

# High Country News



## GOING UNDER

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SCOTUS knocks  
EPA down, not out

Yellowstone's  
rejuvenating river

LandBack  
explained



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On a recent Saturday morning in July, Punjabi Tandoor co-owner Bakhtawar Saini enjoys a chai while waiting for customers at the restaurant's location in Carlsbad, California. **Roberto (Bear) Guerra / HCN**

# Know the West.

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EDITOR'S NOTE



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## Climate and Congress

**ON JUNE 30, JUST DAYS** after torrential rains exacerbated by climate change deluged the Greater Yellowstone Region, demolishing homes, displacing families and upending lives and livelihoods, a Supreme Court ruling hobbled the Biden administration's power to limit greenhouse gas emissions. The court's opinion, penned by Chief Justice John Roberts, essentially said that only Congress could make "a decision of such magnitude and consequence."

Climate advocates plunged into despair. *Congress make a decision? Congress do anything meaningful at all — especially on climate change?* To say it seemed unlikely is to put it mildly.

After all, Democratic lawmakers (and a few Republicans) have been trying, and failing, to pass climate legislation for decades. Back in the 1990s, the Clinton administration pushed for a fossil fuel tax. But not only did it bite the (rapidly growing) dust, its backers were punished by voters in the notorious 1994 mid-term rout. A decade later, Arizona Republican Sen. John McCain teamed up with Connecticut's Sen. Joe Lieberman, who was still a Democrat at the time, to sponsor a bill capping greenhouse gas emissions. That, too, was a no-go — though McCain's career survived, something unlikely to happen in the GOP today. Abandoned congressional climate bills have piled up like tumbleweeds over the years, the latest casualty being Build Back Better, which withered away and died in the narrowly Democratic-majority Senate.

So when Roberts declared that only Congress could act to avoid a climate catastrophe, it was a devastating blow — to the entire planet. But a handful of Democratic lawmakers rose to the challenge and doubled down on their determined negotiations. And just weeks after the Supreme Court ruling, Senate Democrats — with a good deal of help from their pragmatic Western colleagues — finally secured a deal on a bill that tackles not only climate, but also inflation, health care and taxation.

The Inflation Reduction Act of 2022, which President Joe Biden signed into law Aug. 16, is not perfect by any means. It makes numerous concessions to the fossil fuel industry and, because it's a filibuster-proof budget reconciliation bill, is unable to actually mandate emissions cuts. But it is nonetheless historic, allocating some \$369 billion toward renewable energy, environmental justice, heat pumps, efficiency and electric vehicles. Independent analysts predict that it will cut emissions more than 40% by 2030, positioning the U.S. as a global leader in the battle against climate change.

Perhaps the most remarkable fact is that our notoriously polarized and dysfunctional Congress managed to pull this off at all, overcoming conservative Democratic resistance and unyielding Republican obstruction. Maybe this bill is a freak of nature — the first and last of its kind. Or perhaps the public and its representatives, increasingly battered by climate change, are finally waking up to the need to act and make more decisions of genuine "magnitude and consequence."

**Jonathan Thompson**, acting co-editor

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## FEATURES

# The Climate Underground

# 24

Sometimes a successful scientific expedition means something gets left behind.

BY EMILY BENSON | PHOTOS BY LINDSAY D'ADDATO

### ON THE COVER

The Pisa Room in Titan Cave, east of Cody, Wyoming. Scientists are analyzing stalactites and stalagmites to gain insight into the climate of the past and the future. **Lindsay D'Addato / HCN**

Natasha Sekhon, Christopher Kinsley and Warren Sharp collect water samples from a stream next to I-80 near the Wyoming-Utah border (*above*). They and their colleagues are analyzing water and sediment samples as well as cave formations to understand paleoclimate data. **Lindsay D'Addato / HCN**

Graham Biyáál climbs a ladder to harvest pollen from 12-foot-high cornstalks at his parents' farm on the Navajo Nation outside of Shiprock, New Mexico (*facing*). **Beth Wald / HCN**



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# Growing traditions

9

In northern New Mexico, Indigenous farmers reclaim time-honored techniques.

BY LYRIC AQUINO | PHOTOS BY BETH WALD



## The EPA has more options to rein in climate change than you think

7

There are still many ways to shut down major polluters — including some options the agency isn't using.

BY ELIZABETH SHOGREN

## A rejuvenating river runs through it

14

June flooding in the Yellowstone region ruined roads and houses, but could refresh the ecosystem.

BY NICK MOTT

## Can democracy protect Arizona's dwindling water?

16

In Arizona, a group of 'scrappy' locals are working to create the state's first citizen-initiated groundwater management area.

BY CAROLINE TRACEY

## Land-healing economy

18

There's money in recovering from extractive industries.

FACTS & FIGURES

BY JONATHAN THOMPSON

ILLUSTRATIONS BY FIONA MARTIN

## The Song Dynasty

15

POEM BY DAN BEACHY-QUICK

## 6 questions about the LandBack movement, answered

38

Number one: Why are Indians spray-painting my Starbucks?

PERSPECTIVE BY B. TOASTIE

## The new top ways to go outside

40

If you're getting out into nature, do right by the land and each other.

PERSPECTIVE BY JOSÉ GONZÁLEZ

DRAWINGS BY KRYSTAL QUILES

## On the road, a taste of home

42

The Saini family's Punjabi dhabas serve 'good vibes only.'

ESSAY BY MADHUSHREE GHOSH

PHOTOS BY

ROBERTO (BEAR) GUERRA

## We are all of us animals

46

Talia Lakshmi Kolluri's debut collection roars, screeches and stuns.

REVIEW BY DEBBIE WEINGARTEN

ILLUSTRATION BY

KATE SAMWORTH

## Race day

48

On the anxieties and satisfaction of low-stakes yet ambitious goal setting.

RUNNING FREE

BY CASSIE DA COSTA

ILLUSTRATION BY DIANA EJAITA

## #iamthewest

52

Monica Ault, New Mexico state director of the Fines and Fees Justice Center, Santa Fe, New Mexico.

BY MINESH BACRANIA

OTHER MATTER

3 EDITOR'S NOTE

23 DEAR FRIENDS

6 LETTERS

50 HEARD AROUND THE WEST

20 HCN COMMUNITY



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## LETTERS

**High Country News is dedicated to independent journalism, informed debate and discourse in the public interest. We welcome letters through digital media and the post. Send us a letter, find us on social media, or email us at [editor@hcn.org](mailto:editor@hcn.org).**

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### HOPE AFTER TRAGEDY

Thank you for the “Our Fiery Future” issue (August 2022), especially Madeline Ostrander’s article, “After the Flames.” As my community struggles with the flooding and aftermath of the Hermits Peak/Calf Canyon wildfire, FEMA and the national spotlight have moved on to the tragic and devastating floods of Kentucky. There are many lessons to be learned from Carlene Anders and the town of Pateros, including the importance of preparedness for the next disaster. Sarah Gilman’s illustrations are beautiful and representative of the scenery that surrounds me. Within the burn scars, the wildflowers, native grasses and oak brush are thriving. That gives me hope for the forest, but I’m still grasping at “practical optimism” amid the despair.

**Virginia Mattingly  
Mora, New Mexico**

### ENLIGHTENING

Thank you to *HCN* and Austyn Gaffney for the piece on coal

seam fires (“The Fires Below,” August 2022). Very enlightening — even to someone who worked in wildland firefighting in Montana. Well done.

**Traute Parrie  
Red Lodge, Montana**

### PRESCRIBED BURN PROBLEMS

Thank you for Jonathan Thompson’s reporting on the “Forever Fire Season” (August 2022). Having worked on many prescribed burns and studied the Las Dispensas prescribed fire escape, I question a few points in his piece. The Forest Service staff was under pressure from supervisors to get burning done. Conditions were not favorable for a prescribed burn, but were far too dry, as evidenced by the test burn, which exhibited extreme fire behavior. The agency had grossly understaffed the burn, and reinforcements were hours away. The burn was out of control within three hours of ignition. Federal standards that are meant to ensure the safety of prescribed burning were violated at a time

when it is increasingly necessary and perilous in the drying climate Thompson describes.

**Tom Ribe  
Santa Fe, New Mexico**

### OBJECTIONS

Yes! Thank you, Jennifer Sahn, for the simple editor’s note in your August 2022 edition. I couldn’t agree more that a better world “is both possible and worth fighting for.” And *High Country News* is a big part of that vision.

**Gavin Dahl  
Salt Lake City, Utah**

### ENTHRALLED AGAIN

I don’t often read the Letters section in *HCN*, but “resubscribed” caught my attention, because I was going to let my subscription lapse also. Not because *High Country News* doesn’t have great stories that I can’t read anywhere else, but because they slice right to the heart (my heart included) of so many important issues facing our world. I was on the verge of stopping the subscription due to increasing anxiety over our country when your latest issue arrived.

I’m once again enthralled with the articles. I’m particularly pleased to see artwork illustrating one story, “After the Flames,” and the story on Utah Museum of Art (“Deep breath”). Art can be uplifting and informative. Even on your back cover, “I am the West,” you could feature an artist who through their art brings attention to not only the beauty of the West, but the psyche as well.

**Ellen Gust  
Palo Alto, California**

### ATTUNED TO THE WEST

Thanks for keeping me in touch with the West. I don’t travel much anymore, but when my late wife was with us, we’d head out to Colorado once or twice each year, to visit family and then explore the back roads and blue highways between New Mexico and Montana, mostly up along the Continental Divide or out into the

Utah desert. We’ve been through Paonia twice, on our way to or from the Black Canyon of the Gunnison.

But the scenery is one thing — the life of the place is quite another. And you keep me attuned to the lives people are living, in a place very different than North Carolina. Thanks for writing about the life you’re living there.

**Michael Elvin  
Fuquay-Varina,  
North Carolina**

### NUCLEAR DISARMAMENT

The June 2022 article by Terry Tempest Williams accompanying Emmet Gowin’s photos of the Nevada nuclear weapons test site is a sober testimony to America’s test explosions, numbering 100 in the atmosphere and over 900 under the Nevada desert (“Man Looking Down Earth Looking Upward”).

The article also accurately enumerates the current U.S. nuclear arsenal at 3,750 deployed warheads. Her citing Russia’s nuclear saber rattling in the Ukraine war reminds us that *threatening* to use nuclear weapons is, in fact, *using* nuclear weapons!

However, the article makes no mention of an existing path to rid the world of nuclear weapons: the United Nations Treaty on the Prohibition of Nuclear Weapons (TPNW). For the 61 nations that have ratified this treaty, it is now illegal to develop, test, produce, manufacture, transfer or receive nuclear weapons. While no one is advocating unilateral nuclear disarmament, the nine nuclear-armed nations could move toward multilateral action, which is spelled out in this treaty. Such disarmament would be irreversible, be verifiable under intrusive inspections by the International Atomic Energy Agency, be transparent, be time-bound and be enforced by U.N. forces.

**David A. Spence  
Flagstaff, Arizona**

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### CORRECTIONS

In our June photo feature, “Man Looking Down Earth Looking Upward,” we noted that Emmet Gowin was the first photographer to witness the Nevada Test Site; he was actually the first photographer to have official and sustained access for aerial photography, and to the landscape where the nuclear tests occurred. In the wildfire suppression-costs bar graph of our “Forever Fire Season” (August 2022) article, we referenced amounts ranging from \$0 to \$4 trillion that should have been \$0 to \$4 billion. In “After the Flames” (August 2022), we spelled Carlene Anders’ name incorrectly. We regret the errors.





REPORTAGE

## The EPA has more options to rein in climate change than you think

There are still many ways to shut down major polluters — including some options the agency isn't using.

BY ELIZABETH SHOGREN

**ON JUNE 30**, the Supreme Court decided that the Environmental Protection Agency under President Obama had overstepped its authority by creating the Clean Power Plan, which would force the U.S. to transition from coal to cleaner sources of electricity. “A decision of such magnitude and consequence rests with Congress itself,” the court concluded in *West Virginia v. Environmental Protection Agency*. Congress, however, has failed for decades to address climate change

and is unlikely to do so any time soon.

Even though the Clean Power Plan never took effect, the shift away from coal is happening far more quickly than the Obama administration predicted. EPA Administrator Michael Regan has promised to build on that progress despite the court ruling, noting that coal plants pollute the air, water and land in various other ways and that the agency will still require them to clean up their act. Many of those plants will shut down rather than

pay to install pollution controls. “The decision does constrain what we do, but let me be clear it doesn't take us out of the game,” Regan told *PBS NewsHour* in early July. “We still will be able to regulate climate pollution.”

To Earthjustice lawyer Jenny Harbine, though, the EPA's talk of its response to the Supreme Court ruling rings a bit hollow. Harbine is currently representing environmental groups that are fighting the agency in court in a case involving coal plants and pollution.

The Biden administration is defending a Trump-era rollback of an Obama rule that would have required the large coal-fired power plants in Utah to install widely used pollution-control devices. The Huntington and Hunter power plants have long contributed to the haze shrouding the skies over the state's national parks — including Arches, Bryce, Canyonlands and Capitol Reef — and its wilderness areas.

“It's really hard to see the administration issue press releases about how they're adopting a

PacifiCorp's Hunter power plant releases steam as it burns coal outside of Castle Dale, Utah.

Luna Anna Archey / HCN

multi-pollutant strategy to address greenhouse gases and know this very low-hanging fruit is sitting there in the state of Utah,” Harbine said. “I'm frustrated because I know that there is such an urgent need to make progress now, and shutting down the biggest polluters is the first step in doing that. When I hear the administration expressing similar urgency, I can't square it intellectually with the decision that they've made in Utah to defend an illegal Trump-era rollback.”

An EPA spokesperson told *High Country News* that the agency would not comment due to pending litigation. But Matt McPherson, a spokesman for Utah's Department of Environmental Quality, said that requiring the plants to install the equipment was “not necessary to meet the reasonable progress requirements of EPA's regional haze rules and is not a cost-effective strategy to control regional haze.”





EPA Administrator Michael Regan.  
Bill Clark via Getty Images

**EVEN AS THE EPA RESISTS** taking action in Utah, it has a wide range of regulations already on the books or currently planned that are aimed at reducing greenhouse gas emissions. It has proposed rules limiting methane emissions from oil and gas facilities and is targeting vehicle tailpipe emissions. The Supreme Court ruling expressly leaves the EPA with the authority to regulate pollution from the electricity sector — as long as it doesn't order plants to switch from coal to renewable energy the way it would have under Obama's plan.

Regan said that his agency also plans to tighten regulations that would force power plants to clean up pollution — in many cases, an expensive undertaking. He made it clear that he hopes that the owners of coal-fired power plants will decide to close dirty facilities rather than spend the money to clean them up. "They'll see it's not worth investing in the past," Regan said.

In Colorado, Xcel Energy recently agreed to close its Comanche coal plant in Pueblo, the state's single largest emitter of carbon, by 2031. And Gov. Jared Polis said the Supreme Court's ruling will not slow his state's plans to shut down all its remaining coal-fired power plants as it rapidly shifts to wind and solar energy. "We have already locked in the closure of Colorado's coal

plants no later than 2031, because they produce the highest-cost electricity," Polis said in a statement. "Colorado utilities are already on a path to meet or exceed 80% renewable energy by 2030."

Economics are playing a critical role here. Cheap, abundant natural gas, the rise of renewables and a crackdown on dirty coal by the EPA and some states have all combined to drive utilities away from coal, reducing carbon pollution from the electricity sector by a third, more than a decade earlier than the EPA thought the Clean Power Plan would. Even after an uptick in coal use in 2021, the United States used only about half as much coal to produce electricity as it did 15 years earlier. Meanwhile, renewable energy has overtaken coal as a source of electricity.

"The electric utility sector is shifting away from coal regardless," said Amanda Shafer Berman, who as a senior attorney for the Justice Department defended Obama's Clean Power Plan in front of the U.S. Court of Appeals D.C. Circuit in 2016. "There are trends that are resulting in a shift of electric generation to cleaner sources anyway, and I don't think this decision is going to slow that down."

The Supreme Court's ruling has given the EPA a better idea of what kind of climate regulations are likely to withstand future court challenges. "Maybe the Supreme Court did them a favor," said Pat Parenteau, a law professor at Vermont Law and Graduate School. "If the EPA had

gone back to anything like the Clean Power Plan, this court would have killed it anyway."

Experts caution that any EPA plan to regulate carbon dioxide from power plants would probably end up in court anyway, resulting in years of delay. "The trouble is there are still a lot of states that will challenge the next rule that comes out of EPA, whatever it is," said Berman, a partner at Crowell & Moring, a large private law firm with offices around the globe. "A suite of the red states will challenge it, and any greenhouse gas regulation will again get mired in litigation."

That's where the EPA's multi-pronged approach comes in. In a March speech, Regan ticked off a list of responses, including a "good neighbor" rule requiring power plants and industrial polluters in 26 states to reduce air pollution in downwind states. The agency would also tighten and expand an existing rule to include Nevada, Wyoming, Utah and California. And the EPA is planning tighter regulations for mercury and other toxic emissions from coal plant exhausts, coal ash waste and toxic releases into waterways.

"The cumulative effect of all these other tighter standards are really going to put more coal plants out of business," Parenteau said. "The question is: What are they going to be replaced with? Probably gas, in a lot of places."

