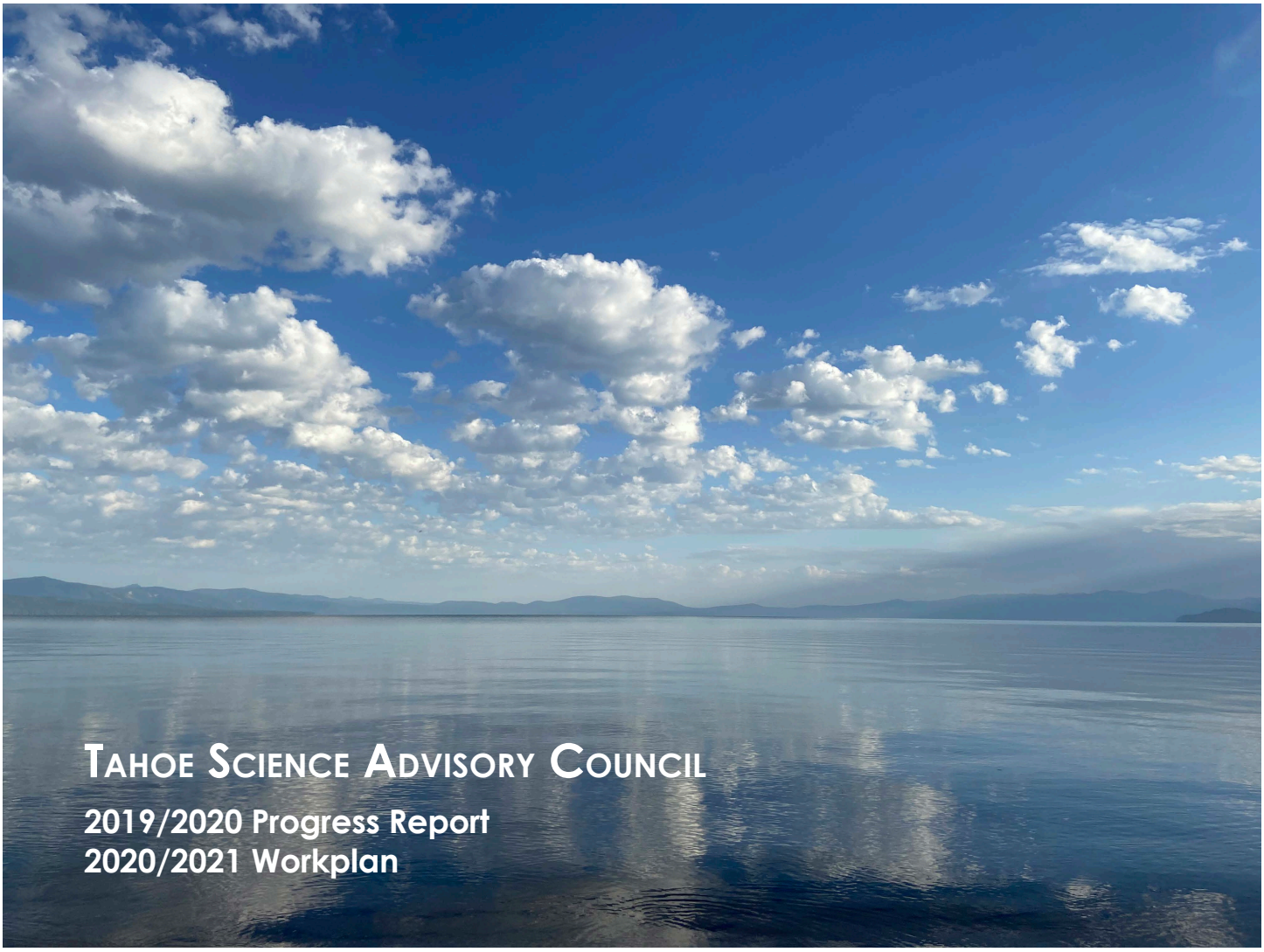


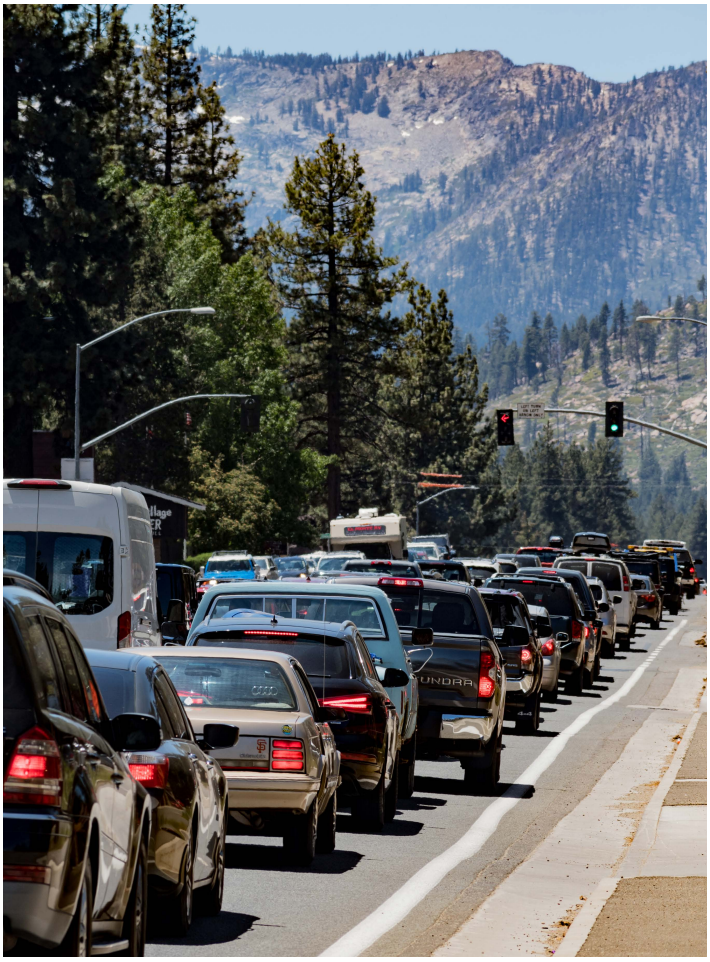
Tahoe Science Advisory Council

2019/2020 Progress Report
2020/2021 Workplan

More than ever, resource managers need the best available science to support decision making and inform policy. The Bi-State Tahoe Science Advisory Council (Council) was created to explicitly meet that need by providing objective research and scientific analyses. In its fifth year, the Council offers expert, independent perspectives on pressing science issues and provides a venue for efficient communication between research partners and land management agencies.

In August 2019, the Council Executive Committee endorsed a workplan to explore Lake Tahoe's clarity trends and overall lake health, continue environmental standards update work, and initiate forest and upland ecosystem science planning. This summary report highlights recent Council achievements and outlines anticipated work for the coming year.

The document is organized around Council efforts to (1) support the threshold update initiative; (2) review and assess relevant science; and (3) plan for future research and monitoring needs.



1. Threshold Update Support

The Tahoe Regional Planning Agency (TRPA) threshold standards are used to measure environmental conditions, set environmental quality goals, and express shared aspiration for restoration of the Tahoe region.

WHERE WE'VE BEEN

Basin managers have long recognized the need to review and update the threshold standards, but making substantive changes was an intractable problem. California and Nevada identified this issue when developing the Council, and it was one of the first tasks the group undertook.

