

Title: Lake Tahoe Science to Action Conference

Date: October 11-13, 2023

Description:

The [Tahoe Science Advisory Council](#) (Council) hosted a three-day conference to celebrate and strengthen the partnership between scientists and resource managers at Lake Tahoe.

For more than six decades, scientific study has been the cornerstone of natural resource management programs in the Lake Tahoe Basin, and the region strives to demonstrate how research and monitoring can translate to effective conservation action.

The conference brought together academic scientists, agency staff, and community members for a thoughtful, interactive dialogue about science as the foundation for environmental protection policy and action – past, present, and future. The conference considered current science with management findings and needs, across a range of topics including Lake Tahoe’s clarity and nearshore conditions, biodiversity, stewardship and recreation, watershed restoration and tribal partnerships, and microplastics.

Summary of Proceedings:

October 11, 2023 - The Council opened the conference with an evening reception at the Lake Tahoe Community College Duke Theater.

- Robert Larsen, Council Program Officer, provided a brief overview of the Council and gave thanks to conference sponsors.
- Julie Regan, Tahoe Regional Planning Agency Executive Director, shared her perspective on the science/management partnership at Lake Tahoe and the importance of science-driven management decisions.
- Dr. Pat Manley, Council co-chair with the US Forest Service Pacific Southwest Research Station, discussed the rich history of Tahoe science coordination before introducing the keynote speaker.

Keynote Address

Dr. Valerie Hipkins, US Forest Service Associate Deputy Chief for Research & Development, spoke about her experiences with the science-management partnership at the federal level. Dr. Hipkins provided numerous anecdotes about the challenges and successes in effective coordination before taking questions from the audience.

October 12, 2023 – The day was devoted to six panel discussion on priority science-management topics. Before the session began, Dr. John Melack, Council co-chair, welcomed participants and encouraged dialogue.

Conserving Biodiversity

Panelists:

Dr. Patricia Manley, US Forest Service Pacific Southwest Research Station
Dr. Will Richarson, Tahoe Institute for Natural Science
Mason Bindl, Tahoe Regional Planning Agency
Dr. Whitney Brennan, CA Tahoe Conservancy
Erin Ernst (Facilitator) CA Tahoe Conservancy

This panel considered the broad topic of wildlife diversity, biodiversity monitoring, environmental thresholds, and the challenges of science communication. A few interesting points:

- A biodiversity-related thresholds should be thought of as a social contract, i.e. a shared commitment to a desired future condition.
- Biodiversity should be considered at multiple scales.
- Greater biodiversity isn't always desirable and can come at the expense of species richness.
- Wildlife are resilient with fantastic adaptive capacity.
- Changing climate conditions are allowing new species to occupy the Tahoe region, forcing questions about monitoring and managing the "new normal" rather than historical conditions.
- Science "findings" are not always neatly defined, confounding managers' need for clear, unambiguous direction.
- Consider science/management co-production and co-development.
- Communicating science is a balance between providing relevant information without overwhelming detail.
- More outreach is needed, along with accessible, visual materials the public can understand.

Clarity and Water Quality

Panelists:

Dr. Geoff Schladow, UC Davis
Dr. John Melack, UC Santa Barbara
Jason Kuchnicki, NV Division of Environmental Protection
Dan Segan, Tahoe Regional Planning Agency
Heather Segale (Facilitator) UC Davis Tahoe Environmental Research Center

Lake Tahoe's clarity continues to be an important indicator of watershed health. The Council has completed a series of projects reviewing data and trends, considering new methods, and identifying research and monitoring priorities. This panel provided a holistic overview of the topic, and the presentations spawned important questions and conversation. Highlights:

