High Country News

OUR FIERY FUTURE

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How extremism hides in plain sight

Oil companies duck cleanup costs

An art exhibit about air

Oil wells located between West Long Beach and Wilmington, California, with smokestacks from the Valero refinery looming in the distance. **Pablo Unzueta / HCN**

Know the West.

High Country News is an independent, reader-supported nonprofit 501(c)(3) media organization that covers the important issues and stories that define the Western U.S. Our mission is to inform and inspire people to act on behalf of the West's diverse natural and human communities. High Country News (ISSN/0191/5657) publishes monthly, 12 issues per year, from 119 Grand Ave., Paonia, CO 81428. Periodicals, postage paid at Paonia, CO, and other post offices. POSTMASTER: Send address changes to High Country News, Box 1090, Paonia, CO 81428. See hcn.org for submission guidelines. Subscriptions to HCN are $37 a year, $47 for institutions: 800-905-1155, hcn.org. For editorial comments or questions, write High Country News, P.O. Box 1090, Paonia, CO 81428 or editor@hcn.org, or call 970-527-4898. For correspondence addressed to High Country News, HCN or to the editors, permission to publish will be considered implicit unless specifically stated otherwise.

EDITOR'S NOTE

We object

SOMETIMES I LOOK UP from the onslaught of news, which, for those of us who care about things like human rights and a livable planet, seems to grow dimmer by the day, and I think: How did we get here? How is it OK for anyone to believe that their fellow humans deserve to have fewer rights, and for our nation's highest court to officially agree? When did it become fashionable, and *legislatively defensible*, to disregard the health and well-being of the ecological communities we inhabit?

I'm thinking about the Supreme Court's recent session, with its massive assault on women's rights and its curtailing of the EPA's ability to regulate dirty energy — both huge steps backward for the country. It has been difficult to digest the immediate and possible future impacts of both of these rulings.

Consider how much delaying climate action will cost the economies and communities of the West. Our forests, our air, our rivers, our towns, our bodies — all will be affected. Delaying climate action is out of step with what a strong majority of people in our region want. According to Colorado College's 2022 State of the Rockies Project, 69% of Western voters feel more worried than hopeful about the future of our land, water, air and wildlife. Two-thirds want their representatives in Congress to focus on protecting resources and natural lands over drilling or mining. Only 7% of voters in our region want to encourage the use of coal, and only 8% want to encourage the use of oil as an energy source.

In other words: We want a different world, one not ruled by the constant threat of catastrophic climate disasters, including wildfires that burn hotter and longer and do far more damage to property and claim more lives than those of the past. All of this is linked to women's rights and human rights, because those who have been marginalized by systemic racism or sexism or any other isms will suffer more from climate disasters like wildfire than those in positions of power.

High Country News is invested in a healthy, equitable and joyful future for all inhabitants of the West — humans, other animals, plants and natural features such as mountains and rivers. We believe that such a world is both possible and worth fighting for. It's why my colleagues and I show up for work each day and look for stories that celebrate small wins, as well as those that hold government agencies and corporations to account. This vision of a healthy and equitable future is why we do the work we do. And we are grateful to you, dear reader, for being a part of it — and for believing in a better future, too.

Jennifer Sahn, editor-in-chief

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ON THE COVER
The moon shines through the smoke of the 2021 Caldor Fire as it burns in Eldorado National Forest near Pollock Pines, California. The fire burned more than 220,000 acres and destroyed more than 700 homes. **Max Whittaker**

OUR FIERY FUTURE

Gases are emitted from exposed coal seams on a ranch near Broadus, Montana (above, facing). A wildfire in neighboring Rosebud County last year was ignited by a coal seam and burned 170,000 acres. **Louise Johns / HCN**

A family on a trail in Bille Park in Paradise, California. During the Camp Fire of 2018, some Paradise residents huddled in a pavilion in the park for hours, sheltering from flying embers *(above)*. The blaze killed at least 85 people and destroyed 18,000 structures. **Andri Tambunan / HCN**

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REPORTAGE

BOOKS, CULTURE & COMMENTARY

OTHER MATTER

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.

SALMON SOLUTIONS?

I found the July 2022 article about the collapse of the Cypress Island salmon farm ("Salmon in Troubled Waters") to be equal parts fascinating, maddening and depressing. I was fascinated by the excellent storytelling about the events of August 2017, maddened by the complete lack of responsibility and humility on the part of Cooke Aquaculture, and depressed by the potential and already-realized impacts on wild salmon populations. What can those of us who love a good salmon dinner do to ensure that we are choosing salmon that are harvested sustainably — for the ecosystem, wild salmon populations and Indigenous peoples?

Ellen Tomlinson
Grand Junction, Colorado

HOPES FOR SUCCESS

Thank you for the great article on Willamette Falls ("Fracture at the falls" July 2022). I wish the tribes luck on sorting out a solution to gaining public access and restoring fishing rights to the people.

Tim Holmen
Sparks, Nevada

COLORADO'S RIVER GENIE

Thank you for Ben Goldfarb's thoughtful essay on ownership of Colorado's rivers ("Who owns Colorado's riverbeds?" July 2022). Fifty years ago, when I was a kid fly-fishing on my beloved Gunnison River and its tributaries, we thought little of who owned the riverbeds in which we were wading. But with the dramatic increase in tourism as well as the cost of land ownership, access to those same waters has become exceedingly contentious. Over the years, as I've purchased the fishing licenses that help fund state stocking of the rivers I fish, I have done so knowing that I am supporting private landowners who essentially receive well-stocked "private" waters in the deal.

I have fished waters across the U.S., including the fabled trout and salmon streams of Michigan. In that state's navigable rivers, private land ownership is inferior to the public trust right to fish. Can the courts be persuaded to reverse Colorado's long-standing rules regarding private ownership of riverbeds? I certainly hope so, but I doubt that genie can be put back in the bottle.

Barth Hague
Gunnison, Colorado

HYDROGEN HUES, BIG-GRID BLUES

Thanks for another excellent Jonathan Thompson infographic in the July issue — this time a succinct and fair explanation of hydrogen "hues." This piece is helpful, but I find it unfortunate that there is so much hype in media and among public officials around centralized "big-grid," capital-intensive energy, and not enough about already available local distributed solar, storage and microgrids. The focus of attention seems to be on serving the interests of investors and corporations over the interests of the people.

Tim Schoechle
Boulder, Colorado

CONCISE & POWERFUL

Dina Gilio-Whitaker's perspective piece on the #LandBack movement ("Environmental justice is only the beginning" July 2022) was beautiful in the way she concisely and powerfully articulated history, importance and urgency. She explains what land return means in a way that directly confronts the fears that arise when we (descendants of colonizers) imagine turning our homes and properties over to Native peoples. As Gilio-Whitaker explains, this is not the case. It reminded me of my reaction when I first learned the specifics of the #DefundThePolice movement. The phrase evokes fear of a lawless, crime-filled cityscape and, like #LandBack, seems, at first glance, completely unfeasible. I see now, however, that both of these describe a set of systemic changes that not only are feasible but are absolutely necessary to protect human rights and our planet. Truly, we all (including colonizers) would benefit from land return and reallocating funds away from our police.

Michael Rowley
Oakland, California

The article "Environmental justice is only the beginning" by Dina Gilio-Whitaker is one of the best I've ever read in your magazine. She so thoroughly spells out so many truths with such brevity.

David Poling
Grand Junction, Colorado

RESUBSCRIBED

It's been a love-hate relationship since I first subscribed in the Tom Bell days. But every time I've canceled I find myself coming back to the fold. A friend just gifted me the May 2022 issue and it's dazzling, and there is power in a name. *High Country News* — sign me up again.

P.S. Wonderful to have poetry back in the mix.

Art Goodtimes
Norwood, Colorado

I just resubscribed to your journal, and I knew I made the right decision when I encountered the essay about finding home by Diane Sylvain ("When I knew I had made it home," 6/30/22). What a gem! Her writing style is so refreshing and descriptive without being trite.

Ken Mitchell
Fort Collins, Colorado

SPRINGTIME LOVE

I wanted to briefly give you some kudos for the May issue, from the layout and content right down to the softer paper stock. I think it is a definite uptick in the quality of the magazine. Did I say poetry? Ironically, I think this direction will return some of the old readership, which might have been alienated by the necessary shift in editorial stance, without going backwards.

John Roehling
Denver, Colorado

CORRECTIONS

We have a few corrections for our July 2022 issue. In "Fracture at the falls" we mistakenly reported that Grand Ronde was a member of the Willamette Falls Legacy Project; the tribe actually was part of the Willamette Falls Trust. "Hydrogen hues" has a chemistry error: When a pair of hydrogens connects with a pair of oxygens, it forms hydrogen peroxide, not water. A caption on our Contents pages said that the J.H. Baxter wood treatment facility was next to the park pictured, rather than about a mile away. Toxins were found there during testing of areas near the plant, but their origins are unknown. Lastly, in "The beauty buried in the data," we misidentified the location of the Deep River and Grays River image. It is in Wahkiakum County, not Pierce County, Washington. We regret the errors.

Jennifer Gomez, who was diagnosed with acute lymphoblastic leukemia, a cancer of the blood cells, in 2019, poses for a portrait inside the home she has lived in for more than four decades. The Port of Los Angeles is just one block away.

REPORTAGE

One family, three generations of cancer

A new community survey exposes widespread cancer, asthma, anxiety and depression in Wilmington, California.

BY ADAM MAHONEY | PHOTOS BY PABLO UNZUETA

WHEN I VISITED Christina Gonzalez and her family in April, she sat slumped in her family's worn black faux-leather couch, trying to recall which explosion had shaken her neighborhood the most. The seven decades they've lived in Wilmington, California, are marked by the dates of the high-octane industrial fires that have erupted at each of the five refineries that surround their home.

There were so many disasters, she and her husband, Paul, both 73, told me. Was it the one in '84? Or maybe the one in '92 or '96? Each fire painted the sky in different shades of black and orange. Paul believes the biggest one might have been later — closer to '01, maybe, or even 2007 or 2009. He shifted uncomfortably in their living room; a recent procedure on his hip still made sitting difficult.

"When that refinery blew, there were black dots everywhere," Christina said, her short dark red-dyed hair framing her face, which was marked by lines from the stress. "All over the cars, the house, our fruit trees and patio furniture.

"It was raining oil," she said. She retired soon after that.

She had worked in the attendance office at Wilmington's Banning High School. She remembered how often students came through, their faces flushed with sickness. "I'd see it in their notes," she said. "Gone to the doctor, asthma, breathing issues, coughing — all the time. It was kind of heartbreaking to see these kids have to suffer as teenagers, and you could see it in their faces, how they didn't feel well." That was around the time her second-youngest grandchild was born.

Poor health, she says, is a painful but routine fact of life in her South Los Angeles community, an 8.5-square-mile tract surrounded

This story was produced in collaboration with Grist.

by the largest concentration of oil refineries in California, as well as the third-largest oil field in the continental U.S., and the largest port in North America. A recent *Grist* investigation found that since 2020, Wilmington has experienced a dramatic rise in deaths related to Alzheimer's, liver disease, heart disease, high blood pressure, strokes and diabetes — all conditions known to be exacerbated by high levels of pollution.

Illness has spread through the Gonzalez home, too. Christina has been diagnosed with lung disease, lupus and fibromyalgia, while her daughter, Jennifer Gomez, 42, has acute lymphoblastic leukemia, a cancer of the blood cells. Jennifer's husband has had two heart attacks, and her teenage son has "been hospitalized more times than a 90-year-old" for multiple severe respiratory infections.

Eight members of the family reside in the house today. Paul's mother, the first to move in, battled breast and skin cancer. Paul himself beat testicular cancer — twice. With his daughter's diagnosis, that's three generations of cancer in the same household. Since the early 1960s, the family has lived on Island Avenue, just one block from the Port of Los Angeles and about one mile from the Phillips 66 Los Angeles refinery. Jennifer jokes that a sane family would have moved, but the family knows it's not that simple.

Housing in Los Angeles is more expensive now than it has ever been. Besides, there aren't many places in Southern California where industry's grasp is any looser. Riverside, located in California's Inland Empire, is a prime example. The city used to be one of the most popular locations for Black and Latino families locked out of housing in Los Angeles, but today it's the site of a major warehousing boom and has the country's highest concentration of diesel pollution.

"We can't afford to sell, because where could we afford to buy?" Paul said. "It used to be that you could afford to buy out towards Riverside, but now that's getting to be more expensive than LA. There's no escape route."

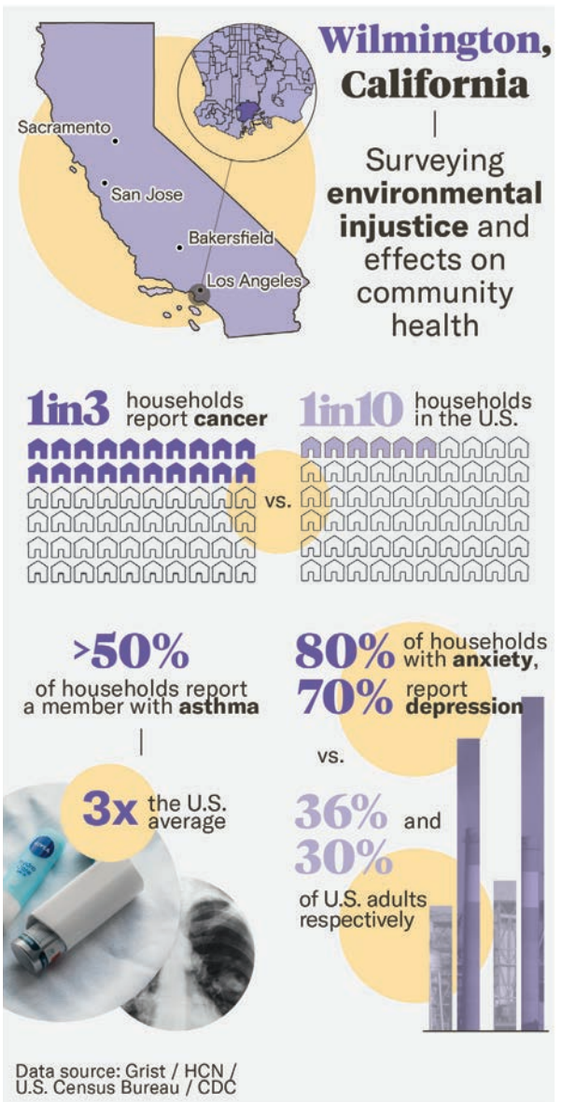
The federal Environmental Protection Agency says that air pollution can cause adverse health effects months or even years after initial exposure. "I know even if the pollution gets better and these refineries close, it is something that will stay within all of us for the rest of our lives," Jennifer said.

Since 2000, more than 16 million pounds of toxic chemicals, primarily hydrogen cyanide, ammonia and hydrogen sulfide, have been spewed into Wilmington's air from industrial sites in the city, according to the EPA. That amounts to more than 2,000 pounds of chemicals every single day. Two-thirds of the chemicals were emitted by the Phillips 66 refinery. In response to an inquiry from *HCN* and *Grist*, a representative from Phillips 66 sent an email statement, writing that its Los Angeles refineries are striving to improve operations in a "safe, reliable and environmentally responsible" way and noting that the company has employed $450 million in "emissions-reduction technology" since the early 2000s. The EPA's Toxics Release Inventory data does not include another major source of pollution in Wilmington: The twin ports of Los Angeles and Long Beach are the largest in the nation as well as the single largest fixed source of air pollution in Southern California; collectively, they are responsible for more pollution than daily emissions from 6 million cars.

The walls of the Gonzalez home are decorated with family photos. When I visited Jennifer and Christina in April, Christina wore a shirt with the word "JOYFUL" written on it in five different colorful fonts. Our conversation was sobering, despite the presence of a six-foot-tall stuffed animal that the children adore. "You can't go outside without hearing trucks from the port going down your street, seeing a cloud of smoke from one of the refineries filling the air, or tasting the sulfur," Christina said. "I've gotten to the point where you could say I'm depressed.

"I get tired of calling the doctors to make appointments because I'm having breathing problems," she added, "and then with the pandemic, being stuck inside

The Phillips 66 refinery looms over Wilmington. Over the years, the refinery has had equipment leaks, which are one of the largest sources of toxic emissions for refineries.



Jennifer Gomez holds the medication she takes for her acute lymphoblastic leukemia *(top)*.

Irene Gonzalez, 94, a leukemia and breast cancer survivor, stands for a portrait outside her Wilmington home *(bottom)*.

watching my daughter (Jennifer) get so severely sick with leukemia."

Just a few weeks after we spoke, Christina was hospitalized for a serious infection. She spent two weeks in the hospital and was then released for daily treatment at home.

