

High Country News

For people who care about the West

DUST to DUST

Forget the hype. In the global rush for energy-critical elements, the West can't compete.

By Tim Heffernan | Page 12





Molycorp's Mountain Pass rare-earth facility in California's Mojave Desert. JOHN GURZINSKI

Editor's note

On lodestones and millstones

Mining made the West, sparking the gold and silver rushes that populated the mountains and shaping the way water is shared, public lands are managed and mineral wealth flows into corporate coffers. It created boomtowns, coal towns and ghost towns. Mining has driven the economy and despoiled the environment ever since the earliest days of the Manifest West. But as our writers show in this issue, the region is now grappling with mining, its legacy and its future, in some new and rather surprising ways.



Tim Heffernan's cover story reports on mineral hullabalooery that is still alive and well. The latest boosters tout rare-earth elements – those strange, once-overlooked minerals now critical to our digital, high-tech lives – as a way forward for mining. Rare earths, they say, will bring us security, and we need to unlock more Western lands to get at them. Alas, as with 19th century promises that rain will follow the plow, rare earths will not get mined just because someone thinks they ought to. We live in a global economy, where complex market forces, knuckleball politics from China and myriad other factors are at work. Rare-earth miners have to be price-takers, and no amount of technology or policy or politics will change that. That means there is no stranglehold on rare-earth minerals or the larger family of "energy-critical elements." It also means that the West is unlikely to be at the forefront of a rare-earth boom, at least not for the foreseeable future.

Meanwhile, as writer Sarah Jane Keller notes, Butte, Montana, is seeking a new way forward, abandoning the copper economics of its rowdy past. A crash in the 1980s led to an attempt at "mining tourism" in the '90s, but that is giving way to some savvy marketing. Tech companies are moving in, as are developers, musicians and local distillers. There are challenges, to be sure, and parts of Butte remain hollowed out – but it is not a ghost town. It is a town where optimism is booming and ideas are the real lode. People are "taking risks," as a city planner says. "There's a lot of energy here."

I find this encouraging. Though many Westerners still yearn for the next mining boom, and much of our wealth still comes from hydrocarbons, our future lies elsewhere. Coal and methane are taking a beating, and falling oil prices are driving rig counts down, at least for now. As of this writing, the only operating rare-earth mine in the United States – Molycorp's Mountain Pass Mine in California – is in serious trouble. All of this underscores the problem with extraction economies. They are based on removal, on diminishment. For Western communities, figuring out ways to add value to their past, while investing in a different future, seems like a very smart play.

—Brian Calvert, managing editor

FEATURE

- 12 **The Rare Earths Bust**
Western mines fueled every economic revolution of the last century. They may not be a factor in the revolutions of the 21st. By Tim Heffernan

CURRENTS

- 5 **The sage grouse two-step**
- 5 **Quake-makers**
- 6 **The Latest: Rio Grande National Forest land swap**
- 7 **Last remains**
- 8 **Re-Butte**
- 8 **The Latest: The EPA and waterways protection**

DEPARTMENTS

- 3 HCN.ORG NEWS IN BRIEF
- 4 LETTERS
- 10 THE HCN COMMUNITY Research Fund, Dear Friends
- 20 MARKETPLACE
- 24 WRITERS ON THE RANGE
We're letting another predator go down By Frank Carroll
- 26 BOOKS
Spare Parts by Joshua Davis. Reviewed by Jenny Shank
The Jaguar's Children by John Vaillant. Reviewed by Michael Engelhard
- 27 ESSAY
The world is on fire By Joni Tevis
- 28 HEARD AROUND THE WEST By Betsy Marston

On the cover

A handful of dirt at the Mountain Pass Mine.

MASSIMO BREGA / THE LIGHTHOUSE / SCIENCE SOURCE



Complete access to subscriber-only content

HCN's website
hcn.org

Digital edition
hcn.ws/digi-4711

iPhone app
hcn.ws/wuZsWu

iPad app
hcn.ws/NGtBYx



An open runoff pit containing water used in the fracking process in the Bakken shale formation in North Dakota. ROGER M. RICHARDS

Fracking and water

The oil and gas industry has long claimed there's no evidence hydraulic fracturing contaminates drinking water. But a major Environmental Protection Agency assessment released in June determined that fracking and horizontal drilling have the potential to do so. The study identified the greatest risks to drinking water, including spills. The study found no evidence that "widespread" pollution of drinking water occurred from these drilling techniques. The number of known cases of well contamination and other impacts to drinking water was small compared to the estimated 25,000 to 30,000 new wells drilled and fracked between 2011 and 2014 and the many more older wells that also were fracked, the study states. Industry groups say this confirms the safety of their operations. But the EPA study concedes that a lack of research may explain why the agency failed to find widespread impacts.

ELIZABETH SHOGREN
hcne.ws/EPA-fracking

Trending

Farmer fears

Cannon Michael, a sixth-generation farmer in California's Central Valley, recently told U.S. senators about the "disturbing time" he and his family are experiencing because of his state's multi-year drought. Michael fears farmers won't get the water they expected this summer. The deal between state and federal officials about how to divvy up the scarce water supplies from the Central Valley Project was revoked because water temperatures are higher than anticipated. Officials are legally obligated to ensure cooler temperatures during runs later in the year of endangered chinook salmon.

You say

FREDERICK JOY: "Always the poor farmer. Most get taxpayer-funded, subsidized water, and most are actually big farming companies. The only place we should be storing more water is in underground aquifers. Water conservation, drip irrigation, crops that don't require as much water, replenishing groundwater in Central Valley by draining Lake Powell, and higher water rates would solve most of the problem."

KATHLEEN O'BRIEN

BLAIR: "They'll privatize water — you just watch."

PAUL BLUE LIGHTS

GROGAN: "Why not just pump it in from the sea? As it goes through the pipeline, it desalts and comes out the other end. Then use salt crystals for building materials in 3D printers."

hcne.ws/store-water and [facebook.com/highcountrynews](https://www.facebook.com/highcountrynews)

12.8 billion

the amount of natural gas, in cubic feet, leaked from natural gas gathering and transmission systems since 2010

170,000

number of homes that amount could heat for a year

From nearly 700 "incidents" reported since 2010 to the federal Pipeline and Hazardous Materials Safety Administration. The reported incidents killed 70 people and injured more than 300. Total costs in lost gas and property damage was nearly \$700 million. All that natural gas is about 95 percent methane, an especially potent greenhouse gas. Methane can escape into the atmosphere during the drilling and hydraulic fracturing process; it's emitted from processing plants and wells, and large quantities of it can escape when pipelines and other parts of the infrastructure spring leaks or are ruptured.

JONATHAN THOMPSON hcne.ws/gas-leaks

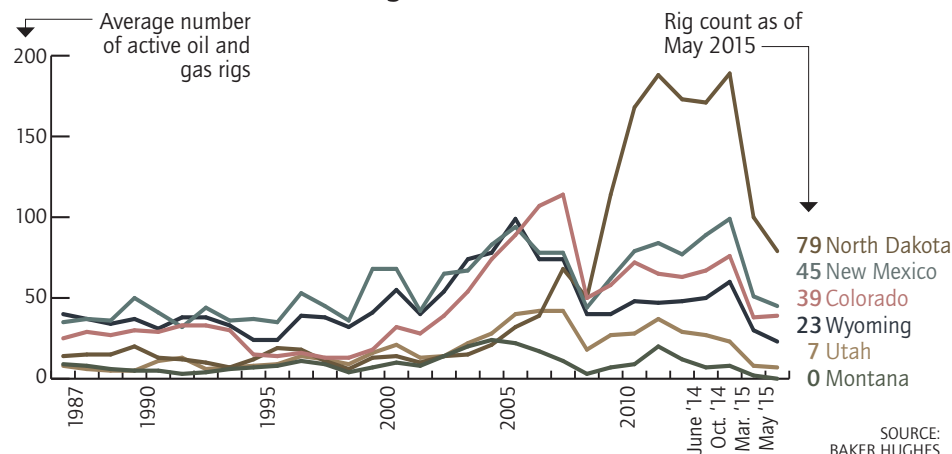
Oil-price ripple effects

In the oil and gas industry, they say the best cure for high prices is high prices. High prices lead to more drilling, greater production and greater supply. They encourage conservation and dampen demand. When supply then exceeds demand, prices drop, so it's no longer economically feasible to be drilling wells at a

cost of \$2 million to \$20 million a pop. The drill rigs come down and production declines, creating low oil prices, more driving and hence more demand. It's a wacky ride, but somewhat predictable. What goes up must eventually come down. JONATHAN THOMPSON

hcne.ws/oil-bust

Rig counts since 1987



arcology \är'käləjə\

A portmanteau of "architecture" and "ecology," used by author Paolo Bacigalupi in his new novel, *The Water Knife*, to name the urban megatowers of the near future and symbolize "the moment that humanity accepts that the world outside is no longer an inviting and supportive and sustaining place."

BRIAN CALVERT hcne.ws/water-knife



Audio Tug of war

Early in June, *High Country News* hosted a live discussion on federal control and what that can mean for individuals in a Western community — in this case our home, Paonia, Colorado. Environmentalists, an oil and gas representative and a local rancher all gave their opinions on what works and what doesn't in this eternal, intractable tug-of-war. You can hear it all online. hcne.ws/LocalControlAudio



Panelists Robbie LeValley, a rancher and Delta County administrator, left, with Pitkin County's Chris Selden.

High Country News

EXECUTIVE DIRECTOR/PUBLISHER
Paul LarmerMANAGING EDITOR
Brian CalvertSENIOR EDITORS
Jonathan Thompson
Jodi PetersonART DIRECTOR
Cindy WehlingONLINE EDITOR
Tay WilesD.C. CORRESPONDENT
Elizabeth ShogrenWRITERS ON THE RANGE
EDITOR Betsy MarstonASSOCIATE DESIGNER
Brooke WarrenCOPY EDITOR
Diane SylvainCONTRIBUTING EDITORS
Cally Carswell
Craig Childs
Sarah Gilman
Judith Lewis Mernit
Jeremy Miller
Sierra Crane-Murdoch
Michelle Nijhuis
Josh ZaffosCORRESPONDENTS
Ben Goldfarb
Krista LangloisEDITORIAL FELLOW
Sarah ToryINTERNS
Kindra McQuillan
Kate SchimelASSOCIATE PUBLISHER
Alexis HalbertDEVELOPMENT MANAGER
Alyssa PinkertonDEVELOPMENT ASSISTANT
Christine ListSUBSCRIPTIONS MARKETER
JoAnn KalenakWEB DEVELOPER
Eric StrebelCOMMUNITY ENGAGEMENT
Gretchen KingFINANCE MANAGER
Beckie AveraACCOUNTS RECEIVABLE
Jan HoffmanCIRCULATION MANAGER
Tammy YorkCIRCULATION SYSTEMS ADMIN.
Kathy MartinezCIRCULATION
Doris Teel
Kati JohnsonADVERTISING DIRECTOR
David J. AndersonADVERTISING SALES
Margaret GilfoyleGRANTWRITER
Janet ReasonerFOUNDER
Tom Bell

editor@hcn.org

circulation@hcn.org

development@hcn.org

advertising@hcn.org

BOARD OF DIRECTORS
John Belkin, Colo.
Beth Conover, Colo.
Jay Dean, Calif.
Bob Fulkerson, Nev.
Wayne Hare, Colo.
Laura Helmuth, Md.
John Heyneman, Wyo.
Nicole Lampe, Ore.
Marla Painter, N.M.
Dan Stonington, Wash.
Rick Tallman, Colo.
Luis Torres, N.M.
Andy Wiessner, Colo.
Florence Williams, D.C.

PHENO V. GENO

Cally Carswell's article on cottonwood diversity freely intersperses facts and opinions and includes some peculiar conceptual shortcuts ("Tree of Life," *HCN*, 6/8/15). For one thing, animals do not respond to the genotypes of trees. They respond to the phenotypes of trees, their physical characteristics, which reflect a combination of genetic, epigenetic developmental and environmental factors. Common garden experiments are a way of attempting to isolate and identify specific phenotypic characteristics, and those may (or may not) map well onto apparent genetic variation, but a truly controlled common garden experiment on trees is fraught with potential complications brought on by the physical and temporal scales in play.

With play in mind, the proposal to select and distribute plants based on their expected characteristics might better be called gardening than "playing God." Conservation biologists share with farmers (and everyone else) the defining human characteristic of seeking to predict the future and manipulate the world to produce the outcomes they desire. A program of selective breeding and laboratory genetic manipulation is standard agricultural practice. It becomes neither more nor less admirable by being associated with something resembling the familiar objectives of biodiversity (or commercial) conservation.

Such programs are hardly new; consider the decades-long attempt to create mostly "American," yet blight-resistant chestnut trees. And however one feels about the artificiality of that, the goal of increasing the predictability of species persistence and (thereby) of ecological structure is antithetical to the goal of preserving wildness and (thereby) of evolution by "natural" selection. That may be seen by more and more conservationists as a necessary shift in values, but it should be recognized and identified as such, rather than represented as something revolutionary.

Finally, reports of the imminent eradication of tamarisk appear greatly exaggerated. And if *HCN* is going to remind us that tamarisk leaf beetles were introduced by a federal agency in 2001, you should also remind us that in 2010 the same agency repudiated and suspended beetle introductions, has



PAT BAGLEY/SALT LAKE TRIBUNE/CAGLECARTOONS.COM

stopped producing them, and prohibited their interstate transportation because their own personnel misrepresented the goals and probable outcomes of the program.

Matthew Chew
Tempe, Arizona

Cally Carswell replies: Trees' physical characteristics do indeed reflect genetic and environmental factors. The goal of the research covered in the story is to untangle what's genetic and what's environmental. The significant leap these researchers have taken is in studying whether genes influence not only the individual but its surrounding community. The point is not that genes determine or explain everything. But the genetic component is often truly significant, and that's important because it can lend a lot of predictive power to land management and conservation.

FALLOW AWAY

Your story on the Arkansas Valley Super Ditch ("Last-ditch effort," *HCN*, 6/8/15) was an enlightening look at efforts in southeastern Colorado to deal with long-term drought in municipalities and rural communities. If the area is indeed drier now than during the 1930s Dust Bowl, these farmers should be commended for caring for the land through voluntary fallowing of some fields. In the rapid rise of commodity prices following World War I, much of the land in eastern Colorado was too intensively farmed, giving rise to the conditions of the 1930s. The government-mandated fallowing during the Great Depression helped bring some health back to the region. Post-WWII worldwide restoration efforts, however, contributed to ris-

ing commodity prices, and eastern Colorado quickly returned to the intensive farming now contributing to Dust Bowl conditions. Periodic fallowing is good not only for diminishing water supplies but the health of the soil as well.

In his *Report on the Lands of the Arid Region of the United States*, published in 1879, Powell had the foresight to question the wisdom of intensive settlement and agriculture on regions short on water. We seem slow to learn

such lessons. Is temporarily fallowing fields to feed the appetite of growing municipalities a wise trade-off? Both the intensive irrigation required to grow marginal crops in these regions and the growth of urban and suburban markets are likely unsustainable in the long run. The Super Ditch is a short-term bandage, doing little more than covering a major wound in the practices of the West.

W. Vance Grace
Grand Junction, Colorado

TRANS-PACIFIC PROBLEMS

Your recent article on the Trans-Pacific Partnership trade deal goes on about the possible economic benefits for the energy industry and ranching community ("Trade winds blow through the West," *HCN*, 5/25/15). And although writer Joshua Zaffos casually mentions that the deal is opposed by environmentalists and some locals, nowhere does he mention its truly frightening aspects. The overriding concern starts with the fact that the TPP gives legal power to the interests of multinational corporations that supersedes the interests of local laws. It allows no avenue of appeal and puts the profit motive above environmental safeguards, above laws that protect our health, labor laws, and local ordinances that are deemed to be in restraint of trade — such as the recently passed local ordinance here in Jackson County, Oregon, that bans the growing of genetically modified crops. Doesn't history teach us that these quality-of-life guarantees are always seen by the corporate world as a hindrance to making money? Of course you can make more money if you have no regard for the health of the planet you live on.

Avram Chevron
Ashland, Oregon

High
Country
News

High Country News is a nonprofit 501(c)(3) independent media organization that covers the issues that define the American West. Its mission is to inform and inspire people to act on behalf of the region's diverse natural and human communities.

(ISSN/0191/5657) is published bi-weekly, 22 times a year, by High Country News, 119 Grand Ave., Paonia, CO 81428. Periodicals, postage paid at Paonia, CO, and other post offices. POSTMASTER: Send address changes to High Country News, Box 1090, Paonia, CO 81428. 800-905-1155. All rights to publication of articles in this issue are reserved. See hcn.org for submission guidelines. Subscriptions to *HCN* are \$37 a year, \$47 for institutions: 800-905-1155 | hcn.org

Printed on recycled paper.



