The Sierra Nevada yellow-legged frog is making a comeback. Page 8

TAHOE IN DEPTH

Protecting, Enjoying & Exploring the Lake Tahoe Basin

Winter 2016 ■ Issue #10

New products, practices help keep winter stormwater from harming lake

By Zack Bradford
League to Save Lake Tahoe

Winter snow is a welcome sight at Lake Tahoe, particularly since four of the last five winters were exceptionally dry. But as much as we all enjoy skiing or riding and as much as our towns depend on winter tourists to keep our economy going, there is a hidden cost to a return to winter: stormwater, and the pollution that it transports into Lake Tahoe.

Lake Tahoe is designated an "Outstanding National Resource Water" by the U.S. Environmental Protection Agency, affording it protections that most lakes its size don't have. EPA, however, also lists Tahoe as "impaired" by fine sediment pollution and an excess of the nutrients nitrogen and phosphorus. Both are carried into Lake Tahoe when rain and snow washes off Tahoe's roads and parking lots. Unlike grains of sand, which sink, fine sediment particles — each smaller than the width of a human hair — remain suspended in the lake, reducing its clarity. Plants need

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Obama praises Tahoe work at summit

Photo: Mike Vollmer

Obama addresses the audience during the Aug. 31 summit at Harveys.

President calls conservation key to battling climate change

By Tom Lotshaw
Tahoe Regional Planning Agency

Making his first-ever visit to Lake Tahoe for the 20th annual summit, President Barack Obama said environmental conservation and restoration work like that undertaken at Tahoe is more important than ever because it goes hand in hand with combating climate change.

"When we protect our lands, it helps us protect the climate for the future. So conservation is critical not just for one particular spot, one particular park, one particular lake, it's critical for our entire ecosystem," Obama said during his 21-minute speech at the Aug. 31 event, held at the Lake Tahoe Outdoor Arena at Harveys.

Obama was joined on the summit stage by Nevada Senator Harry Reid, California Senators Dianne Feinstein and Barbara Boxer, California Governor Jerry Brown, and Janice Schneider, assistant U.S. secretary for land and minerals management at the Department of Interior.

Obama and Schneider also announced new federal funding for environmental restoration and conservation measures at

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Protecting, Enjoying & Exploring the Lake Tahoe Basin

Commitment to Tahoe stronger than ever

With the welcome sight of snow lightly covering the shores of Lake Tahoe, we enter another winter with hopes for a good snowpack while remembering the devastating effects of a multi-year drought. You need only look up at the mountains to see the signs of stress on our forests with new stands of dead trees. While Tahoe is not suffering the same level of tree mortality as other areas in the Sierra, we're taking the matter seriously (you can read more on page 20).

The urgent issue of catastrophic wildfire was just one of many voiced by President Barack Obama, our congressional delegation, California Gov. Jerry Brown, and other officials at the 20th Annual Tahoe Summit in August. As a national spotlight beamed on our alpine home, we reflected on our collective achievements in restoring Lake Tahoe over the last two decades. More importantly, we also discussed new threats like climate change, invasive species, drought, and tree mortality, which have the potential to undermine environmental and economic progress to date.

Having attended the first Tahoe Summit in 1997, I was proud to see the commitment stronger than ever to Tahoe from leaders at the highest levels. Special thanks to U.S. Senate Minority Leader Harry Reid for organizing this year's summit, as well as the first summit in 1997. Sen. Reid and Sen. Barbara Boxer are both retiring from Congress this year and we are eternally grateful for their support for Lake Tahoe. We're fortunate U.S. Sens. Dean Heller and Dianne Feinstein continue to lead the charge on the Lake Tahoe Restoration Act. We are hoping to secure passage of this important legislation in Congress soon.

Enjoy the beautiful Tahoe winter and Happy Holidays!

— Julie Regan, executive editor

Tahoe In Depth

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Corrections

In an article in issue No. 9 of *Tahoe In Depth* (Summer 2016), Dr. Alan Heyvaert's title should have been associate research professor. *Tahoe In Depth* regrets the error.

Pioneering boat inspections benefit lake

Program uses research to prevent invaders by decontaminating boats quickly and thoroughly

By Christopher Kilian
Tahoe Resource Conservation District

After nine years and 51,000 inspections, Lake Tahoe's boat inspection program has become a national model for preventing aquatic invasive species (AIS) from sneaking into the lake and wreaking environmental havoc.

The program by the Tahoe Resource Conservation District (Tahoe RCD) and the Tahoe Regional Planning Agency (TRPA) has used research to pioneer innovative ways to decontaminate boats quickly and thoroughly. Program officials have consulted with boat mechanics to develop the best procedures and resources, and they are working with one manufacturer on engine designs that will facilitate decontamination in the future.

Stopping invaders

TRPA and Tahoe RCD launched the Watercraft Inspection Program in 2008 to minimize the risk of aquatic invasive species becoming established at Lake Tahoe. Understanding that watercraft play a significant role in spreading AIS, and notably the quagga and zebra mussel, the purpose of the program was to intercept these risks before they entered Lake Tahoe.

The 100th Meridian Initiative and Pacific States Marine Fisheries Commission provided the official training for Tahoe's original inspection team leaders. Inspections were introduced to the boating public at launch ramps around Lake Tahoe. Any vessel found to be harboring AIS had few options at the time. Other lakes might turn away potential risks, but the goal of the Tahoe program was to grant access to all watercraft.

From bleach to heat

The solution was decontaminations, a process that would allow access to all vessels that failed the inspection and were at high risk of infesting Lake Tahoe. At the time, science showed that adult mussels could be eradicated by exposure to high concentrations of bleach. And so the advent of Tahoe's decontamination program was born.

Photo: Corey Rich

An inspector uses a pressure washer to decontaminate a boat before it is launched in Tahoe.

Spray bottles of bleach were used on areas of a watercraft deemed by the inspection process to be at high risk of transporting or harboring mussel larvae, called veligers, that are invisible to the naked eye. This process, although proven, had its drawbacks. Bleach could not be used everywhere, and in this concentration is harmful to carpeting, upholstery, and aluminum.

New techniques discovered

Other drawbacks were difficulties in achieving exposure times, removing bleach after application so it would not enter the lake, and an inability to be used in raw-water siphoning systems.

In 2009, scientists discovered that hot water was a suitable method for exterminating mussel veligers and other species. With an exposure time of just 10 seconds, adult quagga mussels will die when exposed to 140-degree water.

The Tahoe program purchased portable pressure washer units to improve the effectiveness of high-risk decontaminations and eliminate chemicals from the process. A small crew of Tahoe RCD and TRPA staff were responsible for performing every decontamination. Machines, equipment, and containment mats were transported to Tahoe marinas to perform these decontaminations, and took anywhere from 1 to 4 hours to complete. It was at this point that our knowledge of the complexity of watercraft began to blossom.

The Watercraft Inspection Program harnessed the knowledge of local boat mechanics, industry professionals, and marina operators and wrote what became known as "The Boat Book."

This was a resource meant to expound upon the limited information previously understood about watercraft. Manufacturers of pumps, impellers, engines, and other marine parts were contacted to ensure that the process of flushing these components with hot water would be safe for vessels.

During the research and consulting process, it became obvious that the risks posed by watercraft lay much deeper than the outer hull and engine compartment. Watercraft have an intricate network of areas for discretely transporting potentially threatening AIS, explaining why they are one of the top carriers of AIS.

Process continually improved

Over the years, continuous research led to many more decontaminations. The program looked to science, statistics, and data analysis, as well as an ever-growing knowledge of the mechanics of watercraft, to eliminate some risk factors and absorb others. Decontamination procedures were

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Innovative inspection program to host training for entire Western U.S. next year

The Tahoe RCD has a seasonal staff of about 25 inspectors who receive decontamination training.

The training encompasses not only the procedures required for decontamination, but also the intricacies of the mechanics of all types of watercraft so that no AIS risk will go undetected, and safety risks will be minimized to the watercraft.

Equipment is updated and improved constantly to provide for more efficient, timely, and effective decontaminations. "The Boat Book" continues to grow and is updated annually to include the newest technology and is a resource used throughout the U.S.

The knowledge is so innovative and expansive that the Lake Tahoe Watercraft Inspection Program has been asked to host an advanced decontamination training for the entire Western United States, expected to take place in 2017.

TRPA staff are also leading the charge of bringing all facets of the boat industry to the table with AIS managers to encourage boat design and construction with AIS in mind.

The goal is to design boats that drain water more effectively, or can be inspected and decontaminated more readily.

For example, starting with the 2017 model year, all boat engines manufactured by Volvo will include direct connection ports that will facilitate decontamination, making it quicker, more effective, and easier on the engine.

The boat industry has been eager to participate, and with both the public and private sectors working collaboratively on solutions, our resources will be better protected for years to come.

For more information on the Watercraft Inspection Program, visit tahoeboatinspections.com.

President announces funds for stormwater, forests

Reid also praises the 20 years and 500 projects that have helped the Lake Tahoe environment

Continued from page 1

Lake Tahoe, including $230,000 for projects to reduce stormwater pollution and more than $25 million to remove hazardous fuels from forests around the lake to reduce wildfire risk and improve forest health.

"As a former Washoe Tribe leader once said, the health of the land and the health of the people are tied together, and what happens to the land also happens to the people," Obama said.

"We embrace conservation because healthy and diverse lands and waters help us build resilience to climate change. We do it because most of the 4.5 million people who come to Lake Tahoe every year are tourists, and economies like this one live or die by the health of our natural resources. We do it because places like this nurture and restore the soul, and we want to make sure that's there for our kids, too."

Reid praises work done at Tahoe

Reid, the longstanding Nevada Senator leaving office at the end of this year, organized the 2016 summit and President Obama's visit. Reid, Obama, Feinstein, Boxer, and Brown all praised the 20 years of hard work and collaboration that have gone into restoring Lake Tahoe's environment; work that started with the first Lake Tahoe Summit in 1997, which Reid also organized and was attended by former President Bill Clinton and Vice President Al Gore.

"President Clinton summed it up properly when he said, and I quote, 'We have an awful lot of work to do.' He was sure right," Reid said.

In the late 1990s, the health of Lake Tahoe's 500-square-mile watershed was at a critical junction. The lake was losing one foot of its famous water clarity each year because of stormwater pollution from roads and urban areas and erosion from streams damaged by logging, cattle grazing, and reckless development around the lake. Lake Tahoe's forests were overgrown and unhealthy after being clear cut a century earlier.

That first summit in 1997 helped launch the Environmental Improvement Program (EIP), an unprecedented partnership uniting the local, state, and federal governments, the Washoe Tribe, nonprofit groups, and the private sector in a shared mission to conserve and restore Lake Tahoe's natural resources.

At the time, some people questioned if the newly formed Tahoe partnership could possibly help turn things around.

But over the last 20 years, EIP partners have prioritized and completed nearly 500 projects in the Tahoe Basin, investing almost $2 billion to conserve and restore the environment and provide greater public recreation opportunities. Those EIP projects have built 150 miles of bike and pedestrian routes; restored 16,000 acres of wildlife habitat; upgraded 720 miles of roadways to reduce stormwater pollution; protected the lake from invasive species; and cleared hazardous fuels from 65,000 acres of forest to reduce wildfire risk and improve forest health.

That work has undoubtedly improved Lake Tahoe's health, Reid said. "Today's lake summit is a celebration of progress, a celebration of unity, though there is much more work to be done in the future. We won't be complacent. Our work is not finished."

With new global temperature records being set every month and climate change threatening even the best conservation efforts, Obama said the biggest choices facing Lake Tahoe and the rest of the country today are not between the environment, the economy, or public health, but how to improve all three together.

"We've got to strengthen all of them together … There is no contradiction between being smart on the environment and having a strong economy, and we've got to keep it going," Obama said.

"Our healing of Lake Tahoe proves it's within our power to pass on the incredible bounty of this country to a next generation."

Tom Lotshaw is the public information officer for TRPA.

Photo: Mike Vollmer

Sen. Harry Reid, followed by Sen. Dianne Feinstein, greets the crowd during the 2016 summit. Reid organized the event and President Obama's visit.

> *"Today's lake summit is a celebration of progress, a celebration of unity, though there is much more work to be done in the future."* — **Sen. Harry Reid, D-Nev.**

Boat inspection program using research to prevent invaders by decontaminating boats quickly and thoroughly

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vetted through local boat mechanics, including those that specialize in pleasure boats, race boats, and wooden boats.

