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# Flying Vicariously Through The Lens

By Omayra Acevedo

Nature and Wildlife Photojournalist

Facebook.com/brandnewdayphoto

It was two days before my birthday, Thursday, December 15, 2011. My Canon 60D was merely three months old. Though not quite my birthday, I had cause to celebrate. I was surrounded by the beauty, sounds, and adventure that can only be found in Colorado. It was cold; still, I found myself wrapping a scarf around my neck and packing my camera along with a couple of lenses. It was midday and I wasn't sure where I was headed. I figured I would fly free like a bird and go where the wind would take me; little did I know the irony in my decision.

Roughly 40 minutes later I pulled into a parking spot at Red Rocks Park and Amphitheater in Morrison. The sky was a perfect blue; the chill in the air smelled like only the great outdoors of Colorado can. It was another perfect day in this colorful state.

I traded my scarf for the camera strap and my hiking backpack for my camera bag. With the bare necessities in hand I took off on one of the trails near the Red Rocks visitor center. The sound of silence was invigorating. I want to say that I was completely alone, but to me, the trees, the wind, the wildlife, the rocks, the sun and everything in nature always keeps me company – great company.

Trudging along, crunching through the snow and ice under my feet, I felt as if I were being watched. Abruptly I stopped to take a good look around, almost forgetting to glance up. Boy, am I ever glad I did! There he was, a stunning Red Tailed Hawk flying high directly above me. In the Birds of Prey kingdom, females are generally much larger than males, so I knew the bird was male. With my jaw practically on the ground, I grabbed my camera and began shooting. Having a background in Zoology and having worked with my fair share of Birds, I was uncontrollably excited and there was no one around to hug; being the nature lover that I am (A.K.A hippie) I hugged the nearest tree instead. I felt like a kid in a candy store!

I must have taken over one hundred shots of this majestic creature before setting the camera down to simply observe the freedom in his flight. At one point I picked the camera back up just to get a closer glimpse at him. He soared above the open field, slowly gliding in splendid circles. I can only describe it as pure perfection - like a dance between him and the earth. It was almost instinctive to feel envious of him. He flew with the grace and wisdom of the most powerful and worry-free being in the world.

Sadly, he does have much to worry about, even if he doesn't know it. With the constant destruction of habitat,

illegal hunting, and the nature of uneducated humans, these inspiring birds, along with so many other incredible creatures, one day will cease to exist unless we change our ways and begin living through the eyes of compassion; not just for humans, but for all things that call this earth home.

I am uncertain of how much time had passed before I continued my hike, but I recall unable to get him off my mind. I do, however, remember smiling from ear to ear for the next 72 hours. He was like a dream I couldn't believe I had; then waking to the mere memory of the irrevocable feeling he had bestowed upon me - the feeling of freedom, beauty and inspiration.

I drove back home to Coal Creek Canyon, holding the experience close to my heart. It wasn't until I transferred the photos to my computer and relived the whole experience that I realized I too had set myself free to fly. The Red Tailed Hawk did it with feathers and wings, and I did it through the lens.

To learn more about birds of prey you can visit:

[cpw.state.co.us](http://cpw.state.co.us)

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# Raptors Are Our Fierce Allies

By Linda M. Hasselstrom

Birds of prey soar over the human imagination like no other creatures do. Even so, some idiots slaughter them. These birds are vital to the ecosystem of the Great Plains: Owls, hawks and eagles prey on small mammals such as voles and rabbits, as well as on reptiles, amphibians, fish and invertebrates like grasshoppers, which can damage crops. They also eat some smaller birds and carrion.

But it is the raptors' appetite for mice that makes them natural allies for humans. Mice compete with us for wheat, corn, oats, rye, barley and other grains used in cereals, pasta, tortillas — even beer. In one year, a pair of mice can start a dynasty that includes 908,544 relatives. And in one year, each pair of mice eats eight pounds of grain and spreads waste in another 22 pounds, according to Maggie Engler, founder of the Black Hills Raptor Center in South Dakota.

Because they don't see well, mice mark every step of a journey with urine and excrement so they can sniff their way home. If you've consumed grain in any form, you've likely munched a bit of mouse filth, says Engler, who got a degree in natural resource management 30 years ago.

So humans ought to love mouse eaters. Fortunately, the Great Plains is home to many raptor species, although subdivisions, plowing, highway building and other human activities are reducing their numbers. Populations of the ferruginous hawk, Swainson's hawk, northern harrier, golden eagle and burrowing owl have sharply declined because we use rodenticides and other pesticides, organic chemicals like PCBs, and metals such as mercury and lead. Raptors can also be poisoned if they eat contaminated prey.

I live in western South Dakota in an area rich in raptors, including bald and golden eagles, turkey vultures, ospreys and five kinds of hawks: red-tailed, ferruginous, Swainson's, broad-winged and rough-legged. The state's raptor riches also include five of the North American falcons: the American kestrel, merlin, prairie falcon, peregrine falcon and, in winter months, the gyrfalcon.

Only three accipiters — hawks with short broad wings and long legs particularly suited to fast flight in wooded areas - live in North America, and South Dakota has all three, the northern goshawk, Cooper's hawk and sharp-shinned hawk, as well as nine nocturnal raptors: great horned, eastern screech, burrowing, long-eared, short-eared, northern saw-whet, flammulated, barn and snowy owls.

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indigenous people to use feathers for religious rituals.

But for some inexplicable reason, there are people who don't understand that raptors are our partners rather than our enemies or our competitors. In South Dakota last year, for example, a man was caught trapping hawks and owls with pole traps, to kill them.

Now he will have to pay to protect the species he harmed. The poacher's sentence included \$17,500 in restitution, a \$500 fine, and other costs.

In western South Dakota, Maggie Engler and John Halverson were fundraising to build their rehabilitation and educational facility, the Black Hills Raptor Center (Facebook.com/blackhillsraptorcenter) when they first learned that restitution money might be available to help them out. Engler asked for help from the restitution fund established by the U.S. Fish and Wildlife Service, and thanks to the combined efforts of that federal agency, as well as the U.S. Attorney's Office and the federal courts, restitution in some raptor poaching cases may now be paid directly to the Black Hills Raptor Center.

"Until we get our facility built and running," Engler says, "volunteers must transport birds several hundred miles." The nearest veterinarians able to treat sick or injured raptors are in Pierre, South Dakota, and Cody, Wyoming. Once up and running, the Raptor Center will be able to treat 100 birds a year, and having a building will also enable the Raptor Center to participate in research about the role of raptors in the environment.

Engler adds, "Helping people realize that they are connected to all other living things is the root of the work we do. Raptors are a fantastic means for us to touch people's hearts and help them realize their connectedness.

We're sad that we will gain funds from destruction of raptors, but grateful for the support those fines will provide."

As I sip my beer, I smile, savoring the irony: That poacher now has to help save the birds he was killing. And I'm delighted to know I'll be drinking less mouse pee.

*Linda M. Hasselstrom is a contributor to Writers on the Range, an opinion syndicate of High Country News (hcn.org). She is a writer in South Dakota.*

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# Radioactive Drilling Waste Disposal

By Jodi Peterson - HCN

## States lack rules for radioactive drilling waste disposal. New report calls for stronger regulation to protect human health and water quality.

The process of extracting oil and natural gas produces byproducts that sometimes create nasty results: briny wastewater that can kill plants and render farmland sterile; oil-based drilling mud and cuttings that can be toxic to fish; and radioactive sludge that's filtered out of wastewater and builds up inside tanks and other pieces of equipment.

As HCN reported last year, in North Dakota alone, the state's oil and gas operations generate an estimated 70 tons a day of radioactive waste. Because the waste is often too radioactive to be disposed of in landfills, it sometimes gets dumped illegally, creating a health and environmental hazard. There's no federal oversight of such waste; that job is left to states, many of which don't have any regulations for handling and disposing of it.

Now, the Western Organization of Resource Councils has produced a report titled *No Time to Waste*, detailing the regulatory situation in six Western states: Colorado, Idaho, Montana, North Dakota, South Dakota and Wyoming. The report calls for federal regulation of radioactive oil and gas waste and more rigorous and comprehensive state standards. "Without thorough, stringent, and effective regulation of this waste stream, Western communities are left vulnerable to serious health and environmental impacts," Bob LeResche, the WORC chair from Clearmont, Wyoming, said in a press release accompanying the report.

Radioactive oil and gas waste is produced mainly through hydraulic fracturing, which can result in injected water returning to the surface along with naturally-occurring radioactive materials from underground. That water gets filtered through "filter socks," which then become radioactive as well. The radioactivity released by drilling is low-level, consisting of radium-226, radium-228,

and radon gas, according to the Environmental Protection Agency. "The radon is released to the atmosphere, while the produced water and mud containing radium are placed in ponds or pits for evaporation, reuse, or recovery."

