

— Inaugural Issue DECEMBER 2012

TAHOE IN DEPTH

Protecting, Enjoying & Exploring the Lake Tahoe Basin

Lake clarity shows improvement

Greatest success occurs in wintertime measurements; summer numbers continue to decline

By Jim Sloan

Lake Tahoe's famed clarity improved by more than 4 feet in 2011 to 68.9 feet, according to the University of California, Davis.

The university's "Tahoe: State of the Lake Report 2012" found that most of the gains occurred during the winter months. Summer clarity continued to decline at the same rate it has since the late 1960s, when scientists first began lowering a 10-inch white disc into the water to see how deep it remained visible.

Scientists were quick to note that improvements in Tahoe clarity – a key goal of the environmental restoration and redevelopment efforts at the Lake – were best studied and understood over a long-term period. Many factors determine the Lake's clarity from year to year, but long-term strategies are critical to achieving the clarity restoration target of 97.4 feet set by federal and state regulators.

Geoffrey Schladow, director of the UC Davis Tahoe Environmental Research Center, said short-term measurements sometimes defy conventional wisdom.



Lake Tahoe's clarity improved by more than 4 feet in 2011, and most of the gains in clarity occurred during the winter months.

"The factors that contribute to Lake clarity are complex, and are not necessarily linked to factors occurring in the current year," said Schladow. "For example, the 2011 clarity improvement followed a winter that was one of the wettest in recent years, something that is usually associated with clarity declines. Understanding what controls the long-term trends is at the heart of what we are attempting to do."

Overall, the Lake's clarity has remained nearly stable since 2000. Average annual clarity in the past decade has been better than in recent decades. In 1997-1998, annual clarity reached an all-time average low of 65.1 feet. From 2001-2011 the average clarity was 70.6 feet.

Researchers provided measurements for both winter (December–March) and

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Forest thinning project will reduce wildfire threat

By Cheva Heck
U.S. FOREST SERVICE

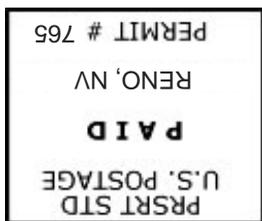
The South Shore project represents the Forest Service's largest effort to date to reduce hazardous forest fuels in the Lake Tahoe Basin. Over eight years, the Forest Service will treat more than 10,000 acres stretching from the California-Nevada state line to Cascade Lake. The Southern Nevada Public Land Management Act funded the planning and some of the on-the-ground work for this Environmental Improvement Program project.

For many South Shore residents, the project should come as a relief – a major step in helping to protect the Lake's largest community from wildfire. Thinning of trees and brush will reduce the fuels that could increase the severity and rate of spread of a wildland fire. These treatments have proven effective in

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Tahoe In Depth
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Welcome to Tahoe In Depth

New publication highlights ways to protect, enjoy, explore

Happy Holidays! We hope you will enjoy this inaugural issue of Tahoe In Depth. This free publication is designed to keep Lake Tahoe homeowners, residents and visitors abreast of the wide variety of activities taking place to protect and restore this national treasure.

The tagline we've chosen for Tahoe In Depth is "Enjoying, Protecting and Exploring the Tahoe Basin." Our goal is not only to help you better understand the environmental initiatives taking place at our Lake, but also to give you ideas for how you can better experience the wonders and beauty of the Tahoe Basin.

We also want to empower you to be good stewards of the Lake. By giving you ideas for landscaping and other environmentally-friendly activities, you can share in the pride many of us feel knowing that we're doing our part to maintain and improve Lake Tahoe's legendary clarity. Toward that end, check out our stories in this issue about how you can improve your Lake Tahoe home's chances of surviving a wildfire. We're also providing you with ideas for landscaping with native plants, and for how to create an ecologically-sensitive landscape design.

We've also included articles about the newest park facilities to open at Lake Tahoe – the Van Sickle Bi-state Park, a beautiful, 700-acre woodland located just footsteps from the Stateline casino core. Van Sickle, the first bi-state park in the nation, connects the Lake's largest bed base to a sprawling and spectacular stretch of land with trails leading to the very top of the Tahoe Basin rim and the famed Tahoe Rim Trail. We'll also tell you what's in store at the new Lakeview Commons, a project that showcases an effort to reduce sediment pollution at the South Shore while building a wonderful new area to enjoy the Lake.

Again, we hope you enjoy this first issue of Tahoe In Depth. If you have any requests for future articles or if you have questions you'd like us to address in upcoming issues, please drop us a line at tahoeinddepth@gmail.com.

– Julie Regan, executive editor

Tahoe In Depth

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Van Sickle Park, the first bi-state park in the nation (page 3), the Tahoe City Lakeside Trail (page 5, above) and Lakeview Commons (page 19) are open and ready for business.

6 Conservation landscaping

There are many ways property owners and residents at Lake Tahoe can help improve and protect Lake Tahoe's clarity, and one of the best ways is with conservation landscaping, using erosion-control techniques, native plants and other methods of having a beautiful landscape that doesn't affect the Lake's legendary transparency.

12 Rebuilding ecosystems

From Blackwood Canyon to the Upper Truckee River (page 14), public agencies at Tahoe are reconstructing long-damaged tributaries – and helping reduce pollution to the Lake.

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Improving Tahoe

Since the mid-1990s, the Lake Tahoe Environmental Improvement Program has taken on hundreds of projects designed to protect the natural and recreational resources of Lake Tahoe.

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Regional Plan Update

The Tahoe Regional Planning Agency (TRPA) reached out to more than 5,000 local residents and visitors over several years to forge a vision for a healthier Lake Tahoe environment and community.

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Best in Basin

Heavenly's new Tamarack Lodge was one of several projects named the "Best in the Basin" for their environmentally-friendly design and building practices.

Dedication

Tahoe In Depth is dedicated to the late Dennis Oliver, the former Public Information Officer for TRPA. Dennis was the public face for TRPA for many years and worked closely with Tahoe Basin agencies. He was a gifted writer who had a special passion for Lake Tahoe and worked tirelessly to tell its story. TRPA would like to thank all who contributed to Dennis's Memorial Fund. Those contributions helped make Tahoe In Depth a reality.





Where:

Van Sickle Bi-state Park is located within a few minutes' walk from the Stateline casino core and Heavenly Village at the junction of Park Avenue and Lake Parkway. The gates are open to vehicles between May 1 and Nov. 1. The park is open year round to pedestrians.

What to do:

The newly constructed park includes restrooms, picnic sites, and access to hiking, mountain biking and equestrian trails. From Van Sickle Bi-state Park, you can access the popular Tahoe Rim Trail via the Van Sickle Trail.

The park is adjacent to the largest bed base in the Lake Tahoe Basin, and will connect with the Tahoe Conservancy's proposed South Tahoe Greenway and the nearby, Conservancy-funded Explore Tahoe Urban Trailhead.

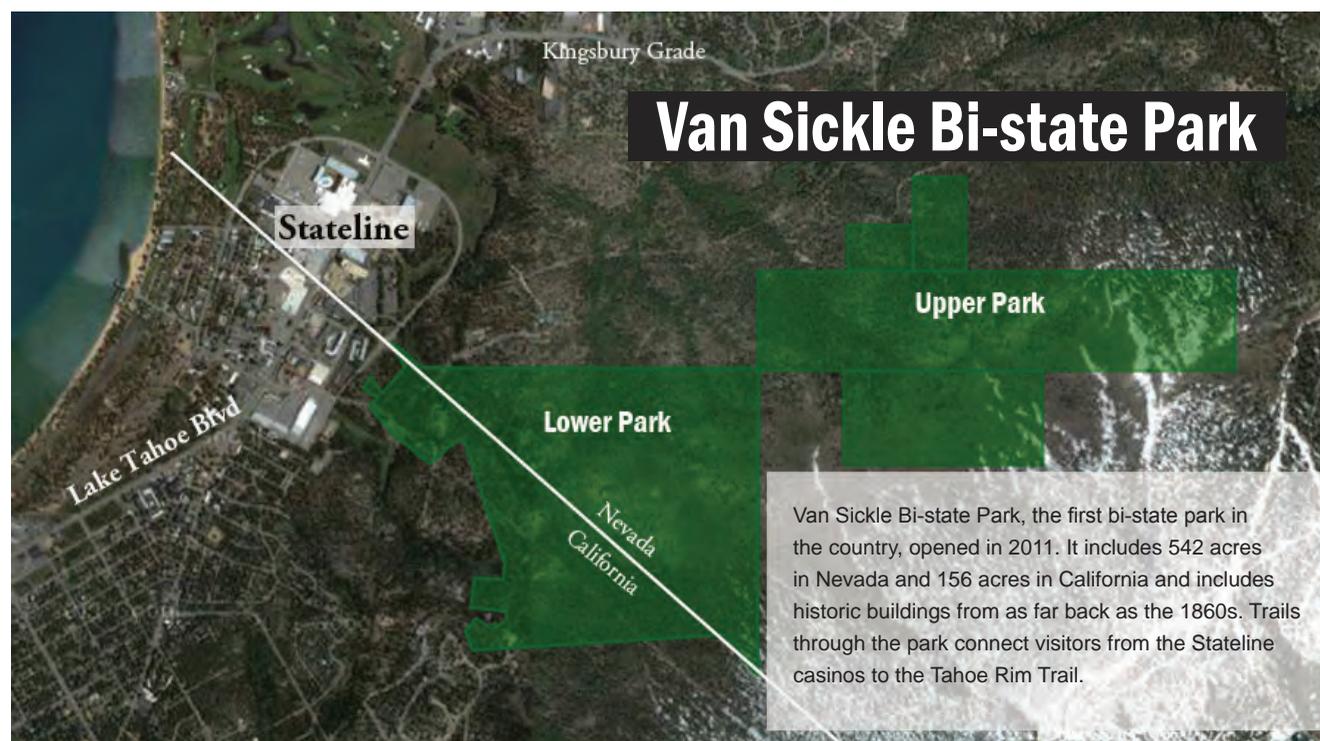
A little more history:

The California side of the park contains historic buildings in the Van Sickle Equestrian Complex. The barn, a nearly 100-year-old log cabin, and housekeeping cabins from the former Three Pines Motel, were brought to their current location in 1960.



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Backcountry at the back door



Van Sickle Bi-state Park, the first bi-state park in the country, opened in 2011. It includes 542 acres in Nevada and 156 acres in California and includes historic buildings from as far back as the 1860s. Trails through the park connect visitors from the Stateline casinos to the Tahoe Rim Trail.

Van Sickle Park provides outdoor recreation next to bustling casino district

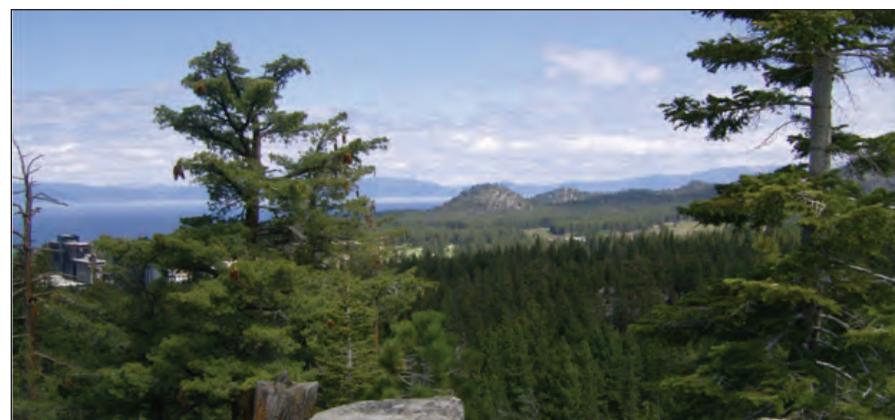
By Rob Gregg

It's not unusual for Lake Tahoe to surprise people. They can't believe how clear the water is. They can't believe the mountains still have snow in July. They can't believe you can be hiking in the wilderness in the morning and checking into a hotel-casino in the afternoon.

Well, add a new natural wonder to the list – the Van Sickle Bi-state Park. This 700-acre expanse sits right outside those Stateline casinos and makes it possible for you to step back in history, hike to a little-known waterfall and hook up with the world-famous Tahoe Rim Trail without even getting into your car.

Van Sickle Bi-state Park represents a long-held vision and partnership between California and Nevada. It's the only bi-state park in the nation with a common entrance.

The California side of the park is home to the historic buildings built by the Van Sickle family. The impressive barn, built in the 1860s, was used to hold hay and grain for a nearby way station and for horse teams pulling freight through the Region. By the 1890s, the operation had become an equestrian



Views from the higher reaches of the park are stunning.

facility. The Van Sickle family operated the Stateline Stables until 1993, keeping up to 60 horses on hand to take riders on the trails throughout this area.

When the Van Sickle family donated 542 acres to Nevada State Parks in 1989 to create a new park, both the Nevada and California State Parks envisioned acquisition of the adjacent 156 acres on the California side. In 2001, the Tahoe Conservancy purchased the California property to bring this concept to fruition. The bi-state park opened last year and won a 'Best in Basin' award for best recreation project in 2012. The

park operators work in cooperation with many partners such as the Tahoe Rim Trail, the Tahoe Fund and most recently the local Kiwanis chapter, which has sponsored the construction of a bulletin board for posting park information.

The park features a new access drive, utilities, restrooms, picnic sites and trails and trailheads that give hikers, mountain bikers and equestrians room to roam.

The Van Sickle Trail connects the park to the Tahoe Rim Trail, giving visitors the opportunity to explore beyond the park's boundaries.



An example of shared-use bike path.