Rigorous protocols were designed to effectively inspect and decontaminate, preventing the spread of AIS without having to decontaminate every vessel entering Lake Tahoe.

Through an outreach campaign, boaters were encouraged to arrive "Clean, Drain, and Dry" in order to pass the inspection.

Inspection sites were moved to improve boater convenience as they entered the basin and alleviate congestion at the launch ramps.

The decontamination equipment was heavily modified and evolved from a simple pressure washer to a unique and purpose-built machine that was quicker, safer, more effective, and capable of accommodating even the most obscure vessel. Through these processes, decontaminations became much quicker and less frequent. And Tahoe's inspection program is now one of the nation's most protective.

Chris Kilian is the operations coordinator for the Watercraft Inspection Program.

Agencies ready to deal with heavy stormwater

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nutrients to grow, but excessive nutrients fuel the growth of algae.

Under federal law, Tahoe's special status requires agencies in the Basin to reduce the inputs of these contaminants and restore Lake Tahoe to its historic clarity. When Dr. Charles Goldman began dropping the Secchi disk in the lake in the 1950s, clarity reached over 100 feet in depth. It worsened over the decades, but for the past four years, the Tahoe Environmental Research Center's clarity measurements at the center of Tahoe have been better than any other year in the previous decade. It's no coincidence that these same four years were a record drought.

So, what can we expect when Tahoe again experiences above-average winters, with accompanying stormwater transporting these pollutants to the lake? Many agencies at Tahoe have been preparing for that scenario.

From engineered stormwater "infiltration basins" on the South Shore, to curb and gutter projects on the West Shore, agencies have been acting to reduce the amount of fine sediment coming off our urban streets, roads, and developments. But the biggest impact, perhaps, has been made by agencies modifying their road sanding practices.

Scientists have found that road traction abrasives, or road sands, are responsible for the vast majority of fine sediment ending up in Lake Tahoe. Road managers apply abrasives in the winter for public safety to provide traction for vehicles traveling on snowy roads. These traction materials are crushed by our car tires and ground into clarity-degrading fine sediment.

Staff from state and local public works departments balance public safety and the environment by monitoring and analyzing storms, applying road salts at precise times, and spreading road sands in precise locations before temperatures drop. They also sweep up road sands after storms. The improvements they've made over the past decade have been challenging.

One major change has been to switch, over the past five years, from a material known as "volcanic cinders" to "Washoe sand." The cinders are a brittle volcanic rock that cars easily crush into an ash-like dust, while the sturdy grains of Washoe sands can withstand more abuse. Washed into a body of water, more of the finely crushed cinders remain suspended, while the larger and heavier grains of Washoe sand sink harmlessly to the bottom.

Research conducted by El Dorado County and Caltrans showed that switching to Washoe sand could reduce ultra-fine particles, those most responsible for clarity loss, by as much as 90 percent.

Agencies have also taken steps to improve efficiency in applying these road abrasives.

"Our drivers now focus on spot sanding at key intersections, steep areas, and critical public safety areas," said Jason Burke with the City of South Lake Tahoe. Caltrans now relies more heavily on weather forecasts, and has installed vehicle sensors to measure road temperature. Both Caltrans and El Dorado County have also begun treating roads with a brine solution, which lowers the freezing point of the road, as a potent ice-prevention step before storms arrive.

"The brine technology allows the county to prevent ice buildup, use less salt, and be strategic in placement of road sand," said Russ Wigart, stormwater coordinator for El Dorado County.

South Lake Tahoe also engages in what Burke calls a "combined effort of refined sand application and enhanced street sweeping after storm events to recover traction materials as soon as feasible." The city recently purchased new spreaders to enable the use of brine on city streets for the first time this winter.

"Brine use reduces the bounce and scatter typical when dropping dry sand onto the roadway," said Burke, allowing the city to reduce the amount of sand it needs to apply by 30 percent.

Nevada public works officials are also using the best available technology, from road temperature sensors to high efficiency street sweepers, to combat the fine sediment runoff problem.

The results of some of these changes have been encouraging. Caltrans' Sean Cross reports that "water quality monitoring and testing have shown reductions to fine sediment particles," while Wigart said "the concentrations of fine sediments in urban runoff appear much cleaner." The real impact though, may not be known for several years, as it takes time for sediment to reach the center of the lake where TERC takes its clarity readings.

So, what can community members like you do to protect Lake Tahoe?

Slow down when driving in winter conditions and bring your vehicle to the car wash more frequently to reduce the spread of roads sands trapped under your car. Residents and business owners can also use less salt, and encourage private snow removal companies to switch to Washoe sand instead of cinders.

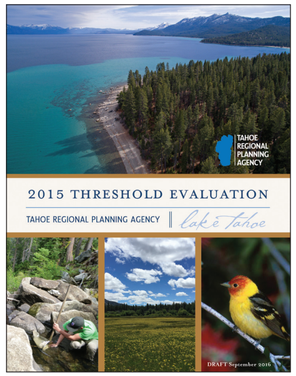
Reducing the number of cars on the road can reduce the fine sediment pollution that threatens Lake Tahoe's clarity. Community members can help by carpooling, and riding the bus and ski shuttles. Little steps add up, and together our actions can help protect Lake Tahoe.

Zack Bradford is the natural resources manager for the League to Save Lake Tahoe. He manages Pipe Keepers, a community-based volunteer monitoring program that examines stormwater entering Lake Tahoe and its tributaries, and Eyes on the Lake, a volunteer program to help prevent the spread of aquatic invasive plants in Tahoe's waters.

Photos: League to Save Lake Tahoe

In recent years, many Tahoe agencies have begun to change what road sand they use to treat snowy roads in the winter.

Stormwater flows into Lake Tahoe from the Fremont Avenue pipe in South Lake Tahoe.



Study shows Tahoe overall health improving

Photo: Tahoe Regional Planning Agency

The threshold evaluation includes an analysis of Lake Tahoe's streams. Pollution from non-urban upland streams is decreasing as they recover from the impacts of grazing, logging, and other historic activities.

> *"This 2015 threshold evaluation shows that we are continuing to make progress in conserving and restoring Lake Tahoe's environment and improving public recreation opportunities for people to enjoy this national treasure for generations to come."*
>
> **Joanne Marchetta, executive director**
> *Tahoe Regional Planning Agency*

2015 threshold evaluation shows progress in attaining standards

By Tom Lotshaw
Tahoe Regional Planning Agency

The Lake Tahoe Basin's environment continued improving over the last four years but faces major challenges from climate change, according to the draft 2015 Threshold Evaluation Report released by TRPA.

TRPA leads the development of a threshold evaluation every four years. The report assesses the Lake Tahoe Basin's environmental health as indicated by 178 standards in nine categories: air quality, water quality, soil conservation, vegetation, fisheries, wildlife, scenic resources, noise, and recreation.

The 2015 threshold evaluation made status determinations for 110 of the 178 standards. It found 77 standards to be in attainment, either at or better than target, or considerably better than target. That's up from 58 standards found in attainment by the 2011 evaluation.

Only two standards — cushion plant communities on Freel Peak and open water algae growth in Lake Tahoe — were found to be in a declining trend compared to the last evaluation.

The 2015 threshold evaluation includes a new analysis of Lake Tahoe's streams. It found pollution from non-urban upland streams is decreasing as Tahoe's 500-square-mile watershed gradually recovers from the impacts of grazing, logging, and other historic activities. This improvement is critical as agencies, local governments, and private property owners work to restore Lake Tahoe's famous water clarity, which is anticipated to take several decades.

"This 2015 threshold evaluation shows that we are continuing to make progress in conserving and restoring Lake Tahoe's environment and improving public recreation opportunities for people to enjoy this national treasure for generations to come. It also flags important areas needing further, focused attention," said Joanne S. Marchetta, executive director of TRPA.

More than 60 people from 25 organizations contributed data, time, or analysis to the 2015 Threshold Evaluation Report. The report is the second threshold evaluation to undergo an independent scientific peer review. Fifteen scientists examined the report's findings, analyses, and conclusions and found them to be sound. They also offered suggestions to improve the threshold standards and their monitoring and evaluation.

Updating the threshold standards is one of TRPA's top strategic initiatives, along with other initiatives focused on forest health, invasive species, shoreline policies, and overhauling the Lake Tahoe Region's development rights system to help accelerate the transfer of development from outlying and environmentally sensitive areas into town centers.

Most of the 178 threshold standards have not been updated or comprehensively reviewed since they were adopted in the 1980s.

TRPA's initiative to review and update the standards, undertaken with the Bi-State Tahoe Science Advisory Council and many other partner agencies in the Tahoe Basin, will focus on making sure that standards are measurable, scientifically sound, and provide the information needed to assess Lake Tahoe's environmental health.

"This threshold evaluation identifies future research needs and lays out a framework to update our threshold standards. This is especially important in light of the changing climate that threatens to impact everything from water clarity and nearshore water quality to invasive species, forest health, and recreation opportunities at Lake Tahoe," Marchetta said.

The draft 2015 Threshold Evaluation Report, scheduled for action by the TRPA Governing Board this December, is available online at www.trpa.org.

Homewood trail completed; work starts on Sand Harbor

3-mile trail will link Incline Village to popular state park, improving safety and environment

By Tom Lotshaw
Tahoe Regional Planning Agency

Lake Tahoe saw continued progress this year on work to build a complete bike trail network around the lake, linking communities and popular recreation areas.

Tahoe City Public Utility District completed the 1-mile Homewood Bike Trail this summer, completing a missing link in the popular West Shore Bike Trail between Cherry Street and Homewood Mountain Resort.

Partners in the project including the North Lake Tahoe Resort Association, California Tahoe Conservancy, California Natural Resources Agency, Tahoe Fund, and Placer County Parks held a ribbon-cutting ceremony for the new trail segment in November.

"We are thrilled to finally see this critical link in the trail network completed," said Cindy Gustafson, general manager of Tahoe City Public Utility District.

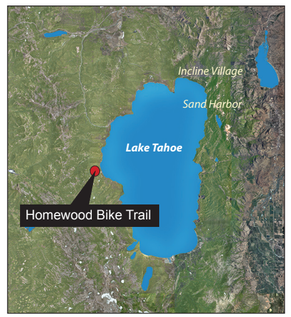
Work also started this summer on a paved 3-mile bike and pedestrian path that will run along the lakeshore from Incline Village to Sand Harbor State Park.

A showcase stretch of the Lake Tahoe Bikeway that one day will encircle the lake, the project is one of several measures being undertaken to improve recreation access, safety, and water quality in the state Route 28 corridor between Incline Village and Spooner Summit.

The bike and pedestrian path will offer scenic views of Lake Tahoe and an alternative way for people to get from Incline Village to the popular Sand Harbor State Park.

But public safety is also a major component of the project, with dangerous roadside parking relocated to new or expanded off-highway parking areas that will have access to the path, said Carl Hasty, district manager of the Tahoe Transportation District.

Work started this summer with construction of trailhead parking near the Flume Trail, Ponderosa Ranch, and Tunnel Creek Café and a tunnel beneath state Route 28 for the path crossing. Future phases of construction will also include water-quality improvements such as enhanced roadside drainage inlets,



sediment filtration systems, and erosion-control measures to help protect Lake Tahoe's famous water clarity.

More than 13 partner agencies are taking a corridor approach to better manage growing volumes of people and vehicles in the state Route 28 corridor. It sees more than 1 million people recreating in the area and more than 2.6 million vehicles each year.

Parking along the road shoulders has continued to increase in the corridor, posing significant safety concerns and environmental problems.

To help alleviate traffic congestion and roadside parking, Tahoe Transportation District has ramped up its seasonal transit service in the 3-mile area during the peak summer tourism months of July, August, and September. Ridership increased to about 24,000 in 2016, a 50 percent year-over-year increase, Hasty said.

Agencies are working to expand the trail and transit service another 8 miles so the services extend throughout the state Route 28 corridor. "Seasonal transit, bus stops, parking, park-and-ride locations, the multi-use trail, that whole package is needed all the way through the corridor to Spooner Summit," Hasty said.

Funding for the Incline Village to Sand Harbor bike path comes from a mix of federal, state, and local sources, as well as $1 million raised by the nonprofit Tahoe Fund.

According to the Nevada Department of Transportation, the project is scheduled to be completed over the next two years.

Photo: Tahoe Area Mountain Biking Association

A mountain biker tests out the Stinger Trail on Kingsbury Grade.