THIS YEAR, I moved back to Wilmington, where I grew up, after five years away. In part, my return was driven by a desire to write about — and on behalf of — my old hometown, an assignment that started with uncovering the hidden impacts of a century of environmental injustice. For three months, I canvassed the 1.5-square-mile area around the 103-year-old Phillips 66 refinery, an area that included my childhood home. My project, supported by *Grist* and the University of Southern California as well as by *High Country News*, focused on the physical, environmental and mental health impacts of air pollution. It came down to this: What is it like to live next to an oil refinery? Roughly 2,200 homes were initially contacted through in-person canvassing and postcards. Ultimately, 75 households, home to more than 300 people, opted to participate. The collected survey data has a 10% margin of error, equivalent to that found in the U.S. Census Bureau's American Community Survey.

While I found the survey responses to be shocking, Alicia Rivera, a community organizer in Wilmington, reacted stoically when I shared the data with her. "None of this is unexpected," said Rivera, who organizes with the Wilmington-based environmental justice organization Communities for a Better Environment. "In fact, it corroborates and legitimizes what we see every day, and it brings into

"No one seems to understand how much front-line communities have put on the line — our health and lives — just for these polluting companies to profit."

question the 'official' data and stories we're told from regulators."

For more than a decade, Rivera has been an integral part of Wilmington's community-organizing ecosystem, seeking accountability from both industry and regulators. Most recently, she was a lead organizer for a successful drive to phase out oil drilling in the city of Los Angeles. But it will take more than a few legislative changes to bring justice to the residents, she said.

"We struggle, and we struggle," she told me, sitting in her organization's office a few blocks from the port. "No one seems to understand how much front-line communities have put on the line — our health and lives — just for these polluting companies to profit."

California is often held up as a model for climate policy, environmental legislation and pollution regulation, but those standards are rarely reflected in front-line communities, said Hillary Angelo, a sociologist at the University of California, Santa Cruz. Angelo, who recently published a study analyzing climate plans in 170 California cities, found that local governments aren't adequately implementing structural changes now.

"Communities on the front lines dealing with legacies of pollution, bad planning, and exclusionary practices are already confronting climate impacts directly," she said during an interview earlier this year. Her research showed that local governments were more inclined to pass legislation with an obvious aesthetic appeal, such as tree-planting initiatives, rather than initiatives that took "histories of racial and economic injustice" into account.

"The inclusion of 'green' policies doesn't seem to have any relationship to the needs in particular places," she explained. In a place like Wilmington, it is "much harder to pass the important life-saving policies like improving public transit and affordable housing or funding contamination cleanup and renewable energy."

Few of the Wilmington residents Rivera works with automatically make a connection between the climate crisis and the issues plaguing their community. Once they do, however, it is an eye-opening experience. "Their biggest concern initially is the pollution from refineries, because it's the more visible thing," she said. "Then they realize its impact on their quality of life, their crumbling streets, the smells in the air. They start to put things together about how it is associated with their poor health."

Over the last four years, Rivera and other local organizers have created the Just Transition Fund to ease the impacts of life in an industrialized community. From President Joe Biden's proposed Civilian Climate Corps to California's Climate Jobs Plan, various attempts have been made to fund and otherwise support the nation's shift to clean energy, but the programs tend to neglect the cumulative impacts of the country's historical dependence on fossil fuels. The Just Transition Fund, Rivera said, would not only help fund training programs for clean energy workers and environmental remediators, it would also pump cash directly into front-line communities like Wilmington. "We need accountability," Rivera said, "and one way to do that is by using federal funds and corporate funds to help pay for things like health care and disability coverage in places paying the price for our pollution."

Jennifer Gomez acknowledges that programs like Rivera's would have an immediate positive effect on Wilmington. At the same time, however, they won't erase the past, and they certainly won't cure those already suffering from cancer in the community.

"I told my oncologist that if I survive, I want to fight back against the refineries and pollution," Gomez wrote in her response to our survey earlier this year. "I firmly believe it's why I got cancer, and why my best friend died of cancer, too, as well as so many other Wilmington residents."

POEM

At My Daughter's Riding Lesson

By Keetje Kuipers

What was the name of that bar
where I kissed a blonde in a photobooth,

her husband just the other side
of the oilcloth curtain? Or the street

where our apartment sat above the train, soot
speckling the ceiling like a bad lung

we lived inside of? The letters we wrote then —
not love — but some bright threads like birds

might down their dull nests with. Now rain
on the roof of the barn, swallows back

after their long winter away, memory no more
than a season. Sometimes I long

for the kind of sadness inside of which
no one could ever touch me. In the snowmelt

puddles beside the barn we once found blood
pooled on the surface like oil, a thing held

deep inside, never meant to be brought up.
But I know what it would mean to choose

to return to the world after real loss —
to my heart with its broken tremolo, to this girl

on a horse, the reins in her still-soft
hands — because I do and I do and I do.

WEB EXTRA Listen to Keetje Kuipers read her poem at **hcne.ws/riding-lesson**

Remediation debt dodging

One sale illustrates how oil companies avoid cleanup costs: by constantly putting it off.

BY NICK BOWLIN

JACKSON COUNTY, Colorado, is not known for oil and gas production. This sparsely populated northern county — population 1,363 — is far from the state's oilfields on the Eastern Plains, which tap into the huge Denver-Julesburg Basin.

But there is some energy development here, including 110 wells on federal public land. K.P. Kauffman, an oil and gas operator with a history of environmental violations, acquired the wells in 2018 from another Colorado company.

It was a minor transaction, the sort that happens all the time.

One company wants to get older, low-producing wells off its books; another sees some remaining profit in them. According to industry experts, however, transactions like this reveal, in miniature, the billions of dollars of accumulated liability created by more than a century of oil and gas extraction in the country. These wells would cost at least $9.6 million for the new owners to clean up, according to Colorado's average well-plugging costs; other estimates put the amount even higher.

"At no point in the process were companies asked to set aside the true cost for cleaning up these wells," said Clark Williams-Derry, a finance analyst with the Institute for Energy Economics and Financial Analysis.

FOUR YEARS AGO, K.P. Kauffman acquired the 110 wells from a company called Bonanza Creek. They were not choice assets. At the time, the wells averaged around 32 years old — the oldest were over 70 — and their cumulative production had declined annually since 2011, according to state oil and gas data. About 60% were still actively producing. By 2017, the year before the sale, they were averaging less than two barrels of oil (BOE) per day. Below two BOE per day, a generally accepted industry standard, wells are often considered to not be economically viable.

Bonanza was aware of this decline. In its 2014 year-end report to the U.S. Securities and Exchange Commission (SEC), it reported a stark drop in the wells' value. The company's estimate of their worth in a sale had fallen to zero dollars. Even so, Bonanza decided to sell. In two financial statements submitted to the SEC in 2015, it stated its intention to get rid of its Jackson County assets.

For whatever reason, though, the sale did not take place right away. In early 2017, Bonanza declared bankruptcy. After some restructuring, it re-emerged a few months later, and, the next year, successfully sold the 110 wells for $100,000 and "full release of all current and future obligations" — meaning the legal responsibility to plug the wells. For 110 wells, $100,000 isn't much. By comparison, drilling a single new, highly productive fracked well in Colorado could cost about $6 million today, according to an analysis of market data by Williams-Derry.

Since the sale, K.P. Kauffman has not plugged any of the wells, which have shown declining net production every year, according to Colorado Oil and Gas Conservation Commission (COGCC) data, including a 19% production drop the year after the transaction. By 2021, the wells averaged a scant 0.37 BOE per day. K.P. Kauffman is unlikely to be making much money, according to a cash-flow analysis by Dwayne Purvis, a petroleum engineer for more than 25 years.

"I estimate that these wells were not profitable to operate under normal operating standards," he said. "An operator might be able to make money on them, but it would require spending little on items like supervision, preventative maintenance and repair."

So, what did each party see in the deal? For Bonanza, the sale coincided with a period of mergers, culminating in a consolidation with other Colorado drillers into a new company, Civitas Resources, now one of the state's largest oil companies. The Jackson County wells had been in decline for years, so Bonanza got rid of assets with small value for a small return, or, as the company put it in SEC filings, "minimal net proceeds."

Bonanza removed the wells from its books, along with, crucially, the requirement that it pay to plug them someday.

As for K.P. Kauffman, it got wells that are still producing oil, even if it's in minor quantities. It got something that will turn a profit in the short term. In response to a list of questions, a company spokesperson told *High Country News*: "Our own investigation of these assets at the time of the transfer makes us confident in their value."

It's possible that K.P. Kauffman believed it could operate the wells more cheaply — thus profitably — than Bonanza. But even if that were true, Purvis said that if the plugging costs were included, he would consider them a "net liability."

"Even assuming reduced operating costs at the time of transfer, there was no viable scenario for the wells to generate enough profit in the future to pay for their plugging," he said. (Purvis is working with Carbon Tracker, a climate think tank, on a forthcoming report about the problem of paying for plugging declining wells in Colorado.)

This appears to be part of K.P. Kauffman's wider strategy: Low-producing wells make up a significant slice of the company's more than 1,200 Colorado wells. State data from 2021 shows that 84% of its wells — both active and inactive — produced less than two BOE per day. It's a business model that appears to rely on not factoring in the true cost of plugging those wells.

This is a national problem: Plugging all the unplugged onshore oil and gas wells in the U.S. will cost at least $280 billion, according to Carbon Tracker. Colorado alone has approximately $8 billion in unplugged wells. A recent study from the Bell Policy Center found that Colorado's insufficient financial requirements for oil and gas companies leave the state at risk of a taking on a large chunk of that liability, potentially overwhelming the state's budget.

Nearly all of the Jackson County wells are on federal public land, overseen by the Bureau of Land Management. The BLM does not require companies to secure the true cost of cleanup for each well up front. Instead, the agency requires, at minimum, a blanket bond, where a single $150,000 bond covers a company's federal wells nationwide. But plugging the Jackson County wells alone could exceed $10 million. In a review of the federal leasing program ordered by President Joe Biden, the Interior Department recommended increasing federal bond requirements, but did not address transfers of risky or low-producing wells.

As of March 1, Colorado has implemented sweeping new oil and gas rules that increased financial requirements across the board, including compelling companies to put forward individual bonds on low-producing wells. The new, stronger bonding requirements

An oil well no longer in use litters the landscape with abandoned facilities and equipment in Jackson County, Colorado. Cleanup for all of Colorado's unplugged wells would cost $8 billion.
AAron Ontiveroz / The Denver Post

apply to K.P. Kauffman's existing wells, along with all other operators. The new rules will ultimately apply to BLM wells in the state, but as of now, they are exempt.

The rules also increase scrutiny on the transfer of low-producing wells, including more stringent financial requirements.

"We can't stop a private business transaction," said John Messner, a COGCC commissioner, in a phone interview, "but they have to meet the financial assurance obligations and every other operator obligations under the (new rules)."

FOR SEVERAL YEARS, K.P. Kauffman has been in regulatory trouble with the COGCC. Agency staff have even suggested that the company no longer be allowed to operate in Colorado.

This process began in 2019, when state regulators noted a worrying pattern of spills, leaks and other incidents at K.P. Kauffman's wells.

The COGCC would subsequently order the company to stop production at 87 wells and remediate more than two-dozen incidents the agency described as "a pattern of violations." Concentrated on Colorado's Front Range, they included a leaking flowline next to a high school and spills in agricultural fields. Agency and company also agreed to a $2 million fine in 2021 — more than half was deferred — as well as a plan for bringing the company into compliance.

This June, the COGCC called K.P. Kauffman for a hearing. Agency staff had concluded that the company was not meeting multiple deadlines or fulfilling its agreement. More than 20 spills have been reported since K.P. Kauffman agreed to the cleanup plan, according to agency staff.

Caitlin Stafford, a Colorado assistant attorney general who represented agency staff, said that the company had agreed to clean up 58 violation sites eight months ago.

"Only two of them have achieved completion," she said. "Two."

The company's legal counsel argued that it is trying to comply but has not been given enough time. In a statement to *HCN*, the company said, "Accelerating our progress on the clean-up work required under the Compliance Plan Agreement is our highest priority."

The COGCC commissioners criticized the company but ultimately did not revoke its permit or impose immediate fines. Instead, K.P. Kauffman has until the end of the year to meet the compliance plan. If the company does not show progress, "I'm ready to throw the book at them," said Jeff Robbins, a COGCC commissioner, during the hearing. An accountant testifying on behalf of K.P. Kauffman said that imposing the full fine would likely force the company into bankruptcy. This could saddle the state with the cost of plugging many of the company's wells.

"K.P. Kauffman is counting on the assets producing some oil and gas in the short term, and delaying cleanup in the long haul," Williams-Derry said. "K.P. Kauffman keeps the profits, its executives get paid, and then at the end of the line, they can go bankrupt if they need to, and say, 'This isn't our problem anymore.'

"The final bag holders of all of this are the taxpayers."

HCN

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What are you reading?

I hope your summer is already brimming with lazy days in a hammock, time spent with friends, exploration, discovery and wonder — all fantastic things in their own right, and (for my purposes) potentially a handful of squares claimed on your *HCN* summer reading card.

If you can peel back your heat-induced amnesia to July, you might recall that I wrote to you about starting an *HCN* summer reading program: a card full of prompts written by myself and Melissa Chadburn, our new contributing editor for books, culture and commentary. Read a book that matches a prompt and claim that square. Fill a row or a column, send us a photo of your card (to dearfriends@hcn.org or use #HCNSummerReading on Twitter or Instagram) and we'll send you *HCN* prizes!

Your lazy day in the hammock can become "Mark how long you've been reading by the shadows." Stuff a few books in your tote, and time spent with friends is easily "Lend your 3 favorite books to 3 different people." The card is also a jumping-off point for some *HCN*-y reading about power, nonhuman viewpoints, place and wonder.

We also want to know what you're reading. Bookmark **reading.hcn.org**, where you can tell us what your best picks are for any of the prompts on the card. What I hope emerges is a compendium of *HCN*ers' favorite book selections for the range of interests we share. I'm also curious about how each prompt is interpreted by the cross-section of Westerners and West-obsessed readers we represent. What does it mean to you to challenge power? What brings you joy? What sparks wonder in you? What are the places you know and love?

So please visit reading.hcn.org as you continue to read this summer, and share with the group your favorite picks. We'll all get some interesting book recommendations, and maybe a new look at the intentions and interests we share.

— Michael Schrantz, marketing communications manager

Gabriella Trujillo / HCN

Submit your book picks

Visit **reading.hcn.org** to let us know what you're reading as part of the #HCNSummerReading program.

How to play

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Remember: Submit your picks as you go along at ***reading.hcn.org*** *and check back for what other* HCN*ers are reading.*

It Takes a Village

Experts say community approaches to reducing fire risk are desperately needed.

By Kylie Mohr | Photos by Andri Tambunan

WHEN THE CAMP FIRE RACED through Paradise, California, in 2018, the town's residents were faced with a decision: They could stay in their homes, which might burn to the ground; they could sit in traffic on one of the four clogged evacuation routes in the fire's path; or they could retreat somewhere that might be protected from the encroaching flames. Around 75 people rushed to the west side of town, where they sought refuge in Bille Park, 56 acres of redwood groves, hiking trails and a playground. They spent hours in the city's green space, huddled under a large metal picnic pavilion, sheltering from flying embers, but they survived.

"If they'd stayed at home, they would've likely perished," said Dan Efseaff, the Paradise Recreation and Park District manager. Sparked by electrical transmission lines, the Camp Fire was the deadliest, most destructive fire in California history. The blaze killed at least 85 people and destroyed 18,000 structures. And it showed how the usual suggestions for home hardening, such as clearing vegetation or removing propane tanks near homes, are not always enough on their own — especially since not everyone can afford to do them. Efseaff and other Paradise government leaders realized that when a fire is that dangerous, individual actions aren't enough to protect homes and people from future fires. Efseaff is now working on a project that he hopes can protect entire neighborhoods, not just individual properties: a combination firebreak and trail system that would encircle Paradise.

Efseaff had the idea for a perimeter trail before the Camp Fire struck, but the conflagration gave the project a new sense of urgency. And the Bille Park survivors, who turned to a city park in their time of need, inspired him to see park land not only as a space for recreation, but also a potential firebreak. "Our vision is to build a buffer around the entire community," he said. "It's fire risk reduction from a community standpoint." It's an approach that could protect entire neighborhoods, not just individual homeowners with the time, money and space to landscape their yards and retrofit their homes.

THE PROPOSED COMMUNITY FIREBREAK in Paradise differs from conventional home hardening techniques, which focus on building-level strategies that require homeowners to shore up their own property. Local governments and federal and state agencies like CAL FIRE encourage removing potentially flammable

items like stacked firewood, patio furniture and combustible plants like juniper and eucalyptus from a home's immediate vicinity. Homeowners can also install new roofs that replace untreated wood shingles with materials that don't burn as easily, such as concrete, metal and slate, and they can replace single-pane with double-pane windows. Lab research and post-fire analysis show that building materials and design are key factors in determining which homes survive. For example, in 2008, California enacted building codes for new homes in high fire risk areas that required fire-resistant materials and at least 100 feet of defensible space between homes and flammable foliage; in Paradise, about 50% of homes built after 2008 survived the Camp Fire, while only 18% of older homes remained.