In 2017, a Council subcommittee summarized best practices used by leading programs across the country. Working with the Council, TRPA used these findings to revise the threshold structure, eliminate overlapping standards, and adopt a framework to guide future threshold standard updates. By reorganizing and eliminating unnecessary overlap TRPA consolidated 173 previously adopted standards to 151. This restructuring and technical cleanup made the system more transparent and set the stage for future substantive changes.

RECENT ACCOMPLISHMENTS

During the past year, Council members and TRPA staff further refined the threshold structure and guidance and applied it to the existing 41 water quality threshold standards. Initial analysis suggests that by using the new framework, TRPA can reduce that number to ten or fewer standards without diminishing water quality protections.

Applying best practices to the water quality threshold standards has positioned TRPA to implement the most meaningful threshold standard updates yet, paving the way for continued program improvement.

WHERE WE'RE GOING

The relationship between the TRPA and the Council continues to demonstrate the value and importance of policy development supported by sound science. Consistent with the 2019 workplan and the 2015 Bi-State Memorandum of Understanding, the Council will continue working side-by-side with the TRPA on the threshold standard update initiative. The Council and TRPA are addressing two topics:

1. *Vehicle Miles Traveled (VMT)*. Understanding where people are driving to and from, and why, underpins a myriad of transportation questions. The Nevada Division of State Lands awarded the Council funds to evaluate factors influencing vehicle miles traveled at Lake Tahoe. A partnership between Council institutions and the TRPA will explore methods for using "big data" – cellular phones, traffic counts, and other sources – to track travel patterns and related factors. This work will inform TRPA's VMT threshold revision and provide standardized methods for measuring VMT in the future.

