# JEFFREY PINE journal

CARING FOR THE PUBLIC LANDS OF THE EASTERN SIERRA

SPRING /21

IN THIS ISSUE | *Payahuunadü* | *Conglomerate Mesa* | *Long Valley* | *Bodie Hills* | *Death Valley*

## THE WATER ISSUE

BIANNUAL NEWSLETTER FRIENDS OF THE INYO VOLUME XIX, ISSUE I

# LAND ACKNOWLEDGEMENT

At Friends of the Inyo, we work to protect and care for lands that have been, for over ten thousand years, and still very much are, inhabited by the Paiute (Nüüumü), Shoshone (Newe) and Timbisha peoples. Many of these lands are now known by names recognizing people who never set foot here. These lands are called Payahuunadü or Panawe by the Nuumu and Newe peoples, respectively. This land acknowledgement is a recognition of the original inhabitants of the Eastern Sierra, and is intended as a show of respect for Native peoples and to surface the often-suppressed colonial history of our country.

PHOTO: Kyle Glenn

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**COVER:** Evaporative ponds in Owens Valley. PHOTO: Cavan

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PHOTO: dfikar

THE WYSS FOUNDATION

# We Are Grateful

Friends of the Inyo would like to express its gratitude to the Wyss Foundation for funding a new position at our organization over the last two years. The new position was ably filled by Bryan Hatchell, who has now permanently joined Friends of the Inyo's staff as Desert Policy Associate. The California desert is the real winner; we are grateful for our increased ability to protect and care for our desert areas.

Bryan Hatchell

# OWENS VALLEY WATER

## Over 150 Years of Injustice to the Paiutes

BY ALAN BACOCK AND SALLY MANNING, BIG PINE PAIUTE TRIBAL ENVIRONMENTAL DEPARTMENT
PHOTOS COURTESY OF ALAN, SALLY, AND EASTERN CALIFORNIA MUSEUM

In 2013, the City of Los Angeles celebrated the 100-year anniversary of the continuous operation of the Los Angeles Aqueduct. The LA Aqueduct transports water to Los Angeles from the Owens Valley. Los Angeles proclaimed, "The completion of the Los Angeles Aqueduct 100 years ago is a significant historical event that led to the growth and prosperity of Los Angeles and Southern California."

If water delivered by the aqueduct led to prosperity for the southland, an obvious question arises: **What happened to the land that the water was taken from?**

During the last 100 years, the Owens Valley has experienced significant changes, just as Los Angeles has, except that instead of prosperity, Owens Valley has experienced devastation. The results of moving water from Owens Valley to Los Angeles have been well documented and include:

- Drying up of Owens Lake which became the largest emitter of PM-10 dust (air pollution) in the nation;
- Destruction of animal and plant habitat due to the drying up of the valley's springs and wetlands;
- Irreversible damage to cultural sites because of unconcerned Los Angeles Department of Water and Power land managers
- Loss of groundwater-dependent vegetation due to groundwater pumping for export from the region; and
- A stifling of self-determination and economic growth opportunities.

Los Angeles' export of water has taken a huge toll on the environment in which we live, but it was not the first time that water was stolen in the Owens Valley.

Water was very important to the Native American Paiute people who lived in Owens Valley since time immemorial. Water gave rise to everything the Paiutes needed for life. Mary DeDecker, who lived in the Owens Valley from 1930 to 2000 and studied the regional ecosystems, stated the following about the Paiute people:

"They had developed a simple form of agriculture in the Bishop, Big Pine, and Independence areas which was an ingenious way of using the natural resources to advantage. Although they lived on the land, harvesting both natural and their cultivated native foods, they were wise enough to allow for replenishment. No resource was exploited to the point of no return. Above all, they had a high respect for water." (The illustrated map on page 5 gives an idea of how extensively the Paiutes used the landscape prior to the arrival of Euro-Americans.)

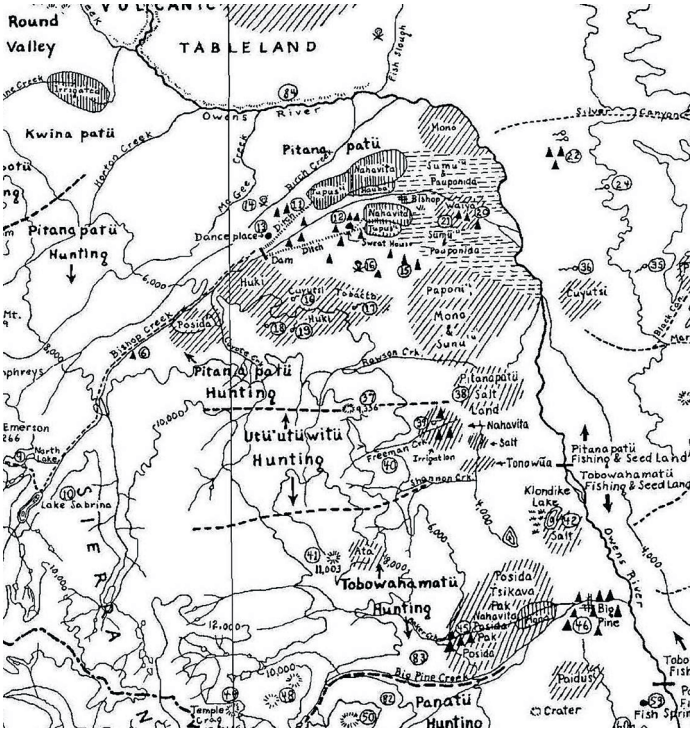
Throughout the valley, a remarkable network of irrigation ditches had been created and maintained by the ancestors of today's Paiute people. Using the water, the people cultivated plants that were used for food and medicine. The irrigation ditches, typically dug using a long, heavy digging stick, diverted flows out of the streams coming from the Sierra Nevada. Areas were irrigated some years and allowed to rest other years, and management was carried out by agreements among the people.

All of this came to an abrupt end when people of European descent arrived, claimed the lands and waters as their own, and fought with the Paiutes. The US government sent the cavalry, and in 1863 a campaign to remove the Native Americans from the valley was carried out by forcing them to march to the Fort Tejon area. After the forced march, "many of the Indian people returned to Owens Valley. Most of their irrigation ditches were already being used by white settlers…Although irrigation [of indigenous plants] in Owens Valley may have continued in some districts after 1863 on a lesser scale, it would appear that the system had largely broken down as a result of white settlement and the use of their fields for grazing and of the irrigation ditches for growing introduced crop plants." (Quoted from Journal of California Anthropology, p. 32, Summer 1976.)

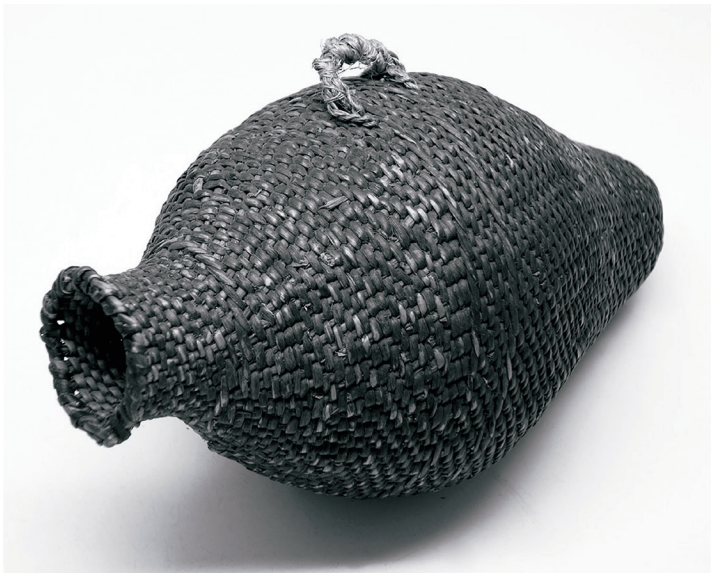
It has been said that when Owens River water flowed into the San Fernando Valley in 1913, the City of Los Angeles "stole the water fair and square" from the Owens Valley's white settlers. This was 50 years after the settlers "stole" the irrigation ditches and fertile lands from the Paiute ancestors. Paiute elder Vernon Miller is quoted as saying,

"Well, first we had the valley. Then the settlers came in and took it away from us. Then the City of Los Angeles came in and took it away from them."

