GRAND CANYON TRUST *COLORADO PLATEAU*

Advocate

SPRING/SUMMER 2024

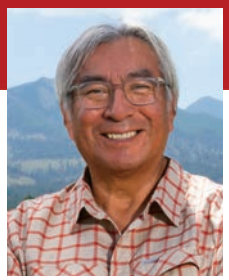
Investigating for Ourselves: Dam Proposals on Tribal Lands

PLUS

How Canyon Mine Dodged the Grand Canyon Mining Ban

The Case of the Missing Waterfall

A Cultural History of Piñon and Juniper



DEIDRA PEACHES

Letter from the BOARD CHAIR

JIM ENOTE

Dear Friends,

Welcome to the 2024 spring edition of *The Advocate*. In this issue, we have a wonderful collection of stories that will inform and connect us to the landscapes we cherish and the communities we are part of.

Our journey begins with Daryn Akei Melvin, who shares a personal narrative about his partner's family's and the Hopi Tribe's ties to Black Mesa and the controversial topic of pumped hydro projects. Daryn's story illuminates the recent landmark decisions by the Federal Energy Regulatory Commission on not approving projects on tribal lands without explicit tribal consent. His account is a testament to the growing recognition of tribal sovereignty and environmental justice.

Jen Pelz brings us an analytical exploration of the Colorado River Basin's hydrological forecasts, drawing comparisons between the record-breaking snow year of 2023 and the predictions for 2024. Her insights shed light on the implications of these water flows for the region, tackling the ever-pressing issues of water scarcity, management, and the ripple effects on communities and ecosystems dependent on the river.

Carrie Calisay Cannon, a Kiowa ethnobotanist working with the Hualapai Tribe, introduces us to pinyon and juniper forests' cultural significance and ecological importance. Through her words, we explore the intimate relationship between these forests and the declining pinyon jay, uncovering layers of Native traditional knowledge and contemporary challenges facing these vital ecosystems.

Amber Benally provides a reflective piece on the lessons learned from Emergence, an intertribal economic initiative. Amber invites us to consider the broader implications for a regional economic alliance that builds a more inclusive and equitable economy for the Grand Canyon region. Amber's story is a compelling call to action, urging us to learn from past experiences and move forward with intention and care for a sustainable economic future.

These stories weave a tapestry of resilience, respect, and connection. They remind us of the importance of listening to the land and each other as we navigate the challenges and opportunities of environmental stewardship. We hope you find inspiration and insight in these pages as we work toward a more sustainable and just world for future generations.

Sincerely,

Jim Enote

OUR MISSION
To safeguard the wonders of the Grand Canyon and the Colorado Plateau, while supporting the rights of its Native peoples.

ON THE COVER
Daryn Akei Melvin in Nastł'a, near the edge of Black Mesa, reporting our cover story. RAYMOND CHEE

EDITOR'S NOTE
The views expressed by the contributors in this issue are solely their own and do not necessarily represent the views of the Grand Canyon Trust.

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BLAKE MCCORD

Spend a day, or a few, in the field with us this season. Volunteer trips, free for Grand Canyon Trust members, are a great way to give back to the lands you love.

Lend a hand
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contents

ECOFLIGHT

ABOVE: Black Mesa, near the site of the proposed Black Mesa East dam. ECOFLIGHT RIGHT: The family home in Nastł'a. JHEREMY YOUNG

Investigating for Ourselves

Dam Proposals on Black Mesa and Beyond

By Daryn Akei Melvin

IN THE SPRING OF 2018, I was invited to visit my partner's family's "sheep camp" in Nastł'a, a sprawling box canyon along the eastern edge of Black Mesa, west of the community of Chilchinbito, on the Navajo Nation. That spring, my partner's relatives had begun renovating their family home, a modest white stone house, where generations of the family had been raised, and which stood only a few hundred yards from the homes of other extended family members. The multi-generational connection to this place was palpable, for despite only having solar power and no running water, relatives both young and old were eager to lend a hand in the renovations that day.

Later, I was invited by my partner's father to walk up the escarpment of Black Mesa, following trails used by generations of my partner's family to reach their grazing lands along the mesa top. After an hour-and-a-half trek, we stood at the end of the trail, which was transected by a weathered barbed-wire fence that served as the boundary line between the Navajo and Hopi partitioned lands. I turned around to look out over the valley below. Little did I know then that much of the dynamic and vibrant landscape I beheld, including the very ground on which I stood, would years later be at the center of three massive pumped storage hydroelectric projects proposed by a company organized by a French entrepreneur under the name Nature and People First Arizona.

Near the edge of Black Mesa. RAYMOND CHEE

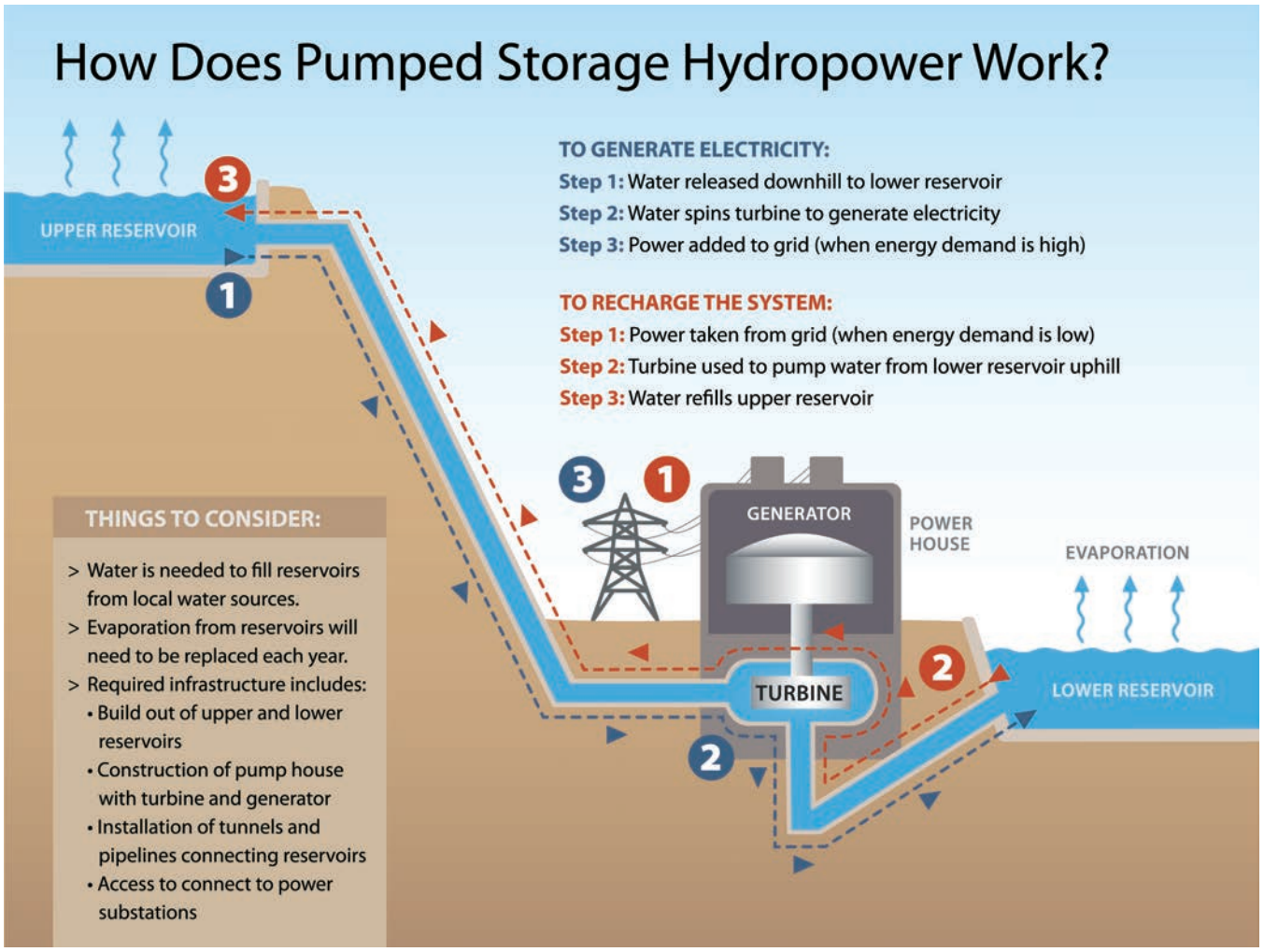
In 2022, Nature and People First Arizona applied for preliminary permits to assess the feasibility of building three hydropower projects on Black Mesa, a large plateau that extends across both Navajo and Hopi lands.