The sage grouse two-step

Massive federal conservation plans strike a delicate balance

BY SARAH GILMAN

Northern spotted owls are white-and-brown tree dwellers with sprays of feathers between their eyes. Greater sage grouse are football-sized ground-strutters, whose males flaunt yellow chest sacs during mating season. The owls nest in drippy old-growth Northwest forests; the sage grouse, beneath the dry, silvery fronds of their namesake shrub. When spotted owls were blamed for shutting down the Northwest's timber industry in the '80s and '90s, bumper stickers appeared with slogans like "I love spotted owls ... fried." And though people actually eat sage grouse, their notoriously bitter taste has perhaps kept them off the tongue-in-cheek menu.

The two birds couldn't be more different, but they're often compared because their declines catalyzed massive, controversial

HCN Contributing Editor Sarah Gilman (@Sarah_Gilman) writes from Portland, Oregon.



A greater sage grouse near natural gas drilling rigs in Wyoming. A federal conservation plan for grouse limits fragmentation of the birds' habitat — the main driver of its decline — in designated areas.

GERRIT VYN/CORNELL LAB OF ORNITHOLOGY

federal interventions. A few years after the owl was listed under the Endangered Species Act, the Clinton administration hammered out the nation's first-ever landscape-scale attempt to manage for ecosystem health. Crafted in a mere 90 days under intense pressure to end years-long wars over logging's environmental toll, the Northwest

Forest Plan sought to balance the industry with habitat protections across 24 million federal acres. But timber harvests proved much lower than promised, leaving local communities reeling and making the spotted owl a magnet for ESA bashers.

Critics will have an even better target
Please see Sage grouse, page 6

Snapshot

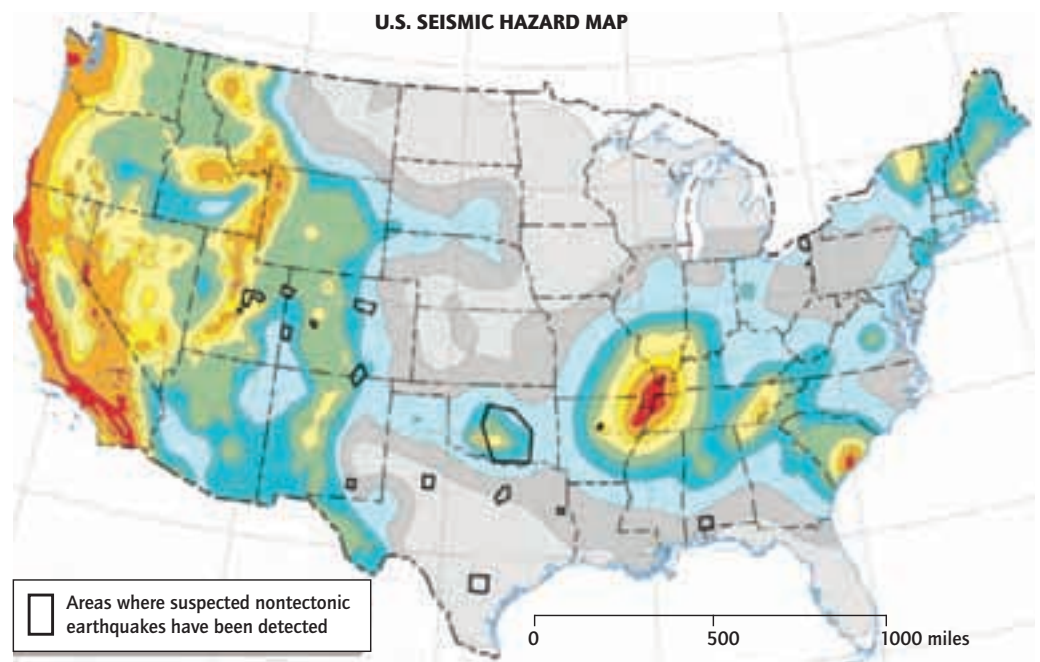
Quake-makers

Some earthquakes come from industry, not nature

Human-induced earthquakes are happening in places like Colorado, New Mexico, Wyoming and Utah. Though some fracking-related quakes have now been documented (including a 4.4-magnitude quake in Alberta this January), the majority of non-tectonic quakes are caused by the disposal of industry wastewater through underground injection. Even relatively minor quakes can be dangerous when they happen in unprepared places, such as the Interior West, where hazard maps and building codes may not have been created with tremors in mind. Complicating the issue, it's hard for officials and researchers to predict where drilling or mining might create problems.

"There are more than 100,000 of these injection wells in the U.S., and only a few of them have caused earthquakes," Anne Sheehan, a geophysicist at the University of Colorado, says. "If we learn more about what's causing these earthquakes, we have more of a chance of reducing the odds of them happening." In a paper published in *Science* magazine in February, Sheehan and other researchers argue for better study of earthquakes that might be human-induced.

Within days of a suspicious earthquake near Greeley, Colorado, last June, Sheehan and other researchers installed several seismometers nearby. They were able to pinpoint the injection well that caused the quake. It was injecting at a high rate, over 300,000 barrels per month — and was still causing tremors. The Colorado Oil and Gas Conservation Commission temporarily shut down the well and lowered its rate of injection. "Now the earthquakes have really tapered off," Sheehan says. "Last summer, there were hundreds of small earthquakes there, and now there are very few." **KINDRA MCQUILLAN**



Polygons indicate areas of suspected seismicity due to fluid injection, mining, and oil and gas production. Three of these areas, one near Paonia, Colorado and two near coal fields in central Utah, show seismicity associated with coal production.

SOURCE: USGS 2014 UNITED STATES NATIONAL SEISMIC HAZARD MODEL



An artist's rendering of the planned development.

THE VILLAGE AT WOLF CREEK

THE LATEST

Backstory

A controversial plan to build a massive resort near a remote ski area in Colorado's San Juan Mountains got a boost in 2005,

when the U.S. Forest Service approved two access roads into the developer's 288-acre Rio Grande National Forest inholding. Opponents said the agency failed to address the impacts of the "Village at Wolf Creek" on the surrounding communities and high-alpine ecosystem. County commissioners later approved the plans, but the Forest Service agreed to further study the issue ("Developers push ahead with mammoth ski resort," *HCN*, 2/7/05).

Followup

In May, **a land swap needed by the still-controversial resort — which would include 821 condos, 522 townhouses, 138 home lots and several hotels — received final Forest Service approval.**

The agency gets sensitive streams and wetlands, while the developer acquires land they can use to build a road to the highway. The agency says its hands were tied: The 1980 Alaska National Interest Land Conservation Act requires the feds to give landowners access to private inholdings within national forests.

SARAH TORY

Sage grouse continued from previous page

if the U.S. Fish and Wildlife Service lists the grouse this year: The bird shares its vast range with powerful industries like oil and gas. To avoid a listing, in late May Interior Secretary Sally Jewell unveiled 14 plans that protect 66 million acres of grouse habitat on Bureau of Land Management and Forest Service lands across 10 states. Unlike the Northwest Forest Plan, though, the sage grouse process has been collaborative from the get-go. The resulting strategy walks a political tight-rope, building on states' existing efforts to conserve the bird, while imposing the consistent, range-wide safeguards needed to convince Fish and Wildlife that additional protections are unnecessary.

"We're trying to put together something that works for the bird *and* provides flexibility for sustainable economic development," says Jim Lyons, Interior's deputy assistant secretary for lands and minerals, who has helped coordinate the planning since 2013 and did the same for the Northwest Forest Plan. But if things skew too far in either direction, the whole endeavor may collapse.

"For an administration that claims to be concerned about climate change, they sure are bending themselves into a pretzel to keep sage grouse from becoming an obstacle to drilling."

—Erik Molvar, *WildEarth Guardians*

Over more than a century, wildfire, invasive species, energy development, livestock operations and ranchettes have gobbled up sagebrush steppe, causing sage grouse numbers to plummet from historic estimates in the millions to as low as 200,000. Though the new plans vary, all adopt tiered restrictions for a large swath of the remaining habitat. The most stringent go to "sagebrush focal areas" that the U.S. Fish and Wildlife Service identified as critical to the species' survival, then to "priority" habitat. Both limit overall surface disturbance, and, with notable exceptions in Wyoming, generally forbid aboveground infrastructure on new oil and gas leases and exclude renewable energy development. "General" habitat faces the fewest limits.

The rules won't apply to existing rights of way and oil and gas leases, and habitat areas aren't off-limits to future leasing, but the administration says most viable hydrocarbon reserves are outside their boundaries anyway. Nor is grazing prohibited anywhere, though every proposal includes stepped-up protections if bird numbers or habitat decline below set levels.

Many environmentalists offer circum-

spect praise, saying the plans appear much stronger and more consistent than their 2013 drafts, which hewed more closely to the priorities — and politics — of individual states. "Is it perfect? No," says Nada Culver, The Wilderness Society's BLM Action Center director. "But it's a stewardship vision. Cross-state wilderness lands, wildlife migration corridors, those should all be easy to plan for after this."

Still, some states are balking at the changes. "While lip service is paid to 'collaboration,' the focus of federal regulators is increasingly unilateral and dismissive of state conservation actions," Kathleen Clarke, Utah's sage grouse lead and Bush-era BLM chief, told a House committee recently.

Harder-line environmental groups are pushing back, too. For example, in fossil fuel-rich Wyoming — home to 37 percent of remaining sage grouse — the feds adopted the state's existing 5 percent cap on total surface disturbance in priority habitat, rather than the 3 percent limit in most other plans. But studies have shown that anything above 3 percent will result in lost birds, argues *WildEarth Guardians'* Erik Molvar. "For an administration that claims to be concerned about climate change, they sure are bending themselves into a pretzel to keep sage grouse from becoming an obstacle to drilling."

Yet Fish and Wildlife itself has endorsed Wyoming's strategy. And the 5 percent cap is actually more restrictive than other states' because it counts wildfire and invasive weeds as "disturbances," says Audubon Society Vice President Brian Rutledge, a member of Wyoming's Sage Grouse Implementation Team. "This ecosystem was utterly without protection 10 years ago. We're a hell of a lot better off than we were."

That kind of "good-enough" sentiment hints at the delicate politics surrounding sage grouse. A rider passed last year already forbids Fish and Wildlife from spending any money in 2015 to issue rules for grouse if it determines protection is required. As of early June, Congress was considering a defense bill amendment that would delay both a listing decision and implementation of the federal sage grouse plans for several more years. If federal conservation efforts don't go far enough, and the bird is listed, the ESA itself will be open to even fiercer attack. If they alienate states, the backlash against the plans could also gain momentum.

"You can't turn the whole West over to sage grouse," says Fremont County Commissioner Doug Thompson, an active participant in Wyoming and federal conservation planning. Thompson recently lobbied lawmakers not to interfere with the process, but "if the final determination is that the plans are as bad or worse than a listing," he says, "then I might change my mind." □



After the fire masters or family members ignite the crematory with juniper, the community watches in silence. After about 20 minutes of quiet, the ceremony continues with speeches, music, singing and poetry in a celebration of life and remembrance.





Last remains

Open-air cremation in Colorado

Death rites are becoming more down-to-earth here in the West. As eco-minded baby boomers age, they're seeking out alternatives to the trappings of modern funerals — with all their concrete burial vaults and chemical embalming. Even cremation uses a lot of energy. Instead, they're choosing to be buried wrapped in shrouds or in plain pinewood caskets, and even, in one small Colorado town, cremated in the open air, using piñon and juniper boughs. Crestone, Colorado, has hosted one of the only legal providers of open-air cremation in the United States since 2008. See more of Taylor McIntosh's photographs of this end-of-life ceremony at hcn.org. KATE SCHIMEL

A community member waves his final goodbye before exiting the cremation site, above. The Crestone End of Life Project's crematory, top right, is as efficient as crematories found in ordinary mortuaries. On average, about two cords of wood are burned in a process that takes roughly two hours.



Before the fire is ignited, community members are asked to participate by laying pieces of fresh-cut juniper around and on top of their loved one. Later, the fragments left are distributed throughout the community to those interested in keeping or scattering what is left of the deceased.



A dry wash in Arizona that shows signs of water flow.

FINETOOTH/WIKIMEDIA COMMONS

THE LATEST

Backstory

In 2008, an Arizona developer flattened a wide swath of the Lower Santa Cruz River, and despite his insistence that he didn't violate the Clean Water Act, the U.S. Environmental Protection Agency fined him \$1.25 million. The case epitomized how two Supreme Court decisions created confusion over which waterways the federal government has power to protect from pollution and bulldozing. Things were particularly murky in the West, where streams can stay dry for long periods ("Muddy waters of the U.S.," *HCN*, 6/23/14).

Followup

Under a new federal rule, tributaries to protected waters and nearby wetlands will be covered, no matter how often they're dry, if they have signs of flow such as beds, banks and high-water marks. Shallow desert pools called playas lose out, as do small streams that don't flow into waters that are big enough to navigate by boat or cross state lines. Overall, more waters and wetlands will likely be protected, though still fewer than before the Supreme Court curtailed the Clean Water Act's reach in 2001 and 2006.

ELIZABETH SHOGREN

Re-Butte

The scrappy effort to revive the richest hill on earth

BY SARAH JANE KELLER

Inside a new microbrewery on a warm autumn evening, a woman in gauzy fairy wings sang indy rock and played the ukulele. People sporting trendy haircuts and man purses swigged locally made IPAs, gin and whiskey. Outside, a movie premiere's blue strobe light cut through the black sky.

It would have been an unremarkable scene in Portland or Los Angeles, but this was Butte, a southwestern Montana town best known for the Berkeley Pit, a toxic lake in an old copper mine that's part of the nation's largest Superfund site. Yet dozens of film industry folks were gathered that night to screen *Orphan Girl*, a historical drama following a day in the life of an underground miner, showing the dangers, hardship and innovation that went into unearthing the copper that electrified the modern era. Butte power-couple Courtney and John McKee of Headframe Spirits wanted to use the story of the Orphan Girl mine, the namesake of their bourbon cream liqueur, to convey the "untold history of Butte." The film is not only part of a marketing campaign, it's also a tribute to Butte's mining history — and a call to arms for its future.

Since copper crashed in the 1980s, Butte has struggled to find an economic footing — and a new identity. In the '90s, the town promoted mining tourism, opening a roadside gift shop and charging visitors to gaze at the Berkeley Pit's metal-melting waters. In 2006, *The Daily Show* visited. "If it's the Berkeley Pit that draws them here, it's our job to keep them here ... for all of the other things we have to offer," then-state Rep. Jon Sesso, D, said. The show's reporter asked for examples; Sesso's edited reply consisted of 30 painful seconds of "um" and "uh."

Since then, Butte has become as well known for its summer music festivals as for its once-legendary St. Patrick's Day bar brawls. A few tech companies have moved in, and developers have breathed life back into historic Uptown. Yet compared to Bozeman and Missoula, the economy still looks anemic: Uptown's poverty rate is nearly 30 percent.

The film, which told Butte's story with the kind of production polish more common at sporty mountain film festivals, was part of a larger effort to reboot the town's image — as well as its cultural and economic reality. The area's population peaked at over 90,000 in 1917; the

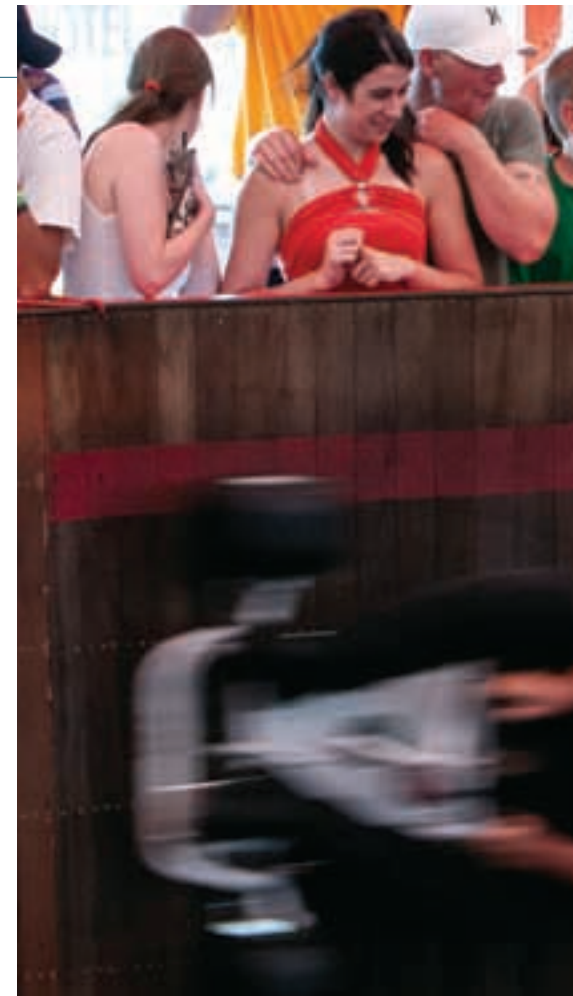
McKees envision rebuilding it to just under 50,000 from its current 35,000 — big enough to bustle, but unlikely to attract big-box stores. The future city, many residents say, should meld the middle-class stability of the past with a diverse economy and amenities like parks, trails and climbing walls. They hope to prove that a post-industrial town without a ski resort or other big tourist draws can still be modern and well connected.