It is important to remember and to tell the story. The descendants of the original inhabitants of this amazing valley want to understand their place in its history. Perhaps one day we might find justice for both the people and the environment.



Upper left, clockwise: Los Angeles Aqueduct Centennial 2013, map of Pauite water use territory (pre-settlers), Pauite woman with baby, groundwater gushing out of LADWP well #222 south of the Big Pine Reservation in 2011, Paiute waterjug basket.

# Water, Who Can Live Without It?

BY SEAN SCRUGGS, TRIBAL HISTORIC PRESERVATION OFFICER, FORT INDEPENDENCE PAIUTE TRIBE

Sierra Mountains from Fort Independence, 2018. PHOTO: Sean Scruggs


1ST Lieutenant Sean Scruggs with A-10 Warthog before deployment to Iraq, 2003. PHOTO: Sean Scruggs

As a Tribal Historic Preservation Officer (THPO) for the Fort Independence Paiute Tribe, I am keenly aware of the water issues in the Owens Valley. Daily, I work with agencies to address issues related to cultural resources and water is one of them. Patsiata (known as Owens Lake) is a painful and stark reminder of how the Valley has been transformed since the 1850s. It is a source of sorrow not only because of the massacres conducted there by the Calvary in the late 1800s, but because it now pollutes the air with its caustic dust every time the wind blows.

Director Ann Kaneko in her documentary "Manzanar, Diverted: When Water Becomes Dust" perfectly captures the mood of how Native Americans feel about the water issue and how the Japanese viewed the importance of water at Manzanar while incarcerated there from 1942 until the end of World War II. It is true that paya (water in Paiute) is life–I believe that it is more valuable than gold.

As a captain in the United States Air Force I came to appreciate water in a different way. In Afghanistan in 2003 and Iraq in 2007 military personnel were allowed one three-minute shower per day. Our only source of water was bottled water on pallets. While my unit was in Uzbekistan, a local enemy faction tried to poison our source of bottled water. How long can anyone fight a war, much less live, without water?

I believe that our climate is changing. Each year there is less snowpack in the mountains, yet water continuously flows to Los Angeles. "Where is the conservation effort?" one might ask. During some of my THPO work I have visited remote places which included lakes and rivers that dried up some 10,000 years ago or more. There is no doubt that mankind is ruining the planet every second of the day–the balance is gone!

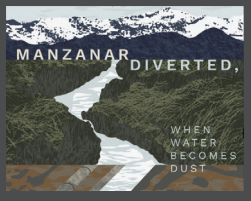
I embrace my Native American culture and work hard to preserve it. But in the end, water is something that all people need. In the early 1900s, in Nevada during an extreme drought, Natives were denied access to springs and water collection points as they were protected by armed guards. Denied their natural water many Natives died of dehydration or worse. Not being citizens until 1924, most people didn't seem to care–it was an "Indian Problem" seemingly being solved by nature.

It turns out that Native Americans may have the answer to the "water problem'' that all of us face–balance! The THPO's that I work with in the Valley always advocate for conservation and smart use of water. It is the only way. Water is the most precious resource, everyone needs to work to change their behavior to preserve and protect it for now and the future.

*Sean Scruggs, a member of the Fort Independence Paiute Tribe, is a retired captain from the United States Air Force with 20 years in Aircraft Maintenance and currently serves as the Tribal Historic Preservation Officer for his tribe. Sean enjoys running and completed the Boston Marathon in 2014 and 2017 and the New York Marathon in 2019.*

*Check online for screenings of Director Ann Kaneko's documentary, "Manzanar, Diverted: When Water Becomes Dust" to learn more about the fight for water in Payahuunadü.*

Visit **manzanardiverted.com**



# THE KEEP LONG VALLEY GREEN CAMPAIGN

## Looking for a Better Way Forward

BY WENDY SCHNEIDER, EXECUTIVE DIRECTOR

Over the last 18 months, I have had the privilege of working with the Keep Long Valley Green coalition, a talented and dedicated group tied together by a shared interest in ensuring an adequate and regular supply of water to southern Mono County. Our group is refreshingly diverse, representing interests of local ranchers, tribes, recreationists, and environmentalists.

The campaign recently received a shot in the arm (isn't that a timely saying?) when the Alameda County Superior Court ruled that the Los Angeles Department of Water and Power (LADWP) could not simply unilaterally abandon historic irrigation practices and withhold water supplies needed to maintain the meadows of Little Round and Long Valleys. Instead, the Court ruled that before LADWP could make substantial changes to its practices, the agency must perform an environmental review as required by the California Environmental Quality Act.

The ruling is certainly a step forward, and sends the right message, but falls far short of ordering the simple and straightforward action the coalition is urging LADWP to take: Commit to provide water to Little Round and Long Valleys, each year, pursuant to a formula tied to each year's snowpack.

So far, the agency has steadfastly refused to even consider making this reasonable commitment. The refusal is especially puzzling because the agency's usual practice (prior to 2018) was to adjust the amount of irrigation water provided to the area based on each year's unique snowpack. So why not commit to follow this practice in perpetuity?

The coalition also recently learned that, in spite of truly stunning conservation achievements over the last decades by the people of Los Angeles, and the commitment of the LA Mayor's office to capture, recycle, and use local storm and groundwater, LADWP, in its 2020 draft Urban Water Management Plan, indicated it has no intention of substantially reducing water exports from the Eastern Sierra over the next 25 years. As with the agency's refusal to commit to follow its own historic practices in Long Valley, the refusal to commit to reduce water imports from the Eastern Sierra is puzzling: LADWP's own data and projections, as well as data and projections provided by LADWP staff on "Operation NEXT," clearly show that LADWP could meet all the water demand needs of the people of Los Angeles AND substantially reduce water exports from the Eastern Sierra.

More than 100 years after activation of the Los Angeles Aqueduct, LADWP is clearly aware that the presence (or absence) of water in the Eastern Sierra has a tremendous impact on the health of our environment and the nature and quantity of our economic and recreational opportunities. For ranchers, fly fishermen, and the many species dependent on the meadows in southern Mono County, it is not an overstatement to say that quality of life is heavily dependent on how much of our water LADWP lets us keep each year.

Our coalition has found that attempting to influence the behavior of LADWP is frustrating. Neither the LADWP Commissioners, nor the office of the Mayor of Los Angeles who appoints them, are accountable to the people of the Eastern Sierra. This makes it very difficult to apply pressure on them to take, or not take, any particular action. The campaign sends letters. Sometimes LADWP politely responds; sometimes not. Our coalition ranchers travel to Los Angeles for meetings. These are polite, but do not lead to the agency taking action on our requests. Our members participate in working groups to protect the sage grouse, but no specific commitments are forthcoming. We are making a movie to tell our story. It will be the latest installation in the long saga of LADWP removing as much water as they can get away with from every corner of Payahuunadü.

The Keep Long Valley Green coalition is looking for a better way forward. It is clear that LADWP could meet the needs of its ratepayers and substantially reduce water exports from our area. Our request for a commitment to consistently provide critical water to southern Mono County, adjusted each year to account for variations in precipitation, is fair and reasonable. The agency's refusal to comply with these requests shows an unfair imbalance of power that has too many times resulted in severe damage to our environment and economy.

# Who Is Planning Los Angeles' Water Future?

## Or, More Importantly, Who Is Planning Owens Valley's Water Future?

BY SALLY MANNING, ENVIRONMENTAL DIRECTOR, BIG PINE PAIUTE TRIBE OF THE OWENS VALLEY

The Los Angeles Department of Water and Power (LADWP) is in the process of updating its **Urban Water Management Plan**. State law requires large water providers to prepare these plans every five years.

The state requires the water agencies to reach out to "appropriate agencies in the area, including other water suppliers that share a common source […] and relevant public agencies, to the extent practicable." LADWP makes an effort to invite a variety of "stakeholders" from the LA area to participate in outreach meetings, but its invited guest list omitted most interests residing in the Eastern Sierra. Nevertheless, their meetings were open to all. And once I became aware of the planning effort, I joined the fourth and final stakeholder outreach online meeting and reviewed information from previous meetings. Here are some observations through the eyes of an Owens Valley "stakeholder!"

