DRI NEWS

Summer 2003

Wild About Tahoe

Mary Cablk is learning how some four-legged residents enjoy the Tahoe resort scene.

Residents know, and visitors agree, that the Lake Tahoe Basin has it all, all the time. Its beaches beckon in the summer, its slopes call in the winter and its trails, spring or fall, bring you face to face with nature at its best. Crisp air, clear waters, incredible views—Tahoe is, put simply, a beautiful place to be.

But we bipeds aren't the only ones who live in and love it. And while other DRI researchers investigate how to preserve the quality and clarity of Tahoe's famous blue waters (see sidebar on page 3) Dr. Mary Cablk stands alone among her DRI colleagues in her focus on the wildlife of the Tahoe basin. "Most people aren't aware of it, but there are ermine, weasels, flying squirrels—a lot of interesting wildlife in the area." Cablk, though, has a favorite, or at least a research favorite, Martes americana, the American Marten.

Simulating a pine marten. Dr. Mary Cablk tests her pine marten photo studio by triggering the beam to trip the camera shutter after placing frozen, hormone-free chicken in the bait trap.

The American Marten is a forest dwelling member of the mustelid family, a group that includes weasels, ferrets, mink, wolverine, badgers, skunks and otters, among others. Their soft, thick fur has made them a target of trappers over the years, and as with most species, habitat degradation has taken its toll. Once found in a broad belt across the forested parts of northern North America, they now inhabit pockets throughout this region.

Like most mustelids, the marten is an omnivore. "Here in the Sierra they eat a lot of squirrels, snowshoe hares, chipmunks and birds if they can catch them," Cablk says. About the size of a large housecat, martens look deceivingly lovable, with their inquisitive eyes, perky ears and bushy tails. But it's best, warns

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IN THIS ISSUE:

Caught in the act. A Heavenly Valley pine marten is photographed taking a chicken wing from a wire trap after tripping the camera beam coming from the gray box (bottom left). Though they look cute and cuddly, the fierce glare hints at their tendency to become all teeth and claws if provoked.

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Cablk, not to forget their curved claws and sharp teeth. "They are proficient predators. You handle them with thick gloves and a lot of caution."

Cablk knows martens better than most, having spent the past two years tracking and observing them for a project sponsored by the United States Forest Service and Heavenly Ski Resort. The goal is to gain a better understanding of just how common martens are in the area encompassed by the resort, and how they use the intact and developed habitat they occupy. At issue, she says, is the need to assess how expansion at the resort and increasing year-round use of the area by bikers and hikers might impact wildlife populations. "The American Marten isn't endangered," Cablk explains. "But it's a 'species of concern' to the Forest Service, meaning their distribution seems to be shrinking. They want to keep an eye on them."

That's precisely what Cablk has done. Using tree-mounted bait—martens like road-kill, according to Cablk, but organic, hormone-free chicken is a lot easier to get—and a concealed camera tripped by an infrared beam, she has captured hundreds of images of the area's martens as they sneak a meal. In the process she's gathered positive proof that there are active martens in the area. More proof comes from using track plates: long narrow boxes baited at one end and lined with contact paper at the bottom. When martens (or other wild visitors) scamper their dirty feet across the contact paper, they leave tracks and a record of their presence.

As valuable as these methods are, Cablk wanted a way to get to know the martens' behaviors beyond the bait box. "I was really interested in evaluating the use of snow tracking for this kind of study. It could be an excellent way to find out not just where the martens are, but what they're doing." Snow tracking is simple enough in theory. Immediately after a snowstorm, you don snowshoes or skis, head into marten habitat and follow the tracks. "If you find tracks, you know the martens are there for their own reasons, not because you lured them." It's simple in theory, but not always easy to pull off.

"I didn't know how well it would work. For one thing, you have a limited window to survey before the resort opens and the fresh snow is disturbed. There are avalanche dangers in the backcountry. The area to cover is so large you may never see the tracks that are there, and your success is further dependent on how often it snows."

Despite those challenges, Cablk says the method worked remarkably well, providing excellent data on where and when the martens were active. She learned

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Heavenly view. From an elevation of more than 9000 feet above sea level, Heavenly Ski Resort's outstanding lake views probably don't impress the pine martens, but they do attract skiers. Martens, like bears, seem to be adapting to the foraging opportunities in garbage and handouts from humans. Cablk says the area's whitebark pine ecology would not traditionally be considered a good marten habitat, but her research found them to be quite active here.

(Photo by Dr. Mary Cablk)

Teaming up for Tahoe

If you visit Lake Tahoe anytime soon, you're likely to see them. They might be driving along the road, boating near the shore or hiking on a streamside trail. They'll seem like ordinary people enjoying one of the world's most extraordinary outdoor recreation areas. But they're not vacationers, they're researchers. And they're not just enjoying the beauty of the lake, they're studying it.

Over the past several years, more and more of DRI's scientists have turned their attention to the imminent environmental problems of Lake Tahoe. At stake, particularly, are Tahoe's famous blue waters, whose clarity has been declining at an alarming rate. Much of that decline can be attributed to sediments entering the lake, literally muddying the waters, and nutrients, like phosphorous and nitrogen, encouraging the growth of water-clouding phytoplankton and algae. The complex ecology of the Tahoe Basin makes it a perfect fit for DRI and its broad-based, multidisciplinary approach to environmental research. Tahoe is lucky to be having regular visits from these researchers, as they turn science to the task of preserving a legendary lake. Here are summaries of a few of DRI's Tahoe-based projects focusing on the problem of sediment and nutrient loading—how it enters the lake, and how we might be able to stop it.

–Jackie Allen

At the Surface

Dr. John Tracy, Dr. Jim Thomas and Todd Mihevc are currently involved in a long-term collaboration with researchers from the University of California, Davis that focuses on how surface water runoff contributes sediment and nutrients to the lake's waters. With more than 30 automated samplers located around the lake, they will investigate how different land uses—commercial, residential, recreational—and different land types—various vegetation covers, soil content—influence the amount of water-clouding substances entering the lake via surface sources.