Per the project proposals filed with the Federal Energy Regulatory Commission, the three projects simply named Black Mesa South, Black Mesa East, and Black Mesa North would span roughly 40 miles of the Navajo Reservation, occupying the entire northeastern ridge of the mesa, from the community of Chilchinbito to the town of Kayenta.

Pumped storage hydropower facilities are essentially low-tech batteries that store energy in the form of water and usually consist of two reservoirs, one above the other. In the case of Black Mesa, the upper reservoirs for the three projects would be placed atop the mesa, while the lower reservoirs would rest at the base of the mesa's steep face. Using surplus power from the grid, usually generated by solar or wind during the day, water from the lower reservoirs would be pumped to the upper reservoirs, and then when demand for power rose, water would be released from the upper reservoirs and propelled by gravity through a turbine, generating electricity before again emptying into the lower reservoirs.

As we stood at the boundary line overlooking Nastł'a, my partner's father noted the footprints of a coyote. "How do you say 'coyote tracks' in Hopi?" he asked, to which I responded, "iskukveni." The fact that this word found its way into our conversation that day was particularly apropos given that the Black Mesa area holds great historical and cultural significance for Hopi people, especially for those of the Isngyam (Coyote Clan). Furthermore, the word kukveni (footprints) serves as a powerful metaphor for Hopi people to comprehend our tangible heritage, whether it be the archaeological remains of former settlements like pottery sherds, stone tools, or petroglyphs, or other physical reminders of our past use and occupation of the land. In every sense, throughout Black Mesa there are indeed many Hopi footprints.

It was then I noticed that the footprints to which my partner's father was referring went along the trail ahead of us and crossed under the barbed-wire fence of the boundary line. This brought a smile to my face as coyotes or their signs are often encountered on the road, for to be on the road is to be between situations, to be in transition. It is perhaps not surprising then that this area, as an ancestral home of the Isngyam, would play a role in the push to transition the United States away from fossil fuels toward renewable "green energy." This push, however, resulted in an explosion of dam proposals on tribal lands, and these numbers are likely to



JOAN CARSTENSEN

The prospect of adverse cultural, ecological, and environmental impacts has consequently drawn much more opposition than support when it comes to Black Mesa and other pumped storage dam projects proposed on tribal lands.

only increase given federal tax credits to support pumped storage hydropower projects under the Inflation Reduction Act.

Yet, despite being considered a renewable "green energy" option and touted as a means to replace some of the revenue, jobs, and power generation lost with the closure of Navajo Generating Station in 2019, pumped storage hydropower is not without its own issues, including how to fill the reservoirs.

Filling the nine proposed reservoirs on Black Mesa would require an astonishing 147 billion gallons (450,000 acre-feet) of water, but in the applications for preliminary permits the developer was vague on the details of where that water would come from. The applications cited the Colorado River, the San Juan River, and two local aquifers as possible sources but did not indicate the current availability of or legal rights to these sources. That means that, potentially, the projects could pump groundwater that has fed the springs and streams of Navajo and Hopi lands for millennia. Over the last century, groundwater has been drawn down by coal mining, power plants, growing populations, and, up until 2005, a slurry line that pumped billions of gallons of water to move coal from the mine in Kayenta to the Mohave Generating Station approximately 273 miles west.

The prospect of adverse cultural, ecological, and environmental impacts

has consequently drawn much more opposition than support when it comes to Black Mesa and other pumped storage dam projects proposed on tribal lands. The Navajo Nation's Department of Justice, 19 Navajo Nation chapters (local governments), members of the Hopi public, and various grassroots and conservation groups filed comments, concerns, and questions regarding the Black Mesa projects and urged the Federal Energy Regulatory Commission to deny Nature and People First Arizona's requested preliminary permits due to the wildly unrealistic nature of the proposals in the arid Southwest, as well as their compounding effects after decades of harm to the people, land, and aquifers of Black Mesa from coal mining.

My own personal experience of the Black Mesa area is colored by the contentious Peabody Coal mining operations of the past, for as a child I would occasionally accompany itàa-pa'pa (our grandfather), a Coyote Clan member, on his visits to the Black Mesa area. During these outings he often lamented the harms the mining operations caused to the land, and the depletion of the most significant water source in the region. He recounted the controversial means by which the Hopi tribal government entered into its lease agreements with Peabody Western Coal Company in the 1960s and how such agreements were negotiated by prominent natural resources attorney John Boyden, who claimed to be representing the Hopi Tribe while actually on the payroll of Peabody. This subterfuge ultimately resulted in unusually advantageous terms for Peabody and gross misrepresentations to the Hopi people of the mine's impacts on their land.

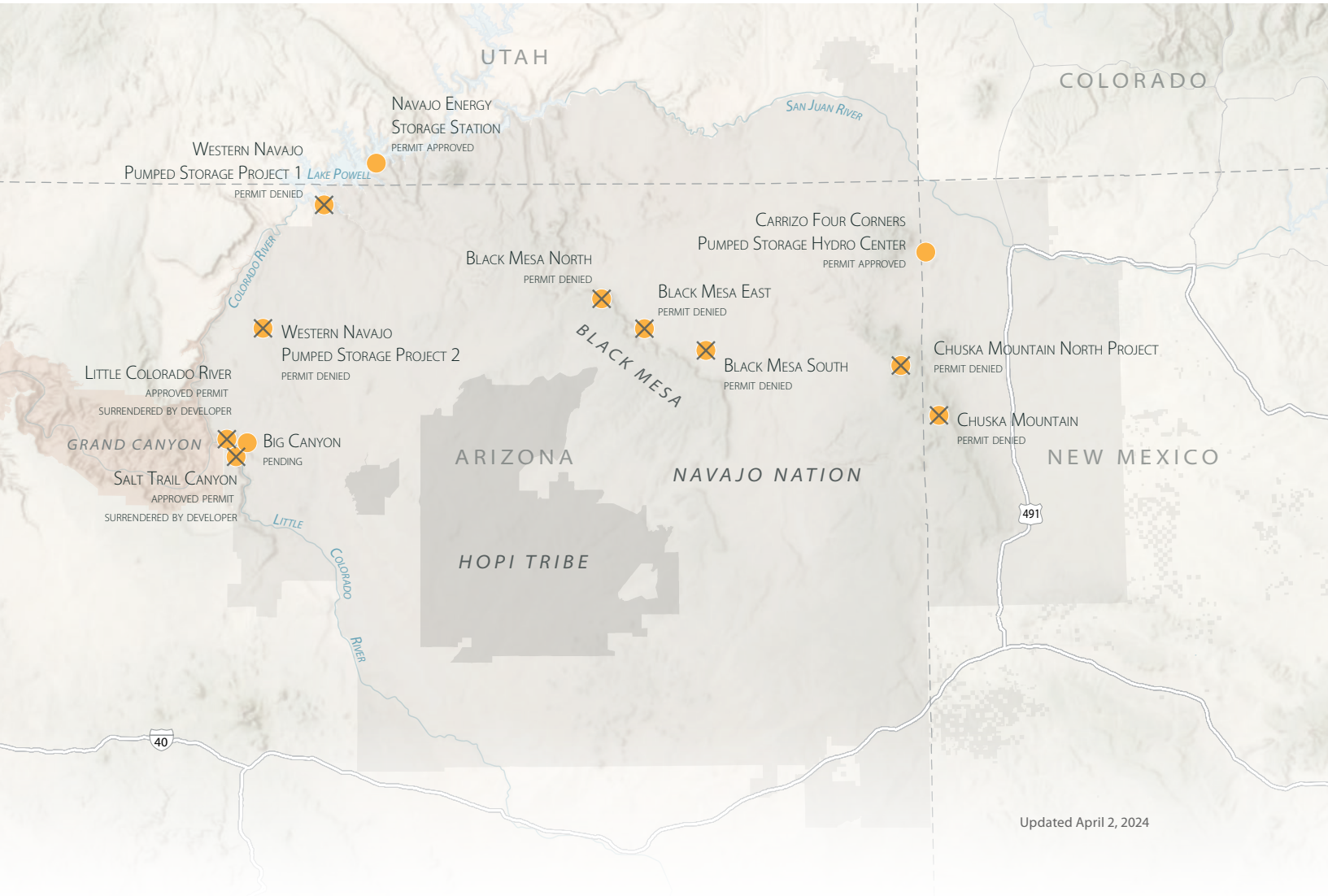
"Okiwa, kur paàsat itam nu'an una'i'istu — Regrettably, then we were oh so gullible," our grandfather said. I recall being particularly amused by his use of the term una'i'ist as it references those who share in the gullible nature of his wu'ya (clan totem), Coyote, who is prone to believe anything he is told and is therefore easily duped. Yet, as the motifs of Hopi coyote tales are in fact meant to demonstrate the ways in which one should not live, his comment also serves as an admonition that people would do well to question things. For as our grandfather often also said when speaking about his wu'ya, "Pu' lisaw piw pas hìita aw poòte'ningwu" — It is also Coyote's nature always to investigate things for himself."

