

UNIVERSITY OF CALIFORNIA, LOS ANGELES

# WHITE MOUNTAIN RESEARCH CENTER

FALL/WINTER 2022-23

NEWSLETTER



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## WMRC LAND ACKNOWLEDGEMENT

The White Mountain Research Center acknowledges the *Nüümü* (Paiute) & *Newe* (Shoshone) as the first Peoples & traditional land stewards of *Payahuunadü* & *Koho* (the Owens Valley & White Mountains). As a facility managed by a land grant institution, we pay our respects to the *Müaddübü* (Elders) and *Hümü* (our relatives/relations) of past, present, and emerging generations.



# A MESSAGE FROM GLEN MACDONALD, WMRC DIRECTOR

Well, 2022 saw things really getting busy again at the White Mountain Research Center (WMRC). After the disruption of operations by the pandemic it was gratifying to see so many old friends, and new users also, taking advantage of that the WMRC has to offer for education and research. Our Owens Valley facilities were in use throughout the year and both of our high-elevation facilities at Barcroft and Crooked Creek were open from June 1st to October 21st. A dry winter facilitated the early opening at Barcroft, but as convenient as that was, we know that the Whites and Sierra could desperately use a good snowpack this winter.

We were very pleased to be able to accommodate 29 research projects and 15 university level courses in 2022. This resulted in over 50 researchers and almost 400 students and their teachers staying with us. These numbers always astound me. It is wonderful that we can offer such incredible experiences in the White Mountains, Owens Valley and Sierra Nevada to so many people each year. These folks came from a wide range of locations. The University of California was well represented with users coming from 8 UC campuses: UCLA, UCD, UCI, UCR, UCSF, UCSB, UCSC and UCB (Jepson Herbarium). We were pleased to welcome researchers and students from CSU Northridge, Sacramento, and Sonoma. We also had a host of visitors from other universities and community colleges throughout California and the rest of the United States. We also welcomed back users from international locations such as Cardiff University and Durham University in the United Kingdom. On top of this we had a number of government agencies and non-governmental organizations taking advantage of our location and great facilities.

I am always amazed and delighted by the wide range of research and educational activities that the WMRC is able to make possible. These range from cutting edge astronomy such as the long-term radioastronomy work of UCSB or the Penn State/University of Chicago BEACON study to detect tau-neutrino dark matter as it passes through the White Mountains. High elevation physiology work continues with examples being the long-term sheep studies of Loma Linda Medical School to the more recent Tasly Pharmaceuticals/UCSF Sall Lab study of the AMS drug T89. We are particularly delighted to have the GLORIA Project returning for their annual monitoring of high-elevation ecosystems changes in response to climate change. Of course, educational work and research abounds on environmental, geological, geographical, and biological science topics. It is great to see geology classes from throughout California and beyond bringing so many students to WMRC. I know that this is a transformative experience for these students. Many of the professors are now old friends of all here at WMRC. *(continued)*



Photos: (above left) October 2022 – WMRC Director Glen MacDonald and an UCLA undergraduate field class conducting tree reproduction surveying at Saddlebag Lake. (above right) Undergraduate students learning the basics of plant identification and line transect surveys on the WMRC Owens Valley grounds.



WMRC is also always eager to engage with and support our local community. Our public lecture series are now back up and running. The year we also hosted a pilot workshop organized by Allen Glazner, the Eastern Sierra Interpretative Associated that focused on educating local agency professionals about Eastern Sierra natural history and geology. We also hosted the inaugural Great Basin Water Justice Forum which was organized by the Owens Valley Indian Water Commission, Dr. Sophia Borgias (Boise State), and the Great Basin Water Network.

The WMRC facilities are located in extreme environments, and as you can imagine, keeping the maintained and doing upgrades is a major task. We made use of Prop 68 funds to help meet some of these challenges. Some examples of work over the past year include new battery banks at the upper stations, a more efficient generator at Barcroft and upgrading phone service to 4G. Exciting news is that we are working on plans for a solar array at Owens Valley. Stand by for progress on that.

None of the work at WMRC and the progress we have made would have been possible without the dedicated and thoughtful work of our staff. Our Facilities Manager, Steven Devanzo, has been critical in his importance in this regard. Aside from the huge day to day responsibilities, Steven was instrumental in our Prop 68 application and deployment. On top of that, as some of you know, he has pinch-hit when additional work was required at upper stations – including cooking. Gaylene Kinzy has proven invaluable in keeping reservations and bookings on track and in all manner of communications work. Our much-valued long-time business manager, Elizabeth Sally, took a much deserved retirement this year. We all miss her and wish her the best on life's new adventures. We were very fortunate to recruit a very experienced and thoughtful new business manager, Laurel Martin, to WMRC. Aside from much experience in the NGO world and an MBA, Laurel brings much positive energy with her to WMRC. As usual, our research scientists, Jeff Holmquist and Jutta Schmidt, continue to conduct important environmental research and outreach in our region. Aside from our career staff, we are fortunate to have wonderful seasonal staff join us each year to keep WMRC running during our busy summer season. Much thanks to all! *(continued)*



Photos: (from top) UC Davis Field Geology TA's Holli & Paige. Steve Monfort & Glen MacDonald at Crooked Creek Station. Allen Glazner lecturing during an ESIA professional development workshop (Photo by Alex Flowers). WMRC Staff & Director at their annual planning meeting.



It must be said that 2022 has offered us some challenges here at WMRC. Like the rest of the nation, there is a severe shortage of food service and hospitality staff in Bishop and the Eastern Sierra. I have had some long conversations with local restauranters about this and the situation is very tough. We made very energetic recruitment efforts in the Owens Valley and Mammoth, but still ended up short-handed at the upper stations and simply unable to secure cooking staff for Owens Valley. We know this is tough on research groups and classes as they must plan and prepare their own meals. If it is any consolation, I bring my UCLA field course to WMRC and also have to plan and prepare meals. I feel your pain. We are working on a plan to alleviate this shortage next summer, but no guarantees, except we will do our best. Like everyone else we have been hit by inflationary increases to our costs. On top of that UCLA has instituted new sales and services overhead rates. This meant some increases in our rates. Please believe me, we worked hard to keep these manageable for you. Again, I understand the situation as I pay the same rates as other UC users when I bring my class up to WMRC.