What Lies Beneath

In another joint project with UC Davis, Tracy, Thomas and Mihevc will be looking at how those same substances may be entering Tahoe via groundwater. Although no sediments enter the lake via this source, groundwater does bring in nutrients, as water from settling ponds and other standing sources recharges the groundwater and eventually reaches the lake.

On the Road Again

Thomas and Mihevc are addressing yet another sediment and nutrient source through a project with the Nevada Department of Transportation. In this study they are evaluating the effectiveness of various methods of removing sediments and nutrients from highway runoff in the basin. These methods include "sealing" roadcuts with netting, rock, vegetation or other materials; treating or filtering runoff from paved surfaces; and using traps and basins to remove sediment from runoff water. The researchers are particularly interested in how well these methods remove smaller particle sizes that are not only a greater cause of clarity problems, but also carry some of the nutrients required for algal growth.

In the Shallows

Dr. Kendrick Taylor has focused his investigation of Tahoe on the causes of clarity loss close to shore, reasoning that this near-shore zone is the first portion of the lake impacted by most incoming pollutants and will be the first portion to respond to restoration activities. His goals are to identify which sections of the shore are contributing the most clarity-degrading particles and the composition of those particles. Taylor works from a specially designed research boat instrumented to collect and analyze data "on-the-float," essentially mapping the near-shore water quality. Preliminary results have identified several short sections of the shore that are causing most of the sediment and nutrient-loading problems.

Out of Thin Air

In collaboration with the California Air Resources Board and UC Davis, Dr. Judith Chow, Dr. Hampden Kuhns and Dr. Vicken Etyemezian of DRI and Dr. Chris Damm of Sierra Nevada College are approaching the problem of Tahoe water quality from above. That's because atmospheric deposition—air pollutants that eventually reach the water—also contributes to Tahoe's clarity problems. Chow, Kuhns and Etyemezian are applying a hybrid approach that includes direct measurement of pollutants collected on filter media using samples located throughout the basin, including buoy stations on the lake's surface. The investigators and student research assistants are looking at the levels of motor vehicle exhaust, road dust and wood-burning emissions in the basin. Motor vehicle exhaust will be collected using roadside sampling devices and the effects of wood burning will be determined through the use of controlled burns as well as sampling directly from residential wood-burning appliances. Road dust emission are being measured with the new DRI-designed TRAKER system, a specially equipped vehicle that monitors, measures and analyzes airborne particles on-the-fly as they are kicked up by the front tires.

Under Cover

Tim Minor and Dr. Mary Cablk are using high-resolution satellite images to map the amount of surface area in the Tahoe Basin that doesn't allow snowmelt and rainfall to soak into the ground. This "impervious cover"—things like paved roads and parking lots—goes hand-in-hand with development and adds to the runoff of silt and nutrient-laden water into the lake.

Into the Woods

The adjacent watersheds of the Tahoe Basin are important factors in addressing clarity problems—what flows through the creeks and streams of the surrounding forests eventually reaches the lake. This summer, Dr. Gayle Dana, Dr. Rick Susfalk, and Dr. Paul Verburg will investigate Incline Creek and Third Creek watersheds in the northeastern part of the Tahoe Basin, looking at how different land uses and types—golf courses, ski resorts, residential communities, undeveloped forests—influence nutrient and sediment loading. Dana is also involved in a project measuring and monitoring evaporation from Lake Tahoe.

The Incline Creek Experimental Watershed
Nevada researchers have lots to learn from one little stream.

Ask DRI's Dr. Rick Susfalk what he and others at DRI, the University of Nevada, Reno, and the University of Nevada, Las Vegas want to know about the Incline Creek watershed and he'll tell you, "a little bit of everything." Susfalk is part of the Incline Creek Experimental Watershed (ICEW) project, a joint effort with the goal of collecting a broad set of background data on this particular area within the Lake Tahoe Basin. It's the group's hope that other researchers can then use the data to identify areas for subsequent, more in-depth, studies.

Susfalk, along with DRI's Dr. Gayle Dana, recently organized one component of the study, a snow survey to help investigate how watershed properties might affect the snowpack, and to collect data for Dana's computer model predicting snowmelt runoff and chemistry. "We try to take the survey at the point of maximum snowpack depth, but this year, with early rains and late snowstorms, our early April date was probably off."

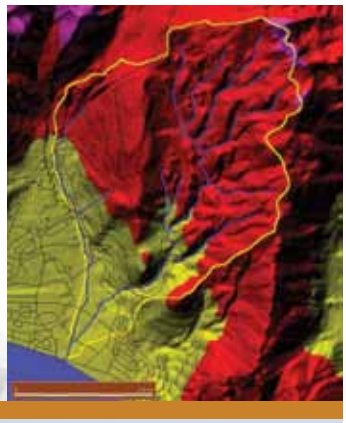
Other components of the ICEW include looking at the effect of vegetation types on the soil solution; monitoring mercury concentrations in water, plants and soils; assessing changes in water chemistry at varying stream levels and locations; and studying macroinvertebrates (those are bugs, Susfalk says) as indicators of stream health.

Why concentrate all this attention on this particular watershed? Location, location, location, according to Susfalk. "The Incline Creek Watershed sits on the gray granite soils so typical of the Tahoe Basin," Susfalk says. "The only other well-studied watershed in the Basin is on andesite-derived soil, which isn't nearly as common, and soil-type can have a large impact on water quality." The area also contains both urbanized areas—Incline Village, Nevada—and undeveloped forests, providing researchers with the opportunity to contrast the areas. Finally, there is easy access from the highway, and a rich history of stream data from the U.S. Geological Survey and the Nevada Department of Environmental Protection.