The radium can contaminate drinking water and builds up in the environment, eventually ending up in livestock, fish and food crops. Once it's ingested, radium can cause health problems, including cancer. Meanwhile, the produced water itself is sometimes hauled to sewage treatment plants that aren't equipped to handle radioactivity, and the resulting water, often far from meeting federal drinking-water standards, is dumped into rivers.

Here's a summary of how solid radioactive waste is handled in each of those states, according to WORC.

**TENORM** stands for **technologically enhanced naturally occurring radioactive materials**, defined as any radioactive materials exposed or concentrated by oil and gas operations.

### Colorado:

- No formal regulations for TENORM.
- Attempt made to revise interim TENORM policy from 2007 for all industries, but process stalled out in 2014.
- Has one facility that can handle TENORM waste at the highest radioactivity levels (2,000 picocuries per gram), which accepts waste from the Bakken, South Dakota, Wyoming, Nebraska, Kansas and New Mexico.

### Idaho:

- Has TENORM regulations but they **don't specify a limit on radioactivity**.
- Has one of largest commercial radioactive waste facilities in the West (that takes waste of up to 1,500 picocuries per gram) – takes waste from all over the country, even Pennsylvania.

### Montana:

- State is working on formal regulations for TENORM disposal, due in 2016.
- Has special oilfield waste facility that takes waste up to 30 picocuries per gram, which is the closest, most convenient option for Bakken waste disposal. Operators in eastern Montana are trying to open similar facilities.



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**North Dakota:**

- New rules, yet to be confirmed, raise radioactivity limit for TENORM waste from 5 to 50 picocuries per gram.

Rules are more aggressive in some ways, such as creating a tracking system for all TENORM loads, but fail to strengthen weak inspection and enforcement protocols.

- Landfills around the state rejected 63 loads of TENORM waste last year that exceeded their radioactivity limits. Many of those loads were then trucked out of state to other facilities, or illegally dumped elsewhere.



allowable level of radioactivity in our state began about two years ago with behind-closed-door meetings with the health department and the oil industry. The result is once again a green light to the oil industry, this time to North Dakota Health Department dump more radioactive waste in our state.”

Photo: *Bags full of radioactive oil filter*

**South Dakota:**

- Has low radioactivity limit for solid waste disposal (5 picocuries per gram), but no other regulations specific to oil and gas waste.

**Wyoming:**

- Does not regulate TENORM waste disposal or set enforceable limits on radioactivity.

The report concludes with several pages of recommendations for federal and state regulations, permitting, radioactivity limits, waste facility design, siting and operation, tracking and reporting, inspections and worker safety.

The North Dakota rule changes, say proponents, would help the oil and gas industry in that state, where collapsing oil prices are pushing companies to figure out how to shave costs. State regulators say the increase in radioactivity limits would save producers at least \$120 million per year, since they’d no longer have to truck so many loads out of state for disposal.

That argument gets little traction among environmental groups. “When the Bakken oil boom started, the oil industry knew they were going to produce radioactive waste and they knew what they were required to do with it.

But, they didn’t put that into their business plans,” wrote Theodora Bird Bear, chair of Dakota Resource Council’s Oil and Gas Task Force. “The process to increase the

*socks, the nets that strain liquids during the oil production process, piled in an abandoned building in Noonan, North Dakota, in March 2014.*

*Jodi Peterson is a senior editor with High Country News. Follow @peterson\_jodi*

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# Benefits & Risks Of Stormwater Or Graywater

From CSU

There's a lot of potential benefit to capturing graywater and stormwater to supplement traditional water supplies, but it doesn't make sense for everyone, and there are plenty of legal, regulatory and climate-related hurdles in doing so, says Colorado State University's Sybil Sharvelle.

Sharvelle, associate professor of civil and environmental engineering and head of CSU's Urban Water Center, served on a 12-member national committee charged with addressing the benefits and challenges of stormwater and graywater as supplemental water sources, as the nation faces widespread water shortages and droughts. The National Academies report, released publicly Dec. 16, was two years in the making and provides information on the costs, benefits, risks and regulations associated with capturing these alternative water sources.

According to the report, stormwater is "water from rainfall or snow that can be measured downstream in a pipe, culvert or stream shortly after the precipitation event." Graywater is "untreated wastewater that does not include water from the toilet or kitchen, and may include water from bathroom sinks, showers, bathtubs, clothes washers and laundry sinks."

The report recommends best practices and treatment systems for the use of water from these sources; for example, in many locations with heavy rainfall, it's possible to store excess water in aquifers for use during dry seasons. In some cases, stormwater captured at neighborhood and larger scales can substantially contribute to urban water supplies.

Graywater is best for non-potable uses like toilet flushing and subsurface irrigation. It has potential to help arid places like Los Angeles achieve substantial savings, and it

serves as a year-round, reliable water source, according to the report. Larger irrigation systems and indoor reuse systems would require complex plumbing and treatment retrofits that are typically most appropriate for new, multi-residential buildings or neighborhoods for future urban planning.

The report cites the Eloy Detention Center in Arizona, which reuses graywater from showers and hand-washing to flush toilets. The facility has observed water savings of 20 gallons per day per inmate.

Sharvelle said the need for the report arose before the onset of widespread drought in the western United States. "The use of these resources has been hindered by a lack of national guidance and ambiguous regulations for water quality targets," Sharvelle said.

Sharvelle led an analysis of residential stormwater and graywater use in Los Angeles; Seattle; Newark; Madison, Wis.; Lincoln, Neb.; and Birmingham, Ala., and calculated potential savings for conservation irrigation and toilet flushing.

The bottom line is there's no single best way to use these resources, because whether they're successful or economically viable depend on a host of factors: legal and regulatory constraints, climate, and source water availability.

The report is online, and a webinar is planned for early 2016 to further detail the findings. The study was sponsored by the U.S Environmental Protection Agency, National Science Foundation and other agencies.

CSU's Urban Water Center is part of the university's One Water Solutions Institute, which seeks to connect CSU's world-class research with real-world water challenges.



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# Fishers Recolonized

By Ben Goldfarb

These are thrilling times to be a wildlife aficionado in the Pacific Northwest, a region whose ecosystems grow richer with each passing day. Wolverines have been trickling into northern Washington for years; biologists are dumping bull trout into Oregon's Clackamas River; wolves are steadily gaining ground in both states. The grizzly bear, a candidate for reintroduction in the North Cascades, looms on the rugged horizon.

Meanwhile, a less heralded creature is also experiencing a quiet revival: the Pacific fisher, a cat-sized mammal that's kin to weasels, marten, and otters. Unlike its cousin, the wolverine, fishers haven't re-infiltrated Washington on their own — rather, they've had help from Homo sapiens, the very species that once extirpated them. On December 3, the fisher's recovery took an enormous bound forward: Before a crowd of 50 onlookers, the state released seven fishers into Gifford Pinchot National Forest, the first time the creature had been seen in the South Cascades in more than 70 years.

Fishers are capable of impressive arboreal acrobatics — they den in tree cavities and can rotate their hind paws 180 degrees to descend from their roosts headfirst. But they're most renowned for their predatory abilities. Woe betide the porcupine that crosses a fisher's path: The fierce carnivore dances circles around its quilled quarry, weakening it with

blows to the head before finally flipping it over and, as Brian Doyle — a writer so appreciative of mustelids that he named a town after one — put it, "scooping out the meat as if the prickle-pig were merely a huge and startled breakfast melon."

Despite those estimable skills, fishers historically proved no match for the most rapacious hunter of all. Prized by trappers for its lush fur, Martes pennanti was completely wiped out in the Evergreen State in the mid-1900s. In the West, they survived only in southwest Oregon and northern California, where they're now imperiled by rat poisons spread by illegal marijuana growers. (In the northeastern United States, the picture is considerably sunnier, as fishers are resettling habitat from Appalachia to, improbably, the Bronx.)

Though fishers had departed Washington, they were never forgotten. In 1998, the state declared the species endangered (an understatement if ever there was one), prompting new interest in its recovery. Soon after, the non-profit Conservation Northwest offered to help the Washington Dept. of Fish and Wildlife study the possibility of reintroduction. Finally, in 2008, WDFW and a host of partners began relocating fishers from a healthy population in British Columbia to the sprawling old-growth of Olympic National Park. Over the next two years, WDFW, Conservation Northwest, and the National Park Service

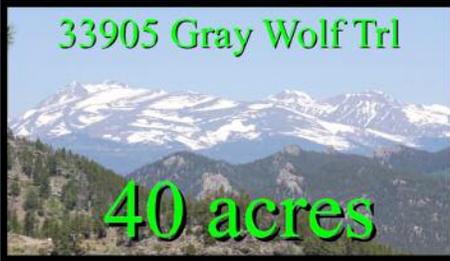
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released 90 altogether. According to WDFW wildlife biologist Jeff Lewis, the tree-dwelling mammals have dispersed widely and successfully reproduced.