LADWP's planners consist of agency staff and not surprisingly, they are taking the **business-as-usual approach** to this 5-year plan. This means that in spite of the LA Mayor and other City leaders striving for LA to become more self-sufficient and sustainable, LADWP is planning to continue to rely heavily on "imported" water for the coming five years and beyond. LADWP staff acknowledge the Mayor's goals and refer to them as "Operation NEXT." Perhaps because the self-sustaining future requires sufficient, functioning infrastructure and some is still being built, the planners are not ready to identify these future water sources as reliable just yet.

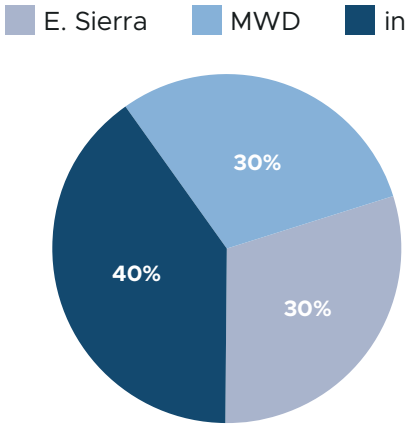
LADWP shared that almost 60% of LA's water is "imported." This means it comes from outside the LA area: It is water they (1) take themselves from the Eastern Sierra via the Los Angeles Aqueduct and (2) purchase from the large water-broker, Metropolitan Water District (MWD). Under Operation NEXT, the staff planners said LADWP would import only 30% of its water, so half as much. Even that amount falls short because both the Mayor and UCLA researchers point out that a goal of 0% imported water is achievable if the City can build enough facilities to capture stormwater, recycle wastewater, clean up and use "local" groundwater, and continue to practice good water conservation. With a push to make progress on these measures, 0% imported water might be achieved by the year 2035. However, the laws directing urban water management planning say agencies must "develop water management plans to actively pursue the efficient use of **available** supplies."

LADWP has access to large amounts of MWD water but prefers to take LA Aqueduct water. They have good reasons for this: Eastern Sierra water comes to them at little to no cost and it is very high quality. Due to long-standing agreements, LADWP is entitled to a significant portion of MWD water. MWD water comes from the California State Water Project and the Colorado River, and when member agencies acquire the water, they pay a fee (rates vary year to year). Data show that LADWP's entitlement to MWD water, if LADWP took all of its portion, could be the 60% of "imported" water–all of it!–with none coming from the Eastern Sierra. LADWP's customers would have water if the LA Aqueduct stopped transporting water across the desert to their City. Each water customer would probably be charged more for water, but there would be sufficient water.

Meanwhile, what is the Eastern Sierra doing to plan its water future? What will our climate be like in 2025? Or 2035 or 2060? It is important to think ahead: Owens Valley needs its water, and our communities need to have a reliable water supply available for future needs. Our ecosystems–the life-support of the area–also need water. LADWP continuously diverts surface flows (creeks and the Owens River) into its Aqueduct and they pump fairly large volumes of water annually from their nine Owens Valley wellfields. LADWP withholds irrigation water from local ranchers who lease City-owned lands. And LADWP is embarking on a program to pump water from beneath Owens Lake. LADWP's wells are being replaced and refurbished. There is talk of a scheme to use the LA Aqueduct to provide Eastern Sierra water to recharge the groundwater under the town of Ridgecrest. In all of these actions, LADWP asserts its superior "rights" to Eastern Sierra water.

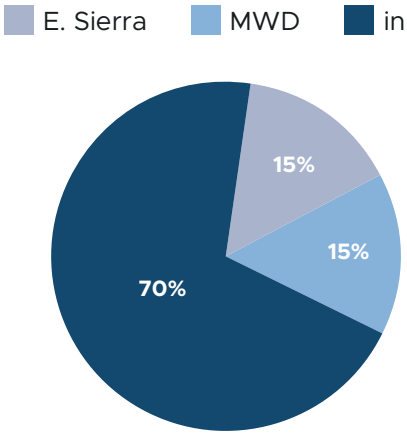
Are we looking out for our future interests? It's time for the Eastern Sierra to think about its own long-term plan and perhaps ask for a seat at the LADWP planning table.

## Business As Usual



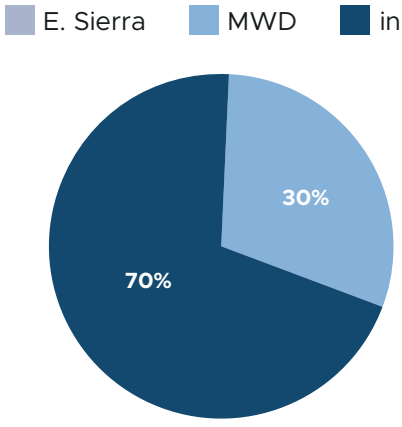

The diagram above, "Business As Usual," shows LADWP's water supply sources as being planned in the 2020 Urban Water Management Plan the state of California requires of all large water agencies. The sources are approximately equivalent to LADWP's sources during the past two decades, with about 60% of water for LADWP customers being "imported" from outside the LA area. The imported water consists of roughly 30% from the large water broker, Metropolitan Water District (which obtains water from the State Water Project and Colorado River), and the other 30% is water exported from the Eastern Sierra via the Los Angeles Aqueduct.

## Operation NEXT

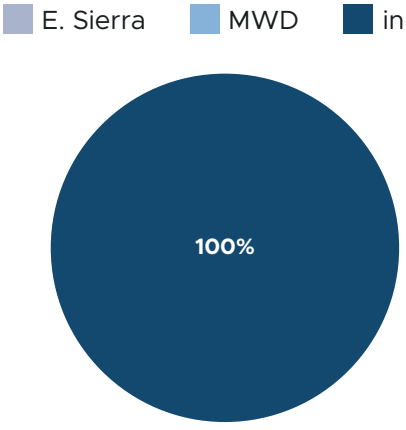



The diagram above shows that, ifshould the Los Angeles area implements the Mayor's sustainability plan, which LADWP calls "Operation NEXT," LADWP would obtain 70% of its water "locally" and import only 30%. The imported fraction would be split between MWD and the Eastern Sierra.

## Op. NEXT version 2




## It's Possible!




The state requires water agencies to present theirits plansplanning for drought conditions. LADWP realizes that drought limits its supply from the Eastern Sierra., Sso when drought hits, LADWP would need to rely more heavily on water from MWD. LADWP's planning projections show that a significant amount of water is available to LADWP from MWD, even when severe drought conditions prevail. Note that the "Business As Usual" plan LADWP staff intends to implement shows 30% of the water supply coming from MWD. This means LADWP could easily provide 30% of its customers' water needs using local water and MWD supplies, all of the time., Aand this is especially true if Operation NEXT is fully implemented. The Mayor, other city leaders, and researchers (for example from UCLA) show that improvements in water infrastructure, continued cleaning of local groundwater, stormwater capture, water recycling, and conservation could lead to LADWP customers receiving 100% of their water from local sources. If put in place sooner rather than later, they estimate LADWP could sourcebe 100% of its water locally by 2035 or 2040! This means Eastern Sierra water could remain in the Eastern Sierra!

# HYDROLOGY of the Eastern Sierra

BY JEFF DOZIER, BOARD OF DIRECTORS OF FRIENDS OF THE INYO,
DISTINGUISHED PROFESSOR EMERITUS AT UNIVERSITY OF CALIFORNIA, SANTA BARBARA

PHOTO: Duck Lake, near Mammoth Lakes, CA.

We live in a rain shadow. In the middle latitudes between about 30° and about 60°, the winds mostly blow from the west. As the air rises over the mountains, it moves into elevations with lower air pressure and thus a parcel of air expands and cools, reducing its capacity to retain water vapor. Therefore, the western slopes of the Sierra Nevada get most of the precipitation, mostly in winter, mostly as snow. Some snowfall spills over the crest onto the eastern slopes, as the winds carry snow formed high in the atmosphere or as they converge through passes in the crest. Some storms wrap around the Sierra Nevada, so occasionally we get more snow at Tom's Place than at Mammoth Lakes. The winds also transport snow after it has fallen to the ground, nourishing glaciers in cirques east of the Sierra crest. Although rain and snow occasionally fall in the Owens Valley, replenishment of the streams and groundwater comes from snowmelt in the mountains.