And finally, learning more about the Incline Creek Watershed can make a difference to Lake Tahoe itself. "There's something interesting that's happening here in terms of nutrients and sediments being delivered to the lake," Susfalk says. "The more we know, the more we can help."

Additional information is available at http://inclinecreek.dri.edu

–Jackie Allen



Incline Experimental Watershed in the Lake Tahoe Basin (above)
(Graphic by Dr. Rick Susfalk)

Incline Experimental Watershed volunteers. Sampling in the experimental watershed started as a federally funded project, and is now continued as a volunteer effort by area scientists interested in keeping the data current. A dozen volunteers turned out on April 14 for the annual spring snow sampling trek. Here, Christine Kirick (standing), a former graduate research assistant at DRI and now a Reno area consultant, and Chris Ennes, Nevada Department of Transportation hydrologist, take a snow core with a device called a federal sampler. The density of the snow in a number of cores obtained from around the watershed is used to calculate the water content of the snowpack.

(Photo by Dr. Rick Susfalk)

Mapping martens from space. Using a global positioning system tracking device, Cablk was able to map the movement pattern of martens in one section of Heavenly by following fresh marten tracks immediately after snowstorms. The track area, indicated by dotted area on the first habitat map above, is located near East Peak Lake, one of two reservoirs that supplies water for Heavenly's snowmaking operations. Cablk says the tracks sometimes disappeared into natural openings in the snow where the martens access tunnels they create that allow them to travel and hunt out of sight.

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in what areas they tend to move about above ground and where they were likely to duck into a hole and travel beneath the snow. Moving about in the marten's element also led to clues of their predation habits (feathers, fur, etc.) and to the opportunity to collect and preserve scat for future analysis.

While much of Cablk's work was done up close and personal, she also made good use of some far-off technology. Her snow tracking was given an added boost by GPS data that helped fix exact locations of the tracks and other evidence of marten activity. And she used high-resolution satellite imagery to delineate specifically the various habitat types within the Heavenly area. "Basically, this helps me say to the sponsors, 'This is the extent of habitat you have here; but we still need to know how the martens are using those habitats.' "

And Cablk found that martens use it all. "Really, most of Heavenly can be considered suitable marten habitat to some degree, although it will take more research to determine which parts are most important for them." While it was no surprise to find them in the wooded areas, she says they are also active at higher elevations where timber is thin and were even found to cross the ski runs.

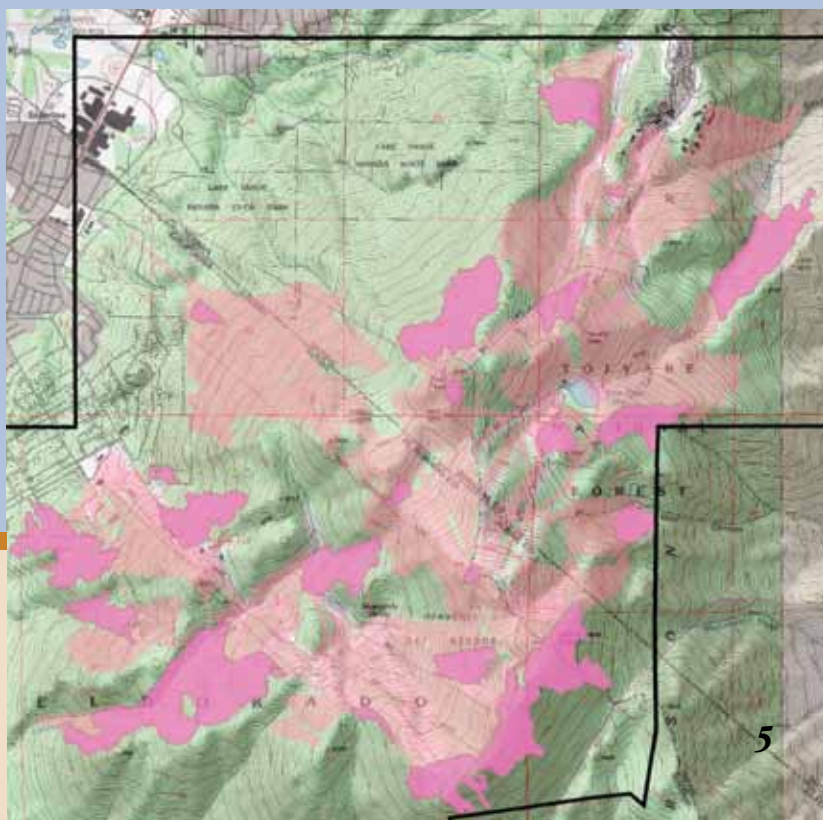
The martens of Heavenly, it seems, are adaptable and will take advantage of the opportunities that the area offers them. That's not always a good thing. "One marten seems to patrol the ground beneath the high-speed gondola lift," Cablk says, "and I hypothesize that it has something to do with trash." Indeed, martens are often seen at trash areas, and one is a frequent lunchtime guest of the ski patrol hut at one of the higher stations. "My thinking is that martens are not unlike bears in this sense," Cablk explains. "They are opportunistic. They can be habituated somewhat toward human activity. But because they're small, people just don't notice them as much. It's a function of the urban/wildlife interface, and it's not going to change."

But Cablk's work might at least help. The study has already had the fringe benefit of raising awareness at the ski resort, where an informational kiosk about the American Marten was recently installed at the mid-station. "A lot of good came out of this study. Not the least of which was a recognition of the importance of science in support of effective management," she says.

Cablk hopes her work of the past two years is only the beginning of developing a more comprehensive understanding of how these animals live and interact with their surroundings, both natural and man-made. "We've really just scratched the surface with this study. There is much more to learn, about their numbers, reproduction, prey base, how far and how fast they travel—and how all of these things might be different outside the resort area."

Meanwhile, we hikers, bikers, skiers and nature lovers will be happy to continue sharing the bounty of the Tahoe Basin with the tenacious American Marten.