Generating electricity with gas instead of coal reduces greenhouse gas emissions by about half. But natural gas is mostly methane, an extremely potent greenhouse gas, and a lot of methane leaks when companies drill, process and transport it. The EPA is working on a rule to cut those emissions, too.

Even so, replacing coal with gas would not achieve Biden's goal of reaching 100% carbon pollution-free electricity by 2035.

But environmental activists say Regan could force some of the biggest power plants in the country to close by rejecting requests from at least six plants, including the Coal Creek plant in North Dakota,

that want to continue operating their outdated coal ash waste systems indefinitely. The EPA has yet to respond to those requests. In the meantime, the plants keep using their outdated systems.

"If he denied (the plants), we would likely see them retire," said Bruce Nilles, executive director at Climate Imperative, a foundation working on climate change solutions. "If you push them, they will close."

An agency spokesperson said the EPA is working to respond to the requests, which can include thousands of pages of documentation, and that it will publish its decisions as soon as possible.


A coalition of groups sued the EPA in April, after 34 states failed to meet a requirement to submit plans showing how they would improve visibility at national parks and wilderness areas, as required by the regional haze rule. The groups called on the agency to reduce emissions and "lock in retirement dates" for big polluters.

This is the rule that Obama's EPA was enforcing when it required PacifiCorp to install pollution equipment on its Huntington and Hunter plants, the first- and third-largest carbon emitters in Utah. PacifiCorp has argued that the "tremendous costs" of installing the equipment are "unreasonable," citing coal plants across the country that had closed rather than install similar pollution controls.

By defending Trump's rollback, the Biden administration is allowing PacifiCorp to avoid a choice "that could make significant progress towards our shared goals of averting climate catastrophe," Harbine said.

"It's inexcusable. This is the first and easiest thing the administration should have done to tackle air pollution in the West," she said. "We expect constant pushback from industry on things like this. It simply can't be the case that EPA folds when it feels pressure. The EPA has to stick to its guns and make the decisions necessary to achieve the pollution reductions we need as a public to move forward." ❁



A man in a maroon hoodie and blue scarf stands on a wooden ladder, reaching up to harvest pollen from a tall corn stalk. The field is filled with lush green corn plants under a clear blue sky. The man is smiling and looking towards the camera.

Graham Biyaál stands on a ladder to harvest pollen from 12-foot-high cornstalks on his parents' farm on the Navajo Nation, outside of Shiprock, New Mexico.

REPORTAGE

## Growing traditions

In northern New Mexico, Indigenous farmers reclaim time-honored techniques.

BY LYRIC AQUINO | PHOTOS BY BETH WALD



**GRAHAM BIYÁÁL** will never forget the taste of his mother's traditional blue corn mush. An earthy, hearty dish made with ground-up blue cornmeal, water and juniper ash, its recipe has been passed down for generations, from his great-grandmother to his grandmother to his mother, and now at last to his own bowl and spoon. Biyáál doesn't claim to have mastered the recipe quite as well as his mother did. But each time Biyáál — a traditional farmer who tends his family's farm in the San Juan River Valley near Shiprock on the Navajo Nation — scoops up another mouthful of corn mush, he pays homage not only to those who came before him, who kept this line of corn seeds alive, but also to a broader movement taking root in Indian Country.

Food sovereignty is the right to access meals like this — healthy

and culturally appropriate meals produced locally using sustainable methods and agricultural practices. In myriad tribal communities, food sovereignty has blossomed from a concept into a full-blown movement. Biyáál is just one of many farmers in this part of northern New Mexico who recognize the importance of growing, harvesting and cooking as their ancestors did. For them, food sovereignty is not just about maintaining good relations with the natural world, it's about doing so with a rising generation of traditional farmers.

The path to food sovereignty, however, is not always easy — at least not initially. Tiana Suazo, of Taos Pueblo, remembers when she started farming. She was 8 or 9, working under an unrelenting sun with her father, planting seeds for a relative's initiation later that year.

"I remember it being hot, and I

hated it," she said. "But our people — Pueblo people — are farming people. Growing these traditional crops means you're being part of something greater than yourself."

As much as she loathed being out in that summer sun as a child, the experience stuck with her—so much so that Suazo currently serves as the executive director of the Red Willow Center, a year-round vegetable farm based out of Taos. Started as a tribal council initiative in 2002, the center now boasts four greenhouses and a one-and-a-half-acre field for crops, all of which is overseen by Suazo. More than just a place to raise food for the community, Red Willow is a space to foster the food sovereignty movement at its roots.

Suazo and her team work with the Taos Pueblo community's youth, teaching them the ins and outs of farming and paying them

above minimum wage for their labor. Suazo makes sure the young ones learn to see the greater good in the work they're doing, just as she did as a child, and that they learn how to provide healthy traditional foods for their own families. She sees the continuation of these age-old practices as part of a nourishing cycle, much like Biyáál's blue corn mush.

Like the plants the farmers work with, this cycle is far from new. For millennia, Suazo said, children have watched their parents go out to the farm, and they have learned which plants should be planted in spring, how to harvest them and, most importantly, how to access a rich and healthy diet.

And, as Suazo was quick to point out, knowing the life cycle of the crops is necessary for young tribal members; it's the way they learn about how and why certain



Tiana Suazo, director of the Red Willow Center, a community farm outside of Taos Pueblo, New Mexico, helps volunteers from the pueblo weed the vegetable garden.



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Tiana Suazo carries a basket of washed lettuce in preparation for a farmers market in early August (*right*).

Alej Martinez, who works at the Red Willow Center, harvests cilantro (*below right*).

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plants are used during ceremonies and why there are different dances for various crops.

“The life cycle of these plants goes hand-in-hand with our traditions, and it’s so important to see these cycles and understand the importance of why we farm,” Suazo said. “We need to get the children involved, because without them, we won’t have a way to connect back. If we lose this information, it’s difficult to come back.”

On the Navajo Nation, Biyáál is likewise ensuring that future generations will have access to the same plants and crops as their predecessors. Biyáál identifies as a seedkeeper — one who maintains the seeds of plants from the traditional diet of their community and nation. He has gained a following on social media, where he shares his life as an Indigenous organic farmer, with the hope of inspiring other Indigenous people to reconnect with tribal foodways, reclaim their diets and prepare traditional recipes like blue corn mush, blue corn cookies, vegetable stews and hearty wild meats like elk and venison. His online store carries seeds grown on the Navajo Nation, so that people can easily send a jar of Navajo blue corn to other Indigenous farmers looking to add to their seed banks.

Some seeds and unique plants were lost when the U.S. military forced the Diné from their homelands in the 19th century. But the corn used in Biyáál’s mother’s recipe endured. Grown using seeds from the previous year’s crop, this corn, which dates back hundreds of years, has helped nourish Biyáál’s family for generation after generation. With his seeds, Biyáál is able to provide the crops necessary for traditional ceremonies, Diné foodways and diets, as well as for current and future farmers who are



looking to reconnect with old ways and traditions.

The spreading and preservation of seeds, much like Suazo’s mission to spread the knowledge needed to grow them, is something Biyáál’s ancestors practiced regularly. Varieties of chilis, sunflowers and corn that were raised and perfected by Diné hands have since spread throughout the Southwest, out to the East Coast and even up to Canada, making the Navajo Nation’s unique

strains and hybrids all the more culturally significant.

The importance of preserving these extends beyond the symbolic. Biyáál has seen and lived with the limited store-bought options he and other Diné citizens have had access to, which too often contain high levels of sodium, fats and added sugars. His goal is to free the Navajo Nation’s health, diet and traditional foods from the grip of colonialism. On his farm, he grows vegetables

that his people have enjoyed for centuries, such as squash, beans, tomatoes, corn and melons.

“We have to look at what the land already provides and align it with our diet,” he said, “like our ancestors did.”

In his tent, Biyáál has already laid out the plans for his next harvest, carefully deciding which crops to plant next to each other based on how each will affect its neighbor — details he said his ancestors had





figured out long before him.

Each time he walks his family's land — the land of his ancestors — he can't help seeing a positive version of the future, one filled with Diné farmers and seedkeepers. Before long, he hopes to see an Indigenous-owned and operated organic grocery store flourish on the Navajo Nation.

"I really think we can get there," he said. "It's something I want to do to provide people with healthy choices, because our reservations lack that. But I want it to be traditional food." ☀

Graham Biyaál tests the beans growing next to corn on his parents' farm on the Navajo Nation in New Mexico (left).

Graham Biyaál and his mother, Natalie Beyale, sift out the pollen from corn blossoms, gathered from his parents' cornfield (below).







Jen Kaasa (far left), a youth intern at the Red Willow Center, selects turnips for Taos Pueblo Councilmember Martin Martinez, while Tiana Suazo packs produce into a bag at the Red Willow Center's weekly community market, outside of Taos Pueblo, New Mexico (left).

Seeds saved by Graham Biyaál (below left).

Tiana Suazo, director of the Red Willow Center, harvests zucchini in the vegetable gardens (below).



*“We have to look at what the land already provides and align it with our diet, like our ancestors did.”*





# A rejuvenating river runs through it

June flooding in the Yellowstone region ruined roads and houses, but could refresh the ecosystem.

BY NICK MOTT



**SPRING RAINS ATOP** deep snowpack fueled mid-June floods that inundated at least 100 homes, forced more than 10,000 tourists to evacuate, and caused millions of dollars' worth of damage in the Yellowstone region, especially in southern Montana. Weeks later, the effects on the ecosystem were just beginning to emerge.

Two weeks after the historic floods, I walked down a gravel road in Montana's Paradise Valley with geomorphologist Karin Boyd,

who runs a private consultancy in Bozeman focused on restoring river systems. We entered a normally bustling fishing-access site, closed due to the flooding. With no anglers or campers, it felt like a ghost town. The Yellowstone River was still high and muddy, around 30% above the average flow for this time of year.

"You don't want to come out here and celebrate when people are hurting," Boyd said. But, she said, there is a lot to celebrate. Big floods — even if devastating to human communities — can help ecosystems like this one thrive.

As Boyd and I walked, we could see evidence of both destruction and regeneration. A waterlogged roof truss bobbed next to the bank.

Caramel-color sediment, cracked like alligator skin, covered the top of a picnic table — an indication of how high the floodwaters had risen. Nearby, otter and beaver footprints dotted the ground. A red-tailed hawk soared overhead, and mergansers drifted down the turbid water.

A little giddy, Boyd pointed at depressions in the earth, still saturated with water, where riparian vegetation might be seeding. "Willows and cottonwoods, man, those are just incredible in systems that get disturbed," she said. Cottonwoods release seeds during a narrow window each year, just after peak runoff. They need flood-scoured areas, where rushing water has deposited

nutrient-rich soil and distributed seeds, to reproduce. Floods like this one can be crucial to creating and maintaining lush, diverse riverside habitat.

But the flood's impacts aren't all visible yet, Boyd said, and not all of them are positive. The success of those cottonwood seeds depends on the water receding gradually in the weeks to come; a sudden drop could leave the water table too low for their roots to reach. Meanwhile, the same water that deposited those seeds could also have carried their competitors — weeds and invasive plants — into new areas.

At the same time, the region is facing other, much greater challenges — mainly climate change. An assessment of the Greater Yellowstone Ecosystem speculates that the region could warm another 5 to 10 degrees Fahrenheit by 2100, meaning more drought, more floods and more wildfire.

And yet, Boyd said, despite everything, she's optimistic about the future here.

**THE YELLOWSTONE** is the longest major undammed river in the Lower 48 and part of one of the largest river systems in the world. It's also a "Blue Ribbon" river, known for its world-class trout fishing. Anglers in the area generally target rainbows, brown trout and Yellowstone cutthroats.

"Floods are horrible and devastating to humans and infrastructure when (the water) comes out of those riverbanks," said Scott Opitz, a fisheries biologist with Montana Fish, Wildlife and Parks. "It's almost the opposite for fish."

Opitz explained that all trout have adapted to flooding to some extent. They generally hang out in slack water near the riverbanks and rise with the water. Surging water deposits woody debris that can provide new safe havens for fish throughout the river. Floods also move and clean gravel and cobblestone, creating ideal new spawning grounds.

The Yellowstone River floods parts of Paradise Valley, a corridor to Yellowstone National Park, and the south side of Livingston, Montana, in June. **Louise Johns**



Back at the closed fishing-access site, I'd seen these processes in action. The floodwaters had eaten away at the outside edge of a horseshoe-shaped bend in the river, gashing the earth within a couple feet of the road. Even more than a week after the flood, cobblestones and gravel trickled — sometimes cascaded — from the incision into the river below. Elsewhere, bare cottonwood roots fanned out over deep pools near the riverbank — prime trout habitat.

Opitz said the flood could impact different species in different ways. Browns and rainbows, for example, were both introduced by state officials more than a century ago and aren't adapted to the region's cycle of runoff; brown trout spawn in the fall and rainbows generally reproduce in the spring, just before peak flows. Opitz speculated that the high, turbulent water could hurt both species' reproduction.

Native Yellowstone cutthroat, he said, are a different story. Their populations have been struggling in many areas, in large part due to warming waters from climate change and competition from nonnatives like browns and rainbows. But they've evolved to tolerate large-scale floods like this one. Cutthroats spawn after peak flows, as the water begins to recede. By rejuvenating habitat and gravel beds in which to spawn, Opitz said, the flood might actually help Yellowstone cutthroats thrive.

**BIG FLOODS CREATE** habitat for more than just fish. For more than 40 years, Ric Hauer, professor emeritus of systems ecology at the University of Montana, has studied gravel-bottomed rivers like the Yellowstone. "These are the major sites of biological activity and biodiversity — for birds, for ungulates, for wolves chasing them," Hauer said. "Bears, eagles. Everything is focused on the floodplain."

The entire complex ecosystem relies on the dynamics of flooding rivers. Hauer's research, for example, shows that about 70% of the

bird species in the Yellowstone area depend on streamside, or riparian, habitats in floodplains — the habitats created by those cottonwoods. Smaller creatures, too, rely on the dynamics of flooding rivers. As floodwater rushes downstream, ripping up sediment in some places and depositing it elsewhere, water and organic matter filter down into the groundwater below the river's gravel bottom and back up again. Microbes from the groundwater attack the new organic matter, releasing nitrogen and phosphorus in the river, creating what Hauer calls "hot spots for more productivity," where algae flourish. Aquatic insects eat that algae, fish feed on those insects and mammals and birds consume the fish.

"It's an amazing, amazing system," Hauer said.

A few days after meeting with Boyd, the geomorphologist, I hiked the road that runs from Yellowstone National Park's North Entrance, along the Gardner River. It was still closed to vehicles, and with no cars or people in sight, the park felt eerily silent. Salmonflies the size of my pinky finger perched lazily on tall grasses. Elk tracks dotted the still-wet floodplain. White, fuzzy puffs of cottonwood seeds floated in the air. Eventually, I arrived at an area where the river had reclaimed the roadway: The pavement ended in a sharp plunge to flowing water about 30 feet below. Marveling at the floodplain, I almost stepped over the road's jagged edge.

The juxtaposition of the human and natural landscape here reminded me of something I'd discussed with Boyd. "In the Yellowstone, we're so blessed with this," she'd said, gesturing to the fast-flowing, muddy water, the distant cottonwoods, and freshly deposited cobblestones exposed on the banks — all parts of a healthy, complex ecosystem. She told me that she has worked in areas where rivers and creeks have been confined, channeled and generally controlled in the name of protecting human infrastructure and development. Now, as plans to rebuild take shape, people in the Yellowstone area are figuring out what comes next. ☀

## POEM

### The Song Dynasty

By Dan Beachy-Quick

One way to make snow in mountains  
is to leave the paper blank  
and ink in the crags and pines—  
a scholar's hut by the flowing stream  
such cold water for the tea—  
but there are other ways. The mind

makes its equal signs and leaves them  
unspoken. A world  
much thought about but thinking  
leaves no trace. The blankness  
snow is to the child  
wrapped in her blanket. The snow

there even in June, the summer snow—  
I know you know. Imagine  
the solstice is a gong that rings out  
an echo song—nothing  
lasts longer than morning fog. Clouds  
can be made just like the snow is made.

And so of mist, vague dews.  
So of water dropping off a cliff.  
So of the steam curling up  
as the cup cools. You leave  
the page blank and ink in the dark  
dream of pines. Law

of the pines  
the scholars of the Song Dynasty  
discovered, painting the world on silk,  
on paper. A principle called  
Mind, or One. Fire, or  
Mite. You

children of snow and  
clouds can make snow and clouds  
for yourselves. Find  
on the blank page some oblivion  
and add water to the ink-stone. A  
drop or two. Begin by painting dew.

**WEB EXTRA** Listen to Dan Beachy-Quick read his poem at [hcne.ws/song-dynasty](http://hcne.ws/song-dynasty)





## REPORTAGE

# Can democracy protect Arizona's dwindling water?

In Arizona, a group of 'scrappy' locals are working to create the state's first citizen-initiated groundwater management area.

BY CAROLINE TRACEY

**ON A SUNNY MORNING** in southern Arizona this spring, members of the Arizona Water Defenders gathered at a park in the small town of Douglas to answer residents' questions about water — and to collect signatures for a citizen-led ballot initiative that would, for the

first time, regulate the region's aquifer.

The crowd was small but diverse. An hour into the community meeting, an artist arrived with a large, colorful map of the region's geology that he was excited to show the Water Defenders. A retired educator and her grown

son came on foot and offered to go door-to-door in their neighborhood in support of the cause. Two students from the local community college rolled up on their longboards, and a man out on a mission of his own — handing out flyers he'd written about the value of God's love — also stopped to listen. All signed in support of the initiative.