While there are some less expensive measures people can take to protect their homes, like clearing gutters of pine needles, which can act as kindling, most suggested retrofits are neither cheap nor easy — and that could leave some homeowners vulnerable. As climate change sets the stage for more frequent and more damaging fires, experts say that wildfire preparedness that protects the life and property of everyone, not just the wealthy, has become a climate equity issue. Retrofitting a three-bedroom home with a new wildfire-resistant roof can cost over $27,000, according to a price study done by Headwaters Economics. "A lot of people don't have the time or space to think about wildfire," said Amanda Milici, who helps communities brace for fire at the Tahoe Resource Conservation District. "Preparedness really is a privilege."

Current fire retrofit and mitigation recommendations are not designed with all types of housing in mind. "They're implicitly assuming a single-family home on a large lot," said Kathryn McConnell, a postdoctoral researcher who studies environmental sociology at Brown University. "And that, of course, leaves open the question: How do we protect buildings that are multifamily buildings, or mobile homes in close proximity to other homes?" The Camp Fire incinerated the Ridgewood Mobile Home Park retirement community in Paradise; according to unpublished research by McConnell, the fire destroyed over 3,800 mobile homes.

Renters, too, are often left out: "There's often limited incentives for renters to make their own financial investments, and time investments, into improving a property that's ultimately owned by someone else," McConnell said. In South Lake Tahoe, Milici, a renter herself, created a renter's guide for how to prepare for wildfire (available in English and Spanish) after she was evacuated during the 2021 Caldor Fire. "Although not intentional, we realized our resources weren't specifically relatable to nonhomeowners," Milici said. "We realized renters wouldn't be able to find information about wildfire preparedness that only applies to them, like renters' insurance and making a defensible space plan with your landlord."

And landlords may not take action, either. Brett Van Paepeghem, the southern Idaho project manager for nonprofit Idaho Firewise, helps run a demonstration garden of fire-resistant landscaping in Boise, Idaho. While he's assisted hundreds of individuals and at least a dozen homeowner associations with property consultations over the last 16 years, no landlords have approached him.

Rather than just relying on residents to retrofit their homes to mitigate fire, Efseaff's proposal puts the onus of protection on the community. A firebreak could defuse a fire before it even reaches the residents' homes. Paradise's unique topography naturally sets the perimeter: Butte Creek and the West Branch Feather River carve canyons that create a triangle around the town. The canyons are steep, subject to high winds, and densely treed — risky areas for out-of-control wildfire behavior that would benefit from a bordering firebreak. Local land managers will thin dense existing foliage, and then plant or seed new trees to create a narrow strip of healthy forest where they'd tend to potential fuels like overgrown bushes, shrubs and trees. That will also create space to build trails for runners, walkers and bikers. It might also incorporate techniques like prescribed burns and grazing to keep vegetation under control.

Efseaff applied for funding through the Federal Emergency Management Agency in December 2020 and is waiting to hear whether the town qualifies. The parks department has acquired 100 acres of property to date, including donations from owners who don't want to rebuild. It's still far from its goal of a total of 16 miles encircling the community, but it has also received private funding that allowed it to hire a project manager to buy more property.

The firebreak won't be easy, or cheap, to create: Land acquisition and initial thinning could run about $30 million. Additionally, scientists don't yet know how effective large firebreaks would be; a literature review by the Conservation Biology Institute, Paradise Recreation and Park District and The Nature Conservancy found that little empirical testing had been done. More field experiments are needed to test firebreaks' usefulness and limitations on a large scale.

But thinking outside the box is necessary these days, and Efseaff is optimistic that the project will not only succeed, but also spread the message that community-level wildfire preparedness should be part of every town's fire planning. "It matters what happens in the neighborhood," he said. "Fire doesn't stop at the fence line."

The Institute for Journalism & Natural Resources supported reporting for this story.

Scenes from Bille Park, in Paradise, California, including the large pavillion that residents sheltered in during 2018's Camp Fire. The park inspired a model of wildfire resistance that uses community green spaces.

Forever Fire Season

How climate change makes wildfire more likely to happen all year round.

BY JONATHAN THOMPSON

ON APRIL 5, the Santa Fe National Forest put out two press releases. One announced that it would conduct the long-planned Las Dispensas prescribed burn west of Las Vegas, New Mexico, the following day, "if forecasted conditions stay in place." The low-intensity burn was intended to reduce fuel buildup — and therefore lower the risk of a catastrophic wildfire — in the Gallinas Watershed, Las Vegas's primary drinking water source. The other press release, from its "Wildfire Preparedness is Year-Round" campaign, urged residents to prepare homes and yards for fire, since wildfire season was "just around the corner."

That corner turned out to be a bit closer than anticipated.

On the morning of April 6, the weather conditions were favorable for burning, so, after a successful test burn, the fire crews got to work. But that afternoon, erratic winds kicked up unexpectedly, blowing embers from the intended burn into unintended places and igniting spot fires that could not be contained. The Hermits Peak Fire was officially declared a wildfire that same day and would soon merge with the Calf Canyon Fire — ignited later by still-smoldering slash piles the Forest Service had burned back in January — to become New Mexico's largest fire on record. That the Hermits Peak Fire was sparked by a prescribed burn is clear. But the reasons it blew up so calamitously are a bit more complicated. More than a century of fire suppression and the long absence of Indigenous fire stewardship, which together increased the buildup of hazardous fuels, certainly contributed, as did the string of dry years the region has experienced. And then there was the Forest Service's miscalculation that fire season was still "just around the corner."

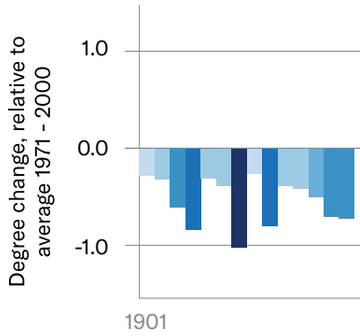
In fact, there is no end or beginning to fire season anymore. It's year-round. And while neither the Hermits Peak Fire or the Black Fire in New Mexico, or Arizona's Pipeline and Tunnel fires — all big blazes that burned across the West before summer even began — can be tied directly to climate change, this new forever fire season can. Warming temperatures can affect snowfall, cause snow to melt earlier, and increase atmospheric thirst, thereby drying out all the fuels that have built up over the last hundred years or more, making them that much more flammable — even during early spring.

And had forest officials working the Hermits Peak Fire acknowledged the long-term effects of climate change, rather than thinking about the short-term weather forecasts, a Forest Service investigation of the Hermits Peak Fire noted, it "would have led ... to more favorable outcomes." Policymakers, take note: Climate change is here, and it's time to recognize it.

Sources: "Gallinas-Las Dispensas Prescribed Fire Declared Wildfire Review," by the U.S. Forest Service; Santa Fe National Forest; Desert Research Institute; "Increasing western US forest wildfire activity: sensitivity to changes in the timing of spring," by A.L. Westerling; NOAA; EPA; National Interagency Fire Center; CalFire; "Impact of anthropogenic climate change on wildfire across western US forests," by John T. Abatzoglou and A. Park Williams.

Infographic design by Luna Anna Archey

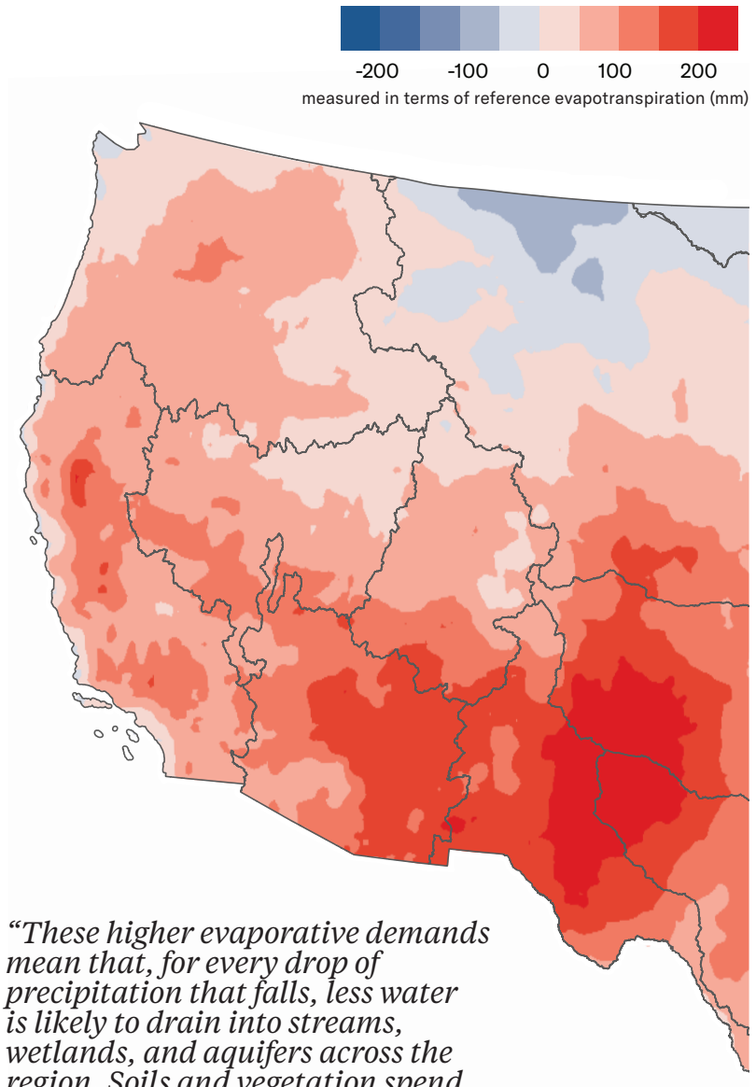
Temperature change in North America, relative to average of 1971-2000 (°C)



THE CAUSE Fossil fuel burning has caused the atmospheric concentration of carbon dioxide to soar to more than 400 parts per million — about 1.5 times pre-industrial revolution levels. Carbon dioxide and other greenhouse gases trap heat, causing the planet's temperature to rise.

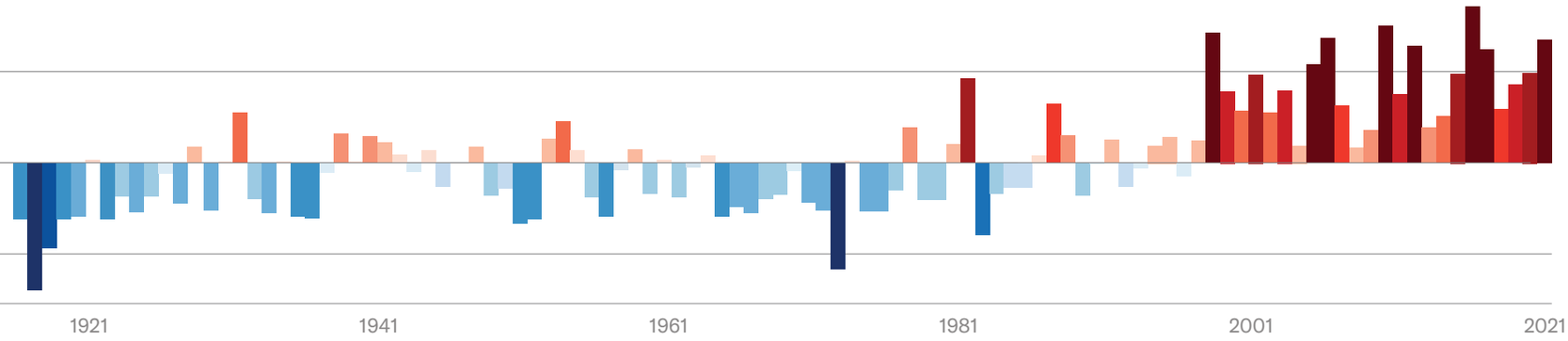
This April, even as fires raged in New Mexico, the Desert Research Institute published a study that found climate change was increasing evaporative demand, or atmospheric thirst, causing more water to be sucked from the soil into the air via evaporation and transpiration from plants (and snow and reservoirs), leaving less water in the streams and soil. Crops in the Rio Grande Basin, for example, where some of New Mexico's blazes burned this spring, need 8% to 15% more irrigation now than they did in 1980.

Change in atmospheric thirst, 1980-2020

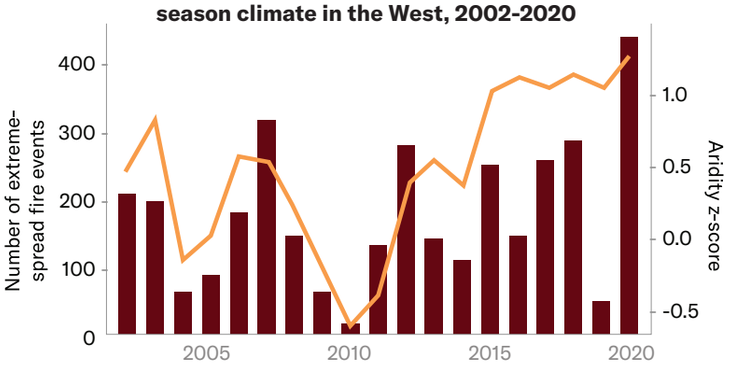


"These higher evaporative demands mean that, for every drop of precipitation that falls, less water is likely to drain into streams, wetlands, and aquifers across the region. Soils and vegetation spend more time in drier conditions, increasing potential for forest fire, tree mortality, and tree regeneration failure."

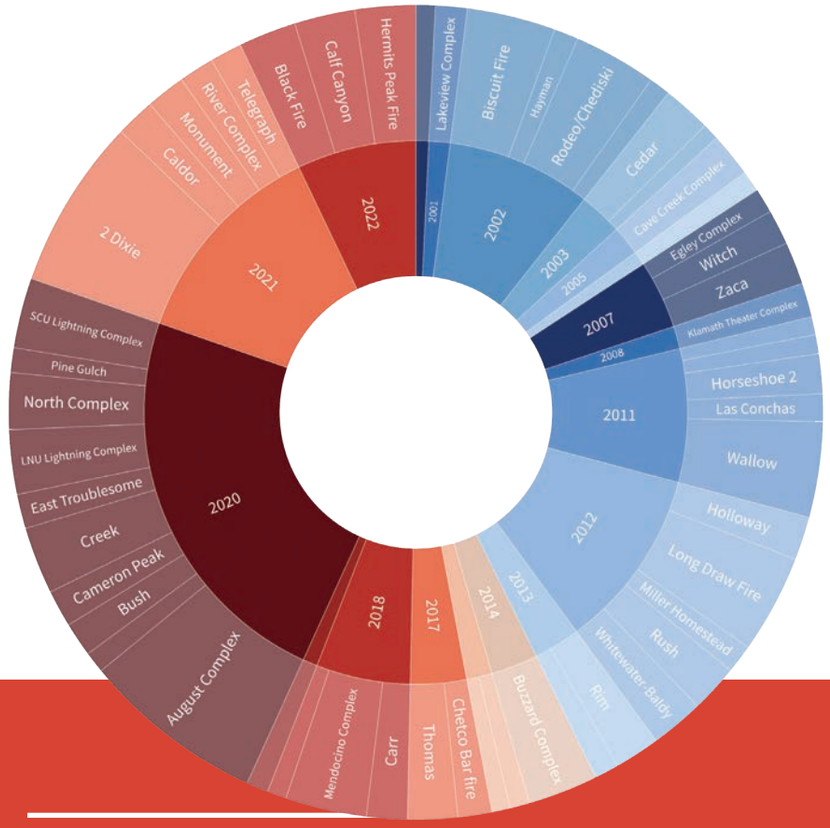
—The Desert Research Institute



Annual extreme-spread fire events and fire season climate in the West, 2002-2020

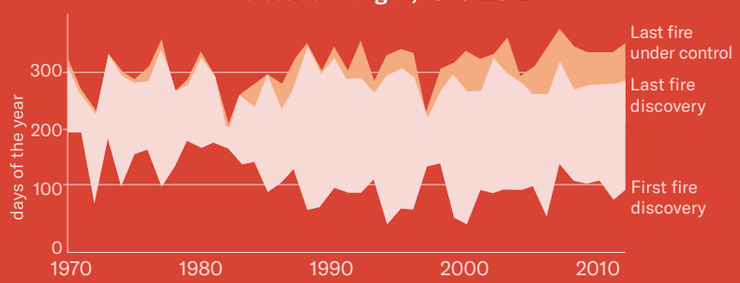


THE CONNECTION "Since the 1970s, human-caused increases in temperature and vapor pressure deficit have enhanced fuel aridity across Western continental U.S. forests, accounting for approximately over half of the observed increases in fuel aridity during this period. These anthropogenic increases in fuel aridity approximately **doubled the Western U.S. forest fire area** beyond that expected from natural climate variability alone during 1984–2015."
— John T. Abatzoglou and A. Park Williams, PNAS, 2016



THE EFFECT In the 1970s, the first fires of the year typically were reported in April or even May, with the last ones occurring before mid-October. By 2012, fire season had grown by at least a few weeks on either end, with starts as early as March and as late as November. Climate change continues to extend the season today: The Marshall Fire in Colorado destroyed 1,000 homes at the end of December 2021, and New Mexico's two largest fires on record had together burned nearly 700,000 acres before this summer even began.