Today, optimism is having its own boom. A Superfund cleanup has changed the cityscape: Once-contaminated soil is now home to parks with walking paths; an old rail bed is a bike trail; one former mineyard is a grassy venue for weddings and festivals. The city is pursuing development grants, including one that built Montana's fastest broadband network. A local nonprofit brought the National Folk Festival to town in 2008, and a few years later, it started the Montana Folk Festival.

Julia Crain, a city planner who grew up during the 1980s mining bust, says the festivals renewed community pride. "After that, sidewalks were improved, facades started to get painted," she remembers. "You saw people like Courtney and John who were taking risks, and they were deciding to do it here. It was kind of like, there's a lot of energy here. It was really palpable."

Headframe Spirits is one of Butte's most visible economic success stories, and Courtney and John McKee are deeply involved in development efforts. Initially, though, they just wanted to stay in Butte, where they had close friends, two kids, a golden retriever and a historic home with a cheap mortgage. In 2010, John was working for a biodiesel company and Courtney had an IT business. Then the biodiesel company folded, so Courtney challenged John to turn his flair for cocktails and distilling knowledge into a business plan.

To succeed in a market glutted with artisanal products, they needed to be, in her words, "a marketing company that sells hooch." So they built their brand around Butte's gritty history; "Headframe," for instance, refers to the multi-story hoist towers that once hauled ore from the earth and still pincushion the landscape. They named their gin, bourbon and vodka after evocative-sounding mines — Destroying Angel, Neversweat, Anselmo — and plastered bottles with historic, sepia-toned photos. Their Uptown tasting room boasts a 110-year-old mahogany bar on loan from the World Museum of Mining.



Though they drained their savings, the sales pitch worked: John McKee now manufactures high-tech stills in Butte, and the company sells booze from California to Chicago. *Orphan Girl* outsells Baileys Irish Cream in Montana. Their experience showed that there was opportunity in Butte, if only people were inspired to create it. The low cost of living and supportive community, Courtney McKee says, allowed them to build a lot from very little. Their appraiser, for instance, told them that their \$165,000 building would have cost \$3 million in Bozeman. "You can push yourself in ways you couldn't in other places," McKee says.

Bad marketing and lack of vision are holding the city back, she thinks. Last fall, the city hired consultants to assess the local economy. There was a lot to build on, they concluded: Low housing prices, proximity to major interstates and local financing help for businesses. But to draw more residents, the city needed to aggressively sell its assets — like its historic business district. To help, McKee recently started a nonprofit called Butte Innovates, with support from the head of Butte's combined city-county government, to amplify positive messages about the town.

To that same end, the *Orphan Girl* film featured a handful of local entrepreneurs as Butte's "modern mavericks" — people like Anthony Cochenour, the founder of a company that secures computer networks against hackers. Cochenour opened his newest office in Butte last summer instead of expanding in Bozeman. He now works

Sarah Jane Keller (@sjanekeller) writes from Bozeman, Montana.



out of the 114-year-old building housing a data center connected to the town's high-speed Internet, which is critical to helping him beat hackers. Other IT companies share the building, while the National Center for Healthcare Informatics, which trains battlefield medics via computer simulations, is plugged in across town.

Crain points out that Butte doesn't lack professional jobs. The city's largest manufacturer makes high-purity silicon used to build solar panels and employs about 300 people. The hospital is always hiring, and the utility Northwestern Energy is expanding in Uptown. And mining isn't totally dead: Copper maintains a few hundred high-wage jobs. Silver Bow County's 4.7 percent unemployment rate is higher than that of Missoula or Gallatin County, where Bozeman is, but lower than the national average. Butte's population is growing again, but just barely. Its growth rate was just over 1 percent between 2010 and 2014, compared to Gallatin County's 8.6 percent.

Such tenuous gains make Crain and others fear that Butte will backslide unless citizens vigilantly maintain its current momentum. Roughly 30 of Crain's young friends, many with small children, left for bigger cities in the last year. The school district lost 60 students last year as part of a decade-long trend. Some couples leave because it's hard to find two good jobs in a small community. But Butte also lacks family-friendly amenities like an outdoor swimming pool. "I have unrivaled professional opportunity here," Crain

says. She has less competition than she would in a bigger city and access to decision makers. "It's awesome. But I'm still seeing all of these people leave."

Last spring, determined to halt the exodus, Crain helped start a group called the Butte Idea Exchange to engage more young professionals in community development. At the first meeting, 145 people crowded the ballroom above Headframe Spirits. On a board on the wall, they listed Butte's assets and asked what people still wanted. The answers: More family activities, and things like community gardens, a livelier nightlife and arts scene, and better recycling programs. Basically, people wanted a New West economy and culture, and didn't want to have to go to Missoula to get it. The group started encouraging young leaders to participate in the school board, the historic preservation board and in economic development groups like McKee's, and they're trying to turn abandoned lots into small parks.

This is what Nick Kujawa, a Butte-raised real estate developer, calls "economic gardening" — small quality-of-life improvements that make people want to stay in a community. Butte's leaders recently approved a \$130,000 project to create bike lanes and make Uptown more pedestrian-friendly, the kind of simple infrastructure that helps attract investors like Kujawa. In 2010, he bought an abandoned early 1900s apartment building and turned it into lofts with a grocery store downstairs, the first in the downtown core in over 30 years. The project

helped kick off a small wave of similar redevelopments. Now, Kujawa says, Butte can use these assets "to convince people who grew up and moved away that, 'Hey, you know this town, there's opportunity here, and you can make a life here.'"

But to really grow, Butte will still have to attract new transplants, and that's an ongoing challenge. "It has a reputation to overcome," says Ray Rasker, the executive director of Headwaters Economics in Bozeman. Take the Berkeley Pit. "That's pollution tourism. You're telling the world you're one of the most polluted places in the world." On the other hand, he says, "People throughout Montana really respect Butte because they have a can-do spirit. That's worth marketing. They are scrappy people, and they get it done."

Courtney McKee herself is evidence that opinions can change. When she first glimpsed Butte from Interstate 90 in 2001 she saw the Berkeley Pit's ochre walls, and a dismal drag of gas stations and fast food chains in an area called The Flats. What a dump, she thought. And yet weeks later, she moved to town — to be with John, who was raised in Butte.

Now, McKee jokes that she's doing penance for her bad attitude. On a cloudy November day, she parked her pickup in a weedy old mine yard with rusting steel buildings and piles of pipe. "This whole site looks like (crap)," she griped, as ravens pecked siding off the hoist house. But she and John are negotiating to buy it. They plan to build the largest distillery West of the Mississippi here, complete with conference facilities, a restaurant, lodging in old miners' bungalows, and a music venue. A lot of cleanup is needed first, but McKee seems undaunted. "I want to create a destination like nothing else that exists here," she said. "I just want to challenge people's thinking about what potential looks like." □

People watch stunt riders, left, during a performance of the Wall of Death traveling show at Evel Knievel Days in Butte, Knievel's hometown. The event brings more than 50,000 visitors each year. Courtney and John McKee, owners of Headframe Spirits, below, in period clothing from the movie *Orphan Girl*, which was part of a marketing campaign for Butte.

CHRIS LOMBARDI, LEFT; COURTESY HEADFRAME SPIRITS, BELOW



RESEARCH FUND

Thank you, Research Fund contributors, for showing us the beauty of the West

Since 1971, reader contributions to the Research Fund have made it possible for HCN to investigate and report on important issues that are unique to the American West. Your tax-deductible gift directly funds thought-provoking, independent journalism.

Thank you for supporting our hardworking journalists.

PUBLISHER'S CIRCLE

Anonymous (1)
 Tamia & Tom Anderson | Berkeley, CA

STEWARD

Katherine Borgen | Denver, CO
 Nancy Davis Fouquet | Los Altos, CA
 Peter & Kathleen Metcalf | Salt Lake City, UT
 Marla Painter & Mark Rudd | Albuquerque, NM

GUARANTOR

Jay Cowan & Harriet Garth | Beaumont, TX
 William Hyde & Dolores Tiongco | Grand Junction, CO
 Tom Neumann | Clarkdale, AZ
 Joyce & Brian Olson | Grand Junction, CO

BENEFACTOR

Sarah & Bill Bishop | Paonia, CO
 Hamilton B. Brown & Martha A. Worthington | Arroyo Seco, NM
 James & Dawn Engel | Califon, NJ
 Grant from Margaret A. Frank Fund | Aspen, CO
 Linda G. Johnson | Salt Lake City, UT

SPONSOR

In memory of Bill Berry | Carmichael, CA
 Richard & Karen Allen | Missoula, MT
 Paul C. Barringer | Golden, CO
 Waldo Griffin | Los Altos, CA
 Arnold Miller | Lynnwood, WA

David C. Moir | Los Alamos, NM
 Joan Olafson | Corona del Mar, CA
 Kim & Jeff Seely | Medina, WA
 John M. Syverud | Pleasant Valley, IA

PATRON

Anonymous (1) | Flagstaff, AZ
 Ellen Aiken | Bent Mountain, VA
 William Aldridge | Olympia, WA
 John Baldauf | Gold River, CA
 Roger C. Bales & Martha Conklin | El Cerrito, CA
 John A. Bjerke | Rockville, MD
 Charles J. Brandt & Timothea Elizalde | Belen, NM
 Glenn O. Clark | Hanover, MA
 Ralph E. Clark III | Gunnison, CO
 Lyle Collins | Yakima, WA
 Diane Davidson | Portal, AZ
 John & Christine Dildine | Loveland, CO
 Ray Ehrenstein & Jim Sample | Denver, CO
 Mike & Dayl Fredrickson | Missoula, MT
 Bernard Friedman & Lesley Hyatt | Los Angeles, CA
 Harper Hall & Seth Cothrun | Tucson, AZ
 Sue Halliday, Four Korner Investment | Moab, UT
 Nick Hazelbaker | Harpster, ID
 Eric Hirst | Bellingham, WA
 Tom & Julie Anne Hopkins | Swall Meadows, CA
 Bill Hubber | Townsend, MT
 Olin A. Kane | Durango, CO
 Kevin Knowle, Conservation Land Group Inc. | Sausalito, CA
 Gail C. Kobetich | Citrus Heights, CA
 Tim Lee | Snoqualmie, WA
 Donald & Cecelia Lojek | Boise, ID
 Mr. & Mrs. Richard Maurer | Castro Valley, CA
 Sarah C. Michael & Bob Jonas | Sun Valley, ID
 Jay Miller & Barbara F. Wolf | Sacramento, CA
 Mike Miller | Estes Park, CO
 Bettina Proctor | Denver, CO
 Robert & Patricia Raburn | Oakland, CA



Dana Rinderknecht, Community First Foundation | Denver, CO
 Ronnie Rogers | Burien, WA
 Paul Schechter | Denver, CO
 Lucile Scopinich | Boise, ID
 Craig Seaver | Estes Park, CO
 Benjamin & Kathleen Smith | Aiken, SC
 Devin Smith | Needham, MA
 Gregory Smith | Spokane, WA
 Ralph & Betsy Stephens | Chevy Chase, MD
 William Stow | Centennial, CO
 The Swifilsons | Lander, WY
 Leon Swigert | Rupert, ID
 Matthew Symonds | Farmington, NM
 H. Virginia Thompson | Eagar, AZ
 Alvin & Margaret Wall | Holyoke, CO
 Andrew Weiner | Albany, CA

FRIEND

Anonymous (2)
 In honor of Mike Hoffman | Bellingham, WA
 In honor of Flora Stein Satt | Denver, CO
 In memory of Daisy Mae Cannon, K7 Ranch | Duncan, AZ
 In memory of Joe Goff, Cross Triangle Ranch | Oracle, AZ
 In memory of Maggie Johnston
 In memory of Fred Mugler; we miss you
 Benjamin Allen | Denver, CO
 Tom Baer | Steamboat Springs, CO
 Britt Bassett | Durango, CO
 Leonard Beaulieu | Carbondale, CO
 Brenda L. Bell | Sedona, AZ
 Kate Benkert | Olympia, WA
 Lucy Best | Park City, UT
 Charles Blair | Lompoc, CA
 Linda Bledsoe | Cedaredge, CO
 Bethany Bradbury Arndt | Prescott, AZ
 Chris Bryant | Missoula, MT
 Cecily & Mike Bryson | Durango, CO
 Jason & Carla Burkhead | Anchorage, AK
 Phil Burton | Pope Valley, CA
 Donald & Sheryl Butler | Tucson, AZ

Deborah A. Caldwell Stone & David R. Stone | Chicago, IL
 Chris Campbell | Rochester, NY
 Virginia & Phil Campbell | Tijeras, NM
 Joe & Christine Cendagorta | Reno, NV
 Harvey Chess, The FTF Group | Little River, CA
 Sheldon Clark | Vail, AZ
 Mitzi Cline | Littleton, CO
 Suzanne & Peter Coe | Pagosa Springs, CO
 Perry & Terra Crampton | Hillsboro, OR
 John Crandall | Colorado Springs, CO
 Steve Cross | Omaha, NE
 Jim Dalgleish | Bountiful, UT
 Jenny Emery Davidson & Mark Davidson | Hailey, ID
 Carol Delker | Erie, CO
 Jay Duncan | Blackhawk, CO
 Eileen B. Ferguson | Prescott, AZ
 Susan J. Fletcher | Whitefish, MT
 David Fonseca | Colonie, NY
 David & Sandra Freeman | Fort Collins, CO
 Marilyn H. Friedrich | Port Townsend, WA
 Paul Garrahan | Portland, OR
 Richard & Nan Geer | Blaine, WA
 David HCN Genter | Belgrade, MT
 Rhoda Gerrard | Emmett, ID
 Gary Gianniny & Cynthia Dott | Durango, CO
 Caroline Gilbert | Indian Hills, CO
 George Gose | Lake Forest Park, WA
 Penelope Grenoble | Oak Park, CA
 Hill Grimmett | Fort Collins, CO
 Andrew Henrichs | Carbondale, CO
 James Hickerson | Cedar Crest, NM
 Denise Hoffman | Brooklyn, NY
 Hillary Hoffman | South Royalton, VT
 Tim & Gwen Holmen | Reno, NV
 Susan Honstein | Louisville, CO
 Bob Hopkins | Missoula, MT
 Karin L. Hughes | Grand Junction, CO
 Ken Hughes | Santa Fe, NM
 Susan C. Jacobson, Jacobson & Jacobson CHTD | Tucson, AZ
 Philip James | Littleton, CO

-YES! I care about the West!

\$25 Friend
 \$75 Patron
 \$150 Sponsor
 \$250 Benefactor
 \$500 Guarantor
 \$1,000 Steward
 \$2,500 Philanthropist
 \$5,000 Publisher's Circle
 \$10,000 & up Independent Media Guardian

Amount of gift \$ _____ Make this amount recurring
 Here's my check (or voided check/1st month's gift for recurring gifts)
 Charge my credit card

Card # _____ Exp. date _____
 Name on card _____
 Billing Address _____
 City/State/ZIP _____

High Country News | P.O. Box 1090 | Paonia, CO 81428 | 800-905-1155 | hcn.org 47:11



Dipper nests, far left, are situated on cliff ledges or tucked behind waterfalls to be inaccessible to predators. As juvenile Steller sea lions, left, age, they travel farther, and by the age of one they are as capable as adults in their diving behavior. CONNOR STEFANISON, JESSICA NEWLEY

THE SALISH SEA: JEWEL OF THE PACIFIC NORTHWEST

Audrey Benedict and Joseph Gaydos
147 pages, softcover:
\$24.95.
Sasquatch Books, 2015.

The Salish Sea: Jewel of the Pacific Northwest pays homage to the Strait of Georgia, Strait of Juan de Fuca and Puget Sound. Writer-scientists Audrey Benedict and Joseph Gaydos blend education with art and persuasion, describing the Sea's geology, ecology and history and documenting its extraordinary biodiversity. Dozens of gorgeous color photographs reveal its intricate beauty, and the book ends with a ringing call to action and a vision for protecting the region. This volume itself is a step toward that goal: All the royalties from its sale will be donated to the Puget Sound-based marine conservation center, the SeaDoc Society.

