



AC Fall **CONSERVANCY CONNECTION**

PROTECT DESERT WATER



OUR MISSION

Working toward a sustainable future for the Amargosa River and Basin through science, stewardship and advocacy.

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Ashley Lee

A SEASON OF STORMS

We are in a season of storms in the Amargosa Basin. Some are bringing water to the desert, and others are seeking to take it away.



In August, Hurricane Hilary, the first hurricane to careen towards the California coast in 84 years, still had enough juice to deposit several inches of rain over some areas in Death Valley and the Amargosa Basin in a 24-36 hour period. A couple inches of rain in the desert is all it takes to produce floods of terrific force: terrific in this case connoting both feelings of terror and awe. These flood events are reminders that the desert has been shaped as much by an abundance of water as by an absence of it.

There is a worrisome new pattern emerging in which flooding is starting to occur with much greater regularity in the Death Valley ecoregion. Each massive rainfall event that has produced a “thousand year flood” over the last seven years has eroded and swept away any remaining faith in the idea that the world as we have understood it for centuries still remains. We are living in a new world now, in a new Mojave Desert and a new Amargosa Basin where chronic drought, raging wildfires, and scouring floods are part of the future climate regime. Folks that have lived on this land for decades, or who have inherited a memory of the land as it was before colonization, are seeing and feeling the changes with every passing season.

If a hurricane coming to the Mojave Desert should tell us anything, it is that our work as a conservation community to safeguard the future of the incredibly rare and vulnerable wildlife species of the watershed is getting more challenging all the time. In response to these rapid changes, the Amargosa Conservancy is continuing to convene and lead collaborative conservation efforts throughout the basin. Our hope is that a more coordinated effort among conservationists, researchers, land managers, and community leaders will lead to the planning and implementation of research and restoration projects that will truly enhance the resilience of the watershed in light of an uncertain future. We have some exciting plans and projects in the works including a newly formed restoration working group that we'll be sure to share more about in the coming months, so stay tuned.

Meanwhile, a different kind of storm continues to churn in Nevada. After a summer spent battling to save Ash Meadows National Wildlife Refuge from the specter of exploratory mining on its doorstep, we were able to take a much-needed breath following the Bureau of Land Management's decision to rescind their approval of Rover Metal's Let's Go Lithium project. But according to recent news articles, the mining company is making moves to push the project forward, despite the public's strong opposition to the project. We had hoped the science and the public's stance on this matter were crystal clear enough to dissuade Rover Metals or any subsequent mining company from trying to conduct mining activities on the boundary of



Flooding Lake Tecopa

a wildlife refuge with one of the highest local concentrations of endemic species (species that live nowhere else) in North America. But as it stands, we are prepared to continue to lead the fight against this project that does not align with the interests of the communities or with the wellbeing of wildlife in the watershed. We're gearing up for what will surely be a contentious National Environmental Policy Act (NEPA) review, and will be depending on our members to help us engage robustly in the process when the time comes.

In truth, though Rover Metals' drilling project poses the most direct threat to groundwater-dependent habitat and wildlife in this area, this project is just one thunderhead in a much greater storm system sweeping into the Nevada portion of the watershed. A slew of proposed projects ranging from mineral extraction, to dozens of renewable energy projects, to the construction of massive transmission lines continue to pour into the Amargosa Desert and Pahrump Valley regions. South of Pahrump, a non-planned industrial solar sector is sprawling along both sides of the Old Spanish Trail, threatening the historic route and thousands of acres of intact desert ecosystems. Taken as a whole, **these projects are the components of a veritable storm, a storm with the potential to jeopardize the future of the Amargosa River by virtue of the one thing all of these projects require: water.**

While the Amargosa Conservancy takes every opportunity to provide comment on these individual projects, we continue to champion the need for land managers to consider the cumulative impacts of all of these proposed projects in the watershed, rather than analyzing them in isolation. The question must be asked as to what scale of development the Am-

argosa River watershed can truly sustain given that these projects will require water for their construction, operation, and maintenance. We believe the answer to that question should be used to guide an intelligent strategy for determining where and how many of these projects are appropriate and aligned with a vision for the landscape that leaves intact the essential groundwater flows and habitat areas that make this region an ecological marvel. That is the challenge ahead, and we believe there are paths for making meaningful change to be taken in the coming months.

