

Protecting, Enjoying & Exploring the Lake Tahoe Basin

STEPS TOWARD REVITALIZATION

ted to aid environment, economy

▼ **Snow Creek, North Shore**
Restoration project reduces sediment.

Restoration project reduces sediment.

Tahoe In Depth
PO Box 5310
Stateline, NV 89449

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Bi-state cooperation reaches milestone

Tahoe In Depth comes to you this season fresh from winning an award for communications excellence – the Silver Spike award, which is bestowed by the Sierra Nevada chapter of the Public Relations Society of America.

The award recognizes the paper for meeting its primary goals of building environmental stewardship in the Tahoe Basin and becoming a financially self-sustaining publication. We couldn’t have achieved these goals without you –



thank you for subscribing and underwriting Tahoe In Depth which allows the paper to continue arriving in your mailbox and on newsstands around the Lake.

December 2014 also marks the 45th anniversary of the Bi-State Compact between California and Nevada which created the Tahoe Regional Planning Agency. In fact, on December 18, 1969, then-President Richard Nixon signed the Compact after ratification by Congress. Much has evolved over the last four-plus decades, but the guiding principles that brought the two states together to protect Lake Tahoe remain constant. The shared commitment to safeguard and restore the health of the Tahoe Basin is as strong as ever.

In our last issue, I mentioned the pending Lake Tahoe Restoration Act in Congress. While we haven’t been successful yet in moving this legislation, our congressional delegation is poised to reintroduce the bill early in 2015. Please watch for news about the bill at trpa.org and contact your member of Congress to weigh in on this important Act. The offices of California Sens. Dianne Feinstein and Barbara Boxer and Nevada Sens. Harry Reid and Dean Heller would like to hear from you. To find your House representative, visit <http://www.house.gov/representatives/find/>.

Have a joyous holiday season and thank you for caring about Lake Tahoe!
– Julie Regan, *executive editor*

Tahoe In Depth

Publisher and contributors: The Tahoe Regional Planning Agency publishes Tahoe In Depth in partnership with various state and federal agencies. Contributors include the California Tahoe Conservancy, U.S. EPA, U.S. Fish & Wildlife Service, Incline Village General Improvement District, Lahontan Regional Water Quality Control Board, League to Save Lake Tahoe, Nevada Department of Wildlife, Nevada Division of Environmental Protection, Nevada Division of State Lands, Tahoe City Public Utility District, Tahoe Fund, Tahoe Resource Conservation District, Tahoe Transportation District, Tahoe Water Suppliers Association, University of California, Davis, University of Nevada, Reno, and the Washoe Tribe.

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Photography: California Tahoe Conservancy, Corey Rich Productions, Karen Fink, Tom Lotshaw, Devin Middlebrook, Jason Patnode, Mike Vollmer, U.S. Forest Service, South Tahoe Refuse, Tahoe Resource Conservation District, Sarah Underhill, Tahoe Institute for Natural Science, U.S. Fish & Wildlife Service.

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Boosting the environment, economy

New construction projects around Lake Tahoe are going a long way toward restoring economic vitality to the Tahoe Basin. But these projects are also bringing a boost to the environment.



▼ Alta Mira, before

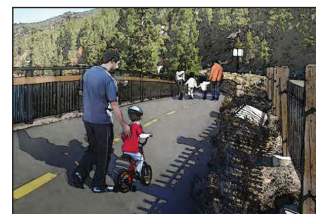


▼ Alta Mira, after

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Hotshot history

The Tallac Hotshots of Lake Tahoe are one of only 108 elite firefighting crews in the country.

Major
funding
provided by:





A captured bat is released after it is cataloged.

Researchers make some significant discoveries during Tahoe bat study

Researchers successfully documented 10 different bat species during their survey. Knowing which species occupy the area will give them a better idea of the most important habitat characteristics to preserve. They also developed follow-up questions that will be the focus of future surveys.

Two lactating little brown bats were caught at Spooner Lake, which indicates that there was a maternity roost nearby. Maternity roosts are important sites where pregnant females gather to raise their young, and some individuals will even return to the same site every year.

Researchers hope to use radio-telemetry to track these females during future surveys to help locate and protect those important roost sites.

Surprisingly, all 12 bats caught at Hobart Reservoir were males. Researchers speculate that only males occupy that high-elevation site, while females stay at lower, warmer elevations with their young to increase the chance of survival. This is another question that researchers hope to address in the future.

The group plans to continue to expand its knowledge of the area's bat species and work to conserve their most important habitat.

For more information on Nevada's sensitive bat species, please see the Wildlife Action Plan at www.ndow.org.

Study focuses on sensitive bat habitat

Survey nets 33 bats from 10 different species during four-night effort

By Mark Enders

NEVADA DEPARTMENT OF WILDLIFE

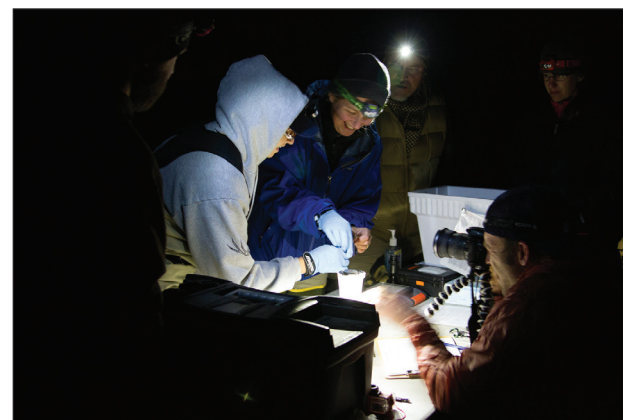
Remember the last time you hiked on your favorite Tahoe trail at dusk, using the last bits of daylight to make it back to your car?

Whether you were out all day or just went for a short sunset hike, you were not the only one waiting for that moment. The bats that live around Lake Tahoe sleep all day, just waiting for the sun to disappear so that they can begin their daily activities. Some people have mixed feelings about having bats in their midst, perhaps conjuring thoughts of vampires and haunted houses, but in reality, bats are harmless and provide benefits to the people living around them.

Bats are efficient insect hunters, using ultrasonic calls to detect and track their prey. Those pesky mosquitoes don't stand a chance against a quick-moving bat, and without bats, we would not have a healthy balance of bugs in our forests. Plus, bats are pretty darn cute.

Despite Tahoe's allure and the numerous biologists working in the area, we don't know a lot about the bats that make their home in the Lake Tahoe Basin. While some bat species are adaptable and will happily nap near your house, others are very particular about where they spend their time, making them especially vulnerable to human presence and habitat disturbance. To help determine which bat species occupy the Lake Tahoe Basin, biologists from six different state and federal agencies (Nevada Department of Wildlife, Nevada Natural Heritage Program, Nevada State Museum, Bureau of Land Management, National Park Service, and U.S. Forest Service) and several volunteers convened on the Nevada side of Lake Tahoe to survey bats during four nights in early August.

The group concentrated its survey around Hobart Reservoir, Spooner Lake, and North Canyon Creek, all located inside Lake Tahoe Nevada State Park. The researchers hoped that this survey would be the first step in identifying



A researcher (above) holds a *Myotis* species bat during a four-day survey conducted on the Nevada side of Lake Tahoe in August. Meanwhile, researchers and volunteers process a captured bat during the study (left).

sensitive sites for bat species that may require special consideration in an area that sees heavy recreation use and numerous forest fuels-reduction projects.

To maximize their ability to detect as many bat species as possible, the researchers saturated each survey area with strategically placed nets, and deployed specialized acoustic detectors to record the bats' ultrasonic calls. The addition of acoustic detectors was especially important because not all bats fly close enough to the ground to be caught in nets. Despite unseasonably cold weather and a winter-like rain that cancelled the first survey night, the group successfully caught 33 bats from six different species in its nets: the silver-haired bat (*Lasionycteris noctivagans*), western small-footed

myotis (*Myotis ciliolabrum*), long-legged myotis (*Myotis volans*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), and Yuma myotis (*Myotis yumanensis*).

Researchers recorded four additional species with the acoustic detectors: Mexican free-tailed bat (*Tadarida brasiliensis*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), and pallid bat (*Antrozous pallidus*). In all, six of those are considered species of conservation priority by the Nevada Department of Wildlife, mostly due to loss of roosting sites, human disturbance, and a general lack of information on their distribution in Nevada.

Mark Enders is a wildlife biologist with the Nevada Department of Wildlife and Nevada Tahoe Resource Team.

Rebounding from the Great Recession

New projects, acquisitions bring promise to Lake Tahoe's environment, economy

Continued from page 1

New construction, renovations, infrastructure improvements, and environmental improvements during the summer of 2014 were all signs of Lake Tahoe breathing new life. The following is a round-up of the most significant changes.

North Lake Tahoe

Kings Beach

Sitting on the California side of Stateline in North Lake Tahoe is Kings Beach, a town of nearly 4,000 residents known for its laid-back, small-town atmosphere. The Kings Beach commercial core sits on Highway 28 along the North Shore of Lake Tahoe. For decades, the aging infrastructure of the commercial core did not complement the town. The Kings Beach Commercial Core Improvement Project, which broke ground in 2014, will upgrade a 1-mile stretch of the highway that runs through downtown. This \$48 million project will improve stormwater management, reducing an estimated 45,000 pounds of fine sediment per year from reaching Lake Tahoe. The project also improves the scenic beauty and walkability of the area.

Snow Creek

Restoration of Snow Creek, a highly degraded tributary in Tahoe Vista, was completed in 2014. The restored site was once home to a cement plant that dumped waste into the creek, leading to its destruction. The restoration project removed old fill in the creek, added stormwater management infrastructure, restored natural vegetation, and re-established historical creek flow. This project reduces fine sediment flowing into Lake Tahoe, increases recreational access, and improves scenic beauty in the area.

South Lake Tahoe

Chateau at the Village

For years, the California side of Stateline was marked by contrasting images on opposite sides of Highway



▼ **Hard Rock, Stateline**
Revitalization means more jobs.



▼ **Chateau, South Shore**
California project signals resurgent economy.

50. Prosperity, in the form of the Heavenly Village, sat across from the unfinished foundation of a planned convention center-hotel-shopping center that had been stalled by the economic downturn. Known locally as the "hole in the ground," the unfinished project was a reminder of the hard times South Lake Tahoe faced during the Great Recession.

Now Chateau at the Village proudly lines Highway 50, bringing promise of

stronger economic times for South Lake Tahoe.

While occupying only a small percentage of the original construction plan, the Chateau gives new life to around 18,000 square feet of retail space where once sat older properties. More importantly, it offers a complete face-lift to the area and brings hope that the rest of the "hole" will soon follow suit and be redeveloped.

Hard Rock Hotel & Casino

At the beginning of 2014, the struggling Horizon casino at the east end of the Stateline casino strip closed its doors.

Shortly after, it was announced that \$60 million would be invested in renovations to transform the building into the new home for the Hard Rock Hotel & Casino Lake Tahoe.

An extensive remodel is planned for the old and weathered property, including a 25,000-square-foot casino

floor and over 500 revamped rooms. Slotted to open in January 2015, the Hard Rock Hotel & Casino Lake Tahoe is expected to bring back 550 to 600 jobs to the area.

Bijou

The Bijou Area Erosion Control Project updates and improves stormwater infrastructure for the Bijou Creek watershed and the Bijou commercial core, a 42-acre area in the central heart of the city of South Lake Tahoe. The existing infrastructure for the area was built in the 1960s and was one of the largest contributors of polluting fine sediment and nutrients to Lake Tahoe. An area-wide approach to capturing stormwater runoff solved the challenge of designing and building a water quality treatment system in this highly urbanized area with a high groundwater table, a large variety

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of property owners, and extensive coverage. This project reduces by 96 percent the amount of nitrogen, phosphorus, and fine sediments that wash into Lake Tahoe with stormwater.

Harrison Avenue

The most visible and overdue improvement in the summer of 2014 was the Harrison Avenue project. Harrison runs along Highway 50 and is the front for a variety of prosperous local businesses. However, the infrastructure did not reflect the local character of businesses in the area. This project met multiple goals, improving the area’s parking, traffic, scenic beauty, and stormwater management.