Charlie Jancic | Escondido, CA
Forrest Jensen | Portland, OR
Randy A. Jordan | Salt Lake City, UT
Olin A. Kane | Durango, CO
Bob Kohut | Ithaca, NY
Penelope Koines | San Luis Obispo, CA
Curtis Krueer | Sheridan, MT
Tom La Point | Denton, TX
David J. Larson | El Cerrito, CA
Percy V. Laube | Somers, MT
Julie Lawell | Seattle, WA
Robert Lee | Austin, TX
Robert Lorenz | Loveland, CO
Liz Loveland | Medford, MA
Melissa M. Mackenzie | Missoula, MT
Judith Maeda | Williams, AZ
Lynne Mahan | Colorado Springs, CO
Jhane Mareello | Prescott, AZ
Susan Markley | Palmetto Bay, FL
Kristen Marshall | Boulder, CO
Bryan Martin | Santa Rosa, CA
John McClow, UGRWCD | Gunnison, CO
Robert & Catherine Melich | Louisville, CO
Wayne Melquist | St. Maries, ID
Leroy Michael | Scottsdale, AZ
John F. Mijer | Ogden, UT
Jaina Moan | Henderson, NV
David Moline | Philomath, OR
Jim & Leslie Morefield | Minden, NV
Joanne Nissen | Soledad, CA
Matt O'Connell | Dillingham, AK
Kathryn Okonzak-Lowry | Golden, CO
Bonnie Overgaard | Scotts Valley, CA
Jo Overton | Philomath, OR
Thomas L. Pick | Bozeman, MT
Stephen Pilson | Portland, OR
Dave Pines | Nederland, CO
John Platt | Bellevue, WA
Marikay A. Ramsey | Rio Rancho, NM
Fred Rasmussen | Salida, CO
Don Rea | Albany, OR
Thomas Riesing | Durango, CO
John Roberts | Sebastopol, CA

Jon Roberts & Elaine A. Smith | Boulder, CO
Ronald J. Roedel | Phoenix, AZ
Duane Roller | Firestone, CO
Chapman Root | Hailey, ID
Peter Rose | Ontario, Canada
Margaret Rostkowski | Ogden, UT
Michael Ruby | Cave Creek, AZ
Todd Russo | New Hope, PA
Max & Gene Schloemer | Reno, NV
Fred Shaw | Woodland Hills, CA
David J. Smith | Mesa, AZ
Marvin Smith | Cedar City, UT
Nancy Soriano | Vashon, WA
Robert & Darlea Stack | Salt Lake City, UT
Jane Starratt | Markleeville, CA
Richard L. Stolz | Mercer Island, WA
Daniel Stowens | Kennewick, WA
Faith & Piers Strailley | Quincy, CA
Kit Strang | Carbondale, CO
Calvin Strom | Fort Collins, CO
John P. Stuart | Newport, WA
Diane Szollosi | Lafayette, CO
Mike Tobin | Juneau, AK
Larry Trammell | Kirkland, WA
Darlene Velder | Fort Collins, CO
Helen & Jim Vessels | San Luis, CO
Bill L. Voigt | Laramie, WY
Glenn & Robin Wallace | Evergreen, CO
Carol Walnum | Portland, OR
Lynn Walz | Lafayette, CO
Kurt Warmbier | Cheyenne, WY
Donald Weinstein | Sonoita, AZ
James L. Wilkinson | Boulder, CO
Larry D. & Becky Williams | Sioux City, IA
Dennis Willis | Price, UT
Jill Wilson | Athol, ID
Kent Winterholler | Park City, UT
Veronica Wisniewski | Lynden, WA
Michael Wright | Indianapolis, IN
Phillip Yates | Niwot, CO
Ted Yellman | Bellevue, WA
Rolen Yoshinaga | Salt Lake City, UT
Josh Zaffos | Fort Collins, CO

See you in July

Here in western Colorado, an unusually cool, wet spring has finally made room for some sunshine and toastier temperatures. It's high time for us to take off for the mountains or steal away from the office to stuff ourselves with local apricots and cherries (assuming there are any this year; you never know). So we're skipping an issue, part of our 22-issue per year publishing schedule, but we'll be back in early July. Our special issue on outdoor recreation should arrive mid-month; until then, visit hcn.org to get your Western news fix.

BACIGALUPI'S NEW BOOK

The drenching we got this spring didn't help Lake Mead; in early June, its water level was only a foot and a half above the threshold that triggers mandatory water cutbacks in Arizona and Nevada. But what's bad news for desert dwellers might be good for book sales. **Paolo Bacigalupi**, *HCN's* former Web editor, has a new sci-fi novel out, *The Water Knife*, set in a Southwest beset by never-ending megadrought. The thriller, which sprang from a short story originally published in *HCN* ("The Tamarisk Hunter," 6/2/06), chronicles the increasingly deadly struggle for water — between states, between rich and poor — and follows the exploits of a "detective, assassin and spy" for the Southern Nevada Water Authority. The *L.A. Times* lauded Bacigalupi for making "water politics sexy." Write on, Paolo! See our recent interview at hcn.ws/waterknife.

VISITORS

Werner Hanicke came all the way from Germany to visit his old friend, longtime Paonia resident, **Ulli Lange**. In 1988, a year before the Berlin Wall fell, the East German government allowed the British-born rock star **Joe Cocker** to perform in Dresden. Cocker, who died last year, lived in Crawford, Colorado, just down the road from Paonia, in the '90s. He dedicated that concert to freedom and made a huge impression on the two Germans, who later helped dedicate the park where he played with a placard identifying it as *Cockerwiese*, or "Cocker Meadow."

Deane and Debra Fehrman

dropped by on their way to Cedaredge, down valley from Paonia. Subscribers for over 20 years, they prefer to savor Western news late at night, on a full stomach. After a mind-numbing day at work, Deane, an auto appraiser, says he likes the "time to reflect."

Gerald Espinosa, who stopped by after Memorial Day, visited us once before. In April, he met office manager **Kathy Martinez**, who was pulling weeds outside our office. She gave him a couple issues of the magazine and talked to him about life in Paonia. Instead of moving to Denver as planned, the 20-something Gerald decided to stick around. "I'm making a go of it," he says. He picked up work on a farm and at Solar Energy International, a local nonprofit. Welcome to town, Gerald! The Paonia Youth Retention Committee is always accepting applications.

—Cally Carswell for the staff



Ulli Lange, left, and Werner Hanicke show off their 1988 Joe Cocker memorabilia. BROOKE WARREN

THE RARE EARTHS BUST

*Western
mines
fueled every
economic
revolution
of the last
century.
They may
not be a
factor in the
revolutions of
the 21st.*

FEATURE BY
TIM HEFFERNAN

Every Sunday at 7 p.m. ET, more than 12 million Americans sit down to watch CBS' *60 Minutes*. But on March 22, most of them were met by a surprise: Instead of the calmly authoritative voices of Morley Safer, Leslie Stahl and the rest of the crew, they encountered the verbal fireworks of basketball announcers. The annual men's college tournament was in its second round, and several of the games had run long. When *60 Minutes* finally came on, around 7:45, however, its viewers were duly rewarded. Stahl hosted an engrossing segment on California's Mountain Pass Mine and the obscure metals it produces. Called the rare-earth elements, they are key to the production of electric cars, LED bulbs, smartphones, wind turbines and aerospace equipment.

The report's formal title was interrogatory: "Modern Life's Devices Under China's Grip?" Its tone, however, was declarative, in a sinister way. "One country," Stahl warned, "has a virtual monopoly — roughly 90 percent — of the mining, refining and processing of rare earths: China." And: "The U.S. developed this technology, but China bought most of it right out from under us." And, most gravely: "We are dependent on China for our weaponry." CBS had just gratified one American passion — March Madness — and followed it up with another: the Red Scare.

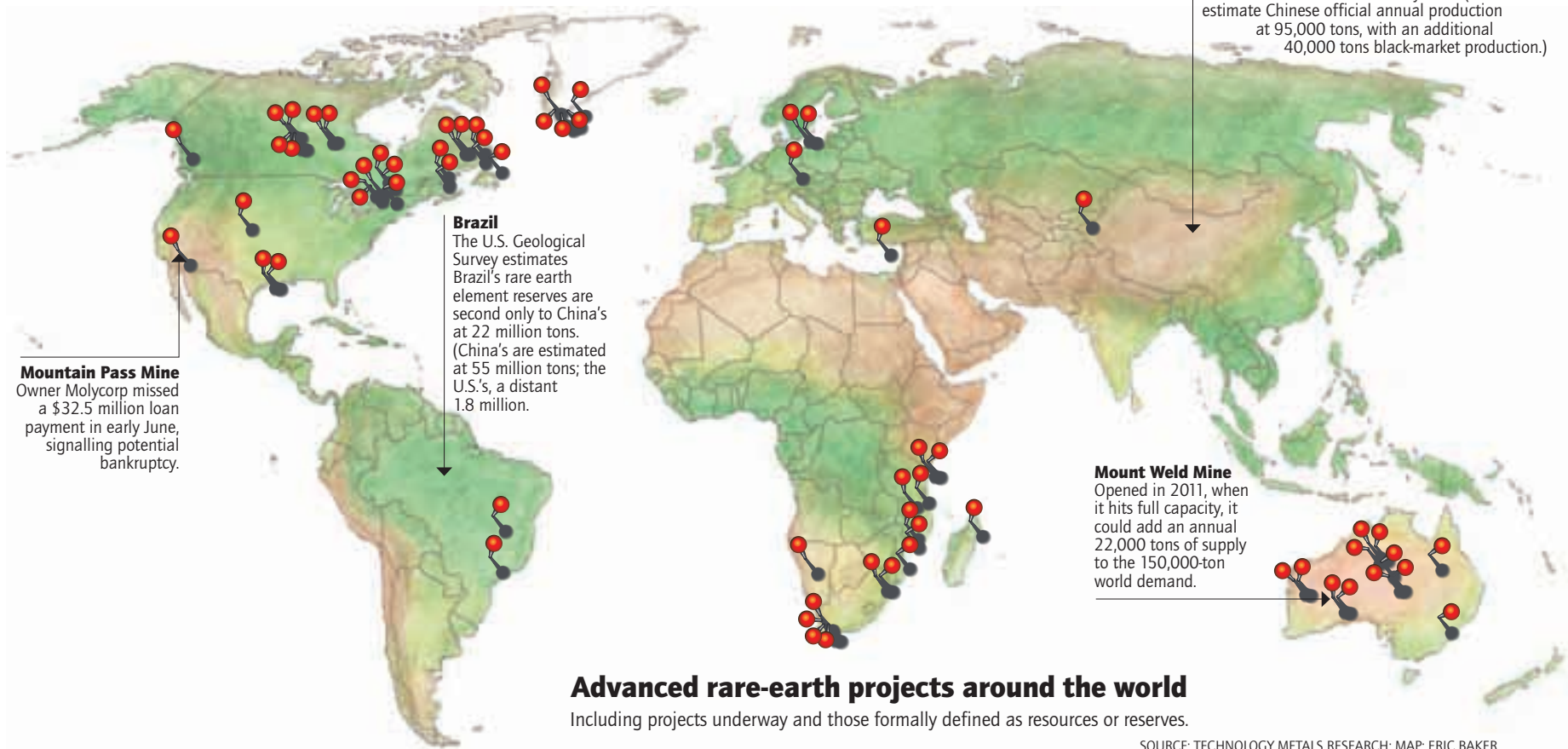
The segment was good television. It was good politics — Alaska Republican Sen. Lisa Murkowski cited it the next morning in a call for more federal support of mining. But it was not good journalism.

Modern life, or at least its smooth functioning, does depend on rare-earth elements. But it's absurd to single them





The pit mine at the Molycorp Mountain Pass rare-earth facility in California's Mojave Desert in April. JOHN GURZINSKI



out as uniquely vital to the U.S. economy, let alone as a unique vulnerability. American manufacturers in 2014 imported just \$210 million worth of rare earths, or about 12,000 tons, just 8 percent of global production. (China's share of those imports was 75 percent, not 90-plus.) No American manufacturer or defense contractor — not even the Pentagon itself — has ever indicated supply problems. Moreover, more than half of rare earths are simply used as catalysts in petroleum refining; most of the rest go into cars, digital devices and lighting. And the rest of the world is happy to sell America as much oil, autos and gadgetry as it wants.

More broadly, modern life depends on the energy-critical elements, or ECEs. Taken together, they underpin many of the technologies that fall under the “green” or digital umbrellas. In addition to the rare earths, they include the familiar metal lithium, used in the batteries that power phones, laptops and hybrid cars; the obscure metal rhenium, which strengthens the turbine blades of latest-generation, super-efficient jet engines; and vanadium, employed in megawatt-capacity batteries that help rationalize the variable output of wind farms and other zero-emission electricity sources.

On paper at least, the Western half of the United States has rich deposits of these elements, and given that global demand for ECEs is generally rising, communities from Alaska to Wyoming to Texas are filled with the hope that a new mining boom is just around the corner. Among politicians and executives concerned with domestic mineral resources, the same facts have led to two broad

strains of thought. One is optimistic — innovation-focused, investor-oriented and extensively (and too often ingenuously) championed by the tech media. Because the U.S. is rich in ECE deposits, these enthusiasts say, exploiting them is merely a matter of uniting Silicon Valley venture capital with desert-rat elbow grease.

The other strain of thought is more pessimistic, and typified by the *60 Min-*

On paper at least, the Western half of the United States has rich deposits of energy-critical elements.

utes report. People in this camp (including the National Mining Association, the National Association of Manufacturers and members of Congress of both parties) insist that America's reliance on foreign sources of ECEs threatens our economic and national security. Their solution is predictable: Deregulate and subsidize the mining industry.

But if the camps apprehend the situation differently — a confident “we will dig” versus a fretful “we must dig” — they share two basic assumptions. Both are certain that America's chief prospects for producing energy-critical elements lie in the West, the nation's mineral breadbasket. And both believe that the West is just the stroke of a pen away from yet another resource boom.

Dispassionate assessment, however, reveals a bleak picture. Several of the most-hyped newcomers to American ECE extraction have quietly closed up shop in recent months, and many others — including Mountain Pass — are confronting skeptical investors and uncertain futures. Over the past five years, numerous nations have brought new ECE supplies to market, eliminating most threats of monopoly control. (The brief Chinese monopoly on rare-earth elements has long since been broken.) Mining industry analysts see little evidence that the market will fuel a burst of American ECE production, and little reason to believe that one could or should be ignited through policy.

In short, a new American mining boom is nowhere in the cards, and the global nature of ECE production means that neither Silicon Valley nor Washington, D.C., can do much to change that. The Intermountain West, whose mines supplied the raw materials for every economic revolution of the 20th century — copper for electrification, coal for industrialization, uranium for the Atomic Age — faces something completely unexpected in the green and digital 21st: the prospect of a comprehensive bust.

EVERY STORY ON AMERICAN RARE-EARTH production begins in the same place: hard beside I-15 in eastern California, where Mountain Pass — the nation's sole operating rare-earth mine — sits on a ridge in the bare lands between Barstow and Baker. I visited in April on a rare rainy day; desert-bound and drought-struck, the mine is usually baked by the sun.

Not much to look at — few mines

are — Mountain Pass is also not much to walk across. There's an open pit a few hundred yards wide, a power plant, a water-purification plant, and a short chain of processing facilities ensconced in dun-colored warehouses, all perched on a hillside covered in sage and Joshua trees. About 400 people work there. Low brown mountains rise on three sides; to the west, Baker's gas stations gleam dully beyond a pink-and-white salt lake. Jim Sims, vice president of corporate communications for Molycorp, which owns the mine, showed me around, and at one point, weighing the mine's physical scale against what I knew of its importance, I began to remark, "It's so —." I intended to say "small." Sims, open-faced and energetic, completed my sentence with an enthusiastic, "Big!" It's a matter of perspective; Mountain Pass is larger than many desert towns, but the whole thing would fit easily inside any neighborhood in Vegas or Phoenix.

In a conference room in the mine's office, a quiet space with neutral shades, vinyl wood and acoustic tiles, Sims outlined the mine's history. At some point, I remarked that every mine office seems to share the same style; call it Extraction Modern. (It's conclusively identified by a closet filled with hard hats and goggles for visiting journalists.) Sims laughed.

The Mountain Pass rare-earth deposit, Sims explained, was discovered in 1949, when exploratory geologists sent a curious rock sample to the U.S. Geological Survey. They were hoping it contained uranium, which it did, along with thorium, though both in very low concentrations. It also contained rare-earth elements — in quite extraordinary amounts. Concentration in the original sample area topped 40 percent. Further exploration revealed a book-shaped ore body sloping into the earth, with an average 8 percent concentration in the easily accessed portion. For comparison, copper ore is generally economically viable at 0.6 percent. By any measure, this was rich stuff.

The problem was that nobody had much use for it in 1949.

The rare earths are a tight-knit family of 17 elements. Fifteen of them fill out a single row near the bottom of the periodic table; two others, higher up, complete the total. All feature an outer shell containing two electrons, which helps account for their similar and curious chemical properties. They tend to be magnetic, and they tend to phosphoresce — to give off light or other forms of electromagnetic radiation — when bombarded with subatomic particles or charged with electricity. Geologically, they travel in a pack: Where one is found, all are found. Sixteen of these elements are not even particularly rare; proven reserves alone are in the millions of tons. The name "rare earth" refers rather to the fact that they don't often form concentrated mineral deposits. Mountain Pass has one of the best deposits of rare earths on the planet.