- Participants appreciated hearing about recent work, as the public is not always aware of current research.
- It is challenging to continue addressing known challenges while also considering emerging issues.
- The impacts of atmospheric deposition on the lake are not well understood.
- The current focus on ecological and biological impacts is warranted.
- There is a lack of adequate monitoring in both the lake and watershed to inform loading impacts.
- The disconnect between lake response and assumed load reduction should be assessed.
- Questions remain regarding the link between development/construction and other landscape disturbances to clarity conditions.
- When would it be appropriate to reconsider Lake Tahoe's Total Maximum Daily Load (TMDL) policy? How relevant is loading? How can managers leverage new findings to improve the program?
- Lake monitoring data needs to be accessible and available in a timely manner (funding required).
- Consider how the changing climate will increase extreme events, and how those events will affect Lake Tahoe.
- There are opportunities to improve communication, both between science/management partners and the public.
- Possible science retreat for policy makers to review science findings and methods in the context of resource management decisions.

Microplastics

Panelists:

Dr. Monica Arienzo, Desert Research Institute
 Dr. Veronica Nava, University of Milan-Bicocca
 Laura Patten, League to Save Lake Tahoe
 Madonna Dunbar, Tahoe Water Suppliers Association
 Alison Toy (Facilitator), UC Davis Tahoe Environmental Research Center

Microplastics are an emerging issue, globally and locally. This panel brought together international and local experts, leading environmental advocates, and municipal drinking water purveyors to consider current science, discuss pressing issues, and brainstorm on a path forward. A few notes:

- Scientific investigation of microplastics is emerging. There are many unknowns, including research and monitoring priorities.
- There is a lack of standardization in monitoring and measuring microplastics.
- There is limited information about ecological and human health impacts related to microplastics.
- Microplastic sources are variable, and it is unclear which human activities contribute most to microplastic pollution.

- The surface of plastics is a substrate capable of creating its own ecosystem for growing microbes, which has implications for bioaccumulation (“Plastisphere”).
- Microplastic fibers being emitted from the common household dryer add to the potential plastic atmospheric deposition impacts from inside and outside of the basin.
- The number of plastics found in a standard single-use water bottle is 325 particles/L compared to 1 particle/22.7L for Tahoe Tap. Drink Tahoe Tap!
- Automobile tire wear is a particular concern as a plastic source.
- Plastic pollution control depends on broad behavioral changes regarding plastic consumption.
- California has established a monitoring subcommittee and is leading efforts to standardize data collection.

Landscape Restoration – Maꞑyála Wáꞑa

Panelists:

Rhiana Jones, Washoe Environmental Protection Department

Jane Freeman, CA Tahoe Conservancy

Dr. Jonathan Long, US Forest Service Pacific Southwest Research Station

Dr. Ben Sullivan, University of Nevada, Reno (unable to attend)

Victoria Ortiz, (Facilitator) Tahoe Regional Planning Agency

The Meeks watershed, known to the Washoe Tribe as Maꞑyála Wáꞑa, provides a unique opportunity to consider watershed restoration in the context of co-management with tribal partners. This panel considered a broad range of topics, from tribal engagement practices (past and present), prescribed fire, and meadow restoration for climate change mitigation. Some of the main takeaways:

- Cultural burning practices are used for several landscape stewardship goals, but are not traditionally used for fire fuel and hazard reduction.
- Historical fire return intervals were much shorter in meadows/wetlands than once thought.
- Meadow restoration offers an important opportunity to store carbon in soils/vegetation.
- Restoration work must balance multiple outcomes – forest and meadow health, habitat, cultural practices, etc.
- While partnerships continue to improve, it took 127 years for federal recognition of Washoe Tribe as a sovereign nation.
- The Washoe Tribe owns only two parcels in the Basin and co-management agreements like the one at Maꞑyála Wáꞑa are rare.
- There is a need to focus on Tribal collaboration and ensure meaningful dialogue to maximize limited Tribal resources.
- Managers and the public should respect Indigenous Knowledge Systems as much as traditional Western science.

- Strong commitment to co-management includes consistent partnership with tribes, especially for the hardest challenges, projects, and decisions.