This issue of the Conservancy Connection is dedicated to the protection of desert water. In it, you will find articles and stories written by people with connections to the waters of the Amargosa River, who can attest to seasons of storms weathered in the past, and illuminate the contours of storms yet brewing on the horizon. We hope this issue illustrates the Amargosa Conservancy's commitment to fighting for the protection of these ancient waters, and why we need the support of our members now more than ever if we are to save places like Ash Meadows from the threats it faces on all sides.

If you value desert water, and the incredible variety of life that depends on it in the Amargosa Basin, please consider donating to the Amargosa Conservancy today. Your support is what empowers us to lean into the storms ahead, and to stand strong for the land, water, and wildlife that are in desperate need of champions.

Onward,
Mason Voehl, Executive Director



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CONSTANT VIGILANCE AND ASH MEADOWS:

A REFUGE ORIGIN STORY

BY BARBARA KELLEY



Ash Meadows sign

In April 1982, I stood on the slope at Devil's Hole with Death Valley National Park biologist Pete Sanchez. With little discussion, we waited, watching the telltale dust trails heralding vehicles from Las Vegas, bearing what we hoped would be folks open to discovering why we sent the invitations, why we were standing by the alkali valley, why we cared. Hoping they'd care too, and spread the word. A line of cars approached as if they'd coordinated timing. Maybe they did. It's a distance from Vegas, from Pahrump, out to Ash Meadows National Wildlife Refuge, a ways out into the alkali. People exited their cars, glancing around from the rocky hillside not quite sure what to focus on, mostly dressed not for the desert. But it was a fine day, a warm day, thankfully with no wind. Among the travelers were Nevada state legislators, newspaper reporters, and a few others from the city. Pete glanced at me, nodded, and I began.

Many reading this will not question why I grew attached to Ash Meadows. The affection didn't really grow, it sprang. I met the oasis first around 1978, hard to remember exactly those desert spring, movement from the vent at its base revealing emerging Pleistocene water. Silly it may sound, but I gasped, grasping instantly the significance of flow. There was a breeze, a yellowjacket. Most vividly I remember blue. Ash Meadows is white, it's parchment, it's tawny and gray with drops of green, yellow, and pink. But to me it's blue. Blue water, blue sky, blue fish. Ineffable gradations of blue.

In those pre-refuge days, I was a frequent visitor. I helped with data collection regarding fishes, snails, plants. I helped with eradication of exotic species. I helped with walking, walking to investigate overgrown springs. Walking to check distances between springs, between stands of ash, bosques of mesquite, holdouts of niterwort and blazing star and sunray. Walking to find a respite spot, maybe with blue water or blue fish, but always with blue sky. When you help a place, when you walk it, talk with it, you do not merely gasp. You become friends.

I'd like to frame my images of Ash Meadows like an artist, watercoloring or photographing, singing or dancing, but an artist I am not. I am a lover of place, feet on earth, eyes on leaves or insects or flowers. Ears for the birds. What privilege I have to glimpse a crissal thrasher through

scrub, hear the waterdrop whistle of a phainopepla and the sweet "come see me" of a verdin. I see the rim of desert mountains, animated with ancient stories I cannot know. I see classic shimmering desert vistas. I tarry by a spring and focus merges with something like meditation, into cerulean water, where small cobalt-verditer fishes and important aquatic creatures are lacing their liquid world. I'd like to paint that for you, with intent to show viscerally how it is to love this place, enough to want to save it. But the only tools I know how to use are memories and words.

