

High Country News

An aerial photograph showing a suburban neighborhood on the left side of the frame. The houses are mostly single-story with light-colored roofs, many of which have solar panels installed. Several swimming pools are visible in the backyards. The houses are surrounded by green lawns and some trees. To the right of the neighborhood, the landscape transitions into a dry, arid desert with sparse, low-lying vegetation and a dirt road. The contrast between the developed area and the natural environment is a central theme of the image.

**LIMITS TO
GROWTH**

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**CHANGING
ARCTIC
SOUNDSCAPES**

**OREGON'S
DYING
ASH TREES**

**THINKING
LIKE
A BOVINE**

HIGH COUNTRY NEWS

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Darby Minow Smith talks with her father, Paul "Brud" Smith, on the Lazy T, their family ranch in Boulder, Montana. (See story on page 46.) **Louise Johns / HCN**

Know the West.

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Responsible Escapism

I've been cloud-watching for a couple of hours now. Cloud layers overtaking one another — cumulous-dotted blue sky to the east; ominous gray to the south. Muriel Lake lies before me, and Muriel Peak behind it. Then the Goethe Lakes, Goethe Peak and what's left of the Goethe Glacier. This is the Glacial Divide, beyond which lies Evolution Valley, where I hiked as a 20-something on the John Muir Trail — a blissful 26 days beyond the range of communication, during which we carried everything we needed on our backs, along with a few things we didn't really need but wanted anyway. No one had cellphones back then.

It is good to escape — whether into the high country, the deep woods or the desert — for a month or even an hour. Get off social media. Shut it all out. Spending a week in the High Sierra with the marmots and the pikas was one of the smarter things I have done this year, and it felt really good to be out of reach of the news cycle. It is tough out there.

Climb the mountains and get their good tidings. But when you come back down, plug back in. Because as tough as the news is, staying informed remains essential to being an engaged citizen. Escape however often you need to — weekly or daily or 10 minutes out of every hour to just breathe some fresh air and be still. But do not lose sight of the fact that rights are being stripped away from people in our communities. And plants, animals and entire ecosystems are under attack.

If no one stands up to defend these people and places, we will have acquiesced to the forces that wish to destroy them for profit — cut it all down and dig it all up and frack it into oblivion. These are the same forces that are trying to whitewash our communities and our history, to erase the contributions of the immigrants and Indigenous people who worked to build this country and make it what it is. If something you love is under attack, you do not bury your head in the sand. In whatever way you can, using whatever skills you have, join the chorus of people saying *No, we won't let this happen. This is wrong. This is not who we are.*

Each afternoon in the mountains, clouds gathered over saw-toothed divides. Some days the storms moved through quickly and the sun re-emerged, and we stood in its slanted golden light, wondering what we had done to have the good fortune to be in this particular place at this particular time. Here's to escaping. And here's to fighting like hell for the places we love.

Jennifer Sahn, editor-in-chief



Ross D. Franklin / AP Photo

Counting flowers to read the saguaro's future

Saguaros are struggling to cope with extreme weather, monitoring studies reveal.

By Shi En Kim



Genaro Molina / Los Angeles Times via Getty Images

The race to protect homes from speculators post-wildfire

Around the West, community land trusts are helping people recover from disasters — and prepare for the next one.

By Annie Rosenthal



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ON THE COVER

Development meets the desert in suburban Phoenix,
Arizona. **Caitlin O'Hara / HCN**



Southern cattails are just one of the many plant and animal species that flourish where treated wastewater is restoring the riparian habitat in Tucson, Arizona's Santa Cruz River. (See essay on page 48.)
Roberto (Bear) Guerra

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.

A SPECIAL "SPECIAL ISSUE"

What an amazing and information-filled issue ("Who Controls Our Food?" September 2025). "The Kill Floor," with its deep dive into the experience of immigrants and refugees who worked at JBS/Swift beef packinghouse, Narsiso Martinez's incredible, poignant art in "Dignified" and Paisley Rekdal's investigation into Chinese immigrants' work on the Transcontinental Railroad in "Eating Bitterness" — all of these articles were of exceptional quality and gave me the opportunity to learn more about my world in all of its beauty and cruelty. Thank you for continuing to shine a light on issues that impact the West specifically, and all of humanity in general.

Garrett Mumma
Fort Collins, Colorado

NO PECANS IN DESERTS

I am in disbelief after reading "The Pecan Problem" in the September 2025 issue. I don't think people listened to John Wesley Powell, who, in the 1800s, warned against widespread farming and advocated for water stewardship west of the 100th meridian. I feel for the people trying to live south of Truth or Consequences, New Mexico; I'm almost sure their wells are drying up. I live in the Sulphur Springs Valley in southeast Arizona near the New

Mexico border. Thanks to Big Ag, Turkey Creek Dairy, Coronado Dairy and the plethora of pecan and pistachio orchards, we are having severe water issues, and our aquifers are being severely depleted by wells that are 1,000 feet deep or more. Flood irrigation is used extensively in the orchards. People's wells are drying up; we're having major dust storms. It's angering and pathetic.

Unfortunately, big money talks loud.

Katherine Brown
Cochise, Arizona

I have a small pecan orchard by the Rio Grande River near Anthony, New Mexico. This is the best article that I have ever read about this horrible problem. Everyone who is involved has a legitimate complaint with all the others. Your article has given me so much information and has caused me to do a lot of soul-searching.

Thank you for your contribution to relevant reporting.

Brian Charles
Anthony, New Mexico

I'm happy that someone sees the pecan problem!

The Rio Grande used to dry out two or three times during the summer months. This year is the worst that I have ever seen:

It's dry from Los Lunas past Belen. A person can't even go fishing anymore. Usually, you can see families fishing and having a good time; now, I wonder if the fish are even alive.

I think greed plays a big part in this problem. The pecan orchards hog all the water and are destroying our environment. Thank you for showing interest in this growing problem.

Eddy Kirksey
Belen, New Mexico

GOOD REASONS TO RESUBSCRIBE

I'm impressed with the quality and timeliness of investigative journalism coming out of HCN right now — in particular, a shout-out to Eva Holland on the Alaska food supply issues with Canadian tariffs ("The Road Not Taken," September 2025), and the *Stateline* article you republished exposing the betrayal of migrant firefighters ("Firefighters question leaders' role in ICE raid near Bear Gulch Fire," Sept. 3, 2025).

I'm glad I recently resubscribed.

Randi Jandt
Alaska and Oregon

POWER STRUGGLES

I was disappointed by the intro to the "Food Is Power" Facts & Figures piece (September 2025). It tries to achieve too much and makes sweeping statements that sometimes contradict themselves.

The author writes that, in the Northwest, dams on the Elwha and Klamath are being decommissioned, and "farmers might worry about their ability to continue irrigating ..."

Neither of those dam systems provided irrigation, only hydropower. This fact was a key point of the Klamath dam-removal effort.

Natalie Bennon
Portland, Oregon

Thank you for your excellent report on power dynamics in our food systems. As an environmental policy student studying food security, I find it hard to explain the intersection of environmental, social and economic consequences that comes from the corporate consolidation of our food system. This piece did a good job of explaining that highly dense issue in a concise way. Thank you for your integrity!

Tosh Morgan
Bellingham, Washington

THERE ARE NO HUMANE EXECUTIONS

I read "Food for thought" (August 2025) with my father-in-law, and it sparked a heated debate over which execution method is more humane — lethal injection or firing squad. After considering the points author Kim Cross raised, we read *The Guardian's* reporting of a botched firing squad execution in April where shooters missed the heart, instead hitting the pancreas, liver and lung, and causing at least a full minute of conscious suffering. The article included data from a human rights report that found there were 73 botched lethal injection executions in the last 50 years. By the end of the debate, we agreed there is no humane, ethical way to execute someone.

Cross' point that the gruesome firing squad method may bring more public awareness, and, I would hope, opposition, to capital punishment is a strong one. Perhaps bringing back the guillotine would be both more humane and newsworthy.

Thanks for sparking important conversations with your great reporting.

Michael Rowley
Oakland, California



Agricultural land stretches from the Pacific Coast to the 101 Highway and beyond in Camarillo, California. Ventura County has some of the strictest protections for farmland in the nation.

REPORTAGE

Fertile ground for housing

In Ventura County, California, affordable apartments for farmworkers are rising on former farmland.

BY ERIN RODE | PHOTOS BY KERI OBERLY

IN A GOOD MONTH, Chepe and his wife made just enough as farmworkers to cover the \$2,400 rent on their two-bedroom apartment in Oxnard, California. But they still had other expenses, including groceries and occasional child care for their four children. So Chepe's tight-knit community of farmworkers often borrowed money from each other, in an endless cycle of IOUs.

But finally, two years ago, the family moved to Las Vegas, where rent was more affordable: A similarly sized apartment cost half of what they paid in Oxnard. Chepe missed the community he'd built during his years in Ventura County, he said, but given the ever-increasing rent and fluctuating work hours and pay, "we couldn't afford to pay that amount."

The impossible math Chepe faced in Ventura County isn't new. Throughout the two decades he lived there, farmworker advocates warned about the region's increasing housing prices and scarce affordable housing,

concerned about how that would affect the county's now \$2 billion-a-year agricultural economy.

Ventura County has some of the nation's strictest protections for open space and agricultural land, but it's also considered one of the country's least affordable housing markets. And farmworkers are especially impacted by the high housing costs, often forced to live in unaffordable, overcrowded and substandard conditions. Now, however, the county is experiencing a small boom in affordable farmworker-housing development, spurred by a 2016 exemption to a slow-growth initiative first passed in the 1990s.

The exemption, which sought to juggle farmland protection with the need for affordable housing, made it easier to build farmworker housing on agricultural land. For years, the region has grappled with the question of how a community that prides itself on preserving agricultural lands could

also improve its farmworkers' housing. And with the Trump administration's ICE raids increasingly impacting the financial situation of undocumented farmworkers, stable housing is more important than ever, both for the workers and the industry that relies on them.

IN A COUNTY where the average monthly rent now exceeds \$2,500, Somis Ranch, a 360-unit affordable housing development for farmworkers, has advertised one-bedroom apartments for \$1,350, and a three-bedroom for \$2,000. More than 200 units are currently leased. The project, located on a parcel of land zoned for agriculture in an unincorporated area, is the largest farmworker-housing project of its kind in the county's history.

In the past six years, California's long-running farmworker-housing grant program has awarded more than \$400 million in funding for more than 4,000 units. The state is also expanding similar efforts: Last fall, Gov. Gavin Newsom, D, signed a law that could allow larger farmworker housing developments in Santa Cruz and Santa Clara counties, and another that could create more permanent housing for migrant farmworkers, some of it on excess state land. And California recently commissioned the first-ever state-wide assessment of farmworkers' housing needs, with a report due next year.

Somis Ranch is located right along the line where suburbia gives way to farmland. Thirty multistory, Spanish-style buildings abut active farm fields on one side and the city of Camarillo on the other, positioning residents near agriculture, a public library and a high school.

In recent years, local farmworkers have reported annual median incomes well below \$25,000, making the average monthly take-home pay often below \$2,000 — more than \$500 short of the region's average rent. Many farmworkers find themselves forced to double and even triple up in places meant for one family. More than 70% of the farmworkers surveyed live in overcrowded housing.

V., who has worked in the county's berry industry for over 20 years, splits her four-bedroom home with two other families, a total

of 10 people. V. and her husband, also a farmworker, pay \$1,800 a month for two bedrooms, one for them and one for their two daughters.

“There are places where more people are living in a house, where they’re sharing everything because there isn’t enough money to pay for a place as just one person,” said V. “Paying less than what I’m paying would be very difficult,” she added, especially with a family.

S., another longtime farmworker in Ventura County, also triples up in a two-bedroom unit in Oxnard that costs \$2,900 a month. He lives with his wife and five kids, plus two of his brothers. For his family to live on their own, he and his wife would have to work 16 hours a day.

And options are limited: In a region that’s home to around 36,000 farmworkers, fewer than 2,000 affordable units have been built or planned over the past two decades. The nearly 700 units in Somis Ranch and a second project, Ventura Ranch, amount to around one-third of this figure. Both were developed by AMCAL, a company focused on market-rate, affordable, student and workforce multi-family housing projects in California, Texas and Washington.

V. has not considered existing affordable

housing options; many developments exclude farmworkers who lack permanent legal status. Most federally funded rental and housing assistance programs exclude undocumented people. “I’ve seen that many houses are being built for farmworkers, but for us working in the fields, there’s no opportunity to get that housing because of our immigration status,” V. said.

Though it’s hard to get an accurate number, most sources estimate that well over half of the farmworkers in Ventura County are undocumented, leaving them ineligible for much of the region’s affordable housing. Somis Ranch, meanwhile, is open to farmworkers regardless of immigration status.

In recent months, the Trump administration’s mass immigration raids and deportations have only added to the urgent need to create safe and affordable housing for the county’s thousands of undocumented farmworkers. More than 620 people were arrested along California’s Central Coast between mid-January and late July, according to local immigrant advocates. Over 300 of them were detained in one day at the chaotic raids of two cannabis farms that resulted in the death of Jaime Alanís Garcia.

The raids have further increased the

farmworkers’ financial insecurity. Many are afraid to report to work, and families have lost income when working family members are detained. Local nonprofits are experiencing “unprecedented demand” for help, according to the Ventura County Community Foundation, which recently launched an emergency fund to support organizations providing food, rental assistance and other necessities.

A place like Somis Ranch can be “transformational” for farmworkers, said Lucas Zucker, co-executive director at the Central Coast Alliance United for a Sustainable Economy. “When you’re living in the living room of an apartment or in somebody’s garage with your kids and your partner, to be able to have an apartment of your own that’s subsidized rate and affordable — that’s actually quality family-style and has good amenities and is brand-new — is like a dream.”

However, he added, such housing units are also “basically impossible to find on the free private market.”

LESS THAN A DECADE ago, building nearly 400 apartments on agricultural land in Ventura County also would have been almost impossible.



In the 1990s, environmental advocates worried about sprawl in Ventura County passed “Save Open-Space and Agricultural Resources” (SOAR), which requires a majority of the voters to rezone open space or agricultural land for development. Proposed developments in unincorporated Ventura County require majority approval from county residents, while proposals in the eight incorporated cities that approved SOAR require a majority vote by those cities’ voters. Voters have since approved only a handful of housing developments.

In 2016, voters renewed SOAR through 2050. But this time, the initiative’s backers added language to the county initiative that allows those protected lands to be re-designated for farmworker housing without a ballot measure. Instead of first requiring the general public’s approval, AMCAL’s two projects are subject to county officials — the same process the county uses for lands not designated as agricultural or open space.

Somis Ranch would not have been possible without these changes, according to Alex Pratt, AMCAL’s vice president of development. The project is on one of “only so many sites” in the county where a project of that scale could work, said Pratt. “Finding these parcels that are big enough to support a significant housing development in a place where all of the regulations actually allow it. ... These are unicorns,” said John Krist, former chief executive officer of the Farm Bureau of Ventura County and a current board member of House Farm Workers!, a local nonprofit.

Pratt is now testing whether Somis Ranch can be replicated. AMCAL’s proposed Ventura Ranch project would build 328 units of affordable farmworker housing about 25 miles northwest of Somis Ranch, on a former orchard between two small residential areas.

But nearby residents oppose using this agricultural land for the housing project. The development would “tower over the single-story residential homes” nearby, and “precious lands may be sacrificed for profit-driven construction,” according to a Change.org petition started by Sarah Swidler, who lives nearby. Another website,



noventuraranh.com, called the proposed apartment buildings “monstrosities,” characterizing the development as “profit driven high-density building where it should not be.” Opponents have also highlighted fire risk and possible impacts on evacuation routes.

“Initially, (the petition) was kind of a reaction to getting news of the proposed project site by watching what was a lemon orchard be demolished and mowed down,” said Swidler. This was a “shocking development” for Swidler and her neighbors, she continued, adding that many longtime residents were under the mistaken impression the land was still protected from that type of development by SOAR. Swidler hoped the petition would create opportunities for residents to weigh in.

Their petition asks Ventura County to put the development to the voters — the very step that SOAR’s 2016 renewal eliminated.

Longtime SOAR advocates have responded by trying to convince Ventura County residents to support the creation of actual farmworker housing on agricultural land, three decades after convincing them to support a ballot initiative that would curtail such development. Richard Francis, co-author of the initial SOAR measure, told a crowd of opponents at a community meeting in late 2023: “You’ve got to have farmworkers if you’re going to have farms.”

Swidler and her neighbors have long lived in the “very high” fire hazard severity zone, CalFire’s highest designation. In an

updated map released this year, the Ventura Ranch site was added to this zone, further complicating the proposal. Now, opponents are highlighting the fire risk. “This isn’t anti-housing, this isn’t anti-farmworker,” said Swidler. “It’s about safety.”

County guidelines state that farmworker housing cannot be built in high fire hazard severity zones. However, the project is currently undergoing environmental review, and “the fire hazards will be addressed” during that process, according to a county spokesperson in mid-August.

Meanwhile, many locals worry that more farmworkers will decide — like Chepe did — that they just can’t make the math work anymore.

Chepe still thinks about returning to Ventura County someday, if the housing situation improves or he gets a different job. In the meantime, he’d love to see his fellow farmworkers end up in a newer, more affordable development.