Recent bike and pedestrian accomplishments at Tahoe

- Completion of the first phases of the Sawmill Bike Path in Meyers, which will eventually connect the existing Pat Lowe Memorial Trail to the South Tahoe "Y"
- Over 3 miles of new sidewalk in the Incline Village Commercial Area
- New bicycle lanes in the Incline Village and Kings Beach areas
- Shared-use paths on both sides of Ski Run Boulevard in South Lake Tahoe
- Lakeside Bike Trail in Tahoe City
- City of South Lake Tahoe allocation of \$25,000 toward community bicycle racks
- Completion of the last phase of the 1-mile-long 15th Street Bike Trail in the City of South Lake Tahoe
- Refurbished the AI Tahoe Trail
- Sixty thousand copies of the Lake Tahoe Bicycle Trail Map distributed
- Bicycle and pedestrian checklists in TRPA project applications, plus online, interactive map of proposed bicycle and pedestrian network
- Recognition of the City of South Lake Tahoe as a bronze-level League of American Bicyclists (LAB) Bicycle-Friendly Community 2006, 2008
- Recognition of North Lake Tahoe-Truckee Resort Triangle with "Honorable Mention" by LAB Bicycle Friendly Community Program.

Two-wheel revolution

Agencies teaming up to improve Tahoe's bicycle network

By Jim Sloan

On just about any summer day at Lake Tahoe, you can find thousands of cyclists tooling along the highways and bike paths at various points around the Basin.

Cyclists on cruiser bikes roll along the flat bike paths through Camp Richardson. Athletes on lightweight carbon-fiber frames power up the road to Spooner Summit or Luther Pass. Casino workers atop their urban commuter bikes head to work down Pioneer Trail.

Whatever kind of cyclist you are, Lake Tahoe is a great place to ride. According to a survey of bike path users, about 30 percent of peddlers using the paths came to Lake Tahoe specifically to ride a bike. This translates to about 188,800 people a year coming to Tahoe to ride. These riders contribute from \$6 million to \$23 million a year to the local economy.

Bikes not only get you out of your car and give you some exercise, but they also contribute to efforts to increase the clarity of Lake Tahoe by cutting down on air pollution from automobiles.

With that in mind, Lake Tahoe agencies and local governments are working together to execute a plan to improve the cycling opportunities, awareness and facilities around Lake Tahoe. Some day, they hope to see a complete bicycle network that connects communities and destinations throughout the Basin.

The plan involves utilizing a variety of bike travel ways, from multiple use trails like those which run through Camp Richardson to bike lanes that are identified along roadways.



Cyclists (top) head out on America's Most Beautiful Bike Ride while other riders cruise through Camp Richardson, below right. Bike lanes, bottom left, are a good way to encourage riding.

Even on some of the Basin's notoriously narrow, steep and topographically constrained roads (think Highway 89 around Emerald Bay), the plan calls for signage that gives cyclists not only a place to ride but a sense that they have as much right to be there as a passenger car.

Another part of TRPA's Bicycle and Pedestrian Plan calls for the implementation of the Lake Tahoe Scenic Bike Loop, which would provide the "widest possible shoulder" on the Lake side of the highway encircling Tahoe where bike lanes are not feasible or haven't already been constructed. Another piece of the plan calls for signed and numbered bicycle routes that provide an easily understood network to visitors and local residents alike.

Although the Basin already has nearly 100 miles of designated bike and pedestrian routes, experts estimate that another 95 miles of high priority facilities will be needed to complete a network for Lake Tahoe. The cost for that is estimated (in 2009 dollars) to be about \$200 million.

Although some of the proposed network will be built as part of future development and future roadway projects, a substantial portion will rely on public funding.

According to Karen Fink, the primary author of TRPA's bike and pedestrian plan, there are a wide variety of potential funding sources, including state bond funding, federal planning grants and smaller grants, such as the California Bicycle Transportation Account and the National Scenic Byways Program.

The investment in bike-friendly infrastructure

makes sense not only from a public environmental health standpoint, it also makes sense from an economic standpoint. Tahoe's annual America's Most Beautiful Bike Ride (AMBBR) brings 3,500 registered riders to the Region each year. You can recognize them by their knotty calves and sleek outfits.

Those riders stay in hotels and eat in restaurants. More than half make more than \$100,000, so they may have a little extra disposable income.

The importance of having an overall bike plan for the entire Tahoe Basin is that it helps local jurisdictions better coordinate their bikeway-building efforts and puts the importance of cycling at the top of everyone's mind.

Having bike projects on the planning books is also required for many projects to qualify for funding. A plan also helps facilitate cost savings when bike projects can be coordinated with the work being done by utilities, departments of transportation, water companies and communications providers.

Tahoe City Lakeside Trail 25 years in the making



A cyclist heads west on the new Tahoe City Lakeside Trail near the playground at Commons Beach recently. The 1-mile trail has been a popular addition to the 19-mile trail network.

New promenade provides better shoreline access and makes it easier to link with other trails

By Jim Sloan

When the Tahoe City Public Utility District hosted a public ceremony earlier this year to officially open the new Tahoe City Lakeside Trail, TCPUD Board President Judy Friedman called it “a \$12 million miracle mile.”

She wasn’t exaggerating.

The 1-mile paved trail traces the shoreline from Commons Beach to Tahoe State Park. Because of the challenges of building a trail along the Tahoe shoreline and through and around various geologic formations and private property lines, it took about 25 years to be completed. The utility district needed financial help from 12 sources to bring the \$12 million project to fruition.

It’s significant because although it’s only a mile in length, it provides a critical connection for the North Shore Trail, the West Shore Trail and the Truckee River Trail. What’s more, it provides easy and comfortable access to the shoreline from downtown Tahoe City, which previously required its visitors to scramble down steep makeshift paths or to wander down different side streets to reach the water.

Now those visitors are delivered to the lakefront through a number of different stairways down from the street. When they reach the water, they find all manner of places to relax – from



The Tahoe City Lakeside Trail connects the North Shore Trail, West Shore Trail and the Truckee River Trail. Cyclists going through Tahoe City previously had to negotiate downtown traffic when trying to make the connection from one bike path to the next. The planning, design and construction of the trail took 25 years and cost \$12 million. The trail connects Commons Beach to the Tahoe State Park and includes picnic areas, plazas, bridges and easy access to lakefront restaurants and businesses.

the sandy and grassy Commons Beach area to various granite benches or wooden picnic tables.

The trail is much more than your typical paved bike path. The lighted route includes interpretive signs and wide, stout wooden bridges. There are

at the nearby Truckee River rafting companies, couples strolling with their morning coffee, and kids from the Tahoe State Park campground heading over to the beach for the day. Several joggers, happy to avoid the traffic and bustle of downtown Tahoe City, used the new trail on their way to the Truckee River to the west or east to Dollar Hill and beyond.

A large group of hikers had gathered at a small plaza of picnic tables overlooking the Lake to eat breakfast and plan their day on the trail. Stand-up paddlers made their way on the water out beyond the piers.

Dan Shea, who was vacationing from Rhode Island with his two sons, said he was surprised to hear that the trail was new.

“It just fits into this location so perfectly,” said Shea. “It’s like it was meant to be here.”

Although the trail runs along the shoreline and through wooded and rocky areas, the project – which got a big boost from the more than \$5 million contribution provided by the California Tahoe Conservancy – actually includes a number of environmental improvements that will benefit the Lake. Urban and stormwater runoff will be better filtered, and the landscape will benefit as the makeshift trails down the steep slope from North Lake Boulevard become revegetated.



sections of wooded solitude mixed with brief excursions past commercial areas, shops, restaurants, bike and kayak rental shops, the marina and more piers and small rocky beaches.

On one Sunday this summer, the trail was active with people cycling to work



A Tahoe RCD Landscape Tour.

Tahoe RCD offers Conservation Landscape Tour

The Tahoe Resource Conservation District hosts an Annual Conservation Landscape Tour that allows gardeners to enjoy and explore eight beautiful gardens in the Tahoma and Homewood areas that highlight Tahoe Basin conservation techniques. This FREE tour highlights native and adapted plant selection, water conservation techniques, defensible space methods, Best Management Practice (BMP) demonstrations and wildlife enhancement features.

Last year's event brought together more than 150 Tahoe residents to learn about water-efficient irrigation and defensible space through proper plant selection, arrangement and management. As you explore the gardens, garden stewards and homeowners are available to answer your questions related to the conservation landscapes and plant identification.

For more information, visit www.tahoercd.org

Conservation in your yard

Sustainable gardening and landscaping makes sense at Tahoe

Let's face it: Living at Lake Tahoe comes with certain responsibilities.

We can't just cut down a tree to improve our view of the Lake.

We have to avoid blowing snow from our driveways into the street.

And we have to be careful about how we landscape our yards.

If you're new to Lake Tahoe or just new to landscaping, you may not be familiar with the term "conservation landscaping." But it describes a method of preserving and protecting Lake Tahoe's natural resources with sustainable gardening and landscaping techniques that promote wildlife habitat, erosion control, water conservation, clean air and water, composting and other resource-friendly practices.

Conservation landscaping will enhance the look and functionality of your property and are typically more cost-efficient and require less maintenance.

Tahoe Resource Conservation District (Tahoe RCD) staff can work with California Tahoe Basin homeowners to provide site-specific advice. Homeowners can learn about project planning and site analysis, soil preparation, irrigation considerations and plant selection and care.

Tahoe RCD staff can provide assistance with:

- how to restore and re-vegetate retired dirt parking areas and areas damaged during construction;
- how to replace thirsty lawns with a low-maintenance landscape;
- how to implement defensible space landscaping practices;
- how to start a wildlife garden and integrate vegetation into BMP plans.

When funding is available, homeowners can receive a "native garden start-up kit" that includes free native plants and compost. Some participants have received a credit for compost and up to 25 plants indigenous to the Lake Tahoe Basin. To request a free landscape water efficiency evaluation or obtain advice on conservation landscaping practices, contact the Tahoe RCD, TahoeRCD.org, 530.543.1501 ext 113.



1



2



3

Great plants for a Lake-friendly Tahoe Basin garden

Conservation landscaping preserves and protects the Tahoe Basin's natural resources with gardening and landscaping techniques that promote wildlife habitat, erosion control, water conservation, clean air and water, composting and other natural resource-friendly practices. Some plants that lend themselves to a beautiful, sustainable landscape include:

1. Columbine: Plant western columbine to attract wildlife to your garden. It is a perfect addition to a butterfly garden, and will entice hummingbirds and bees with its tubular red flowers. Allow the flowers to set seeds because they are a favorite food of small birds.
2. Lupine: Lupines, such as these found at the South Tahoe Public Utility District, are hardy plants that self seed and will remain colorful for a long time.
3. Sulfur buckwheat, mountain pride and penstemon: There are a variety of penstemons native to the Tahoe Basin. They provide habitat for pollinators and are also low-maintenance.

5 ways to show you love Lake Tahoe

A guide for locals, homeowners and visitors alike

By Pete Brumis



1

Tear out your lawn – and get paid for it!

Lawns are not very sustainable or practical here. Lake Tahoe gets its clarity from the abundance of clean granite rock in the Tahoe Basin. Fertilizers, fill soil and excess water put additional strain on the Lake by contributing sediment and nutrients, decreasing Tahoe's clarity. The Summer Turf Buy-Back Program 2012 was a partnership between South Tahoe Public Utility District (STPUD) and the Tahoe Resource Conservation District (Tahoe RCD) that allowed homeowners the opportunity to be eligible for a rebate by removing their lawn and replacing it with Tahoe Sierra native and adapted plants. Email: dmorse@stpud.dst.ca.us for more details and information on next summer's program. Tahoe RCD's Green Thumb Speaker Series usually begins each June with "Turf Removal Techniques for the High Sierra." Visit TahoeRCD.org for this and other great conservation events.



2

Doo your duty – pick up your dog's poo

No one wants to step in your dog's, uh, "surprise," while out walking on the beach or the local trails. Fido's feces contains bacteria and nutrients, which can lead to algae blooms and decreased Lake clarity. Plus, it's just plain nasty. Make sure to grab a doggy bag before you take your pooch on a walk, and "Doo your Duty." It's good for Tahoe, and your neighbors will appreciate it too!



3

Keep aquatic invaders out

There has been a lot of talk about the dangers of aquatic invasive species (AIS), and boat inspections are now a fixture at off-highway locations around the Lake to help avoid introduction and spread of aquatic invasive critters and plants. Most boaters know to arrive Clean, Drained and Dry at inspection locations. But what about paddlers? With unrestricted access to most of the Lake shores around the Tahoe Basin, local paddlers have a big responsibility to ensure they're not introducing unwanted pests and plants to local lakes – and also to educate visitors. Dirt, debris and standing water in boats or gear can easily introduce unwanted species into our lakes. Visit TahoeBoatInspections.com and click on the Tahoe Keepers link to learn more about cleaning and self inspecting your canoe, kayak or paddleboard.



4

Share your favorite play spot

Locals love to get outside, whether to glide through open powder in the winter, cruise a beautiful single track, or paddle the glassy water. But even seasoned veterans were new to Tahoe once, so take the time to be a good steward for Tahoe! Informed visitors can better help to protect the "Jewel of the Sierra" from pollution, invasive species and more. Taking the time to educate and share with the millions of people that visit the Basin every year helps us all in the long run.



5

Attract the birds, bees and butterflies to your yard!

If you're looking to bring the wildlife back into your yard, Tahoe Sierra native and adapted plants are the way to go. Birds and insects pollinate native plants and contribute to the long-term survival and proliferation of our beautiful plants and wildflowers. Tahoe RCD has some great (and free) conservation landscaping resources available that may include free native plants, removal of invasive species, and even assistance in designing your erosion control best management practices (BMPs). Visit TahoeRCD.org for more details on conservation landscaping tips and how to take advantage of these and other free resources.

Angora Fire highlighted importance of treating woods along streams



A worker operates a cut-to-length harvester during a forest-thinning project.

Continued from page 1

recent wildland fires such as the 2007 Angora and Washoe fires.

Work will be done using mechanical equipment, such as a cut-to-length harvester, when possible, and by chainsaw crews in areas in which mechanical equipment is not permitted or not feasible. Contractors will remove the material for sawlogs or biomass, or crews will process it on site through chipping and mastication, or piling and burning.

As the work progresses, residents can expect to see changes in the way the forest looks.