## Importance of Snow

In the Sierra Nevada, precipitation usually falls as snow from November to April, and the snow melts from April on. Large interannual variability in the snowfall occurs, with the wettest years on record having ten times as much snow as the driest years. Along with spatial variability in snow accumulation, the snow melts more rapidly on slopes that receive more sunlight, and it also melts more rapidly in years and places where deposition of dust or soot lowers its reflectivity (also known as albedo), leading to more absorption of solar radiation.

At higher elevations, snow covers the ground for at least half the year; water is thus stored in its frozen form for many months, with little water released to the watersheds and the lowlands below until melt begins. Of the seasonal hydrologic changes that affect soils, streams, and lakes in the Sierra, the most significant are the winter accumulation of snow, the spring and summer melt of the snowpack, and the infrequent precipitation in summer and early autumn. This wet-dry seasonal difference, combined with rugged topography, steep gradients in temperature and precipitation with elevation, and high interannual variability, makes hydrologic processes and variations in the mountains significantly different from those at lower elevations. Because of its persistence through spring and often into the summer, the snowpack provides soil moisture for forests and meadows in the summer when the plants need it. At the higher elevations, snow protects vegetation from damage by winter winds. Streams and lakes receive water and nutrients from spring runoff.

Once meltwater reaches the soil beneath the snowpack, runoff begins, and a task for water managers and scientists lies in partitioning that water into streamflow, evaporation, and transpiration, and water movement into and out of

the soil and the groundwater. An important difference between rainfall and snowmelt is that when precipitation occurs as rain, the water is rapidly available as runoff or to recharge groundwater, whereas when it occurs as snow, weeks or months may elapse before melt occurs. For water resources for human uses, this delay enables a forecast of runoff well before the runoff occurs. For ecosystems, this delay in the timing of water availability strongly affects ecological processes in the watersheds and lakes.

### Measurement: Depth, Density, and Water Equivalent

Study of the mountain snowpack depends on regular measurements at the high elevations. Falling snow is notoriously hard to catch in a rain gauge, so its accumulation is better assessed by measurements on the ground. By 1910, Professor James Church of the University of Nevada Reno had designed a tube that could be plunged through the snowpack to the ground. Weighing the tube and subtracting the empty tube's weight leads to the calculation of the snow water equivalent (we call it SWE, pronounced, "swee"), the amount of liquid water that would result if the snowpack were melted.

(If you measure the SWE as a mass per unit area, for example, kilograms per square meter, the snow depth in meters, and the density in kilograms per cubic meter, then SWE = depth × density. One millimeter of water has a mass of one kilogram per square meter.)

The first snow course was established on Mt. Rose in 1910; as of 2021, snow surveyors measure the snow water equivalent at 259 snow courses in the Sierra Nevada, typically monthly from February through May, and sometimes June in the wetter years. Eighty-seven courses now have 90 or more years of record. The long-term climate record they provide shows the April 1st snowpack to have declined at some of the low-elevation courses but not at the higher elevations.

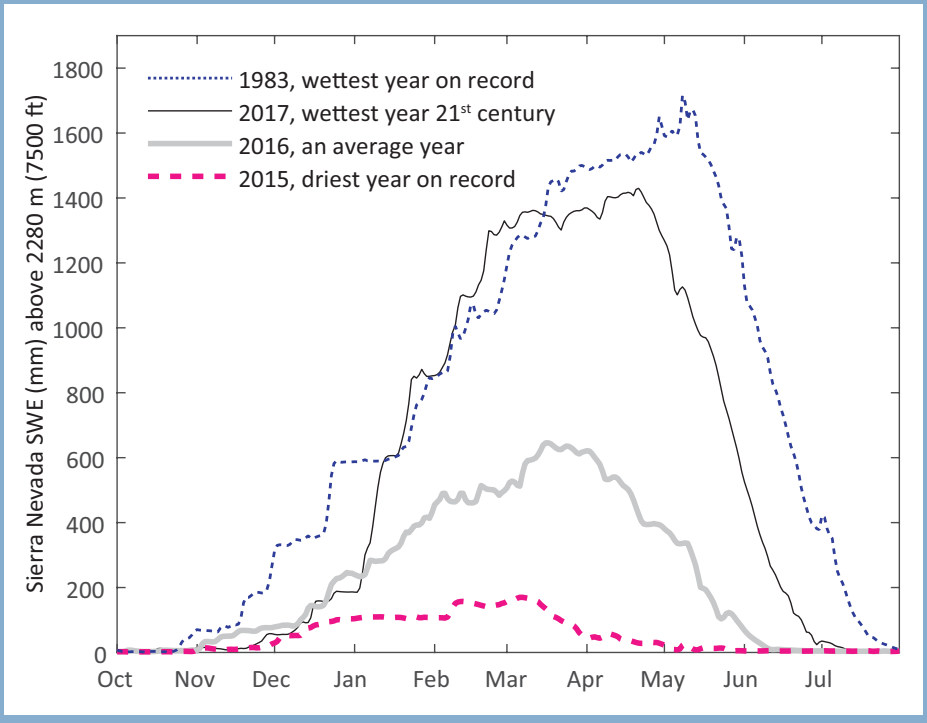
The snow water equivalent is also called the snow water content, but I prefer to distinguish the snow water equivalent from the liquid water held in the snow as it melts. As snow melts at the surface and water drains into the snowpack, capillary tension holds the liquid water in the spaces between the snow grains. Snow's coarse grains are similar in size to the particles in sandy soil, so the maximum liquid water content that the snow will hold against the force of gravity is about 10% unless frozen impermeable layers in the snowpack impede drainage. The liquid water affects the snowpack's properties, particularly the propensity for wet avalanches in the spring.

Automatic acquisition of daily data began in the late 1960s with the installation of snow pillows at the snow-soil interface that measures the pressure, and thus the weight, from the overlying snowpack, and thereby its snow water equivalent. As of 2021, 133 snow pillows operate throughout the Sierra Nevada, transmitting their data through surface radio links or via satellite.

### Snowmelt Runoff

Based on these measurements, the California Department of Water Resources, and independently the U.S. Army Corps of Engineers, issue forecasts of the likely runoff, typically the issue forecasts of the likely runoff, typically the guess at the total April through July magnitudes into the reservoirs on the western and eastern sides of the Sierra Nevada. The forecasts begin in February when the forecast includes an estimate of more snow to come so the

**PROGRESSION OF SNOW WATER** equivalent through the seasons as a spatially weighted average of all Sierra Nevada snow pillows above 7500 ft. The years shown are 1982-83, the wettest year on record, 2016-2017, the wettest year since 1983, 2015-16, an average year, and 2014-2015, the driest year on record. Adapted from Lakes and Watersheds in the Sierra Nevada of California, University of California Press, 2021.



uncertainty range is large. As the season progresses, the forecast is based more and more on the snow that is on the ground already. Typically, the May forecast anticipates little or no more precipitation.

A problematic attribute of the snow courses and pillows is that they do not sample the topographic variety. For logistical reasons, snow pillows and other remote meteorological sites in the mountains lie on nearly flat terrain, so they may poorly represent snow accumulation and melt rates on nearby slopes. For instance, in midwinter, the snow pillows on a valley floor and all slopes nearby are covered with snow, but later in the spring the valley floor still has snow while slopes facing the sun are bare. In addition to snow pillows not covering the slopes and other aspects of topography, many watersheds include elevations well above the highest measurements, so substantial snow can linger after the snow has disappeared entirely from the sites where it is measured.

Thus, there is a need for improved methods of observation, including remote sensing. In the Sierra Nevada, the Airborne Snow Observatory, operating out of the Mammoth Airport, surveys the snowpack in some watersheds by measuring its depth from lidar—measuring the time of travel from the plane to the surface and back and thereby determining the elevation of the surface. Subtracting the elevation of the snow-free surface, measured in August or September, from the elevation of the snow-on surface yields the depth of the snowpack everywhere in the watershed.

## Future Snow in a Warming Climate

California's two biggest worries about climate change lie in the effects on water and fire. A warming climate increases the chance of co-occurring warm temperatures and lack of precipitation, causes some of the precipitation in the mountains to fall as rain instead of snow, melts snow earlier in the spring, and increases rates of evapotranspiration. The snowpack is related to the fire hazard, which increases when soils are drier in the early autumn. Of the changes in the hydrologic cycle that could come with a changing climate, those in the Sierra Nevada are perhaps the most consequential.

