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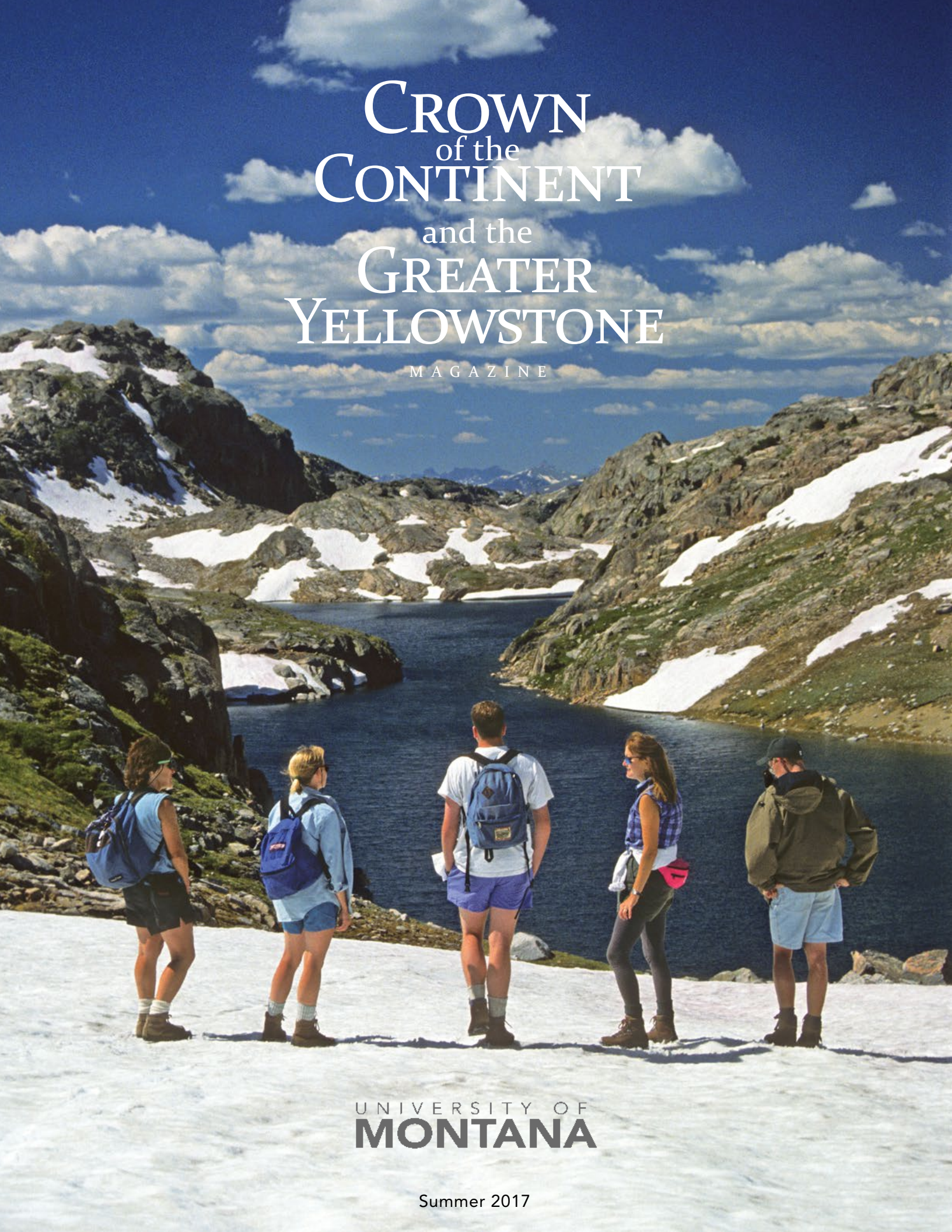
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CROWN
of the
CONTINENT
and the
GREATER
YELLOWSTONE
MAGAZINE

UNIVERSITY OF
MONTANA

Summer 2017

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Susie Graetz, Managing Editor

Neal Wiegert, Designer, UM Printing and Graphics

Will Klaczynski, Director of Photography

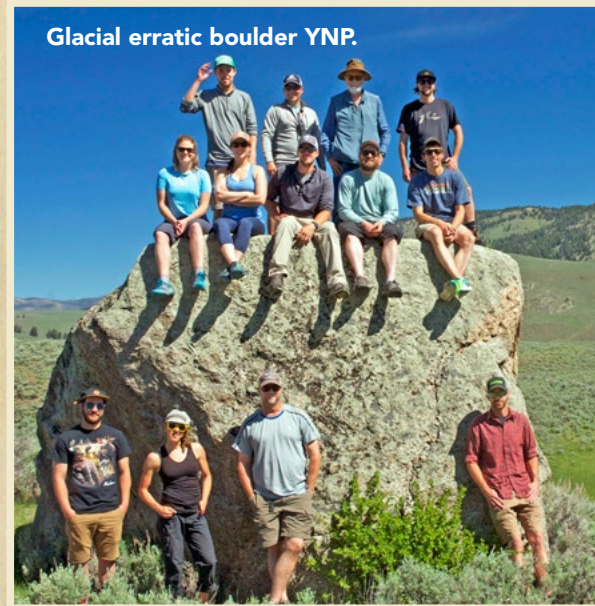
Crown of the Continent and Greater Yellowstone Initiative
c/o Department of Geography
University of Montana
32 Campus Drive
Missoula, MT 59812

Email: crown.yellowstone@umontana.edu

Web site: crown-yellowstone.umt.edu

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Glacial erratic boulder YNP.