In closing, I want to thank all of our users, supporters and friends for making 2022 another good year here at WMRC. I am hoping that 2023 will be even better still. I can promise that all of us at WMRC will work our hardest to make sure we offer the best research and educational experiences possible - here in this magnificent region.

All the best for 2023!

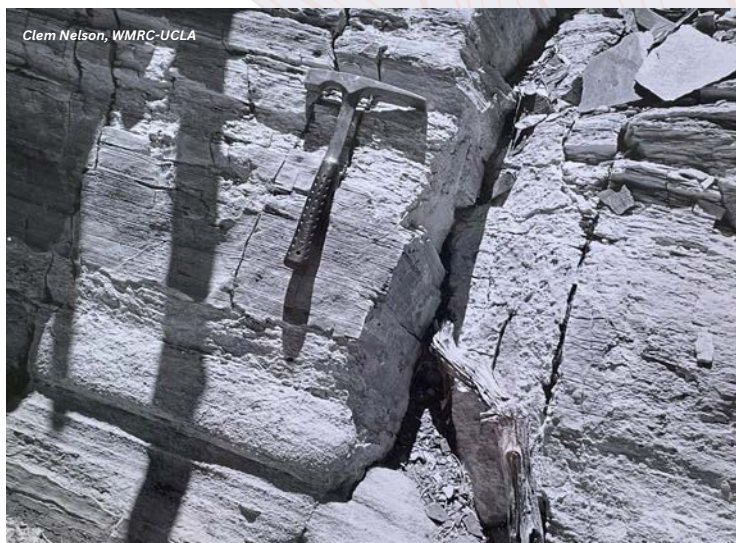
*Glen*

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## About this issue...

2022 heralded the return of many perennial field courses to WMRC, of the 15 visiting university level courses almost all were based in the physical and earth sciences. Some institutions and their faculty have been utilizing WMRC for decades. Many visiting geology undergraduates get their first taste of fieldwork by mapping the notorious Poleta Folds in the Deep Springs Valley. Ironically, this unique land feature was discovered by UCLA professor and former WMRC resident geologist Clem Nelson (1918-2004).

Clem was internationally known for his Precambrian/Cambrian paleontological and stratigraphical work in the Inyo-White Mountains. The 35mm photo featured on the cover and below was taken by Clem in 1966 in an area described as "Papoose Canyon". Art Sylvester (from 'Geology Under Foot' fame) accompanied Clem on the expedition. This photo and several others were bequeathed to WMRC after his passing.



WMRC hosted some the following institutional field courses in 2022...

- **UCLA**- Geog 178: Conservation Geography
- **CSUS**- Geol 188: Advanced Geological Mapping
- **UCD**- GEL 110 A/B: Capstone Summer Field Geology
- **UCR**- GEO 102 A/B: Summer Field Geology
- **Durham University**- GEOL 4081: Earth Science Field Seminar
- **Dartmouth University**- "The Stretch"
- **CSUN**- GEOG 630C: Special Topics in Environmental Geography & GEOL 430 A/B: Summer Field Geology
- **Central Washington University**- GEOL 210: Intro to Geological Field Methods
- **Oregon State University**- Geo 295: Intro to Field Geology
- **Cal Tech**- Ge120a: Intro to Field Geology.
- **UNC Chapel Hill**- GEOL 072H: Field Geology of Eastern California
- **Piedmont Virginia Community College**- GOL 295: Geology of Eastern California

# IN MEMORIAM, CAMPITO

by Tim Forsell, WMRC Staff

Campito's long walk has come to an end. He's moved on to somewhat greener pastures, leaving an unfillable hole in our hearts. With no effort on his part, Campito made the world a better place. He was likely in his thirty-first year when he left—old, for a horse that lived so rough.

Campito's fame had been on the rise for some time. To the point that people were coming to the Whites, not just to see ancient trees or bag a peak, but to maybe catch a glimpse of this mysterious lone horse they'd heard about—a wild-hearted solitaire with some vaguely Hispanic (maybe Italian?) name. Others, some who'd known about him for years, had no idea the old horse even had a name. But anyone who knew anything at all about Campito wondered how he came to be in the Whites in the first place. Where did he come from? Why would a horse be roaming around in the mountains all by his lonesome? Where does he go in the winter?

Campito touched everyone who laid eyes on him. He was a living symbol of things we admire... things we aspire to. He represented certain intangibles that people of all cultures hold in high esteem. For one, he embodied the archetype of the loner-hero: that rare being who carries everything they need with them, on the inside. But, for those of us who loved Campito, there was little reason to try and analyze such notions—it was all about a particular feeling you had whenever you saw him. A good feeling. And Campito? He cared about one thing only: eating.

For the longest time, Campito wouldn't let humans get within fifty yards of him. Once you crossed that invisible line, he'd slowly amble off. If you persisted in trying to get nearer, at some point he'd up and take flight—his Seeya! often preceded by a spirited head-toss and bodacious, rodeo-style heels-over-head bucking maneuver. Without fail, though, Campito would stop... turn his head...and shoot you a certain look. A look that was not unfriendly; an inquisitive, inviting look that made you say to yourself, "Secretly, I think he really wants to be petted." And, secretly, you'd stand there wishing you were the one person Campito would bestow that honor upon (*continued*).

Starting maybe five or six years ago, something inside him shifted and Campito became much less reserved. It came as a shock at first: you'd be driving along and there he was, loitering right by the road. He'd move off if you started to get out of your rig but if you stayed put you could roll down the window and have a little tête-à-tête. Like Mr. Ed, Campito didn't have much to say. Nonetheless, you'd be having a conversation, yessirree. And then—who knows why—he started letting people get out of their vehicles and approach. Closer. And closer still. Until you'd find yourself standing right in front of him, face to face. For Campito's long-time admirers this was an indescribable thrill. You couldn't help but feel that he'd finally decided to let us in.

One bonus feature of the new, intimate encounters: we were finally able to get a clear photo of that curious white mark on Campito's neck. For those who don't know about this: that barcode-like tattoo on his neck was a "freezemark." Freezemarks are made using a special adjustable branding-iron dipped in liquid nitrogen—the process is painless and, after the frostbit bits heal, the hair grows back white. The result is an identifying mark that can tell you several things. First off, that the bearer is a captured wild horse that has been registered and, if male, gelded. Using a close-up photo of Campito's freezemark and an online key, in 2018 we were at last able to ascertain his age (foaled, 1991) and roughly where he came from (NE California).