Fire season length, 1970-2012



The West's largest wildfires since 2000

After the Big Burn, aka the Great Fire, charred 3 million acres in the Northwest in 1910, the U.S. Forest Service began suppressing wildfires as quickly as possible. For decades, this resulted in much smaller fires, but the "fire deficit" also allowed fuels to build up in the forests. Warmer temperatures caused by climate change dried out the fuels and made them even more flammable, ultimately leading to larger and larger fires. Most of the region's biggest fires on record have burned in the last two decades, and the most mega of those mega-fires occurred between 2020 and 2022.

5,238,977

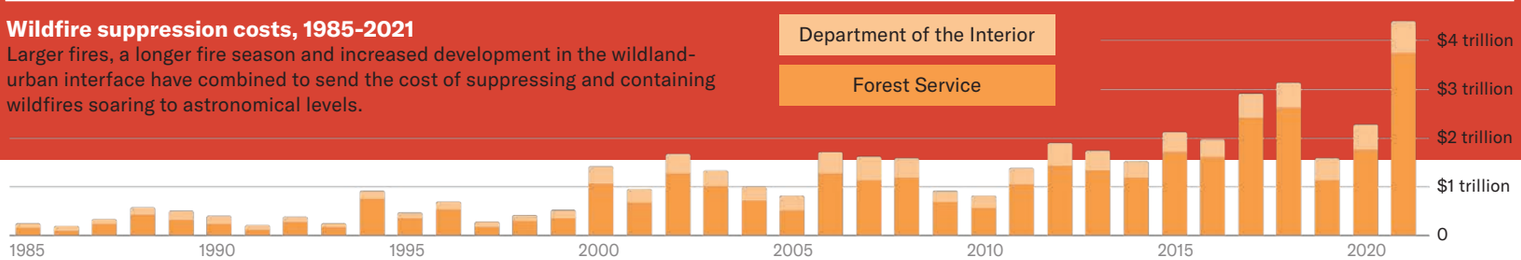
Number of acres that have burned in U.S. wildfires as of July 15 this year.

865,620 acres

Size of the Lime Complex Fire, currently the largest of several wildfires burning in Alaska this summer, as of July 19.

Wildfire suppression costs, 1985-2021

Larger fires, a longer fire season and increased development in the wildland-urban interface have combined to send the cost of suppressing and containing wildfires soaring to astronomical levels.



AFTER

Okanogan County, Washington, had hardly recovered from the last devastating wildfire when the next one struck.

By Madeline Ostrander
Illustrations by Sarah Gilman

THE STORY THAT TAKES PLACE after an acute disaster such as a fire or a flood is generally unglamorous, especially when compared with the adrenaline-charged heroics of fighting fires or rescuing people who are trapped or injured. In this era of catastrophe, we can always distract ourselves with the next fire, the next flood, the next tragedy — ride the crest of the drama without asking what happens in the years after a place burns.

But it's important to understand how people can recover, too. After all, sifting through the wreckage, putting things back in order where possible, salvaging what still has value — these tasks are no less important, and in some ways require even greater mettle.

In 2014, the Carlton Complex Fire tore through Okanogan County, in north-central Washington. Hundreds of people were forced to evacuate, and more than 350 homes were destroyed. The flames were particularly destructive in the small town of Pateros, at the confluence of the Columbia and Methow rivers, where they reached into the very heart of the community, even destroying the town's water towers.

Carlene Anderson lived in Pateros and had spent 17 seasons fighting fire. She had never seen such dangerous and intractable conditions. She

THE FLAMES

remembered thinking, as she battled the flames of the Carlton Complex, "We are not going to contain this. We're not going to be able to handle this."

After the fire, she and her neighbors looked at the burned-up town and felt that they could never let this happen here again. Carlene's mother lost her home, a rental property and an orchard down the valley. Several children in every grade were houseless, along with about one-fifth of the school district staff and one-third of the fire department. Many months would pass before the kids in town would stop "playing fire" — like playing house, except your house is burning down and you have to pack up and evacuate.

Eventually Carlene realized she had crossed over into a new sort of reality, where climate change stoked more dangerous and more frequent wildfires. They would all meet this sort of fire again, and they would all have to learn how to protect themselves, how to rebuild, and how to help one another through.

IMMEDIATELY AFTER THE FIRE, the people of Pateros began en masse cleaning up trash and debris. There were yards full of ash and rubble to dig up; truckloads of melted and warped scrap metal to haul away; concrete foundations to be excavated or buried onsite; burned trees and brush to remove. It was like an archaeological dig in reverse. Could you take a major catastrophe and hide it, bury it, haul it away, so that people could move on with their lives?

A stream of donations from around the country started piling up in the Pateros fire hall, the city hall and the school, and someone had to decide what to do with all of it. Some things were useful — water, food, clothing in good condition. But many were not — broken appliances, old bird cages, tattered swimsuits, a rusted push mower. There were enough items to fill multiple warehouses. They required perpetual sorting and reorganizing.

Carlene threw all her energy into helping manage this messy recovery process. She knew nothing about disaster recovery — an entire professional field of its own — and felt as if she was cramming a university course of study in the subject into just a few months. She spent every day scouring websites, making phone calls to navigate the convoluted processes of applying for government aid and philanthropy, getting access to heavy equipment, dealing with cleanup of wastes both hazardous and benign, and addressing miscellaneous government requirements.

She helped set up the Pateros-Brewster Long Term Recovery

Organization. (Brewster, a small city just north of Pateros, had also sustained fire damage.) She worked without pay until she couldn't any longer. In September, the group's board cobbled together a salary for her, and she took the helm as its executive director. Just a few months later, she took charge of the Carlton Complex Long Term Recovery Group, which led the effort across the county.

The U.S. Federal Emergency Management Agency (FEMA) supplied money to rebuild public buildings and infrastructure in communities damaged by the Carlton Complex Fire, but refused any aid to private property owners, a decision that frustrated many in the valley, including Carlene. FEMA also called in legions of disaster volunteers. Many of the major Christian churches have disaster response wings, some of them vast and well organized. Such volunteers are not supposed to preach, only help. "Disaster chaplains," clergy and some laypeople trained to support survivors of disasters, usually commit to a code of ethics that includes this fundamental rule: "Do not proselytize." By the fall of 2014, teams of volunteers from Christian Aid Ministries, Western Anabaptist Mission Services and Mennonite Disaster Service had arrived.

Carlene's new organization housed some of the volunteers at Alta Lake — a tiny resort area two miles south of downtown Pateros that had been ravaged by the fires. They stayed in a motel that had survived the disaster, but the keys, in a now-torched outbuilding that had served as a clubhouse, had all melted. "So we had to crawl through windows and open the doors," Carlene said. Then the volunteers were dispatched all over the area to help with cleaning up, clearing debris and providing emotional support.

It was a massive endeavor. In Pateros and Brewster, disaster chaplains helped people sift through ash so they could try to recover lost belongings, valuable jewelry, ceramics. A group of retired veterans and firefighters made house calls and cleared debris. "They were fast and furious," Carlene recalled.

Some locals set up entire new business ventures based on the cleanup effort. For instance, a Pateros mom of a teenager started a scrapping business at the behest of her son, to help pay to rebuild her own home.

Meanwhile, there was the question of where to house people who'd been displaced. A third of the firefighters in the Pateros Fire Department had lost their own homes while they were out trying to contain the Carlton Complex and save the homes of others. The Pateros mayor stepped down shortly after the fire because her house had burned down, along with her mother's and uncle's homes, and she needed time to

support her family. People camped around the city in tents and trailers.

Carlene let two wildfire survivors stay at her late grandparents' place in Brewster. Meanwhile, the Recovery Group brought in dozens of trailers, many donated, some acquired on Facebook, and asked people with vacation homes to house the displaced. In the fallow months of winter, a local orchard let wildfire survivors move into its farmworker housing.

The first person to rebuild was a retired teacher named Sue. She was one of the lucky few to make a successful insurance claim, and she hired contractors to put up a new house where her old one had been, near the golf course at Alta Lake. The volunteers helped clear her yard. One photo of the community's work on this house would become iconic: Carlene and other community members and volunteers raising Sue's first wall with their hands. In the end, it was a modest house, tan and brown with an ample garage — done by Christmas. The symbol of things to come, Carlene hoped.

As the piles of ash and debris shrank and disappeared from the landscape, she and her collaborators, including philanthropists from around the area, decided they would build more houses for those who had little to no means to recover on their own. There were many in this category. The people of Okanogan County — wherein sit Pateros, Twisp, Winthrop, parts of the Colville Reservation and a scattering of other small communities in a landscape roughly the size of Connecticut — have one-third smaller household incomes on average than other people in Washington state as a whole and are nearly 70% more likely to live in poverty. People who had already been bearing this kind of strain had suddenly also lost residences, material possessions and life savings in the fire.

First, the Recovery Group tried buying manufactured homes for people — and, in one case, experimented with a yurt. But eventually they decided they wanted to give people something better than that, real houses that might outlast the next disaster — with fire-resistant siding and metal roofs, which are not generally combustible and are unlikely to trap embers that could ignite other parts of the house.

Anyone who got a house had to meet certain criteria. They needed to own the land and agree to live there for five years, barring extraordinary circumstances. They had to learn fire-readiness, a series of strategies for preventing a house from catching fire and making it easier for firefighters to access the property if flames did arrive.

By the spring, the Recovery Group had chosen 11 households and begun raising the millions of dollars required. The first home would go to a Latinx family who had been in Pateros for 20 years. The husband worked at the school district, and the kids attended the high school. In April 2015, troops of volunteers laid the first four foundations. They started drywalling in the summer.

AT THIS POINT, Carlene believed she was charting a path out of the previous summer's devastation. It had been a once-in-a-lifetime disaster, she thought, but her community would survive and rebuild, even if it took years.

However, the weather of 2015 was as strange as the previous year. The winter brought normal precipitation but too-warm temperatures — causing a "snow drought" in the mountains that starved the streams of meltwater in the spring. A heat wave hit the Pacific Northwest in June, and a few places clocked record, over-100-degree temperatures that month. Another dry summer followed.

In mid-August, 13 months after the wildfire that assailed downtown Pateros, Carlene was attending an emergency response and recovery class led by FEMA on the west side of the Cascade Mountains, 20 miles outside Seattle. There were four dozen emergency managers in one room, and suddenly the air filled with the chirruping and buzzing of cellphones and pagers. A group of fires had lit and were spreading around Omak, a town about 30 miles north of Pateros, at the center of Okanogan County. Another called the North Star had ignited on the Colville Reservation, and four blazes were burning in Chelan County, to the southwest of Okanogan County. Evacuations had already begun.

They would all meet this sort of fire again, and they would all have to learn how to protect themselves, how to rebuild, and how to help one another through.

The class came to an abrupt halt, and its attendees hit the road.

Carlene returned home that afternoon. Over the next few days, she helped patrol the area in a small fire engine called a rescue rig, equipped with Jaws of Life for prying people out of cars. She was ready for any emergency that might come to the area. Pateros was spared this time, but up the valley, west of the town of Twisp, a tree branch was tossed against a sagging power line by the wind, igniting another wildfire, called the Twisp River Fire.

Carlene had the emergency radio on, and in the afternoon, she heard a caller describing a dire situation in Twisp: A crew was entrapped in the fire, and someone needed to be helicoptered out. She panicked. Her daughter, also a firefighter, had been out in a fire engine in that part of the county. "I couldn't get ahold of my daughter," she said. "And that was her region, that area, Twisp River Road. And there were only two of them. And I thought, 'Oh my God, that's them!'"

Carlene drove out of town, still suited up in her firefighting gear but in her own SUV. Heading northwest, she passed a long line of cars — a parade of evacuees moving in the opposite direction. They were all going to Pateros. She called the disaster chaplains from the road. "Please call everybody you can," she begged. "We need help right now in Pateros!"

Just before the tiny town of Carlton, she spotted the car of a local newspaper reporter, flagged her down, and asked her what had actually happened. A fire engine — not her daughter's — had lost

visibility in the blackness of the smoke and teetered off the road. Three firefighters perished, and Carlene knew one of the dead. He was 20 years old. She had taught him to ski when he was a little boy and had fought fires with his father.

The Twisp River Fire was one of five blazes that quickly merged into the Okanogan Complex, one of the largest wildfires in Washington state history. In the end, 120 homes were lost. The survivors and emergency responders turned to Carlene and her group. "I remember everybody looking at us and going, well, you're going to take this on, right? And there was a point where I literally got physically sick and thought, can I do this? Can I live through this? And I thought, well, who else could actually do this? We have to take this on. So then I stopped panicking a little bit, and said, 'OK, how do we strategize to make this work?'"

She and her community had figured out how to raise their town up from the wreckage, bit by bit. They had learned much about how to recover from disaster — and this was knowledge many others would need in this precarious era. They could teach them.

You could scratch a story of hope out of the ash. It existed in what could grow back and what could be learned — on the land and among the people.

"It's going to get worse. There's no way it's not going to get worse. So we better be prepared, better do as much as we can while we can."

IN 2019, FIVE YEARS after the Carlton Complex, I met Carlene in Pateros. As she marched me through the tiny downtown riverfront, she recited a list of facts and figures about the town without pause. To the east, the Columbia River shone wide and pale blue as we observed the path that the Carlton Complex Fire had traveled. Carlene pointed to a pair of round, squat cylinders with colored tiles decorating the sides of a golden bluff that rose above Pateros. "Those are our water towers that got burned up there." Both had been repaired. But in the fire's aftermath, manganese, a heavy metal, had rushed into the water supply and filled the pipes, a common trouble after wildfires loosen earth and liberate certain minerals from the soil. Although it had improved, the problem had never fully gone away. "Over the last three years, we've been working on replacing the water system here for the city," she explained. "It's a $7.6 million project."

As we walked, Carlene gestured to the many things that had burned down and were now gone, as if conjuring ghosts. "It was all on fire. You used to have trees and all kinds of stuff between the railroad tracks and the highway right there."

She directed me into a metal-roofed building that temporarily served as a museum on the fire. Inside, a large square mirror in a white wooden frame sat propped against a cloth-draped stool. Hand-painted across the mirror were the words "Welcome to the Smoke and Reflections Exhibit."

The room held a series of dividers covered in black cloth with displays of images mounted on them and a table set with an array of burned and warped metal and glass. Some of the items laid out here were recognizable. A glass bottle with a curved and distended neck. A shovel end with no handle. But some had liquefied and re-formed into the sort of bizarre shapes candle wax can make when it drips. "Everything melted, all the radiators, all the cars, all the wires melted in place," Carlene said. Then quietly, "This was mostly my mom's stuff."

Above the table hung a photograph of the metal frame that once sat beneath a modular home, warped and sunken and covered in bits of ash. "This was my mom's." It had stood on the orchard property. "It was her retirement plan. She had rentals. She lost all of our homes except for one." The house that remained, also at the orchard, had been equipped with woodpecker-resistant cement siding, which had also turned out to be fire-resistant. The 30-acre orchard that her mother owned had been uninsured. "She had gotten mad," Carlene explained. "A year and a half before, she had had welding equipment stolen, and the insurance company wouldn't pay for the welding equipment. So she canceled her insurance. She lost the shed, the tractors, the eight picker sheds, the kitchen, everything, lost it all."

There were other similar stories throughout the community. Carlene's group estimated that three-fourths of the homes destroyed had been uninsured or underinsured at the time of the fires. Some people had believed they were covered only to discover loopholes and exemptions in their policies.