– Jackie Allen



How to estimate the extent of a habitat. The dark red area on this map shows the extent of the Heavenly Ski Resort marten habitat defined only by camera detections. Cablk says this is not only restrictive, it is unrealistic. The lighter red areas show the marten habitat defined using a wildlife habitat relationship model. This definition includes all camera detection station data and snow track data. This version more likely approximates actual marten habitat.

Winter terraces at Yellowstone. Looking like frozen waterfalls, these are actually limestone deposits connecting travertine terraces formed from geothermal springs.

(Photo by Dr. Bruce Fouke)

Seeking the origin of Yellowstone's Travertine Terrace Formation: are the bugs involved?

About three million people each year visit Mammoth Hot Springs on the northern edge of Yellowstone National Park to see the extraordinary, quickly changing geological formations produced by the springs' mineralized waters. As the geothermal fluids descend toward exotic algae-colored ponds, the dissolved limestone settles out rapidly to create elaborate travertine terraces, shelves and dams that constantly rearrange the flow patterns as well as the landscape's architecture.

Among the visitors to the springs this June was a scientist from the Desert Research Institute who has shifted her analytical gaze from such settings as deep ocean thermal vents and freezing oceans along Antarctica's ice sheets. A microbial ecologist, Dr. Alison Murray is fascinated by the nature of microscopic life in extreme environments, and in this project she's curious to determine whether microbes play a role in the park's popular terraces.

Murray's work is funded by a $1.1 million grant from the National Science Foundation. The principal investigator on the project is Dr. Bruce Fouke, a geologist from the University of Illinois Urbana-Champaign. The interdisciplinary team also includes University of Illinois physicist Dr. Nigel Goldenfeld, who will develop models to predict the travertine formation process. The multidisciplinary nature of the team reflects the complexity of the challenge.

The geothermal water temperatures steadily decline from a high of 160°F as the fluids run from pool to pond, Murray says. Preliminary visits to the hot springs by the Fouke research group have determined that the terraces are home to a vastly diverse assemblage of microbes. Many of the microbes are limited to a

The essential tool. As a microbial ecologist, Dr. Alison Murray spends a lot of time at a microscope when she's not sampling hot springs for microbes. This epifluorescence microscope is in the Microscopy Laboratory of DRI's Division of Earth and Ecosystem Sciences.

(Photo by John Doherty)

Yellowstone's intricate terrace architecture. This close up of one of Mammoth Hot Springs' travertine terrace shows the elaborate natural layering resulting from the rapid deposition of calcium carbonate—dissolved limestone—as the geothermal fluids flow downhill. The layers are about a half inch thick.

(Photo by Dr. Bruce Fouke)

specific temperature regime, perhaps to a single pool, while others are found throughout the system.

Colorful microbial mats coat the travertine terraces throughout the thermal spring system. Murray notes that recent work suggests that there's a good possibility that a more complex biogeochemical process is at work that involves the microscopic "bugs."

"The conventional explanation for these formations has always assumed that they form by purely physical processes," Murray says. "This basically involves the dissolved limestone or calcium carbonate precipitating out as the water cools on rocks and previous layers of the terrace.

"The basic question is: are biodiversity and activity of specific living microbes and/or microbial communities required to create the terraced architecture? These features are observed in high-temperature and low-temperature carbonate spring deposits all over the world," Murray points out, "but the possible role of a microbial ecology being involved has never been fully examined."

The terraces can rise up to five millimeters, or about a fifth of an inch a day, a rate of deposition that makes it possible for the research team to conduct nearly real-time experiments. These will involve comparisons between natural deposition and experimental conditions where the microbial communities are removed with filtration or rendered inactive with ultraviolet rays. A detailed "census" of microbial communities and assessment of the range of various microbial populations will also be conducted to help describe the ecologies in the system.

"What we find here will provide fundamental knowledge of microbe-water-mineral interactions during carbonate precipitation. This is knowledge needed to reconstruct more accurately the history of microbial life not only on Earth, but also to anticipate what might be encountered on other planets."

From Murray's point of view, if the bugs are involved in the springs' amazing architecture, it's time they got credit for their work.

–John Doherty

President's Medals Awarded

Desert Research Institute President Stephen G. Wells awarded four DRI President's Medals for 2003 to acknowledge individuals and organizations that have provided outstanding support for the Institute's programs and for higher education in Nevada. The medals, awarded annually as part of the Nevada Medal awards ceremonies in Reno and Las Vegas each spring, are presented by DRI in lieu of the honorary doctorates or similar acknowledgments traditional among the University and Commtunity College System of Nevada's teaching campuses.

