Summary Report: Recovery Potential Screening of New Mexico Watersheds in Support of Nutrients Management

INTRODUCTION

The US Environmental Protection Agency's (EPA's) Total Maximum Daily Loads (TMDL) Program, in cooperation with state water quality programs, released a long-term TMDL Vision document in December 2013. Part of the TMDL Vision involves increasing states' identification of priority watersheds for restoration and protection efforts over a several-year time frame, and better linkage of TMDLs to these priorities. Previously, a 2011 Office of Water policy memorandum on nutrients had also recommended systematic watershed analysis, comparison and priority setting to obtain better results. EPA's TMDL program has provided watershed data, comparative assessment tools and state technical assistance for the past ten years through the Recovery Potential Screening (RPS) approach and tools (see Attachment 1). In support of state requests for assistance in nutrients-related prioritization, the TMDL program has partnered with several states, including New Mexico, to jointly carry out RPS assessments and develop results to help states consider their watershed nutrients management options systematically with consistent data. These RPS assessments were designed to address primary nutrients issues identified by each state using state-specific indicators and data relevant for watershed comparison. This report summarizes the New Mexico project approach and findings, and identifies multiple additional products (e.g., RPS Tools and data files) that were developed along with this overview document.

Background

Recovery Potential Screening (RPS) is a systematic, comparative method for identifying differences among watersheds that may influence their relative likelihood to be successfully restored or protected. The RPS approach involves identifying a group of watersheds to be compared and a specific purpose for comparison, selecting appropriate indicators in three categories (Ecological, Stressor, Social), calculating index values for the watersheds, and applying the results in strategic planning and prioritization. RPS was developed to provide states and other restoration planners with a systematic, flexible tool that could help them compare watershed differences in terms of key environmental and social factors affecting prospects for restoration success. As such, RPS provides water programs with an easy to use screening and comparison tool that is user-customizable for the geographic area of interest and a variety of specific comparison and prioritization purposes.

Application of RPS is facilitated by the RPS Scoring Spreadsheet Tool (RPS Tool). The RPS Tool is a custom-coded Excel spreadsheet that performs all RPS calculations and generates RPS outputs (rank-ordered index tables, graphs and maps). It was developed several years ago to help users calculate Recovery Potential Index scores for comparing up to thousands of watersheds in a desktop environment using widely available and familiar software. Separate RPS Tool files with embedded indicator data have been developed for each of the conterminous states and other selected geographic areas of interest.

New Mexico Environment Department (NMED) requested assistance from EPA originally in 2012 due to their interest in a more systematic, data-supported comparison of watersheds for restoration investments. An RPS assessment project was jointly undertaken by EPA's TMDL program, The Cadmus Group, Inc. (EPA contractor), NMED, and NMED collaborators. In New Mexico's first statewide RPS Tool, RPS indicators were compiled at the HUC8 scale and HUC12 scale (115 indicators for both scales). These base, ecological, stressor, and social indicators were measured from state and federal data sources after a September 2012 kickoff workshop and subsequent discussions about relevant data.

A multi-day RPS workshop at NMED in September 2013 demonstrated a working New Mexico RPS Tool to trainees from several NMED units, other state and federal agency collaborators (e.g., EPA Region 6 staff), and others. This workshop corresponded with the completion and delivery of the state's first RPS Tool and enabled NMED to begin its routine use. In 2014, NMED requested follow-on assistance in RPS Tool enhancement and application from EPA and its contractor

Cadmus, as one of several state nutrients demonstration projects using RPS. New national-scale data made available in 2016, including EPA's Preliminary Healthy Watersheds Assessment (PHWA) scores in addition to datasets from the state, enabled development of the current (2017) New Mexico statewide RPS Tool for this project. This RPS Tool contains 425 indicators with full statewide coverage at one or more of the HUC12 or HUC8 scales. Of these, 361 are at the HUC12 scale and 154 are at the HUC8 scale. All the assessment findings and figures in this document were generated by the New Mexico RPS Tool.

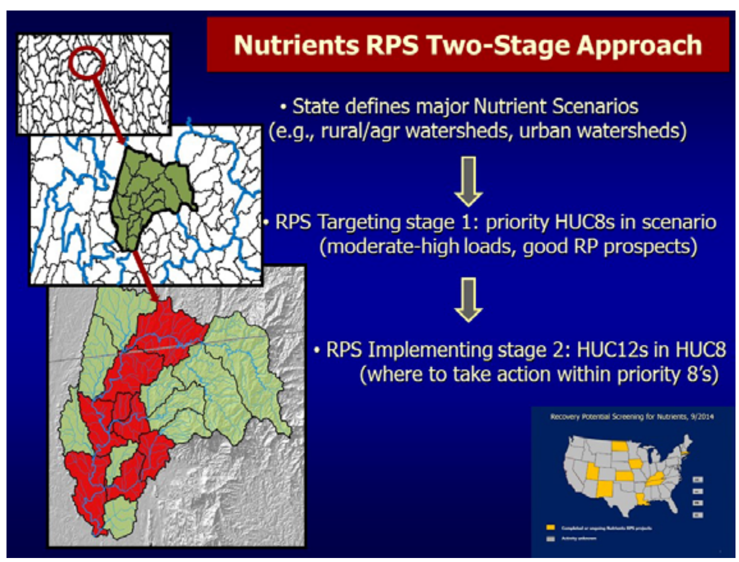
APPROACH

As a starting point, each RPS nutrients project was designed to apply recommendations from the EPA Office of Water 2011 nutrients policy memorandum, which reads in part:

> *<u>Prioritize watersheds on a statewide basis for nitrogen and phosphorus loading reductions</u>*
>
> *A. Use best available information to estimate Nitrogen (N) & Phosphorus (P) loadings delivered to rivers, streams, lakes, reservoirs, etc. in all major watersheds across the state on a Hydrologic Unit Code (HUC) 8 watershed scale or smaller watershed (or a comparable basis.)*
>
> *B. Identify major watersheds that individually or collectively account for a substantial portion of loads (e.g. 80 percent) delivered from urban and/or agriculture sources to waters in a state or directly delivered to multi-jurisdictional waters.*
>
> *C. Within each major watershed that has been identified as accounting for the substantial portion of the load, identify targeted/priority sub-watersheds on a HUC 12 or similar scale to implement targeted N & P load reduction activities. Prioritization of sub-watersheds should reflect an evaluation of receiving water problems, public and private drinking water supply impacts, N & P loadings, opportunity to address high-risk N & P problems, or other related factors.*

The two-stage approach implicit in the text above fits well with the RPS Tool, which easily supports comparing HUC8 watersheds in a first, targeting stage and then focuses on screening and comparing HUC12 subwatersheds in a second, implementation-oriented stage (throughout this document, HUC8s are also called 'watersheds' and HUC12s are also called 'subwatersheds'). The New Mexico RPS nutrients project described in this report utilizes the two stage approach, with HUC8 watersheds screened in Stage 1 and HUC12 subwatersheds screened in Stage 2 (Figure 1). In this project, the data sources and indicators compiled in the RPS Tool, selection of indicators, weighting of indicators, and choice of watersheds to screen all took place collaboratively among NMED, EPA and its contractor. Nevertheless, this technical project's findings and outputs are not meant to represent final decisions or policies of NMED, EPA, or other entity.

Figure 1: Two-stage conceptual approach utilized in RPS projects for supporting state nutrients management.



<u>Use of RPS Screening Results</u>

Any comparisons made with multi-metric combinations of indicators are highly dependent on the indicators selected and the way they are combined to yield a score. The availability of high quality data and good indicator choices relevant to the screening purpose can substantially improve usefulness; nevertheless, multi-metric tool products such as RPS outputs are best considered to be generalized results. Further, the value of the RPS screening results is not in a single, bottom-line score (although that is available as the RPI score), but rather in producing separate ecological, stressor, and social index scores as well as individual indicator scores, any one of which might be the most appropriate choice for making a more focused watershed comparison. Also, RPS index scores represent a gradient of relative values across only the watersheds being screened, and do not in themselves identify absolute thresholds such as healthy/unhealthy or restorable/unrestorable.

The directionality of RPS scores (i.e., whether a higher score is "better" or "worse" for watershed condition) also needs to be well understood to use RPS results appropriately. The better-scoring watersheds from a basic, statewide RPS analysis will be those that are either currently healthy or relatively closer than most to meeting water quality standards, based on higher ecological and social scores and lower stressor scores. Lightly to moderately impaired watersheds score as better prospects for restoration than severely impaired, but this initial result needn't imply inability to consider more impaired watersheds. The RPS tool's flexibility still enables comparisons among watersheds with substantial pollution problems by screening as a group only the watersheds that exceed a threshold, such as those exceeding the statewide median values for nutrient loading estimates. Even though comparing significantly impaired watersheds, RPS results in this case still reveal differences in their likelihood of restorability based on the degree to which ecologically and socially positive traits may help counteract the magnitude of impairment. This approach was used in some parts of this study because of the importance of addressing relatively high loading levels as well as restorability-related traits in New Mexico.

Stage 1 Methodology: Defining and Analyzing Nutrient Scenarios

The Stage 1 analysis compares ecological, stressor, and social factors that are relevant to restoration among HUC8s with significant nutrient loading. The following paragraphs describe the approach to the Stage 1 analysis.

Because RPS is most effective in comparing groups of watersheds that have something in common (such as generally similar landscapes, nutrient sources and impacts, and possible management options), Stage 1 begins by engaging the state to define specific groups of watersheds with shared nutrient management challenges. The term "scenario" is used throughout this report to describe the shared characteristics that serve as the basis for grouping watersheds to be compared and contrasted with one another.

Nutrient management challenges in any given state can be complex and involve multiple scenarios. Breaking down an entire state's watersheds into subgroups enables a narrower focus on each subgroup's nutrient issues and possible solutions. At a minimum, nutrients scenarios usually differentiate between a group of watersheds with primarily agricultural/rural loading sources and a group of more urban-suburban watersheds with wastewater and urban runoff nutrient sources. Screening these scenarios separately allows for the selection of RPS indicators that are more specific to each scenario and its watersheds, leading to project results of higher scenario-specific relevance.

For New Mexico, four scenarios relevant to nutrient management were initially identified jointly by EPA, NMED, and Cadmus. These were used to filter New Mexico's 86 HUC8s and identify four HUC8 subsets that shared the general traits described below.

Scenarios 1A & 1B: Rural-Agricultural Watersheds. Watersheds in these scenarios contain a mixed land use pattern typically including cropland, grazing/rangeland, low-density residential areas, some limited woody or forested land, and desert scrub. Isolated, small urban areas of moderate density may also occur, as well as other land uses not listed, but these are not always defining characteristics of these scenarios. Contiguous cropland areas may occur in larger low-gradient areas near surface water supplies, and thus may occur near the moderate to larger rivers and streams. Grazing areas are not as slope-limited as cropland and may include moderately steep areas as well as areas near rivers and streams. Human population and typically urban/suburban nutrients sources probably are secondary to agriculture in these watersheds, but rural residential patterns in or near the stream corridors might be capable of a significant effect on loading at more local, subwatershed scales.

Scenario 1A and 1B watersheds differ based on the relative prominence of point sources of nutrients, with Scenario 1A focusing on rural watersheds having significant point source nutrient discharges and Scenario 1B watersheds that have substantial nonpoint source nutrient inputs.

Scenarios 2A & 2B: Urban-Suburban Watersheds. Watersheds in these scenarios contain a substantial urban and suburban presence, but typically are not urbanized over much of their area. Urbanization may comprise a small percentage of HUC8 scale watersheds due to their relatively large watershed area, but can still be the source of significant nutrient loads especially where effluents may discharge to already low flows. Few New Mexico HUC8s contain large, high-density urbanized areas, but several more do contain extensive suburban and smaller high-density urban components. With urbanization seldom dominating spatially, a mosaic of cropland, rangeland, forest and other uses cover most of the area of these watersheds.

Like the Scenario 1 subsets, watersheds in Scenarios 2A and 2B are distinguished by the prevalence of point source nutrient discharges (substantial point source discharges in Scenario 2A, substantial nonpoint source discharges in Scenario 2B).

Selection of Stage 1 RPS Indicators. Because the four scenarios differ fundamentally in land use patterns, nutrient source types, and exposure pathways, the HUC8 watersheds within each scenario can be compared to one another with scenario-specific indicator selections. Indicators for Stage 1 need only to be sufficient for identifying which HUC8s to include in each scenario, generally compare HUC8 watersheds across New Mexico, and reveal major differences in condition and estimated nutrient loading magnitude as a state considers its options for watersheds to assess. Using the RPS Tool, four different scenario-specific selections of recovery potential indicators were used to screen all the New Mexico HUC8s and determine which HUC8s would belong in each scenario. See indicator lists and weights in Table 1 and their definitions in Attachment 2.

Selection of Demonstration Watersheds. After scenario watersheds are identified, several HUC8 watersheds in each scenario are selected as a group of "demonstration watersheds" to illustrate the RPS assessment approach. The demonstration watersheds may target high-interest watersheds, but selection of demonstration watersheds is not meant to assign priority or preclude a state's assessment of all their remaining watersheds over time. Selections can be based on Stage 1 screening results, expert judgment, or a combination of both. Ideally, Stage 1 screening results and expert judgment combine to identify watersheds that not only have nutrient loading issues, but also show traits relevant to better restorability. Demonstration HUC8s are highlighted in the discussion of Stage 1 and Stage 2 screenings in this report.

Table 1. Stage 1 RPS indicator selections and weights for screening and comparing HUC8 watersheds statewide for the four scenarios. See Attachment 2 for indicator definitions.

Stage 1 – Scenario 1A: Rural-Agricultural Point Source Scenario					
Ecological Indicators	**Wt.**	**Stressor Indicators**	**Wt.**	**Social Indicators**	**Wt.**
% NEF2001, National Ecological Framework, WS	1	Empower Density 2001, Mean Value in Watershed	1	% of HUC8 Instate	1
% Natural Cover, N-index 2 (2006) in HCZ	1	% Urban (2006) in Riparian Zone	1	# of Watershed Groups (ISO)	1
% Woody Vegetation (2006) in Riparian Zone	1	Watershed Likely N/P NPDES Discharger Count	1	Percent GAP status 1, 2, and 3 WS	1
Ratio of Natural to Recycled N Inputs	1	Centralized Sewage N Input	1	Anthropogenic Recycled N Effort (Inverse)	1
Ratio of Natural to New N Inputs	1	Agricultural water use WS	1	Anthropogenic New N Effort (Inverse)	1
		Domestic water use WS	1	Percent Drinking Water Source Protection Area WS	1
		SPARROW Predicted Incremental N Yield	1		
		SPARROW Predicted Incremental P Yield	1		
		Anthropogenic Recycled N Effort	1		
		Anthropogenic New N Effort	1		
		# of Nutrient Impaired Segments (ISO)	1		
Stage 1 – Scenario 1B: Rural-Agricultural Non-Point Source Scenario					
Ecological Indicators	**Wt.**	**Stressor Indicators**	**Wt.**	**Social Indicators**	**Wt.**
% NEF2001, National Ecological Framework, WS	1	Empower Density 2001, Mean Value in Watershed	1	% of HUC8 Instate	1
% Natural Cover, N-index 2 (2006) in HCZ	1	% Agriculture (2006) in HCZ	1	# of Watershed Groups (ISO)	1
% Woody Vegetation (2006) in Riparian Zone	1	% Agriculture (2006) in Riparian Zone	1	Percent GAP status 1, 2, and 3 WS	1
Ratio of Natural to Recycled N Inputs	1	Agricultural water use WS	1	Anthropogenic Recycled N Effort (Inverse)	1
Ratio of Natural to New N Inputs	1	Domestic water use WS	1	Anthropogenic New N Effort (Inverse)	1
		SPARROW Predicted Incremental N Yield	1	Percent Drinking Water Source Protection Area WS	1
		SPARROW Predicted Incremental P Yield	1		
		SPARROW Predicted Incremental Agr N Yield (2012)	1		
		SPARROW Predicted Incremental Agr P Yield (2012)	1		
		Anthropogenic Recycled N Effort	1		
		Anthropogenic New N Effort	1		
		# of Nutrient Impaired Segments (ISO)	1		

Table 1, cont'd. Stage 1 RPS indicator selections and weights for screening and comparing HUC8 watersheds statewide for the four scenarios. See Attachment 2 for indicator definitions.

Stage 1 – Scenario 2A: Urban-Suburban Point Source Scenario

Ecological Indicators	Wt.	Stressor Indicators	Wt.	Social Indicators	Wt.
% NEF2001, National Ecological Framework, WS	1	% Human Use, U-index1 (2006) in Watershed	1	% of HUC8 Instate	1
% Natural Cover, N-index 2 (2006) in HCZ	1	Empower Density 2001, Mean Value in HCZ	1	# of Watershed Groups (ISO)	1
% Woody Vegetation (2006) in Riparian Zone	1	% Agriculture (2006) in Watershed	1	Percent GAP status 1, 2, and 3 WS	1
Ratio of Natural to Recycled N Inputs	1	Watershed Likely N/P NPDES Discharger Count	1	Anthropogenic Recycled N Effort (Inverse)	1
		Centralized Sewage N Input	1	Anthropogenic New N Effort (Inverse)	1
		Agricultural water use WS	1	Percent Drinking Water Source Protection Area WS	1
		Domestic water use WS	1		
		SPARROW Predicted Incremental N Yield	1		
		SPARROW Predicted Incremental P Yield	1		
		Anthropogenic Recycled N Effort	1		
		Anthropogenic New N Effort	1		
		# of Nutrient Impaired Segments (ISO)	1		

Stage 1 – Scenario 2B: Urban-Suburban Non-Point Source Scenario

Ecological Indicators	Wt.	Stressor Indicators	Wt.	Social Indicators	Wt.
% NEF2001, National Ecological Framework, WS	1	% Human Use, U-index 2 (2006) in Watershed	1	% of HUC8 Instate	1
% Natural Cover, N-index 2 (2006) in HCZ	1	Empower Density 2001, Mean Value in HCZ	1	# of Watershed Groups (ISO)	1
% Woody Vegetation (2006) in Riparian Zone	1	% Agriculture (2006) in Watershed	1	Percent GAP status 1, 2, and 3 WS	1
Ratio of Natural to Recycled N Inputs	1	% Agriculture (2006) in Riparian Zone	1	Anthropogenic Recycled N Effort (Inverse)	1
Ratio of Natural to New N Inputs	1	% Urban (2006) in HCZ	1	Anthropogenic New N Effort (Inverse)	1
		Centralized Sewage N Input	1	Percent Drinking Water Source Protection Area WS	1
		Agricultural water use WS	1		
		Domestic water use WS	1		
		SPARROW Predicted Incremental N Yield	1		
		SPARROW Predicted Incremental P Yield	1		
		SPARROW Predicted Incremental Agr N Yield (2012)	1		
		SPARROW Predicted Incremental Agr P Yield (2012)	1		
		Anthropogenic Recycled N Effort	1		
		Anthropogenic New N Effort	1		
		# of Nutrient Impaired Segments (ISO)	1		

Stage 2 Methodology: Screening Subwatersheds to Evaluate Nutrient Management Options

The Stage 2 analysis compares HUC12 subwatersheds within a given HUC8 of interest (identified from Stage 1 results) for a more specific nutrient management planning purpose (i.e., considering where best to implement protection, pollution control or restoration efforts). Stage 2 screenings are organized around the same scenarios defined for Stage 1. The following paragraphs describe the approach to the Stage 2 analysis.

Selection of Stage 2 RPS Indicators. Separate sets of Stage 2 indicators are selected for assessing HUC12s within the four scenarios. Indicator selection at this second, more detailed stage can draw from the much lengthier and varied set of indicators compiled statewide at the HUC12 scale (361 metrics in New Mexico), and thus is capable of being tailored to address more specific land use settings or nutrient management techniques. Indicator and weight selections by NMED were modified slightly by EPA due to dataset updates and newly available, superior ecological metrics developed in the Preliminary Healthy Watersheds Assessments (PHWA) project (see Table 2, and definitions in Attachment 3). These indicator selections were used for screening the HUC12s within the demonstration HUC8s.

Within-HUC8 Comparison of HUC12s. The Stage 1 and Stage 2 screenings differed in both purpose and geographic scope. Stage 1 compared larger watersheds statewide using rather general indicators and criteria at statewide scales, thus Stage 1 results were meaningful in the context of the state. In contrast, Stage 2 compared HUC12 subwatersheds in the context of other HUC12s within their larger HUC8 watershed, not in the context of the state's entire group of HUC12s. This difference means that the Stage 2 screening identifies HUC12 subwatersheds that may influence the health and future of the larger HUC8 watershed and reveal opportunities for action within subwatersheds individually. Comparing all HUC12s statewide may be appropriate, but within-HUC8 comparisons of HUC12s are frequently more useful because they reveal HUC12 relative differences within the context of a smaller, more homogeneous setting, rather than a highly variable statewide setting. Nevertheless, also comparing the HUC12s within one HUC8 to the HUC12s statewide represents an important, broader geographic context within which the range of general HUC12 conditions in the HUC8 can be better understood. For example, it may reveal whether the HUC12s within the HUC8 are all exceptional, or all in very poor condition, or may vary from one another as much as the HUC12s statewide; these findings could have substantially different implications for management.

Identification of Potential Priority HUC12 Subwatersheds. The RPS Tool screening runs performed on each demonstration HUC8 identify gradients of conditions among the HUC12s within the HUC8. Each screening run generates an Ecological, Stressor, Social and Integrated (RPI) Index score for every HUC12; those four indices, and even single indicators of exceptional interest, may be used in contrasting differences among HUC12 subwatersheds and thus helping to inform strategies for where to invest nutrient management and control resources. As the purpose of this report is to demonstrate procedures and alternatives for identifying potential priorities that states may build into their planning, the Stage 2 results presented in this document should be considered a demonstration of potential priority subwatershed alternatives rather than final selections.

Table 2. Stage 2 RPS indicator selections and weights for screening and comparing HUC12 subwatersheds within selected HUC8s for the four scenarios in New Mexico. See Attachment 3 for indicator definitions.

Stage 2 – Scenario 1A: Rural-Agricultural Point Source Scenario					
Ecological Indicators	**Wt.**	**Stressor Indicators**	**Wt.**	**Social Indicators**	**Wt.**
Soil Stability, Mean in WS	1	% Human Use, U-index (2011) in HCZ	3	% GAP Status 1 and 2	1
Habitat Condition Index WS (2015)	2	Population Density (people / sq. mi.) (INSTATE)	2	% Streamlength Assessed (2015)	1
PHWA_HEALTH_NDX_ST_2016	3	Agricultural Water Demand in WS	1	Count Ratio TMDLs to Impairments (2015)	1
PHWA_HEALTH_NDX_ER_2016	2	Oil Gas Wells Per sq. mi. (INSTATE)	1	% Streamlength with Nutrient TMDLs (2015)	2
% N-Index1 in HCZ (2011)	3	% Streamlength Impaired 303d-Listed + TMDLs (2015)	2	# Drinking Water Intakes (INSTATE)	2
		Dam Density (# per stream mi.) (INSTATE)	1	# of Groundwater Wells (INSTATE)	2
		# of Groundwater Discharges (INSTATE)	1	# of Watershed Groups (INSTATE)	1
		# of Diversions (INSTATE)	1	Jurisdictional Complexity (INSTATE)	3
				NPDES Permit Count	3
Stage 2 – Scenario 1B: Rural-Agricultural Non-Point Source Scenario					
Ecological Indicators	**Wt.**	**Stressor Indicators**	**Wt.**	**Social Indicators**	**Wt.**
Soil Stability, Mean in WS	1	% Human Use, U-Index1 in HCZ (2011)	3	% GAP Status 1 and 2	2
Habitat Condition Index WS (2015)	2	% Agriculture in RZ (2011)	3	% Streamlength Assessed (2015)	2
PHWA_HEALTH_NDX_ST_2016	3	Synthetic N Fertilizer Application in WS	2	Count Ratio TMDLs to Impairments (2015)	1
PHWA_HEALTH_NDX_ER_2016	2	% Area with Grazing Allotment (INSTATE)	2	% Streamlength with Nutrient TMDLs (2015)	3
% N-Index1 in HCZ (2011)	3	# of Cattle (INSTATE)	2	# Drinking Water Intakes (INSTATE)	2
% Perennial Streams (INSTATE)	2	Dam Density (# per stream mi.) (INSTATE)	1	# of Groundwater Wells (INSTATE)	2
		# of Groundwater Discharges (INSTATE)	1	# of Watershed Groups (INSTATE)	2
		# of Diversions (INSTATE)	1	Jurisdictional Complexity (INSTATE)	3
		Agricultural Water Demand in WS	1		
		% Streamlength Impaired 303d-Listed + TMDLs (2015)	2		
		Oil Gas Wells Per sq. mi. (INSTATE)	1		

Table 2, cont'd. Stage 2 RPS indicator selections and weights for screening and comparing HUC12 subwatersheds within selected HUC8s for the four scenarios in New Mexico. See Attachment 3 for indicator definitions.

Stage 2 – Scenario 2A: Urban-Suburban Point Source Scenario					
Ecological Indicators	**Wt.**	**Stressor Indicators**	**Wt.**	**Social Indicators**	**Wt.**
Soil Stability, Mean in WS	1	% Human Use, U-Index1 in HCZ (2011)	3	% GAP Status 1 and 2	1
Habitat Condition Index WS (2015)	2	Population Density (people / sq. mi.) (INSTATE)	2	% Streamlength Assessed (2015)	1
PHWA_HEALTH_NDX_ST_2016	3	Agricultural Water Demand in WS	1	Count Ratio TMDLs to Impairments (2015)	1
PHWA_HEALTH_NDX_ER_2016	2	Oil Gas Wells Per sq. mi. (INSTATE)	1	% Streamlength with Nutrient TMDLs (2015)	2
% N-Index1 in HCZ (2011)	3	% Streamlength Impaired 303d-Listed + TMDLs (2015)	2	# Drinking Water Intakes (INSTATE)	2
		Dam Density (# per stream mi.) (INSTATE)	1	# of Groundwater Wells (INSTATE)	2
		# of Groundwater Discharges (INSTATE)	1	# of Watershed Groups (INSTATE)	1
		# of Diversions (INSTATE)	1	Jurisdictional Complexity (INSTATE)	3
				NPDES Permit Count	3
				% Large MS4 (INSTATE)	2
				% Small MS4 (INSTATE)	2
Stage 2 – Scenario 2B: Urban-Suburban Non-Point Source Scenario					
Ecological Indicators	**Wt.**	**Stressor Indicators**	**Wt.**	**Social Indicators**	**Wt.**
Soil Stability, Mean in WS	1	% Human Use, U-Index1 in HCZ (2011)	3	% GAP Status 1 and 2	2
Habitat Condition Index WS (2015)	2	% Streamlength Near ≥ 15% Impervious Cover (2011)	2	% Streamlength Assessed (2015)	2
PHWA_HEALTH_NDX_ST_2016	3	Agricultural Water Demand in WS	1	Count Ratio TMDLs to Impairments (2015)	1
PHWA_HEALTH_NDX_ER_2016	2	Oil Gas Wells Per sq. mi. (INSTATE)	1	% Streamlength with Nutrient TMDLs (2015)	2
% N-Index1 in HCZ (2011)	3	% Streamlength Impaired 303d-Listed + TMDLs (2015)	2	# Drinking Water Intakes (INSTATE)	2
% Perennial Streams (INSTATE)	2	Dam Density (# per stream mi.) (INSTATE)	1	# of Groundwater Wells (INSTATE)	2
		# of Groundwater Discharges (INSTATE)	1	# of Watershed Groups (INSTATE)	2
		# of Diversions (INSTATE)	1	Jurisdictional Complexity (INSTATE)	3
		% Urban in RZ (2011)	2		

STAGE 1 RESULTS

This section presents and discusses the results of the Stage 1 RPS screening runs for four different nutrients management scenarios generated from the New Mexico RPS Tool with the indicators and weights listed in Table 1. One screening run per scenario was completed using the RPS Tool. Results are displayed in multiple ways using graphics generated directly in the RPS Tool. The techniques available for displaying results in the RPS Tool include tabular display, bubble plotting, and mapping of RPS indexes and indicators.

Throughout this section, values of the Recovery Potential Integrated (RPI) Index, Ecological Index, and Social Index for a given watershed are described as being in the "top" quartile (75th-100th percentile), "second" quartile (50th-75th percentile), "third" quartile (25th-50th percentile), or "bottom" quartile (0-25th percentile). For the Stressor Index, these descriptive labels are reversed since lower scores correspond to greater restorability: "top" quartile (0-25th percentile), "second" quartile (25th-50th percentile), "third" quartile (50th-75th percentile), and "bottom" quartile (75th-100th percentile). Consistently, "top" quartile implies better condition for any index.

<u>Scenario 1A: Rural-Agricultural Point Source Watersheds</u>

Scenario 1A identified HUC8s with a combination of rural and agricultural landscapes and significant point sources of nutrients. A copy of the RPS Tool populated with this scenario's screening results is among the project deliverables.