Twice I visited a life-long Ash Meadows resident, a woman in her 70's. She lived next to her spring, named for her family, where she was born. He was there before peat mining, before dredging or pumping killed things, when indigenous folks had homes in their oasis homeland. There were miners doing what miners do. She talked about bighorn sheep, coyotes, flocks of ducks. She told me about going to school, at, where else? The schoolhouse of School Spring. With two other students. On Fridays, they would walk to the Miner's Bathtub after class, before the miners got there, and lather for their weekly washup. She told me about her fish in her spring, and how another kind had arrived since her youth. I asked to see; mosquito fish had indeed joined her Warm Springs Pupfish. Another spring that desperately needed attention. When I asked her about Devil's Hole Pupfish and the impact their Friday baths might have had, she shrugged and said the fish move underground between all the springs. So, she believed, no harm done.

I treasured those visits. I wish there had been more.

Forty some years ago, Ash Meadows was under immediate threat of probable total elimination as an essential life center for endemic, regional, and migratory international wildlife. Under the auspices of the Desert Fishes Council, I worked to increase awareness of the importance and urgency of this danger. Virtually everything I did could be described as "behind the scenes," including meeting with some people in very high places of influence.



Ash Meadows

With Don Sada from US Fish and Wildlife/University of Nevada, Reno, and Dave Livermore from The Nature Conservancy, an intricate series of actions came to fruition in the establishment of Ash Meadows National Wildlife Refuge. Since 1984, Ash Meadows has been protected and extraordinary work has been done to refresh many areas of this desert oasis, to restore habitat, with more yet to be accomplished. Recently, new serious threats to Ash Meadows have erupted. Forty years ago I thought, "We did it, we're done. Ash Meadows is safe." But the refuge continues to face threats from beyond its borders. The work is not yet finished. It's very sobering, returning to the fray after forty years. The lesson is we need enduring effort, lasting commitment, constant vigilance. We need voices raised in defense of the refuge once again.

After Pete's nod to me at Devil's Hole, I described and explained and led the group on a tour of the Meadows. Preferred Equities owned the property and had begun housing development work, which

meant destruction had ensued. I had permission to take people to certain areas, but not to Point-of-Rocks where the most blatant damage had already occurred. Just before we got into the cars, a pickup raced up to our gathering, a local resident emerging. He said he was not used to speaking to many people, but it was important for us to know what Ash Meadows once was. He described with broad gestures areas that had been too boggy to ride a horse, too dense to walk. He described thousands and thousands of waterfowl coming through, large numbers of passerines and much other wildlife. He verified an untold abundance of life we could not now know. He said we must save the place. He motioned me to the pickup and we led the group to areas allowed, developers who

meant to build the next desert metropolis on top of this oasis watching us from their dusty Cadillac in the distance.

It worked. The group of travelers from Las Vegas left for home, convinced that Ash Meadows was worth saving. Action began in the press and in state and federal legislatures.

This is just a sliver of the story of how Ash Meadows National Wildlife Refuge came to be established. Preserving Ash Meadows for the future is a story still unfolding.

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Fairbanks Spring

Lithium claim near
Fairbanks Spring

FAIRBANKS SPRING: A FAMILY HISTORY

BY BRIAN BROWN

When Ralph Fairbanks, whom everyone called "Dad", arrived in Las Vegas, it was 1903. He was a teamster, and after his job helping to build the railroad grade with his mules and scrapers ended he bought a little land and set up a livery stable, and began freighting from the humble little railroad siding to the boomtowns farther north; Tonopah and Goldfield and Rhyolite. He shrewdly realized that Las Vegas was never going to amount to anything, and that the mining fields were where the action and opportunity was.

He sold out in Vegas and headed north, eventually ending up at the Spring in Ash Meadows that bears his name; Fairbanks Spring. He had a wife and eight children in tow, and he did about anything possible to make a living; He carried people and freight from the Las Vegas and Tonopah Railroad to the boomtown of Greenwater, always stopping by Fairbanks Spring to rent them a tent for the night, sell them supplies, and engage in a friendly game of poker. He then moved his operation to Greenwater, and when it went bust he started the town of Shoshone, a water stop on the new Tonopah and Tidewater Railroad. In 1927, in his 70's, he would move again 50 miles south and start the town of Baker, acquiring 160 acres where the First paved road across the Mojave Desert would intersect with the Railroad. He flourished, and to this day his descendants still populate many corners of the Mojave Desert. He was a rough character but right for the times and the location, and he figured out how to make a living in one of the harshest environments on the planet.