Auto Zone

Construction on the new Auto Zone building began during the summer of 2014. Located next to Izzy’s Burgers on Highway 50, the building replaces an old garage that was home to a martial arts studio. This new building will not only improve the scenic quality of Highway 50, it will also reduce stormwater runoff going into the Lake. Best Management Practices, including bio-swales and a paved lot, will replace the old dirt lot that contributed sediment and nonpoint pollution to Lake Tahoe.

Cold Water Brewery & Grill

Another building that sat vacant for years is now the new local artisan Cold Water Brewery & Grill. The building once housed the Swiss Chalet restaurant, the cornerstone of the Swiss Chalet Village. Major renovations updated the old building that once stood out with its stark white exterior paint and Swiss-themed accents. The brewery illustrates the increasing popularity of midtown South Lake Tahoe.

California Tahoe Conservancy

The California Tahoe Conservancy, one of the state’s 10 land conservancies, was established in 1984 to lead California’s work to restore and enhance the extraordinary natural and recreational resources of the Lake Tahoe Basin. In 2014, the Conservancy



acquired several key properties in South Lake Tahoe.

Alta Mira Building

The California Tahoe Conservancy purchased the Alta Mira building, located at the east end of El Dorado Beach, in 2014. This parcel, co-owned by State Lands Commission, complements the city’s larger Lakeview Commons project. The removal of the building adds 190 linear feet to the existing 2,050 linear feet of public lake views. The increasing recreational and scenic values are immediately visible, but there are less obvious benefits, too. It will also infiltrate stormwater runoff and decrease the amount of sediment discharged to the Lake.

Other Properties

In addition to the Alta Mira property, the Conservancy acquired two pieces of property in the “Y” area of South Shore — the South “Y” Lodge and a half acre lot that is home to Heads Up Smoke Shop and Tahoe Psychic. The larger of the two properties, South “Y” Lodge, has over 14,400 square feet of impervious surface that was removed this fall. The other property has 7,750 square feet of impervious surface that will be restored to a more natural state.

The restoration of these properties will have several benefits to both the environment and community. They provide open space, improve water quality, and increase scenic beauty.



Additionally, development rights associated with the properties will be banked by the Conservancy and can be transferred for future redevelopment within town centers as part of TRPA’s Regional Plan.

Upper Truckee Restoration

The California Tahoe Conservancy took another important step toward the restoration of the Upper Truckee River and marsh. In September 2014, the Conservancy staff announced its preliminary, staff-recommended alternative for this critical South Lake Tahoe project. The marsh is responsible for filtering water from the Upper Truckee River, the largest of the 63 tributaries that feed the Lake and the largest contributor of sediment clouding the Lake. The approach recommends improvements to the recreation amenities on the west side of the marsh;

restoration of the natural floodplain of the marsh in the middle section; and no action on the east side. This preliminary alternative was proposed after decades of study, environmental review, and public comment, the Conservancy said.

The Upper Truckee Marsh is responsible for filtering nearly 40 percent of all water that enters Lake Tahoe. After years of development and environmental degradation, marsh restoration is of critical importance to the clarity of Lake Tahoe’s waters. The Conservancy’s plan also takes into consideration the recreational value of the area to locals and tourists. After additional review, the final recommended alternative will be presented in 2015 and construction could start as early as 2017.

Devin Middlebrook is environmental education specialist at TRPA.

Summit participants praise protection efforts

Continued partnerships, funding key to progress at Lake Tahoe

At the 18th annual Lake Tahoe Summit in August, California and Nevada officials and members of the two states' federal delegations touted successful efforts to restore and protect the Jewel of the Sierra Nevada.

But they also emphasized a need for continued collaboration among more than 50 local, state, and federal partner agencies and the nonprofit and private sectors, as well as a need for additional funding, to keep momentum going.

Sen. Dianne Feinstein (D-Calif.) hosted the 18th annual summit, held at the Tallac Historic Site.

Speakers at the summit included Senate Minority Leader Harry Reid (D-Nev.); Sen. Dean Heller (R-Nev.); Reps. Mark Amodei (R-Nev.), Tom McClintock (R-Calif.), and John Garamendi (D-Calif.); Nevada Gov. Brian Sandoval; California Gov. Jerry Brown; representatives of the Washoe Tribe; and other officials.

Significant progress to restore and

protect Lake Tahoe has been made with \$1.7 billion in federal, state, local, and private sector funding paying for restoration projects through the Environmental Improvement Program.

But Lake Tahoe continues to face threats. They include nearshore water quality degradation, the introduction and spread of invasive species, wildfire, drought, climate change, and looming funding shortfalls for programs created to tackle those and other issues.

Gov. Sandoval said he's confident California and Nevada and dozens of partner agencies are "more engaged than ever" to work together to protect Tahoe.

Gov. Brown, the keynote speaker, focused on how those with different points of view can come together to find common ground. "A breakdown can pave the way for a breakthrough," he said to the crowd of more than 600 people.



Sen. Dianne Feinstein addresses participants at the 18th annual Lake Tahoe Summit in August while Reps. Mark Amodei (R-Nev.) and John Garamendi (D-Calif.) listen.

This month marks the 45th anniversary of the creation of the bi-state compact to protect Tahoe

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a 750,000-resident metropolis at Lake Tahoe and a four-lane highway with a bridge across scenic Emerald Bay.

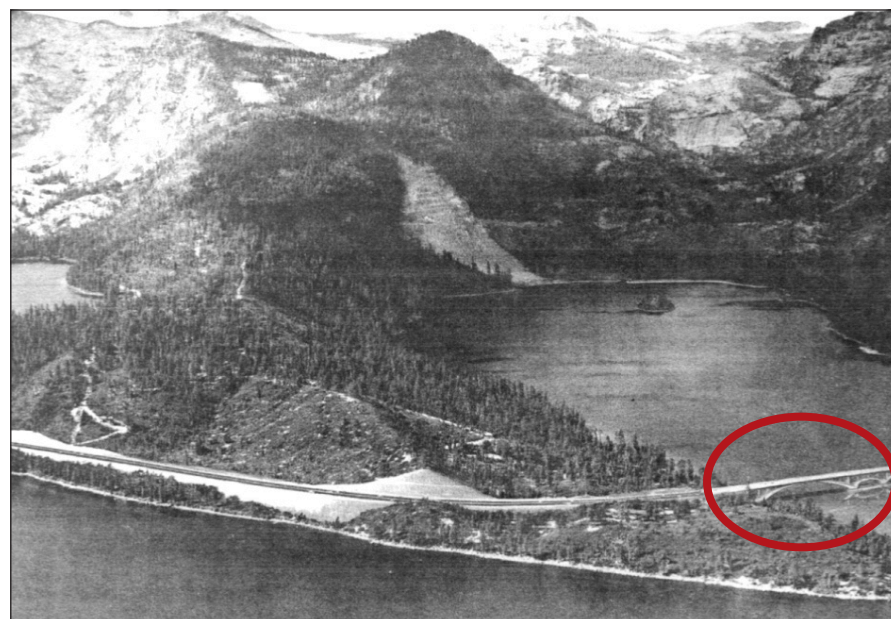
Later compact agreements established growth controls and caps for all types of development in the Lake Tahoe Basin, including residential, hotel, and commercial land uses, and set restoration targets for environmental thresholds such as air and water quality, lake clarity, wildlife and fish habitat, vegetation, scenery, and recreation.

California and Nevada reaffirmed their partnership to protect Lake Tahoe through legislation in both states in 2013 which endorsed the Regional Plan Update of December 2012.

Major goals of the Regional Plan Update include accelerated attainment of environmental thresholds, development of more walkable, bikeable town centers, the transfers of development out of sensitive

environmental areas into town centers, and the environmental redevelopment of legacy properties that were built before modern environmental standards took effect.

"The two states have reaffirmed their partnership for the Lake, and their commitment to Tahoe remains strong," said Shelly Aldean, chairwoman of TRPA's Governing Board. "As a bi-state organization, we know the only way we'll be able to save the Lake is to keep that cooperation alive."



Lake Tahoe faced intense development pressure when the bi-state compact creating the Tahoe Regional Planning Agency was signed into law by Congress and by California Gov. Ronald Reagan (above left) and Nevada Gov. Paul Laxalt. One proposal at the time that was thwarted by the new environmental controls was a four-lane highway and bridge across the mouth of Emerald Bay, circled in this rendering (above).

Recovery facilities help Tahoe hit recycling targets

More blue bag use could boost recycling results

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

Environmental sustainability covers extensive ground, including recycling.

More participation in the “blue bag” mixed recycling programs at Lake Tahoe is needed, according to waste management representatives.

Customers of South Tahoe Refuse and Tahoe Truckee Sierra Disposal are recycling at least some of their trash, even if they’re not actually taking the time to sort their plastic, glass, paper, or metal cans. That’s because the companies have “dirty MRFs,” material recovery facilities where their workers can separate and salvage some of the recyclable materials that get mixed in with the general waste stream.

But the percentage of material recovery is lower compared to the blue bag program.

“Recycling is happening even if you don’t see it, but the more people who participate, the better,” said Jeanne Lear, Human Resources Manager at South Tahoe Refuse, which operates on the South Shore in California and parts of Douglas County, Nevada.

South Tahoe Refuse built its MRF in the mid-1990s after California set recycling rate targets of 25 percent by 2000 and 50 percent by 2005. “We had to pick a system and because of the large tourist population we went with a dirty MRF because so many recyclables are collected with the garbage,” Lear said.

California’s recycling targets increase to 75 percent by 2020. South Tahoe Refuse is aiming for that goal, with an overall current rate of about 63 percent.

The MRFs can generally recover about two-thirds of the recyclable materials that are mixed in with the general waste stream, so South Tahoe Refuse wants to get more people to participate in the blue bag mixed recycling program, Lear said. It has a much higher recovery rate, as long as people are careful to not contaminate their recyclables.

Recyclable materials such as glass, plastic, and paper are all put into blue



Workers sort out recyclable materials from trash at a material recovery facility. If more residents and visitors used the blue bag, mixed recycling program, the area would see a big boost in its recycling rates.

bags. The bags are then picked up by garbage trucks and separated at the MRF for sorting.

The three waste collection companies operating in the Lake Tahoe Basin agreed to offer the blue bag program for a higher-visibility, more-effective, and uniform recycling campaign, Lear said.

South Tahoe Refuse is the only one that offers blue bags to customers free of charge. Tahoe Truckee Sierra Disposal customers on the North and West Shore and customers of Waste Management at Incline Village must buy blue bags at local stores.

Lear estimates about half of South Tahoe Refuse’s residential customers participate in the blue bag program. More widespread participation would boost its recycling rates. But facing an ambitious 75 percent recycling target in five years, the company is also exploring other material recovery options. Recovery of yard waste, construction waste, and demolition waste are all expected to play a factor in meeting the state target, she said.

South Tahoe Refuse built a Resource Recovery Facility to process organic materials, which can be turned into compost, mulch, and landfill covers. The company also continues to pilot a food waste recovery program at South

Shore schools and with some of its large commercial customers. The challenge is keeping the food waste free of contamination by things such as plastic so that it can be effectively composted and marketed for sale.

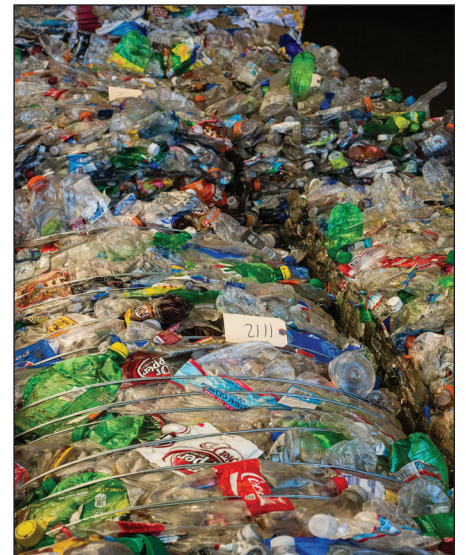
“We’re targeting food waste programs to help meet our 2020 goals,” Lear said.