The circumstances and events leading to Campito's living free in the High Whites have always been something of a mystery and an enduring part of his legend. However! Just recently, with a friend's help, I contacted two people who actually knew Campito's story firsthand. (One of them—a long-time Eastern Sierra packer/outfitter—was, albeit briefly, Campito's legal owner.) These two individuals were able to finally lay some of our questions to rest but, unfortunately, many details of what happened thirty years ago have been lost to the sands of time (*continued*).

Throughout the 1990s, Campito's one-time owner would on occasion travel to Modoc County where he'd purchase, at \$125 a head, mustangs taken from the Devil's Garden Wild Horse Territory. Devil's Garden Plateau—rugged, high desert sagebrush-steppe underlain by lava flows—lies just north of Alturas in Modoc National Forest. Many people have remarked on Campito's fine confirmation...his downright regal beauty. (Compared to the scrawny, scruffy individuals that make up your average mustang herd, Campito looked like a genuine show horse.) It so happens that the Devil's Garden WHT is known for the overall quality of its animals. According to a Forest Service website, "Wild horses have been present on the Devil's Garden Plateau since shortly after the first pioneers arrived. Many of the early horses escaped from settlers or were released when their usefulness as domestic animals ended.... Local ranchers and tribal members turned horses out to graze and then gathered them as needed." It goes on to say that "Devil's Garden Horses contributed to the liberation of Europe in WW I." If so, these would have been US Cavalry "remounts," animals that came out of federal horse- and mule-breeding programs. These programs, established after the Civil War ended, provided stock for military use up until 1948. After WW I the Remount Services sold surplus animals to farmers and ranchers at bargain prices. More importantly, in each state the Remount Services provided stallions that, for a minimal fee, farmers and ranchers could breed with their own mares. (Significantly, this program—intended to help create a ready future supply of up-to-military-standards riding horses, resulted in an overall improvement in the quality of riding stock throughout the country.) Campito's size and confirmation closely match that of military horses in the WW I era.

Our hero (who at the time was called "Shaq") escaped, shortly after his arrival, from a pen just a few miles from WMRC. (In fact, he may have walked right by the station following his breakout.) Here's a juicy tidbit we can now add to the Campito legend: he escaped, in the dead of night, by jumping over an eight-foot fence. The following morning, signs of his return to Earth were found on the freedom-side of said pen. Clearly, Campito did not want to work for the man.

Along with the other adopted Modoc County mustangs, Campito was to be a saddlehorse ridden by pack station wranglers (but not by "the dudes"). Following his daring escape, Campito wandered aimlessly back and forth along the base of the Whites for a solid month. Apparently, he spent some of that time around Warm Springs, at the foot of Black Mountain. Repeated attempts were made to capture the fugitive. Finally, Campito made his way up Silver Canyon, perhaps sensing that this was his path to freedom. ("He was on a mission," as Former Owner put it.) He was tracked as far as the top of Silver Canyon and, at that point, the pursuit was abandoned. The Forest Service was notified by letter that the horse was loose in the Whites but no action on their part was taken to remedy the situation. Moreover, no further attempts were ever made to try and catch him. These events took place in 1995 or 96.

Thank goodness. For a quarter century, Campito graced us with his presence. He had a surprisingly limited range, alternating between three favorite spots—Big Prospector Meadow, Campito Meadow, and Sagehen flat. He never dallied when switching locales, heading straight from one to another on well-worn paths, eating as he went and whistling a happy tune. In his final years, however, he took to spending time in new haunts: springy areas at the foot of County Line Hill and around Golden Siren Mine—places he'd previously ignored. Oddly, there were places within his domain you'd think Campito would be drawn to that he never ever set a hoof on. For instance, even in the driest years he never ventured down Crooked Creek. In fact, during our extended drought, almost all of his once-reliable water sources dried up entirely or would be gone by mid-summer. Where Campito slaked his thirst in dry times is a lingering mystery (*continued*).

Here's a heartwarming story: Campito had a special friend—an ancient packhorse called "Bob." This story was relayed to me by a pair of Deep Springs cowboys. When this event occurred, the two were fixing fence. Bob, who'd packed the tools, was snoozing nearby. Campito suddenly appeared and walked right up to Bob. The two immediately launched into a distinctive equine routine: with necks crossed, they'd toss their heads and exchange little lippy nips—love-bites, as it were; literal horseplay. (The cowboys assured me that this had happened before. But only with Bob.) The two were more than casual acquaintances—they were buddies. Well then.

One final item. In answer to the question, Where did Campito go in the winter? the answer is: Nowhere. As hard as this is to believe, Campito never went down the mountain. Not only were there no indications of him ever having ventured downslope, over the years there were numerous sightings during the months of long, cold nights. Always, in his usual hangouts. He grew his thick winter coat and got by. Somehow, even during those years where snow was all the way to the valley floors, he got by. He knew all the windblown places where the ground was exposed or he was able to paw through shallow snow like a reindeer. Yes, it's hard to believe. But Campito was an expert survivor. Visualize him standing alone at 11K on a frigid February night in a raging blizzard. Just taking it...patiently waiting out the storm. Talk about fortitude.

Campito.

It's hard to believe he's actually gone. Many have commented that his passing has affected them powerfully; more than was to be expected. Sure, we're all scientists here (scientists at heart and in outlook, if not professionally). Campito was just a horse—a member of a separate tribe—and all our sentiments and sentimentality are nothing more than anthropomorphic projections. This may be so. But there's more to it than that. Personally speaking, I'm a naturalist (by one definition, part scientist but with a little mysticism thrown into the mix). A naturalist by trade and by temperament. I believe that nature's shadowy side, its unknowable aspects, should always be factored into what we know—or believe we know. In this light, I see nothing amiss in thinking of Campito, not just as *Equus ferus*, but as a sort of totem animal who embodied the quintessence of the High White Mountains. Campito was a red-blooded-animal version of the bristlecone pine. I can say this much: with his departure, there's something missing that was there before. Again, it was just knowing Campito was out there. Living his life...on his terms.

