



NONPOINT SOURCE SUCCESS STORY

Nevada

Lake Tahoe Investments Yield a Decade of Progress

Waterbody Improved

Lake Tahoe's clarity declined by one-third between the 1960s and 2000, threatening the lake's value as an international tourist destination and drinking water source. The roadmap for reducing pollutant loads to the lake, called the Lake Tahoe Total Maximum Daily Load (TMDL) Implementation Plan, was collaboratively developed and adopted by the California Lahontan Water Board (LWB) and the Nevada Division of Environmental Protection (NDEP). The TMDL is currently being implemented by public and private partners. A 2021 performance review indicated implementation progress has successfully achieved 10-year pollutant load reduction targets. As a result, water clarity has stabilized.

Problem

Nestled in the Sierra Nevada Mountains on the border of California and Nevada, Lake Tahoe's uncommonly clean water allows sunlight to reach much greater depths than most other water bodies (Figure 1). Due to Lake Tahoe's remarkable clarity, averaging over 97 feet annually before the 1960s, Nevada designated the lake a Water of Extraordinary Ecological or Aesthetic Value. However, one-third of Lake Tahoe's clarity was lost by the year 2000, and a TMDL was initiated.

To address clarity in Lake Tahoe, the LWB and NDEP collaborated to develop the watershedwide Lake Tahoe TMDL to attain the numeric target of 97.4 feet of annual average clarity. After a decade of development using new and best available science, the TMDL was adopted by California and Nevada and approved by the U.S. Environmental Protection Agency in 2011.

TMDL research found Lake Tahoe's clarity decline is due to increased fine sediment particles (FSP) and algae fed by nitrogen (N) and phosphorus (P). The TMDL found the largest source of FSP to be urban stormwater loads, forested upland runoff, stream channel erosion, and atmospheric loading. FSP and algae affect clarity by reducing the amount of light that can penetrate the water column. The TMDL lays out a roadmap to restore historic clarity to 97.4 feet by 2076, which requires FSP, N, and P loads to be reduced by 65%, 10%, and 35%, respectively. Approximately half of these reductions are needed to meet the interim Clarity Challenge milestone of 78 feet of clarity by 2031 (Figure 2).



Figure 1. Lake Tahoe is on the Nevada-California border.

Story Highlights

Because clarity is slightly more responsive to FSP than nutrients, current implementation is focused on FSP reduction. Reducing forest, stream, and atmospheric FSP loads is important to achieving goals, but because urban stormwater makes up over 70% of FSP loading, attaining clarity hinges on reducing urban stormwater loads (Figure 3).

Douglas and Washoe counties in Nevada collaborate with the Nevada Department of Transportation to implement the TMDL through interlocal agreements established with NDEP, in lieu of municipal separate storm sewer system permits. These TMDL partners implement the following pollutant controls to reduce loads entering Lake Tahoe: (1) ensuring roadway

operations use advanced practices and best available technology (BAT) equipment to target application and improve recovery of wintertime traction abrasives; (2) constructing stormwater treatment facilities and infrastructure improvements to capture and infiltrate stormwater runoff; (3) implementing erosion control measures to reduce pollutant sources; and, (4) in the counties, installing parcel-scale-based best management practices (BMPs) that capture and infiltrate runoff on-site. Nevada will continue to implement these pollutant controls to meet pollutant load reduction targets specified in interlocal agreements that ramp up over time.

Results

A performance review conducted in 2021, the 10-year anniversary for TMDL implementation, indicated Nevada urban implementers had reduced average loads for FSP by 150,000 pounds per year (lbs/yr) and P and N loads by over 460 lbs/yr and 1,400 lbs/yr, respectively. These reductions exceeded 10-year targets. Actions to reduce pollutants entering the lake through forestland runoff, erosion of stream beds and banks, and air deposition were also on track to achieve 10-year goals. The overall conclusion was that 10-year pollutant load reduction milestones were achieved. Due to progress in achieving load reductions, clarity levels have stabilized over the last 20 years.

However, climate change is challenging the progress toward achieving TMDL goals by leading to more extreme precipitation events; an increased threat of wildfire from extended drought; increased stream temperatures that can affect pollutant load insertion depth; and alterations to internal lake dynamics, such as increased duration of stratification and the suppression of mixing and upwelling events that help flush out the water column. The Lake Tahoe TMDL Program remains committed to collaborating with the Lake Tahoe Science Advisory Council to better understand processes, drivers, and impacts. The partners continue to implement effective pollution controls and adaptively manage the program in response to research findings and recommendations.

Partners and Funding

Over \$1 billion has been spent watershedwide by local, state, and federal natural resource management agencies and the private sector to improve water quality. Within Nevada, the Nevada Division of State Land's

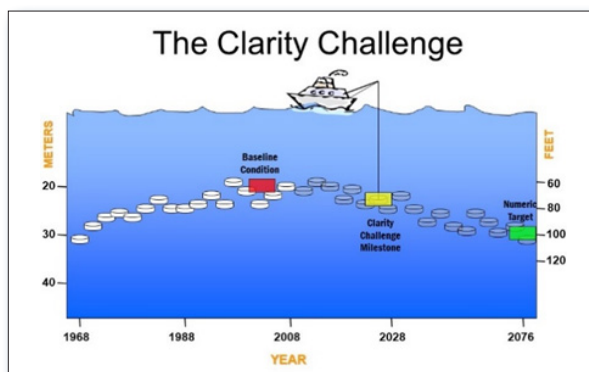


Figure 2. The Clarity Challenge Milestone infographic.

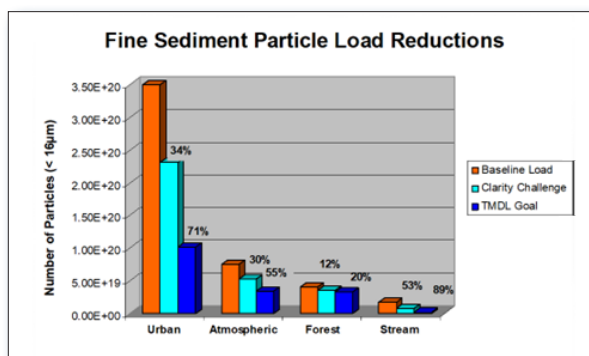


Figure 3. Urban lands contribute most pollutant load.

Water Quality and Erosion Control Grant Program and Lake Tahoe Restoration Act Erosion Control Grant Program administered by the U.S. Forest Service has funded stormwater treatment/erosion control projects. The Nevada Nonpoint Source (NPS) Pollution Management Program has provided over \$1 million in Clean Water Act (CWA) section 319(h) funds for these project types since 2000. Additionally, the Nevada NPS program has provided Washoe and Douglas counties almost \$850,000 in CWA section 319(h) funds to purchase BAT equipment for advanced road operations, and over \$3.25 million to facilitate installation of parcel-level BMPs over the same timeframe.

Additionally, the Nevada NPS program has provided almost \$350,000 to several stream restoration projects. While fish passage improvement was the primary objective, the multibenefit component featured water quality improvement by enhancing riparian vegetation and stabilizing channels. Nearly \$450,000 was provided to support TMDL research and planning activities, and roughly the same amount was provided for education and outreach efforts in the watershed.



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-23-001H
September 2023

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