Tahoe Truckee Sierra Disposal is also piloting a program to explore the logistics and feasibility of food waste recovery options, said Bert Wallace, Operations Manager.

Nevada residents in the Basin served by Waste Management must actively recycle, either by participating in the blue bag program, putting recyclable materials in designated recycling containers, or dropping recyclable materials off in person, if they want to keep recyclable materials out of the landfill. That’s because there’s no MRF to salvage recyclables from the general waste stream.

“If you’re not recycling in Nevada it goes straight to the landfill,” said Madonna Dunbar, Resource Conservationist for the Incline Village General Improvement District.

“Incline’s blue bag program was the first single-sort recycling option in Nevada. Our blue bag program has boosted the annual community



Sorted plastics ready to be shipped off to be recycled into new products.



recycling rate to 18 percent, compared with 5 percent several years ago. During the seasonal green waste recycling program offered from May to July, we top 30 percent. Much of what goes to the landfill still includes food waste, construction waste, and recyclables that are not separated,” Dunbar said.

For more information on the dos and don’ts of Tahoe recycling, visit:

- www.southtahoerefuse.com
- www.waste101.com/flashindex.html
- www.wm.com/index.jsp

Tom Lotshaw is public information officer at the Tahoe Regional Planning Agency.

Tahoe Fund seeks help with weed-removal projects

The Tahoe Fund is seeking donors for aquatic invasive weed removal projects at the Tahoe City Dam and the Ski Run Marina Channel. In partnership with the Tahoe Resource Conservation District, the funds raised will pay for removal of Eurasian watermilfoil and curlyleaf pondweed by sending divers down to place mats over the weeds or to hand pull. These techniques have been used throughout Emerald Bay to eradicate the weeds.

“The weeds growing in front of the Tahoe City Dam and in the Ski Run Marina Channel are significantly changing the nearshore environment,” said Tahoe Fund CEO Amy Berry. “With the help of the private community, we can use proven techniques to remove the weeds and bring back the pristine waters we expect in Lake Tahoe.”

Lake Tahoe has been infested with aquatic invasive weeds in the shallow, nearshore waters since the early 1990s. The weeds affect lake clarity, alter habitat, reduce property values, and impact tourism. The Tahoe Fund has already raised \$40,000 for these projects through the generous support of private individuals and the Ironman Foundation. A nonprofit dedicated to raising private support and funding for environmental improvement projects, the Tahoe Fund has set a total campaign goal of \$65,000 for these projects.

“These weeds are impacting lake clarity, health, and recreation,” said Tahoe Fund board member Patricia Ronald. “I hope we can inspire the private community to help us in our efforts to remove them, so we can all continue to enjoy the Lake.”

The private funds raised for these projects will be leveraged with public funding from the California Tahoe Conservancy, thanks to California Senate Bill 630, which now allocates pier fees collected by the California State Lands Commission to aquatic invasive species control projects.

The Tahoe Fund is a 501(c)(3) and all donations are tax exempt to the fullest extent of the law. For more information on these and other projects, please visit www.tahoe fund.org.

Donors pave way for East Shore bike path

\$750,000 in donations help secure \$12 million in grants to connect Incline to Sand Harbor

With the help of contributions from private donors, the Tahoe Fund met its goal of raising \$750,000 for a bike path from Incline Village to Sand Harbor State Park. This private investment will be the matching monies needed to help the Tahoe Transportation District secure more than \$12 million in public funds from federal, state, and local governments for bike path construction. The new 3-mile path will create a valuable recreational amenity on the East Shore of Lake Tahoe while significantly improving the safety of the highway corridor.

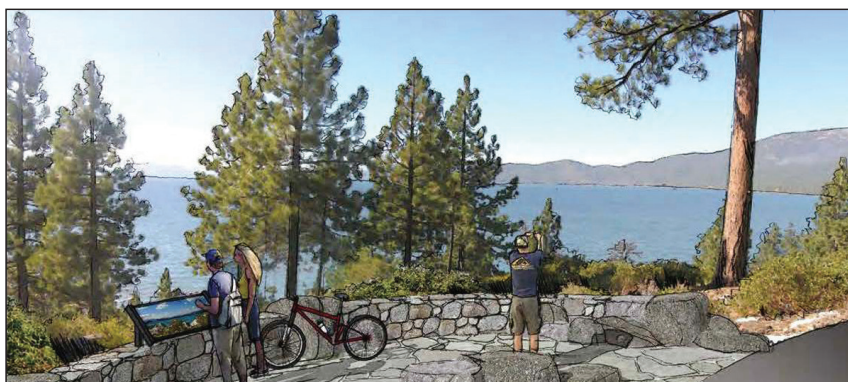
“It is simply incredible to see the generous support of the private community to bring this world-class walking, running, biking, strolling path to Tahoe,” Tahoe Fund CEO Amy Berry said. “We invite individuals, businesses, and foundations to add their support for the path and leave their names and legacies on the beautiful eastern shore of Tahoe.”

The Incline Village to Sand Harbor bike path will provide an opportunity for the community to explore the natural beauty of the East Shore of Tahoe that until now was safely accessible only by car. The path will provide an exceptional recreational amenity, while significantly improving safety along the State Route 28 corridor. With a 10-foot wide path, it will meet the American Disability Act standards to ensure it is accessible for everyone to ride, walk, or stroll.

“The Tahoe Fund was founded to inspire the private community to support great environmental projects in Tahoe,” said Tim Cashman, Tahoe Fund Board Chair. “We are so grateful to everyone that has stepped up to make this dream project a reality.”

There are still opportunities to be a part of this effort before construction begins in May 2015. All donations of \$100 or more will be featured on a donor wall at the trailhead. Engraved bear- and trout-shaped pavers are also available along the path for donations of \$2,500 and \$5,000.

The new path will be separated from the highway. It will begin at the intersection of Lakeshore Drive



Donors Steven and Sandy Hardy (above) contributed to the private fundraising by the Tahoe Fund that will help make the East Shore bike path project a reality. The 3-mile path will reduce traffic along a busy stretch of highway. Construction is expected to begin in May 2015.

and State Route 28, expanding the current Lakeshore Drive bike path and continuing on to Sand Harbor State Park, providing access to Hidden Beach, Memorial Point, and other scenic vistas. It is one of the important missing segments in the Lake Tahoe Bikeway that will one day circumnavigate the Lake.

Founded in 2010, the nonprofit Tahoe Fund is dedicated to raising private

funds for projects that will improve lake clarity, enhance recreation, and inspire environmental stewardship in the Lake Tahoe Basin. The organization has funded portions of 12 projects that include other new sections of the bike path around the Lake, watershed restoration, removal of aquatic invasive species, and improvements to state parks and public beaches.

Resorts provide access to public lands

Several Lake Tahoe ski areas utilize Forest Service lands for their operations

By Cheva Gabor
U.S. FOREST SERVICE

Every winter, skiers and snowboarders throughout the Lake Tahoe Basin pray for snow. When it comes, they'll likely head out to National Forest System (NFS), lands to enjoy it. But most winter sports enthusiasts probably don't realize that more than 60 percent of the nation's ski resorts operate on public lands.

In the Lake Tahoe Basin, Heavenly Mountain Resort, owned by Vail Corporation, offers downhill skiing and snowboarding on lands managed by the U.S. Forest Service Lake Tahoe Basin Management Unit (LTBMU) under a ski-area permit. Incline's Diamond Peak Resort and Homewood Mountain Resort hold ski slope permits, which authorize use of NFS lands for periods of 10 to 20 years but do not allow placement of facilities or infrastructure. While Alpine Meadows operates partially on the LTBMU, the bulk of the resort lies on the Tahoe National Forest, which administers its ski area permit.

A long-term commitment

The National Forest Ski Area Permit Act of 1986 authorizes the Forest Service to permit ski areas on public lands. The resulting partnership between the Forest Service and the ski industry offers high quality winter recreation opportunities that neither party could provide on their own, says Andrew Strain, vice president of planning and governmental affairs for Heavenly Mountain Resort and Northstar California Resort.

The private sector takes the financial risk, amortized over the life of a 40-year permit, and invests the substantial private dollars necessary to build and maintain infrastructure, such as lodges and ski lifts.

"Ski area permits are the longest-term commitments the Forest Service makes to an outside entity for a particular piece of land, in recognition of the extremely high initial investment required," LTBMU ski area permit administrator Jonathan Cook-Fisher says.

In return for their investment, corporations such as Vail are allowed



The U.S. Forest Service's Ski with a Ranger program at Heavenly allows skiers to learn about forest health, wildlife and water quality issues — all while enjoying breathtaking views of Lake Tahoe.

to develop ski and snowboard opportunities on some of the most spectacular landscapes in the country.

The economic benefits

Ski areas pay fees for the use of federal lands, which go to the U.S. Treasury. The resorts also bring economic benefits from the use of public lands to Forest Service communities. These include employment opportunities with the resort, as well as multipliers such as dollars spent on lodging and restaurants by visiting skiers and snowboarders. Expansion of summer activities at ski resorts such as Heavenly should help to stabilize and increase this economic opportunity while enhancing recreation.

Across the Forest Service, 122 ski areas operate on 180,000 acres of the 193 million total managed by the agency. The agency averages 23 million visits to ski areas annually, which contribute \$3 billion to the economy each winter and create approximately 65,000 full-time, part-time, and seasonal jobs in rural communities.

With experience managing resorts on both public and private lands, Strain has a unique perspective on the additional complexities of managing a resort located on NFS lands. In addition to Heavenly, Vail operates Kirkwood Resort on the Eldorado National Forest and several resorts on NFS lands in

Colorado. The company also operates Northstar Resort, located just outside the Lake Tahoe Basin entirely on private lands. Strain points to relationship building as the key to success when working with federal land managers. "We work to connect on all levels — from the forest supervisor, to the permit administrator, to staff working on the ground."

The planning challenge

Inherent tension exists between private industry's need for agility in responding to customers' changing interests and the federal government's requirements for analyzing and approving new projects on the mountain.

"The biggest challenge we face in administering ski area permits is adapting to changes in user preferences and the market," Cook-Fisher says.

Strain agrees, noting the constraints as well as the Lake Tahoe Basin's short construction season, particularly at 9,000 feet, where much of the resort's infrastructure is located.

Heavenly's Master Plan, approved by the Tahoe Regional Planning Agency's Governing Board, sets forth broad direction for the resort, but all projects that occur on federal lands must also undergo National Environmental Policy Act analysis, which gives the public

Ski with a Ranger program gives visitors special views

By Cheva Gabor
U.S. FOREST SERVICE

Like many ski resorts, Lake Tahoe's Heavenly Mountain Resort operates on public lands, managed by the U.S. Forest Service. The Lake Tahoe Basin Management Unit's (LTBMU) Ski with a Ranger partnership brings together Forest Service staff, volunteers, Heavenly, and the city of South Lake Tahoe to deliver a conservation message.

"When you attend a Ski with a Ranger tour, you'll learn about recreation on public lands, forest health, wildlife, and water quality," says program coordinator Megan Dee. "However, instead of sitting in a lecture or reading a brochure, you're learning by skiing or riding the slopes of Heavenly, enjoying breathtaking views."

The free tours are available to guests who ski or snowboard at an intermediate level or higher. Ski with a Ranger draws all types of guests — locals, repeat visitors, and Forest Service employees and retirees.

"This was amazing! I have been coming to Heavenly for many years and never knew the different species of trees and or animals, or about the forest health or fire ecology," one visitor said.

The Ski with a Ranger program in Lake Tahoe started informally in 1976. Recently, funding through the Bureau of Land Management's Southern Nevada Public Land Management Act allowed the Forest Service to hire a coordinator. The current program began in 2009 with 497 contacts. By 2012, it was drawing more than four times that many. In 2013, the Forest Service and Heavenly began offering the tour in Spanish.

"There is no better way to learn the most interesting Lake Tahoe facts and history," said Pete Sonntag, Heavenly's general manager. "While skiing with a ranger, you will learn about Heavenly's unique relationship as partners in recreation with the U.S. Forest Service to share the important responsibility of maintaining a healthy forest, protecting our fragile ecosystem, and exposing Heavenly and Lake Tahoe to a more diverse population."