*In the cage there is food.  
Not much, but there is food.  
Outside are only great stretches of freedom.*

Nicanor Parra



Photo: Ron Phifer, 2021



# UCLA ANTONY ORME RESEARCH AWARD

Former White Mountain Research Center Director, the late Professor Antony (Tony) Orme, was honored recently by the establishment of an UCLA undergraduate award in his name. Tony Orme was a Professor of Geography at UCLA and served as the Faculty Director of the WMRC from 2012 to 2016 when he retired from the position. Tony shepherded the WMRC through the transition from UCSD to UCLA and worked tirelessly to address deferred maintenance and upgrade the facilities.

Current Director, Glen MacDonald, said "Tony's vision regarding the importance of WMRC to the University of California's mission, and his dedication to WMRC, its staff and users, was critical in allowing the WMRC grow and prosper.". Sadly, Tony passed away in May of 2020.

Tony's family made an initial establishing gift in his memory to develop an endowment for the Antony Orme Undergraduate Research Award at UCLA. Many of Tony's former colleagues, students, and friends pitched in and the fund raised over \$100,000 to establish an endowed award in perpetuity.

The establishment of the Orme Award was celebrated at a campus event at UCLA in November of 2022. Aside from many friends, colleagues, and former students, three generations of the Orme family were in attendance. The family was led by Tony's wife, Professor Amalie Orme, who is known to many of us here. Amalie is a professor of Geography at CSU Northridge, and a frequent educational and research user of the WMRC. Amongst those speaking at the event was Tony's daughter, Devon, who is a geologist and faculty member at the University of Montana. We here at WMRC cherish Tony's memory – he was a true champion of WMRC and its mission.



*Photos: (above) Three generations of Tony Orme's family celebrate the launch of the Antony Orme Award for Undergraduate Research. (Right) November 5, 2022 event at UCLA to launch the Antony Orme Undergraduate Research Award.*

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## ELIZABETH SALLY RETIRES AFTER 16 YEARS AT WMRC

Business Office Manager Elizabeth Sally retired in March after working for WMRC for 16 years. She previously worked in the UC system in southern California. We are all grateful for her hard work, dedication, and attention to detail. We wish nothing but the best for her and hope she is enjoying her retirement!

*Pictured, Elizabeth and WMRC staff enjoying a "farewell picnic" at the Bishop City Park.*



# NEW STAFF INTRODUCTIONS

## Laurel Martin, WMRC Business Office Manager

Hello, my name is Laurel Martin, and I am the new Business Office Manager for White Mountain Research Center. I have taken over the position from Elizabeth Sally, who retired this spring after more than 16 years working for WMRC. Originally hailing from Connecticut, I received my B.S. in Environmental Science with an emphasis in Biological Science from University of California-Berkeley. After returning to Connecticut upon graduation, I worked as a Zoo Educator for Connecticut's Beardsley Zoo. As my first 'real job', it gave me an amazing opportunity to work with animals and educate local school children. I discovered early on that having meaningful work and working with animals are very important to me.

I relocated to Mammoth Lakes in 2006. For the past 15.5 years, I worked for local non-profit Disabled Sports Eastern Sierra. I served in various capacities including customer service, program and grant development, event planning, and finance. During my tenure, I helped grow the organization by creating a comprehensive summer program and tightening financial controls while taking over all accounting for the organization. I also received an MBA from University of Nevada-Reno, while working full time.

In addition to my day job, I teach swim lessons and volunteer with the local dog sled team. I have also served as a Parks & Recreation Commissioner for the Town of Mammoth Lakes for the past 6 years. In my free time, I enjoy mountain biking, hiking, skijoring, and paddling throughout the Eastern Sierra. I am excited to be a part of the team at WMRC and look forward to learning more about the incredible research and learning opportunities provided by our facilities.





# New UCNRS Executive Director Visits WMRC

The UC Natural Reserve System (UCNRS) recently hired Steve Monfort as their new Executive Director in October 2021. Steve was formerly the Executive Director of the Smithsonian Zoo in Washington D.C. and has educational ties to the University of California.

To become familiar with all the reserves in the UCNRS, Steve went on a 12+ month tour visiting all 41 sites across California. Steve visited WMRC over a two-day period this last July. He was given a tour of all three facilities and listened to staff concerns and needs. The tour also included a trip to the Patriarch Grove, natural history talk, walk to the observatory at 12,000+ feet, and an overnight stay at Owens Valley and Crooked Creek Stations .

WMRC staff had a wonderful time getting to know Steve and showing him the center. We look forward to continuing working with him.



*Clockwise from top: Steve Monfort, WMRC staff and director near White Mountain Peak. Steve standing at an overlook on White Mountain Rd. Operations Manager, Steven DeVanzo giving Steve a tour of OVS.*

## UCNRS Managers Meeting

In late October 2022 our Operations Manager and Scheduling Coordinator (Steven and Gaylene) attended the annual UCNRS managers meeting as representatives of WMRC. Steven and Gaylene drove 6 hours to UC Irvine's Steel/Burnand Anza-Borrego Desert Research Center in Borrego Springs, CA. This was the first meeting held in-person since 2019 and 84 people were in attendance. Topics of discussion included Diversity, Equity, and Inclusion (DEI), Proposition 68 funding, Tribal Relations, and Field Safety Planning. Attendees could also participate in interpretive hikes in the state park. The meeting was a great opportunity to meet others who work in the NRS and for UCOP.



*Clockwise from upper left: Steel/Burnand Anza-Borrego Desert Research Center. Morning hike/fieldtrip to Borrego Palm Canyon. The center was originally a mid-century social club. Gaylene & Steven on a 2nd fieldtrip.*



# 2022 FIRES

WMRC experienced an early and terrifying start to the 2022 fire season. Two fires ignited within three weeks of each other, and one destroyed a staff member's housing and vehicle.

On the early afternoon of February 16th, smoke was spotted just south of the Owens Valley Station (OVS) perimeter fencing along the Owens River. A northerly wind with gusts as strong as 32 to 50 mph coupled with low relative humidity and a dry January made the fire explode. WMRC was shortly evacuated thereafter by an Inyo County Sheriff's deputy. Luckily, the station was minimally occupied and no groups and most staff were not onsite. Within a few hours the fire had made it's way to the Cal Tech Owens Valley Radio Observatory, all agencies kept the facility and the town of Big Pine protected. OVS then became a staging area for engines and their crews for several weeks. As a token of appreciation, WMRC opened up their buildings for hot showers, snacks, and beverages to fire personnel. The Airport fire was contained 10 days later after burning 4,136 acres. 680 personnel, 51 engines, 7 dozers, and 3 helicopters were assigned to the incident. No WMRC or Cal Tech structures were damaged or destroyed.