With an Olympic population established, the agency and its partners turned their attention to the South Cascades this fall. Translocating a fisher, it turns out, is a fairly straightforward process. Conservation Northwest pays Canadian fur trappers \$600 apiece for live fishers, considerably more than they'd earn for a pelt. The mustelids are then housed briefly at an animal sanctuary, where they're fed donated roadkill, before being trucked down to Washington. (They tend to attract attention from border patrol.) In the U.S., they're checked for parasites and broken teeth and implanted with a tracking device. The plan is to release a total of 80 fishers in Gifford Pinchot National Forest and Mount Rainier National Park over the next two years, then repeat the procedure in the North Cascades. "We've got a great chance to achieve a self-sustaining population in a really important part of its historic range," says Lewis.

While the large weasels aren't about to devour sheep or maul backpackers, wildlife projects are seldom devoid of controversy. The fisher is currently proposed for federal Endangered Species Act listing throughout its range, and a decision is expected this year. That's prompted some nail-biting among private landowners, particularly timber companies, which fear new regulations when relocated fishers inevitably wander onto their property. To alleviate such concerns, WDFW and the U.S. Fish and Wildlife Service are developing an agreement that will allow landowners to complete voluntary conservation actions and thereby avoid additional restrictions, a bargain that's been used to protect some populations of sage grouse.

Though fisher politics may someday get sticky, the critter's advocates are relishing their success so far. After decades of biological poverty, the Northwest's forests now teem with mammalian life; just about all that's missing is, yes, the grizzly. The reintroduction model pioneered on behalf of fishers, whereby environmental groups like Conservation Northwest split costs and responsibilities with public agencies, could eventually provide a blueprint



Seven fishers were released into Gifford Pinchot Nat'l Forest on Dec. 3, 2015. Paul Bannick/Conservation Northwest for restoring even that polarizing predator. "As we protect more land, we can go to the next level and start bringing back some of the wildlife that's characteristic to the state," says Dave Werntz, science and conservation director at Conservation Northwest, which spent more than \$80,000 on the fisher program. "It's a marvelous time we're living in." Ben Goldfarb is a correspondent at High Country News.



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# Buffalo Field Update ~ [buffalofieldcampaign.org](http://buffalofieldcampaign.org)

BFC patrols continue to be out in the field all day, every day, monitoring buffalo migration corridors along the north and west boundaries of Yellowstone National Park. We are very pleased to report that buffalo have been keeping themselves alive since our last Update. Recent hunting pressure along Yellowstone's north boundary in the Gardiner Basin has driven many buffalo to seek shelter deeper in the park, outside of Montana's killing fields. Recent snowfall has had us worried that this would trigger a large migration into the hunt zones but both the buffalo and their BFC defenders were able to take a breath and enjoy this brief respite. Wild is the Way ~ Roam Free!~Stephany



and it is another wonderful exploration of this country's largest land mammal. Featuring stunning photos from generous professional photographers such as Sandy Sisti (photo above 'Hunkered Down,') Tom Mangelsen, and Ric Kessler, along with photos from Buffalo Field Campaign,

## Buffalo Field Campaign has seasonal openings for field volunteers. We have

opportunities for every season, but are in great need of folks during our field season, which runs from November through May. This is the time of year when wild bison are migrating into Montana and facing death and harassment. Any buffalo within Montana's borders is in danger of being shot on sight, hazed, or captured and shipped to the slaughterhouse. All volunteers are provided room, board, gear, and training in exchange for staffing our field patrols. We cater to most any dietary need. We are located in a warm log cabin by beautiful Hebgen Lake, just a few miles outside of West Yellowstone, Montana, and we also run a camp north of Yellowstone, in the Gardiner Basin.

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# Breakthrough Tool Maps Cells' Composition In 3D

A one-of-a-kind instrument built at Colorado State University lets scientists map cellular composition in three dimensions at the nanoscale, allowing researchers to watch how cells respond to new medications at the most minute level ever observed. The new mass-spectral imaging system is the first of its kind in the world, and its applications are just beginning to surface, said Carmen Menoni, a University Distinguished Professor in the Department of Electrical and Computer Engineering.

A special issue of *Optics and Photonics News* last month highlights the CSU research among "the most exciting peer-reviewed optics research to have emerged over the past 12 months." Editors identified the imaging device among global "breakthroughs of interest to the optics community." Menoni's group, in collaboration with an interdisciplinary group of faculty, devised and built the instrument with help from students. She found a partner in CSU's renowned Mycobacteria Research Laboratories, which seek new treatments for the global scourge of tuberculosis. The partners described the system in a paper published earlier last year in *Nature Communications*.

**Unprecedented detail** - Dean Crick, a professor who researches tuberculosis, collaborated with Menoni to refine the mass spectrometer imaging system. He said the instrument will allow him to examine cells at a level 1,000 times smaller than that of a human hair – about 100 times more detailed than was earlier possible. This will give researchers the ability to observe how well experimental drugs penetrate and are processed by cells as new medications are developed to combat disease.

Crick's primary research interest is tuberculosis, an infectious respiratory disease that contributes to an estimated 1.5 million deaths around the world each year. "We've developed a much more refined instrument," Crick said. "It's like going from using a dull knife to using a scalpel. You could soak a cell in a new drug and see how it's absorbed, how quickly, and how it affects the cell's chemistry." The earlier generation of laser-based

mass-spectral imaging could identify the chemical composition of a cell and could map its surface in two dimensions at the microscale, but could not chart cellular anatomy at the more detailed nanoscale and in 3-D, Crick said.

**Possible applications** - In addition to observing how cells respond to new drugs, he said, researchers could use the technology to identify the sources of pathogens propagated for bioterrorism. The instrument might also be used to investigate new ways to overcome antibiotic resistance among patients with surgical implants. "You might be able to customize treatments for specific cell types in specific conditions," Crick said. The CSU instrument would cover the average dining room table. Its central features are mass-spectral imaging technology and an extreme ultraviolet laser. Jorge Rocca, also a University Distinguished Professor in the Department of Electrical and Computer Engineering, created the laser attached to the spectrometer. Its beam is invisible to the human eye and is generated by an electrical current 20,000 times stronger than that of regular fluorescent tubes in ceiling lights, resulting in a tiny stream of plasma that is very hot and dense. The plasma acts as a gain medium for generating extreme ultraviolet laser pulses.

The laser may be focused to shoot into a cell sample; each time the laser drills a tiny hole, miniscule charged particles, or ions, evaporate from the cell surface. These ions then may be separated and identified, allowing scientists to determine chemical composition. The microscopic shrapnel ejected from each hole allows scientists to chart the anatomy of a cell piece by piece, in three dimensions, at a scale never seen before, the scientists said. The project was funded with \$1 million from the National Institutes of Health as part of an award to the Rocky Mountain Regional Center of Excellence for Biodefense and Emerging Infectious Disease Research. The optical equipment that focuses the laser beam was created by the Center for X-Ray Optics at the Lawrence Berkeley National Laboratory in Berkeley, Calif.

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# Understanding Permafrost

By Krista Langlois

On July 16, 2007, a rare bolt of lightning touched down on a remote, lake-studded expanse of tundra about 350 miles south of the Arctic Ocean. It had been a hot, dry summer, and the tundra ignited into what would eventually become its largest blaze in 5,000 years. Over the next three months, the Anaktuvuk River Fire scorched an area the size of Cape Cod. Its scar was visible from space.

In its wake, scientists flocked to the burned tundra to find out how plants, wildlife and soils respond to an ecological regime that's likely to become the new normal: a hotter, drier and more fire-prone Arctic.

Now, the results from those studies (and numerous others) are beginning to trickle in. And while some are of limited interest to those of us below the Arctic Circle, discoveries about thawing permafrost have the potential to impact people and environments the world over. That's because permafrost — the frozen soil that can stretch as much as 650 meters below the tundra's surface — contains a third of the planet's land-based carbon.

Until recently, relatively little was known about the repercussions of thawing permafrost. Today, as its role in

global carbon cycles grows increasingly apparent, a slew of studies are transforming our understanding of the north's frozen soil. Here are five of the most notable: Naturally occurring polygons, a sign of continuous permafrost, in Alaska's Arctic. The study: "Recent Arctic tundra fire initiates widespread thermokarst development," Nature, Oct. 2015. Takeaway: Tundra fires, which are becoming increasingly common, strip away protective vegetation and contribute to substantial thawing.