The Arizona Water Defenders, a grassroots group, was formed in March 2021 by southeastern Arizona residents who were concerned about local wells going dry and the increasingly visible ground fissures and land subsidence. There has been agricultural pumping in the area since the 1940s, but in recent years, as large-scale dairy and nut producers have bought land in the area and drilled deep new wells, the water-table drawdown has become more noticeable and worrisome. After contacting the Arizona Department of Water Resources and reading the state's Groundwater Management Act, the Water Defenders began



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A new pivot irrigation system installed by Riverview Dairy LLP near Elfrida, Arizona, last summer.  
**Roberto (Bear) Guerra / HCN**

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the process of initiating a ballot measure that would create Active Management Areas (AMAs) — geographic designations in which the state’s strictest groundwater regulations apply — for the Willcox and Douglas basins, southeastern Arizona’s two watersheds. In May, the Cochise County Elections Office approved the ballot initiative for the Willcox Basin. The Water Defenders submitted the signatures they collected for the Douglas Basin on July 6.

If voters approve the Willcox and Douglas AMAs in November, the new management areas will be the first in the state to have been created by citizen petition. Though other examples of collaborative groundwater management exist in the West — voluntary reductions in well use in Colorado’s San Luis Valley, for example, as well as the San Joaquin Valley of California’s Collaborative Water Action Program — most have come from state mandates. There have been other groundwater-related ballot initiatives, including the bans on groundwater export proposed in California’s Siskiyou and San Luis Obispo Counties, but those have largely failed.

If the Water Defenders’ ballot initiatives succeed, they will show that local, democratic approaches to regulating the West’s increasingly scarce water resources are possible.

Together, the 1,910-square-mile Willcox Basin and the 750-square-mile Douglas Basin form the Sulphur Springs Valley, all of which is located in Arizona’s Cochise County, except for a small fringe. After the county loosened its agricultural permitting regulations in 2012, Riverview LLP, a Minnesota-based dairy, began buying land on the eastern side of the valley. The dairy has drawn local concern and some animosity because its financial resources have enabled it to drill unusually deep wells, which many believe have dramatically affected the water table. *High Country News* reported in August 2021 that since 2015, the company has drilled about 80 wells in the Willcox Basin and six more in the Douglas Basin. Most of them are at least 1,000 feet deep.

Legally, there are no limits as to how deep Riverview and the other agribusinesses that have recently bought land in the valley can dig wells, a fact that points to a paradox at the heart of Arizona’s groundwater law. The state’s Groundwater Management Act came into being in 1981, after the federal government

threatened to withhold Arizona’s share of Colorado River water until the state curbed its excessive groundwater usage. The law created four Active Management Areas for the places where the aquifers were experiencing the greatest strain. These management areas hold 80% of the state’s population and account for 70% of its water use. Yet by square mileage, they represent just 13% of Arizona’s total land area.

Within these regulated regions, Arizona’s groundwater law is “one of the most comprehensive groundwater codes in the nation,” writes historian Thomas Sheridan in *Arizona: A History*. According to Susanna Eden of the University of Arizona’s Water Resources Research Center, each management area is required to produce a conservation plan every 10 years, and there are rules about the volume of water groundwater users can pump.

But in areas not regulated by an AMA — including the Douglas and Willcox basins — there is no oversight of groundwater use. That’s what the Water Defenders hope to change this November. (The Douglas Basin is designated as an Irrigation Non-Expansion Area, but it doesn’t regulate the amount water that can be used; it only prohibits new land from being irrigated.)

In the summer of 2021, the Water Defenders — which Ash Dahlke, the group’s chair, describes as a “pretty scrappy group” that includes “a lot of teachers and librarians” — began the process of collecting signatures. The support of 10% of the basin’s registered voters is needed to put the creation of an AMA on the ballot.

“People agree we need something,” said Bekah Wilce, the Water Defenders’ treasurer. Wilce is optimistic that the group’s “hard work on the ground of talking to people” will pay off. “People didn’t know this was possible,” she said, but “they understand its importance.”

If voters approve the AMA proposals in November, the director of the Arizona

Department of Water Resources will have 30 days to visit the basins and establish goals for the management area. The state also appoints advisory committees to represent the basins’ users. The department and the committees will then have two years to draft initial management plans for the new AMAs.

But not all residents are on board with the proposal. Farmer Claire Owen said that it’s “too late” for new AMAs to be effective, because the water table has already dropped too much. “They messed up when they wrote the law in 1981,” he said. “Everybody should have had the same regulations.”

Jim Graham, who grows pistachios and grapes at Cochise Groves, said he is concerned but cautiously optimistic about the valley’s groundwater. He feels that an AMA is the “wrong tool. ... It’s like going to the toolbox when you need a hammer and coming back with a saw.” Graham is also worried about the possible economic impact of new regulations.

Nathan Watkins of San Ysidro Farms doesn’t think that AMAs will mitigate Riverview’s impact on the basins, at least not in the way that advocates hope they will. “The dairy has changed the whole character of this valley because it bought out all the local farmers. We’ve lost our sense of community,” he said. Though he says he is unhappy about Riverview’s 1,500-foot-deep wells, he believes that the water table would still be dropping “even if the family farmers were still here.”

The Arizona Water Defenders believe that the intensive groundwater pumping by agribusiness has to be reined in, Wilce said, in order to ensure long-term groundwater access for small farmers and non-farming residents. She emphasized that AMAs are designed to respond to, and be shaped by, the needs of communities. “We need as many groundwater users as possible to be part of the process and have their voices heard in crafting our new AMAs.” ✨

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*“They messed up when they wrote the law in 1981. Everybody should have had the same regulations.”*

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# Land-healing economy

There's money in recovering from extractive industries.

BY JONATHAN THOMPSON | ILLUSTRATIONS BY FIONA MARTIN

**ON A BLAZING** mid-June day, Don Schreiber stands on a plateau on the edge of northwestern New Mexico's San Juan Basin. The landscape is spare and spectacular — like a giant cathedral, Schreiber says — offering views of Tse Bit'a'i (Shiprock) and the Carrizo Mountains.

Yet this hallowed place is blighted, invaded nearly seven decades ago by oil companies and drill rigs. Roads slice haphazardly across the khaki earth to motionless pumpjacks littered with tumbleweeds. PVC and steel pipes snake over sandstone, connecting to clusters of fittings and valves.

The Horseshoe Gallup oil field is home to several hundred oil and gas wells, many suffering from “orphaned/non-orphaned well syndrome”: They're defunct and the owners are bankrupt, but regulators still consider them active, so cleanup can be delayed indefinitely.

“It's like someone went into a church and vandalized it,” Schreiber, a local rancher and industry watchdog, said. Robyn Jackson (Diné) of Diné CARE agrees: “This place may not be pristine or lush. But for our people, it is sacred. It has significance. I'm disturbed by industry being allowed to do whatever it wants.”

But where there's desecration, there's also opportunity: Both land and economy could be restored by employing displaced fossil fuel workers to help clean up the mess.

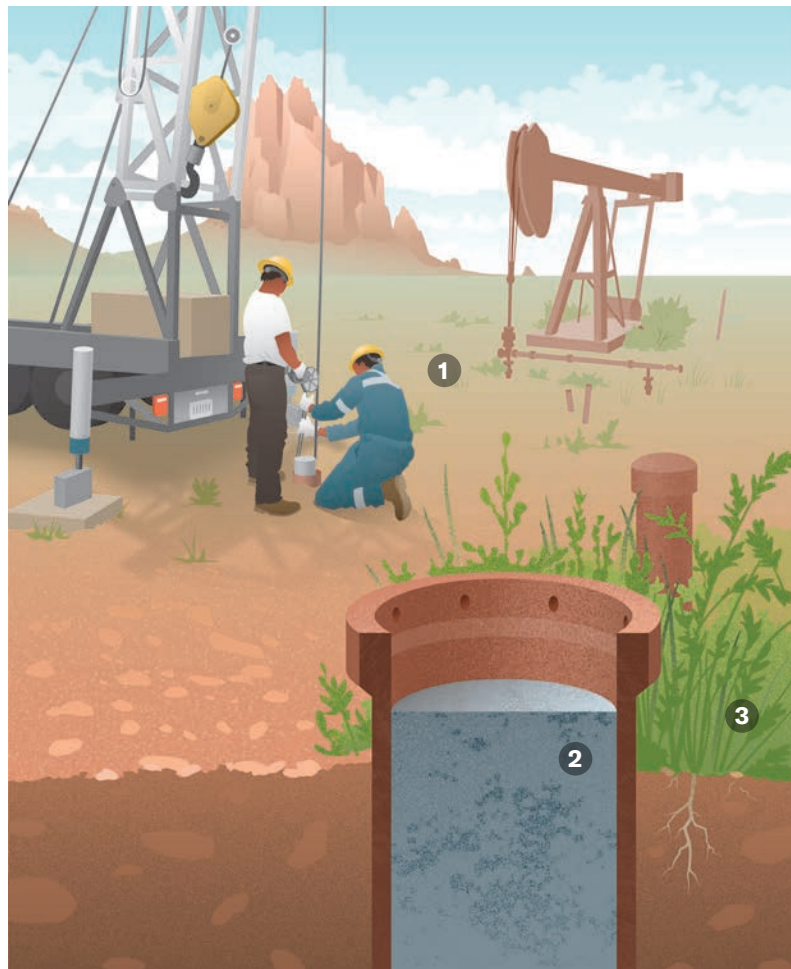
Once, the extractive industry helped fuel the local economy. Now it's abandoning the region after profiting off it for decades, leaving behind a broken landscape, decaying detritus, displaced workers, empty government coffers and an

economic void.

Economic development officials have tried to fill that void with tourism, but recreation and clean energy are no substitute for high-paying drill rig or mining jobs. Now, there's a movement to create a new industry, one that employs displaced rough-necks and miners and loggers to clean up their ex-employers' messes and repair the landscape.

New Mexico, for example, working with the Multicultural Alliance for a Safe Environment, hopes to build an industry around cleaning up more than 1,000 abandoned uranium mines, many of them on the Navajo Nation. Megan Milliken Biven, a former analyst for the Bureau of Ocean Energy Management, is leading a campaign to establish a federal Abandoned Well Administration to deal with the millions of old oil and gas wells — including those in the Horseshoe Gallup field — that are leaking methane and other hydrocarbons and potentially contaminating groundwater. And last year's federal infrastructure bill could jump-start this restoration economy by allocating over \$20 billion for cleaning up old wells and abandoned hardrock and coal mines.

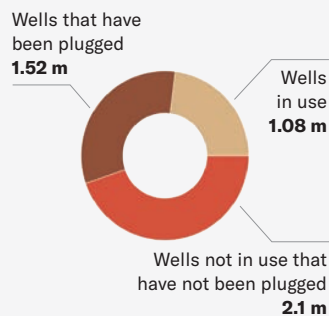
But money and a desire to do better do not alone create a restoration economy. Regulators must decommission long-idled wells and mines, inventory orphaned and abandoned facilities, and direct taxpayer funds without letting industry off the hook. Cleanup programs must be designed to actually heal the land and communities, not benefit the companies that did the damage in the first place. ✨



## ABANDONED AND ORPHANED OIL AND GAS WELLS

Over a century of oil and gas drilling has left behind hundreds of thousands of abandoned, orphaned and inactive wells that can leak methane and other harmful materials if not plugged and reclaimed properly. One challenge is identifying and inventorying orphan wells, or those without solvent owners. **PROCESS:** 1 Surface equipment is removed and well depth determined. 2 Cement is pumped into the well to isolate zones that produce oil and gas, and an identifying marker is welded to the top of the plugged well. 3 The site is revegetated to match the landscape.

**4.7 million:** Approximate total number of oil and gas wells drilled in the United States.



**120,000:** Number of people a federal program to plug and reclaim some 500,000 orphan wells would employ, according to a 2020 study.

**.13 tons:** Volume of methane emitted per year, on average, by each unplugged abandoned oil and gas well, according to the EPA.

**\$21 billion:** Estimated ecosystem services benefits from restoring surface impacts at 430,000 well sites in the U.S.

**\$132,319:** Median cost to plug and remediate an oil and gas well in New Mexico.

**\$1,115,711:** Maximum cost to remediate a well in New Mexico, according to a 2021 survey of 158 wells.

**13,090:** Number of oil and gas wells associated with 2020 bankruptcies in Interior West states, not including California or North Dakota.

**37,620:** Number in California.

**\$4.7 billion:** Amount in last year's federal infrastructure act for federal agencies, tribes and states to plug and reclaim orphaned oil and gas wells.

**22:** Number of wells plugged so far by the Well Done Foundation, a Montana nonprofit founded in 2019 that's currently branching out to New Mexico.



**COAL MINE RECLAMATION** As the industry contracts, Western mines are shutting down. Regulators can force companies to clean up their messes — unless they go bankrupt first. **PROCESS:** ① Spoil material removed during mining is used to backfill the mined area to approximate pre-mining grades. ② Channels are constructed to direct water away from disturbed areas and to drain the area in a “natural” manner. ③ Topsoil is distributed, then seeded and mulched.

**18,239 acres:** Area mined at Peabody Energy’s Kayenta Mine on the Navajo Nation and Hopi Reservation prior to its 2019 closure.

**350:** Approximate number of employees laid off when the mine closed.

**416:** Estimated number of potential reclamation job-years (e.g., 104 full-time jobs over four years) if Peabody fully reclaims the site as required. However, Peabody delayed reclamation for years and continues to drag its feet, employing just a handful of workers.

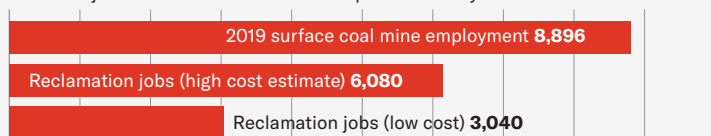
**748:** Estimated number of potential job-years needed to reclaim Peabody’s North Antelope Rochelle Mine in Wyoming once it closes.

**\$11.3 billion:** Amount in last year’s federal infrastructure act for the Abandoned Mine Reclamation Fund, intended for cleanup and remediation of coal mines. Priority will be given to projects employing current and former coal mine employees.

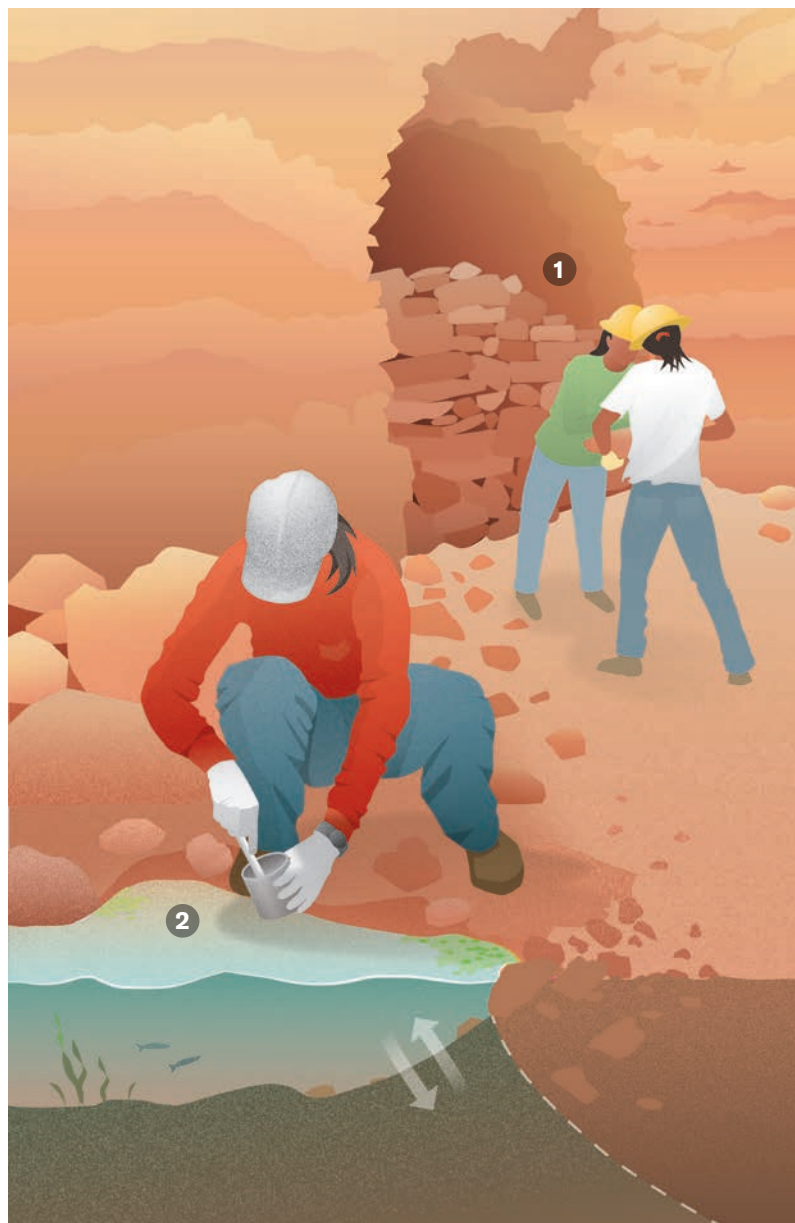
**273:** Approximate number of abandoned coal mines on the Navajo Nation.