Eighteen HUC8 watersheds were selected for scenario A1:

11080001	Canadian Headwaters*	13030202	Mimbres*
11080004	**Mora***	13060001	Pecos Headwaters*
11080006	Upper Canadian-Ute Reservoir	13060007	Upper Pecos-Long Arroyo
13020101	Upper Rio Grande	13060008	Rio Hondo
13020102	Rio Chama*	13060011	Upper Pecos-Black
13020201	Rio Grande-Santa Fe	14080101	Upper San Juan
13020203	Rio Grande-Albuquerque	14080104	Animas
13030101	Caballo	14080105	Middle San Juan
13030102	El Paso-Las Cruces	15020006	Upper Puerco*

The selection of scenario 1A watersheds was based on an initial set of screening criteria and was refined through input from NMED. Initial screening criteria were:

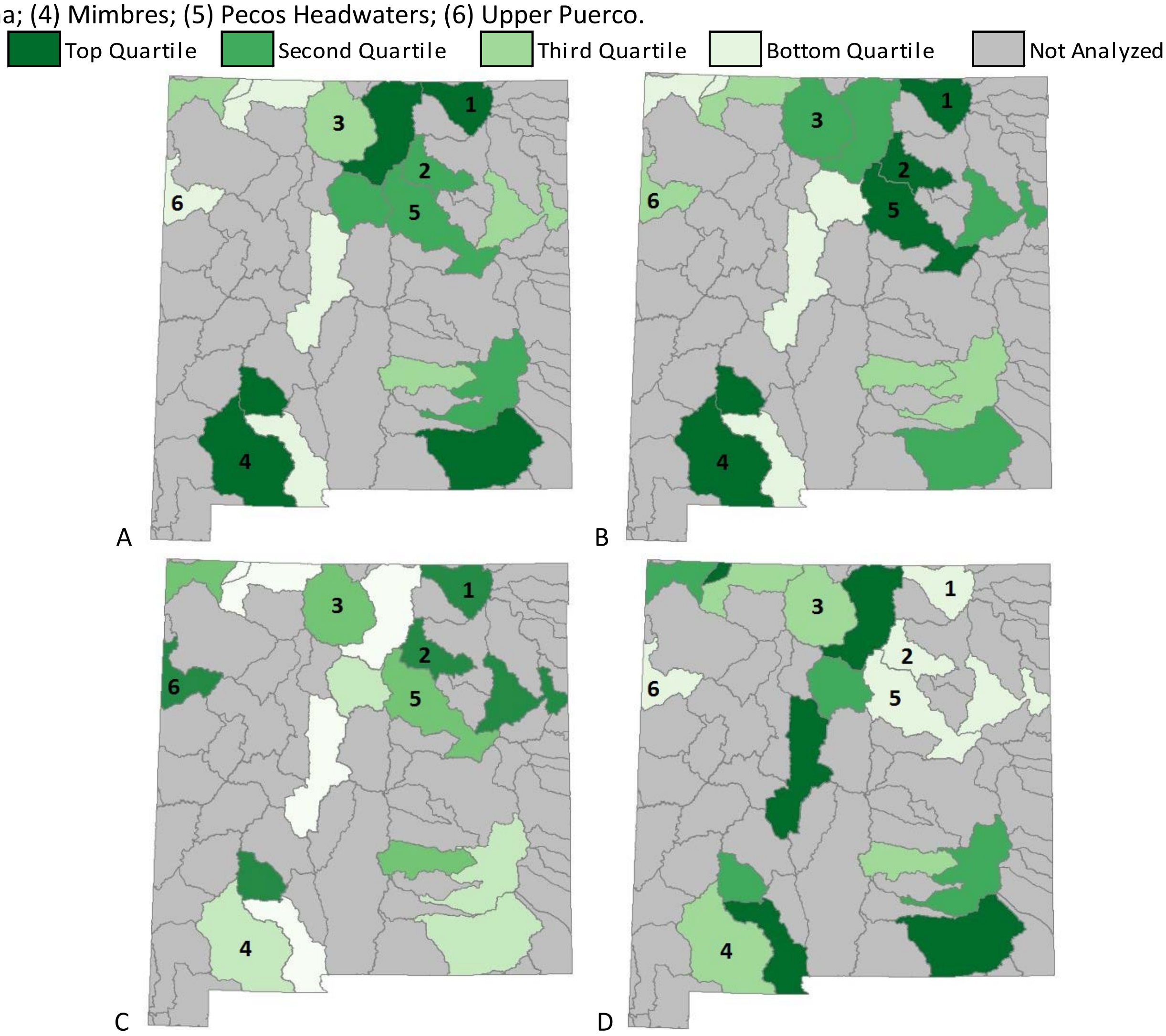
- ≥25% of HUC8 area within New Mexico
- ≥ Statewide median SPARROW-predicted agricultural nitrogen (N) or phosphorus (P) loads
- ≥ Statewide median nitrogen (N) load from centralized sewage treatment facilities

Six of the eighteen HUC8 watersheds in this scenario were requested by NMED as demonstration watersheds for this report (marked with an asterisk in the list above). Seventeen of the eighteen scenario 1A HUC8s combine enough urban-suburban traits to also qualify for the scenario 2A screening. The only exclusively rural-agricultural HUC8 (Mora) is highlighted with **bolded** text in the list above.

Scenario 1A: Map Results*.* Recovery Potential Index scores for scenario 1A are displayed in map form in Figure 2. Recovery Potential Index maps show the geographic distribution of the scenario HUC8s as well as how they differ in Ecological, Stressor, Social, and RPI Index scores. The scenario 1A watersheds are spread throughout New Mexico with some clustering in the north-central, southwestern, and southeastern areas of the state. Figures 2A through 2D show that top quartile Ecological, Stressor, Social, and RPI Index scores are scattered throughout the state and not consistently high in any one region.

Figure 2 also offers insight on how the six selected demonstration watersheds compare to other scenario watersheds. Although it should be noted that Stage 1 comparisons are very generalized, the results suggest that some of the demonstration watersheds combine moderately high nutrient loads (having qualified for the scenario in the first place) with some positive restorability traits. For example, the Canadian Headwaters and Mora HUC8s have top quartile Ecological Index and Stressor Index scores, indicating that they may contain ecological features more favorable for restoration (e.g., undeveloped or unfarmed riparian zones) and fewer aquatic ecosystem stressors relative to other scenario HUC8s. However, Social Index scores for all of the demonstration HUC8s are among the lowest in the screening and point to the existence of social factors that may be less supportive of restoration than other HUC8s in the scenario.

Figure 2. Recovery Potential Index scores for the rural-agricultural point source scenario. A: Recovery Potential Integrated (RPI) Index; B: Ecological Index; C: Stressor Index; D: Social Index. The most intense colors in each map denote the “best” index scores. Demonstration HUC8s are numbered: (1) Canadian Headwaters; (2) Mora; (3) Rio Chama; (4) Mimbres; (5) Pecos Headwaters; (6) Upper Puerco.

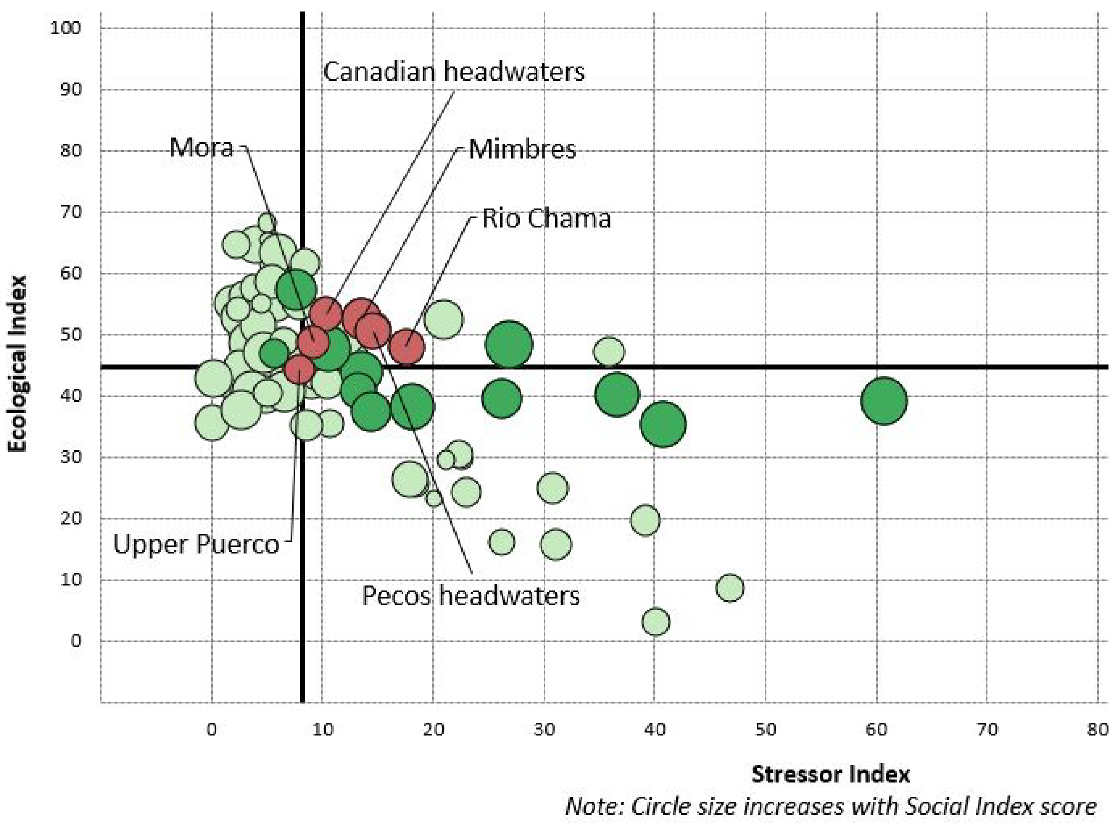


Scenario 1A: Bubble Plot Results. The different methods for displaying RPS results (maps, bubble plots, tables) provide slightly different insights into how the watersheds compare to one another. The bubble plot enables visualization of how watersheds compare among multiple indices at once. The scenario 1A bubble plot displayed in Figure 3 shows relative differences in Ecological Index (y-axis), Stressor Index (x-axis), and Social Index (bubble size) scores. Further, the bubble plot also displays scores for all other New Mexico HUC8s not included in the scenario and has its axes positioned at the statewide median Ecological Index score (x-axis) and the statewide median Stressor Index score (y-axis). This allows for an evaluation of scores for scenario HUC8s in a statewide context.

The defining properties of the scenario 1A watersheds in relation to other HUC8s in New Mexico are evident in the bubble plot. The majority of the scenario watersheds (dark green and red) have Stressor Index scores that are higher than the statewide median and approximately one-half have Ecological Index scores that are lower than the statewide median. Social Index scores (as reflected in bubble size) vary, but there are many HUC8s in the scenario with Social scores that are among the highest in the state.

The bubble plot also allows for contrasting the six demonstration HUC8s with other scenario HUC8s and the rest of the HUC8s in the state. All six demonstration HUC8s have Ecological Index scores that are at or above the statewide median. Stressor Index scores are also at or above the statewide median but are lower than most other scenario HUC8s. Social Index scores for all six demonstration HUC8s appear average compared to others in the state, and low compared to other HUC8s in the scenario. The demonstration HUC8s all appear to have a mix of significant nutrient loading and favorable recovery potential scores, with Canadian Headwaters noteworthy for having the highest Ecological Index score in the scenario along with a Stressor Index score that is only slightly higher than the statewide median.

Figure 3. Bubble plot for all New Mexico HUC8s based on rural-agricultural point source scenario indicators. This plot highlights rural-agricultural point source scenario watersheds (dark green and red) and demonstration watersheds (red with name labels). Axes are set to statewide median Ecological index and Stressor index scores.



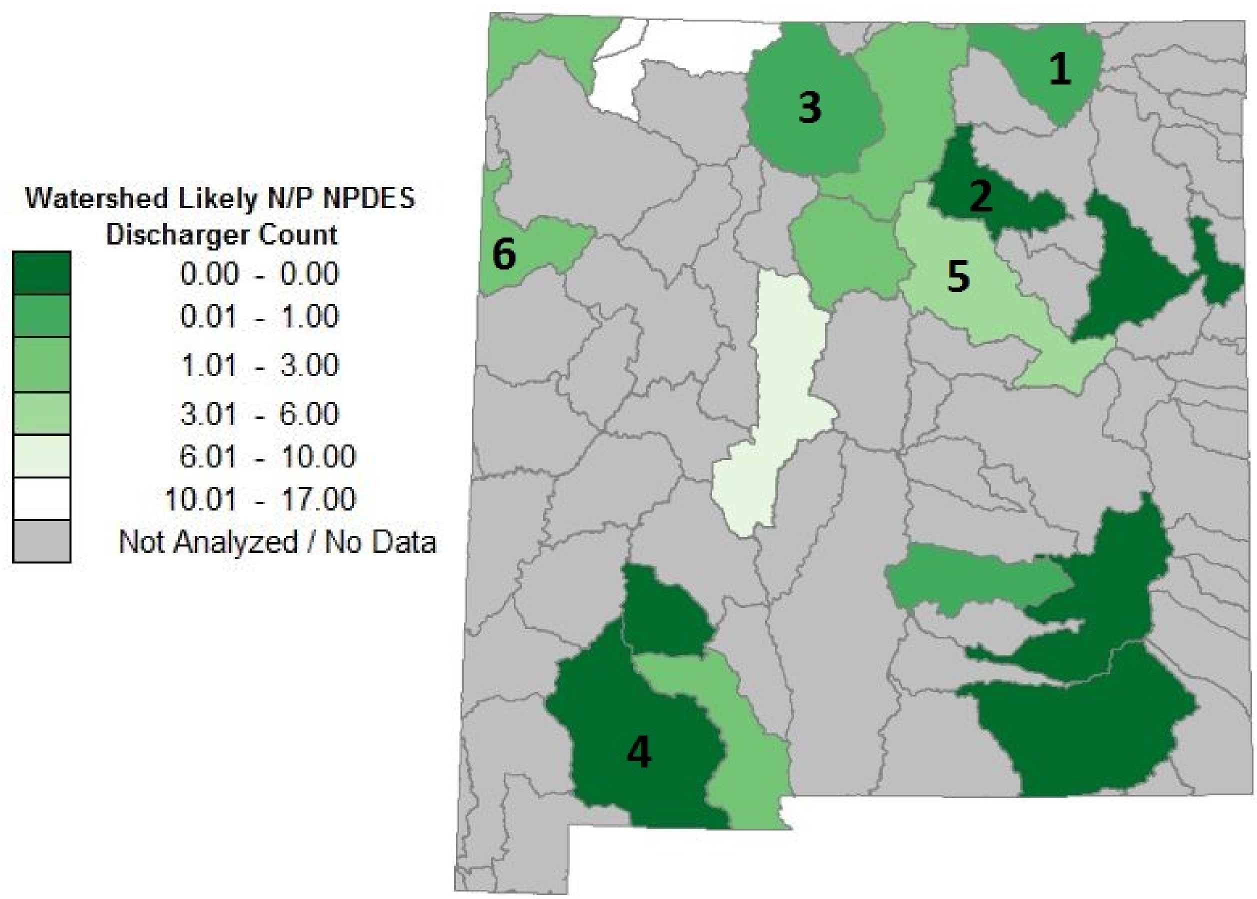
Scenario 1A: Tabular Results. Table 3 contains Ecological, Stressor, Social, and RPI scores for the rural-agricultural point source scenario HUC8s, in order of descending RPI score and color-coded by quartile. This tabular format is another option for presentation of Stage 1 results that can be used to compare and contrast HUC8s for point source nutrient management efforts. When interpreting this table, the preferred HUC8s for point source nutrient management do not necessarily have to be those with the highest RPI scores but instead could consider one or more of the Ecological, Stressor, or Social Index scores. For example, Rio Chama and Upper Canadian-Ute Reservoir rank well below the top quartile in RPI score but have high Ecological Index scores.

Table 3. Index and RPI scores for the rural-agricultural point source scenario. HUC8s are ordered by RPI score. Cells are shaded according to rank (green = 76 -100th percentile; yellow = 51-75th percentile; orange = 26-50th percentile; pink = 0-25th percentile). Scores and quartiles are derived from screening rural-agricultural point source scenario HUC8s only. The six demonstration HUC8s are bolded.

Watershed ID	Watershed Name	Ecological Index	Stressor Index	Social Index	RPI Score
13030101	Caballo	64.90	5.72	45.02	68.07
13060011	Upper Pecos-Black	43.40	21.08	60.30	60.87
11080001	**Canadian headwaters**	55.06	10.68	32.45	58.94
13020101	Upper Rio Grande	43.74	31.62	62.12	58.08
13030202	**Mimbres**	49.38	22.32	44.65	57.24
11080004	**Mora**	49.52	8.68	26.92	55.92
13020201	Rio Grande-Santa Fe	30.80	20.56	55.80	55.35
13060007	Upper Pecos-Long Arroyo	35.46	22.46	52.80	55.27
13060001	**Pecos headwaters**	52.12	18.77	32.10	55.15
13020102	**Rio Chama**	47.58	20.08	36.40	54.63
11080006	Upper Canadian-Ute Reservoir	45.50	7.54	22.88	53.62
14080105	Middle San Juan	27.44	17.05	47.93	52.78
13060008	Rio Hondo	33.46	16.06	38.08	51.83
15020006	**Upper Puerco**	37.82	7.76	23.00	51.02
14080101	Upper San Juan	32.42	31.47	41.55	47.50
14080104	Animas	26.36	45.05	58.52	46.61
13030102	El Paso-Las Cruces	31.54	50.99	57.03	45.86
13020203	Rio Grande-Albuquerque	27.02	76.51	64.28	38.27

Scenario 1A: Examining Single Indicators. An additional way to use the Stage 1 scenario screening results is to examine the values of single indicators of interest for each HUC8. For the rural-agricultural point source scenario, one such indicator is the count of NPDES facilities likely to discharge nitrogen or phosphorus (Figure 4). Since this is a stressor indicator, note that in Figure 4 the darkest colors are assigned to the lowest stressor scores (best for restorability). Figure 4 shows that the Mora and Mimbres HUC8s score the highest, while the Pecos Headwaters HUC8 scores the lowest.

Figure 4. Number of NPDES facilities likely to discharge nitrogen or phosphorus for HUC8s in the rural-agricultural point source scenario. The most intense colors in RPS maps denote the "best" scores for traits likely to be more favorable to restoration efforts. As this is a stressor indicator, the lower scores are better. Numbered HUC8s include: 1. Canadian Headwaters; 2. Mora; 3. Rio Chama; 4. Mimbres; 5. Pecos Headwaters; 6. Upper Puerco.



Scenario 1B: Rural-Agricultural Non-Point Source Watersheds

Scenario 1B identified HUC8s with rural and agricultural landscapes and significant nonpoint sources of nutrients that are of higher interest for nutrient management efforts than other HUC8s throughout the state. A copy of the RPS Tool populated with this scenario's screening results is among project deliverables.

Forty-two HUC8 watersheds were selected for scenario 1B:

11040001	**Cimarron headwaters**	13030102	El Paso-Las Cruces
11080001	Canadian headwaters*	**13030200**	**Mimbres border**
11080002	Cimarron	13030202	Mimbres*
11080003	**Upper Canadian***	13050003	Tularosa Valley
11080004	**Mora**	**13050004**	**Salt Basin**
11080005	**Conchas**	13060001	Pecos headwaters
11080006	Upper Canadian-Ute Reservoir	13060003	Upper Pecos
11080007	**Ute**	13060007	Upper Pecos-Long Arroyo
11080008	**Revuelto**	13060008	Rio Hondo
11100101	**Upper Beaver**	**13060009**	**Rio Felix**
13010005	**Conejos**	13060010	Rio Penasco
13020101	Upper Rio Grande*	13060011	Upper Pecos-Black
13020102	Rio Chama	14080101	Upper San Juan
13020201	Rio Grande-Santa Fe	14080104	Animas
13020202	Jemez*	14080105	Middle San Juan
13020203	Rio Grande-Albuquerque	**15020004**	**Zuni***
13020204	**Rio Puerco**	15020006	Upper Puerco
13020205	**Arroyo Chico**	**15040001**	**Upper Gila***
13020207	Rio San Jose	15040002	Upper Gila-Mangas*
13020211	Elephant Butte Reservoir	15040003	Animas Valley
13030101	Caballo	15040004	San Francisco*

The selection scenario 1B watersheds was based on an initial set of screening criteria and was refined through input from NMED. Initial screening criteria were:

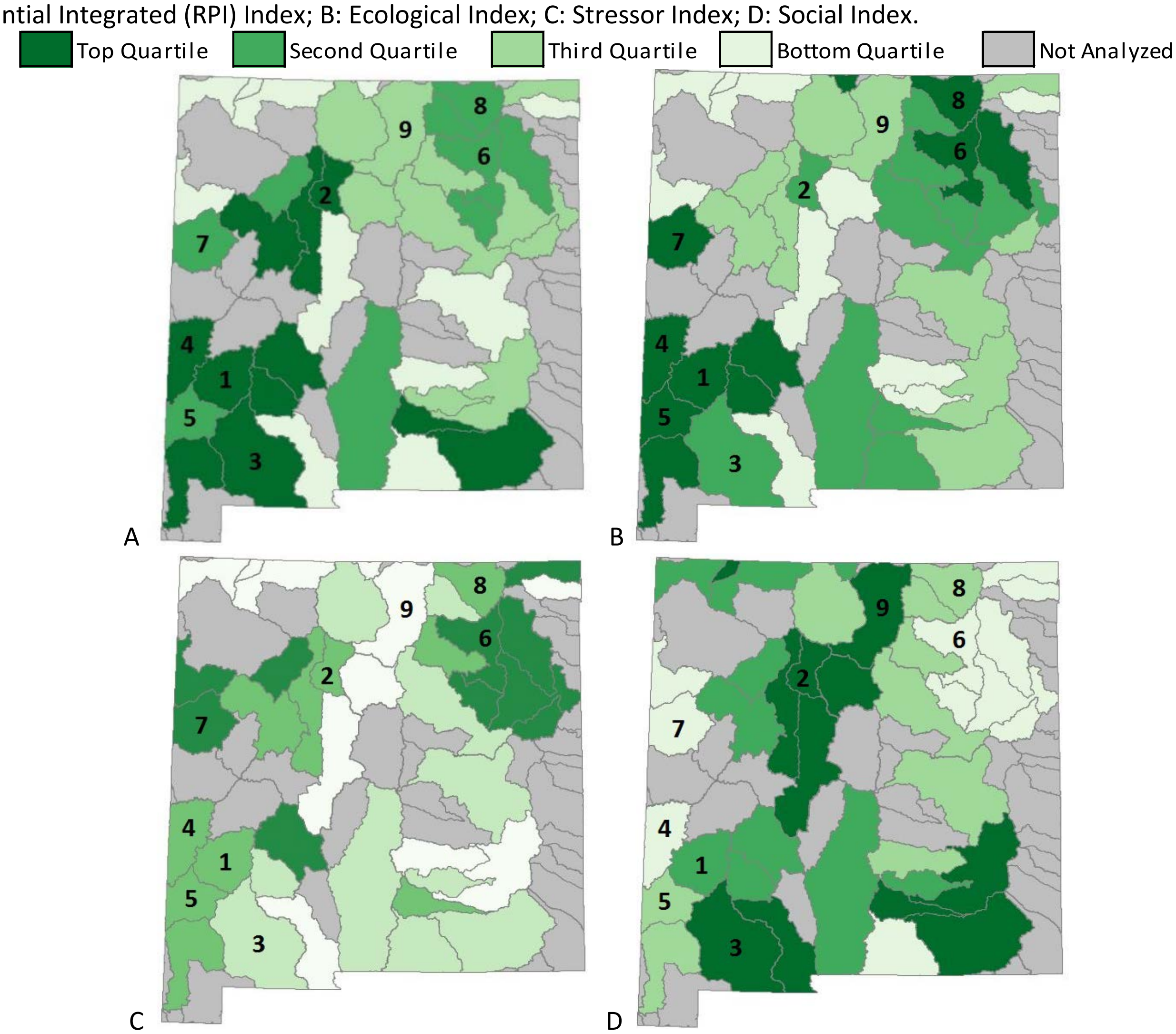
- ≥25% instate
- ≥ Statewide median SPARROW-predicted agricultural nitrogen (N) or phosphorus (P) loads

Nine of the forty-two HUC8 watersheds in this scenario were requested by NMED as demonstration watersheds for this report (marked with an asterisk in the list above). Many of the scenario 1B HUC8s combine enough urban-suburban traits to also qualify for scenario 2 screenings. The exclusively rural-agricultural HUC8s in scenario 1B are highlighted with **bolded** text in the list above.

Scenario 1B: Map Results. Recovery Potential Index scores for scenario 1B are displayed in map form in Figure 5. Recovery Potential Index maps show the geographic distribution of the scenario HUC8s as well as how they differ in Ecological, Stressor, Social, and RPI Index scores. Many of the top quartile RPI Index and Ecological Index scores cluster in the southwestern region of the state. This distribution is not followed in Stressor Index scores, with top quartile HUC8s mostly located in the north. Top quartile Social Index scores are more evenly distributed geographically.

Figure 5 also offers insight on how the nine selected demonstration watersheds compare to other scenario watersheds. Although it should be noted that Stage 1 comparisons are very generalized, the results suggest that some of the demonstration watersheds combine moderately high nutrient loads (having qualified for the scenario in the first place) with some positive restorability traits. For example, the Mimbres HUC8 scores in the second quartile in the Ecological Index and the top quartile in the Social Index, indicating that it possesses above-average ecological and social features to support restoration relative to other scenario HUC8s. Even though the Mimbres watershed has a bottom quartile Stressor Index score, its positive ecological and social features may offset or dampen the effect of stressors.

Figure 5. Four Recovery Potential index scores for the rural-agricultural non-point source scenario HUC8s, including demonstration HUC8s selected by NMED: (1) Upper Gila; (2) Jemez; (3) Mimbres; (4) San Francisco; (5) Upper Gila-Mangas; (6) Upper Canadian; (7) Zuni; (8) Canadian Headwaters; (9) Upper Rio Grande. The most intense colors in RPS maps denote the “best” scores for traits likely to be more favorable to restoration efforts. A: Recovery Potential Integrated (RPI) Index; B: Ecological Index; C: Stressor Index; D: Social Index.

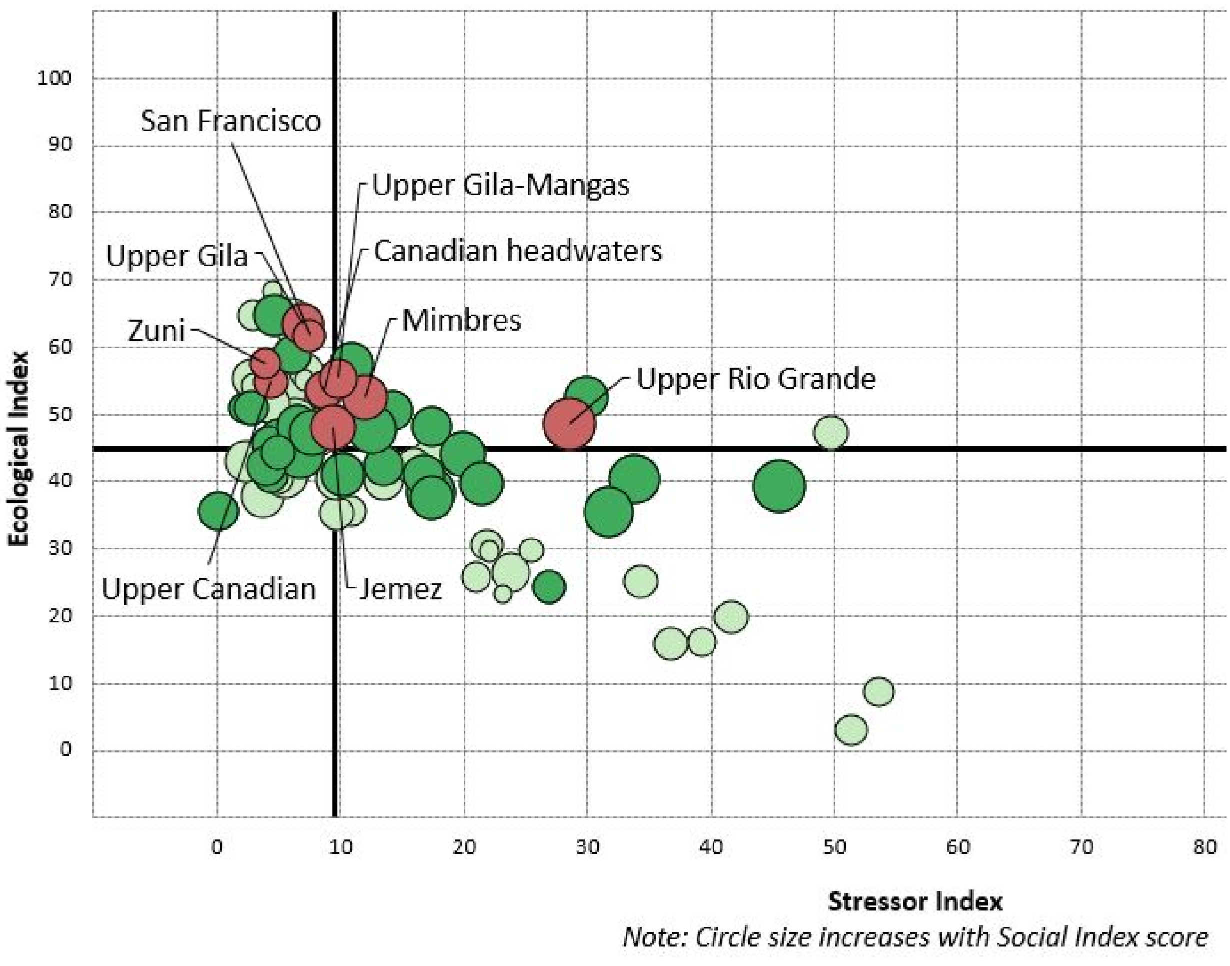


Scenario 1B: Bubble Plot Results. The scenario 1B bubble plot displayed in Figure 6 shows relative differences in Ecological Index (y-axis), Stressor Index (x-axis), and Social Index (bubble size) scores. Further, the bubble plot also displays scores for all other New Mexico HUC8s not included in the scenario and has its axes positioned at the statewide median Ecological Index score (x-axis) and the statewide median Stressor Index score (y-axis). This allows for an evaluation of scores for scenario HUC8s in a statewide context.

In Figure 6 illustrates that the range and distribution of Ecological Index scores and Stressor Index scores for the scenario watersheds are in line with statewide scores, as a number of scenario watersheds have scores that fall above and below statewide medians. Social Index scores (as reflected in bubble size) for scenario watersheds also cover a wide range, with scores that are among the highest and lowest in the state.

The bubble plot also allows for contrasting the nine demonstration HUC8s with other scenario HUC8s and the rest of the HUC8s in the state. The nine demonstration HUC8s display Ecological Index scores that are at or above the statewide median, while Stressor Index scores are mostly at or below the statewide median. Social Index scores for the nine demonstration HUC8s range from the highest in the state (Upper Rio Grande) to near the statewide minimum (Zuni, Upper Canadian). Overall, demonstration HUC8s appear to have positive ecological traits for restoration and a wide range of stressor and social conditions that can be factored into restoration priority planning.

Figure 6. Bubble plot for all New Mexico HUC8s based on rural-agricultural non-point source scenario indicators. This plot highlights rural-agricultural point source scenario watersheds (dark green and red) and demonstration watersheds (red with name labels). Axes are set to statewide median Ecological index and Stressor index scores.



Scenario 1B: Tabular Results. Table 4 contains Ecological, Stressor, Social, and RPI scores for the rural-agricultural non-point source scenario HUC8s, in order of descending RPI score and color-coded by quartile. This tabular format is another option for presenting Stage 1 results that can be used to compare and contrast HUC8s for non-point source nutrient management efforts. When interpreting this table, preferred HUC8s for non-point source nutrient management do not necessarily have to be those with the highest RPI scores but instead could consider one or more of the Ecological, Stressor, or Social Index scores. For example, Conejos ranks well below the top quartile in RPI score but has a high Ecological Index score.