Kingsbury Stinger Trail overhauled; alignment boosts recreation, links

By Tom Lotshaw
Tahoe Regional Planning Agency

The Kingsbury Stinger Trail reopened Oct. 8 after a major realignment and upgrades by the U.S. Forest Service, the American Conservation Experience, and volunteers with Tahoe Area Mountain Biking Association (TAMBA).

The 4.5-mile alignment runs from Andria Drive and Genoa Peak Road at the top of Kingsbury to the Tahoe Rim Trail and then down to neighborhoods on lower Kingsbury, connecting neighborhoods and popular trails in Stateline and South Lake Tahoe.

"It's a good way to hike, bike, horse ride, or motorcycle from the top of Kingsbury to the bottom," said Jacob Quinn, trails engineer for the U.S. Forest Service.

The old 3-mile alignment was steep and heavily rutted with erosion and trail stability problems. "It was one of our worst trails in terms of sustainability and had gotten to a point where we were seeing a real tapering off in users," Quinn said.

Funding from the Nevada Recreational Trail Program and Southern Nevada Public Land Management Act in addition to private donations helped make the project happen.

"The new trail is much more usable and enjoyable," Quinn said. "It's rideable in both directions, where the old trail was not rideable uphill. The new trail incorporates several vista points with great views of the lake, Desolation Wilderness, Pyramid Peak, Mount Tallac, and the Stateline area, which were not part of the original trail. We've been hearing lots of good things about that."

The project also restored the old trail alignment, with eroding areas stabilized and duff put down to promote revegetation.

Forest Service trail crews used trail-sized equipment to rough out the new trail corridor. The American Conservation Experience and TAMBA helped with finer detail finish work on the trail, including alternate lines and rock features.

More than 130 TAMBA members volunteered more than 1,000 hours of work this past summer to help complete the Kingsbury Stinger Trail, said Ben Fish, president of TAMBA.

"We saw this as a great opportunity to connect neighborhoods to trails. It's night and day. It's very scenic, it's fun uphill and downhill, it's family friendly. The environmental improvements and the trail connections it provides are huge."

Photo: Chris Linder

Dr. Sudeep Chandra conducting research in Siberia.

University of Nevada, Reno creates water resource center

The University of Nevada, Reno (UNR) has launched a new research initiative to examine how water resources will be affected by climate change, invasive species, dam and water diversions, pollution, and demands by humans for water.

The Global Water Center will be headed up by Dr. Sudeep Chandra, an associate professor of limnology at UNR who has conducted extensive research at Lake Tahoe.

"The issues surrounding water resources, water quality, and ecosystems aren't just single-focused that can be solved by isolated scientific disciplines or individual scientists — they are multidimensional and need collaborative data-driven solutions," Chandra said in July after the Board of Regents approved the formation of the center.

Research projects under the auspices of the water center are being conducted at Lake Tahoe and in places all over the globe, including Mongolia, Vietnam, Hawaii, and Uzbekistan. Many studies are also being conducted closer to home, including Crater Lake in Oregon, Shasta Lake and Castle Lake near Mount Shasta, and the Truckee River.

Projects include studies on snowpacks' effect on ecosystems, the impact of snowfall on forests, and the effect of environmental restoration on carbon sequestration and greenhouse gases.

Chandra emphasized that he expects research to result in specific steps resource managers can use to protect and sustain water resources.

"There is an urgent need to translate basic science and research into actionable solutions accessible to stakeholders at local, regional, national, and global scales," Chandra said.

For more information about the Global Water Center, go to www.unr.edu/water.

Endangered amphibian making comeback

Yellow-legged frog recovering in areas where non-native fish removed

By Sarah Muskopf
U.S. Forest Service

Photos: U.S. Forest Service

Sierra Nevada yellow-legged frogs relocated to seven lakes in Desolation Wilderness came back stronger than expected after non-native fish were manually removed from the lakes.

Listed as an endangered species in 2014, the Sierra Nevada yellow-legged frog (*Rana sierra*) was once common throughout the California mountain range. The frog is now absent from more than 90 percent of its historic range, including habitat here in the Tahoe Basin.

The widespread stocking of non-native trout in historically fishless areas and the infectious disease chytridiomycosis, a fungus that has caused the decline and extinction of amphibians worldwide, are the main drivers of the Sierra Nevada yellow-legged frog's decline.

Nearly all high elevation lakes and streams in the Sierra Nevada were historically fishless due to natural barriers preventing migration upstream. But as early as the 1800s, non-native species such as brook, brown, and rainbow trout were introduced into these habitats to increase recreational fishing opportunities.

Predation by these non-native trout on all life stages of the Sierra Nevada yellow-legged frog has caused widespread declines in their populations, and caused them to disappear from some areas completely. But there are some signs of improvement.

A 20-year study in Yosemite National Park by researchers with San Francisco State University and University of California Santa Barbara found populations of Sierra Nevada yellow-legged frogs have recovered at a rate of approximately 11 percent per year in the park as non-native trout were removed from lakes and as the frogs developed some resistance to chytridiomycosis.

"We now have a park-wide picture of what's happening in Yosemite, and it shows convincingly that these frog populations are increasing dramatically," said lead author Roland Knapp, of University of California Santa Barbara Sierra Nevada Aquatic Research Laboratory in Mammoth Lakes to the California Academy of Sciences. "These new results show that, given sufficient time and the availability of intact habitat, the frogs can recover despite the human-caused challenges they face."

Here at Lake Tahoe, the U.S. Forest Service Lake Tahoe Basin Management Unit started a recovery effort in 2008 in the Desolation Wilderness to restore habitat and prevent the disappearance of Sierra Nevada yellow-legged frogs from the Lake Tahoe Basin.

Seven lakes in the Desolation Wilderness in proximity to populations of Sierra Nevada yellow-legged frogs on the El Dorado National Forest were identified for restoration actions, including the manual removal of non-native trout.

All seven lakes were monitored for at least two years after the restoration actions to ensure removal methods were successful and to determine if Sierra Nevada yellow-legged frogs from populations on the El Dorado National Forest had recolonized any of the lakes.

In 2012, Roland Knapp and San Francisco State University researcher Vance Vredenberg initiated a study to determine the success of different recovery tools for Sierra Nevada yellow-legged frogs in the Desolation Wilderness. From 2013 through 2016, their study completed extensive recapture and marking of frogs to determine the size of the source populations, which were found to be much larger than expected, allowing more adults to be relocated to the restored lakes in the Desolation Wilderness and for additional juveniles and egg masses to be reared at the San Francisco Zoo to test potential treatments for chytridiomycosis. From 2014 through 2016, zoo-reared frogs and frogs from the El Dorado National Forest were relocated to the restored lakes in the Desolation Wilderness. This research is providing valuable information for future recovery actions, and researchers are currently seeking additional funding to continue work to understand the fungus.

Sarah Muskopf is an aquatic biologist with the U.S. Forest Service.

Tahoe RCD working to acquire important meadow

209-acre Johnson Meadow purchase could help future restoration work on main Tahoe tributary

By Tom Lotshaw
Tahoe Regional Planning Agency

With recent California state funding awards, the Tahoe Resource Conservation District (Tahoe RCD) is working to purchase Johnson Meadow in South Lake Tahoe.

The 209-acre property sits along the Upper Truckee River just north of U.S. Highway 50. It is the largest privately owned meadow in the Tahoe Basin and the last large private property holding in the lower nine miles of the Upper Truckee River.

"If completed, the acquisition of the Johnson Meadow property will be one of the most important public land purchases in the last decade in the Tahoe Basin," said Kim Boyd, district manager for Tahoe RCD. "It would connect over 1,000 acres of Upper Truckee River floodplain in near continuous public ownership within the river's lower nine miles."

The California Tahoe Conservancy awarded $4.234 million for the Tahoe RCD acquisition of Johnson Meadow in March. In October, California Department of Fish and Wildlife awarded another $4 million. And the nonprofit Tahoe Fund is working to raise an additional $100,000 for Tahoe RCD to purchase the meadow at its appraised value.

The Upper Truckee River is Lake Tahoe's largest tributary. Its watershed is the largest contributor of fine sediment that harms the lake's famous water clarity because of erosion from the lingering impacts of logging, cattle grazing, and development in environmentally sensitive areas.

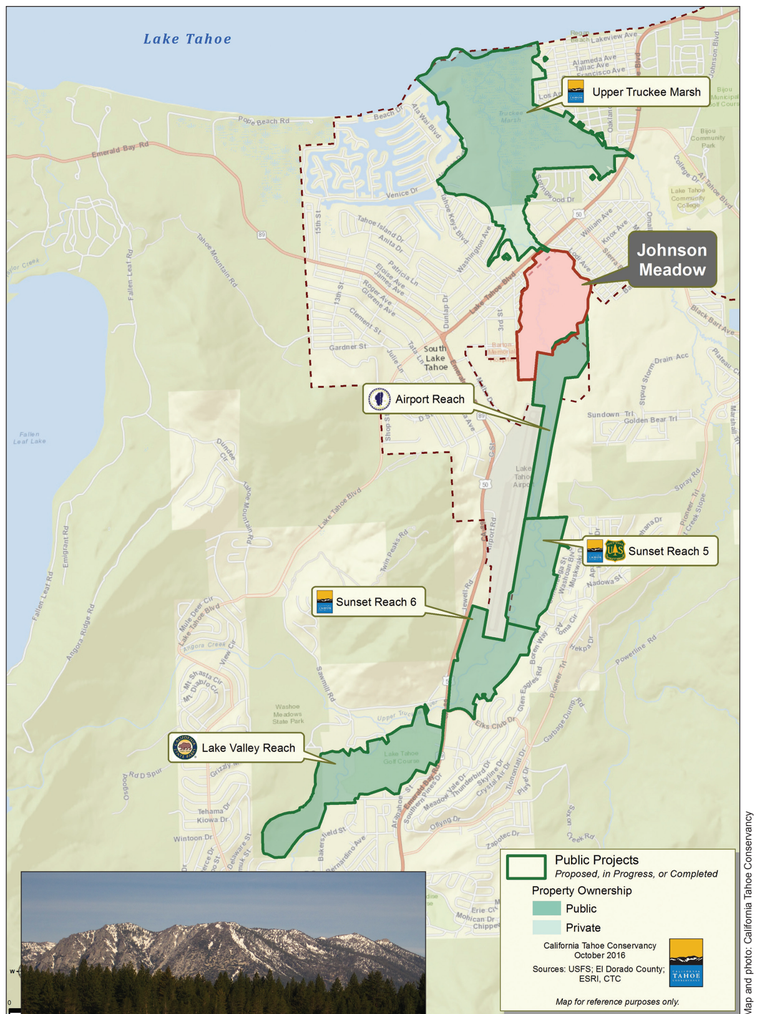
The U.S. Forest Service, California Tahoe Conservancy, City of South Lake Tahoe, and California State Parks have been working for years to acquire and restore stretches of the river. That includes ongoing planning to restore 500 acres of the Upper Truckee Marsh at the river's mouth by the California Tahoe Conservancy — the largest marsh not only in the Tahoe Basin, but the Sierra Nevada.

Tahoe RCD's acquisition of Johnson Meadow would offer the potential for improved public access, help conserve important fish and wildlife habitat, and streamline the planning and protection of future river restoration work.

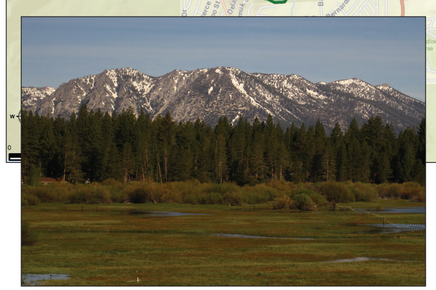
The river corridor serves or could serve wildlife species, including willow flycatcher, bald eagle, Northern goshawk, osprey, black bear, deer, waterfowl, and native fish species, including Paiute sculpin, mountain whitefish, Lahontan redside shiner, speckled dace, Mojave tui chub, Tahoe sucker, mountain sucker, and Lahontan cutthroat trout.

Tahoe RCD is working to purchase the Johnson Meadow property by the end of 2017. Property acquisition and ownership would be a first for the district.

"There aren't a lot of resource conservation districts in the state that own property, so this is a large endeavor and commitment our board has made," Boyd said. "We are very excited and feel supported by other agencies to share the responsibility of restoring the Upper Truckee River to a collective vision. The Upper Truckee River Watershed Advisory Group has been talking about acquiring this reach of the river for a long time."