## Sources of Information

The California Department of Water Resources maintains a snow information web page (https://cdec.water.ca.gov/snow/current/snow/index.html) with current and historical data on snow at the snow courses and pillows. "Bulletin 120" (https://cdec.water.ca.gov/snow/bulletin120/) published monthly February through May, reports on the state of the snowpack and forecasts for the seasonal flow into the reservoirs. The Eastern Sierra Avalanche Center (https://esavalanche.org/) issues assessments of the avalanche hazard and the state of the snowpack. The Mammoth Mountain Ski Patrol (http://patrol.mammothmountain.com) and the University of California, Santa Barbara (https://snow.ucsb.edu), in collaboration with the U.S. Army Cold Regions Research and Engineering Laboratory, provide publicly available data on the state of the snowpack from measurements on Mammoth Mountain.

## Recommended Further Reading


Patrick Armstrong (2014). The Log of a Snow Survey: Skiing and Working in a Mountain Winter World. Bloomington, IN: Abbott Press. An account by a long-time snow surveyor who helped sustain the collection of information about the Sierra snowpack that started in 1910. The author lives in Bishop.

*Mary Austin (1903). The Land of Little Rain*. New York: Houghton Mifflin. A collection of 14 essays about life in the American Southwest. At least six editions have been published, including two with photographs by Ansel Adams or Walter Feller. The author lived for many years in Independence.

*Jeff Dozier (2011). Mountain hydrology, snow color, and the fourth paradigm*. Eos, 92, 373-375. https://doi.org/10.1029/2011EO430001 (open access). A short essay about the use of satellite imagery to study the snowpack. The author lives in Mammoth Lakes.

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Emerald Lake Basin, a typical high-elevation Sierra Nevada headwater watershed.


FRIENDS OF THE INYO SINCE 1986

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Views and Lessons From the Craggy Cliffs of

# CONGLOMERATE MESA

BY BRYAN HATCHELL, DESERT PROTECTION ASSOCIATE

From the right angle on the southern slopes of Conglomerate Mesa, one can see the fractured polygons of the southern end of the Owens Lake beaming in translucent pinks, sunburst oranges, navy blues, and every shade of grey and beige one can imagine. Owens Lake stands as a salt-steeped symbol of how the deceit of industry can permanently scar an area and impact its residents for the rest of time. The Los Angeles Department of Water and Power's (LADWP) aqueduct is a snake-like leviathan that stands as a monumental reminder of the water transported daily from Inyo County to the city of LA, leaving only enough water for residents and businesses to seemingly exist. There is no water to grow and barely enough to remain in stasis. If swindling all the water out of this valley knocked us down, the subsequent Owens Lake dust bowl was the extra kick in our teeth while we're on the ground. But in a true testament to the resiliency of the people in these parts, we stood back up and demanded action from LADWP. The Department of Water and Power has taken great (court-mandated) lengths to remediate Owens Lake and decrease the lung clogging dust pollution in our area. The reclamation is not perfect. Actually, it is far from ideal. But better than what used to be. Through this tangled web of environmental damage, litigation, citizen protest, and reclamation stands one unassailable fact: The water in this valley has been taken from us and LADWP shows no plans of giving it back. And Payahuunadü (Owens Valley) is forever changed because of it.

When soaking this history lesson in from the craggy cliff sides of Conglomerate Mesa, it's easy to wonder about the modern assault on the Inyo County water supply. With Canadian exploration company, K2 Gold, preparing for an all-out mining assault on Conglomerate Mesa, many scratch their heads and wonder, "Where the heck will water for the larger open-pit cyanide mine come from?" Every drop of water in this valley is a knock-down, drag-out fight and there is no better case-and-point than K2 Gold's recent water fiasco with the Lone Pine Golf Course, now dubbed "pond-gate." In September 2020, K2 Gold illegally siphoned water from a pond at the Lone Pine Golf Course, filling their many 50 gallon drums with the water. The Lone Pine Golf Course is a lessee of LADWP, meaning LADWP owns all water rights on that land. K2 Gold had already filled up their 50 gallons drums when they received a phone call from LADWP officials demanding the return of the water. With tails tucked, K2 Gold poured the water from their drums back into the ponds. This action shows the overall disconnect this company has with our County. We've been fighting for nearly 100 years to simply maintain the water needed for our way of life in the Owens Valley. And this company thinks they can steal it from LADWP? Good luck!

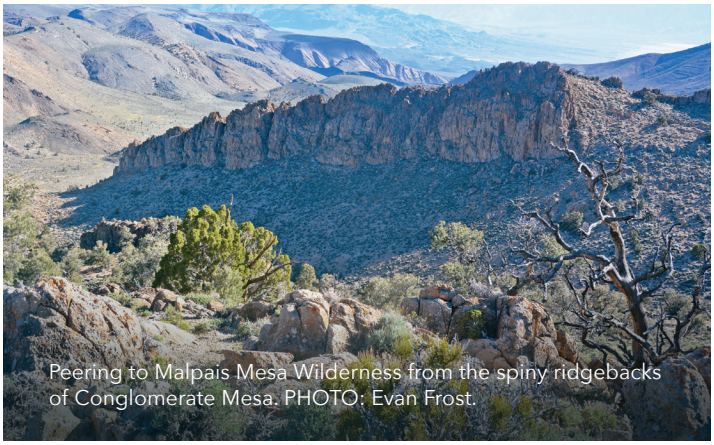
Eventually, K2 Gold found the water they needed from a residential private well. In November of 2020, K2 Gold completed a helicopter-access-only exploration program, which was approved in 2018 by the Ridgecrest Bureau of Land Management. This first phase of exploration was approved to use 1,000 gallons of water per day for three months of operation. Due to modifications in the drill techniques, K2 Gold claims to have reduced the water needed to roughly 500 gallons for the entire project, which I still struggle to believe. K2 Gold is now ramping up for a new phase of exploration at Conglomerate Mesa that would drastically increase impacts to land and water consumption. The company is requesting to drill roughly 120 drill holes and plow a brand new 5-7 mile road into Conglomerate Mesa. Not only would water-use increase to assist with the drilling operations, but K2 Gold would need water for new road construction and to assist with dust suppression on all the Saline Valley roads they would travel on for this work. Where will this next round of water come from? Are a few private wells enough to meet this project's demands? Will the company try to buy water from the town of Keeler?

All of this uncertainty is wrapped in the unignorable elephant in the room: "Where will the water come from for an open-pit cyanide heap leach gold mine?" For reference, the Castle Mountain open-pit gold mine, located on the eastern end of the Castle Mountain National Monument in the Mojave Desert, is approved to use up to 203 million gallons of water per year. The entire city of Bishop consumes roughly 600 million gallons of water a year. If Conglomerate Mesa becomes a fully developed industrial open-pit gold mine, how could we justify using nearly one-third of the amount of water the city of Bishop uses annually? And it's possible the mine could require even more water. A USGS study published in 2012 titled, "Estimated Water Requirements of Gold Heap Leach Operations," calculated that an open-pit cyanide heap leach gold mine that averages five metric tons of production annually will need somewhere between 500 million gallons to 1.2 billion gallons of water per year. This amount of excess water in Owens Valley simply does not exist.

The Owens Lake is a stark reminder of the deceit and empty promises of faraway interests that seek to take advantage of our small towns. But the people here are strong and wise. If water for the larger mine would never exist, why even consider this exploration plan? Why let K2 Gold carve up Conglomerate Mesa based promises of a mine that is logistically impossible? Will they try to get water from LADWP? If they have any success, I hope they let our local water officials know!