“I know what it’s like in the fields, how you suffer,” he said, “how (it feels) when work slows down. ... You feel bad or sad because you’ve been through that, and you know how you suffer to be able to pay for that apartment month after month.” ☀

Erin Rode is a freelance journalist based in Southern California, where she reports on housing, homelessness, the environment and climate change.

Somis Ranch House, a 360-unit affordable housing development for farmworkers on former agricultural land in Somis, California (left). A vandalized sign at the proposed Ventura Ranch House, another affordable housing development (above).

REPORTAGE

A good sign

How words and pictures can keep bears safe.

BY SHI EN KIM



PART OF THE GREATER Yellowstone Ecosystem's draw is its magnificent megafauna, especially its bears. Excited tourists who see grizzly or black bears sometimes pull over to snap photos or even leave their cars, endangering both themselves and the bears. The National Park Service and other agencies have long used signs to warn people away from roadside bears, but little research has been done on whether the messages work and why. Recently, researchers gathered feedback on four prototype signs, using the data to identify three core qualities of effective roadside messages.

"I think, fundamentally, people want to do the right thing," said Miranda Foster, one of the study's authors and a graduate student at the University of Montana. "The question was: How can we make (the signs) more powerful and actually reach people?"

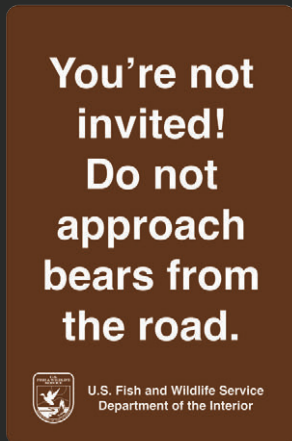
This is what her team learned. ☀

Shi En Kim is an editorial fellow at HCN covering science, environment and society.

DESIGN CRITERIA:

ATTENTION

- ▶ Road signs have only a split second to communicate their message to drivers, so they have to be clear and eye-catching. That means pithy language and a contrasting color palette that makes the text and art pop.
- ▶ Sign 1 was too text-heavy, while Sign 3 had too many graphics, including an image of a mountain range that cluttered the visual field without contributing to the message. The deep blue text and imagery of Sign 2 stood out against its stark white background, snagging viewers' attention.



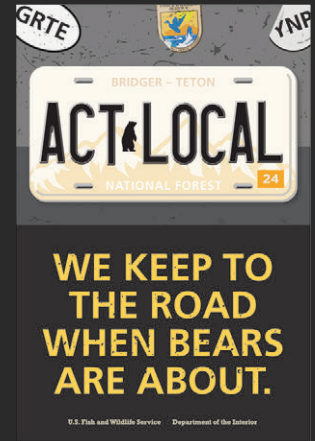
SIGN ONE



SIGN TWO



SIGN THREE



SIGN FOUR

DESIGN CRITERIA:

AUTHORITY

- ▶ A federal agency's name carries weight. Study participants said they felt compelled to comply when signs name-dropped the U.S. Fish and Wildlife Service, as Signs 1 and 2 did by including the agency's logo. Style elements associated with an agency's brand, such as Sign 1's brown color scheme and font, also strengthened the sign's authority by invoking an agency's professionalism and decades-long heritage.
- ▶ Overly stylized signs blunted the impact of their own message: Sign 3, for example, had lighthearted elements that, according to one participant, suggested a marketing ploy rather than a command. Participants also disliked tonal embellishments such as idioms and witticisms, preferring more direct and inclusive messages.

DESIGN CRITERIA:

PERSUASION

- ▶ Participants found simple, reader-friendly signs to be the most persuasive. Graphics that illustrated good behavior also swayed viewers: They liked the visual separation between cars and bears in Signs 2 and 3, for example.
- ▶ The most persuasive signs came off as authoritative but not pushy. Participants found the "you're not invited" message of Signs 1 and 3 to be aggressive and rude.

USE YOUR NEW DESIGN SKILLS

- ▶ Now that you know how to evaluate signs like a design pro, test your knowledge: The same group of researchers measured vehicle speeds as drivers passed these five road signs in Grand Teton National Park. Which has the best chance of persuading drivers to stay within the speed limit?



WEB EXTRA See the researchers' final design for the do-not-approach-bears warning and find out which of the bear-crossing signs above has the best odds of success at hcn.org/bear-signage

A man tries to feed a bear during a visit to Yellowstone in 1958. **Carl Iwasaki / Getty Images**



REPORTAGE

Fen fixers

Meet the researchers restoring Colorado's high-altitude carbon-storing wetlands.

STORY AND PHOTOS BY ANNA MARIJA HELT

THE RESINOUS SCENT of Engelmann spruce wafted over a shallow, mossy pool surrounded by lush sedges near the 11,800-foot summit of Ophir Pass, in southwestern Colorado's rugged San Juan Mountains. This type of wetland, known as a fen, forms when perennial water saturates the ground, limiting plant decomposition and allowing organic matter to accumulate as peat.

Just downhill, however, on that hot, sunny July day, another part of the fen was visible: a degraded area, bare soil exposed on a steep slope.

Peatlands — fens and bogs — are key climate regulators. (Bogs are maintained by precipitation, but fens, which, in North America, occur in the Northeast, Midwest and Mountain West, depend on groundwater.) Their peat retains plant carbon that

would otherwise decompose and be released as carbon dioxide. Despite covering only about 4% of Earth's land area, peatlands store a third of the world's soil carbon — twice the amount trapped in forest biomass. "Fens are old-growth wetlands," said Delia Malone, a recently retired field ecologist with the Colorado Natural Heritage Program. Some of Colorado's fens are over 10,000 years old.

In relatively dry southern Colorado, they also provide a secondary round of water storage. The first round is Colorado's snowpack, which, as it melts, feeds groundwater that fens' spongy peat captures and later releases to dwindling waterways and drying landscapes after the snow is gone.

But the steep and degraded bare patch at Ophir Pass no longer functions. Where sedges, mosses, bog birch and other wetland species

should be thriving, white PVC groundwater testing wells dot the ground, and heavy straw tubes called wattles reduce water and sediment runoff into the creek below.

"This is the steepest peatland we've ever tried to restore, as far as I know," said wetland ecologist Rod Chimner, a professor at Michigan Tech. In the Rockies, fens lie at high elevations, which complicates restoration. Approximately 2,000 fens have been mapped so far in the San Juans, and about 200 need work. Chimner's Ph.D. advisor, David Cooper, began restoring the area's fens decades ago, and together they've literally written the book on mountain peatland restoration. Now, Chimner and staff from Mountain Studies Institute (MSI) — a local nonprofit research and education center — are restoring an ecosystem born from the last ice age but damaged by bulldozing in the 1970s.

Dams, road-building and other human activities harm Colorado's fens, which can take 1,000 years to build just 8 inches of peat soil. The Ophir Pass fen is a rare iron fen, fed by groundwater rendered acidic by iron pyrite. The resulting chemistry supports unique plant communities — and leaves iron and other minerals incorporated in the peat or deposited in hardened layers. This fen was likely damaged by bog iron mining, which has degraded several iron fens in the San Juans.

CLOUDS STARTED TO BUILD as workers used hand saws to extract plugs of sedge and soil from a healthy, already restored part of the fen. Like Goldilocks' bed, the plugs have to be just right: Too large or too many, and digging them up disturbs the soil surface; too small, and they won't survive transplantation. "As long as it has at least one rhizome, it will plant and spread," said Lenka Dorskocil, a research associate with MSI's Water Program and Chimner's graduate student. She split a plug, revealing rhizomes embedded in the rusty-brown peat, then nestled it into a bucket of plugs. Sometimes, workers plant nursery plugs or greenhouse starts from seeds collected in the area.

Chimner and Dorskocil hauled the first bucket of plugs up to the bare patch, began digging small, regularly spaced holes, then gently inserted one sedge plug per opening. A stiff breeze provided relief as several other

people joined in. “Take your time and do it right,” Chimner said encouragingly as he stepped back to observe. Otherwise, the plugs wouldn’t take.

Doskocil spotted an older plug protruding from the soil. But it wasn’t from rushed planting: Frost heave, a freeze-thaw cycle that thrusts soil upwards, had kicked it out of the ground, she said, tucking it back in. Frost heave complicates planting and breaks rhizomes, preventing nearby plants from colonizing bare soil. But Chimner’s past research has yielded a solution: Team members insulated the surface around each newly transplanted sedge with Excelsior, a shredded aspen mulch tough enough to withstand several winters. “We’re giving them little down jackets,” Chimner said.

A rhythm of extract-portage-dig-plant-mulch ensued as the iron-painted ridge of Lookout Peak towered to the north. A passenger yelled “thank you” from a truck descending the pass. Doskocil broke open a handful of peat, revealing roots that were hundreds of years old, if not older.

Planting the steepest quarter acre here has been difficult, and a 2021 fire didn’t help. “We’re kind of starting all over again” in that section, Chimner explained. They’re experimenting with direct seeding, which is common in wetland restoration, but challenging at the high-elevation site. “I’ve seeded here three times,” said Haley Perez, a community science program assistant with MSI.

Conservation biologist Anthony Culpepper, associate director of MSI’s Forest Program, gestured uphill toward what used to be a bare “Mars slope.” He listed the challenges: timing, winds that blow seeds away, variable winter and monsoonal precipitation, a short growing season, a sunbaked slope and animals that eat the seeds. Still, over many seasons and with multiple collaborators — several federal agencies, San Juan National Forest, Purgatory Village Land, the National Forest Foundation, San Juan Citizens Alliance and others — they’ve made great progress. That former Mars slope is now covered with mat-forming, soil-stabilizing wetland plants, including rare species.

The fen is wetter from strategic placement of wattles and check dams, wooden slats that slow surface water flow so that it soaks into the ground instead of running straight downhill. In turn, more

“Fens are old-growth wetlands.”

groundwater has enabled transplantation and spread of thousands of plants. Much of the fen is now green, with mosses and other vegetation colonizing on their own. “This is the first time I’ve seen arnica at the site,” said Culpepper, who also noted the lack of invasives, a promising sign.

MSI takes an adaptive approach to restoration: Research guides planning and execution, and outcomes are carefully monitored to guide future work. That’s important in a region and state where rising temperatures and declining snowpack are predicted to lower water tables, which could disrupt new peat formation and even promote peat decomposition, potentially shifting some fens from carbon storage to carbon release. “How do we get our systems to a spot where they’re resilient enough to withstand the challenges that are going to continue to come?” asked Doskocil. MSI and its collaborators are working on it — at Ophir Pass; at Burrows Fen, a new project north of Silverton; and elsewhere throughout the San Juans.

Fat raindrops landed as the group debated whether to secure the mulch with a layer of jute netting. A wind gust decided it; they added the netting and then, just as the sun returned, trooped uphill to their vehicles to head home. Someone asked Chimner if he was satisfied with the day. “When I can look down and see all green, I’ll be satisfied,” he replied. ☀

Anna Marija Helt is a freelance writer, herbalist and former research scientist. Instagram: @annamarijahelt

Scientists secure jute netting over mulch on a newly planted section of the Ophir Pass fen in Colorado’s San Juan Mountains (opposite). Wattles on a steep degraded section of the fen (top). Lenka Doskocil examines roots in peat that could be centuries old (middle). A restored pool flanked by sedges (right).



Eavesdropping on the Arctic

Scientists are racing to understand what a changing underwater soundscape means for Alaska's whales.

BY CAROLINE VAN HEMERT

ILLUSTRATION BY ALEX BOERSMA

A LINE OF PINK lingers above the horizon, the April sun offering a welcome dose of brightness after the months-long polar night. A dozen miles off Point Barrow, Alaska's northernmost tip, the sea is still frozen except where inky tendrils of open water spiderweb across the pack ice. On the surface, the scene feels hushed by the cold. But if you were to dip a hydrophone beneath the ice — like biologist Kate Stafford did this past spring — you might be surprised by what you hear.

Underwater, a carnival of sound is unfolding, with bowhead whales the featured act. Somewhere, a mother calls to her newborn calf, guiding her young along a route she's navigated dozens of times before. Several males compete for the season's final serenade, singing, as bowheads do, with two voices at once. There's a growl, a "gunshot," a burp, a series of upsweeps and downsweeps — the phonemics of a language only these whales can understand.

Scientists like Stafford, a professor at Oregon State University, are eavesdropping on the action. With a toolkit of recording techniques, they're tracking a dramatic story of change.

The underwater acoustic landscape defines the life of *Balaena mysticetus*, the bowhead whale. Imagine swimming in frigid, pitch-black waters beneath the ice of a frozen sea, using echolocation as your guide. Alaska's bowheads migrate in the near-complete darkness of late winter and spring, traveling from their winter range in the Bering Sea to spend summer in the eastern

Beaufort Sea, more than 1,500 miles away. To avoid becoming trapped in the ice, they negotiate this complex environment through sound, honing skills developed over more than 10,000 years in the Arctic.

For bowheads — *Āḡviq* in Iñupiaq — sound is essential, not only for navigating but for finding food, connecting with mates, and even breathing. To surface, the whales must detect patches of open water or areas of thin ice, which they can break through — at thicknesses up to two feet — using their powerful heads. They listen for predators and home in on prey while mapping the subtle contours of the seafloor. Given bowheads' reliance on sound, it's no coincidence that these long-enduring, soniferous animals also sing some of the most complex and innovative songs on the planet.

Now, however, they face a new threat: Arctic waters are getting noisier, and fast.

BOWHEADS ARE THE only whales that live year-round in the Arctic. The ones that inhabit the waters around Alaska and northwestern Canada were spared from the slaughter of industrial whaling until the mid-19th century, several hundred years later than in other parts of their range. They now comprise the only stable — and perhaps growing — bowhead population, currently estimated at 12,000 to 14,000 individuals, and they remain an important subsistence resource for Alaska Native communities.

A bowhead can live to be well over 100 and, according to some estimates, as much as 200 years old. The species' impressive lifespan has long been acknowledged among Indigenous residents and more recently confirmed by dating bone and ivory fragments from hunter-harvested whales and performing chemical analyses of whale eye lenses and reproductive organs. In theory, a bowhead living today could have witnessed the earliest commercial whaling ships sail into Alaska's waters, lived through the latter part of the Industrial Revolution and heard the first oil drill boring into the Beaufort Sea.

Only later did biologists begin to listen in on their lives. Sonobuoys deployed from an aircraft in the late 1970s offered the first formal documentation of bowhead calls and songs. The resulting scientific report, published in the *Journal of the Acoustical Society of America* in 1982, marked just the

latest technological advance in a longstanding field of study. In 1979, Christopher Clark, who conducted some of the earliest acoustic surveys in Arctic Alaska, noted that his Iñupiat colleague Benny Nageaq knew all the species at Point Barrow by voice. "(Nageaq) patiently explained how his ancestors had listened, too, not with a hydrophone, but with an oar paddle placed into the water with the butt of its handle against the jawbone."

Even today, Arctic underwater soundscapes are, at a baseline, quieter than their temperate or tropical equivalents, not only because there are fewer sources of anthropogenic noise, but because ice acts as a powerful dampening force. It scatters sound waves that hit its underside, modulating the intensity and distance they can travel. Ice also limits vessel traffic, but as it recedes earlier and faster each season, open water routes are becoming more accessible.

Median noise levels will nearly quadruple across the pan-Arctic by 2030, relative to levels measured in 2019, according to a report produced by the Protection of the Arctic Marine Environment and the Arctic Council earlier this year. Because sound is not uniformly distributed, the rate and scale of the changes vary. In places with low ambient noise, small increases in vessel traffic can have a disproportionate effect. In the Chukchi Sea, for example, where Alaska's bowheads spend part of their year, natural sounds like whales, walrus and wind currently have a greater impact on the soundscape than ship-driven noise. By 2030, however, that dynamic is expected to flip, with ship noise taking the largest share of the bandwidth.

Because bowheads' home waters in Alaska and Canada are inaccessible much of the year, biologists' ability to study these environments has also historically been limited. However, over the past four decades, improvements in acoustic technology and oceanographic monitoring, combined with a growing number of recording stations, have helped highlight the importance of sound in the underwater lives of Arctic animals.

Today, passive acoustic monitors help biologists estimate population sizes, track movements and identify feeding hotspots for bowhead whales and other marine mammals. These hardy devices return data in the form of spectrograms, colorful frequency charts showing patterns of scattered dots and vertical



spikes. By reading what amounts to a series of Morse code patterns emerging from the seafloor, biologists can infer which species are in the area and what they might be doing.

Listening underwater also helps identify the potential impacts of noise pollution. A series of studies dating back to the 1980s augmented traditional ecological knowledge about bowheads' sensitivity to vessel noise; it's now well established that they will alter their course to avoid ships, or even aircraft.

For bowheads, sound is essential, not only for navigating but for finding food, connecting with mates, and even breathing.

Airguns and other oil and gas activity can also affect whale dive cycles and vocalizations. During seismic surveys in the Beaufort Sea in 2007-2010, for example, Susanna Blackwell and her colleagues found that bowheads increased their calling rates in response to low decibel sounds, but at high noise levels they stopped communicating altogether. Marine mammals aren't alone in feeling the effects of noise; many fishes and zooplankton are also sensitive to sound and, at acute decibel levels, can be injured or killed.