2. *Sustainable Recreation*. Visitor and recreation user data in the Lake Tahoe Basin are sparse and incomplete, leading to a general lack of understanding about visitor demographics, their recreation needs, experience, and values. The Council will work with the Sustainable Recreation Working Group to review the sustainable recreation threshold standards and management tools. This project, funded by the Southern Nevada Public Lands Management Act, aims to develop an adaptive framework for evaluating, tracking, and reporting priority recreational conditions and to support the development of appropriate metrics.

2. Science Review and Assessment

Reviewing research and monitoring data and communicating findings and implications to resource management agencies are the cornerstone of a productive science/policy partnership.

WHERE WE'VE BEEN

The Council recognizes the importance of both internal and external science review and assessment. Following practices employed by the National Institutes of Health and the Health Effects Institute, the Council established a Peer Review Committee to coordinate independent review efforts. This group prepared a guidance document to ensure credible, transparent, and unbiased review of scientific products or technical programs.

RECENT ACCOMPLISHMENTS

Peer Review. The Council used its external peer review process for the first time in 2019. The accumulation of algae on natural rock surfaces, piers, and boats is perhaps the most conspicuous indicator of Lake Tahoe's water quality. Following a 2015 analysis that found no significant trend in the 20-year monitoring record, partners asked the Council to evaluate the efficacy of the existing program. External scientists considered current monitoring methods and overall program direction. The peer review verified the value of the current program and offered suggestions for refinements. Importantly, the periphyton assessment demonstrated the Council's capacity to review established programs and inform monitoring investment.

Clarity Research. Restoring Lake Tahoe's clarity has been a long-term focus of management action. Following the record-low clarity of 2017, the Council was charged with reassessing the drivers of Lake Tahoe's overall health. While winter clarity appears to have stabilized, summer clarity continues to worsen. Management partners asked the Council to synthesize 40 years of data and research to better understand the change in seasonal clarity trends. The Council project team also investigated a series of hypotheses related to the observed physical and biological changes. The collaborative assessment shed light on how climate change is impacting both summer and winter conditions and highlighted the complexity of linking pollutant control accomplishments to clarity changes. The thorough data compilation and multi-institution perspective provides a foundation for further Council inquiry into Lake Tahoe's water clarity.

WHERE WE'RE GOING

Building on the seasonal trend analysis, the Council is advancing two important Lake Tahoe clarity projects. The Council will also identify priority peer review opportunities and explore ways to provide efficient, timely advice and feedback on management issues.

1. Data Synthesis and Analysis. This task will provide ongoing, integrated analyses and executive-level briefings on lake and watershed conditions. Annual working meetings between scientists and resource management staff will be used to share preliminary science findings as conditions evolve. A science/management workshop will provide timely Council perspective on changing conditions that may influence the lake's health, and will inform public messaging and guide decision making.

2. *Clarity Model Enhancement.* The seasonal clarity trend analysis underscored the multitude of factors influencing Lake Tahoe's water quality. The Council is currently reviewing the existing clarity model in the context of the latest findings and prioritizing predictive model needs to guide future investments. This first review is expected to be complete in September 2020.

3. *Peer Review.* Recent monitoring suggests food web dynamics may be an important factor in Lake Tahoe's clarity condition and overall system health. The Peer Review Committee is organizing an independent review of a recent project that attempted to test this hypothesis by harvesting Mysis shrimp from Emerald Bay to improve water clarity.

   Management partners have also expressed interest in Council engagement on other research efforts and projects. Over the coming year, the Council will also explore methods for providing less-formal review of common plans, documents, and research findings to provide perspective and guidance.

4. *Algae Monitoring.* A recent pilot project for monitoring filamentous algae highlighted the potential for a more inclusive and integrated algae monitoring plan. The Council will work with partners and explore opportunities to provide a more complete look at algal growth in Lake Tahoe's nearshore.

3. Planning for the Future

Climate change induced effects are stressing natural processes in both the lake and terrestrial environments at Lake Tahoe. These stresses, coupled with increasing recreation and visitation pressures, require sustainable resource management strategies based on understanding expected changes and exploring opportunities for system resilience.

WHERE WE'VE BEEN

Changing climate conditions may influence the effectiveness of Basin-wide programs to restore Lake Tahoe's water quality. In 2018, the Council drafted a "Science-to-Action Plan" guiding the development and application of modern approaches to modeling, data analysis, and interpretation of changes in Lake Tahoe's aquatic environment. That plan is now guiding the Council's lake clarity assessment work to provide decision-relevant science and anticipate emerging issues relevant to lake water quality and aquatic system health.