Perhaps he was an obvious parallel to the unique species of flora and fauna at Ash Meadows that have also figured out how to flourish there, as have the native peoples for millennia. And now,

we are being asked to potentially sacrifice the wonderful little bit of American History for... phone batteries? Electric cars?

If the Rover Minerals proposal to drill multiple wells within a stone's throw of Fairbanks Spring is successful, the Spring and all the organisms that depend upon it are under a real threat. If Rover Metals is then able to successfully develop and sell a commercial lithium mining claim there, I believe the entire Ash Meadows ecosystem will be in real peril. That the federal agencies would even consider siting an open pit mine right next to a wildlife refuge whose stated mission is the recovery of endangered and endemic species is absurd on its face. But, that's the possible future we are facing in this rarest of places, a desert wetlands.

It is my understanding that Ash Meadows and the waters there are part of the Salt Song Trail, a religious journey sacred to the Indigenous peoples of this region. As no one would propose erecting a cell phone tower on the Wailing Wall, perhaps no one should propose drying up an area that is just as sacred to another culture.

It is often said that history is important because we can't know where we are going unless we know where we have been. Fairbanks Spring is important to me, as I have a familial connection to it. I hope that my son, Travis Fairbanks Brown and his children, and theirs, will also be able to stand by those aqua blue waters and imagine their descendants there over a century ago. It's up to us to fight this good fight, this one is critical. I urge everyone who knows and loves the Ash Meadows region to join with the Amargosa Conservancy in this effort.

IMPACTS TO GROUNDWATER FROM OPEN-PIT MINING: HISTORY AND PRESENT THREATS

BY BILL NEILL

Rhyolite, NV

Small towns of the Amargosa region were founded between 1900 and 1910 to support the mining of gold, silver, borax, talc and other minerals. In south-central Nevada, near the northern headwaters of the Amargosa River watershed, the town of Beatty was founded in 1905 during a gold rush to the Bullfrog Hills west of town. Beatty is one of several places along the 120-mile course of the Amargosa River where groundwater rises to the surface and feeds a perennial flowing stream. With the arrival of railroad service from Las Vegas in 1906, Beatty became a railhead for mining towns in the surrounding hills, with colorful names such as Rhyolite, Gold Center, Bullfrog and Transvaal. After 5 years of intense mining activity, neighboring settlements were gradually deserted but Beatty with its water source survived with a small population, currently less than 1000 residents.

During the boom years of 1906 to 1908, Rhyolite was the largest mining town of the Bullfrog District, more populous than Las Vegas, with about 5,000 residents, several churches and banks, an opera hall, daily and weekly newspapers, police and fire departments, and a train station. In these early year, miners dug underground tunnels to access and follow high-



grade veins. But gold production fell as the richest ore was exhausted -- the largest mine closed in 1911, and by 1920 the town was nearly deserted.

Then in 1988, with modern earthmoving equipment, an open-pit mine and mill was started south of Rhyolite and operated for 10 years, until it became unprofitable. Open-pit mining allowed low-grade ore, disseminated in host rock, to be pulverized and leached by cyanide solution to extract the gold profitably. During mine operation, groundwater was pumped out so the pit remained dry; but when mining and water pumping ceased, the pit was partly backfilled to prevent a toxic pit lake from forming. The pit was filled to a level where groundwater rises to the surface and evaporates, but does not form puddles deep enough to attract waterfowl that would be killed by a pond of acidic water. Although this backfill method does prevent waterfowl casualties, it produced by design an evaporation sink that perpetually withdraws groundwater that might otherwise contribute to natural spring flow near and downstream from Beatty.