In addition to Heavenly, several of Vail's Colorado resorts offer the Ski with a Ranger program as well. As one snowboarder remarked, "What a great way to spend a day. Learning and riding!"

Continued on page 10

Resorts provide access

Continued from page 9

additional opportunities to review and comment.

Much of Heavenly's permit area remains relatively undisturbed, providing important habitat for threatened, endangered, and sensitive species such as Tahoe draba, whitebark pine, and pine marten. The Forest Service works closely with Heavenly to ensure that approved projects include extensive design features meant to protect water quality, wildlife habitat, visual quality, and other standards.

Cook-Fisher and Strain note that environmental concerns at the resort often stem from features constructed in the 1950s and '60s that require costly and time-consuming installation and maintenance of water quality Best Management Practices.

"Now, instead of looking to control topography when designing ski runs and lifts, we try to blend with the existing topography, minimizing any impact to the natural environment," Cook-Fisher says.

In addition to offering exceptional winter recreation opportunities, partnering with private industry allows the Forest Service an unsurpassed opportunity to help winter visitors understand the importance of protecting public lands. Heavenly partners with the Forest Service on two winter conservation education programs: Ski with a Ranger and Winter Trek Express. Winter Trek, also supported by the Tahoe Heritage Foundation and the city of South Lake Tahoe, fulfills fifth-grade curriculum requirements in science, language, social science, and physical education. Forest Service rangers lead the students on a snowshoe tour at the top of Heavenly in search of the signs of winter-adapting animals.

"Ski areas have become part of the culture of the American West," says Cook-Fisher. "Resorts like Heavenly take our visitors to new heights, exploring areas of our national forests that few would otherwise see."

Cheva Gabor is public information officer at the U.S. Forest Service Lake Tahoe Basin Management Unit.

Homeowners partner to battle weeds



Treatment will involve bottom barriers as well as hand removal of the Eurasian watermilfoil that is clogging the marina.

Crystal Shores East homeowners working to remove water plant from marina

By Nicole Cartwright

TAHOE RESOURCE CONSERVATION DISTRICT

The homeowners association of Crystal Shores East in Incline Village is stepping up to remove invasive weeds from its marina by partnering with local experts.

An infestation of approximately 10,000 square feet of Eurasian watermilfoil (*Myriophyllum spicatum*) is crowding out the marina. Eurasian watermilfoil is a submerged aquatic plant that grows in still or slow-moving water and reproduces by fragmentation. It was first discovered in Lake Tahoe in the late 1990s on the South Shore. Over the years, small fragments of this plant have made their way across the 22 miles of the Lake to establish new colonies.

The Tahoe Resource Conservation District (Tahoe RCD) and Crystal Shores East homeowners, with support from the Nevada Division of State Lands, are combining public and private dollars to treat the weeds. This new partnership is providing Crystal Shores access to materials and the technical expertise of the Tahoe RCD and members of the Lake Tahoe Aquatic Invasive Species Program.

Treatment for this location will

include a combination of bottom barriers and diver-assisted hand removal. Bottom barriers—synthetic material used to block sunlight and inhibit the plants from photosynthesis—were placed on the infestation in early September and removed in October. Divers will be following up with hand pulling to treat outlying plants.

There have been some challenges with low water levels, but the removal team is making adjustments as conditions change. The project will conduct follow-up surveys in Spring 2015 to determine if additional treatment is needed.

The Tahoe RCD hopes to continue the partnership with Crystal Shores and use it as an illustration for other



invasive species removal projects on private property. This project, one of many in the Lake Tahoe Environmental Improvement Program, is part of the larger initiative to fight existing invasive species at the Lake and prevent new invasives from taking hold.

"It was an eye-opening experience to see how involved it was to deploy the barriers," Ann Schofield, representative from Crystal Shores East, said. "The Tahoe RCD has been great to work with."

Lake Tahoe's clarity will benefit from private industry combining forces with public organizations to tackle aquatic invasive species.

Nicole Cartwright is the Aquatic Invasive Species Program coordinator with the Tahoe Resource Conservation District.

Signs remind visitors to help protect Lake Tahoe

Signage project greets travelers from Nevada; goal is to add signs to California side, too

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

Gateway signs installed on three Nevada highways leading into the Lake Tahoe Basin have a simple message to help remind people they are entering a special place and share a duty to help protect its famously clear waters.

The three decorative signs read, “Entering the Lake Tahoe Watershed – Help Protect It!” They were installed this summer near Daggett Summit on Nevada State Route 207, Spooner Summit on U.S. Highway 50, and on Nevada State Route 431, the Mount Rose Highway.

At this year’s Fourth of July celebrations on the South Shore, beachgoers left several thousand pounds of trash behind for community volunteers to clean up, showing there is still a strong need to remind people of their responsibility to help protect Lake Tahoe and its beaches.

That same responsibility goes for keeping trash and pollutants out of stormwater drains and the 63 streams that flow into Lake Tahoe in a watershed that spans about 500 square miles.

“Everything drains into the Lake,” said Julie Regan, chief of external affairs at the Tahoe Regional Planning Agency. “The purpose of these new signs is to bolster environmental stewardship, let all visitors know they are entering a special place, and remind them there’s a responsibility we all share to take care of it. These signs are one more tool to help instill that awareness.”

The Lake Tahoe Environmental Gateway Signage Project was paid for with funding from the U.S. Environmental Protection Agency, the Nevada Division of Environmental Protection, and the Lake Tahoe License Plate Program run by Nevada Division of State Lands.

“The Nevada Division of State Lands, through its Lake Tahoe License Plate Program, provided funding to the gateway signs project to promote stewardship and preservation and restoration efforts in the Lake Tahoe Basin for residents and visitors alike,”



The sign on the Mount Rose summit greets westbound travelers on State Route 431. TRPA is seeking funding for signs on California highways leading into the Basin.

said Elizabeth Harrison, Lake Tahoe coordinator for the Nevada Tahoe Resource Team at Nevada Division of State Lands.

The gateway signs were designed by Lolly Kupec of Wild West Communications Group in Homewood, and engineered by Lumos and Associates in Stateline and K.B.Foster Civil Engineering in Truckee. Rapid

Construction in Carson City installed the signs.

TRPA is trying to secure funding for similar gateway signs on the California highways leading into the Lake Tahoe Basin for a true watershed-wide approach to raising awareness. The agency is also looking for community groups to help maintain the signs.



Do you remember your first glimpse of Tahoe?

Readers are asked to share their memories with us

Lake Tahoe, the Jewel of the Sierra Nevada, has long inspired people with the beauty of its clear, blue water and surrounding forests and mountains.

Mark Twain wrote about his first sight of Tahoe and the “singular clarity” of its water in his 1861 book, “Roughing It.” Twain hiked up to have a look at the natural wonder after hearing “a world of talk about [its] marvelous beauty.”

“At last the lake burst upon us – a noble sheet of blue water lifted six thousand three hundred feet above the level of the sea, and walled in by a rim of snow-clad mountain peaks that towered aloft three thousand feet higher still! As it lay there with the shadows of the mountains brilliantly photographed upon its still surface, I thought it must surely be the fairest picture the whole world affords,” Twain wrote of the experience.

What do you remember about seeing Lake Tahoe for the first time?

People are asked to share their stories about their first glimpse of the Lake for a future publication of Tahoe In Depth. E-mail us with your recollections at tahoeinddepth@gmail.com, or write to us at

Tahoe In Depth, PO Box 5310,
Stateline, NV 89449

Be sure to include your name and your phone number or e-mail address in case we need to clarify anything.

You can also share your stories with us via social media using #TahoeMemories.

BEST *in the* BASIN

By Tom Lotshaw
TAHOE REGIONAL PLANNING AGENCY

With its Best in the Basin program, the Tahoe Regional Planning Agency each year recognizes projects that demonstrate exceptional planning, design, and environmental compatibility in the Lake Tahoe Basin. The program saw some changes for 2013. Award categories were reduced from 12 to five with the highest scoring projects in each category receiving an award. Also, the team of independent judges pushed back their evaluations from fall to spring to allow for more ideal vegetation conditions.

Here are the Best in the Basin award winners for 2013:

Fulton-Steifel Shorezone Erosion Control Improvement: This project in Tahoe City repaired and stabilized a badly eroding section of shoreline on Dollar Point. It involved the relocation of a sewer lateral and the stabilization and vegetation of the shoreline.



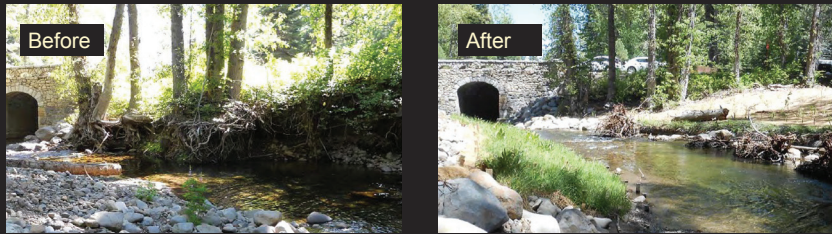
Tahoe House Best Management Practices Retrofit: This project installed an innovative solution to treat stormwater runoff at the Tahoe House, a family-owned bakery and coffee shop in Tahoe City. The site was constrained by high groundwater and a steep parking lot grade, so planners designed a flow-through, above-ground, treat-and-release system that was less than half the cost of the commonly used filter, vault-type system. The system was built around the business's existing sign and planter. It collects runoff and channels it through a series of media zones. Monitoring found the system cut point-in-time concentrations of suspended sediment by 68 percent and oil and grease by 78 percent.



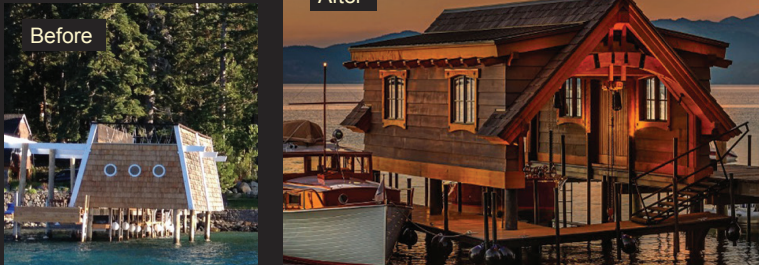
Chinquapin Lighting Replacement: Spearheaded by the Chinquapin Homeowner Association, this phased project replaced street, parking lot, pathway, stairway, and pier lighting at this Tahoe City community. All underground wiring was replaced and the project installed more than 350 new lighting fixtures. The high-efficiency fixtures down cast light to reduce light pollution and will provide attractive, efficient, and low-maintenance lighting.



Lower Blackwood Creek Restoration: A century of human disturbance, including in-channel gravel mining, severely degraded this West Shore creek and significantly increased its sediment flows into Lake Tahoe. The California Tahoe Conservancy restored about 1,200 linear feet of the creek south of Tahoe City, with channel realignments to reduce erosion and improve stream habitat. The project also restored native riparian vegetation.



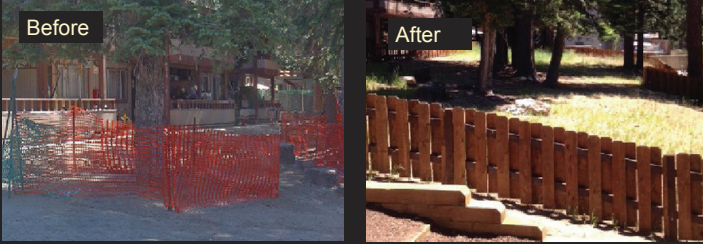
Tahoe Mountain Boathouse Scenic Improvement: This upgraded Tahoma boathouse is an accessory structure to a home that won a Best in the Basin award in 2012. Using the same footprint for the boathouse imposed many challenges, including complying with bulk, mass, and scenic requirements. The mooring deck and floor can be raised or lowered depending on water levels or watercraft height.



