

UC DAVIS TAHOE ENVIRONMENTAL RESEARCH CENTER

SUMMER 2014

THE TAHOE ENVIRONMENTAL RESEARCH CENTER (TERC)

is a global research leader providing the science for restoring and sustaining Lake Tahoe and other treasured lakes worldwide for over 50 years.

TERC educates the next generation of leaders and inspires environmental stewardship in thousands of students, community members and visitors annually through its outreach centers in Incline Village, Nevada and Tahoe City, California.



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SCIENCE TO SAVE THE LAKE



GRADUATE STUDENT Derek Roberts testing new instruments to establish the first real-time Nearshore Monitoring Network to guide restoration of Tahoe's shoreline and beaches

RESEARCH UPDATES

NEARSHORE NETWORK LAUNCHING IN AUGUST

TERC has been working to launch a world-first, real-time nearshore network at approximately 20 sites around the Tahoe basin. The first six stations, spanning both California and Nevada, are scheduled to be installed in August. Each station measures water temperature and conductivity, turbidity, algal concentration and dissolved organic material. Additional sensors can be added in the future as additional funding is acquired. Measurements are taken continuously (day and night) allowing TERC researchers to understand what is driving nearshore quality changes and to quantify differences around the lake. An underwater cable supplies power to each instrument and collects the data to be instantly displayed on the internet. The data will be part of new exhibits at our Tahoe Science Center.

Funding for this project (along with access to docks) is being provided through a unique partnership between lakefront property owners, private donors in the Tahoe basin, instrument manufacturers and TERC. Each

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LETTER FROM THE DIRECTOR

world? The best estimate is 200-300 million, although most of them are tiny. When we look at those lakes with an area of Lake Tahoe or larger, the number quickly shrinks to about 200. Regardless of size, what all lakes have in common is that they are rapidly changing, due to some combination of climate change, human population pressures and introduced species. And the changes are rarely for the better.

What makes Tahoe unique is that it has a long and detailed record of ecological and water quality change, and that has allowed scientists to inform and guide restoration efforts. The decision to divert all sewage outside the Tahoe Basin in the 1960's was made on the basis of research. Similarly research has revealed the underlying causes of the dramatic clarity decline, and so restoration efforts can now be better targeted and more effective. Lake clarity data



GRADUATE STUDENT Derek Roberts prepares the Nearshore Monitoring Network equipment for launch

show that this approach is working.

One area where recovery has not been observed is the nearshore zone, where algae-covered rocks, turbid waters and rising temperatures are encountered by all users of Tahoe's beaches. Unlike mid-lake clarity, where decades of research could be used to develop solutions, research on the nearshore has been confined to documenting the extent of the problem. Until now.

This summer TERC, in partnership with property owners and donors from around the lake, is launching the Nearshore Network. This is just the latest example of how private citizens are making the difference in research and stewardship efforts at Lake Tahoe. Comprised of a set of approximately 20 sophisticated instruments located on the lake bottom at a depth of 7 feet, the instruments continuously measure the key water quality variables in the nearshore and transmit the data to a publicly accessible database. The first 6 stations will be deployed by the end of August, and with the help of new donors the set can be fully built out in less than a vear.

What will the network tell us? One thing is the minute-by-minute changes in water quality in the nearshore. By linking the results to the network of weather stations, stormwater stations and stream stations, along with our routine lake



GEOFFREY SCHLADOW, Ph.D., Director Tahoe Environmental Research Center

monitoring efforts, we can start to pinpoint the precise causes of nearshore degradation. Once we know that, the fun begins with the search for solutions.

When combined with TERC's long-term nearshore monitoring, and with research being conducted by our collaborators at other research institutions, for the first time we can say that the nearshore is starting to get the systematic attention that it has long deserved.

RESEARCH UPDATES (Continued from Page 1)

donor is supporting the operation of a nearshore sensor for the next several years, and making possible the collection of a consistent water quality data set for the areas of the lake that most people interact with.

We are actively seeking additional partners. If you, your homeowners association, or your business is interested in funding a nearshore monitoring station, please contact TERC Director Dr. Geoff Schladow at gschladow@ ucdavis.edu and see insert for additional details.



SIX NEARSHORE MONITORING NETWORK instrument transportation cases and cables aligned in the Tahoe City Field Station. The instruments will be deployed in August.



RESTORATION PLANTING activities above Tunnel Creek coordinated by forest ecologist Patricia Maloney

CONSERVATION AND RESTORATION OF SUGAR PINE IN THE LAKE TAHOE BASIN

For more than a century, logging, fire suppression, and the invasive fungal pathogen that causes white pine blister rust have influenced populations of sugar pine (Pinus *lambertiana* Dougl.). These disturbances can affect the population dynamics and genetic diversity of the species. Forest ecologist Dr. Patricia Maloney is overseeing two sugar pine restoration projects at Sugar Pine Point State Park in California and on Nevada State Park lands

between Tunnel Creek and Sand Harbor. The sugar pine population in the Tahoe Basin is at a high risk due to white pine blister rust, negative population growth, and low genetic variation as a result of the Comstock Era logging. The restoration efforts are not solely about numbers—Dr. Maloney and her team's long-term goals are to restore genetic diversity and improve disease resistance. They have planted hundreds of genetically diverse sugar pine seedlings at both sites. To date they have had 54% seedling survival at Sugar Pine Point but only 16% survival on the east shore location. The Tunnel Creek area will require supplemental plantings that are planned for 2016. With the new seedlings and long-term monitoring of the sites, Dr. Maloney hopes to see Tahoe's sugar pines make a comeback.