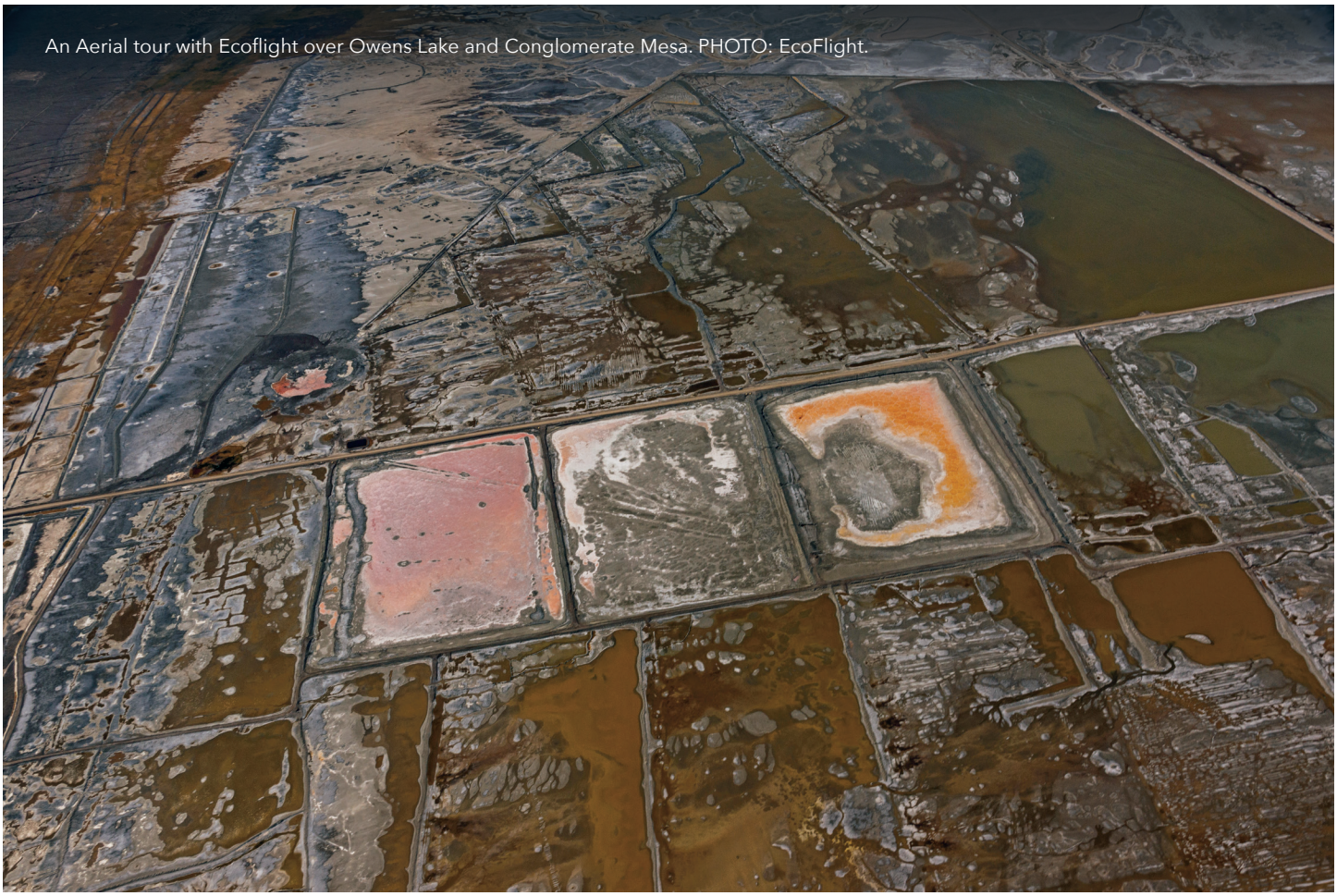
People stand up for Conglomerate Mesa to protect one of the last truly wild areas in the California Desert. Between the local Tribal Nations, environmental groups, grassroots activists, and local businesses, the floodgates of opposition are fully open. We've bought the promises industry in the past and we live with the futures of their impacts, for better and for worse. Benjamin Franklin once said, "When the well's dry, we know the worth of water." In Inyo County, our collective wells have been dry for many years. We know the worth of water. And it's worth more than gold.

Whether above Conglomerate Mesa or on its ridges, one can see the shimmering of Owens Lake. PHOTO: EcoFlight.



Peering to Malpais Mesa Wilderness from the spiny ridgebacks of Conglomerate Mesa. PHOTO: Evan Frost.

Connection is the catalyst to protection. PHOTO: Evan Frost.



An Aerial tour with Ecoflight over Owens Lake and Conglomerate Mesa. PHOTO: EcoFlight.

# Waterways and Restoration in the Bodies

BY JORA FOGG, POLICY DIRECTOR

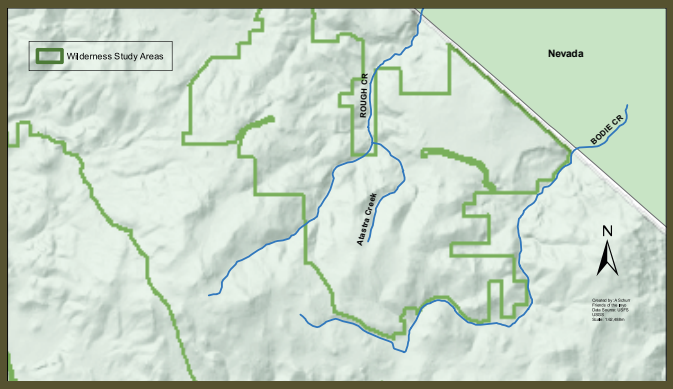
**This page:**
An aerial view of Rough Creek.

**Following page, upper right:** map shows the general location of Atastra. Left: Bodie and Rough Creeks, map from California Department of Fish and Wildlife shows historic range of the Lahontan Cutthroat Trout within California (shown in green). Lower right: stream dwelling Lahontan Cutthroat Trout, Nevada Department of Wildlife.

East of the Bridgeport Valley and Mono Basin rise the Bodie Hills, a mosaic of Great Basin habitats with sagebrush, small islands of conifer forests and talus slopes, verdant aspen groves, and pockets of wet meadows that feed ephemeral creeks. Three main creeks, Bodie, Atastra, and Rough, drain eastward making their way from the highest peaks of the Bodie Hills: Potato and Bodie Peaks. The majority of the land around these creeks are managed by the Bureau of Land Management (BLM) with multiple private inholdings that provide for a working landscape of ranching that contributes to Mono County's rural economy. Much of the springs and water sources are found on private land.

Rough Creek begins at a high elevation (9,800 feet) spring between Bodie Mountain and Potato Peak. It flows northeast for several miles, crossing into Nevada before joining Bodie Creek at the lush meadows of the historic Nine Mile Ranch–now managed by Nevada State Parks as the Walker River State Recreation Area. At the ranch, Rough Creek bends northwest and joins the east Walker River. Bodie Creek begins at springs within the Bodie State Historic Park (BSHP) at an elevation of 8,400 feet and also flows northeast to Nevada joining Rough Creek at the Nine Mile Ranch. In most years, surface flow in the creek disappears typically one mile downstream of Bodie State Historic Park (BSHP). Water then reappears where the creek flows over bedrock outcropping several miles upstream of the California/Nevada state line. Atastra is the smallest of the three and flows for a shorter distance (1.7 miles), again, northeast into Rough Creek. Rough and Atastra creeks were found eligible by BLM (1993) for inclusion in the National Wild and Scenic Rivers System and are proposed candidates for a Wild and Scenic River designation. The headwaters of the creeks are within the Congressionally-designated Bodie Wilderness Study Area.

Waterways in the Bodie Hills have been affected by mining. The BSHP, designated in 1962, is located near the headwaters of Bodie Creek and consists of the


remains of the town of Bodie, a gold mining boomtown whose heyday was in the late 1800's. The Lahontan Regional Water Quality Control Board (RWQCB) is responsible for water quality protection east of the Sierra Nevada crest. The Regional Board administers the Clean Water Act (CWA) within the Lahontan Region. The Lahontan RWQCB placed Bodie Creek on what is known as the 303(d) list of impaired waters in 1991 based on data collected from sediment, fish tissue, and surface water samples. Through the 1990s and 2000s various metals and cyanide were detected in sediment samples in Bodie Creek and the surrounding area, including arsenic, antimony, beryllium, cobalt, copper, chromium, lead, mercury, nickel, silver, and zinc. Mercury concentrations in aquatic invertebrates at all sites downstream from mining activities in the Rough and Bodie watersheds were also elevated.

Beneficial uses of Bodie Creek described by the Water Board include municipal and domestic water supply, agricultural supply, groundwater recharge, recreation, commercial and sport fishing, wildlife and spawning habitat, and rare and endangered species habitat. The viability and safety of these ongoing uses will depend on demonstrated partnerships between agencies, landowners, and conservation groups that will result in restoration and remediation activities, hopefully leading to future removal of these creeks from the 303(d) list.