Fall Residential Custom Log Home: This Incline Village home is an example of new construction that is both aesthetically pleasing and environmentally conscious. The home is one of a handful of structures in the Basin to achieve a LEED silver rating for energy efficiency. Most of the structure is made from logs that were recovered from a burned forest in the Pacific Northwest. Extensive paneling inside the home is recycled barn wood.



Southwood Apartments Best Management Practices Retrofit: A BMP retrofit at this Incline Village apartment complex installed vegetated basins and a long, rock-lined bioswale infiltration system to address a large amount of stormwater runoff, instead of a cost-prohibitive approach that would have buried rock and plastic under parking lots. The project used on-site materials so there was essentially no import or export of materials. About 20,000 square feet of compacted dirt was seeded with native grass and wildflowers as part of the project. The project used on-site materials.



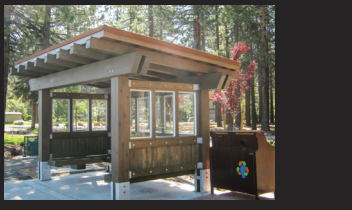
Highway 50 Spooner Summit Wall Replacement: Nevada Department of Transportation used a hybrid method to stabilize a section of scarred highway slope experiencing rock falls and heavy erosion. The Vegetated Reinforced Soil Slope System entails a series of wire baskets that are reinforced with a geo-grid and faced with seeded matting to encourage vegetation growth. Geosynthetics Magazine said, "This reinforced soil slope meets TRPA requirements for beauty and NDOT requirements for strength, stability, and durability."



Warrior Way Water Quality Improvement: Douglas County Community Development Department implemented this project to reduce roadside erosion and its water quality impacts along Warrior Way in Zephyr Cove. Conveyance features capture runoff and carry it to infiltration areas. Vegetation, rip-rap, vehicle barriers, and curb and gutter will reduce sediment loads into Lake Tahoe. The project also represents what can be done through partnerships. Douglas County, Douglas County School District, and U.S. Forest Service all own property in the area and the project could not have been done without them working together.



Highway 50 Transit Shelters: Tahoe Transportation District installed custom Blue Go Transit System shelters in South Lake Tahoe. The bus shelters have a covered seating area, receptacles for trash and recycling, bicycle racks, and route information. They offer improved comfort and safety for bus riders while also improving the system's visibility to attract new riders.



Pioneer Trail Pedestrian Improvement: South Lake Tahoe upgraded both sides of Pioneer Trail from Highway 50 to Larch Avenue with 5-foot-wide pedestrian walkways, driveway transitions, ADA-compliant pedestrian ramps, and LED sidewalk lighting, along with bus pads and shelters. The project resulted in significant pedestrian, transit and bicycle improvements. Prior to the project, this section of roadway lacked infrastructure for pedestrians and did not meet federal accessibility standards.



We all play a role in improving Tahoe's clarity

Best Management Practices are required on all developed properties in the Tahoe Region

By Shay Navarro

TAHOE REGIONAL PLANNING AGENCY

One neighborhood is installing a large vegetated basin that will be used to capture and treat polluted stormwater before it reaches the Lake.

Another area with high groundwater has installed a system for capturing runoff and pumping it upstream to be infiltrated.

Both of these projects represent an areawide approach to treating stormwater through a regional system. They are public-private partnerships used in key areas around Lake Tahoe to improve the clarity of the Lake. An added benefit of these projects is the opportunity for other improvements beyond water quality such as scenic, recreation, and air quality improvements through the use of lighting, bicycle, and pedestrian infrastructure and open space.

Why BMPs help the Lake

As one of the largest alpine lakes in the world, Lake Tahoe's famed clarity is linked to historically receiving very low amounts of nutrients and sediment from the surrounding environment. However, Lake Tahoe's clarity has declined and continues to be threatened mainly due to soil erosion and polluted stormwater runoff as a result of development in the Tahoe Region before environmental regulations were in place.

Roadways, buildings, and parking lots prevent stormwater from naturally infiltrating into the ground, as it does in undisturbed forests and meadows. Instead, stormwater runs off, picking up sediment, nutrients, and other pollutants such as oil and heavy metals, as it passes over these surfaces and transports them to the Lake. Lake Tahoe's watershed is relatively small and much of the historic wetlands that once acted as filters have been disturbed and developed. Polluted stormwater does not have far to travel before it reaches the Lake.

Science shows that implementing



Regional Treatment Systems (above) treat multiple properties together, versus installing BMPs on each individual property (below). Treat-and-release systems (left) allow properties unable to infiltrate on site to treat their stormwater before it has a chance to reach the Lake.



Best Management Practices (BMPs) on developed properties is an important factor in improving Lake Tahoe's clarity.

BMPs are measures taken to minimize soil erosion, maintain fire defensible space, and capture, infiltrate, and/or treat polluted stormwater before it enters Lake Tahoe. This helps improve water quality and reduces the decline of Lake Tahoe's clarity and helps to protect against the threat of catastrophic wildfire.

Getting a BMP certificate

To preserve Lake Tahoe for future generations, the Tahoe Regional Planning Agency requires all developed properties to meet Best Management Practices, or BMP, requirements for treating stormwater runoff. Properties in compliance receive a BMP certificate,

which remains valid as long as BMPs are maintained and functioning. Protecting Lake Tahoe's water quality is everyone's responsibility, yet there are different ways property owners can meet their obligation depending on their location, the unique conditions found on site, and the possibility of participating in a regional treatment system. Areas not prioritized by local governments for regional treatment must still meet BMP requirements on their individual properties.

Installing BMPs on developed properties in recent years has largely focused on commercial properties, whose parking lots and rooftops can dramatically accelerate lake-fouling runoff. While these improvements on commercial properties are expensive,

hundreds of businesses have made investments in recent years, which help the Lake and enhance the overall aesthetic of the properties. Other priorities for BMP installation on private properties include proximity to public water-quality improvement projects. These projects are built by local jurisdictions to treat stormwater from roads and public right-of-ways in order to help meet their Total Maximum Daily Load (TMDL) requirements. The TMDL is a plan developed by California, Nevada, and the U.S. Environmental Protection Agency to restore Lake Tahoe's clarity by working with local governments and state highway departments to prevent pollutants from entering the Lake.

Smaller projects help larger ones

Installing and maintaining BMPs on private properties adjacent to these public water-quality improvement projects prevents additional stormwater runoff from flowing to and overwhelming the systems and increasing the frequency by which they need to be maintained. In 2014 TRPA notified hundreds of property owners with single-family residences in the Sierra Tract neighborhood in South Lake Tahoe and the central Incline Village area of Washoe County of the need for them to install BMPs around their homes. These areas were strategically selected because of their proximity to larger public water-quality improvement projects built by the local jurisdictions.

Although all developed properties in the Tahoe Region – including private homes – have to meet BMP requirements, compliance remains a challenge for thousands of properties. Whether through participation in an area-wide treatment system or by installing individual parcel BMPs, property owners are urged to participate in this important environmental effort to protect Lake Tahoe's clarity.

For more information on how to get started, visit tahoebmp.org.

Shay Navarro is the Stormwater Program manager for TRPA.



The outdoor school teaches students about ecology, watersheds, and astronomy.

About Great Basin Outdoor School

Many schools bring students to Tahoe throughout the year to participate in environmental education programs conducted by Great Basin Outdoor School.

"My students come from a variety of backgrounds," a fifth-grade teacher from Bailey Charter Elementary School in Reno reported last February, after spending two days at Lake Tahoe in Great Basin Outdoor School's winter ecology and snowshoe program.

"Watching them go through many 'first' experiences such as seeing Lake Tahoe, staying in cabins, playing on a beach, and eating family style was such an honor."

Many of the students in these programs also learn about winter astronomy, winter safety, animal adaptations to winter, and the importance of snow and water in the Tahoe Basin.

Since 1998, this local nonprofit based in Reno has been helping children learn about local ecology, watersheds, and astronomy through team challenges, group activities, games, and water-quality testing. Most programs are multi-day science camps on the shore of Lake Tahoe targeted primarily for fifth- and sixth-grade classes. Students gain real-world skills, such as critical thinking, teamwork experience, social interaction, environmental connections, and exploration.

For more information about Great Basin Outdoor School, visit www.GreatBasin-os.org. To contact the organization, please call (775) 823-8888 or email Leilani Valdez at Education@greatbasin-os.org.

Students in snowshoes



Most programs conducted by the Great Basin Outdoor School are multi-day science camps on the shore of Lake Tahoe targeted primarily for fifth- and sixth-grade classes.

Winter program brings classrooms closer to history, watershed

By Kaitlyn Stone

UNIVERSITY OF NEVADA, RENO

Great Basin Outdoor School winter programs use activities and experiments to teach local youth about watersheds, water quality, and how the Sierra snowpack is the major source of water for the area.

One of these lessons focuses on Dr. James Edward Church, who was a pioneer of snow surveying in the early 1900s. Church developed the Mount Rose snow sampler that is able to accurately measure the water content of snow.

Steve Hale, a retired U.S. Forest Service staff member, appears in costume during the lesson portraying Dr. Church. He teaches students how to use the snow-measuring device Church developed more than a century ago.

"Understanding Dr. Church's work helps us to understand the role each student and every one of us has to play in practicing water conservation," Hale explained.

Church's love of the snow-covered Sierra prompted him to pioneer snow measuring as a science. Church, a



Retired Forest Service employee Steve Hall, portraying snow measurement pioneer Dr. James Edward Church, teaches students how to use one of Church's devices.

professor at the University of Nevada, Reno, developed methodology and hydrologic prediction models that continue to be used all over the world today.

By demonstrating how the snow sampler works and what it measures,

Hale helps Great Basin students understand where the life-sustaining water comes from. Sierra snow provides drinking water and supports wildlife, agriculture, forests, and aquifer recharge.

Winter can make some Tahoe animals feel at home

For some creatures, deep snow is a challenge; for others it's a sanctuary

By T. Will Richardson

TAHOE INSTITUTE FOR NATURAL SCIENCE

Many of us love the winter at Tahoe. Winter means snow (usually), and snow means skiing or other outdoor pursuits.

But wintertime sends some Tahoe residents fleeing the mountains for the warmer climes of Palm Springs or Puerto Villarta. The same is true for many animals who inhabit the Tahoe Basin in the warm months; some love winter and thrive during the snowbound months while others don't do well at all and decide to head south.

For many species, the Sierra Nevada winter is a tough time. Quite a few species head to lower latitudes or elevations, either on wing or on foot. Other species find their solution to the hardships of winter by simply shutting down for the season, significantly reducing their energy demands and their exposure to the harsh conditions. But there is a third set of animals that choose to stick it out and face winter head on, and for some of these species, deep snow is actually a good thing.

Problems posed by snow

For many animals, snow on the ground presents challenges. For example, it may render their food supply inaccessible. This problem appears to be the principal difference between winter-active tree squirrels and hibernating ground squirrels and chipmunks. This challenge also appears to drive short-distance migration in many shrub-foraging birds.

Another problem is that of locomotion. With their small hooves and heavy bodies, deer expend a tremendous amount of extra energy moving in relatively shallow snow. If, however, an animal can still find food and figure out a way to move over, on, or under the snow, the animal may be inconvenienced very little, if at all. Some species may even benefit from the snow during winter.

Snowshoe hare is one such species. With its oversized feet and light weight, it easily lopes over the surface of the snowpack, browsing on whatever shrubs and trees are tasty and



This white-tailed ptarmigan, photographed in the Carson Pass area in March 2011, has no trouble blending in the Tahoe Region during the winter. Other animals may choose to leave the area when the snow flies, however.

accessible. White-tailed ptarmigan is another species adapted to walk on the surface of the snow. This grouse-like bird has a dense covering of feathers on its feet that help with both insulation and buoyancy. Presumably, neither of these adaptations is ideal for efficient movement on bare ground, so we can assume that there is a small energetic cost to the animals when the ground is bare. Further, both of these species actually change colors in winter to match their snowy backgrounds. Three other Sierra Nevada species that perform this trick are long-tailed and short-tailed weasels and the white-tailed jackrabbit. When these animals are out of color phase with the landscape, they are alarmingly conspicuous and vulnerable to predation.