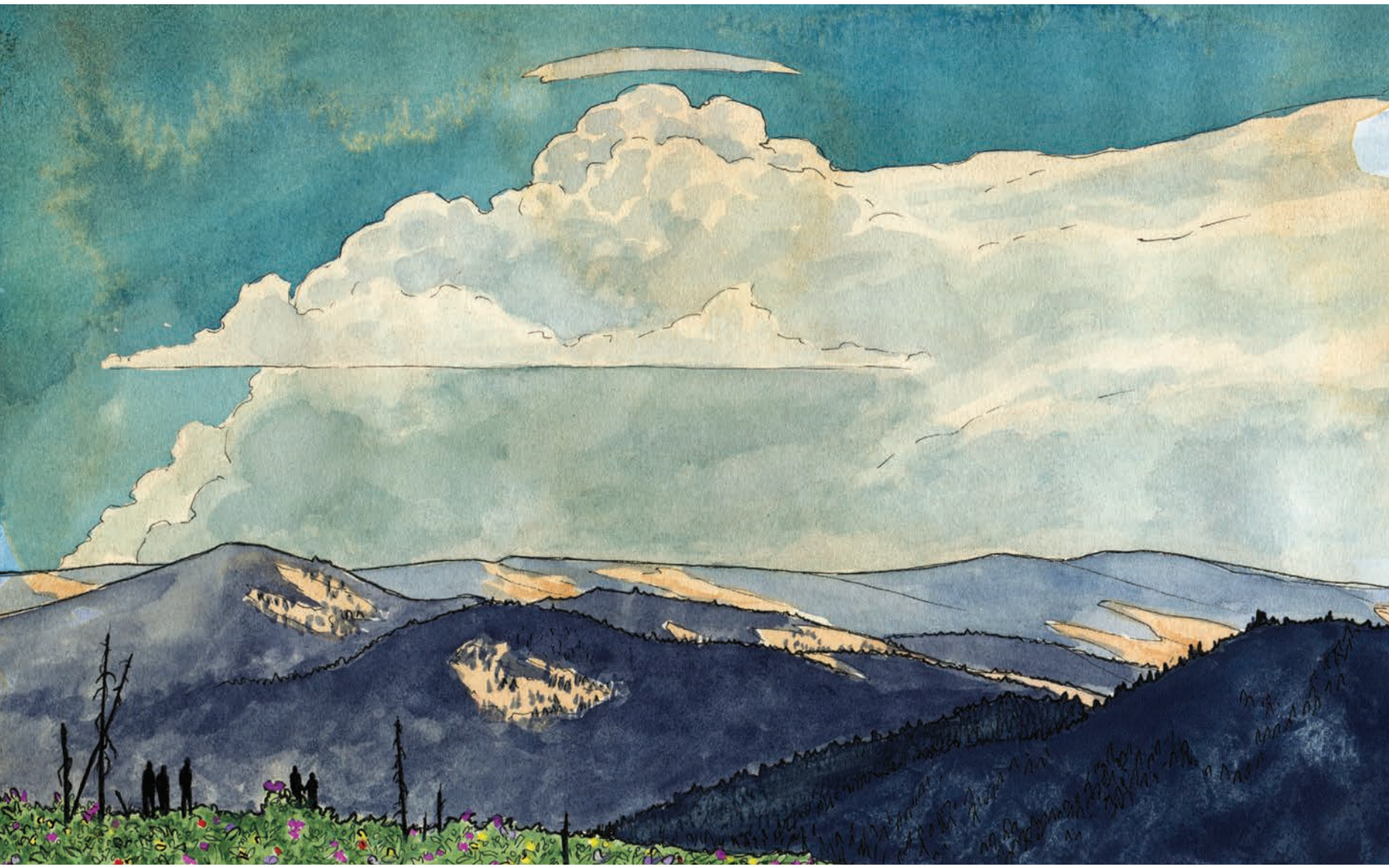
The entire exhibit had a handmade feeling, laminated photographs pinned on black fabric. An image of a brick chimney still standing while the rest of the house it had belonged to was nothing but ash. An ATV so warped it looked like folded cloth. Some images were donated by community members, including a local photographer. Some were Carlene's. A picture of a young woman and an older man clearing a yard full of ash beside a concrete wall: "This is my daughter. This is the house that we built when I was young. This is my husband," she said, gesturing to the image. It occurred to me that she had been reciting these same details to people for years.

"Is it hard to keep telling this story?" I asked.

"It depends. People told me that you had to tell the story eight to 12 times before you start to lose that emotional piece of it, and so telling a story probably helps."

Plus, there were reasons to keep reminding people. She worried about the complacency that can set in even after a crisis. "The problem is, five years down the road, are we still going to remember?" she reflected. "And it's going to get worse. There's no way it's not going to get worse. So we better be prepared, better do as much as we can while we can."

THE NEXT YEAR, with most of the country now trapped in their homes due to the pandemic,



millions of acres burned across Washington, Oregon and California. Fires burned through many square miles of forest and sagebrush steppe, across rangeland and grassland, through towns, jumping roads and rivers. These fires were driven by dry winds and heat. They were driven by climate change. They couldn't be suppressed.

The smoke rose into the atmosphere and drifted a thousand miles to the west, where it entangled itself in a Pacific cyclone, spiraling across satellite images.

The fires of 2020 were frightening, Carlene told me. To the north of Pateros, the Cold Springs and Pearl Hill fires burned more than 413,000 acres. A few hundred evacuees, including farmworkers from the town of Bridgeport, had fled to Pateros and Brewster. She had driven through both downtowns and surveyed the scene just afterward, families sleeping in parked cars everywhere with dogs leashed to their side mirrors, clothing wedged in their windows to approximate privacy curtains. "I thought, how do we do this? How do we do it safely in a pandemic?" She had spent six years by then developing a strategy for getting food and shelter and help to people after a fire. "Now you've added another layer that makes it incredibly difficult." Community leaders couldn't make announcements at social gatherings, for instance. It was harder to temporarily house people and give them separate air to breathe.

But quickly a plan came together. In the years since the Carlton and Okanogan Complex Fires, Carlene had become a sought-after expert on disaster. She had offered guidance to survivors of the fire in Paradise, California, and, after the 2020 fires, she began advising the town of Malden on how to set up a recovery group like the one she had helped put together and run.

There are stories of grief and horror from these fires that will never really vanish. Still, how do you write a story about this era of disaster that doesn't end in tragedy? How do you make a life and a community in a recurring set of crises and still offer any kind of stability or safety? In spite of the devastation, people like Carlene, who regularly deal with wildfire, seem to know despair and still find a way to live in a practical strain of optimism. Not the same as hope — not anchored to expectations about the future. But the kind where you size up a catastrophic situation, decide what is available to you, and get to work, by whatever means you can. To make it through this unruly era intact, we will need to keep remembering how to do that — the work it takes to renew the world.

This story is excerpted from At Home on an Unruly Planet: Finding Refuge on a Changed Earth *by Madeline Ostrander, out this month from Henry Holt and Company and used with permission.*

THE FIRES BELOW

The world's least understood ignition source is causing devastating wildfires across the Powder River Basin.

BY AUSTYN GAFFNEY | PHOTOS BY LOUISE JOHNS

ON A HOT, DRY, WINDY SUMMER MORNING in 2014, rancher John Bailey drove along the edge of a wildland fire in southeast Montana. The fire had started inconspicuously — no lightning strike or neglected campfire involved, just flames appearing on open range owned by Jared Broadus, Bailey's cousin. The county's official fire warden was stationed about an hour away, so Bailey, 53 at the time and Rosebud County's volunteer fire chief, drove a state-owned pickup out to check on the fire line. The blaze was small, only a few acres, and Bailey, who had fought fires his entire life, wasn't worried. He didn't own any fire gear, so he wore his regular ranching clothes: jeans and a Stetson that shaded his eyes as he looked across the valley below, where slabs of beige rock the size of three-story houses littered the landscape.

Here in the high desert, generations of rivers — the Yellowstone, the Powder and the Tongue — had eaten into the soft sandstone, leaving a fortress of ochre and amber walls, webbed by steep escarpments and narrow drainages. Black Angus roamed between them, the calves running on their tippy legs. The whole eroding country looked like it was settling, like someone sinking into the folds of a giant armchair. Bailey drove slowly through the smoke from the fire, trading jokes with another cousin, Pat Bailey, who rode shotgun.

They were driving through a smoky gap — the fire line on their right, and a steep drainage, the Rough Draw, that dropped to a 60-foot-deep ravine to their left — when the ground beneath them suddenly disappeared. Ghostly fumes rose up from the space where two men and the pickup had been just moments before.

Inside the pickup, shaken but unhurt, Bailey looked through a windshield at a world now split between earth and sky. The truck had sunk into dry yellow grass, as though the ground they'd been driving on had eerily, and swiftly, deflated. The two men rolled down their windows and scrambled out of the truck, crawling back up to soil that was hot to the touch. The truck's tires were smoking, and the rotten-egg smell of sulfur and ash poured out of tiny fissures surrounding the sinkhole.

The moment the truck was swallowed, Bailey knew what had happened: They'd fallen into a sinkhole created by a burning coal seam, a type of fire that starts on natural outcrops of coal before quickly moving belowground, eating through seams that can range in thickness from a few inches to dozens of feet. Once underground, these fires become extremely difficult, if not impossible, to extinguish.

Locals like the Baileys were familiar with these fires; the area had long been nicknamed Coal

Seam Alley. But the fires were changing, becoming more common and more dangerous, and foretelling a new era of climate catastrophe in southeast Montana — an era in which devastating wildfires were no longer caused just by humans or lightning, but also by the fires below.

COAL SEAMS, glinting ribbons of flammable ore that unspool across every continent except Antarctica, have caught fire for millions of years. They ignite on the surface, sparked by lightning or nearby wildfires, or through spontaneous combustion. They devour the surface coal and burrow deep belowground where they continue to smolder, lasting anywhere from a few years to centuries; Australia's Mount Wingen has been burning underground for at least 6,000 years. While there are hundreds of underground fires in the Western United States, many are concentrated in the Powder River Basin, a lung-shaped swath of southeast Montana and northeast Wyoming.

This area is the world's largest known coal reserve, containing the nation's largest coal mines, though many of the seams in the rugged landscape are too thin and unreachable to attract mining companies. For at least 4 million years, the basin has naturally burned through its coal bed, baking the sediment above into red-brick stone known as clinker, which the locals call scoria because it resembles volcanic rock. Today, about 7% of the hills and ridgelines in the basin are capped by clinker, the product of tens of billions of tons of burnt coal.

Subterranean fires have been observed in Montana for at least 200 years and likely longer; the Cheyenne and Crow tribes have lived in the area for millenia. In the early 19th century, William Clark documented the coal fires, noting the relationship between clinker and exposed coal seams along the "burnt" hills. A coal seam fire called the Burning Coal Draw fire was one of the longest-lasting recorded in the region. It was first documented by a military expedition in 1870, and was still burning around World War II, when one Wyomingite described it as sounding "like the roar of a freight train — on its good days." It was finally extinguished in 1951 by the now-defunct U.S. Bureau of Mines. But for the most part, the ranchers, like the tribes, regarded the underground coal fires as a normal part of life, like rainstorms and winter.

They are easiest to spot in the winter; telltale signs include a patch of snow melt, steam hissing from a vent, a blackened edge of burnt ground. In the summer, the stench of sulfur gives them away. Over time, they often form a ring or a crescent moon as the surface sloughs off around the vent. Sometimes, embers glow as the fire tunnels into the earth. Eventually, this tunnel can collapse, weakened by wind, rain and erosion, becoming a sinkhole like the one Bailey's truck fell into. The coal can burn until either the coal seam ends, starving the fire, or the overburden buries it, depriving the fire of oxygen and snuffing it out.

But the fire can also keep growing, gnawing its way back toward the surface, fueled by oxygen and aboveground vegetation, until it finally breaks free and — sometimes — erupts into a raging wildfire.

Today, coal seam fires, like other wildfires, are becoming more common and more destructive.

Since the early 20th century, the temperature has risen 2.5 degrees Fahrenheit. Meanwhile, the frequency of Montana wildfires has almost doubled since 2002, according to the National Interagency Fire Center. In Montana, tribal members, ranchers, firefighters and local officials all report a dramatic increase in the number of naturally occurring coal seam fires.

In 2021, local officials estimated that 60% of Rosebud County's roughly 70 wildland fires were ignited by coal seams. According to the Bureau of Indian Affairs, 80 active coal seams at Northern Cheyenne have caused, on average, five wildfires per year. But data collection by the county, state, tribal and federal offices is neither regulated nor coordinated. Montana's Department of Natural Resources and Conservation recorded an increase in coal seam fires from 14 to at least 200 across seven counties between 2000 and 2021, a 1,400% increase, but only started actively looking for coal seam fires in 2011.

Then, last August, the largest-known wildfire ever ignited by a coal seam ravaged 170,000 acres of Rosebud County and the Northern Cheyenne Reservation. The Richard Springs Fire was the largest wildland fire in Montana last year. It took two weeks to fully contain and cost the sparsely populated region at least $30 million.

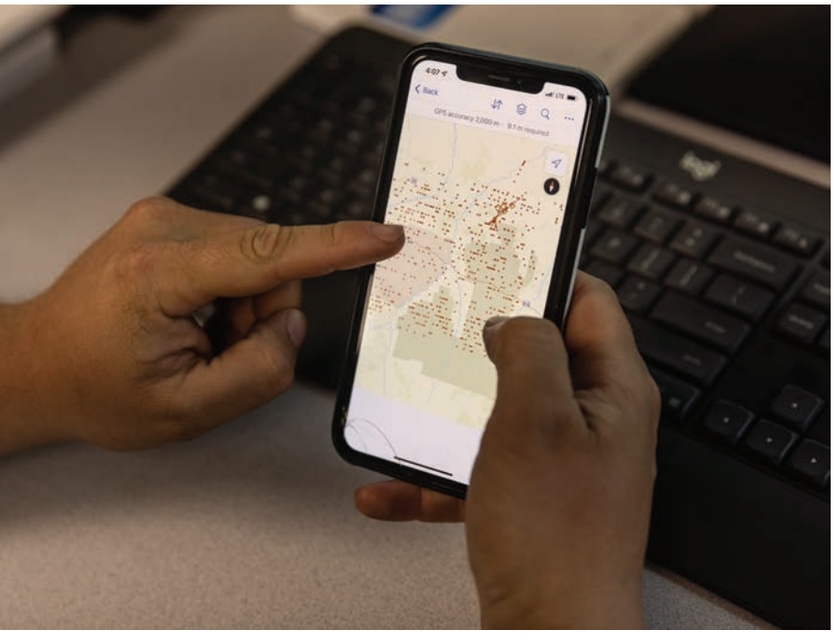
The dramatic increase of fire activity in the West could mean that wildfires are reaching, and igniting, more coal seams, while the hot, dry weather causes more seams to spontaneously combust. Fire activity here creates a feedback loop: Wildfires ignite coal seams, coal seams ignite more wildfires, and so on. But since coal seam fires aren't comprehensively tracked, the extent of the problem remains theoretical.

"We have always had a handful of coal seam fires in this country, just because there's coal and it's exposed," Jared Broadus, John Bailey's cousin, said. "But we've never had an issue with them like we do now."

Previous pages: Scorched earth and vegetation from the Richard Springs Fire behind the home of Rae Peppers. The wildfire, ignited by a coal seam, grew quickly, trapping and killing Peppers' herd of draft horses.

John Bailey *(facing page)*, a rancher in southeast Montana, sits on the bed of his ranch truck on his property in an area nicknamed Coal Seam Alley. Bailey's family has been ranching there since the late 1800s, and his property has dozens of coal seams on it. Bailey says that every three or four days during the summer he responds to a fire.

An exposed coal seam on Bailey's property *(below)*. Coal seams are a major cause of wildfires in the region, and drought and dry conditions allow the seams to easily catch fire and then continue burning underground.



Science has yet to determine if the increase is caused by climate change, partly because it has seldom paid much attention to coal fires at all. Ed Heffern, a now retired geologist for the Bureau of Land Management, is one of the few scientists who have studied coal seam fires in the U.S. He began learning about them in the 1970s, after moving to Lame Deer, the tribal headquarters of the Northern Cheyenne Reservation: While cross-country skiing, he noticed mysterious puffs of smoke rising along the horizon. One day, when the temperature hovered around zero, he moved carefully around a patch of bare ground, hot to the touch and emitting sulfurous fumes, surrounded by a foot or two of snow.

By the early aughts, Heffern's research showed that the clinker-capped hills had begun forming millions of years ago, when temperatures zigzagged between warm and cold cycles. Most of the clinker hardened during the warmer interglacial periods, indicating that more coal fires occurred when the climate was hotter — as it is today.

"I wouldn't be surprised" if the increase in coal seam fires was caused by climate change, Heffern told me last spring. "But it's a conclusion based on limited data." Glenn Stracher, a geologist and another of the few experts on the subject, agrees that the signs point toward a connection.

Given the lack of reliable information, the Custer County fire department has decided to step up and build a data set of its own, tracking coal seam fires across five southeast Montana counties, including Custer and Rosebud, Custer's neighbor to the east, as well as the Northern Cheyenne Reservation. The fire department hopes to show that the region needs help, and money, to deal with the growing problem.

"THE LAST FOUR OR FIVE years, it's been fire years, it hasn't been fire seasons," Cory Cheguis, the 30-year-old fire warden of Custer County, said in early May. Clad in a Montana State University T-shirt, sunglasses balanced on his baseball cap's brim, Cheguis guzzled gas station coffee at 8 a.m. as we left his firehouse in Miles City, the county seat, and drove south toward the town of Broadus, in Powder River County. Cheguis, who started working for Custer County in 2015, has fought fires in the region since he was 12.

When wildland fires strike in the rural West, volunteers from all over the region drive their "ranch rigs" — souped-up firefighting pickups carrying 200-to-500-gallon water tanks — toward the flames. Cheguis has fought fires for both Custer and Rosebud counties and he's done state-level rotations, even traveling to Southern California for the 2019 Maria Fire.

Until recently, he explained, wildland fires ignited by coal seams have been dealt with by landowners and tribal members on a case-by-case basis. If a burning coal seam appeared likely to spark a wildfire, the locals might build a fire line around it and monitor it; if a wildland fire then started, they would extinguish the surface flames, trace the ignition source back to the coal seam and watch it even more closely. Extinguishing the coal seam fire itself was often too dangerous and expensive to tackle without tribal, state or federal assistance.