Unfortunately, the ability of tribal communities and governments to holistically investigate and assess the positive and negative implications of large-scale projects on their lands, particularly as they endeavor to balance humanitarian and economic needs with cultural preservation and environmental protection, is something that has been historically lacking.

"Okiwa, kur paàsat itam nu'an una'i'istu — Regrettably, then we were oh so gullible," our grandfather said.


SKELETON MESA
Kayenta
163
160
RED POINT MESA
BLACK MESA NORTH PROJECT
8176 ft
NAVAJO NATION
BLACK MESA EAST PROJECT
6023 ft
PEABODY COAL MINING AREA
NASTŁ'A CANYON
Chilchinbito
BLACK MESA SOUTH PROJECT
Rough Rock
8094 ft
HOPI TRIBE
BLACK MESA
PARTITIONED LAND BOUNDARY
Miles
0
3
6
Area Enlarged
ARIZONA

Pumped Storage Hydroelectric Projects Proposed on the Navajo Nation



Less than a week after Hopi's decision, in a historic reversal of past precedent, the commission denied seven preliminary permits for pumped storage hydropower projects across the Navajo Nation...

Case in point, historically the Federal Energy Regulatory Commission has not been required to consult with or obtain the consent of the tribe on whose land a project was being proposed before issuing a preliminary permit. In fact, the commission wasn't even required to notify a tribe when a project had been proposed on its tribal lands.

The need to remedy this oversight became even more apparent in 2020, after preliminary permits were issued for two pumped storage hydropower projects on the lower Little Colorado River not far from its confluence with the Colorado River in the Grand Canyon and within the sovereign borders of the Navajo Nation despite objections by the Navajo Nation, the Hopi Tribe, and the Hualapai Tribe. A third proposal to dam nearby Big Canyon for hydropower has been pending since 2020.

Following several years of community conversations on the Navajo Nation and in Hopi villages, and informed by the concerns community members voiced, on February 6, 2024, the Hopi Tribe passed Resolution 010-2024 in which the Hopi Tribal Council resolved to petition the Federal Energy Regulatory Commission to update its rules to require tribal consultation and consent for granting preliminary permits for hydroelectric projects on tribal lands. Less than a week after Hopi's decision, in a historic reversal of past precedent, the commission denied seven preliminary permits for pumped storage hydropower projects across the Navajo Nation, including all three of the Black Mesa storage projects, citing opposition from the Navajo Nation. In these orders, the commission announced a new policy: "the Commission will not issue preliminary permits for projects... if the Tribe on whose lands the project is to be located opposes the permit."

The commission didn't immediately strike down the Big Canyon project, but instead opened an additional 30-day comment period, likely intended to provide the Navajo Nation an opportunity to make a clear statement about whether or not it opposes the project.

The Hopi Tribe is currently reviewing the Federal Energy Regulatory Commission's new policy on tribal consent and speaking with other tribes as potential cosigners on a formal petition urging the commission to establish additional requirements governing tribal consultation and consent before preliminary permits can be issued on tribal lands. Regardless, this recent reversal in policy, at the very least, stands in recognition of tribal sovereignty, grants tribes a legal means of determining the kinds of hydropower projects that happen on their lands, and is a positive, proactive step toward true self-determination and governance for Native people.

Daryn Akei Melvin works as a Grand Canyon manager for the Grand Canyon Trust with a focus on addressing issues related to the Little Colorado River.

Lands the proposed Black Mesa dam projects could have flooded. RAYMOND CHEE

The Havasupai Tribe's sacred mountain, Red Butte, with Canyon uranium mine (renamed Pinyon Plain Mine) in the foreground. BLAKE MCCORD

How Canyon Mine Dodged the Grand Canyon Mining Ban

By Amber Reimondo

Maya Tilousi-Lyttle (left) delivered remarks and introduced President Joe Biden (right) at the Historic Red Butte Airfield on August 8, 2023 before he signed a proclamation establishing Baaj Nwaavjo I'tah Kukveni – Ancestral Footprints of the Grand Canyon National Monument. OFFICIAL WHITE HOUSE PHOTO BY CAMERON SMITH

On August 8, 2023, wind gusts raised fine veils of dust and sunshine warmed the faces of the assembled crowd as Maya Tilousi-Lyttle — the teenage daughter of Havasupai advocate Carletta Tilousi — spoke powerfully from a podium bearing the U.S. presidential seal. It was a day many had waited decades for. At the conclusion of Maya's introduction, President Joe Biden walked onto the stage in the foreground of Red Butte and minutes later, surrounded by leaders from 13 regional tribes, he signed the proclamation declaring Baaj Nwaavjo I'tah Kukveni – Ancestral Footprints of the Grand Canyon National Monument.

LIBRARY OF CONGRESS

1872

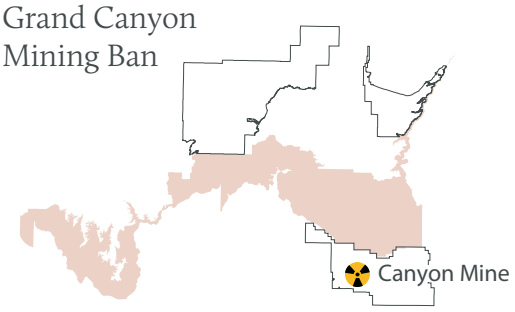
The General Mining Act is signed into law by President Ulysses S. Grant, allowing prospecting and mining of hardrock minerals including gold, silver, and uranium on federal public lands royalty-free.

1986

Canyon Mine approved by the U.S. Forest Service.

2011

President Barack Obama establishes a temporary administrative mining ban on public lands near the Grand Canyon.