Bodie and Rough historically support the federally threatened Lahontan Cutthroat Trout (LCT), which may be impacted by elevated metals concentrations and pH in the creeks. The trout was listed as endangered in 1970 and reclassified as threatened in 1975. Eastern California is one of three endemic locations of the species. In 1844, there were 400 to 600 stream-dwelling populations in over 3,600 miles of streams just within the Lahontan Basin. Abundance and distribution shrank rapidly in the face of extensive landscape changes associated with development, mining, timber harvest, road and railroad building, dams and diversions, pollution, non-native fish introductions, and commercial harvest. The Bridgeport Valley was the first known location for LCT to be eliminated. The species uses cold-water habitats including small headwater tributary streams such as those found in the Bodie Hills. Preferred habitat is cool, flowing water with well-vegetated and stable stream banks that provide shade and cover, with stream velocity breaks and rocky riffle-run areas.

The LCT recovery plan (1995) calls for establishing a subpopulation of the species in the Rough Creek drainage, with the goals of preserving genetic integrity and, eventually, providing a new sport fishery. Both Bodie and Rough Creek are being examined by the management agencies as potential sites for reintroduction of LCT. The placement of fish barriers will isolate competitive non-native species in the drainage allowing for the stocking and increased survivorship of the native trout. In 2003 the Walker River Basin Recovery Implementation Team released a short-term action plan for LCT in the Walker Basin. Seventeen years later, the agencies are exploring opportunities for good projects that provide for landscape-level ecological benefits.

The Bodie Hills Conservation Partnership, with leadership from the Walker Basin Conservancy, is developing a project to understand the ecological processes of Rough Creek that will help inform the reintroduction and eventual recovery of Lahontan Cutthroat Trout in the Bodie Hills and support legislative efforts to permanently protect the Bodie Hills from the harmful effects of mining, as well as bring much needed economic revenue to northern Mono County. Local, state, and federal investments in watershed restoration that seek to remove Bodie and Rough Creek from the list of impaired waters could be jeopardized if mining is allowed to continue in the Bodie Hills. The toxic byproducts of mining activity are one of the most harmful impacts to fish and wildlife. There is no substitute for high-value habitat and very few streams reaches within the Walker River basin are still suitable for Lahontan Cutthroat restoration. Permanent protection for the Bodie Hills will bring needed resources for ongoing research and restoration and keep this landscape and its waterways healthy for future generations of people and wildlife.

# Building the Ship as We Sail It (in All the Best Ways):

## Effacing Vehicle Trespass in Death Valley

BY ALEX ERTAUD, STEWARDSHIP DIRECTOR

PHOTO: First light hits the Badwater Basin.

Death Valley National Park is a land of superlatives. Lowest, hottest, driest, windiest; it is a place known for being that place that is the most x. Even in its name it possesses an extreme, an exclamation point, a finality. While the harsh conditions of the Park make it a difficult place to live (as its name implies), much of what we see in the Park has a long life. Some things are even everlasting. It is a geologist's paradise because the rocks and their formations are billions of years old. The Timbisha Shoshone Tribe has and continues to call this area home since time immemorial. They are the first stewards of this land and continue to be an inspiration on how to care for and respect the land we inhabit. Another timeline is the one concerning the more recent history of the area, over the last 150 years or so. Mining, white exploration and settlement, and tourism mark the time until the area was designated a National Monument in 1933, and a National Park in 1994. Today the area is tremendously popular to visitors from across the globe for all the above-listed reasons. Geology, intricate human history, flora, fauna, otherworldly picturesqueness, and of course, those extremes are Death Valley's collective siren song.

Over the last decade or so, there has been a marked increase in folks driving their motor vehicles (the most common way to experience the Park's 3.3 million acres) off the designated roads they are allowed on. Some people seem to have taken it upon themselves to recreate their favorite beer or car commercials and rip some donuts across the dry lake beds, salt flats, sand dunes, and bedrock found across the Park. Due to the aforementioned harshness of the climes, it can be a long time for these tracks to disappear purely by natural mechanisms (if at all). This combined with the fact that we humans too often fall prey to what can best be described as "monkey see, monkey do" syndrome, led Death Valley National Park to do something about the problem of these trespass tracks marring the viewshed of the park.

That is how Friends of the Inyo got involved in what we now refer to as the practice of "vehicle trespass track effacement". Effacement is essentially the disguising of tracks through making them blend into their surroundings. Over the eight weeks we worked in the Park in the fall of 2020 alongside partners from the National Park Service and the Great Basin Institute, our Friends of the Inyo crew worked tirelessly to refine their practices and perfect their technique. You see, this is about as novel as stewardship work gets. Due to the aforementioned extremities, Death Valley is pretty unique in its topography, sediment, and climate; there is no place quite like it. There is no manual with schematics and standard practices for effacing these kinds of tracks. It is one of a kind and involved a great deal of creativity, troubleshooting, and outside-of-the-box thinking.

Fearless leader Matt Ferlicchi enjoys breakfast at dawn.

Robin Hirsch sweeps up the playa.

Luckily, our fearless leader and effacement guru was Matt Ferlicchi, the kind of person you can't help but want to follow to the end of the Earth and back due to his good cheer, better jokes, and handsome beard. Using shovels, rakes, brooms, rototillers, McLeods, two giant soil aerators, giant squeegees, pitchforks, gallons upon gallons of water, and a constant reevaluation and refinement of methods and practices, our crew was able to do some truly amazing things. We essentially cleared the entire Badwater Basin of visible vehicle tracks on the delicate surface we call playa (dried lake bed). Not bad for building the ship as we're sailing it.

Over those eight weeks, our crew of Lindsay Butcher (FOI crew lead), Tess Irving-Ruffing, Maggie McCain, Anna Hoessle, Robin Hirsch, Jamie Jirele, and Mariah Butters, refined their technique and standard operating procedures to an exact science through iteration and a commitment to efficiency and effectiveness in equal measures. The playas were not all uniform in their water saturation, so each track required an analysis of how best to disguise the track. Each track presented an intricate puzzle of order of operations. Carefully identifying each track's individualistic traits such as depth and color was paramount to creating a plan of attack.

"Should we aerate first and then water?" "Does it make sense to work on the surrounding area or just the track?" "Should we unearth the track completely or just aerate and lightly disturb?" Each day of work required constant communication and for our team to operate smoothly as one larger organism. Towards the end of our work stints, the crew had developed a distinctive short-hand of terms, techniques, and styles. We may even have begun to communicate telepathically, without even the need for words or language, simply working together in harmony as if waltzing with our tools across the playa. Though we have no empirical evidence to back that up.

Our crew did all this amid the aforementioned extremes Death Valley is so known for. We worked from the first week of October to mid-December in three-week blocks. Each time we returned, we encountered a different set of extremes. Initially, it was the heat. As some days reached a high of 108 degrees Fahrenheit at Furnace Creek, we would leave camp in the dark to begin working at first light. Dawn would come around 6 AM, and the sun would hit the playa around 8. Things would get hot at 10, and we would wrap up at 1. Wide-brim hats, UV-resistant clothing, lots of water and snacks, and constant check-ins with one another were the key to avoiding heat exhaustion. As our fall progressed, heat was traded for furious wind storms and bitterly cold nights that rob you of sleep and wear you down. Our crew displayed amazing mental and physical strength all along our work in the Park. I cannot gush enough about how well they worked to remain resilient, thorough, and in good spirits while doing groundbreaking (literally and figuratively & pun intended) work in such conditions. And none of this would have been possible without Matt's leadership. His ability to motivate, keep things light, have our back, and make us feel welcome in the Park was so moving. The vision, delicate balance of art and science, and openness to feedback, group input, and brainstorming that he displayed all along our time working with him was inspiring to no end and a masterclass in mindful management.

Matt, Tess, Maggie, and Lindsay work on our triumphant first day of watering.

Robin spreads some dirt at Mud Canyon.