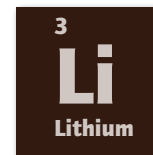
But decades ago, when "high tech"



Jim Sims, vice president of corporate communications for Molycorp, top, shows the vats that hold solvents for extracting elements at the Mountain Pass rare-earth facility in California's Mojave Desert. Center, Jeff Adams, control room operator for the mill. Above, crushed rock is conveyed into the mill where it will be turned to powder for further processing. JOHN GURZINSKI

Energy-critical elements

In the *Proceedings of the National Academy of Sciences*, Thomas Graedel of Yale identifies 62 energy-critical elements, including the 20 discussed in this issue of *High Country News*: lithium, rhenium, vanadium and the rare earths. Graedel ranks them all according to a key factor: substitutability, or the availability of technological workarounds or material replacements. Lower substitutability creates a higher risk of supply bottlenecks. Lithium and vanadium (which are both readily substitutable) and their often-obscure uses are highlighted below and on the following pages, along with the 11 least-substitutable energy-critical elements.



The lightest solid element, its low density and high reactivity render it ideal for hybrid-car and digital-device batteries. Ultralight lithium-aluminum alloys are increasingly employed in aerospace.

23

V

Vanadium

A light, strong cousin of titanium, it has long been used to harden steel alloys. Because each of its atoms can absorb or discard four electrons, vanadium also shows great promise as the basis for high-capacity, infinitely rechargeable batteries that can store and release megawatts of energy from variable solar and wind sources.

75

Re

Rhenium

With a melting point near 6,000 degrees Fahrenheit, rhenium gives nickel-based jet-engine turbines the ability to function in hellish conditions. Because of its rarity and corresponding expense, however, turbine-makers are developing low- and no-rhenium alternatives.

70

Yb

Ytterbium

A rare earth element, ytterbium (*yuh-TERB-ee-um*, named for the Swedish village Yttrby, where its first source was found) is chiefly a source of X-rays. It is also employed in some lasers and in the world's theoretically most perfect clock, accurate to less than two quintillionths of a second per second.

meant automats and automatic transmissions, their curious properties had no obvious economic utility. The founders of Mountain Pass got by in the 1950s by supplying the defense and scientific communities with oddments for general research. Then, in the early 1960s, everything changed: A compound containing europium was found to emit a brilliant red light when bombarded with electrons. Almost overnight, it turned early color TVs from muddy affairs into Technicolor wonders, and Mountain Pass, which contains europium in abundance, became a figurative gold mine. Over the next four decades, the mine flourished as uses were found for other rare earths: in medical scanners, lasers, and especially in fluorescent lights and microchips. Individual bulbs and chips used micrograms of rare earths. Multiplied by the billions, they used kilotons.

Sims and I toured the facilities in his black SUV. Dodging Caterpillar dump trucks carrying 100-ton loads of ore and overburden — the waste rock that's dug up to expose the ore — we crept up the muddy mine roads, keeping to the posted 14 7/8 mph speed limit. (The official limit is 15 mph, of course, but the signs "keep us honest," Sims said.) At the very top of the mine, a crusher reduced chunks of ore to pea-sized gravel. A humming conveyor belt transferred the peas to a warehouse, where a spinning, barrel-shaped ball mill, loaded with iron spheres, pounded them to fine powder. Hissing compressors squeezed the powder into dry, crumbly cakes. Beyond that lay alchemical mystery: The cakes vanished into the processing facilities, where, hidden inside various proprietary acid vats and solvent extractors, the ore was slowly dissected into its constituent rare-earth oxides.

After the raw outside air, the warehouse was pleasantly warm. It was also thunderously loud, so when I tried to thank the mill operator for his comfortable reception, I had to bellow my gratitude. He smiled. The building, he yelled back, has a brand-new ventilation system that keeps it comfortable year-round. In the old days, the humidity sometimes got so bad that in summer, the warehouse filled with fog. Winter was worse: On really cold days, it snowed indoors.

The real surprise, though, was that there was anything brand-new at Mountain Pass. The constant noise and bustle made it hard to imagine, but for most of the past 15 years, there was nothing happening at the mine at all.

BEGINNING IN THE EARLY 1990s, after 30 years of unchallenged domination of the rare-earth market, Mountain Pass ran into difficulties. Repeated spills from its wastewater pipelines contaminated the Mojave National Preserve — a vast saltbush-and-saltpan wilderness, home to the endangered desert tortoise — with small amounts of lead and trace amounts of radioactive barium, uranium and thorium. In 1997, federal and state authorities

brought legal action against Molycorp. (Environmentally, rare-earth mining is generally low-impact. Extraction is chemical, not thermal — no fuel-hungry furnaces — and the chemicals involved are easily neutralized or contained: common acids and bases, water and oils. The chief concern is the trace amounts of mildly radioactive elements that occur in all rare-earth deposits. Modern best practices contain these effectively, and Westernized nations and, increasingly, the Chinese government enforce these practices. The nightmarish tailings lake in Baotou, Inner Mongolia, is a legacy of China's earlier unregulated industry.)

About the time that Molycorp ran into trouble, China initiated a state program to develop its own extensive rare-earth deposits. For the first time, Mountain Pass faced serious competition. In 1998, battered by unfavorable prices and threatened by huge cleanup costs, Molycorp shut down the processing facili-

In 2010 ... the market for rare earths panicked, and prices spiked as much as 2,000 percent.

ties. The excavation and concentration of ore continued for a few more years, but in 2002, Mountain Pass shut down entirely.

Meanwhile, Chinese production boomed, bolstered by demand from two new technologies: LED light bulbs and, especially, the small but powerful magnets found in hard drives, smartphones and the generators of hybrid vehicles and wind turbines. As demand for both products intensified in the 2000s, China found itself in the catbird's seat: It already dominated their production, and now it dominated the supply of their raw materials.

And so things might have continued, but then China, with 97 percent control of the rare-earth market, did the one thing that could change the situation: It deliberately sent prices into the stratosphere.

In 2009, it announced export controls on its rare earths, cutting them by 40 percent. Then, in September 2010, a Japanese naval vessel interdicted a Chinese fishing boat near the disputed Senkaku Islands and arrested its captain. The islands are little more than rocks, and the dispute had more to do with historic Sino-Japanese conflicts than modern state interests. Still, the Chinese government responded ferociously. It ceased all exports of rare-earth elements to Japan, a lighting and automotive powerhouse. The market for rare earths panicked, and prices spiked as much as 2,000 percent.

Immediately, the world's media were agog over what they called a "captive" global market. "China's lock on market

for rare earth elements: Why it matters," read a representative *Christian Science Monitor* headline. But that is pretty much where the popular narrative on rare earths ended. ("They'd been working on that story for two years," Sims said when I approached him, coincidentally, a few days after the *60 Minutes* segment aired.)

Of course, the mining industry sprang into action, and back-page stories soon noted the consequence of high prices: increased supply. In December 2010, just two months after the naval incident, Mountain Pass began processing ore again. That same month, the Japanese conglomerate Sumitomo invested \$130 million in Molycorp to upgrade the mine's facilities. The new Mountain Pass opened in 2012. (Among other improvements, Sims emphasized its closed-loop water system and encapsulated, dry tailings impoundment, which eliminate the chance of further wastewater spills.) By 2014, America's only rare-earth mine was producing 4,700 tons a year.

But the mining industry operates without any particular loyalties. Australia opened the Mount Weld rare-earth mine in 2011; at full capacity, it may add 22,000 tons of annual supply to the roughly 150,000 tons of annual demand. A joint partnership between Japan and Vietnam began producing small amounts in 2012; it may eventually produce 10,000 tons per year. Worldwide, nearly 60 rare-earth deposits in 16 countries are currently in advanced development. Far from controlling global supply, China no longer even controls its own: It's estimated that Chinese wildcatters add 40,000 tons of black-market material each year to the 95,000 tons the country officially produces. From a near-monopoly of 97 percent in the late 2000s, China's market share has fallen to 86 percent, and seems destined to fall further. More importantly, all the new global production has caused rare-earth prices to collapse from their 2011 peak.

As Sims spoke of Mountain Pass' recent history, we left Extraction Modern behind and found ourselves contemplating Extraction Eternal: a muddy verge on the edge of a brown hole spewing nondescript dirt that might conceivably be transformed into riches. Rain pattered on our heads. "To be honest," Sims said, "we are price-takers. And frankly, the Chinese are price-takers, too." His tone matched the weather.

"PRICE-TAKER" IS AN ECONOMIST'S TERM, but you don't have to be an economist to understand it. You only have to be a conscientious shopper. I am writing these words in early May in New York City, and my grocer is offering twin-packs of mediocre corn-on-the-cob for \$3 apiece. By July, I'll be able to buy a dozen ears of dripping-fresh Silver Queen corn for the same price. Today, my grocer is a price-setter: Because he controls a rare commodity, he dictates the price I pay. In July, he'll be a



A man works at the site of a rare earth metals mine at Nancheng County, Jiangxi Province in 2010, when prices had spiked. REUTERS/STRINGER

price-taker: Every farm on the East Coast will have more corn than it can sell, and he'll take whatever he can get.

Fundamentally, price-taking is a matter of supply and demand, but in the mining industry its tangles resemble those of the Gordian knot. The interplay of supply, demand and non-market factors is so complex that many thinkers are attempting to quantify it. Tom Graedel of Yale University ranks high among them. With a handful of colleagues at Bell Labs in the 1970s, Graedel — today the picture of emeritus professorhood, then a young expert in satellite-communications technology — founded the field of industrial ecology: the study of the life cycle of materials. At Yale, he has focused on obscure naturally occurring materials that, though unfamiliar to most consumers, nonetheless are vital to their lives. In an influential 2011 report from the American Physical Society, he and his colleagues identified 28 of them, and gave them a name: the energy-critical elements, or ECEs. Graedel has since expanded the list to 62 elements. They include the 20 under consideration here, which the U.S. contains in quantity — rare earths, lithium, rhenium, vanadium — and several dozen more, many with unpronounceable names. Ytterbium, anyone?

A few weeks ago, in the *Proceedings of the National Academy of Sciences*, Graedel published a method of untangling the knot of ECE supply-and-demand curves — a way, that is, of supplementing neutral analysis of their industrial

ecology with a predictive analysis of their markets.

Graedel's model assigns a value to each of three factors that affect energy-critical element supply: the risk of non-market restrictions, like China's 2009 limits on rare-earth exportation; the risk of market-based bottlenecks, such as those due to demand spikes from popular new technologies; and environmental costs that may eliminate existing sources or pre-emptively cut off prospective ones.

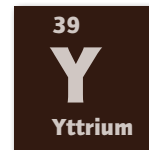
The model is not a predictor of day-to-day ECE prices. Rather, it's designed to help mining firms, analysts and governments rationally assess medium-term (months to years) and long-term (decades) trends. The picture it gives is generally calm: No energy-critical element faces the triple threat of high supply risk, volatile markets and extreme environmental costs. Many measure low on every scale.

Lithium, for example, is widely distributed and plentiful, takes little energy to produce, leaves no nasty waste behind, and faces predictable (steadily rising) demand. Vanadium mining also incurs low environmental costs; its supply-and-demand volatility is moderate at worst. Rhenium measures extremely high on environmental costs, but that's a bit misleading: It reflects the energy-intensive nature of copper production, of which rhenium is a byproduct. (In fact, it's a bit of an afterthought: When I spoke with a representative of the Copper Alliance, the industry's lobbying group, I had to explain what rhenium is.) The rare earths

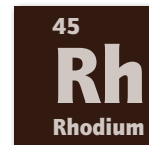
measure high in one area of risk: vulnerability to geopolitical manipulation. But that, of course, is changing rapidly. And they are plentiful and environmentally inexpensive.

When Sims described Molycorp as a price-taker, then, he could have been speaking for energy-critical element producers as a whole. The global ECE crop is abundant, which means that for the foreseeable future, ECE consumers will have the price advantage and producers will be under immense price pressure. For domestic producers, that's bad news. America could theoretically provide many of these materials, but in reality it can't do so as cheaply as many other countries can. Never mind *we will mine* or *we must mine*. Basic market realities strongly suggest that *we won't mine*, for the same reason I won't find cheap corn in New York in spring. Domestically, it simply isn't the right time to harvest.

AMERICAN HUSTLE, however, is always in season. For much of the 20th century, California's Imperial Valley, down near the Arizona and Mexico border, was known as America's melon capital. Cantaloupes and honeydews thrived in the desert sun. Beginning in the 1990s, however, the valley became known for a second, unlikely export: electricity. Deep beneath the Salton Sea lies a vast pool of superheated, briny groundwater. Pumped to the surface, the brine flashes into steam. Channeled through turbines, the steam generates green electricity (400 megawatts in the latest tally) at 11



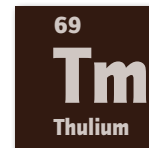
Another rare earth (pronounced *IT-ree-um* or *YIT-ree-um* and named for the same Swedish village as Ytterbium), it is employed in sparkplugs, television displays, lasers, cancer drugs and aerospace alloys.



Part of the six-member platinum group of metals, rhodium has unique capabilities as a catalyst in petroleum refining. It's also the source of whiteness in white-gold jewelry.



Once chiefly employed in odorless, tasteless thallium sulfate rat poison, it is now used in specialty optics and photosensitive electronics.



This rare earth is key to some high-efficiency lasers used by the military and by meteorologists.

geothermal energy plants.

Then, in 2007, came news of a possible third local crop. A company called Simbol Materials announced plans to produce lithium from the power plants' brine. Backed by millions of dollars from Silicon Valley venture capital firm Mohr Davidow, for the next eight years Simbol enjoyed glowing media coverage. "This is not for the faint of heart: the technology is complex," then CEO Luka Erceg told *Wired* in 2008. "It doesn't surprise me that we're the only ones looking at it right now." "Lithium: The New California Gold Rush," gushed *Forbes* in 2011. Later stories described a pilot facility, attached to EnergySource's Featherstone geothermal plant, producing hundreds of tons of lithium. On Jan. 15 of this year, *The Desert Sun* ran a headline that must have thrilled the hardscrabble towns that ring the Salton Sea: "Lithium Plant to Bring 400 Jobs to Imperial Valley." Less than three weeks later, though, on Feb. 4, the story had changed: "Lithium Plans in Doubt as Simbol Materials Fires Dozens."

The Desert Sun reported that Simbol fired only the 40 or so employees who staffed its pilot plant. But my later reporting revealed that the company apparently fired everyone. The multiple voice-mails I left at its Bay Area headquarters requesting comment went unanswered. My attempts to directly contact Simbol's executives failed or were rebuffed. EnergySource, too, declined to speak.

But the new California gold rush didn't just fail to thrive; it may never have begun. "I personally do not think they ever had anything," Ed Anderson, founder and CEO of the lithium consultancy TRU Associates, told me. Potential investors hired Anderson to analyze Simbol's supposed revolutionary extraction method; he was twice given the runaround. "I had a chat with the chief executive of that company, and he couldn't explain to me his technology," he said.

Simbol is not unique. In 2013, a similarly hyped startup, American Lithium, went completely bust after years of aggressively promoting lithium-brine prospects in Nevada and Utah. It never actually produced anything, and Anderson considers it "a prime example of a company that ripped off — and you can quote me on this one — that basically ripped off American and international investors." That same year, Rodinia Minerals, an established lithium producer mostly active in Argentina, abandoned its 1,012 Nevada brine claims as economically unviable. Anderson also cast doubt on the viability of a fourth much-hyped prospect owned by Western Lithium, which is exploring lithium-rich clay in northern Nevada's King Valley. The company estimates its per-ton production costs at almost \$3,500, far above the cost of brine production; lithium contracts average around \$4,500 per ton delivered. The potential profits don't look promising.

That leaves a single active American



A front-end loader moves rocks from the pit at Mountain Pass Mine. JOHN GURZINSKI

lithium producer, Albemarle's insignificant Silver Peak brine operation, west of Tonopah, Nevada, and of it Anderson was equally pessimistic: "I'm actually surprised that it is even continuing." The only U.S. prospect he considers potentially viable is in Arkansas, where Albemarle claims to have developed a process to extract lithium from brine at its existing bromine plant. The technology was announced in 2011; no lithium has been produced.

Hype is part of these disappointments, but price pressures ultimately decide the day. Other countries, especially Chile, Argentina and Bolivia, have vast lithium-rich brine sources, low labor costs and political and regulatory regimes that favor maximum production. They don't need hype. And they set the price.

Hype-plus-price also explains American Vanadium. It was positioning its Nevada deposit as North America's only domestic supply of the raw material used in high-capacity vanadium-based batteries. Demand for the batteries, however, failed to meet projections, and

existing vanadium sources, primarily in South Africa, Russia and China, more than meet its demand as a steel-alloying agent. American Vanadium shut down its mine project in February; its director has resigned, its stock price has cratered, and nobody has answered the phone at its Vancouver headquarters for months.