2012

A 20-year Grand Canyon mining ban begins.

2016

Miners pierce an aquifer at Canyon Mine and water begins flooding into the mine shaft.

BLAKE MCCORD

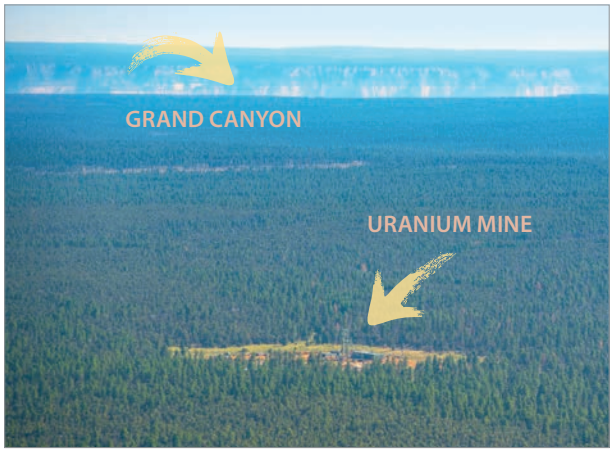
The monument represented a form of long-sought permanent protection for a region that holds irreplaceable significance to Native American tribes who have called it home for millennia, for the region's climate resilience, and for outdoor-based regional economies, from hunting to hiking.

But that day, inside the monument, just two miles through the forest from where the president of the United States stood, loomed a threat that the newly designated monument, and its permanent mining ban, couldn't touch: Canyon Mine (renamed Pinyon Plain Mine). And today, that threat is rearing its ugly head.

In December 2023, the mine's owner, Energy Fuels Resources, announced that for the first time in the mine's history, uranium production had begun "in response to surging prices, supportive government policies, and a domestic focus on security of supply." Why didn't the monument prevent this?

1986. That's when Canyon Mine was first approved by the U.S. Forest Service despite opposition from the Havasupai Tribe. Since time immemorial, the Havasupai Tribe has used and held sacred the lands that the mine would come to desecrate. For decades the mine was only sporadically developed, idling for long stretches. Up until December 2023, it had yet to commercially produce a single ounce of uranium ore. What it had done was crack open a Pandora's box of potential water problems that will only open wider now that the mine is operating and exposing more mineralized rock to the elements.

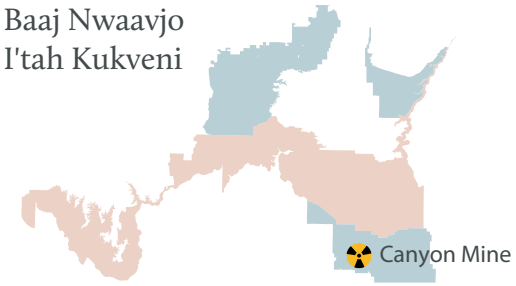
After the mine's initial approval in 1986, the operator dug a hole in the ground 50 feet deep and then stopped digging, blocking tribal or public access to the national forest land behind the mine fence. Then in 2011, after the Obama administration established a temporary administrative mining ban in the region, the mine's owner informed the U.S. Forest Service of its intent to further develop the mine, arguing that the company had "valid existing rights" that were exempt from the ban. The Forest Service agreed.



ECOFLIGHT

2020

Canyon Mine is renamed Pinyon Plain Mine in an apparent attempt to escape controversy.



2023

August

President Joe Biden establishes Baaj Nwaavjo I'tah Kukveni – Ancestral Footprints of the Grand Canyon National Monument. The monument includes a permanent mining ban, but Canyon Mine is exempt from it, because of the 1872 Mining Law.

December

Canyon Mine begins extracting uranium ore.

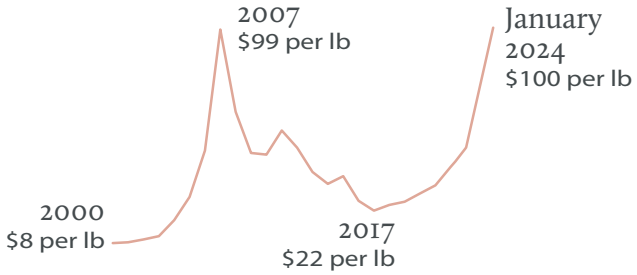
2022

Legal efforts to prevent the mine's exemption from the mining ban prove unsuccessful due to the antiquated 1872 Mining Law.

CHRIS JORDAN-BLOCH, EARTHJUSTICE

2024

Uranium spot prices surge, topping $100 per pound.



The Havasupai Tribe, Grand Canyon Trust, Sierra Club, and Center for Biological Diversity sued to challenge the mine's exemption. The Trust argued, among other claims, that a mining company cannot have valid existing rights unless its mining claim covers a mineral deposit that can be economically extracted, both at the time mining is banned and at any later point when the government examines the claim's validity. In short, if you can profitably mine the mineral deposit you've claimed at the moment the mining ban takes effect and that remains true when the validity of your claim is evaluated, you can generally satisfy the valid-rights exemption. But uranium had a low market value around the time that mining was banned around the Grand Canyon, casting serious doubt on whether the uranium at Canyon Mine could be profitably mined.

Unfortunately, after years of back and forth, in 2022, the legal effort to prevent the mine's exemption from mining bans proved unsuccessful. A federal court decided that under the antiquated 1872 General Mining Law, the Forest Service had not made an error when it concluded that the mine could be operated at a profit, despite the agency's disregard of expenses that went into developing the mine prior to 2012.

During the years the legal challenge was moving through the courts, the mining company continued sporadically to develop the mine. But the company took its time, 11 years to be exact, waiting for prices to climb. In that time, miners finished digging the 1,470-foot-deep mine shaft, which pierced an aquifer in late 2016, causing a still-ongoing influx of water into the mine that must be managed 24-7 to prevent uranium and arsenic-laced water from leaching out of the mine shaft and into connected groundwater sources.

Since 2016, the mine has pumped millions of gallons of water out of its mine shaft — as of 2023, the total was over 66 million gallons — both wasting limited water resources in an arid region and demonstrating the long-term challenge of protecting groundwater far into the

TOP: In the western parcel of Baaj Nwaavjo I'tah Kukveni – Ancestral Footprints of the Grand Canyon National Monument. BLAKE MCCORD
ABOVE: Rock writings in the western parcel of Baaj Nwaavjo I'tah Kukveni – Ancestral Footprints of the Grand Canyon National Monument. BLAKE MCCORD

future, especially after the mining company has moved on.

Why now? The company's stated reason for starting up the mine in December 2023 was "surging prices, supportive government policies, and a domestic focus on security of supply." But let's dig into that.

Prices are surging — they were up over $100 per pound in January 2024, the highest they've been in over 15 years. Driving prices, in part, is the fact that the Biden administration has touted nuclear energy as a major policy priority. Russia's invasion of Ukraine has stepped up the desire to move away from any amount of U.S. uranium supply coming from Russia. But how does Canyon Mine contribute to these priorities in any significant way? The short answer: it doesn't.

Canyon Mine offers nothing but heartache. According to the mine's 2023 technical report, the company expects the mine to operate for 28 months — that's right, fewer than two and a half years. Over those 28 months, it expects to produce 1.57 million pounds of uranium — that's once it's milled from raw ore at the company's White Mesa Mill near Bears Ears National Monument, of course, and the company says it won't start that process until at least 2025 subject to several conditions. For context, U.S. nuclear power plants purchase 40-50 million pounds of uranium every year. 1.57 million pounds is only a tiny fraction of annual U.S. uranium demand.

While the market environment and the company's own production estimates don't reflect an actual need for Canyon Mine's uranium, what we can see clearly is that we're in an attractive marketing window for a company to finally cash out on a bad investment and appear to be serving national-security interests in the process. It's tribal communities, sacred lands, and irreplaceable and delicate water resources in a region critical to climate resilience in the Southwest that will pay the price.