Comstock logging and fire exclusion have created an unhealthy and fire-prone forest, Forest Service officials said. Still, they noted that it can be upsetting when a thinning project changes the appearance of our favorite places. The drive along Highway 50 past Zephyr Shoals, Roundhill Pines and Nevada Beach provides an excellent example of how the forest will look a few years after thinning is complete.

The South Shore project also marks the first time the Forest Service can effectively treat areas along streams on the California side of the Lake. A look back to the Angora Fire underscores the importance of treating stream environment zones. Aerial pictures show how the heavy fuel load of dead and downed trees around Angora Creek carried the fire from its origin at Seneca Pond to the neighborhoods.

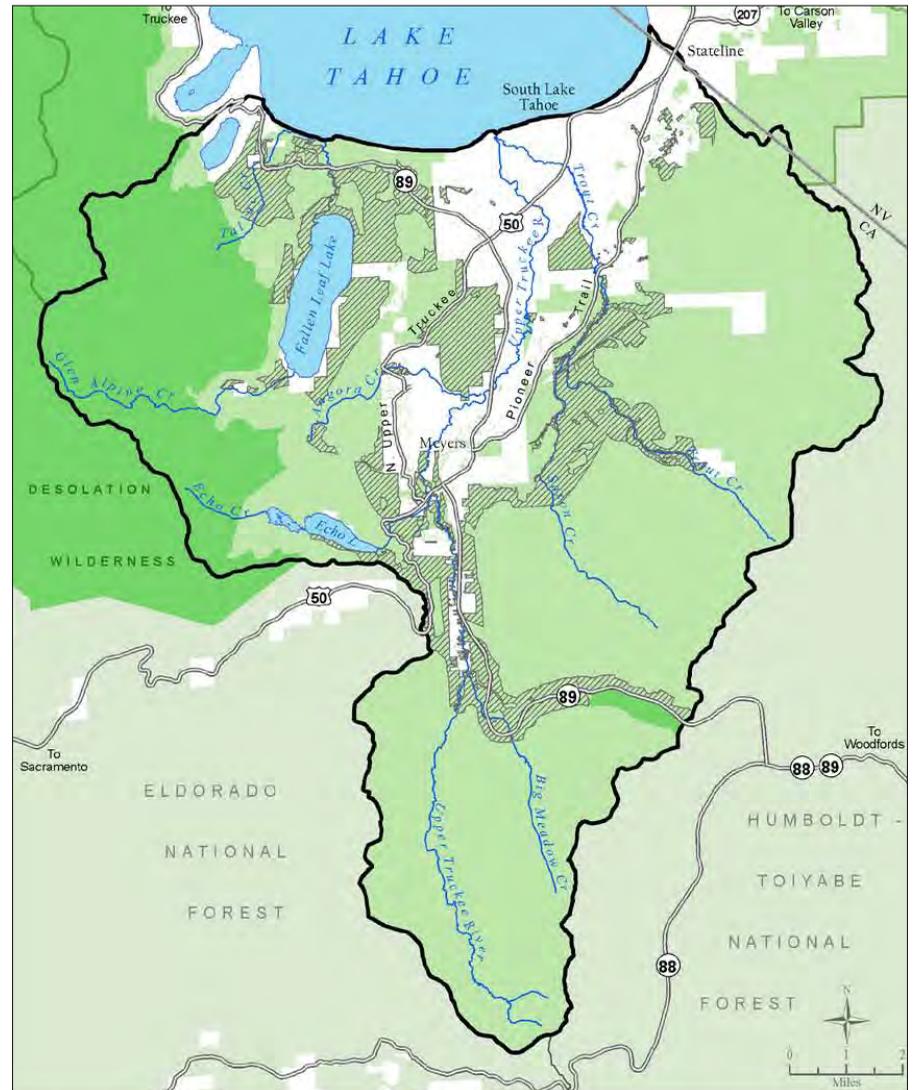
“Treating along streams such as

Angora Fire remembered

Lake Tahoe residents were reminded of the importance of fuel reduction and defensible space (see page 17) in the Tahoe Basin earlier this year on June 24, the fifth anniversary of the devastating Angora Fire. The blaze, which burned for several days, destroyed 254 structures and burned 3,100 acres in South Lake Tahoe. In late 2011 and early 2012, two large fires tore through parts of Reno, signaling that wildfires are no longer just a summertime danger. The Washoe and Caughlin fires destroyed scores of homes in the Sierra foothills in and around Reno.

Saxon Creek will allow us to reduce the risk that their dense fuel loads will carry a wildfire and increase its intensity,” said Kathy Murphy, LTBMU staff officer for vegetation, urban lots, fire and fuels. “We understand the need to protect these sensitive environments, and we’ll be monitoring and adapting our work as needed to achieve that.”

Work began in summer 2012 at a number of locations, including Sierra Tract, Trout Creek, Camp Richardson, Fallen Leaf Lake and Christmas Valley. To protect public safety, the Forest Service will temporarily close units where work is occurring. This may affect access to official and unofficial trails. The Forest Service restores official roads and trails, but unofficial trails are not restored.



Years of fire suppression have created thick forests (left) that make wildfires even more dangerous. Thinning operations restore forests to a more natural state (right).

Keeping the Lake safe from invaders

Unwanted aquatic species can cause long-term damage to Tahoe's clarity, beauty

By Kristi Boosman

TAHOE REGIONAL PLANNING AGENCY

Every year millions of people come to Lake Tahoe to enjoy its natural beauty and marvel at its famed clarity, which, after decades of decline, is finally showing signs of stabilizing. The latest Lake clarity data released by the UC Davis Tahoe Environmental Research Center and the Tahoe Regional Planning Agency reported the average annual clarity level for 2011 at 68.9 feet, a 4.5-foot improvement over 2010.

Urban stormwater runoff accounts for 72 percent of the sediment and pollution running into Lake Tahoe. However, aquatic invasive species have emerged in recent years, and they not only threaten Lake Tahoe's famed clarity, but its entire ecosystem.

Aquatic invasive species are non-native species that have the potential to cause long-term damage to Lake Tahoe's delicate ecosystem and economy. Lake Tahoe's original ecosystem was simple, and consisted of only one predominant predator, Lahontan cutthroat trout.

Over time, non-native species have been introduced by agencies to increase sport fishing or enhance ecosystem resources. Others were unintentionally or intentionally introduced from the public by releasing live bait, introducing game fish, dumping aquariums or unknowingly bringing them in on boats from other lakes or waterways.

The Watercraft Inspection Program, which is led by the Tahoe Resource Conservation District, the U.S. Fish and Wildlife Service and Tahoe Regional Planning Agency, was formed in 2008 to protect Lake Tahoe from aquatic invasive species such as quagga and zebra mussels.

In 2012, boat inspectors processed 100 percent of all boats entering Lake Tahoe at roadside inspection sites.

The annual watercraft inspection fee currently only covers half of the inspection program costs, while federal funding covers the remainder. TRPA is looking into greater efficiencies and



Watercraft inspections are available at various locations around the Lake. They ensure boats don't inadvertently bring aquatic invasive species into Lake Tahoe.



Summer inspection locations:

1. Meyers, junction of U.S. 50 and Highway 89
2. Spooner Summit, at the junction of U.S. 50 and Highway 28 in Nevada
3. Highway 267 at Northstar Drive near Truckee
4. Highway 89, at Alpine Meadows Road near Tahoe City
5. Highway 89, at Homewood Resort on Lake Tahoe's West Shore

For winter hours and locations, visit TahoeBoatInspections.com or (888) 824-6267. Follow @TahoeBoating on Twitter for real-time updates.

other funding sources in anticipation of future reductions of federal funding.

"The Watercraft Inspection Program is critical to the health of Tahoe and our local economy," said Ted Thayer, the TRPA's Aquatic Invasive Species Coordinator.

Quagga or zebra mussels in Lake Tahoe could have a particularly devastating impact. These invasive mollusks multiply quickly and colonize underwater surfaces, including docks and piers, water supply and filtration systems, buoys, moored boats and even the beautiful rocky shoreline. They destroy fish habitat,

ruin boat engines and cloud the water. Boats and other watercraft are the largest transporters of aquatic invasive species and the inspection program is critical to preventing the spread into Lake Tahoe and surrounding water bodies. Knowingly transporting aquatic invasive species into Lake Tahoe is against the law.

Boaters are encouraged to Clean, Drain, and Dry their boats prior to arriving at inspection stations in order to save everyone time and money, according to Kim Boyd, Assistant District Manager for Tahoe RCD.



Eurasian watermilfoil being removed from the Tahoe Keys.

Aquatic Invasive Species harm Lake Tahoe by:

- Severely impacting recreational uses such as swimming, boating, water-skiing, and fishing
- Degrading boats by clogging propellers and cooling intakes
- Facilitating invasions of other non-native species
- Altering nutrient cycles and increasing algal growth in the Lake by adding phosphorus to the water column thus contributing to overall clarity decline

Species of concern presently in Lake Tahoe:

- Eurasian watermilfoil
- Curlyleaf pondweed
- Warm-water fish such as small and large mouth bass and bluegill sunfish
- Asian clam
- Bull frogs

Aquatic invasive species **NOT** presently in Lake Tahoe that we need to keep out:

- Zebra mussel
- Quagga mussel
- New Zealand mudsnail
- Spiny water flea
- Hydrilla
- Giant salvinia

How Lake Tahoe clarity is measured

Clarity is measured by the depth at which a 10-inch white disk, called a Secchi disk, remains visible when lowered beneath the water's surface. The measurements have been taken since 1968, when the Secchi disk could be seen down to 102.4 feet.

Clarity Readings Since 2000

- 2011: 68.9 feet (21 meters)
- 2010: 64.4 feet (19.6 meters)
- 2009: 68.1 feet (20.8 meters)
- 2008: 69.6 feet (21.2 meters)
- 2007: 70.1 feet (21.4 meters)
- 2006: 67.7 feet (20.6 meters)
- 2005: 72.4 feet (22.1 meters)
- 2004: 73.6 feet (22.4 meters)
- 2003: 71 feet (21.6 meters)
- 2002: 78 feet (23.8 meters)
- 2001: 73.6 feet (22.4 meters)
- 2000: 67.3 feet (20.5 meters)

For a complete list of Annual Secchi Depth Data since 1968, visit <http://terc.ucdavis.edu/research/SecchiData.pdf>.

Graphs showing the various clarity measurements for summer months, winter months, and the yearly averages, are available at the UC Davis Tahoe Environmental Research Center website at <http://terc.ucdavis.edu>.

“Ecosystem restoration is seen over a time scale of decades and is difficult under the best of conditions. Sustaining the pollutant reduction to any lake that has an urban population and infrastructure like Lake Tahoe is challenging, especially in a faltering economy. In my opinion, the federal, state and public partners at Lake Tahoe are facing this restoration challenge with considerable insight, coordination and determination.”

John Reuter

UC Davis Tahoe Environmental Research Center

Lake clarity shows improvement

Wintertime gains help offset continued summertime clarity losses

Continued from page 1

summer (June–September) months. The winter average of 84.9 feet in 2011 was an improvement from the worst point seen in 1997 and a 12-foot jump over 2010.

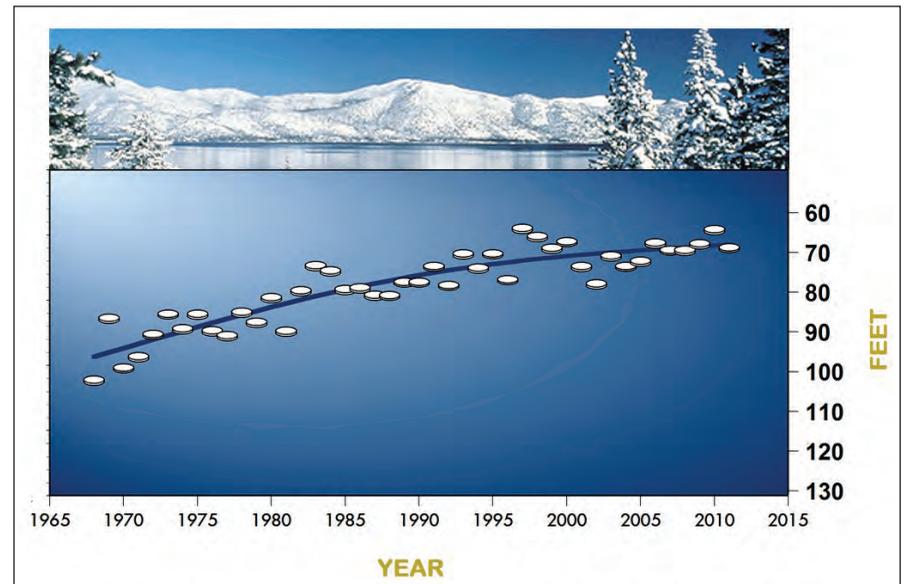
Urban stormwater runoff has long been one contributor to reduced clarity at the Lake. Most of that runoff occurs during the winter and spring, when rain and snowmelt carry small, inorganic particles from the land into the Lake.

Researchers say the improvements for 2011, despite the wet winter, could indicate that efforts led by TRPA, other management agencies, local jurisdictions and private property owners to reduce urban stormwater runoff are helping. They emphasized that they need more data on stormwater to make definitive conclusions.

Summer clarity levels continued to show a decline. The 2011 value of 51.5 feet was the second worst on record, which UC Davis data suggest may be due to the large, late-spring snowmelt, which carried enormous amounts of fine sediment and nutrients from the watersheds surrounding the Lake.

The Tahoe Regional Planning Agency leads the collaborative Environmental Improvement Program that sets thresholds for various environmental indicators at the Lake, with clarity being among the most important.

“We’re encouraged that Lake clarity is improving and seems to be responding to the substantial restoration investments we’ve collectively made through the Environmental Improvement Program,” said Joanne S.



The chart shows the average annual Secchi disk depth reading recorded by researchers at the University of California, Davis. UC Davis maintains a boat, left, that is used to take the measurements.

improvement efforts in the Lake Tahoe Basin related to water quality, forest health and watershed condition have been significant.

