Mono's Scientists

A Portrait of Five Committed Researchers

by Geoffrey McQuilkin

Think back to 1976. Next to Mono Lake, under starry night skies a dozen or so undergraduate scientists camped out along one of Mono Lake's small tributaries. By day they fanned out across the lake and basin, conducting the first comprehensive ecological study of the lake.

Through scientific inquiry, the team discovered far more than had ever before been known about the impacts of decades of water diversions on the lake. They also discovered the trends that foretold the lake's approaching ecological collapse.

The science produced the knowledge that generated the effort to save Mono Lake. Due to what science found, National Guard helicopters settled down on exposed landbridge loaded with crew and explosives to detonate the landbridge. Due to what science found, the impact of unfettered water diversions on Mono Lake was undeniable in the court case that wound up in the California Supreme Court. Due to what science found, a solid core of knowledge about what Mono Lake is, was, and could be underlay every letter writing campaign, public policy effort, and solution proposal.

Several researchers came before the 1976 group and many more followed. Numerous scientific inquiries have expanded the factual framework for understanding Mono Lake's ecology and the destructive impacts of excessive water diversions, adding to the astonishing wealth of knowledge about this astonishing place.

As the Mono Lake Committee celebrates its 25th anniversary, five scientists deserve special recognition. Their work, their commitment to the truth, and their ability to take science to the courtroom, the public, and the State Water Resources Control Board have forever altered the fate of the special place we call Mono Lake.

The gang at the State Water Board hearings on Mono Lake in 1993. From left to right: Dave Herbst, Peter Vorster, Scott Stine, attorney Bruce Dodge, Dave Shuford, and David Winkler.

David Winkler

Wink weighing a gull.

Meeting Mono: David Winkler first saw Mono Lake on a spring birding trip totally unaware that he would soon be back studying those bird populations in detail. In the fall of 1975, David met Jefferson Burch on SE Farallon Island, and soon after Jefferson suggested that together with Christine Weigen they collaborate on a grant proposal to get National Science Foundation (NSF) undergraduate research money to study Mono Lake, a location David Gaines had introduced them to the previous summer during research internships in the nearby Slate Creek Valley. Gaines had been mentoring Winkler in birding circles in Davis, and when the three met to discuss the grant, much of it was hatched in Gaines' living room. Thus was born the 1976 summer of research, the first Mono summer for so many scientists.

The work: Wink did foundational work both scientifically and for Mono Lake's protection. He edited the '76 group's report and soon after took a year off to try to do something about the landbridge that was fast approaching Negit Island and the great majority of Mono Lake's nesting California Gulls. By winter, he had talked to enough people in the government and NGOs to realize that something more organized about Mono's future needed to be done, so Wink journeyed to the Northern California Coast Range Preserve of the Nature Conservancy to spur David and Sally Gaines into action. And thus, in the kitchen of the Preserve's managers, the Mono Lake Committee was born on a wet winter night in early 1978.

After working with the Committee for its first few months (he still remembers the first newsletter, the creation of the grebe logo, and the first bumper sticker on Gaines's old Plymouth), and getting the National Guard to blow a trench through the nascent Negit landbridge, Wink went off to pursue his Ph.D. at Berkeley, ultimately spending four years of dissertation work living with and studying the gulls of the Negit islets to try to understand why the Mono gulls lay only two eggs, instead of the more normal three laid elsewhere (it's all about the availability of food in early spring).

Wink recalls that the grad school years, punctuated as they were by court testimony and disagreements with DWP and its consultant, Joe Jehl, were challenging. But he learned a great deal about conservation biology and his Mono expertise carried through to, ultimately, the State Water Board hearings

Continued on page 8

Where Are They Now?—from page 7

in 1993. His one regret is that his deep friendship with Gaines was cut short by David's death before they had time to resolve years of struggle between advocacy and science.

25 years later: Wink is now Professor and Curator of Birds in Cornell University's Department of Ecology and Evolutionary Biology. For over 15 years he has been studying Tree Swallows, semi-colonial songbirds that conveniently nest in nest boxes and, he points out, lack the discouraging gull habit of eating their neighbors' offspring. He remains committed to Mono Lake and the lessons that it has to teach us, and currently chairs the Mono Science Council and advises Justin Hite in his gull studies at the lake (see page 11 for more).