Even if decibel levels remain below directly harmful thresholds, increasing ambient noise can affect animals' ability to communicate. Bowheads' vocalizations, and their ability to perceive sound, may be drowned out by a phenomenon known as "acoustic masking" — the undersea equivalent of trying to hold a conversation in a windstorm. This sort of background interference with bowheads' daily activities ranks among Stafford's greatest concerns.

AS THE ARCTIC HEATS UP, so too do sources of industrial noise pollution. Offshore oil and gas production has been underway in Arctic Alaska since the 1970s. However, the stakes of such development have recently risen with the implementation of several presidential executive orders. President Donald Trump's January 2025 order "Unleashing Alaska's Extraordinary Resource Potential" promised to unlock "this bounty of natural wealth." What the fine print of this sweeping order doesn't reveal is the potential collateral damage from increased offshore development, including its impact on some of the Arctic's quietest soundscapes.

Warmer oceans have also spurred commercially valuable fish such as cod and pollock to move north, attracting new fishing fleets to the northern Bering and Chukchi seas. Another executive order calls for the roll-back of fishing regulations and catch limits in U.S. waters. Meanwhile, political jockeying for potentially valuable shipping routes and greater militarization of this region will presumably draw even more traffic.

Anthropogenic sources of noise aren't the only climate-related changes to bowhead soundscapes. As sea ice disappears, the ocean has greater fetch, allowing the buildup of waves. The same storms that hit land also make a ruckus underwater. Breaking surf, crashing ice floes and wind gusting across the water's surface mean more ambient noise across all frequencies for bowheads to contend with. As Stafford explained, "Imagine a radio station that can't be tuned in properly; you can hear that there's music playing, but the static makes it hard to tell what is being played."

Longer periods of open water in the Arctic also mean that new neighbors are moving in. Alongside the region's usual underwater chorus — trilling bearded seals, knocking walruses, grunting Arctic cod and crunching krill — unfamiliar voices have begun to emerge. Over the past several years, acoustic monitoring has revealed the growing presence of orcas and humpback whales in the Pacific Arctic during summer and fall. In a study published in *Polar Biology* earlier this year, researchers from the University of Washington and the National Oceanic and Atmospheric Administration (NOAA) determined that orcas are not only becoming more common in the region, they're arriving more than a month

earlier each year as the sea ice decreases.

For bowheads, these novel clicks and whistles signal trouble. A pair of studies published in *Polar Biology* in 2020 and 2022 documented 25 bowhead whales that were presumably killed by orcas during 2009-2019, with a notable spike in the western Beaufort Sea in 2019. This corroborated the evidence of subsistence hunters, who had harvested whales with scars indicative of orca attacks. In the presence of orcas, bowheads, especially mothers traveling with calves, may silence their calls to avoid predation.

Humpback whales are not a direct threat to bowheads, but their vocalizations overlap with bowhead frequencies, meaning there could be competition between the species for acoustic "space" and perhaps other resources. According to Stafford, who has been studying whales in the Arctic for two decades, bowheads are increasingly likely to feel the crunch as humpbacks move north. Her first sighting of a humpback in the Beaufort Sea was in 2021; she's since dubbed the summer of 2024 a "humpbackpalooza," with large numbers of humpback whales sighted in an area also heavily frequented by migrating bowheads.

The changes are happening faster than scientists can track them. Both sea ice melt and Arctic shipping have already exceeded most model predictions; the Arctic Council's 2025 report, for instance, notes that its own previous projections for 2030 noise levels may have underestimated vessel traffic by as much as 40%. These models also assumed a pre-Trump regulatory framework and anticipated oil and natural gas leases. In other words, they didn't factor in an aggressive push for offshore drilling and fishing or the potential reversal of major U.S. environmental regulations. Given the increase in commercial activity that the current administration is pursuing, acoustic impacts on bowheads and other species may be much more severe than the hypothetical accelerated scenarios.

At the same time, basic research on Arctic soundscapes is threatened. Many of the programs critical for deploying and maintaining acoustic monitors, including those overseen by NOAA, are at immediate risk of defunding. Decades of monitoring could screech to a halt, leaving some of the most urgent questions unanswered.

Even as funding from U.S. sources dries up, the Arctic Council, the Protection of the Arctic

Marine Environment and other international working groups have emphasized the urgent need to develop real-time mitigation strategies in the region. Vessel speed limits, rerouting of ships and the establishment of “sound reserves” are among some of the measures proposed. Stafford also cites the need for better acoustic mapping in order to identify highly sensitive areas. Above all, increased collaboration between stakeholders — scientists, industry leaders, local communities and Indigenous-led groups such as the Alaska Eskimo Whaling Commission — will be essential to protect these rapidly changing acoustic habitats.

IN SEPTEMBER, bowheads return to the waters around Point Barrow. This time, they aren’t dodging ice but gulping enormous mouthfuls of zooplankton, which are so dense they can be seen on satellite images as a brownish-pink smear across the water. Here, at the margin of the Chukchi and western Beaufort seas, a unique combination of bathymetry and winds coalesce each autumn to create what is known as a “krill trap.” For bowheads, this translates into a feast of whale-sized proportions.

Since its initial discovery via aerial surveys, biologists have been listening in on this fall feeding frenzy. Hannah Sawyer, a recent graduate student in Stafford’s lab, determined that when the krill trap is “on,” bowhead call rates increase in frequency by as much as 20 times; the whales also make more complex vocalizations that could signal cooperative feeding. No one knows exactly how bowheads detect this ephemeral food source, but sound likely plays a role. The krill trap is so critical for their late-season fattening that they will tolerate higher decibel levels from vessels and other sources just to keep feeding.

The question is how much noise is too much, and whether we humans can quiet our own activities enough to allow bowheads the acoustic space they need. For the bowheads, as for all of us, the ending is yet unsung. 🌟

Caroline Van Hemert is a wildlife biologist, live-aboard Arctic sailor, and author of The Sun is a Compass. Her travel and science writing has been featured in The New York Times, Vogue, Outside and more.

WEB EXTRA Hear the songs of Arctic bowheads at hcn.org/bowhead

POEM

The High Roads

By Laura Da’

The arroyo looks dry but there’s water inside the bright-lipped cholla and yellow cactus, the belly of a fleeing rabbit, and the

snake’s bright stripes of pale on black crossing the junction of the Camino Real and the Armijo route where I once cradled

a child’s twisted ankle and carried him back along the brush to the parked school bus. That summer the police came to the school

and village looking for whomever might have cut the silver leg from the statue of Oñate in Alcalde. I scooped ice from the bottom

of a cooler and held it to the child’s skin where it melted too fast to soothe. A map identifies the Camino Real de Tierra Adentro

as one of four of the new world’s Caminos Reales. Road of kings. King of the road. You take the high road and I’ll take the low road.

Right of way. Might makes right. The rules of the road. Droit de seigneur. Droit et avant. (Be right—then forward.) To be upstanding. To depart

on the right foot (Oñate ordered the severing of the foot at the ankle of all male survivors over the age of twelve). A wake of clouds gathers

across a bony row of yardangs. Pale lavender trumpeter flower blooms from a shattered fragment of bumper. On the silver road,

I am carrying silver. My son turns thirteen in October. Droplets patter behind my steps, awakening the environment almost instantaneously.

Turquoise, obsidian, salt, and feather in the blush of light that warms the bellies of the clouds across the wide but intricate skyline.

Ladling stew into bowls, I drip three deep red stains across the bridge of my left shoe. The white column of bone I spoon

from the broth mirrors a spine of ancient volcanic ash in the desert. At dawn, cactus flowers open in a glamorous wake.

Dancers enter. A youth shifts away from an adobe wall shedding adolescent reticence and begins to move his feet in time.

WEB EXTRA Listen to Laura Da’ read her poem at hcn.org/high-roads

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"I just saw that you are offering free subscriptions to current and recent federal employees. I retired from the Forest Service and hope my contribution will help you meet the needs of so many good people."

— Ann Bartuska, Lutherville-Timonium, Maryland

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DEAR FRIENDS

A season of grizzlies and get-togethers

There's nothing like gathering with family and friends and enjoying the fruits of the harvest. *HCN*ers love get-togethers, so here's a few recent ones.

Way back in May — ancient history now — the editorial and design teams assembled at the B Bar Ranch in Montana's Tom Miner Basin, on Yellowstone National Park's northern border. The ranch is owned by longtime *HCN* reader and supporter **Maryanne Mott**, whose late husband, **Herman Warsh**, a board member in the 1980s, seeded our internship endowment and other education programs. The B Bar runs an organic beef operation that practices regenerative ranching.

During our retreat, we saw moose, sandhill cranes — even grizzly bears (from a comfortable distance). We hung out on the ranch house porch, sharing stories, setting goals and talking about ways to do everything better. (Your thoughts and suggestions are always welcome! Email us at editor@hcn.org.)

That same month, the fundraising team headed to Paonia, *HCN*'s western Colorado hometown, for a few days of brainstorming and fun. Occasionally, customer service and editorial colleagues joined

us, offering some of us the first chance to meet in person. All that, plus local cherries and cider — what could be better?

The retreat gave us a chance to slow down, review where we are and where we're going, and celebrate our shared passion for *HCN*. We balanced energizing discussions about work with creative exercises that captured who we are as a team and everything we want to do for *HCN* and the West.

That same week, a small group celebrated our recently retired art director, **Cindy Wehling**, who is clearly enjoying spending time in her glorious garden. We calculated that among the five people at the dinner table, we'd spent a combined 150 years working at *HCN* — no time off for good behavior.

In-person gatherings require logistical acrobatics when your staff is scattered across the West. But evenings around a campfire and conversations over dinner nourish the soul, especially at a

time when the West, and the news business, face enormous challenges, both from within and without.

— Jennifer Sahn, Mia Axon and Greg Hanscom



Clockwise from left: Paul Larmer, Diane Sylvain, Greg Hanscom, Cindy Wehling and Betsy Marston.

Praise for *HCN*'s Indigenous Affairs reporting

The Indigenous Journalists Association held its annual gathering in Albuquerque in August, and *HCN* staff and contributors were frequently onstage, as panelists and emcees and — congratulations! — honorees.

We received 10 Indigenous Media Awards, including special recognition for an investigation into state trust lands on reservations by *HCN* Associate Editor **Anna V. Smith** and contributor **Maria Parazo Rose**, a spatial data analyst. Published in collaboration with *Grist*, it's part of a larger project that won this year's Richard La Course Award — a high honor!

Staff writer **B. "Toastie" Oaster** won third place in "Best environmental coverage" for their reporting on the climate and environmental obstacles faced by Northwestern Indigenous communities, plus second place for best editorial for a thoughtful piece about covering sacred sites in a respectful way.

Top honors for longform magazine writing went to *HCN*

contributors, one for a piece about a new DNA technique that could help families of missing and murdered Indigenous people and another about tribes' role in decommissioning Klamath River dams.

And photography wasn't forgotten: prizes for images of tree sitters in Oregon, an Indigenous celebration of Hanford, fish camps on the Yukon, an Indigenous-led native plants movement, and a group creating a place for Alaska Natives to harvest, preserve and share salmon and other traditional foods.

(If you missed any of these stories, you can always find them on our website! Read the web version of this column at hcn.org/df-oct25)

To top it off, Indigenous Affairs Editor **Sunnie Clahchischiligi** was elected incoming board president of the Indigenous Journalists Association. (Sunnie was recently a guest on a podcast produced by the Institute for Independent Journalists. Listen to it here: hcn.org/iad-pitch)

Needless to say, we're all very proud!



DRIED OUT IN



PHOENIX

A groundwater crisis has halted the construction of thousands more homes than previously reported.

BY TONY DAVIS | PHOTOS BY CAITLIN O'HARA



■ The Tartesso housing development at the edge of the desert in Buckeye, Arizona.



ON THE FAR EDGE OF SUBURBAN PHOENIX,

a giant concrete arch spans the Central Arizona Project, dubbed a “Bridge to Nowhere” by developers and neighborhood activists alike. Nobody can use it; even pedestrians are barred by a chain-link fence sporting a huge “Road Closed” sign. To the bridge’s north, the desert sits as raw as ever.

The bridge was built in recent years to connect an existing subdivision to the planned North Star Ranch and its proposed 9,600 homes. North Star was to be the latest of many new master-planned communities in Buckeye, one of the fastest-growing cities in one of the nation’s fastest-growing metro areas.

■ Locals call this bridge over the Central Arizona Project canal in Buckeye, Arizona, the “Bridge to Nowhere.”

But now, this development is on hold over concerns that there’s not enough groundwater to supply the community. And it’s not the only project: *High Country News* found that almost half a million homes, including thousands in North Star, are currently on pause, far more than developers or local elected officials have acknowledged publicly.

Developments like North Star have long represented the future of housing for local developers and prospective homebuyers. Phoenix has sprawled endlessly in every direction since World War II, a beacon of the Sun Belt. The city’s rampant growth has transformed former agricultural fields and open desert into homes and tested the bounds of the water supply in Maricopa County, which usually ranks as one of the nation’s fastest-growing counties. The proposed new developments would stretch past the White Tank

Mountains, a low-slung collection of peaks that has long served as Phoenix's unofficial western boundary, making them the most remote developments yet.

But then, in June 2023, state modeling studies concluded that Phoenix and the surrounding areas had "reached the anticipated limits of growth on groundwater supplies," and the Arizona Department of Water Resources (ADWR) made the stunning decision to stop issuing new water supply certificates to developments served by groundwater in the city's outer ring of suburbs. Nowhere on Phoenix's edges did this moratorium hit harder than in Buckeye, where many of the halted projects were slated to be built.

The decision stemmed from a provision in the state's pioneering 1980 Arizona Groundwater Management Act that required metro areas and developers to prove that new subdivisions have enough water to last 100 years.

A slew of sensational headlines followed. *The New York Times* said it likely signaled the "beginning of the end to the explosive development that has made the Phoenix area the fastest growing metropolitan region in the country," a prediction echoed by other outlets. The number of homes halted due to unsustainable reliance on groundwater is a striking indication of how widespread the practice has become — and of the state's determination to rein it in.

The moratorium's impacts heightened a political crisis that had been building in Phoenix for years as the demand for cheap housing and the limits on its water supply collided. Not only did the moratorium come during the worst drought to hit the Southwest in at least 1,200 years, it also hit in the midst of a nationwide housing crisis that has impacted even the Phoenix area, once a bastion of affordability. Developers and their supporters argue that it has caused real economic harm to homebuyers, because they say growth has stopped where the housing is most affordable. But the moratorium could also encourage denser growth in the city — something urban planners say would be healthy for Phoenix and also preserve desert habitat, conserve water and bolster the sense of community.

In the two years since the moratorium began, the housing and water pressures on the area have only increased. Phoenix has become trapped between a demand for affordable homes that meet people's expectations for a

good middle-class life and what government officials say is the dwindling amount of water available to supply those homes. And decision-makers have splintered along partisan lines, seemingly intractably, divided over the best way forward. Republican legislators have pushed hard for bills that would ease or lift the moratorium, while Democratic Gov. Katie Hobbs, whose administration introduced it, and most Democratic legislators have continued to stand by it.

Phoenix is at an inflection point, Tom Buschatzke, Arizona's water chief, said at a June 2023 press briefing announcing the new restrictions. The question remains: In which direction will Phoenix tip?



ONCE A QUIET FARMING COMMUNITY, Buckeye has rapidly mushroomed; town officials say about 125,000 people live here today, making it about 19 times larger than it was in 2000. That's nothing, though, compared to the future growth already approved by the Buckeye City Council — enough new development to push the city's population to more than 1 million.

State officials and local governments like Buckeye's have routinely enabled this kind of growth through zoning and planning policies that treat sprawl as a way of life. Homes built within the urban core typically use less land, consume less water and require less infrastructure. Although they're more expensive to build due to land costs, their urban location preserves desert habitat. But development on the edges has long been seen as the quickest, simplest way to meet people's housing needs.

"In Phoenix, land development has always been as natural as breathing," Andrew Ross observed in his 2011 book *Bird on Fire*, one of the few works that has ever taken a critical look at the region's growth practices. "Any corner of the landscape is a parcel, begging for a contract; each building is a renovation opportunity, every open space a 'vacant lot,' awaiting its approver, and, with a little backing, it could be you."

Efforts to rein in sprawl have run into economic — and political — walls. Growth-related industries such as construction and real estate account for a substantially larger share of the area's economic base than they do in the U.S. as a whole — nearly 19% compared with 14.3% nationally. In 2000, the Sierra Club

led a high-profile ballot initiative to compel Arizona cities to form growth management plans and impose urban growth boundaries on all cities with more than 2,500 people. A sizable majority of voters favored it initially, but the effort ultimately crashed at the polls, crushed by the real estate industry's over \$4 million opposition campaign.

Kathleen Ferris, a former state water director who is now a senior researcher studying water supply issues at Arizona State University, takes a particularly cynical view of the local attitude toward development — the "god of growth," as she calls it.

An architect of the 1980 law that, years later, would halt North Star Ranch and the hundreds of thousands of other new suburban homes, she sees the restrictions as a protection against the worst of Arizona's past excesses. "We are not going to have growth without water," she said. "We will have water in hand before growth is allowed."

Today, Ferris, at 76, is a key player in the ongoing struggle over the city's water issues — one part water lawyer, one part researcher and one part crusader. She regularly talks with legislators and gives ADWR a piece of her mind about pending bills and regulations. As a water expert and a prominent voice speaking against groundwater-based development, her presence has become almost obligatory in discussions of Arizona's water troubles.