Map and photo: California Tahoe Conservancy



Federal and state agencies have been acquiring and restoring stretches of the Upper Truckee River for years, and the acquisition of the privately owned Johnson Meadow would help the overall effort to reduce fine sediment flowing into Lake Tahoe.

Environmental redevelopment projects move ahead

Regional Plan Update of 12.12.12 marks four years of progress

By Adam Jensen and Tom Lotshaw
Tahoe Regional Planning Agency

A renaissance is underway in the Sierra. As we celebrate the fourth anniversary of the update of the Lake Tahoe Regional Plan on Dec. 12, the Region continues to move in a positive direction. Public agencies and private sector businesses have invested more than $500 million in the last few years into projects to revitalize Tahoe communities and restore the environment. Here's a look at some recent environmental redevelopment projects at Lake Tahoe.

Photo: Adam Jensen

Photo: Rachid Dahnoun/Novus Select

From The Crossing at Tahoe Valley (top) to the Zalanta condominium project in South Lake Tahoe (right), several construction projects at the lake are designed to repair environmental damage while making areas more pedestrian friendly. The Fanny Bridge project (below) in Tahoe City includes pedestrian and bicyclist safety improvements.

Photo: Tahoe Transportation District

South Lake Tahoe

Robert Maloff Center of Excellence

Healthy living will soon have a new home at the South Shore. In August, Barton Memorial Hospital supporters celebrated the groundbreaking of a 25,000-square-foot orthopedic, sports performance, and wellness center on the hospital's campus.

The center "will integrate health, fitness, and medical expertise to treat the person holistically and improve overall well-being. It will expand on Barton's comprehensive offerings for healthy living and preventative medicine, and build on a personalized, patient-centered experience," according to Barton Health.

The facility will incorporate innovative green building practices and be LEED-certified. It is expected to open in late 2017.

Edgewood Tahoe Lodge

Lake Tahoe is the inspiration for a years-in-the-making new lodge at South Shore's Edgewood Tahoe Golf Course. Designed to mimic its beautiful natural surroundings, the Edgewood Tahoe Lodge's grand opening is scheduled for June 22, 2017.

After tearing down old, rundown motels, the Edgewood Company transferred those units to build a new, 154-room lodge with a bistro, ballroom, and spa. The building will meet silver LEED green-building standards and feature local materials.

The project also includes best management practices to control erosion and environmental restoration work to improve fish and wildlife habitat and water quality in the surrounding 4,200-acre Edgewood Creek watershed.

The Chateau at the Village

A long-awaited piece of redevelopment near the state line received new life this fall with continuing redevelopment of the Chateau at the Village area on U.S. Highway 50.

For years, the California side of Stateline was marked by contrasting images on either side of the highway — a bustling, redeveloped Heavenly Village on one side, and on the other an unfinished foundation for a planned convention center, hotel, and shopping center where work ground to a halt with the national recession.

Work is now continuing on residential and retail center projects at that site, and plans are underway to extend that redevelopment back behind the highway frontage, helping to further revitalize the stateline area into a retail, dining, and tourist lodging hub centered around the Heavenly Gondola.

The Crossing at Tahoe Valley

A renewal of the factory stores at the "Y" intersection into the Crossing at Tahoe Valley is well underway after being purchased in 2014.

Part of the plan for the 4.58-acre retail center at the intersection of U.S. Highway 50 and state Route 89 includes pedestrian-friendly improvements and a connection with an existing bicycle path, concepts that complement the Tahoe Valley Area Plan approved by the TRPA Governing Board in July 2015.

The area plan focuses on creating commercial, mixed-use, and multi-family developments that are pedestrian friendly and transit oriented, helping realize the vision of the "Y" as a revitalized South Shore Gateway and downtown gathering spot for Tahoe residents.

North Shore

The Kings Beach Commercial Core Improvement Project

A major overhaul of the Kings Beach downtown is complete after a three-year, approximately $40 million project wrapped up in November.

The award-winning project, led by Placer County with many partners including Caltrans, features new bike lanes, sidewalks, a roadway lane reconfiguration, intersection improvements, corridor beautification, public parking, bus shelters, and traffic-calming measures.

This project upgrades existing roadway and drainage infrastructure and provides better stormwater treatment. The project enhances pedestrian and bicyclist mobility and access to businesses, homes, and public facilities.

SR 89/Fanny Bridge Community Revitalization and Dollar Creek Shared-Use Trail Projects

The Tahoe Transportation District announced in October that Martin Brothers Construction has been awarded a $30.1 million construction contract for the SR 89/Fanny Bridge Community Revitalization and Dollar Creek Shared-Use Trail Projects.

The Fanny Bridge project will route traffic around Tahoe City. It also includes pedestrian and cyclist safety improvements at the intersection of state Routes 89 and 28, the replacement of Fanny Bridge with the same rail design, the upgrading of a 40-plus-year-old sewer pipe, new sidewalks, street lamps, aesthetic improvements, additional egress and ingress from Tahoe City's West Shore, and a new bridge over the Truckee River, according to the Tahoe Transportation District.

Placer County's Dollar Creek Shared-Use Trail Project features 2.2 miles of new shared-use trail along the North Shore of Lake Tahoe near state Route 28 between Dollar Hill and Tahoe Vista.

Construction on the projects began this fall and is scheduled to be completed in summer 2018.

Other resort projects on the North and South Shores are underway to update the Tahoe hospitality experience while at the same time improve environmental measures on site. *Tahoe In Depth* will keep you posted in future issues as Tahoe's renaissance continues to unfold.

Adam Jensen is the environnmental education specialist and Tom Lotshaw is the public information officer at TRPA.

Not all bears will hibernate during Tahoe's winter

While many animals in the basin take a long sleep, bears' behavior determined by many factors

By Sarah Hockensmith and Will Richardson
Tahoe Institute of Natural Science

Have you ever seen a bear print in the snow? How about a bear walking through your neighborhood during the winter season? At such times, many might ask themselves "shouldn't this bear be asleep right now?" Others might be compelled to ponder "do bears really even hibernate in the Tahoe region?" The most curious among you may go on to ask "what exactly IS hibernation, anyway?" These are great questions, and commonly asked, partly because hibernation is complicated.

Here in the Sierra Nevada, we experience the complete four-season cycle during the calendar year, including winter. Animals that breed in the Tahoe region have adapted three main strategies to cope with these seasonal changes. The first strategy is migration, where animals come to Tahoe during the summer months to take advantage of abundant resources, the mild climate, and long periods of daylight hours.

During the winter, these animals, which include deer, many birds and bats, and even insects, must retreat to lower latitudes and lower elevations.

Staying through the winter

A second strategy is where animals have evolved to stay put in Tahoe and stay active, somehow managing to balance their energy output, withstanding the freezing temperatures, and maintaining the ability to find enough food in a snow-covered landscape. This strategy is for the hardiest creatures, but it works for a surprisingly large diversity of animals.

The last strategy that animals have adopted to get through seasonal periods of difficulty, and the strategy that is perhaps least intuitive, is the process in which an animal simply goes to sleep for a period of time to wait for better conditions. By reducing their metabolism and body temperature, animals are able to greatly reduce the "expense" side of their energy budget and make it through such periods. This tactic is commonly known as hibernation in the broad sense.

Among the scientists that study such things, the term "hibernation" has been applied somewhat strictly, reserved only for certain types of hibernation, and that has led to considerable confusion over the years. The experts hold competing ideas about hibernation strategies and patterns among bears and other animals, but some of the debate falls on very fine distinctions and technical definitions.

Photo: Will Richardson

If food — including human garbage — is readily available, bears in the Tahoe area may forego hibernation.

Types of hibernation

There are many terms that refer to different, often very precise, types of hibernation. For example, brumation is a type of hibernation among reptiles, but different metabolic processes are involved. Unlike mammals, reptiles are cold-blooded and cannot control their body temperature; thus, brumation allows reptiles to handle temperature extremes.

Aestivation is a type of hibernation utilized in the summer to protect an animal (e.g. insects and amphibians) from long hot or dry periods. The term "torpor" often refers to a type of short-term hibernation where a reduction of body temperature and metabolic rate occurs during an inactive part of a daily cycle. We can often get frost in mid-summer, so consider the dramatic metabolic swing a tiny hummingbird must undergo not to burn through their meager reserves getting through such a night!

For the average person, it is unnecessary to get hung up on the finer distinctions of these technical definitions, and there is much debate among the experts anyhow, so we at the Tahoe Institute for Natural Science prefer to focus on the broader concepts and implications of seasonal dormancy.

For some animals, seasonal dormancy is a "facultative response" — only occurring if the conditions demand it for survival. Some of our short-distance migrants are similar in this regard. In other species, hibernation has been locked in as an obligate part of the annual cycle, regardless of weather and resource availability.

Programmed to sleep

A local example on the obligate side of the dormancy spectrum is the Belding's ground squirrel (*Spermophilus beldingi*), which experience a long hibernation period for 8 to 9 months. Even if there are ample grasses and warm temperatures to find food in the late summer and early fall, these squirrels go to sleep as soon as they have enough body fat to survive the winter, often in late August.

Winter a hardship for most animals

This brings us back to the initial question, "Do bears hibernate in the Tahoe region?" Again, winter in the Tahoe region is a time of hardship for most animals, including bears. Food is scarce and hard to find, temperatures are dipping below freezing for long periods of time, and snow is covering the ground, making travel and foraging energy intensive.

The American black bear (*Ursus americanus*), inhabits an enormous range across the North American continent and has evolved as a facultative hibernator. In Florida, you can find male black bears active year-round, but if you were to study populations in the coldest parts of Alaska, you would find that these bears are sleeping for up to 7 months out of each year!

Studies from the southern Sierra Nevada and elsewhere have demonstrated that onset of bear hibernation and denning behavior is driven by two factors. The first factor is whether the bear is pregnant. A pregnant female must den up for a period of time regardless of weather, and typically these family groups will remain in the den longer than individual bears given the same conditions.

The second factor determining when (or if) a bear decides to hibernate has to do with food availability. A large and readily accessible pine seed crop may keep bears active and feeding. Unfortunately, this applies to garbage as well as natural food sources, and if either are available throughout the winter, you are likely to find black bears awake and active.

Getting a wake-up call

Unlike deep hibernators, bears occasionally wake up and shift positions inside the den, helping to prevent sores and better conserve heat. During their dormancy they lower their body temperatures 8 to 12 degrees Fahrenheit, break down fat reserves for energy, and recycle wastes to eliminate the need for urination, defecation, or drinking water. Amazingly, they wake with almost no appreciable muscle atrophy and are capable of fine motor skills almost immediately.

Clearly, hibernation is a complicated subject. It has proven to be a successful strategy of saving energy during hard times and is utilized by many animals of the Sierra Nevada. "Do bears hibernate in the Tahoe region?" The answer is "yes and no, sort of. It depends." When, if, and for how long an animal hibernates depends on whether that species is an obligate or facultative hibernator, may depend on the sex of that individual animal and how that relates to energy demands, and often depends on weather conditions and food availability from year to year.

Sarah Hockensmith is the outreach manager and Will Richardson is the co-founder and director of science and outreach for the Tahoe Institute of Natural Science.

THE TAHOE BASIN'S BEST

TRPA awards showcase exceptional work that helps make Region more sustainable

Best in Basin projects helping environment, communities

By Tom Lotshaw
Tahoe Regional Planning Agency

Nine outstanding projects at Lake Tahoe that built bike paths and a bike park, improved energy efficiency at an historic ski resort, restored streams and wildlife habitat, cleaned up stormwater pollution that harms the lake's famous water clarity, and restored the Angora Fire burn area were recognized by TRPA with Best in Basin awards this September. The awards program, now in its 26th year, showcases projects that demonstrate exceptional planning, implementation, and compatibility with Lake Tahoe's environment and communities. "These projects show the great progress our partners around the lake are making to restore and conserve our environment, improve our communities, and make our Region more sustainable," said Joanne S. Marchetta, executive director of TRPA.

Bijou Bike Park

The City of South Lake Tahoe volunteers with the Tahoe Area Mountain Biking Association, and Elite Trax built this highly popular recreation site. The bike park includes a world class BMX track, two pump tracks, three slopestyle jump lines, and a perimeter of loop trail—all nestled in 5 acres of forested land in Bijou Community Park.