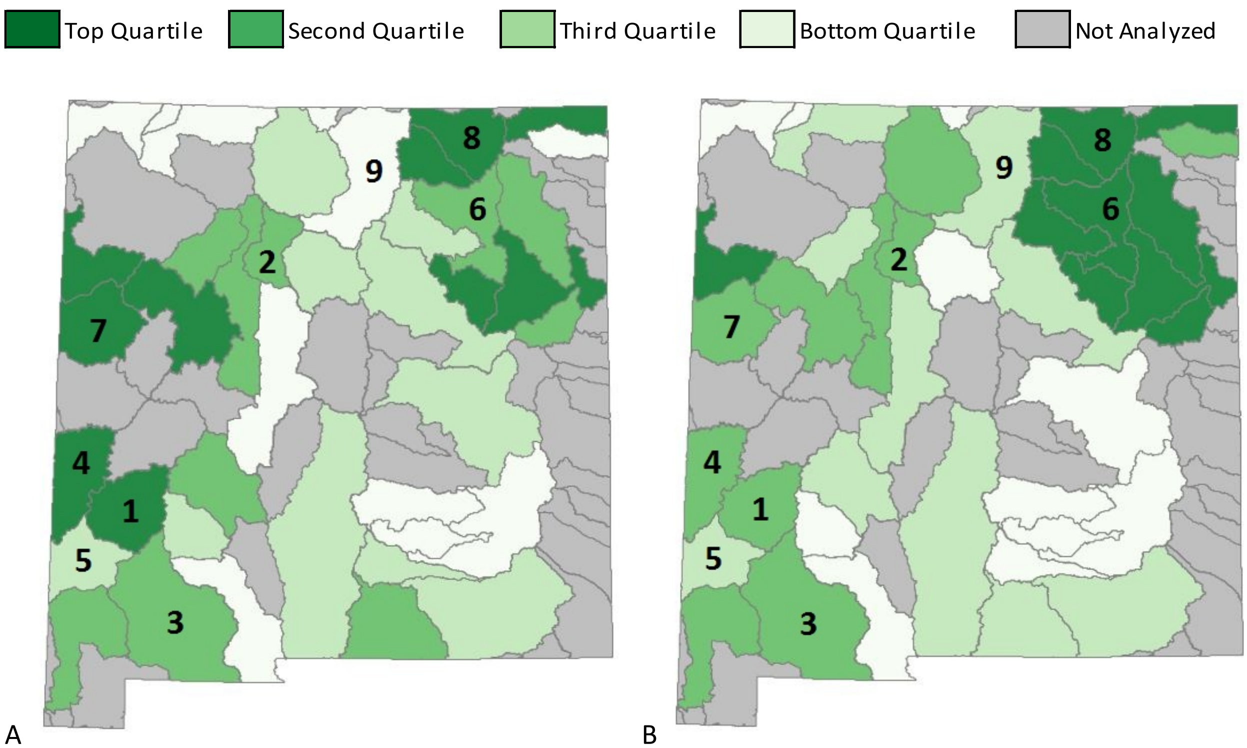
Table 4. Index and RPI scores for the rural-agricultural non-point source scenario. HUC8s are ordered by RPI score. Cells are shaded according to rank (green = 76 -100th percentile; yellow = 51-75th percentile; orange = 26-50th percentile; pink = 0-25th percentile). Scores and quartiles are derived from screening rural-agricultural non-point source scenario HUC8s only. Demonstration HUC8s are bolded.

Watershed ID	Watershed Name	Ecological Index	Stressor Index	Social Index	RPI Score
13020211	Elephant Butte Reservoir	65.68	6.27	36.92	65.44
15040001	**Upper Gila**	67.74	8.29	35.00	64.82
13030101	Caballo	56.70	13.98	39.82	60.85
15040003	Animas Valley	59.78	8.02	28.43	60.07
13020202	**Jemez**	45.96	10.84	43.70	59.61
13020204	Rio Puerco	41.78	8.54	43.95	59.06
13060010	Rio Penasco	46.12	10.73	41.02	58.80
13060011	Upper Pecos-Black	44.36	17.68	48.95	58.54
13020207	Rio San Jose	45.10	8.35	37.10	57.95
13030202	**Mimbres**	50.04	16.30	40.00	57.91
15040004	**San Francisco**	64.10	9.14	18.50	57.82
15040002	**Upper Gila-Mangas**	55.64	12.42	29.53	57.59
11080003	**Upper Canadian**	55.78	5.86	22.75	57.56
11080007	Ute	52.14	4.27	24.27	57.38
15020004	**Zuni**	59.46	5.18	17.25	57.18
11080001	**Canadian headwaters**	52.84	10.62	28.25	56.82
13050003	Tularosa Valley	49.48	17.21	37.33	56.54
13020205	Arroyo Chico	41.16	5.54	33.30	56.31
11080005	Conchas	50.34	2.99	19.30	55.55
13030200	Mimbres border	36.02	0.20	29.83	55.22
11080002	Cimarron	48.82	14.58	30.60	54.95
13060001	Pecos headwaters	50.06	18.08	31.10	54.36
11080004	Mora	48.30	10.57	25.07	54.27
13020101	**Upper Rio Grande**	44.12	35.72	54.18	54.20
13060009	Rio Felix	39.02	14.76	37.67	53.98
13020201	Rio Grande-Santa Fe	32.56	21.58	49.70	53.56
11080006	Upper Canadian-Ute Reservoir	45.64	6.97	21.03	53.24
11080008	Revuelto	41.66	7.51	22.77	52.31
13020102	Rio Chama	44.56	20.47	32.37	52.15
11040001	Cimarron headwaters	40.34	5.99	22.00	52.12
13060007	Upper Pecos-Long Arroyo	40.38	27.60	41.68	51.49
15020006	Upper Puerco	37.72	6.49	21.42	50.88
13060003	Upper Pecos	40.06	19.23	31.35	50.73
13060008	Rio Hondo	36.04	23.21	33.25	48.69
13010005	Conejos	50.86	40.93	35.55	48.50
14080105	Middle San Juan	30.40	24.08	37.00	47.77
13050004	Salt Basin	47.38	15.56	9.35	47.06
14080101	Upper San Juan	33.56	27.23	34.58	46.97
13030102	El Paso-Las Cruces	36.00	45.50	48.40	46.30
14080104	Animas	28.82	38.94	46.98	45.62
13020203	Rio Grande-Albuquerque	31.32	57.15	52.93	42.37
11100101	Upper Beaver	13.46	45.73	19.90	29.21

Scenario 1B: Examining Single Indicators. An additional way to use the Stage 1 scenario screening results is to examine the values of single indicators of interest for each HUC8. For the rural-agricultural non-point source scenario, two such indicators are incremental N and P loadings from agricultural sources estimated from the USGS SPARROW model (Figure 7). Since both are stressor indicators, note that in Figure 7 the darkest colors are assigned to the lowest stressor scores (best for restorability).

Figure 7 also enables a closer look at the nine demonstration HUC8s relative to the primary nutrient sources for this scenario, separately for N and P. The Upper Gila, Jemez, Mimbres, San Francisco, Upper Canadian, Zuni, and Canadian Headwaters HUC8s all fall in the top two quartiles for N and P loading (Figure 7A and Figure 7B). The Upper Gila-Mangas and Upper Rio Grande HUC8s both fall in the bottom two quartiles for N and P loading (Figure 7A and Figure 7B). Figure 7 also enables the opportunity to identify other relatively high-loading HUC8s from the scenario, independently for N and P.

Figure 7. Agricultural nitrogen (A) and phosphorus (B) yields for HUC8s in the rural-agricultural non-point source scenario predicted by the USGS SPARROW model. The most intense colors in RPS maps denote the “best” scores for traits likely to be more favorable to restoration efforts. As these are both stressor indicators, the lower scores are better. Numbered HUC8s include: (1) Upper Gila; (2) Jemez; (3) Mimbres; (4) San Francisco; (5) Upper Gila-Mangas; (6) Upper Canadian; (7) Zuni; (8) Canadian Headwaters; (9) Upper Rio Grande.



Scenario 2A: Urban-Suburban Point Source Watersheds

Scenario 2A identified HUC8s with urban and suburban landscapes and significant point sources of nutrients that are of higher interest for nutrient management efforts. A copy of the RPS Tool populated with this scenario's screening results is among project deliverables.

Seventeen HUC8 watersheds were selected for scenario 2A:

11080001	Canadian headwaters*	13060001	Pecos headwaters*
11080006	Upper Canadian-Ute Reservoir	13060007	Upper Pecos-Long Arroyo
13020101	Upper Rio Grande*	13060008	Rio Hondo
13020102	Rio Chama*	13060011	Upper Pecos-Black
13020201	Rio Grande-Santa Fe*	14080101	Upper San Juan
13020203	Rio Grande-Albuquerque*	14080104	Animas*
13030101	Caballo	14080105	Middle San Juan
13030102	El Paso-Las Cruces	15020006	Upper Puerco
13030202	Mimbres*		

The selection scenario 2B watersheds was based on an initial set of screening criteria and was refined through input from NMED. Initial screening criteria were:

- ≥25% instate
- >0% developed land cover in watershed
- ≥ Statewide median nitrogen (N) load from centralized sewage treatment facilities

Eight of the seventeen HUC8 watersheds in this scenario were requested by NMED as demonstration watersheds for this report (marked with an asterisk in the list above). All of the scenario 2A HUC8s combine enough rural-agricultural traits to also qualify for the scenario 1A screening.

Scenario 2A: Results. Recovery Potential Index scores for scenario 2A are displayed in map form in Figure 8, in bubble plot form in Figure 9, and in tabular form in Table 5. These outputs show that index scores for scenario 2A are nearly identical to index scores generated for scenario 1A (rural-agricultural point source scenario, Figure 2). This result suggests that a single stage 1 point source scenario could be appropriate for screening watersheds with significant point source inputs of nutrients, rather than dividing into separate rural-agricultural versus urban-suburban scenarios, since very few New Mexico HUC8s with point source issues are exclusively rural or urban. Due to the similarity of scenario 1A and scenario 2A results, no further discussion of scenario 2A results is presented in this section.

Figure 8. Four Recovery Potential index scores for the urban-suburban point source scenario HUC8s, including demonstration HUC8s selected by NMED: (1) Canadian Headwaters; (2) Upper Rio Grande; (3) Rio Chama; (4) Rio Grande-Santa Fe; (5) Rio Grande-Albuquerque; (6) Mimbres; (7) Pecos Headwaters; (8) Animas. The most intense colors in RPS maps denote the "best" scores for traits likely to be more favorable to restoration efforts. A: Recovery Potential Integrated (RPI) Index; B: Ecological Index; C: Stressor Index; D: Social Index.

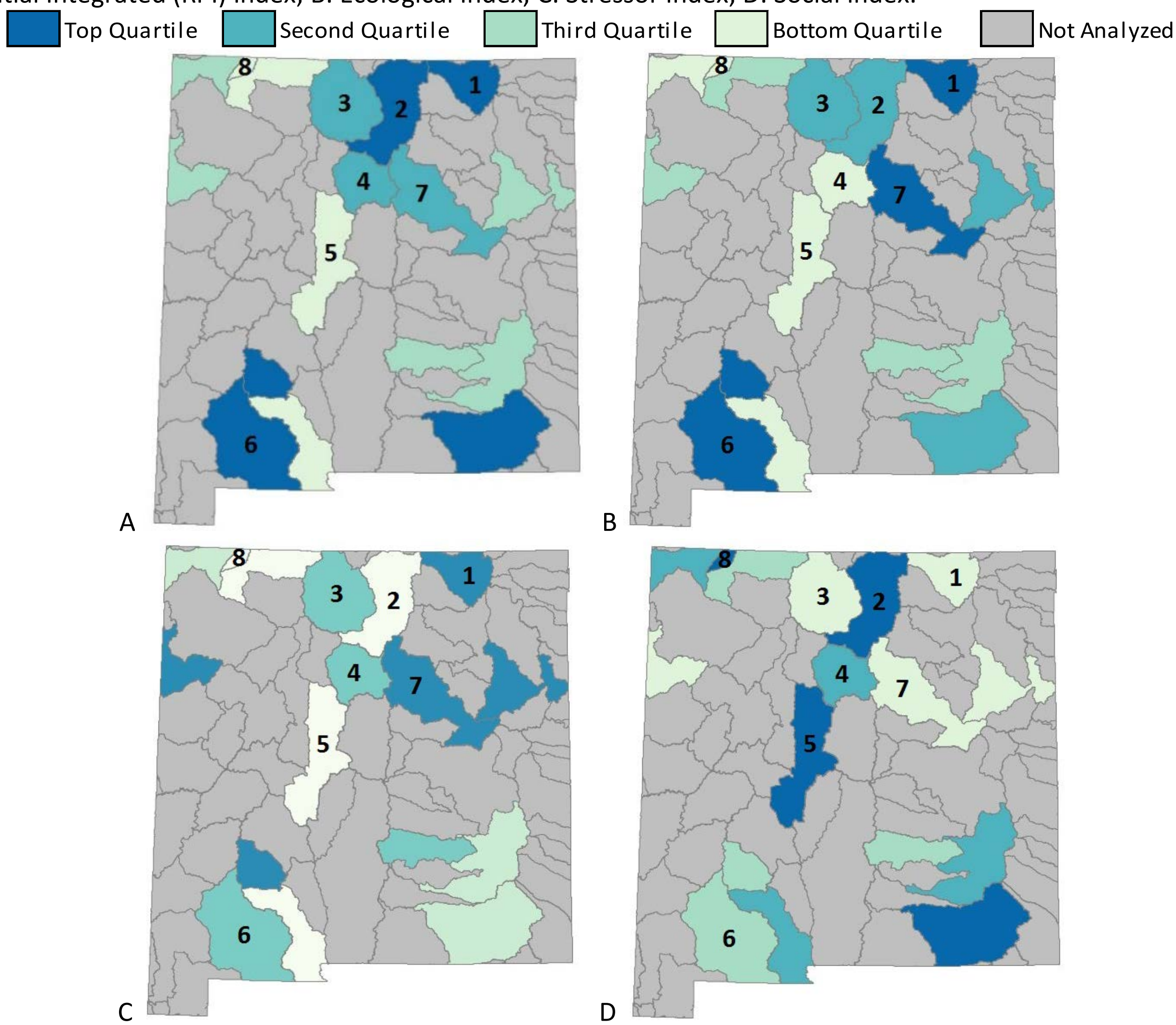


Figure 9. Bubble plot for all New Mexico HUC8s based on urban-suburban point source scenario indicators. This plot highlights the urban-suburban scenario watersheds (dark blue and red) and demonstration watersheds (red with name labels). Axes are set to statewide median Ecological and Stressor index scores.

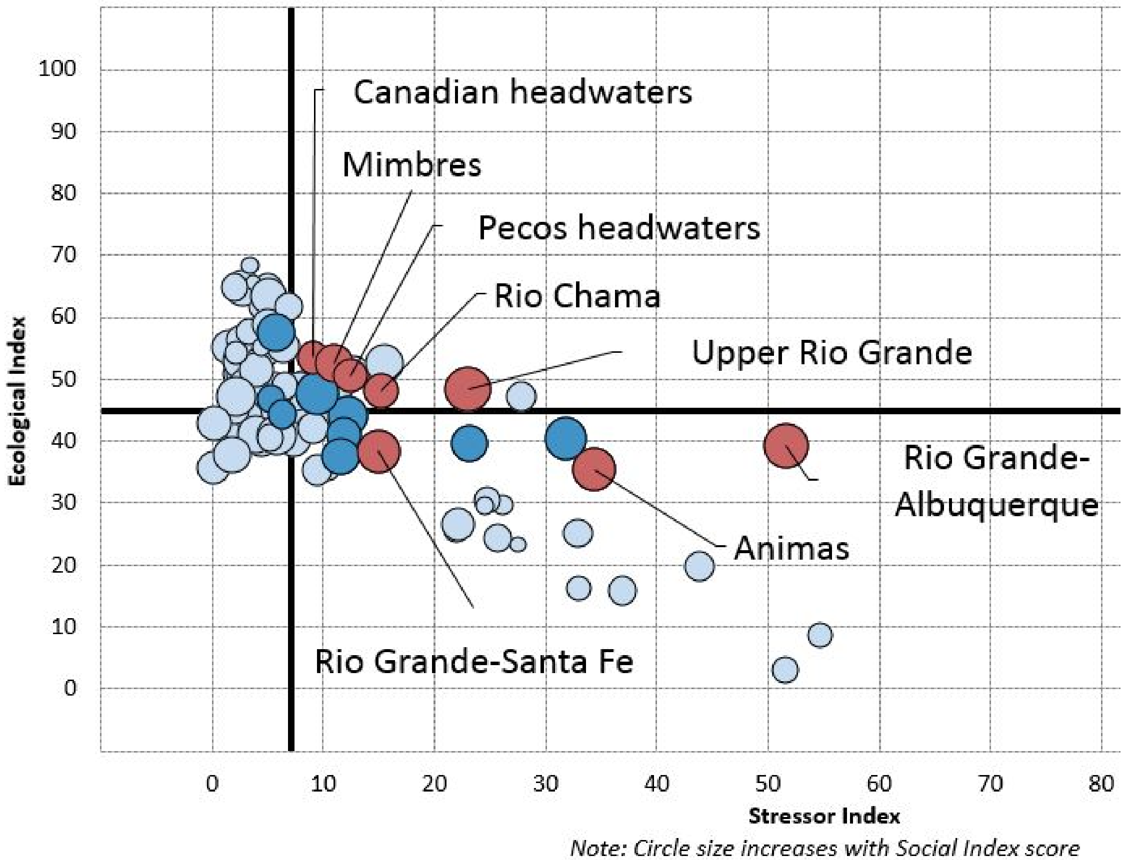


Table 5. Index and RPI scores for the urban-suburban point source scenario. HUC8s are ordered by RPI score. Cells are shaded according to rank (green = 76 -100th percentile; yellow = 51-75th percentile; orange = 26-50th percentile; pink = 0-25th percentile). Scores and quartiles derived from screening urban-suburban point source scenario HUC8s only. Demonstration HUC8s are bolded.

Watershed ID	Watershed Name	Ecological Index	Stressor Index	Social Index	RPI Score
13030101	Caballo	64.90	4.36	44.92	68.49
13060011	Upper Pecos-Black	42.02	20.83	60.18	60.46
11080001	**Canadian headwaters**	52.40	10.43	32.22	58.06
13020101	**Upper Rio Grande**	41.60	30.53	61.93	57.67
13030202	**Mimbres**	47.78	20.68	44.53	57.21
13020201	**Rio Grande-Santa Fe**	28.76	18.60	55.72	55.29
13060001	**Pecos headwaters**	49.44	15.92	31.87	55.13
13020102	**Rio Chama**	45.94	18.67	36.15	54.47
13060007	Upper Pecos-Long Arroyo	32.86	24.82	52.75	53.60
11080006	Upper Canadian-Ute Reservoir	42.70	8.37	22.63	52.32
15020006	Upper Puerco	35.64	6.69	22.87	50.61
14080105	Middle San Juan	25.80	22.91	47.78	50.23
13060008	Rio Hondo	31.02	19.68	37.98	49.77
14080101	Upper San Juan	30.58	35.99	41.35	45.31
14080104	**Animas**	24.14	51.41	58.40	43.71
13030102	El Paso-Las Cruces	29.10	56.09	57.02	43.34
13020203	**Rio Grande-Albuquerque**	25.68	74.28	64.28	38.56

Scenario 2B: Urban-Suburban Non-Point Source Watersheds

Scenario 2B identified HUC8s with urban and suburban landscapes and significant nonpoint sources of nutrients that are of higher interest for nutrient management efforts. A copy of the RPS Tool populated with this scenario's screening results is among project deliverables.

Twenty-seven HUC8 watersheds were selected for scenario 2B:

11080001	Canadian headwaters*	13060001	Pecos Headwaters
11080002	Cimarron*	13060003	Upper Pecos
11080006	Upper Canadian-Ute Reservoir	13060007	Upper Pecos-Long Arroyo
13020101	Upper Rio Grande	13060008	Rio Hondo
13020102	Rio Chama	13060010	Rio Penasco
13020201	Rio Grande-Santa Fe*	13060011	Upper Pecos-Black
13020202	Jemez*	14080101	Upper San Juan
13020203	Rio Grande-Albuquerque*	14080104	Animas
13020207	Rio San Jose*	14080105	Middle San Juan
13020211	Elephant Butte Reservoir	15020006	Upper Puerco
13030101	Caballo	15040002	Upper Gila-Mangas*
13030102	El Paso-Las Cruces	15040003	Animas Valley
13030202	Mimbres*	15040004	San Francisco*
13050003	Tularosa Valley		

The selection scenario 2B watersheds was based on an initial set of screening criteria and was refined through input from NMED. Initial screening criteria were:

- ≥25% instate
- >0% developed land cover in watershed

Nine of the twenty-seven HUC8 watersheds in this scenario were requested by NMED as demonstration watersheds for this report (marked with an asterisk in the list above). All of the scenario 2B HUC8s combine enough rural-agricultural traits to also qualify for scenario 1 screenings.

Scenario 2B: Results. Recovery Potential Index scores for the urban-suburban non-point source scenario are displayed in map form in Figure 10, in bubble plot form in Figure 11, and in tabular form in Table 6. Index scores for scenario 2B are very similar to scores for scenario 2A (rural-agricultural non-point source scenario; Figure 5). For example, six of the seven HUC8s with top quartile Ecological Index scores also score in the top quartile in scenario 1B and all seven HUC8s with top quartile Stressor Index scores also score in the top quartile in scenario 1B. These results indicate that stage 1 could be streamlined by defining a single non-point source scenario rather than separate rural-agricultural versus urban-suburban scenarios due to the shared presence of both land cover categories in New Mexico HUC8s with non-point source nutrient issues.

Figure 10. Four Recovery Potential index scores for the urban-suburban non-point source scenario HUC8s, including demonstration HUC8s selected by NMED: (1) Canadian Headwaters; (2) Cimarron; (3) Rio Grande-Santa Fe; (4) Jemez; (5) Rio Grande-Albuquerque; (6) Rio San Jose; (7) Mimbres; (8) Upper Gila-Mangas; (9) San Francisco. The most intense colors in RPS maps denote the "best" scores for traits likely to be more favorable to restoration efforts. A: Recovery Potential Integrated (RPI) Index; B: Ecological Index; C: Stressor Index; D: Social Index.

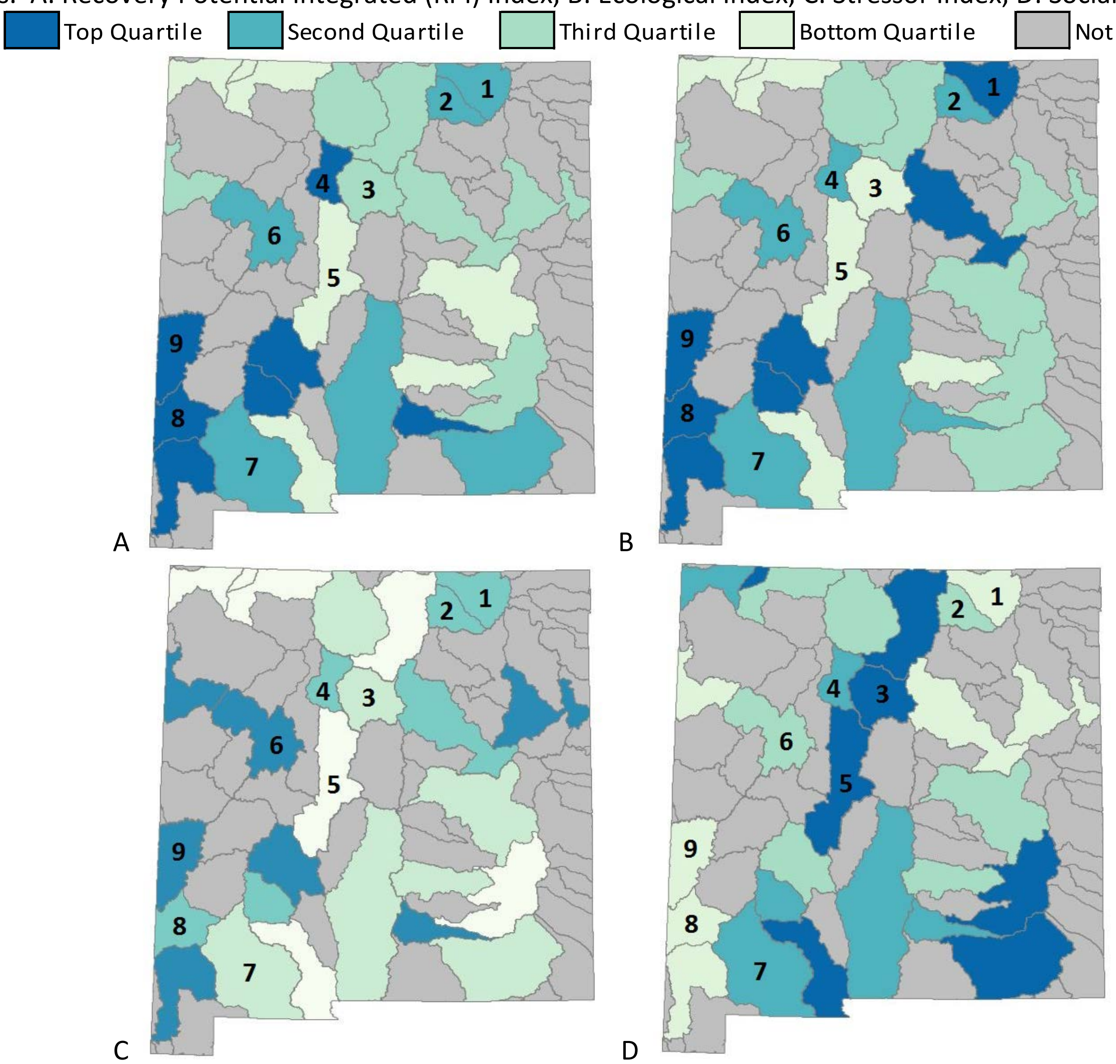


Figure 11. Bubble plot for all New Mexico HUC8s based on urban-suburban non-point source scenario indicators. This plot highlights the urban-suburban scenario watersheds (dark blue and red) and demonstration watersheds (red with name labels). Axes are set to statewide median Ecological and Stressor index scores.

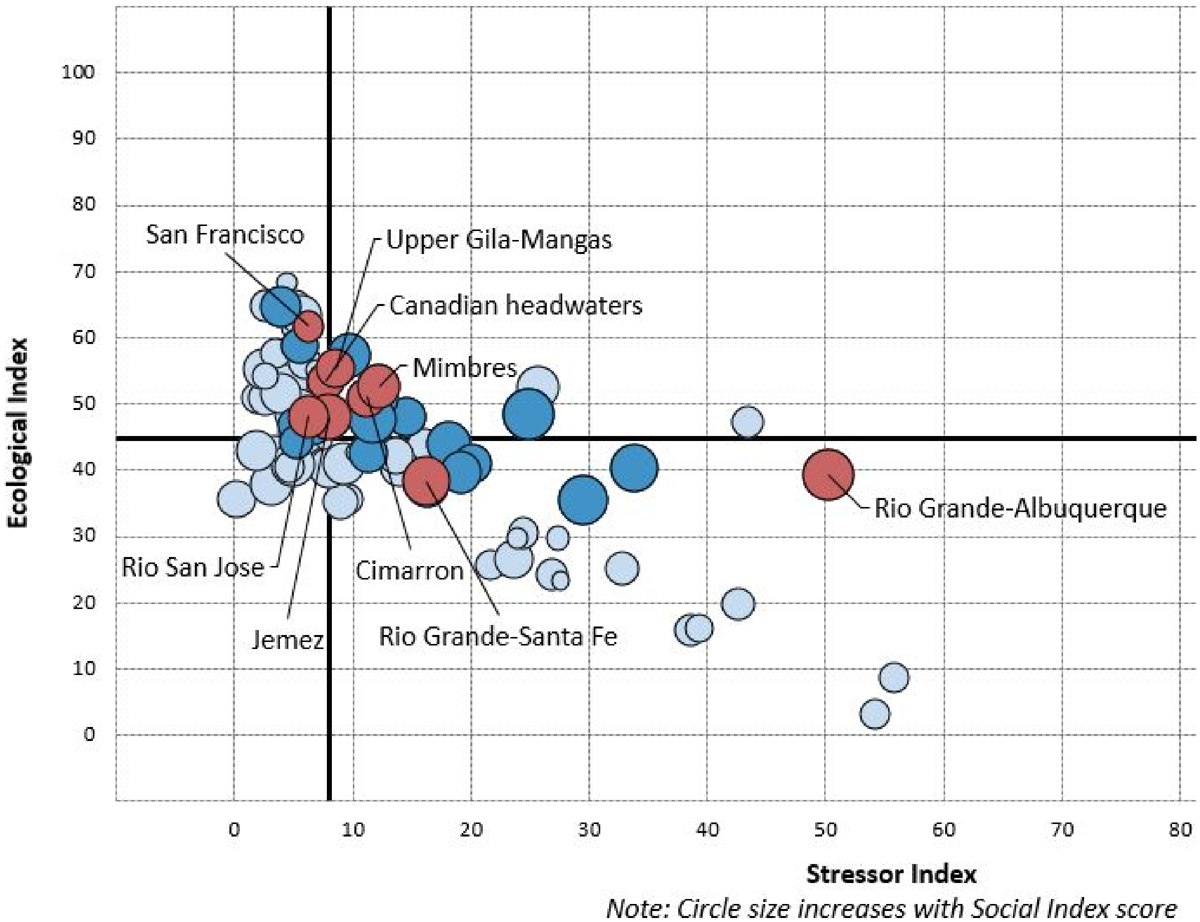


Table 6. Index and RPI scores for the urban-suburban non-point source scenario. HUC8s are ordered by RPI score. Cells are shaded according to rank (green = 76 -100th percentile; yellow = 51-75th percentile; orange = 26-50th percentile; pink = 0-25th percentile). Scores and quartiles derived from screening urban-suburban non-point source scenario HUC8s only. Demonstration HUC8s are bolded.