From another perspective: During that 1976 summer of research, most of the twelve-odd undergrads camped along upper Dechambeau Creek. Three researchers named David made things too complicated, and so it was there that the Davids niche-shifted their names: Winkler reverted to his childhood "Wink," Gaines stayed "Dave" (though the group was tempted by the "Dagwood" that sprung from his initials), and Wink stuck Dave Herbst with the simple moniker of "Bug."

Dave Herbst

Bug and the microcosm studies.

Meeting Mono: Walking down a hallway at UC Davis, Dave Herbst's future was forever changed when he saw a flyer calling for researchers to join the Mono Lake Ecological Study crew. He spent the summer of 1976 sleeping under the stars and conducting, by day, the first comprehensive invertebrate inventory of the lake and shoreline wetlands and springs (the bone-dry streambeds weren't on the list for obvious reasons).

The work: After a summer looking at the invertebrate big picture, Dave focused his microscope onto alkali fly (*Ephydra hians*) research, quickly becoming *the* expert on alkali flies at Mono Lake. As one of the two basic elements of the food chain, it was clear that the fate of the alkali fly was also the fate of Mono's birds. In his graduate work at Oregon State, Dave teased out the physiology and population ecology of the fly and compared it with other salt lakes. His postdoctorate work carried on with the ultimate experiment: the "microcosm" studies. Bug simulated various lake levels with 130-gallon tubs of fly habitat and Mono Lake water concentrated to different salinities, creating, as he says, "a time machine that revealed the past and projected future for the alkali fly." The studies proved both that lower lake levels harmed the flies and that higher lake levels would increase their productivity. Eighteen years later, Herbst's testimony before the State Water Board was crucial to the understanding of Mono's impending collapse. "I had no worries about testifying," says Bug, "because I knew I had the truth in my hands."

25 years later: Bug leads studies today that track the health of Mono's alkali flies, and he advises the Committee on scientific matters as a charter member of the Mono Science Council. Based at the Sierra Nevada Aquatic Research Laboratory just down the road from Mono Lake, much of his salt lake ecology work is now focused on Owens Lake, where shallow flooding to control dust is creating an amazing density and diversity of invertebrates. He also is deeply involved with bioassessment, a technique of determining water quality in streams and lakes by measuring resident insect diversity and health, and related stream ecology studies.

From another perspective: Wink remembers many Grateful Dead-inspired campfires from 1976, with Bug wielding a Weir-like guitar and delivering the pleading, declarative vocals of the old stand-bys. And his poem in the 1977 report, says Wink, is still one of the best pieces of writing about the lake anywhere.

Peter Vorster

Peter Vorster jumping to Negit Island.

Meeting Mono: Peter passed by Mono on many a childhood camping trip and first spent time at the lake when one of those Sierra trips was snowed out in 1968 (a precursor to the extremely wet winter of 1968-69, hydrologist Vorster is quick to point out). Subsequent visits for fun and study led Vorster to push for Mono's listing in the 1978 *California Water Atlas*, which he was helping write, in the "Unresolved Questions" chapter. He connected with David and Sally Gaines at the "Save Mono Lake" booth at the Friends of the River Confluence in 1979. The need for expertise was obvious and Peter enthusiastically laid out his hydrology credentials and knowledge of the LA aqueduct system; on the spot he had a new job and was soon on the road to Lee Vining.

The work: "Mono Lake," Vorster says, "was a classic case of applying science to a conservation need." Vorster's work was both in the science and in the applying. His press release helped recruit a media circus for the second go at blowing up the Negit landbridge. From organizing crowds for public meetings to printing Mono Lake T-shirts and calendars, Peter and his unstoppable energy were involved. At the same time, he began to put his technical knowledge to work; a state task force looking at the Mono issue, it turned out, got its numbers and options from DWP. Vorster used his knowledge of the Los Angeles water system to present the other side. When the Mono Lake lawsuits began in 1979, Voster focused even more on the technical, initially developing the blueprint for replacing Mono diversions by managing DWP's supplies more efficiently and then developing what is still the authoritative water-balance model for Mono Lake, detailing where Mono's water comes from and where it goes. Vorsters' complex 15-variable equation allowed him to analyze DWP's own aqueduct operations, lake-level projections, and diversion scenarios, giving Mono advocates control of information that allowed them to consider the effects of any potential change in diversions. Peter, his work, and his jack-of-all-trades

Continued on page 9

enthusiasm have been part of every single court or water board hearing on Mono Lake in the past quarter century.