#### Coal mine reclamation employment in the West\*

Full-time jobs based on reclamation completed in two years.



\*Colorado, Montana, Navajo Nation, Hopi Tribe, Arizona, New Mexico, North Dakota, Utah and Wyoming



#### ABANDONED URANIUM AND HARDROCK MINES

For more than 150 years, federal laws — or their absence — allowed companies to stake claims on public land and extract gold, silver and uranium without paying royalties and with little or no regulation. Now, the West is paying the price as thousands of abandoned mines leak toxic and sometimes radioactive materials into streams, lakes and even drinking water wells. Some of the most egregious cases are leftovers from the Cold War uranium boom, which sickened workers and still plagues residents, many of them Indigenous. **PROCESS:** Collect, isolate and remove or contain hazardous materials. Dismantle surface equipment and other structures. In some cases bulkheads, or giant concrete plugs, are installed in mines to control acid mine drainage. ① Mine openings are backfilled and the mine-affected area is reclaimed to something resembling pre-mining conditions. ② If acid mine drainage exists, the draining water is run through a treatment plant.

**523:** Minimum number of abandoned uranium mines on the Navajo Nation.

**\$1.7 billion:** Value of enforcement agreements and settlements to reduce risks of radiation exposure to the Diné from abandoned uranium mines, enough to “begin the assessment and cleanup process” at 230 sites, according to the EPA.

**8.7:** Number of full-time high-wage jobs created for every \$1 million of investment in surface uranium mine cleanup, according to a University of New Mexico study.

**80; 17; 10:** Number of construction; professional service; agency jobs created for Navajo workers by the EPA’s Navajo Nation abandoned uranium mine cleanup effort.

**\$844 million to \$1.1 billion:**

Estimated cost for the ongoing cleanup of the Atlas Uranium Mill site in Moab, Utah.

**4.1 million pounds:** Amount of heavy metal-laden sludge produced annually by the water treatment plant at the Summitville Mine Superfund site in Colorado that must be removed and buried.

**1,200:** Approximate number of uranium mining and milling sites in the Uravan Mineral Belt in Western Colorado, only a handful of which have been cleaned up.

**67,094:** Abandoned mine sites (including coal and uranium) in 11 Western states.

SOURCES: Resources for the Future, U.S. Environmental Protection Agency; *Decommissioning Orphaned and Abandoned Oil and Gas Wells: New Estimates and Cost Drivers*, by Daniel Raimi et al; Interstate Oil and Gas Compact Commission; National Wildlife Federation; Navajo Abandoned Mine Lands Reclamation Department; AbandonedMines.gov; UNM Bureau of Business and Economic Research; TrueTransition.org; Colorado Department of Public Health and Environment; Western Organization of Resource Councils. **Infographic design by Luna Anna Archey / HCN**





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Jalen Bazile and Rachel Olzer at Elevenmile Reservoir near Deckers, Colorado. **Adam Andres Pawlikiewicz** Mesa



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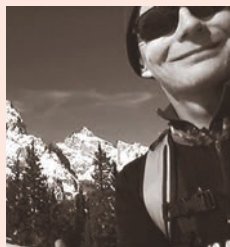
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DEAR FRIENDS

## Spreading the news

**SOME OF YOU HOLDING THE MAGAZINE RIGHT NOW** were first introduced to *High Country News* when an envelope landed unbidden in your mailbox, asking you to subscribe. If you are still with us today, we'd like to thank you! You are part of a very special group.

For the most part, *HCN's* readers were turned on to the magazine by an in-the-know friend, got a gift subscription from a generous family member, picked up the magazine in a class they enjoyed, or found their way to it in some other word-of-mouth fashion. *HCN* spreads best when the excitement that comes from finding a publication that speaks to your experience, concerns and sense of community rushes over its banks and can't help spilling onto others.

That's the main reason we've decided to stop using so-called "direct mail" — those unbidden letters asking strangers to subscribe. Add to that the waste inherent in the practice and its sizable costs, and we knew it was time to move on.

And so now, we're going to concentrate on growing our network of partners and organizations engaged in the same kind of issues *HCN* writes about — finding the folks who are doing the work. That includes you, the readers who have stuck with us because you recognize the value of independent reporting on the West.

Our publisher, Greg Hanscom, recently went on a mini-tour of a few Western states, meeting with readers in homes and brewpubs across the land. He came back riding high on the excitement readers have for *High Country News*. It was a great reminder, for him and the rest of the staff, that our efforts don't exist in a vacuum. We have a wide range of readers and enthusiasts out there already evangelizing on our behalf and ready to jump on further opportunities.

With that in mind, I have a few suggestions (requests, really) for how you can help spread *High Country News*:

**Give a gift subscription.** The most straightforward way — just send it to friends and family! [hcn.org/gift](https://hcn.org/gift)

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**Let us know who *HCN* should work with.** Do you have connections with organizations or individuals who are leading the charge on issues like climate change or environmental justice? Equity in access to the outdoors? Conservation or stewardship of natural resources? Let us know at [dearfriends@hcn.org](mailto:dearfriends@hcn.org).

If you're feeling revved up about informing and inspiring people across the West, we would love to use that excitement any way we can. Drop us a line with your ideas: [dearfriends@hcn.org](mailto:dearfriends@hcn.org).

— Michael Schrantz,  
marketing communications manager



*HCN* publisher Greg Hanscom, left, took a selfie with former staffer Robyn Morrison and Greg Aitkenhead at a reader meetup in Casper, Wyoming.

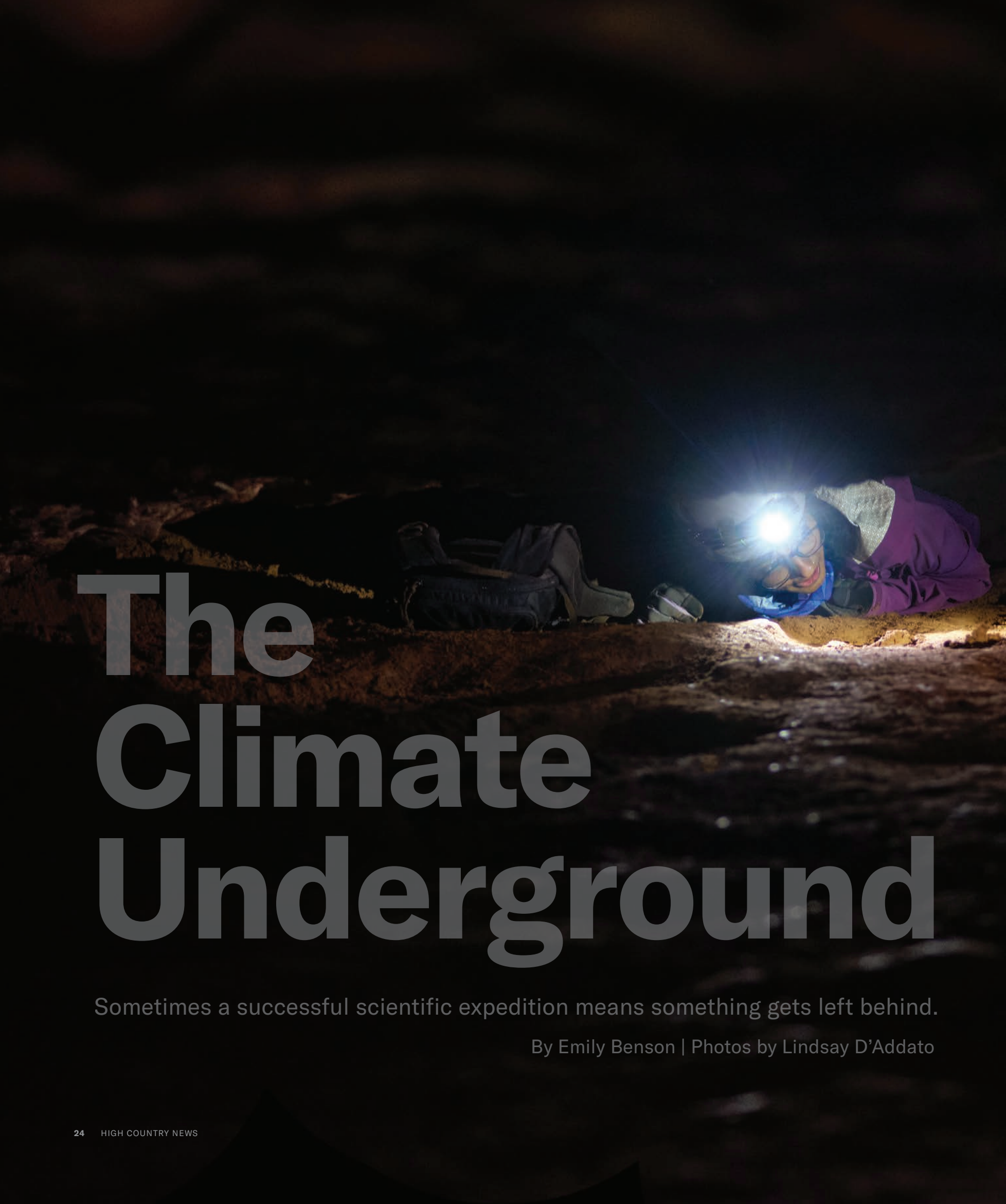
## #HCNSummerReading

Thank you to everyone who's submitted book picks for our summer reading program! Check out the submissions and vote for your favorites at [reading.hcn.org/bookboard](https://reading.hcn.org/bookboard).



Gabriella Trujillo / *HCN*





# The Climate Underground

Sometimes a successful scientific expedition means something gets left behind.

By Emily Benson | Photos by Lindsay D'Addato





Natasha Sekhon makes her way through Titan Cave, east of Cody, Wyoming. Scientists navigated sections so narrow that they had to crawl on their stomachs with their heads and feet turned sideways.





**T**

**HE ENTRANCE TO TITAN CAVE**, east of Cody, Wyoming, is hidden on a wide plateau of sagebrush and juniper surrounded by ridge after ridge of craggy mountains. The distant peaks were snowy when I visited in late May, and a slight breeze stirred the desert air. I was with a group of five scientists whose research would take them underground into a grand chamber of stalagmites and stalactites, or speleothems, formations created by occasional drips of water starting hundreds of thousands of years ago or more. They fill Titan's main room with delicate flutes and hulking, lopsided formations that look like something from a sea floor. Hundreds of broken pieces lie scattered around the cave, like piles of bones, while others stand tall, rough stone pillars connecting the floor to the ceiling.

The night before our descent, Jessica Oster, an associate professor of earth and environmental sciences at Vanderbilt University, and one of her graduate students huddled around a laptop open on the bed of the student's motel room in Cody, trying to recall the route to Titan's location on a Bureau of Land Management parcel. Oster, kneeling in front of the computer, sighed. "I'm less worried about this part and more worried about the door," she said, anxiety bringing a lilt to her voice. "I just want everyone to have fun." After a moment, she added, "And stay alive."

The scientists had visited the cave before, but never without a BLM employee guarding its entrance. The door is a heavy metal panel, a couple of feet across, that's supposed to be kept locked. But the BLM cave coordinator would be at an all-day helicopter training, so he'd dropped off a key to the door — along with a sledgehammer.

We were on our own.

Lilacs were just starting to bloom in the small towns we drove through on our way to Titan. The scientists pointed out different rock layers through the windows: red siltstone and shale, with names like the Chugwater and Goose Egg formations. Eventually, we reached the top of the plateau, and parked a few yards from the cave mouth.

The researchers stepped around their vehicle and each other, packing up gear, pulling on boots, duct-taping headlamps to helmets. Anticipation combined with the knowledge that we weren't supposed to pee underground meant we took turns ducking behind the scrubby bushes. Earlier, Cameron de Wet, a graduate student, had printed out tiny paper maps of the cave for each of us. Now he carefully adjusted items in one of two blocky blue rectangular bags that held the



pieces of a scientific instrument — the reason for the trip.

One of the scientists had analyzed calcium carbonate formations from Titan Cave — stalagmites, the pillars that grow from cave floors — and found that some were around 400,000 years old or older. Stalagmites accumulate from the bottom up, preserving the chemical composition of the water that forms them as it drips from the cave ceiling, often from the tip of what looks like a stone icicle — a stalactite. Researchers can use those chemical recordings to infer what the climate was like when the stalagmites formed. But working all this out is complex, and requires understanding the present-day chemical relationships among rainfall on the surface, the water that drips from a cave's ceiling and the stalagmites below.

The researchers were there to set up equipment to make this easier: an autosampler, an instrument that can be positioned beneath a drip to collect water as it falls. The trip was part of a larger project to help scientists understand what the climate of the Western U.S. was like more than 100,000 years ago, using the natural archives of stalagmites and lake sediments.

But first, Oster and her team had to get the entire ottoman-sized autosampler apparatus — clear plastic boxes housing vials and a rotating carousel that holds them, tubing, a funnel and an expandable tripod to hold the funnel up — deep into the cave, where most of its drips and stalagmites and stalactites are located. There were several obstacles in the way. First was the door, which had a reputation for being stubborn, then a narrow, rocky chute inside the cave's entrance nicknamed “Mr. Twister,” which might prove too tight for the autosampler, and then crawl through a space no more than a foot high. Still, it could be worse, Oster told me, since the crawl was several yards wide — not so narrow that it felt laterally confining. “It's more like being crushed by an anvil,” she said.

Jessica Oster enters Titan Cave (*facing*). Just below her is a locked metal door covering a semi-vertical culvert that ends above the cave floor.

Thirty minutes into the expedition, Oster stops to write in her field notebook (*below*). The data collected at Titan Cave is part of a project to help scientists understand the climate in the Western U.S. more than 100,000 years ago.

**OSTER, DE WET** and another graduate student, Bryce Belanger, walked over to Titan's entrance. The slanted metal door was set into the bottom of a depression nearly invisible behind a small rise. Loose pale rocks lined the short slope down into it; the depression itself was protected by overhanging bedrock and roomy enough for a couple of people to squat inside. The air within was damp and cool, moss blanketing some spots; it felt like a small oasis in the desert landscape.

The scientists scooted down into the depression, then dug out the dirt that had collected along the bottom of the door. They'd been to Titan twice before — in October 2019 and again last September — and once it took them two hours to get inside. Those two hours, however, yielded a crucial insight,

which Belanger made use of now: He kicked the door.

That tweaked it enough for de Wet to unlock it. “Whoa,” he said as it swung open. “Didn't even need the sledge.”

Belanger slid through the open doorway feet-first, into the top of a nearly vertical culvert a couple of feet wide, lined with sturdy rebar rungs. De Wet locked the deadbolt open, so the door couldn't close all the way, and then shut Belanger inside.

Belanger tested the door from below. He pushed it open using both palms and popped up from the hole in the earth, mugging for a camera in the dim light of a cellphone — “That works!”

He turned back around and the rest of us followed him one at a time, our breath loud in our ears in the narrow, echoing culvert. We climbed down about 10 or 15 feet, dropped another foot or two, and then were inside the cave proper. We turned to go deeper in, the wall and ceiling to our left merging into a single diagonal rock face hanging over us. The cobbled slope under our feet was broken by patches of bedrock. We picked our way horizontally across it, following a faint path lit by our headlamps. It had taken months of preparation to get here, and we were excited to finally be underground.

It took only a minute or two to reach the top of Mr. Twister. De Wet disappeared into the chute, shoving one of the blue bags down before him. It's a tricky channel about 20 feet long, with an especially tight spot about halfway down where we had to twist our bodies at the waist so that our hips could squeeze through. Belanger started to feed the second bag down to de Wet, invisible at the bottom of the chute, and the sound of the stiff fabric catching on the rocks filled the cave for a moment. “I got it,” de Wet called up.

With the bags safely through, the rest of us followed, sliding and turning our way down Mr. Twister, one by one.





**TITAN CAVE** is about 100 miles from Yellowstone National Park, where, a couple of weeks after our expedition, rain and snowmelt inundated the landscape. Rivers and tributaries demolished previous high-water records; one spot on the Yellowstone — the site the U.S. Geological Survey calls Yellowstone River at Corwin Springs — peaked at 13.88 feet, more than two feet higher than the previous record, set in 1918. The flooding decimated roads and bridges, washed buildings into rivers and broke water mains. The National Park Service temporarily closed the park and ordered more than 10,000 visitors to leave.

Climate change is intensifying weather: Dry periods are drier, wet periods are wetter, and human infrastructure and communities are not, in most places, prepared for it. By the end of this century, the area around Yellowstone is expected to be more than 5 degrees Fahrenheit warmer than it was between 1986 and 2005, and to experience 9% more precipitation — but lose 40% of the average snowpack. That means more rain, and more floods.

Scientists make these projections using climate models. The models are based on physics: For example, warmer air can hold more moisture than cooler air. This is one reason why, as climate change ratchets up temperatures, storms are becoming more extreme.

Researchers can use information about the past — paleoclimate data — to test how well the models are working. This gives them more confidence in their projections: They can plug certain conditions into the models — like how much of the earth was covered by glaciers or ice sheets, the sea level, the amount of CO<sub>2</sub> in the atmosphere — and then see whether the models return temperature and rainfall patterns that match what actually happened.

“We’re pinning our faith on these models to deliver accurate projections,” Kim Cobb, a climate scientist and the director of Brown

University’s Institute at Brown for Environment and Society, said. “And this is one of the most important ways we have of understanding their limitations and their strengths.”