Watershed ID	Watershed Name	Ecological Index	Stressor Index	Social Index	RPI Score
13020211	Elephant Butte Reservoir	67.04	4.82	39.87	67.36
13030101	Caballo	57.74	12.22	43.30	62.94
13020202	**Jemez**	44.94	9.36	46.45	60.68
13060010	Rio Penasco	43.30	8.93	47.13	60.50
15040003	Animas Valley	59.00	8.14	30.32	60.39
15040004	**San Francisco**	69.56	7.99	18.62	60.06
15040002	**Upper Gila-Mangas**	57.62	11.87	31.40	59.05
13060011	Upper Pecos-Black	39.78	23.33	58.17	58.21
13020207	**Rio San Jose**	43.30	8.36	38.45	57.80
11080001	**Canadian headwaters**	50.46	10.67	31.45	57.08
13030202	**Mimbres**	45.72	22.22	43.47	55.66
11080002	**Cimarron**	45.76	14.73	33.68	54.90
13050003	Tularosa Valley	45.44	21.05	40.18	54.86
13020101	Upper Rio Grande	40.06	36.03	60.33	54.79
13060001	Pecos headwaters	48.32	17.63	31.87	54.19
13020201	**Rio Grande-Santa Fe**	27.98	22.75	54.85	53.36
13020102	Rio Chama	42.56	20.15	34.72	52.38
11080006	Upper Canadian-Ute Reservoir	41.92	9.18	22.93	51.89
15020006	Upper Puerco	36.46	6.89	23.50	51.02
13060007	Upper Pecos-Long Arroyo	33.82	33.21	51.65	50.75
13060003	Upper Pecos	34.06	21.73	37.63	49.99
14080105	Middle San Juan	24.72	32.55	45.77	45.98
13060008	Rio Hondo	31.04	31.61	37.47	45.63
14080101	Upper San Juan	29.00	34.83	39.85	44.67
14080104	Animas	23.52	48.57	56.77	43.91
13030102	El Paso-Las Cruces	29.60	59.60	55.45	41.82
13020203	**Rio Grande-Albuquerque**	24.90	76.17	63.18	37.31

STAGE 2 RESULTS

As described in the Approach section, the Stage 2 analysis compares the HUC12s within a single HUC8 to one another. The much more extensive array of RPS indicators available at HUC12 scale enables more specific targeting of indicators relevant to implementing nutrient management activities. Stage 2 indicator selections and weights (see Table 2 and definitions in Attachment 3) were selected by NMED, updated by EPA with newer data, and used in the Stage 2 screenings carried out by EPA and Cadmus. Stage 2 screenings were completed on all demonstration HUC8s from the four scenarios (rural-agricultural point source, rural-agricultural non-point source, urban-suburban point source, urban-suburban nonpoint source).

The Stage 2 screening results are briefly summarized below. In addition, results for a single demonstration HUC8 for each of the four scenarios are detailed in this section to serve as in-depth examples of how Stage 2 results can be interpreted for priority setting. As with the Stage 1 screenings, a separate copy of the RPS Tool for each of the demonstration HUC8s in the four scenarios has been archived for delivery to NMED with other products (see Attachment 4).

General Summary of Stage 2 Results

The demonstration HUC8s from each of the four scenarios (rural-agricultural point source, rural-agricultural non-point source, urban-suburban point source, urban-suburban non-point source) were screened individually, enabling comparison of the HUC12 subwatersheds within each HUC8 based on selected indicators and weights submitted by NMED. Figure 12 through Figure 15 show the Stage 2 screening bubble plots for the demonstration HUC8s in each scenario (each bubble is a HUC12 within the HUC8).

It is important to note that the solid horizontal and vertical axes on the Figure 12 through Figure 15 plots are statewide median values for the Ecological Index (x-axis) and Stressor Index (y-axis). This provides context for the user to observe how HUC12s included in the screening compare not only to one another but also how they compare to all HUC12s statewide. The RPS Tool provides the option to position bubble plot axes at median index scores for the subset of HUC12s included in the screening or at the median of index scores for all HUC12s in the state in order to display the broader geographic context for the subwatersheds being screened. Also note that the median statewide Stressor Index score is approximately zero in all four scenarios (the vertical axis is near zero on the Figure 12 through Figure 15 bubble plots). This is because a large proportion of HUC12s in the state have zero or near zero values of stressor indicators selected for the scenarios, resulting in a large number of zero or near zero Stressor Index scores.

Figure 12 through Figure 15 contain bubble plots that illustrate major differences in ecological and stressor index scores among the HUC12s in each of the demonstration HUC8s. Note that each of these plots display the HUC12s relative to statewide conditions, not to conditions across the HUC8 alone. The position of the clustered bubbles relative to the statewide median stressor and ecological scores (the vertical and horizontal axis lines, respectively) shows whether the HUC8 tends to have higher stressor scores or ecological scores compared to the rest of the state.

Many of the demonstration HUC8s in all four scenarios have Ecological and Stressor Index scores that cover a wide range, indicating that factors relevant to restoration vary widely across the HUC8. Other HUC8s have subwatersheds that cluster around a narrow range of Ecological and Stressor Index scores, pointing to little variability in recovery potential throughout the HUC8. For example, bubble plots for the rural-agricultural point source scenario 1A (Figure 12) show that HUC12s in the Mimbres watershed cover a wider range of Stressor Index scores (between 0 and 20) compared to HUC12s in the Upper Puerco watershed, which cluster between 0 and 5.

The following sections detail how Stage 2 screening can be used to ask and answer a variety of questions that may help guide nutrient management activities. Each section highlights results for a single demonstration HUC8 for each of the four scenarios. The variety of conditions across all four sets of HUC12s is thought provoking and invites further analysis as to how they differ, and what these differences may suggest regarding strategies from place to place.

Figure 12. Bubble plot comparing the HUC12s within the six demonstration HUC8s from the rural-agricultural point source scenario 1A (Canadian Headwaters, Mora, Rio Chama, Mimbres, Pecos Headwaters, and Upper Puerco). Vertical and horizontal axes on the plot represent the Stressor and Ecological Index median values for all HUC12s statewide, respectively.

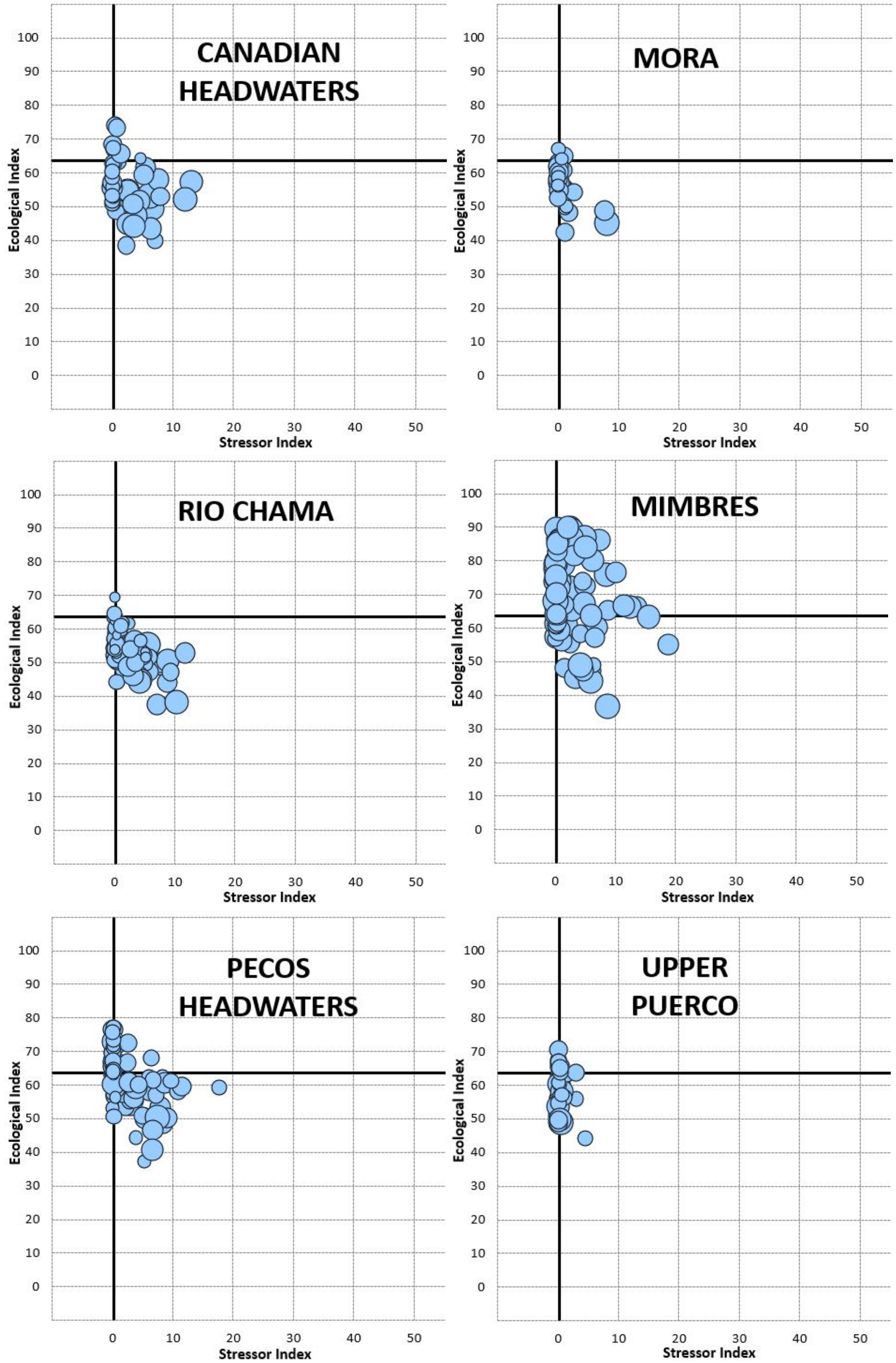


Figure 13. Bubble plot comparing the HUC12s within the eight demonstration HUC8s from the rural-agricultural non-point source scenario 1B (Caballo, Canadian Headwaters, Jemez, San Francisco, Upper Canadian, Upper Gila, Upper Gila-Mangas, Zuni, Mimbres). Vertical and horizontal axes on the plot represent the Stressor and Ecological Index median values for all HUC12s statewide, respectively.

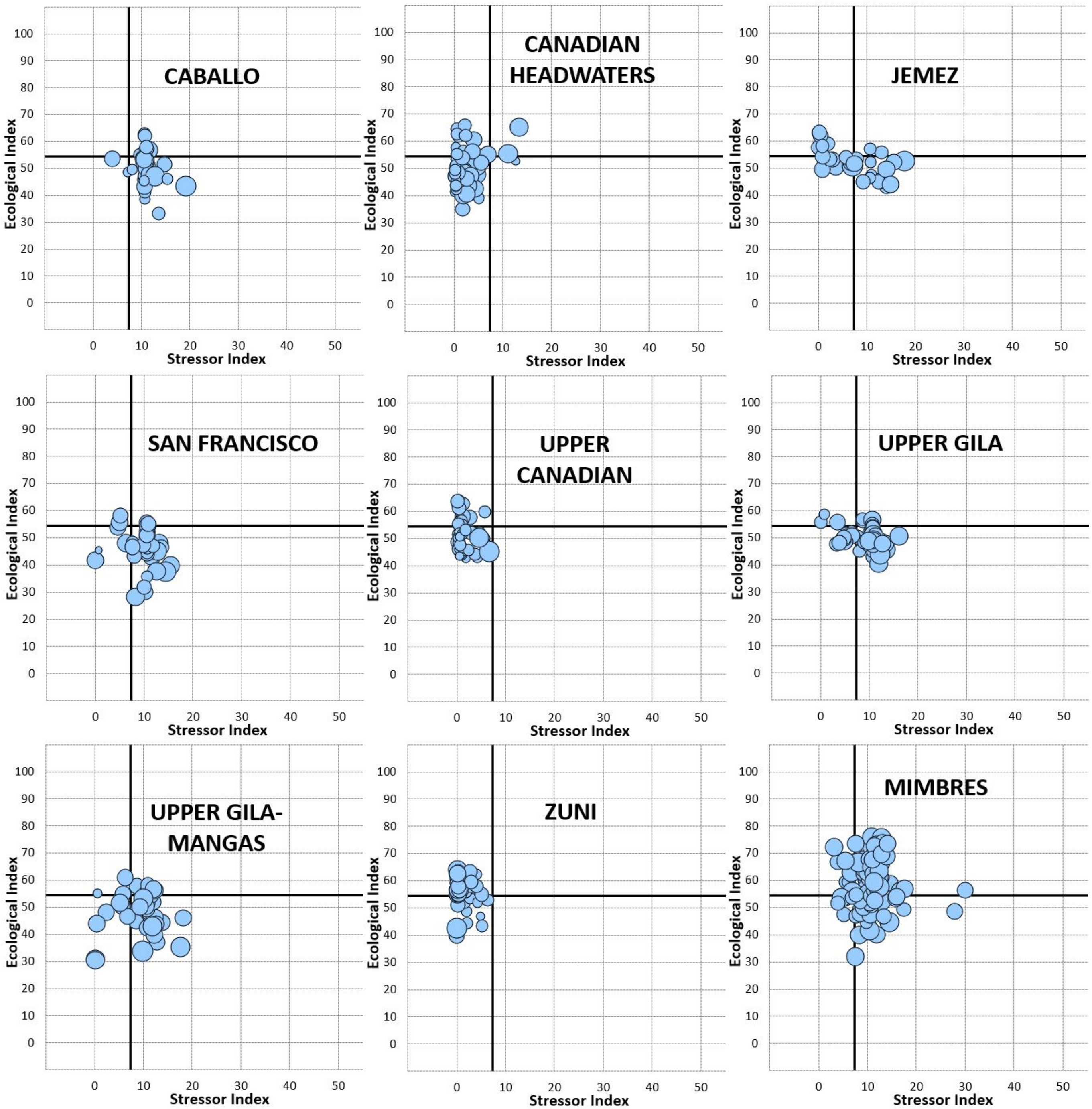


Figure 14. Bubble plot comparing the HUC12s within the eight demonstration HUC8s from the urban-suburban point source scenario 2A (Animas, Canadian Headwaters, Mimbres, Pecos Headwaters, Rio Chama, Rio Grande-Albuquerque, Rio Grande-Santa Fe, Upper Rio Grande). Vertical and horizontal axes on the plot represent the Stressor and Ecological Index median values for all HUC12s statewide, respectively.

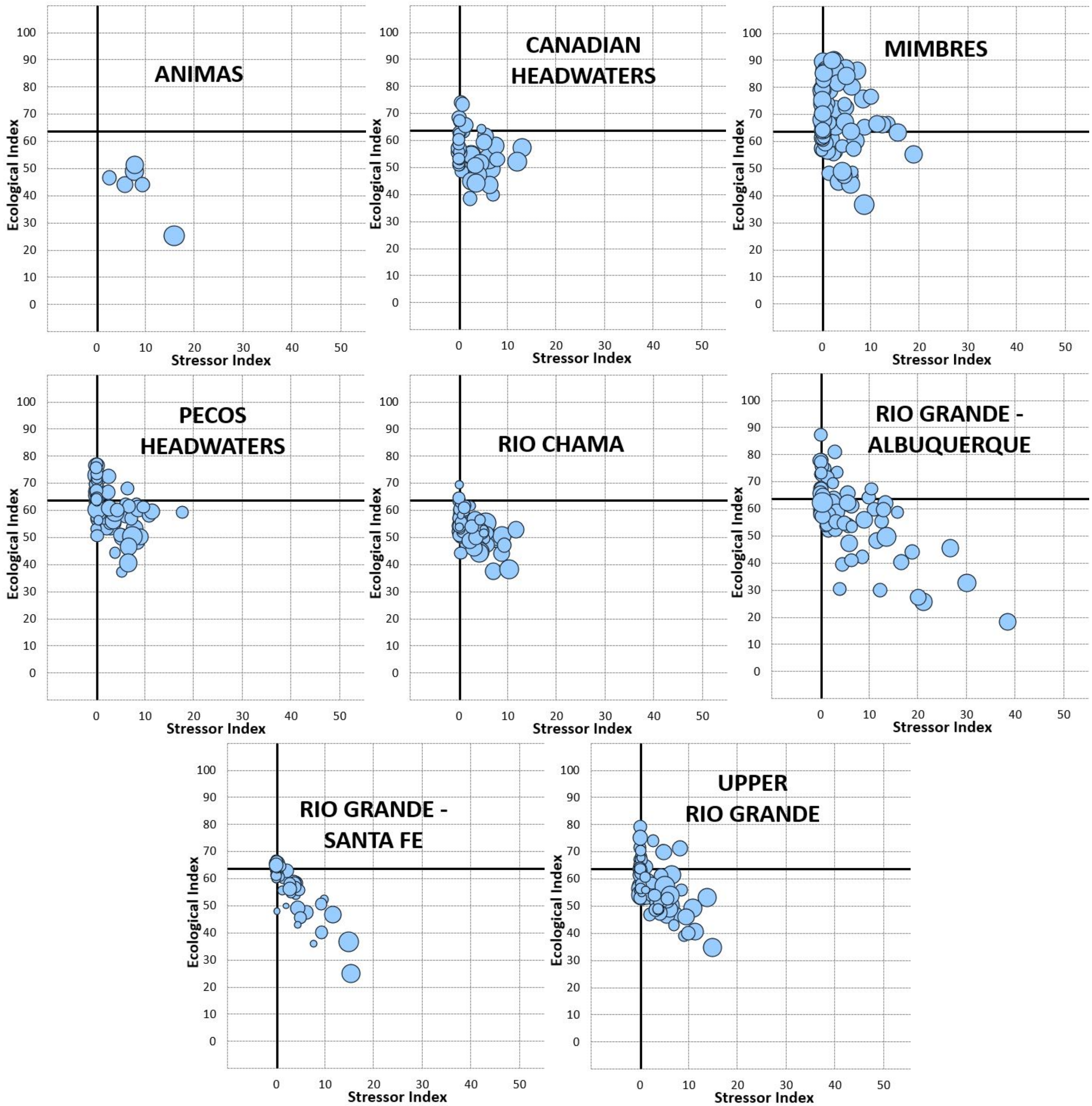
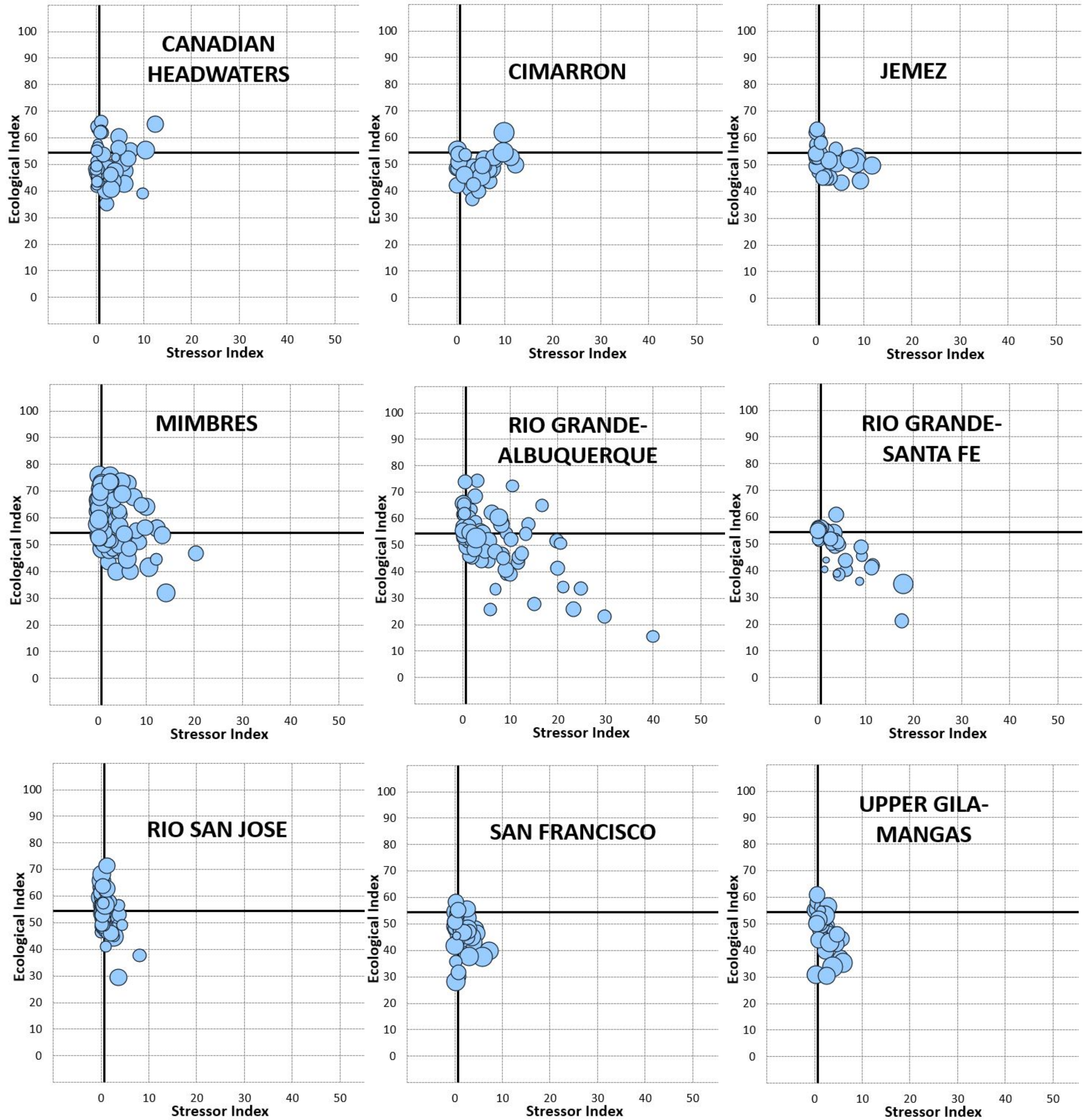


Figure 15. Bubble plot comparing the HUC12s within the nine demonstration HUC8s from the urban-suburban non-point source scenario 2B (Canadian Headwaters, Cimarron, Jemez, Mimbres, Rio Grande-Albuquerque, Rio Grande-Santa Fe, Rio San Jose, San Francisco, Upper Gila-Mangas). Vertical and horizontal axes on the plot represent the Stressor and Ecological Index median values for all HUC12s statewide, respectively.

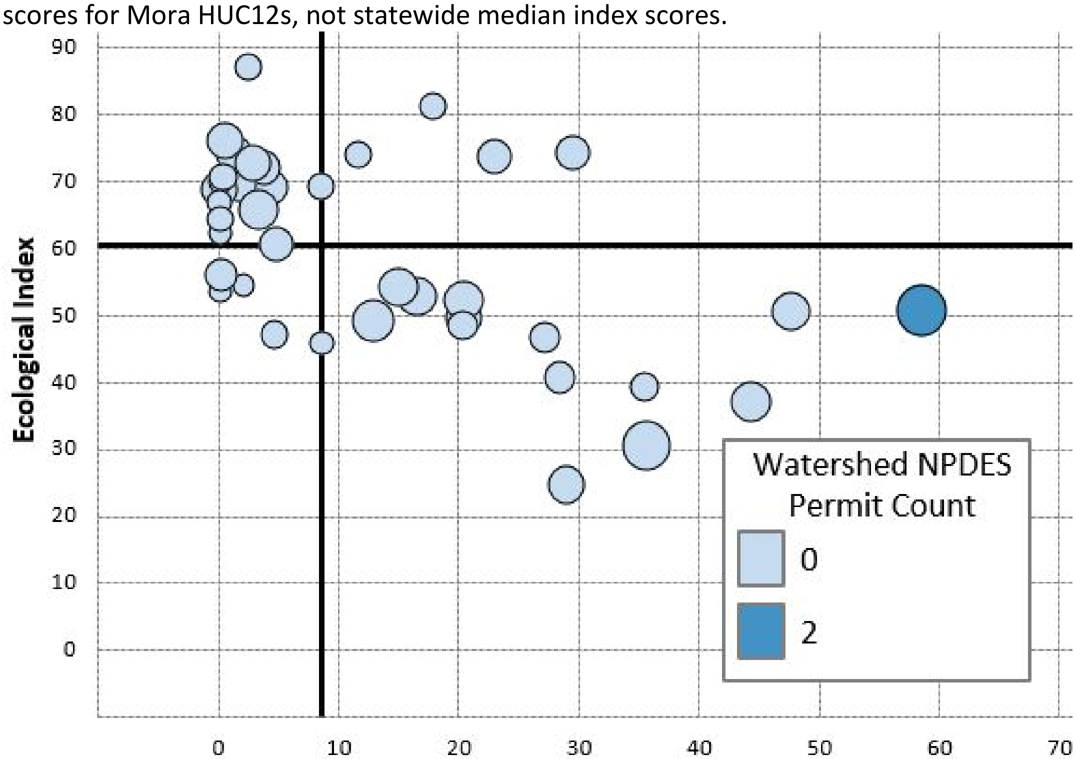


Results for Stage 2 Rural-Agricultural Point Source Scenario: Mora Watershed

The Mora HUC8 was one of six demonstration HUC8s in the Stage 1 rural-agricultural point source scenario (1A). Compared with all HUC8s statewide and other scenario HUC8s (see Figure 3), the Mora HUC8 has Ecological Index and Stressor Index scores that are near statewide median values. Figure 12 contrasts the Mora HUC12 subwatersheds with one another and with those in other demonstration HUC8s from this scenario. Most Mora HUC12s have an Ecological Index score below the statewide median and very few Mora HUC12s exceed the statewide median Stressor Index score (approximately zero).

Because point sources are typically not widespread across a HUC8, a first step in reviewing the Stage 2 results for the rural-agricultural point source scenario could be to evaluate RPS index scores in HUC12s with point sources. Figure 16 displays the bubble plot for Mora HUC12s with bubbles shaded according to the "Watershed NPDES Permit Count" indicator. Based on the data used to calculate NPDES permit counts, only one HUC12 in the Mora watershed contains point source discharges (110800040308; Coyote Creek-Mora River). This HUC12 has the highest Stressor Index score in the Mora watershed and an Ecological Index score that is slightly below average. These scores suggest that other HUC12s in New Mexico may be better candidates for prioritizing point source nutrient management efforts, particularly those with fewer stressors and greater presence of ecological infrastructure to support restoration. Index scores for other HUC12s with point source discharges can be explored by reviewing Stage 2 results for the remaining demonstration HUC8s in New Mexico.

Figure 16. Scenario 1A results for Mora HUC12s, highlighting HUC12s with point source discharges (darker shade of blue). Note that this figure has axes located at median index scores for Mora HUC12s, not statewide median index scores.



Results for Stage 2 Rural-Agricultural Non-Point Source Scenario: Canadian Headwaters Watershed

The Canadian Headwaters HUC8 was one of nine demonstration HUC8s in the Stage 1 rural-agricultural non-point source scenario (1B). Compared with all HUC8s statewide and other scenario HUC8s (see Figure 6), the Canadian Headwaters HUC8 has a high Ecological Index score and a mid-range Stressor Index score. Figure 13 contrasts the Canadian Headwaters HUC12 subwatersheds with one another and with those in other demonstration HUC8s from this scenario. The majority of Canadian Headwaters HUC12s are below the statewide Stressor Index median while Ecological Index scores are more evenly distributed above and below the statewide median. Social Index scores (represented by bubble sizes) HUC12s tend to be relatively high for HUC12s with above-average Ecological Index scores.

The variety of conditions across the Canadian Headwaters HUC12s invites further analysis as to how they differ, and what these differences may suggest regarding strategies from place to place. An example series of further analytical steps is offered below. Note that the Stage 2 screening plots throughout this section have axes located at median index scores for Canadian Headwaters HUC12s, not statewide median index scores.

Where are impairments relative to how the HUCs are scored? Regardless of which indicators are used in a screening, the RPS Tool can color-assign a value gradient for any RPS indicator to the bubble plot or map results. In Figure 17, the bubble plot from the Canadian Headwaters screening is further enhanced to display the number of segments that are 303d-listed as nutrient impaired (based on the 2012 listing cycle). Interestingly, several HUC12s with nutrient impairments score at or above the median Ecological Index value, suggesting these HUC12s possess ecological traits that could facilitate restoration efforts.

Where are we better prepared for action? In addition to where nutrient impairments occur, the existence of TMDLs can be displayed as a factor in RPS bubble plots to illustrate where detailed information on watershed conditions, pollutant sources, and required pollutant reductions already exists. Figure 18 shows the Canadian Headwaters bubble plot with bubble colors assigned based on the percentage of stream length with TMDLs. TMDLs have been developed for many of the Canadian Headwaters HUC12s, including several HUC12s with nutrient impairments. The HUC12s that combine: (a) presence of nutrient impairments; (b) presence of TMDLs; (c) high Ecological Index scores; and (d) moderate to low Stressor Index scores may be good candidates for prioritizing future nutrient management actions.

Figure 17. Scenario 1B results for Canadian Headwaters HUC12s, highlighting HUC12s with the nutrient 303d listings (deeper shades of blue).