The illustration below shows the impact of open-pit mining on groundwater. During excavation, wells are pumped to withdraw groundwater while the ore body is mined, creating a cone of depression around the mine. When pumping ends, groundwater floods the pit to a level approaching the original water table. The creation of a toxic lake can be prevented by backfilling the pit partly with non-mineralized rock and soil originally removed to uncover and access



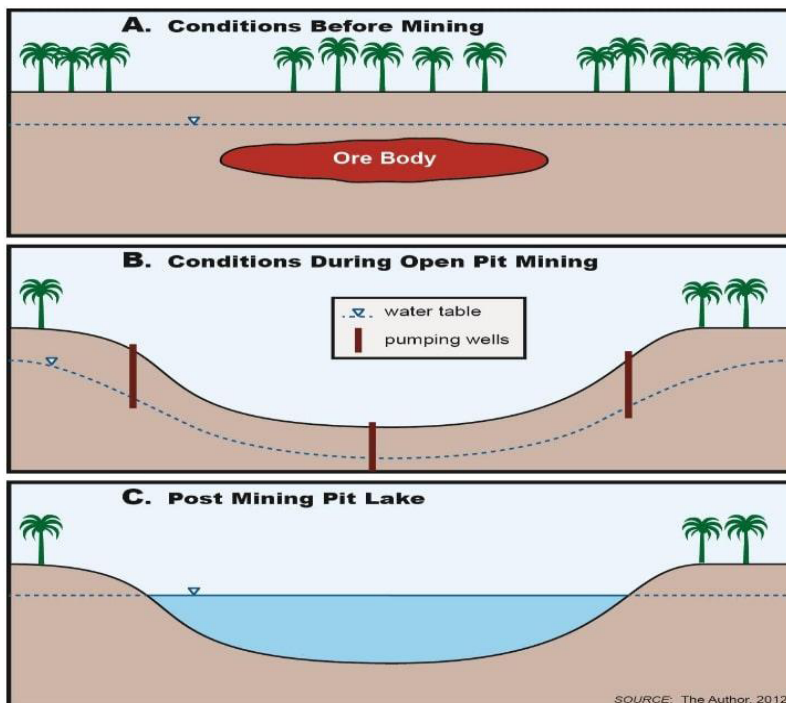
We are concerned that even without mine development, one or more of the bore holes could intersect deep fractures that convey water to the pools and change the hydrology forever.

the ore body.

During the past year, the Amargosa Conservancy board has learned of two open pit mine proposals that could impact groundwater resources in Nevada. Several miles north of Beatty, AngloGold Ashanti based in South Africa has filed plans for the North Bullfrog Project to extract gold. This will include an open pit and heap leach facility located about one mile from the Amargosa flood channel. The heap leach process will require significant water pumping, which in our opinion should be mitigated by reduction of water use for agriculture near Amargosa Valley. We will also propose that the open pit should be partly refilled with overburden after mining is completed, so that a post-mining pit lake does not form.

The deep pools and rare endemic species of Ash Meadows National Wildlife Refuge face a different threat from proposed mineral exploration and mine development. In this case, the mineral target is lithium just beyond the reserve's northern border, where a Canadian company, Rover Metals, has proposed to drill 30 exploratory bore holes into the groundwater table. We are concerned that even without mine development, one or more of the bore holes could intersect deep fractures that convey water to the pools and change the hydrology forever. Beyond that, excavation of an open pit mine next to Ash Meadows is unthinkable, in our opinion; although lithium is certainly more useful than gold to our economy, it can be found elsewhere without jeopardizing a world-class ecological resource.

Figure 4. The Process of Mine Pit Dewatering.



EACH DESERT SPRING IS UNIQUE

BY DR. SOPHIE PARKER, DIRECTOR OF SCIENCE
FOR CLIMATE AND LAND USE, CALIFORNIA CHAPTER,
THE NATURE CONSERVANCY

If you've ever visited a desert spring in the summertime, you know how important these wet wonderlands can be for plants and other wildlife. Where water emerges from an underground aquifer, the desert blooms in a riot of deep green. Insects and other invertebrates emerge, and birds come to feed on them. Where there is sufficient and persistent surface water, amphibians and fish may call desert springs home. Wide-ranging mammals such as bighorn sheep and bobcats use springs as watering holes as they travel across the landscape. Large spring systems serve as important rest stops on the Pacific Flyway, and whole desert ecosystems, such as the Amargosa, are dependent on spring flow.