More: Researchers led by the United States Geological Survey used LIDAR (aerial laser mapping technology) to study thermokarst — the slumped, irregular topography that follows permafrost thaw — after the Anaktuvuk River Fire. They detected permafrost thaw in 34% of land affected by the fire, compared to 1% elsewhere.

The study: "Distribution of near-surface permafrost in Alaska: Estimates of present and future conditions," Remote Sensing of Environment, Oct. 2015. Takeaway: Between 16 and 24% of Alaska's permafrost will disappear by the end of the century. More: USGS researchers used data from 17,000 locations to create an unprecedented map of permafrost in Alaska, and quantify for the first time just how much of that permafrost will likely vanish. And while

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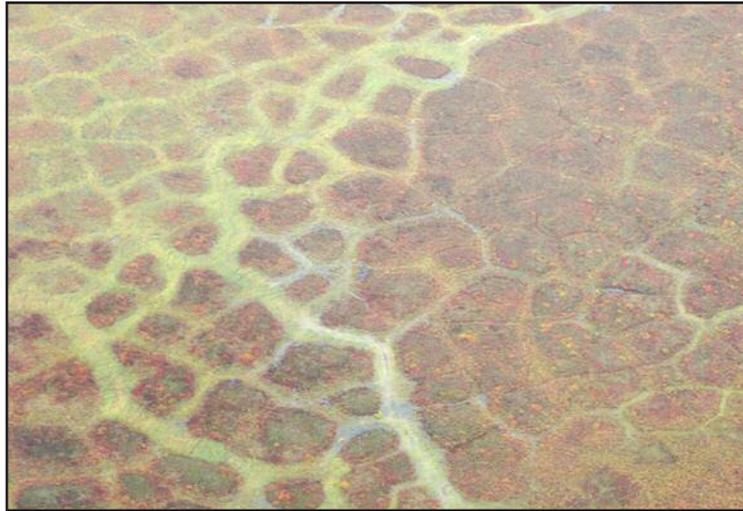
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it considers a variety of climate scenarios, the study doesn't take into account increased fire or other positive feedback loops, meaning it could be conservative. The study: "Ancient low-molecular-weight organic acids in permafrost fuel rapid carbon dioxide production upon thaw," The Proceedings of the National Academy of Sciences, Sept. 2015.



emissions until 2100, and zero emissions thereafter.

The study: "Climate change and the permafrost carbon feedback," Nature, April 2015.

Takeaway: Instead of an explosive 'carbon bomb' released all at once, the carbon stored in permafrost is likely to trickle into the atmosphere gradually.

More: Scientists with the Permafrost Carbon Network estimate that altogether, the amount of

Takeaway: Scientists had assumed that 35,000-year-old permafrost was already largely decomposed, but it turns out that's not true. When it thaws, ancient frozen soil still converts some 25% of its organic carbon to atmospheric carbon dioxide.

More: In 2012, the U.S. Army Corps of Engineers began expanding an existing underground tunnel in the permafrost near Fairbanks. The new tunnel provided access to a certain type of ancient permafrost called yedoma that stores vast amounts of carbon in Alaska and Siberia.

Scientists had believed thawing yedoma wouldn't contribute much in the way of greenhouse gases, but this study shows that to be untrue: half of the dissolved organic carbon in yedoma decomposed within a week, and half of that turned into carbon dioxide.

The study: "Economic impacts of carbon dioxide and methane released from thawing permafrost," Nature Climate Change, Sept. 2015. Takeaway: Thawing permafrost could cost the world \$43 trillion by the year 2200.

More: Researchers from the University of Cambridge and the National Snow and Ice Data Center used various models from the Intergovernmental Panel on Climate Change to measure the economic impact of the billions of tons of carbon dioxide emitted from thawing permafrost. The \$43 trillion assumes increased anthropogenic

carbon predicted to escape within the next 85 years is the equivalent of 10 percent of the current emissions from fossil fuels. While that's good news in the short term, it means future generations will have to deal with the bulk of greenhouse gases leaking from thawing permafrost.

(Photo above - permafrost in Western Arctic National Parklands.)

Krista Langlois is a correspondent at High Country News.



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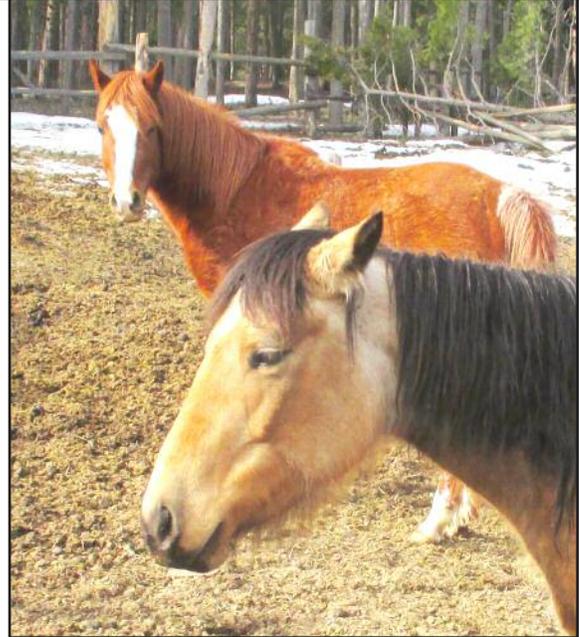
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*Previous Page:  
Top - Sascha & Spirit  
scratch each other.*

*Left: Foster Kittens.*

*Bottom: Romeo & Bella.*

*This page: Top - Two Does in  
new snow by Julie Jacoby.*

*Bottom: Dog drives  
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*Right: Chela, a Bengal.*



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# Adrenaline Junkies Start Getting Political

By Sarah Jane Keller

Last fall, ski-movie producer Nick Waggoner took the stage in Bozeman, Montana, to tell the audience they were about to see something different. That was no surprise, since Waggoner's Sweetgrass Productions has become known for creative ski flicks. A couple of years ago, his company made an unusually arty film featuring athletes shredding powder in the buff. But there would be no naked people in this film, Waggoner told the audience; this would be a documentary about land use.

Called **Jumbo Wild**, its subject was the proposed Jumbo ski resort deep in British Columbia's Purcell Mountains. The Patagonia-backed film ended by asking the audience to sign a petition against the development. Waggoner told the packed theatre that similar debates are probably happening on nearly every skier's home turf, and he hoped **Jumbo Wild** inspired them to get educated and involved.

It may not seem like a big deal that extreme skiers and environmentalists sat shoulder-to-shoulder to hear that message. But here's why it matters: Adrenaline junkies need to join conservationists in advocating for the lands they love. Fortunately, this is already happening through groups that engage recreationalists in stewardship, groups like the Access Fund, Protect Our Winters, the Surfrider Foundation, & Adventurers & Scientists for Conservation.

Still, the sentiment persists that younger recreationalists, who tend to like things faster and steeper, don't care about the land the way their backpacking forebears did. Bozeman-based writer Todd Wilkinson, for example, wrote earlier last year that "Recreation lobbyists are good at getting young people to demand more trails, but seldom has it resulted in them turning out en masse to reliably defend the integrity of existing wild places"

But there are hopeful signs of a growing conservation movement that should encourage people like Wilkinson. One indicator of this trend within the adventure sports community is the Shift Festival, started in Jackson Hole by Alpinist Magazine co-founder Christian Beckwith. Beckwith conceived of Shift to help recreationalists grapple with their impacts on the land and their roles in conservation efforts.

"We're fun hogs, but we almost need an evolution of the tribe," Beckwith said at the festival this fall. "We're coming out of nascency and heading into adulthood, and

adulthood is a little bit more responsible." There was a sense at Shift that recreationalists have a lot of potential to leverage their influence as part of a \$646 billion-a-year industry. They could get more involved in issues such as climate change, the lack of adequate funding for land management agencies, Congress' failure to renew the Land and Water Conservation Fund, destructive efforts to transfer federal lands to state control, and the lack of diversity in the recreation community.

But how do you encourage rugged individualists to feel like they're an integral part of a movement? It turns out that hunters and anglers grappled with this problem 100 years ago.

In the late 1800s, Teddy Roosevelt and his buddies started worrying about the unregulated hunting and trapping that was decimating America's deer, bison, beaver and birds. They devised a credo, the "North American Model for Wildlife Conservation," that continues to underpin America's uniquely effective wildlife management system. At its heart is the conviction that the public — not wealthy land barons — should own wildlife.