EDUCATION AND OUTREACH

NEW STUDENT FIELD TRIPS

UC Davis staff and volunteer docents educate thousands of visitors each year, including about 4,400 local students from around the region. Students come to the Tahoe Science Center for themed field trips, investigating scientific topics relevant to Lake Tahoe including geology, landforms, water cycle, and food webs. This form of place-based education helps students tie concepts to the place they live creating connection to both the place and the topic.

This past year the TERC education team leveraged a National Science Foundation grant, plus supplemental funding from the Thomas J. Long Foundation and the Tahoe Truckee Community Foundation, to partner with curriculum development experts from the UC Berkeley Lawrence Hall of Science and develop an



LAKE TAHOE AQUATIC FOOD WEB may get messy, but because students have built the model themselves, they are able to interpret what they have made

exciting new curriculum for our themed field trips.

We have developed new curriculum, technologies, and visuals to engage students on the topics of food webs and lakes around the world.

The topic of the "Lake Tahoe Aquatic Food Web" has been reworked and instead of just telling the story of the historical and current food web of Lake Tahoe, a class that comes for



LAKES OF THE WORLD are compared when students line up according to lake depth, surface area, volume and discover the various uses and threats at each of their lakes.

an ecology field trip has the opportunity to construct the food web model on their own. Since the students build the model themselves they are able to interpret the data and make predictions regarding changes to the food web.

Additionally, a new "Lakes of the World" field trip aims at educating students about how lakes are formed, where they are located, and how these freshwater resources are both used and threatened around the world. This field trip employs the use of 3-D technology. The students are able to soar high above the earth in our 3-D theater to see the location, shape, and bathymetry of each lake, and learn about the lake as they take a virtual trip to visit new places.

For more information or to inquire about a field trip please visit http://terc.ucdavis. edu/ed-outreach/ed-programs/ field-trips.html or contact TERC education and outreach director Heather Segale at (775) 881-7562 or hmsegale@ucdavis.edu.

EDUCATION AND **OUTREACH** (Continued from Page 4)

DOCENT SPOTLIGHT

In June 2014, more than 20 new volunteers joined for the annual TERC Docent Training program. These enthusiastic new volunteers joined our existing docent group to provide the best science education for visitors to the Tahoe Science Center or Eriksson Education Center. We greatly appreciate their contributions of time and energy.

If you are interested in volunteering as a docent

for TERC, please contact Alison Toy, Docent Program Coordinator, at (775) 881-7566 or antoy@ucdavis.edu.

NEW TERC WEBSITE

You may have noticed that the TERC website has a new look with new information available. Visit us at http://terc.ucdavis. edu and give us your feedback at tercinfo@ucdavis.edu.



VOLUNTEER DOCENTS gather aboard the UC Davis Research Vessel to study Lake Tahoe

WHERE IS THE TERC DIRECTOR?

TERC director Dr. Geoff Schladow is often hard to find – he's not at Tahoe and he's not in Davis. In the last 12 months he has been working on 5 continents, building collaborative partnerships with lake researchers across the world. In July he traveled to the Physical Processes in Natural Waters Conference in Trento, Italy, where he presented a paper on the impacts of climate change on Lake Tahoe, along with TERC alumnus Alex Forrest.

He visited Lake Garda, the largest lake in Italy, Lake Tovel, a lake famous for turning bright red every spring, and Lake Iseo, bordering the famous Franciacorta sparkling wine district. Collaborative research projects are being planned with Dr. Marco Toffolon of the University of Trento and Dr. Marco Pilotti of the University of Brescia. Central to the research is how science is incorporated into management decisions in both countries.

In September he will return to Chile with UC Davis Provost Dr. Ralph Hexter to visit the Universidad Austral de Chile in Valdivia. Dr. Schladow is the UC Davis representative for an MOU with this University, which is known for having the first limnology program in Chile. Under the MOU there will be exchanges of graduate students and researchers between the two institutions to further limnology and other environmental studies in both regions.



GEOFF SCHLADOW at a pair of high altitude lakes in Italy's Dolomites with many similarities to Sierra lakes

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STAFF HIGHLIGHT: JOHN REUTER RETIRING

With some sadness, TERC announced the retirement of Associate Director and longtime Tahoe researcher Dr. John Reuter. John's work in Tahoe began in 1978 when the organization was still called the Tahoe Research Group.