In 1980, her presence loomed even larger: She was at the center of Arizona's seemingly intractable groundwater wars. Back then, when lawmakers were drafting the bill that would ultimately spawn the current moratorium, the state's groundwater levels were already nearing a crisis point: There were essentially no limits on groundwater pumping in any sector of the state's economy, which was booming with the same intensity as it is today. Cities, farms and mines were at one point pulling at least 1.9 million more acre-feet a year out of the state's aquifers than rainfall and snowmelt could replenish. In some areas, the aquifers were so depleted that they were collapsing, causing the land to sink and subside.

Around 200 miles of earth fissures caused by this subsidence have been mapped across Arizona. In both rural and suburban areas, earth fissures have undermined and closed roads, power lines, irrigation canals and sewer systems. In 2007, a horse fell into a 10-foot-deep, 15-foot-wide fissure in suburban

Phoenix and died before it could be rescued.

Arizona already had a well-earned national reputation as a haven for land fraud. Legendary swindlers like Nathan Waxman, the self-proclaimed godfather of land fraud, were behind the sale of lots without any water supplies, roads or a clear understanding of who even owned the land. In the 1960s and 1970s, Waxman, working secretly with some of Arizona's most prominent businessmen, "had scammed millions of dollars from Easterners who thought they were buying a retirement home rather than a chunk of barren desert," reporters for the *Arizona Project* wrote.

"It just seemed horrible to me," Ferris recently recalled. "Growth was really starting to happen big-time in Arizona. We were using way too much groundwater."

In late 1979 and into 1980, then-Gov. Bruce Babbitt and more than a dozen lobbyists and legislators gathered in a downtown Phoenix law office for a closed-door meeting to hammer out details of what would become the state's Groundwater Management Act. Ferris, one of the state's preeminent groundwater authorities, and one of her staff members were the only women in the room.

Ferris was a few months shy of 31, but she was already regarded as an authority on groundwater. She had been intimately involved in day-to-day negotiations and politicking over the groundwater law. She spent countless mornings and evenings with Babbitt, the law's prime architect, sifting through the bill's fine points and hashing out the details.

As director of the Arizona Groundwater Management Study Commission, she spent nearly two years during the late 1970s traversing the state, seeking public comments on how to cobble together a new law regulating groundwater pumping. The committee's recommendations would form the basis of the negotiations over the 1980 law.

Congress authorized construction of the \$4 billion Central Arizona Project (CAP) in 1968, hoping to ease the groundwater deficit and deliver Colorado River water to Phoenix and Tucson. It was still under construction in the late 1970s, but a report commissioned by then-State Water Engineer Wes Steiner predicted that CAP would only bring in enough river water to fill two-thirds of central Arizona's total overdraft — even if substantial farmland was retired.

Ferris agreed. She worked with Babbitt

to orchestrate a quiet, successful effort to induce then-Interior Secretary Cecil Andrus to threaten to cut off federal funding for finishing CAP's construction unless Arizona enacted a groundwater law.

But at one spring 1980 meeting, Bill Stephens, an attorney for the Arizona Municipal Water Users Association, made it clear that his group had strong objections to the assured water supply rule. And his association, which represented water utilities in Phoenix and its largest suburbs, had plenty of influence. Many of its members were already formalizing contracts to buy very expensive CAP water, and Stephens felt the rule was unfair.

"We were late in the negotiations, and I just remember Babbitt saying something like 'I guess we're going to have to put the issue aside. We're not going to resolve this one,'" Ferris said.

"I just lost it," Ferris recalled. "Tears were starting to flow down my face. I gathered up my books and my papers, and I walked out of the room. I was demoralized; I was so sad. I just had to get out of the room. I left while all those men were sitting around the table watching me."

Within days, though, cooler heads prevailed. Ferris' supporters among the negotiators convinced her to stay. If she walked out, it would permanently sink the bill. Some crafty negotiating got the cities back on board with the assured supply provision.

The law's "over-arching objective" — explicitly spelled out — was to reduce and manage groundwater use in key areas of the state, including the Phoenix and Tucson metros. But only in recent years has that law actually stopped any development on a large scale — first in 2019 in Pinal County, a much smaller but also fast-growing slice of suburbia to Phoenix's southeast — and now the city's desert suburbs.

After the law was passed, Ferris became the first chief counsel of the Arizona Department of Water Resources, which the law created, then the director. These days, she sits on a water policy council that Gov. Katie Hobbs appointed shortly after taking office.



WHEN NEWS BROKE OF THE STATE'S 2023 BAN on new groundwater-based subdivisions, sparking apocalyptic national coverage, local and state officials switched into defense mode.

"It seems in some ways like there's criticism for us for doing planning and smart development," Phoenix Mayor Kate Gallego told the *Arizona Republic* after the ADWR moratorium was announced. "It is a strength, not a weakness. We are planning ahead. We have a very simple principle: Water first, then development."

While the moratorium is unlikely to stop the area's runaway growth — 80,000 lots had already been approved — the initial response far downplayed the number of homes on hold, according to a *High Country News* review of state records.

Developers had filed for confirmation that they had enough water to move ahead on roughly 300,000 home lots when the state decision came down. Another 162,000 home lots on state-owned land from Phoenix west to Buckeye also remain undeveloped due to water shortfalls, ADWR records show. Arizona's Constitution mandates that such lands be sold or leased to help fund public schools, meaning it's usually developed with housing. But the application process for the assured water supply certificates started in the 2000s and never came through. The development plans were halted.

Among the biggest developments currently on hold are Teravalis and Belmont. Both have been in the works more than two decades. The aftereffects of the 2008 real estate crash delayed them, but they had recently been revived.

Teravalis, at 100,000 homes on nearly 37,000 acres, heralds itself as "the community of your future" and "the nation's next premier master planned community." Its website is packed with photos of sunset-drenched saguaros and chollas, and it promises to reduce water use by promoting native landscaping and to set aside 7,000 acres as natural open space, parks and trails. To its west runs Sun Valley Parkway, a seldom-traveled, 30-mile-long four-lane road, itself long known as the Road to Nowhere. Belmont would be only a little less grandiose, building 80,000 homes on 24,000 acres in unincorporated Maricopa County, along with data centers and autonomous vehicles, according to a 2017 press release.

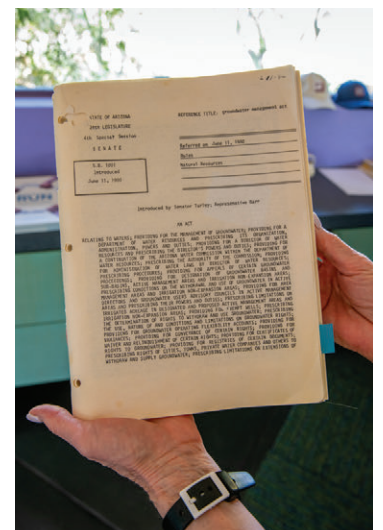
In 2022, developers began construction on 8,000 homes in Teravalis that already had a guaranteed water source. Some are now listed for sale; model homes are already up



**“WE ARE NOT
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—KATHLEEN FERRIS

■ Kathleen Ferris has spent her career working toward water security in Arizona as the state's population doubled. In the image below, she holds a copy of the 1980 Arizona Groundwater Management Act at her office in Paradise Valley, Arizona.



and the first homes could be occupied by early 2026. But since none of the other planned homes were certified prior to the ruling, the rest of the project is on hold.



THE MORATORIUM CAME AS A COLLECTIVE SHOCK to the Phoenix-area homebuilding industry. But it shouldn't have: For more than two decades, Arizona water officials had been sending out warnings, echoed by Ferris' high-profile criticism. Time after time, they concluded that far less groundwater was available for proposed subdivisions than the developers claimed.

Belmont's original developers, for example, wanted permission to use 39,000 acre-feet of groundwater per year. But back in 2003, ADWR determined that barely half that amount was physically available. Around the same time, Tartesso's developer asserted that 26,000 acre-feet was available, while ADWR said it was actually only about 19,000 acre-feet. Similar discrepancies arose around proposed developments across the West Valley.

Then, in 2021 and 2022, ADWR told the developers of several subdivisions, including Festival Ranch and North Star Ranch, that it was finalizing a computer model for the West Valley area that showed the subdivisions' groundwater demands likely exceeded known supplies.

But then-Gov. Doug Ducey's Republican administration was said to have prevented the model's public release. The day after Gov. Hobbs took office in January 2023, Ferris urged the new governor to release the study in an opinion piece for the *Arizona Republic*. Hobbs did so six days later. Alarm bells began to go off for developers and builders.

The moratorium that ADWR declared five months later "had pretty devastating impacts to housing," homebuilder lobbyist Spencer Kamps told an ADWR advisory committee meeting a few weeks after its release. "We are the only land use that does meet the 100-year requirements," since apartment, commercial and industrial development were not covered by the 1980 law.

He estimated that developers and homebuilders were sitting on at least \$2 billion worth of investments in infrastructure in the Buckeye area, including roads and sewer and water lines, along with the Bridge to



"I LIKE THE QUIET. THE ONLY THINGS YOU HEAR ARE CARS GOING BY, PEOPLE TALKING AND DOGS BARKING, WHEREAS IN CITIES IT WAS TRAFFIC, 24-7. I NEVER FELT AT PEACE."

—EMILIE MYTH

Nowhere. His estimate rose to \$4 billion as the moratorium continued. Kamps also said it contributed to rising housing costs as well, adding to the existing 45,000-unit housing shortage in the metro area.

The moratorium has also intensified the isolation of suburban areas where new development had been planned. Emilie Myth moved to Tartesso, a subdivision of Buckeye, well over three years ago. She had been living in Torrance, south of Los Angeles, but found herself stressed by the cost and concerned about the safety of her neighborhood. Late

one night, for example, she found a woman sleeping in her garage and was barely able to wake her and get her to leave.

So she moved to Tartesso, where the mortgage for a four-bedroom house costs the same as the rent for her one-bedroom apartment back in California: about \$1,600 a month.

The downside is being marooned on a service-less island. Tartesso, with its 3,400 homes housing 10,000 residents, is about 10 miles east of the nearest gas station and 20 miles west of the nearest place to buy groceries. A convenience store is expected to open



■ Emilie Myth and her dog, Piper, at home in September (*opposite*). Clouds catch the last light of the day behind a sign for the Tartesso development in Buckeye, Arizona.

a few miles away at the end of this year. The only food service available comes from the handful of food trucks that spend evenings in one of Tartesso's many parks. Similarly, North Star Ranch would lie an hour's drive north of downtown Buckeye. Just south at one of Festival Ranch's subdivisions, there's a lone restaurant attached to a golf course, and a single Subway outlet and convenience market at the development's entrance. The nearest grocery store is a Safeway 20 miles east.

Yet, in some ways, Myth enjoys the isolation. "I like the quiet," she said. "The only things you hear are cars going by, people talking and dogs barking, whereas in cities it was traffic, 24-7. 'I never felt at peace.'"

But it's been an adjustment, too. She grew up in South Sacramento, where she could take the bus to the movies or walk to the convenience store to get a candy bar. "What do kids do around here? What do teenagers do around here?" she wondered. "I just feel like as a kid I could be more independent than a child is here."

The very thing she struggles with now

contributes to her new neighborhood's low cost: Since World War II, homebuilders have hopped over the urban fringe and alfalfa and cotton fields to develop the vast swaths of cheap desert land beyond them. This made the housing more affordable; denser construction would have cost more per unit, as would including commercial services.

Buckeye, for example, is among the handful of areas in the Phoenix area where homeowners can find a new home for under \$400,000, a study by longtime Phoenix economic consulting firm Elliott D. Pollack and Co. found. Between June 2019 and June 2025, the median home price in Maricopa County jumped 65% to nearly \$474,000, according to one real estate company, putting home ownership out of reach for much of the working class. In a 12-month stretch, though, more than a quarter of the 2,700 homes that sold for less than \$400,000 were in Buckeye. According to Pollack, "There are few suitable alternatives for affordable homes in the region if Buckeye cannot continue to develop

homes." Pollack's study was commissioned by the Home Builders Association of Central Arizona.

Other reports, though, suggest that the moratorium may have had less of an impact than developers claim. There are dozens of homes listed in Tartesso, Festival Ranch and Buckeye in general for under \$400,000. And a variety of other factors affect housing prices, according to a recent study from ASU's Kyl Center for Water Policy: federal interest rates, inflation, supply chain interruptions, migration patterns, remote work, labor markets, inventory and local, state and federal government policies and regulations.

For example, the single-family, low-density zoning that covers most of the metro area can discourage lower-cost housing development and increases the cost of infrastructure such as roads and utilities. Macroeconomic influences account for much of the housing costs and availability, the study found. "In the absence of economic studies, it is difficult to say whether or how the (ADWR) moratorium might impact housing affordability."

But it does mean that residents like Myth will likely continue to live in suburban isolation. "In a lot of ways, it sucks," said Myth. "I understand why the governor wants to do that. We don't want to turn off water for some people and have other people have it. But at the same time, when I moved here, I was told there is going to be more housing soon and eventually there will be a grocery store. That looks like it's not going to happen for decades now."

Some Tartesso homeowners told *HCN* they were leaving, or at least considering it, due to the long bus rides for schoolchildren and the onerous drives to get basic groceries. Not Myth, though. "I'll probably stay here," she said, since anywhere else, her mortgage bill could easily double.



WITH TIME, THE FIGHT OVER THE MORATORIUM has hardened along familiar lines. Republican legislators have essentially accused ADWR of waging war against affordable housing, while ADWR and its backers say they're standing firm on behalf of the state's 45-year-old tradition of responsible groundwater management. A complicated history and a challenging present, distilled

into a simple fight: affordability versus environment.

Duane Schooley Jr. bought two houses in Tartesso to rent out at first back in 2018 and 2019 because “we figured that Arizona was going to be a hot spot.” But Schooley, a local Republican party activist, is now openly disdainful of the state’s decision to stop allowing new homes to be built on groundwater supplies. He even doubts the state’s talk of a water shortage.

“When I moved here, it was all farmland, all of it,” Schooley recalled “Now, you have the Walmarts, the Boeings, the distribution centers. You displaced 1.3 million square feet of farmland for a concrete warehouse. Where did the water rights go? How much water were they using?” ADWR’s model found, however, that even those kinds of reductions in water use — moving away from farming, cutting back water use — hadn’t been enough.

Arizona officials are “playing with fire” and are “kind of short-sighted” by stopping so much development simply because of water, he added. “It seems kind of heavy-handed.”

Homebuilders began looking for a way around the moratorium just weeks after it was implemented. Industry representatives argued that developments that had been in process should be allowed to move forward, but state legislation on that got nowhere. After that and other efforts to overturn the moratorium failed, they pushed for a bill to allow new subdivisions to be built on retired farmland, since homes generally guzzle less water than cotton fields. The Legislature passed it in 2024, but Hobbs vetoed it after ADWR officials claimed it could actually lead to more water use in those areas. Developers have also challenged the accuracy of the forecasts made by ADWR’s groundwater model, saying its forecasts make faulty assumptions about where wells would be placed, overestimate future demands and underestimate supplies. Their consultant prepared an alternative model that projected groundwater supplies would more than suffice for 100 years. ADWR, however, pushed back on its findings.

For now, the department has focused instead on extending the responsibility to restrict groundwater use to some cities as well, by requiring them to cut groundwater use once renewable supplies arrive. While the rule’s backers say this provision is essential for reducing dependence on native

groundwater, homebuilders and Republican legislative leaders have claimed it is an illegal “tax.” (ADWR has denied this, saying that it isn’t a tax.)

In early 2025, the Home Builders Association of Central Arizona joined two lawsuits against ADWR. One was filed on their behalf by the Goldwater Institute, a conservative think tank. This complaint challenged ADWR’s decision to stop issuing certificates for development, while the other, which was filed along with the Arizona Senate and House of Representatives, went after the requirement that cities importing renewable water cut groundwater use by 25%.

The Goldwater Institute lawsuit alleges that ADWR lacked the authority under state law to impose its moratorium in the first place, arguing that ADWR’s rules have become “insurmountable obstacles” to obtaining state certification of a 100-year supply.

In response, ADWR filed to have that lawsuit dismissed. “What is at stake in this lawsuit is the ability of the state to protect the Arizonans that are here today, by ensuring that their water supplies don’t run out or water levels fall to alarming depths of 1,000 feet due to new groundwater pumping,” Buschatzke, a defendant in the Goldwater lawsuit, wrote in an op-ed. “The Goldwater lawsuit would create a policy directive to rubber-stamp new developments if water was available beneath them, while forcing ADWR to ignore any potential impacts to neighboring homeowners or communities.”

The various factions have found one area of compromise, however: Legislation was passed this summer that could allow several hundred thousand new homes to be built on farmland. New subdivisions can only be built if they use as much as 1.5 acre-feet of groundwater per acre of developed land — enough water to serve three Phoenix-area homes for a year but far less than the farms themselves would have used.

But the new law won’t help the hundreds of thousands of planned homes in Buckeye and other suburbs in the desert. Instead, it focuses on developments that are less likely to move quickly.

Developers of master-planned communities want to build in lush desert mountain landscapes because they are selling atmosphere, said Sarah Porter, director of ASU’s Kyl Center. “They are designed from top

to bottom, and everything is beautifully designed for a look, to work well together. It’s very hard to do that in an old farming town.”