Luckily, crews were still along the Owens River conducting Airport Fire mop up, when on the morning of March 3rd a vehicle stopped on Poleta Road caught fire. Brush along the OVS west fence line soon was aflame. Mop up crews and other agencies responded quickly to the incident and prevented another substantial fire.

Dry weather and high winds persisted well into mid-summer in the Eastern Sierra. On the early afternoon of July 8th a fire broke out on Fairview Circle in West Bishop. The fire initially engulfed the home of one WMRC employee, he managed to call 911 as he narrowly escaped with minor burns to his feet. He lost his belongings and vehicle, WMRC thankfully could provide temporary housing for the duration of the season.

In all 9 homes, 20 outbuildings, and several pets and livestock were lost to the fire. Several local agencies provided mutual aid. Many homes in the area have not had their power restored to date.

We're hoping our wet winter will quell the 2023 fire season. Three fires in one year is a little much!





# 2022 CSU Sacramento Field Course Geol 188: Advanced Geological Mapping

Photos provided by Brian Hausback





# NSF Broader Impacts Program Brings Detroit Teens to OVS

Dr. Sven Morgan, Professor of Geology and Chair of the Natural Sciences Department at the University of Michigan-Dearborn, used the Broader Impacts part of his NSF research grant (EAR 2120302) to take 11 high school students from Detroit to Owens Valley, California to teach them about geology and specifically, how water affects rocks on all scales. James Student (PI from Central Michigan Univ.), Sarah Trevino (postdoc on grant), and two earth science education faculty from UMD also travelled and assisted. The students were from the Cesar Chavez Academy High School and were allowed to dual enroll at the University of Michigan-Dearborn so they would receive college and high school credit. Only 8% of CCAHS students go on to higher degrees and 42% of families rank below the poverty line. The class met three times in the spring of 2022 on the UMD campus for a series of introductory lectures on plate tectonics, rocks and minerals, and maps and cross-sections. From August 4-13, 2022, the class flew from Detroit to Las Vegas where we rented two vehicles and drove to Bishop where we all stayed at the University of California White Mountain Research Center. The cost of the college tuition was reduced by half (dual-enrolled courses are charged 50% by UMD) and paid for by Cesar Chavez HS. The travel, housing, and meal costs were covered by the NSF grant. Each day we drove the students to a different location in and around Owens Valley to examine and work on the geology.

Students spent their days collecting data to construct maps, drawings, and reports on the geology of Owens Valley. The cooler mornings were mostly spent in Owens Valley, the hotter afternoons usually spent at higher elevations, either in the Sierra Nevada Mountains to the west or the White Mountains to the east. Evenings consisted of short discussions (20 min) on what we have seen that day and short lectures (20 min) on what we will see the next day, and 20-minute exercises on skills (rock ID, making maps, x-sections, etc.,).



*(Top left)  
Broader Impacts  
students  
enjoying their  
stay at OVS (top  
left).*



*(Bottom left)  
Students and  
instructors on a  
fieldtrip to  
Mammoth  
Mountain.*



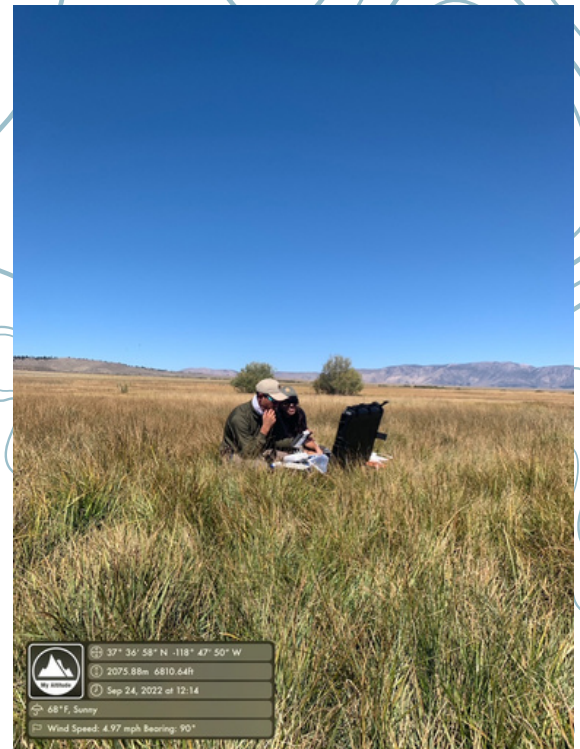
# Fluvial Geomorphology: Continuing Research at McGee Creek

*Amalie Orme, Professor of Geomorphology, CSU Northridge*

The Geomatics and Environmental Aerial Research Group (GAERG) of California State University Northridge Geography (CSUN) continued its research into channel patterns, sediment yield, and landscape change during fall 2022. Built on a program initiated in 2015, the project examines channel adjustments of the lower 3 km of McGee Creek upstream of its confluence with Convict Creek.

The focus of ongoing efforts by the Los Angeles Department of Water and Power to mitigate decades of grazing which impacted channel morphology and meadowland recovery, students from CSUN have surveyed 22 cross sections to date and constructed longitudinal profiles using a high accuracy RTK GNSS receiver in concert with satellite-driven total stations and traditional automatic levels. Stream velocities were collected with both Doppler profilers and electronic currents meters while classic Wolman pebble counts and USGS-based suspended sediment have been analyzed. When permitted, a series of UAS based low altitude flights have been performed by licensed pilots, with image processing to develop high resolution mosaics of the nearly 3 km reach of the channel.

Funding from the CSUN College of Social and Behavioral Sciences, Campus Quality Fee, Instructionally Related Activities, and the Department of Geography and Environmental Studies, support this unique opportunity to train undergraduate and graduate students in field studies and fluvial geomorphology under the direction of Dr. Amalie Orme. Grateful acknowledgement is extended to the White Mountain Research Center (Bishop) (UCLA Institute of the Environment and Sustainability) for providing a welcoming and safe base for the project and to the Los Angeles Department of Water and Power for access to the channel and its meadowlands.