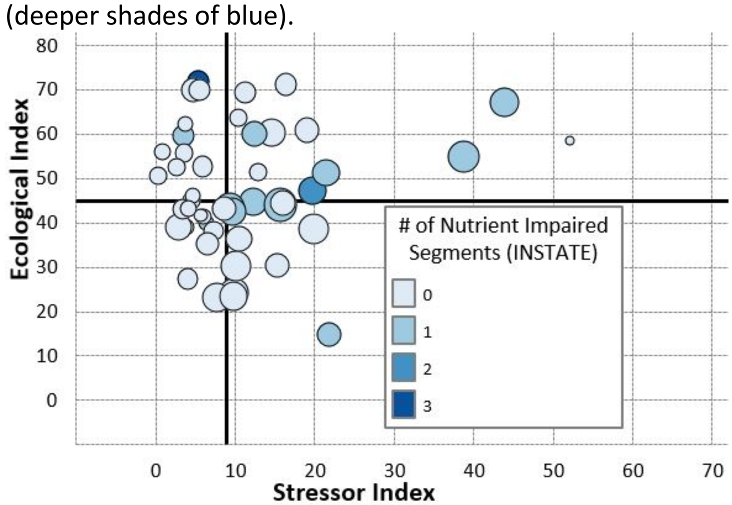
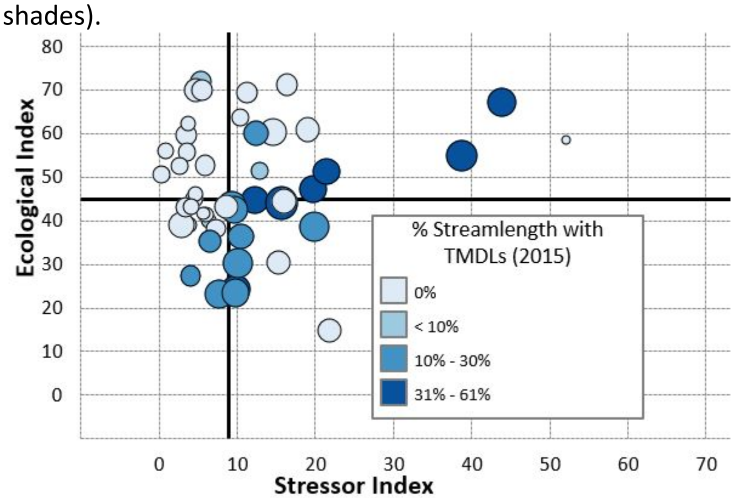
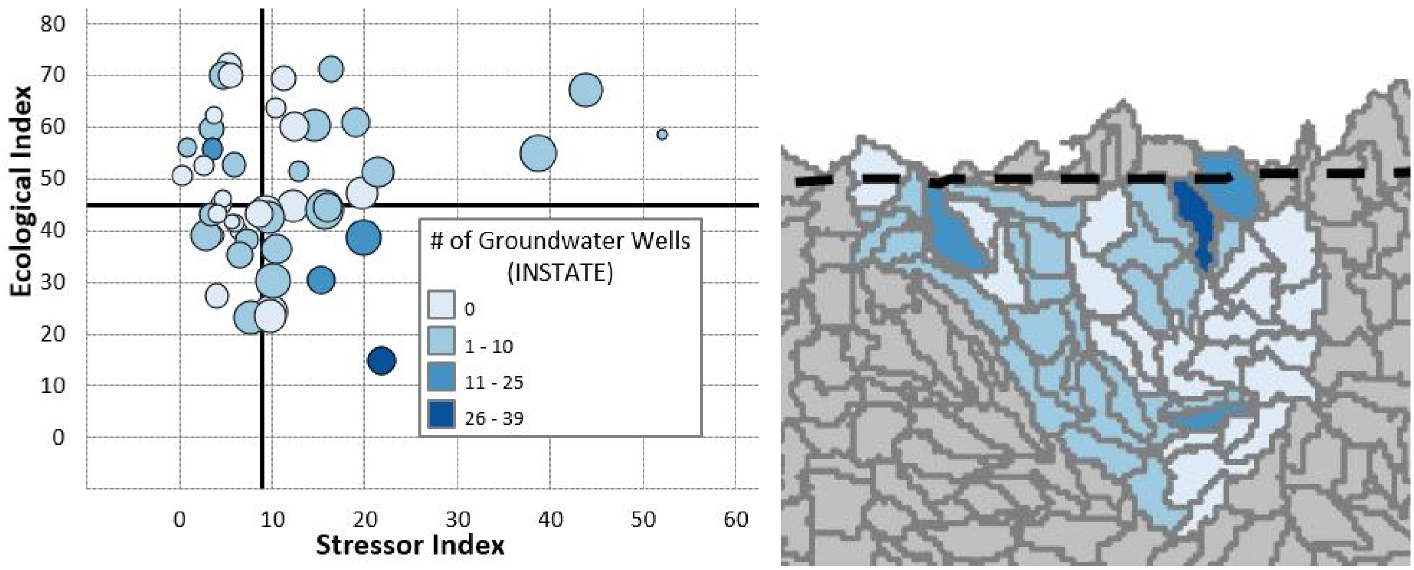


Figure 18. Scenario 1B results for Canadian Headwaters HUC12s, highlighting HUC12s with TMDLs (deepest blue shades).



<u>*Are there specific community motivators for some subwatersheds*</u>? Another technique for interpreting screening results is to compare index scores in conjunction with a particular social indicator of high importance to local communities. In Figure 19 the Canadian Headwaters HUC12s are color-assigned by the number of groundwater wells in the watershed. As groundwater protection is easily communicated to most communities, this may be a factor that increases the likelihood of community support for nutrient management control actions in specific watersheds.

Figure 19. Scenario 1B bubble plot and map outputs for Canadian Headwaters HUC12s, highlighting HUC12s with the largest number of groundwater wells (deepest blue shades).



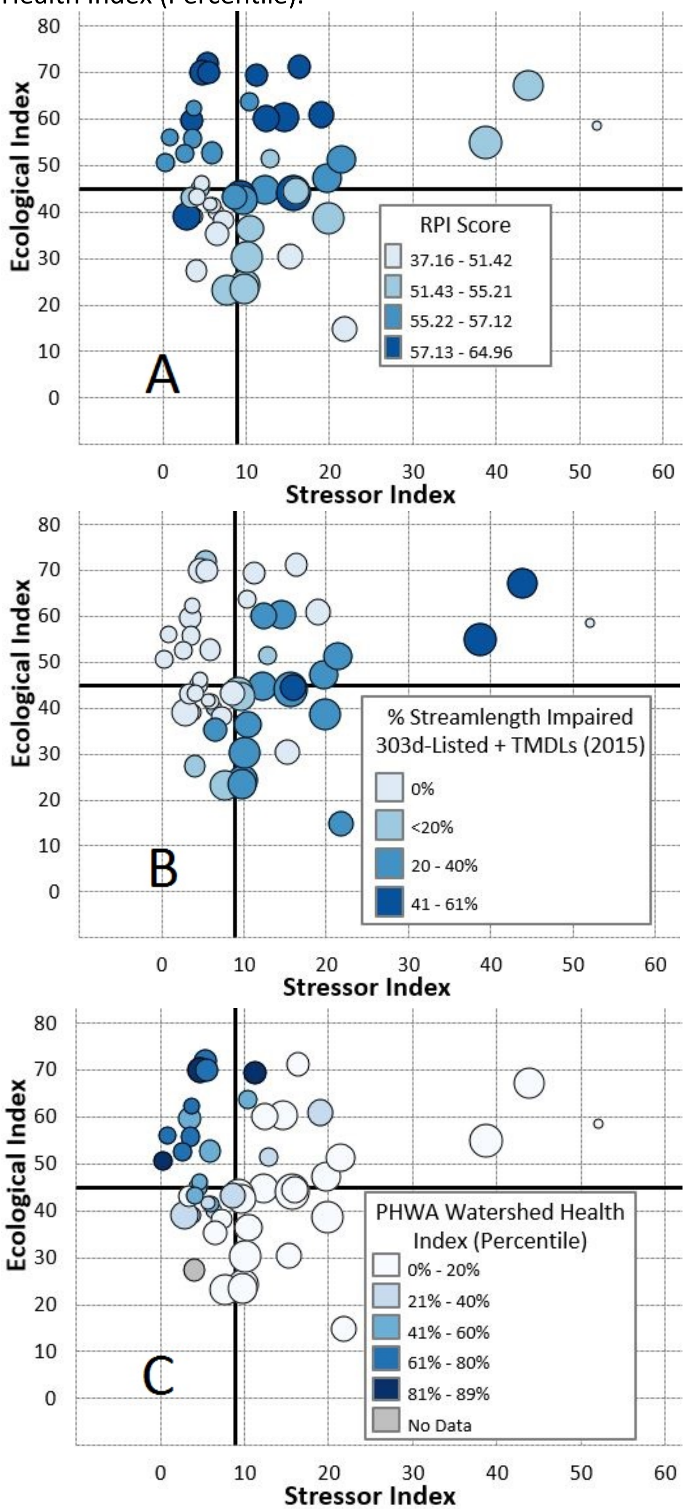
<u>*Where would specific types of control practices be appropriate, or effective*</u>? Building on questions like the above, planners may want to use RPS Tool results to evaluate which HUC12s might be most appropriate for specific families of nutrient control practices while also considering other recovery potential factors. Given that the Canadian Headwaters HUC8 is one of the rural-agricultural demonstration watersheds, one approach would be to compare values of the agricultural and low-density residential stressor indicators selected for the screening that are relevant to management strategies and practices. In Table 7, values of four indicators for all Canadian Headwaters HUC12s are displayed for comparison, with each indicator value color-assigned by quartile.

For the three stressor indicators (names in red), the highest values (red-shaded cells) help identify HUC12s with the greatest amount of specific activities that may be nutrient sources or otherwise degrade aquatic ecosystems. The “Number of Cattle” indicator, for example, helps identify HUC12s likely to have nutrient loading contributions from cattle manure. The “Synthetic N Fertilizer Application” indicator provides insight into HUC12s with greater application of fertilizer to cropland. The “Number of Diversions” indicator also could be used to highlight HUC12s where nutrient management may not improve the condition of aquatic ecosystems due to stresses from flow alteration. For the one ecological indicator in Table 7 (“Percent Natural Cover in HCZ”), values highlight differences in natural cover in the hydrologically connected zone, which helps to stabilize streambanks and attenuate nutrients, as an additional consideration. These are just a few examples of how any single indicator or group of indicators can be readily compared for a group of subwatersheds within the RPS Tool.

Table 7. Values of four RPS indicators from the Canadian Headwaters scenario 1B screening that may be useful for selecting management strategies and targeting subwatersheds. Values of the ecological indicator (green text) are shaded by quartile from highest to lowest in the order green, yellow, orange, and red. Stressor indicator (red text) values are shaded by quartile from lowest to highest in the order green, yellow, orange, red.

Subwatershed	% N-Index1 in HCZ (2011)	Synthetic N Fertilizer Application in WS	# of Cattle (INSTATE)	# of Diversions (INSTATE)
Upper Chicorica Creek (110800010101)	11.1	0.31	343	17
Little Water Creek (110800010102)	19.0	0	320	0
Headwaters Una de Gato Creek (110800010103)	17.5	0.01	549	0
Raton Creek (110800010104)	20.1	0.07	401	39
Middle Chicorica Creek (110800010105)	25.3	0	174	6
Black Mesa Arroyo (110800010106)	28.4	0	275	0
Outlet Una de Gato Creek (110800010107)	33.7	0	263	0
Headwaters Blosser Arroyo (110800010108)	20.4	0	285	0
Outlet Blosser Arroyo (110800010109)	31.1	0	294	0
Lower Chicorica Creek (110800010110)	49.8	0	170	0
Six-Horse Canyon-Canadian River (110800010201)	7.6	0.04	467	2
Potato Canyon-Canadian River (110800010202)	5.9	0.01	399	0
Dillon Canyon (110800010203)	7.9	0.01	375	3
Dillon Canyon-Canadian River (110800010204)	8.8	0.01	394	1
Chicorica Creek-Canadian River (110800010205)	28.3	0.34	281	5
Gold Creek-Vermejo River (110800010301)	6.7	0.04	191	0
Leandro Creek (110800010302)	8.9	0.01	211	3
Rock Creek (110800010303)	13.2	0.02	215	4
Rock Creek-Vermejo River (110800010304)	7.8	0.02	215	3
York Canyon (110800010305)	6.4	0	269	0
York Canyon-Vermejo River (110800010306)	7.2	0.03	436	18
Headwaters Caliente Canyon (110800010307)	6.2	0	350	5
Outlet Caliente Canyon (110800010308)	6.9	0	311	5
Caliente Canyon-Vermejo River (110800010309)	7.1	0	377	0
Rail Canyon-Vermejo River (110800010401)	7.2	0.01	397	2
Saltpeter Creek (110800010402)	9.8	0	188	1
Headwaters Van Bremmer Creek (110800010403)	9.3	0.02	426	1
Outlet Van Bremmer Creek (110800010404)	26.9	0.01	437	5
Van Bremmer Creek-Vermejo River (110800010405)	19.5	0.04	258	5
Stubble Field Arroyo-Vermejo River (110800010406)	60.4	0.35	391	7
Crow Canyon (110800010501)	5.7	0.04	450	0
Willow Canyon (110800010502)	21.6	0.02	310	5
Headwaters Tinaja Creek (110800010503)	12.3	0	372	0
Outlet Tinaja Creek (110800010504)	29.0	0	316	0
Crow Creek (110800010505)	50.3	0	244	0
Crow Creek-Canadian River (110800010506)	52.8	0	375	0
Curtis Creek (110800010507)	46.0	0.22	312	0
Kappis Arroyo (110800010508)	32.3	0	163	2
Spring Arroyo (110800010509)	42.7	0	204	14
Maxwell National Wildlife Refuge (110800010510)	62.6	2.33	317	1
Ladd Arroyo (110800010511)	28.2	0	151	0
Vermejo River-Canadian River (110800010512)	49.9	0.89	184	1
Rondeau Creek (110800010601)	26.4	0	142	0
Headwaters Rio del Plano (110800010602)	18.2	0	292	0
Dry Arroyo (110800010603)	54.2	0.48	362	3
Outlet Rio del Plano (110800010604)	55.3	0	444	0
Alkali Arroyo (110800010605)	38.9	0	211	0
Cimarron River-Canadian River (110800010606)	39.2	0.76	395	4

Figure 20. Candidate Canadian Headwaters HUC12s for watershed protection (darkest blue are best candidates) based on: (A) RPI Index Score from the scenario 1B screening; (B) percentage of streamlength that is 303(d) listed or has a TMDL; (C) PHWA Statewide Watershed Health Index (Percentile).



<u>Which HUC12s should be protected while others are restored</u>? Although the RPS Tool is most often used to assist restoration planning, it can also be used to identify candidates for watershed protection. The HUC12s in the Canadian Headwaters ultimately all contribute to the same drainage, and thus targeted HUC12 protection affects the condition of this HUC8 just as targeted HUC12 restoration efforts do. The healthier HUC12s likely play an important role in attenuating nutrient loads from upstream or contributing low nutrient water that may dilute loads from other HUC12s downstream. There are multiple options for identifying healthy watersheds and selecting protection priorities. For example, the HUC12s in relatively better condition for protection in a nutrients setting can be found using RPS Index scores, indicators related to the absence of impairment, ecological attributes associated with ability to process nutrients, and indicators from EPA's Preliminary Health Watersheds Assessment.

Three such options appear in the Figure 20 bubble plots using different bubble colors to highlight the best prospects for protection. The first (A) is the RPI Index score, an integrator of the ecological, stressor and social indicators chosen for scenario 1B. High RPI scores may serve as a single predictor of the best protection candidates given a broad range of considerations. A portion of the best HUC12s (top 50th percentile RPI scores) fall in the upper left quadrant of the plot where lower Stressor Index and higher Ecological Index scores combine.

A second option (B) uses the percentage of stream miles in the HUC12 that is 303d listed or has a TMDL. The best prospects for protection based on this indicator have no 303d listings or TMDLs (0% of stream miles). These HUC12s (palest blue) also tend to cluster in the upper left quadrant of the bubble plot.

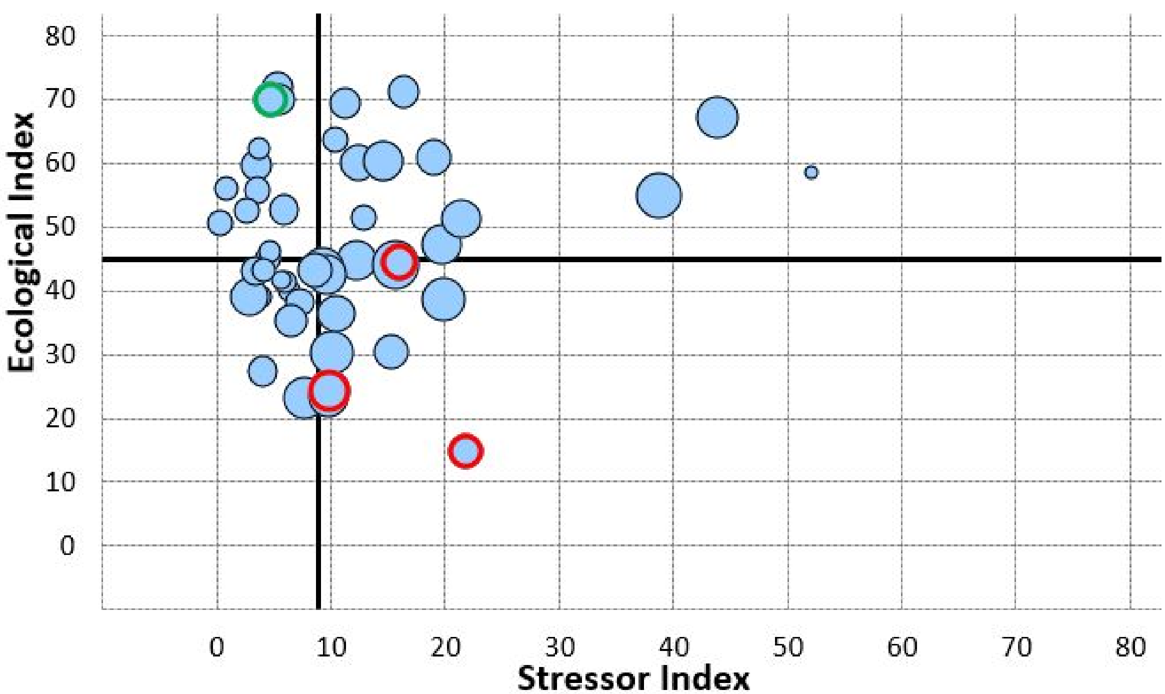
A third option (C) is the overall PHWA statewide Watershed Health Index. This indicator identifies watersheds with the greatest potential for supporting healthy, functioning aquatic ecosystems by combing sub-indices of landscape, hydrologic, geomorphology, habitat, water quality, and biological condition, and is expressed as a percentile relative to all other watersheds in the state. It points to many of the same HUC12s as protection candidates (located in the upper left quadrant) as overall RPI scores and the percentage of stream miles with 303d listings or TMDLs.

<u>*Does the screening make sense overall*</u>? Although all RPS indicators are evaluated against data quality criteria during and after compilation, it is appropriate to also test RPS screening results as the product of the selected indicators and screening formulae together. The usefulness of any screening is dependent on the relevance of the indicators selected to the purpose of the screening. If the indicators for a given screening purpose are performing as intended, 'good reference' HUC12s and 'poor reference' HUC12s from the 48 Canadian Headwaters HUCs being screened should have predictably good and poor index scores, respectively. To test the screening result in this manner, indicators preferably independent from those in the screening, but likely associated with relatively good or poor reference condition, can be selected and compared with the Canadian Headwaters screening output. Screenings conducted by state water quality programs can also use local knowledge of a watershed to identify suitable good and poor condition HUC12s for validating screening results.

To demonstrate the concept of validating screening output, candidate good and poor reference HUC12s were selected from the 48 Canadian Headwaters HUC12s. Candidate reference HUC12s were selected based on the length of streams with 305b water quality assessments (at least 25% assessed) and the length of streams categorized as impaired. One HUC12 (Van Bremmer Creek-Vermejo River) was selected as a 'good' reference HUC12 because it contained no impaired stream miles and three HUC12s (Raton Creek, York Canyon, and Headwaters Van Bremmer Creek) were selected as poor reference because at least 30% of stream miles in those watersheds were impaired streams.

Figure 21 shows the results of plotting both types of reference HUC12s against the full set of Canadian Headwaters HUC12s. Generally, their Stressor Index scores appear as expected with respect to all Canadian Headwaters HUC12s (low Stressor Index for the good reference HUC12, high Stressor Index for the poor reference HUC12s). Ecological Index scores also appear as expected between the good and poor reference HUC12s (high Ecological Index for the good reference HUC12, low Ecological Index for the poor reference HUC12s). These reference HUC12s provide validation that this screening was set up to effectively represent the indices.

Figure 21. Testing 'good reference' (green outline) and 'poor reference' (red outline) HUC12s in association with the scenario 1B screening results for the Canadian Headwaters watershed. Selection of good and poor reference HUC12s was based on indicators of stream water quality assessments and impairments.

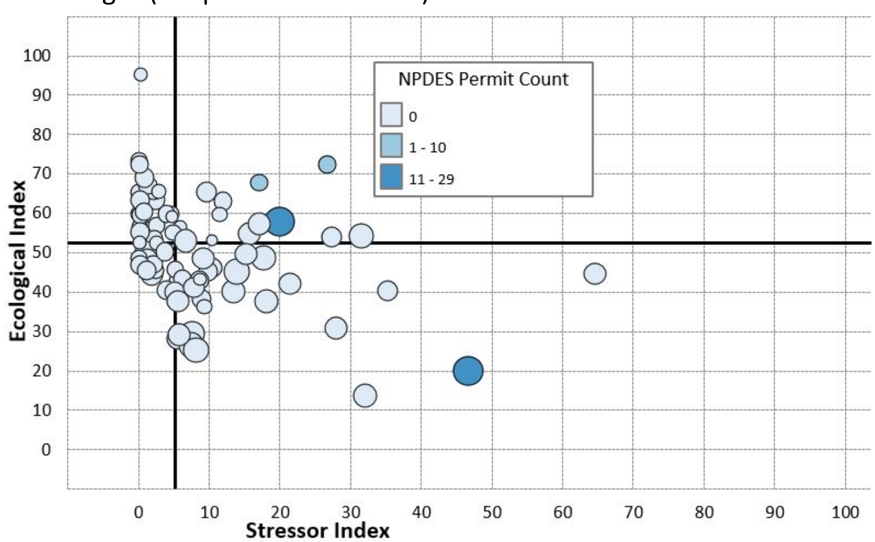


Results for Stage 2 Urban-Suburban Point Source Scenario: Rio Chama Watershed

The Rio Chama HUC8 was one of nine demonstration HUC8s in the Stage 1 urban-suburban point source scenario 2A. Compared with all HUC8s statewide and other scenario HUC8s (see Figure 9), the Rio Chama HUC8 has a mid-range Ecological Index score and a slightly above-median Stressor Index score. Figure 14 contrasts the Rio Chama HUC12 subwatersheds with one another and with those in other demonstration HUC8s from this scenario. Ecological Index scores for Rio Chama HUC12s are almost all below the statewide median while most Stressor Index scores exceed the statewide median.

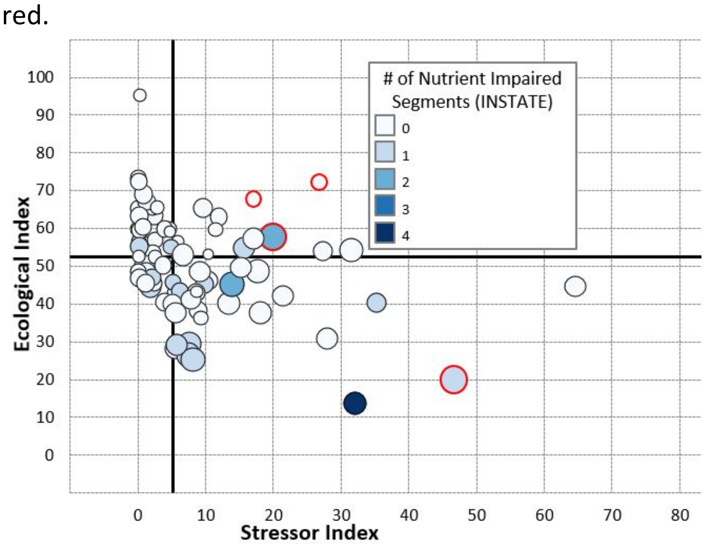
Figure 22 displays the urban-suburban point source scenario bubble plot for Rio Chama HUC12s with bubbles shaded according to the "Watershed NPDES Permit Count" indicator. Based on the data used to calculate NPDES permit counts, four HUC12s in the Rio Chama watershed contain point source discharges. An example series of analytical steps is offered below to further explore restoration potential in these four watersheds. Note that the Stage 2 screening plots throughout this section have axes located at median index scores for Rio Chama HUC12s, not statewide median index scores.

Figure 22. Scenario 2A results for Rio Chama HUC12s, highlighting HUC12s with point source discharges (deeper shades of blue).



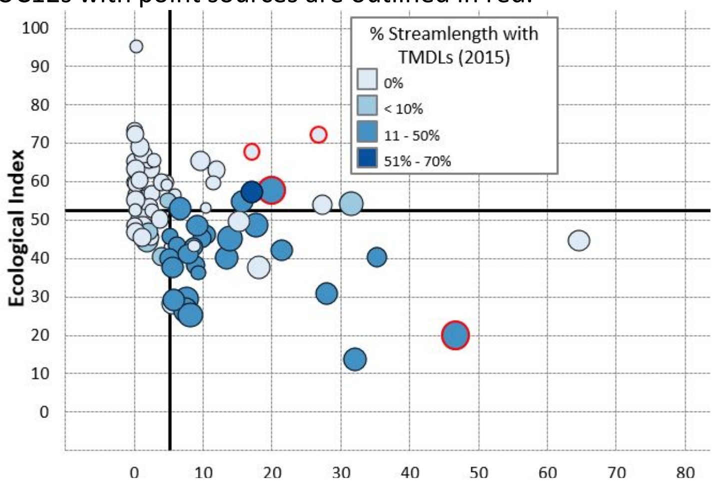
<u>Are HUC12s with point sources also 303(d)-listed for nutrient impairments</u>? In Figure 23, the bubble plot for the Rio Chama screening displays the number of segments in each HUC12 that are 303d-listed as nutrient impaired, based on the 2012 listing cycle (HUC12s containing point source discharges outlined in red). Two of the four HUC12s with point sources contain nutrient impaired streams. One of these has a very high Stressor Index score and very low Ecological Index score (positioned in the bottom right quadrant), indicating that significant reductions in nutrients and/or other pollutants may be needed to improve water quality. The other HUC12 has an above-median Ecological Index score and more moderate Stressor Index score and therefore may be a better candidate for restoration.

Figure 23. Scenario 2A results for Rio Chama HUC12s, highlighting HUC12s with the nutrient 303d listings (deeper shades of blue). HUC12s with point sources are outlined in red.



<u>*Where are we better prepared for action*</u>? A TMDL can provide detailed information on watershed conditions and pollutant sources and can therefore serve as a foundation for on-the-ground water quality management planning. Figure 24 shows the Rio Chama bubble plot with bubble colors based on the percentage of stream length with TMDLs (HUC12s containing point source discharges outlined in red). Two of the four HUC12s with point sources have TMDLs. These same two HUC12s also contain nutrient impaired stream segments (see Figure 23). The presence of a TMDL in the HUC12 with point sources, nutrient impairments, and an above-median Ecological Index score further advances its position as a potential priority for nutrient management.

Figure 24. Scenario 2A results for Rio Chama HUC12s, highlighting HUC12s with TMDLs (deeper shades of blue). HUC12s with point sources are outlined in red.



<u>*What other prominent stressors are present in HUC12s with point sources*</u>? Table 8 lists values and ranks of stressor indicators included in the screening for the four Rio Chama HUC12s that contain point source dischargers. Reviewing this information can provide valuable insight into watershed attributes for priority-setting and management planning. For example, the "% Human Use, U-Index1 in HCZ (2011)" indicator reveals the prominence of developed and agricultural land cover types which could contribute to non-point pollution in the HUC12. Planners could focus on HUC12s where anthropogenic land cover is low and point sources are primary contributors to nutrient loading. Alternatively, HUC12s with higher anthropogenic land cover could be of interest if project goals include coupling point source and nonpoint source management actions. Other stressor indicators related to water use ("Agricultural Water Demand in WS (MGD)", "Dam Density (# per mi.) (INSTATE)", "# of Diversions (INSTATE)" can highlight HUC12s where restoration of aquatic ecosystems may be further complicated by flow alterations.

Table 8. Values of stressor indicators for HUC12s in the Rio Chama watershed with point source discharges. Indicator values are followed by ranks in parentheses. HUC12s are ranked in ascending order (lowest to highest) out of 83 Rio Chama HUC12s.

HUC12 ID	% Human Use, U-Index1 in HCZ (2011)	Agricultural Water Demand in WS (MGD)	Dam Density (# per mi.) (INSTATE)	% Streamlength Impaired 303d-Listed + TMDLs (2015)	# of Groundwater Discharges (INSTATE)	# of Diversions (INSTATE)	Pop. Density (# per sq. mi.) (INSTATE)
130201020204	1.9% (71)	0.1 (56)	0 (1)	26.4% (69)	1 (70)	31 (64)	17.8 (81)
130201020402	7.3% (82)	0.7 (73)	0.08 (82)	43.5% (80)	1 (70)	58 (73)	8.2 (73)
130201021103	3.4% (78)	4.9 (82)	0 (1)	0% (1)	1 (70)	122 (78)	13.9 (76)
130201021504	1.5% (68)	1.1 (75)	0 (1)	0% (1)	2 (81)	50 (70)	9.9 (74)

What economic factors could be considered for prioritization? In Figure 25, the Rio Chama HUC12s are color-assigned by the estimated median household income for the watershed, based on the 2010 US Census Bureau American Community Survey. Median incomes for the four HUC12s with point sources range from $36,114 to $41,964, a difference of approximately 15%. Factors such as median household income can provide an indication of potential economic support to finance sewage treatment plant upgrades to reduce nutrient discharges. Alternatively, watersheds with lower income populations may be good candidates for management initiatives with environmental justice objectives and dedicated funding to support them.

Figure 25. Scenario 2A bubble plot and map outputs for Rio Chama HUC12s with watersheds shaded according to estimated median household income. Red outlines indicate HUC12s with point sources.