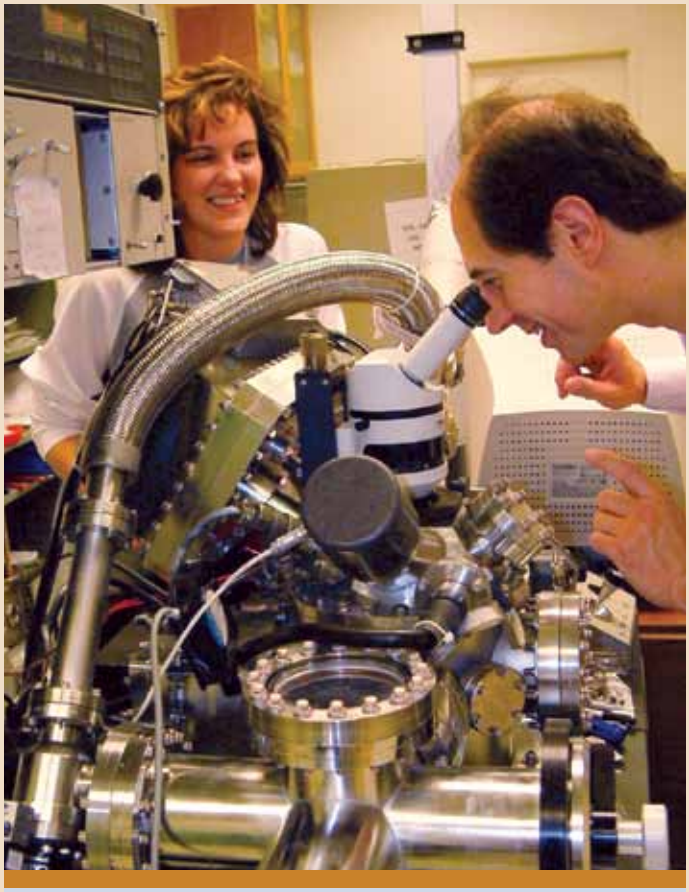



Above (left to right): Troy Wade's dream of telling Nevada's Cold War history is becoming a reality. • "Mr. Speaker" Joe Dini receives his President's Medal. • Dr. Rudolf Gunnerman wants to see more innovative technology in Nevada. • Hilton Foundation President Steven M. Hilton and Vice President of Programs Dyanne M. Hayes know they can improve more lives working with DRI scientists • For information: http://news.dri.edu/nr2003/aprl_presmedals.html

Closer DRI, UNLV ties in Water Resources Management grad program

Aims to enhance training of future water-policy makers

"Whiskey is for drinking; water is for fighting over." That cowpoke adage—often attributed to Mark Twain—resonates as loudly in the new millennium as it did when six-guns ruled the Old West. But managing and conserving Earth's most precious asset is no laughing matter. Within 50 years, millions of people worldwide will face shortages brought on by the pollution and mismanagement of water resources, the United Nations reports. So, training a new generation of skilled professionals well versed in both science and water policy is more important than ever.



First-year UNLV graduate student Rebekah Harris-Burr, who is pursuing a master's degree in chemistry, looks on as Dr. Lambis Papelis studies a soil sample in an x-ray photoelectron spectrometer at a DRI laboratory in Las Vegas. The XPS is used to probe the composition and bonding environment of the topmost layers of a solid surface at an incredibly thin five to 10 atomic monolayers.

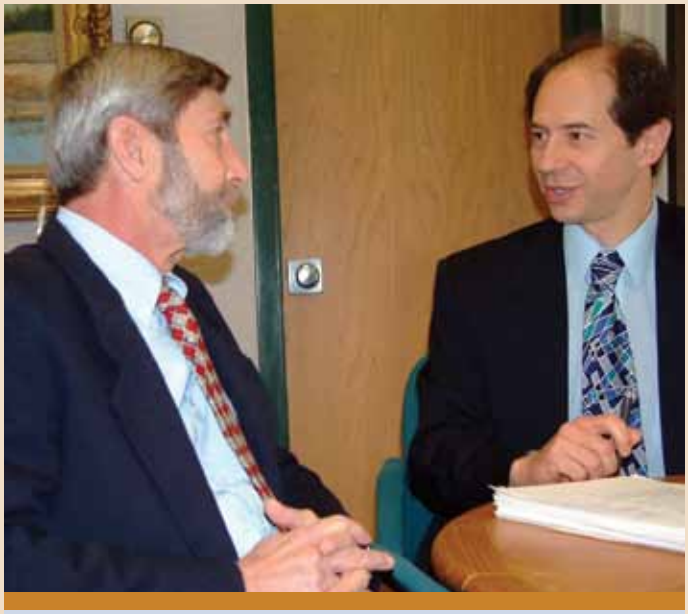
(Photo by Ron Kalb)

University of Nevada, Las Vegas—one of the Desert Research Institute's sister institutions in the University and Community College System of Nevada—is ideally situated by way of faculty and geography to understand water resources management, especially in arid lands. In fact, UNLV is one of a handful of institutions of higher learning offering a master of science degree in Water Resources Management, or WRM.

As this graduate program has evolved over the last few years, the benefits of close collaboration between UNLV and DRI have become apparent to all, according to the DRI Associate Research Professor Dr. Charalambos "Lambis" Papelis. A nine-year veteran of DRI's Division of Hydrologic Sciences, Papelis is principal investigator of a study to evaluate the potential of selenium migration in the Las Vegas Wash and adjacent areas; co-principal investigator, with the University of Nevada, Las Vegas, of a U.S. Environmental Protection Agency study of contamination by perchlorate—the primary ingredient of solid rocket propellant— in the Las Vegas Valley; other water and sediment quality projects along the Las Vegas Wash; and various geochemical investigations at the Nevada Test Site.

Athens-born Papelis, who is fluent in seven languages, has been actively involved for nearly a decade with UNLV's WRM program, where next-generation shapers of water policy are trained. A highly regarded teacher, adviser, and steering committee member, he joined the graduate program in1994. So when Papelis was named director of the interdisciplinary program last fall, the decision was widely hailed in the College of Sciences and at DRI. Papelis is the first DRI professor to lead the program in its 20-year history, and his appointment launches a new era of collaboration between DRI and UNLV.

"Lambis is far and away the best choice to head the program," says Dr. Fred Bachhuber, UNLV Dean of the College of Sciences, where the program resides. "He brings with him not only DRI's world-class scientific resources, but also a new vision for a program with huge potential to make a dramatic impact in an area of increasing global importance." According to Bachhuber, because fresh water is fundamental to life and is a limited resource, its management is a key to heading off political flashpoints between nations, regions, states, counties, cities, towns and even neighborhoods.



UNLV Dean of the College of Sciences Dr. Fred Bachhuber and Dr. Lambis Papelis, director of the university's interdisciplinary Water Resources Management graduate program, discuss curriculum issues at a recent meeting.

(Photo by Ron Kalb)

UNLV was instrumental in bringing about the closer working relationship, and for good reason. "We are looking forward to increased collaboration between UNLV and DRI," UNLV President Carol C. Harter says. "Faculty and students in the WRM program will enjoy considerable benefit from the opportunity to work with researchers from both institutions."