Shift's leaders took inspiration from this model when they recently created a similar set of ground rules for recreationalists called the Principles for Advancing Outdoor Recreation and Conservation. The principles say that while recreationalists need access to well-managed public lands and waters, they also need to take responsibility for the places where they play.

Hunting's history shows that starting with seemingly no-brainer ground rules can lead to huge conservation payoffs. The North American Model provided the philosophical grounding that inspired sportsmen to ask for taxes on hunting and fishing gear, starting in the 1930s. Today that translates into hundreds of millions of dollars annually for wildlife habitat and management.

The North American Model also continues to shape some hunters' identities as conservation advocates. Last year, hundreds of sportsmen and women assembled on the steps of Montana's State Capitol to tell elected officials that transferring federal lands to state control would be a

non-starter. Imagine the impact if even a fraction of the state's mountain bikers, climbers and backcountry skiers had joined them.

*Sarah Keller is a contributor to Writers on the Range, an opinion service of High Country News (hcn.org). She's an adrenaline junkie, hunter and environmental journalist based in Bozeman, Montana.*

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# A Century Of Poisoning Predators

By Andrew Gulliford

We celebrate most anniversaries, but there are some we should just acknowledge by pausing to do some serious thinking. This year, for example, marks the 100th anniversary of the founding of the Bureau of Biological Survey. Congress created the agency a century ago to trap, poison and kill predators and “varmints” across the West. The result was an ecological holocaust of strychnine-ridden carcasses and indiscriminate destruction up the food chain. We tried to kill coyotes; we brought death to eagles instead.

The agency’s goal was to eliminate predators to foster game populations of deer and elk, and to reduce losses by stockmen who raised sheep and cattle. Back in 1915, the words “ecology” and “environment” were unknown. Annual reports of the Bureau of Biological Survey and books like Michael J. Robinson’s *Predatory Bureaucracy*, published in 2005, document the agency’s massive onslaught of poisons and steel traps.

Even a skilled naturalist and big-game hunter like my hero, Theodore Roosevelt, referred to wolves as “beasts of waste and desolation.” No one seemed to grasp that healthy predator-prey relationships helped maintain healthy ecosystems. The West’s few remaining wolves became so famous they were given nicknames.

Government trappers for the Biological Survey, called “wolfers,” became legendary on Colorado’s Western Slope. “Beneath his admirable exterior he had the cruelest nature I have ever known,” wrote David Lavender, about trapper Slim Hawley. “His business was killing.”

Lavender, who ran his father’s ranch in Colorado’s Disappointment Valley, didn’t approve of the bureau placing steel traps in carcasses to lure predators. “I believe the grass which average coyotes save by putting a check on foraging rodents and insects far outweighs the value of the stock they harm,” Lavender concluded. Few stockmen shared his insight. We poured poison onto public land, and the Biological Survey managed a special poison laboratory in Denver to experiment with strychnine, arsenic and cyanide.

In the 1918 Report of the Chief of the Bureau of

Biological Survey, E.W. Nelson described the work of 250- to-350 hunters under the direction of district supervisors as making sure that “predatory animals are destroyed by trapping, shooting, den hunting during the breeding season, and poisoning.” He wrote that a “large area in southern Colorado was systematically poisoned with excellent effect.”

Nelson proudly wrote that three years into the Biological Survey’s work throughout the West, “predatory animals taken by hunters under the direction of this bureau” included “849 wolves, 20,241 coyotes, 85 mountain lions, 3,432 bobcats, 30 lynxes, and 41 bears.” Wholesale slaughter had just begun, and states contributed thousands of dollars to augment the Bureau’s federal funding.

By 1931, the annual report claimed the public lands had become “breeding reservoirs for predators and rodents,” which “re-infested stocked and cultivated areas.” That year, \$35,752 was allocated for research on control methods and \$404,062 was spent on poison, primarily strychnine laced in cubes of animal fat and placed in carcasses. A horse carcass, for example, might be seeded with 50 or more poison pellets. Such random poisoning killed predators but also everything (Continued next page.)

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## Highlander Wildlife

else — including raptors and eagles.

Five years later, the forester Aldo Leopold ventured into a remote area of northern Mexico in the Sierra Madre, and it was there, he later wrote, “that I first clearly realized that land is an organism, that all my life I had seen only sick land, whereas here was a biota still in perfect aboriginal health.” Everything he saw seemed to be in ecological balance with both abundant deer and no coyotes. He wondered if wolves had kept them out.

But throughout the West, our war on predators continued. The M44 gun-trap blew up when a predator bit the bait, the gun firing a cyanide shell directly into the animal’s mouth. Government trappers also used Compound 1080, an odorless, tasteless poison that’s toxic to mammals. It was finally outlawed in 1972, a year before Congress passed the Endangered Species Act.

How ironic that the same agency that sponsored decades of predator control — the Bureau of Biological Survey — evolved into the U.S. Fish and Wildlife Service. Congress gave the newly named agency a mandate to protect endangered species, including some of the very species the government had spent years killing off. Colorado Parks and Wildlife, for example, even brought back lynx, animals that had previously been poisoned and trapped.

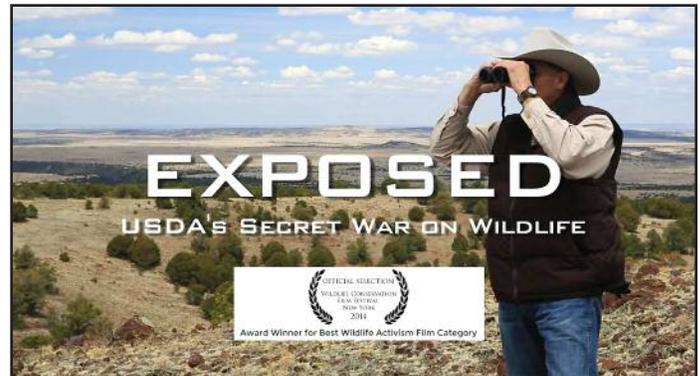
A century later, we know a lot more about ecological

balance and land health, and thankfully, poison pellets are things of the past.

*Andrew Gulliford is a contributor to Writers on the Range, an opinion syndicate of High Country News (hcn.org). He is professor of history and environmental studies at Fort Lewis College.*

**Editor’s Note:** While most of Andrew’s opinion here is true, the fact that the U.S. Dept. of Agriculture’s Wildlife Services has taken over the job of killing predators on public lands for many years and the poison pellets are still very much in use and abuse/kill wildlife and people’s pets.

A non-profit organization, **PredatorDefense.org** has worked hard to reveal this rogue, killing spree agency for what it truly is by producing an award winning video called **EXPOSED**. This video cites Wildlife Services whistle blowers’ eye witness accounts of unlawful practices that are still going on today and paid for with our taxes. Do yourself a favor, go to their website and watch the video.





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# Crowdfunding For Non-Profits

**Dear EarthTalk:** How are environmentalists and environmental groups using crowdfunding to get their projects off the ground? — Sean Jackson, Baltimore, MD

Crowdfunding relies on the collective effort of a large amount of individuals making online contributions to allow a project or venture to happen. ArtistShare, a website that allows fans to fund the creation of new artistic works, was the Internet's first fan-funded crowdfunding platform, launching its initial project in October 2003. Today, crowdfunding is a bit more crowded, to say the least, and among the most popular sites for this purpose today are GoFundMe, IndieGoGo, Kickstarter and Razoo. Crowdfunding has grown from a market of \$880 million in 2010 to \$16 billion in 2014, with 2015 estimated to surpass \$34 billion.

A wide variety of both small and large-scale environmental endeavors are now utilizing this revolutionary new kind of fundraising. In November 2015, Indiegogo.com, the largest global crowdfunding platform, allowed the HomeBiogas system to reach their fundraising goal of \$100,000 in 24 hours. The HomeBiogas system is a family-sized biogas system that converts any organic waste into clean cooking gas and a high quality liquid fertilizer for the garden. With the system, 2.2 pounds of food waste produces an average of about 200 liters of gas, which generates around one hour of cooking over a high flame. Also, using the HomeBiogas for one year saves six tons of CO2, the equivalent of your car's yearly emission.

On Kickstarter.com, a creative project-focused crowdfunding site where "every project is an opportunity to create the universe and culture you want to see," over 2,000 people pledged a total of some \$280,000 to fund the Little Sun Charge high-performance solar phone charger, developed by artist Olafur Eliasson and engineer Frederik Ottesen. Backers of the Little Sun, which offers a full smartphone charge from five hours of sunshine, are projected to receive the product in March 2016. The device is handheld and can be clipped to a backpack to collect sun when walking outdoors.