25 years later: Peter consults with the Committee as a hydrologist and is working on the North Mono Basin water allocation process, stream restoration, and aqueduct operational review. He is an active member of the Mono Science Council and volunteers—he points out—as the Committee's chief malcontent and institutional historian. Most of his time goes into forging new frontiers of water resource protection in California through his hydrological work at The Bay Institute on San Joaquin River rewatering (using the court precedents established in the Mono Basin) and Bay Delta protection.

From another perspective: "Peter has always been so eager and full of energy," says fellow scientist David Winkler. And in one of those strange quirks of life, that energy almost ended up on the other side of the table. Looking for an outdoor job in a beautiful setting, Vorster had applied to DWP for the Mono Basin hydrographer position. He aced the test but missed the interview, and the rest is history.

Scott Stine

Scott Stine testifying for Mono Lake.

Meeting Mono: A field class brought Stine to the Mono Basin in 1973 where he found a landscape that offered an irresistible variety of features, from volcanoes to glaciers to the Sierra itself. As a graduate student at Berkeley he visited again in 1979. There David Gaines informed him that, supposedly, Mono Lake had been very low in the mid-1800s. In fact, DWP was using that supposed low stand to argue that their diversions were simply mimicking the recent natural history of the lake. Stine, suspicious because of his knowledge of climate history, tore into the issue, and showed that the supposed low level was a historic fabrication.

The work: Through the lake level investigation Stine saw that the rise and fall of Mono Lake could be used as a climate indicator. His doctoral dissertation, unabashedly titled "Mono Lake: The Last 4000 years," unraveled the mysteries of Mono's fluctuations—and found answers about the ages of the tufa groves, the ages of the islands, and the history of the north-shore dune field, among other things. A geomorphologist of unending energy, Stine can give you the story behind nearly every landscape feature in the Mono Basin. When and how was Negit Island created? How old are the towers at South Tufa and why were they formed? Through hundreds and hundreds of days of Mono Basin fieldwork, Stine answered the critical Mono Lake questions. How did Rush and Lee Vining creeks work, back when they had water? What happens to the landscape when Mono Lake rises and erodes the shore? What was it about Mono Lake that supported a million waterfowl back in pre-diversion times? Stine challenged the Committee to think beyond the lake to the then-dry streams. He asked questions and gave the answers, again and again, in great detail before courts, the public, and the State Water Board.

25 years later: Now-Professor Stine is still free-ranging in his inquiry into the landscape—in California and the Great Basin, as well as in Patagonia and Alaska. Some Mono work continues, leading to a much anticipated book on the history of the basin. His work on California's climate history and epic droughts has challenged thinking about the state's water resources. Recently he's taken up a new vein of inquiry: the history of exploration and discovery. A question turned to an inquiry and turned to an investigation, leading Stine to trace Joseph Walker's 1833 route across the Sierra—not through Yosemite, as the old campfire story had it, but rather through the Carson, Mokelumne, and Stanislaus drainages.

From another perspective: Known for his inexhaustible energy and tendency to stay nourished with a thermos of tea for breakfast and two full entrees at dinner, Stine covers more ground and hunts down more answers in a day than many others can do in a week. Winkler recalls that Stine "with his penchant for extreme exercise and vigorous interaction" was a whirlwind unlike any other researcher; "he was just flat out driven by this intrinsic fire about Eastern Sierra Quaternary history."

Dave Shuford

Dave Shuford banding a California Gull.

Meeting Mono: Dave Shuford came to Mono Lake from Point Reyes Bird Observatory (PRBO) after a visit from Gaines and Winkler, who were looking for an expert to continue the gull research. Shuford remembers asking, "who wouldn't want to spend the summer in the field at Mono Lake?" Not that there weren't some serendipitous connections: years earlier, as it happens, he had arrived at UC Davis as an undergraduate and found a spot to live in a house with, among other students, Sally Gaines.

The work: "Shuf" and PRBO took over the gull work when Wink left for postdoctoral work and replaced Wink's more general focus on gull life history with a reproductive success focus on precise estimates of gull numbers. The count methodology Shuf developed made it possible to tally the gull population size and annual breeding success. The counts dramatically revealed the importance of Mono Lake as the second-largest California Gull rookery in the world—and its continuing vulnerability to destruction by mainland predators as the lake level fell. The gulls have played such a major role in the resolution of the Mono controversy that the monitoring data and framework that Shuf put in place remains a key part of the Committee's ability to intelligently advocate for the well-being of the Mono ecosystem.