What now? There's no simple answer, but there are a few things that we can focus on. First, we can do everything in our power to ensure that the mine operator complies with regulatory standards, including the mine's closure plan, once it finishes mining. We can also press government leaders to keep a close eye on this high-risk mine. And more broadly, we can continue our advocacy for reforming the outdated 1872 General Mining Law, which treats mines like this one as the highest and best use of the land and leaves little to no room for tribes or the public to say, "not here."

Amber Reimondo directs the Grand Canyon Trust's Energy Program.

TIM PETERSON

A gnarled juniper tree growing beside a piñon pine. BLAKE MCCORD

A GOOD HARVEST

The Cultural History of Piñon and Juniper

By Carrie Calisay Cannon

During the Hualapai Wars, from 1866 to 1869, the U.S. Cavalry struggled to track down Hualapai fighters. Hualapai Chief Cherum was aware that the cavalry greatly outnumbered the Hualapai, were better mounted, and supplied with far greater munitions.

With skill and ingenuity, he traded goods acquired from the Pueblos to the Mojave in exchange for horses, which were then traded to the Southern Paiute in exchange for guns and ammunition that the Paiute had attained from Mormon settlers.

Cherum's strategic approach helped the Hualapai fight intelligently and effectively, until the cavalry, led by Lieutenant Colonel Price, took aim at the Hualapai's food reserves.

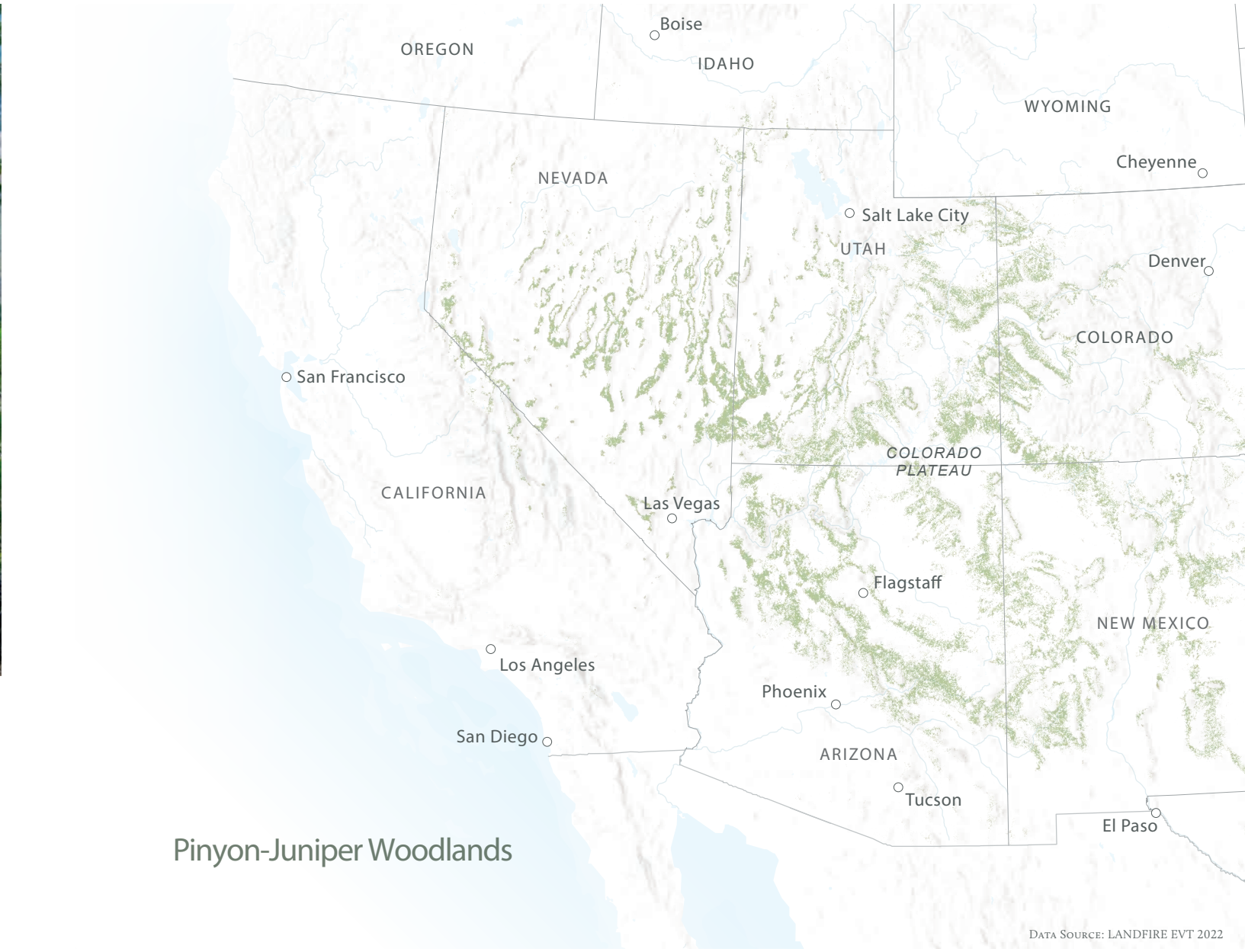
FUN FACT

Piñon pine nuts, rich in **amino acids**, contain high levels of **iron** and **vitamin A**. At more than **2,800 calories per pound**, they offer great nutritional value, making them important for food security.

TOP: Piñon and juniper forests.
MIDDLE: Piñon pine nuts in the cone.
ABOVE: Juniper berries.
ALL PHOTOS BY BLAKE MCCORD

In a relentless series of callous raids, the cavalry destroyed thousands of pounds of food supplies. U.S. soldiers, outmatched by Hualapai fighters' swift guerilla-warfare tactics, attempted to starve their opponents by destroying Hualapai winter food reserves including grass seeds, mesquite beans, and piñon nut stores. Military accounts from the period meticulously detail the large volumes of piñon nuts destroyed by military raids.

One might consider what bison were to the Great Plains tribes, piñon pines were to the Colorado Plateau tribes. In the Hualapai origin narrative, as recorded by anthropologists in 1929, Judaba:h, known as Younger Brother, instructs the peoples of the Earth on the foods they are to have and how they are to be prepared. The first four plants given to the Hualapai in order of significance include: piñon and juniper trees, banana yucca, mescal agave, and prickly pear. The piñon and juniper are treated as one, highlighting the Indigenous understanding of this important and interconnected natural resource.



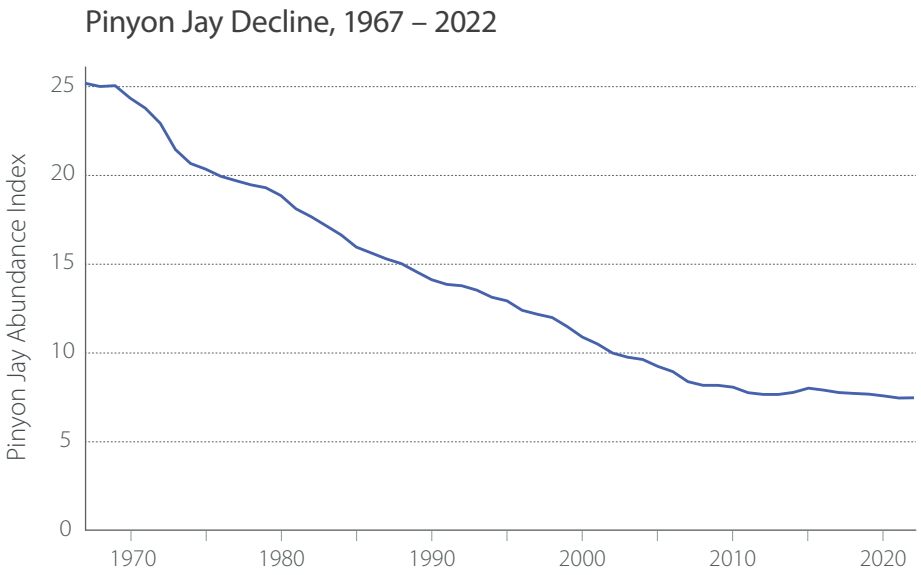
Piñon and juniper forests cover about 15% of the Southwestern states and include many understory shrubs, bushes, cacti, wildflowers, and annual and perennial grasses that provide habitat for mammals, birds, insects, and humans.