This testing, however, requires knowledge of what happened in the past. There are two kinds of historical data: instrumental data, and proxy data. Instrumental data comes from direct measurements made with a thermometer, a rain gauge or another instrument. But the era of direct measurements is just a tiny blip in Earth’s 4.5 billion-year history. Oster and her colleagues are particularly interested in the Last Interglacial Period, about 129,000 to 116,000 years ago. Back then, the planet may have been slightly warmer than it is today, similar to the low end of the temperature range predicted for the end of this century.

That could make it a good analogue for the coming decades. It also highlights what Cobb called the most important reason to study paleoclimate records: They can reveal the extraordinary nature of human-caused changes to Earth’s climate. The knowledge that global temperatures have not been this high in at least 125,000 years is powerful. “Being able to deliver numbers like that ... put(s) into full, unfortunately jaw-dropping, context exactly what we’re doing right now,” Cobb told me.

To understand that context, or as much of it as possible, scientists must employ proxy measurements, like those made from tree rings. But wood rots; even the oldest tree ring data in the Northern Hemisphere only goes back about 14,000 years, and it’s more commonly used to understand just the last 1,000 or so years. But other archives last longer: ocean and lake sediments, for example, and cave formations.

For paleoclimate records to be useful, scientists need to know the age of whatever they’re analyzing. And speleothems can be precisely dated, said Kathleen Johnson, a geochemist and paleoclimatolo-

*“I feel like I’m inside somebody’s nose. ... Someone with a bad infection.”*

Jessica Oster places a bottle in a drip zone in Titan Cave (*facing*). Scientists can use data from current drips to help them understand the climate of the past.

gist at the University of California, Irvine, and a member of the Grand Traverse Band of Ottawa and Chippewa Indians. The dating method most scientists use, called uranium-thorium dating, is accurate for about the last half a million years, so that’s how far back speleothem records typically go — if researchers can find the right ones.

The trouble is that it’s impossible to distinguish, from the outside, a 3,000-year-old speleothem from a 300,000-year-old speleothem. Researchers have to crack them open and analyze them to find out. Still, there are some helpful signs: Stalagmites tend to generate a more useful record than stalactites, for example, because they grow in a more straightforward pattern. And a candlestick shape is a good indication of a slow and steady drip rate over time, which makes for a better analysis.

Some people have even developed tricks for finding good samples, Johnson told me, such as shining a flashlight on a stalagmite to see if it lights up like a Himalayan salt lamp — a potential indication of useful calcite — or striking a speleothem and guessing its density from the ringing tone it produces. “I don’t think any of them are guaranteed,” she said. “But they’re, you know, fun to try.”

Whenever they can, researchers prefer to take stalagmites that have already broken off on their own, for conservation’s sake. Once they select a specimen, they bring it into their lab, then saw it in half vertically, revealing the layers that formed as it grew. Oster showed me a picture on her phone of a cross-section of a stalagmite from Titan. They’d nicknamed it “Wee Titan” — it was just under two inches tall — and its layers resembled the strata in a perfectly laminated breakfast pastry.

There are several ways to analyze the layers. One of the most common involves measuring their oxygen isotope signals. These may reflect both temperature and wet-



ness; in the Western U.S., a higher value may mean colder and wetter conditions, and a lower value may indicate warmer and drier, though some caves show a different pattern. A detailed understanding of how something like rainfall is recorded in the stone of a specific stalagmite requires understanding its context.

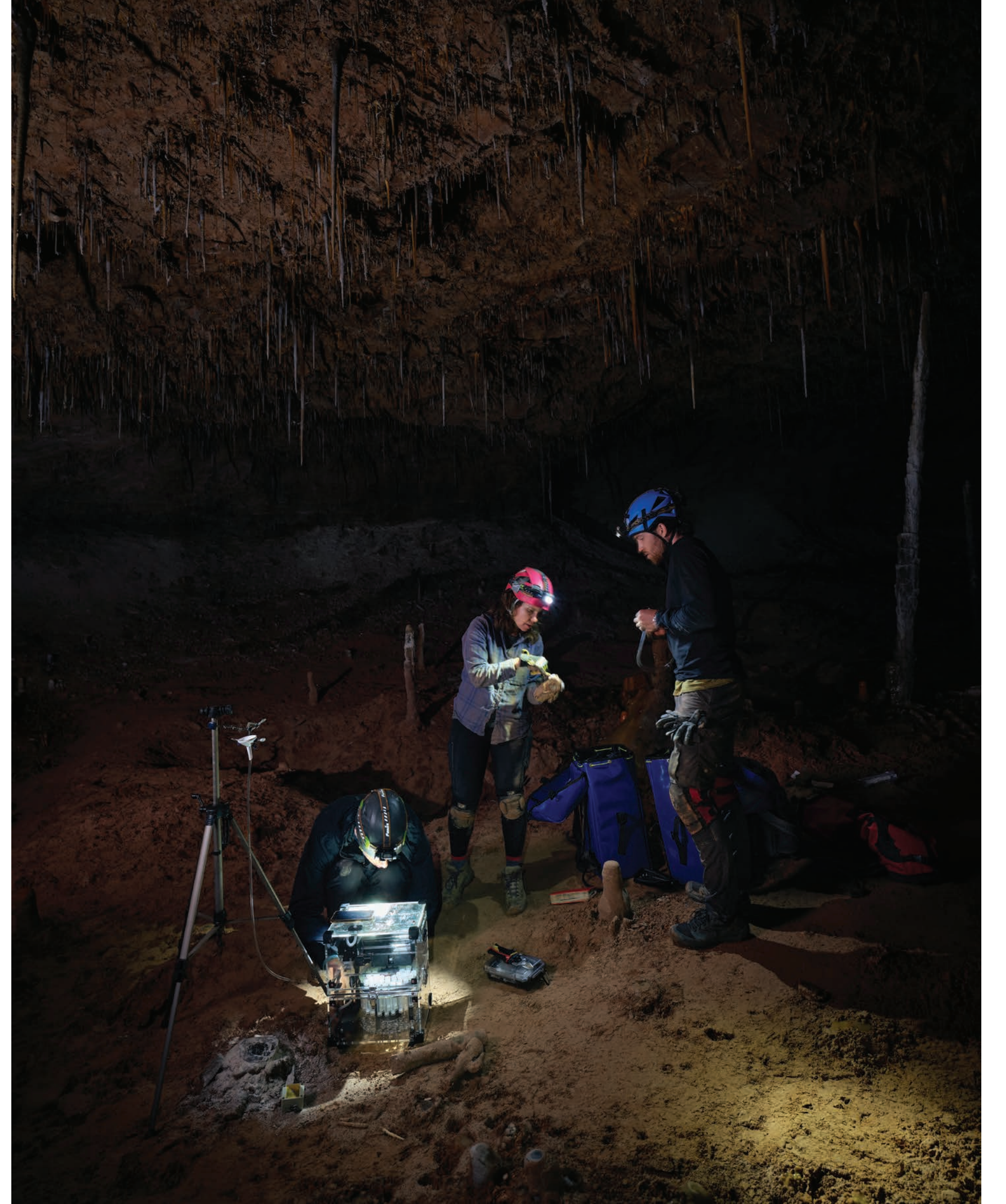
Titan Cave, for example, is in an arid location, with certain plants growing above it, a certain soil thickness, a certain kind of rock. “All of that stuff will give it its own personality,” Oster explained. Cobb likened this to each cave speaking its own language. Comparing the chemistry of drip water to the chemistry of stalagmites in a cave across several seasons, years or El Niño-La Niña cycles can help researchers create a sort of Rosetta Stone: Once they’re able to read which conditions lead to which readings, “We can extend that understanding back through time,” Cobb said.

The Yellowstone-area flooding could help the researchers decipher Titan’s language. It’s unlikely that the cave flooded — it’s relatively dry in general — but they wondered whether they might see the heavy rainfall reflected in the oxygen isotope signals of the drip water samples they hoped to collect. If they do, they could apply that knowledge to the older, untranslated layers in Titan speleothems. First, however, they needed to get the water.

**AT THE BOTTOM** of Mr. Twister, the cave opened up and we stood on a soft floor of fine, dry dirt, perhaps 20 feet wide, bisected by a path marked by metal reflectors. The reflectors were laid down by the independent cavers who discovered Titan in the late 1980s. There’s no natural opening to the cave; according to the BLM cave specialist, the entrance we’d used was dug by cavers, on the advice of a geologist who had felt air coming through cracks in the ground. After that, the BLM installed the door and culvert and closed Titan









to recreational caving in order to preserve it for scientific research. Scientists and BLM employees enter occasionally, but aside from some unpublished radon testing, Oster's project was the first to make use of the cave.

De Wet and Oster pointed out a drip site: To the side of the pathway, a bit of the ceiling glistened with moisture. It wasn't forming a speleothem, though, just a small puddle on the floor. They discussed putting out a bottle to sample the drip water, but decided against it.

Something about the close, humid air of the cave made everyone whisper; no one wanted to disturb the subterranean quiet. But just as their hushed discussion ended, we heard an unmistakable plop: a single drop of water falling from the ceiling to the puddle below. "Let's just do it," Oster said.

They put out a plastic bottle a little bigger than a film canister, and de Wet sat to take notes, dust swirling in their headlamp beams. De Wet leaned over the bottle; there was already a drop inside. "Oh, we're in! Great."

We walked deeper into the cave. The next obstacle, the crawl, began gradually: At first, we strolled single-file to avoid disturbing the occasional piles of small bones or drip sites next to the path. Then we were crouching, then crawling on hands and knees, and finally inchworming forward on our bellies, our heads tilted to the side so our helmets would fit through, and our feet turned out to avoid the unpleasant sensation of a boot heel catching on the ceiling. Even with the protection of gloves and kneepads, it was tough going, each bit of forward progress the painstaking result of pulling with our fingertips or pushing with our toes, leveraging whatever body parts we could to wriggle onward.

Partway through, the path took a sharp left turn, and then kept going. And going. In the tightest places, previous visitors' passage had compacted the dirt floor, but it was easy to imagine losing the trail and



Bryce Belanger, Jessica Oster and Cameron de Wet set up an autosampler to collect drip water in Titan Cave (*facing*).

Scientists adjust the autosampler, with its carousel of vials that are automatically rotated into place every few days (*top*). The vials will be recovered when a team returns to the cave in September.

A stalagmite growing from the floor of the Pisa Room (*above*).

unintentionally shoving my body into an even narrower spot, then being so disoriented I wouldn't be able to find my way out. I tried not to think about the many tons of rock above us.

Finally, suddenly, we were out, in a big open space that felt cavernous after the crawl. "That's about three times as long as would be ideal," de Wet said. "And three times as long as in my memory," Oster replied. But they had managed to drag the blue bags through.

"I can't believe it," Belanger said.

"They better work," Oster added.

We continued, pausing to place the occasional bottle or peer into a side-room, and taking some time to scramble down a steep cliff, 20 or 30 feet high, with a serendipitous shelf halfway down. Then we were at the entrance to our destination: a large cul-de-sac at the end of one of Titan's passages, an area called the Pisa Room after a prominent column leaning in the middle of it, one of thousands and thousands of stalactites and stalagmites growing from the ceiling and the floor. After the relatively smooth surfaces of the rest of the cave, the Pisa Room was an extravagant profusion of speleothems and wet spots, the air punctuated by an audible drip every few seconds. Many of the formations looked wet, and the stone they were made of was a distinctive milky yellow, reminiscent of mucus. "I feel like I'm inside somebody's nose," Oster said. "Someone with a bad infection."

The researchers launched into action. They downloaded data from instruments they'd left on their last visit — things like plates set underneath drips that count the number of drops over a certain period of time — placed bottles to collect other drops, and evaluated broken speleothems that they might want to carry back out. One of them showed me a helictite, a strange curling thread twisting a few gravity-defying inches out of the side of a stalactite; it's not clear exactly how they form.

Belanger set to work pulling the autosampler pieces out of the blue bags, assembling the instrument and carefully setting the numbered vials — 58 of them, meticulously labeled in the hotel room the night before — in order in the carousel. The carousel rotates, so that a new vial moves beneath the drip every few days; this allows the scientists to analyze how the drip water changes over time. The stalactite that Belanger situated the funnel under looked just like a narrow, two-foot-long carrot hanging from the ceiling: symmetrical and yellow, surrounded by shorter and darker stalactites.

The autosampler was a new piece of equipment from a New Zealand-based company, and the researchers were still working out a few potential pitfalls. The plan was to leave it in the cave until some of them return in September to check on it and collect the full vials of drip water. But a lot could go wrong in the meantime. It runs on a bank of AA batteries, for example — but they could fail. The drip water enters a funnel placed just so — but the funnel could fall. From the funnel, the drips run into a tube — but the tube could pop off the bottom of the funnel. The drips are supposed to flow easily down the tube — but they could get hung up on an air bubble. The tube ends in a pair of needles, which puncture the soft rubber stopper on the vial below — but when the carousel is turning to move a new vial into place, a cap could catch on the plastic case above it, preventing the carousel from getting the next vial in the right spot.

Belanger and de Wet decided to check that last problem. Belanger set the carousel to rotate, but it didn't seem to be working. I asked him if it was doing what he told it to do. "Um, not quite," he said, and bent to pop the two halves of the instrument apart, to see what was going wrong.

**PALEOCLIMATE PROXY DATA** isn't perfect, so it's a good idea to use multiple archives if possible.



And Oster and her colleagues want a broader picture of past climate than any single site could provide. So they didn't confine themselves to Titan Cave; they also looked for clues about the past climate in a cave in California, and previously collected lake sediments from Bear Lake, on the Idaho-Utah border, as well as from lakes across the Great Basin. "The lakes and the caves provide this nice complimentary check on one another," explained Dan Ibarra, an assistant professor of earth and environmental sciences at Brown University and a co-leader of the overall project; he heads up the lake portion.

Lake sediment is sampled and stored as cores — columns a couple of inches thick that can be several to hundreds of yards long, collected by drilling into a lakebed. Just like speleothems, the sediment includes layers that record chemical conditions. The deeper you go, the older they get. To interpret that information, researchers need to understand the context of the lake system where they were collected — the chemistry of tributaries at different elevations, for example, or of tributaries fed mostly by snow or by rain. So Ibarra and the team, including the Titan Cave researchers, collected present-day water and sediment samples from Bear Lake and its tributaries.

Just before we visited Titan, the group went to Bear Lake. Over two sunny days, we drove from site to site, pausing frequently to consult maps, determine whether the road they wanted was private, or simply let some cows go by. The team split into groups to cover more ground. Both days, I ended up with Natasha Sekhon, a post-doctoral researcher at Brown University who is studying hurricanes and flooding in the Philippines using speleothems. We navigated using her phone's GPS, plugged into the car console screen; she had set the map app to French, and whenever we reached a destination — Sekhon had pre-loaded the sampling sites Ibarra wanted us to visit — it in-

formed us: "*Vous êtes arrivé.*"

The first day, one of our sites was a stream, a couple yards across, that wound prettily through a cattle pasture, the grass on either side of it dotted with cow patties and dandelions. We parked on a red dirt two-track and walked through a patch of unusually tall sagebrush, our soundtrack a mix of mooing cattle and wind rustling the sage. Oster and Sekhon measured the temperature and pH of the stream as two other researchers, Christopher Kinsley and Warren Sharp, another co-leader of the project, started looking for a good sediment sample. Scientists at the Berkeley Geochronology Center, they determine the ages of the stalagmites and lake cores for the project. Kinsley, in Texas and shorts, stood in the calf-deep water and scooped up a trowel-full of muck from the streambed. He wasn't happy with the result, though, and let it fall back into the creek.

Upstream, Oster drew water into a syringe, then pulled a filter out of her pocket and twisted it onto the end. Sekhon knelt, holding two small plastic vials, one with a bright green cap and the other hot pink. Oster pushed the water through the filter and into the vials, then into a few additional bottles. Back in the lab, the water samples would be analyzed for isotope signals and for their geochemistry: things like the level of magnesium and calcium, elements that make so-called hard water hard.

Meanwhile, Kinsley scooped up yet another bit of sediment. "I'm getting down to this black stuff again," he said. The black stuff was a layer of sediment with a lot of organic material in it, but Kinsley and Sharp were looking for silt and clay. They intended to use it in their analyses of the lake-core ages. Kinsley brought up another trowel-full. "Might be better," he said, as the two picked a few pebbles out, determined it would indeed work, then slipped the sediment into a small plastic bag to take home. "Good prospecting, Christopher," Sharp said as he

closed the sample bag. "I thought we were skunked."

The next day, I tagged along with Sekhon, Ibarra and one of Ibarra's graduate students, Cathy Gagnon, as they sampled more sites. In the early afternoon, we stopped at tiny Preacher Creek, northeast of Bear Lake. The trio was efficient and practiced, moving quickly and in coordination: Sekhon and Gagnon slipped through a barbed wire fence and down a small slope to reach the stream, which flowed into a culvert and under the road where Ibarra stood.

At 6,825 feet in elevation, Preacher Creek was the highest spot we visited that day. It flows into the Smiths Fork, a major tributary of the Bear River. During warmer times, like the Last Interglacial Period and today, the Bear River isn't naturally connected to Bear Lake, but during cooler periods it is. The scientists wanted to make sure they understood its chemistry so they could see how the periods of connection might have changed the chemistry of the sediment cores — a piece of context they'd need to interpret the paleoclimate record.