25 years later: Over the course of twenty years monitoring Mono's gulls, Shuf has also documented the importance of wetlands throughout California (Klamath Basin to the Salton Sea) and the West (Pacific Coast to Rocky Mountains) to a variety of waterbirds, particularly shorebirds and colonial nesting waterbirds (pelicans, cormorants, gulls, terns). Shuf

Continued on page 10

Where Are They Now?—from page 9

chaired the Mono Science Council for the first four years of its existence, and he remains an active member, lending his broad regional understanding of bird distribution and conservation issues. He works closely with Committee staff on the waterfowl habitat restoration required by the State Water Board.

From another perspective: West Coast bird experts gravitate toward the Point Reyes Bird Observatory, and those fortunate enough to work there take up residence in the small neighboring towns. Shuford found himself living in Bolinas, an enclave noted for its liberal tendencies, and DWP attorneys on several occasions grilled him not about birds, not about biology, but about his residence, neighbors, and friends. The questioning was always cut off as irrelevant.

Many Others

Many other scientists have been part of that investigative effort, building a deep understanding of Mono Lake. Before the 1976 team's time, four scientists stand out.

Israel Russell arrived on horseback in 1881, studied the lake and glacial history of the mountains over several years, and published his seminal report in 1889. Fisheries biologist Elden Vestal roamed Mono's tributaries starting in 1938. He extensively documented the natural conditions of Rush Creek and their destruction as diversions commenced. Vestal produced his meticulous notes in the 1980s as a star witness on prediversion conditions. David Mason studied the lake in 1961, performing a detailed chemical analysis and examining both biological and physical phenomena. He tried to raise concern about the lake's decline but found that, beyond local concern, the lake had been written off as doomed. Geologist Kenneth Lajoie dissected the geological strata of the lake in the 1960s, revealing past lake fluctuation. Lajoie also saw where Mono was headed and got the Sierra Club involved on the lake's behalf (though without ultimate success) via Inyo County water litigation.

The 1976 research crew ushered in a new wave of scientific interest. Individually, the scientists revealed critical aspects of Mono Lake's ecology, then most moved on to new challenges. Gayle Dana studied the Mono Lake brine shrimp intensively, revealing the shrimp's response to increasing salinities and the unique attributes that distinguish it from other brine shrimp species. Now a glaciologist at the Desert Research Institute in Reno, she's moved her focus to frozen lakes of Antarctica. Gayle's partner in exploring Mono's limnology, Connie Lovejoy, is now studying the microplankton of polar waters at the Université Laval in Quebec. Bob Loeffler did work on the hydrology of the Mono Basin, and his work was the foundation for Vorster's model. He is now Alaska's Director of Mining, Land and Water. Jefferson Burch and Christine Weigen put in many days at the lake, and moved on to professional careers and marriage; Christine is a physician for Planned Parenthood and Jefferson is an engineer for Agilent. Elliot Burch, Jefferson's brother, was also part of the 1976 team and now teaches high school science in the Northeast. Brett Engstrom, another of the bird crew in 1976, went on to the University of Vermont, and now works on rare plants with the Nature Conservancy. Botanist Dean Taylor worked with the crew here and there and with the Mono Lake Committee in the early years, providing the younger biologists with plenty of Latin names, and he is now a botanical consultant working out of the Jepson Herbarium at UC Berkeley. John Harris hung out with the 1976 crew and then, as a graduate student at Davis, did his thesis on kangaroo rats and mice interactions on Mono's east shore; he's now a professor at Mills College. Evan Sugden tied in through undergraduate connections to the '76 crew and did valuable early work on bee ecology, completing his Ph.D. at Mono; now he is an instructor in entomology at the University of Washington.

Top: The Daves, Shuf, Wink, and Bug, on top of a peak. Middle: Stine and Vorster get to the bottom of Mono's questions. Bottom: from left to right: Gayle Dana, Peter Vorster, Dave Shuford, David Winkler, and Dave Herbst kick up their heels.

A flowering of researchers and expertise has followed; far more individuals than can be listed here have furthered our understanding of the Mono Basin. But were it not for these early researchers and young students, out to understand a special place just a bit better, we might indeed have nothing left to study at all. ❖

Geoff McQuilkin is the Committee's Co-Executive Director. He is working on a home-made field guide to birds of the Mono Basin for his daughter Caelen.