By Melanie Robbins '06M.A.

SAVING BIG BLUE

Tahoe environmental summit celebrates 10th anniversary

Wally Miller remembers the first Tahoe Summit in 1997 as a coming together of researchers, institutions and agencies with the shared intent of forging a collaborative approach to protecting Lake Tahoe, one of the world's largest, deepest and — despite dwindling clarity in recent decades — clearest alpine lakes.

It worked, according to Miller, a professor of hydrology in the Department of Natural Resources and Environmental Science, whose area of research is soils and water quality and, especially, how that quality is affected by fire.

"We've been very, very productive," Miller says. "We've made some real strides in understanding how the watershed ecosystem functions. We now know pretty much what's going to happen following a fire. Now we need to learn how to mitigate those effects."

Former President Bill Clinton — who attended this year's summit, as well as the first — issued an executive order July 26, 1997 that established the Tahoe Federal Interagency Partnership. The partnership brought together a number of agency heads, including the secretaries of the departments of Agriculture, Interior and Transportation and the U.S. Army, as well as the head of the Environmental Protection Agency. The partnership's mission was to coordinate federal efforts and to "ensure that Federal agency actions protect the extraordinary natural, recreational, and ecological resources in the Lake Tahoe Region," according to the order.

Sen. Harry Reid, D-Nevada, who initiated the first summit, says the mission has been accomplished, but is ongoing. "Probably the most important thing that has happened in the 10 years since the first summit has been increased communication and collaboration between stakeholders, researchers and federal agency personnel," he says.

Locally, a number of institutions have answered the summit's call to action. In addition to greater collaboration between regulating and managing bodies such as the Tahoe Regional Planning Agency and the U.S. Forest Service, the scientific community has come together, as well.

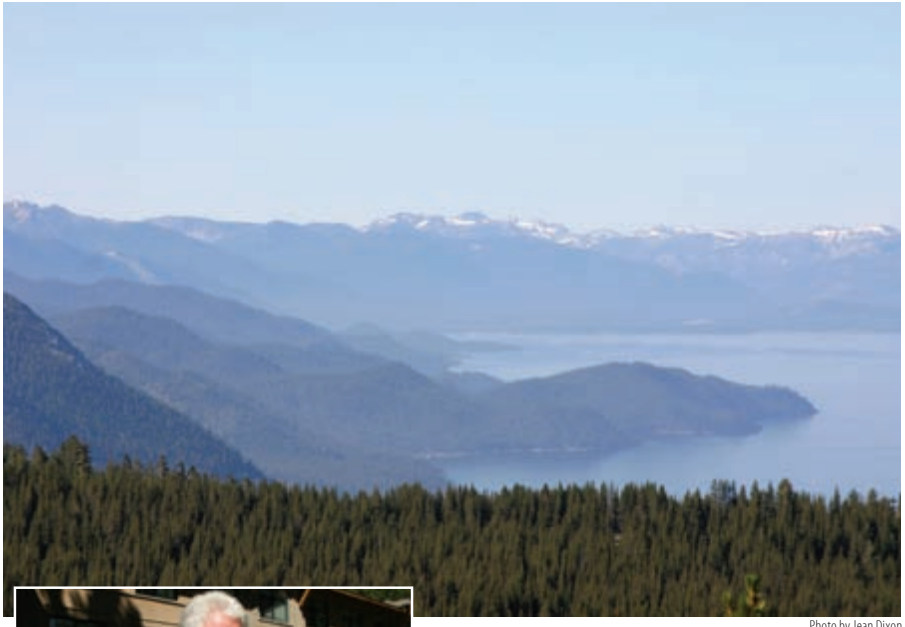

Photo by Jean Dixon

Former President Bill Clinton stopped to greet the crowd gathered at the 10th Anniversary Lake Tahoe Forum at Sierra Nevada College in Incline Village on Aug. 17. The gathering has been an annual event since 1997, when Sen. Harry Reid organized the first forum, which President Clinton also attended. At the first forum, President Clinton and Vice President Al Gore pledged $50 million in federal spending for the Tahoe basin's fragile environment.

The Tahoe Science Consortium, which is a collaboration among the University of Nevada, Reno; University of California, Davis; Desert Research Institute; the Pacific Southwest Research Station of the Forest Service; and the U. S. Geological Survey, was formed in 2005 following extensive discussions between the research organizations and the land management and regulatory agencies. One of its many activities is to develop a science plan that will identify needed areas of research.