Changing colors

Over many generations, the timing of these color changes can shift, but individual animals have no way to prevent turning white if snows arrive late. The color changes through molting in new fur or feathers, in turn brought on by hormonal changes triggered by daylength. Recent research on snowshoe hares in Montana found they could

drag out the process when there is a lingering snowpack, but there is no flexibility within the population in terms of when the molts actually began.

Life beneath the snow

Many species actually thrive during the winter by living beneath the snow surface. Deep snowpack provides a great deal of insulation from the cold air above, and temperatures where the snow and the ground meet are often just above freezing due to heat being released by the ground, metabolic heat from plants, and a small input from the latent heat of condensation (any liquid water freezing at that interface).

This insulation is especially important in small mammals with high metabolisms and very little insulation of their own. Amazingly, tiny shrews are able to find enough invertebrate prey during the winter to stay active through the season. Indeed, with their sky-high metabolisms, they may actually find it easier to meet their energy requirements under the steady temperatures beneath the snow. Many shrews die from cold-starvation during cold nights in mid-summer, and surely winter months without snow



A white-tailed jackrabbit.

exact a heavy toll on these minuscule predators.

Some mammals living under the snow not only benefit from the insulation from cold temperatures, they are also shielded from predators. Further, some plants can continue to grow, albeit very slowly, beneath up to 6 feet of snow!

The busy voles

In addition, Tahoe's several species of voles, small rodents related to lemmings, can be insulated from the cold, protected from predators, and remain well fed. This, in turn, means that voles will reproduce straight through the winter. Under the right conditions, populations can explode under the snowpack, and anyone in Tahoe with a lawn has surely seen the evidence of this come springtime. Deep snowpack tends to bring a healthy resurgence of voles in the springtime, and this is welcome relief for a great diversity of predators, assuming they can make it through the leanest months of winter themselves. A thin or absent snowpack is much tougher on the voles, but makes them readily accessible to the many owls, hawks, coyotes, and bobcats that depend on them to make it through the winter.

It's all a matter of perspective and timing. One species' hardship is another's relief. Variable and changing conditions continually apply evolutionary pressures on behavior, timing of molt and migrations, and diet. Snow depth in the Sierra Nevada mountains is surely one of the most important of these factors.

T. Will Richardson is co-director and co-founder of the Tahoe Institute for Natural Science.

Work continues to bolster cutthroat trout

Pilot Peak strain of Lahontan cutthroat trout may be spawning in Fallen Leaf watershed

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

The U.S. Fish and Wildlife Service and partner agencies started work this October on a fisheries management plan to bolster populations of the Pilot Peak strain of Lahontan cutthroat trout at Fallen Leaf Lake.

After years of stocking and research, data suggest the reintroduced native trout species has been attempting to spawn in the watershed during the past three drought years.

“We’re switching from scientific study and research into active management,” said Stephanie Byers, senior fishery biologist at the Lahontan National Fish Hatchery Complex in Gardnerville, Nevada.

“The research identified the strategies and management actions we needed to create a niche for the Lahontan cutthroat trout to survive and over-winter in Fallen Leaf Lake. Now we can go and implement those actions on a watershed scale to make that niche bigger and make them more successful.”

The Pilot Peak strain of Lahontan cutthroat trout is the Lake Tahoe Basin’s native lacustrine, or lake, trout species. The species was extirpated, or disappeared, from the Region by the 1930s, mainly because of habitat loss and the impacts of a commercial fishing industry that peaked at about one million pounds per year.

“Commercial fishing operations were catching thousands of these fish and marketing them as far away as San Francisco in the 1800s,” said Jason Smith, a staff research associate with the U.S. Fish and Wildlife Service at the University of Nevada, Reno.

Lahontan cutthroat trout weighing upwards of 20 pounds once lived in Fallen Leaf Lake and other waters in the Lake Tahoe Basin. The record Lahontan cutthroat trout for Lake Tahoe weighed a little more than 31 pounds.

The goal of the management plan is to create a viable, naturally reproducing population of Lahontan cutthroat trout in the Fallen Leaf Lake watershed



Lahontan cutthroat trout are shown in Glen Alpine Creek near Fallen Leaf Lake.

— one that can also support a native species fishery.

Recreational fishing is an important part of this effort and the Lahontan National Fish Hatchery Complex will continue its annual stocking program, Byers said.

“The Pilot Peak fish are proving to be great fighters in other waters. They’ll leap out of the water and are described as being like torpedoes. A kayaker up in Fallen Leaf Lake reported his catch to us. He thought he had a 24-inch fish on the line with the fight the fish was putting up. When he finally pulled it in, it was a 12- to 14-inch fish. He was thrilled,” Byers said.

Management actions will focus on reducing populations of non-native lake trout and rainbow trout in Fallen Leaf Lake and Glen Alpine Creek.

Lake trout pose a predation threat for Lahontan cutthroat trout and rainbow trout pose a hybridization risk, so weirs and nets will be used to reduce populations of those non-native trout. Lake and rainbow trout captured as part of year-round suppression efforts will be donated to area food banks and wildlife sanctuaries.

“Some level (of non-native trout) will probably persist in the watershed. But in order for these cutthroat trout to grow to the sizes that were historically in the system, management of the non-natives is imperative,” Smith said.

“This is very exciting for us. We’ll finally get to see what the Lahontan cutthroat trout can do when we give them a chance and we’re looking forward to the success we’ll have as we start to manage the lake trout and rainbow trout.”

The Fallen Leaf Lake reintroduction project is a top priority of the Tahoe Basin Recovery Implementation Team and Lahontan Cutthroat Trout Management Oversight Group.

The interagency teams include the U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, Nevada Department of Wildlife, Tahoe Regional Planning Agency, Washoe Tribe of Nevada and California, U.S. Forest Service Lake Tahoe Basin Management Unit, and the Tahoe, Truckee, and Humboldt-Toiyabe national forests.

Tribe backs effort to re-establish Lahontan cutthroat trout

The Washoe Tribe of Nevada and California supports this management plan to strengthen populations of Lahontan cutthroat trout at Fallen Leaf Lake and efforts to reintroduce the native trout species within the tribe’s ancestral territory.

Marie Barry, a former director of the Washoe Environmental Protection Department, started collaborations with the Lahontan cutthroat trout working group and was a member of the group for years in an effort to re-establish the trout to its historic range in the Lake Tahoe Basin.

Fishing has always been an important part of the Washoe lifestyle, said Darrel Cruz, tribal historic preservation officer.

Lahontan cutthroat trout, mountain whitefish, and minnows were the primary native fish species in the Lake Tahoe Basin that sustained the Washoe people for thousands of years. The seasonal life patterns of the fish influenced the seasonal life patterns of the Washoe who depended on them, Cruz said.

At the turn of the last century, the Washoe people, who had fished and managed fishing in the Lake Tahoe Basin for thousands of years, were forbidden from fishing in Lake Tahoe and portrayed as the cause of the Lahontan cutthroat trout’s decline and near extinction. In fact, it was unregulated commercial fishing practices along with other contributing factors that caused the decimation of the species, Cruz said.

More recently, the Washoe Tribe of Nevada and California was granted a special day for traditional fishing, and can now use traditional fishing practices utilizing harpoons, nets, spears, and traps made with natural resources. Cruz said this is important to the tribe to keep traditions alive, a very important part of its culture as a native people.

Grant program boosts walking, cycling

On Our Way supports ideas to encourage human-powered transit

By Karen Fink

TAHOE REGIONAL PLANNING AGENCY

Six Lake Tahoe local governments, one school district, and two community organizations have been working over the last six months on projects to make their communities a better place for those who want to walk, cycle, or use transit services rather than drive a car.

These projects are all part of the On Our Way program, a new federally funded effort managed by the Tahoe Regional Planning Agency. On Our Way projects are funded through the Federal Highway Administration, and include matching funds, staff, or volunteer time from project proponents. More than \$580,000 in grant funding has gone to Tahoe communities since the program's launch this year. A list of awarded projects can be viewed at www.tmpo.org/onourway.aspx

On Our Way encourages communities to look at ways to make their streets more appealing for biking, walking, or transit use while at the same time incorporating environmental and economic enhancements. The program is based on the principle that biking and walking are healthy ways to get around — both for individuals and the environment — but that people will only choose those routes if they feel comfortable while traveling on them.

Connected bikeways, well-marked crossings, and walkable plazas encourage people to walk and bike to their destinations. And these improvements provide a variety of benefits — they not only help the Lake by reducing car travel and the associated runoff, but they can also create vibrant streetscapes that attract economic investment and encourage people to get outside and enjoy their communities. On Our Way seeks to accelerate these kinds of improvements.

Some of the initial projects funded by On Our Way focus directly on safety and connections for kids accessing school facilities. The Community Mobility Group of the Lake Tahoe Sustainability Collaborative recently completed the first On Our Way project — a Lake Tahoe Unified School



A father and son take advantage of a nice fall day at Lake Tahoe to head off to school on a tandem bicycle. Connected bikeways help make cyclists more comfortable on their trips.

District (LTUSD) Safe Routes to Schools Framework. Based on surveys and observations of kids arriving at and leaving school, the project team recommended projects for the four district elementary schools. This framework can now be used to initiate projects for priority improvements like sidewalks.

Another project related to school access is the South Tahoe Middle School Connectivity Project, through which the LTUSD will be identifying ways to connect the South Tahoe Middle School to nearby neighborhoods, parks, and the Lake Tahoe Community College.

Douglas County used an On Our Way grant to create visual depictions for the Tahoe Douglas Area Plan of potential pedestrian, bicycle, and stormwater treatment improvements. The visuals are intended to spark the public's imagination for changes to important travel corridors leading to Lake Tahoe.

The Tahoe Rim Trail this summer collected trail surveys and user counts to inform its project, "Connecting Tahoe Rim Trail Users to Transportation Alternatives." This project will recommend ways the transit system can better connect trail users to trailheads.

Placer, El Dorado, and Washoe counties are working on corridor management plans to promote improved transportation choices

through major corridors. A project on the U.S. Highway 50 corridor in Meyers will design streetscape improvements that promote walking, biking, transit use, and increased public safety.

Placer County's project, located in Tahoe City, will examine centralized parking strategies and new pedestrian connections to establish a vibrant pedestrian-oriented downtown. Washoe County is developing a Corridor Management Plan for the Mount Rose Highway Scenic Byway to integrate transit, points of interest, bicycling corridors, and parking. These projects all include public outreach components to gather input on corridor alternatives.

In addition, Washoe County is looking at ways to enhance the user experience of the Nevada Stateline to Stateline Bikeway and the State Route 28 Scenic Byway, and is using On Our Way funds to develop a Wayfinding Signage Master Plan for this corridor, as well as studying ways to fund maintenance of the bicycle trail.

The strong partnerships behind each of these eight projects, slated to be completed by the summer of 2016, speaks to the widespread level of commitment and interest in making that bike, walk, or transit trip a cozy and comfortable one.

Karen Fink is principal transportation planner with TRPA.

Why we choose to walk or ride

With the warm weather this summer, many of us were riding our bikes to work, on errands, and just for fun.

Recently, I drove my car to work on a day when rain and hail threatened. During the day, I occasionally thought of how my drive home would be in a heated, water-tight vehicle. No speeding cars whizzing past and splashing me, no ragged asphalt to navigate.

Feeling safe and comfortable is something that we usually take for granted in a car. While driving has its risks, we can reach almost all of our day-to-day destinations on a paved road.

When biking or walking, however, we sometimes need to get creative to feel safe. That may mean riding our bikes on the sidewalk or the dirt, taking a longer, indirect route to avoid busy streets, or riding in the vehicle lane with cars.

For many people, particularly new riders, visitors, or kids and their parents, uncertainty about the connectivity and safety of bike routes can be stressful. And that influences the choices we make when we leave the house. Whenever we go somewhere, "safe and cozy" plays into our decision-making. Does a mental image of our upcoming voyage direct us toward the bike or the car?

Biking and walking are healthy ways to get around — for individuals and the environment. But before people will make that choice, they need to feel comfortable on their cycling or walking trip. Connected bikeways, well-marked crossings, and walkable plazas encourage people to walk and bike to their destinations.