It was sunny and quiet on the road, the only sounds our voices and the rush of the creek through the culvert below. Then, suddenly, we heard an object hit the water. "Oh no!" Sekhon exclaimed; she'd dropped a sample bottle.

Ibarra ran across the road and down the slope on the far side, hoping to catch it as it came through the culvert. At first it seemed like he'd missed it; then it bobbed into sight and he scooped it up. He carried it back up the slope, but instead of giving it to Sekhon, he tossed it into the car and brought her a clean new one, so that the water sample wouldn't be contaminated. It seemed like a lot of trouble to go to for one errant bottle, but, he said, he didn't want to litter.

**BACK IN THE PISA ROOM,** Belanger and de Wet were pressing the rubber vial caps down harder into the vials, hoping that would

help the autosampler's carousel spin the way it was designed to do. Science, of course, like any other human endeavor, is subject to an endless stream of mistakes and corrections, misfortunes and moments of serendipity — in other words, life.

De Wet noticed that the vials were threaded on the bottom and realized that they needed to be screwed into place, to pull them low enough to avoid the lid. Belanger's face broke into a wide smile; he stopped just short of smacking himself on the forehead, relieved to know what the problem was and unperturbed that it could be characterized as operator error. "Oh, that's so smart!" he said with a grin. "Un-be-lievable. So smart."

As they screwed in the vials, de Wet asked if a drip had fallen into the funnel yet. "Yeah, look, there's water coming through," Belanger said, pointing to a drop partway down the tube. Once the vials were done, he reassembled the autosampler, then took out his phone to direct the instrument to rotate the carousel again, worried that the motor had been damaged when the caps had caught the lid. "Gettin' on the Wi-Fi?" de Wet joked, at ease now that they'd figured out what was going on. Belanger smiled. To everyone's relief, the carousel revolved as it was supposed to.

"All right," Belanger said, standing up. The sampler was set. "We're live!" Gentle cheers erupted from the group. As we watched, a single drip dropped into the funnel. "Oh, money," Belanger said, with another big smile. "It ran down! *All right.*"

Oster glanced over and saw a drop go down the autosampler's tube. "Oh my God!" she laughed. "I love it!" Then she sighed. "Actually, makes me feel pretty good to see that," she said.

She and Sekhon had been looking at different stalagmites, trying to figure out which ones might have formed during the Last Interglacial Period. They already had samples of the younger, yellow stalagmites — the ones





After spending most of the day underground, the team returns to the surface.

that looked like mucus — and the others that were darker and older. “We’re chasing this one little interval of time,” Oster said, standing over five broken chunks, debating whether they should take more.

A few minutes later, she collected another that looked in-between as far as color went, which might also mean that it was in-between in age. The researchers numbered the samples with a Sharpie, then wrapped them in brown paper packaging that had originally held the autosampler pieces, packing them into the now-empty blue bags.

By then, we’d been underground for about four hours. As we gathered our gear to head back to the surface, Oster and Sekhon knelt to look at the first vial — a drop had made it all the way to the bottom. “Hopefully, when we come back, it’s not still just that drop,” Oster said. We turned to go, and Belanger, a smile on his face,

looked back at the autosampler — the manufacturer calls it a Syp — one last time. “Be good, Mr. Syp!” he said. “Don’t move at all.”

**IT TOOK ANOTHER HOUR** and a half to get out of the cave — it turns out gravity was a big help in shimmying down Mr. Twister, and an equally big impediment on the way back up — but eventually everyone made it to the surface.

It was a brilliant late afternoon, sunny and hot, the fresh scent of sun-warmed juniper a sharp contrast to the damp air of the cave. The researchers chatted and laughed, the group having gelled in the way that comes from accomplishing something hard together. We snapped a few photos, changed into sandals and happily ripped open the chocolates that de Wet passed around. As we drove back to Cody, Belanger’s thoughts jumped forward to autumn. “I’m just going to be holding my breath

when I go back to check on it in the fall,” he said.

The next day, we drove to Salt Lake City via Yellowstone. Outside Cody, we passed a layered ridge of pale rock, the same color as the walls of Titan, stark against the gray sky. Oster pulled up an app on her phone — Rockd, created by researchers at the University of Wisconsin-Madison — which showed the geologic formations around us. “Madison limestone! This is it, this is our stuff,” she said — the same sedimentary rock layer, formed more than 300 million years ago, in which Titan Cave is located.

Before we got to the park, Oster and de Wet and I talked about how to define the Anthropocene, a discussion Oster sometimes uses as a class exercise. In the early 2000s, chemist Paul Crutzen suggested that we are living in a new geologic epoch, the Anthropocene, characterized by humanity’s impacts on the Earth. Despite

widespread popular use, the term has not been officially adopted; that would require affirmative decisions by both the International Commission on Stratigraphy, which is considering it, and the organization that oversees the commission, the International Union of Geological Sciences.

In the meantime, the actual start date of the Anthropocene is a matter of debate: Should it be the beginning of the nuclear age? Humanity’s adoption of agriculture? The invention of the Haber-Bosch nitrogen-fixing process, which revolutionized food production by allowing for widespread fertilizer manufacturing? Or perhaps it should start with the colonization of North America, visible in some natural records as a sudden explosion of tree growth across the continent due to the genocide of Indigenous peoples. Oster explained that geologists like to mark the start of an epoch with something physical, a visible layer you can actually point to in rock.

When we arrived at the park, the sky was spitting rain. We drove by Yellowstone Lake, slushy but still frozen, and eventually parked at Norris Geyser Basin, a series of hot springs and geysers transected by trails and boardwalks. The basin is otherworldly: a wide plain dotted with bright green algae, milky blue pools and thermal vents ringed in chalky white material. Steam rose from the water and disappeared into the low clouds overhead as we walked, stopping now and then to read the signs describing the microorganisms and mineral deposits creating the colors. By then a steady, cold rain was falling, but the scientists just pulled up the hoods on their jackets and continued along the path. ✨

*Additional reporting and story development by former High Country News Assistant Editor Jessica Kutz.*



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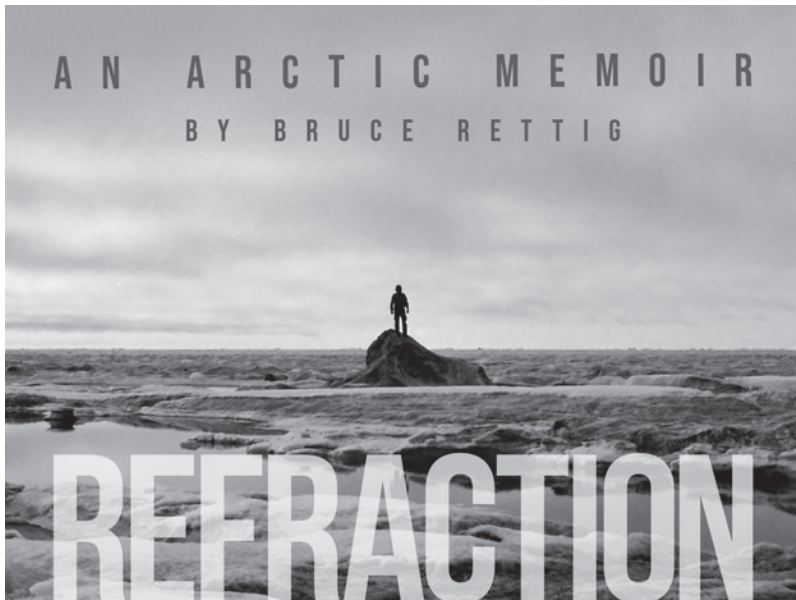
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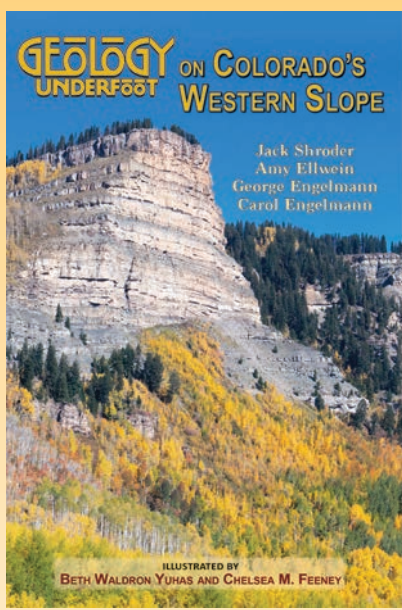
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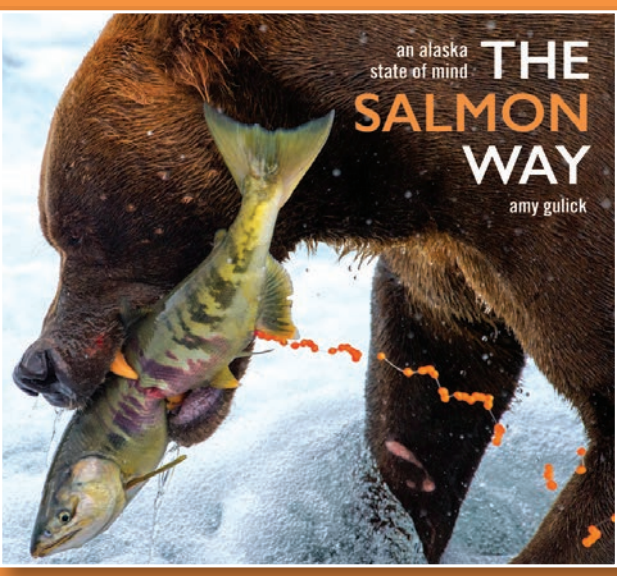
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## 6 questions about the LandBack movement, answered

Number one: Why are Indians spray-painting my Starbucks?

BY B. TOASTIE



**HOW CAN TWO LITTLE WORDS** have such combustible power, setting passions ablaze, threatening to undermine 500 years of written law, multigenerational ranching operations and modern-day sprawling subdivisions, not to mention contemporary conservation's entire foundational concept of wilderness, in one fell swoop? These two little words, "Land" and "Back," say so much with so little. That slogan spray-painted on bridges and Starbucks windows is more than just a Twitter trend. It has a storied history. Indigenous activists have painstakingly built its momentum over generations — and non-Natives are starting to take notice. Let's talk about the LandBack movement and what it really means.

**What is the LandBack movement really asking for?**

The land. Back.

**How did this movement get started?**

Well, it all began in 1492. ...

But the 500 years-and-counting

struggle has gained momentum in the last century, and particularly in the last 50 years or so. The federal government's decision to return Blue Lake to Taos Pueblo, which took place in stages between the Nixon and Clinton administrations, long after Teddy Roosevelt's administration stole it to enhance a national forest in 1906, is considered one of the first modern LandBack victories. It took generations — 90 years altogether — of dedication and complex legal struggles to achieve.

While Taos Pueblo organized the return of Blue Lake, Indigenous organizers mounted the Alcatraz occupation in 1969, in a direct demand for the return of an island regarded as merely surplus federal land. Meanwhile, the rising American Indian Movement more broadly called for federal recognition of Native sovereignty.

LandBack returned in force in the digital age, when the Twitter hashtag cropped up in the early 2010s, referring to land theft and colonization in South Africa. In mid-2019, the hashtag gained

traction in North America during the Tiny House Warriors' blockade of the Trans Mountain Pipeline in unceded Secwepemc territory. Soon after, the Yellowhead Institute, an Indigenous-led policy research center at Toronto Metropolitan University, released a report called *Land Back* that examined settler-colonialism at work in present-day Canada. In August 2020, the advocacy group NDN Collective launched landback.org with a brief LandBack Manifesto, followed by a campaign launch on Indigenous Peoples Day. These developments brought the movement into the public eye.

The federal government has slowly and selectively begun to engage with the idea since the appointment of Deb Haaland (Laguna Pueblo) as secretary of the Interior, and of Chuck Sams (Umatilla) as director of the National Park Service, the first Native people to hold either office. The United States is currently piloting tribal co-management of certain federal lands, a step in the direction of LandBack.

**What about all the people who would say "I'm not giving up my hard-earned private property"?**

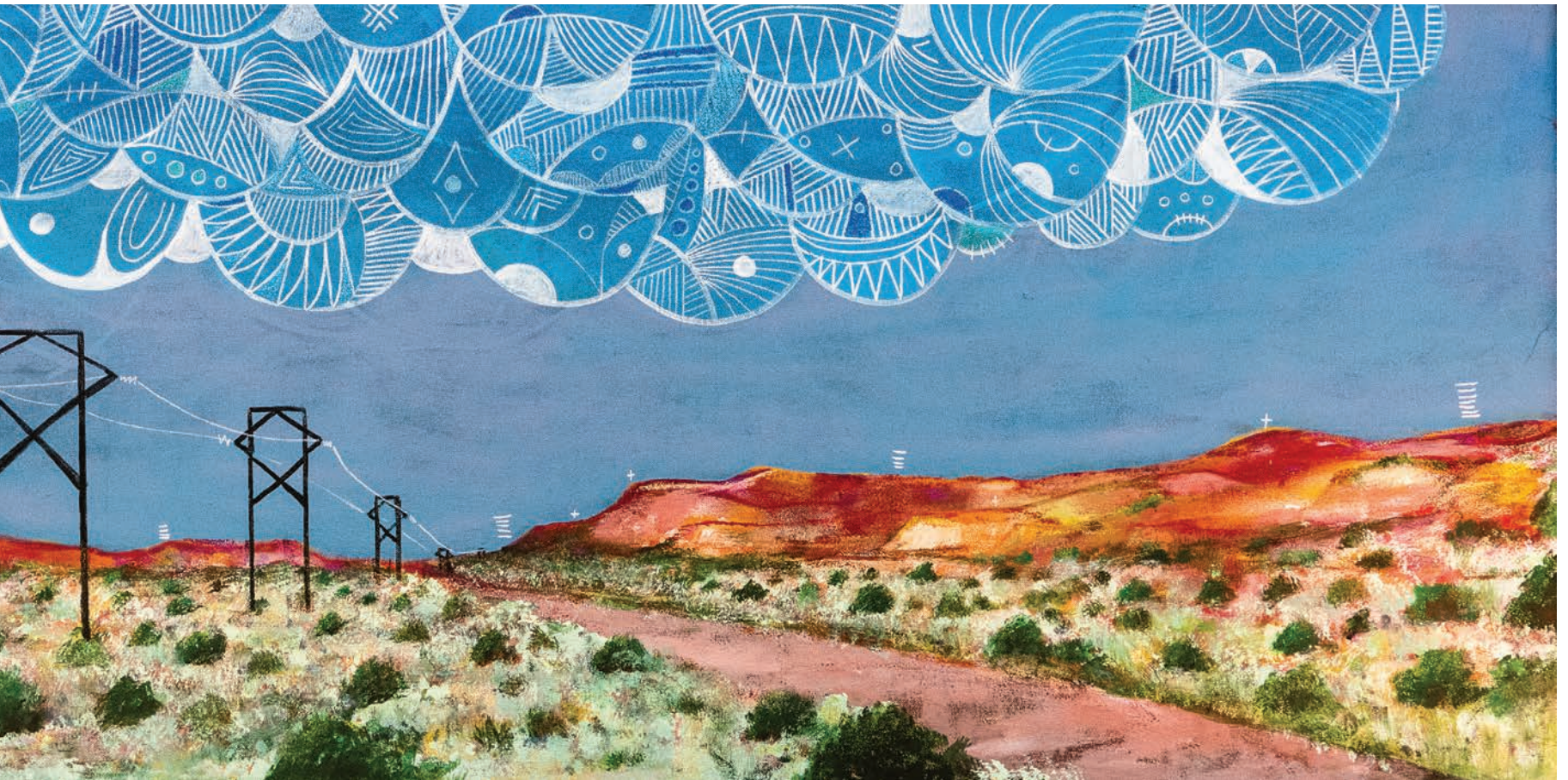
Gee willikers, it really would be awful to have to give up land, wouldn't it? *Wouldn't it???*

While some private landholders may resist, others, including mainline conservation groups and even art galleries, have already taken it upon themselves to donate property to tribes or Native organizations. These acts are a positive and inspiring step, even if still largely symbolic.

Selling or donating a piece of land to a tribal nation or Native organization does not exempt the new owners from tax obligations on that land to the United States. So it's not a true repatriation; it is a real estate transaction under U.S. law. Treaties, as the supreme law of the land, outrank U.S. law and demand something more.

The LandBack movement is less about a mass real estate transaction than it is about sovereignty, recognition of treaties, and, ultimately, the abolition of the United States' concept of real





estate altogether. From many traditional Indigenous points of view, land ownership is an illusion, no more possible than ownership of a rainbow. Land “ownership” is simply a legal concept — one that keeps wealth and power in white families.

Think of it this way: As a landowner, what you really own is a title. That’s just a piece of paper. But the courts will recognize that paper in case of any dispute. What’s more, they’ll enforce it through police violence. So-called “landowners” may have access to violent state force, but they still don’t really own the land. Don’t take it too hard, though. Nobody owns rainbows, either!

Many Indigenous civilizations recognized private property in the form of houses and personal belongings, while land itself remained communal. The white Westerner’s fear that the “other” will rob, dispossess, subjugate and otherwise violate them is a core fear of the colonial mindset. True LandBack would reflect this.