However, Reuter noted that “ecosystem restoration is seen over a time scale of decades and is difficult under the best of conditions. Sustaining the pollutant reduction to any lake that has an urban population and infrastructure like Lake Tahoe is challenging, especially in a faltering economy. In my opinion, the federal, state and public partners at Lake Tahoe are facing this restoration challenge with considerable insight, coordination and determination.”

Marchetta, executive director of TRPA.

John Reuter, associate director of the UC Davis Tahoe Environmental Research Center, said environmental



Lake Tahoe Fast Facts: How does the Lake stack up?

How does Lake Tahoe compare to other world lakes?

Tahoe is the second largest lake in the world at or above this elevation. It is the 31st largest lake overall and the 11th deepest lake.

Where does the water come from?

Rain and snow melt runoff from 63 tributaries in the 312 square-mile

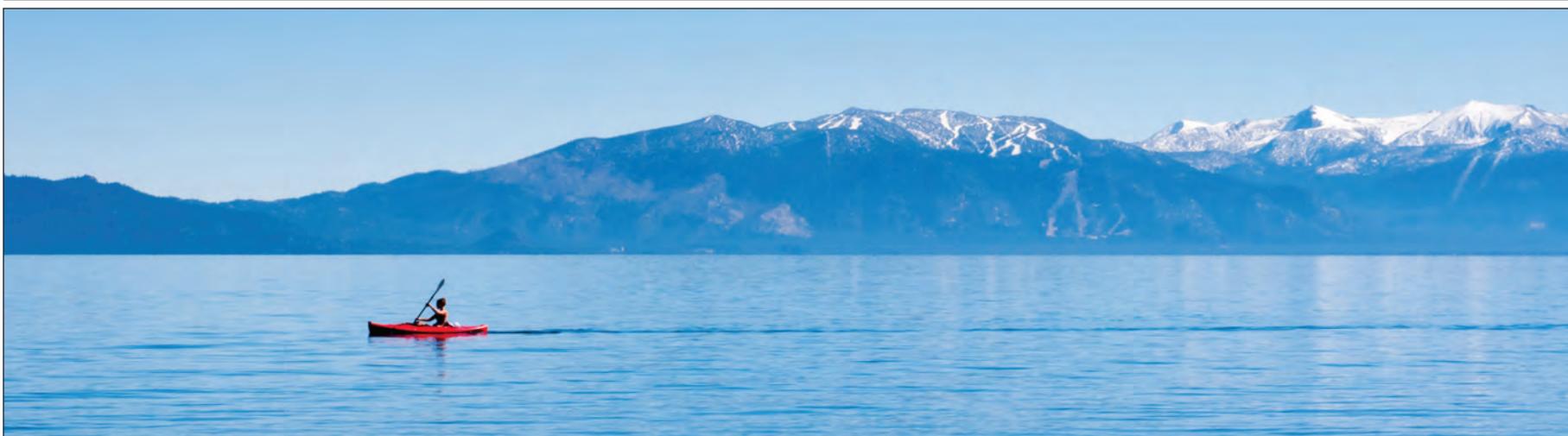
watershed adds 65 percent of the water. Another 35 percent falls as precipitation.

Where does all the water go?

About a third flows into the Truckee River through the dam at Tahoe City and travels 140 miles to Pyramid Lake in Nevada. The rest evaporates from the surface at an annual average rate of 0.1 inch per day.

How cold is the Lake?

Below an average depth of 900 feet, water temperature is a near constant 40 degrees. Daily maximum surface temperature can reach 75 degrees. Over the past 38 years, water temperature warmed an average of 1 degree from top to bottom and monthly water surface temperature increased 1.6 degrees.



A kayaker glides over Lake Tahoe with Heavenly ski resort as a backdrop.

Paddlers join fight to keep Tahoe clear

Learn how you can help protect the Lake from invasive species at TahoeKeepers.org

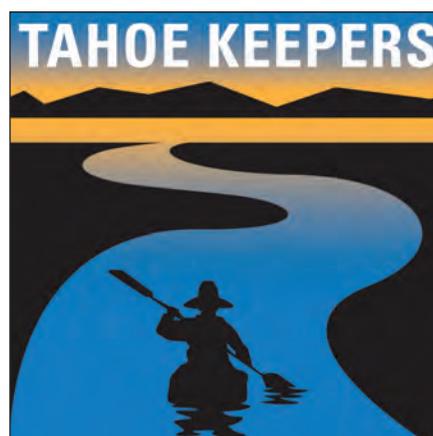
By Patrick Stone

TAHOE REGIONAL PLANNING AGENCY

For thousands of years, canoes and kayaks have provided paddlers at Lake Tahoe with an opportunity to enjoy the peace and solitude of skimming over crystal clear blue waters. Today, the watercraft we see on the Lake are almost as diverse as the people floating in them. With the recent arrival of standup paddle boarding, currently the fastest-growing sport in the world, paddling in the Tahoe Basin is more popular than ever.

But this popularity does not come without a risk. Aquatic invasive species are spreading rapidly throughout the western United States, damaging infrastructure, ecosystems and tourist industries in their wake. These invaders are spread through the transport of watercraft, including paddle-driven kayaks and boards. Invasive species like snails or mussels hitch a ride in water or debris that can collect in cockpits and hatches, cling to outer hulls, rudders, and paddles, and even hide out in the nooks and crannies of gear. The transport of aquatic invasive species in the Lake Tahoe Basin threatens the pristine condition of our waters and is illegal.

To protect your favorite place and to protect your favorite pastime from the threats of aquatic invasive species, you can become a Tahoe Keeper at



www.TahoeKeepers.org.

The Tahoe Keepers are a community of water stewards who have committed to a quick and easy ritual of Clean, Drain, and Dry every time they use their canoe, kayak, board, or boat. A free online training program is available to help paddlers understand the threats and laws associated with aquatic invasive species, as well as familiarize them with the self-inspection and decontamination methods necessary to guard against the inadvertent transport of these invaders.

Widespread participation in the Tahoe Keepers voluntary training program and stewardship community will also help to protect our recreational opportunities and privileges in the Lake Tahoe Basin.

Did you know that many of the aquatic invaders that threaten Tahoe are

already here? That's why it's important for paddlers to Clean, Drain, and Dry their boat and gear and properly dispose of debris every time, even when staying within the Tahoe Basin.

Species like Eurasian watermilfoil, an aquatic invasive plant, and Asian clam are found in Lake Tahoe but have not invaded other waters in the Basin, like Fallen Leaf Lake or Echo Lake. The Tahoe Keepers are equally committed to reducing this risk of in-Basin transfer of invasive species.

Facility staff and invasive species inspectors are often at popular launch sites to provide education to boaters. The staff and inspectors may ask you a few questions that help to assess the potential risk of your watercraft. All watercraft are subject to inspection and decontamination.

It's a good idea to know where and when your watercraft was last used so that you can answer an inspector's questions and move through the inspection quickly.

Free kayak, canoe, paddle board, and non-motorized watercraft inspections and decontaminations are also available at each roadside watercraft inspection station located at Meyers, Spooner Summit, Homewood Mountain, Northstar-at-Tahoe and Alpine Meadows. Directions to these roadside stations and answers to other frequently asked questions are available at www.TahoeBoatInspections.com.



Cleaning tips for paddlers

- Remove all dirt, plant and other material from your rudder, hull, cockpit and gear.
- Drain the water from your hatches, cockpits, boards and gear on land before you leave the immediate area. Open all hatches or plugs, turn the boat upside down and rest on an open hatch to incline the watercraft and drain it.
- Dry your watercraft and gear, and store them in a dry place where aquatic invaders cannot survive. Inspect your watercraft and gear for moisture before launching.
- If you're coming from a Region with infested water bodies or find invasive plants during your inspection, free decontaminations are available to non-motorized watercraft at each of the roadside inspection stations.

More details: tahoekeepers.org

The problem:

Blackwood Creek generates approximately 30 percent of all stream bank erosion in the Lake Tahoe Basin, second behind the Upper Truckee watershed, which produces 40 to 50 percent.

The cause:

- Aggressive logging and sheep grazing up to the 1960s
- Gravel mining
- Flooding in the 1960s triggered massive bank failures along a 2,400-foot stretch of the creek. The resulting erosion converted an ecologically diverse meadow and floodplain into a sparsely vegetated series of gravel bars with little ecological value. Additional flooding and erosion suggested excessive bank erosion would continue for decades.

What the Forest Service did:

- Manmade impediments to desired riparian form and function were treated first. A fish ladder and culvert that outlived their need were upgraded and are now functioning sections of stream and expected to evolve naturally over time.
- Reshaped channel bars to deflect streamflow away from exposed banks and terraces, reducing wide-scale erosion during floods and promoting sediment storage and retention on floodplains.
- Installed river boulders and logs at bar heads to deflect flow, even at forces generated during historic floods and beyond.
- Planted and irrigated native cottonwoods, willow stakes and poles in key areas to re-establish riparian vegetation and restore floodplain stability and durability.
- Increased channel sinuosity to encourage channel sediment storage and pool-riffle development.
- Enhanced the health of aspen stands by harvesting conifers and using the logs for additional flood and channel roughness. Vegetation specialists and wildlife biologists were on hand to ensure crews maintained desirable forest structure.
- Constructed 2,400 feet of new channel to connect to 1,200 feet of the historic channel of Blackwood Creek.

Rebuilding Blackwood

Efforts to restore creek will reduce sediment entering Lake Tahoe

By Sue Norman
U.S. FOREST SERVICE

Blackwood Canyon represents the best and worst of a Lake Tahoe watershed. A wide valley filled with mature cottonwood trees, pine forests interspersed with aspen stands, and steep canyon walls framed by rugged volcanic rock outcrops characterize this remarkably scenic canyon. Blackwood offers some of the best fall color vistas at Tahoe.

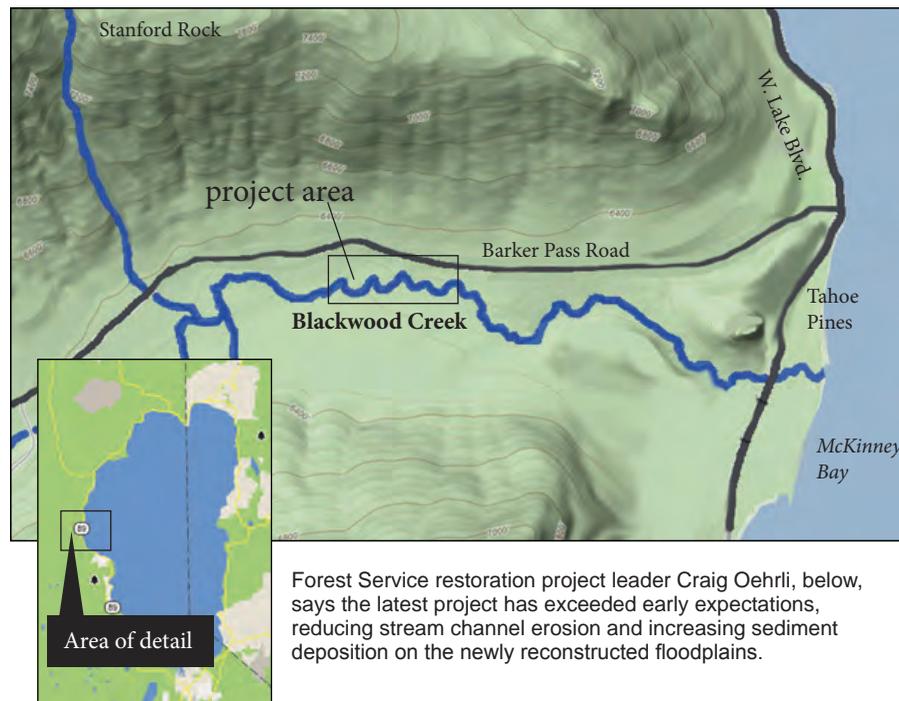
However, amidst this natural beauty, Blackwood Creek is still recovering from a long history of damaging land use practices. Though not urbanized, aggressive logging and sheep grazing occurred there into the 1960s. A massive gravel mining operation that provided cheap building materials to construct facilities for the 1960 Squaw Valley Winter Olympics delivered the *coup de grace* of man's impact.

Healthy watersheds exist in "dynamic equilibrium." This term describes any system that can absorb constant change while maintaining balance. The naturally steep and rocky geology of Blackwood Canyon creates a truly impressive hydrologic response in Blackwood Creek. This watershed naturally experiences constant change, in a big way.

During large rain-on-snow events, water in Blackwood Creek accumulates faster than most watersheds in the Lake Tahoe Basin. Flows can increase from a few cubic feet per second to a thousand or more cubic feet per second within 24 hours, creating a virtual stampede of water raging down Blackwood Creek and its tributaries.

The combination of Blackwood's naturally "flashy" hydrology, along with the destabilizing impacts of man's activities, pushed Blackwood Creek over the edge, causing its bed and banks to erode at an alarming rate. The creek banks increased 6 to 10 feet in depth and 100 or more feet in width.

Water quality data indicates that Blackwood Canyon is one of the largest sediment producers to Lake Tahoe, contributing to reduced Lake clarity.



Forest Service restoration project leader Craig Oehrli, below, says the latest project has exceeded early expectations, reducing stream channel erosion and increasing sediment deposition on the newly reconstructed floodplains.



Research shows that much of the creek provides poor habitat for fish and other aquatic species.

The Blackwood watershed has been the training grounds for every new hydrologist to the U.S. Forest Service Lake Tahoe Basin Management Unit (LTBMU), a place to witness firsthand the concepts learned in the classroom. When I was first hired by the LTBMU in 1989 as a seasonal hydrologist, one of my first assignments was to perform a watershed improvement needs

inventory of Blackwood. For over a month, I hiked, waded, and sometimes crawled up every road, trail and stream channel, looking for indicators of unnatural rates of erosion, and I found plenty.