WHATEVER THE OUTCOME of the various debates and lawsuits, Phoenix’s future growth ultimately depends on the public’s willingness to pay. “For enough money, people can dig a trench between Phoenix and the ocean to bring water. It might cost a trillion dollars, but it can be done,” said Brett Fleck, a water resources manager for the city of Peoria, northwest of Phoenix. “It’s not about running out. It’s about: Are you willing to pay for what it costs?”

Even relatively straightforward solutions are expensive and quickly run into problems. The city of Buckeye, for instance, agreed in early 2023 to pay \$80 million to buy rights to 5,926 acre-feet of groundwater a year — enough to serve more than 17,000 homes annually — from a company that represents farms west of Phoenix. The town of Queen Creek spent \$30 million for about 5,000 acre-feet from farms in the same area a year earlier.

In July, ADWR allowed the cities to take the water. But they still need the Central Arizona Project’s permission to put the water into the canal to bring it about 60 miles to the Phoenix area. That won’t be easy, since the water will require costly treatment: Much of it is contaminated with unsafe levels of naturally occurring arsenic and nitrates from crop fertilizers. If it’s put in the canal untreated, it would make water flowing to other houses and farms unusable.

And the CAP canal itself may very well be carrying less water soon. It has delivered renewable Colorado River water supplies to the state’s hot, dry interior since 1985, but with officials of the seven river basin states locked in tense negotiations over how to apportion the water supply from the oversubscribed river, the prospect of cuts looms large. Water officials of five Phoenix-area suburbs that get Colorado River water told *HCN* that they may have to scale back their future growth plans if the region sustains a significant cut to CAP deliveries.

Another proposal is to raise the Bartlett Dam on the Lower Verde River northeast of Phoenix so it can store an additional 323,000 acre-feet of water for metro-area cities in central Arizona. But one projection estimated



■ A roofer works on a home in a housing development in Buckeye, Arizona, in September.

it will cost about \$1 billion, needs congressional authorization and wouldn't go online until the late 2030s. The city of Phoenix is considering a facility that would treat upward of 80 million gallons of wastewater per day to make it drinkable — projected to cost \$4 billion to build, and that's a decade away.

Former Gov. Ducey proposed spending more than \$1 billion for seawater desalination plants on the Gulf of California and a pipeline to ship the treated seawater 200 miles north to the CAP canal. Ducey proposed this billion-dollar allocation toward the cost of such a project to the Arizona Legislature in 2022, but major state revenue shortfalls in 2024 led to a more than \$400 million cut to the funding, leaving the prospect for water imports uncertain at best.

Myth would like to see some of these options considered more seriously. Why not, she asks, if the question is having enough water for people to drink and to bathe and to live?

"I would say that we are not being as imaginative about water as we could be," she said. "If we could pipe oil from Canada to the Gulf of Mexico, why can't we pipe water from the Great Lakes here, or bring water up from the Sea of Cortez and treat it up here?"

But for some residents the moratorium has offered unexpected benefits. They have come to love their subdivisions marooned in the desert and dread the revival of the

growth machine. Tom Berry began thinking of moving to Arizona more than a decade ago but dismissed Phoenix's rural suburbs as an option. "I thought, 'Who in their right mind would ever live out there?' It was so remote." But after years living in a booming neighborhood of northern Peoria west of Phoenix, he grew concerned about all the development he could see coming. "It was really going to impact our lifestyle." So he drove to Festival Ranch "on a whim," and bought a new home there in September 2021. Like many Festival Ranch residents, he was delighted that the state had blocked North Star Ranch.

"(The city is) enamored with the high growth rate of Buckeye," he said. "It is growth at any cost, and too bad if you already live here."

Just across the Sun Valley Parkway from his neighborhood lies the huge White Tank Mountains Regional Park, he noted. The parkway drive passes through open desert where cattle that graze on neighboring state land occasionally break through fences and stroll onto the road. Authorities have posted signs between Festival Ranch and Surprise warning drivers to "Watch for cattle."

"So one of my friends said, 'How about we put signs on the fenceline facing the desert that says 'Watch for cars?'" Berry said.

A few streets over, Billy Ryan, a 39-year-old paramedic and Phoenix-area native whose four-bedroom house lies a block away

from the bridge, was also cautiously celebrating the halt on new homes.

"I don't want any development up there. It's more traffic, more people, more everything," said Ryan. "The whole reason I moved out here was to get away from that."

"You go five miles down the road and you're in open desert. You see snakes and bugs. There's nothing to the north of us, to the east or to the west. We're kind of like an island," he added. "If you like being outside, in nature, it's ideal."

Still, he tempers his relief at the indefinite delay imposed on the North Star Ranch project with the intuitive awareness of someone born in the state that "you can't stop progress."

"It will happen," he said. "The developers always get their way. At the same time ... if people want to develop here, they need to find a better way to get the water."

"I don't know where they are going to get the water, it is a finite resource, to be sure. But at the end of the day, developers are the ones with cash. If not this election cycle, not now, four years later, five years later, 15 years later, it will get done." ☀

Tony Davis has covered Southwestern environmental stories for daily papers since 1981, most recently at the Arizona Daily Star. He has won awards from the Society of Environmental Journalists, Best of the West and Scripps-Howard. @tonydavis987

PORTRAIT *of a* VANISHING TREE



The Oregon ash is heading for functional extinction.
How do we make the most of the time we have left with it?

BY JACLYN MOYER
ILLUSTRATIONS BY KATE SAMWORTH



ONE JUNE AFTERNOON IN 2022, Dominic Maze was sitting on his tailgate at an elementary school parking lot in Forest Grove, Oregon, waiting to pick up his kids from camp. “I had a resolution that year to not look at my cellphone to kill time,” he told me recently. Instead, he scanned the lot’s planter strips. A biologist with the city of Portland, Maze is always looking at plants. That day, he noticed the trees. Their crowns were oddly leafless, and bursts of new shoots sprang from the base of each trunk. Someone must have chosen the wrong tree for this site, he thought. But when he took a closer look he realized: They were all ash.

With a sinking feeling, he fished a hatchet from his pickup and started scraping at a bark split on one of the trunks. Underneath, snaking tunnels carved a labyrinth into the tree’s inner tissue. Maze’s two kids, released from camp and eager to see what their dad was doing with a hatchet in the school parking lot, ran toward him. He told them to watch for a shiny green beetle. Just then, an insect landed on his son’s hand. The family stared at the creature: slender body hardly larger than a grain of rice; two bulbous eyes; iridescent shell shimmering emerald-green in the afternoon sun. The beetle flew off, vanishing into the distance, and Maze turned back to the tree. There, he found another, this one dead and wedged in a hole in the bark. “I don’t want to be hyperbolic about it, but I felt terrible,” he told me. “I mean, just the worst feeling.”

Maze had never seen this particular insect in Oregon, but he recognized it immediately; he’d been expecting it for years. Native to northeastern Asia, the emerald ash borer (EAB) was first found in the United States in Michigan in the early 2000s, after ash trees there began dying for no apparent reason. By the time researchers identified the insects as the cause, they’d already spread across much of the state. Over the next two decades, the beetles continued to spread through the Midwest and East Coast, killing more than 100 million ash trees and becoming the nation’s most destructive forest pest. But they hadn’t been found west of the Rockies until that summer afternoon when one landed on Maze’s son’s hand.

That day in the parking lot, after reporting his finding to the Oregon Department of Forestry, Maze sat down on his tailgate to think. The trees in the planter strip were excelsior ash, a non-native landscaping

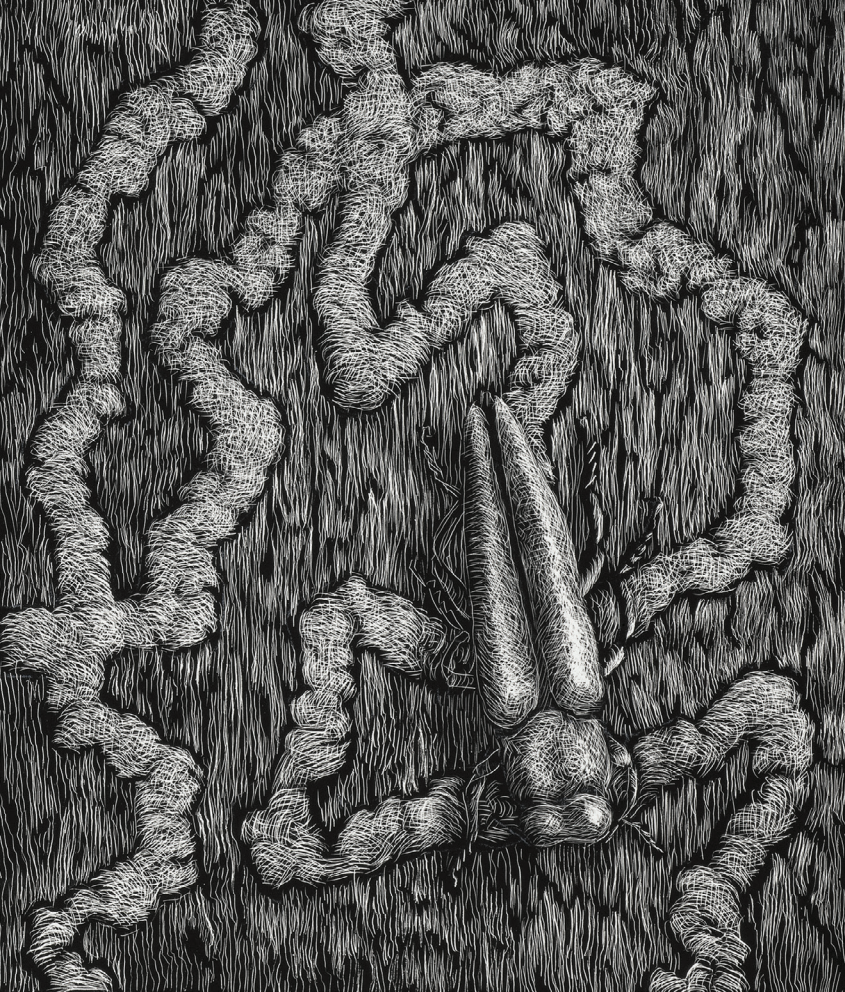
species. Though their loss would make the parking lot hotter, it was no great tragedy. But Maze knew that by the time a tree shows visible signs of decline from EAB, it’s already been infested for several years. And each year, female beetles lay 60 to 90 eggs, some on the same tree, others on nearby trees, and a few on trees up to 10 miles away. In other words, the cat was already out of the bag.

“I just sat there, looking around at the other ash trees in the neighborhood,” Maze told me. Then he remembered the river. Though out of sight, the Tualatin River was less than a mile from the school, its banks forested almost entirely with Oregon ash. “I thought: Well, this is not good.”



FIVE YEARS BEFORE MAZE FOUND THAT FIRST ASH BORER, my family moved to Oregon’s Willamette Valley. We bought a house and three acres of unruly woods along the Marys River in Corvallis, just 70 miles south of Forest Grove. When the trees started leafing out our first spring on the land, I recognized some: maple, hazelnut, dogwood. But most were a species I couldn’t identify. They held compound leaves and sprawling canopies, some towering as tall as 70 feet and too wide to wrap your arms around. I asked a neighbor, who said, “Those? Those are some *big-ash* trees.” When I didn’t catch the joke, he chuckled: “*Ash* trees. They’re Oregon ash.”

The only ash species native to the Pacific Northwest, Oregon ash grows abundantly in lower elevations west of the Cascades from Washington to California. Despite — or perhaps because of — the tree’s



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ubiquity in the Willamette Valley, I wasn’t the only one unable to point it out. In a land of spectacular trees, ash is hardly anybody’s favorite. The tree has little commercial value compared to the region’s lauded timber species — Douglas fir, ponderosa pine — and it lacks the charisma of the beloved white oak and bigleaf maple. Sometimes described as messy, Oregon ash are asymmetrical and prone to dropping branches. They can grow upwards of 80 feet tall but are more commonly medium-sized and clustered in dense stands. They spread prolifically by seed and often pop up in unwelcome spaces: farm fields and restored prairies, lawns and backyard hedges. Because of all this, Oregon ash has long been easy to disregard. “If you look in the scientific literature, hardly anything’s been published on *Fraxinus latifolia*,” Wyatt Williams, invasive species specialist for the Oregon Department of Forestry, told me in 2023. “In fact, up until just now, it’s been considered kind of a weed.” With the arrival of EAB, however, this oft-overlooked tree is gaining new attention. It’s like infrastructure, a friend suggested: No one notices it until the day it breaks.

In the 20-some years since the ash borer appeared in the U.S., foresters and entomologists have developed tools to help slow its spread. Insecticides, expensive and arduous to apply, can be injected into individual trees. Parasitic wasps have been introduced to predate upon the insects. But what’s also become clear is this: There’s no stopping the beetles. Five North American ash species have been listed as critically endangered by the International Union for Conservation of Nature, and Oregon ash is likely to join that list soon. “Worst-case scenario, my prediction is that EAB will spread across Oregon within 10 years,” Williams told me. “Best-case scenario, maybe 30. You can slow it down, but trees are going to die.”

I drove home from Williams’ office that day with the scent of wild-fire smoke blowing in my windows and his words ringing in my head. If we know something irrevocable has been set into motion — if we already know where the story begins and where it ends — what, then, do we do with the middle? With that space of possibility in between?

The following spring, when my son was 5 and my daughter 9, the three of us wandered into the woods behind our house. We were out to pick stinging nettles, and the ash overhead had just begun to leaf out. Little fists of avocado-green fingers unfurled from each branch, catching the noon sun. The trees were all brightness, all growth, no signs of decline, and I wondered: How long until EAB reaches this patch of woods? I’d seen photos of “ghost forests” devastated by the ash borer in the Midwest, and I tried to imagine a similar scene here, skeleton trees looming bone-white and leafless over blackberry brambles. I found this both easy and impossible to truly picture, the same way it felt both easy and impossible to imagine the other changes predicted to transpire by the time my kids become adults: 6 inches of sea-level rise. Dry summer heat replacing October rains. A year-round wildfire season.

We passed a low-hanging branch, and up close I could see each new ash leaf was coated in velvety fuzz. I reached out to touch one and startled at the familiarity of the sensation: like running my fingertips over the hairs at the nape of a baby’s neck. My daughter asked what I was doing, and I pinched a leaf from the tree, brushed it against her cheek. She giggled, snatched the leaf and tickled it across her brother’s face. He demanded to know where she got it, and she pointed to the ash. Together, they craned their necks back and looked up into the canopy. Clouds now covered the sun, but even in the muted light the

undersides of the leaves shimmered silver, and I wondered: What will it mean to lose these trees?

My kids ran ahead. Farther down the trail, I found them crouched at the base of another ash. All hushed voices and raised brows, they waved me over. The tree leaned southward, reaching for the sun, and sheltered under its slanted trunk lay a burrow of sorts, a bed-like depression in the dry soil. Tufts of gray fur clung to the edges of the bowl. My kids peered into the little den, but did not trespass; they know a home when they see one.

I watched their careful examination, their wide-eyed wonder, and it occurred to me that maybe I was asking the wrong question. Maybe the more urgent question to ask now, while Oregon's ash forests are still intact, was this: What does it mean to *have* them? What roles do these places play, ecologically and otherwise? Who, for lack of a better word, are these trees? The research, thin as it was, couldn't fully answer these questions. So I set out to talk with people who'd spent their lives alongside ash trees, who might help us piece together something of their story before they're gone.



IF YOU FOLLOW THE MARYS RIVER DOWNSTREAM FROM MY HOUSE, through residential lots, around a neighborhood park and under a highway bridge, you soon reach the Willamette River. And though I'd been thinking about a tree, I came here, to a city park just upstream from the confluence, to talk with a fish biologist named Stan Gregory. Gregory has been in the Department of Fisheries, Wildlife, and Conservation Sciences at Oregon State University since 1971 and has spent much of his career studying the Willamette River Basin.

We met at the edge of a baseball field and followed a trail toward the water while Gregory rattled off a list of fish found in this stretch of river. "Sandrollers. Suckers. Sculpin." The Willamette River, the mainstem of Oregon's largest watershed, flows through the flatlands of the Willamette Valley from Eugene to Portland, gathering all the waters that spill down the western slopes of the Cascades and the eastern slopes of the Coast Range. Its banks hold industrial sites, homeless encampments, wastewater treatment plants, farm fields and all three of Oregon's largest urban centers. In winter, this river runs fast and brown. In the summer, the flow slows, becoming shallow enough to walk across in places, and wafting of algae and warm mud.

The Willamette is not exactly what comes to mind when one imagines salmon habitat, a far cry from the burbling streams that tumble through higher elevations. But this river, Gregory told me, is just as important for salmon and steelhead. To get to their spawning grounds in those more picturesque streams, the fish must migrate through these waters. In fact, the mainstem of the Willamette hosts the greatest diversity of native fishes found anywhere in the watershed, 31 species in all.

We followed a trail through the shade of a mixed riparian forest. Cottonwoods towered high above bigleaf maples, red twig dogwoods and plenty of Oregon ash. The forest here in the park stretches for a little less than half a mile from the river's edge. It's among the widest sections of riparian forest along the Willamette today, but, historically speaking, it's a narrow strip.