More than anything else, the idea of safe, comfortable routes for walkers and cyclists helps explain why TRPA has launched the On Our Way grant program. Have a suggestion for how to achieve this? For more information on the On Our Way projects and to get involved in making your community more walkable and bikeable, visit www.tahoempo.org.

— Karen Fink

Mountaintop cameras keep watchful eye

Firefighters use the 360-degree online views to spot blazes early

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

Four mountaintop cameras the University of Nevada, Reno set up around Lake Tahoe to help people spot wildfires didn't take long to show their value.

In August, days before the Lake Tahoe Summit, Mac Heller, a firefighter with the U.S. Forest Service, remotely accessed a camera on Snow Valley Peak for a look around. He was scanning Spooner Summit after lightning storms, and he spotted wisps of smoke among the trees.

Heller reported the smoke sighting and firefighters quickly responded and put out a small half-acre wildfire. He then shot off

an email to Graham Kent, director of the University of Nevada Seismological Laboratory.

"His last line was, 'Great job keeping the first of many (fires) small.' That right there says it all to me," Kent said.

"At the summit, nobody talked about that fire because it was knocked down before getting out of control. The system has proven its capability. Now it's about building it out to ensure this place doesn't burn down."

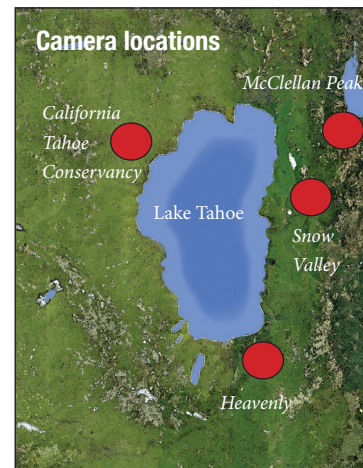
Kent oversaw the installation of the cameras. They were put in as part of other upgrades made to mountaintop observatories around Tahoe that report seismic, environmental, and climate data to the Nevada Seismological Laboratory's statewide seismic network.

The cameras are a new tool for firefighting agencies in the Basin. They offer real-time, high-definition, 360-degree views of their surroundings and can tilt, pan, zoom, and create time-lapse footage. The goal is to help firefighters spot wildfires early so they

Find the fire cameras online

To access the cameras, visit <http://alerttahoe.seismo.unr.edu> and click on Wildfires.

To see time-lapse footage created by the cameras for several recent wildfires, visit <https://www.youtube.com/user/nvseismolab>.



The mountain-top cameras installed by the University of Nevada, Reno around the Tahoe Basin paid dividends in August when a firefighter used the one on Snow Valley Peak to spot a small, lightning-caused fire starting on Spooner Summit.

can be extinguished before they grow.

"The fire personnel folks are loving them," Kent said.

The cameras enhance a disaster preparedness platform that's being created to detect natural hazards such as fires, floods, and earthquakes, and notify people about those hazards as early as possible. The platform is dubbed ALERT Tahoe, which stands for Access to Leverage Emergency Information in Real Time.

Members of the public will be able to access the cameras for a look at the Basin. They just won't be able to operate them the way authorized personnel can.

Kent wants to see more cameras set up at the observatories around Tahoe, and to see them installed soon.

"I think this is a big increase in our ability to keep things from burning down. We're trying to bring a 21st century monitoring network to Lake Tahoe," he said.

Tahoe's 3 faults capable of producing major damage

By Tom Lotshaw

Minor earthquakes are relatively common at Lake Tahoe, but large earthquakes happen every few thousand years.

There are three main faults in the Lake Tahoe Basin, one on the West Shore, one mid-Lake, and one that crosses the Northeast Shore near Incline Village. Research suggests that the largest fault, the West Tahoe fault, is more than 1,000 years past its average recurrence time between earthquakes.

All three faults are capable of generating earthquakes in the low magnitude-7 range. The fault along the West Shore was the source of three magnitude-7 earthquakes about 11,400 years ago, 7,800 years ago, and 4,500 years ago.

"If you start looking at those intervals it gives you pause," Graham Kent, director of the University of Nevada Seismological Laboratory, said. "We feel more and more confident that those dates are spot on, and that the West Tahoe fault is well beyond its average recurrence time."

A magnitude-7 earthquake could cause serious damage to manmade structures around Lake Tahoe. Last year's earthquake in Napa, California, was a magnitude-6 and it caused several hundred million dollars in damage.

With the faults running under Lake Tahoe, underwater ground movement could also trigger a seiche wave up to 30 feet tall that could cause additional damage. The term seiche describes a wave in a closed basin, caused by an earthquake or prolonged winds.

If an earthquake triggered a sizeable landslide into Lake Tahoe, that seiche wave could grow bigger, possibly much bigger. "We have seen evidence of waves that could reach as high as 300 feet," said Scott Valentine, an earth sciences professor at Lake Tahoe Community College.

A wave of that size is believed to have been caused at least once before by the collapse of a large sediment shelf on the West Shore near Meeks Bay.

"When you're in a closed basin it acts like a bathtub, where the waves can ricochet off the walls. They can either destroy one another and neutralize, or if two large crests meet they can basically double up," Valentine said.

Continued on page 21

Are you eligible?

To find out if you are eligible for a rebate in your area and live in the Tahoe Region, contact your local office of air quality prior to any purchase or installation. Contact information for each jurisdiction is provided below.

El Dorado County and the City of South Lake Tahoe:

- Prior to any appliance removal or installation, contact: Adam Baughman, El Dorado County Air Quality Management District, 530-621-7571, adam.baughman@edcgov.us, to find out if you are eligible for the Chimney Smoke Reduction Incentive Program.
- Visit: https://www.edcgov.us/Government/AirQualityManagement/Grants_and_Incentive_Refunds.aspx.

Placer County:

- Visit www.placer.ca.gov and click on the link for "Wood Burning Appliances & Info" for updates, notifications and information on the Air District's Burn Bright Burn Right Wood Stove Replacement Program. Stoves purchased prior to receiving a voucher are ineligible for funding.

Nevada:

- Contact: John Handzo, at the Business Environmental Program at University of Nevada, Reno; (775) 834-3674, jhandzo@unr.edu
- Visit: <http://www.unrbep.org/>.

Tips to burn cleaner:

- Locate heating appliances centrally in a building along with a fan or blower assembly to optimize heat distribution and circulation. Professionally install heating appliances and service annually.
- Examine your chimney smoke. If you see smoke rather than clear heat waves and water vapor, try these tips:
 - Begin with a hot fire that is constructed with a generous amount of kindling, then add small pieces of wood to start the fire
 - Ensure that the wood is dry and seasoned for at least 6 months (never burn trash, coal, or treated wood)
 - Maintain a hot fire, and give the fire enough air to breathe.

Source: US EPA Burn Wise

New rebates offered for old woodstoves

Woodsmoke can cause air pollution and affect Tahoe water quality

By Jennifer Cannon
TAHOE REGIONAL PLANNING AGENCY

Though most people enjoy the cozy ambiance of a crackling fire on a cold evening, the fact is that smoke from inefficient wood-burning appliances and open fireplaces is a substantial source of air pollution in the Lake Tahoe Region.

The smoke emitted from incomplete wood combustion contains fine particulate matter, greenhouse gas emissions, carbon monoxide, and toxic air pollutants such as benzene and formaldehyde, which are known carcinogens.

Smoke, particularly in the wintertime, can get trapped near the surface of Lake Tahoe and the ground in atmospheric inversion layers that can decrease visibility as well as lake clarity.

According to the EPA, open fireplaces emit an average of 28 pounds of fine particles per one million British Thermal Units of heat output. Uncertified older woodstoves emit 4.6 pounds of fine particles. These wood-burning appliances can remain in use for decades. As a result, they can be a long-term, persistent contributor to air pollution and pose



Woodsmoke from old stoves can negatively affect visibility, human health, and air and water quality at Lake Tahoe.

serious health threats.

Newer, efficient, EPA-certified woodstoves burn one-third less wood and emit only 1.4 pounds of fine particles per million British thermal Units of heat output, while pellet stoves emit 0.49 pounds. Replacing an old, uncertified woodstove for a new cleaner-burning, EPA-certified model can reduce emissions by 50 percent and result in particular matter emission reductions equivalent to getting five diesel buses off the road.

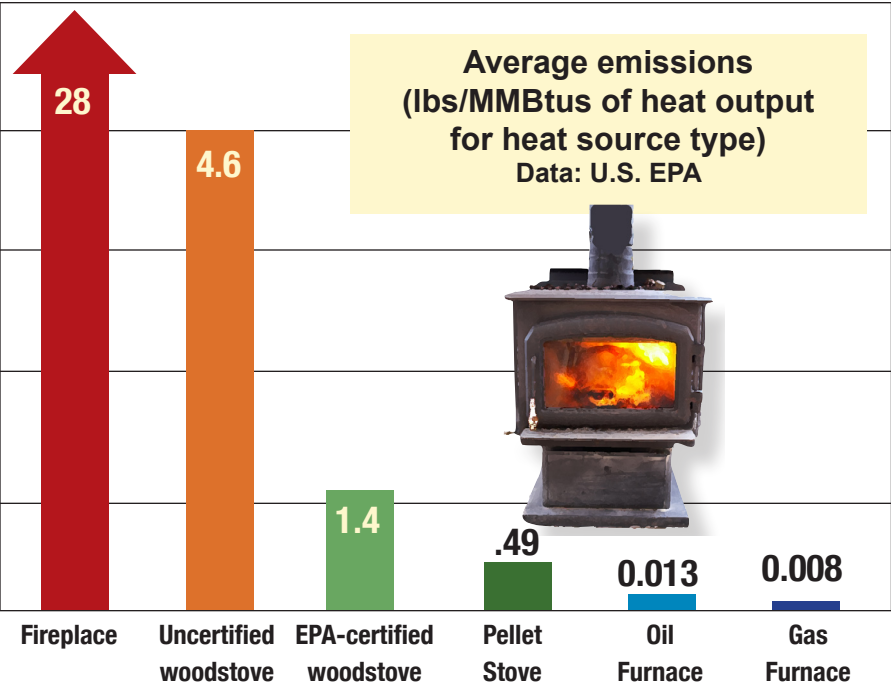
If you have an older wood-burning stove or fireplace (generally, those manufactured before 1990), consider

upgrading to a newer appliance, such as a high-efficiency gas, pellet, or woodstove or fireplace insert that is certified by the EPA. Typically, new certified appliances burn the wood more completely, resulting in less pollution and more heat generation. Consequently, higher-efficiency appliances save money from reduced fuel needs, contribute to healthier indoor air quality, and promote safety, since complete combustion prevents the buildup of flammable chimney deposits of creosote, a frequent cause of home fires.

To encourage homeowners to replace older, heavily polluting stoves, the Tahoe Regional Planning Agency and several local agencies have teamed up to offer rebates ranging from \$400 to \$1,400 for the replacement of older woodstoves and fireplace inserts with qualified, EPA-certified heating appliances. These rebates are targeted for existing homes in the Lake Tahoe Region, and are not available for new construction. The rebate programs are being administered by local agencies, and eligibility requirements and rebate amounts vary from program to program. All of the rebate programs operate on a first-come, first-served basis, so rebates will be issued while the funding lasts.

The rebate programs are expected to result in the removal or replacement of about 200 older heating appliances, which is expected to result in an annual reduction of 5 tons of particulate matter. Jennifer Cannon is an associate planner in TRPA's Long Range Planning Division.

Relative Emissions of Fine Particles



Group backs new tourism model

Sustainable Tahoe promotes 'geotourism' adventure concept

By Tom Lotshaw

TAHOE REGIONAL PLANNING AGENCY

Jacquie Chandler, volunteer director of the nonprofit group Sustainable Tahoe, has spent the last 8 years working to help a new tourism model emerge at Lake Tahoe.

Chandler and her Sustainable Tahoe colleagues envision a "geotourism" economy that helps protect Tahoe by inspiring visitors to become stewards of the Lake and getting them interested and engaged in its well-being.