With funding from the Southern Nevada Public Land Management Act, the Forest Service has implemented a wide variety of restoration projects in the Blackwood Watershed as part of the

Continued on page 13

Heavy rainfall between 2009 and 2011 put the rebuilt creek to the test

Continued from page 12

Environmental Improvement Program. These include removing roads, upgrading water quality best management practices on roads, and implementing several stream channel and floodplain restoration projects.

The first major phases of stream channel restoration consisted of removing man-made structures that were inhibiting natural channel and floodplain processes. This included removing an outdated concrete and steel fish ladder, as well as a large culvert under Barker Pass road. The culvert was replaced with a bridge, and in both locations the stream channel and floodplain were restored.

In 2008 and 2009, the LTBMU began constructing its most complex restoration ever, restoring three quarters of a mile of the most severely degraded section of stream channel. According to restoration project leader Craig Oehrli, "The results of this latest project have exceeded our early expectations, resulting in a measured reduction in stream channel erosion, and dramatic amounts of sediment deposition on the newly reconstructed floodplains."

Several extreme rainfall events occurring between spring 2009 and spring 2011 put the project to the test. The channel response demonstrated that the project was meeting performance objectives.

For instance, in an analysis contained in a recently completed Master's thesis, Utah State University student and LTBMU hydrologist Dave Immecker documented that approximately 132 tons of fine sediment from the upper watershed was deposited on the newly reconstructed floodplain in just the first year after construction. Previous studies indicate that the reconstructed section alone released an average of 61 tons of fine sediment per year to Lake Tahoe prior to restoration.

The Blackwood Watershed still has hurdles to overcome to achieve a full recovery to "dynamic equilibrium," but it is definitely on its way. The last two planned stream channel restoration projects in Blackwood Creek will be constructed in the summer of 2012 by the Forest Service and the California



Rebuilding flood-damaged portions of Blackwood Creek involved making careful measurements and using natural materials to deflect stream flows.

Tahoe Conservancy.

The next time you are in Blackwood Canyon, take a walk along Blackwood Creek and witness for yourself the dynamic process of recovery in this magnificent watershed. For a more detailed description of the results of restoration impacts and effectiveness monitoring, visit the publications page of the LTBMU public website, <http://www.fs.usda.gov/main/ltbmu/maps-pubs>.

“The results ... have exceeded our early expectations, resulting in a measured reduction in stream channel erosion, and dramatic amounts of sediment deposition.”

Craig Oehrli, project leader

Forest Service reviewing input on management plan

The U.S. Forest Service (USFS) released in June a draft environmental document that outlines alternatives for managing the national forest system lands in the Lake Tahoe Basin. The four alternatives capture input received from public collaboration during the multi-agency Pathway process and Forest Service workshops held in 2008 and 2010.

The Draft Environmental Impact Statement (DEIS) was out for public comment for 90 days. Public meetings were held in July. To assist citizens in developing their comments, the meetings offered an overview of the DEIS and the alternatives and provided the opportunity to ask questions or get clarification about the plan contents. For up-to-date information on the plan, call (530) 543-2694 or visit <http://www.fs.usda.gov/goto/ltbmu/ForestPlanRevision>.

-- Cheva Heck

Tahoe's biggest tributary gets a makeover

Several projects on the Upper Truckee designed to improve river conditions, help Tahoe

By Jim Sloan

High up in the National Forest in the Meiss Meadow area, a stream drains out of the volcanic bluffs near Red Lake Peak and plunges down the mountains. In the wilderness at 9,000 feet, the water runs clear and pure as it gathers strength from the melting snowpack.

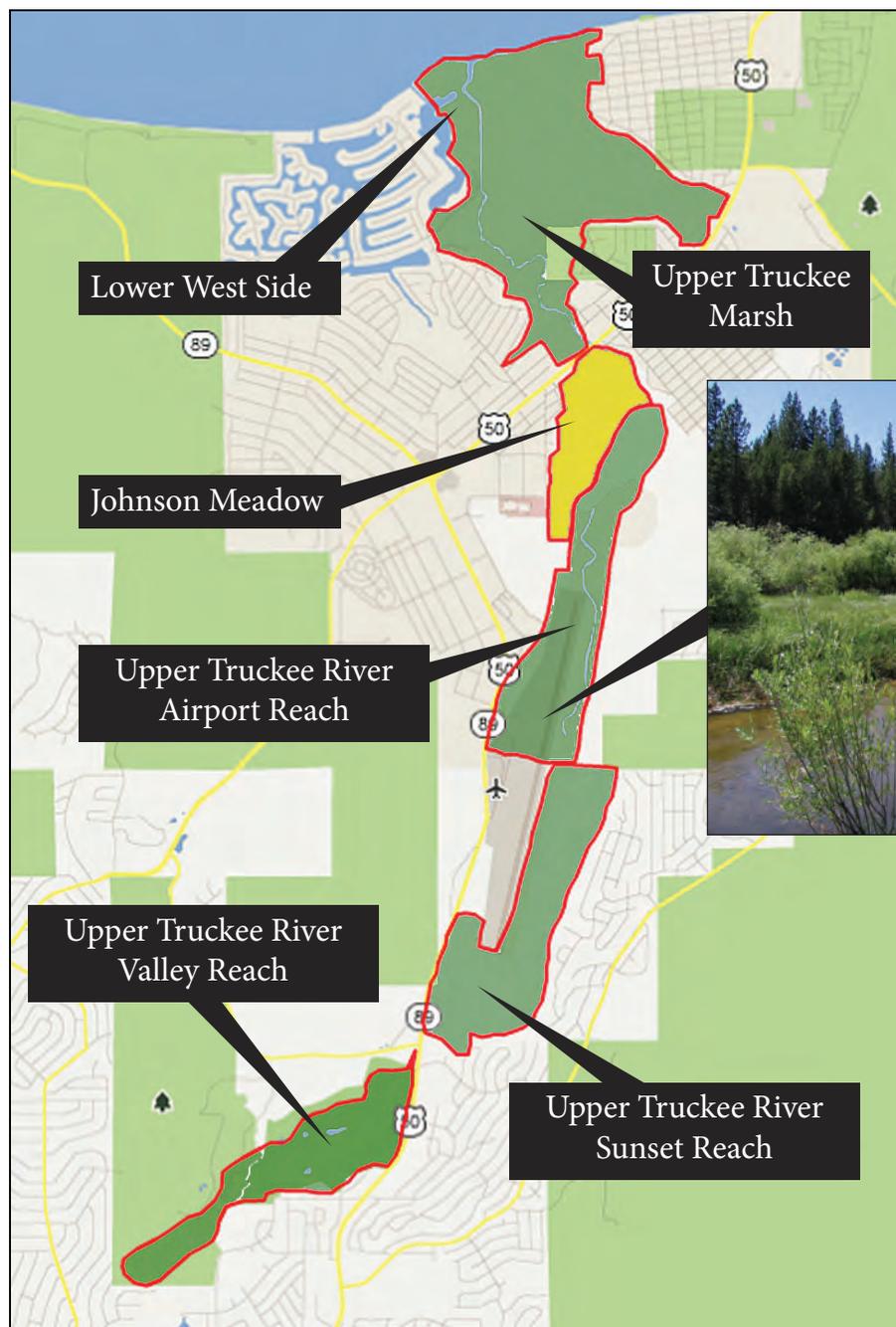
These are the headwaters of the Upper Truckee River, and from its origins 10 miles south of Lake Tahoe, it's hard to believe that this clear mountain stream will quickly become a major source of sediment pollution to the Lake.

As soon as the Upper Truckee splashes into Christmas Valley, its life changes dramatically. It races through a channel straightened by humans for logging and grazing, picking up dirt and nutrients from heavily eroding stream banks that were once lush with vegetation. It bypasses the meadows where it once naturally flowed over its banks to deposit silt and filter its waters. It squeezes through narrow bridges that accelerate its speed and cause it to chew away more stream banks. When it reaches the once-marshy delta where it once spread out and was filtered one final time before reaching Lake Tahoe, the river is channeled around the homes and canals that now form the Tahoe Keys.

Today, as a result of more than 150 years of man-caused disturbances – from logging to grazing to rechanneling to urban development – the Upper Truckee is a significant source of the sediment and algae-feeding nutrients flowing into Lake Tahoe.

Tahoe Basin land managers are taking steps to change that, however. The Upper Truckee River is the focus of a number of major projects designed to restore the river to its former ecological health.

These projects involve restoring natural meanders, reconnecting the river to the wet meadows and marshes, and stabilizing the crumbling stream banks that are helping cause a decline in the clarity of Lake Tahoe.



Project areas

Various Lake Tahoe agencies are working on several projects designed to restore the Upper Truckee River's health while working around the development that has occurred near it.

A little bit of history

The Upper Truckee was once one of the most important fishing waters for the Washoe tribe. The Lahontan cutthroat trout and mountain whitefish once spawned on the gravelly bottom of the river near Meyers.

That all began to change with advent of the Comstock Lode, which initiated a period of heavy logging in the Tahoe Basin. Loggers used the Upper Truckee to transport logs downstream to the

Lake, dredging and rechanneling the river and building timber or earthen splash dams to make the process easier. You can imagine the kind of damage that caused; not only were trees and stream-bank vegetation removed – eliminating the shade and woody debris that help make a river healthy for spawning trout – but stream banks were torn up and allowed to melt into the rushing river water.

In later years, heavy grazing further

damaged the river, and feeder streams were modified to improve irrigation.

Then in the 1950s and 1960s, development took its toll.

The Tahoe Keys were built on the delta and lower marshes, and the river was rechanneled for the Lake Tahoe Airport. A golf course was built on a former floodplain.

Making amends to a river

The challenge now is to restore the river's health while working around all the development that has occurred around it.

Because of property ownership, this is a collaborative approach involving numerous Lake Tahoe agencies and private property owners. Several projects designed to accomplish restoration include:

■ **Valley Reach:** A 520-acre study area near Meyers that includes the southern portion of Washoe Meadows State Park, Lake Valley State Recreation Area (SRA),

Continued on page 15

Upper Truckee restoration work will improve area's largest wetlands

Continued from page 14

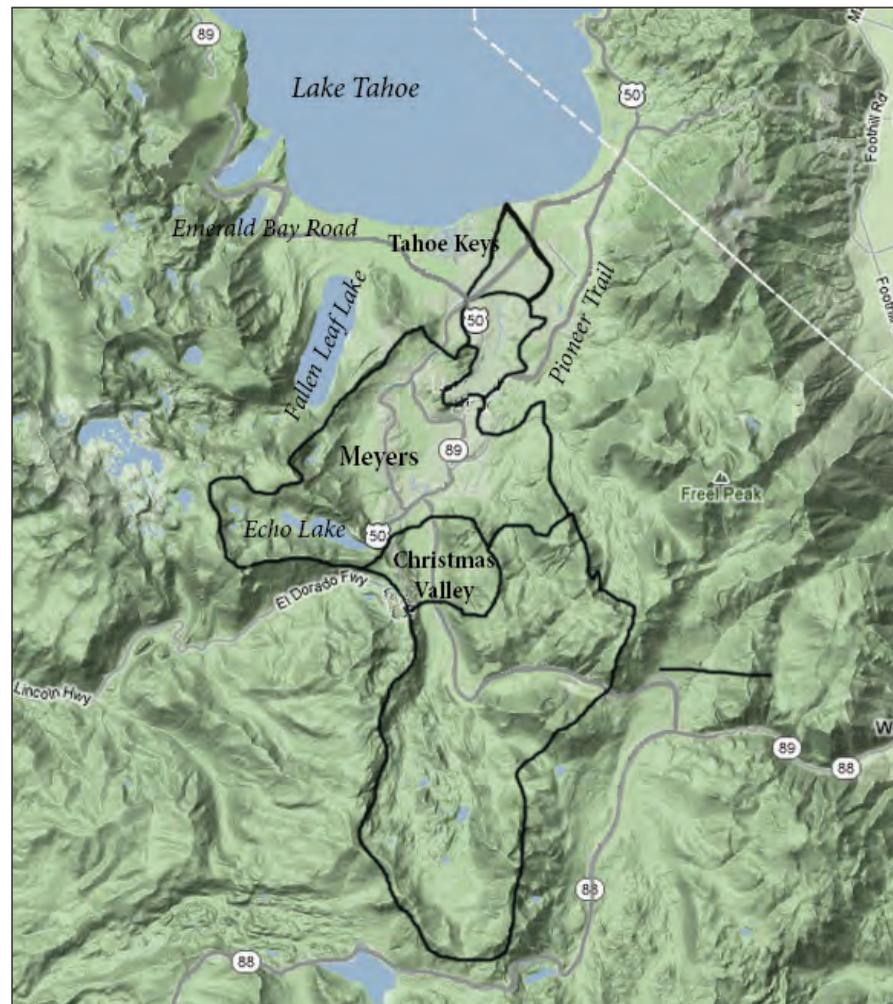
and small portions of U.S. Forest Service and California Tahoe Conservancy lands. Here, along a 1.5-mile reach of the Upper Truckee River, the California Department of Parks and Recreation is proposing to restore natural geomorphic and ecological processes along this reach of river to reduce the river's suspended sediment discharge to Lake Tahoe. This will involve moving some of the golf course away from the river onto less sensitive land.

■ **Sunset Reach:** Just downstream, the Sunset Stables Reach Restoration Project, located from the Highway 50 crossing near Elks Club Boulevard to the middle of the airport runway, covers 297 acres and 2.5 miles of the river. This project, being developed by the California Tahoe Conservancy and the U.S. Forest Service, would replace the existing incised and widened channel with a new stable channel that connects the river to the adjacent floodplain, improving water quality and wildlife habitat.

■ **Airport Reach:** This project, completed last year by the City of South Lake Tahoe, restored a 1-mile stretch near the airport. This project improved the river channel and is expected to allow more frequent flooding of the meadow, increasing the amount of sediment deposited on land rather than in Lake Tahoe. Higher groundwater will improve riparian and meadow vegetation and improve the fish habitat, too.