Species of juniper typically live to be 350 to 700 years old, though some junipers live much longer. Piñons, which can take up to 100 years before ever producing high nut yields for good seed crops, typically live 350 to 450 years but can survive up to 1,000 years in some cases.

Cattle grazing, fire suppression, persistent drought, climate change, and habitat loss due to clearing for homes as cities continue to expand and sprawl in the West, have all changed the piñon and juniper forests we see today.

Savanna-like piñon and juniper forests are popular with ranchers, since their understory supports good forage for cattle. But overgrazing can change these forests, with shrubs and trees edging out grasses. To reverse this trend, land managers sometimes resort to destructive measures, including clearcutting piñon and juniper and even mulching and spiking trees, in an attempt to open up space for grasslands to better feed cattle.

Suppressing natural, low-intensity wildfires that thin forests has also negatively impacted piñon and juniper forests, leading to crown fires burning at higher intensity due to the buildup and density of fuels. These devastating fires so severely scar the landscape that they make regeneration and recovery hard. Light-burning ground fires were historically a natural process on the landscape and benefited forest health,



Source: Hostetler, J.A., Sauer, J.R., Hines, J.E., Ziolkowski, D., and Lutmerding, M., 2023, The North American Breeding Bird Survey, Analysis Results 1966 - 2022: U.S. Geological Survey data release.

Recent research indicates piñon jays have declined as much as 80% and are one of the most rapidly declining birds in North America.

clearing out undergrowth and making space for more grasses. When high-intensity fires burn, exotic species like tansy mustard, horehound, knapweed, cheat grass, various non-native thistles, and spreading wallflower often are the first plants to get a foothold in the aftermath.

Persistent drought along with climate change also strain these forests. Just as stress can weaken the human immune system, climate stress can weaken trees, making them more susceptible to die-offs from beetle invasions, which trees might normally be able to survive if they were not dealing with the compounded stress of drought.

But it's not just the trees that are in trouble. When Hualapai tribal elders share their knowledge of piñon and juniper forests with tribal youth, they say, "Look to the forest in the fall, and if the piñon jays are in abundance, it will be a good year to harvest." Yet piñon jay numbers have been declining over the past 50 years. Prolonged drought, wildfires that burn hotter, climate change, and land management practices, which eliminate forest cover to feed cattle, can mean less habitat for birds like the piñon jay that rely on these forests for nesting, food, and habitat. The forests need this social blue bird, whose nut-stashing is essentially responsible for planting the next generation of trees that will become future forests. Recent research indicates piñon jays have declined as much as 80% and are one of the most rapidly declining birds in North America. This has led to a petition for review to try to get the U.S. Fish and Wildlife Service to list the piñon jay as a threatened or endangered species. When considering that piñon and juniper forests encompass as many as 75,000 square miles across the Western states, losing a species that is intimately tied to that forest's regeneration is no small concern.

Hualapai tribal members gather piñon-nut-filled cones in September. Piñon nuts are eaten raw or roasted, or made into nut butter, soup, or formed into cakes, just like they were in Chief Cherum's time. In 1871 after years of war with the U.S. Cavalry, the Hualapai were defeated and rounded up on a temporary reservation. By 1883 an official reservation was established for the tribe, one seventh the size of the ancestral land base. In 1901, an Indian boarding school was opened on the reservation. At that time in American history, assimilation was a policy adopted by the U.S. government which intended to absorb Native Americans into mainstream American life.

During this era, the federal government's approach to education was to strip Indian children of their culture

LEFT TO RIGHT Elnora Mapatis winnows piñon nuts at the bilingual elementary school in Peach Springs, on the Hualapai Reservation. HUALAPAI PEACH SPRINGS BILINGUAL PROGRAM Jorigine Paya shows Hualapai Ethnobotany youth Sharissa Walker and Angelique Jackson how to make bread on hot coals for their piñon butter. CARRIE CALISAY CANNON Annie Querta shows youth at the bilingual school how to roast piñon cones. HUALAPAI PEACH SPRINGS BILINGUAL PROGRAM

and heritage in an attempt to acculturate them into white society. English was therefore mandatory, and speaking the Hualapai language was forbidden. Three-quarters of a century later, in the fall of 1975, work to reverse this assimilation and reintegrate Hualapai children back into their Hualapai culture and language began in a school setting.

Children who attended the Peach Springs Bilingual/Bicultural School from 1975 to 2000 were taught Hualapai language, culture, ethnobotany, zoology, and ethnogeography. The curriculum and instructional content were presented in both English and Hualapai. In addition to instituting the Hualapai language in the school setting, this nationally acclaimed program developed bilingual curriculum books to be culturally relevant and taught about the local flora, fauna, geography, land, and the meanings of petroglyphs and pictographs within ancestral tribal lands. When the bilingual school was founded, the Hualapai team of teachers that developed the curriculum had the forethought to teach what was relevant from the Hualapai perspective. In large part, this involved teaching ethnobotanical knowledge, and of course that included the importance and significance of piñon for its many uses.

Piñon pitch has been used for gluing arrows and cradleboards, chewed as gum, and applied as a topical healing agent for cuts and wounds. The melted pitch can be used to waterproof baskets.

Piñon pine cones cycle and, on average, ripen approximately once in four years, but trees may produce nuts once every three to seven years. In traditional times among the Hualapai, the cones were gathered from the trees using a seven- or eight-foot-long hooked stick called a digatu'. It is best to gather the cones early in the morning before the sap warms up and becomes very sticky. After the cones are pulled down, they can be rolled in the dirt to cover the sticky sap. Back in the 1970s and 1980s, piñon roasts were a regular event. Many cones were gathered in sacks and roasted in a shallow pit a few inches deep. After being roasted among hot coals produced from juniper wood, the cones were taken out and laid out to air and dry out. After two days of drying the cones were beaten with a long stick to knock loose the nuts so they could be gleaned in a winnowing basket.

After cones are harvested, and, later in the season as winds knock down more cones, piñon nuts drop to the forest floor. Historically, harvesting these fallen nuts was considered a

Ectopistes migratorius (passenger pigeon), James St. John male passenger pigeon (extinct), on display at the Cleveland Museum of Natural History. CLEVELAND MUSEUM OF NATURAL HISTORY

more time-consuming task. But in today's busy world, harvesting nuts from the forest floor has become the preferred method since it requires less effort than gathering and roasting cones, though it also yields smaller hauls.

Up until 1975, Hualapai remained an unwritten language. That year, the Hualapai launched their language-revitalization program, and, after a decade of exceptional achievements, received national recognition for accomplishments in Native language literacy and curriculum development. Languages are considered "severely endangered" when they are mostly spoken only by the grandparent generation and older, according to the criteria established by UNESCO, and are thus one generation away from being lost.

When early Euro-Americans began settling the North American continent, passenger pigeons ranged in great abundance across the entire eastern half of the continent, from Canada to Florida all the way through the Midwest down to Texas.