Smaller scale—but equally impactful—current environmental efforts seeking crowdfunding include:

Ashley Hoffman's Fundraiser for the Kentucky Association for Environmental Education; the World Parrot Trust USA's effort to save wild parrots from being stolen from their nests and forced into captivity; the Washington Youth Garden's living garden classroom that provides hands-on science learning, inspires environmental stewardship and cultivates healthy food choices in youth and families; the Franklin Land Trust's work with Western Massachusetts landowners to conserve farms, woodlands and scenic vistas; and the Nature Conservancy's innovative approach to turn farmland into temporary habitat for millions of migrating birds. All of these campaigns are posted on **Razoo.com**, which has helped non-profit organizations raise \$450 million since 2006. **Any registered non-profit can claim its Razoo page and start raising money online immediately through the site's customizable fundraising portal.**

While crowdfunding to support environmental campaigns and projects may still be in its infancy, no doubt more and more non-profit leaders and activists will embrace it as a way to expand their constituencies and pay for operations in the most democratic way possible.

*ArtistShare, www.artistshare.com; GoFundMe, www.gofundme.com; IndieGoGo, www.indiegogo.com; KickStarter, www.kickstarter.com; Razoo, www.razoo.com. www.earthtalk.org.*



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# U.S. Forest Service: An Agency Adrift

By Matt Rasmussen

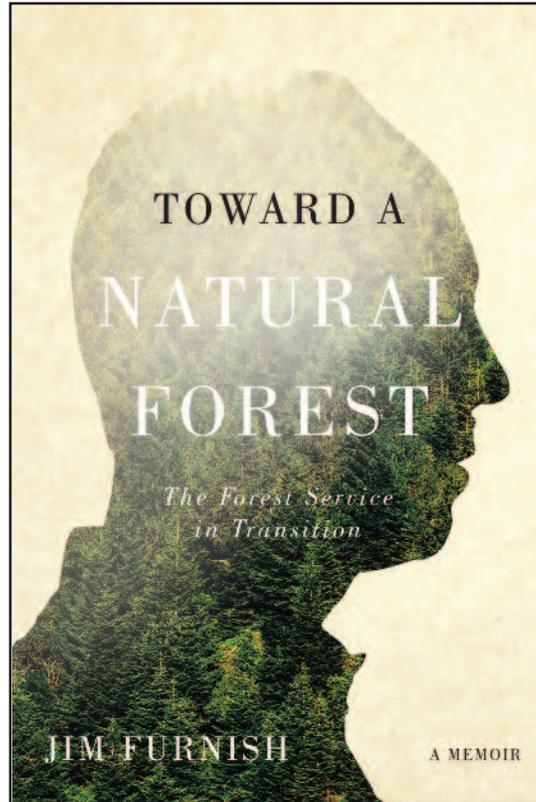
Whither the U.S. Forest Service? Jim Furnish, whose 34-year career with the agency culminated in one of the most important public-lands protection measures in the nation's history, has grappled with this question throughout much of his life.

In his engaging new memoir, *Toward a Natural Forest*, Furnish outlines how the Forest Service transitioned from a can-do operation with a clear mission — getting out the cut — to an agency striving, and largely failing, to find new reasons to justify its existence.

He also chronicles his own transformation, from gung-ho young forester to passionate advocate for responsible environmental stewardship.

Furnish portrays an agency that grew increasingly at odds with public sentiment during the 1970s and 1980s, as it outstripped the ecological limits of the land it managed. But those in charge insisted on staying the course. The Forest Service sold more timber in 1989 — a year racked with litigation and

controversy — than in any other year in the agency's history.



Furnish recalls the reaction of Bob Devlin, former director of timber management for the Forest Service's Pacific Northwest region, when he was asked about a statement by Chief Dale Robertson that "clear-cutting is not an appropriate practice in scenic mountainous areas."

"Devlin kind of laughed dismissively," Furnish writes, "as though curing me of my naiveté, and said, 'Those are just policies. They're not really binding.'"

The crash came in 1991, with Judge William Dwyer's decision to protect the northern spotted owl by curtailing logging.

Furnish went on to serve as supervisor of Oregon's Siuslaw National Forest, where he led a transformation from massive logging to restoration work.

In 1999, then-Forest Service Chief Mike Dombeck made Furnish his deputy chief. Furnish helped implement President Clinton's Roadless Area Conservation Rule, which protected 58 million acres of national forests.

The author, who retired in 2002, implores "my beloved Forest Service" to embrace a new mission, one that allows for modest timber production but recognizes the many other goods, tangible and intangible, provided by national forests.

"We tried the 'timber is king' approach," Furnish concludes, "and it failed." He knows what "primary values" should replace that approach: providing clean water and air, high-quality fish and wildlife habitat and abundant recreation opportunities. That, Furnish says, is a mission that would make the agency proud.

*Toward a Natural Forest*

Jim Furnish

213 pages, softcover: \$19.95.

Oregon State University Press, 2015.

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# Homegrown Flavor From An Indoor Garden

By Melinda Myers

Add some homegrown flavor to your winter meals. From microgreens to tomatoes, it is possible to grow produce indoors. Microgreens are a quick and easy way to add some flavor and crunch to your plate. Just plant seeds labeled for sprouting or microgreens in a shallow container filled with a sterile potting or seed starting mix. Within two weeks you will be harvesting nutritious mini vegetable and herb leaves for salads, sandwiches or snacking.

Take it one step further and grow a few of your favorite herbs on a warm sunny windowsill. Select a container with drainage holes and set on the appropriate size saucer to protect your woodwork. Fill the container with well-drained potting mix and plant seeds or transplants. Purchase basil, chives, parsley, oregano and rosemary plants from a local garden center or a produce department.

Greens, like lettuce and spinach, will also grow in a sunny window or better yet under artificial lights. Grow them in a container filled with a well-drained potting mix similar to your windowsill herb garden. Plant seeds according to the seed packet. Continually harvest the outer leaves when they are four to six inches tall.

Those that like a bit of a challenge may want to try growing a compact tomato, pepper or eggplant. You'll get the best production with a combination of natural and artificial light or full spectrum lights.

Natural sunlight and full spectrum lights contain the variety of light plants need to grow, flower and fruit. Blue light promotes leaf and stem growth, while red combined with blue promotes flowering. Consider investing in energy efficient and long lasting high intensity grow lights

for the greatest yields when growing tomatoes, peppers, eggplants and other fruiting plants indoors.

Leave lights on for 14, but no more than 16 hours each day. Plants need a dark period as well as bright light each day to grow and thrive. Use a timer to ensure the plants receive the right duration of light. Most flowering and fruiting plants need a high intensity of light, so keep the lights six to twelve inches above your plants. Use reflective surfaces under and around the plants to bounce light back into larger plants. Increase your indoor growing space by going vertical. Shelf units with built-in light fixtures like the Stack-n-Grow Light System (gardeners.com) provide multiple layers of growing space. And once your tomatoes, peppers and eggplants start flowering, you will need to shake things up a bit. Gently shake the plants several times a week, better yet daily, to move the pollen from the female to the male parts of the flower so fruit will develop. A gentle breeze from a fan or vibrations from a battery-operated toothbrush work well.

Indoor gardening won't yield the same results as a sunny outdoor garden, but the flavor can't be beat when gardening outdoors is not an option.

*Gardening expert, TV/radio host, author & columnist Melinda Myers has more than 30 years of horticulture experience and has written over 20 gardening books, including Small Space Gardening and the Midwest Gardener's Handbook. She hosts The Great Courses "How to Grow Anything: Food Gardening For Everyone" DVD set and the nationally syndicated Melinda's Garden Moment TV & radio segments. Myers is also a columnist and contributing editor for Birds & Blooms magazine. Myers' web site, [www.melindamyers.com](http://www.melindamyers.com), offers gardening videos and tips.*

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## *Dying With Dignity*

By *Laura Pritchett*

My father's recent death was not beautiful, and neither were any of the other deaths I've witnessed of late. This has left me wondering about a better path. Death is not easy, to be sure, but these were made particularly painful by medical interventions — or perhaps I witnessed the confusion between saving a life and prolonging the process of dying.

So I threw a party. Or rather, I held my first Death Café, and it turned out to be a lively, invigorating affair.

In Europe, there's a tradition of gathering to discuss important subjects — a café philo, for a philosophical café, or café scientifique, a scientific café, and now there are café mortel, or death cafés. A death café isn't an actual place; it's a temporary event in various locations, such as my home, complete with decorations and a cake with DEATH: THE FINAL FRONTIER scrawled on top.