**Wouldn’t that mean white people have to go back to Europe?**

No! LandBack is not a call for revenge. The white Westerner’s fear that the “other” will rob, dispossess, subjugate and otherwise violate them is a core fear of the colonial mindset, one that is often expressed through dystopian science fiction. It’s a projection based on the foreign doctrine that all humans are evil. Christian Europeans brought with them the idea of “original sin,” based on Adam and Eve’s shenanigans in the biblical creation story. If all humans are sinners by definition, the thinking goes, then everybody is just as evil as Western colonizers, so we’d better protect our (stolen) private property before somebody else inevitably tries to steal it.

Because this fear is so foundational to Western thought, Westerners often struggle to leave room for possibilities like the peaceful communal ownership of land. But the practice of communal land-holding has precedent, and supported stable civilizations for hundreds of generations in this hemisphere before being

dismantled by Europeans. Perhaps, says LandBack, it could do so again.

And to those who doubt that this could ever happen, well, it already is: In American Samoa, where a hybrid legal system of traditional and Western law ensures that 96% of land is held in common, Samoans have retained their sovereignty, ethnicity and cultural traditions remarkably well. The continental United States could look to American Samoa as a model, although that model is not without problems of its own. (Hello, blood-quantum requirements!)

In short, white people would not be deported after LandBack, because Indigenous people are not colonizers. Honestly, though, is Europe really that bad? I mean, France is there! White people love France, right?

**How can LandBack matter so much when we have things like climate change to worry about?**

There’s an increasing public realization that humanity must look to Indigenous leadership if we’re going to survive the climate disaster. Westerners are beginning to realize that Indigenous ways of

*Monsoon Season: Clouds Building on Rez Roads. Jesse Littlebird / Courtesy of FaraHNHeight Gallery*

living are not primitive forms of resource extraction, as was once thought, but rather methodical and scientific practices, refined over thousands of years and designed to manage balanced and biodiverse ecosystems, something Western so-called-civilization has failed at.

So, LandBack is in the best interest of all living things, human, plant and animal alike. Rolling back the destruction inflicted by settler-colonialism, imperialism and extractive global capitalism requires returning the land.

**Hot diggity, because I love biodiversity, egalitarianism, justice and the existence of life on Earth, I am on board with Indigenous sovereignty and land repatriation! How do I support the LandBack movement?**

Tell your friends, show up at marches, donate wisely, and keep using the hashtag. You might also consider giving your land. *Back.* ☀



# THE NEW TOP WAYS TO GO OUTSIDE

IF YOU'RE GETTING OUT INTO NATURE, DO RIGHT BY THE LAND AND EACH OTHER.

WORDS BY: JOSÉ GONZÁLEZ

DRAWINGS BY: KRystal QUILES

1. Wear comfortable shoes, and be ready to experience discomfort in your personal growth.



2. Pack your day pack with essentials,



AND it's essential to unpack your invisible backpack of privilege.

3. Sunscreen is important to reflect harmful UV rays.



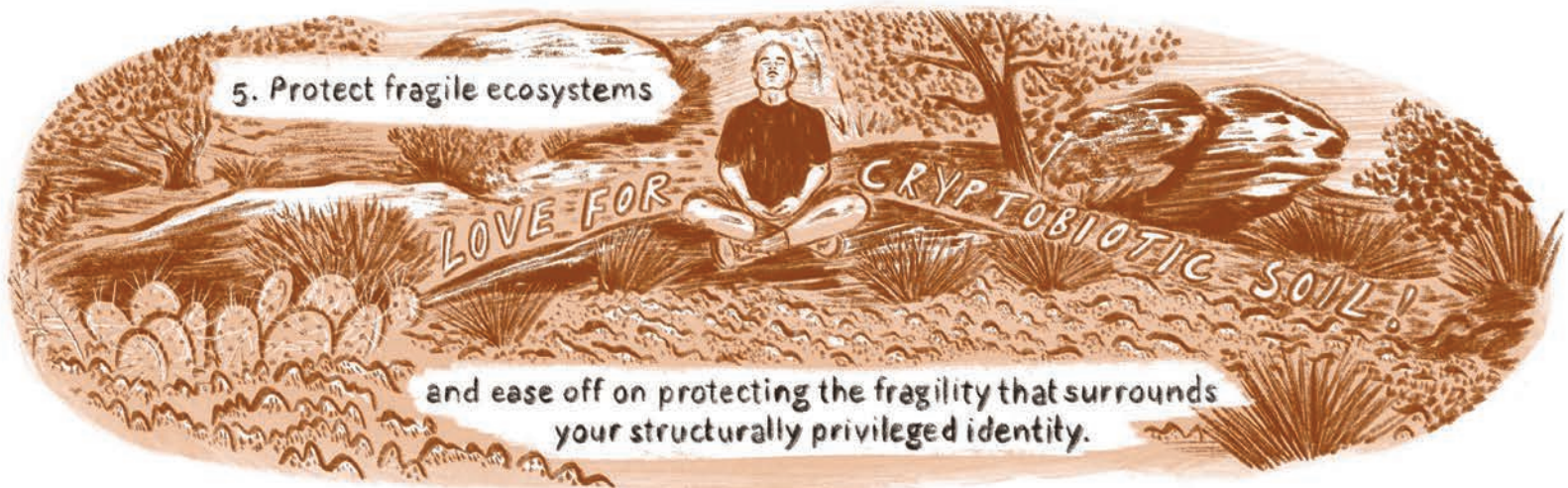
It's also important for you to reflect on how normatively white (like the color of your sunscreen) the outdoors can be.

4. Pack it in and pack it out; call it in before you call it out.

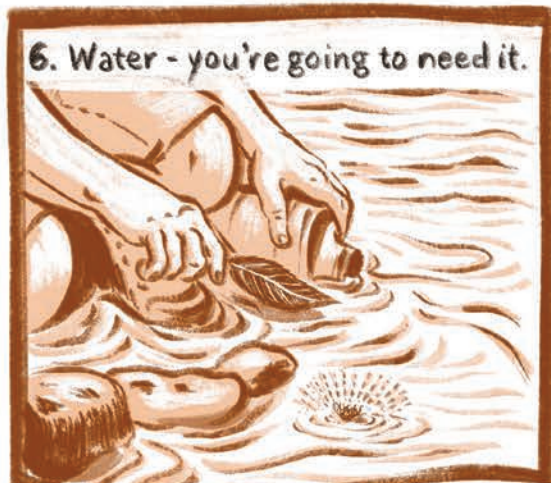


Hey, have you considered how your cognitive biases overlaid with structural oppression and sociocultural lens may be affecting how you are viewing this scenario?

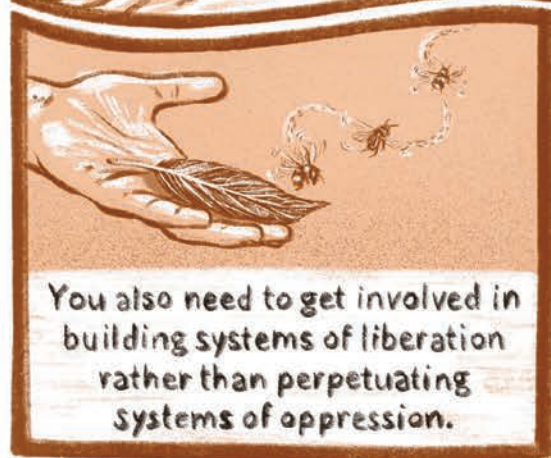




and ease off on protecting the fragility that surrounds your structurally privileged identity.



6. Water - you're going to need it.



You also need to get involved in building systems of liberation rather than perpetuating systems of oppression.



7. A first aid kit is vital for treating physical trauma.

How about treating the generational trauma of historical exclusion and structural inequities?



8. Leave no trace.

Actually, practice "Relationship to Place" in ways that challenge binary myopic colonial frames of our relationship to the land.



9. Live. Love. Laugh. LandBack!







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ESSAY

## On the road, a taste of home

The Saini family's Punjabi *dhabas* serve 'good vibes only.'

BY MADHUSHREE GHOSH  
PHOTOS BY ROBERTO (BEAR) GUERRA

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**WALKING INTO** Punjabi Tandoor, located in a strip mall in Carlsbad, about 25 miles north of San Diego, I'm struck by the contrast between the harsh fluorescent lights and the delightful fragrance of garam masala, onions and garlic. The owners already know what I want, ladling my favorite three-item combo into a Styrofoam container of curries heaped over fragrant jasmine rice. They pile on generous dollops of cauliflower and saag paneer. I dig into this quintessential North Indian fare, the taste immediately reminding me of home.

Punjabi Tandoor, run by Bakhtawar Saini and his cousin, Jagdish, caters to Indian immigrants in Southern California, people working in software or biotech, like me, or studying at nearby colleges. Eateries like this have sprung up all over California, in strip malls, business parks and along the freeway rest stops where the old burger joints once reigned supreme. They serve the growing ranks of Sikh long-haul truckers who move produce, fruits, nuts and dry goods from California's rich agricultural lands to the rest of the country and beyond.

These establishments offer more than comfort food and a taste of home cooking. They also provide reassurance that while their patrons may be far from home, the food along the freeway exists to remind them of the way back.

Jagdish mans the large clay tandoor oven while his daughters take people's orders and

run the register. Two decades ago, on my first visit to their Mira Mar restaurant, I had asked Jagdish Saini about an Indian restaurant on Black Mountain Road. The restaurant served mediocre food, but he replied respectfully, "I want them to succeed."

A religious Sikh, Jagdish isn't interested in badmouthing his competition. Rather, he's focused on what Indians term *atithi devo bhava*, or "the guest is God" philosophy. His customers, he says, bring him closer to divinity.

Bakhtawar has now opened multiple restaurants, and I've been a regular customer at all of them.

What diners and dives are to California freeways, Punjabi dhabas are to Indian highways. Growing up in Delhi, I was used to the dhabas lining our roads. Tiny ramshackle stalls with roaring burners, a fired-up clay tandoor, and perennially boiling milk tea on a separate burner: This was what late-night expeditions were about. Dhabas were not only for truckers and long-haul drivers, but also for college students, party-goers, travelers and anyone who needed a break, a chai, hot food and a place to rest. Typical dhaba fare includes bright chicken masala curry, thin rotis, paneer tikka, thick choley curry or spinach aloo alongside clay glasses of ginger chai. In India, it was comfort food; more than that, it was food that marked when we became adults, and our parents allowed us to drive long distances. At the dhabas, we were treated as grownups, making new friends and then moving away. The highways and rest stops and dhabas highlighted the newfound freedom of our generation.

Sikh Punjabi agricultural workers brought the dhaba tradition with them when they came to California in the late 19th and early 20th centuries. They were met with systematic

discrimination in the form of anti-miscegenation laws and state land acts that denied immigrants citizenship grants and the chance to own land. The men were unable to bring their families from India, and so many married Mexican farmworkers, creating a hybrid community of about 2,000 people in the Bakersfield and the Yuba-Sutter areas. In response, local restaurants began melding Punjabi and Mexican cuisine, creating new dishes like the roti quesadilla and lamb burrito. The next wave of immigrants from Punjab came after the passage of the 1965 Immigration and Nationality Act. This time, entire Sikh families migrated, creating a "mini Punjab" with schools, gurudwaras and community centers in various California communities.

Sikhism, which began in the 15th century, differed from the Hinduism and Islam that then prevailed in India; they accepted other religions and the equality of men and women, reflected in similar names, and they celebrated Guru Granth Sahib and the holy texts instead of idols. Sikhs have long been known as brave warriors who are also people of peace and faith, but they often faced persecution in India. Finally, in the 1980s, Jarnail Singh Bhindranwale led an uprising and took over northern India, demanding a separate nation and the freedom to practice their religion. Faced with retaliation by the Indian armed forces, Bhindranwale and his followers took refuge in the Sikh house of worship in Amritsar, the Golden Temple. The Indian military stormed the temple in what became known as Operation Bluestar, killing Bhindranwale along with many of his followers and thousands of civilians who had come to the temple to pray. Trauma reverberated through the decades that followed.

Four months after the storming of the Golden Temple, Prime Minister Indira Gandhi

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Before opening the doors on a recent Saturday morning in July, Bakhtawar Saini, right, and Sukhpreet Singh, left, prep for the day in the Carlsbad location's kitchen (above right).

Saini family members at the Carlsbad, California, location of Punjabi Tandoor (facing page).

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was assassinated by her Sikh bodyguards. This prompted even harsher reprisals: Over 2,800 Sikhs were killed in Delhi during just a few days, and at least 50,000 Sikhs were displaced from New Delhi and adjoining areas. The 1984 massacre sparked a mass migration of Sikhs from India to Canada, the U.S. and England. Sikh communities in the U.S. grew, and many Sikhs became truckers in California and the West. Before long, Punjabi dhabas were sprouting up at the rest stops along the I-10, I-5 and I-40 freeways.

Punjabi Tandoor has three branches in San Diego: the closet-sized one in Mira Mar I

frequented whenever I was homesick; a second one in a former sushi restaurant near Sorrento Valley; and a third one in Carlsbad, north of San Diego, in a strip mall across from biotech behemoths bustling with afternoon lunch traffic.

Jagdish's daughter, Satwinder, leads the cash register in the Carlsbad restaurant with a perpetual smile and an Americanized accent. Much like her family, she spends her free time at the San Diego gurdwara, since prayer and service are an important part of her life. Lucky, her cousin, a tall skinny young man with a thick Sikh turban and even thicker black beard,

handles the tandoor, sticking the naan on the side of the hot oven and keeping an eye on the boiling chicken curry handi. Throughout the day, he fields customers' questions about how spicy a "level seven" might be, or whether the navratan korma is a better choice than the choley today.

On the restaurant television mounted on the wall, European football or cricket plays on mute. This is "desi timepass," as we call it — sports, food and family.

Satwinder fills up a container with lamb curry; the spices mixed with the creamy yogurt remind me of home every time. Lucky makes me a roti because I prefer it to naan. Jagdish quietly boils the tea; no Indian will say no to an offer of chai.

The food is always the same, as is the service. And always, I am treated as family.

Bakhtawar Saini doesn't talk about what it was like when he first came to California, back in the 1980s. Shrugging, he asks instead, "Have you tried food in all our restaurants?"

"Yes," I reply. "Same menu, no?"

"That's the idea. Whether you eat it in Carlsbad or Mira Mesa, the food tastes like from Punjab. Quality is what we look for."

He adds, "It brings you back home. I've visited Italy, Germany, England — now here. I

Satwinder Saini adds fresh samosas to the buffet in anticipation of the day's first customers (*left*).

The stove in the kitchen at the Carlsbad location of Punjabi Tandoor (*bottom left*).

Jagdish Saini is the co-owner of the Punjabi Tandoor restaurants (*below*).





ate Punjabi food everywhere. The flavor's the same."

He isn't talking about fancy gourmet cooking, but about the pure delight of comfort food. It's the familiar smell that makes you want that saag paneer, returning you to your childhood. When you eat at Punjabi Tandoor, you belong.

"Come again," he says, inviting me back formally.

Later, I ask Lucky why Bakhtawar wouldn't talk about the riots, Lucky shrugs, smiling, "Arre, it was so long ago," he says. "I wasn't even born. We focus on good — hard work, honesty. And the rest — *baaki, rab jaane.*"

The rest, God will take care.

The head-down, model-immigrant trope continues, even though the individual stories remain untold. The Sainis and their Punjabi restaurants in America's Finest City bring me that much closer to a conflict-ridden land I left three decades ago.

At the Mira Mesa Punjabi Tandoor register, a sign advertises a summer special on rose milk. It is also a celebration of Sikhism. A small sign below it proclaims, "Good vibes only."

In 1983, a year before the Sikh temple desecration, before Indira Gandhi was assassinated, before thousands of Sikhs were killed,

before the family fled India, I sat in a hot and humid taxi next to Jagat Sudhar Gurudwara in Kolkata, the city my parents came from, a city we visited every summer to be with our cousins and extended family.

A Sikh boy — his hair in a tight topknot covered with a small handkerchief — knocked at the taxi's window. "Dada, brother, yeh lo!"

The driver reached for a glass filled with a pink lassi-like sherbet.

Baba asked, "How much?"

"Nah, no money, sir," the boy laughed, "it's Guru Arjan's shaheedi, we celebrate with chabeel, kachi lassi. We feed the hungry, and the thirsty. Want a glass?"

My father accepted the glass. Ma hesitated; unfiltered water can lead to upset stomachs, but Baba chugged his drink down.

"Baah," he said, in appreciation, "that was

refreshing! Rose, yogurt, so nice."

The boy took the glass back, yelling, "*Sat sri akal!*" Glory be to God.

The drink, we later learned, brings respite to weary travelers even as it honors the Arjan's martyrdom, remembering the guru who was executed by the Muslim emperor. He had asked his Sikh followers to defend their religion and live with dignity and honesty — a martyred guru who is celebrated with optimism by his followers, centuries later.

Baba's stomach held fine. Behind us, the Sikh boy held up glasses of rose milk, spreading happiness.

For those of us who still miss home, a small Punjabi restaurant in Southern California run by a long-persecuted people is the closest thing to being there.

Good vibes only. ☀

*"It's the familiar smell that makes you want that saag paneer, returning you to your childhood."*

Jaspreet Kaur Saini, Kamaljeet Kaur Saini and Satwinder Saini (from left to right) share a laugh as they wait for customers.





## We are all of us animals

Talia Lakshmi Kolluri's debut collection roars, screeches and stuns.