In terms of progress in preventing further degradation of the lake's clarity, Reid notes that "some serious steps have been taken to reduce transportation around the lake and utilize environmentally friendly means of moving people," as well as "significant stream restoration and fire suppression activities." However, "We have more to do," he says, noting that as a result of the initial summit, some $331 million has been invested in improving Lake Tahoe and its watershed, and an additional $45 million has been identified for

an upcoming round of federal funding that is awaiting the secretary of interior's approval.

Mike Collopy, director of the University's Academy for the Environment, estimates that out of the $331 million, approximately $20 million has been spent specifically on research in the last decade. The money is allocated competitively and has gone to research on both California and Nevada sides of the lake.

Miller and his primary research team, which includes Dale Johnson and Roger Walker, also professors in the Department of Natural Resources and Environmental Science, have garnered about $1.5 million for their studies that look at water quality, nutrient cycling and forest health in the aftermath of a forest fire. They have found that fire suppression causes not only a dangerous buildup of fuels, but also thick organic layers that are nutrient rich. These nutrients, when mobilized by a wildfire, have the potential to seriously degrade the lake's clarity.

By studying the 2002 Gondola Fire, which burned some 670 acres of forest on the ridge behind the Stateline casinos, Miller's group found that heavy rainfall and resulting erosion about three weeks after the fire caused 380 metric tons of sediment to be deposited in a riparian zone, but fortunately did not make it to the lake.

"If there had been a perennial stream such as Angora Creek, the sediment would have gone into the creek and right down to the lake," Miller says. "We now have an idea of what the magnitude of sediment will be following a fire. Our research will help engineers to determine how big and how many sedimentation basins are needed to mitigate potential erosion events."

The recent Angora Fire near South Lake Tahoe, which burned some 3,100 acres of forest and destroyed 254 homes, was not only far more destructive than the Gondola fire, but almost five times as large.

Now is the time to study the effectiveness of the mitigation efforts that are being put into play following Angora, Miller says. "It's an opportunity to gain even greater knowledge than we have in the last 10 years."

Orchids' drought resistance might help fight global warming

By John Trent '85/'87, '00M.A.

Those pretty orchids at home could hold keys to fight against global climate change. They are plants that just won't die. And for John Cushman, Department of Biochemistry and Molecular Biology professor, his ongoing research on plants with the metabolic ability to use less water than other plants could be an important step forward in developing new generations of plants that are drought- and global climate change-resistant.

Photo by Jean Dixon

John Cushman, Department of Biochemistry and Molecular Biology professor, is making great strides in the ongoing research of plants with the metabolic ability to use less water than other plants.

Cushman, along with researchers from the University of Florida and the Smithsonian Tropical Research Institute in Panama, was awarded a three-year grant of $750,000 from the National Science Foundation to study the evolution of plants with a form of photosynthesis called crassulacean acid metabolism or CAM.

CAM plants take up carbon dioxide, a major part of their metabolism, through small pores called stomata during the night instead of during the day, as plants that have C3 photosynthesis do. CAM plants then store the carbon dioxide as organic acids and introduce them into the rest of the photosynthesis process during the day.

Plants with C3 photosynthesis, which occurs in 90 percent of all plants, lose a great deal of water by opening their stomata during the day while CAM plants lose much less water by storing carbon dioxide at night.

"CAM plants lose 10 times less water C3 plants do," Cushman said. "It is a very 'water-efficient' way of taking up carbon dioxide in a metabolic sequence."

This type of photosynthesis occurs in about 7 percent of vascular plant species, a very minimal amount of plants compared to the large number of species that conduct C3 photosynthesis. To study this metabolic phenomenon, Cushman and his colleagues are studying the orchid family, 50 percent of which have CAM.

Orchids are important in many other ways, according to Cushman. Orchids produce vanilla, a widely used flavoring, and many different species are sold as potted plants or as cut flowers.

"Orchids are horticulturally significant," Cushman said. "There are many different types and the orchid family is one of the largest families of higher plant species."

The group is interested in tracking the changes that led C3 plants to evolve into CAM plants by using molecular phylogeny, a sort of family tree that traces the evolutionary history of a group of organisms. By seeing where CAM plants occur in the tree, the researchers can identify the circumstances under which the switch from C3 to CAM took place.