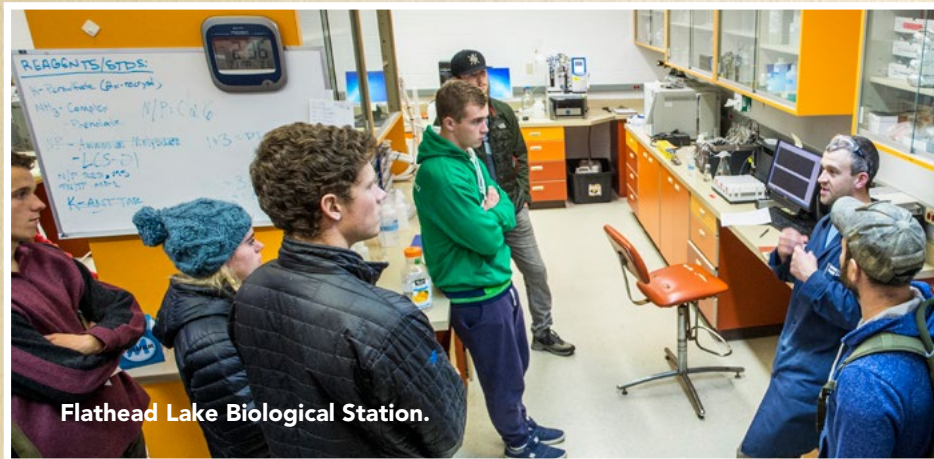


Wildlife study field course.



Rocky Mountain Front field course.

Our mission is to inform the public about what is happening in the Crown of the Continent and Greater Yellowstone ecosystems.



Flathead Lake Biological Station.

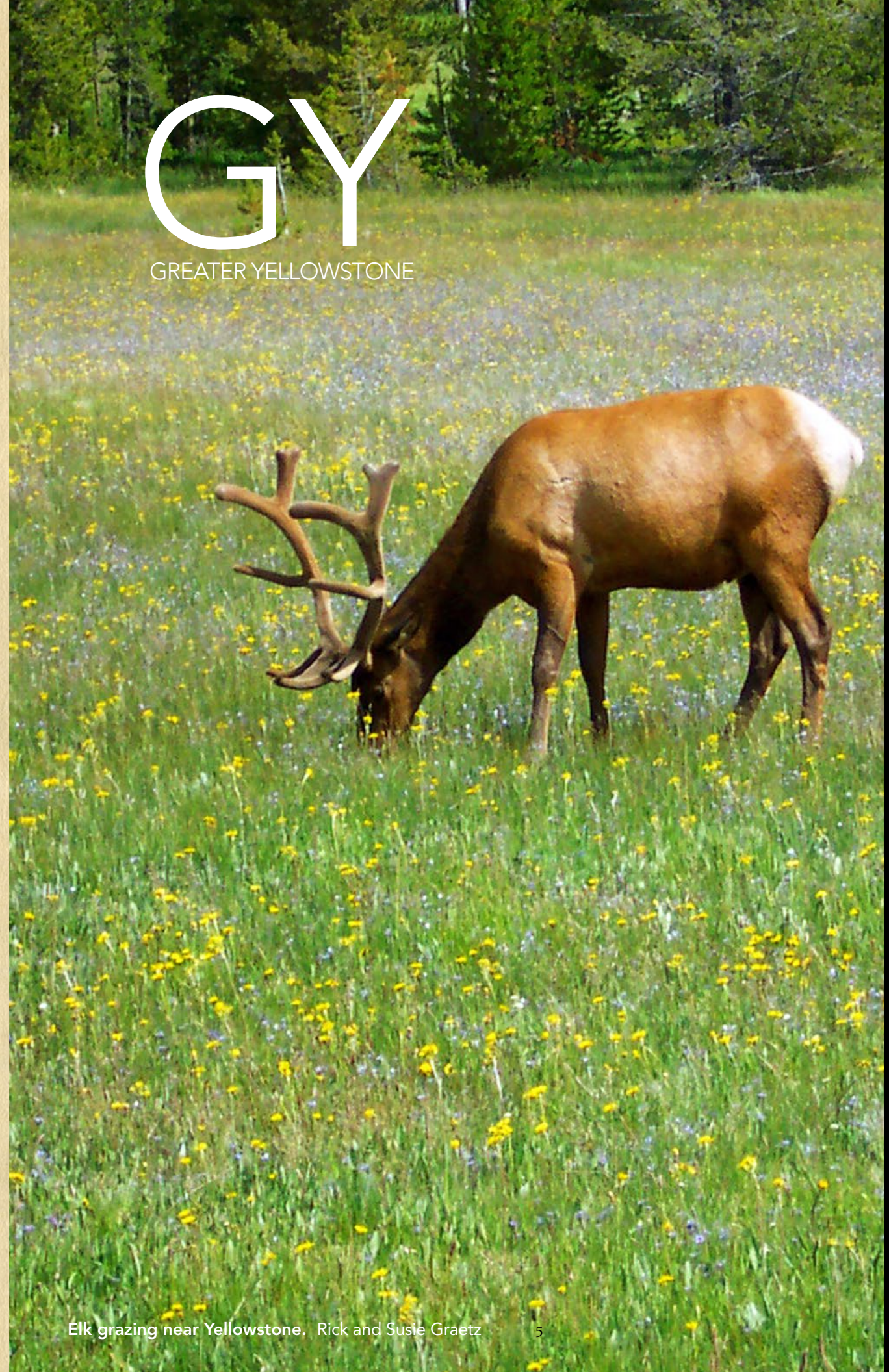
Photos by
Todd Goodrich, Will Klaczynski,
Rick and Susie Graetz



Students film lichen species near Choteau.

We do this through our publications, with presentations in communities, and by holding classes on campus and off.