In the early 1800s, before settlers came to the Willamette Valley, riparian forests like this extended for miles — as far as seven — from the

edge of the main channel. In those days, the river resembled a frayed length of macramé. Braided webs of side-channels and alcoves, sloughs and oxbows threaded across a vast floodplain. In this wet landscape, ash thrived. "It doesn't mind it getting soggy and mucky and inundated with water for several months every winter," Gregory told me. We'd stopped beside a swale a hundred yards or so from the river's edge where a monolithic stand of ash grew tall. It was late summer and the ground was dry, but in a few months, this swale would fill with water.

In places like this, Gregory explained, the floodplain takes some of the energy out of the flow of the main channel. Here, the river can spread laterally, increasing the interface between water and land to allow for an exchange of nutrients between terrestrial plants and aquatic life. Fish depend on such off-channel habitats to take refuge from the swift flow of the main channel and to find shelter from predators. "The wet mucky areas along the river where ash trees grow are some of the most important parts."

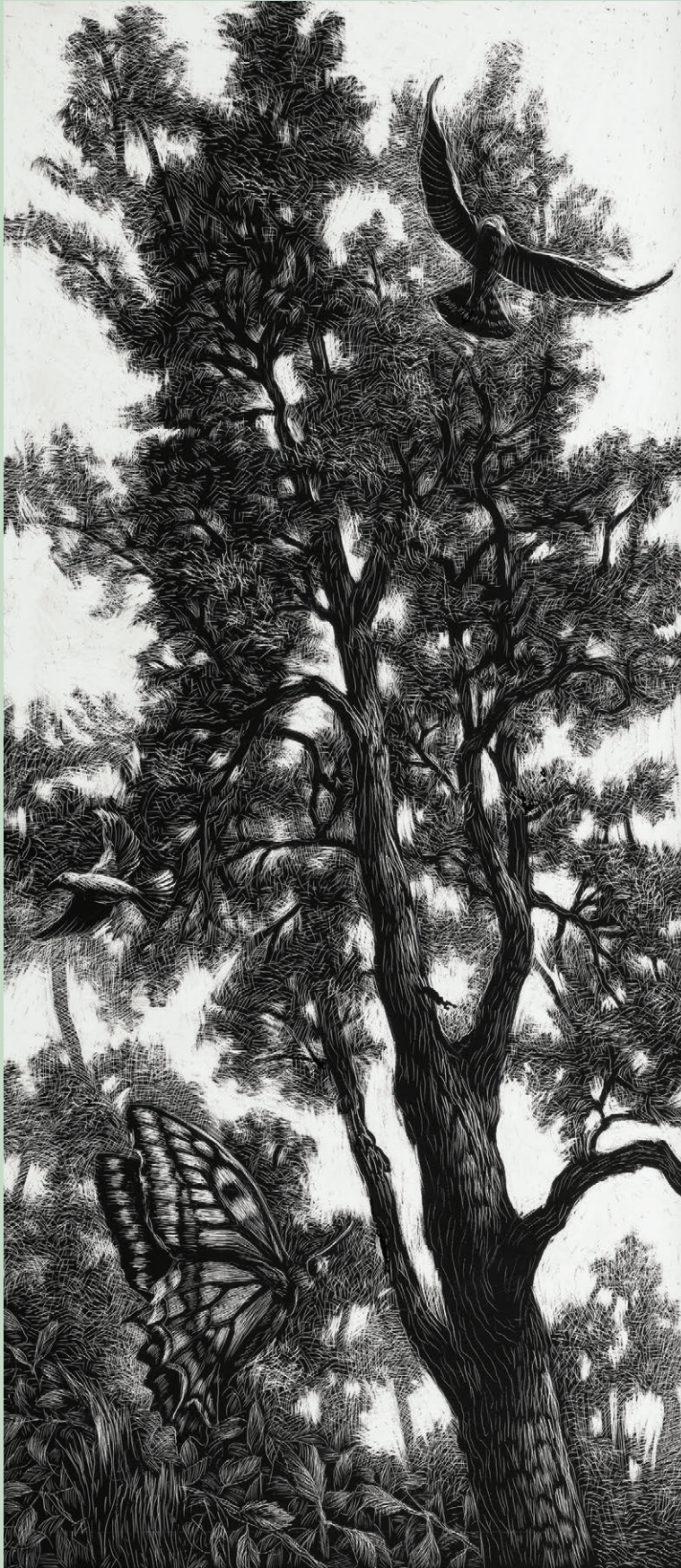
These landscapes began to disappear when settlers, lured by promises of a gentle climate, fertile soil and the most generous land giveaways in U.S. history, began pouring into the Willamette Valley in the 1840s. By the mid-1850s, they had claimed nearly all of the land in the valley, and the U.S. had forcibly relocated the Kalapuya tribes to reservations in the Coast Range. The land was as flat and fertile as promised, ideal for farming except for one thing: the river's wild flow. Annual floods washed out farms and settlements alike and prompted an ongoing effort to control the Willamette River and its many tributaries. Settlers and, later, state and federal agencies built dams and revetments, channelized streams and drained wetlands. These processes snipped away at the threads of macramé, simplifying the river into something closer to a single cord and allowing farm fields and cities to march right up to its banks. Disconnected from the forests and side-channels, alcoves and sloughs that had comprised the river's wide floodplain, the Willamette's health declined.

"It's like our intestines," Gregory said. "We have little villi and things that increase the surface area in the intestine so it can absorb nutrients. Same thing happens in the river. When you simplify a channel, you're just turning it into an export system." The result, he said, apologizing for the unsavory metaphor, was the equivalent of a human experiencing diarrhea: "All the nutrients just shoot on through."

Not so long ago, farm fields covered most of the park where Gregory and I now walked. But in the mid-1990s, Corvallis bought the farmland, intending to develop sports fields, and a group of locals convinced the city to set aside part of it for reforestation. Community members planted native trees in the former fields, restoring a sliver of width to the river's floodplain forest.

Around a bend, the river swung into view again. Willows edged the water, and ash grew thick under cottonwoods. The afternoon sun hung low in the west, and the trees cast long shadows across the water. This, Gregory said, is another thing ash trees do for fish: Create shade. In the Pacific Northwest, most native fish need cold water to survive. But water temperatures have been warming; in many rivers and streams, they now hover at the threshold of what most native species can tolerate. Shade plays a crucial role in keeping waters from further warming.

On the banks of the Willamette's main channel, cottonwoods are abundant, and maples and alders, too, grow alongside ash, helping shade the water. But in the off-channel areas of the floodplain and along many



of the slower-moving streams and tributaries where soils are heavy and poorly drained, ash is the primary shade tree, sometimes comprising 95% of the canopy. And those waters, Gregory reminded me, ultimately end up here: When they warm, so too does the mainstem. “Its just like the circulatory system in the body,” he said. “It’s all connected.”

A breeze drifted off the river, tousling the ash leaves overhead. One blew loose, and I caught it, held it skyward. Sunlight filtered through the leaf’s thin flesh, illuminating its intricate pattern of veins. Thread-thin at the edges, the veins joined thicker and thicker lines as they moved inward, ultimately intersecting with the sturdy stem down the center. In the body of this ash leaf, I saw a map of the watershed.



I HADN’T INTENDED TO TELL MY KIDS ABOUT THE ASH BORER and its arrival in our home region. Why burden them with news of another impending disaster beyond their control? But they overheard me talking about it with a friend, a neighbor, my partner. Eventually, they’d learned the whole story. The news, however, evoked less sadness or fear than it did awe. *How?* my son asked. *How could a tiny beetle kill a giant tree?* I explained as best I could: The beetle’s larvae feed on the inner bark and cambium layers of the tree’s trunk where nutrients and water are carried throughout the tree. As the larvae eat, they cut serpentine tunnels, called galleries, into this soft flesh, eventually severing the passage of nutrients and killing the tree.

My son wrinkled his nose and shrugged, unconvinced. So one day, in the woods behind our house, we found a fallen limb to investigate. I hacked at the bark with a hatchet until we could see the cream-colored flesh underneath. It was soft and moist, like young coconut meat. My children pressed their fingers into this surprising tenderness, then brought their faces close and sniffed: Not the earthy musk of tree bark, but something tangy and sweet, like cooked grain — sourdough bread or wild rice. I scraped at the tissue, and it peeled off in curls. It was easy to imagine why an insect might pupate here, in the innards of this tree where it is soft, dark. Womb-like.



WHEN FALL COMES TO THE WILLAMETTE VALLEY, ash are among the first trees to change color. In September, they’re easy to spot: bursts of bright butter-yellow in a landscape still mostly green. As the season unfolds, their shade deepens toward a rich ocher. By the time I met Paul Adamus at Adair Park north of Corvallis, in early October, the ash leaves were the color of apricot skins. Adamus is a lifelong birder and renowned wetland scientist. Together, we followed a trail through dense woods. No stream or water body fell in sight and the ground under our feet was dry. Still, Adamus told me, we were walking in a wetland. There are some oaks here and many shrubs, but the forest is dominated by ash. In the heavy clay soils typical of seasonal wetlands in the Willamette Valley, few other native trees thrive.

Minutes into our walk, Adamus had heard a black-capped chickadee, a raven and a brown creeper. “If I did a 10-minute point count here, I could reliably hear or see 10 species,” he said. In the spring nesting season, he would hear 20 or 30. The birds come for shelter and sustenance, finches and grosbeaks feed on ash seeds, while others eat the

insects that live in the tree's bark. Fallen seeds feed rodents, which, in turn, support the hawks and owls further up the food chain. Without ash, it's hard to know how these birds will fare. "A particular species of concern is the evening grosbeak," Adamus told me. This bird relies heavily on ash seeds and is already declining for unknown reasons. It's not only birds who depend on these ash-forested wetlands: larval moths and butterflies including the two-tailed swallowtail feed on ash leaves, bats roost in the branches, deer and elk browse twigs and foliage.

Shafts of sun cut through the canopy, sending shadows kaleidoscoping across the trail as Adamus and I walked back to the parking lot. Fallen leaves carpeted the ground and looking up at the half-bare bodies of the ash trees, I saw what I hadn't noticed before: Epiphytes. Mosses, thick as wool, shrouded trunks. Lichens tinsel limbs. Ferns spilled from nooks between branches: Each tree, a forest unto itself.

Leaving these woods, I couldn't help but imagine the cascade of changes sure to befall the place and its many inhabitants once the ash borer arrived. As I considered this future, I found myself wondering, too, about the past. Back home, I pulled out a map detailing the pre-settlement vegetation of the Willamette Valley, compiled from 1850s survey data. When I located the place where the park now resides, I was surprised to see it wasn't labeled as an ash forest — or any kind of forest at all. Instead, the map described the place as a prairie.

Before Euro-American settlement, the Kalapuya routinely burned the Willamette Valley to sustain the prairie landscapes that provided their staple food sources — camas bulb, tarweed, biscuitroot. Camas grew so thick in some places that, from a distance, settlers mistook the vast fields of blue flowers for lakes. After tribes were forced off the land, burning ceased. Without fire to keep them at bay, ash trees — fast-growing, easily established from seed, and capable of withstanding even the heaviest clay soils — quickly began to transform prairies into forests. Many of these new forests were later cleared to make way for farms and towns, but in wildlife refuges and parks like the one I visited, in places too soggy to plow and in protected wetlands, these prairies-turned-ash-forests endured. Today, they persist in scattered patches across the valley floor, where, despite their relative novelty, they now provide crucial wildlife habitat in a landscape dominated by agriculture and urban development.



MARKIE HESS GREW UP ON A CATTLE FARM on the banks of Butte Creek, northeast of Salem. Most of her family's acreage was long ago cleared for farming, but along the creek and in the land's bogs, ash trees proliferated. "There was one here that was 3 feet in diameter, but had grown and cracked so many times it created a hollow," Hess told me. "We used to call it the duck blind, because we would go inside and watch the ducks."

I met Hess at her family's farm in November 2024. A few months earlier, a utility worker had reported signs of EAB in an ash tree along Butte Creek a few miles away. It was among the first sightings outside of Washington County, where Dominic Maze found the beetle in the school parking lot. Hess participated in a training to learn how to identify signs of the beetles and soon found them in the trees at her childhood home.

She showed me the first tree where she found evidence: cracking

bark and D-shaped exit holes. I traced my finger over a puncture. The size of a lentil, it was rounded on one side to fit the curve of the beetle's back, straight on the other to match its flat abdomen. Once infested with EAB, ash can survive for three to five years. When the trees here begin to die, Hess told me, it won't be easy to manage. "We can't just get in there and get the trees out." Many are hard to access, and hiring arborist crews is expensive. "My family is a small operation. My dad works full-time as a truck driver. This is not something that he can afford." Dead trees offer important wildlife habitat but can be hazardous for people below, which will make it difficult to manage the invasive shrubs like blackberry and ivy that will thrive in the increased light once the trees die.

Hess and I walked along Butte Creek in the dimming light of evening. In the distance, storm clouds gathered, threatening rain. "One of the things we've been talking a lot about as watershed workers is: How can we replace these trees?" Hess works as a restoration specialist for the Pudding River Watershed Council. Recently, the council's efforts to improve the health of the region's waterways — installing livestock exclusion fences, revegetating banks, adding large wood to creeks — had begun to show results. "We saw some lamprey this year," she said, a sign that things were improving. But the coming ash crisis will hamper that progress. "It's like you're climbing a hill and there's a rockslide."

Not much could be done for the trees, Hess knew. But there is a lot to do for the watershed. Maybe the coming loss of ash could help draw attention to the importance of the places where it resides. Maybe it could help propel forward other projects — dam removals, floodplain reconnection — to improve the health of these landscapes, even while we lose this tree.



THE FOLLOWING SPRING, after days of heavy rain, my children and I walked across town toward Willamette Park. We wanted to see the river in flood. A drainage ditch traced the highway and we paused on a bridge to look down. The water flowed hot-chocolate brown and cluttered with trash: plastic bottles, a tennis shoe, a bike tire, a half-submerged shopping cart. I cringed at the sight, but my son noticed something else:

"Look," he pointed, "ducks!" Two mallards floated in a shady eddy, and they weren't the only creatures here. Squirrels rascaled through the thicket of trees flanking the stream, a spotted towhee and a group of gray songbirds perched in the foliage. I scanned the drainage: As far as I could see, the trees were all ash.

Though I'd once hardly noticed pockets of ash woods like this one, now I seem to encounter them everywhere I go; they've become, perhaps, my favorite kind of ash forest. These groves don't grow in parks or preserves, but are instead sandwiched between residential developments and railroad lines, clustered under freeway bridges, behind gas stations, and in narrow ribbons along roadsides. In these margins, ash trees have salvaged scraps of land discarded by agriculture, urbanization and conservation alike, and transformed them into forests.

When we reached the park, the flow was so high it blocked the entrance. So we stood on a hill and took in the view: Water spilled through the forest, swallowing the trails and sports fields, the boat ramp and the parking lot, turning it all, once again, into river.

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ON A FOG-THICK MORNING, I drove 45 miles northwest of Corvallis to the rural community of Willamina in the foothills of the Coast Range. Outside a metal shop building, I parked in the shade of an ash tree. But the ash I'd come to see today was inside.

Here, Brian Krehbiel, a canoe builder and member of the Confederated Tribes of Grand Ronde, was painting epoxy across the hull of a canoe. The canoe's main body was built of laminated plywood, but the thwarts — the bands of wood stretching across the opening — were made from ash. "I use a lot of modern materials for my canoes," Krehbiel told me. But for the thwarts and paddles, he still uses the traditional material: Oregon ash. The wood produced by this tree, Krehbiel explained, is especially well-suited to these purposes. It's remarkably strong, and unlike many other hardwoods, ash has the ability to flex upon impact, so it won't break when met with force.

Krehbiel traces his heritage to multiple tribes, including Chinookan ancestors who lived along the Columbia and Willamette rivers. They were among the dozens of tribes that the U.S. government forcibly relocated from their lands to a reservation near Krehbiel's shop in the Coast Range. Small streams and creeks traversed the land they were left with, but no large rivers. "There was no need for canoes on our reservation," Krehbiel told me. Growing up, he knew little about the significance of canoes to his culture, much less how to build one; colonization had stripped his ancestors of their ability to openly practice many of their traditions in public. "My grandma had stories of getting hit with a yardstick for speaking her language," Krehbiel said. "No songs, no dances, you were locked up if you did any of that." Still, his forebears passed on what they could. "And that little bit of culture, that little bit of knowledge that grandma taught us, that little bit of language, it planted a seed inside us."

As an adult, Krehbiel worked for his tribe as a cultural resource specialist. He learned a lot and also realized just how much he didn't know. "I was hungry for any little piece of knowledge. What plant is that? How do you make that basket?" In 2005, his tribe was invited to

participate in Canoe Journey, an annual event where Native communities from around the Pacific Northwest paddle ancestral waterways and gather at a final destination. But they no longer had any traditional canoes. After tribes were forced off their lands, Krehbiel said, settlers burned many of the canoes left behind. "That way we had nothing to go back for." So in preparation for the trip, he and other tribal members built a 32-foot canoe — his tribe's first new canoe in over a century. That year, they paddled to Lower Elwha, on the Olympic Peninsula.

"When we landed, there were 109 canoes coming across the bay all at once, and the beach was just littered with people cheering for us," Krehbiel told me. "It was like: *'Hey, we're Somebody.'*" The camaraderie and connection to the people and the water he felt on the trip was euphoric. He attended several more Canoe Journeys, and each time he returned home more inspired to build a canoe that lived up to his tribe's traditional designs.