BIRDWATCHERS NEEDED

Grab your binoculars and help us spot pinyon jays

Pinyon jays live in pinyon and juniper forests across the Colorado Plateau. The birds and the trees depend on each other. Pinyon pines provide nuts and pinyon jays help the pines spread their seeds. Both face unprecedented threats.

We need volunteers to help gather information about pinyon jays. Knowing where the birds are helps us protect their habitat and advocate against clearcutting of the forests they depend on.

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CHRISTINA M. SELBY

Similar to languages, forests face endangerment if their next generation doesn't sprout and thrive. The seemingly dire situation of the piñon jay population begs the question of how piñon and juniper forests will be able to regenerate if these seed-dispersing birds continue to decline. Without piñon jays, we run the risk of losing these quintessential forest landscapes that have coevolved together with animals, peoples, cultures, and traditional lifeways.

It is easy to travel throughout vast regions of the Southwest and see miles of piñon and juniper as far as the eye can see. To a passive observer this makes it hard to fathom that such habitats and the species contained within are in fact in danger.

When early Euro-Americans began settling the North American continent, passenger pigeons ranged in great abundance across the entire eastern half of the continent, from Canada to Florida all the way through the Midwest down to Texas. Although Native Americans engaged in subsistence hunting, passenger pigeons were soon avidly hunted by early Euro-American settlers for food and sport. Simultaneously, the pigeons' habitat began disappearing to deforestation. This bird was once so widespread and plentiful that early settlers didn't believe it could be brought to extinction. However, a slow decline from 1800 to 1870 was followed by a rapid decline between 1870 and 1890. In 1900, the last confirmed wild passenger pigeon was shot in southern Ohio. Although stories such as this can leave a sadness about the historical past, they also offer a special gift. This gift is a reminder that we have the opportunity to avoid repeating history. Many of the losses that have taken place on our continent resulted from a combination of greed and ignorance. By paying attention to the dynamic natural world that surrounds us, we can better understand and protect it for our future generations. It starts with realizing that these seemingly abundant regions actually exist in a delicate balance and with doing our part to advocate for their protection.

With the piñon jay undergoing a review process for potential listing under the Endangered Species Act, wildlife biologists are studying and assessing this species and its habitat. If the species does get listed, it may undergo a review of critical habitat — specific areas that contain features essential to its conservation and therefore in need of special management protections. Unlike the passenger pigeon, the piñon jay and its habitat persist in a time when society has a more widespread awareness of ecology and laws exist to prevent extinctions.

Back on the Hualapai Reservation, when tribal elder Jorigine Paya takes the Hualapai Ethnobotany Youth Project students out on the harvest, she begins the morning with a blessing: "Ha nyi gacha, wi nyi gacha, wil nyi gacha, nyi nya gacha." She addresses the waters, the land, the plants, and the sun as her relatives. This simple prayer serves as a reminder to the next generation of Hualapai that as much of a technological society as we have become, nature is still and always our relative.

Carrie Calisay Cannon is an enrolled member of the Kiowa Tribe and an ethnobotanist employed by the Hualapai Tribe, for whom she has worked for the last 19 years.

The Missing Waterfall

By Jen Pelz

Vaughn Spring, Grand Canyon National Park. JEN PELZ

Breath by breath, I ascended the red rocks away from the Colorado River, captivated by a ribbon of water, searching for its source. When I reached the canyon's wall, I found a few wispy bushes, dry branches, and stained, dry rock: a missing waterfall. What had once been a verdant oasis had dried up completely.

Encountering a dry spring shouldn't have surprised me. The Colorado River Basin, including the Grand Canyon, is experiencing a multi-decade drought that began in 2000 — one of the driest periods in 1,200 years. The region is warming, and the increasingly arid environment is likely to persist. Water for this spring comes from high on the Kaibab Plateau and enters the intricate groundwater system of porous rock and faults that carry water deep underground into the canyon. Even the historic snowpack of 2023 — the second wettest year in the 21st century — was not enough to power the spring's flow.

How much snow we receive and how much of it we can conserve once it melts off are key to meeting current needs and making up for water deficits from previous years or decades. A good snow year can help restore river flows, refill drained reservoirs, and replenish groundwater, seeps, and springs. While it is too soon to tell how much runoff we'll see in 2024, several key indicators can help shed some light on where we are today, including how much water is contained in the snow.

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MARIE READ

As of late January 2024, the snowpack outlook was below average. The snow water equivalent in the Colorado River Basin was 85% of median in Colorado, New Mexico, Utah, and Wyoming and much lower — 68.5% — in Arizona, California, and Nevada. These levels are well below the 148% and 218% for the upper and lower basins respectively that we saw in 2023 and are tracking more closely with 2021 and 2022 levels.

While 2023 runoff into Lake Powell was 167% of average, both 2021 and 2022 were below-average years. As of early February 2024, the forecast predicts runoff into Lake Powell will be a weak 79% of average — closer to what we saw in 2021 and 2022, and roughly half of what the lake got in 2023.

What is left of the snow runoff windfall of 2023? Given the modest snowpack forecasts for 2024, conserving the water-storage gains we made in 2023 will likely be very important. 2023 helped fill up the tubs, adding the second largest volume of water to Colorado River Basin reservoirs in a single year since 2011, the wettest year in the 21st century. Most of that water is stored in lakes Powell and Mead, but these gains are still meager in the big picture.

As recently documented by Jack Schmidt, director of the Center for Colorado River Studies at Utah State University, in a series of blog posts, history shows that the water added to reservoirs from the previous year's high runoff is typically completely used up within two years.

To understand how effective recent policies are at protecting yearly gains in reservoir storage, Schmidt is tracking monthly losses in reservoir gains from 2023 and comparing those to each year over the past decade.

So far, efforts to hold on to 2023 runoff have been successful. We've been depleting reservoir levels more slowly than over the past decade, likely due to a combination of policies that trigger water-use reductions as water elevations in Lake Mead fall. In 2023, those agreements saved about 235 billion gallons of water.

The U.S. Bureau of Reclamation also paid billions of dollars to water users in the lower Colorado River Basin to conserve water in Lake Mead, which added another 114 billion gallons of reductions. Combined, these efforts appear to have protected at least 350 billion gallons of water in storage. A typical household uses about 150,000 gallons of water each

Colorado River, Grand Canyon National Park. TIM PETERSON

We've been depleting reservoir levels more slowly than over the past decade, likely due to a combination of policies that trigger water-use reductions as water elevations in Lake Mead fall. In 2023, those agreements saved about 235 billion gallons of water.

year for its indoor and outdoor water needs; by that measurement, the water saved is enough to supply more than 2,300 households for one year.

While this is good news, the challenges associated with a drying climate go far beyond reservoir elevations and water supply. Less rain and snowfall leave environmental, spiritual, and cultural resources, like springs, vulnerable to drying up.

Let's return now to the drying spring where this story started — Vaughn Spring. While at first glance it looked to be a casualty of climate change, in reality it is more a lesson in geology. Deer Creek — the water I had followed through the rocks — is fed by two sister springs: Vaughn and Deer. Deer Spring contributes more to the creek's flow and in fact "pirates" most of the water traveling through the layers of rock in the Grand Canyon toward its cave-like surfacing point. Vaughn Spring only pours forth when the volume of water is too much for the faults in the rock to carry it to Deer Spring — it is essentially an overflow valve, and an important reminder that when it comes to water in the Colorado River Basin, it is complex and there are no easy answers.

Jen Pelz directs the Grand Canyon Trust's Water Program.

Space for All of Us

How the Emergence Network Links Native Economies

By Amber Benally

JAMIE ARVISO

Grand Canyon Trust Native America Director Deon Ben. JAMIE ARVISO

"The network is you. The network is the capacity that you bring,"

says Grand Canyon Trust Native America Director Deon Ben,

surveying the crowd seated at round tables and lining the walls.