GY
GREATER YELLOWSTONE



Elk grazing near Yellowstone. Rick and Susie Graetz

Trouble In Paradise

An unlikely alliance in Montana's Paradise Valley joins forces to combat a proposed mine that threatens to disrupt livelihoods and the area's relatively untouched beauty and solitude.

by Beth Kampschorr

It's not every day that staff at Greater Yellowstone Coalition (GYC) get hugs from Montana hunting outfitters. And it's not every day that an actual gold miner tells Montana's congressional delegation and the press that a gold exploration proposal is "amateur" and "littered with red flags."

But that's what happened when local business owners hosted a tour of a proposed gold mine site on Crevice Mountain, just half a mile from Yellowstone National Park, last October. "Obviously it will hurt my business because people come here for a getaway," said Cheryl Standish, owner of Crevice Mountain Lodge, which borders the proposed mine site. Susan and Warren Johnson, owners of Hell's A Roarin' Outfitters, worry that an industrial mine here would threaten the quiet, solitude, and elk their business relies on. GYC's Joe Josephson acknowledged the area's mining history, and added: "A lot of these holes are visible, but are recovering. Now we're next to Yellowstone and there are a lot of other things driving our economy here – tourism, pristine waters and wildlife." And exploration geologist Steve Koehler noted that Australian-backed Crevice Mining Group lacked funding, and had put forward an exploration proposal sorely lacking in critical details. "There's a more stable resource that people from around

the planet want to come and see – Yellowstone National Park," he told the Billings Gazette.

Gold miners and hunting outfitters singing the same tune as greenies doesn't happen every day, but that's the unusual nature of the fight against two proposed mines north of Yellowstone. As two fly-by-night mining companies are planning large-scale gold mines bordering the park, local business owners are banding together to protect their private property rights, the Yellowstone River's clean water, and the already thriving local economy. It's not the usual suspects who oppose this mine, or the mine a Canadian penny-stock company is proposing up Emigrant Gulch. Both lefties and libertarians oppose these mines, as do yoga teachers and hunters, press operators and fishing guides. In this age of entrenched red versus blue, this group is a purple, bipartisan coalition working together.

They're trying to protect their jobs, and their way of life from these risky mine projects. Many of them have joined the Yellowstone Gateway Business Coalition (YGBC), a group of more than 325 business owners who are saying no to these mine proposals. They're pointing to an economic study they commissioned last year, which revealed some startling numbers about what really fuels Park County's economy.

For example, in 2014 the county saw \$196 million in non-resident tourism revenues. Some \$70 million per year comes to the county in direct spending from the fishing industry alone. And every one of the 564 farms and ranches in the county need clean water for their bottom lines.

"We relied heavily on Yellowstone and Park County visitation numbers to support our new business plan," LaNette and Brice Jones told the researcher about their early plans for today's thriving Katabatic Brewery in Livingston. "Quite frankly, our plan would not have penciled had we not factored these powerful tourism statistics."

And mining? It's not even in the top 10 industries in Park County. And the Canadian company that's planning to explore up Emigrant Gulch anticipates just 10 jobs – temporary jobs that aren't guaranteed to be filled by anyone in Park County.

The numbers in Park County are stark, and have kept area business owners focused on fighting the two risky mine proposals in this county, keeping all other Montana mines – including Stillwater, in next-door Stillwater County – firmly off the radar. "I'm not anti-mining," Livingston-area realtor Tracy Raich recently said on a Coalition promotional video. "I believe there are many people in this valley who are not anti-mining. But there are places to mine, and this is not one of them."

Opposing these mines doesn't mean opposing all mines. And opposing these mines means standing up for all the jobs – not only tourism jobs – that make up the thriving current economy. Tucked into a draw on the west side of Livingston is Printing for Less (PFL), a \$30 million company that's second only to the hospital as Park County's biggest employer. PFL was the first commercial online printing company in America when it was founded

in 1996. Today more than 200 people work here. PFL owner Andrew Field was a founding member of the Yellowstone Gateway Business Coalition, because he said it's the place that allows PFL to attract and keep talented and skilled people like press operators.

"Our employees put in their 40 hours here and then they get outside. They hike, they float the Yellowstone, and they enjoy everything we have here in Montana," Field wrote in an op-ed last summer. "If we lose the very qualities that make the Paradise Valley special, these skilled workers could find a new job somewhere else and be gone tomorrow — especially with PFL on their resume. What keeps them here is the quality of life."

If YGBC members are the stars at center stage in this fight to protect their jobs and their way of life, green

groups are firmly offstage, building sets, helping the stars with cues, and doing other critical support work. Bozeman-based Greater Yellowstone Coalition, which led the fight against the Noranda/New World Mine in the 1990s, for example, has two full-time staff and several others who help organize and

work with the Business Coalition. Other green groups are also involved.

"These folks have businesses to run, and don't have time to do a second job navigating the organizing and the policy work and the press," said Caroline Byrd, GYC's Executive Director. "That's what we do. And we love working with this group, and helping them own and build their power."