1

Sawmill 2B Bike Path and Erosion Control

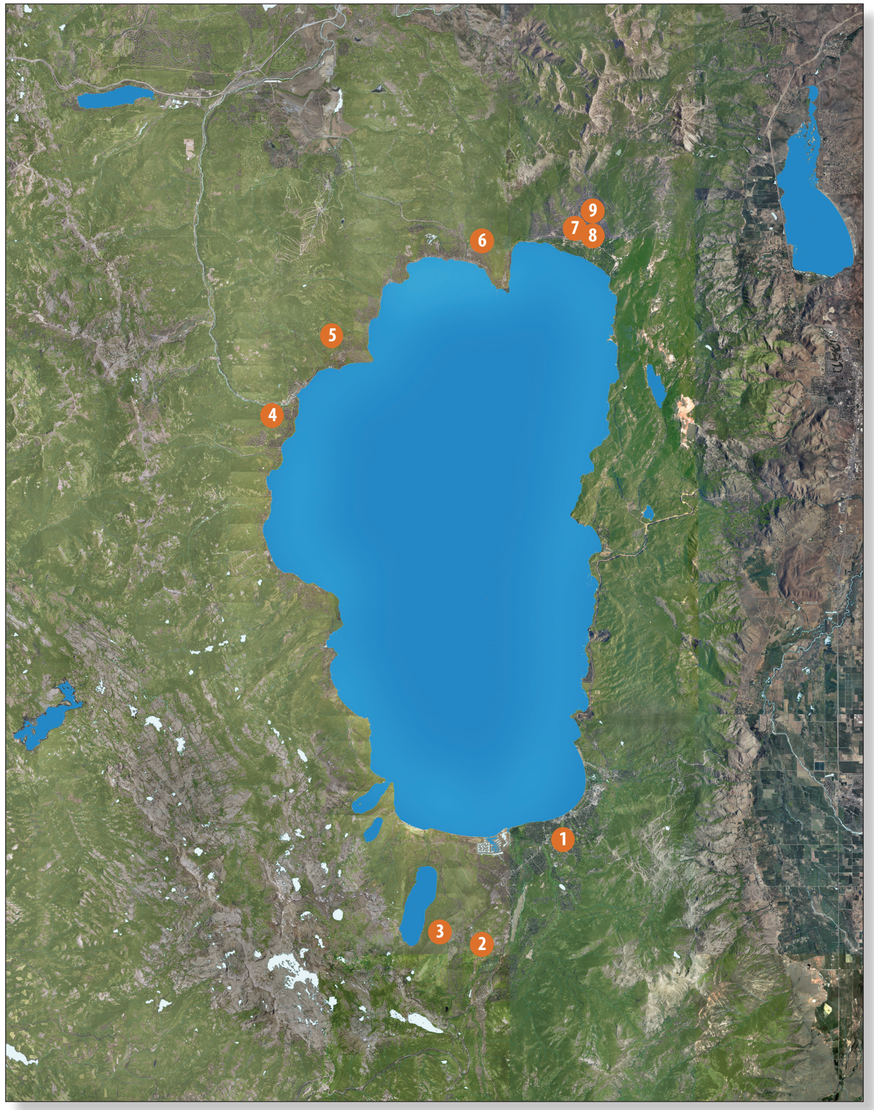
El Dorado County and its partners built 1.2 miles of Class 1 bikeway, completing an important link between South Lake Tahoe and Meyers. The bikeway connects neighborhoods, schools, and popular recreation sites. The project also included water quality improvement features to reduce erosion and stormwater pollution and thinned thick forested areas along the bikeway to help reduce wildfire risk.

2

Angora Burn Area Restoration Phase 3

Following the Angora Fire in summer 2007, the U.S. Forest Service Lake Tahoe Basin Management Unit took immediate steps to manage the 3,100-acre burn area and address immediate erosion risks. Over the last nine years, the Forest Service, working with government partners and community groups, has reforested 672 acres, restored 44 acres of aspen and meadow, completed 1,400 acres of fuels reduction and forest thinning to reduce wildfire risk, restored 2,000 feet of stream channel, relocated roads and trails out of stream zones and upgraded them to reduce erosion and stormwater pollution, and installed new wayfinding signage for better recreation access.

3



Photos by Tom Lotshaw unless otherwise noted.

4 Granlibakken Energy Upgrades

Working with the Sierra Business Council, Placer County, and the mPOWER program, Granlibakken Tahoe upgraded its heating and air-conditioning systems and kitchen appliances with more energy-efficient units. The project results in an estimated 43 percent reduction in energy use and annual savings of up to $44,000. Granlibakken Tahoe has also been recognized by the U.S. Department of Energy as one of its Better Buildings Challenge showcase projects.

5

Lake Forest Water Quality Improvement

Placer County and partners improved water quality, reduced erosion, and restored stream environment zones in a 173-acre area around Lake Forest Beach. The project installed stormwater filters, drop inlets, sediment cans, and curb and gutter, and upgraded compacted dirt road shoulders with pervious concrete that allows for stormwater infiltration and roadside parking at this popular recreation site. The project also restored a wet meadow area on the lakeshore.

6

Lower Chipmunk Street and Outfall Water Quality Improvement

Placer County and partners completed this project to capture stormwater and reduce sediment loads from Lower Chipmunk Street, Brockway Vista East, and state Route 28 that previously washed directly into the lake.

7

Central Incline Village Phase 2 Water Quality Improvement

Washoe County and partners installed infiltration basins, sediment cans, inlets, infiltration galleries, pervious concrete road shoulders, stormwater filters, and monitoring equipment to reduce stormwater pollution in 244 acres of Incline Village.

8

Middle Rosewood Creek Area "A" Stream Environment Zone Restoration

Nevada Tahoe Conservation District and partners restored more than 2,100 feet of this stream channel and floodplain to improve water quality and fish and wildlife habitat. This stretch of Middle Rosewood Creek was severely degraded before the project and had the potential to deliver thousands of cubic yards of sediment into Lake Tahoe over the next two decades, making it a high-priority restoration area.

9

Photo: IVGID

Incline Creek Restoration, State Route 28 Culvert

Incline Village General Improvement District and its partners re-lined and upgraded this culvert to prolong its service life and improve fish passage, stream habitat, and water quality. Before the project, the culvert water dropped more than 4 feet. The project built a series of riffle and pool step sections to gradually raise the stream bed up to the culvert, creating low-flow fish passage for longer periods of migration.

TERC celebrates 10-year anniversary of science center

The UC Davis Tahoe Environmental Research Center (TERC) celebrated the 10-year anniversary of its Incline Village building this summer with a special event honoring famed Lake Tahoe scientist Dr. Charles Goldman.

Dr. Charles Goldman

TERC launched the Charles Goldman Endowed Fund in 2014 with a major gift from Robert and Patricia Ronald and Family. The fund supports student research with a focus on providing science and solutions to sustain the health of Lake Tahoe and other lakes worldwide.

TERC Education and Outreach Director Heather Segale said the fund will also help in long-term research projects and enable investment in emerging technologies and solutions. She said the fund is looking for donors willing to donate $25,000 annually for four years.

Goldman began working at UC Davis in 1958, and as he recorded the progressive decline of the lake over the years, he attracted national and worldwide attention to the effort to protect Tahoe's clarity.

"The local community now fully understands the role a healthy lake plays in our economy, our way of life, and how the rest of the world views us," TERC director Geoffrey Schladow noted in the summer of 2015. "Much of that change was led and inspired by Charles Goldman."

The Goldman fund is one of a number of fundraising efforts at TERC. The center is also looking for donors to give $5,000 annually for five years to help public programs continue with the latest science incorporated into the center's exhibits and programs. More than 12,000 students, teachers, and visitors annually participate in programs at UC Davis education centers in Tahoe City and Incline Village.

The center is also looking for support for its Nearshore Monitoring Network. TERC is building the first network of data collection stations around Lake Tahoe, and the information helps researchers develop science-based solutions to environmental problems facing the lake. Donors for that program can contribute $12,500 annually for four years to underwrite one monitoring station, or $3,000 annually to help TERC track the decline in oxygen throughout the lake, or both. A gift of $10,000 a year for four years for Graduate Student Fellowships helps TERC attract top-notch students to conduct research.

For more information on how to support TERC programs and fundraising initiatives, contact Allison Chilcott at accchilcott@ucdavis.edu.

Emerald Fire causes heavy erosion

Blaze drives home importance of fuels reduction, fire-adapted areas

By Tom Lotshaw
Tahoe Regional Planning Agency

A wildfire that burned near Emerald Bay this October drives home the importance of preventing and preparing for wildfires at Lake Tahoe, and the importance of ongoing work to clear forests of hazardous fuels.

The Emerald Fire was reported at about 1:30 a.m. on Oct. 14 when someone spotted it burning on a ridge near Cascade Lake. Driven by gale-force winds in front of an approaching storm, the wildfire quickly burned 176 acres, crossing state Route 89 and threatening residences in Spring Creek Tract and Cascade Properties. The fire was fully contained on Oct. 15 due to a favorable change in weather conditions, the work of firefighters, and the beneficial impact of prior fuel reduction work done in the area.

CAL FIRE, the U.S. Forest Service, Lake Valley Fire, Fallen Leaf Fire, and North Lake Tahoe Fire quickly mobilized and started fighting the fire, while the El Dorado County Sheriff's Office worked with other local law enforcement agencies on evacuations.

The wildfire spotted around several structures in the Cascade Road and Sugar Pine Road area, but engine crews and hand crews helped fight the fire and protect those areas. No structures were destroyed by the wildfire.

Following the strong winds from the approaching storm, firefighters were helped by upwards of 6 inches of rain over the Emerald Fire.

One area burned by the Emerald Fire was previously treated as part of a fuels reduction project and fared better than other areas burned by the fire, but the burn site saw substantial erosion because of the heavy rainfall.

Caltrans removed more than 250 tons of dirt and debris from state Route 89 before it could be reopened and El Dorado County cleared out sediment basins and catchments that filled up with debris washing off the burn area. Sediment from erosion that washes into Lake Tahoe harms its famous water clarity.

"The Emerald Fire was a very fast moving and dangerous forest fire. Without the early morning rains, this fire had the potential to burn homes and destroy the world-renowned beauty of Emerald Bay and Cascade Lake," said Chris Anthony, CAL FIRE division chief for the Amador-El Dorado Unit and the unified incident commander for the Emerald Fire.

"The threat of wildfire in the Lake Tahoe Basin is real, which is why so many agencies and stakeholder groups are working to restore resiliency in our forests and create fire-adapted communities that can withstand future events," Anthony said.

Learn more about how to create defensible space around your property, become a fire-adapted community, and sign the Think First pledge at thinkfirsttahoe.org.

Photo: Lake Valley Fire Protection District

Firefighters responded to the blaze after it was spotted burning on a ridge near Cascade Lake.

Photo: CAL FIRE

Steep slopes denuded by the Emerald Fire resulted in heavy erosion.

Students help monitor restoration

28 high schoolers collect data on streambanks in Blackwood Canyon

By Adam Jensen
Tahoe Regional Planning Agency

High school students from the Tahoe-Truckee region found themselves on the leading edge of river restoration this October during the fifth annual Tahoe Basin Watershed Education Summit (TBWES).

The event partners students and teachers with natural resource specialists to undertake a watershed monitoring project. This year, 28 students collected field data using a new protocol for monitoring streambank stability in Blackwood Canyon, on Lake Tahoe's West Shore. Blackwood Creek has undergone extensive restoration in recent years, and the students' efforts will provide the U.S. Forest Service with real data about the effectiveness of the restoration.

"I think it's really rewarding in the sense that they get a lot of hands-on training," said Adilene Negrete, a conservation education assistant with the Forest Service Lake Tahoe Basin Management Unit.

During this year's weather-shortened summit, students also tested water quality, sampled macroinvertebrate diversity, and removed invasive plants. They also received a presentation from the Tahoe Institute for Natural Science on bird banding that featured live, wild birds.

"It's been so informative," said Truckee High School freshman Isabella Terrazas, following this year's summit. "I definitely learned more about the watershed and the lake than I probably have in my 14 years here."

The summit exposes participants to environmental career paths, encourages them to become involved in their communities, and presents a variety of ways to be environmental stewards. Several students also earned environmental science credit through Lake Tahoe Community College as part of the summit.