Papelis points to DRI's close and long-standing relationship with University of Nevada, Reno that dates back to 1962. "UNR's Graduate Program of Hydrologic Sciences is consistently ranked among the top 10 hydrology programs in the U.S.," Papelis says. "That's not a bad working model for WRM."

He admits this will take some time—WRM has eight students, compared to some 80 in UNR's Hydrologic Sciences program—but he thinks DRI's and UNLV's science and administrative expertise in managing water resources in arid lands will create considerable demand for the program once it gets into high gear.

Papelis says UNLV's program is unique in that it offers master's degree candidates equal emphasis on physical sciences and water management courses. The WRM program blends the physical aspects of the hydrologic sciences with policy and management issues. "We encourage applications from people with undergraduate degrees in the social sciences, management and environmental studies as well as those with 'hard science' degrees," Papelis says. A recent batch of applicants included an attorney who wants to parlay his legal background into a new career in WRM.

Degree candidates must take six credits in hydrologic sciences, three units in science, math or engineering and nine credits in management, public administration, economics, law or political science. An additional nine elective credits may be chosen from among the physical sciences or policy management courses.

Dr. Roger Jacobson, DRI vice president for academic affairs and acting VP for research and business development, believes UNLV's program is ideally staffed and located for global leadership in WRM. "Southern Nevada and the southwest are a crossroads for rapid land development and diminishing water supplies," Jacobson says. "UNLV and DRI faculty have solid science-based and policy knowledge about issues surrounding the Colorado River, Lake Mead and other water sources in addition to disputes arising in California, Arizona and Nevada."

Jacobson also sees stronger collaborative academic and scientific relationships resulting from the new dual role Papelis is taking on. "Having access to DRI people, resources and research projects also gives UNLV's WRM program a powerful recruiting tool with prospective grad students," Jacobson says. According to Jacobson, the real-world experience students gain in the WRM program also gives them a leg up in the job market at DRI and other organizations,

And DRI benefits, too. "A closer tie to this important UNLV graduate program helps our faculty recruiting efforts as well," says Dr. Stephen Wells, DRI president. "Many of the world-class researchers we want to attract want part-time teaching opportunities and access to graduate students. We're now in a better position to offer these kinds of value-added relationships."

Wells also explains that while DRI is a fulltime environmental research entity, the Institute's enabling act requires training new scientists. "These teaching and joint-research relationships with UCCSN campuses are embedded in our culture, and we value them very highly."

In addition to heading the UNLV WRM graduate program—which accounts for nearly 20 percent of his time—the energetic Papelis, who earned his master's degree and doctorate in environmental engineering at Stanford, continues handling DRI research projects as well as teaching duties at UNLV and Nevada State College. He is also on the UNR hydrologic sciences faculty. And further proving that water is his life, Papelis also teaches scuba diving on the weekends at Lake Mead, just east of Las Vegas.

If Papelis gets his way and rational, science-based WRM policies prevail, the only fights over water in the latter half of this century will involve water pistols and mischievous little brothers or sisters who splash their siblings in the swimming pool.

– Ron Kalb

Nevada Medal Dinners 2003

1. Governor Kenny Guinn and First Lady Dema Guinn hosted the Medalist and special guests for dinner at the Governor's Mansion. Left to right: DRI Research Foundation Chair David Fulstone, Governor Kenny Guinn, Dr. Charles Goldman and DRI President Stephen Wells.
2. At the Governor's Mansion, (left to right): DRI Research Foundation Chair David Fulstone, First Lady Dema Guinn and Diane Fulstone.
3. At the Governor's Mansion, (left to right): Governor Kenny Guinn, University and Community College System of Nevada Board of Regents Chair Douglas Seastrand and DRI Research Foundation Trustee Lou Emmert.
4. In Las Vegas, (left to right): Former Governor Bob Miller, Regent Thalia Dondero, Dr. Charles Goldman, Drake DeLanoy and Jackie DeLanoy.
5. In Reno, (left to right): Dr. Rudolf Gunnerman, Barbara Smith Campbell, Doris Gunnerman and Chief Justice Deborah Agosti.
6. In Las Vegas, the KLAS table: Paula Francis (right front) and Gary Waddel (next to Francis), were the Las Vegas Nevada Medal Dinner Masters of Ceremony.
7. In Reno, (left to right): Russ Fields, Nancy Finch, Dr. Charles Goldman, Dr. Glenn Miller, Mary Miller and Dirk Van Zyl.
8. In Las Vegas, (left to right): Regent Stavros Anthony, Dr. Charles Goldman, DRI President Dr. Stephen Wells, Beth Wells and Nevada State College at Henderson President Dr. Kerry Romesburg.
9. In Reno, (left to right): Dr. Charles Goldman, Fritzi Hunnington and Frank Moffett.
10. In Reno, (left to right): DRI Research Foundation Trustee Rose McKinney-James, Janice Pine-Wilson, Dr. Charles Goldman, Be-Be Adams, Patty Wade and Senator Mark Amodei.
11. In Reno, (left to right): Lt. Governor Lorraine Hunt, Dr. Charles Goldman, SBC President for Nevada Sylvia Samano and DRI President Dr. Stephen Wells.
12. In Las Vegas, (left to right): Betsy Van Noy, former DRI Research Foundation Chair Terry Van Noy, Judy Linton and George Linton.
13. In Reno, (left to right): Del Noland, Dr. Charles Goldman and Bob Noland.
14. In Reno, DRI Research Foundation Trustee Assemblywoman Dawn Gibbons (far left) and friends.
15. In Las Vegas, the U.S. Bank table: Carol O'Hara, Charles O'Hara, Dee Ladd, DRI Research Foundation Co-Vice Chair Ken Ladd, Betty Hanseen, Richard Hanseen, Ricci Flaherty, Rich Flaherty, Somer Hollingsworth and Peggy Hollingsworth.
16. In Reno, Regent Howard Rosenberg.
17. In Las Vegas, DRI Research Foundation Co-Vice Chair Sandy Miller.
18. In Reno, Regent Marcia Bandera.
19. In Las Vegas, Dorothy Huffey
20. In Las Vegas, (left to right): Theresa Minden, Dr. Charles Goldman and Michael E. Minden.
21. In Reno, (left to right): Assemblyman William Horne, Dr. Charles Goldman and Assemblyman Kelvin Atkinson.
22. In Reno, Gordon Peters and DRI Research Foundation Trustee Emerita Countess Angela Dandini.
23. In Reno, Chancellor Jane Nichols and Jim Nichols.