But then the issue exploded. Like many others I spoke to, Cheguis traced the increase in burning coal seams to the spring of 2011, when heavy rains greened up the flowering yellow sweetclover till it towered six feet tall. When drought hit the following summer, the vegetation turned to tinder, and a trio of lightning-caused fires in 2012 — the Chalky, the Rosebud Creek Complex and the Ash Creek, the sixth-largest fire in the West that year — burnt over 550,000 acres of southeast Montana and ignited a whole new generation of coal seam fires.

"Then, in the spring of 2015, all hell broke loose," said Rosebud

County fire warden Rodney Dresbach. He started getting calls about fires that started without lightning or evidence of human involvement. "During the months of March and April, we were running on coal seam fires about every three to four days."

Cheguis saw firsthand the problems caused by the increasing number of fires. But nobody seemed to be tracking them, and the lack of data meant no one knew the extent of the problem, he said. Stracher, the geologist, agreed: "Unfortunately, there aren't more people in the U.S. studying these fires."

So, in October 2021, after last summer's Richard Springs Fire, Cheguis called a stakeholders meeting. He expected a dozen people, but 50 local officials, ranchers and tribal members crowded into the Miles City Fire Hall, and more attended via Zoom. They came from all over Montana's southeastern pocket — Rosebud, Custer, Powder River, Treasure and Big Horn counties, and the Northern Cheyenne Reservation. At the meeting, Cheguis unveiled his plan: to map every coal seam fire in a 10,000-square-mile region using infrared cameras, and create a data set for all five counties and the Northern Cheyenne Reservation.

Over the last century, inventorying coal seam fires has been sporadic at best: Between 1948 and 1958, the Bureau of Mines recorded 177 coal seam fires across the West and Alaska, while in 2013, Heffern, the BLM geologist, counted 53 natural coal fires in the Powder River Basin. During four months in 2022, Cheguis recorded 1,684 hot spots — infrared pinpoints, most of which he believes will be verified on-the-ground as burning coal seams — across a tiny fraction of the area studied between 1948 and 2013. He estimated that the final tally will be closer to 3,000. Montana's Abandoned Mine Lands office donated an ArcGIS mapping program, and in late June, Cheguis received a $400,000 grant from the Federal Emergency Management Agency.

Among the October meeting's attendees were two volunteer firefighters — Myles Gardner and Clint Pedersen — who knew that Cheguis' initial aerial maps would require verification, or ground-truthing, to confirm that every hot spot the infrared cameras found was actually a coal seam, not an extremely hot rock or solar panel. The process would also provide each location's GPS coordinates, along with details like the seam's size, its position on a slope and its access points. Verification would lead to prioritization: How high a risk was this particular coal seam? Were there embers near the surface, or tree roots smoldering belowground? Was the area particularly windy and inclined to shoot sparks?

Pedersen, a compact 56-year-old who ran the Broadus veterinary clinic and served as Powder River's assistant fire chief, and Gardner, a lanky 33-year-old volunteer firefighter, rancher and hunting guide, believed that drones would be the easiest way to ground-truth the hundreds of hot spots in rough country. So that winter, they spent hours on YouTube learning to fly drones, and in the early spring, began working closely with

Clint Pedersen *(above)* looks at a coal seam on a ranch near Broadus, Montana, after identifying its location with thermal imaging from drones.

Cory Cheguis *(facing page, top)*, fire warden for Custer County, stands next to a fire truck at the firehall in Miles City, Montana.

Red dots on a map on Cheguis' phone show coal seams that have been identified using ArcGIS data mapping.

Cheguis, while discovering additional burning coal seams.

An hour after leaving Miles City, we pulled up to Pedersen's clinic in the one-street town of Broadus. After a round of handshakes, I climbed into Gardner's dark blue Chevy Denali, with a spare tire roped to the roof, a cellphone booster bobbing off the hood and a pile of Vienna sausage cans rolling on the floorboard, while Cheguis and Pedersen trailed us in the truck. Six miles south of Broadus, we turned onto the Randall Ranch, where Gardner and Pedersen had found 36 active coal seam fires in a 25-acre bowl of ridges and ravines. Cheguis' flyover of the same region the winter before — thousands of feet above the height a drone could go — hadn't found any.

"That's how scary this is, how many more we know about than what the plane sees," Gardner said. Here, we saw the first of what would be almost a dozen burning coal seams that day. Gardner advised us to be alert around the loose earth surrounding a vent. When I touched the ground, it radiated heat like a sunburn. Pedersen pulled out two plastic bins from the trunk, which held thousands of dollars' worth of drone equipment. Between January, when they launched their new business, CM Thermal and Fire, LLC, and our visit in May, Gardner and Pedersen had pooled $55,000 to buy seven drones, four with thermal imaging. They'd already found at least 750 coal seams in three-quarters of Powder River County alone.

Cheguis, Gardner and Pedersen knew of just two tactics for lessening the risk of coal seam fires: Excavate the coal and fill in the resulting chamber with nonflammable soil, extinguishing the fire, or create a 10-to-100-foot-wide buffer line, which might include logging and chemically spraying the land, to limit the chance of igniting a wildland fire. Gardner thought a parcel this size — 25 acres — might require both logging and spraying the entire acreage, turning the area back to dirt, so no spark could set the hillside aflame. In lieu of those solutions, the region simply deals with wildland fires ignited by coal seams as they come.

Above us, their newest drone shot up into the air — tiny and unnerving in the intelligent precision of its movements. Its four buzzing propellers swooshed the grass below as it moved off to inspect a pair of horseshoe-shaped coal seams to the east. Meanwhile, Gardner sent up what he called their "workhorse," a drone so small and delicate you could easily mistake it for a bird. His controller, a black screen a little larger than a deck of cards, showed an infrared map, with a red spot reading 250 degrees Fahrenheit about 100 feet above a coal seam-looking crack.

About 20 feet from where I'd investigated the first vent, a second one spewed sulfur from the side of a cliff. The ground between the two vents felt solid, but Pedersen said they were likely connected, chewing away at the coal underneath us and hollowing out the hillside. Coal seam fires move from an outcropping to the subsurface quickly, and because there are virtually no regulations on how to handle them, there are no public safety measures. Standing atop one is spooky at best, deadly at worst.

"What do they call it in the Bible?" Pedersen asked later, pushing up his glasses as we hiked a draw toward another coal seam, a boxed-up drone knocking against Gardner's knees like a briefcase. "Brimstone," he answered himself. "Hellfire, and brimstone."

CHEGUIS, LIKE MANY locals, believes that the coal seam fires have been ignored at the federal level. But from the mid-20th century until the early aughts, the U.S. government has periodically intervened in what it terms "coal-crop fires" — naturally occurring blazes that begin on unmined coal outcrops.

In 1948, the Bureau of Mines began tackling fires from inactive coal deposits through a Department of Interior Appropriations Act. By 1958, the agency had investigated 126 of the 177 coal fires documented across 19 states in the Western U.S., the majority in Montana.

The agency's firefighting tactics mirrored Cheguis' approach: excavation and replacement with clean fill dirt, isolating the burning area from the main coal bed, or smothering the fire and compacting the earth up to 35 feet beyond the active embers. Each fire required at least three years of patrolling, inspection and maintenance before it was considered extinguished. The agency spent over a million dollars to put out 40 fires, noting that accessibility and cost often determined its priorities. It argued that the program should continue, citing the "conservation of coal resources and preservation of property."

"It was on the radar screen many, many years before you and I were born," Heffern, who's 72, told me. The federal government knew about coal seam fires, he said, and "they were concerned about it way, way back then, but it just — lost the funding."

Funding is now even patchier. After the Bureau of Mines dissolved in 1996, the Abandoned Mine Lands Division of the North Dakota Public Service Commission used almost $170,000 in federal funding to suppress 60 naturally occurring coal-crop fires between 2003 and 2012 on state and federal land underlain by lignite coal.

The costs were authorized by a special grant, part of a cooperative agreement between the U.S. Forest Service and the Interior Department's Office of Surface Mining. But the program ended in 2012, and Joan Breiner, assistant director of North Dakota's Abandoned Mine Lands Division, said the agency was no longer allowed to extinguish these fires and had stopped tracking them altogether.

Across the West, the number of agencies tracking coal seam fires, their funding methods for dealing with such fires, and their strategies for mitigation, if they exist, are complicated and hard to track, often isolated within bureaucratic silos.

"Montana is a complex checkerboard of jurisdictions that must work together to identify and share the collective responsibility of exploring improvements to coal seam fire detection and mitigation strategies," Robyn Broyles, public affairs specialist for the Bureau of Indian Affairs, wrote in an email. "There is no one easy, single strategy."

On the Northern Cheyenne Reservation, the Bureau of Indian

Myles Gardner flies a drone that uses thermal imaging to detect coal seams. Gardner and his partner, Clint Pedersen, both volunteer firefighters, use drones to verify that hot spots identified by ArcGIS are coal seams.

Affairs monitors coal seam fires, managing them if they reach the surface, but not actively extinguishing them. Broyles wrote that the focus of BIA's wildland fire prevention program was on preventing human caused wildfires, not naturally occurring fires that smolder in coal seams.

"Because firefighters don't always know when or where coal seam fires that may be smoldering will rise to the surface, igniting grass or brush as it does, firefighters' proactive measures are limited to mapping and monitoring known coal seam areas," Broyles wrote. She added that BIA was appropriated funding "only for wildfires that consume burnable *vegetation* such as grass and timber."

"From a tribal perspective, we just haven't gotten that far yet," Teanna Limpy, the tribal historic preservation officer in charge of the Northern Cheyenne's archaeological and cultural sites, said. "Historically, we haven't really done anything. We don't dig up our ground. It's not something we've had to make a hard decision on yet, but we're going to have to because our fires are burning all the time."

The Montana Legislature has also failed to address the problem, said Rae Peppers (Crow), who served eight years in the state House of Representatives. She helped pass a long-overdue firefighter pension plan, she said, but the lawmakers never discussed coal seam fires.

Rae Peppers *(above)*, a Crow tribal member, walks with her horse, Sassafras, on her ranch outside of Lame Deer, Montana, on the Northern Cheyenne Reservation. Peppers lost 10 of her beloved draft horses in the Richard Springs Fire, which was started by a coal seam last August. Sassafras was not with the animals that were killed in the fire, part of a herd that had been carefully bred for generations by her husband's family.

Jeanie Alderson *(facing page)* sits at her kitchen table in Birney, Montana, where her family has been ranching since the late 1880s. The Aldersons worry about wildfire on their ranch and its increasing severity owing to drought and climate change.

"We did support the firefighters," Peppers said, "but we didn't directly talk about coal seam fires. We should have."

Today, Scott McAvoy, acting fire management officer for the BLM's Eastern Montana/Dakotas District, said the BLM deals with burning coal seams solely on a case-by-case basis. Over the last decade, McAvoy has responded annually to an average of 20 wildfires ignited by coal seams, and as many as 50 in 2020 alone. Sometimes he's had to respond to the same ignition point several times, because the fire isn't always extinguished. If the coal seam is shallow, they can dig it out, but if it's a larger project, they have to get both funding and regulatory approval, including federal reviews to ensure that no historic artifacts or endangered species are in the vicinity.

The lack of support has been frustrating to Rosebud fire warden Dresbach, who said the BLM "hadn't done shit" about coal seam fires on federal property, including fires that impacted rural landowners. Without the proper regulatory approval, Dresbach lacks the jurisdiction to fight coal seam fires on BLM land, though when asked about it, he said bluntly, "I don't give a rat's ass about BLM at this point. I'm going to do what needs to be done."

The Montana Department of Environmental Quality's Abandoned Mine Lands Division has tried to help. Bill Snoddy, the program manager, said his agency has extinguished at least 16 coal fires in its 42-year history. The most recent coal seam fire Snoddy fought, in early January, took two weeks to extinguish. But before the agency can get the funding to deal with coal seam fires, his staff has to find evidence of historic mining, he said. Montana's coal mines, which were established long before the state's Abandoned Mine Lands program was born in August 1977, run the gamut of abandoned underground shafts to surface seams dug by homesteaders.

"If we can even make that tenuous of a connection, I can spend AML money on combating and putting out the coal seam fire," Snoddy said. Putting out the over 1,600 coal seam fires Cheguis believes he has found so far would cost millions, said Snoddy, whose budget of $3.3 million has to cover the entire fiscal year. But if the burning coal seams aren't mitigated, he said, disasters like the Richard Springs Fire could happen again.

The human impact of coal fires is often studied in conjunction with coal mines, instead of coal outcrops, since more funding is available and more regulatory tracking occurs. Glenn Stracher first learned about

coal fires in Centralia, Pennsylvania, now a ghost town, where the nation's largest and most destructive coal mine fire began in 1962. Later, Stracher visited eastern India, where the world's largest coal mine fire has devoured 37 million tons of coal since 1916. Last year, the most destructive fire in Colorado's history, the Marshall Fire — which destroyed over 1,000 homes and killed two people — was linked to an underground coal mine fire.

"There's no question people have been negatively impacted," Stracher said. Coal mine fires have caused horrific disasters: When seams have collapsed in India, Stracher wrote, buildings and people have been completely swallowed up by the newly created abyss.

In a 2010 edition of *EARTH*, he reported that the particulate matter and noxious gases from coal fires caused illnesses like strokes, chronic obstructive pulmonary disease and asthma, and advised anyone investigating such fires to wear protective clothing and a respirator. Broyles, of the BIA, said impurities like sulfur and nitrogen that are released when coal burns could expose wildland firefighters to toxic fumes, and because they lack appropriate protective equipment, he added, "Firefighters avoid directly engaging with burning coal." The BLM's McAvoy said that while many safety protocols for wildland fire suppression also apply to coal seam-ignited fires, his firefighters don't wear respirators or special clothing either. Instead, he simply tries to use "extra caution" around coal seams to prevent injuries.

"This whole situation we have is a ticking time bomb," Cheguis said. "I'm trying to take all this data above and beyond local government. This needs to be a federal issue."

CHEGUIS ISN'T THE ONLY one seeking federal intervention. Two months after the Richard Springs Fire, while Cheguis formed his group in Miles City, Jeanie Alderson, a fourth-generation cattle rancher and former chair of the Northern Plains Resource Council, a statewide conservation and agricultural advocacy group, participated in a virtual hearing to address the issue underlying every coal seam fire: Who was responsible for putting these fires out, and for the damages they wrought?

Alderson, her dark curly hair tied back, testified before the House Committee on Natural Resources: "One of the challenges that my neighbors and I continue to face are large, uncontrollable wildfires on our ranches that are sparked from underground fires in federally owned coal seams."

Fighting coal seam fires is expensive and dangerous, but Alderson said that the biggest problem was the threat they posed to the locals' livelihoods by damaging grazing land, fences, livestock, buildings and water infrastructure. "Time and time again, it feels like private landowners are paying for damage to our property from minerals that belong to the federal government," she said.

The Aldersons have ranched near the Tongue River, about 30 miles south of Ashland, since 1889. But beginning in the early 20th century, a series of federal acts created so-called "split estates," meaning that, the surface rights — the grassland — and the mineral rights — anything minable below-ground, especially coal — have divided ownership, largely to assist the U.S. government in maintaining coal rights while selling surface rights to Western landowners. Today, most coal rights, including one-third of U.S. reserves, are owned by the federal government, but in the Powder River Basin, it's even more concentrated. Here, the federal government owns 77% of recoverable coal; 87% of private landowners own just the surface rights.

Back in 1958, before a burning coal seam could be mapped or mitigated, a preliminary investigation was done to determine who owned the coal rights, because "partial cost must be borne by the owner, if the fire is on privately owned coal," read a 1958 Bureau of Mines report. But by the report's publication, the Bureau had only managed fires on federal coal deposits, or fires endangering such deposits.

In May, sitting at his kitchen table, Alderson's husband, Terry Punt, said that in order for the federal government to do something, "they almost have to be held liable."

"That's their asset, yet they're paying no taxes on it," Punt said, meaning the coal. "They're paying nothing on it until they develop it. It's sitting in the ground. Yet it could be doing somebody else a hell of a lot of harm."

But ranchers also worry about the precedent it could set to make anyone, even the federal government, liable. No one owns the thunderclouds that produce lightning strikes. Coal outcrops are also natural, but unlike lightning, they can often be managed to reduce the chance of wildfires. If a property owner was aware of a burning coal seam and did nothing to put out or isolate the embers, and the embers started a fire, would they be liable?

"Who owns the bad dog that's biting everybody?" Bailey asked. "Nobody wants to take ownership."