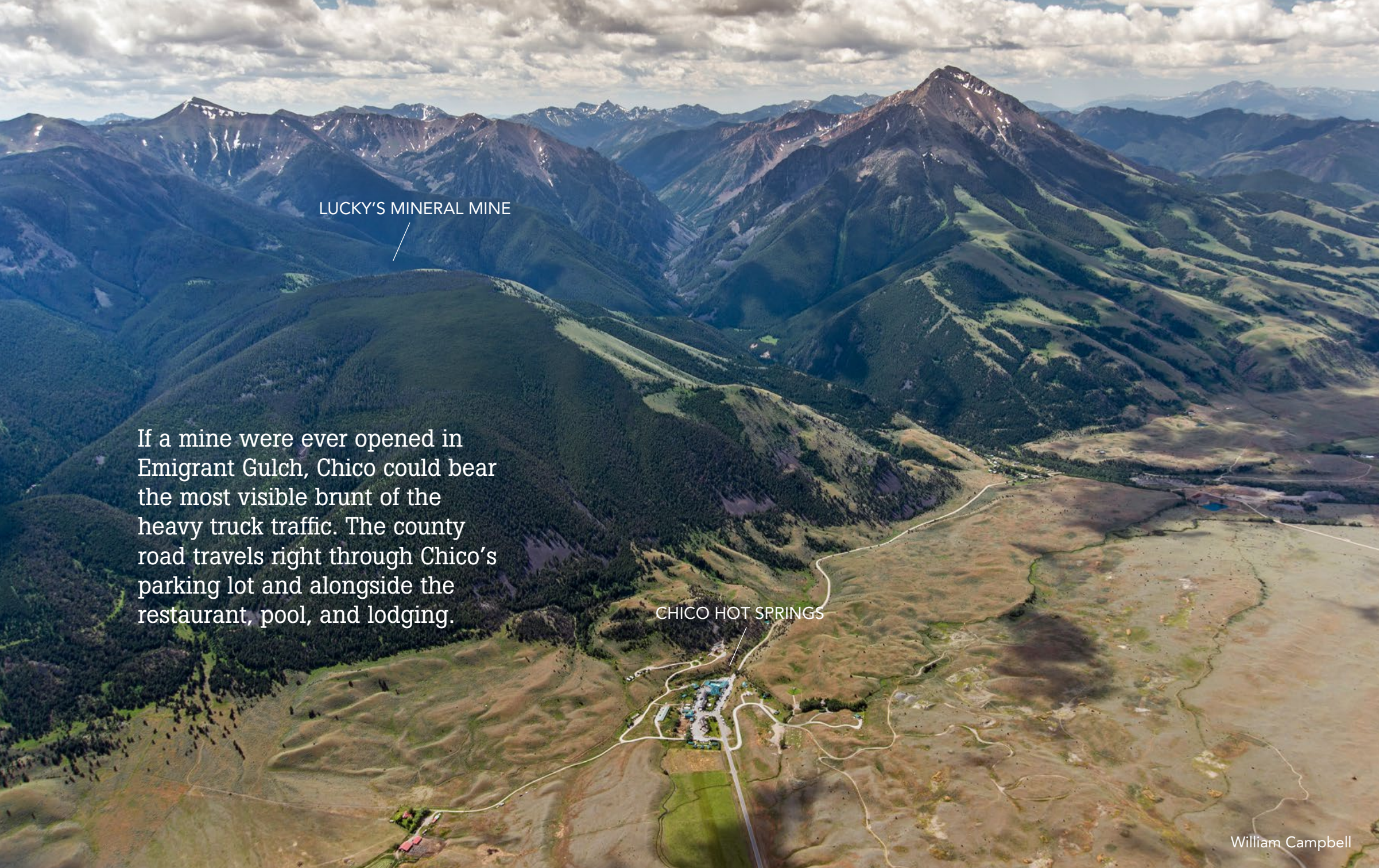
This local grassroots strength and power was what brought the Business Coalition its most recent victory – a two-year timeout on gold mining on the area's public lands. Realtor Tracy Raich, along with Emigrant Creek Cabins owner Bryan Wells, and Chico Hot Springs owner Colin Davis, went to Washington last year and asked



Chico Hot Springs. William Campbell



Ranching and tourism are strong in the valley. Anne Rockhold



If a mine were ever opened in Emigrant Gulch, Chico could bear the most visible brunt of the heavy truck traffic. The county road travels right through Chico's parking lot and alongside the restaurant, pool, and lodging.

William Campbell

Montana's delegation to support the two-year timeout, pointing out that an old-school mining law – the 1872 Mining Act – allows mining companies to ride roughshod over what local people want.

By June, with technical help from GYC, they'd sent their request to the Forest Service. They and other members of YGBC wrote opinion pieces and were available on press tours. More and more businesses signed on. By July, then-Rep. Ryan Zinke, a Republican, had joined Sen. Jon Tester, a Democrat, in siding with

the local business owners against these risky projects. In August, when VIPs attended the 100th birthday of the National Park Service in Gardiner, green groups helped carpet the valley with "Yellowstone is more valuable than gold" banners and yard signs.

And by November? Then-Interior Secretary Sally Jewell appeared at Chico to announce the timeout on these 30,000 acres north of Yellowstone.

"I'm elated," Chico owner Colin Davis told KBZK at the Nov. 21 event. "The fact that we were heard, that Senator

Tester heard us, and I think all of our elected officials. They asked us to back them up, so they could back us up. The coalition formed and we over-delivered."

So what's next? The two-year timeout can be extended to 20 years, and the business owners, as well as GYC and partners, will be diligently working to cover that base. Already they organized more than 11,000 public comments to support the timeout. And they have a potential ally in former Montana Congressman Ryan Zinke, who's now Secretary of the Interior, and will

need to sign off on any extension of the timeout. In March, Zinke went on record for the first time as Interior Secretary, writing on Facebook: "The gates of Yellowstone are not to be mined."

But even a 20-year extension doesn't buy much time – particularly to those who remember GYC's fight against the Noranda/Crown Butte mine in the 1990s. "We keep playing Whack-a-Mole with this idea to mine Yellowstone's borders for gold," said GYC's Caroline Byrd. The only way to stop the game forever is for Congress to pass a law. Montana's Sen. Jon Tester said at November's mining timeout event that he'd introduce a bill in this Congress to permanently protect these lands. Activists are confident Tester will do so.