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This Wolf proves you can go home again; New Atomic Testing Museum director returns to Las Vegas after a decade away

"Yes, you can."

That's Art Wolf's no-frills response to the rubric "You can't go home again" by novelist and near-namesake Thomas Wolfe, or "a wolf of a different spelling," as he puts it.

Being named director of the Atomic Testing Museum is indeed a homecoming for Wolf, who ran the Nevada State Museum and Historical Society in Las Vegas from 1988 to 1992.

A museum-management professional with more than 25 years' experience, Wolf brings solid credentials and the infectious enthusiasm of a man on a mission for DRI and the Nevada Test Site Historical Foundation. He was hired for the post by the Desert Research Institute and will manage the museum in collaboration with NTSHF.

"Both DRI and NTSHF believe that the best possible understanding of NTS activities will be achieved through even greater accessibility to documents and information, and are dedicated to promoting a balanced view and access to all elements of Test Site history," Wolf says. "The opportunity to assist in bringing the dreams of NTSHF to reality was a great attraction to me, and I have been gratified to see the dedication and interest shown by every single person involved in the project to date."

Most recently, Wolf was president and CEO of the 74-year-old Museum of Northern Arizona, in Flagstaff. He also served as president of the High Desert Museum, in Bend, Ore., director of the Museum of the Rockies, in Bozeman, Mont. and director of the Millicent Rogers Museum, in Taos, N.M.

A co-founder of the Nevada Museums Association in 1989, Wolf served as the group's president from 1990 through 1992. He is a member of the Association of Science Museum Directors, a grants reviewer for the National Science Foundation and grant panelist for the National Endowment for the Humanities. Wolf has also written for numerous professional publications.

Art Wolf on guard. Museum Director Arthur H. Wolf stands in the unfinished window of the reproduction of the Wackenhut Security Services NTS Guard Shack that will serve as the museum's ticket office. Visitors' museum tickets will resemble the official security passes issued for everyone entering the Test Site.

(Photo by Ron Kalb)

As one might expect given his background, Wolf has abiding respect for the past and a strong desire to preserve knowledge. "The Atomic Testing Museum will bring to light for the general public the Nevada Test Site stories, large and small, that have been hidden from view for two generations," he says. "The vision and passion of the Cold War-era NTS employees have given life and momentum to this project, and the interpretive aspects of the exhibits will give richness and permanence to the commemoration of that time."

As Wolf returns to his southern Nevada home, he also takes great pride in helping create a new, enduring home that will preserve the memory and understanding of the NTS, which he sees as a lynchpin in world history.

DRI projects capture major news media attention

DRI scientists working at opposite ends of the Earth, in the Southwestern desert, and in their Nevada laboratories, have attracted the recent notice of major news media. The Associated Press ran a story in December, featured in national and international press, including the New York Times, USA Today, Chicago Sun Times and Boston Globe, about Dr. Joe McConnell's analysis of lead deposited in the Greenland Ice Sheet between 1780 and 1998. The lead levels corresponded to changes in industrial activity, economic conditions, technological applications and, finally, environmental regulations. McConnell is an associate research professor in DRI's Division of Hydrologic Sciences.

That article was followed several weeks later by another New York Times article quoting Dr. Chris Fritsen's work on a project to analyze microscopic life forms in an extremely salty Antarctic lake covered with a 60-foot ice cap. The unique ecosystem is considered a possible analogue for the last life forms to exist on Mars billions of years ago. The San Francisco Chronicle quoted DRI scientist Dr. Eric McDonald on March 27 on the impacts of U.S. military traffic on the surface of the Kuwaiti and Iraqi deserts. He was also interviewed by reporters from the Los Angeles Times, Reno Gazette-Journal and Tahoe Quarterly. McDonald is an expert

on desert surfaces who works with the Department of Defense to mitigate the impact of training activities on the desert and to retain a realistic desert setting to enhance that training. On April 2, a long-running DRI experiment testing the feasibility of using solar and wind power to produce hydrogen fuel for a fuel cell or other power systems was included in a CBS News "60 Minutes II" segment looking at the potential for hydrogen to replace oil as a primary energy source.

DRI scientists Moosmüller and Keislar obtain new DRI patent for air pollution technology

DRI has received a U.S. patent for the invention of an instrument by two DRI scientists that remotely measures the particulate matter mass emitted by motor vehicles as they drive by the instrument. Drs. Hans Moosmüller and Robert Keislar, air quality scientists in DRI's Division of Atmospheric Sciences, developed and built this remote sensing device to study the impact of mobile sources on particulate matter pollution and on the non-attainment of federal PM standards.

The two are part of a team of DRI researchers working to develop new methods determining and predicting the level of vehicle emissions in order to improve air quality management and urban transportation planning. Four manuscripts describing the remote sensing device, the theory behind it and first results were recently submitted to peer-reviewed journals. United States Patent, No. 6,542,831 for a "Vehicle Particulate Sensor System" was awarded on April 1, 2003.