The watershed education summit is coordinated by Sierra Watershed Education Partnerships along with the Tahoe Resource Conservation District, the Forest Service, the Lake Tahoe Unified School District, and the South Tahoe Environmental Education Coalition.

The program is funded by donations. Students apply to participate in the summit and are charged a small fee.

The annual Tahoe Basin event grew out of the Watershed Environmental Summit in Eldorado National Forest.

"It was an incredible experience and I loved it," said Melissa "Missy" Mohler, executive director of Sierra Watershed Education Partnerships, of her experience at her first Watershed Environmental Summit. The experience inspired her to bring a similar program to the Lake Tahoe Basin.

"We get a lot of kids that have never camped before," Mohler said. "It may be all around here, but just because it's here doesn't mean they get exposed to it."

Spirited games of flashlight tag and songs from students and instructors concluded the evening at Kaspian Campground, where this year's event was based.

South Tahoe High School senior Allan Medrano has participated in TBWES during all four years of his high school career. He said he's considering a career in environmental law.

He believes the summit is part of his responsibility to give back to an area that gives us all so much.

"I think everyone should give back. I'm just trying to do that," Medrano said.

"It's just an amazing experience," he added.

For more information, visit: 4swep.org/tahoe-basin-watershed-education-summit.

Photo: Adam Jensen

U.S. Forest Service hydrologist Craig Oehrli teaches participants in this year's Tahoe Basin Watershed Education Summit a new streambank stability monitoring protocol in Blackwood Canyon.

Photo: Peter Spain

The low snow-to-rain ratio and warmer inflowing water contributed to a decrease in the clarity of the lake.

State of the Lake: A warming trend

Lake Tahoe continued to change under the impact of climate change in 2015, with both its water and air temperatures warming.

According to the UC Davis 2016 State of Lake Report, the Tahoe Basin recorded only 24 days of below-freezing temperatures in 2015, the lowest ever recorded. Although precipitation levels were average for the year, only 6.5 percent of that moisture fell as snow — the lowest amount ever recorded, researchers said.

The annual report summarizes how different natural and human forces affect Tahoe's clarity, physics, chemistry, and biology over time.

The low snow-to-rain ratio and warmer inflowing water contributed to a decrease in the clarity of the lake. For 2015, the average annual clarity was 73.1 feet — a 9-foot improvement from eight years ago but a 4.8-foot drop from 2014. The clarity of the lake is measured by the greatest depth at which a 10-inch white disk remains visible when lowered into the water.

The lake was nearly a half degree warmer in 2015 than the previous year, the report found. The average surface temperature was 53.3 degrees F, the warmest on record, and over the last four years the lake has been warming 15 times faster than its long-term warming rate.

Although the levels of attached algae in the lake were at record lows, the lake itself failed to mix to its full depth for the fourth year in a row. Deep mixing helps lakes add oxygen to deep water and redistributes nitrogen, but Tahoe's mixing depth of 262 feet in 2015 was its shallowest in its recorded history.

For details on the State of the Lake Report, visit http://terc.ucdavis.edu/stateofthelake.

Photo: Aerial Flight Productions/CC BY-NC-SA 2.0

A Tahoe City dock photographed in 2015.

Tahoe study to examine frequency and severity of extreme climate events

By Dr. Geoff Schladow
Tahoe Environmental Research Center

The impacts of climate change on Lake Tahoe and its watershed have been recorded over the last 50 years. Warming lake temperatures, shorter winters and less snow compared to rain have all been observed. Looking forward, however, it is important that decision-makers and stakeholders have better knowledge on some of the likely future consequences of climate change.

A new study led by UC Davis Tahoe Environmental Research Center (TERC) is using a new set of future climate scenarios developed by a team at the Pacific Southwest Climate Center that includes researchers from UC San Diego, U.S. Geological Survey, and the Desert Research Institute.

Unlike previous climate scenarios that have been applied to the Tahoe Basin, the focus here is on the frequency and severity of extreme events in the coming decades. These include extreme droughts (with prolonged periods of low lake levels) and extreme wet periods that may challenge the infrastructure that needs to be designed and installed in the near future.

The research team includes collaborators from Washington, Oregon, and the Bay Area, with the aim to complete the work within 18 months. Throughout the project period, the team will be interacting with other ongoing research at Lake Tahoe to ensure the results are incorporated to the maximum extent possible.

Funding for the study is being provided by the California Tahoe Conservancy.

Dr. Geoff Schladow is the director of the UC Davis Tahoe Environmental Research Center.

Program inspires new stewards

Sierra Nevada College prepares new generation of leaders

By Rosie Hackett
Sierra Nevada College

I am passionate about Lake Tahoe and all it has to offer us, including beauty, solitude, education, adventure, recreation, clean water, clean air, and science. As Aldo Leopold said, "I am glad to never have been young without wild country to be young in. Of what avail are forty freedoms without a blank spot on the map?"

It is harder and harder to find a blank spot in Tahoe these days. Our special place, along with many other recreation destinations, is experiencing high visitation. In summer 2016, our beaches, marinas, campgrounds, parks, trails, and wilderness hit record numbers. With more users, it's more important than ever to manage impacts on our beautiful environment. Impacts occur on all levels — ecosystem, quality of experience, facilities, transportation, to name a few. With growing populations and limited resources, we must educate our youth on getting outside, connecting to wildlands, and ultimately serving and protecting these special places for future generations.

The Sierra Nevada College Outdoor Adventure Leadership (ODAL) Program prepares students to become competent outdoor users, leaders, and stewards. ODAL students enter as "users," learning in Lake Tahoe's outdoor classrooms: granite cliffs, meandering trails, snowy peaks, and river gorges. Through technical skills development in backpacking, rock climbing, whitewater rafting, avalanche science, backcountry skiing/snowboarding, navigation, Leave No Trace principles, and wilderness medicine, they learn safely and competently.

ODAL students move beyond the "user" phase and become outdoor "leaders" on a four-day wilderness orientation expedition through Desolation Wilderness, honing the skills that really matter in life, such as communication, risk management, accountability, resourcefulness, and compassion.

As outdoor leaders of their peers, students appreciate that getting out there is not just about having fun, but that it is about deeper learning, responsibility, and service. They recognize that if an outdoor adventure is structured and facilitated well, it can be the impetus for profound growth on all levels. ODAL students gain the experience, skills, and knowledge to take care of themselves and a team at Lake Tahoe.

Photos: Rosie Hackett/Sierra Nevada College

ODAL students move beyond the "user" phase and become outdoor leaders. They recognize that if an outdoor adventure is structured and facilitated well, it can be the impetus for profound growth on all levels.

As Terry Russell, a young outdoor adventurer and writer in 1965, said, "The next step is to take care of the places that really matter. Crazy kids on the loose, but on the loose in the wilderness. That makes all the difference."

The experience, skills, and knowledge that really matter to Lake Tahoe and its sustainability future are learned in the final class of the ODAL curriculum, ODAL 401: Outdoor Ethics: Land Management. The capstone class delves into some of the thorniest problems in land ethics, exploring them in clear, straightforward language: What do we value? How do we value it? What are the threats? How do we protect it for the future?

The course begins with a fascinating history of the outdoor movement in America and gives a comprehensive survey of the legislation and agency structures that define land management today. Through readings, debates, current event presentations, field trips, service projects, community meetings, and guest visits from professionals in the field, students learn to think critically about controversial issues and values. They can then put their experiences as outdoor users and leaders into context to develop their own passionate and informed land ethic.

It is through this class that I feel hopeful for the future of Lake Tahoe and other national treasures. Through this thought-provoking program, I can clearly see the beginnings of passionate, vibrant people, ready to engage in this world to make it a better place for future generations.

Rosie Hackett is an associate professor and director of Outdoor Adventure Education at Sierra Nevada College.

The early days of Tahoe ski resorts

From miners to movie stars, the history of Sierra alpine sports runs deep

Jim Sloan
Tahoe In Depth

Many point to the 1960 Winter Olympics at Squaw Valley as the event that kickstarted skiing in the Sierra and the Tahoe region. The event, only the eighth Winter Games ever held, was the first Winter Olympics ever televised.

But the truth is that skiing had been an established, vibrant industry in the area for nearly 30 years before the Olympics arrived at Squaw Valley. There were mechanized rope tows, cutting edge ski lifts, professional ski instruction, innovative equipment designs, ski lodges, destination resorts, celebrity sightings and travel packages all along the snowy Highway 40 corridor from the western foothills to Tahoe and the eastern Sierra above Reno.

49ers raced on skis

But even before that Golden Age of T-bars and rope tows, California gold miners were strapping on boards – really long boards – for ski races in places like La Porte and Johnsville. They developed ski waxes, 12- to 15-foot skis, and a one-pole technique that had some of them reaching speeds of 100 miles per hour. According to writer Patricia Fox, writing in a 2007 issue of *Sierra Heritage Magazine*, the first organized ski race in the U.S. was held in La Porte, in the mountains west of present-day Graeagle, in February 1867, 14 years after informal racing had started in the town of 3,000 miners.

Of course, everyone's heard of Snowshoe Thompson, who was not a snowshoer but actually a skier who traversed the snowy Sierra on skis for 15 years, bringing mail back and forth from Genoa, Nevada, to Placerville. Thompson gets a lot of credit for pioneering the sport of skiing in the Sierra, but the first ski resort didn't open at Tahoe until the mid-1920s. Olympic Hill, it was called, and it was opened for guests of the Tahoe Tavern. Later, the ski area's name was changed to Granlibakken.

Granlibakken joins sport

According to Jeffrey Weidel, a former newspaper reporter in Roseville who has been writing about Tahoe skiing for about 20 years, Granlibakken was the third ski resort to open in the U.S., behind Howelsen Hill in Steamboat, Colorado, and Eaglebrook School in Massachusetts. Soda Springs was the second California resort to open, hauling its first skier to the hills above Lake Van Orden in 1935.

Photo: Wikimedia Commons

Sugar Bowl's lodge was one of the first in the Donner Summit area.

Driving to ski

According to historian Mark McLaughlin, in his book "Skiing at Lake Tahoe," the first ski lift in the United States was a "pullback lift" built in 1910 in the Hilltop area of Truckee (the present-day finish line for the annual Great Ski Race from Tahoe City to Truckee). According to McLaughlin, the lift was initially built for toboggan riders but skiers also used it.

McLaughlin says skiing was already popular in the California mountains in 1930, where the Rainbow Lodge on Highway 40 was a magnet for winter sports enthusiasts. By 1936, there were a handful of popular skiing and sledding areas between Cisco, where the Auburn Ski Club built a ski jump and winter park, and Donner Lake to the east. Skiers either drove into the mountains, strapping their skis and poles to the roofs of their cars, or they rode the train into the Sierra and took horse-drawn sleds from the railroad depot to ski lodges.

By 1940 the "ski business was booming" in the Donner Pass region. Rope tows had replaced the original practice of hiking to the top of mountains to ski down. Ski schools imported experts from Switzerland and Austria to introduce and teach the latest techniques and equipment. You could stay at the Soda Springs Hotel for a dollar a day, paying 25 cents to a $1 for a meal. Donner Ski Ranch opened up the road in 1937, and work began on Sugar Bowl across the highway a couple of years later. It opened with great fanfare — and a fantastic $39,000 ski lift that allowed skiers to ride to the top.

Galena Creek Ski Hut

Around this same time, Galena Creek Ski Hut was being built near Mount Rose. According to the Nevada Historical Society, the ski hill at Galena Creek hosted an annual Intercollegiate Winter Sports Carnival where college teams came to compete against the hometown favorites at the University of Nevada in Reno. One of those UNR skiers was Wayne Poulsen, who would become a major landowner in Squaw Valley. One of the first significant resorts in Nevada was Sky Tavern, completed in 1945 near Mount Rose. Further south, near Spooner Summit, the White Hills ski area opened in 1949 with a T-bar lift and a ski jump. The resort closed five years later after several dry winters.

At the south end of Lake Tahoe, highway crews rarely completely cleared snow from Highway 50 between Placerville and Lake Tahoe. One of the first rope tows was installed at Twin Bridges, where the snow removal usually stopped.

Edelweiss on Echo Summit

Then in 1941 Edelweiss resort opened near Echo Summit, according to "Skiing at Lake Tahoe." The resort operated for about 20 years before closing. The nearby Sierra Ski Ranch opened five years after Edelweiss and continues to operate today as Sierra-at-Tahoe Resort. During the 1940s, other family-owned resorts opened along Highway 50, including Echo Lakes, Nebel Horn, Echo Summit, and, in the lake basin itself, Bijou Skiway Park in 1947. The park would soon be sold and renamed Heavenly Valley.