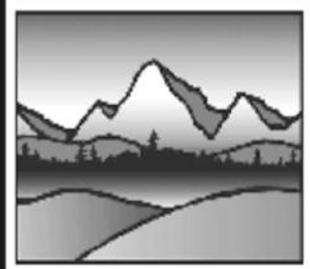
My gathering was comprised of spunky friends, all in our middle years, all of us healthy. As it turns out, this is the segment of population that most seems to care about shaping the end of a life. A Pew Research Center study found that less than half of people over 75 had given much

thought to the end of their lives, and incredibly, only 22 percent of them had written down wishes for medical treatment. The same study, though, found a sharp increase in all adults putting something in writing (six of 10 of us), which indicates that percentage-wise, it's the slightly younger folks who are preparing now for their inevitable deaths.

This does not surprise me. For the last 14 years, I've been one of the 28 million Americans currently helping someone die. Baby Boomers and Gen Xers are caught in an unprecedented tide of caretaking both children and parents (not to mention ourselves and our own aging bodies); we are the first generation to be caught in this particular kind of caregiving-and-slow-death crisis. With medical intervention and technological wizardry, we're forced to make decisions about procedures and medicines and ethics as never before. And we find ourselves without much guidance in a culture that's conflicted and confused about dying.

Which is why we're willing to talk. At my Death Café, I encouraged us not to focus on the deaths we'd witnessed in the past, but rather to speak of the deaths that we want for

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ourselves in the future. Various results emerged. Half were afraid of the suffering that can precede death; half were afraid of death itself. Few of us had practiced death (“pretend this next breath is your last; what does that feel like?”), but all of us were convinced that doing so would only intensify and enlarge our lives.

The zeitgeist of this new movement is just now gaining momentum, but I can feel its strength and power. An unprecedented 66 percent of Americans now think there are instances in which doctors should allow a patient to die instead of doing everything possible to save that patient’s life. People would like to die — sometimes would like others to die — and this doesn’t make us morbid or crazy or unethical or mean. No. We are merciful and kind. We are as moral as we are mortal. We just want to know how to gracefully do what is going to happen anyway.

What lies ahead is unexplored territory, much like death itself, really. California recently passed “Death with Dignity” legislation, and the state representative in my hometown is reintroducing a similar bill in Colorado. Don’t get me wrong; I am all for funding research, finding cures, and offering respite to caregivers. But it’s also our ethical duty to try for a chin-up, heart-steady end.

My father contracted pneumonia after 14 years of suffering with Alzheimer’s. He was given antibiotics; I was not in a legal position to object, but I’d have asked for comfort care only — not because I didn’t love him, but because I loved him enough to want him to have as natural and relaxed a death as possible.

Instead, I saw him grimace in pain and fear. I saw tubes and syringes and the sores on his body. I saw the family he’d worked so hard to create break apart under the pressure. I saw his blue eyes fade, and they taught me well: This could happen to you, too.

Death is perhaps the greatest mystery we face, and the actual act of dying is the last physical act of our lives. We can strive to do it our way and to do it well. If anything deserves preparation, or some renewed clarity, death might be it. Which is why I suggest throwing a lively party.

*Laura Pritchett is a contributor to Writers on the Range, an opinion service of High Country News (hcn.org). She lives in rural Colorado and her novel, **Stars Go Blue**, is based on her experience with her father.*

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# Part 15 - Overpopulation

By Frosty Wooldridge

“A simple look at the upward path of global greenhouse emissions indicates we will continue to squeeze the trigger on the gun we have put to our own head.” Eugene Linden, *The Winds of Change: Climate, Weather and the Destruction of Civilization*

*Worldwide, millions upon millions of smokes stacks exhaust billions of tons of chemicals, carbon dioxide and particulate into the air 24/7. Those chemicals fall as acid rain on the land and into oceans. They change the chemistry of the soil, water and oceans. All of it deadly. Photography by www.captainkimo.com*

In the United States, 254,000,000 (million) cars, hundreds of thousands of planes, boats, trains, lawn mowers, snow machines and other combustion engines burn fuel 24/7. They exhaust enormous amounts of pollution every second without end.

In the United States, millions upon millions of homes, office buildings, schools and factories burn billions of tons of energy to operate the engines of commerce. They also exhaust billions of tons of carbon pollution.

It all adds up to an enormous load on the Natural World that cannot be mitigated. Note that the USA houses

319 million people. The rest of the planet carries more than 7.2 billion humans also burning colossal amounts of energy to create horrific impact on the ecology of the planet.

At some point, something must give, and it will!

Systems that cannot withstand the assault must collapse. Mother Nature deforms to fit humanity’s onslaught. Earth’s average temperature rose 1.4°Farenheit over the past century. Scientists project a rise of 2 degrees F to 11.0 degrees F within this century.

Small changes in the average temperature of the planet translates to large and dangerous shifts in climate and weather. It also transforms our oceans with temperature changes and acidification from carbon infusing with the water.

*(Cities burn millions of gallons of oil and billions of tons of coal 24/7 in order to keep up with demand. All that pollution falls back to Earth. It*

*devastates the ecology of the planet.) Photography by www.captainkimo.com*



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Previous to the Industrial Revolution, the Earth's atmosphere carried 280 parts per million of carbon dioxide. In March of 2013, that figure rose to over 400 ppm for the first time in millions of years.

Since that time, oil, gas and coal became energy sources that overwhelm the Natural World's ability to mitigate their impact.

The evidence grows stronger with each passing year.

Rising global temperatures caused Hurricane Katrina, Sandy and Haiyan in the Philippines. Tornadoes touch down in February throughout the Midwest in America.

Many regions face extreme drought like California while extremes express themselves all over the planet. Glaciers melt at lightning speed in Asia, Greenland and Alaska.

*(Cities around the world house up to 36 million residents such as Tokyo, Japan that intensify air pollution and carbon footprint. Lung cancer rates rise while water pollution rates scream off the charts. Everyone breathes toxic air with every breath 24/7.) Photography by www.theguardian.com*

Oceans warm while becoming more acidic, which translates into unlivable habitat for marine creatures. Extinction follows. So what's causing our massive environmental warming trend? Essentially, human beings burn up the planet.

The United Nations weather agency chief Michel Jarraud

said, "Ocean temperatures are rising fast, and extreme weather events, forecast by climate scientists, showed climate change was inevitable for the coming centuries." "There is no standstill in global warming. The year 2013 tied with 2007 as the sixth hottest year since 1850 when recording of annual figures began." "The warming of our oceans has accelerated, and at lower depths. More than 90 percent of the excess energy trapped by greenhouse gases

is stored in the oceans. Levels of these greenhouse gases are at a record, meaning that our atmosphere and oceans will continue to warm for centuries to come. The laws of physics are non-negotiable."

We humans set a course beyond our understanding. We tinker with the mechanism of climate and ecology beyond our capacity. We very well could become our own executioner along with much of our fellow travelers.

*(Shallow-water creatures, like these corals, are extremely vulnerable to carbonic acid.*

*Scientists are calling for drastic measures to avert massive bleaching of the world's reefs.") Photography by Ove Hoegh-Guiderg/AFP/Getty Images*

Scientists understand the Earth's oceans absorbed half of anthropogenic, or man-made CO2 since 1850. But *(Continued next page.)*



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## Highlander Worldview

research shows the introduction of massive amounts of CO2 into the seas alters water chemistry, which affects the life cycles of many marine organisms throughout the food chain. **Carbonic Acid** -When carbon dioxide dissolves in the ocean, carbonic acid forms. This leads to higher acidity, which inhibits shell growth in marine animals and causes reproductive disorders in some fish. On the pH scale, which runs from 0 to 14, solutions with low numbers are considered acidic and those with higher numbers are basic. Seven is neutral. Over the past 300 million years, ocean pH measured "basic," averaging 8.2. Today, it is around 8.1, a drop of 0.1 pH units, representing a 25-percent increase in acidity over the past two centuries.

During an overpopulation conference in Washington DC, I attended a lecture by Dr. Camilo Mora, professor of Geography at the University of Hawaii. He said, "When you look at the world ocean, there are few places that will be free of changes; most will suffer the simultaneous effects of warming, acidification, and reductions in oxygen and productivity. "The consequences of these co-occurring changes are massive – everything from species survival, to abundance, to range size, to body size, to species richness, to ecosystem functioning are affected by changes in ocean biogeochemistry."

Humpback whales are among the many whales that feed on krill, which will be subject to multiple climate stressors.



*(Photo courtesy International Whaling Commission)*

If we humans continue our 24/7 carbon footprint attack on Mother Nature, she will respond. For example: if the oceans become overly acidic, the krill that feeds endless numbers of creatures in our oceans may go extinct. If they die, the entire food chain dies.