In 2012, Krehbiel learned of one existing Chinook-style canoe. It was stored in the Oregon Historical Society's museum, where it had been donated from the estate of James Scarborough, a white man who settled on the Columbia River in the mid-1800's and married a Chinook woman. The canoe was made from a red cedar log in the style of a traditional Chinookan dugout. After discovering this canoe, Krehbiel began working with a local boat builder to design and construct a canoe modeled on the shape and style of this one, but made from a combination of modern materials, such as laminated plywood, and traditional elements like ash thwarts instead of a single log. He now builds tribal canoes professionally and has more orders than he can keep up with.

Over the years since Krehbiel's tribe first attended Canoe Journey, many other traditional practices have undergone a revival in his community: weaving, carving, language, dance. "Once our canoe came back, that's what opened up our eyes." He told me. "All that good stuff came back with that canoe."

On the day I visited, Krehbiel's shop brimmed with works in progress. Canoes stretched over sawhorses, chisels and hand planes hung on the walls, and paddles leaned into corners. He handed one to me, and I ran my fingers along the length of ash. It shone silk-smooth and straw-colored. A paddle, Krehbiel said, has a relationship to the water, to the canoe, and to the person paddling: It's the link connecting each to the other. "Ash" he said, "is what moves us."



BEFORE THE ASH BORER WAS FOUND IN OREGON, Wyatt Williams, of Oregon Department of Forestry, asked foresters from the Midwest what they'd have done to prepare had they known it was coming. Everyone agreed: "We wish we had collected seeds. We had no idea it was going to spread so fast, and we have no native seeds left." So, in 2019, three years before Maze found that first beetle, the agency began gathering Oregon ash seeds from across the state.

Most of the seeds — nearly a million — were sent to long-term storage facilities. At the U.S. Forest Service's Dorena Genetic Resource Center in Cottage Grove, some have been used to plant trial plots in an effort to find EAB-resistant genetics. The trees in these plots, now a few years old, will grow until the beetles reach them. Then, researchers will watch for signs of natural resistance. If a tree shows resistance,



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researchers can match the tree to its parent and use those genetics to breed EAB-resistant ash populations that might one day be returned to the landscape. Similar efforts are proving successful with other species: breeders have developed Port Orford cedars able to resist a devastating pathogen that causes root rot, and have found genetic resistance to blister rust among western white pines.

"If you were to come back in 10,000 years, there would be ash here," Williams told me. The trees, he explained, would eventually develop resistance, like the ash species in EAB's native range. There, where the insects and the trees have co-evolved, only stressed trees are killed by infestations and healthy trees are unharmed. In those ecosystems, the borers contribute to healthy forests by culling sick or injured trees. "It just takes 1 or 2% of the trees to be resistant and for them to find each other, mate and produce seeds," Williams said. With the help of researchers, he hopes these trees might find each other sooner rather than later.

Back in Willamette Park, walking through the floodplain forest with my children at the start of another winter, I thought of Williams' words and tried to imagine returning to this place in 10,000 years: would anything be recognizable? At the ash swale where I'd stood on dusty ground with Stan Gregory in summer, the trees now waded knee-deep in still water. The pond formed a perfect mirror, reflecting a forest turned upside-down. Looking at this inverted world, I found myself thinking not of the trees, but of the beetles themselves.

Since they arrived unnoticed, we don't know much for certain about their journey to the U.S. But researchers believe it went something like this: Somewhere in northeastern Asia, an ash tree was cut. Out of sight beneath its bark, lay hundreds of EAB larvae. The tree was milled into lumber and turned into a packing crate, or loaded whole into the hold of a ship to stabilize a load. Either way, the larvae remained inside the wood. Some days or months later, that ship set sail and they embarked on a 6,000-mile trip overseas. I don't know if the larvae knew they were moving, realized the landscapes around them were shifting, or if they were entirely unaware, curled in the darkness, attending instead to the steady work of metamorphosis.

When the boat reached Detroit, the wood was unloaded at the port or hauled to a dump site nearby. In spring, sunlight struck the wood and the warmth nudged the creatures inside awake. No longer gummy grubs but hard-bodied beetles, they chewed their way out and emerged into the strange light of a Midwestern morning.

It's an impressive feat, to survive the felling of the tree and the trip around the world. But it's what happened next that amazes me most. The beetles looked around — or, perhaps more accurately, *smelled* around, seeking the particular chemical compounds emitted by their host tree, their partner in this life: ash. The insects and the trees had evolved alongside one another so that the beetle was now dependent on this tree to feed its larvae. Without ash, emerald ash borers cannot survive. It seems unlikely, then, almost impossible, that creatures known to fly typically only a mile or two in their entire lives could survive such a drastic relocation from their homeland and their original host.

And yet, here on the shores of a distant continent, the beetles caught wind of a familiar scent and made their way to its source: an ash tree. It was not the same species, but closely related. Similar in nearly every way except one: this tree lacked resistance to the new

beetle. The borers began to nibble its foliage and soon laid eggs on the bark. When those eggs hatched, the tiny larvae tunneled into the bark as their instincts instructed them to and found it hospitable. The next spring, a new generation emerged. Before long, the insects had made a home here in a faraway forest and, in doing so, began to transform it.

My children and I followed the trail to the river's edge, where mud gave way to gravel. The flow was high after a week of rain, and the water surged past. Fallen leaves collected in drifts on the gravel bar. The ash were bare except for the lingering clusters of seed ornamenting their branches. I thought of the mice and squirrels that would feed on those seeds through the long gray winter, and of the owls and hawks swooping through the woods hunting for those rodents.

When I asked Stan Gregory if he thought the loss of ash would prove catastrophic for the ecosystem here, he surprised me. "No," he said. "But it will be changed, greatly." Then he asked aloud the obvious next question: "So where's it all going?" To this, he had no answer. "The toughest thing for me is trying to anticipate the future river because it's changing constantly. It's changing right now in front of us."

When I first learned of the emerald ash borer's arrival in Oregon, I understood the moment as the start of a story with a known end: First, there were ash forests here; soon, there'd be none. Now, these two fixed points no longer seemed to contain the narrative. I thought of the places I'd been — prairie turned ash woods; floodplain turned farm fields; farm fields turned forest. I thought of Krehbiel's canoes, and of the lamprey returning to Butte Creek. I thought of the many landscapes and lifeways that had disappeared from this valley, those that had returned, and those that were emerging anew, and could locate no such moments of stasis — no beginning, no end. Instead, it appeared we live always just right here, in the murk of the perpetual middle — that space of possibility in between.

"We humans don't live too long," Gregory said. "We tend to think in short windows of time; the river has been here for hundreds of thousands of years."

I plucked an ash seed from a branch, held the single-winged samara in my palm. A slender oval narrowing to a point at one end and rounded at the other, the whole thing was slightly cupped. The shape, a forester recently told me, resembles a canoe. Because ash grow near water, he explained, some believe this shape has evolved to help the seeds float so that the tree might spread its progeny downstream.

I carried the seed to the river's edge and dropped it in: It floated. My daughter picked a dozen more and tossed them over the water. They twirled downward, settled near the bank. Then, with a long stick, my son nudged the seeds away from shore until, at last, the current gathered them up and whisked them away. We watched the fleet of tiny canoes sail out into the wide river and rush north. A moment later, they were gone. ☀

Jaclyn Moyer lives in Corvallis, Oregon. She's the author of On Gold Hill, which won the 2025 Oregon Book Award for Creative Nonfiction.

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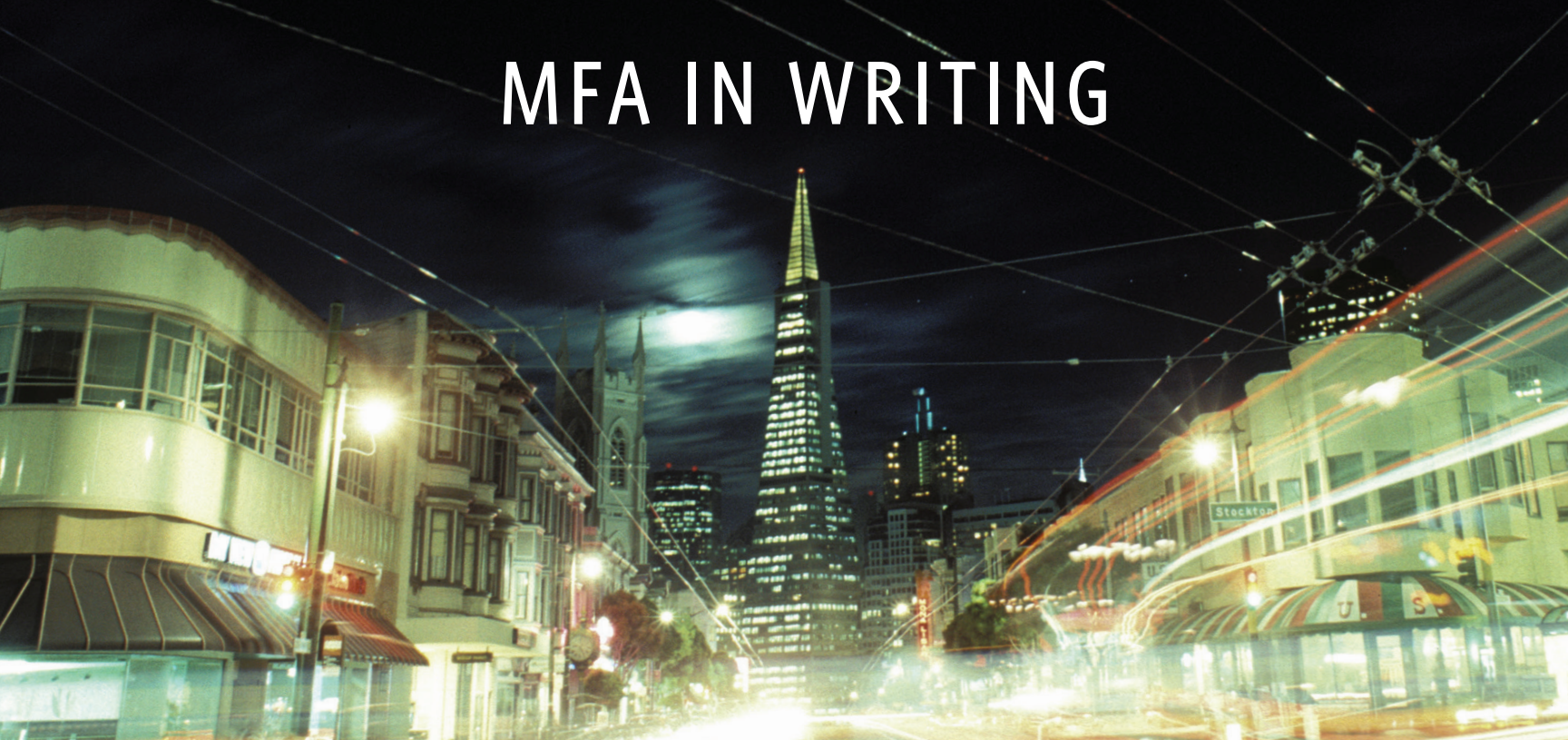
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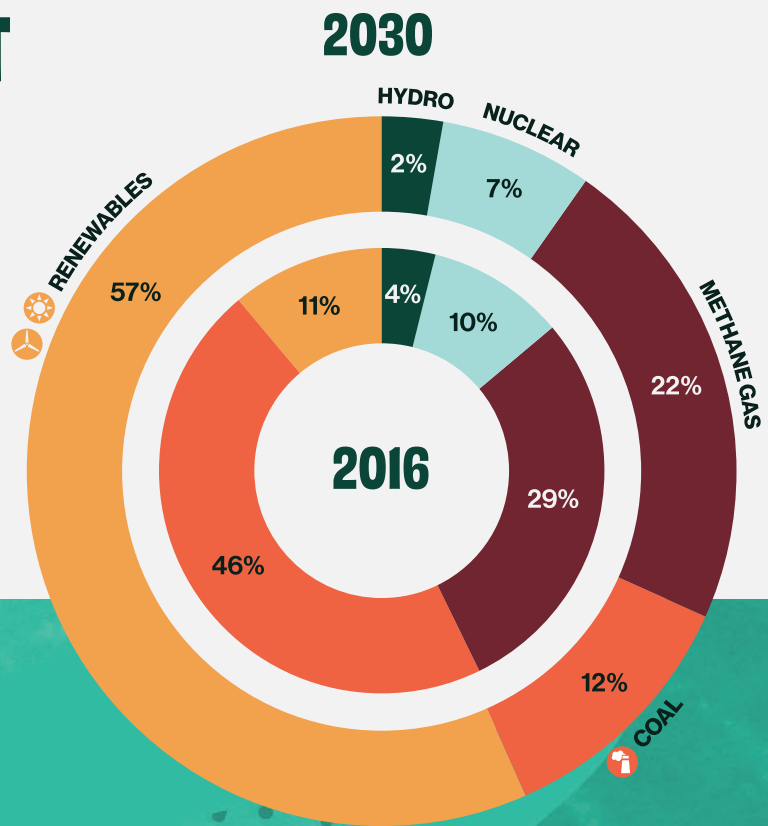
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TOWNSHIP AND RANGE

Exploring the intersection of race and family in the interior rural West.



Building new worlds

How do we embrace the new and still hold on to the things that shaped us?

BY NINA MCCONIGLEY
ILLUSTRATION BY TARA ANAND

THERE ARE JUST two working escalators in the whole state of Wyoming. Both are in Casper, my hometown, and both are at banks. (There used to be one at the airport, but it is long defunct.) So while you are depositing a check, getting cash or taking a free lollipop from the counter, you can ride between floors with ease.

As a child, I loved going for a ride.

“Look how fast we are going!” I would say to my sister, and we would ride up and down several times, our pockets full of lollipops.

Casper is an oil and gas town, and my mom used to joke that the escalators were like boom-and-bust: Sometimes things were up, sometimes things were down.

My dad, who worked in the oil fields, scoffed and took the stairs.

“Oh, he’s just old-fashioned,” my mom would say.

I LOVE OLD-FASHIONED things, too. When I was growing up, reading the *Little House* books and *Anne of Green Gables* made me long for bonnets and rag dolls. I was always wildly out of step with my peers. I played with paper dolls and jacks. And it’s something I have taken into adult life — I love quilting and sewing, like to bake and relish reading a book. Anything away from a screen. The tension between nostalgia and technology is ever present for me.

There’s a bumper sticker that’s common in Wyoming that says “WYOMING IS WHAT AMERICA WAS,” and I get it. But as my daughters grow, I realize that I need to get more up-to-date. Getting their reports from school requires downloading an app, and they know how to do that better than I do. Their world is moving faster than mine. They think video calling is the only way to use the phone, yet they also like to spin tops and jump rope.

I teach creative writing, and in recent years, I have noticed something peculiar. The majority of the stories that my students submit are fantasy or science fiction. Most are set in dystopian worlds full of creatures that aren’t human, worlds in which resources are scarce. I told my husband how strange it was to read these stories, and wondered why my students were all doing this. As a reader, I am firmly grounded in the actual world. Why this trend?

“It’s because we’ve messed up the real world,” he reasoned. “They’re trying to make a different one.” Teaching post-pandemic with orange wildfire light streaming into the classroom, all of us in masks, I realized he was

right. They were building something new on paper as a way to feel a sense of agency in a diminished world.

In an essay on world-building, the writer Karen Russell said that to make a new world on the page, you have to have one foot in Kansas and another foot in Oz. In writing, there needs to be an equal Oz-to-Kansas ratio, a bit of both worlds to be believable. I teach this all the time. But I still find myself wanting Kansas. To my students, Kansas isn’t a viable option.

I ONCE ASKED my dad why we didn’t have more escalators in Wyoming.

“It’s the West — we don’t need to build skyscrapers. There’s plenty of room out there.”

And it’s true, in the West, cities sprawl out across deserts and prairies with only mountains to fence them in. My hometown was ringed with sagebrush and open prairie. There are no city skyscrapers crowding and

My daughters’ world is moving faster than mine.

competing for space.

But is there really more space?

The horizon feels like it’s ever-shrinking these days. The distance is often no farther than the nearest screen, showing you exactly what you want to see. Our sightlines are increasingly compromised. We don’t always want to see.

One thing about escalators is that they are continuously in motion. There is no waiting for an escalator like you would for an elevator. And there is an escalator etiquette: You are supposed to stand to the right to let people who wish to climb pass on the left. It’s designed to move climbers and standers, and it can move many more people than an elevator at one time — though it isn’t very inclusive if you aren’t able-bodied.

At times, I think Wyoming is like an escalator, one where there are people standing both to the left and to the right. No one is

moving, no one can pass. And when people do get off, it’s because the state is in a constant loop of young people leaving, the energy industry faltering, federal jobs being cut and the state needing to diversify its economy. Up and down and around we go.

And yet, I hate to think of us stuck in a cycle. I, for one, don’t want to go back to what America was — what even was that? Being stuck in the past gets us nowhere. It’s in taking elements from the past and going forward that we can truly evolve.

A funny fact about escalators: Over its average 40-year lifespan, an escalator will typically travel a distance equivalent to a trip to the moon and back. To the moon! How wild and distant that place once seemed. And now people take short flights into space as tourists. Maybe there will be a new world out there someday. Maybe my students will help build it. Maybe my girls will as well.