Though the Rosebud County Sheriff's Office fire report says the Richard Springs Fire began on the Broadus ranch, Broadus denies this, and the coordinates reported to

Inciweb — an interagency information system for wildland fire — show that the ignition point was on land owned by Westmoreland Rosebud Mining, LLC. Broadus' neighbor, Doug McRae, said mine officials told him earlier this spring that they knew about the burning coal seam a few days before it ignited the wildland fire on Aug. 8, and tried to suppress it with water. (The Westmoreland Mine did not respond to multiple requests for comment.)

"There was some talk about possibly pursuing it from a legal perspective," McRae said. "But if you go there, then every time you have a coal seam fire that happens to break out, and you were aware of it, then you're subject to the same concern, or the same liability, if you push it."

DEALING WITH COAL SEAM fires becomes a cost-benefit analysis: Which is worse? Letting a coal seam burn and risking a bankruptable level of destruction if it spreads, or spending millions of dollars and risking unforeseen ecological impacts to put it out?

After a century of surface wildfire suppression, the blanket management suggested by the surrounding counties could just be another way of halting a naturally occurring process, with implications as yet unknown. Doug Martens, Rosebud County's former fire warden and current county commissioner, said suppressing fires for so many years had prevented the natural fire cycle from taking place.

"We are probably our own worst enemies," Martens said. "If we would have managed fire suppression years ago, the (Richard Springs) fire wouldn't have gotten that big in the first place."

It's as if the vents are mouths through which the Earth is speaking to us, warning of trouble above and below and the imminent danger of climatic collapse. In southeast Montana, the testimony is regionally specific: The bedrock is eating itself. This geologic cannibalism is part of a natural cycle, leaving behind lines of clinker, brick

Trees burned in the Richard Springs Fire, which was ignited by a coal seam and burned more than 170,000 acres of southeast Montana.

pathways back in time. But the growing number of burns, and their frequency, could be another result of human intrusion. One wildland fire, under the right conditions, can propagate many coal seam fires, which can in turn ignite many more wildland fires. The only way to know whether it's happening is if someone pays attention. But we tend to ignore the forge beneath the earth, until catastrophe strikes.

Martens said his own 30 years of firefighting had likely contributed to the problem of massive wildfires today. "But we have to put out the fire," he added, "or people lose their livelihood."

The Richard Springs Fire burned about 20,000 acres of the Broadus ranch, and about half of Bailey's land last summer, while another coal seam fire, the Slough Grass Fire, took the rest. Bailey, like many local ranchers, had to sell his cattle early, cutting his herd by 100 head and spending $90,000 on additional hay — an unfunded budget item, since he typically grows and harvests his own.

"We don't have time really to mitigate it like we should," Bailey said. Between branding and putting spring crops in, he, his wife and his son can't do it all. "It seems like we always have time to fight fire but never have time to mitigate."

And McRae, who lost 217 cattle in the 2012 fires, and virtually all his grassland in the Richard Springs Fire, said that insurance doesn't cover coal seam fires. "You get to be my age, and you think, is it really worth it?" McRae asked.

On Northern Cheyenne tribal land, Rae Peppers, the 66-year-old former legislator, and her husband, Jim (Northern Cheyenne), lost $30,000 in hay, fences and farm animals to the Richard Springs Fire.

"Every bit of it takes away from your livelihood," Peppers said in May. Five days after the fire began last August, she and Jim raced through the suffocating heat to gather as many of their 70 head of cattle as they could find. Bombers the size of passenger planes looped overhead, releasing retardant in long pink horsetails. Tribal members drove around with loudspeakers, begging residents to take shelter at the local Boys and Girls Club or board a bus for the tribal school. Power, then water, and finally, cellphone service, all sputtered out.

That afternoon, as flames licked the hills above their house, dozens of firefighters, exhausted after almost a week of choking ash and little sleep, doused their yard with water. While a black bear escaping the flames cooled off beneath their sprinklers, the Peppers evacuated.

But that night, Rae Peppers couldn't sleep. In all the chaos, she'd failed to call back their string of horses — 10 immensely strong, half-wild draft mares raised for generations by her husband's family. One was Peppers' saddle horse, Menoodle. She feared the airplanes had spooked the horses, sending them running toward timberline.

Peppers went home at 6 the next morning. The smoke was so thick, she drove the mile up her dirt road almost blind, navigating slowly, from reflector to reflector. At the cattle guard to a hayfield overlooking the hills, she opened the truck door, stumbled out and fell to her knees. Trees were charred into inky toothpicks, hay twisted together like matted hair across black dirt. And just half a mile away, all her horses were dead.

It wasn't until early May, the night before our visit, that she finally went up to see where they died. Their bare white bones were laid out like yet another geologic layer, bright in the early evening light.

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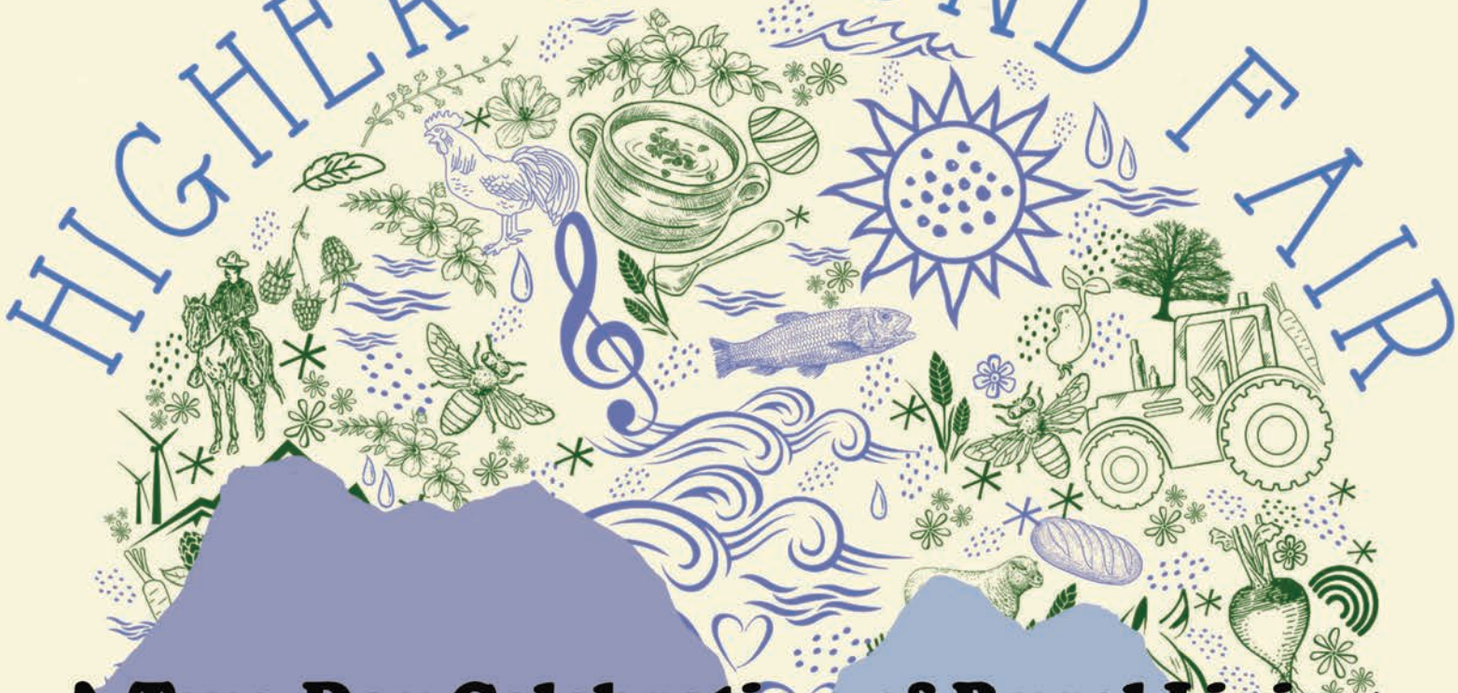

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Q&A

Extremism in plain sight

Leah Sottile's *When the Moon Turns to Blood* investigates how an Idaho couple's embrace of fringe Mormon beliefs led to murder charges.

BY KYLIE MOHR | ILLUSTRATION BY LAUREN CROW

HALF-SIBLINGS Joshua "JJ" Vallow, 7, and Tylee Ryan, 16, of Rexburg, Idaho, had been missing for months when their mother and her new husband went to Hawai'i for a vacation in late 2019. Police eventually found the children's bodies on the husband's property. Now, both Chad Daybell and Lori Vallow are in jail on multiple first-degree murder charges. The couple believe in a fringe Mormon ideology that claims that the world is ending, and, according to court documents, they thought JJ and Tylee were zombies.

When the Moon Turns to Blood, a new book written by Oregon-based freelance journalist and longtime *High Country News* contributor Leah Sottile, explores how the couple's extremist ideologies developed and led to violence. Sottile's work has appeared in *The New York Times Magazine*, *The Atlantic* and elsewhere, and she has also hosted podcasts, including *Two Past Nine*, on the legacy of the Oklahoma City bombing, and *Bundyville*.

Season 1 of *Bundyville*, released in 2018, follows members of the Bundy family, the anti-government extremists who led an armed standoff against the federal government on grazing land in southeast Nevada in 2014, and spearheaded the occupation of Oregon's Malheur National Wildlife Refuge in 2016. But despite years of reporting on extremist ideologies, writing *When the Moon Turns to Blood* forced Sottile to reconsider how extremism manifests in the West.

HCN recently caught up with Sottile as she prepared for her book launch. She continues to follow the story of Vallow and Daybell, whose joint trial is scheduled for January 2023. Here, Sottile reflects on how two kids ended up buried in a backyard, how religion can incite violence and the need for a more holistic view of extremism.

This conversation has been edited for length and clarity.

When the Moon Turns to Blood is your first book. Why did you want to write this particular story?

I've been wanting to write a book forever, and I've been looking around for the right topics for years. In late December of 2019, I moved back to Portland from Missoula, and I saw a story about this lady and her husband: They were missing, and their kids were missing. My husband sent it to me and said, "This is a weird thing you want to know about." He knows that I'm interested in weird ideas, ideologies and groups. I knew I needed to write about it when I just automatically created a timeline of what had happened.

It turned into a book when I heard someone say Lori Vallow had "cult-like beliefs." It set off alarm bells for me, because so much of the work I've done on *Bundyville* was about the religious beliefs of the Bundy family and their interpretation of LDS (the Church of Jesus Christ of Latter-day Saints) scriptures that is not really accepted by the mainstream church. … I started to see that these people believe in a lot of the same religious ideology that the Bundys do. There was a lot to sink my teeth into, and there was a lot that wasn't being talked about.

Many of your fans came to you via the _Bundyville_ podcast. What similarities and differences are there between the kind of extremism you covered in _Bundyville_, and the kind you covered in this book?

They're shades of a similar thing. The origin point of the book was realizing that Lori Vallow's father believes in the "White Horse Prophecy." It's not accepted doctrine by the Church of Jesus Christ of Latter-day Saints, but some people still believe in it. The gist of it is that people believe the prophet of the Church, Joseph Smith, prophesied that in the future, the Constitution would "hang by a thread," and it would be up to the "white horse" — the Mormons — to save it. So it does two things: It gives the LDS people, who were historically oppressed in their earliest days by the U.S. government, a sense of exceptionalism. And it inserts a patriotism into the belief system — that to be a good Mormon, you must also be a warrior for the Constitution. This is very argued about. But you see it on display with the Bundys, and you see it on display with Chad Daybell.

With the Bundys, it came to this point where they started sifting through LDS scripture to find all the references that they felt gave them permission to fight the government. But with Lori and Chad, it's different. At first, Chad is clearly a very, very faithful person who was raised in the Mormon Church, raised in a Mormon culture; it's everything to him — and his writing (in fictional Doomsday novels) comes from that perspective. But over time, he starts to change. He goes from writing stories with LDS characters to straight-up predicting the downfall of America, and LDS people are being spared from disaster. It's the nonbelievers and sinners who get killed in horrific ways. And then he starts surmising to the reader that he's actually seeing the future — that these books aren't stories, but visions. So he positions himself like he's a prophet, in a way. And that's very much in the spirit of the Bundys. They see themselves as warriors.

Other similarities are that this story takes place in Idaho, Utah and Arizona, so it's in that same zone that I was pecking away at with *Bundyville*. There are cultural things on the wind in the Mountain West that aren't in other places.

You've written about extremism in the past for _HCN_. How did working on those pieces influence how you approached this story?

The *High Country News* work that feels the most directly related was a story I wrote in the summer of 2020, "As a plague sweeps the land, zealots see a gift from heaven." It made me understand how much control one person and one ideology can have over a place. That's part of the reason I love writing for *High Country News* — this obsessive interrogation of place. When I wrote that story, it had been a while since I'd written about religion. It just revived in me how much I like understanding how much power spirituality has over people.

How do religious institutions bolster violent ideas?

It's a little disturbing. I feel like I went as far down the rabbit hole as I could. The LDS church has, for a long time, tried to patrol the fringes of the faith. And those are noble efforts. But at the end of the book, I talk about a speech given by one of the elders of the church and he's talking about the need to take up "musket fire" against threats to the faith. I think there are these really scary parts of Mormon history that are very violent. There's a lot on the shoulders of the leaders of the faith. It's a new faith, so there's room to grow and change. But I don't know if they're willing to do that.

Why should people care about far-right extremism in the West? What are the bigger implications?

What I realized as I was working on this is: We think that we can always recognize what extremism looks like. It's a bunch of guys holding tactical gear and semi-automatic weapons at a protest or storming the Capitol. But I think that what is so interesting about Chad and Lori is that they embody what feels like a really common extremism in certain cultures in the West. It's very permissible to be a prepper. It's very permissible to hold spiritual meetings and do all the things that they were doing. I realized that there were multiple moments where they told people that they were violent. Lori said to people, "I wanted to kill my husband," there were all these kinds of things happening, and people didn't call the police. I wonder if they had been wearing the costume of extremism that we've all decided is scary, if maybe they could have been stopped sooner.

Extremism isn't what you think it is. It doesn't look like what you think it does. It doesn't talk like you think it does. It could be sitting in the pews of your church. It's haunting to realize that sometimes the most faithful people have some really scary ideas. *High Country News'* everlasting quest is to make people understand what the real West is. I think this is a real Western story about the LDS faith, and I think religion is important for us all to understand. Understanding our human experience in this moment means understanding what large swaths of people believe.

Extremist ideologies look for times when society is weak. Whether that's a person or a whole group of people, they watch and wait. And when shit feels really bad, that's when, all of a sudden, answers are provided by extremists. If you live with this fear that the world is always ending, then there's fertile ground for extremism to take root.

"Extremism isn't what you think it is. It doesn't look like what you think it does. It doesn't talk like you think it does."

Hair on Landscape.
C.E. Fitzgerald

BOOKS, CULTURE & COMMENTARY

Collaborations with nature

A new ‘school’ of art and geography gathers artists for creative fieldwork in the Sonoran Desert.

BY KIMI EISELE

LAST FEBRUARY, I huddled with 18 other artists on the narrow shoulder of the Mount Lemmon Highway, which snakes up the Santa Catalina Mountains north of Tucson, Arizona, through desert scrub and grasslands into spruce-fir woodlands. We'd stopped at 3,000 feet above sea level to notice the change in altitude.

"How much can we perceive elevation?" asked Erik Schmahl, the landscape architect who led the somatic exercise. I closed my eyes and heard wind, car engines and a distant airplane. I felt cool air on my skin. My bones seemed to settle.

"Feeling altitude isn't solely a human experience, though we have more faculty to move up and down the mountain easily," Schmahl said. "For plants and animals, slight shifts in elevation can mean life or death."

We got back in the cars and traveled on, stopping every 1,000 feet in elevation to repeat the exercise. Schmahl's statement awed and disquieted me. Pea-green saguaros gave way to yellow grasslands, and eventually, Mexican blue oaks and junipers appeared. I felt at once aware of my human adaptability and limitations. I also wanted more time — and maybe more solitude — to try to sense the impacts of temperature, light and elevation in my own body.

Such are the gentle provocations of SNAG, the free, informal "art school" that Schmahl co-founded with Susanna Battin, a contemporary visual artist. The pair, who moved to Tucson from Los Angeles during the pandemic, wanted "to make interesting friends, think critically together, and make work together," Battin said.

SNAG stands for School of New Art Geographies. The acronym came first: "We were inspired by the catclaw acacia, sometimes called the 'wait-a-minute bush,'" Battin said, referring to the plant's apt nickname; its tiny thorns snag clothing or bare skin, often halting hikers in their tracks. "You can confidently go out in the brush thinking you know everything, but then nature itself — or our thoughts about it — pulls us back and challenges that confidence. But we keep going. It's about embracing those challenges and remaining open to difficulty," she said.

With funding from Tucson's Museum of Contemporary Art for SNAG's first year, Battin and Schmahl put out a call for applicants. They selected 25 participants, me among them. As a writer and artist, my work has long explored our complex relationships with — and as — nature, and I was hungry for both rigor and camaraderie, especially after pandemic isolation. SNAG leaders scheduled a field trip or a gathering to discuss readings every other weekend, February through May. Together, we created our reading list, which included essays by Ursula K. Le Guin, Marcia Bjornerud and Brandon Shimoda, among others. Some of us volunteered to lead activities in the field. One afternoon, I invited fellow SNAGers to hop like frogs and flock like birds, exercises from my past choreographic work designed to help us imagine the lives of animals and challenge anthropocentric perceptions of landscape.