It's called "cascading extinctions." As one creature in the chain dies off, everything that fed upon that creature dies off in a chain-reaction that cascades into massive extinction rates for other dependent creatures. What do we face? Humans add 80 million of our kind annually, net gain. We add one billion every 12 years. We expect to increase from 7.2 billion to 10.1 billion within 36 years and continue to increase indefinitely. The United States expects to add 138 million within 36 years. That will increase our carbon footprint beyond measure.

Should we accept our fate and keep heading down the same road? Result: it won't be pretty for our kids.

Solutions: world leaders must gather to speak about human population stabilization.

If you would like to make a difference, please join these organizations for the most effective collective action you can take: [www.CapsWeb.org](http://www.CapsWeb.org)

[www.NumbersUSA.org](http://www.NumbersUSA.org) [www.TheSocialContract.com](http://www.TheSocialContract.com)

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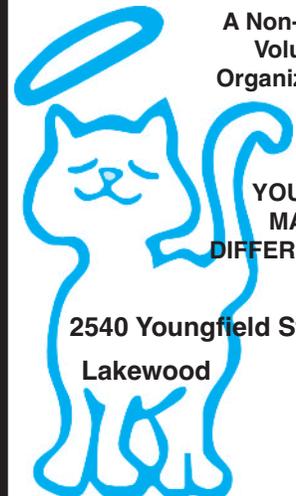
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# Locavores Aren't Loved By Everybody

By Ari LeVaux

In the last 20 years, the amount of locally grown foods consumed in the American diet has tripled, according to the U.S. Department of Agriculture, and it now comprises 2% of the food consumed in the country. As with anything that's popular, some have seen fit to attack this trend. Why do they do this? Do they find locavore talk of "terroir" pretentious and therefore annoying, or do they seriously believe, as some critics argue, that local food enthusiasts pose a threat to the planet?

One frequent complaint is relatively minor and concerns the fraudulent claims made by some restaurants. Thanks to the farm-to-table movement, menus have become dense with information, as chefs detail the life histories of every ingredient in every dish. San Diego Magazine did some investigating and documented cases of straight-up menu fraud: "Chefs will come look (at what we're selling that day), write down notes, leave without buying anything, and then say they're serving our food at their restaurants," said Tom Chino of California's Chino Farms.

The main argument against the locavore movement, however, revolves around the purported energy savings of growing food locally. In *The Locavore's Dilemma: In Praise of the 10,000-mile Diet*, economists Pierre Desrochers and Hiroko Shimizu argue that if everyone focused on local foods, agriculture would damage the environment even more than it already does. Their case rests on a widely circulated statistic: that local production adds up to a lot more food-related carbon emissions than the 5% accounted for by the transportation of food. Greenhouse tomatoes grown in the United Kingdom, for example, have been shown to produce three times the greenhouse gas emissions as tomatoes imported from Spain.

This criticism is not new. Stephen Budiansky wrote about it in a 2010 New York Times editorial, *Math Lessons for Locavores*, and several books have made the same argument, including *Just Food, An Economist Gets Lunch and Food Police*. Their arguments, based on economic concepts such as efficiency, comparative advantage and the economics of scale, assume that all advantages and disadvantages of a given food chain can be accounted for. But is this true?

Taken to their logical extremes, the economics-based arguments would label almost all gardens as inefficient. Most gardeners would agree that it would be more efficient, and even cheaper, to spend a few extra hours at work and buy all their food than spend that time crawling through the dirt. But they choose to garden just the same. Quality of life is hard to quantify.

An article published last summer by two economics professors, Anita Dancs and Helen Scharber, rebuts the efficiency arguments in the economists' own language.

While California can grow a lot of produce, they point out, the economic calculations don't account for the state's dwindling aquifer. Florida may also grow cheap tomatoes, but that economic efficiency doesn't account for the near-slavery conditions in which some of the workers toil.

"I can't believe that people are trying to argue that communities feeding themselves is a bad thing," says Josh Slotnick, a farmer in Missoula, Montana. "Growing food in just a few places and shipping it around the world from there doesn't sound like efficiency." Eating locally, he argues, makes you a better citizen. "Food is a medium for creating culture. It's a medium for people falling in love with their places. And when people love where they live, all kinds of great behavior follows, very little of which is economically rational. It's a red herring to say that, because the industrial food system is so efficient and its carbon footprint is so small, that it's a good thing. Agribusiness isn't about making food and places better. It will make us better consumers, but not better people or better citizens."

Anyone who's raised chickens will surely concede that it is more efficient to buy eggs at the store. But try telling that to my 2-year-old, whose first words in the morning are "get some eggs," as he stumbles toward the coop in his sagging diaper. Should I tell him how inefficient that notion is? I'll let you explain it to him, if it means that much to you. But I don't think it's an argument you're going to win.

*Ari LeVaux is a contributor to Writers on the Range, an opinion service of High Country News (hcn.org). He writes about food and food politics in Montana.*

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# Evolution By You

By David Cowley - EarthTalk

## Natural selection & chance mutation have surrendered control to the human race!

Here's a bold statement for you. We are now in charge of evolution on this planet. Eons of natural selection and chance mutation have surrendered control to the human race, and what we do with it is going to say a lot about who we really are.

Don't scoff, you saw this coming. Who hasn't at some time heard the story of the peppered moth, which changed from a mostly white to a mostly dark species when soot from the industrial revolution blackened the trees it rested on? For years, this was the prime example of how humans can dictate the change in a species.

What we're finding out now though, is that the effects of human development on natural selection is already much more widespread than we had thought, and it's moving fast.

A recent paper by Marina Alberti, director of the Urban Ecology Research Lab at the University of Washington, weaves a tale of these recent changes to our animal neighbors: city-dwelling swallows that can navigate traffic

with their new, more maneuverable wings, urban trees that no longer bother with long-distance seed dispersal, and robust earthworms that can survive in the high metal content of polluted soil. The changes expand outside of city limits as well, where tuskless elephants, shrinking salmon, and hornless bighorn sheep seem to be adapting to be less attractive to human hunters.

For millennia, our race has been busily designing a world of buildings, roads, and networks that fits us well. With our habitat now stretching across the globe, any animal or plant that hopes to survive along with us must adapt to our decisions. It's still a matter of survival of the fittest, but the force that decides what "fits" is now we humans. It's kind of like the dream-world rules of the movie *Inception*: the architect builds an environment to suit his or her own needs, which is then organically populated with people and creatures that would realistically live there. For the organisms of the future, we are – very literally in the case of city-dwelling animals – the architects.

Of course, this isn't to say that there will be anything conscious or intentional about natural selection from this point on. Genetic mutations will continue as randomly as before, and that's the really interesting part. Instead of designer animals, we will end up with rugged, resilient creatures that can survive on what we have left, that can fill the vacant spaces people haven't taken for themselves. They will be a reflection of what we prize as valuable and dismiss as worthless, an x-ray of the subconscious preferences behind our actions. In other words, the future of animal phenotypes will be like a mirror to the human condition.

Consider it this way, we design our surroundings based on our needs and desires, (i.e., we need shelter, and we want it to be comfortable). Our needs and desires are in turn made from a mix of basic human nature and cultural values (i.e. because we used to be persistence hunters on the savanna, comfortable means spacious, warm, and offering a nice view). For this reason, we build high-rise condos and sprawling cities instead of, for example, the

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underground complexes some experts suggest would be far more energy and space efficient, and as a result, the pests of our cities are fat, omnivorous pigeons, instead of prairie dogs.

Or how about the modern adage that bigger is better, a belief brewing in western culture since the ancient Greeks clamped onto the concept of heroes. A person's pride in mounting that ten point buck or record breaking salmon on their wall is akin to Persus's larger-than-life conquest of the sea serpent Cetus, and demonstrates a uniquely human belief. While most predators pick off the weak members of a herd, humans hunt trophies. The result is a new generation of animals that survive by ditching their headgear, and shrinking in size.

In this way, often-hidden human values lead to preferences which lead to choices, which lead to consequences, which in some cases reveal the original values.

So, what comes next? Will the next hundred years see the rise of sewers that truly are full of mutated alligators, or tropical insects that can only survive in the temperature controlled micro-climates of our buildings? Who knows, at some point, there may even be something higher on the food chain than us once again.

Regardless of the final outcome, I believe that our future will result in the unwary creation of the human race's most telling work of art. After all, true art tends to be a commentary on the human condition, and perhaps even an observation of changes to come, which is what these changing organisms demonstrate. In this case however, perhaps it's nature painting a picture of us.

*David Cowley is a writer and photographer living in the natural splendor of Southern Utah. His work frequently focuses on the unseen factors driving modern life.*

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