Poulsen, meanwhile, was scouting Sierra terrain for a major new ski resort. He settled on Squaw Valley. Although he worked as an airline pilot half the year, he and his wife Sandy purchased 2,000 acres of Squaw Valley with an eye toward finding investors to help build a ski resort over the five peaks surrounding his land. The Poulsens eventually partnered with Alex Cushing, but the partnership was short-lived, and Cushing went on to develop the alpine resort on his own while the Poulsens developed their valley land.

The wildly successful 1960 Winter Olympics in Squaw Valley ushered in a new era of large ski area development, as Alpine Meadows, Kirkwood, Ski Incline (now called Diamond Peak) and Homewood all came on line in succeeding years. Some smaller resorts also emerged, like the Powder Bowl ski area in Alpine Meadows, but smaller areas couldn't compete with the new mega resorts and either closed or merged with a neighboring establishment. Sierra Ski Ranch, Heavenly and Mount Rose all underwent large expansions to accommodate more skiers and to open up more challenging terrain. Over time, many resorts began adding snow-making equipment so they could open during low-snow winters.

Frankie, friends, and the forgotten Lahontan

Piecing together the memories of a cluster of old Tahoe cabins on 4th of July Creek

By Ned Engle
SPECIAL TO TAHOE IN DEPTH

In the fall of 1959, I was writing my college admissions essay. Subject and content: Unknown. My father was at the dining room table, too, doing the paperwork to buy three tumble-down old cabins on a couple of acres at Homewood, Lake Tahoe, near 4th of July Creek, for $12,000. We both got what we wanted.

A few years later, early one summer morning, I found my fraternity brother, TK, also from Sacramento, sleeping down on the beach where 4th of July Creek empties into Lake Tahoe. He looked quite stylish in someone else's sandy, florid tropical shirt but was missing a shoe. The night before, when we went into the Cal-Neva Casino on the lake just over the Nevada border, Frank Sinatra looked lonely at the bar, and without his toupee. We took stools on either side of him. An enormous, shiny and grotesque stuffed Lahontan cutthroat trout was mounted on the wall over his head.

"Buy you a drink, Frankie?" TK asked.

Pause. Cigarette puff.

"No thanks, pallie, I own the joint."

Soon these two new pals disappeared to shoot craps, and I headed for the nickel slot machines and eventually back to the cabin. I remember TK and me washing our faces in the creek that next morning.

Photo illustration: Jim Sloan

The author's cabins on the West Shore of Lake Tahoe are filled with memories — as well as a few mysteries.

Before the land rush

It's not officially named 4th of July Creek. In fact, it's not on any maps and doesn't count as one of Tahoe's 63 tributaries. It's snow-fed, rocky, and contorted — an alder-choked little thing that drains a small valley. It used to roar until the 4th of July, then it dried up except for a few pools … hence the local name. It's been dry by mid-May these last five years, owing to the lack of snow and any decent runoff.

Here's how it is said the area was developed. In 1868, following a deadly confrontation about cutthroat trapping in a nearby creek, a homesteader quickly disposed of his nearly 400 acres of lake frontage and forest, including the 4th of July drainage, to a Sacramento speculator for $8 an acre. A few years later, the speculator tried to sell lakefront lots in Homewood for $50 apiece, or $.50 a frontage foot. (These lots now sell for multiple millions; just try to find one.) But none sold then, so he gave them away to anyone who would build "a substantial house." This considerably stimulated interest. No roads yet, but in 1881 The Governor Stanford, an elegant steamer out of Tahoe City, arrived whistling grandly at the wharf of one palatial lakeside estate near 4th of July Creek. The land rush was on.

A former summer camp for girls

Faint local legend has it that our funky little buildings were long ago used as the summer camp for young ladies at a private elementary school in the Bay Area. Curious, I spent hours in the Placer County recorder's office trying to establish a title chain of ownership of our property. Back and back I went through the microfiche, dead-ending in the 1920s with a deed to Elizabeth Place ("a femme sole"). Later, in the 1927 Berkeley phone directory, I found a display ad for "Claremont Heights Out-of-Door School" in Berkeley, listing Miss Elizabeth Place, principal. It suggested "Country Life and Sports…and swimming...and outdoor sleeping porches."

Waiting for the cutthroat

Our place, it turns out, had been their summer camp for about 20 years until the war, and I picture the girls skipping over to 4th of July in the afternoon in their denim overalls for picnics and games and wading with squeals in the freezing snow water and maybe watching the last of the Lahontan cutthroat trout spawning.

Which they might have done there in those days. But not any more. Once thick in the lake, the fish were extinct by 1931. Sportsmen and commercial fishermen took tremendous "harvests" for mining camps, local towns, and San Francisco restaurants. Some of the catch was even sent to Chicago. There were other causes for their decline, but there may have been as many as 500 tons caught and shipped every year between 1860 and 1920. Lots of big, limitless fish, delicate of taste, so easily caught. Reintroduction of the fish remains a challenge.

Listening

I walk over to the creek often in the summer. I walk the dry bed, look at the rocks. My old dog Woody, sitting up in the back of my Jeep like some addled potentate, came with me one day to gather a few stones for the terraces I'm building around the old cabins. Mostly we walk over at night. Starscapes. The dogs are restless, sniffing around at the remains of the wild ... that rogue bear that breaks into cabins, those song-doggies — the coyotes — with dens up the creek, just now starting their eerie chorus. All our mingled destinies.

I listen for the rumor of cutthroats finning up to spawn once again in 4th of July Creek.

Ned Engle spends the summer at Homewood and the rest of the year in Mill Valley.

A selfie solution for Taylor Creek

Photo: David Safanda

Kokanee salmon spawning in Taylor Creek draw many visitors — as well as bears — to the area, creating potential safety issues.

Plan for new overlook would create a safe place to photograph bears

By Amy Berry
TAHOE FUND

Fall in Tahoe brings with it cooler weather, changing leaves, and the return of the Kokanee salmon to Taylor Creek. The salmon show off their bright red colors as they move up the narrow creek on the South Shore of Lake Tahoe to lay their eggs. Thousands of visitors come to the U.S. Forest Service's Taylor Creek Visitors Center to see this natural wonder. And so do the bears.

Tahoe bears have made Taylor Creek a regular stop in the fall as they fuel up before the long winter. This creates a precarious situation for the growing number of social media users who are eager to take selfies with the bears. The Forest Service has been forced to consider closure of the creek area to protect both the people and the bears.

"It is so incredible to see these bright red fish right there at your toes," said Lindsay Gusses of the Forest Service. "Over the past few years with the increase in social media, we have had a lot more visitors come down to get closer to the wildlife. We have had to consider closing off portions of the trail and creek to protect the wildlife and the resources and the people."

As the bear-selfie issue made national headlines, leaders of the Tahoe Fund also took note. The nonprofit works to ensure more environmental improvement projects are completed around the Tahoe Basin with the support of the private community. Tahoe Fund leaders met with members of the Forest Service to discuss the issue and see if the private community could help provide a solution that would keep the creek open and provide a safe way to view the fish and bears.

"There is something truly magical about watching the Kokanee salmon spawn that fosters a great connection to nature for so many," said Tahoe Fund Board Chairman Art Chapman. "We are always looking for ways to help, and this seemed like a good opportunity for us to get involved."

The Tahoe Fund and the Forest Service developed a plan to build a new overlook at a main viewing area along the creek. This will allow people to continue to visit the creek's edge to see the salmon, while creating a safer space between selfie takers and the bears. The Tahoe Fund is actively seeking $28,000 in donations to start construction.

Recently, Matt Levitt, owner and president of locally owned Tahoe Blue Vodka, committed a matching donation for every dollar raised for the project.

"Preserving Tahoe is at the heart of our brand," said Levitt. "We donate thousands of dollars to environmental projects in Tahoe. Having visited Taylor Creek many times with my kids, I want to do something special to make sure generations to come can experience the excitement of the salmon."

To help make this project a reality with a donation, please visit www.tahoefund.org/donate. Every donation made will be matched dollar for dollar by Tahoe Blue Vodka until the goal is met.

Amy Berry is the CEO of the Tahoe Fund.

Ninth Circuit Court upholds TRPA Regional Plan

By Tom Lotshaw
TAHOE REGIONAL PLANNING AGENCY

This November, the federal Ninth Circuit Court of Appeals in San Francisco issued a unanimous ruling upholding TRPA's landmark 2012 Regional Plan, the blueprint to restore Lake Tahoe's environment and revitalize its communities.

Sierra Club and Friends of the West Shore filed a lawsuit against the Regional Plan shortly after the TRPA Governing Board adopted it in December 2012. U.S. District Court Judge John Mendez in Sacramento found the lawsuit to have no merit and dismissed it in April 2014, prompting the two groups to appeal to the Ninth Circuit Court of Appeals.

"This ruling by the Ninth Circuit is yet another strong affirmation of the widely supported 2012 Regional Plan," said Joanne S. Marchetta, executive director of TRPA. "The plan is based on sound science, planning, and analysis and is the best path forward for TRPA and its many partners to continue working to restore Lake Tahoe's treasured environment and revitalize our communities."

The 2012 Regional Plan is the first comprehensive update to environmental protections at Lake Tahoe since 1987.

TRPA adopted the plan after extensive environmental review and years of public input from more than 5,000 citizens. The plan re-galvanized the commitments of California and Nevada to work together to conserve and restore Tahoe. The Regional Plan has continued to be implemented since its adoption, despite the lawsuit.

The plan retains Lake Tahoe's caps on development capacity and strengthens environmental protections. It offers redevelopment incentives for projects that remove harmful legacy development from outlying and environmentally sensitive areas such as marshes, meadows, and stream zones and restore those areas and transfer development into existing town centers to create more walkable, bikeable, and sustainable mixed-use communities.

"This decision is good news for Lake Tahoe," said Darcie Goodman Collins, executive director of the nonprofit environmental group League to Save Lake Tahoe.

"We chose to support the Regional Plan Update, following years of negotiations, because it provides safeguards to protect the lake, while requiring that any new redevelopment is concentrated in town centers and comes with environmental benefits for Lake Tahoe. Proper implementation and strong enforcement of the regional plan policies are the next steps to ensure Lake Tahoe is protected. The League to Save Lake Tahoe is committed to collaborating with TRPA and other stakeholders to see that this is achieved."

Drought, beetles taking toll on Tahoe trees

Land managers hope to control the damage by creating healthier, more resilient forests

By Adam Jensen
TAHOE REGIONAL PLANNING AGENCY

Photo: Mike Vollmer

Dead trees along the shoreline of Lake Tahoe show the damaging impact of climate change, drought, beetles, and overstocked forests.

As the Sierra Nevada experiences unprecedented tree deaths due to five years of drought and exploding bark beetle populations, forest managers are working to mitigate the outbreak in the Tahoe Basin and create healthier, more resilient forests.

Areas of dead trees from bark beetle infestations can primarily be seen on the North Shore, but the lake has so far been spared from the devastation seen in other areas of California, where 80 to 90 percent of trees have died.

"We are seeing elevated tree mortality in the Basin — patches and pockets," said Brian Garrett, urban forest program manager with the U.S. Forest Service Lake Tahoe Basin Management Unit.

More than 102 million dead trees have been surveyed in California, many of them in the Sierra Nevada foothills and at the southern end of the mountain range. The number of dead trees on national forest land in the Tahoe Basin more than doubled from 35,000 in 2015 to 72,000 in 2016, according to CAL FIRE.

"I do not believe we are on the back side of this problem. This problem is ongoing and will continue," said Tom Tinsley, Amador-El Dorado unit forester for CAL FIRE.

The varieties of bark beetles causing the tree deaths are all native to the Sierra. Many target specific conifer species, tunneling under their bark and interrupting food and water supplies. The black or brown insects are about the size of a rice grain. Thousands can result from a single infestation and rapidly move to nearby trees.

At lower population levels, beetles play an important role in mountain ecosystems, weeding out weaker trees and helping create diverse stands. Healthy stands are typically able to ward off a bark beetle attack, but many trees are stressed from forests thick from years of fire suppression, unprecedented drought conditions, and warmer temperatures from climate change. The combination has swung the scale distinctly in the beetles' favor. Populations of beetles between 3,000 and 6,000 feet on the West Slope of the Sierra have been able to reproduce four or five times a year rather than once or twice due to recent mild winters, Garrett said.