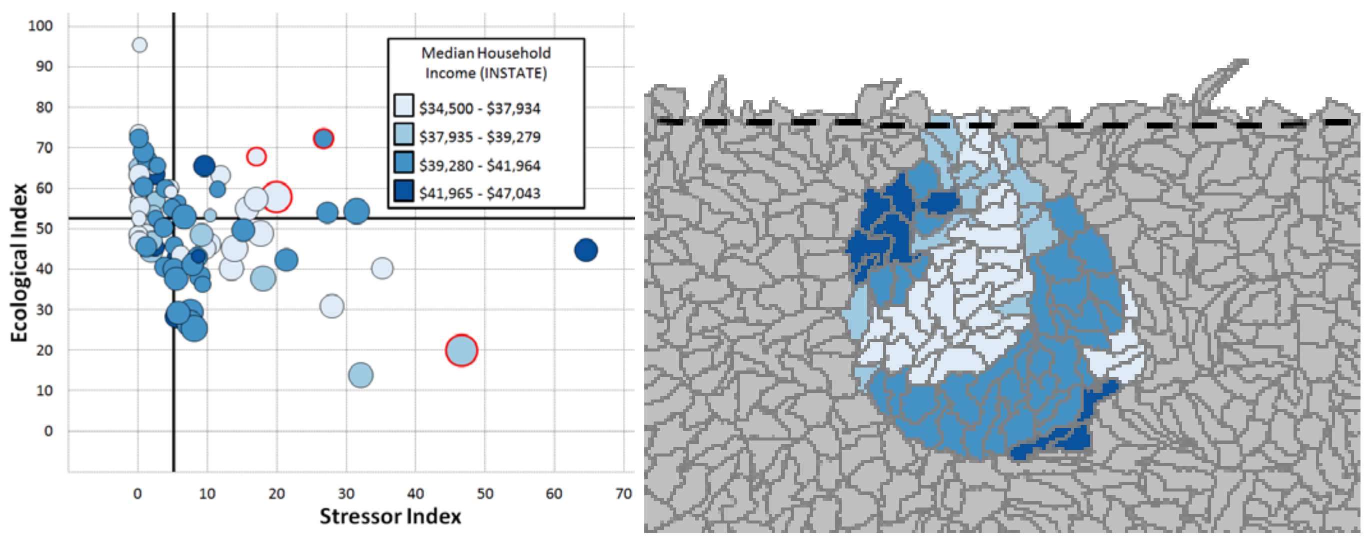
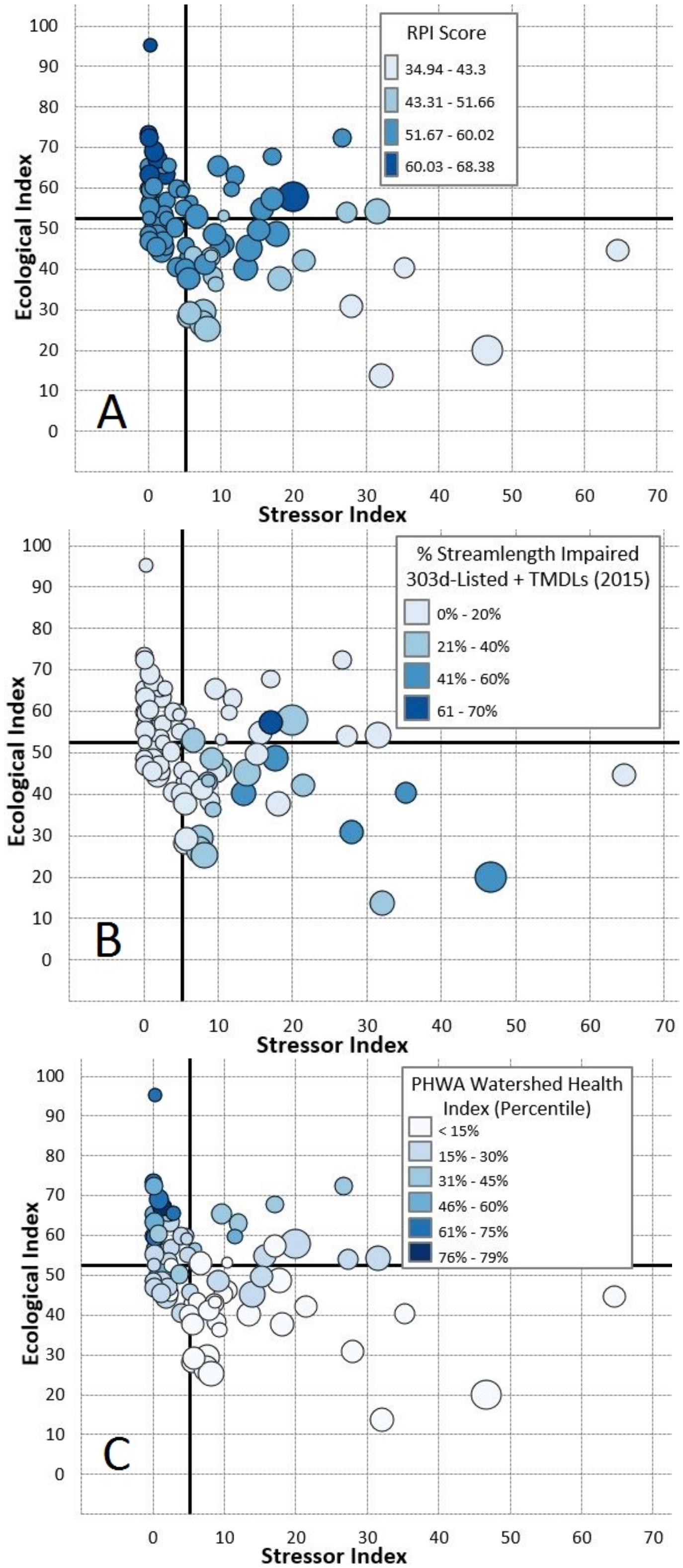


Figure 26. Rio Chama HUC12s for watershed protection (darkest blue are best candidates) based on: (A) RPI Index Score from the scenario 2A screening; (B) percentage of stream length that is 303(d) listed or has a TMDL; (C) PHWA Statewide Watershed Health Index.



<u>*Which HUC12s should be protected while others are restored*</u>? Healthy watersheds and protection priorities for healthy watersheds can be identified using a variety of indicators, including RPS Index scores, indicators related to the absence of impairment, ecological attributes associated with ability to process nutrients, and indicators from EPA's Preliminary Health Watersheds Assessment.

Three such options appear in the Figure 26 bubble plots using different bubble colors to highlight the best prospects for protection. The first (A) is the RPI Index score, an integrator of the ecological, stressor and social indicators chosen for scenario 2A. High RPI scores may serve as a single predictor of the best protection candidates given a broad range of considerations. Almost all the best HUC12s (top 50th percentile RPI scores) fall in the upper left quadrant of the plot where lower Stressor Index and higher Ecological Index scores combine.

A second option (B) uses the percentage of stream miles in the HUC12 that are 303d listed or have a TMDL. The best prospects for protection based on this indicator have no 303d listings or TMDLs (0% of stream miles). These HUC12s also tend to fall within the upper left quadrant of the bubble plot.

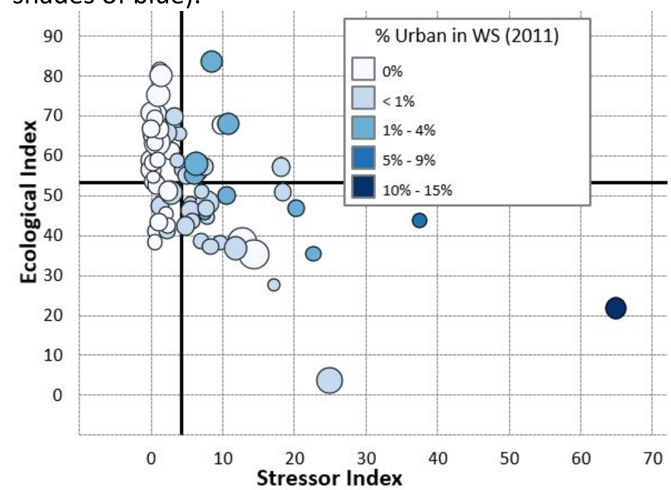
A third option (C) is the overall PHWA statewide Watershed Health Index. This indicator identifies watersheds with the greatest potential for supporting healthy, functioning aquatic ecosystems by combing sub-indices of landscape, hydrologic, geomorphology, habitat, water quality, and biological condition, and is expressed as a percentile relative to all other watersheds in the state. It points to many of the same HUC12s as protection candidates (located in the upper left quadrant) as overall RPI scores and the percentage of stream miles with 303d listings or TMDLs.

Results for Stage 2 Urban-Suburban Non-Point Source Scenario: Rio San Jose Watershed

The Rio San Jose HUC8 was one of nine demonstration HUC8s in the Stage 1 urban-suburban non-point source scenario 2B. Compared with all HUC8s statewide and other scenario HUC8s (see Figure 11), the Rio San Jose HUC8 has moderate Ecological Index and Stressor Index scores (near statewide medians). Figure 15 contrasts the Rio San Jose HUC12 subwatersheds with one another and with those in other demonstration HUC8s from this scenario. Nearly all of the Rio San Jose HUC12s are near the statewide Stressor Index median but Ecological Index scores are distributed above and below the statewide median. Social Index scores (represented by bubble sizes) HUC12s tend to be relatively high for HUC12s with above-average Ecological Index scores.

An example series of further analytical steps to compare and prioritize Rio San Jose HUC12s is offered below. Note that the Stage 2 screening plots throughout this section have axes located at median index scores for Rio San Jose HUC12s, not statewide median index scores.

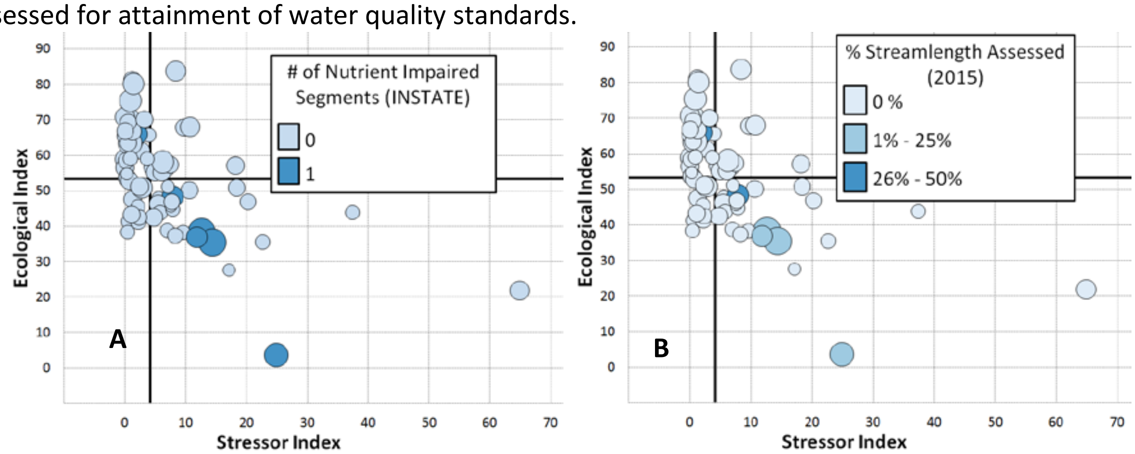
Figure 27. Scenario 2B results for Rio San Jose HUC12s, highlighting HUC12s with urban land cover (deeper shades of blue).



<u>*Where are urban-suburban centers relative to how the HUCs are scored*?</u> In Figure 27, the bubble plot from the Rio San Jose screening is further enhanced to display the percentage of urban land cover in the HUC12. The majority of HUC12s with high Ecological Index scores have no or low amounts of urban land cover (less than 1%). However, some of the HUC12s with highest Ecological Index scores have moderate levels of urban land cover (up to 4%). These HUC12s could be better candidates for urban stormwater management to reduce nutrient loading because they may possess ecological traits that support nutrient retention and processing or contain ecosystems that are not severely degraded.

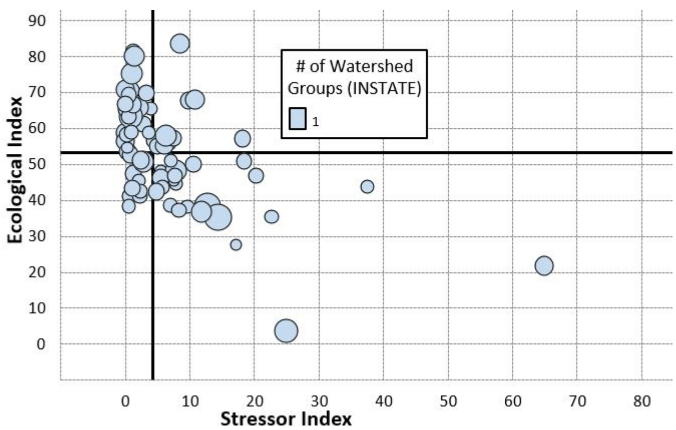
<u>*Do HUC12s with urban-suburban land cover also have 303d listed nutrient impairments*?</u> In Figure 28A, the bubble plot for the Rio San Jose screening displays the number of segments in each HUC12 that are 303d-listed as nutrient impaired, based on the 2012 listing cycle. Six of the Rio San Jose HUC12s contain a nutrient impaired segment, however, these HUC12s all have low urban-suburban land cover (less than 1%). The absence of nutrient impairments in HUC12s with higher urban land cover does not necessarily mean that nutrient loading is not an issue in these watersheds, as they may not have been assessed recently for attainment of water quality standards. This is confirmed by reviewing the bubble plot with shading based on the percent of assessed stream miles in the HUC12 (Figure 28B), which shows that most of the Rio San Jose HUC12s have zero assessed streams.

Figure 28. Scenario 2B results for Rio San Jose HUC12s, highlighting HUC12s (a) with nutrient impairments; and (b) waters assessed for attainment of water quality standards.



<u>Are stakeholder groups active in the watersheds?</u> Another technique for interpreting screening results is to compare index scores in conjunction with a particular social indicator of high importance to local community action. In Figure 29, the Rio San Jose HUC12s are color-assigned by the number of watershed groups active in the watershed. All of the Rio San Jose HUC12s have one active watershed group, indicating that there is likely a watershed group working within the entire Rio San Jose HUC8 or possibly a broader group of HUC8s. The presence of a watershed group could be a factor in increasing the likelihood of implementing nutrient management control actions in specific watersheds.

Figure 29. Scenario 2B bubble plot and map outputs for Rio San Jose HUC12s, highlighting the number of watershed groups active in each HUC12.



<u>Which watersheds could be affected by urban-suburban growth</u>? Given that the Rio San Jose HUC8 is one of the urban-suburban demonstration watersheds, an additional consideration for priority-setting could be to compare indicators of urban-suburban expansion in the HUC12s. In Figure 30, two indicators of urban expansion are displayed for Rio San Jose HUC12s: (1) the change in urban land cover from 2001 to 2011 and; (2) the projected increase in impervious cover from 2010 to 2050. Nearly all of the Rio San Jose HUC12s have had negligible recent urban growth (0% increase in urban cover from 2001-2011), with above-zero values occurring in the two HUC12s with the highest Stressor Index scores only. Similarly, projections of future imperviousness also point to minor increases by 2050 (<0.5%) in most HUC12s. A lack of extensive recent and projected future urban expansion may be preferred for prioritizing HUC12s for restoration because of the planning uncertainties associated with growing areas and additional potential stresses that could impede restoration efforts.

Figure 30. Scenario 2B bubble plot outputs for Rio San Jose HUC12s, highlighting HUC12s with (A) recent urban expansion and (B) projected increases in impervious area (deepest blue shades).

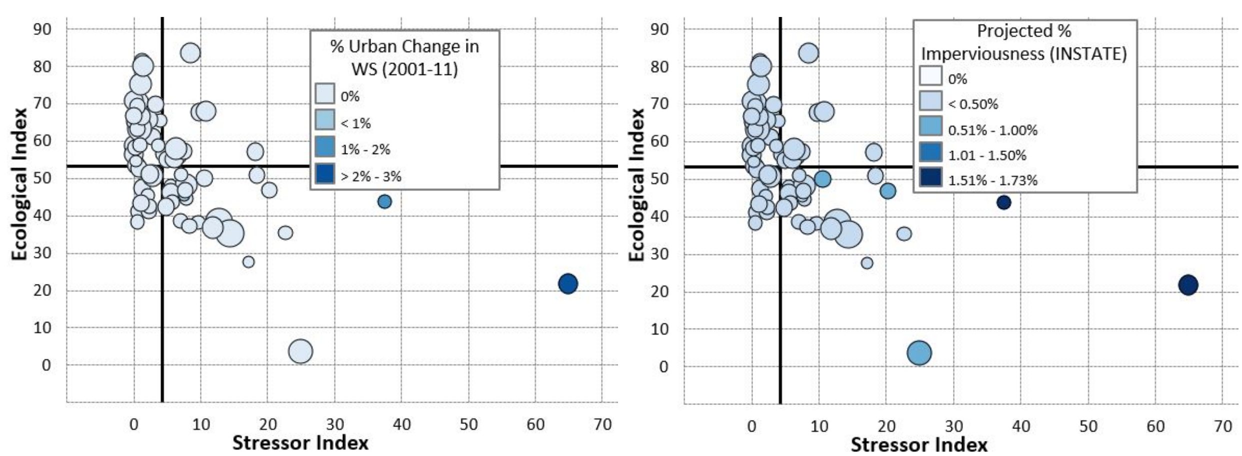
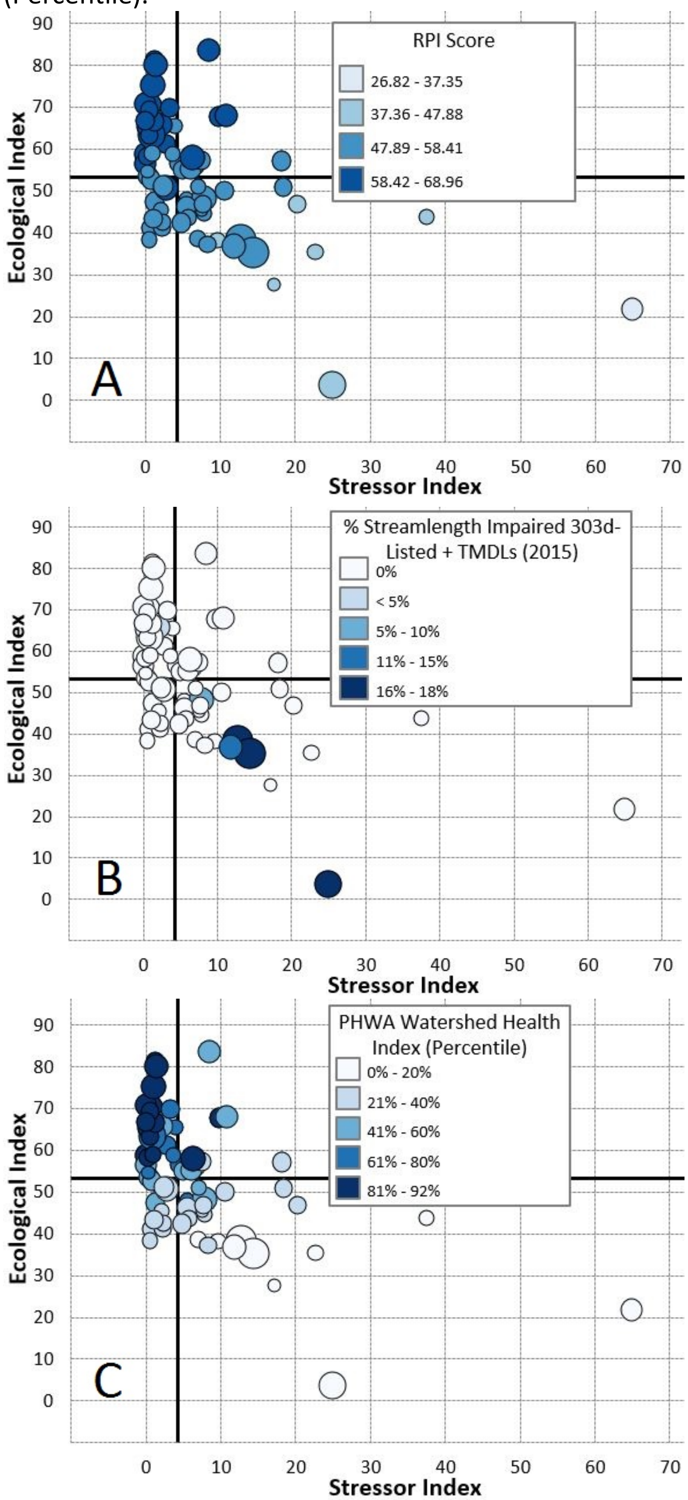


Figure 31. Candidate Rio San Jose HUC12s for watershed protection (darkest blue are best candidates) based on: (A) RPI Index Score from the scenario 2B screening; (B) percentage of stream length that is 303(d) listed or has a TMDL; (C) PHWA Statewide Watershed Health Index (Percentile).



__Which HUC12s should be protected while others are restored__? Healthy watersheds and protection priorities for healthy watersheds can be identified using a variety of indicators, including RPS Index scores, indicators related to the absence of impairment, ecological attributes associated with ability to process nutrients, and indicators from EPA's Preliminary Health Watersheds Assessment.

Three such options appear in the Figure 31 bubble plots using different bubble colors to highlight the best prospects for protection. The first (A) is the RPI Index score, an integrator of the ecological, stressor and social indicators chosen for scenario 2B. High RPI scores may serve as a single predictor of the best protection candidates given a broad range of considerations. Almost all the best HUC12s (top 50th percentile RPI scores) fall in the upper left quadrant of the plot where lower Stressor Index and higher Ecological Index scores combine.

A second option (B) uses the percentage of stream miles in the HUC12 that are 303d listed or have a TMDL. The best prospects for protection based on this indicator have no 303d listings or TMDLs (0% of stream miles). These HUC12s are distributed throughout the bubble plot. However, as previously noted in this section, most of the HUC12s in the Rio San Jose watershed have not been assessed for attainment of water quality standards.

A third option (C) is the overall PHWA statewide Watershed Health Index. This indicator identifies watersheds with the greatest potential for supporting healthy, functioning aquatic ecosystems by combing sub-indices of landscape, hydrologic, geomorphology, habitat, water quality, and biological condition, and is expressed as a percentile relative to all other watersheds in the state. It points to many of the same HUC12s as protection candidates (located in the upper left quadrant) as overall RPI scores.

SUMMARY AND RECOMMENDATIONS

This document summarizes the usage of Recovery Potential Screening (RPS) to compare watersheds at two scales (HUC8 and HUC12) for purposes of informing possible watershed management options and priorities for nutrient management. Utilizing georeferenced data provided primarily by NMED, EPA and additional sources, this project compiled 300 indicators (base, ecological, stressor and social) at one or more watershed scales that were used to screen and compare watersheds in a two-stage process. In the first stage, New Mexico's 86 HUC8s were screened with four separately developed sets of indicators selected to identify initial focus groups of rural-agricultural watersheds and urban-suburban watersheds with nutrient management challenges. Based on these first stage screenings and NMED input, four were selected as demonstration HUC8s for further analysis in the second stage.

Stage 2 screenings were performed on each of these four demonstration HUC8s, and one per each scenario was utilized in this report's discussion of Stage 2 results. These screenings scored and compared each HUC8's component HUC12s using more detailed sets of indicators that drew from HUC12-scale metrics. Whereas the purpose of Stage 1 was to compare and recognize similar groups of scenario watersheds at the larger scale, Stage 2's purpose was to examine and reveal potential opportunities for nutrient management action at the more localized HUC12 scale. As this project was a demonstration of the RPS Tool and approach, no priorities among HUC12s were selected but numerous alternatives and analytical techniques were presented in one Stage 2 screening from each of the two Stage 1 scenarios. Products include this summary report, a master NM RPS Tool file, and separate screening files that archived the results from the two Stage 1 screenings, the three Stage 2 rural-agricultural watershed screenings, and the three Stage 2 urban-suburban watershed screenings. Opportunities for NMED and other users from this point forward may include:

Become adept at RPS Tool desktop use. Despite the extensive amount of data it holds, its numerous product formats and the wide variety of comparisons among watersheds that these data can support, the NM RPS Tool is actually a fairly simple spreadsheet tool. As novice users of Excel far outnumber GIS specialists, for many more people this tool opens the door to simple but useful forms of spatial data analysis, systematic comparisons among watersheds, and a variety of visualization tools – on their own desktops. A wider circle of users will be able to perform quick 'what-if' screenings to compare watersheds on the spur of the moment and gain insights on what may be worth a greater investment of time and effort with more technical analytical tools.

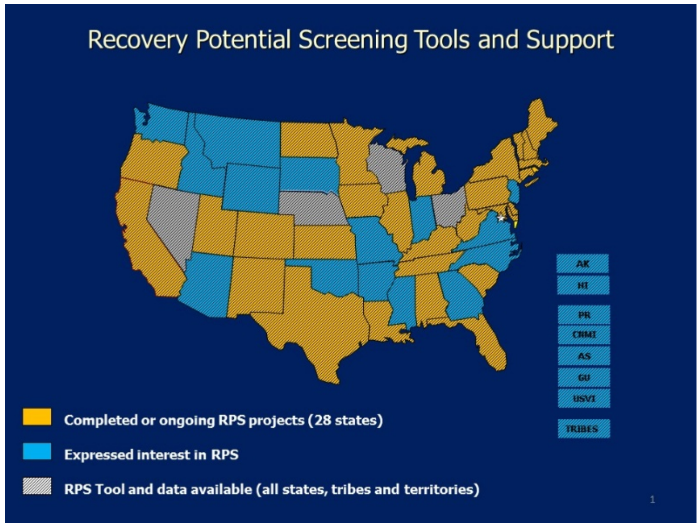
Apply the RPS Tool to other screening topics. Although this effort focused on a nutrients application of RPS, the New Mexico dataset would support numerous other screening themes and purposes that can be explored in the interest of long-term priority setting for restoration and protection. Pathogen impairments have been the focus of previous NMED uses of the RPS Tool. Other screening topics might include sediment, metals, or any other prominent cause of impairment. Or in contrast, screenings might focus on a valued resource such as watersheds with coldwater fisheries, or drinking water sources, or major outdoor recreational sites. The RPS Tool might be used to develop a first-cut identification of healthy watersheds for protection, or rank likely eligibility for specifically targeted pollution control settings such as leaky septics along inhabited stream corridors. With both the TMDL Program and the Non-Point Source Control Program promoting watershed priority-setting, the range of opportunities is widespread.

Refine the available data and selection of indicators. Even within this nutrients application of RPS, opportunities always will exist to add more relevant data or refine previous screenings as new insights are gained. The RPS Tool is structured to accept additional indicator data from a user that can then be made part of future screenings. New data needn't be statewide, and a local user may still use the tool after adding new data for a limited set of their local subwatersheds. Further, previous analyses can be refined by structured group processes to assign consensus weights to indicators, or by correlation analyses designed to narrow down indicator selections and better differentiate watersheds. For example, re-running the Stage 1 screening to separately include SPARROW incremental and delivered nutrient load estimates would allow for considering HUC8 differences in relation to nutrient delivery to the Gulf of Mexico as well as to instate effects only.

Galvanize state/local restoration and protection dialogue and partnering. RPS offers an organized and accessible mechanism for state-local collaboration. Rather than assume that the RPS indicators are a static dataset, or that the HUC8 screenings shouldn't be additionally adjusted or customized, further tailoring to the circumstances and data of each locale is appropriate and encouraged. Some HUC8s may host watershed groups, researchers and other sources of continued analysis and refinement of the available indicators and techniques that can be accommodated by this versatile tool. Further, if local organizations do engage with NMED and enhance their RPS Tool copies, they may provide valuable dialogue on addressing local as well as statewide interests in watershed priority-setting and improved nutrient management.

Attachment 1

RECOVERY POTENTIAL SCREENING: SUMMARY



- Recovery Potential Screening (RPS) is a systematic, comparative method for identifying differences among watersheds that may influence their relative likelihood to be successfully restored or protected. The EPA Office of Wetlands, Oceans and Watersheds (OWOW) created RPS jointly with the EPA Office of Research and Development (ORD) in 2004 to help states and others use limited restoration resources wisely, with an easy to use tool that is customizable for any geographic area of interest and a variety of comparison and prioritization purposes.

- The main programmatic basis for RPS includes the TMDL Program (e.g., prioritized schedule for listed waters; where best to implement TMDLs; Integrated Reporting of Priority waters under the TMDL Vision) and the Nonpoint Source Program (e.g., annual program strategies; prioritization to aid project funding decisions; collaboration with Healthy Watersheds), but several other affiliations also exist.

- Since 2005, several hundred RPS indicators have been incrementally compiled through literature review, identifying states' indicator needs and preferences, and collaboration with others (ORD EnviroAtlas, Region 4 Watershed Index). Most have been applied in a series of statewide RPS projects. In 2009, an RPS paper was published in the refereed journal *Environmental Management*. The one-stop RPS Website hosts a library of indicators, RPS tools, case studies and step by step RPS instructions.

- As of 2017, RPS projects and statewide databases have been either initiated or completed in 28 states (see figure). Approximately that many additional states have expressed interest in RPS usage, but limited EPA resources have not yet been able to support all requests.

- The RPS Tool is key to RPS' ease of use, widespread applicability and speed. This tool is an Excel spreadsheet that contains all watershed indicators, auto-calculates key indices, and generates rank-ordered tables, bubble plot graphics and maps that can be user-customized. Any novice Excel user can become fluent in using the RPS Tool.

- Statewide RPS Tools and data have now been developed for each of the states and territories. These generally contain 285 indicators measured for every HUC12, and enable customizable desktop screening, rank ordering, graphics plotting and mapping without advanced software or training. Individual, state-specific RPS Tools were distributed in 2014, 2016, and 2017 and are publicly available online.

- RPS is playing/may soon play a pivotal role in each of the following:
  - Prioritizing watersheds for nutrient management (projects in 9 states)
  - Identifying state priority watersheds for TMDL Vision/Integrated Reporting 2016-2022
  - Improving state/local interactions in states with RPS projects
  - Enabling Tribes to screen and compare their watersheds for purposes similar to states
  - Helping the Healthy Watersheds program by providing a national preliminary assessment
  - Jointly (OW and EPA Region 4) creating the Watershed Index Online (WSIO) interactive tool

- Contact: Doug Norton, WB/AWPD/OWOW at norton.douglas@epa.gov or 202-566-1221.

Attachment 2: NM Stage 1 Scenario Indicator Descriptions

(Note: Black denotes base metrics not used in scoring, green is ecological, red is stressor, blue is social. WS in indicator name always means based on watershed; HCZ always means based on hydrologically connected zones in the watershed; RZ always means based on 100-meter per side riparian zones in the watershed.)