The conference room, a short walk from the bustling south rim of the Grand Canyon, brims with Native brilliance: farmers, entrepreneurs, river guides, outdoor industry leaders, and artisans. A number of National Park Service employees are here too, as well as partners from Grand Canyon Conservancy. For everyone assembled, the Grand Canyon is much more than a beautiful landscape. To some, it's a call to protect the natural beauty of intricate layers of rock and water. To others, it's where the histories and stories of their people originate and continue to exist. Among all of us, there's a common thread that weaves us together: a shared mission to bolster the presence of tribes in the Grand Canyon.

"We have been waiting for this to happen for over 20 years," says Tina Yazzie, who works for Grand Canyon National Park.

There's a feeling of urgency and excitement in the room. We're about to make something happen. We're here for the second annual Emergence Intertribal Economic Summit. Over the course of the next three days, this collective of 68 people from 10 tribes of the Grand Canyon region will work together to create the Emergence Network, a community-guided economic initiative that represents a big step toward Native people determining

ABOVE LEFT: Grand Canyon National Park employee Tina Yazzie in a small group conversation at Emergence. ABOVE RIGHT: Grand Canyon Trust Grand Canyon Manager Daryn Akei Melvin facilitates a discussion to help the Emergence group define its values. BELOW LEFT and RIGHT: Participants engage in brainstorming activities. ALL PHOTOS BY JAMIE ARVISO

what their economic presence looks like in and near Grand Canyon National Park.

The call to address the economic disparities experienced by Indigenous vendors in Grand Canyon National Park came from the Intertribal Centennial Conversations Group. Leading up to the park's centennial, dozens of cultural leaders from Grand Canyon tribes formed the group to heal, share their true histories, and strengthen relationships with the National Park Service and other partners to protect the Grand Canyon's heritage. Today, momentum continues as the group works to place Native voices at the forefront of education, stewardship, and economic opportunities in Grand Canyon National Park. Among the problems the group identified are a lack of Native vendors inside of the park and the National Park Service's long history of forcibly removing tribes from lands within the park boundaries. Another restrictive factor for Native entrepreneurs is the lease agreements held by concessionaires that limit who can sell goods inside the park.

"We have to think with an abundance mindset," advises Jessica Stago, Grand Canyon Trust Native American economic initiatives director.

Sahar Khadjenoury (Navajo/Persian) owns an Airbnb in her community of Aneth, Utah, and encourages people to invest in the things they already have.

"Do you have a hogan in your backyard that you use for storage? That's an opportunity for an Airbnb!" she says. Khadjenoury is currently training people to turn hogans into short-term rentals.

When it comes to the future of cultural tourism and economics, "There is space for all of us," Khadjenoury says. The Emergence Network offers a way to put entrepreneurs like Khadjenoury in contact with other business owners and aspiring entrepreneurs all working to build a strong economy that reflects their cultural values.

ABOVE LEFT: Small-group breakout sessions like this one gave Emergence participants a chance to share ideas and experiences and brainstorm solutions together. ABOVE RIGHT: Sahar Khadjenoury shares her experience operating an Airbnb in Aneth, Utah. BELOW LEFT: Native American Economic Initiatives Director Jessica Stago facilitates a group brainstorm on the size and scope of the Emergence Network. BELOW RIGHT: Grand Canyon National Park Ranger Kelkiyana Yazzie adds a sticky note to to show the potential businesses to include in the Emergence Network. ALL PHOTOS BY JAMIE ARVISO

The current economic system simply does not align with the cultural values of many tribes. As they have been in the past, the lifeways of tribes of the Grand Canyon are almost continuously under threat with numerous proposals dubbed "economic development" by outside companies targeting Indigenous communities.

Recent proposals include pumped storage hydroelectric dams throughout Navajo Nation lands (seven of these were struck down in February 2024) and then there's the uranium mining that started up in December 2023 at Canyon Mine (renamed Pinyon Plain Mine); radioactive ore from the mine will be transported from south of the Grand Canyon, across Navajo Nation lands, to the White Mesa Mill, in Utah, near the Ute Mountain Ute Reservation. The common thread in these proposed projects is that Native communities get the short end of the stick; they suffer the impacts but see very few of the benefits. These "economic development" projects repeat what has become a common tale for tribes: tribes suffer huge environmental disturbances to their tribal lands and waters while receiving little economic revenue in comparison to the outside companies.

The Emergence Network is designed to meet the needs of tribal communities in ways these outside developers can't, including prioritizing a "just transition" away from extractive industry and economic exploitation.

A just transition allows communities the opportunity to infuse their cultural and traditional values into all aspects of their lives, including their economies. This has not always been the reality, as tribes have dealt with the long-term effects of being forced to adopt non-Indigenous systems of government and economic models.

The Emergence Intertribal Economic Summit, first held in 2022 and reconvened in 2023, is designed around a model of community conversations. It allows participants to

ABOVE LEFT: Emergence participants create a visual of the values of their communities. ABOVE MIDDLE: Chef Denella Belin of Nella's Innovative Kreations catered Emergence 2023, featuring cultural foods from several tribes. ABOVE RIGHT: Participants shared what the future of the Emergence Network will mean to their communities. BELOW LEFT (L to R): Grand Canyon Trust Legislative and Policy Project Manager Wilda Anagal, Native American Economic Initiatives Director Jessica Stago, and keynote speaker Natasha Hale swap ideas at Emergence. BELOW RIGHT: 2023 Emergence Summit participants gather for a group photo. The gathering included tribal representation from 10 tribes including: A'aniih, Diné, Havasupai, Hualapai, Hopi, Isleta Pueblo,Pascua Yaqui, San Juan Southern Paiute, Yavapai-Apache,and Zuni. ALL PHOTOS BY JAMIE ARVISO

determine the structure that works best for them, define their shared values, host workshops to build the skills of attendees, and strategize the future of the self-determined, Indigenous-led Emergence Network, which includes tourism, cultural arts, and tribally guided initiatives within and outside of Grand Canyon National Park.

Delores Wilson-Aguirre of the grassroots organization Save the Confluence says she appreciates "Seeing all the young people leading the conversations," adding, "it would be nice to take these meetings home to the communities to see what young people have to offer."

Going forward, the Emergence Network will be something bigger than annual gatherings. Twelve tribal members have committed to serve on the inaugural Emergence Advisory Council to guide the work and future of this Indigenous-led economic initiative; the council is set to formally meet for the first time in Zuni, New Mexico in 2024.

Because the Emergence Network is community-led and building it requires a wide range of voices and experiences, the future of the initiative is in the hands of its members. The network is committed to strengthening Indigenous economies within and outside of Grand Canyon National Park. Inside the park, the National Park Service and Grand Canyon Conservancy have committed to share resources and move forward together toward greater Native inclusivity and Native presence. As a longtime trainer of future environmental advocates, I'm personally committed to inviting more young Native voices to the table, because just as there's space for all of us, all of us should have a hand in shaping economies that reflect our cultures and our values.

Amber Benally manages just transition work at the Grand Canyon Trust.

A Tribute to the late

N. Scott Momaday

Grand Canyon Trust Poet Laureate

1934-2024

N. Scott Momaday. STEVEN ST. JOHN

In the grand tapestry of words and landscapes, N. Scott Momaday stood as a towering figure, a Pulitzer Prize-winning Native American novelist and poet whose voice resonated with the profound depth of the earth and the soaring heights of human imagination. As a poet laureate for the Grand Canyon Trust, he was not only a steward of words but a guardian of the sacred, a bridge between the beating heart of nature and the human soul.

In words and silence, in canyons and on peaks, N. Scott Momaday's legacy is as enduring and profound as the landscapes he so dearly loved.

— Jim Enote, Grand Canyon Trust Board Chair

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