Hesham Bekhit receives 2003 Guinn Environmental Fellowship

Hesham Bekhit, a Ph.D. student in the University of Nevada, Reno Hydrologic Sciences Program, has been awarded the Kenny Guinn Environmental Fellowship by the Desert Research Institute, DRI President Stephen G. Wells announced. Wells said that Sprint has agreed to underwrite the annual $15,000 fellowship, which was established by DRI in 2001 to acknowledge Governor Guinn's Millennium Scholarship Program.

Bekhit will use his fellowship to conduct laboratory experiments on the potential of colloids—liquids containing undissolved solids in suspension, such as the milk fats suspended in whole milk—to retard or mitigate the movement of pollutants in ground water. Bekhit is completing his course work at UNR this semester and will conduct his experiments at DRI's Las Vegas research facility under the guidance of Dr. Ahmed Hassan, assistant professor in DRI's Division of Hydrologic Sciences.

Darko Koracin awarded Fulbright Senior Specialists Grant

Dr. Darko Koracin, a research professor in DRI's Division of Atmospheric Sciences, received a Fulbright Senior Specialists Grant in Environmental Science to teach a class on atmospheric and dispersion modeling at the Andrija Mohorovièiæ Geophysical Institute of the University of Zagreb, Croatia. The program offers two- to six-week grants to leading U.S. academics and professionals to support instructional development and institutional planning at academic institutions in 140 countries.

The Fulbright Scholar Program, sponsored by the U. S. State Department and managed by the Council for International Exchange of Scholars, is intended to increase mutual understanding between the United States and other countries. Koracin was scheduled to teach in his native Croatia in May and June.

Oxford University confers 'distinguished associate' status on DRI sand dune expert

The School of Geography at Oxford University in England has conferred "distinguished research associate" status on Desert Research Institute scientist Dr. Nicholas Lancaster, an international expert in the analysis of sand dunes as indicators of climate trends and on the role of arid land surfaces in contributing to dust pollution.

Lancaster was awarded the associate status in recognition of his extensive research collaborations with faculty in Oxford's School of Geography and the Environment. He has analyzed dunes in the Namib, Kalahari, northern and western Sahara deserts in Africa, in the Dry Valleys of Antarctica and in the Mojave and Sonoran deserts of the western United States.

DRI scientist leads planning of national air quality forecasting research program

Dr. William Stockwell, a DRI scientist who specializes in the chemistry of air pollution, has completed a one-year special assignment as chief scientist for air quality with the National Oceanic and Atmospheric Administration. Stockwell developed the research plan for enhancing the National Weather Service's national air pollution forecasting system. He worked with NOAA's Office of Oceanic and Atmospheric Research to develop a strategy for a 10- to 15-year research plan that would involve American university and government scientists.

Jonathan O. Davis Scholarship awarded

Humboldt State University graduate student Ronna Bowers has been awarded the Desert Research Institute's $3,750 Jonathan O. Davis National Scholarship in Quaternary Sciences for 2003 for her research proposal involving an ancient lake in Lassen County, Calif. UNR Ph.D. candidate Kelly Graf won the $1,450 Davis Stipend for her proposal to conduct geoarchaeological studies of a prehistoric Native American rockshelter.

DRI scientist Jonathan O. Davis, a prominent geologist and geoarchaeologist, died in an auto accident near Reno in 1990. The memorial scholarship, administered by DRI's Quaternary Sciences Center, is open to graduate students enrolled in an M.S. or Ph.D. program at any United States university and supports field research concerning Quaternary geology of the Great Basin or surrounding areas. The stipend is open to graduate students enrolled in a geology-related M.S. or Ph.D. program at the University of Nevada, Reno.

For information: http://www.dri.edu/Opportunities/JonathanDavis.html

Warden winner finds one degree of separation between a hot, sunny day and American monsoon

Maureen Warden, widow of award's namesake, left, with recipient Dorothea Ivanova.

A Desert Research Institute graduate research assistant who has shown that a single degree rise in sea surface temperatures in the Gulf of California can stimulate summer monsoons in the Desert Southwest has received DRI's 2003 Colin Warden Award. Dorothea Ivanova, a Ph.D. candidate in atmospheric sciences at the University of Nevada, Reno, applied an advanced forecasting model to connect an increase in the gulf's summer sea surface temperatures from 29 to 30 degrees Centigrade with the development of major regional thunderstorm systems that periodically caused fatal flash floods in southern Nevada.

Ivanova has been working under the guidance of Dr. David Mitchell, a DRI atmospheric physicist who has been studying the monsoon-sea surface temperature connection in collaboration with Mexican scientists for about five years. The American Monsoon is responsible for significant summer precipitation in Arizona and New Mexico, and can also significantly influence weather throughout the Intermountain West and into the Great Plains. Massive, widespread range fires across much of the central and eastern Great Basin several years ago were caused by monsoonal lightning storms.

The $1,000 award is named for Colin Warden, a Washoe Medical Center electrician and an ardent environmentalist who died in 1991. His family and friends established the endowment to promote environmental research by graduate students working at DRI or supervised by DRI scientists.

DRI News is published by the Desert Research Institute, a nonprofit, statewide division of the University and Community College System of Nevada. DRI is internationally recognized for excellence in environmental research. Eighty-seven percent of the Institute's budget comes from research grants and contracts. DRI operates the Dandini Research Park in Reno. Articles appearing in *DRI News* may be reprinted without restriction unless noted otherwise.

Vice President for Institutional Advancement
Dr. Claudia Miner

Editor
Ron Kalb

Contributors
Jackie Allen
John R. Doherty
Ron Kalb

Layout & Design by Samba Design

755 East Flamingo Road, Las Vegas, NV 89119-7363
(702) 862-5400

2215 Raggio Parkway, Reno, NV 89512-1095
(775) 673-7300

E-mail: kalb@dri.edu
www.dri.edu

DRI
Desert Research Institute
2215 Raggio Parkway
Reno, NV 89512-1095

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