*Pictured, GAERG members collecting data in the field. Photos provided by Amalie Orme.*

# Visions for Change at the Great Basin Water Justice Summit

Story and photos by Sophia Borgias, School of Public Service, Boise State University

In August 2022, WMRC's Owens Valley Station was host to the Great Basin Water Justice Summit, an event that brought together communities from across the region to share perspectives on water justice issues and build networks for future action. I had the pleasure of helping to organize the Summit with the Owens Valley Indian Water Commission and the Great Basin Water Network, building upon research collaborations in recent years. The Summit spanned three days, featuring presentations and panels, breakout sessions and workshops, and a field trip. Approximately 30 people attended the three-day event in person, with another 160 virtual participants joining the first day virtually via Zoom webinar.



The Summit provided an opportunity to hear from a diverse array of tribal members, environmentalists, ranchers, and social justice activists engaged in water issues in Great Basin. Speakers highlighted shared concerns about the impacts of rural-urban water transfers, groundwater extraction, mining, and energy projects in the Great Basin. But they also emphasized the strength of collective efforts to protect rural landscapes and livelihoods, uplift Indigenous stewardship, and build more resilient communities.

The Summit was kicked off with a panel about the fight for water justice in Payahuunadü (Owens and Mono basins) in light of Los Angeles's continued extraction and export of water from the region. Topics included its effect on Tribal land and water rights, groundwater and vegetation conditions in Owens Valley, ranch leases and meadow habitat in Long Valley, and water levels at Mono Lake. This provided context for the second panel, which highlighted the 30-year battle to prevent similar impacts from happening in eastern Nevada when threatened by a proposed water transfer to Las Vegas. Members of the Great Basin Water Network talked about how the history of water conflicts in the Eastern Sierra informed their efforts to bring together a diverse coalition to defeat the project. And they in turn shared lessons about coalition-building that resonated with current efforts in Payahuunadü and other parts of the Great Basin.

The afternoon featured lightning talks regarding a range of other water justice issues across the region. Some expanded upon the topic of rural-urban water transfers discussed earlier, adding dimensions of groundwater management, Indigenous food sovereignty, and cultural resource protection. Others focused on the impacts of a wave of new energy and mining development in the Great Basin spurred by the green transition. These topics then formed the basis for an interactive session in which participants discussed visions of water justice, as well as actions that could help make those visions a reality. Common themes included increased awareness, policy reform, and socio-economic change to support water conservation, ecosystem health, rural livelihoods, and Indigenous sovereignty and stewardship (*continued*).



The second day of the Summit included further discussion of visions of water justice and the potential to build stronger networks across the region. There was also a chance to hear from Tribal leaders about their priorities and visions for future water justice work. And there was a final panel about building collaborations among Indigenous and non-Indigenous communities.

I had the chance to share about recent research I've conducted with Dr. Kate Berry (UNR) about unlikely alliances in rural-urban water conflicts. And Dr. Meg Mills-Novoa (UC Berkeley) and I facilitated a workshop to identify priorities for future research and outreach regarding the intersections of climate justice and water justice issues raised during the Summit. We are preparing a short report to inform researchers and students about the research topics, data gaps, and tools identified.

The final event of the Summit was a field trip led by the Big Pine Paiute Tribe's Environmental Department. The group discussed the impacts of groundwater pumping around Fish Slough, Big Pine, and Fish Springs, as well as efforts to revitalize food sovereignty and traditional irrigation practices at the Big Pine Reservation. Being out on the land together offered the perfect way to close out the Summit, seeing firsthand the depth of local water injustices but also the seeds of a more just future.



## ABC10 Sacramento Treks California's Highest "Backroad"

*Photos provided by John Bartell*

In August 2022 we had the pleasure of hosting John Bartell from ABC 10 Sacramento. John is known for his travel segment "Bartell's Backroads" that features many Eastern Sierra and California landmarks. On this episode he treks up to Barcroft Station and the summit of White Mountain Peak with our Operations Manager, Steven DeVanzo.



To watch click [HERE](#) or scan the QR code



# Black Holes, White Gold: A Floristic Inventory of the Silver Peak Range, Esmeralda County, NV.

Story and photos by Peri Lee Pipkin,

Claremont University/California Botanic Garden, 2022 WMRC Mini Grant Recipient

Master's student Peri Lee Pipkin, studying botany at the California Botanic Garden, has been working on compiling an inventory of all known plants in the Silver Peak mountain range of Esmeralda County, NV. Located about an hour from Bishop, CA, the area is high in biodiversity and is home to multiple rare plants and animals. These beautiful mountains are home to Bristlecone pines (*Pinus longaeva*), mountain-top vernal pools, pinyon juniper forests, sagebrush steppes, creeks and mossy canyons, and alkali wetlands and hot springs. It's also rich in human history, with many arrowheads and ruins to be seen. So far, close to 1800 collections have been made representing a little over 400 plant taxa! Nevada's botanical diversity is largely under-documented, and the Silver Peak Range is what's known as a "botanical black hole", so next season may bring some new and interesting finds as well.

Despite the lack of botanical documentation, we know that the Silver Peak Range is home to rare and endangered species such as Tiehm's buckwheat (*Eriogonum tiehmii*) and Tecopa bird's beak (*Chloropyron tecopenseis*). Its proximity to other specialized habitats, such as those located in the White Mountains and Death Valley National Park in California, as well as the presence of unique ecosystems such as alkali wetlands lends potential for this area to host high levels of species richness and endemism. It also straddles the transition zone between the Great Basin and Mojave deserts, and includes the northernmost extent of the western Joshua trees (*Yucca brevifolia*), a species predicted to undergo widespread extirpation in the southernmost region of their range. In addition to this, a rare wildflower, *Chloropyron tecopense* (Tecopa Bird's Beak), grows in the area wetlands and depends on groundwater for survival. In its narrow habitat range, groundwater extraction for agriculture and geothermal energy threaten the Tecopa Bird's Beak and many other rare plants and animals found in this unique desert wetland. The subalpine peaks of the range descend into unusual geology that bears both diverse plant communities and mineral rich soil, some of which are notably high in lithium. Because of this, the region is a hot-spot for proposed lithium extraction, a critical mineral in our transition to renewable energy sources. This leaves the area immediately vulnerable to the destructive practices of resource extraction. As an increasing demand for minerals grows and new projects are being proposed on public lands, baseline biological data is needed to inform management decisions that can maximize protection of biodiversity (*continued*).