In the meantime, the Yellowstone Gateway Business Coalition is 325 strong as of this writing, and adds more members every week. The group has expanded to Gallatin County, with more than 100 businesses here. And it's probably no surprise that, given the threat the mines pose to the Yellowstone River, fishing-related businesses now make up around 10 percent of the Coalition. "Standing up for the Yellowstone River is a no-brainer for us," Simms Fishing Products Director of Product Marketing Rich Hohne told the Bozeman Daily Chronicle in January. The Bozeman-based company has included the Yellowstone River in its "Save our Streams" campaign, and selling commemorative t-shirts to highlight a threatened river every month. Simms's Yellowstone t-shirts kick off the SOS campaign in April. A portion of the proceeds go to GYC to support the group's mines work. "We're honored to be working with Simms to protect the Yellowstone River," said GYC's Caroline Byrd. "Simms gives this mine fight a national profile, which helps us better protect the river and Yellowstone National Park. And our work then helps businesses like Simms and the other 320+ local businesses that need the river and these lands to thrive. It's a virtuous circle."

For more information: join the Yellowstone Gateway Business Coalition www.dontmineyellowstone.com

Learn how you can help at GYC: www.greateryellowstone.com/dontmineyellowstone

Beth Kampschror is the Communications Coordinator for the Greater Yellowstone Coalition.



When the strength of nature converges with the strength of advice

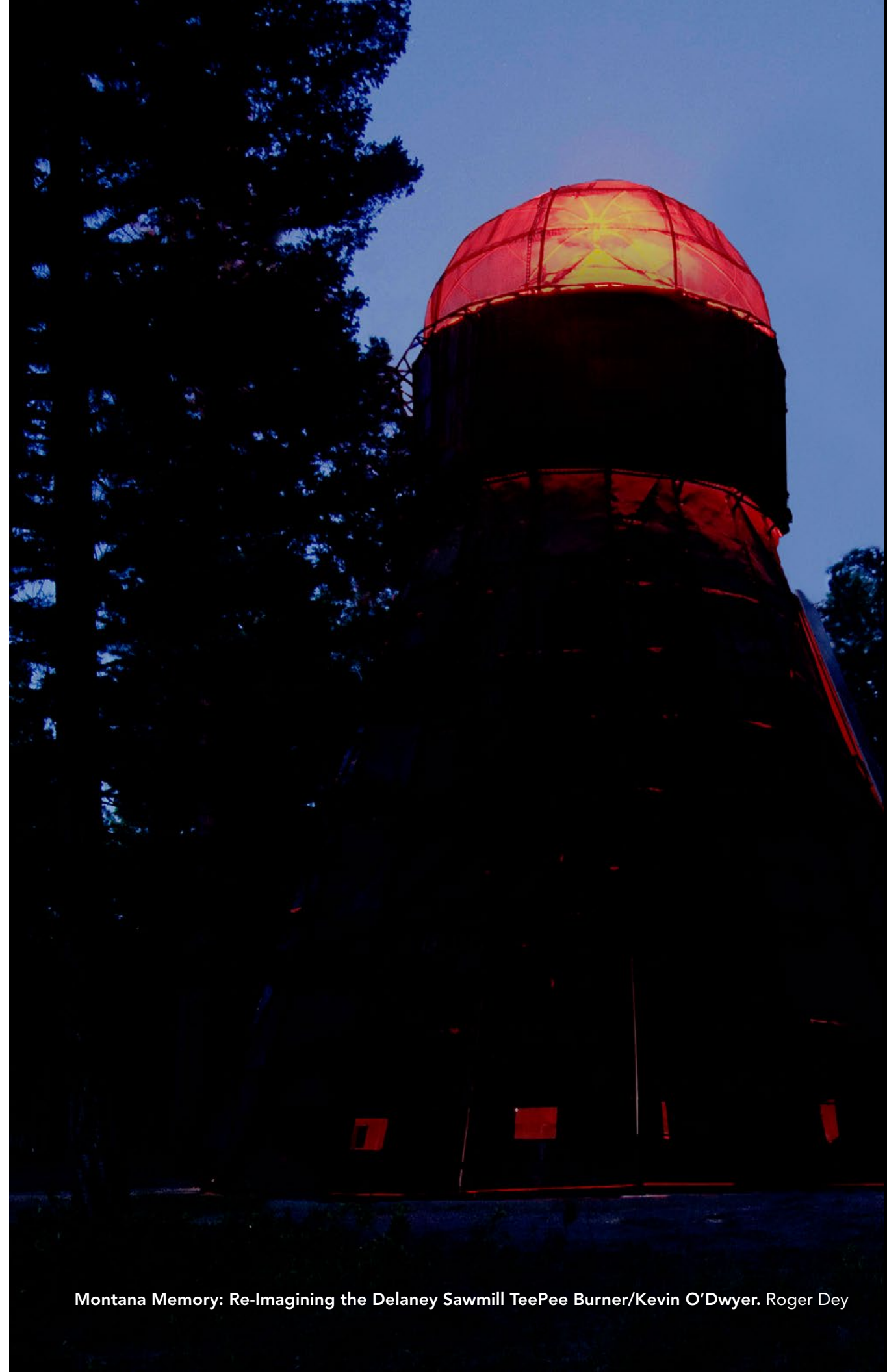
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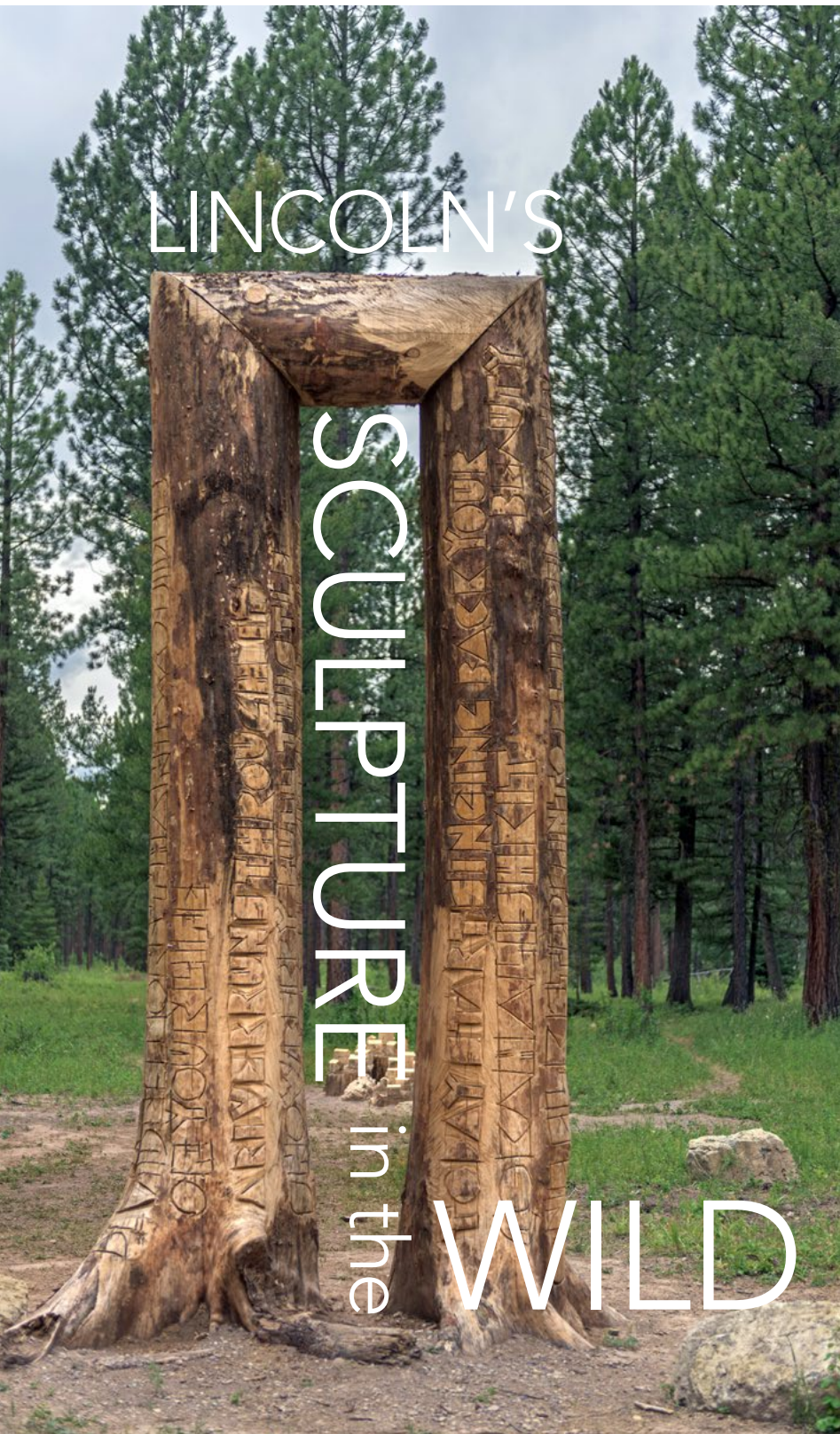
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ART