■ **Johnson Meadow:** Below the Airport Reach, the river captured an old irrigation channel in a section of private property between the airport and the Highway 50 bridge 15 years ago and created a gully channel that is eroding a large amount of sediment. By partially filling and stabilizing the gully channel, the project would increase overbanking onto the floodplains; protect eroding steep riverbanks; and use logs, boulders and vegetation to improve aquatic habitat.

This project is located on private land and the California Tahoe Conservancy and the Tahoe Resource Conservation District are working with the property owner to develop a restoration plan for



The Upper Truckee River drains a large watershed (map) that starts near Red Lake Peak along Highway 88. Restoration work has included re-meandering the river and stabilizing banks with rock and native plants.

this portion of the river.

■ **Upper Truckee Marsh:** The final Upper Truckee River restoration project study area is the Upper Truckee River Marsh, one of the largest remaining wetlands in the Basin. This project is being led by the California Tahoe Conservancy and would restore

natural geomorphic processes and ecological functions in this lowest reach of the Upper Truckee River and the surrounding marsh to reduce the river's discharge of nutrients and sediment into the Lake while providing safe access to vistas and environmental education to the public.

Where to Learn More

Find out more about Lake Tahoe science, issues and agencies at the following state parks, museums, centers and gardens:

Donner Memorial State Park/Emigrant Trail Museum, Truckee

530-582-7892

parks.ca.gov/?page_id=503

Hellman-Ehrman Mansion, West Shore

530-525-7982

parks.ca.gov/?page_id=991

Explore Tahoe – An Urban Trailhead, South Lake Tahoe

(530) 542-4637

cityofslt.us/index.aspx?nid=288

Galena Creek Visitors Center, Reno

(775) 849-4948

galenacreekvisitorcenter.org/

Gatekeepers Museum, Tahoe City

530-583-1762

northtahoemuseums.org/museums_and_exhibits.html

Incline Village & Crystal Bay Historical Society, Incline Village

775-832-1606

tahoehistory.org

Kidzone Museum, Truckee

530-587-Kids(5437)

KidZoneMuseum.org

Lake Tahoe Community College

Demonstration Garden, South Tahoe

For reservations: (530) 577-6027

ltcc.edu/about.asp?scatID=60

North Lake Tahoe Demonstration

Garden, Sierra Nevada College, Incline Village

(775) 560-5615

demogarden.org/

Tahoe Maritime Museum, Homewood

530-525-9253

tahoemaritimemuseum.org

Thunderbird Lodge, Incline Village

1-800-GO-TAHOE (1-800-468-2463)

Main telephone number: (775) 832-8750

thunderbirdlodge.org

UC Davis Thomas J. Long Foundation

Education Center, Incline Village

775-881-7566

terc.ucdavis.edu

UC Davis Historic Fish Hatchery and Eriksson Education Center, Tahoe City

530-583-3279

terc.ucdavis.edu/education_outreach/tcfieldlab/tcfieldlab.html

Vikingsholm, Emerald Bay

530-525-9530

vikingsholm.org

Watson Cabin Museum, Tahoe City

530-583-8717

northtahoemuseums.org/museums_and_exhibits.html



When you see this logo ...

You know another Lake-saving project is under way. Visit conservationclearly.org for information.

Lake Tahoe Fast Facts

How did Lake Tahoe form?

A shallow lake began forming 3 to 5 million years ago when the Tahoe Basin dropped between parallel fractures and mountains rose up around it. A



couple of million years later, a volcano erupted and blocked the lake's northern outlet, deepening the lake considerably. Glaciers also dammed the lake more than 20,000 years ago, and other cataclysmic events – including a massive mudslide all the way down to what is now Reno and a shoreline collapse that produced a tsunami – also contributed to what has become Lake Tahoe.

How pure is the Lake?

The water is 99.994 percent pure, making it one of the purest large lakes in the world. For comparison, commercially distilled water is 99.998 percent pure.

How deep is the Lake?

Tahoe's deepest point is 1,645 feet at a spot in Crystal Bay. That makes it the second deepest lake in the United States, third deepest in North America and 11th deepest in the world. It holds about 39 trillion gallons of water – enough to cover California in 14½ inches. Tahoe is the sixth largest lake by volume in the U.S.

EIP has wide-ranging impact on Tahoe

Program coordinates 50 partners, \$1.6 billion investment in Lake improvements

By Karin Edwards

Launched in the mid-1990s, the Lake Tahoe Environmental Improvement Program (EIP) is implemented through a partnership of federal, state, regional and local governments, private interests, and the Washoe Tribe. The program's goal is to protect the extraordinary natural and recreational resources of Lake Tahoe.

TRPA spearheaded the Environmental Improvement Program in an effort to better implement the Regional Plan and highlighted it at the Presidential Forum at Lake Tahoe in 1997 when then-President Bill Clinton and Vice President Al Gore signed an Executive Order creating the Lake Tahoe Federal Interagency Partnership. This partnership provided the funding mechanism for the federal share of the Lake Tahoe Environmental Improvement Program. Recognizing that capital investments, research and monitoring were essential components of the Regional Plan, the EIP called for an investment of \$908 million in capital projects and \$58 million in research and monitoring. Partner organizations have invested \$1.6 billion on EIP programs in the Tahoe Basin to date.

The Environmental Improvement Program has identified hundreds of specific projects and programs to be undertaken by more than 50 funding and implementing partners. The projects are focused on improving air, water and scenic quality; forest health; fish and wildlife; and public access to the Lake and other recreation opportunities.

The prime directive of the EIP remains to move the Tahoe Basin closer to environmental threshold attainment. A snapshot of accomplishments include:

- Treated stormwater runoff on 577 miles of roadways
- Managed the installation of BMPs for 14,774 private properties to reduce stormwater runoff
- Completed and planned 25 projects to help restore Upper Truckee River watershed
- Conducted more than 7,600



Former President Bill Clinton and Vice President Al Gore helped kickstart the EIP process.

watercraft inspections for all invasive species and 30,000 check-ins for previously inspected watercraft in 2011

- Performed 4,800 watercraft decontaminations in 2011
- Treated 51,288 acres to improve forest health and reduce wildfire risk
- Inspected approximately 4,000 private properties for defensible space in 2011
- Acquired high-efficiency street sweepers to significantly reduce particulate matter by local jurisdictions and state transportation departments
- Continued to operate a seasonal transit service on the West Shore to connect existing transit services
- Completed or improved 134 miles of bike and pedestrian trails
- Acquired 2,579 linear feet of shoreline for public access
- Constructed or rehabilitated 93 facilities.

Priorities of the EIP

The next 10 years of the EIP will build upon its accomplishments to date, with an increased emphasis on monitoring and focused research, adaptive management, and performance benchmarks. These new areas of emphasis are essential to ensure that the most cost-effective projects are implemented, and to better document and evaluate progress toward meeting environmental thresholds.

Another key priority of the EIP is to implement a new strategy to advance Lake Tahoe's clarity goals. In 2002, the states of California and Nevada began to develop a water quality restoration plan for Lake Tahoe, known as the Total Maximum Daily Load (TMDL), as required by the Clean Water Act. As part of these efforts, the states have issued a "Clarity Challenge," which calls for an improvement in clarity from 70 feet to 78 feet in 15 to 20 years. The TMDL was put into effect in 2011 and the partner agencies are now working together to implement the TMDL.

Other EIP priorities include:

- Achieving the fuels reduction targets in the 10-Year Multi-Jurisdictional Fuels Reduction and Wildfire Prevention Strategy
- Restoring and protecting the Basin's watersheds and stream environment zones;
- Implementing a comprehensive aquatic invasive species management plan;
- Expanding the Basin's transit facilities and bike and pedestrian trail network;
- Achieving the milestones in the Lahontan Cutthroat Trout and Tahoe Yellow Cress Recovery Plans; and
- Improving access to Lake Tahoe and providing quality recreational opportunities.

Tahoe planners look for innovation, incentives

Regional Plan Update promotes continued environmental restoration, redevelopment

By Jeff Cowen

TAHOE REGIONAL PLANNING AGENCY

Local planners, policymakers, residents and other interested stakeholders have been working hard in recent months to hammer out changes to the Lake Tahoe Regional Plan, which governs development and promotes environmental restoration efforts at the Lake.

The new plan would update one that was approved in 1987. The updated plan addresses the new challenges that face Lake Tahoe today, and includes innovative measures to spur new investments that produce environmental improvements. These incentives are designed to inspire homeowners to control erosion on their own properties while encouraging town center redevelopment projects that will help both the lake and the local economy.

“The Regional Plan Update is the blueprint for Tahoe’s sustainable future,” Tahoe Regional Planning Agency Executive Director Joanne Marchetta said. “It will guide how communities evolve, how ecosystems function, whether the transportation network is effective, and whether the Basin is restored and economically sustainable.”

While the 1987 plan was effective at stopping runaway growth, the updated plan focuses on correcting environmental problems associated with past development at the Lake. Recent scientific findings indicate that roadways and previously developed areas contribute 72 percent of the fine sediment that affect Tahoe’s legendary clarity. With that in mind, the updated plan focuses on redevelopment and upgrades to the Tahoe Basin’s aging infrastructure – projects that will do a better job of collecting and removing pollution before it reaches the Lake. To do this, the updated plan creates incentives for environmentally responsible reinvestment while maintaining growth management programs that are working.

Under the updated plan, homeowners could get credit to allow for decks, pervious pavement and small structures



A public boardwalk helps beachgoers in Carnelian Bay enjoy Lake Tahoe without impacting a sensitive marsh area.

like garden sheds if they have their stormwater infiltration measures certified, called BMP certification. Creating a one-stop-shop at the local building department for residential permits is another process improvement the TRPA is proposing in order to encourage more homeowners to upgrade their properties.

Reinvestment in Lake Tahoe’s town centers requires a more sophisticated incentive program because Tahoe’s communities sprung up during the mid-century building boom that favored car travel over walking and biking. For redevelopment to bring significant environmental improvements, more compact buildings that embrace a mix of uses, state-of-the-art stormwater treatment, walkable street frontage and connections to transit are needed.

Town center redevelopment under the plan won’t rely on increased population or substantially more housing units because the development caps put in place by TRPA in 1987 are staying

“The Regional Plan Update is the blueprint for Tahoe’s sustainable future. It will guide how communities evolve, how ecosystems function, whether the transportation network is effective, and whether the Basin is restored and economically sustainable.”

Joanne Marchetta, TRPA Executive Director

intact. Nearly all of the housing units and development rights that would be used in the more compact, mixed-use centers would come from the restoration of homes and businesses that were improperly built in sensitive areas like wetlands and stream environment zones (SEZs) before protections were established.

With a modest package of what are considered bonus unit incentives, privately funded restoration of Lake Tahoe’s natural filters would help reverse the decline of its once-famed clarity.

“This kind of innovative, green reinvestment will put Lake Tahoe back in the forefront of environmental

sustainability and help achieve the Lake’s clarity goals,” Marchetta said.

A draft of the policy updates were the topic of extensive public discussions and public input prompted by TRPA throughout this summer and fall. Additionally, a bi-state consultation process led by Nevada and California environmental agencies brought stakeholders together to come up with recommended adjustments to the plan update.

Since the process began, more than 5,000 people have helped shape it. To learn more about the draft plan and when the updated policies might come online, visit trpa.org.

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Summit points to need for private funds

Annual gathering stresses public-private partnerships to protect Lake

By Jim Sloan

California and Nevada dignitaries, policymakers and lawmakers gathered together in August at the Edgewood Tahoe for the annual Lake Tahoe Summit, which started in 1997 with President Bill Clinton and has been held annually since.

This year's event, hosted by Sen. Dean Heller, R-Nev., focused on public-private partnership, and drove home the need for government agencies to work with private businesses in the effort to restore and protect Lake Tahoe's legendary clarity.

Heller noted that federal funding for research and environmental restoration work at Tahoe was declining and that other methods for funding erosion control work and other water-quality projects needed to be used.

"Public-private partnerships will be critical to the long-term environmental health of the Tahoe Basin," Heller said.

Heller was joined by Nevada Gov. Brian Sandoval, California Gov. Jerry Brown, Rep. Tom McClintock, R-Calif. and Sen. Dianne Feinstein, D-Calif. Sandoval and Brown both made it a point to spotlight the "partnership" between Nevada and California in working toward environmental improvements at Lake Tahoe.

Their comments come on the heels of a Nevada bill passed last year – and signed by Sandoval – that could pull Nevada from the bi-state Tahoe Regional Planning Agency in 2015.

That did not sound likely during the summit, judging from Sandoval's comments.

"Today's Lake Tahoe Summit continues the strong partnership between Nevada and California to preserve the Lake," Sandoval said. "I am pleased that as a result of work begun at last year's Summit, real progress has been made toward an updated Regional Plan, which will provide the roadmap for success in reaching environmental and economic goals. I am optimistic that the recommendations from this effort will be seriously considered and I look



Student conservation award winners line up with Nevada and California dignitaries during the 2012 Tahoe Summit (top). Gov. Brian Sandoval (left) enjoys a laugh while addressing the audience. Gov. Jerry Brown (right) called Tahoe's prospects "bright."

forward to continuing our efforts."

Brown agreed.

"After years of debate, California and Nevada are finally getting their act together," he said. "The prospects for Lake Tahoe are bright."

Feinstein, meanwhile, focused in on what she considers to be the three major threats to Lake Tahoe: wildfire, invasive species and pollution. She pointed to the Tahoe Restoration Act, which Heller joined as a co-sponsor in August, as an important piece of pending legislation to continue the federal commitment to Lake Tahoe.

This summer marked the fifth anniversary of the Angora Fire that destroyed 254 homes and scorched 3,100 acres in the Basin, but forest thinning projects have gone a long way since then toward removing the type of dense, overgrown forests that made the Angora

Fire so difficult to fight. Likewise, an extensive boat inspection program has helped prevent the introduction of such invasive species as the quagga mussel, which have invaded other California and Nevada lakes with disastrous results.

While many political leaders acknowledged the need for more economic investment in the environmental future of Lake Tahoe, McClintock urged TRPA and other regulatory agencies in the Basin to more frequently consider the economic consequences of their decisions.