John entered UC Davis as a Ph.D. student 36 years ago, researching periphyton (attached algae) in Lake Tahoe. His accomplishments include contributing to over 180 scientific publications and technical reports, initiating a three-year water quality monitoring program after the Angora Fire, and discovering that watercraft were the primary source of the fuel additive MTBE to lakes. He headed a team of scientists from universities, federal and state agencies, local government, and private consulting firms in a \$10 million effort to develop a water quality restoration

plan for Lake Tahoe under the guidelines of the federal Clean Water Act. The plan, now known as the clarity TMDL, was approved by the EPA and signed by the Governors of California and Nevada in 2011. John also served as the principal investigator for an EPA project that enabled the Pyramid Lake Paiute Tribe to successfully establish its own water quality standards for Pyramid Lake and the Lower Truckee River, a project that was one of the first of its kind in the US.

Beyond his many scientific accomplishments, possibly his greatest contributions to Lake Tahoe have been his dedication to working collaboratively with other researchers from institutions across the globe, and the passion that he brought to elevating the role of science into decision making in the Tahoe basin. Lake Tahoe would not be on its present trajectory of recovery had John not spent decades convincing agency managers to not only trust science, but to actively seek it out.

"Working with my colleagues at TERC, the support, camaraderie and friendship over all these years has been a huge gift," John says. "It will be these relationships that I'll always remember." And we at TERC thank John for his hard work and dedication, his mentoring of generations of students and junior researchers, and bumping heads when needed.

As for John's retirement plans, he quotes the great Yogi Berra: "when you come to a fork in the road, take it."



JOHN REUTER begins his career as a scientist with Dr. Charles Goldman (left) in 1982 with pioneering work on attached algae



RETIREMENT PARTY for Dr. John Reuter (middle) with colleagues Dr. Goloka Sahoo and Dr. Shohei Watanabe

STAFF HIGHLIGHT: ZACH HYMANSON

ERC welcomes Zach Hymanson as our new Associate Director. Zach comes to us with 26 years of experience working in technical and management positions in the California State government. Much of his work has occurred at the interface between science and policy, focusing on the development of sound technical information for use in management decisions and policies. Before joining TERC, Zach served as the natural resources program manager at the California Tahoe Conservancy. Prior to this assignment, he served as the founding executive director of the Tahoe Science Consortium.

Zach's initial assignments as TERC's Associate Director will focus on maintaining and expanding TERC's interactions with Tahoe Basin agencies and stakeholders managing the Lake Tahoe Interagency Monitoring Program (LTIMP), and assisting in public outreach. He also will undertake activities associated with program development and new initiatives.

Zach has a B.S. in biological sciences from UC Davis and an M.S. in marine ecology. In his free time, Zach enjoys hiking, backpacking, fishing, scuba diving, and traveling to far-away places. A native Californian, Zach was raised in the San Francisco Bay Area. He has resided in Tahoe City for the last 12 years with his wife, Tamara, and their dog, Maddie.



ZACH HYMANSON is the new TERC Associate Director

ALUMNI SIGHTINGS



UC DAVIS Tahoe Research Group alumnus Hans Paerl working on blue-green algal blooms at Lake Taihu in China

TERC VISITORS

ERC continues to attract visitors from around the world. This year we have welcomed the following visitors:

Mr. Singye Tshering from the Kingdom of Bhutan spent a month working with Brant Allen and Katie Webb on lake monitoring. A long-term collaboration is being planned.

Dr. Luciana de Souza Cardoso from the Universidad Federal do Rio Grande do Sul, Brazil, returned for 3 weeks. Luciana is helping TERC staff identify the changing zooplankton community in Lake Tahoe

Dr. Bruce Hargreaves from Lehigh University, Pennsylvania, returned to assist in setting up the Nearshore Monitoring Network.

TERC's education center also hosted groups of visitors from Chile, Colombia, Mexico, and more.



AUGUST 9, 2014: The 15th annual *Children's Environmental Science Day* will be held from 1 - 4 p.m. in Incline Village. This free community event for children ages 6 and up includes hands-on science activities, games, crafts, and demonstrations to provide an opportunity for young and old alike to learn about environmental and Earth science. Come learn with your child!

AUGUST 14, 2014: The 2014 State of the Lake Report will be available at http://terc.ucdavis.edu/news/ stateofthelake/

AUGUST 14, 2014: Join Dr. Geoff Schladow for an entertaining public *State of the Lake* presentation about the most important factors that affected the health of Lake Tahoe last year. Hear about the most pressing issues for this year, and the new programs that are designed to address them.

AUGUST 19, 2014: The 18th annual *Lake Tahoe Summit* hosted by Senator Feinstein will be held on Tuesday, August 19 at the Valhalla Estate in South Lake Tahoe. The theme and focus this year will be "Drought, Wildfire, and Invasive Species: Confronting the Effects of Climate Change on Lake Tahoe." For more info and to RSVP, please register online http://www.tahoefund.org/events/.

OCTOBER 16, 2014: Join Dr. Rick Grosberg, founding director of the UC Davis Coastal and Marine Sciences Institute, for a presentation on *Family Values: Lessons from the Rest of Life.*



SCOTT HACKLEY showing algae-coated rocks at Children's Environmental Science Day

DECEMBER 4, 2014: Join Benjamin Hatchett, atmospheric scientist, University of Nevada Reno, for a presentation on *Mountain Weather and Climate in the Sierra Nevada* and how weather and climate defines our past and future landscapes.

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