There are no stand-alone rhenium prospects anywhere on earth, and therefore no busts, either. But, as a byproduct of copper mining, it, too, is under price pressure. Copper demand, driven skyward by China's industrialization in the 2000s, has lately cooled along with China's economy. At \$5 or even \$3.50 a pound, which copper commanded as late as 2013, American mining prospects like Alaska's Pebble or Arizona's Resolution looked like slam-dunks. Today, with copper hovering between \$2.50 and \$2.75, Pebble is moribund and Resolution's fate is uncertain, while the more profitable Andean copper industry is thriving. Meanwhile, the jet-engine industry, rhenium's chief user, has figured out ways to use far less of it. If there ever was an

12

Mg

Magnesium

Lightweight, strong and readily alloyed, magnesium is important to most of the industries where mass is a concern: aerospace, automotive and digital.

25

Mn

Manganese

Named, like magnesium, after the ancient Greek province of Magnesia, it is critical to steel production because it pulls embrittling sulfur out of many alloys.

66

Dy

Dysprosium

This rare earth allows powerful neodymium-praseodymium (fellow rare earths) magnets to operate at fairly high temperatures. Its relative scarcity has led to workarounds as complex as nano-engineering and as simple as running coolant through the generators where the magnets are employed.

American rhenium lobby, its services are no longer necessary.

As for American rare-earth mining, the future looks bleak. In addition to the fully operational Mountain Pass, there are only four rare-earth deposits officially in development: Bear Lodge in Wyoming, Bokan in Alaska, and La Paz and Round Top in Texas. None is anywhere close to commercial production. Each, however, has a handsome website, enthusiastic profit projections, and a long-term stock chart that dives asymptotically toward sea level from a heady peak during the 2010 and 2011 price spike. (The geology of hype, to warp Stegner's great phrase.)

The stock chart for Molycorp, which alone among the five operations actually produces rare earths — and revenue — is the ugliest of all: From a high of nearly \$75 on Tax Day 2011, it had fallen to 57 cents on Memorial Day 2015. A week later, it plummeted to 43 cents on the news that Molycorp had defaulted on its \$32.5 million semiannual loan payment. As we cruised around Mountain Pass, Sims hinted a few times at “challenges,” referring diplomatically to Molycorp's increasingly desperate financial situation. In the first quarter of this year, the price of its particular “basket” of rare earths fell 8 percent. The company reported a negative cash flow of \$73 million, and warned that without the restructuring of its debt, the mine might be forced to close some time this year. On June 3, the *Wall Street Journal* and others reported that the company plans to file for bankruptcy this month. Challenges, indeed.

IN A BAD MARKET, corporations tend to turn to Washington, D.C. Molycorp is no different: Last year, it sent Sims to testify before the Senate Committee on Energy and Environmental Resources in support of the Critical Minerals Policy Act, sponsored by Alaska's Murkowski, then the committee's ranking member. Murkowski's bill, which never made it out of committee, proposed promoting U.S. mineral independence by a number of routes: encouraging efficient use of critical elements, developing alternative materials, offering education and workforce training (“The U.S. lags behind many nations in this area, which in turn can negatively impact investment decisions by private sector companies in critical materials supply chain development,” Sims said), and of course, streamlining or stripping down the permitting process.

With regard to the last, Sims noted good-humoredly that Molycorp had to get “more than 500 permits” to reopen Mountain Pass. However, he emphasized, “The most significant barrier to entry for new rare-earth producers is undoubtedly the capacity to take mixed rare-earth minerals out of the ground and chemically process them into separated, usable rare-earth products.” Similarly, at Mountain Pass, he repeatedly mentioned

the mine's technical difficulties with its novel solvent-extraction and reagent-regeneration processes as the company's main obstacles to growth. With regard to permitting, he noted that Molycorp voluntarily exceeded many environmental regulations in the name of good stewardship and good public image. As he spun them to me, at least, regulations weren't a burden to bear; they were a benchmark to surpass.

Yet the morning after the *60 Minutes* report, when Murkowski — now chair of the Energy and Environment Committee — issued a long statement on American mineral “dependence,” regulation was her chief scapegoat. She quoted Sims' aside about “500 permits” prominently, as though it were the mining industry's central concern, and blamed U.S. policy failures for China's supposed dominance of energy-critical elements. “I'm grateful that *60 Minutes* investigated the depth of

“China does not have market power. They cannot strangle us.”

—Economist Derek Scissors of the conservative American Enterprise Institute

America's dependence on China for rare earths, and has now shared that story with its millions of viewers,” she wrote. “Our foreign mineral dependence is a serious challenge, decades in the making, and we urgently need to reform federal policies all along the supply chain.” That day, Murkowski introduced the American Mineral Security Act of 2015 (S.883). It would direct the White House and the officers of its Cabinet (particularly Interior, Agriculture and Energy, including the Bureau of Land Management, USGS and Forest Service) to “facilitate” domestic production of energy-critical elements through all available means. As with her stalled Critical Minerals Policy Act, the rule changes are broad and vague, but they address education, quantitative assessment, research, and permitting reform — initiatives, frankly, that a Democratic administration could easily bury in bureaucratic sediment, and that a Republican administration could wield like bulldozers. Despite its 2015 dateline, Murkowski appears to be hanging her bill's impact on the outcome of the 2016 presidential race.

But her effort already faces deep skepticism from an unexpected quarter. In December 2011, when the panic over Chinese rare-earth export controls first reached Congress, economist Derek Scissors of the conservative Heritage Foundation read a statement before the House Energy and Environment Subcommittee. Its thesis, as indicated by its title, could not have been more blunt: “Energy-Critical Elements: The Market is Working.”

Now at the equally conservative

American Enterprise Institute, Scissors has not changed his views. “China does not have market power,” he told me. “They cannot strangle us. We do not have to have government involvement in production of these strategic elements.” Scissors agrees with Murkowski that the Department of Defense must ensure that supplies of rare-earths and other ECEs are available — but unlike Murkowski, he is confident they are: “What I've been trying to figure out with the DOD is, ‘What's the stuff you're worried about in the short term?’ And the answer still appears to be: ‘Nothing.’” Scissors considers the Murkowski camp to be “lost in old, very statist thinking.” Federal initiatives (and spending) are “just not the way we need to fill our strategic mineral needs.”

Nor is skepticism limited to politicized think tanks. Gareth Hatch is a founding partner of Technology Metals Research, an independent consultancy that advises governments and businesses on energy-critical elements. He agrees with Murkowski that American regulations slow development of domestic mineral resources, critical and otherwise; Australia, for example, brings new mines into operation in an average of two to three years, versus seven to 10 in the United States. But when we spoke, he also reiterated that “dominance” of any given ECE, by any country, is at best temporary and in most cases illusory. He mentioned, pointedly, China's little-noted capitulation to the capitalist reality of the rare-earth market: Last New Year's Eve, it eliminated all export quotas on its rare earths, and in April it eliminated export tariffs. Now it simply lists them among items whose exportation must be licensed. As Hatch wrote acidly in January, “Perhaps the fact that REEs (rare-earth elements) can be found cheek to jowl alongside live cattle, frozen meat, tungsten, sand, motorcycles and paraffin, to name but a few of the commodities listed, will finally correct the notion that some folks have of REEs as unique, precious snowflakes in the grand scheme of nefarious Chinese strategy. Or perhaps not.”

Or certainly not. Given the politicization of the extraction industry, Washington will continue to make hay — and rake in re-election dollars — over the false threat of foreign domination. But the rest of the world has moved on. The night after I visited Mountain Pass, I drove back to Las Vegas to catch my flight home. With hours to kill, I cruised the Strip. Every casino seemed to be named for a faraway El Dorado: the Venetian; the Luxor; the Bellagio; Paris; Mandalay Bay; Caesars Palace; Treasure Island. The nation's wagering capital, like its political capital, has long since recognized that there is big money to be made in the American West. Unlike Washington, it has also recognized that the hottest action often lies beyond American shores. □

This coverage is supported by contributors to the High Country News Enterprise Journalism Fund.

63
Eu
Europium

Yet another rare-earth element, it's still irreplaceable as a red-light phosphor in some television displays.

82
Pb
Lead

Industrially, lead is ubiquitous — and unequalled — in soldering compounds, easily machined alloys, radiation shielding and glass manufacturing.

00
Hf
Heffernan

Tim Heffernan writes about heavy industry, economics and the environment for *The Atlantic*, *Popular Mechanics* and other magazines. In 2013, *Esquire* honored him as one of its Best & Brightest for his reporting on what he terms “big analog”: the industrial underpinnings of the so-called digital economy. He lives in New York. You can follow him at twheffernan.com and [@Tim_Heffernan](https://twitter.com/Tim_Heffernan).

A person is seen from behind, climbing a steep, reddish-brown rock face. The climber is wearing a light-colored shirt, blue pants, and a backpack. A rope is visible running down the side of the rock. The background is a blurred, warm-toned landscape.

YOUR EDUCATION ADVENTURE STARTS HERE

Outdoor Recreation
Parks & Tourism
Canyoneering
Kayaking
Rock Climbing
Archeology
Snowboarding
Geology
Horsemanship

**DEGREE
INCLUDED**

SUU

SOUTHERN UTAH UNIVERSITY
www.suu.edu

Notice to our advertisers: You can place classified ads with our online classified system. Visit hcn.org/classifieds. July 6 is the deadline to place your print ad in the July 20 issue. Call 800-311-5852, or e-mail advertising@hcn.org for help or information. For more information about our current rates and display ad options, visit hcn.org/advertising.

BUSINESS OPPORTUNITIES

Conservationist? Irrigable Land? Stellar seed-saving NGO is available to serious farmer. Package must include financial support. Details: <http://seeds.ojaidigital.net>.

CONFERENCES AND EVENTS

EWI 2015 – Environmental Writing Institute, led by David James Duncan, Sept. 9-13, 2015, in Missoula, Mont. www.umt.edu/ewi for application and details. Deadline July 15, 2015.

Writing Workshop – Deepen the impact of your writing and learn how to keep your submission off the slush pile with author Amy Irvine McHarg and Torrey House Press co-publisher Kirsten Allen. Oct. 3-5 in Torrey, Utah. See more at redrockwritingworkshops.submittable.com/submit.

Oct. 7-10, 2015, SHIFT Festival, Jackson, Wyo. An in-depth exploration of outdoor access, responsible recreation, conservation leadership and youth engagement for communities striving to live in balance with nature. Tickets at www.shiftjrh.org.

"Where Did the Water Go?" The 2015 Annual Symposium of the Arizona Hydrological Society will pursue interpretations of this multi-layered theme, Sept. 16-19, 2015, at the Desert Willow Conference Center in Phoenix, Ariz. Hydrologists, water professionals, policymakers and students should attend. Register now at www.ahssymposium.org.

EMPLOYMENT

WorkInFarming.com – Where job seekers and farmers connect. Facebook Twitter LinkedIn Google+.

The Powder Basin Watershed Council, headquartered in Baker City, Ore., seeks an Outreach Coordinator. Email pbwced@qwestoffice.net for the vacancy announcement.

District Manager for Trinity County Resource Conservation District in Weaverville, Calif. For full description, visit www.tcrd.net.

President – The Yellowstone to Yukon Conservation Initiative (Y2Y) is a joint Canada-U.S. nonprofit organization with a mission to connect and protect wildlife habitat from Yellowstone to Yukon so people and nature can thrive. The organization is seeking a President passionately committed to large-scale conservation and possessing the vision, skills and other attributes necessary to build on past successes with new accomplishments.

The successful candidate will report to the Board of Directors and be responsible for leadership of all aspects of the organization, including fundraising, planning and programs, fiscal management, personnel, administration and Board relations. The President will also provide leadership within the conservation community at large. For a detailed job description, qualifications and details on submitting an application for this position, visit our website: y2y.net.

Yellowstone Association seeks a collaborative leader for a Director of Information Technology. This individual will play a critical role in assessing technological needs, while recommending and implementing a comprehensive IT strategy to achieve our goals. This position is responsible for establishing a comprehensive IT function that meets the current and future needs of the Association. The Director of IT is a member of the YA Leadership Team, which requires a hands-on collaborative approach to solving the challenges of the organization. The person in this position may reside in the areas of Gardiner, Livingston, or Bozeman, Mont. The majority of Yellowstone Association's operations is in Gardiner and throughout Yellowstone National Park, and this position will require a physical presence at these operational locations. Success in this position requires the flexibility and expertise to build a comprehensive IT department for a complex growing organization. Find the complete job description and apply online at yellowstoneassociation.org/jobs.

Housekeeper at Redstone – Part-time seasonal. Motel/hotel experience preferred. Must be eligible to work in the U.S. Apply to Jonathon Dunn, Redstone Cliffs Lodge: 970-963-2691.

Friends of the Clearwater seeks a Development Director to engage foundations and potential donors, recruit new membership and grow our financial capacity. Position is located in Moscow, Idaho. Visit: friendsoftheclearwater.org/development-director for details.

The Sierra Club in Idaho is seeking a motivated and dynamic full-time Conservation Program Coordinator to work in our Boise office. For more information and a job description, visit www.idaho.sierraclub.org.

HEALTH AND WELLNESS

Colorado Aromatics cultivated skin care Natural botanical farm-to-skin products, lavender products and gifts. www.coloradoaromatics.com.

Enjoy a healthier lifestyle! Experience the LIVING ENERGY of Therapeutic Grade-A Essential Oils. Unadulterated – no pesticides. Organically grown. Proprietary distilling methods. Business opportunity. www.theOilSolution.com.

Are you or someone you care about addicted to something? Anything? Explore www.sidetripsfromcowboy.com.

ReDiscover THE West
with the *Essential Geography of the USA*
by Imus Geographics | The Art of Cartography

This is absolutely the finest thing I have ever purchased for some \$30.
—BA, Tualatin, Oregon

www.imusgeographics.com

13th Biennial Conference of Science & Management on the Colorado Plateau & Southwest Region

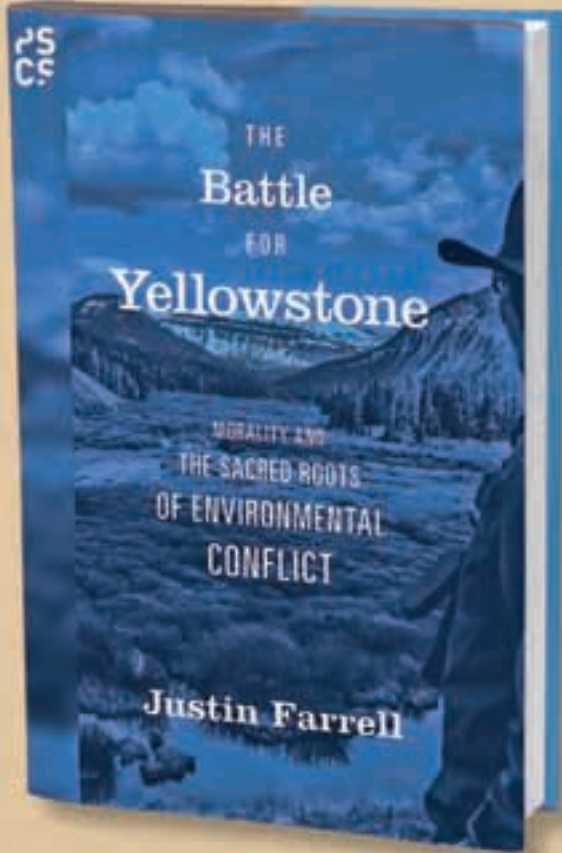
October 5–8, 2015
Northern Arizona University • Flagstaff, Arizona

Theme: Multi-disciplinary Approaches to Assess and Respond to Climatic, Social, and Technological Changes

Abstract submission deadline: June 29

<http://nau.edu/Merriam-Powell/Biennial-Conference/>

What can Yellowstone teach us about the worsening environmental conflicts worldwide?



Yellowstone holds a special place in America's heart. As the world's first national park, it is globally recognized as the crown jewel of modern environmental preservation. But the park and its surrounding regions have recently become a lightning rod for environmental conflict, plagued by intense and intractable political struggles among the federal government, National Park Service, environmentalists, industry, local residents, and elected officials.

This groundbreaking book shows how the unprecedented conflict over Yellowstone is not all about science, law, or economic interests, but more surprisingly, is about cultural upheaval and the construction of new moral and spiritual boundaries in the American West.

"Farrell presents an original and compelling view of what constitutes the relevant aspects of a moral framework for understanding environmental conflicts. The scholarship is impressive."
 —Robert Wuthnow, author of *Rough Country: How Texas Became America's Most Powerful Bible-Belt State*

Cloth \$39.50



See our E-Books at press.princeton.edu

HOME AND GARDEN

Cast-iron cookware scrubber — Makes cast-iron cleanup quick and easy without detergents. 18/20 stainless steel. Lifetime guarantee. Order: www.cmscrubber.com, 781-598-4054.