Heller, meanwhile, noted that despite the funding challenges, work must continue at the Lake.

"Bottom line is we're far from done and it's going to take renewed commitment and that's why we have the Tahoe Summit," he told one newspaper.

Lakeview Commons project opens

Redesigned beachfront offers gathering place, Lake access and environmental improvements

By Karin Edwards

New parks are always a cause for celebration. But when that new park includes a beach at Lake Tahoe, state-of-the-art environmental improvements and facilities for concerts, picnics and small-craft boating, you really have something to cheer about.

The new Lakeview Commons at El Dorado Beach in South Lake Tahoe radically transforms an eroding beach adjacent to Highway 50 into an elegantly designed waterfront area that combines green building, energy and water conservation, and cutting-edge water quality improvements.

"We're really proud of how this project has turned out," South Lake Tahoe Mayor Claire Fortier said during a ceremony in January this year. "And we're grateful for this opportunity for families to come here to picnic and play and to enjoy our Lake. I hope this becomes a focal point in our town."

The park, whose grand opening was June 20, not only gives locals and visitors a place to gather and hear music, see films or go for a swim, it's also designed to dramatically reduce the amount of sediment flowing into Lake Tahoe.

The project is a collaboration between the City of South Lake Tahoe, El Dorado County, and the California Tahoe Conservancy. It's the centerpiece of the community's efforts to develop a sustainable and vibrant environment and economy.

The land was given to El Dorado County in the 1920s by longtime families who wanted it to be used in perpetuity as open space. Although it has always been a popular area for residents and visitors, it's never had the facilities – such as the new plaza and concessionaire building – that will make it a truly popular destination. A few years ago, the county and the City of South Lake Tahoe staged a competitive design contest and began working with the winners, an internationally recognized team of landscape architects and planners, on a plan to redesign the area. The designers



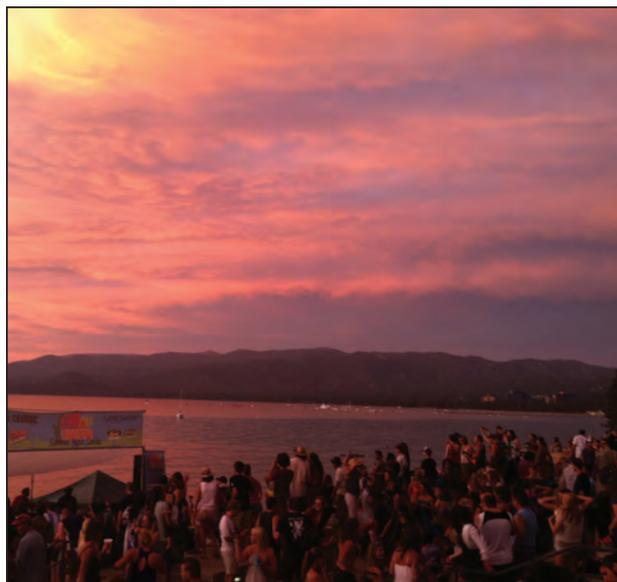
An audience enjoys live music and views at Lakeview Commons, a project that utilizes state-of-the-art erosion control methods to protect Lake Tahoe's clarity.

worked with the local community for nearly two years developing a conceptual plan for the area.

Construction began in earnest in May 2011, and landscaping was installed in the spring of 2012. Native vegetation was used throughout the site. The resulting project enhances scenic vistas to and from the Lake through the use of natural materials.

Some of the improvements to the recreational features of the site include:

- enhanced public beach access;
- storm-water infiltration, pervious paving and stabilization of the bluff to reduce erosion at the Lake edge;
- terraced seating areas for Lake viewing (it's expected to become the best seat in the house for fireworks and community events);
- improved picnic and BBQ areas;
- food concessionaire building;
- a small boathouse for non-motorized watercraft;
- a cantilevered Lake overlook;
- a new waterfront plaza for community recreation;
- an aquatic invasive species inspection station at the existing boat



ramp; and

- plaza-level improvements for day use recreation, including picnic tables, barbecues, seating areas, a bike path, and bike racks.

Former Mayor Kathay Lovell said Lakeview Commons was important for a number of reasons.

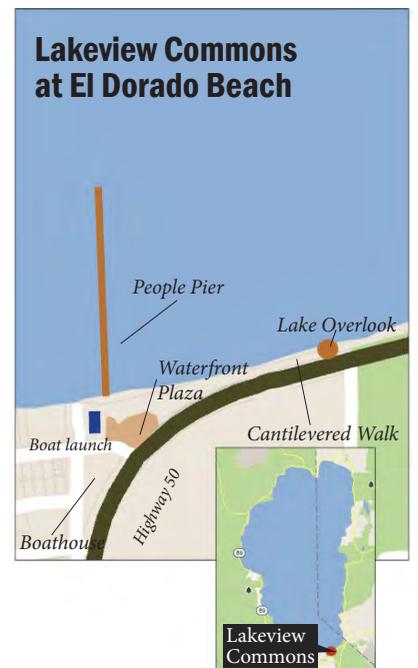
"It's prime lakefront property and we needed a place for our community and tourists to gather and have a venue where they could sit and really enjoy the Lake," she said. "There is nothing else like this at Lake Tahoe."

The successful summer 2012 concert series proved that Lakeview Commons is a welcomed and loved community gathering place.



Lakeview Commons hottest new gathering spot

Lakeview Commons is located in South Lake Tahoe where Highway 50 meets the Lake. Parking is available at the intersection of Harrison Ave and Lakeview Ave, just off of Highway 50.



Threshold report shows gains for Tahoe

Clarity decline slows; improvements in scenic resources, air quality

By Kristi Boosman

TAHOE REGIONAL PLANNING AGENCY

In late April, the Tahoe Regional Planning Agency presented the draft 2011 Threshold Evaluation to the public before TRPA's Governing Board. The comprehensive report offers a snapshot of the ecosystem health in the Tahoe Basin by documenting the status and trends of more than 100 environmental indicators ranging from air and water quality to fish and wildlife.

The Report revealed that the Tahoe Basin made environmental gains in the majority of indicators over the last five years, although water quality continued to be a concern. The evaluation was the fifth published since the adoption of the Regional Plan in 1987, with updated reports expected to follow every four years.

For the first time, an independent panel of scientists coordinated by the Tahoe Science Consortium reviewed the 2011 Report. Dr. James Mahoney, Chair of the TRPA Independent Scientific Review Panel, called the document "a top-level report with no major flaws."

"I would judge this Report, out of the 30 peer reviews I've done, as among the best."

TRPA Executive Director Joanne S. Marchetta said the Report was a milestone for both the Agency and the Tahoe Basin.

"This is a proud day for TRPA," she said, "not only because the majority of environmental standards measured at Lake Tahoe are moving in a positive direction, but because we've raised the bar on the scientific rigor of our work here at the Agency."

Other public officials weighed in on the results of the technical report.

"Lake Tahoe doesn't belong only to Nevada or to California – it belongs to every citizen of the United States," said U.S. Sen. Harry Reid.

Partners in the Environmental Improvement Program, launched in the late 1990s, have invested \$1.6 billion in ecosystem restoration in the Tahoe Basin with water quality investments being one of the highest priorities. The rate of Lake Tahoe annual clarity decline has



A bear hunts for spawning kokanee salmon at Taylor Creek.

slowed over the last decade. The Report states the winter clarity threshold indicator met the interim target of 78.7 feet (2011 measured 84.9 feet) and is trending toward attainment of 109.5 feet. Summer clarity and nearshore conditions remain a concern.

"Lake Tahoe is truly the Jewel of the Sierra and I'm very encouraged to see TRPA's progress toward meeting its environmental quality standards," said U.S. Sen. Dianne Feinstein.

The biggest improvements were in air, average annual water quality and scenic resources. Summer water quality (particularly along the Lake's shoreline), soil conservation and noise are areas of concern, the Report said. Another finding noted the need for improved monitoring and update of environmental threshold standards.

The 2011 Threshold Evaluation spotlights the overall environmental health of the Tahoe Basin.

Some highlights:

- TRPA assessed indicators associated with 151 standards and made a status determination on 92 of them. Of these indicators, 63 percent were attained or implemented and 37 percent have not yet been attained.

- The Report found the Regional Plan, through the partnerships of many federal, state, local and private organizations, has made progress on

improving environmental quality.

- Trends in stream water quality indicated that conditions have not declined.

- Air Quality: The Tahoe Basin made gains over the last five years. The majority of air quality indicators were at or better than adopted standards. Indicators for carbon monoxide and vehicle miles traveled moved from non-attainment into attainment. Federal and state tailpipe and industrial emission standards have likely contributed, along with walkable, transit-friendly improvements such as the Heavenly Gondola in South Lake Tahoe.

- Soil Conservation: Eight of nine indicators related to impervious land coverage were in attainment, although "over-covered" wetlands negatively affect water quality and other resources. Stream zone restoration efforts implemented by TRPA partner agencies are making progress in achieving restoration goals although more needs to be done.

- Scenic Resources: The Basin made gains in scenic quality since 2007. Compliance with standards is at 93 percent with an improving trend in scenic quality for the built environment. Improvements are needed along developed roadways and the shoreline.

- Vegetation: Sensitive plant species



“Those of us who love this Lake, like I do, have a duty to our fellow citizens to protect it. It's important we measure how the environment is responding to our policy actions on the ground and this report shows our collective actions are making a positive, meaningful difference.”

Sen. Harry Reid, D-Nev.



“This report underscores why we have invested in ecosystem restoration for the last 15 years and why we need to reaffirm our commitment to restoring the Tahoe Basin.”

Sen. Dianne Feinstein, D-Calif.

Could crayfish harvest help clarity?

UNR researcher backs commercial fishing of water-clouding invader

By Jim Sloan

Nevada officials recently issued the first ever commercial permit for harvesting crayfish at Lake Tahoe – a move one University of Nevada, Reno scientist says could help improve the clarity of the Lake.

Sudeep Chandra, a leading Lake Tahoe scientist who has studied invasive species and limnology at the Lake for 20 years, said commercial crayfish harvesting at Lake Tahoe could also help the Lake by taking away a food source for other invasive species that threaten Lake clarity and ecosystems.

Commercial harvesting of the estimated 220 million crayfish by the Tahoe Lobster Co. will make the tasty crayfish available to local and regional restaurants.

Kim Tisdale of the Nevada Department of Wildlife said other companies have expressed interest in the commercial harvesting and are expected to apply for permits.

“Our interest is in maintaining a good fishery,” Tisdale said. “We’ll monitor the operations and the effects on the ecosystem. It will be important to see the effects of the harvesting. We’ll be getting monthly reports on the number of crayfish harvested and from which locations.”

Chandra said the signal crayfish, introduced in the Lake in the late 1800s, stimulates algae growth by excreting



A crayfish caught off a dock in Emerald Bay. There are an estimated 8 million pounds of crayfish scattered around Lake Tahoe.

nutrients and grazing on algal cells, some of which are dead, and that opens up room for more algae growth.

“Algae growth is a major factor in Tahoe’s declining clarity. What we are finding is that the crayfish stimulate algae growth,” Chandra said.

Chandra estimates that there could be as much as 8 million pounds of crayfish scattered around the Lake. He is helping the Nevada Department of Wildlife by identifying the best places and practices for harvest.

He’s also been working closely with entrepreneurs who brought the harvest idea forth to public agencies and supports their efforts.

Chandra said a study he did last summer showed the nearshore zone of

Tahoe is the critical area for fish habitat and a place where invasive species, including crayfish and warm-water fish such as the invasive bass, can live. The crayfish thrive in this nearshore and a harvest could have a positive impact.

The harvest involves placing traps on the bottom of the Nevada side of the Lake, from 5 to 250 feet below the surface, and selling the trapped crayfish to restaurants and local meat wholesalers. One California lawmaker has introduced a bill to allow the commercial crayfish harvest on the California side of the Lake as well.

“It can have a positive effect on the economy and the environment,” Chandra said. “And with a little butter and garlic, it’s tasty too.”

Threshold report shows progress on fuels reduction and forest health

Continued from page 20

have been protected, keeping those standards in attainment. Osgood Swamp in South Lake Tahoe, which supports an uncommon plant community, fell short of attainment because of beaver populations. Aquatic invasive species and noxious weeds were identified as threats to uncommon plant communities. Progress is being made on fuels reduction and forest ecosystem restoration.

■ **Recreation:** Both threshold standards have been implemented and are in attainment. TRPA partners have made substantial progress in upgrading

recreational facilities through the Environmental Improvement Program.

■ **Fisheries:** Although TRPA and partner agencies have implemented robust control and prevention programs, aquatic invasive species are a major area of concern.

■ **Wildlife:** Indicators for special-interest wildlife show stable or improving conditions. TRPA’s development regulations have protected riparian wildlife habitats and partner agencies are making progress restoring these valuable habitats.

■ **Noise:** TRPA and the peer review

panel recommended that noise standards and approaches be re-evaluated. The majority of standards were out of attainment.

TRPA and the peer-review panel highlighted data gaps and the need to continue ongoing work to update Basin-wide monitoring programs. The scientific panel made recommendations to include additional analysis to improve future reports.

A copy of the 2011 Threshold Evaluation Report, the Regional Plan Update and corresponding documents can be found online at trpa.org.

Bark beetles trigger haze problem in West

A new study finds that bark beetles, which have bored through more than six billion trees in the western United States and British Columbia since the 1990s, can make trees release up to 20 times more of the organic substances that foster haze and air pollution in forested areas.

A paper reporting the findings appeared in the journal *Environmental Science & Technology*, published by the American Chemical Society.

The study says that western North America is experiencing a population explosion of mountain pine beetles, which damages and kills pines and other trees when they bore into the bark to lay eggs. In a defensive response, gases called volatile organic compounds (VOCs) are released from the bore holes, contributing to the smog and haze that obscures views of natural landscapes in U.S. national parks and other natural areas.