(Top) Booth's evening primrose (*Eremothera boothii*), a charismatic and common annual wildflower of the area.

(Center) Nakedstem sunray (*Enceliopsis nudicaulis*) growing in a limestone outcropping.

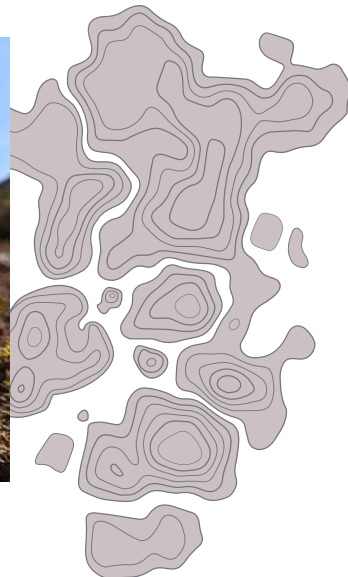
(Bottom) The dark-throated shooting star (*Primula pauciflora*), at one of the area wetlands.





(Left) Tiehm's buckwheat (*Eriogonum tiehmi*) is a rare area endemic that has been newly listed as an endangered species.

Collecting herbarium specimen data and understanding geographic patterns of plant diversity can inform appropriate siting of mineral extraction and energy development in order to reduce conflicts with sensitive resources such as rare plants and ecological communities. This project will provide much needed data for an understudied and rare plant species facing existential conservation threats. These factors also underscore the urgency and importance of a floristic inventory in this region. The White Mountain Research Station provided a very lovely and supportive basecamp for this research project this summer! If you'd like to volunteer to help with collecting efforts this summer, please get in touch with Peri Lee! ([ppipkin@calbg.org](mailto:ppipkin@calbg.org)) The season starts around May and goes through mid July and offers a chance to see spring wildflower blooms, subalpine trails with views of the Sierras, Whites, and Death Valley, and beautiful desert scenery.



(Above left) Midsummer Silvery lupines (*Lupinus argenteus*) on the summit.  
(Above right) Hillman's stinkweed (*Cleomella hillmanii*) growing in the volcanic soils in the southern part of the range.

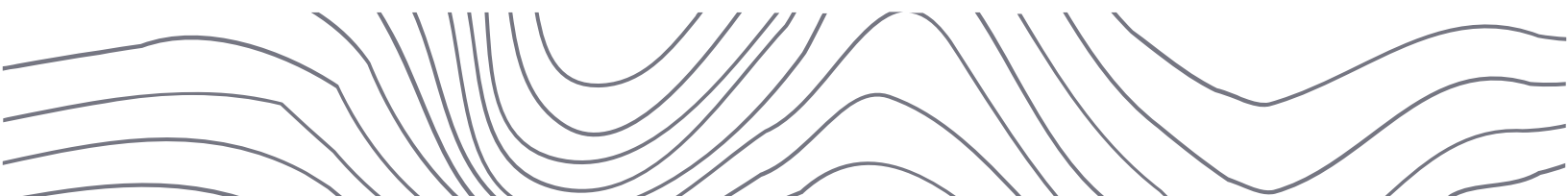


# Exploring the Role of Systemic Inflammation in High-Altitude Changes in Immune Function, Sleep Quality, and Cognitive Performance.

Story and Photos by Kathy Pham  
University of California, Riverside, WMRC Mini-Grant 2022 Recipient

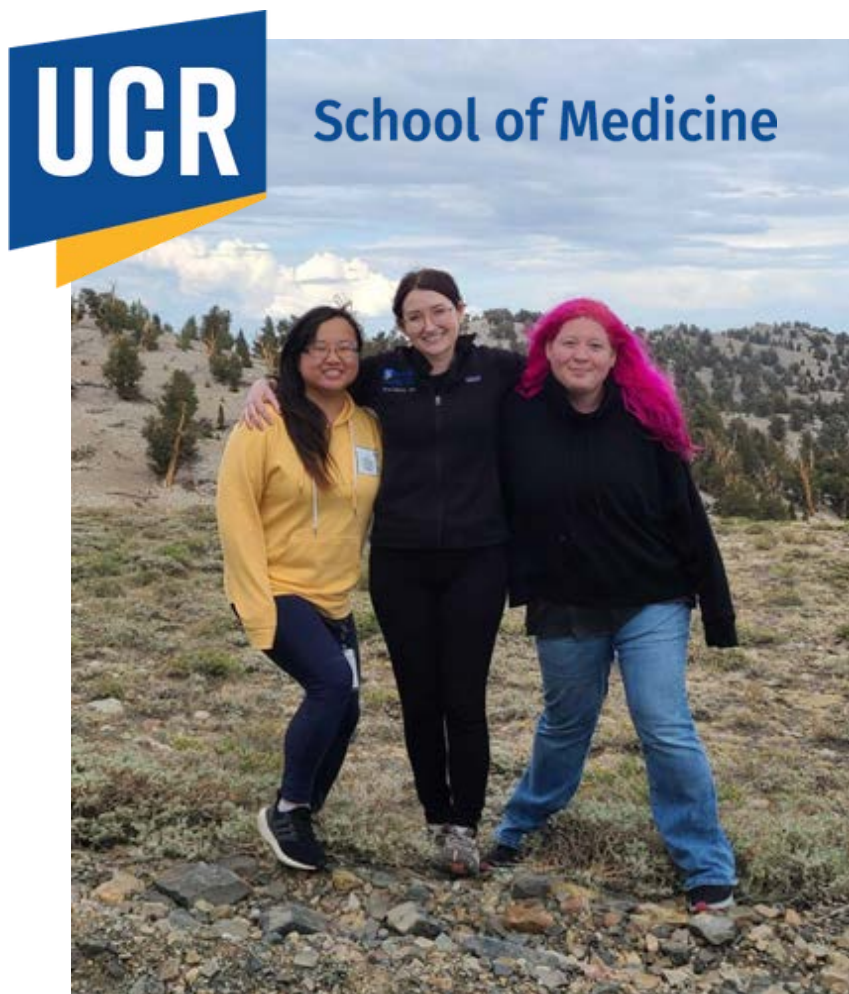
This summer, I completed sample collection for my doctoral thesis, Effects of Hypoxia Exposure on Inflammatory Signaling and Immune Function. Barcroft Station is located in the White Mountain Research Center (Bishop, CA, USA) at an altitude of 3800m. Across the Heinrich Lab's two field expeditions (2019 and 2022), I have had the opportunity to recruit 35 participants to travel to high altitude, where we took measurements and samples as we acclimatized to the low-oxygen environment (Figure 1). While my thesis focuses on the inflammatory profile changes in immune cells and function, the Heinrich Lab had very successful collaborations with the Malhotra Lab at UC San Diego, the Simonson Lab at UC San Diego, and the Seitz Lab at UC Riverside.