Montana Memory: Re-Imagining the Delaney Sawmill TeePee Burner/Kevin O'Dwyer. Roger Dey



Gateway of Change/Jorn Ronnau. Ron Armstrong

So, an Irishman and a logger walk into a Seattle bar. Imbibing spirits, they bond over their interest in knives, solve the world's problems, and by the end of the night the two new BFFs think that with no source of funding, building a massive 26-acre outdoor art gallery in the middle of woods in Montana and getting renowned international artists to participate is a swell idea. And, just like that... Blackfoot Pathways: Sculpture in the Wild was born. Well, that's my short version of the story and I'm sticking to it.

We can thank acclaimed Irish silversmith/environmental sculptor Kevin O'Dwyer and Lincoln, Montana, logger/rancher/steel knife mastersmith Rick Dunkerley for their vision and commitment. To date, eleven highly accomplished artists from Finland, Ireland, the UK, Denmark, and the USA have ignited our imaginations, amazed us with the scale and creativity of their installations, put a tiny town on the "Must See" map, and proven O'Dwyer, Dunkerley, and a passionate army of believers and volunteers right.

Each piece of art represents the artist's own understanding of the history and the landscape of the Blackfoot Valley, but with no walls confining one's thoughts, visitors are free to interpret the installations in their own way. When I first came upon O'Dwyer's vertical, bare steel Montana Line Drawing in the forest, I was struck by how strongly it represented the winter larch trees with their branches stripped of needles standing out against the evergreen fir trees; but to O'Dwyer, it portrays the repetitive pattern of a jackleg fence and is sited upright to create a tree-like structure. What do you think?

Part Grande Dame, part Great Old Broad, the Delaney Teepee Sawmill Sawdust Burner is the centerpiece of the Park. Weathered and worn, she stands solid, stately and proud... I am incessantly drawn to her. In the daytime,



Music wafts over Hill and Valley/Steven Siegel. Ron Armstrong

she is a gathering place, a shelter from the elements, a classroom... her walls portray the logging history of the valley: but at night, a burning red crown harkens me back to her early years and the memory of the massive lumber industry this state was built on. She is a force to be reckoned with.

It takes many adjectives to completely describe the Park. Often quiet, sacred almost, it can also be boisterous with youngsters exploring, discovering, and creating their own personal works, or photographers and painters making their own art out of the installations. Whimsical, thought provoking, refreshing, educational, industrial, inspiring, respectful, natural, fun, and touchable are merely a few descriptors that come to mind. But don't just take my word for it, go see for yourself!