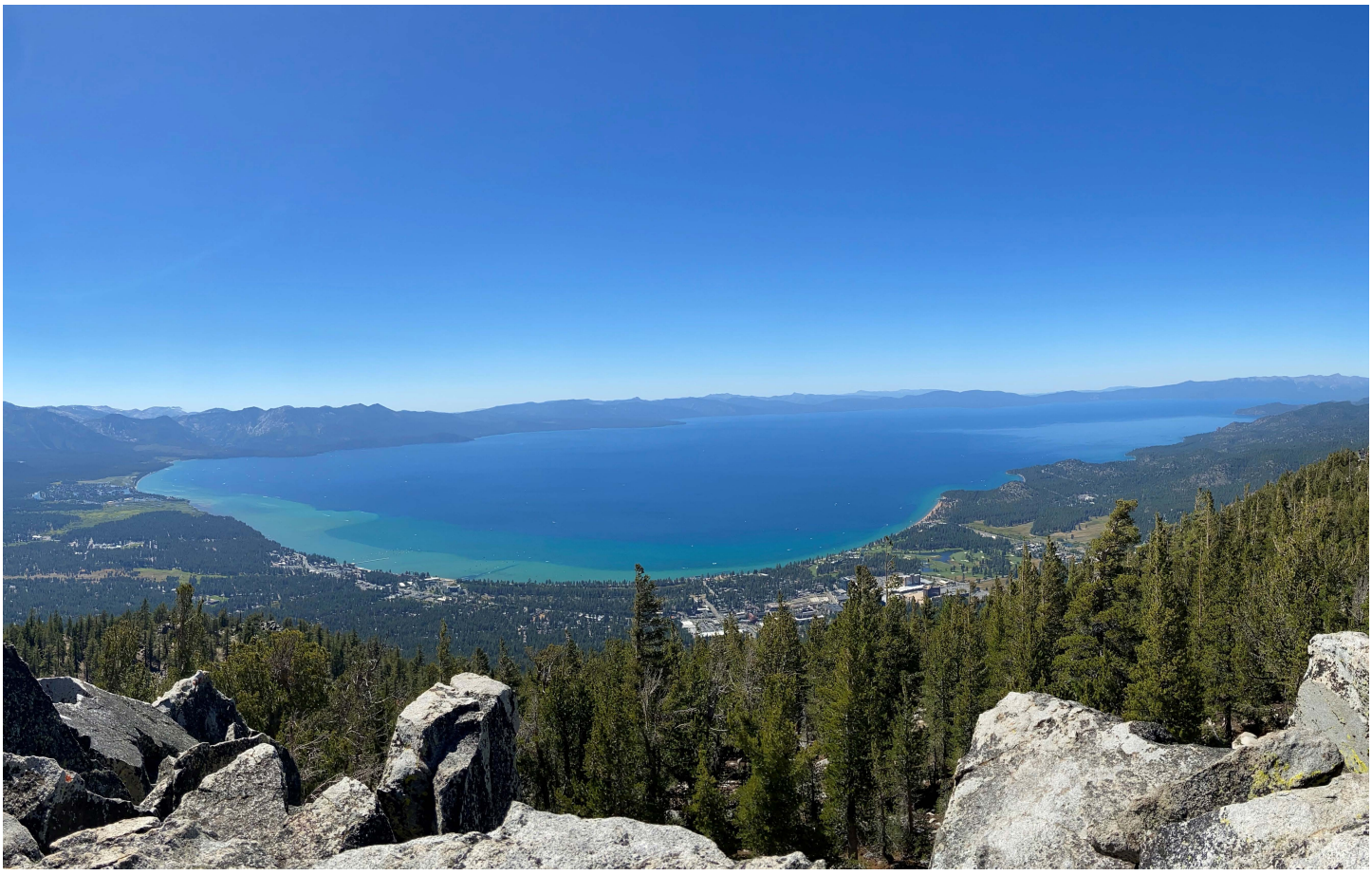
RECENT ACCOMPLISHMENTS

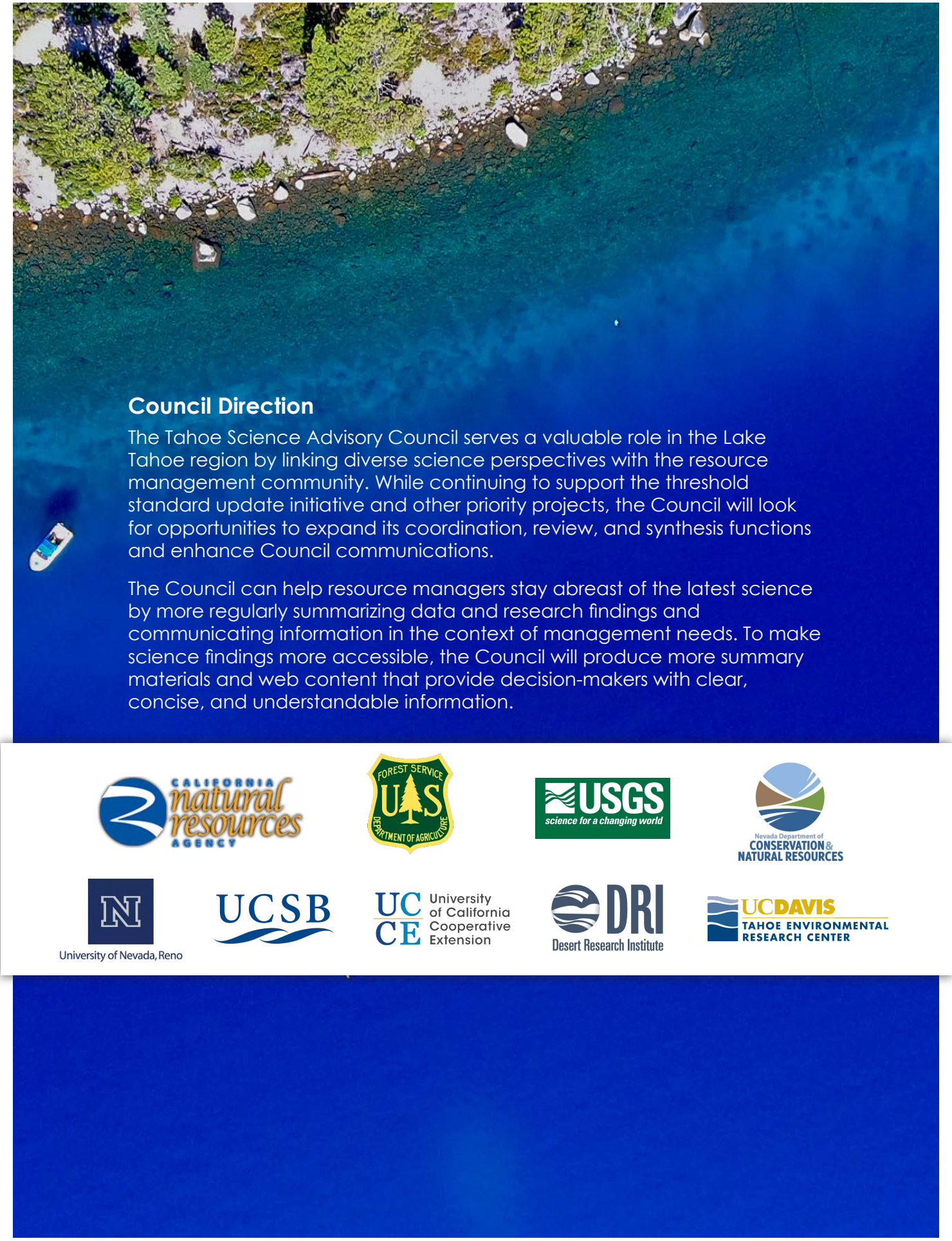
Improving resilience of the Basin's upland ecosystems to climate change and disturbance (e.g. wildfire, introduction of species) is a broadly shared Basin objective. Effectively managing upland ecosystems requires a holistic, coordinated framework that identifies changing conditions, informs resource management decision-making, and monitors expected outcomes.

Building on the aquatic ecosystem Science-to-Action framework, a Council subcommittee has drafted an upland ecosystem Science-to-Action Plan for the Lake Tahoe Basin. This plan describes the state of the science with respect to upland systems and outlines critical research needs to inform management that can help guide future science investment.

WHERE WE'RE GOING

The Council has now developed both upland and aquatic Science-to-Action planning documents. Looking forward, the Council seeks to integrate the upland and aquatic ecosystem plans into an inclusive framework that prioritizes research and monitoring needs for Lake Tahoe and its watershed. This will require extensive stakeholder and resource management coordination to align the approach with current and anticipated needs.





Council Direction

The Tahoe Science Advisory Council serves a valuable role in the Lake Tahoe region by linking diverse science perspectives with the resource management community. While continuing to support the threshold standard update initiative and other priority projects, the Council will look for opportunities to expand its coordination, review, and synthesis functions and enhance Council communications.

The Council can help resource managers stay abreast of the latest science by more regularly summarizing data and research findings and communicating information in the context of management needs. To make science findings more accessible, the Council will produce more summary materials and web content that provide decision-makers with clear, concise, and understandable information.