



Tahoe Science Advisory Council

Tahoe Regional Planning Agency 2023 Threshold Evaluation Independent Peer Review

Background

The Tahoe Regional Planning Agency (TRPA) has the authority to adopt environmental quality standards, called threshold standards, and to enforce ordinances designed to achieve those standards. The Bi-State Compact defines a threshold standard as “...an environmental standard necessary to maintain a significant scenic, recreational, educational, scientific or natural value of the region or to maintain public health and safety within the region.” The TRPA Governing Board adopted the first set of threshold standards in 1982.

Every four years TRPA leads an evaluation of the adopted threshold standards. The information summarizes TRPA’s assessment of existing standards within the established framework.

TRPA asked the Tahoe Science Advisory Council (Council) to coordinate an independent peer review to determine whether appropriate methods, the best available science, and accepted best practices were used in the 2023 threshold evaluation. Reviewers were asked to identify deficiencies, errors, and positive aspects for their respective threshold category.

Threshold Dashboard Structure

TRPA uses a [web-based dashboard](#) to display information about the threshold standards and to summarize the status, trend, and confidence for each indicator based on evaluations conducted every four years. Threshold standards are organized for a general audience based on the focus of the standard.

The individual pages for the threshold standards provide an overview of the standard’s importance, outline the known drivers of the condition, summarize recent monitoring data, and describe TRPA’s recent standard evaluation findings.

Review Charge

Reviewers are asked to consider the breadth of information for each threshold standard with the goal of improving TRPA’s analysis and presentation of the available information. The reviews focused on the 2023 evaluation pages and were framed by a series of questions about material presentation, the findings associated with the standard status determinations, and the validity of the data evaluation approach. The full review charge is provided in Appendix A.

Review Panel

Council member Adrian Harpold and Program Officer Robert Larsen coordinated the review with the topical experts listed in Table 1.

Table 1 - Subject Matter Experts

| Name | Institution | Review Category |
|------------------|---------------------------------|--|
| Keith Bein | University of California, Davis | Air Quality |
| Naresh Kumar | Desert Research Institute | Air Quality |
| Perry Williams | University of Nevada, Reno | Wildlife |
| Jeffrey Marion | Virginia Tech | Recreation, Noise, Scenic resources, Sustainable communities |
| Mariana Dobre | University of Idaho | Soil conservation |
| Thomas Dilts | University of Nevada, Reno | Vegetation preservation |
| Robert Shriver | University of Nevada, Reno | Vegetation preservation |
| Joanna Blaszczak | University of Nevada, Reno | Water quality |
| John Umek | University of Nevada, Reno | Fisheries |
| Scott Kelley | University of Nevada, Reno | Sustainable communities |

Review Findings

Each reviewer provided detailed comments on each individual threshold standard. Their unedited comments are included in Appendix A and summarized below.

In general, the reviewers found TRPA’s evaluation to be reasonable, and agreed most findings were supported by available information. Several reviewers found the Threshold Dashboard to be cumbersome and repetitive and offered suggestions to improve the dashboard structure the for noise, recreation, scenic resources, transportation and sustainable communities, and wildlife thresholds. Reviewers also asked about the supporting information behind TRPA’s evaluation findings. In some cases, this was due to website complexity (noise, recreation, and scenic resources) while other dashboard pages were missing relevant references (air quality and wildlife).

Importantly, the reviewers found the threshold standards are often poorly linked to the projects and policies intended to improve measured conditions. The disconnect between some standards and management activities reinforces the need (identified by previous threshold evaluation reviews) to revisit the threshold standard system for air quality, noise, recreation, vegetation preservation, and water quality. Revisiting the threshold standards and the associated data sources is needed to ensure TRPA’s monitoring programs can best inform implementation actions and monitor the impacts of those investments.

Air Quality

Drs. Naresh Kumar and Keith Bein reviewed thirteen air quality threshold standards. The reviewers mostly agreed with TRPA's documentation and status findings, but found the assessment of several standards would benefit from additional analyses. The reviewers also suggest that, in some instances, TRPA should evaluate data from individual monitoring sites rather than averaging across multiple locations. Similarly, Kumar and Bein suggest TRPA should consider averages over time rather than comparing individual years' data.

Both reviewers note the lack of appropriate references or data to support causal assertions. For example, wildfire smoke is considered the primary driver of visibility and fine particles concentration indicators. While this finding is intuitive, it would be useful to provide relevant references. Finally, the reviewers found it difficult to link the efficacy of management actions with measured threshold conditions. For instance, reviewers note there is insufficient evidence provided to link the decline in nitrogen oxide emissions (NOx) to in-lake nitrogen standards. While data regarding atmospheric nitrogen and ammonium are listed, the reduction in NOx emissions from mobile sources over time is not shown. The assertion that PM10 reductions in the south shore area are due to control actions is also not supported by the presented data, and the statements regarding regional and local sources are similarly unsupported.