Sculpture in the Wild is a gift to adventurers, art enthusiasts and ordinary folk everywhere and is a testament to the foresight, fortitude, and love of the land of the people of Lincoln. As the Base Camp to the Crown of the Continent, Lincoln has much to offer. With access to the great Bob Marshall Wilderness complex, it is smack in the middle of an outdoor paradise. Lincoln has a long history of hard-working people making a living off of the land, a stellar winter recreation playground, excellent hunting, Blue Ribbon trout streams, a welcoming community intent on moving forward and willing to put its shoulder to the grindstone to make things happen, and now a prestigious and world class art park.

I like Lincoln. It's a "can do" town... it's my kinda town.

Susie Graetz

For more information go to:
sculptureinthewild.com



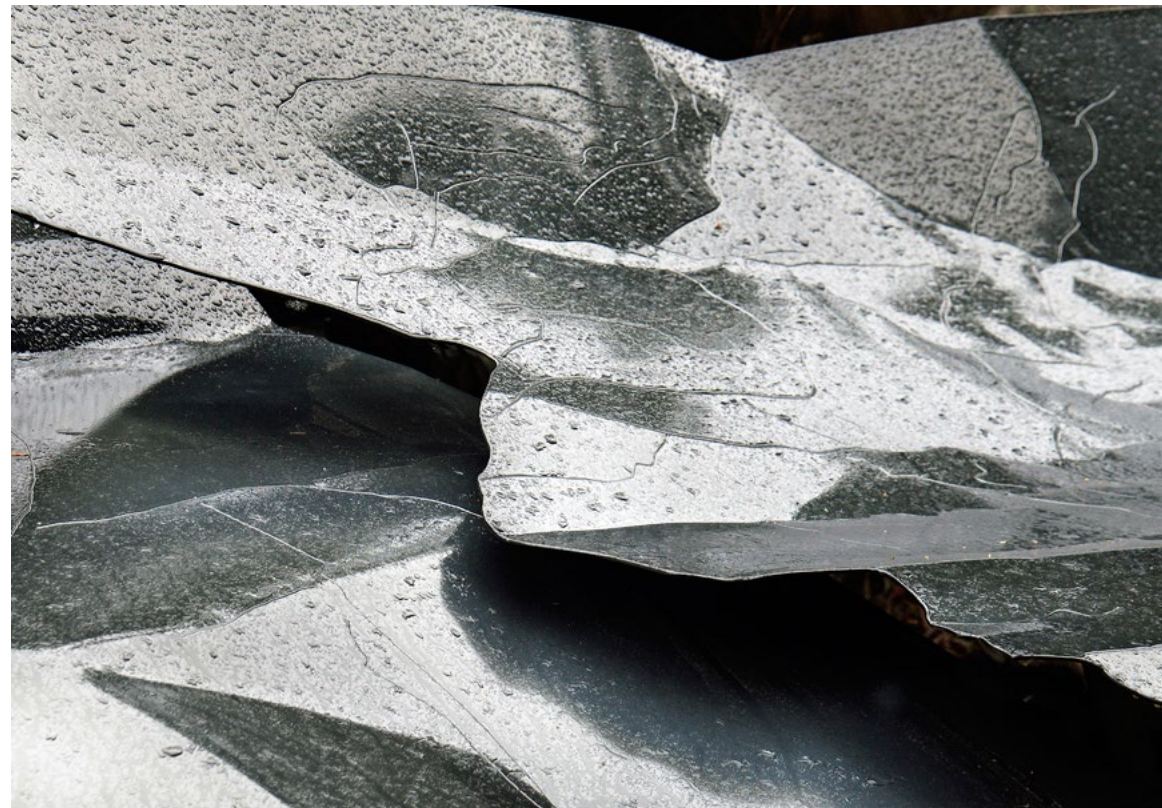
Ponderosa Whirlpool/Chris Drury. Kevin O'Dwyer