In the previous field expedition, I found that acute high-altitude exposure increases the proinflammatory gene expression in immune cells. This is an interesting finding, as this indicates that the immune system is being primed to mount an immune response during high-altitude exposure, without any secondary infection. Additionally, these changes are suspected to cause a potentially enhanced and exacerbated immune response to subsequent inflammatory stimuli. We have discovered novel genes of interest that were significantly upregulated following exposure to systemic hypoxia, which may prime the immune response. Additionally, several inflammatory pathways were found to be heavily enriched for genes upregulated at high altitude, further lending evidence into hypoxia-induced immune sensitization. We have also found significant associations between inflammation-related pathway genes and physiological measures at high altitude, such as associations with oxygen saturation and Acute Mountain Sickness Scores. In conclusion, my data suggests that acute high-altitude exposure may sensitize inflammatory pathways and that there may be links between an individual's inflammatory status and the development of high-altitude pathologies, such as Acute Mountain Sickness (Pham et al., 2022). To further complement our research, our sample collection for the White Mountain 2022 Expedition has also found elevation in immune system activation markers, particularly for immune cell mobilization. Further experimental plans include characterizing specific immune cell populations, and how high-altitude hypoxia impacted the immunological cell balance (*continued*).



(continued) In our previous collaborations, we investigated how systemic inflammation caused by high-altitude hypoxia may impact sleep quality and cognitive performance. Our research demonstrates that several aspects of cognitive performance are impaired at high altitude, including sustained attention, reaction time, and risk avoidance (Heinrich et al. 2018, Frost et al. 2021). Our current questions aim to elucidate potential mechanisms behind these impairments, and if other factors may contribute to these impairments. We therefore investigated if lower arterial oxygen content, poor sleep quality, systemic inflammation, and/or reduced cerebral blood flow are potential factors that contribute to cognitive impairments. With this most recent field expedition, we will be able to investigate each of these items and determine if they are associated with performance on a novel cognitive test battery improved for our specific study cohort and exposure. Data analyses related to these questions are underway.

Thank you to the White Mountain Research Center (WMRC) for generously awarding me with the White Mountain Mini-Grant 2022, and supporting my research at Barcroft Station. I would like to thank all of the WMRC staff who assisted the research personnel with our research and housing us. I would also like to thank all of our participants who were with us for all our expeditions, and we hope to see everyone again! Thank you everyone for making this research possible! The Heinrich Lab hopes to visit again soon!



*Pictured: Heinrich Laboratory Graduate Student Research Personnel. Kathy Pham, Dr. Erica Heinrich, and Shyleen Frost (left to right).*



# GLORIA Great Basin: tracking alpine plant range shifts on mountaintops in the White Mountains with citizen scientists

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GLORIA (Global Observation Research Initiative in Alpine Environments) is a collaborative network with a shared methodology for surveying alpine summits across the globe (<https://www.gloria.ac.at>). The primary objective of GLORIA is to measure changes in plant community composition on mountain summits in response to rapid and accelerating climate change. It is a tremendous effort with over 100 alpine areas in the global network. The non-profit GLORIA Great Basin leads the effort at eight of these areas in eastern California and Nevada. The White Mountains are a GLORIA Master Site, which means that the methodology used in the White Mountains is used as an example for the international GLORIA community.



*The rare Townsendia condensata. Photo by Kaleb Goff.*



*Above: downslope surveying of Sheep Mountain East. Photo by Jim Bishop.*



*Above: 2022 Gloria Great Basin team at Patriarch Grove. Photo by Brian Smithers.*

GLORIA Great Basin has also pioneered complementary approaches to the standard international GLORIA summit protocol. Since 2007, GLORIA Great Basin has conducted surveys designed to observe changes in the upslope or downslope movement of plant populations by sampling across the entire alpine zone, where we expect mountain plants to shift upslope to track their climatic niches. These downslope surveys consist of 100 m long and 1 m wide belt transects, which are located at 25 m elevation intervals from just below GLORIA summit area plots down the slope below the summit toward the tree line. In each transect, we record the presence of all vascular plant species, and quantitatively record cover of plant species and substrata using a pin-flag method. These plots are consistently located on the southeast side of the mountain, to control for the strong effect of aspect. Every five years the same transects are re-located using GPS points and ground markers and re-surveyed. Data from this project have been used better understand the role of scale-dependency in alpine plant communities (Smithers and Oldfather et al. 2019). In the future, we hope to use this data to examine changes in the elevational distribution of plant species through time.

In the summer of 2022, GLORIA Great Basin returned to the White Mountains to repeat downslope surveys on Mt. Barcroft and Sheep Mountain East. We had a diverse crew of 25 volunteers from around the country and from all walks of life, including students, academics, agency personnel, GLORIA Great Basin board members, and citizen scientists. These surveys would not have been possible without the warm hospitality and generous collaboration from White Mountain Research Center. If you are interested in getting involved or participating in future GLORIA surveys, please check out our website (<https://www.gloriagreatbasin.org>) where you can sign up to receive more information.





In July 2022 UCB Jepson Herbarium hosted a botany workshop in the White Mountains led by Jim Moorefield and Martin Purdy. Participants observed and identified plants in the diverse ecosystems of the Southern White Mountains. Participants stayed at Crooked Creek Station for the duration of the workshop.

*Photo: Castilleja nana by Staci Markos, UC Jepson Herbarium.*

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