BY DEBBIE WEINGARTEN

ILLUSTRATION BY KATE SAMWORTH

**ON THE FIRST PAGE OF** Talia Lakshmi Kolluri's debut story collection, *What We Fed to the Manticore*, I fell in love with the donkey in Gaza City, who, much to his embarrassment, finds himself being painted by his beloved owner, Hafiz, to resemble a zebra. Hafiz is building a zoo to bring joy to the city, he explains, because "children are still children, you know. Even in times like this." But he cannot afford a real zebra, let alone get one through the checkpoints. So the good donkey sacrifices his own identity and endures the painted stripes, the strange new enclosure and the children reaching through the bars.

Next, I fell for a tiger roving through looking-glass mangrove trees in the Sundarbans, searching for something, anything, to eat as the water turns saltier and the prey disappears. So

palpable is his hunger, which grows by the day, that I can feel his ribs, can taste the dust through the pages.

One by one, I fell in love with each of Kolluri's nine animal narrators as they soared, hunted, screeched and dove through their stories, experiencing joy and loss, contemplating identity and confronting the realities of a changing world. Throughout the collection, Kolluri's vivid prose has the precision of a tuning fork, and each animal narrator offers the reader a rare intimacy with a slice of transforming earth. Human beings appear, too — occasionally offering friendship and kindness, and at other times haunting the edges of the wild with their cities, boats, missiles and traps. Climate change is ever-present: Ice melts, storms surge, bombs fall, viruses spread and drought creeps.

Each animal seems to exist in a space between loss and adaptation, between grief and survival. And by now, who among us isn't familiar with this space, as Europe endures an unprecedented heatwave, as cellphone footage shows another coastal house buckling into the ocean, the Colorado River reservoirs falling to new lows, and the pandemic rears its head and strikes again?

A lifelong Californian, Kolluri says she often thinks about adaptation as the West grows hotter and drier. She was 6 years old when she first she saw the mountains burning from her childhood home in the Bay Area. She remembers the dramatic smoky sunsets over the Santa Cruz Mountains, her mother worrying, the family driving up to see the scars of the fire after it finally went out. "It loomed really large in my memory," says Kolluri. "But when I went back to look it up later, I was astonished by how small it was relatively." Nowadays, she spends nine months each year studying the California fire maps from her home in Fresno, keeping tabs on family members who are spread throughout the state. And always she worries for the animals — mountain lions, deer, birds — who can't get out in time.

Fire doesn't appear in *What We Fed to the Manticore*, however. It just felt "too close to the bone," explains Kolluri. Instead, she has unleashed a host of other catastrophes that demonstrate our planet's increasing precariousness. Kolluri deliberately transports us around the world, from the bustling streets of Delhi to the grasslands of a Kenyan wildlife sanctuary, from the Arctic tundra to the open ocean. Global linkages matter, she explains: "The fires in the American West will affect the air quality in New York. Warming ocean temperatures can change the makeup of sea life in a completely different ocean." She pauses. "It's no longer possible to behave as though we can make

decisions in our local communities and that they don't have any impact on anybody else."

Ultimately, Kolluri's decision to inhabit the minds and bodies of animals feels courageous and new, not at all cheesy or two-dimensional like the talking animals in so many children's cartoons. Rather, each of Kolluri's animals is a fully realized individual, driven by instinct, intellect and love, standing at the precipice of events that challenge their understanding of self and the world. And, somehow, they are able to say what human narrators cannot.

When she began writing from animal perspectives, Kolluri says she experienced a kind of liberation. Suddenly, emotional honesty unfurled on the page, in sharp contrast with the vulnerability she felt when writing from the human perspective. Through animals, she could say anything she'd ever thought or felt before — about joy, belonging, grief, identity — however messy or complicated.

*What We Fed to the Manticore* took 10 years to write, Kolluri says, largely because she kept getting sucked into research, deepening her understanding of tiger communities or bird behavior. As an avid documentary watcher and consumer of science journalism, Kolluri says many of the stories were inspired by reports of real events: An *Atlantic* article about the deaths of 200,000 saiga antelope in Central Asia, reporting from the *Guardian* about the last male northern white rhinoceros, a *National Geographic* profile of a military dog sled team in the Arctic.

Kolluri has always been intensely curious about the inner lives of animals, and though she admits that some readers might take issue with anthropomorphizing, she says, "I just can't accept the idea that they don't have complex emotions, that they don't have rich inner lives. And so, since I can't ask them how they feel, I'm answering that question for myself."

In her author's note, Kolluri writes, "How would a wolf describe a truck or a gun if she's never seen one before? How would a bird who's never left the city she lives in describe an elevated rail line? What does a devastating cyclone feel like to a tiger? What does the noise of a container ship do to the underwater world of a blue whale?"

Let us return to the good donkey, paint dripping down his legs, humiliation blooming in his chest as he is transformed into a fake zebra. One painted donkey can bring some joy to children who have been plagued by war, but he cannot keep the war away. "Let me tell you a thing about tragedy," the donkey laments. "At first, every one of the missiles is shocking. You don't know if you will survive. If you can lose anyone else without





losing yourself. And then it becomes ordinary.”

Perhaps the most surprising member of Kolluri’s animal cast is the deeply spiritual vulture, who is tasked with cleaning the bones of the dead to ensure their safe passage to the next world. On the day we meet him, the vulture is overwhelmed by an entire herd of saiga antelope, all suffering from a mysterious illness. As far as the eye can see, the animals are lying dead across the steppe — “Thousands. Hundreds of thousands. Perhaps all the saiga in the world.” There are far too many for the vultures to clean. As a result, many of the saiga will not go to the beyond, a horrifying thought for our vulture. When he picks away their flesh, he tastes their stories — the story of the illness that devastated the herd, the story of each individual life.

*What We Fed to the Manticore* allows readers

to glimpse the many animals in ourselves. “In the end, I did what I hope my readers will do,” Kolluri writes in her author’s note. “I dissolved the distance in my mind between myself and the wild world, which helped me understand that the story of my life includes the story of all the life that surrounds us.”

We are all of us pigeons, dogs, donkeys, polar bears and whales trying to find our way. We are all of us humans haunting the edges of a story. Like the vulture, this is a book that picks us clean so that we may go beyond. ✨

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**What We Fed to the Manticore**

Talia Lakshmi Kolluri,  
200 pages, softcover: \$16.95  
Tin House, 2022

*“How would a wolf describe a truck or a gun if she’s never seen one before?”*





## Race day

On the anxieties and satisfaction of low-stakes yet ambitious goal setting.

BY CASSIE DA COSTA  
ILLUSTRATION BY DIANA EJAITA



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**IT'S TIME TO** get it over with. At 5:20 a.m., just off the highway, I kiss my girlfriend in the dark, then dash toward a red port-a-potty. The beginning of dawn seeps through the commode's plastic walls. I hold my breath to avoid a whiff and hope to do more than pee. When I don't, I exit, streaks of grayish light now illuminating the underpass where a corral of people shift in their various moisture-wicking apparel. Beyond them, several runners jog and skip along a frontage road. I join in, turning on my GPS watch for a short warm-up, then stopping to bend, swing and kick my arms and legs, easing blood into my muscles as I wait for the race to start. Today is the first time I'll ever run more than 10 miles: 13.1 miles, in fact.

Until a year ago, I never thought that half marathons — targeted, it seemed, toward adult runners enthusiastic about the self-imposed anxieties of low-stakes yet ambitious goal setting — would ever be my business. At track tryouts during my freshman year of high school, I showed some natural talent for the 200-to-800-meter distances. It was indoor season, and the coach said he wanted to put me in races, a flattering concept to someone alienated by the politics and favoritism of team sports.

But he always awarded the spots to a few thin, white teammates instead. I, in my thicker Black body, received a speedy and underwhelming tutorial in shot put: Ball to neck, two revolutions, then a thrust. I competed at one meet and never quite figured out how I'd done. Some weeks later, I gladly quit the team, relieved to end those lung-burning sprints around the track day after day, and focused on soccer instead.

Fifteen years on, with my 30s looming, I started thinking about that abridged track season. I had been pretty good at something, but never tried to cash in on my potential. Why not now?

**NEARLY A YEAR** and a half into the coronavirus pandemic, I signed up for a race eight months away. Scrolling the Mountains 2 Beach Marathon website, I thought, "This will get me running again." I told everyone I knew what I was planning, to hold myself accountable. I spent four months building my base, then four more training specifically for the race. I aimed to run it in under two hours, or just over a 9-minute-mile pace, a goal daunting enough to ensure adherence to my training regime.

During the first several weeks, I felt as if my body was the inside of a pinball machine. Pressure points seemed to arise at random, one following ruthlessly after another. But I'm used to discomfort during exercise. When I was a kid, soccer had gradually turned into a masochistic affair: If you weren't on the verge of crumbling, you hadn't really played. Running, by comparison, is more of a mental game. If you don't let your brain convince you you're done, you can almost always keep going — and even finish faster than you started.

Still, it's easier to obsess over the physical hurdles. Some weeks into my half-marathon training block, I felt the whispers of an old bout of patellar tendinitis. I called up a physical therapist, and he gave me a long list of exercises. By this point, my girlfriend, Annie, was both impressed and exasperated by my fanaticism. Not only did I wake her at 6 every morning, stumbling through my routine before heading out the door to run, I also talked constantly about it — running the race, but also running in general. I got motivated by watching YouTube videos of elite runners doing track intervals. And I disappeared my professional identity as a film critic when I took a new job as an editor for a major outdoors retailer, overseeing, of course, running-related content.

By the time race day arrived, I'd run the gamut of neuroses, doubting every decision I'd made in the lead-up. I'd been coaxed by friends, family, and (several times) by Annie — told that my anxiety was a sign that I cared, that I was challenging myself in a meaningful way. But I dreamed of the day *after* the half marathon, when I would finally be free of this absurd inner churn of doubt. In the midst of the turmoil, I decided that, after all this, I better just enjoy the race.

On the start line — or really several feet behind it, far enough back from the 2-hour pace group to run the opening miles according to my inner rhythm rather than in a rush of panic — I watch as a course photographer snaps photos of nearly everyone except for me and one other person. I turn to the woman, who's around my age, and we laugh. Do we look that dour? When we finally take off, I keep her in view before eventually passing her. She had planned to run the full marathon, but contracted COVID a couple months before the race. Now, she's aiming to finish the half.

A driver honks encouragement from the highway up on our left. I channel the best of what I've

learned while ticking off miles on the road, trails and track during training, all sans music. Despite being bisected by a highway, Ventura County has beautiful scenery, including the cascading mountains and bright beaches promised by the race's name. Traditional Japanese odaiko drummers line the course, pounding their instruments to a stirring beat, and we get to pass them *twice*.

In my relentless YouTubing, I'd noticed how pro runner Dakotah Lindwurm always smiles and celebrates during marathons, even while running a sub-6-minute-per-mile pace. So, at my leisurely trot, I pump my arms at cheering spectators, whether their signs are general or specific to someone who isn't me. When I see other participants go to the dark place runners call the "pain cave," slowing to walk with a huff of resignation, I sunnily encourage them on.

Then, around Mile 8, my stomach starts to cramp, dull aches spread across the muscles in my right quad, and my racing flats start to drag over bumps on the road. Ten miles in, when the race veers into mileage I've never taken on in one go, and even as the aches accrue into sharp clusters, I find an odd kind of peace. The sun goes from pink and dim to orange and hot. Ventura's downtown storefronts come into view, and I glance at groups out for Sunday brunch; they look back at us runners in amusement.

As my sub-2-hour race slips away in the final, mostly uphill 5K, the rocky, glistening beach begins to appear — long surfboards and wetsuited bodies dotting the ocean. I remind myself of some humbling wisdom: Nobody but me cares what time I run.

I hear the 2:10 group behind me and muster enough stubbornness to beat them even as their voices get louder. The bright sun obscures the onlookers lining the railing as I narrow my focus to the finish that I know must be coming up soon. I ignore my quad and push into the "nothing else matters" gear. Just before crossing the line, arms swinging hard, body airborne, I see Annie, grinning, with our dog, Sardine, and her phone out, recording me. To my surprise, my name blares from the loudspeaker: 2:09:22. My first thought, of course, is how glad I am to finish—then, how soon I ought to start again. ✨

*Cassie da Costa is a Black runner and writer based in Ojai, California. Her column, "Running Free," explores the meaning of public space and community as she traverses California's beach trails, canyons and roads.*



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# Heard Around the West

Tips about Western oddities are appreciated and often shared in this column. Write [heard@hcn.org](mailto:heard@hcn.org).

BY TIFFANY MIDGE | ILLUSTRATION BY ARMANDO VEVE

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## CALIFORNIA

Two sea lions, understandably irked at having their afternoon snooze interrupted, were filmed chasing off panicked beachgoers at La Jolla Cove in California. Charlianne Yeyna, the woman who took the video and uploaded it to TikTok, told NBC San Diego that she thought it was funny to “see all these tourists getting blown away by these giant sea lions.” Many people agreed, as the video racked up millions of views. We recently reported on the problems caused by Yellowstone visitors who take selfies with bison only to find themselves quite literally on the horns of a dilemma, but watching the bison’s aquatic cousins going aggro and charging day-trippers at the beach is next-level. Stay safe, and remember: *Do not pet the fluffy sea-cows!* Because they’re not really fluffy, and it clearly TikToks them off.

## COLORADO

Bob Salem, a proud resident of Colorado Springs, successfully pushed a peanut — yes, a peanut — all the way up 14,115-foot Pikes Peak using only his nose. Wearing a plastic ladle fastened onto a CPAP breathing mask and crawling up the notoriously steep 13-mile-long Barr Trail, he was a curious sight. He told *The Gazette* that hikers were “constantly asking” what he was doing, and he obligingly stopped for photos with some of them. Salem began his ascent at 9 a.m. on July 9 and finished at sunrise on July 15. Strange as it may seem, and it does seem strange, he isn’t the first person to achieve this quirky triumph. In

1929, Bill Williams won a \$500 bet by nosing a peanut to the summit in 11 days. Ulysses Baxter, in 1963, made it in eight (his peanut is proudly displayed at the Manitou Springs Heritage Center), while Tom Miller, in 1976, reportedly summited in just under five days. Pilgrims around the world often humble themselves by crawling to a holy place. Salem’s trek marked the 150th anniversary of the founding of Manitou Springs — right next door to Colorado Springs. Salem said he has a soft spot for eccentric types, and we figure his audacious achievement puts him way ahead of the competition. At the very least, he leads by a nose. Call us Freudian, but we confess to being filled with peanuts envy.

## WYOMING

The *Jackson Hole News&Guide* reported that ElkFest’s Boy Scouts of America Elk Antler Auction held a live event after a two-year pandemic hiatus. For 55 years, the Boy Scouts have collected naturally shed antlers at the 25,000-acre National Elk Refuge — a job only park personnel and the Scouts are authorized to do — and weighed and sorted them for the auction. This spring, there was beaucoup buzz because the skull and rack formerly belonging to “Big Bull,” a renowned refuge resident who died in 2017, were up for auction and expected to fetch \$20,000, or more. Cliff Kirkpatrick, an ElkFest organizer, attested to the elk’s awesomeness: “He was hard to miss because he always had the biggest



rack.” If the festival had a signature cartoon, we imagine it would be in the tradition of Gary Larson: A well-antlered elk in conversation with a shed hunter, with the caption reading: “Dude, my eyes are down *here*.”

The annual ElkFest celebrates “Wapiti and Wilderness in Jackson Hole.” (“Wapiti” derives from the Shawnee and Cree word for “white rump.”) The festival coincides with Old West Days, which also features the Teton Powwow, the Rocky Mountain Elk Foundation’s Annual Banquet, a chili cook-off, ranch tours on horseback, stagecoach rides, a parade and even a town square shootout — staged by actors, of course, or so we hope.

In case you’re wondering why there’s so much fuss about antlers, “shed hunting,” as the pastime is called, has become big business. Shed antlers are used around the world for naturopathic medicines, medical research, dog chews, Western-style furniture, chandeliers and good ol’ trophies for over the fireplace.

Other Western states also attract shed hunters, but every spring an impressive herd of them stampedes Wyoming’s public lands near the National Elk Refuge, where the collection season officially opens in May. *The New Yorker* reported that top-grade antlers can go for \$16 a pound, and buyers will pay as much as \$1,500 for a prodigious set. The most valuable skulls are still adorned with antlers and called “deadheads” — not to be confused with devoted followers of the Grateful Dead, who are not, as far as we know, generally used for decorating purposes. ✨





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Northern Arizona University sits at the base of the San Francisco Peaks, on homelands sacred to Native Americans. We honor their past, present, and future generations, who have lived here for millennia and will forever call this place home.



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# #IAM THE WEST

**MONICA AULT**  
New Mexico State Director of the Fines  
and Fees Justice Center and former  
Public Defender  
Santa Fe, New Mexico

I was born and raised in New Mexico. We *norteros* are proud, strong and resilient people. We even have a word that encompasses this: “*querencia*.” It’s the love of the land, the people and the culture. In law school, I was curious how people solve social and economic problems in cities. I’m always thinking about how I can apply this in a rural context. We can’t throw anybody away, regardless of the choices or the mistakes that people make. Fines and fees reform is an economic justice issue. If we can remove the money from the system, we can get a little bit closer to having a fair criminal legal system. We’re slowly working toward true equity and justice.

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