Geologists, botanists, dendrochronologists and cultural historians joined our field trips, offering specific knowledge — and an interesting vocabulary — about Sonoran Desert history and ecology. During one geology talk, I made this list in my notebook: *sheering, silly putty, deformation, magma bodies, electron backscatter refraction, cinematic fabric, rock candy*. Together, these terms seemed to create a kind of geologic poem or even a choreographic score.

On a hike in the Santa Rita Mountains south of Tucson in early May, botanist Jack Dash impressively rattled off scientific names of dozens of plant species. I knew canyon hackberry by its tiny green leaves and edible orange fruits, but not its Latin name, *Celtis reticulata*, or its family — *Cannabaceae*, but without any THC.

Plant taxonomies are most useful when they tell us something descriptive or geographical about plants, Dash said. Sideoats grama grass, for example, is *Bouteloua curtipendula*, from the Latin *curtus* for "shortened" and pendulus, for "hanging."

"Believe it or not, there's a genus of fern now named after Lady Gaga," said Dash, who expressed some skepticism. "We have all these plants named after dead white dudes, so to name a plant after a woman is cool. But ultimately, I'm not sure it serves the larger cause of taxonomy."

Maybe not, but I love the botanical creativity in such nomenclature. When I researched it later, I learned that ferns in the new genus resemble one of Lady Gaga's outfits. Better yet: Its DNA sequence spells GAGA.

Perhaps this is what cultural theorist Donna Haraway means when she calls for creative entanglements and collaborations with the more-than-human. (Her 2016 book, *Staying with the Trouble*, is on the SNAG reading list.) Humans are inextricably linked with the nonhuman, Haraway writes, and this requires sympoiesis, or "making-with," rather than insisting on our human dominance.

For many visual artists, poets, choreographers, photographers and filmmakers in SNAG, the idea of "making with" nature may not be a new concept. Still the readings, discussions and field trips have brought depth and structure to our research and practice.

After rereading William Cronon's 1996 essay, "The Trouble with Wilderness," photographer Conor Fitzgerald discovered a new lens through which to view the images he'd been making of mesquite and palm trees in his neighborhood.

"The tree in the garden is in reality no less other, no less worthy of our wonder and respect, than the tree in an ancient forest," Cronon writes, adding that "the tree in the wilderness … can teach us to recognize the wildness we did not see in the tree we planted in our own backyard."

Fitzgerald had been bothered by the dust and hair that sometimes collected on his 4-by-5-inch negatives. "Then I thought, if this is bothering me so much, why don't I lean into it?"

So, he purposely added more human hair — his own and his partner's — and liked the result. "Man-made, but full of wild ecology," he said. And an example, perhaps, of how an artist can "make-with" nature instead of *about* it.

SNAG artists will share ideas and studio visits this fall to offer support, critique or collaborative possibilities across disciplines. Additionally, a group show is scheduled for December. SNAG's founders are seeking funds for the future, with a continued focus on the Sonoran Desert. "Next year could be underground rivers or wastelands," Battin told me. The hope is "to build up a strong community so that the program can somewhat run itself."

Community is not only key to SNAG's vision, it's also essential for undoing outdated romantic ideas about how best to relate to nature.

"I like the idea of distorting this notion of having to be alone in nature to experience the sublime," Battin said. "You see images of this, and there's no one in the frame. For me, it's interesting to populate those views, because, of course, they've always been populated."

For Schmahl, bringing people with different approaches and value systems together is the only way to confront the complex environmental and cultural issues facing Western landscapes — from wildfire to drought, the loss of biodiversity to the colonial assault on Indigenous knowledge. "The scale of it all is so immense," Schmahl said. "You can't do it yourself."

At 7,000 feet above sea level, the air felt crisp. Ponderosa pines rose high into the blue sky, and I heard their swaying trunks creak. I also listened to the voices of nearby SNAG artists, trying to figure out who was riding in which car the rest of the way up the road.

If the job of scientists is to show us how nature works and how we humans are calamitously impacting those workings, maybe the job of artists is to show us there is no nature at all that is separate from our own messy — and hairy — human selves.

Deep breath

A new exhibition at the Utah Museum of Fine Arts wants to pull your head out of the clouds.

BY BK CLAPHAM

WHEN WHITNEY TASSIE MOVED to Salt Lake City 10 years ago, she became acutely aware of air pollution's impact on life in the Mountain West. "I had never experienced that sort of, like, daily routine of checking the air levels, or wondering if my kids were going to be able to play outside at recess or not," says Tassie, who came to Salt Lake to be curator of modern and contemporary art at the Utah Museum of Fine Arts (UMFA). The experience made her think about how she might process it through a special exhibition.

On July 16, visitors to the museum were given the chance to ponder their own relationship to the elemental in the resulting exhibition, "Air," which explores different facets of air from environmental, social justice and cultural perspectives. On view through Dec. 11, the show features work by 16 artists, poets, engineers and designers from around the world. Many names are familiar — Ai Weiwei, for example — but all are artists who are able see air both as material muse and as inspiration for discourse about Earth's most pressing challenges.

Take, for instance, Rotterdam-based Studio Roosegaarde, a "social design" lab founded by Dutch artist and innovator Daan Roosegaarde. Working with a team of designers and engineers, Roosegaarde created The SMOG FREE TOWER, the world's first outdoor air purifier, which compresses smog particulates into jewelry. The resulting bling, now part of the UMFA's permanent collection, can be found in renowned institutions across the globe, including the Stedelijk Museum in Amsterdam, National Museum Zurich and the Biosphere Museum in Montreal.

For Roosegaarde, SMOG FREE's accomplishment — turning pollution into useful products through inventive upcycling — is designed to highlight the seemingly limitless potential of sustainability. It's summed up in his comment about the exhibit: "Clean air is the *true* beauty."

Other jewelry — including a pair of unique hand-carved wood-and-beaded earrings — was created by Alaska Native (Tlingit and Unangax̂) and multimedia artist Nicholas Galanin. "They're rape whistles, which are activated by forced breath," says Tassie, adding that Galinin's work makes use of Native decorative arts to comment on the silence surrounding the epidemic of violence against Indigenous women and girls.

Navajo Nation member and multimedia artist Anna Tsouhlarakis interprets air through her community's experience of environmental racism. Her installation, *Breath of Wind*, is a three-minute, 16-second video highlighting the deadly effects of the 1979 Church Rock, New Mexico, uranium disaster. The largest radioactive spill in United States history, it poisoned the water, soil and air of the Navajo Nation, the site of more than 700 of the uranium mines that produced the raw material that fueled the Cold War's nuclear arms race. (Many mine workers reported that they never received protective gear or information about the health risks associated with breathing the deadly ore.)

"I started thinking about how that uranium is still part of the landscape now," says Tsouhlarakis, an assistant professor of art and art history at the University of Colorado Boulder. The title of her video, she says, comes from Navajo stories about the "Big Wind," and museumgoers will hear her grandmother tell stories in Navajo about what's carried on its currents. Many women in her family have developed cancer over the years, something she attributes to the abandoned mines: "Decades later, every time the wind blows, it brings up those particles."

Our fear of the unseeable in the form of the coronavirus is also acknowledged in the exhibit. Tassie says that when the pandemic hit, she looked around and realized how rapidly notions of air and breath were changing. This led her to procure a set of 10 limited-edition masks designed by legendary Chinese artist Ai Weiwei. The masks incorporate Taoist principles and represent flora and fauna, honoring Hawaiian culture and warning of the threat the islands face from climate change.

"We were all masking and afraid of air, afraid of sharing breath," she says.

Phoenix-based artist Naomi Bebo offers a somewhat more macabre interpretation of masking in our day and age. Her *Beaded Mask*, an Iraqi gas mask embellished with seed beads, deer hide, ermine and ribbons, is described as a call for us to choose between "oil dependence, environmental degradation, and cultural genocide" or a breathable world for our children.

And after the world watched Derek Chauvin murder George Floyd, an unarmed Black man pinned to the ground while repeatedly gasping, "I can't breathe," Tassie knew that air and its intersection with state-sanctioned violence would have to be interrogated in the show, as it is in the video work of poet and multimedia artist Julianknxx. Born in Sierra Leone, the London-based artist's three-minute, 40-second video *Black Corporeal (Between This Air)* is a visual love letter to Black bodies. It's a soulful meditation on the psychic cost of being Black in a world that is built to seek your demise — to, quite literally, take your breath.

"I don't think you can do a show about this thing, this essential life force that we share, without talking about who gets to breathe and who doesn't," Tassie says. Julianknxx's somber video with its Afrofuturistic feel poses the question: "What does it mean to breathe in light of everything happening globally?"

This isn't the first time art has been inspired by the air we breathe. New York's Museum of Modern Art defines kinetic art as "art that moves or has an element of motion." Artists like Jackson Pollack — whose abstract drip paintings evolved into "action painting," a form of kinetic art in which the physical act of painting became essential to the final piece — were prominent in the Abstract Expressionist movement of the 1950s. In the late 1960s, artist and independent curator Willoughby Sharp pioneered a postmodern version of kinetic art that expanded the definition to include movement either of the artist or the object itself. "It was really interesting, because it was in this moment artists were saying, 'We don't even need an object, because art is just an idea,'" says Tassie. "Air became a material to those artists who thought art could be invisible, kinetic or just an experience."

Willoughby's 1968 show helped shape UMFA's current exhibit, Tassie says. But her hope is that her exhibit responds to more contemporary issues: "Willoughby focused much more on formal concerns: inflatable sculpture, kinetic sculpture, condensed air. Our (show) goes way beyond the sort of aesthetic concerns of art to the political possibilities." As UMFA's promotional page puts it, "This exhibition is intended to enter and move through you, past gallery walls and exit signs, and into your everyday conversations, classrooms, and voting booths."

At least that's the idea.

Woodland Child in Gas Mask, 2015, mixed media, photo by Jason S. Ordaz. **Courtesy of Naomi Bebo**

Smog Free Ring, 2017, collected smog particles, transparent cube, stainless steel and other media. **Courtesy of Daan Roosegaarde and Studio Roosegaarde**

"Air" runs until Dec. 11.
For more information about the exhibition, visit umfa.utah.edu/air; see more pieces from the show at hcn.org

"Air" is every art lover's dream — an ambitious show with blue-chip talent that addresses some of the most complex themes of our time. But even as climate change dries up the Great Salt Lake, Utah remains a stubbornly conservative state. Utah's eight sovereign nations continue to meet opposition to eliminating Columbus Day, for example, and some leaders of Black Lives Matter Utah have left the organization (and the state) because of the death threats they've received. One can't help asking: How will a show with such explicitly political themes come off in Red State Utah?

"I am bracing myself," Tassie says. "I do think it's not going to be for everybody."

Heard Around the West

Tips about Western oddities are appreciated and often shared in this column. Write heard@hcn.org.

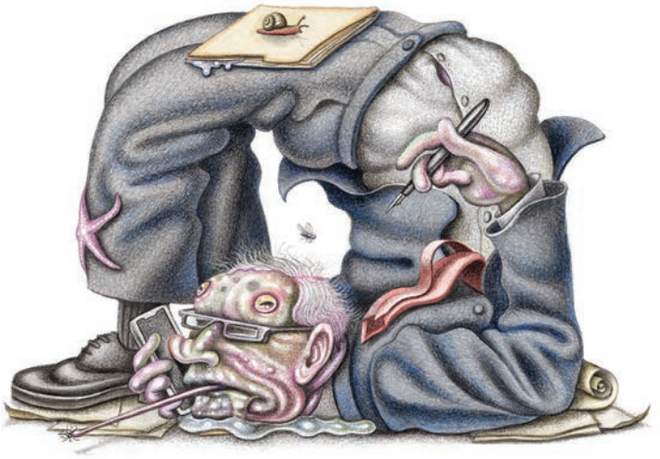
BY TIFFANY MIDGE | ILLUSTRATION BY ARMANDO VEVE

CALIFORNIA

What do salmon, mollusks, crustaceans, and bees — yes, bees — have in common, other than not having all that much in common? Well according to a California court, they are all really fish at heart. In 2018, a trio of conservation and food safety groups wanted to protect our pollinating pals. Unfortunately, the California Endangered Species Act (CESA) lacks a space for bees and other non-marine invertebrates. So, the bee advocates resorted to some nifty legalese, arguing that CESA's definition of "fish" could actually include any invertebrate — air-breathers and sea-suckers alike. We might add some politicians to that list, too. After some back-and-forth in the state courts, the 3rd Appellate District settled the matter in late May, allowing the California Fish and Game Commission to list bees in their rightful place: As protected fish. And now we know how Bumblebee Tuna got its name.

WASHINGTON

For the last half-century, Marty Bluewater has been the sole inhabitant on a 380-acre island in the Strait of Juan de Fuca. Well, the sole *human* inhabitant. According to *1889 Magazine*, Protection Island has many other longtime residents: Puffins, gulls, rhinoceros auklets, bald eagles and other feathered species. And that's just the birds; seals, sea lions and deer have also made themselves at home. At one point, sea otters even holed up in Bluewater's septic tank. (*No connection to "woman in port-a-potty," see story below.*) The diverse tenants have the U.S. Fish and Wildlife Service to thank for their



Shangri-la, because in 1988, it was officially protected as a national wildlife refuge.

So how did Bluewater become the only two-legged resident?

He bought some lots for $7,000 in 1971, built a cabin and learned how to live off the grid. Back then, a dozen other homes were on the island. KREM reported that when the U.S. Fish and Wildlife decided to designate it a sanctuary, the people were given the option of staying forever, but Bluewater was the only one who chose "life use." After he passes on, the federal government will take ownership. John Donne said, "No man is an island," but Bluewater just might be an exception. After 50 years, we think he's earned it.

THE WEST

Who knew that coyotes and wolves hate flashy disco lights? *WyoFile* reported on an "across-the-West depredation reduction demonstration project," in which livestock owners equip animals with motion-sensor LED ear tags to keep predators from eating into the owners' profits, not to mention their animals' bodies. Wildlife conflict-reduction researchers retrofitted small solar lights — the kind that decorate a car's rim — to attach to the tags.

Similar solutions have been tested elsewhere, often to protect animals from motorists. The Finnish Reindeer Herders, for example, paint reflective paint on antlers. And a New Brunswick artist proposed the "Vamoose Animal Alert System"; reflective pinstripes painted on highways to help drivers avoid moose. The dissertation of Aaron Bott, a Utah State Ph.D. student who is researching wolves, includes a chapter on the whopping 4,000 flashtags installed on livestock in Western states. We relish the thought of happy cows boogieing all night to the tune of *Stayin' Alive*.

WASHINGTON

In June, we recounted a story from *The Kitsap Sun* about a California woman who fell into the pit of a Washington outhouse while attempting to retrieve her phone. It was a mishap heard across the news wires. *The* (Port Townsend) *Leader* followed up with the transcript of the 911 call she made from inside the pit, accurately noting that "she lost her balance, but not her sense of humor":

Dispatcher: "911. What's your emergency?"

Caller: "Hi. I can't believe I'm this person. Um. I'm stuck in a port-a-potty."

Dispatcher: "In a port-a-potty?"

Caller: "In a port-a-potty … And my phone fell down and then I slipped into it. And I've been trying to get out. And I just need a lift."

The caller epitomizes "grace under pressure," and then some.

Caller: "I can't believe I'm this person."

Dispatcher: "It happens."

Caller: "I just need some strong man to come lift me out, cause I can't do it. (Laughter.)"

Caller: "Yeah, OK. But, I mean, you're not injured? You're just stuck in there, correct?"

Caller: "I'm not injured, I'm just stupid."

At one point, the dispatcher attempts to make small talk, inquiring politely: "So, other than this, how are you liking Washington so far?"

"Otherwise, it's beautiful," the woman replies, adding, with commendable honesty, "This is possibly the worst view I've seen."

The 911 dispatch transcript is well worth a read, we promise.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#IAM THE WEST

GERALD SHORTY
Counselor and assistant director, Outreach Initiatives for the Fort Lewis College Counseling Center
Durango, Colorado

I'm from Shiprock, New Mexico, and the Navajo Reservation and identify as Diné. I went to the Nenahnezad Boarding School from kindergarten to sixth grade, and this part of my identity informs my work as a counselor. For me, Indigenizing psychology is about finding ways to wellness and healing through traditional practices. In June, we brought in a traditional healer who was part of my network to bless crops that will be planted at the Old Fort, the site of a former boarding school. It's a lesson about the positive things about life and how we treat plants, the soil, the water. I see a lot of tribal representation on and off campus, and this visibility is lifting up the Indigenous perspective, which has in the past been ignored. — Interview by Alx Lee

Do you know a Westerner with a great story?
Let us know on social.

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Jeremy Wade Shockley / HCN