RURAL-AGRICULTURAL POINT SOURCE SCENARIO INDICATORS	DESCRIPTION
Hydrologic Unit Code 8-Digit (HUC8)	HUC8 Code (TEXT)
Name HUC8 Watershed	Name of primary stream draining area or description of area bounded by HUC8 polygon. (TEXT)
% NEF2001, National Ecological Framework, WS	% of HUC that is National Ecological Framework 2001. NEF is the combination of Hubs & Corridors.
% Natural Cover, N-index 2 (2006) in HCZ	% of HUC with natural cover (not barren, urban or agriculture) in the Hydrologically Connected Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 71, 90, 95)
% Woody Vegetation (2006) in Riparian Zone	% of HUC with woody vegetation in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 90)
Ratio of Natural to Recycled N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to recycled anthropogenic N inputs. Inverse of original ORD metric.
Ratio of Natural to New N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to new anthropogenic N inputs. Inverse of original ORD metric.
Empower Density 2001, Mean Value in Watershed	Mean value of non-renewable emergy flow per year (2001 National Land Cover Dataset, EPA R4, Brown & Vivas 2005)
% Urban (2006) in Riparian Zone	% of HUC with urban cover in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 21, 22, 23, 24)
Watershed Likely N/P NPDES Discharger Count	From EPA's NPDAT website, the HUC8's number of NPDES-permitted dischargers whose permits contained terms related to nutrient discharge limits
Centralized Sewage N Input	Estimated nitrogen load from centralized sewage treatment systems per HUC8 per year. Derived by multiplying sewage input rate (kg N per HA per year) from EPA ORD nitrogen study times the HUC8 area in sq meters.
Agricultural water use WS	Estimated millions of gallons of water used daily for agricultural irrigation for each HUC-12. Estimates include self-supplied surface and groundwater, as well as water supplied by irrigation water providers, which may include governments, companies, or other organizations.
Domestic water use WS	From EPA/ORD EnviroAtlas, domestic water usage estimates.
SPARROW Predicted Incremental N Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
SPARROW Predicted Incremental P Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009)

	(http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
Anthropogenic Recycled N Effort	The value of TOTRECYCNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTRECYCNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve recycled N reductions for the whole HUC8 as influenced by both effort per unit area and size.
Anthropogenic New N Effort	The value of TOTNEWNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTNEWNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve new N input reductions for the whole HUC8 as influenced by both effort per unit area and size.
# of Nutrient Impaired Segments (ISO)	Total number of stream segments impaired by nutrients (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% of HUC8 Instate	Percent of total HUC8 area within NM; allows for setting higher state priorities on watersheds fully or mostly within their borders as well as identifying watersheds for multi-state cooperation.
# of Watershed Groups (ISO)	# of watershed groups that are active in the watershed (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Percent GAP status 1, 2, and 3 WS	Percent of HUC8 by total area that is in GAP analysis program's protection and conservation status categories 1, 2, and 3
Anthropogenic Recycled N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for recycled N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Anthropogenic New N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for new N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Percent Drinking Water Source Protection Area WS	Representative of the relative amount of source water protection area (SPA) in the watershed. Original source data are available at HUC12 scale as SPA total % of HUC12 area; every SPA's percent area is summed to get the HUC12 total. Thus, due to multiple SPAs per HUC, it is possible to have values >100%. The HUC8 indicator is the mean of the HUC12 values.

RURAL-AGRICULTURAL NON-POINT SOURCE SCENARIO INDICATORS	DESCRIPTION
Hydrologic Unit Code 8-Digit (HUC8)	HUC8 Code (TEXT)
Name HUC8 Watershed	Name of primary stream draining area or description of area bounded by HUC8 polygon. (TEXT)
% NEF2001, National Ecological Framework, WS	% of HUC that is National Ecological Framework 2001. NEF is the combination of Hubs & Corridors.
% Natural Cover, N-index 2 (2006) in HCZ	% of HUC with natural cover (not barren, urban or agriculture) in the Hydrologically Connected Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 71, 90, 95)
% Woody Vegetation (2006) in Riparian Zone	% of HUC with woody vegetation in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 90)
Ratio of Natural to Recycled N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to recycled anthropogenic N inputs. Inverse of original ORD metric.
Ratio of Natural to New N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to new anthropogenic N inputs. Inverse of original ORD metric.
Empower Density 2001, Mean Value in Watershed	Mean value of non-renewable emergy flow per year (2001 National Land Cover Dataset, EPA R4, Brown & Vivas 2005)
% Agriculture (2006) in HCZ	% of HUC with agricultural (crops + hay/pasture) cover in the Hydrologically Connected Zone (2006 National Land Cover Dataset version 1; Land classes 81, 82)
% Agriculture (2006) in Riparian Zone	% of HUC with agricultural (crops + hay/pasture) cover in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 81, 82)
Agricultural water use WS	Estimated millions of gallons of water used daily for agricultural irrigation for each HUC-12. Estimates include self-supplied surface and groundwater, as well as water supplied by irrigation water providers, which may include governments, companies, or other organizations.
Domestic water use WS	From EPA/ORD EnviroAtlas, domestic water usage estimates.
SPARROW Predicted Incremental N Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
SPARROW Predicted Incremental P Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
SPARROW Predicted Incremental Agr N Yield (2012)	Recalculation of SPARROW results for N incremental yield estimation developed in 2012-2013 at HUC12 scale using newer data; HUC12 data aggregated to HUC8 scale.
SPARROW Predicted Incremental Agr P Yield (2012)	Recalculation of SPARROW results for P incremental yield estimation developed in 2012-2013 at HUC12 scale using newer data; HUC12 data aggregated to HUC8 scale.
Anthropogenic Recycled N Effort	The value of TOTRECYCNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTRECYCNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve recycled N reductions for the whole HUC8 as influenced by both effort per unit area and size.
Anthropogenic New N Effort	The value of TOTNEWNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTNEWNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve new

	N input reductions for the whole HUC8 as influenced by both effort per unit area and size.
# of Nutrient Impaired Segments (ISO)	Total number of stream segments impaired by nutrients (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
% of HUC8 Instate	Percent of total HUC8 area within NM; allows for setting higher state priorities on watersheds fully or mostly within their borders as well as identifying watersheds for multi-state cooperation.
# of Watershed Groups (ISO)	# of watershed groups that are active in the watershed (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Percent GAP status 1, 2, and 3 WS	Percent of HUC8 by total area that is in GAP analysis program's protection and conservation status categories 1, 2, and 3
Anthropogenic Recycled N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for recycled N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Anthropogenic New N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for new N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Percent Drinking Water Source Protection Area WS	Representative of the relative amount of source water protection area (SPA) in the watershed. Original source data are available at HUC12 scale as SPA total % of HUC12 area; every SPA's percent area is summed to get the HUC12 total. Thus, due to multiple SPAs per HUC, it is possible to have values >100%. The HUC8 indicator is the mean of the HUC12 values.

URBAN-SUBURBAN POINT SOURCE SCENARIO INDICATORS	**DESCRIPTION**
Hydrologic Unit Code 8-Digit (HUC8)	HUC8 Code (TEXT)
Name HUC8 Watershed	Name of primary stream draining area or description of area bounded by HUC8 polygon. (TEXT)
% NEF2001, National Ecological Framework, WS	% of HUC that is National Ecological Framework 2001. NEF is the combination of Hubs & Corridors.
% Natural Cover, N-index 2 (2006) in HCZ	% of HUC with natural cover (not barren, urban or agriculture) in the Hydrologically Connected Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 71, 90, 95)
% Woody Vegetation (2006) in Riparian Zone	% of HUC with woody vegetation in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 90)

Ratio of Natural to Recycled N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to recycled anthropogenic N inputs. Inverse of original ORD metric.
Ratio of Natural to New N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to new anthropogenic N inputs. Inverse of original ORD metric.
% Human Use, U-index1 (2006) in Watershed	% of HUC that is barren, agricultural, or urban (2006 National Land Cover Dataset version 1; Land classes 21, 22, 23, 24, 81, 82)
Empower Density 2001, Mean Value in HCZ	Mean value of non-renewable emergy flow per year in Hydrologically Connected Zone
% Agriculture (2006) in Watershed	% of HUC with agricultural (crops + hay/pasture) cover (2006 National Land Cover Dataset version 1; Land classes 81, 82)
Watershed Likely N/P NPDES Discharger Count	From EPA's NPDAT website, the HUC8's number of NPDES-permitted dischargers whose permits contained terms related to nutrient discharge limits
Centralized Sewage N Input	Estimated nitrogen load from centralized sewage treatment systems per HUC8 per year. Derived by multiplying sewage input rate (kg N per HA per year) from EPA ORD nitrogen study times the HUC8 area in sq meters.
Agricultural water use WS	Estimated millions of gallons of water used daily for agricultural irrigation for each HUC-12. Estimates include self-supplied surface and groundwater, as well as water supplied by irrigation water providers, which may include governments, companies, or other organizations.
Domestic water use WS	From EPA/ORD EnviroAtlas, domestic water usage estimates.
SPARROW Predicted Incremental N Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
SPARROW Predicted Incremental P Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
Anthropogenic Recycled N Effort	The value of TOTRECYCNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTRECYCNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve recycled N reductions for the whole HUC8 as influenced by both effort per unit area and size.
Anthropogenic New N Effort	The value of TOTNEWNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTNEWNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve new N input reductions for the whole HUC8 as influenced by both effort per unit area and size.
# of Nutrient Impaired Segments (ISO)	Total number of stream segments impaired by nutrients (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.

% of HUC8 Instate	Percent of total HUC8 area within NM; allows for setting higher state priorities on watersheds fully or mostly within their borders as well as identifying watersheds for multi-state cooperation.
# of Watershed Groups (ISO)	# of watershed groups that are active in the watershed (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Percent GAP status 1, 2, and 3 WS	Percent of HUC8 by total area that is in GAP analysis program's protection and conservation status categories 1, 2, and 3
Anthropogenic Recycled N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for recycled N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Anthropogenic New N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for new N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Percent Drinking Water Source Protection Area WS	Representative of the relative amount of source water protection area (SPA) in the watershed. Original source data are available at HUC12 scale as SPA total % of HUC12 area; every SPA's percent area is summed to get the HUC12 total. Thus, due to multiple SPAs per HUC, it is possible to have values >100%. The HUC8 indicator is the mean of the HUC12 values.

URBAN-SUBURBAN NON-POINT SOURCE SCENARIO INDICATORS	**DESCRIPTION**
Hydrologic Unit Code 8-Digit (HUC8)	HUC8 Code (TEXT)
Name HUC8 Watershed	Name of primary stream draining area or description of area bounded by HUC8 polygon. (TEXT)
% NEF2001, National Ecological Framework, WS	% of HUC that is National Ecological Framework 2001. NEF is the combination of Hubs & Corridors.
% Natural Cover, N-index 2 (2006) in HCZ	% of HUC with natural cover (not barren, urban or agriculture) in the Hydrologically Connected Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 71, 90, 95)
% Woody Vegetation (2006) in Riparian Zone	% of HUC with woody vegetation in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 41, 42, 43, 52, 90)
Ratio of Natural to Recycled N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to recycled anthropogenic N inputs. Inverse of original ORD metric.
Ratio of Natural to New N Inputs	The ratio of pre-European N inputs (natNfix + Nat_OxN) to new anthropogenic N inputs. Inverse of original ORD metric.

% Human Use, U-index 2 (2006) in Watershed	% of HUC that is barren, agricultural, or urban (2006 National Land Cover Dataset version 1; Land classes 21, 22, 23, 24, 31, 81, 82)
Empower Density 2001, Mean Value in HCZ	Mean value of non-renewable emergy flow per year in Hydrologically Connected Zone
% Agriculture (2006) in Watershed	% of HUC with agricultural (crops + hay/pasture) cover (2006 National Land Cover Dataset version 1; Land classes 81, 82)
% Agriculture (2006) in Riparian Zone	% of HUC with agricultural (crops + hay/pasture) cover in the Riparian Zone (2006 National Land Cover Dataset version 1; Land classes 81, 82)
% Urban (2006) in HCZ	% of HUC with urban cover in the Hydrologically Connected Zone (2006 National Land Cover Dataset version 1; Land classes 21, 22, 23, 24)
Centralized Sewage N Input	Estimated nitrogen load from centralized sewage treatment systems per HUC8 per year. Derived by multiplying sewage input rate (kg N per HA per year) from EPA ORD nitrogen study times the HUC8 area in sq meters.
Agricultural water use WS	Estimated millions of gallons of water used daily for agricultural irrigation for each HUC-12. Estimates include self-supplied surface and groundwater, as well as water supplied by irrigation water providers, which may include governments, companies, or other organizations.
Domestic water use WS	From EPA/ORD EnviroAtlas, domestic water usage estimates.
SPARROW Predicted Incremental N Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
SPARROW Predicted Incremental P Yield	From EPA's NPDAT website, NPDAT provides yields for Mississippi River Basin HUCs only [published in Robertson et al. (2009) (http://onlinelibrary.wiley.com/doi/10.1111/j.1752-1688.2009.00310.x/suppinfo)].
SPARROW Predicted Incremental Agr N Yield (2012)	Recalculation of SPARROW results for N incremental yield estimation developed in 2012-2013 at HUC12 scale using newer data; HUC12 data aggregated to HUC8 scale.
SPARROW Predicted Incremental Agr P Yield (2012)	Recalculation of SPARROW results for P incremental yield estimation developed in 2012-2013 at HUC12 scale using newer data; HUC12 data aggregated to HUC8 scale.
Anthropogenic Recycled N Effort	The value of TOTRECYCNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTRECYCNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve recycled N reductions for the whole HUC8 as influenced by both effort per unit area and size.
Anthropogenic New N Effort	The value of TOTNEWNEFFORT adjusted to consider HUC8 size; calculated by HUC8 area times TOTNEWNEFFORT, then adjusted for better area reporting units. This metric estimates effort to achieve new N input reductions for the whole HUC8 as influenced by both effort per unit area and size.
# of Nutrient Impaired Segments (ISO)	Total number of stream segments impaired by nutrients (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.

% of HUC8 Instate	Percent of total HUC8 area within NM; allows for setting higher state priorities on watersheds fully or mostly within their borders as well as identifying watersheds for multi-state cooperation.
# of Watershed Groups (ISO)	# of watershed groups that are active in the watershed (NMED). ISO means this indicator is calculated for the In-State Only portion of border watersheds.
Percent GAP status 1, 2, and 3 WS	Percent of HUC8 by total area that is in GAP analysis program's protection and conservation status categories 1, 2, and 3
Anthropogenic Recycled N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for recycled N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Anthropogenic New N Effort (Inverse)	A weighted average overall degree of difficulty based on the proportion of each N input source and its individual degree of difficulty, for new N sources per HUC. Does not consider HUC size. Based on values assigned by the specific state water program personnel as their best professional judgment whether the HUC's anthropogenic N sources require high (3), medium (2) or low (1) effort to reduce loads. Original rankings were inverted in this metric to be directionally consistent with other (higher=better) social metrics.
Percent Drinking Water Source Protection Area WS	Representative of the relative amount of source water protection area (SPA) in the watershed. Original source data are available at HUC12 scale as SPA total % of HUC12 area; every SPA's percent area is summed to get the HUC12 total. Thus, due to multiple SPAs per HUC, it is possible to have values >100%. The HUC8 indicator is the mean of the HUC12 values.

Attachment 3: NM Stage 2 Rural-Agricultural and Urban-Suburban Scenario Indicator Descriptions

(Note: Glossary terms may be referenced in Stage 2 indicator descriptions. Green denotes ecological, red is stressor, blue is social. WS in indicator name always means based on watershed; HCZ always means based on hydrologically connected zones in the watershed; RZ always means based on 100-meter per side riparian zones in the watershed.)

GLOSSARY TERMS	DESCRIPTION
NHDPlus2	The National Hydrography Dataset Plus Version 2 (NHDPlus2) is a collection of geospatial datasets on the location and attributes of surface waters in the United States and their drainage areas. NHDPlus2 datasets are derived from static snapshots of the National Hydrography Dataset (NHD) surface water network, Watershed Boundary Dataset (WBD) hydrologic units (12-digit), and National Elevation Dataset (NED) topography. NHDPlus2 is the current standard for US EPA and many other users of nationally consistent geospatial data on surface waters. For more information and data access go to: http://www.horizon-systems.com/NHDPlus/NHDPlusV2_home.php.
NHD Snapshot	The NHDPlus2 National Hydrography Dataset Snapshot (NHD Snapshot) is a geospatial database of surface water features (rivers, streams, lakes, reservoirs, etc.) in the United States. The NHD Snapshot depicts the location of surface waters at medium resolution (1:100,000-scale or better) as line or polygon features with information on upstream/downstream connections. The NHD Snapshot is a static copy of the National Hydrography Dataset (NHD) maintained by the US Geological Survey which was used for development of NHDPlus2. Because the NHD undergoes frequent updates by USGS, and because improvements were applied during NHDPlus2 development, the NHD Snapshot is provided for download by NHDPlus2 developers to serve as a standard hydrography dataset for users.
NED Snapshot	The NHDPlus2 National Elevation Dataset Snapshot (NED Snapshot) is a geospatial gridded dataset of the land surface elevation of the United States at 30-meter resolution. The NED Snapshot is a static copy of the National Elevation Dataset (NED) maintained by the US Geological Survey (USGS) which was used for development of NHDPlus2. Because the NED undergoes frequent updates by USGS, the NED Snapshot is provided for download by NHDPlus2 developers to serve as a standard elevation dataset for users.
WBD Snapshot	The NHDPlus2 Watershed Boundary Dataset Snapshot (WBD Snapshot) is a geospatial dataset of surface water drainage area boundaries in the United States. The WBD Snapshot is a static copy of 12-digit hydrologic unit (HUC12) boundaries in the Watershed Boundary Dataset (WBD) maintained by the US Geological Survey and Natural Resources Conservation Service which was used for development of NHDPlus2. Because the WBD undergoes frequent updates by USGS and NRCS, the WBD Snapshot is provided for download by NHDPlus2 developers to serve as a standard HUC12 boundary dataset for users.
WBD Snapshot, EnviroAtlas Version	The EnviroAtlas version of the NHDPlus2 Watershed Boundary Dataset (WBD Snapshot, EnviroAtlas Version) is an edited version of the WBD Snapshot. To create the EnviroAtlas Version, the WBD Snapshot was clipped to the boundaries of the United States and manually edited to eliminate overlapping HUC12 boundaries. Additional information on the

	WBD Snapshot, EnviroAtlas Version can be found at: http://www.epa.gov/enviroatlas/enviroatlas-data-download-step-2.
2011 CDL-NLCD Hybrid Land Cover	The 2011 CDL-NLCD Hybrid Land Cover dataset is a national land cover grid that combines the 2011 Cropland Data Layer (CDL) and the 2011 National Land Cover Database (NLCD) Land Cover datasets. The 2011 NLCD Land Cover dataset was used as the base layer. Agricultural land cover classes from the 2011 CDL were then overlaid onto the base layer except where single, "Instate"lated CDL crop pixels had less than 90% confidence in crop type classification. This dataset was produced by EPA EnviroAtlas as a continuous 30 meter resolution grid for the United States. More information on the 2011 CDL-NLCD Hybrid Land Cover dataset can be found at: https://edg.epa.gov/data/Public/ORD/EnviroAtlas.
Water Mask	The Water Mask is a geospatial grid dataset depicting the location of surface waters in the United States. The Water Mask combines surface water features in the NHDPlus2 with areas classified as open water or wetlands in the National Land Cover Database (NLCD) 2011 Land Cover dataset. The Water Mask was created by overlaying a grid of NHDPlus2 surface water features (the NHDPlus2 CatSeed grid) with pixels in the NLCD2011 Land Cover dataset classified as open water (code 11), woody wetlands (code 90), and emergent herbaceous wetlands (code 95). The spatial resolution of the Water Mask grid is 30 meters.
Wetness Index	The Wetness Index is a geospatial grid dataset of Wetness Index values for the United States. The Wetness Index is a relative measure of average soil moisture and runoff potential based on topography and is also known as the Topographic Index. The dataset stores a Wetness Index value for each grid pixel based on the magnitude of the pixel's upstream drainage area and pixel slope. The Wetness Index grid was generated from the NHDPlus2 NED Snapshot and NHDPlus2 Flow Accumulation grids using the following steps: (1) the NED Snapshot was used to create a gridded dataset of land surface slope in degrees; (2) a Wetness Index value was calculated for each grid pixel as ln(Flow Accumulation/tan(Slope)); (3) a smoothed Wetness Index grid was calculated as the average of step 2 values in each 3-by-3 pixel block; (4) the final Wetness Index value for each grid pixel was calculated as the average of the unsmoothed value (step 2) and the smoothed value (step 3). The spatial resolution of the Wetness Index grid is 30 meters.
Watershed (WS)	Watershed (WS) is used to describe indicators that are measured throughout the entire geographic area of the HUC12. Although all indicators are expressed as attributes of HUC12s, some indicators measure conditions throughout the entire geographic area of the HUC12, while others measure conditions within a subarea of the HUC12. For example, watershed (WS) land cover indicators measure land cover in the entire HUC12 while riparian zone (RZ) land cover indicators measure land cover in the buffer surrounding surface water features in the HUC12.

Riparian Zone (RZ)	The Riparian Zone (RZ) is the corridor of land adjacent to surface waters. The RZ is delineated for the United States in a geospatial grid dataset depicting surface water features and adjacent buffer areas. The RZ grid was generated by creating a 108 meter buffer around surface waters in the Water Mask grid. The buffer includes areas on both sides of surface waters and the buffer size of 108 meters was selected based on the spatial resolution of the Water Mask grid to approximate a 100 meter buffer. The spatial resolution of the RZ grid is 30 meters. (See also Water Mask glossary definition).
Hydrologically Connected Zone (HCZ)	The Hydrologically Connected Zone (HCZ) is comprised of wet areas with high runoff potential that are contiguous to surface water. The HCZ is delineated for the United States for indicator calculations in a geospatial grid dataset depicting surface water features and wet areas that are contiguous to surface water. The HCZ grid was generated using the Wetness Index and Water Mask grids. The Wetness Index grid was first used to identify wet areas based on topography (i.e., low-lying, low-slope areas), defined as pixels with a Wetness Index of 550 or greater. The HCZ was then delineated as wet pixels in the Wetness Index grid that were also contiguous to surface water in the Water Mask. Wet pixels that were "Instate"lated from surface water were not included in the HCZ grid. The spatial resolution of the HCZ grid is 30 meters. (See also Water Mask and Wetness Index glossary definitions).
Hydrologically Active Zone (HAZ)	The Hydrologically Active Zone (HAZ) is a geospatial grid dataset that combines the Riparian Zone grid and the Hydrologically Connected Zone grid. (See also Riparian Zone and Hydrologically Connected Zone definitions).
303(d) Listed Waters Dataset	The 303(d) Listed Impaired Waters NHDPlus Indexed Dataset (303(d) Listed Waters) is a geospatial dataset of waters designated under Section 303(d) of the Clean Water Act as impaired and requiring a Total Maximum Daily Load. The 303(d) Listed Waters dataset is produced and maintained by EPA Office of Water. It depicts the location of 303(d) surface waters as line and polygon features and stores 303(d) listing attributes such as the pollutant(s) causing impairment. The 303(d) Listed Waters dataset uses the NHD Snapshot to map 303(d) listed waters. Most water features in the 303(d) Listed Waters dataset therefore have a match in the NHD Snapshot. Custom-added features that are not present in the NHD Snapshot are also used when a 303(d) listed water feature is not represented in the NHD Snapshot. Additional information is available at: http://www.epa.gov/waterdata/waters-geospatial-data-downloads.
305(b) Assessed Waters Dataset	The 305(b) Waters as Assessed NHDPlus Indexed Dataset (305(b) Assessed Waters) is a geospatial dataset of waters assessed under Section 305(b) of the Clean Water Act for attainment of water quality standards. The 305(b) Assessed Waters dataset is produced and maintained by EPA Office of Water. It depicts the location of 305(b) assessed waters as line and polygon features and stores 305(b) assessment attributes such as the designated use(s) assessed. The 305(b) Assessed Waters dataset uses the NHD Snapshot to map 305(b) assessed waters. Most water features in the 305(b) Assessed Waters dataset therefore have a match in the NHD Snapshot. Custom-added features that are not present in the NHD Snapshot are also used when a

	305(b) Assessed water feature is not represented in the NHD Snapshot. Additional information is available at: http://www.epa.gov/waterdata/waters-geospatial-data-downloads.
TMDL Waters Dataset	The Impaired Waters with TMDLs NHDPlus Indexed Dataset (TMDL Waters) is a geospatial dataset of waters with an approved Total Maximum Daily Load (TMDL). It depicts the location of waters with TMDLs as line and polygon features and stores TMDL attributes such as TMDL pollutant(s). The TMDL Waters dataset uses the NHD Snapshot to map waters with TMDLs. Most water features in the TMDL Waters dataset therefore have a match in the NHD Snapshot. Custom-added features that are not present in the NHD Snapshot are also used when a water body with a TMDL is not represented in the NHD Snapshot. Additional information is available at: http://www.epa.gov/waterdata/waters-geospatial-data-downloads.
EnviroAtlas	EnviroAtlas is a project led by EPA Office of Research and Development that provides tool and data for exploring the benefits that people receive from nature. The EnviroAtlas team has developed several geospatial datasets on watershed conditions, and dozens of indicators of watershed conditions measured for all HUC12s in the nation. Additional information on EnviroAtlas can be found at: http://www.epa.gov/enviroatlas.

RURAL-AGRICULTURAL POINT SOURCE SCENARIO INDICATORS	**DESCRIPTION**
Hydrologic Unit Code 12-Digit (HUC12)	Twelve-digit Hydrologic Unit Code (HUC12) from the NHDPlus2 WBD Snapshot, EnviroAtlas Version (February 2015 version). The 12-digit Hydrologic Unit is the smallest drainage area delineation in the Watershed Boundary Dataset (WBD) maintained by the US Geological Survey and Natural Resources Conservation Service. They are identified by their 12-digit Hydrologic Unit Code (HUC) and are therefore referred to as HUC12s. (See also WBD Snapshot, EnviroAtlas Version glossary definitions).
Name HUC12 Watershed	Name of the HUC12. Source data was the NHDPlus2 WBD Snapshot (January 2015 version). (See also WBD Snapshot glossary definition).
Soil Stability, Mean in WS	Mean soil stability in the HUC12. Soil stability is the inverse of soil erodibility. Source data was a 100-meter resolution grid of soil map units and attributes in the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (STATSGO2) database, acquired from the US Geological Survey in July 2013. Mean soil erodibility was calculated as the average of erodibility grid values per HUC12. Mean soil stability was calculated as 1 - Mean soil erodibility.
Habitat Condition Index WS (2015)	Mean Habitat Condition Index (HCI) score for the HUC12 from the National Fish Habitat Partnership (NFHP) 2015 National Assessment. Scores range from 1 (high likelihood of aquatic habitat degradation) to 5 (low likelihood of aquatic habitat degradation) based on land use, population density, roads, dams, mines, and point-source pollution sites. Source data were NFHP 2015 National Assessment Local Catchment HCI scores for NHDPlus Version 1 catchments (acquired via personal communication with NFHP in March 2016). NHDPlus Version 1 catchments are local drainage area delineations for surface water features in the NHDPlus Version 1 database. Catchment HCI scores were aggregated to HUC12 scores by calculating the area-weighted mean of HCI scores for catchments that intersect the HUC12. See http://ecosystems.usgs.gov/fishhabitat/nfhap_download.jsp for more information on the NFHP National Assessment.
PHWA_HEALTH_NDX_ST_2016	The statewide Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an

	integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Only reported for HUC12s with a majority of their area instate; HUC12s with a minority of their area instate are left blank. (See also PHWA glossary definition).
PHWA_HEALTH_NDX_ER_2016	The ecoregional Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Ecoregional scores reported for HUC12s are relative scores based on the entire (often multi-state) ecoregion; HUC12s straddling ecoregional boundaries are scored only relative to their majority ecoregion. (See also PHWA glossary definition).
% N-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as natural land cover (including barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Natural land cover classes in the N-Index1 include barren, forest, wetlands, shrubland, and grassland; codes 131, 141 through 143, 152, 171, 190, and 195 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of N-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
% Human Use, U-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as a human land use (excluding barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Human use land cover classes in the U-Index1 include cropland, pasture, and urban; codes 1 through 92, 121 through 124, 181, 182, and 204 through 254 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of U-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
Population Density (people/sq. mi.) (INSTATE)	Population density in the watershed, 2010 (people / sq. mi.) (Census Bureau). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Agricultural Water Demand in WS	Daily agricultural water use in the HUC12 (million gallons per day). Agricultural water use includes surface and groundwater that is self-supplied by agricultural producers or supplied by water providers (governments, private companies, or other organizations). Water used in a HUC12 may originate from within or outside the HUC12. Calculated by downscaling county water use estimates for 2005 reported by US Geological Survey ("Estimated Use of Water in the United States County-Level Data for 2005") using the 2006 National Land Cover Database (2006 NLCD) Land Cover dataset, the 2010 Cropland Data Layer, and a custom geospatial dataset of irrigated area locations. Counties with zero reported water use were assigned a state-level average value to address issues with water use reporting. This indicator was calculated for EPA EnviroAtlas. Detailed information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BD5113083-CFCD-48EC-BC24-0ADA5B9BDDB7%7D
Oil Gas Wells Per sq. mi. (INSTATE)	Density of oil and gas wells in the watershed (Petroleum Recovery Research Center [GO-TECH]). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% Streamlength Impaired 303d-Listed + TMDLs (2015)	Percent of streamlength in the HUC12 with a TMDL or listed as impaired and requiring a TMDL under Section 303(d) of the Clean Water Act. Source data for calculating the length

	of stream features with a TMDL was the EPA Office of Water TMDL Waters geospatial dataset. Source data for calculating the length of 303(d) listed stream features was the EPA Office of Water 303(d) Listed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus NHD Snapshot stream features in the HUC12 plus any additional custom-added stream features in the TMDL Waters and 303(d) Listed Waters datasets. Methods were applied to ensure that streams present in both the TMDL Waters and 303(d) Listed Waters datasets were not double-counted. (See also TMDL Waters, 303(d) Listed Waters, and NHD Snapshot glossary definitions).
Dam Density (#per stream mi.) (INSTATE)	Number of dams per stream mile (NHD). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Discharges (INSTATE)	Total number of permitted groundwater discharges in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Diversions (INSTATE)	Total number of water diversions (water withdrawals) in the watershed (NM OSE). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% GAP Status 1 and 2	Percent of the HUC12 designated as having Status 1 or Status 2 protection by the USGS Gap Analysis Program. Status 1 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management. Status 2 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. These include lands held by national, state, or local governments or non-profit organizations, as well as voluntarily protected private lands. Source data used was the Protected Areas Database of the United States Version 1.2 from the USGS Gap Analysis Program (http://gapanalysis.usgs.gov/). Equation used: (Status 1 Area + Status 2 Area) / HUC12 Area * 100. This indicator was calculated for EPA EnviroAtlas. Additional information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BC5FFDE8E-7C27-4F50-AFEF-082E8A08C00A%7D
% Streamlength Assessed (2015)	Percent of streamlength in the HUC12 assessed under Section 305(b) of the Clean Water Act for attainment of water quality standards. Source data for calculating the length of stream features assessed was the EPA Office of Water 305(b) Assessed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features plus any additional custom-added stream features in the 305(b) Assessed Waters dataset. (See also 305(b) Assessed Waters and NHD Snapshot glossary definitions).
Count Ratio TMDLs to Impairments (2015)	Ratio of the number of surface water impairments with TMDLs to the total number of impairments in the HUC12. The total number of impairments is the number of impairments with TMDLs plus the number of impairments listed as requiring a TMDL under Section 303(d) of the Clean Water Act. The number of impairments with TMDLs is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water TMDL Waters geospatial dataset. The number of impairments listed as requiring a TMDL is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water 303(d) Listed Waters geospatial dataset. (See also TMDL Waters and 303(d) Listed Waters glossary definitions).
% Streamlength with Nutrient TMDLs (2015)	Percent of streamlength in the HUC12 with a nutrient-related TMDL. Source data for calculating the length of stream features with TMDLs was the EPA Office of Water TMDL Waters geospatial dataset. Only includes the length of stream with "Nutrients", "Organic

	Enrichment/Oxygen Depletion", "Algal Growth", or "Noxious Aquatic Plants" listed as a parent TMDL pollutant. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features in the HUC12 plus any additional custom-mapped streams in the TMDL Waters dataset. (See also TMDL Waters and NHD Snapshot glossary definitions).
# Drinking Water Intakes (INSTATE)	# of drinking water intakes for public water systems in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Wells (INSTATE)	# of groundwater wells in the watershed (NM OSER). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Watershed Groups (INSTATE)	# of watershed groups that are active in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Jurisdictional Complexity (INSTATE)	# of government jurisdictions (local, state, federal) within the HUC (National Map). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
NPDES Permit Count	Count of National Permit Discharge Elimination System (NPDES) permits in the HUC12, including both active and expired NPDES permits. Calculated from the EPA Office of Water "Facilities that Discharge to Water NHDPlus Index Dataset" (February 2014 version; https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B091FC504-8762-8E7F-DCD7-513F648BC5B5%7D).