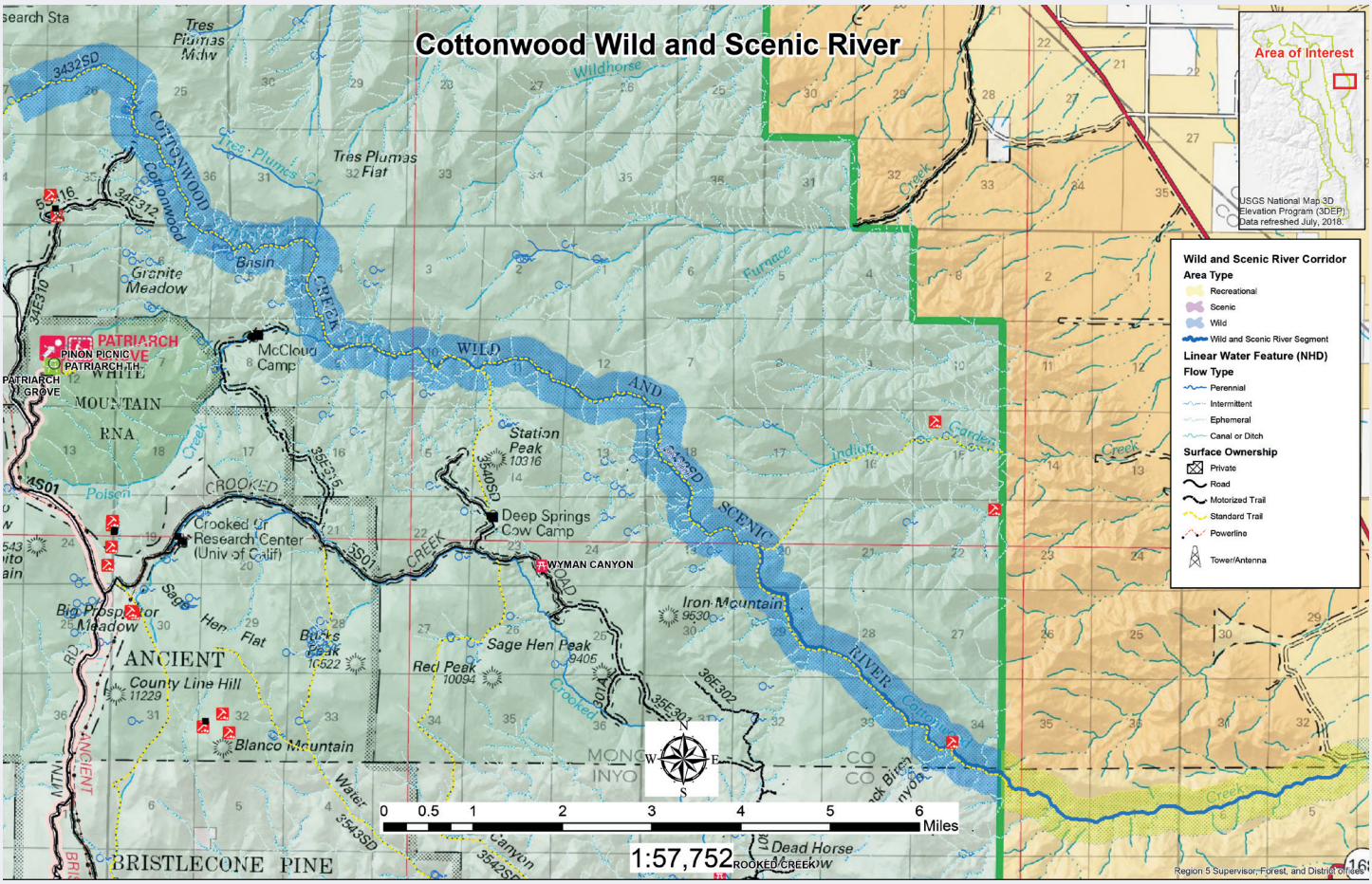
# GET OUT!

## Lower Cottonwood Creek

BY LINDSAY BUTCHER, TRAIL AMBASSADOR

The White Mountains are oftentimes overlooked and forgotten about as the red-headed stepchild of the Sierra Nevada. Most vacationers traveling through the Owens Valley bee-line to the campgrounds around Lone Pine, Big Pine, Mammoth, or Tahoe and only ever get a scenic highway view of the White Mountains. I've always thought the moniker "the Range of Light'' bestowed upon the Sierra Nevada could be extended to include their sister range to the east. Sunsets in the valley are magical when the last rays highlight the rugged ridgeline in stark contrast to the shadow cast by the Sierra. At higher elevations, the White Mountains are an arid alpine desert scape with sparse water sources (thru-hikers beware, springs on old maps are increasingly ephemeral and should not be relied on as dependable water sources). Nevertheless, the springs and creeks that do exist feed into subalpine forests of bristlecone pine (the oldest trees on earth), and pinyon pine and juniper at lower elevations. The range is home to bighorn sheep, wild horses, mountain lions, black bears, countless species of small mammals and birds, and notably, the transplanted-naturalized Paiute cutthroat trout. These now-endangered trout were originally transplanted to the White Mountains in Cottonwood Creek, one of the longest perennial streams, in the 1940s and are today one of the most genetically pure populations due to a lack of hybridization.

In 2009, Cottonwood Creek–along with the Owens River Headwaters in the Sierra Nevada–was designated a Wild and Scenic River through the Omnibus Public Land Management Act. When the Act passed, Friends of the Inyo published an exploration piece on the upper headwaters of Cottonwood Creek in the summer 2009 edition of the *Jeffrey Pine Journal*. Over ten years later the USFS and BLM are now completing Comprehensive River Management Plans for these rivers, as required by law. The Inyo National Forest's planning effort is currently underway with draft plans and a public comment period expected this year. What better time to explore the lower portion of the creek than now?



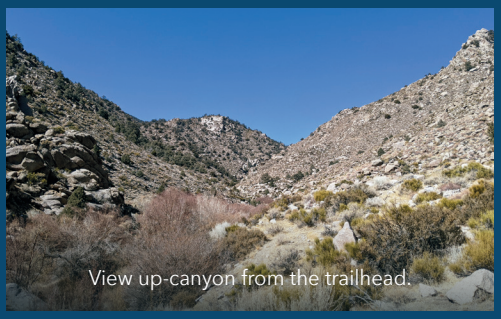

LEFT:
BLM's newly installed (2019) National Conservation Lands signage welcoming you to the Wild and Scenic River.

RIGHT:
One of the three creek crossings.

# Getting There

The lower portions of Cottonwood Creek are accessed from the east side of the White Mountains near the California-Nevada border. From Bishop, drive south on Highway 395 then east on Highway 168 from Big Pine. Just before the intersection with Highway 266, turn left on the dirt road aptly named Canyon Road. Follow Canyon Road as far as you feel comfortable (it is about 3 miles from the turn-off to the dead-end parking). 4WD and high clearance are recommended and eventually essential the further you venture down the road. To get to the "parking" area there are three mandatory creek crossings that in high-water years may be dangerous.

Canyon Road is on BLM land and there are multiple dispersed camping spots along the bucolic river corridor. However be prepared for primitive camping, there are no facilities or services. And be sure to brush up on Leave No Trace best practices.



View up-canyon from the trailhead.

# Exploring

If you look on USFS/BLM maps there is supposed to be a trail that follows the river. As of this issue's publishing in May 2021 there definitely is not a real trail. There are signs of use and faint social trails, but going out with the objective of getting far up the canyon is bold. Unless you are well acquainted with the rigors of off-trail cross country travel I would advise you to stick to the lower reaches of the river along Canyon Road well before reaching the FS boundary. It lies about two miles up-canyon from the parking area.

The road slowly climbs from just above 5,000' elevation to the trailhead at 6,200'. We spotted Mountain Bluebirds, Golden-crowned Kinglet, Bushtits, and Antelope ground squirrels all from the car. The cottonwoods that follow the river drainage slowly give way to pinyon pines and juniper as you ascend the canyon. Once you get out and start hiking you will notice signs of cattle grazing and larger animals present. If you choose to explore further be prepared for multiple creek crossings and some rock hopping, but if you stay higher on the slope you will be rewarded with wide-angle views of the drainage, surrounding hills, and rocky outcroppings.

# Get involved

The BLM portions of the Wild and Scenic River are seeing increased visitor use and would benefit from agency services such as access development and campsite inventory/management. The Forest Service encourages public comment on development of the river management plans. If you are interested in participating in the planning process please submit your thoughts on the Forest Service project website **www.fs.usda.gov/project/?project=57325**.

# thank you

## MEMBERSHIP & SUPPORTERS

Friends of the Inyo succeeds thanks to the generous support of members and donors who help us care for public lands in the Eastern Sierra. We are please to acknowledge the following individuals and organizations who made contributions between September 16, 2020 and March 15, 2021.

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