Sierra Nevada still growing, study finds

The Sierra Nevada are still rising, and they’re a lot younger than most scientists previously thought. That’s the conclusion of Earth scientists in Nevada who have used space-based radar and the most advanced GPS measurements to conclude that the entire range is now rising at a rate of one to two millimeters a year - less than an inch a decade - and in its modern form could be less than 3 million years old.

And scientists who have long held very different views about the age of the Sierra Nevada concede the mountains may have undergone a more recent pulse of upward growth, but still maintain they reached their present height many millions of years ago.

Restoring a lost fishery

The Lahontan cutthroat trout was once a dominant fish at Lake Tahoe

By Lisa Heki

U.S. FISH AND WILDLIFE SERVICE

The Lahontan cutthroat trout (LCT) was once the top fish predator in Lake Tahoe. In the mid-1800s when settlers first began arriving at Lake Tahoe, the water was teeming with native cutthroat. These fish, named for the distinctive slash of red under their chins, often weighed in at more than 40 pounds and were easy to catch from shore. Many historic photos show anglers of all stripes, from kitchen workers in aprons to well-to-do gentlemen in neckties, holding up the huge, fleshy fish.

The Truckee River in combination with Taylor, Ward and Blackwood creeks historically provided spawning habitat for Lahontan cutthroat trout occurring in Lake Tahoe. However, the last spawning LCT was observed in these tributaries in 1938.

Here's what happened: After European discovery in the mid 1800s, Lake Tahoe and the Truckee River system became known for its abundant timber and mineral resources. By 1859 numerous lumber mills were established and began having negative impacts on Tahoe's fragile environment. The mills discharged sawdust and other logging debris directly into the Truckee River and silt and erosion runoff from timber clear-cutting significantly degraded water quality. Eventually, these practices choked riverbanks and riverbeds with the debris and ultimately prevented fish passage.

During this period, commercial fishermen also took advantage of thousands of large LCT that made their way each spring from Lake Tahoe into the tributaries to spawn. They set up permanent fish traps on the major tributaries and used gill nets and seines to capture these large fish.

By 1880, overfishing, the damage to the LCT's habitat, and the introduction of non-native lake trout began to take their toll. Commercial fishing was banned in 1917, but LCT in Lake Tahoe did not survive.

LCT outside of the Lake Tahoe Basin also declined. In 1844, there were 11 lake-dwelling populations of Lahontan



Anglers enjoy catching a Lahontan cutthroat trout. This 19.5-pound lake fish was caught at Pyramid Lake recently.

cutthroat trout and 400 to 600 stream-dwelling populations in over 3,600 miles of streams within the major basins of historic Lake Lahontan. Today, they only occur in 10.7 percent of their historic stream habitat and 0.4 percent of their lake habitat.

LCT was listed as endangered in 1970 and reclassified as threatened in 1975. In 1997, during the Lake Tahoe Presidential Forum, former President Bill Clinton and Interior Secretary Bruce Babbitt called for the Lahontan cutthroat trout to be restored to the Lake.

The U.S. Fish and Wildlife Service is working in collaboration with state, federal, tribal and local partners to restore the lake form of Lahontan cutthroat trout to the Tahoe Basin.

The Lahontan National Fish Hatchery Complex in Gardnerville, Nev., has been stocking Fallen Leaf Lake since 2002 with the strain of Lahontan cutthroat trout native to the Tahoe Basin. They have partnered with researchers throughout the past 10 years to improve their understanding of the existing lake ecosystem and used this applied research to continually improve on their conservation strategies. The applied research has demonstrated opportunities for re-establishing this iconic lake species

to Fallen Leaf Lake and Lake Tahoe. The research has improved management strategies for stocking methods, locations and frequency that improves the initial survival of Lahontan cutthroat trout. In recent years, research has documented multiple year survival, improved angler catch rates of Lahontan cutthroat trout, and this year, anglers are catching LCT in Glen Alpine Creek.

Lahontan National Fish Hatchery has taken the experience from Fallen Leaf Lake and applied lessons learned to Lake Tahoe.

A contract research vessel is on the lake throughout much of the year with researchers using hydroacoustic monitoring methods as well as more traditional sampling methods to better understand the existing aquatic ecosystem. Complete hydroacoustic surveys are identifying ecological sub-regions, refining live fish trawling techniques and lakewide surveys of zooplankton.

The lake form of LCT are generally a longer-lived top predator (15-20 years), feeding on any fish species that their mouth gape can accommodate. This year at Pyramid Lake, an angler caught this strain of LCT weighing in at 19.5 pounds at 6 years of age.



Fallen Leaf research provides Tahoe template

The U.S. Fish and Wildlife Service began Lahontan cutthroat trout re-introduction efforts in the Tahoe Basin in 2002 at Fallen Leaf Lake. Fallen Leaf Lake is much smaller than Lake Tahoe, however it has many of the same limnological characteristics, including a similar suite of non-native species.

Working with university partners, the Service has developed a program of adaptive management and methods, which can now provide a template for research in Lake Tahoe.

From a practical research perspective, the clear difference between the lakes is the great depth and size of Lake Tahoe. For this reason, in 2011, the Fish and Wildlife Service began working with the Western Slope research vessel.

The Western Slope crew has extensive experience working with large lake systems in cooperation with conservation scientists. As a first step, during the summer and fall of 2011, the Lake was surveyed extensively with hydroacoustics in order to develop methodologies for deep water scientific surveys.

During 2012, the Fish and Wildlife Service partnered with researchers to conduct a multi-year study of the Lake Tahoe ecosystem. The first year will focus on the dynamics of the deepwater pelagic zone of the Lake, with subsequent years branching out to study connectivity with the shallow and deep water zones.

7 steps to creating defensible space

Basin homeowners can help protect their property from a wildfire

Defensible space is the area between a house and a wildfire where proper vegetation selection and management can reduce the fire threat and help firefighters defend the house. In the Lake Tahoe Basin local fire districts will conduct free defensible space inspections. The following are steps to creating an effective defensible space.

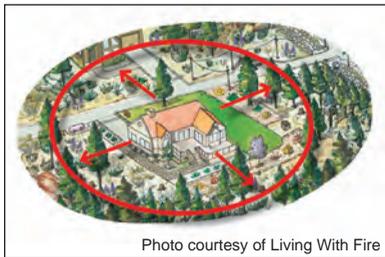


Photo courtesy of Living With Fire

1. Determine the size of an effective defensible space.

Defensible space distance is measured from the base of the house, extending outward from the house in all directions. The recommended distance varies depending on vegetation and lot steepness. Steep lots can require a considerable amount of defensible space while flat lots with little vegetation will require less. Use this online calculator to determine your needs: <http://www.livingwithfire.info/tahoe/beforethefire/defensiblespacezone/calculator.php>



Step 2: Remove dead vegetation.

Dead vegetation includes dead and dying standing trees or recently fallen trees; dead native and ornamental shrubs; dead branches; dried grass, weeds and flowers. Remove fallen needles and leaves regularly within 5 feet of your house and seasonally farther away. Don't let this material accumulate to more than 3 inches deep anywhere on your property.



Photo courtesy of Living With Fire

Step 3: Create a separation between shrubs and trees.

Thin your dense stands of native trees and shrubs, such as Jeffrey pine, white fir and manzanita.



Photo courtesy of Living With Fire

Step 4: Remove ladder fuels.

Vegetation that can carry a fire burning in low-growing plants to taller plants is called "ladder fuel." Lower tree branches should be removed to a height of at least 10 feet. Remove ladder fuels to a height of 5 feet when no understory vegetation is present. Lawn, flower beds and low-growing native ground covers are okay as long as they would not allow a fire to ignite the tree.



Photo courtesy of California Department of Forestry and Fire Protection

Step 5: Create a Lean, Clean and Green Area extending 5 feet to 30 feet from the house.

Eliminate easily ignitable fuels, or "kindling," near the house. This will help prevent embers from starting a fire in your yard. This area is typically the residential landscape which has irrigation and ornamental vegetation, and it's regularly maintained. Erosion-control grasses and wildflowers are good choices for this area.



Photo courtesy of Mike Dannenberg

Step 6: Create a Noncombustible Area at least 5 feet wide around the base of the house.

This area should consist of noncombustible landscape materials and ignition-resistant, low-volume plants. Avoid using wood mulch and flammable plants, such as juniper, within 5 feet of the home. Herbaceous plants, such as lawn, clover, erosion-control grasses, flowers, some ground covers and succulents, should be less than 18 inches tall. Deciduous shrubs should be pruned to remove branches contacting the ground or the house.



Photo courtesy of Living With Fire

Step 7: Maintain the Defensible Space Zone.

This is an ongoing activity. Plants grow back and flammable vegetation needs to be routinely removed and disposed of properly. Before each fire season, re-evaluate your property using the previous six steps and implement the necessary defensible space.

Tahoe celebrates annual Wildfire Awareness Week

The third annual Lake Tahoe Basin Wildfire Awareness Week was held May 26 to June 3. The event, "Wildfire Survival: Your Home, Your Responsibility," promoted homeowner and resident actions that reduce the risk from wildfire to Tahoe homes and communities. Risk can be reduced by upgrading vulnerable home components, creating defensible space around homes, and having a plan in place for evacuation.

Fire-resistant homes have fire-rated roofs, covered vents to reduce the risk of ember intrusion, fire-resistant construction materials and are in good repair.

Defensible space involves selecting and maintaining vegetation near the home, reducing the risk homes will ignite. Successful evacuations require having a plan in place and an evacuation kit.

Fire agencies and local organizations have collaborated to empower Tahoe Basin homeowners and residents through community clean-up days, free chipping and pine needle pick-ups, evacuation drills, and educational activities including a webinar series. A postcard with defensible space tips and other safeguards was mailed to all 39,000 Tahoe Basin residential property owners.

The six-part webinar series was webcast in May and June, providing wildfire risk-reduction strategies including conservation landscaping, home upgrades and emergency preparedness.

Sessions were held on how to work with fire departments, land management agencies, neighborhoods and communities and on the fire risk-reduction activities being conducted in the basin by the U.S. Forest Service.

University of California Cooperative Extension advisor Susie Kocher, coordinator of the webinar series, said the difficulty in reaching Tahoe second-home owners led to the relatively new webinar approach.

Recordings of the webinar sessions are available at the webinar homepage at <http://ucanr.org/tahoe/firewebinar>. For resources on how to upgrade homes or create defensible space in the Tahoe Basin check the Living with Fire website at <http://www.livingwithfire.info/tahoe> or contact Susie Kocher at 530-542-2571 or sdkocher@ucdavis.edu.

Best in Basin Awards

Building and restoration projects that set new standards for Tahoe

By Jeff Cowen

TAHOE REGIONAL PLANNING AGENCY

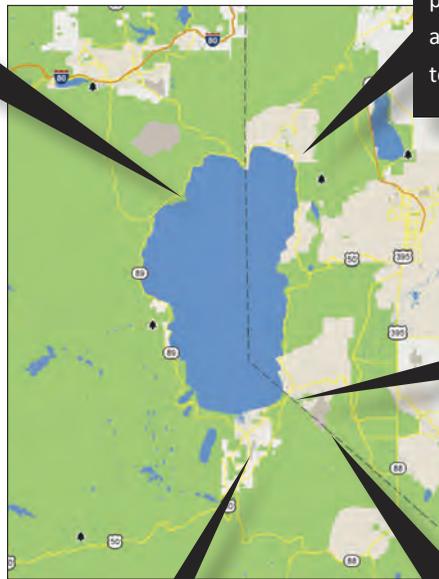
The Tahoe Regional Planning Agency annually recognizes the projects that demonstrate exceptional planning, design and compatibility with the Lake Tahoe environment. Here are a few of the projects that received a Best in the Basin award for 2011 and why they rose above other projects in their categories.

Erosion Control Project:

Lake Forest

This project restored wetlands and floodplain in a highly disturbed Lake Forest watershed east of Dollar Hill. The project rescued Lake Forest Creek from storm drains and returned it to a restored meadow. Culverts along the restored creek were designed with natural stream bottoms to re-create fish habitat. Only weeks later, Kokanee salmon were seen swimming over the gravels of the new culvert.

Boardwalks and foot bridges enhance recreational access while protecting the meadow.



Green Building Project

Miller residence, Incline Village

One of the first homes in the Region to qualify for the U.S. Green Building Council's LEED certification. Green materials include paint with no volatile organic compounds, concrete countertops, advanced insulation, air exchange equipment, high-performance windows and blinds, and smart technology throughout to monitor energy consumption.



Recreation Project:

Van Sickle Bi-state Park

One of the nation's first bi-state parks, Van Sickle covers nearly 700 acres and provides easy access from Stateline casinos for hikers, mountain bikers and equestrians. A connector trail reaches to the Tahoe Rim Trail. This project included restoration of more than 4,000 square feet of stream environment zone. (See story on page 20.)

Restoration Project:

Upper Truckee River Restoration, Airport Reach

This is the largest river and stream environment zone restoration project to date in the Tahoe Basin, and is a lynchpin in the effort to completely restore the Basin's largest river and conveyor of runoff to Lake Tahoe. The project transformed this section of the river from a straight-and-deep, manmade channel – constructed in the 1950s to make way for an airport runway – to shallow, man-made meanders that help slow the river, control erosion and allow greater filtration and groundwater recharge. The restoration supports outstanding and long-missed habitat for native vegetation as well as fish and wildlife. (See story on page 14.)



New Commercial Project:

Tamarack Lodge, Heavenly Mountain Resort

The main inspiration for the design of the mid-mountain day lodge at the top of Heavenly's gondola came from the ski lodge designs of years gone by that were simplistic in form but elegant in the detailing. The design needed to accommodate the severe logistics of constructing a 15,000-square-foot structure at 9,150 feet above sea level with limited vehicle access

and a very limited construction season. The resulting clean, elegant and dramatic wood structure blends into its surroundings while providing a striking contrast with the snow and sunlight. The site was carefully chosen to accommodate skier and visitor circulation, maximize views, allow passive solar gain and to minimize tree removal. This building achieved the Silver Level of the U.S. Green Building Association's LEED certification.