ONE DAY IN early September, I was walking Juniper to school. She was still tentative about it. These were her first days of kindergarten.

She held my hand as we crossed the playground, tears in her eyes. “How long do I have to stay?” she sobbed.

“I’ll come get you later in the afternoon.”

She looked down and, upon seeing a set of boxes painted on the asphalt, her face brightened.

“Hopscotch! I love this game!” She dropped her backpack and proceeded to hop on one foot.

She loves a game that has been played for over a thousand years, one that may have started in ancient India in 1200 BCE, and was said to help train Roman soldiers to improve their footwork while wearing full armor.

I watched her as she moved from square to square: up, up, up, over, over, up, over, over, up. When she reached the end, she scooped up her backpack and ran away from me, toward her classroom.

Upward or outward? Perhaps I was thinking about this all wrong. It’s not either/or. It’s OK to keep one foot in Kansas, the other in Oz. That’s how we build the world — mixing the old and the new. It might be the very thing that saves us. ☀

Nina McConigley is a writer and professor at Colorado State University and the author of Cowboys and East Indians.

To err is human, to forage bovine

A rancher reflects on her occupation and how other animals see the world.

BY DARBY MINOW SMITH | PHOTO BY LOUISE JOHNS

HALF THE HERD is missing. We count noses, but they don't add up. Our remaining cows linger by the neighbors' fence; the neighbors' cows stare through it, separated only by different brands and ear tags and four strands of barbed wire.

So we steer our horses through the gate onto the neighbors' land. Two riders search the hills at the base of the Elkhorns, the Montana range above my family's ranch. Another rider and I go low, and as we round a bend, our offending cows come into view. Some lounge, others twitch their tails as the neighbors' three red bulls drool and huff. As we move our cattle into a bunch, calves find their mothers and knock noses into milkbags. The cows stretch out necks to yank up still more of someone else's grass.

We push. The cattle become a stream of black hides that surges forward, bottlenecks, swirls with calves who can't find their mothers, and tries to change direction. We work to push the neighbors' bulls back; they're like three red-headed jocks, ogling our cows and getting into fights that could topple our horses if we aren't careful. Impatience blooms in my chest. I yell and ride hard against the edge of the herd. We need to get everyone to the meeting point with the other cowboys.

Then one cow swings her head back, and I glimpse her white mask and unimpressed gaze. *Ah, Moody*: If there's any sort of mess, my favorite cow will be in the middle of it. I first noticed Moody when she was a pregnant heifer, chewing her cud atop the manure pile, ignoring her fellow cows. When she had her first calf, she found something to care about but still couldn't resist sneaking into the hay or over a downed fence. Time would pass. Then she'd suddenly remember she was a mother and leap around the field, looking for her calf like a drunk searching for her purse at closing time.

Naturally, Moody's in the center of the chaos, her calf trotting beside her. Bemusement replaces my impatience: Moody might be an opportunist, but she's not trying to ruin my day. Neither are her colleagues. The herd is made up of individuals with their own desires. Some broke through the fence because they found those grunting bulls irresistible. Others viewed the land beyond the wire as an endless salad bar. Others did what cows do: followed the herd.

There's a growing movement within ranching to understand how cows think. Temple Grandin and Bud Williams redesigned slaughterhouses and holding

pens, realizing that cows experience the world differently from us. By observing what frightens or entices cows, we can improve their lives. This might seem achingly obvious, but it requires a shift in how we've been taught to work with cattle — and each other. Low-stress cattle-handling only works if everyone is on board. Try telling an old-timer that his father's aggressive way of moving cows might be counterproductive. Egos get tangled in stirrups. They should really teach courses on low-stress cowboy-handling.

An empathetic approach shifts away from domination toward something with softer edges, but it grows slowly as good intentions meet entrenched human habits.

The German biologist Jakob von Uexküll coined the term *umwelt* for the subjective way each creature experiences its environment. The spider's eight feet tune to the vibrations of its web. The trout darts away when danger fractures the light along the riverbank. The Smith Family's cows follow the siren song of the neighbor's pasture.

For so long, we've treated animals like dumb-downed humans. But that's beginning to shift. In 1974, Thomas Nagel asked, "What's it like to be a bat?" That question is unanswerable; even the most scientific, whole-hearted attempt would still be a person imagining being a bat.

Yet the question regularly circles overhead. Ed Yong's *An Immense World* brought the popular science lens to the *umwelt*. In the *New York Times* podcast *Animal*, Sam Anderson asked what it's like to be a puffin, a wolf, and, yes, a bat. Sabrina Imbler and Anelise Chen mix science and memoir, blurring the line between human and invertebrate *umwelts*.

To puzzle over how another animal experiences the world

means setting aside our own *umwelt* and trying to step into the strange, deep pool of another's.

Cows might seem like a simple exercise in interspecies imagining, yet they're more complex than most assume. According to Lori Marino and Kristin Allen's survey of scientific studies, cows form lasting bonds, navigate mazes, learn from their elders. They remember people who handled them roughly, even if they're dressed like everyone else. They smell stress hormones in other cows' urine and become stressed themselves — not empathy, perhaps, but something approaching it. In ranching, we discuss genetic projections for milk production and carcass weight like baseball stats, but we know less about the animal itself.

I spent decades away, so I'm coming at ranching with fresh eyes. New York friends occasionally ask, "What's it like to be a rancher?" with such curiosity, I feel like I'm hanging upside-down from the rafters.

Ranching requires enough botanical knowledge to irrigate alfalfa and the mechanical skills to fix a plugged-up hay baler. There's the social aspect — neighbors and fences and riding together across the plains, wordlessly cooperating to turn a runaway calf. The financial and the spiritual loom: All morning, I feel deeply fortunate to steward this land, only to have an afternoon panic attack over QuickBooks.

And, of course, there's sorrow and sweetness in spending my days raising animals for meat.

When I met Moody, I asked another rancher if motherhood had changed how she saw calving. She said no, but it changed how she felt about weaning. When a cow's first calf is shipped off, it's often hard on the mother. Later, they become accustomed



Darby Minow Smith rides her horse, Milton, on her family's ranch in Boulder, Montana.

“To puzzle over how another animal experiences the world means setting aside our own umwelt, and trying to step into the strange, deep pool of another’s.”

to having their babies here one day, gone the next. But first-year cows don't know the pattern, so they search the fencelines, calling out for calves already in semis rattling down distant highways.

I couldn't do this job if I lingered on how Moody must have searched for her first calf. What's it like to be a rancher? You live amid the messy churn of the seasons and the brutal

realities of animal agriculture — the tubed calf choking to death on milk, the broken-backed cow who needed multiple bullets to still, the knowledge that despite our affection, these animals were grown to be consumed. The human umwelt contains so much knowledge — and power. Considering another creature's world can feel dangerous to the work at hand.

Still, I believe in ranching. I don't see it as a choice between ranching and a gentler world, but rather between ranching and asphalt. A good ranch preserves land for untold umwelts. I feel lucky to be surrounded by cattle and the multitude of life in these fields: the porcupine trundling through alfalfa, the sandhill cranes leaving prints across the muddy banks.

I don't know what it's like to be a cow, but that doesn't mean I shouldn't wonder. I can work to be a gentler rancher, and to bring more cowpokes along for the ride. Having Moody helps. Still, some days I'll slip up and let my ego and impatience take over. I'm only human, after all. ☀

Darby Minow Smith ranches and writes in southwestern Montana.

ENCOUNTERS

An exploration of life and landscape during the climate crisis.



Inventing habitats

Reconciliation means meeting a landscape on its own terms.

BY RUXANDRA GUIDI

IN TUCSON, ARIZONA, where I live, a remarkable ecological movement has been slowly and quietly building for decades now. Instead of focusing solely on restoring degraded habitat, it encourages Westerners to reimagine and reconnect with their local landscapes — beginning by accepting them on their own imperfect terms.

It was catalyzed by the 1960s environmental movement and the resulting '70s and '80s conservation and ecological restoration efforts. Today, however, instead of using the word “restoration” to discuss an urban stretch of a riparian corridor, we talk about “reconciliation.” “Reconciliation ecology,” a term coined in 2003, aims to increase biodiversity in human-dominated landscapes. Think of it as conservation for the Anthropocene.

Angelantonio Breault, a fourth-generation Tucsonan, grew up near the top of the region's floodplain “thinking it was a ditch.” But when he started studying ecology and visiting the Santa Cruz River on Sundays “to look for birds and wildflowers,” he began thinking about stewardship, and how he was developing a personal connection to the river even as he learned from it. And so he created the *Reconciliación en el Río Santa Cruz* community initiative. It differed from past environmental campaigns in that it was concerned less with restoring the landscape than with reimagining how we humans engage with each other and the land.

Its roots go back to the 1960s, when growing awareness of air and water pollution and environmental disasters including oil spills and pesticide use inspired local environmentalists. By then, uncurbed development had led to the widespread overuse of surface water and groundwater pumping, leaving creeks and rivers dry for most of the year.

While Phoenix, two hours to the north, kept expanding and building new housing developments, various local nonprofits and community groups formed coalitions to convince the city of Tucson to rein in

development. Within a decade, Tucson had purchased farmlands west of city limits, retiring them to ease pressure on groundwater pumping. Small water systems were consolidated into the city-run Tucson Water, with its valley-wide structure and a unified agenda focused on stewarding water resources.

What followed was the city's first “Beat the Peak” campaign in 1977 to raise consciousness around water use at peak times and encourage wastewater use for landscape irrigation. In 1984, Tucson became one of the first cities in the country to recycle treated wastewater for parks and golf courses.

The activists who'd championed slower growth for years built a coalition calling for protecting habitats for 44 vulnerable, threatened and endangered species, creating bond-funded land conservation programs and a solid system to preserve open spaces, and mitigating impacts to important riparian habitats. Their efforts led to the Sonoran Desert Conservation Plan, which was finally adopted by the Pima County Board of Supervisors in October 1998. It had two major goals: protecting endangered species and imposing considerable restrictions on development. But over time, it has done even more, from environmental restoration and wildlife crossings to harvesting stormwater.

THE 200-MILE SANTA CRUZ RIVER, which passes through Tucson on its way from northern Mexico, exemplifies how Tucsonans have been at the forefront of urban conservation.

When development kicked into high gear in the early 20th century, overgrazing, excessive groundwater pumping and infrastructure building devastated the riverbed. By the 1950s, Tucson's stretch of the Santa Cruz had completely dried up.

Decades later, local ecologists saw the need to stand up for the river and the communities that rely on it. But Breault and his cohorts saw no way to restore the trash-clogged, drought-ravaged Santa Cruz to meet the standards of scientific experts or conventional conservationists. They wanted something different — a reconciliation.

“I see the Santa Cruz as a portal,” Breault told me — a way for people to explore the authentic relationships they already have

with the natural world. “We know the best way to engage people is through participatory stewardship programming. People don't need to have their hand held.” Breault believes that what works best is for people to find their own way to connect to nature, regardless of how badly it's been impacted, used or abused by humans in the past. Even degraded and dried-up ecosystems like the Santa Cruz can still support life and find ways to thrive.

In late 2017, for example, the endangered Gila topminnow was found downstream of the Nogales International Wastewater Treatment Plant. To help replenish the aquifer and its riparian habitat, Tucson Water started diverting up to 2.8 million gallons of treated recycled water a day into the river, at a point south of downtown. A team of scientists from the Arizona Game and Fish Department and the University of Arizona collected more than 700 Gila topminnows upriver and carefully transported them to a release point near downtown Tucson, where the once-polluted river had entirely dried up.

That was in 2020. Today, the river flows humbly for about a mile near downtown Tucson. Parts of it are ephemeral while others are perennial, so it never looks quite the same. I've seen water flow freely after heavy monsoon rains, but even without the monsoon, the effluent is enough to support the resurgence of wetlands and marshes. Cottonwoods, which disappeared more than six decades ago, are returning, the Gila topminnow is reproducing, and 40 other native animal and plant species have come back. And so have people, whether as part of organized trash cleanups, impromptu invasive plant purges or just simple wildlife watching.

“Get in line,” Breault told me. “Do what you do best; tell stories.” He described gatherings he's planning along the river, ranging from storytelling workshops and art-making meetups to interpretive nature walks, as well as others he's hearing about. “We don't have to do everything. The river knows. We just have to be down there together.” ☀

Ruxandra Guidi is a correspondent for High Country News. She writes from Tucson, Arizona.

WEB EXTRA Lea éste ensayo en español en hcn.org/reconciliacion

The endangered Gila topminnow is now thriving in a section of the Santa Cruz River near downtown Tucson that was dry until just a few years ago.

Roberto (Bear) Guerra

COLORADO

Don't worry, the zombie plague isn't upon us — well, not yet, anyway. For now, it's just a few afflicted/affected bunnies doing their part to put the "rad" in Colorado. When Susan Mansfield, a resident of Fort Collins, Colorado, first spotted some peculiar-looking rabbits hopping around her neighborhood, she described them as having "black quills or black toothpicks sticking out all around" their mouths. One rabbit visited her several times, she told KUSA: "I thought he would die off during the winter, but he didn't, he came back a second year, and it grew." Which worries us; "I thought he'd die, but he came back" being among what you might call Famous Last Words, the kind of ominous tagline common to monster movies and infamous cyborgs. Other media sources described the now-legendary lagomorphs as "zombie bunnies" and "Frankenstein rabbits" stricken with Cthulhu-like "tentacles." But fear not: The University of Missouri confirms that the eerie-looking condition is caused by Shope papillomavirus, a DNA virus "seen most frequently in cottontail rabbits of the Midwest." And this should bathe you in relief: According to Colorado Parks and Wildlife, the condition doesn't appear to harm the rabbits or threaten other animals, including humans. Then again, that's what they always say in the monster movies. ...

OREGON

Aside from marauding zombies, is there anything scarier than the sound of a couple arguing? Wolves certainly seem to hate it. And so, in an effort to discourage them from killing livestock, the U.S. Department of Agriculture's loudspeakers have been blasting audio from an argument between



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 DANIEL GONZÁLEZ

Scarlett Johansson and Adam Driver in the 2019 film *Marriage Story*. Evidently, everyone's a film critic, even wolves. USDA District Supervisor Paul Wolf (no relation), told the *Wall Street Journal*, "I need wolves to respond and know that, hey, humans are bad." Before they tried this — they also used the sounds of fireworks and gunshots — wolves killed 11 cows during a 20-day period in Oregon. Since this new "wolf hazing technique" debuted, just two cows were killed in 85 days. Verbal confrontation and marital strife aren't easy, but they beat a shotgun marriage. What movie will they use next? *Who's Afraid of Virginia Woolf?* We just hope the cows wear

noise-canceling devices; all this discord might sour their milk.

UTAH

A heroic 6-year-old German short-hair pointer helped save the life of his ride-or-die human companion, Jake Schmitt, a Utah hunting guide who was scouting for mule deer in the Uinta Mountains. After parking his truck on a forest road, Schmitt drove into the mountains in his Polaris Ranger UTV with his trusted buddy, Buddy, by his side. Unfortunately, one of his tires hit a stump while he was navigating a steep incline, and the vehicle flipped and rolled 15 to 20 times before finally coming to rest at the bottom. The tumble broke

Schmitt's leg, ribs and ankles, dislocated his shoulder and left him with severe cuts and bruises. The UTV was scattered, and there was no sign of his gear. "No lights, no phone. Pistol, rifle, inReach, all gone. Everything was gone but my dog," Schmitt told *Outdoor Life*. Schmitt MacGyvered a makeshift splint for his broken leg from duct tape and UTV pieces and began a "long, slow crawl in the dark." His faithful dog never left his side, constantly nudging Schmitt awake and keeping him going, crossing half a dozen creeks out of the mountains — a feverish and exhausting trek that took a nightmarish 11 hours — until they finally reached his truck, 5 miles away. Schmitt somehow managed to drive to a diner and was rushed to the Park City Hospital, where he was treated for his injuries. "I don't think I'd be talking to you now if that dog hadn't been there," Schmitt said. "He gets T-bone steaks for the rest of his life."

ARIZONA

One of the newest paleontology discoveries is a new taxon of tanystropheid, an unusually long-necked Triassic-era reptile — rather like the Loch Ness monster, if she shrank in the dryer — found in a place called Thunderstorm Ridge in Petrified Forest National Park, ABC4 reports. The reptile's vertebrae were parsed from rock samples rinsed through fine metal screens, then analyzed under microscopes. When we think of paleontological discoveries, we tend to imagine massive dinosaurs a la *Jurassic Park*. But the recently discovered tanystropheid, dubbed *Akidostropheus oligos* — or "tiny, spiked-back bone" — was small enough to fit in an average hand, with a neck bone smaller than a pinky fingernail. Size isn't everything, although Nessie might disagree. ✨

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#IAM THE WEST

ANGELO IBLETO

**"Jerky King," meat processor
and master smoker
Petaluma, California**

I was lucky when I came to this country: I already knew what good food tastes like. The flavors — they should explode in your mouth. Flavor from any food does not come out by accident. If you want the flavors to come out, you have to put them in first. I came to this country in '62, to help my brother. I never aspired to be successful by getting involved in business; the only thing I knew was that whatever I did, I had to be the best, and that would be enough. Then I stepped into this community, and it doesn't matter where I go, they know who I am. So I'm happy. I really enjoy it. I like to go back to Italy, but my heart is here, to be honest!

Do you know a Westerner with a great story?
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