Nearshore Conditions and Aquatic Invasive Species (AIS)

Panelists:

Dr. Sudeep Chandra, University of Nevada, Reno
 Dr. Steven Sadro, UC Davis
 Dr. Melissa Thaw, Lahontan Regional Water Quality Control Board
 Holly Holwager, Nevada Division of Environmental Protection
 Jesse Patterson (Facilitator), League to Save Lake Tahoe

Lake Tahoe's nearshore is where most people interact with the Lake, and nearshore conditions are much more accessible and obvious to visitors and residents than mid-lake clarity. This panel explored recent nearshore research and explored the complexity of the physical, chemical, and biological elements of the nearshore environment. Noteworthy moments include:

- Tahoe is not alone in its nearshore challenges. Lakes around the world are all experiencing some degree of change (nearshore greening).
- There is great variability in the nearshore environment. Invasive species, clarity, vegetation, substrate, and inflow patterns all differ greatly along the shoreline.
- Nearshore processes are complex, driven by the nutrient bank, nutrient cycling, nutrient and sediment inputs, and ecology.
- There has been a significant decline in endemic species in Lake Tahoe's nearshore.
- The science/management partnership is strong, as evidenced by the recent rapid response to discovery of New Zealand mudsnail.
- The resources dedicated to nearshore research and monitoring are insufficient to adequately understand the nearshore system. An estimated \$3-4M is needed over the next decade.
- There is a need to better understand the drivers and impacts associated with Harmful Algal Blooms.
- Access to Lake Tahoe's shoreline and the associated nearshore conditions present unique opportunities to align local and visitor messaging. There is a shared commitment to continued learning.

Destination Stewardship

Panelists:

Dr. Derek Kauneckis, Desert Research Institute
 Dr. Jose Sanchez, US Forest Service Pacific Southwest Research Station
 Dr. Elizabeth Perry, Michigan State University
 Devin Middlebrook, Tahoe Regional Planning Agency
 Daniel Cressy, US Forest Service (unable to attend)
 Dr. Darcie Goodman-Collins (Facilitator), League to Save Lake Tahoe

Growing demand for outdoor recreation and changing patterns in visitation timing and destinations have affected how visitors and residents enjoy Lake Tahoe and its watershed. This panel brought together regional and national experts to share their perspectives on user experience, environmental impacts, and recreation preferences in the context of research, monitoring, and stewardship needs. These presentations and ensuing discussion focused on:

- The link between human activity/use and environmental conditions represents a new scientific frontier.
- The “problem” is not easy to define, as differing groups have differing concerns. For example, some visitors prefer busy destinations while residents generally prefer isolation.
- Managers need to develop a monitoring program that gathers meaningful data to support adaptive management needs.
- Effective communication is critical to influencing behavior.
 - Consistent and concise messages for different users.
 - Encourage ownership/stewardship ethos (“Tahoe pledge”).
- Use Tahoe as a model for social experiments to guide management actions.
 - What drives bad behavior?
 - How can managers encourage good behavior?
- Be cautious about management actions that create access barriers (economic or otherwise).

October 13, 2023 – Following the full day of panel discussion, conference participants convened on Friday morning to hear panel summaries, share observations, and talk about next steps. Over 60 people joined the conversation.

- There is great value in the in-person science/management conversations that took place during the conference.
- The science/management partnership has a strong history at Lake Tahoe (TMDL, two-stroke engine ban, AIS rapid response, Caldor fire response, etc.)
- New perspectives are important. Council members should continue to use their networks to bring new ideas to various issues.
- A successful science/management partnership requires effective communication. The Council should redouble efforts to strengthen networks, build trust, and listen to each other.
- Science/management work groups are a productive approach for addressing priority topics.
- The Council should explore ways to build capacity for science/management engagement, communication, and other science delivery functions.
- Upcoming conferences (National Outdoor Recreation, North American Lake Management Society) provide the opportunity to further elevate science at Lake Tahoe.