"So many organizations are focused on environmental cleanup at Lake Tahoe," Chandler said. "We are focused on attracting visitation that doesn't require cleanup."

Geotourism is a term coined by the National Geographic Center for Sustainable Destinations. It is defined as "tourism that sustains or enhances the geographical character of a place, its environment, culture, aesthetics, heritage, and the well-being of its residents."

The model requires recognition that there's much more to Tahoe than just its ski resorts and casinos, long the staples of its tourism industry. It also means the Region must offer a wide range of activities and adventures that connect visitors to unique environmental and cultural assets.

"We have three criteria for geotourism adventures," Chandler said. "They have to be fun, meaningful, and low carbon as much as possible."

Showcasing geotourism adventures is the focus of Sustainable Tahoe's Tahoe Geotourism Expo. The fourth annual



Sustainable Tahoe's Geotourism Expo at Sand Harbor featured a lakelup, at which the Washoe Tribe of Nevada and California taught visitors some of the tribe's cultural practices.

event was held at Sand Harbor State Park in August. It featured a "lakalelup" with the Washoe Tribe of Nevada and California, the original inhabitants and stewards of the Tahoe watershed. Members of the tribe offered visitors a unique opportunity to "learn by doing" the cultural practices that remain important parts of the tribe's heritage.

Other activities showcased by the Tahoe Geotourism Expo included fly fishing tours, a presentation about Tahoe's geological formation, paddleboard yoga, yoga hikes, a kayak tour of the Upper Truckee River, a Mark Twain kayak tour of Tahoe, an electric bike ride that explored how neighborhood storm runoff affects Tahoe's water clarity, a bird watching tour at Spooner Lake, a historical walking tour of the Al Tahoe

neighborhood, a heritage tour of the West Shore, and a rock climbing tour in Meyers.

Chandler hopes Tahoe's geotourism offerings will grow to become a four-season brand.

"We usually host about 20 adventures, but I think there are about 2,000. We just haven't found them yet. As the community owns its part in making geotourism a reality for Tahoe, they reap the rewards and prosperity it will bring," she said.

The goal is to more deeply connect visitors to Lake Tahoe.

"When you connect, you care, and when you care, you share," Chandler said. "Visitors who are passionate about Tahoe, who understand Tahoe, will never trash Tahoe. That's geotourism, that's sustainable."

Connected Tahoe working to expand high-speed Internet service in Basin

Connected Tahoe, a project of the Tahoe Prosperity Center (TPC), is focused on expanding high-speed Internet and cellular service within the Tahoe Basin as part of the TPC's mission of promoting regional sustainability through economic vitality.

The TPC received a two-year Advanced Services Fund grant from the California Public Utilities Commission to support the Connected Tahoe Project.

The goals for the Internet project are to:

- Collect and map current broadband infrastructure
- Conduct a community-wide broadband needs assessment and speed test
- Analyze the data to determine the underserved areas within the Basin
- Assist interested Internet service providers in applying for grants to expand high-speed broadband in underserved communities identified through the Basin-wide assessment.

The goals for expanding cellular service are to:

- Attain comprehensive cell coverage for the Lake Tahoe Basin
- Minimize impact on the environment
- Create a predictable and efficient process for cell coverage expansion
- Enhance public safety and environmental monitoring.

To find out more about both these projects, go to www.tahoeprosperty.org and sign up for the Tahoe Prosperity Center newsletter.

Earthquakes overdue? Seismologists keep a close eye on Tahoe faults

Continued from page 19

The three main faults at Lake Tahoe see about 1.7 millimeters of movement each year on average, but some sites have shown as much as 12 feet of ground movement during a single seismic event.

An earthquake at Tahoe could have significant impacts for not only the people

living or vacationing here, but also on the environment. Kent said the area needs to be better prepared for a quake in terms of quickly alerting people and getting them to safety.

"If you take the worst 10 years in Tahoe building history and continue them for 500 years, there is still more fine particulate

sediment released during an average magnitude 7 earthquake in the Basin," Kent said. "I'm not saying don't fight for water clarity in the Lake now. But you have to understand there are environmental drivers other than humans that are dramatic."

When completed, the seismic network at Tahoe will be added to the nascent

earthquake early warning network being tested in California. Once operational, that network will be able to give people in the Basin five to 10 seconds of advance warning for strong shaking and up to several minutes of warning for seiche waves that will strike various shorelines at the Lake, Kent said.

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We hope you've enjoyed this edition of *Tahoe In Depth*. Feedback for our first four issues was so overwhelming that we are looking for sustainable funding. **You can help!** Consider becoming a subscriber to *Tahoe In Depth* so that you and others can continue to receive ideas on "Protecting, Enjoying & Exploring the Lake Tahoe Basin" in your mailbox.

All subscribers are entered in a drawing to win a \$100 gift certificate from a local nursery for a native plant. Just cut out and mail in the subscriber form and your check made out to the Tahoe Regional Planning Agency. Please add the *Tahoe In Depth* account number 0000552 on the note line.

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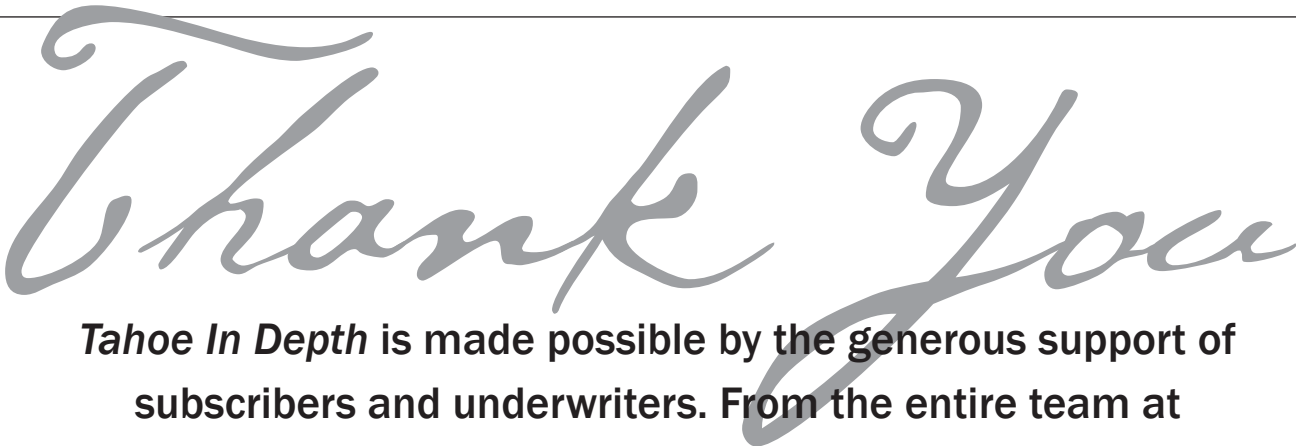
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Enter our drawing!

For every issue of *Tahoe In Depth*, all subscribers are entered to win a \$100 gift certificate from a local nursery for a native plant.

This issue's winner

Congratulations to **Shane Wessels** of South Lake Tahoe, California, our latest subscriber winner!



Tahoe In Depth is made possible by the generous support of subscribers and underwriters. From the entire team at **Tahoe In Depth**, thank you for contributing to the publication.

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If you are interested in becoming an underwriter, please contact Sarah Underhill, design and project manager at the Tahoe Regional Planning Agency, at 775-589-5211 or sunderhill@trpa.org.

What readers are saying:

I have just spent time reading the winter and summer publications. As a half-year resident I appreciate the update about a number of issues that confront Tahoe. I found the articles informative and helpful. Good work!
R.R. – via email

I work for Explore Tahoe and love being able to give visitors Tahoe In Depth and get them interested in Tahoe and help to connect them with the land and the lake in a more meaningful way. Tahoe In Depth is very well done and a good tool toward that goal. Keep up the great work :-)
G.F. – South Lake Tahoe, CA

Congratulations on a fantastic issue of Tahoe In Depth. The paper does a really nice job of describing current issues and trends in a very user-friendly format. We had some out-of-town visitors over the weekend and it was a wonderful way to share some details about what we do and what's going on in the basin. You all did a fantastic job putting this together – many thanks for your hard work!
B.L. – via email

Drop us a line at tahoeindepth@gmail.com

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Firefighters become Tahoe's first Hotshot crew

Tallac Hotshots are sent to the front lines of the toughest fires for hand-to-hand combat

By Jim Sloan

TAHOE IN DEPTH

When a wildfire breaks out, they are the ones who head to the front lines, carrying their own tools, their own fuel, and their own water.

They head to the hottest part of the fire, wherever it might be – in a deep ravine, a thick forest, or a steep mountainside – and they fight the fire and create firebreaks with chainsaws, heavy steel rakes called McLeods and pickaxes called Pulaskis (axes with a grubbing edge). It could be two weeks of 16-hour days before they get a home-cooked meal, a decent night's sleep, or get to take a breath of fresh, smoke-free air.

They are Hotshots, members of small, mobile, and elite firefighting crews that are sent into the worst possible conditions with an almost impossible task: to control a wildfire without the help of water, bulldozers, or fire engines. Their job is hand-to-hand combat with flames that can reach 100 feet in height, in some of the most remote terrain imaginable.

Now the Tahoe Basin, where wildfires have become an increasingly dangerous threat, has its own Hotshot crew. The Tallac Hotshots, headquartered in Meyers, is one of only 108 crews in the country that have met the extremely strict and demanding federal standards required to qualify.

Formerly the Tallac Hand Crew, the newly certified Tallac Hotshots completed a demanding and extensive certification process in order to become the U.S. Forest Service Lake Tahoe Basin Management Unit's first Interagency Hotshot crew.

Hotshot crews consist of 20 firefighters, trained in wildfire suppression tactics. They are on call 24/7, provide initial attack response or large fire response for fast-moving fires in remote regions, and are trained to meet stringent physical requirements. Within two hours of receiving orders, Hotshots must be ready to travel anywhere in the country, and are often flown by helicopter or hike into steep terrain where they fight fires using only



Hotshot crews are sent to the the most difficult parts of a fire, where they work to create firebreaks using chainsaws and hand tools.

the equipment they can carry. Hotshots can respond to all types of national emergencies, including hurricanes, tornadoes, floods, earthquakes, and other disasters.

Crew Superintendent Aaron Grove said the Tallac Hotshots were sent into action very soon after being certified earlier this year. They fought a fire in Clear Creek above Carson City and then numerous lightning-caused fires on the Sierra Front before being sent to the Klamath National Forest for most of the summer.

While competition for the limited openings on the Hotshot crew is fierce, it's not a glamorous life when the fires are burning, Grove said. His crew can be asked to stay on the fire lines for as long as three weeks without a day off, and it's not unusual for crew members to lose several pounds over the course of a fire season. It's taxing mentally as

well as physically.

"We make sure to go into the season in top physical shape," Grove said. "But the truth is that the work requires even more mental resilience than physical toughness.

"We're mostly sent to the difficult, active portions of the fire. You're out there for weeks, sometimes, and it's 16 hours a day of hard, hazardous work. It takes its toll."

In the weeks leading up to fire season, Grove brings in his full crew – only nine Hotshots work year-round – so the 20-member outfit can begin training. The crew physically trains twice a day for two to four hours for up to a month before they're ready for their first call.

"Fitness for us is not muscles," Grove said. "It's cardio and long repetitions. There aren't many workouts that emulate swinging a Pulaski and hauling around a chainsaw for 16 hours a day."

Grove said his crew members are grateful for the chance to be a part of the Tallac Hotshots.

"A lot of our guys were born and raised around Lake Tahoe and they have a true passion for this area," he said. "They love this community and think of it as an honor to represent and protect the Lake Tahoe area as its first and only Hotshot crew."

Grove notes that Hotshots play an important role all year.

"We're not just about fire," he said. "We're out remodeling forest structures, working with recreation, doing fuels reduction, prescribed fire management and support, hazard tree removal, eradicating invasive weeds, general forest stewardship, providing fire training, and other duties as assigned. We're here to provide a quality, professional service and we're proud of that. We never shy away from work."