Freedom Ranger Hatchery, Inc. Hatching year-round. Freedom ranger chickens/blackbroilers, bantam silkies, French guineas, khaki campbell/white muscovy ducks. 717-336-4878. www.freedomrangerhatchery.com.

Navajo rugs — Display your textiles! Navajo rugs, quilts and other weavings. Hand-forged wrought iron and aspen-pole systems. All sizes. Wall-mounted and free-standing. www.TwinRavenZ.com. "Made in a good way."

Aggrand Natural Organic Fertilizers. Exceptional bio-based/OMRI-certified liquid concentrates for lawn, garden, orchards, forage, agriculture. Retail/wholesale/resale. 877-486-7645. www.natural-fertilizers.com.

A 15% discount! Order now — Premium dried vegetables, fruits and beans from award-winning company. Non-GMO. Order at www.GoHHE.com. Call 1-800-696-1395. Use coupon: HCN.

Renewable Energy Products For Remote Homes — Solar water pumping, back-up power systems. Visit our websites: www.oasismontana.com, www.PVsolarpumps.com, www.LPappliances.com, www.grid-tie.com or call toll-free for information: 877-627-4768.

Seat-weaving supplies — Chair cane, reed splint, Shaker tape, fiber and natural rush. Complete line of basketmaking supplies. Waxed linen cord. Royalwood Ltd., 517-HCN Woodville Road., Mansfield, OH 44907. 800-526-1630. www.RoyalwoodLtd.com.

PERSONALS

Green Singles dating site — Meet singles who value green-living, holistic health, sustainability, alternative energy, spiritual growth. www.GreenSingles.com.

PROFESSIONAL SERVICES

Wildland Fire Services — Planning, reviews, litigation. www.blackbull-wildfire.com.

Strategic storytelling for nonprofits and progressive organizations. Stories are tools. We're tool builders — in video, print and multimedia. www.narrativelab.com. 503-891-0641. info@narrativelab.com.

Expert land steward — Available now for site conservator, property manager. View resumé at: <http://skills.ojaidigital.net>.

PUBLICATIONS AND BOOKS

Read *Lyric River*, by Mac Griffith. A quirky novel, radiating charms. <http://amzn.to/1EbtINs>.

REAL ESTATE FOR SALE

Beautiful two-bedroom, 1,700-square-foot custom home in lovely Castle Valley, Utah. Close to Moab, it is situated on five acres of piñon and juniper trees that provide quiet and privacy. Included is a detached shop/three-car, 1,852-square-foot garage that has two levels. The upper level is finished into a hobby workspace and a very large office area. Call Janie Tuft at 435-260-1572 for more information.

200 acres with water and utilities, Orangeburg, S.C. Artesian wells, springs; running streams; 10-acre pond; natural ecosystem. Protected from major storms year-round. Unlimited possibilities: equestrian sports; specialty farming; bed and breakfast; retreat; winery; water sports recreation; fishing and hunting. Commuting distance to Charleston, Aiken, Columbia, horse and golf events; seven miles to nearest airport. Janet Loder, 425-922-5959. janetloder@cablespeed.com.

17.5 acres-off grid. Water and electric available. Ideal for earthship-bale and passive solar. No adverse building codes. Sunny, mild Western Colorado. Lush agricultural valley, little snow, surrounded by mountains. Great views. Youthful retirement community provides invigorating culture. Elk, deer, turkeys enjoy site. \$135,000. O.W.C. Bill: 970-527-7255.

HIDDEN VALLEY INN
luxury in the sanctuary of nature...

In the Maya Mountains of Belize, a private 7000+ acre nature reserve is filled with Mother Nature's splendor. Soaring views above the jungle canopy, waterfalls and miles of natural trails.

In the center, an oasis of comfort and luxury, Hidden Valley Inn.

Call for a reservation: +502-822-3391
www.hiddenvalleyinn.com

HIDDEN VALLEY INN & RESERVE

Bozeman, Mont. — Former *HCN* editor offering his house for rent beginning this fall, nice three-bedroom, two-bath on one acre with views, near university, downtown, trails, rivers and skiing, unfurnished, \$1,750/mo. Contact Ray at rring@mcn.net.

Jewel home in the Wind River Country!

Set in an elbow of the North Fork of Popo Agie River, three miles north of Main Street, Lander, Wyo. Six-plus acres of mature trees, spring-fed creek flowing into ponds and the river, providing a wealth of wildlife: Trout, geese, fox, pheasants, nesting great horned owls and birds. 360 degrees of inspiring views surrounding the exceptional 3,500 square-foot, five-bedroom, three-bath home. Large barns and corrals for horse and animal lovers. Owners retiring to simpler lifestyle. Wonderful home for entertaining or just enjoying day-to-day life. \$985,000. Call or email for additional information and photos. Bill and Catheron Oviatt: 307-349-2576. ovollc@wyoming.com.

Heart Of The Wood River Valley —

The 273 plus-or-minus acre historic Sunshine Ranch is blessed with one mile of river, complete seclusion, panoramic mountain views, abundant wildlife, peace and quiet. Wooded acreage, fertile springs, meadows and aspen thickets perfectly accommodate deer, elk, moose, crane and other varieties of waterfowl. Easily access public lands, including national forest, and experience unparalleled hiking, hunting, horseback riding and recreation opportunities. Fish anytime your heart desires, on either side of the river. Enjoy playing the well-maintained, smartly designed croquet

court. Recent land and water rights surveys are in place. Oh, yes — there is a gorgeous 4,900-square-foot residence as well, but you won't spend much time in it. \$3,000,000. Call for a private showing. BHHS Brokerage West, Inc., 877-443-6234, CodyLiving.com, YouTube: Sunshine Ranch, WY.

Heart of the best hiking and recreation

in southern Utah. These 10-acre residential parcels in Boulder, Utah, make a great base camp from which to enjoy the Escalante canyons and slots; the Boulder Mountain trails, streams and lakes. Protective covenants, low density, conservation easements spread over 900 acres. Rim lots with 100-mile views. Power, phone and water included. \$165,000. Take a virtual tour and contact at www.blackbouldermesa.com.

House and orchard for sale near Olathe,

Colo. Land is agricultural and beautiful. 125 acres of rural acreage. Well-landscaped with great view. 150 feet rural acreage, perked and approved. Town water. Utilities available. Fully permitted. Three city-water hookups available. Four-bedroom, two-and-one-half baths. Contemporary. Secluded site. 7049 High Mesa Rd., Olathe, Colo. \$795,000. diane_shoutis@nols.edu.

Three-bedroom, four-bath home on

54-acre mountain in scenic Trinity County, Calif. Creek frontage springs, summer-sunny acreage, fenced garden, large garage, lockable carport, block pump house, outbuildings, covered equipment storage, mountain views, three bonus rooms, large pantry, jacuzzi-tub, marble decor, grape arbor, varied

forest land on main highway. \$450,000. 775-747-1965 or 530-628-5724.

You know you love Bluff!

Energy-saving, artisan home that dreams are made of. Solar panels, passive solar and wind power. Amazing scenic views, 2.42 acres. four bedrooms, three and one-half bath. 320 N. 300 W. Bluff, Utah. \$499,000. Call Realtor Valerie Brown 435-260-2808 Arches Real Estate Group for this and other listings in southeastern Utah. <http://bit.ly/1C0afth>.

Retail building for sale in beautiful Pao-

nia, Colo, on the Western Slope near Aspen, Crested Butte and Grand Junction. Good visibility and parking in the heart of the business district. 5,671 total square footage with 4,131 finished. \$195,000. 970-527-6243. westhomecenter@tds.net.

TOURS AND TRAVEL

Explore America's ancient past —

Travel with Crow Canyon Archaeological Center, Cortez, Colo. Small-group tours in Mesa Verde Country and beyond, led by archaeologists and American Indian scholars. Campus-based archaeology programs for adults, teens, and school groups. 800-422-8975, www.crowcanyon.org.

Get to know where we love to go on the

Colorado Plateau. Learning adventures for you, your family, tour group, board or school group. Canyonlands Field Institute, Moab, Utah. www.cfimoab.org, 1-800-860-5262 for scheduled and private custom trip planning.

Luxury Adventure Trips — Passionate about exploring the world? Love kayaking, gentle hiking, climbing, whale watching, safaris or cultural tours? Who you travel with matters: www.luxuryadventuretrips.com, 866-318-5396.

Live your dreams with Mountain Mad-

ness. Climb, trek, ski worldwide. Expedition guide service, mountaineering school and outdoor adventure vacations since 1984. www.MountainMadness.com. 800-328-5925.

Holiday Adventures Travel —

Designing unique travel experiences to Australia, New Zealand, Africa, Europe, South America and beyond. Adventures include safaris, hiking, biking, scuba diving, sailing, skiing. www.HolidayAdventures.com. 970-748-9818.

Coming To Tucson?


Popular vacation house, everything furnished. Rent by day, week, month. Two-bedroom, one bath. Large enclosed yards. Dog-friendly. Contact Lee at cloler@cox.net or 520-791-9246.

Five-day Colorado River trips

and more. 2015 schedule now available. AdventureBoundUSA.com or 800-423-4668.


Explore Colorado National Monument!

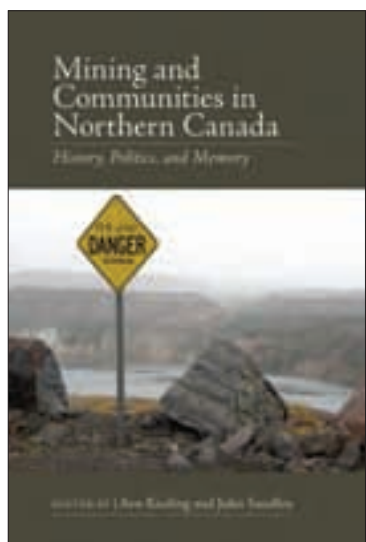
Miles of pristine on and off-road biking and hiking. Redbikeretreat.com. Favorite location: Little Park Road. 970-216-7543.



UNIVERSITY OF CALGARY

Press





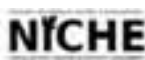
MINING AND COMMUNITIES IN NORTHERN CANADA: History, Politics, and Memory





Arn Keeling and John Sandlos, editors

400 pp, \$34.95, illustrations
Paperback, e book | Fall 2015

“The book situates itself at the intersection of two of the signal developments shaping Canada’s political landscape today: the renewed boom in natural resource extraction and the mobilization of First Nations communities around territorial stewardship and self-determination. The book brings a much needed historical perspective on this juncture and its editors are explicit in their hope that the case studies assembled here will have bearing on contemporary debates and policy-crafting.”

Daviken Studnicki-Gizbert,
McGill University



www.uofcpress.com

Available through bookstores and online retailers. E books available from Kobo.

“Boom, Bust, Boom is the best sort of journalism: beautifully written, rich in detail, and impossible to ignore.”

—SEBASTIAN JUNGER, (*The Perfect Storm* and *War*)

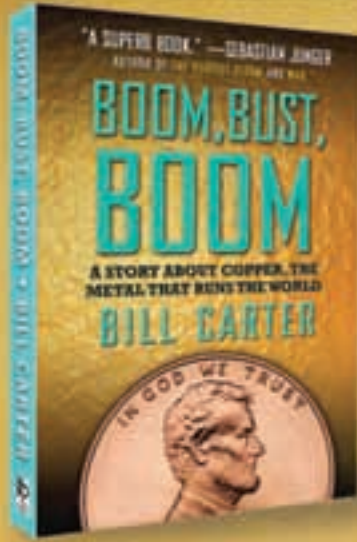
BOOM, BUST, BOOM

by


BILL CARTER

A STORY ABOUT COPPER, THE METAL THAT RUNS THE WORLD

Winner of the 2013 Arizona/New Mexico Book Award



“Face to face with environmental risk, Mr. Carter determined to learn more about copper. He quickly stumbled upon a paradox: Copper mining may be an environmental disaster... but it is also an environmental necessity.” —*High Country News*



Schaffner Press
schaffnerpress.com
boombustboombook.com

We're letting another predator go down



OPINION BY
FRANK CARROLL

In New Mexico, some wildlife outranks others, with mountain lions landing near the bottom of the pack. It's not much of an exaggeration to say that the solitary *Puma concolor* enjoys the status of rats or "trash fish" — which is how New Mexico's wildlife department characterizes carp.

Late last month, the New Mexico Game and Fish Department unveiled its latest proposal to benefit hunters who think lions are taking too many deer and elk: leg-hold traps. Though they would only be permitted on private land, these traps are known to cause terrible suffering; some unfortunate animals are so desperate that they even bite off their own legs in order to escape.

But lions seem to be considered expendable, and this bias against the big cats is sadly common in most states, including Montana, Colorado, Arizona and South Dakota. Though each state claims to study lions, none can tell us with any clarity how many there are, and each has set goals to dramatically reduce their numbers, with little or no science to guide this politically driven destruction.

WEB EXTRA

To see all the current Writers on the Range columns, and archives, visit *HCN's* website, hcn.org

South Dakota's anti-lion policy is clearly working. The state is said to be home to an estimated 225 lions, but that number may be too high. The game commission significantly upped the number of available deer and elk tags in the Black Hills in a state that already sells over 55,000 deer tags annually. Yet state officials and hunters continue to blame lions for depleting the deer, even though deer are now so numerous that most residents of small mountain towns can't even have gardens. Deer replaced yard gnomes years ago.

Lions keep ecosystems healthy by taking out some deer, elk and bighorn sheep, and keeping grazing animals away from fragile riparian areas. So why wildlife managers remain so prejudiced against them is hard to explain, especially in this age of increasing awareness of the need for conservation of all species. Three groups influence lion policy out of all proportion to the actual damage that lions do. The first is hunters, who don't like to compete with other predators; the second is ranchers, who don't like the bother of practicing lion-friendly animal

husbandry. (Lions have been known to kill a few head of livestock.) Finally, there are the always-underfunded wildlife agencies.

South Dakota's West River wildlife manager, Mike Kintigh, agrees that lions are killed for fun and profit — not for the benefit of the species — and to make life safer for a handful of favorite hunted species, such as Rocky Mountain bighorn sheep, as well as deer and elk. Yet 90 percent of South Dakotans say they would prefer using "non-lethal means" to deal with conflicts between lions and people, and more than half of South Dakotans say they support lions continuing to live in the wild.

Nonprofit lion supporters such as Arizona's Southwest Jaguars: a Voice for the Jaguars, Wyoming's Biodiversity Conservation Alliance and California's Mountain Lion Foundation are waging an increasingly hopeless war to turn the tide and save the species. But the opposition appears to favor keeping mountain lions penned up in zoos or as exhibits in museums. Even those who are somewhat supportive of maintaining lion populations, such as Tom Clemons

Get behind the scenes of wildlife science. Explore HCN's new video series.

Watch beginning June 22 at hcn.org

of the Arizona Desert Bighorn Sheep Society, seem content to sacrifice lions for other species.

Though few in number, lion opponents are dictating what game animals roam the wild and under what conditions. That is why lion numbers are declining in most Western states, including California, even though lion hunting has been illegal there since 1996. But state lion policies are coming home to roost. In Arizona, for instance, where lion hunting with dog packs is an important business, hunters say they are alarmed that only 188 lions were taken in 2014, down from the average of 220.

While all but dewy-eyed neophytes understand that big cat biology in the West is two parts politics and one part science, we are on course to eradicate catamounts, including jaguars, much as we did grizzly bears. Only one lonely jaguar roams the American side of the Mexican border now. What's worse, we're not even pausing to wonder if it's too late to do the right thing and protect these creatures.

In the end, it's really about political power and influence rather than the need for a balanced ecosystem. The bottom line is that some people like to kill lions, and they bring in a lot of money by doing so. □



A mountain lion yearling pads around Joshua Tree National Park, California. Mountain lion hunting in California has been illegal since 1996, but is still allowed in some other Western states.

NATIONAL PARK SERVICE

Frank Carroll is retired from the U. S. Forest Service. He lives in Custer, South Dakota.

Writers on the Range is a syndicated service of *High Country News*, providing three opinion columns each week to more than 70 newspapers around the West. For more information, contact Betsy Marston, betsym@hcn.org, 970-527-4898.

HCN's Annual Issue on



Outdoor Recreation

Join us for this very special issue.

- Huge discounts available on print, eNewsletter and Web advertising.
- Package and à la carte options available.
- Special ad pricing is extended to all Marketplace ads.

ISSUE COVER DATE: July 20, 2015
SPACE RESERVATION DEADLINE: June 29, 2015
AD ART DEADLINE: July 6, 2015

Visit hcn.org/OR or contact David Anderson: 800-311-5852 or davida@hcn.org

HCN ART AUCTION

AUGUST 1-17
 Online at hcn.org/ArtAuction

Support the work of *High Country News* and find stunning art to enrich your life.