RURAL-AGRICULTURAL NON-POINT SOURCE SCENARIO INDICATORS	**DESCRIPTION**
Hydrologic Unit Code 12-Digit (HUC12)	Twelve-digit Hydrologic Unit Code (HUC12) from the NHDPlus2 WBD Snapshot, EnviroAtlas Version (February 2015 version). The 12-digit Hydrologic Unit is the smallest drainage area delineation in the Watershed Boundary Dataset (WBD) maintained by the US Geological Survey and Natural Resources Conservation Service. They are identified by their 12-digit Hydrologic Unit Code (HUC) and are therefore referred to as HUC12s. (See also WBD Snapshot, EnviroAtlas Version glossary definitions).
Name HUC12 Watershed	Name of the HUC12. Source data was the NHDPlus2 WBD Snapshot (January 2015 version). (See also WBD Snapshot glossary definition).
Soil Stability, Mean in WS	Mean soil stability in the HUC12. Soil stability is the inverse of soil erodibility. Source data was a 100-meter resolution grid of soil map units and attributes in the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (STATSGO2) database, acquired from the US Geological Survey in July 2013. Mean soil erodibility was calculated as the average of erodibility grid values per HUC12. Mean soil stability was calculated as 1 - Mean soil erodibility.
Habitat Condition Index WS (2015)	Mean Habitat Condition Index (HCI) score for the HUC12 from the National Fish Habitat Partnership (NFHP) 2015 National Assessment. Scores range from 1 (high likelihood of aquatic habitat degradation) to 5 (low likelihood of aquatic habitat degradation) based on land use, population density, roads, dams, mines, and point-source pollution sites. Source data were NFHP 2015 National Assessment Local Catchment HCI scores for NHDPlus Version 1 catchments (acquired via personal communication with NFHP in March 2016). NHDPlus Version 1 catchments are local drainage area delineations for surface water features in the NHDPlus Version 1 database. Catchment HCI scores were aggregated to HUC12 scores by calculating the area-weighted mean of HCI scores for catchments that intersect the HUC12. See http://ecosystems.usgs.gov/fishhabitat/nfhap_download.jsp for more information on the NFHP National Assessment.

PHWA_HEALTH_NDX_ST_2016	The statewide Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Only reported for HUC12s with a majority of their area instate; HUC12s with a minority of their area instate are left blank. (See also PHWA glossary definition).
PHWA_HEALTH_NDX_ER_2016	The ecoregional Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Ecoregional scores reported for HUC12s are relative scores based on the entire (often multi-state) ecoregion; HUC12s straddling ecoregional boundaries are scored only relative to their majority ecoregion. (See also PHWA glossary definition).
% N-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as natural land cover (including barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Natural land cover classes in the N-Index1 include barren, forest, wetlands, shrubland, and grassland; codes 131, 141 through 143, 152, 171, 190, and 195 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of N-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
% Perennial Streams (INSTATE)	% of stream length with perennial flow. "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% Human Use, U-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as a human land use (excluding barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Human use land cover classes in the U-Index1 include cropland, pasture, and urban; codes 1 through 92, 121 through 124, 181, 182, and 204 through 254 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of U-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
% Agriculture in RZ (2011)	Percent of the HUC12 that is in the Riparian Zone and classified as agriculture cover by the 2011 CDL-NLCD Hybrid Land Cover dataset. Agriculture cover classes include cropland and pasture; codes 1 through 92, 181, 182, and 204 through 254 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Calculated as agriculture area in the Riparian Zone divided by HUC12 area, multiplied by 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Riparian Zone glossary definitions).
Synthetic N Fertilizer Application in WS	Average annual nitrogen application to agricultural lands as synthetic fertilizer in the HUC12 in 2006 (kilograms Nitrogen/hectare/year). Calculated by downscaling county-level fertilizer application estimates reported by US Geological Survey ("County-level Estimates of Nitrogen and Phosphorus from Commercial Fertilizer for the Conterminous United States, 1987-2006") using the 2006 National Land Cover Database (NLCD) Land Cover dataset. County totals were evenly distributed to agricultural lands throughout the county, crop-specific differences were not considered. This indicator was calculated for EPA

	EnviroAtlas. Additional information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B09DF9B39-6CC8-4DFF-A14D-1BA14C06321F%7D
% Area with Grazing Allotment (INSTATE)	% of land that is open to grazing (USFS, BLM). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Cattle (INSTATE)	Number of cattle in HUC, derived from county-level data (USDA NASS). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Dam Density (# per stream mi.) (INSTATE)	Number of dams per stream mile (NHD). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Discharges (INSTATE)	Total number of permitted groundwater discharges in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Diversions (INSTATE)	Total number of water diversions (water withdrawals) in the watershed (NM OSE). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Agricultural Water Demand in WS	Daily agricultural water use in the HUC12 (million gallons per day). Agricultural water use includes surface and groundwater that is self-supplied by agricultural producers or supplied by water providers (governments, private companies, or other organizations). Water used in a HUC12 may originate from within or outside the HUC12. Calculated by downscaling county water use estimates for 2005 reported by US Geological Survey ("Estimated Use of Water in the United States County-Level Data for 2005") using the 2006 National Land Cover Database (2006 NLCD) Land Cover dataset, the 2010 Cropland Data Layer, and a custom geospatial dataset of irrigated area locations. Counties with zero reported water use were assigned a state-level average value to address issues with water use reporting. This indicator was calculated for EPA EnviroAtlas. Detailed information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BD5113083-CFCD-48EC-BC24-0ADA5B9BDDB7%7D
% Streamlength Impaired 303d-Listed + TMDLs (2015)	Percent of streamlength in the HUC12 with a TMDL or listed as impaired and requiring a TMDL under Section 303(d) of the Clean Water Act. Source data for calculating the length of stream features with a TMDL was the EPA Office of Water TMDL Waters geospatial dataset. Source data for calculating the length of 303(d) listed stream features was the EPA Office of Water 303(d) Listed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus NHD Snapshot stream features in the HUC12 plus any additional custom-added stream features in the TMDL Waters and 303(d) Listed Waters datasets. Methods were applied to ensure that streams present in both the TMDL Waters and 303(d) Listed Waters datasets were not double-counted. (See also TMDL Waters, 303(d) Listed Waters, and NHD Snapshot glossary definitions).
Oil Gas Wells Per sq. mi. (INSTATE)	Density of oil and gas wells in the watershed (Petroleum Recovery Research Center [GO-TECH]). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% GAP Status 1 and 2	Percent of the HUC12 designated as having Status 1 or Status 2 protection by the USGS Gap Analysis Program. Status 1 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency,

	intensity, and legacy) are allowed to proceed without interference or are mimicked through management. Status 2 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. These include lands held by national, state, or local governments or non-profit organizations, as well as voluntarily protected private lands. Source data used was the Protected Areas Database of the United States Version 1.2 from the USGS Gap Analysis Program (http://gapanalysis.usgs.gov/). Equation used: (Status 1 Area + Status 2 Area) / HUC12 Area * 100. This indicator was calculated for EPA EnviroAtlas. Additional information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BC5FFDE8E-7C27-4F50-AFEF-082E8A08C00A%7D
% Streamlength Assessed (2015)	Percent of streamlength in the HUC12 assessed under Section 305(b) of the Clean Water Act for attainment of water quality standards. Source data for calculating the length of stream features assessed was the EPA Office of Water 305(b) Assessed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features plus any additional custom-added stream features in the 305(b) Assessed Waters dataset. (See also 305(b) Assessed Waters and NHD Snapshot glossary definitions).
Count Ratio TMDLs to Impairments (2015)	Ratio of the number of surface water impairments with TMDLs to the total number of impairments in the HUC12. The total number of impairments is the number of impairments with TMDLs plus the number of impairments listed as requiring a TMDL under Section 303(d) of the Clean Water Act. The number of impairments with TMDLs is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water TMDL Waters geospatial dataset. The number of impairments listed as requiring a TMDL is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water 303(d) Listed Waters geospatial dataset. (See also TMDL Waters and 303(d) Listed Waters glossary definitions).
% Streamlength with Nutrient TMDLs (2015)	Percent of streamlength in the HUC12 with a nutrient-related TMDL. Source data for calculating the length of stream features with TMDLs was the EPA Office of Water TMDL Waters geospatial dataset. Only includes the length of stream with "Nutrients", "Organic Enrichment/Oxygen Depletion", "Algal Growth", or "Noxious Aquatic Plants" listed as a parent TMDL pollutant. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features in the HUC12 plus any additional custom-mapped streams in the TMDL Waters dataset. (See also TMDL Waters and NHD Snapshot glossary definitions).
# Drinking Water Intakes (INSTATE)	# of drinking water intakes for public water systems in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Wells (INSTATE)	# of groundwater wells in the watershed (NM OSER). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Watershed Groups (INSTATE)	# of watershed groups that are active in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Jurisdictional Complexity (INSTATE)	# of government jurisdictions (local, state, federal) within the HUC (National Map). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.

URBAN-SUBURBAN POINT SOURCE SCENARIO INDICATORS	DESCRIPTION
Hydrologic Unit Code 12-Digit (HUC12)	Twelve-digit Hydrologic Unit Code (HUC12) from the NHDPlus2 WBD Snapshot, EnviroAtlas Version (February 2015 version). The 12-digit Hydrologic Unit is the smallest drainage area delineation in the Watershed Boundary Dataset (WBD) maintained by the US Geological Survey and Natural Resources Conservation Service. They are identified by their 12-digit Hydrologic Unit Code (HUC) and are therefore referred to as HUC12s. (See also WBD Snapshot, EnviroAtlas Version glossary definitions).
Name HUC12 Watershed	Name of the HUC12. Source data was the NHDPlus2 WBD Snapshot (January 2015 version). (See also WBD Snapshot glossary definition).
Soil Stability, Mean in WS	Mean soil stability in the HUC12. Soil stability is the inverse of soil erodibility. Source data was a 100-meter resolution grid of soil map units and attributes in the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (STATSGO2) database, acquired from the US Geological Survey in July 2013. Mean soil erodibility was calculated as the average of erodibility grid values per HUC12. Mean soil stability was calculated as 1 - Mean soil erodibility.
Habitat Condition Index WS (2015)	Mean Habitat Condition Index (HCI) score for the HUC12 from the National Fish Habitat Partnership (NFHP) 2015 National Assessment. Scores range from 1 (high likelihood of aquatic habitat degradation) to 5 (low likelihood of aquatic habitat degradation) based on land use, population density, roads, dams, mines, and point-source pollution sites. Source data were NFHP 2015 National Assessment Local Catchment HCI scores for NHDPlus Version 1 catchments (acquired via personal communication with NFHP in March 2016). NHDPlus Version 1 catchments are local drainage area delineations for surface water features in the NHDPlus Version 1 database. Catchment HCI scores were aggregated to HUC12 scores by calculating the area-weighted mean of HCI scores for catchments that intersect the HUC12. See http://ecosystems.usgs.gov/fishhabitat/nfhap_download.jsp for more information on the NFHP National Assessment.
PHWA_HEALTH_NDX_ST_2016	The statewide Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Only reported for HUC12s with a majority of their area instate; HUC12s with a minority of their area instate are left blank. (See also PHWA glossary definition).
PHWA_HEALTH_NDX_ER_2016	The ecoregional Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Ecoregional scores reported for HUC12s are relative scores based on the entire (often multi-state) ecoregion; HUC12s straddling ecoregional boundaries are scored only relative to their majority ecoregion. (See also PHWA glossary definition).
% N-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as natural land cover (including barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Natural land cover classes in the N-Index1 include barren, forest, wetlands, shrubland, and grassland; codes 131, 141 through 143, 152, 171, 190, and 195 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of N-Index1 in HCZ / HUC12

	Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
% Human Use, U-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as a human land use (excluding barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Human use land cover classes in the U-Index1 include cropland, pasture, and urban; codes 1 through 92, 121 through 124, 181, 182, and 204 through 254 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of U-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
Population Density (people / sq. mi.) (INSTATE)	Population density in the watershed, 2010 (people / sq. mi.) (Census Bureau). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Agricultural Water Demand in WS	Daily agricultural water use in the HUC12 (million gallons per day). Agricultural water use includes surface and groundwater that is self-supplied by agricultural producers or supplied by water providers (governments, private companies, or other organizations). Water used in a HUC12 may originate from within or outside the HUC12. Calculated by downscaling county water use estimates for 2005 reported by US Geological Survey ("Estimated Use of Water in the United States County-Level Data for 2005") using the 2006 National Land Cover Database (2006 NLCD) Land Cover dataset, the 2010 Cropland Data Layer, and a custom geospatial dataset of irrigated area locations. Counties with zero reported water use were assigned a state-level average value to address issues with water use reporting. This indicator was calculated for EPA EnviroAtlas. Detailed information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BD5113083-CFCD-48EC-BC24-0ADA5B9BDDB7%7D
Oil Gas Wells Per sq. mi. (INSTATE)	Density of oil and gas wells in the watershed (Petroleum Recovery Research Center [GO-TECH]). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% Streamlength Impaired 303d-Listed + TMDLs (2015)	Percent of streamlength in the HUC12 with a TMDL or listed as impaired and requiring a TMDL under Section 303(d) of the Clean Water Act. Source data for calculating the length of stream features with a TMDL was the EPA Office of Water TMDL Waters geospatial dataset. Source data for calculating the length of 303(d) listed stream features was the EPA Office of Water 303(d) Listed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus NHD Snapshot stream features in the HUC12 plus any additional custom-added stream features in the TMDL Waters and 303(d) Listed Waters datasets. Methods were applied to ensure that streams present in both the TMDL Waters and 303(d) Listed Waters datasets were not double-counted. (See also TMDL Waters, 303(d) Listed Waters, and NHD Snapshot glossary definitions).
Dam Density (# per stream mi.) (INSTATE)	Number of dams per stream mile (NHD). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Discharges (INSTATE)	Total number of permitted groundwater discharges in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Diversions (INSTATE)	Total number of water diversions (water withdrawals) in the watershed (NM OSE). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% GAP Status 1 and 2	Percent of the HUC12 designated as having Status 1 or Status 2 protection by the USGS Gap Analysis Program. Status 1 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management. Status 2 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to

	maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. These include lands held by national, state, or local governments or non-profit organizations, as well as voluntarily protected private lands. Source data used was the Protected Areas Database of the United States Version 1.2 from the USGS Gap Analysis Program (http://gapanalysis.usgs.gov/). Equation used: (Status 1 Area + Status 2 Area) / HUC12 Area * 100. This indicator was calculated for EPA EnviroAtlas. Additional information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BC5FFDE8E-7C27-4F50-AFEF-082E8A08C00A%7D
% Streamlength Assessed (2015)	Percent of streamlength in the HUC12 assessed under Section 305(b) of the Clean Water Act for attainment of water quality standards. Source data for calculating the length of stream features assessed was the EPA Office of Water 305(b) Assessed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features plus any additional custom-added stream features in the 305(b) Assessed Waters dataset. (See also 305(b) Assessed Waters and NHD Snapshot glossary definitions).
Count Ratio TMDLs to Impairments (2015)	Ratio of the number of surface water impairments with TMDLs to the total number of impairments in the HUC12. The total number of impairments is the number of impairments with TMDLs plus the number of impairments listed as requiring a TMDL under Section 303(d) of the Clean Water Act. The number of impairments with TMDLs is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water TMDL Waters geospatial dataset. The number of impairments listed as requiring a TMDL is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water 303(d) Listed Waters geospatial dataset. (See also TMDL Waters and 303(d) Listed Waters glossary definitions).
% Streamlength with Nutrient TMDLs (2015)	Percent of streamlength in the HUC12 with a nutrient-related TMDL. Source data for calculating the length of stream features with TMDLs was the EPA Office of Water TMDL Waters geospatial dataset. Only includes the length of stream with "Nutrients", "Organic Enrichment/Oxygen Depletion", "Algal Growth", or "Noxious Aquatic Plants" listed as a parent TMDL pollutant. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features in the HUC12 plus any additional custom-mapped streams in the TMDL Waters dataset. (See also TMDL Waters and NHD Snapshot glossary definitions).
# Drinking Water Intakes (INSTATE)	# of drinking water intakes for public water systems in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Wells (INSTATE)	# of groundwater wells in the watershed (NM OSER). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Watershed Groups (INSTATE)	# of watershed groups that are active in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Jurisdictional Complexity (INSTATE)	# of government jurisdictions (local, state, federal) within the HUC (National Map). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
NPDES Permit Count	Count of National Permit Discharge Elimination System (NPDES) permits in the HUC12, including both active and expired NPDES permits. Calculated from the EPA Office of Water "Facilities that Discharge to Water NHDPlus Index Dataset" (February 2014 version; https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B091FC504-8762-8E7F-DCD7-513F648BC5B5%7D).
% Large MS4 (INSTATE)	% of watershed included within an area designated as a large MS4 (EPA). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.

% Small MS4 (INSTATE)	% of watershed included within an area designated as a small MS4 (EPA). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.

URBAN-SUBURBAN NON-POINT SOURCE SCENARIO INDICATORS	**DESCRIPTION**
Hydrologic Unit Code 12-Digit (HUC12)	Twelve-digit Hydrologic Unit Code (HUC12) from the NHDPlus2 WBD Snapshot, EnviroAtlas Version (February 2015 version). The 12-digit Hydrologic Unit is the smallest drainage area delineation in the Watershed Boundary Dataset (WBD) maintained by the US Geological Survey and Natural Resources Conservation Service. They are identified by their 12-digit Hydrologic Unit Code (HUC) and are therefore referred to as HUC12s. (See also WBD Snapshot, EnviroAtlas Version glossary definitions).
Name HUC12 Watershed	Name of the HUC12. Source data was the NHDPlus2 WBD Snapshot (January 2015 version). (See also WBD Snapshot glossary definition).
Soil Stability, Mean in WS	Mean soil stability in the HUC12. Soil stability is the inverse of soil erodibility. Source data was a 100-meter resolution grid of soil map units and attributes in the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (STATSGO2) database, acquired from the US Geological Survey in July 2013. Mean soil erodibility was calculated as the average of erodibility grid values per HUC12. Mean soil stability was calculated as 1 - Mean soil erodibility.
Habitat Condition Index WS (2015)	Mean Habitat Condition Index (HCI) score for the HUC12 from the National Fish Habitat Partnership (NFHP) 2015 National Assessment. Scores range from 1 (high likelihood of aquatic habitat degradation) to 5 (low likelihood of aquatic habitat degradation) based on land use, population density, roads, dams, mines, and point-source pollution sites. Source data were NFHP 2015 National Assessment Local Catchment HCI scores for NHDPlus Version 1 catchments (acquired via personal communication with NFHP in March 2016). NHDPlus Version 1 catchments are local drainage area delineations for surface water features in the NHDPlus Version 1 database. Catchment HCI scores were aggregated to HUC12 scores by calculating the area-weighted mean of HCI scores for catchments that intersect the HUC12. See http://ecosystems.usgs.gov/fishhabitat/nfhap_download.jsp for more information on the NFHP National Assessment.
PHWA_HEALTH_NDX_ST_2016	The statewide Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Only reported for HUC12s with a majority of their area instate; HUC12s with a minority of their area instate are left blank. (See also PHWA glossary definition).
PHWA_HEALTH_NDX_ER_2016	The ecoregional Watershed Health Index score for the HUC12 from the 2016 EPA Preliminary Healthy Watersheds Assessment (PHWA). The Watershed Health Index is an integrated measure of watershed condition that combines Landscape Condition, Hydrologic, Geomorphology, Habitat, Water Quality, and Biological Condition Sub-Index scores. Higher scores correspond to greater potential for a watershed to have the structure and function in place to support healthy aquatic ecosystems. Source data were Watershed Health Index scores for HUC12s developed as part of the 2016 EPA Preliminary Healthy Watersheds Assessment (February 8, 2017 version). Ecoregional scores reported for HUC12s are relative scores based on the entire (often multi-state) ecoregion; HUC12s straddling ecoregional boundaries are scored only relative to their majority ecoregion. (See also PHWA glossary definition).

% N-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as natural land cover (including barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Natural land cover classes in the N-Index1 include barren, forest, wetlands, shrubland, and grassland; codes 131, 141 through 143, 152, 171, 190, and 195 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of N-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
% Perennial Streams (INSTATE)	% of stream length with perennial flow. "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% Human Use, U-Index1 in HCZ (2011)	Percent of the HUC12 that is in the Hydrologically Connected Zone (HCZ) and classified as a human land use (excluding barren land) by the 2011 CDL-NLCD Hybrid Land Cover dataset. Human use land cover classes in the U-Index1 include cropland, pasture, and urban; codes 1 through 92, 121 through 124, 181, 182, and 204 through 254 in the 2011 CDL-NLCD Hybrid Land Cover dataset. Equation used: Area of U-Index1 in HCZ / HUC12 Area * 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Hydrologically Connected Zone glossary definitions).
% Streamlength Near ≥ 15% Impervious Cover (2011)	Percent of stream length in the HUC12 that is within 30 meters of areas with greater than or equal to 15% impervious cover. Impervious cover source data was the National Land Cover Database 2011 (NLCD 2011) Percent Developed Imperviousness dataset; a national grid of percent imperviousness at 30-meter resolution (http://www.mrlc.gov/nlcd11_data.php; October 2014 version). Stream location source data was the NHDPlus2 NHD Snapshot (downloaded June 2014). Streams were defined as linear features in the NHD Snapshot with FCODE (feature code) equal to 33400, 46000, 46003, 46006, or 46007; and polygon features with FCODE equal to 46003 or 46006. Calculated as the length of streams in the NHD Snapshot that are within 30 meters of grid pixels with greater than or equal to 15% impervious cover, divided by total stream length in the HUC12, multiplied by 100. (See also NHD Snapshot glossary definition).
Agricultural Water Demand in WS	Daily agricultural water use in the HUC12 (million gallons per day). Agricultural water use includes surface and groundwater that is self-supplied by agricultural producers or supplied by water providers (governments, private companies, or other organizations). Water used in a HUC12 may originate from within or outside the HUC12. Calculated by downscaling county water use estimates for 2005 reported by US Geological Survey ("Estimated Use of Water in the United States County-Level Data for 2005") using the 2006 National Land Cover Database (2006 NLCD) Land Cover dataset, the 2010 Cropland Data Layer, and a custom geospatial dataset of irrigated area locations. Counties with zero reported water use were assigned a state-level average value to address issues with water use reporting. This indicator was calculated for EPA EnviroAtlas. Detailed information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BD5113083-CFCD-48EC-BC24-0ADA5B9BDDB7%7D
Oil Gas Wells Per sq. mi. (INSTATE)	Density of oil and gas wells in the watershed (Petroleum Recovery Research Center [GO-TECH]). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% Streamlength Impaired 303d-Listed + TMDLs (2015)	Percent of streamlength in the HUC12 with a TMDL or listed as impaired and requiring a TMDL under Section 303(d) of the Clean Water Act. Source data for calculating the length of stream features with a TMDL was the EPA Office of Water TMDL Waters geospatial dataset. Source data for calculating the length of 303(d) listed stream features was the EPA Office of Water 303(d) Listed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus NHD Snapshot stream features in the HUC12 plus any additional custom-added stream features in the TMDL Waters and 303(d) Listed Waters datasets. Methods were applied to ensure that streams present in both the TMDL Waters and 303(d) Listed Waters datasets were not double-counted. (See also TMDL Waters, 303(d) Listed Waters, and NHD Snapshot glossary definitions).

Dam Density (# per stream mi.) (INSTATE)	Number of dams per stream mile (NHD). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Discharges (INSTATE)	Total number of permitted groundwater discharges in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Diversions (INSTATE)	Total number of water diversions (water withdrawals) in the watershed (NM OSE). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
% Urban in RZ (2011)	Percent of the HUC12 that is in the Riparian Zone and classified as urban cover by the 2011 CDL-NLCD Hybrid Land Cover dataset. Urban cover classes include 'Developed, Open Space' (code 121), 'Developed, Low Intensity' (code 122), 'Developed, Medium Intensity' (code 123), 'Developed, High Intensity' (code 124) in the 2011 CDL-NLCD Hybrid Land Cover dataset. Calculated as urban area in the Riparian Zone divided by HUC12 area, multiplied by 100. (See also 2011 CDL-NLCD Hybrid Land Cover and Riparian Zone glossary definitions).
% GAP Status 1 and 2	Percent of the HUC12 designated as having Status 1 or Status 2 protection by the USGS Gap Analysis Program. Status 1 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events (of natural type, frequency, intensity, and legacy) are allowed to proceed without interference or are mimicked through management. Status 2 lands are defined as having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. These include lands held by national, state, or local governments or non-profit organizations, as well as voluntarily protected private lands. Source data used was the Protected Areas Database of the United States Version 1.2 from the USGS Gap Analysis Program (http://gapanalysis.usgs.gov/). Equation used: (Status 1 Area + Status 2 Area) / HUC12 Area * 100. This indicator was calculated for EPA EnviroAtlas. Additional information on source data and calculation methods can be found at: https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7BC5FFDE8E-7C27-4F50-AFEF-082E8A08C00A%7D
% Streamlength Assessed (2015)	Percent of streamlength in the HUC12 assessed under Section 305(b) of the Clean Water Act for attainment of water quality standards. Source data for calculating the length of stream features assessed was the EPA Office of Water 305(b) Assessed Waters geospatial dataset. The denominator used for percentage calculations (total streamlength) is the length of NHDPlus2 NHD Snapshot stream features plus any additional custom-added stream features in the 305(b) Assessed Waters dataset. (See also 305(b) Assessed Waters and NHD Snapshot glossary definitions).
Count Ratio TMDLs to Impairments (2015)	Ratio of the number of surface water impairments with TMDLs to the total number of impairments in the HUC12. The total number of impairments is the number of impairments with TMDLs plus the number of impairments listed as requiring a TMDL under Section 303(d) of the Clean Water Act. The number of impairments with TMDLs is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water TMDL Waters geospatial dataset. The number of impairments listed as requiring a TMDL is calculated from the number of unique surface water segment ID-parent cause of impairment combinations in the HUC12 from the EPA Office of Water 303(d) Listed Waters geospatial dataset. (See also TMDL Waters and 303(d) Listed Waters glossary definitions).
% Streamlength with Nutrient TMDLs (2015)	Percent of streamlength in the HUC12 with a nutrient-related TMDL. Source data for calculating the length of stream features with TMDLs was the EPA Office of Water TMDL Waters geospatial dataset. Only includes the length of stream with "Nutrients", "Organic Enrichment/Oxygen Depletion", "Algal Growth", or "Noxious Aquatic Plants" listed as a parent TMDL pollutant. The denominator used for percentage calculations (total

	streamlength) is the length of NHDPlus2 NHD Snapshot stream features in the HUC12 plus any additional custom-mapped streams in the TMDL Waters dataset. (See also TMDL Waters and NHD Snapshot glossary definitions).
# Drinking Water Intakes (INSTATE)	# of drinking water intakes for public water systems in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Groundwater Wells (INSTATE)	# of groundwater wells in the watershed (NM OSER). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
# of Watershed Groups (INSTATE)	# of watershed groups that are active in the watershed (NMED). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.
Jurisdictional Complexity (INSTATE)	# of government jurisdictions (local, state, federal) within the HUC (National Map). "(INSTATE)" denotes that the indicator was only calculated for the HUC areas within New Mexico state boundaries.

Attachment 4: NM RPS Tool file names and contents

(Note that the 6 digit date beginning each file name may change with subsequent updates)

The following are RPS Tool files completed during this project and delivered to NMED for statewide and HUC8-specific use. Except for MASTER NM RPS which is a blank tool file, all these files contain archived results for each geographic area and scenario as named.

RPS Tool File Name	Content
170901NM RPS-Scoring-Tool-041917MASTER.xlsm	NM RPS Tool with all HUC8 and HUC12 data, no screening content saved (master copy for all new screening statewide or on HUC subsets)
170901NM RPS-Scoring-Tool-041917STAGE1 SCENARIO1A.xlsm	NM RPS Tool with screening results for HUC8 Stage 1 rural-agricultural point source scenario 1A
170901NM RPS-Scoring-Tool-041917STAGE1 SCENARIO1B.xlsm	NM RPS Tool with screening results for HUC8 Stage 1 rural-agricultural nonpoint source scenario 1B
170901NM RPS-Scoring-Tool-041917STAGE1 SCENARIO2A.xlsm	NM RPS Tool with screening results for HUC8 Stage 1 urban-suburban point source scenario 2A
170901NM RPS-Scoring-Tool-041917STAGE1 SCENARIO2B.xlsm	NM RPS Tool with screening results for HUC8 Stage 1 urban-suburban nonpoint source scenario 2B
170313NM RPS-Scoring-Tool-072816 STAGE2 1AMORA.xlsm	NM RPS Tool with screening results for Mora HUC8 Stage 2 rural-agricultural point source scenario
170313NM RPS-Scoring-Tool-072816 STAGE2 1BCANADIAN.xlsm	NM RPS Tool with screening results for Canadian HUC8 Stage 2 rural-agricultural non-point source scenario
170313NM RPS-Scoring-Tool-072816 STAGE2 2ARIOCHAMA.xlsm	NM RPS Tool with screening results for Rio Chama HUC8 Stage 2 urban-suburban point source scenario
170313NM RPS-Scoring-Tool-072816 STAGE2 2BRIOSANJOSE.xlsm	NM RPS Tool with screening results for Rio San Jose HUC8 Stage 2 urban-suburban non-point source scenario