Fisheries

Dr. John Umek evaluated TRPA's assessment of two fish habitat threshold standards and found TRPA appropriately applied the data and analytical method to determine the indicators' status and trend. The methods used provide a clear and systematic approach, allowing for accurate and consistent measurement of each indicator. The chosen techniques align with best practices, ensuring that the data is analyzed reliably and meaningfully reflects the indicators' current state. The thorough application of analytical methods enhances the credibility of the findings, offering a credible basis for interpretation and decision-making.

Noise

Dr. Jeffery Marion reviewed TRPA's evaluation of ten (10) noise standards, with an emphasis on cumulative events. Dr. Marion expressed support for TRPA's ongoing noise monitoring efforts and found the threshold standard findings to be justified and the status and trend statements to be well written. He suggests providing a clear link to monitoring protocols and offers a number of suggestions for improving the dashboard structure.

Recreation

Dr. Marion reviewed TRPA's evaluation of two recreation standards. Dr. Marion found TRPA's evaluation and findings appropriate and defensible. He notes that while TRPA acknowledges there are a variety of factors impacting recreational quality, the agency does not specifically monitor or report those values. Information regarding visitor numbers at specific sites, facility environmental conditions, ease of access, and capacity are not well linked to the specified threshold indicators.

In an overarching comment, Dr. Marion notes that using multiple web pages to present the same or slightly different information makes the dashboard confusing and difficult to understand.

Scenic Resources

Dr. Marion also reviewed TRPA's evaluation of five scenic resources threshold standards and expressed his support for TRPA's evaluation and findings in this category. To highlight the importance of monitoring scenic resources, Dr. Marion suggests TRPA provide additional detail on the desired conditions and link those outcomes to relevant regulations and activities.

As with the Recreation pages, Dr. Marion provided numerous recommendations to improve the presentation of the threshold dashboard.

Transportation and Sustainable Communities

The Council engaged two reviewers, Dr. Marion and Dr. Scott Kelley, to evaluate TRPA's assessment of the Vehicle Miles Traveled (VMT) per capita threshold standard. Both reviewers found the overall evaluation and findings related to the VMT standard to be complete and defensible.

Drs. Marion and Kelley both suggest adding detail about the standard's definition, purpose, and value would be useful to the reader. Dr. Kelley notes his support for TRPA's efforts to leverage "big data" sources and shares some insights regarding differing VMT patterns between the two states.

Soil Conservation

Dr. Mariana Dobre reviewed TRPA's evaluation of eleven (11) soil conservation standards. Dr. Dobre found the analysis and rationales mostly reasonable, but requested that additional information be made available to support findings related to land coverage and enhance the precision of indicator status determinations.

Like others, Dr. Dobre offers suggestions to improve various sections and highlighted areas that would benefit from additional data or references.

Vegetation Preservation - Common Vegetation

Thomas Dilts reviewed the evaluation of fourteen (14) threshold standards related to common vegetation and old growth forests. While Mr. Dilts found the assessment of the established standards to be reasonable, he offers recommendations for improving the monitoring and environmental assessment approach.

Specifically, Mr. Dilts recommends a smaller subset of indicators that are more closely aligned with threshold goals. Such indicators should include metrics associated with forest fuel treatments, direct monitoring for Whitebark Pine (a federally threatened species), Aspen, and Sugar Pine, and enhanced meadow health measurements. TRPA should also consider its approach for tracking old growth forest, with an emphasis on conserving remaining old growth trees and promoting their health.

Vegetation Preservation - Sensitive Plants and Uncommon Plant Communities

Dr. Robert Shriver focused his review on the seven (7) indicators associated with sensitive plants and uncommon plant communities. Dr. Shriver found that many of the sensitive plant pages lack basic details on monitoring history, protocols, and results. TRPA's status and trend determination and confidence details do not reflect the fact that some species and communities have not

benefited from consistent monitoring. Reporting status without recent data can lead to overconfidence in species' health. Tahoe Yellowcress is an exception and should serve as a model for the information needed on other species.

Water Quality

Dr. Joanna Blaszcak reviewed fourteen (14) standards related to water quality. In general, Dr. Blaszcak found TRPA's threshold indicator assessment to be sufficiently rationalized and supported by the provided data and information. She offers numerous constructive comments, reserving larger comments and suggestions for the nearshore (littoral) and tributary sediment concentrations.

Specifically, Dr. Blaszcak suggests that TRPA should not use chlorophyll data to represent detached algae. TRPA should use the same methods to estimate phytoplankton productivity used in the pelagic zone. Also, there are questions about whether total phosphorous concentrations are in attainment, and whether the data collected after 2017 need to be included in the trend analysis.

Wildlife

Dr. Perry Williams reviewed TRPA's evaluation of eight (8) wildlife thresholds and found TRPA's evaluation to be reasonable. Dr. Williams offered numerous suggestions to clarify website text.

His most substantive recommendation is to have TRPA use linear regression for all indicators that have annual count data (e.g., bald eagles, osprey nests, peregrine falcon nests). Dr. Williams notes using linear regression rather than complex models would provide consistency across different species and allow TRPA to easily view and demonstrate change over time.