Accepting Art Submissions Through July 1




Questions/comments: development@hcn.org

Underdog roboticists



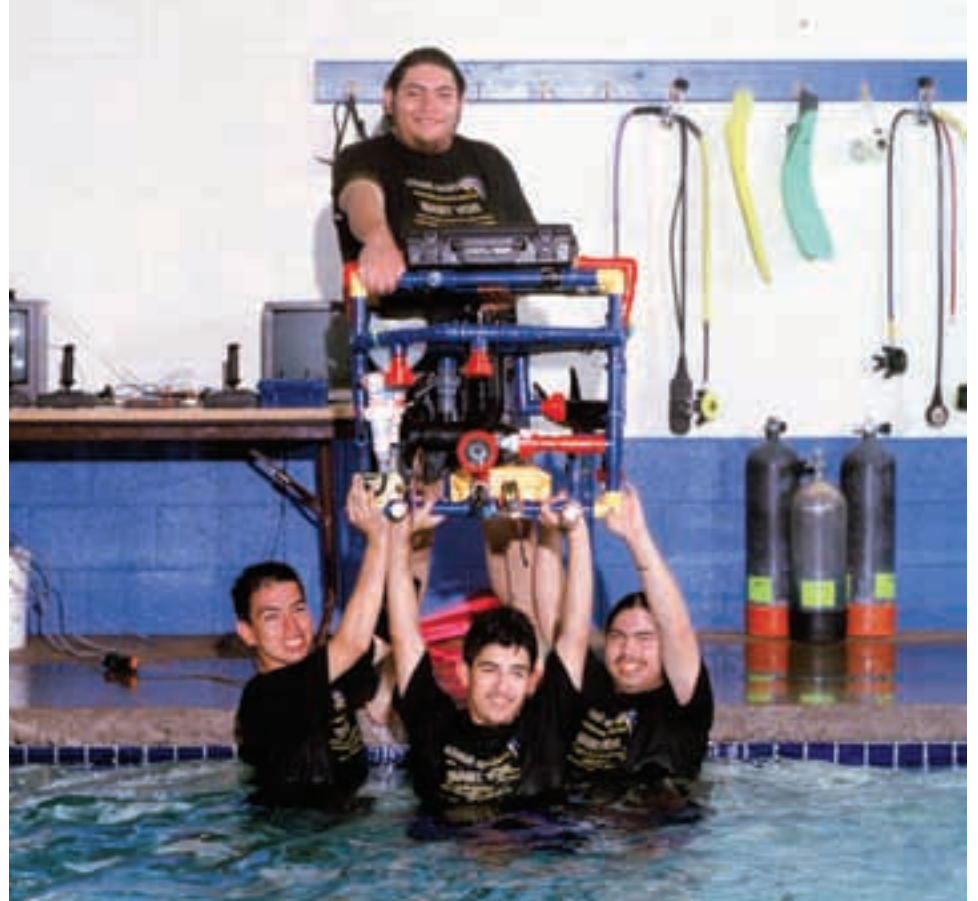
Spare Parts: Four Mexican American Teenagers, One Ugly Robot, and The Battle for the American Dream

Joshua Davis
240 pages, softcover:
\$14.
Farrar, Straus and
Giroux, 2014.

In 2004, four low-income Mexican-American high school students from Phoenix built an ingenious robot for a science competition that pitted them against teams from top colleges, including the Massachusetts Institute of Technology. The story sounds almost too “Hollywood” to be true, and in fact, it has already inspired a documentary and a feature film. But seasoned journalist Joshua Davis sticks to the facts in his original book, *Spare Parts*, carefully reconstructing how these ESL students, “caught in the tractor-beam pull of poverty and low expectations,” became one of the top underwater robot teams in the country.

Davis opens with officials from the NASA and Navy-sponsored Marine Advanced Technology Education Robotics Competition grilling the team members. “These kids had shown up with a garishly painted plastic robot that was partially assembled from scrap parts,” Davis writes. “They called their creation Stinky because it smelled so bad when they glued it together.” And yet “Stinky” manages to outperform the sophisticated work of MIT’s best underwater robotics team.

Davis then draws back to tell us about the robot’s creators, illustrating just how improbable it was that these teenagers ever managed to enter this competition. All four were brought to America from Mexico by their parents as children, and only one of them held a green card. Oscar Vasquez excelled in ROTC until he realized that his undocumented status would get in the way of a military career, while Cristian Arcega is a tinkerer with a sharp



These Mexican-American students from Phoenix, who won an underwater robotics contest in 2004, against MIT, are the subjects of the book *Spare Parts*. LIVIA CORONA

engineering mind. Lorenzo Santillan joins the robotics team as a way to escape a gang, and Luis Arranda is a taciturn hulk. They are fortunate in their teachers, Iranian immigrant Fredi Lajvardi and former Navy electronics technician Allan Cameron, who encourage their quest.

Davis’ prose is straightforward, but he’s skillful at creating atmosphere and building suspense. You’ll find yourself whipping through the pages to learn what happened — especially how the kids’ lives turned out after the contest. Davis describes how Lisa Spence, one

of the contest judges, felt when she first met the four boys: “As a NASA employee, she had become accustomed to working with engineers who conformed to a sort of industry standard: white, well educated, conservative clothes. These four teenagers standing in front of her signaled that the future looked different.” One can only hope that this book leads people to question the wisdom of deporting American-raised children of immigrants — especially high-achieving engineering whizzes like these.

BY JENNY SHANK

A border crossing gone wrong



The Jaguar's Children
John Vaillant
288 pages,
hardcover: \$26
Houghton Mifflin
Harcourt, 2015.

John Vaillant, the Canadian author of *The Tiger* and *The Golden Spruce* — two nonfiction books that delved into the darker aspects of our relationship with nature — now delivers an unflinching novel, his first. *The Jaguar's Children* opens in the back of an empty water truck, where Hector, an undocumented immigrant, languishes with his injured friend César and 13 other crossers just north of the border. They’ve been smuggled into the U.S., only to be abandoned between Sonoita and Nogales, sealed inside a tanker by shifty “coyotes,” young machos that “were talking fast all the time, but not as fast as their eyes.” Using Hector’s cellphone, César repeatedly but in vain tries to contact a gringo friend. The situation only gets worse as everyone runs out of water. Within days,

the migrants’ strange prison resembles “the intestine of some animal,” digesting its inmates. The reader suffers along with the tanker’s human cargo, surrounded by “walls alive with something that likes to grow in the wet and dark, something that needs much less air than a man.”

A descendant of Zapotecs who revered the jaguar spirit, Hector grew up in Oaxaca, and flashbacks reveal his childhood there and the reasons why he and his compatriots left. Some fled from the *narcos*, from violence and corruption; others sought better economic opportunities. Now, all they want is to be found, even by La Migra, before they perish of thirst. Hector recalls the church in Altar, staging ground for their crossing, with its map of red dots that marked where

migrants have died. “But when you look north, past the sand and rock and mesquite, toward that wall of mountains with only cactus growing, you still believe you can do it because who wants to turn back now when you came so far?”

Hector’s monologue inside the tanker consists of his text messages to his friend. His language is leavened with slang and rustic similes, but the cellphone as story device feels somewhat contrived. Nevertheless, *The Jaguar's Children* shows with compassion how a proud people have become prey for coyotes, victims of capitalism run amok. Mexico’s pyramid builders sacrificed lives to their stone gods — modern Mexico trades them for dollar infusions.

BY MICHAEL ENGELHARD

The world is on fire

NEVADA TEST SITE, 1953

Put yourself in his shoes: cold, Army-issue, treads packed with sand. Rise before dawn, climb into the truck and bump down the road to Doom Town. As the convoy tops the last ridge, narrow your eyes at the rising sun's brilliant seam. Showtime. Up the ladder you go, sun already warm on your neck, roof shingles softening underfoot, nail heads gleaming silver.

The day wears on in pounding and shouts as you move down the line, lapping layers tight enough to turn any water, although this roof will never see rain. Down below, masons raise the chimney a row at a time, scraping excess mortar free. The painters spray the siding, not bothering to tape the windows; time is of the essence. Saltbrush shivers on the ridge and smashed jackrabbits stain the road as you ride back to Mercury Camp, work done, clothes heavy with sweat and tar, paint and dirt, tacky with sap from lumber that was a tree six months ago.

OPERATION DOORSTEP-SHOT ANNIE, 1953

Full dark over a silent house. See how easy it is to make a family, twins sprawled on the floor, Baby in his high chair, Mother bending near, a spoonful of pears in her shapely hand. J.C. Penney provided the mannequins and wardrobe: rompers for the twins, footed sleeper for Baby, and Mother's sensible skirt, button-front blouse, clip earrings. (Daddy's at work, offstage.)

The bomb will detonate in a minute's time.

The countdown begins.

Ten, nine, eight.

See the desert, scraped bare, hash-marked with distances. A mile from Ground Zero, soldiers crouch in their foxholes.

Seven, six, five.

Abandoned tanks wait in arrow formation. Testing instruments nestle in the cold sand.

Four, three, two.

Journalists on the little hill press dark goggles to their faces, giving nervous hands something to do.

Zero.

There must be sound, but it's been edited out. In the film, everything unspools in silence, Mother's face lighting up, bleaching white, catching fire. Then the blast wave punches in the wall, shattering the window and knocking Mother off her stool. There must be the sound of glass splintering, a noise lost in the roaring wind that snuffs the blazing bodies, shreds the curtains, shears the door from its hinges. Then the house collapses in a raw hex of timber. Two seconds, all told, the roof blown straight to hell.

Operation Doorstep-Shot Annie was one of a hundred or so nuclear weapons that exploded above Nevada from 1952 until 1962. I'm mesmerized by their names' blunt cadences: Ranger-Able, Ranger-Baker, Ranger-Easy. Tumbler-Snapper; Greenhouse-Dog. Fox shot rose in three ice-capped steps. Climax made a narrow stem, a wide-beamed cap, and a batch of skinny tracers. Buster-Jangle-Charlie was a textbook cloud, opening in classic mushroom shape. Upshot-Knothole: a tidal wave of dust pushing across Frenchman Flat, strewing tires, twisted chassis, and an upended tank in its wake, track lying on the ground like a zipper. (After Operation Hot Rod, the Federal Civil Defense Administration warned citizens not to think of their cars as "rolling foxholes" that would save them.) On the old clips, the narrator calls this landscape "the desert," or the "dusty precursor-forming surface." Bombs exploded, sometimes once a day, and tourists visited Vegas — the "Up and Atom City" — to watch the shots. One observer noted that the "visual show" proved to be "very spectacular."

I wonder about those tourists. What did she think, that woman who might have — as I would have — talked her husband into rising early from their motel bed to stand in the cold desert dark, waiting? Did she say, *Drive faster; I don't want to miss it? Or, I brought my sunglasses; you wear yours too.* We don't have much time. What's a minute worth? Ten seconds? Countdown: nine, eight, seven. Did she squeeze his hand and remember unbalanced bank statements, unwashed bedsheets, relics of another world? Moments long past, safe in the warm light of memory. Nothing like this stark, blinding flash. Standing there on the hill, did she gasp, or shout?

Did it thrill her, the searing blaze, the weird shadows the greasewood threw, just like in the news clips? Rumbling. Wall of dust racing across the flats toward her, howling in her ears and crusting her lips with powder. Her sunglasses hung at her throat; a kerchief covered her hair. Afterward, she was tired, windburned, sick of the Geiger counter's staccato clicks. Now everything was tainted: stones, the newspapermen's laced-up shoes crushing gypsum to powder, cars, cactus, road, bird. Even her husband. Even herself, empty face reflected in the smudged windshield. A sheet of notebook paper jumped across the desert, whirled high on air currents and caught on a yucca, some forgotten detail or maybe just a blank sheet, an open mouth with nothing to say. □

Joni Tevis wrote a new collection of essays, *The World Is On Fire: Scrap, Treasure, and Songs of Apocalypse*, from which this excerpt is taken. *Milkweed Editions* will publish the book this month.

A civilian defense observer inspects a bombed mannequin "family" that was 4,700 feet from ground zero of an atomic blast, left. A "typical American family" of mannequins who were subject to an atomic bomb test at "Doom Town" in Yucca Flat, Nevada, below. BETTMANN/CORBIS/AP IMAGES





HEARD AROUND THE WEST | BY BETSY MARSTON

IDAHO

It didn't take more than an hour or so for Jacob Pool, 33, to spill his guts to Idaho Fish and Game investigators. In a "straightforward and crass account," he detailed how he poached a beloved — and quite tame — buck in a Twin Falls park, afterward tossing its antlers in the Snake River and taking home some of the meat. The mule deer was considered a celebrity in the town, distinguished by its huge antlers, and everybody had pictures of it, said Forrest Andersen, manager of a local pawnshop. He called it "tame as a dog." But Pool, after learning that the deer hung out in a canyon between the Amalgamated Sugar Factory and the Snake River Canyon, decided he'd rather shoot the animal with a gun than a camera, reports *Magicvalley.com*. According to investigators, who said they pursued the case as zealously as if it were a murder investigation, Pool recalled the scene theatrically, with a touch of boastfulness: "I've never seen a deer that big. ... I went after that (expletive) deer by myself at nighttime. I was all alone, you know, crawl across that field for two (expletive) hours. ... I was (expletive) exhausted, tired." Once in chat mode, Pool added nonchalantly that he'd "poached a couple deer in my life, you know. This is like the third time. ..." Charged with felony killing or wasting a trophy mule deer during a closed season, felony destroying or concealing evidence, and hunting big game with an unlawful weapon, a seemingly chastened Pool expressed second thoughts: "You guys, I'm (expletive) sorry, man. I feel like I robbed the community of that deer."

COLORADO

Most likely drawn by the smell of food at an illegal encampment near a tech center just outside of Durango in southern Colorado, a bear attacked and mauled two men, reports the *Durango Herald*. It came close to killing Joshua Barber, 21, who was nursing a broken toe and quietly reading a book in his tent when something big



MONTANA Talk about being "bear aware."
WILL HARMON/YELLOWSTONE NATIONAL PARK

smacked the side of it. The something was a bear, which ripped through the mosquito netting and then stepped into the tent. Quick as a flash, Barber says, he jumped up, threw a bunch of sunflower seeds at the animal, unzipped his tent and fled toward a ravine where friends were camped. But the bear reached him first, knocking him over and biting him in the neck and head. "My first thought was I was going to die." Somehow, he scrambled to his feet but the bear tackled him again. Fortunately, his friends heard his screams and came running, and with the help of their dogs kept the bear at bay for 15 minutes, long enough for a couple of them to grab Barber and flee, with the bear in pursuit. One chilling note: According to a police report, "As police and medical personnel were helping Barber, the bear sat down in the dirt next to the parking lot and watched." Later on, Robin R. Derendy, 33, told officers that a bear attacked him through his tent, though he fought back and struck it with a knife. Wildlife Services tracked down the bear with dogs and killed it after it climbed a tree. Several people commented

on the *Durango Herald's* story, some lambasting the campers for being slobs, some sympathizing with the homeless people, as well as with the bear. Barber, who suffered serious wounds to his neck and head, said he wanted it known that he'd been cleaning up the debris in the area, not creating it. Homeless since he was 14, Barber said, "I live in a camp graveyard. I couldn't have created all this trash myself nor would I have wanted to. ... It's very insulting to me." And Marcus Shirley, one of the friends who'd come to Barber's rescue, said that even before the bear came on the scene, a fox had attacked a nearby tent. Shirley's conclusion about all this outdoors drama? "I'm done with the camping."

ARIZONA

Be prepared to bounce through potholes in Tucson: The town recently won top ranking as having the "worst streets" of 11 Western urban regions, as compiled by the University of Arizona and two other groups. "Tucson's roads are terrible, and like light speed, photosynthesis, and the UA's superiority over ASU, it's now a scientific fact," said *tucson.com*.

MONTANA

In other vehicle news, a driver near Missoula "created some buzz" after his car was spotted swerving all over the road, while inside a bunch of bees swarmed over his windshield. The driver, who seemed unfazed by his flying companions, told troopers that his five hives of Russian honeybees were harmless, reports the *Billings Gazette*. The driver was cited for careless driving; no word on the bees.

WEB EXTRA For more from Heard around the West, see hcn.org.

Tips and photos of Western oddities are appreciated and often shared in this column. Write betsym@hcn.org.



High
Country
News

For people who care about the West.

High Country News covers the important issues and stories that are unique to the American West with a magazine, a weekly column service, books and a website, hcn.org. For editorial comments or questions, write *High Country News*, P.O. Box 1090, Paonia, CO 81428 or editor@hcn.org, or call 970-527-4898.

“Who doesn't lament the bad weather in our governance, whether we're talking Congress or state and local governments? **Like a thunderstorm, most political arguments contain no hint of compromise.**”

Ray Ring, in his essay, "Bipartisan weather emerges in the Northern Rockies," from *Writers on the Range*, www.hcn.org/wotr