"We're really at the mercy of the drought cycle and the bark beetle populations," he said.

Beetle infestations typically continue until precipitation returns to normal levels for several years, reducing stress on trees and allowing them to better fend off attacks. The basin last saw significant tree death from bark beetles during droughts in the late '80s and early '90s.

"This is part of a natural cycle of fire, beetles, and drought," said Mike Vollmer, Environmental Improvement Program manager for the Tahoe Regional Planning Agency. "But with the forest's changing conditions, we are in new territory."

Climate models show temperatures continuing to rise in the Sierra Nevada, increasing stress on water supplies and forest ecosystems — and potentially keeping conditions tilted in the beetles' favor.

The Lake Tahoe Basin Tree Mortality Task Force created an action plan in August. A full task force is expected to meet this winter. The U.S. Forest Service, TRPA, and Tahoe Fire and Fuels Team will head the task force in developing detection, prevention, permitting, funding, utilization, and public outreach strategies for tree mortality in the basin. Task force members will also serve as liaisons with county and statewide tree mortality efforts in California and Nevada.

A magnified photo of a bark beetle.

One goal of the task force is to implement measures to help prevent large-scale infestations and actively treat infested areas at risk for tree mortality. The task force's strategy will integrate existing work to increase the pace and scale of forest fuels and restoration projects to create healthier, more resilient forests and remove dead and dying trees to protect lives and property.

"The science is saying stands need to be thinned and resilient, not overstocked," Vollmer said of ways to mitigate future outbreaks.

Also underway is a partnership that could result in cutting-edge science used at Lake Tahoe to increase the health of large swathes of the forest ecosystem. The goal of the Lake Tahoe West Restoration Partnership is to restore the resiliency of the West Shore's forests, watersheds, recreational opportunities, and communities against threats such as drought, climate change, overstocked forests, and bark beetle epidemics.

The California Tahoe Conservancy, Lake Tahoe Basin Management Unit, Pacific Southwest Research Station, California State Parks, and TRPA are joining with the Tahoe Fire and Fuels Team and National Forest Foundation to lead the partnership, which is currently meeting with a wide variety of stakeholders prior to an extensive environmental process.

Resiliency from bark beetle attacks is only one aspect of a healthy forest, but it's on the minds of forest managers around the Tahoe Basin.

"We want to do something to prevent the next outbreak," Vollmer said. "It's not if, it's when."

To view an interactive map of tree mortality in California visit: egis.fire.ca.gov/TreeMortalityViewer/. To learn more about the Lake Tahoe West Restoration Partnership visit: www.nationalforests.org.

To learn more about what you can do to help protect Lake Tahoe from wildfire, visit: thinkfirsttahoe.org.

The key role of Tahoe transportation

Photo: Rachid Dahnoun/Novus Select

A bus on the South Shore carries people from town centers to recreation destinations.

Plan focuses on links from town centers to neighborhoods, recreation

By Devin Middlebrook
TAHOE REGIONAL PLANNING AGENCY

Air quality, water quality, visitor experience, and resident quality of life can all be helped or harmed by Lake Tahoe's transportation system.

The transportation network serves many different needs. Residents use the system for their daily commutes and reaching basic services, like the grocery store. Residents and visitors use the system to reach recreation points and town centers for shopping and night life.

The Region's economic prosperity and quality of life are directly linked to the environment. Roughly 72 percent of the fine sediment harming lake clarity comes from the Region's built environment, including roadways and parking lots. Transportation is also one of the three main contributors of greenhouse gas emissions. Creating a safe, efficient, modern, and attractive transportation system that reduces impacts on Lake Tahoe's environment is imperative to the Region's success as a place to live and visit, and as an ecological treasure.

The Tahoe Regional Planning Agency is responsible for creating a regional transportation plan. The goal is to create an innovative transportation system that prioritizes bicycling, walking, and public transit, and serves residents and visitors while contributing to the environmental and socioeconomic health of the Region.

In partnership with the Tahoe Transportation District and other entities, TRPA is updating the regional transportation plan, called Linking Tahoe. The plan builds on system-wide successes over the last four years by focusing on strengthening access and connections between town centers, residential areas, and recreation destinations.

Transit: Placer County and the Tahoe Transportation District operate transit services on the North and South Shores of Lake Tahoe. On the North Shore, planned transit upgrades include increasing frequency to 30-minute intervals on all mainline routes, and expanding summer and evening service. South Shore transit has deployed new real-time schedule technology, and is planning additional upgrades, including increased frequency on many of its mainline routes, expanded route distance and service, and upgrading shelters and transit centers to act as mobility hubs.

Trails: Lake Tahoe's trail network serves many users with different needs, such as residents commuting to work or visitors traveling to the beach. The planned trail system is identified in TRPA's 2016 Active Transportation Plan and prioritizes projects that close gaps in connectivity, have high estimated use, link to desirable destinations, increase safety, connect to other modes of transportation, are cost-effective, and increase economic vitality.

Technology: Technology can provide cost-effective benefits and upgrades to the transportation system. Linking Tahoe prioritizes implementing technology to improve traffic flow, safety, and public access. Key projects include improved traffic signal coordination, real-time parking information, switching lane direction based on traffic flow, improved traveler information, and prioritizing transit through congested areas.

Creating a truly transformative transportation system requires coordination and can make an impact toward achieving regional environmental and economic goals. The 2016 regional transportation plan update will be available for public input in early 2017. The plan will be posted at www.trpa.org/regionaltransportationplan, complete with a full list of projects. Please provide your valued input into making Tahoe's transportation system work for you.

Devin Middlebrook is the sustainability program coordinator at TRPA.

New data provides insight into Tahoe's visitation

Quantifying the number of people who visit Lake Tahoe every year is not an easy task. People come at different times, stay for different amounts of time, and use a variety of transportation options to reach the lake. However, new data-collection methods are now providing a more complete picture of annual visitation to Lake Tahoe.

This new data comes from cell phone providers and offers the most comprehensive look at visitors and travel patterns in the Region. Cell phone data is the newest technology transportation planners are using to meet the travel demands of the public. It allows for greater insight into where visitors are coming from, where they are going, and how they travel while they are here.

Using traditional traffic models, ongoing traffic counts, and the new cell phone data, local agencies now estimate that Lake Tahoe serves around 10 million visitor vehicles and roughly 24 million visitors every year. This number does not necessarily mean more people are visiting Lake Tahoe than have in the past, it simply means that local agencies have better methods to quantify reality as new data becomes accessible. Previous visitation estimates were limited by the source of information, including overnight stays, skier days, and recreation site use. The newly available data also indicates that 47 percent of visitors to Tahoe do not stay overnight.

What does this mean for Tahoe's transportation system? Now that more accurate visitation numbers and patterns are known, local planning and implementation agencies can better serve the needs of residents and visitors.

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

What readers are saying:

We are pleased to know about all the efforts around the lake! We have a place at Fallen Leaf Lake — for 20 years. Love the Sierras. Keep up the good work.

— GA & NN, Medford, OR

We love the Tahoe in Depth newspaper — it is a great way to stay connected with our home away from home.

— CG, Lafayette, CO

I read the special summit issue cover to cover and found it very informative about what has been going on with the clarity of the Lake. It is great to know that the future looks bright for the continued work to keep the lake pristine. I like the paper's effort to let readers know some of the historical facts about the lake and the people who have been involved in it preservation.

— MS, Homewood, CA

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Sledding, snowshoeing and skiing safety tips

- Weather conditions in the mountains can be unpredictable. Check the weather before heading out and tell someone where you're going and when you plan to return. Never venture into the backcountry alone.
- Dress appropriately for cold weather conditions and be prepared for ice and snow. Dress in layers and always consider the possibility of changing weather conditions when deciding what to wear or bring with you. Sturdy boots, a warm jacket, and extra clothing are essential. Sunglasses and a hat are also recommended.
- Carry tire chains and a shovel in your vehicle and bring emergency supplies, including water, food, extra blankets, and a first-aid kit.
- Develop an emergency plan. Before heading out, make sure everyone knows what to do if they become lost or if a medical emergency arises.
- Keep in mind your mobile device may not work in some areas.
- Park in a safe, legal location, obey any parking restrictions, and do not block gates. Parking restrictions are in place to ensure public safety.
- Select a safe location to engage in recreational activities. Avoid roads, bodies of water, and hazards such as rocks, posts, fences, stumps, and trees.
- Watch out for hazards and take care to avoid obstacles. Sleds and skis can be difficult to control. Colliding with a rock or tree can ruin an outing and may result in serious injury.
- Snow can be hard! Compacted snow can be as hard as concrete and as fast as ice. Recognize when conditions are not appropriate for sledding, snowshoeing, or skiing.
- Kids, particularly those ages 12 years or younger, should wear helmets designed for winter sports.
- Pack out trash and sled debris. Inexpensive sleds are made from cheap and thin plastic that breaks apart easily. Pack out broken sled pieces just as you pack out food wrappers, drink containers, and any other garbage.
- Know your limitations. Sledding, snowshoeing, and cross-country and backcountry skiing are a great way for friends and family to play together. However, if you are not used to the altitude or if you have any physical restrictions, recognize that these activities are strenuous and require active participation.

For more information, visit www.fs.fed.us/visit/know-before-you-go.

Enjoying winter — safely

Photo: Daniel Cressy, U.S. Forest Service

Cross-country skiers head out for a trek to Round Lake.

Avalanches, hypothermia pose risk to outdoor adventurers at Tahoe

By Don Lane
U.S. Forest Service

Winter has arrived at beautiful Lake Tahoe, and regardless of a heavy or light snow year for the Sierra Nevada, Tahoe's residents and visitors will be enjoying its beauty and recreational opportunities.

Winter snow involves shoveling walkways, installing snow tires, and turning up the heater. In addition, winter brings colder temperatures and the need for Lake Tahoe residents and visitors to be aware of hypothermia potential and avalanche conditions.

Hypothermia is a rapid, progressive physical and mental collapse that can happen to people when they are exposed to wind and cold temperatures. When venturing outside, be sure to dress warmly, layer clothing for changing weather conditions, and stay dry. Drink hot liquids and try to stay out of the wind when it's freezing.

Avalanches typically occur after storms on south-facing slopes around the Lake Tahoe Basin. Be especially cautious during heavy snowstorms and in windy conditions. Check local avalanche conditions at sierraavalanchecenter.org and never venture into the backcountry alone.

Winter also brings an opportunity to enjoy sledding, snowmobiling, skiing, snowboarding, snowshoeing, and, of course, building a snowman! Most of the National Forest lands around the Lake Tahoe Basin are open to non-motorized winter recreational use such as cross-country and backcountry skiing, snowshoeing, and sledding.

Photo: Deliah Cooper

Sledding is fun but can also be strenuous.

Winter forest visitors are encouraged to follow the principles of Leave No Trace during their visits by packing out any trash, including broken sleds.

Snowmobiling is another popular winter recreational activity within the Lake Tahoe Basin. Nearly half of the National Forest lands around the basin are open to snowmobiling. A Snowmobile Guide map is available at no charge from the Forest Supervisor's office at 35 College Drive in South Lake Tahoe, or can be accessed online at www.fs.usda.gov/ltbmu. California and Nevada snowmobiles are required to be registered with their home states.

Whether sledding, skiing, snowmobiling, or snowshoeing, enjoying the Lake Tahoe Basin during winter also offers scenic pleasures, such as the opportunity to encounter wildlife that are seldom seen during the summer months. Because food is scarce in the winter, many birds and mammals forage during the day, and it's much easier to see them against a backdrop of white snow. The secret to seeing winter animals is to remain quiet and look up into the tree branches, along tree trunks, and in clearings. Pay attention to tracks in the snow, as martens, ermines, coyotes, and Douglas squirrels may be seen during the winter.

One way to access the forest during the winter months is to visit State of California Sno-Parks. For a small parking fee, users have access to sites at Blackwood Canyon Sno-Park on the West Shore and Taylor Creek Sno-Park on the South Shore. These areas are plowed and equipped with restrooms throughout the winter months.

Enjoy the beauty and recreational opportunities winter brings to Lake Tahoe, and please be safe and have fun!

Don Lane is the recreation and wilderness program manager for the U.S. Forest Service Lake Tahoe Basin Management Unit.