Because the conservation of Mojave Desert springs is critical to biodiversity, The Nature Conservancy has been working to protect these springs for over 50 years. We began with the purchase of Big Spring in the Nevada side of the Amargosa River watershed. 10 years later, The Nature Conservancy completed the larger land acquisition needed to form what is now Ash Meadows National Wildlife Refuge. We knew we needed to protect water in order to conserve desert plants and animals. However, threats to springs continue to mount. Recently, we became convinced that we must do more to understand Mojave Desert springs if we were going to be successful in conserving them.

Saratoga Springs





The Nature Conservancy began by co-funding the 2015-2016 spring survey conducted on public lands by Andy Zdon. In 2018, we formed an interdisciplinary group of scientists to complete research on several topics related to Mojave Desert springs. In addition to Andy, our group includes Adam Love and Rachel Maxwell from Roux Associates, Inc., Maura Palacios Mejia and her research group from UCLA, Naomi Fraga and colleagues from the California Botanic Garden, and me and Brian Cohen at The Nature Conservancy. We approached our research using a variety of tools and techniques with the goal of setting a baseline for understanding Mojave Desert spring biology and hydrogeology.

Andy and Rachel conducted hydrogeologic surveys to update the original spring survey by completing new measurements of spring flow, temperature, pH, electrical conductivity, total dissolved solids, salinity, dissolved oxygen, and isotopes. Information now exists for 480 desert springs, primarily on public land, and a subset of these have been surveyed multiple times.

Naomi and her colleagues completed full floristic surveys at 48 springs. Many of these locations had never been botanized. Her [botanical investigations](#) showed that about 22% of the total vascular plant diversity of the California desert occurs at the springs they surveyed. This is remarkable, given that Brian's work to spatially delineate the extent of the vegetation supported by springs shows that these groundwater-dependent ecosystems constitute only 0.000005% of the region's land area.

Maura led her team in the collection and analysis of

[environmental DNA](#) (eDNA) from the soils and sediments of 4 springs, and showed that eDNA techniques are complementary to field techniques. Each method captures some species, and misses others. Maura's research showed something extraordinary: that each spring supported a unique suite of species.

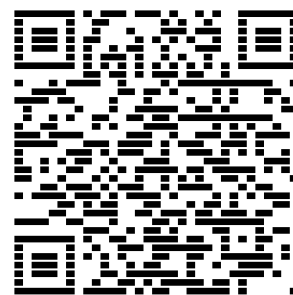
Finally, Adam led a [statistical analysis](#) using the data derived from all of the team's fieldwork to demonstrate that the hydrologic and biological measures taken by the group did not correlate. For example, while the largest spring sampled (Big Morongo) did have the greatest number plant species, there was no general relationship found between the size of the vegetated area surrounding a spring, and the number species it supported. Furthermore, beyond spring size, no other clear hydrogeologic or geographic factors measured were found to control the biodiversity observed at each spring. This is remarkable because it defies what is known as "island biogeography theory."

Island biogeography theory is used by conservation scientists to help make sense of patterns in plant and animal presence that occur in isolated habitat patches. True islands are isolated, land-based patches of habitat surrounded by water, which provides a very different habitat than that found on land. Inversely, desert springs serve as wet “islands” of life surrounded by an “sea” of dry desert uplands. Theory postulates that there are two main factors that determine how many species are found on an island: size and degree of isolation. Theory suggests that when two islands are the same distance away from other islands, then the larger island will have more species. It also predicts that an island of the same size will have fewer species if it is more isolated.

While we need to do more investigations to understand how well our sub-set of springs represents larger biogeographic patterns, our studies suggest that **each desert spring represents a unique ecosystem** that has developed in relative isolation from the other springs. When you consider the more than 60 endemic species that exist within the spring-fed Amargosa region, and how many of these are narrowly restricted to just a small part of the total watershed, this begins to make sense.

The upshot is that the very idea of mitigation or compensation for destruction of a spring ecosystem may not be possible. This gives us even more reason to protect each spring, and by doing so, the wildlife it supports.

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Sunset over Carson Slough



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