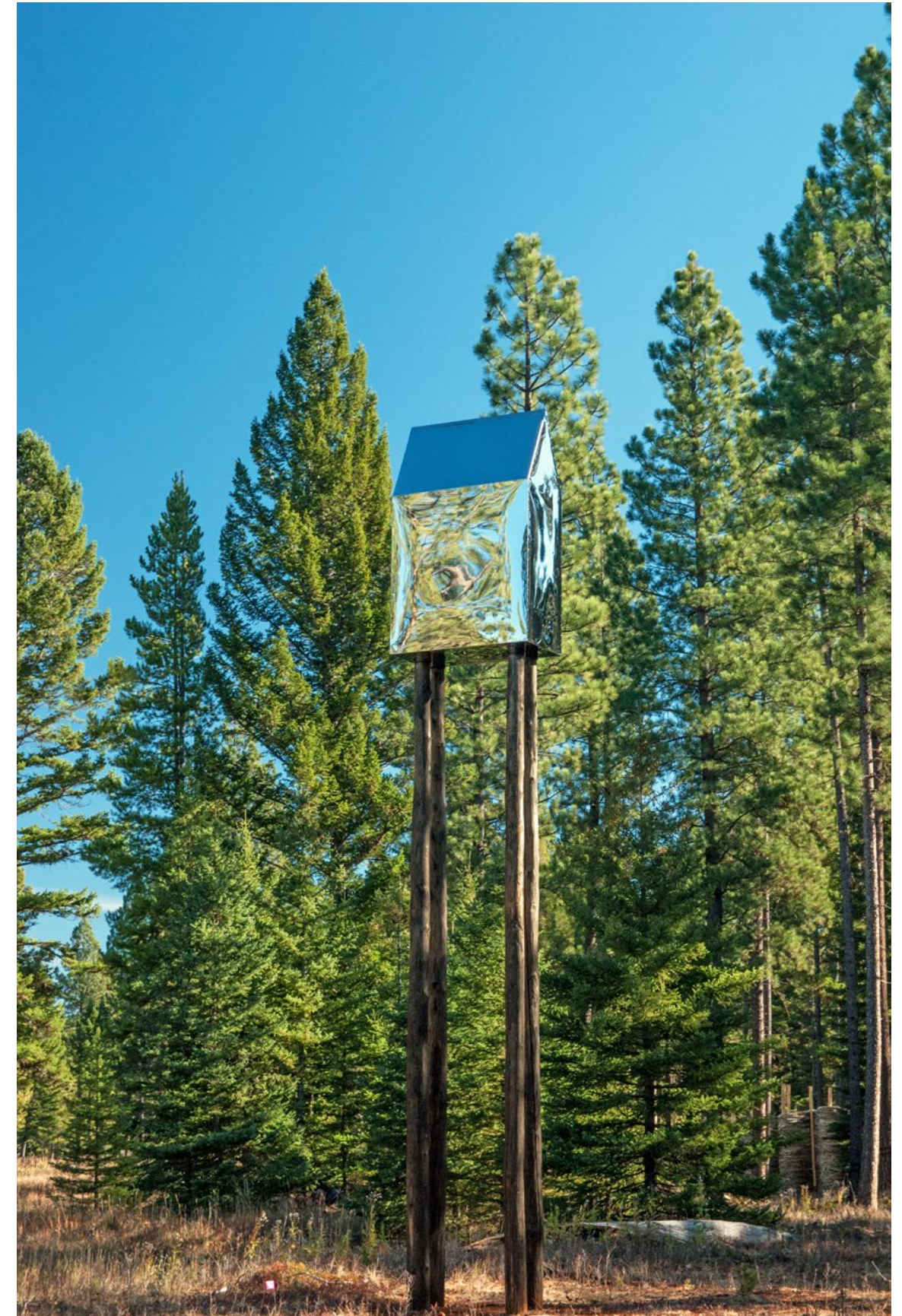
Picture Frame/Jaakko Pernu. Roger Dey



Montana Line Drawing. Sculpture and photo/Kevin O'Dwyer



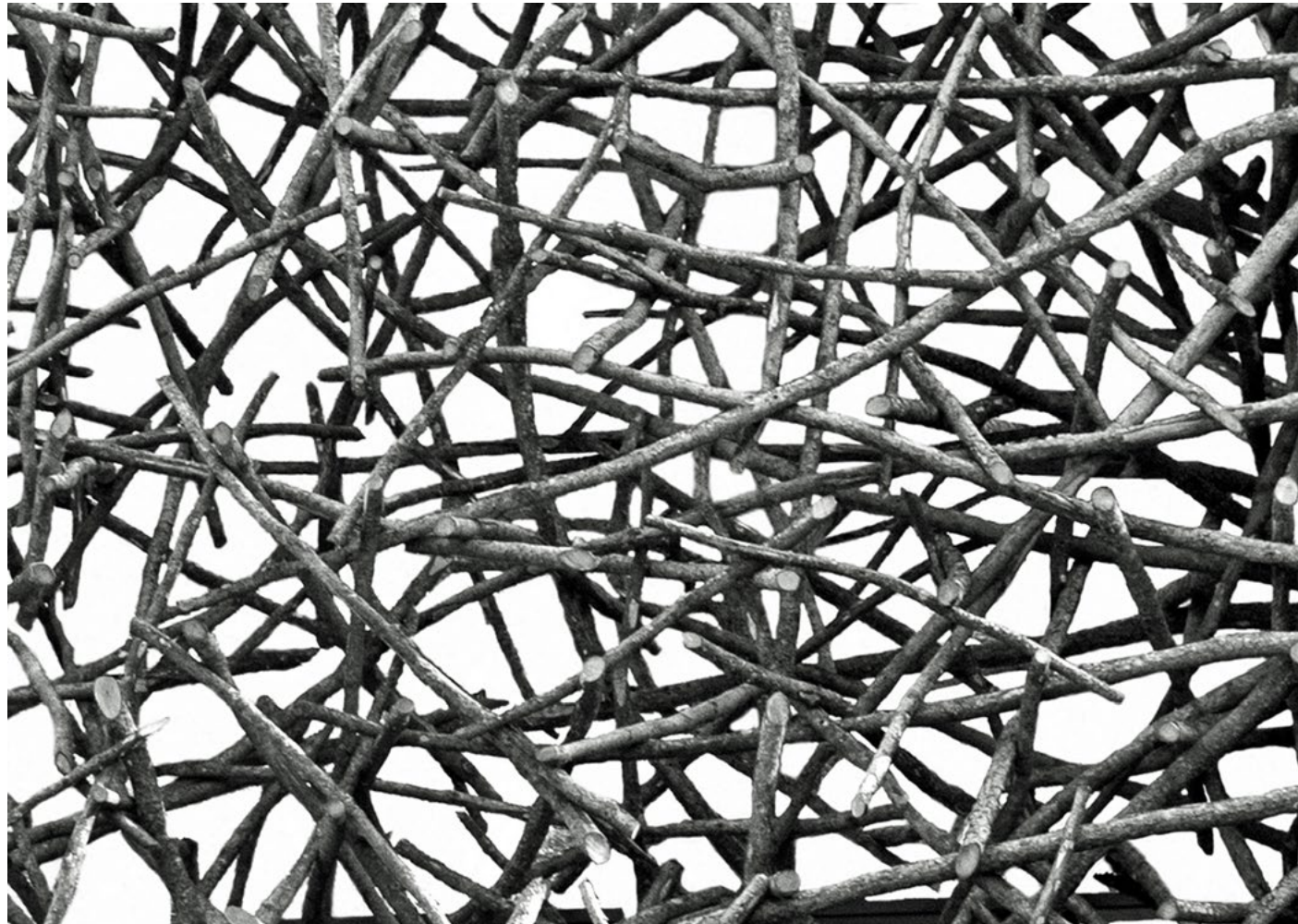
Of Earth, Of Sky,
Of Place Between/
Noellynn Pepos.
Kevin O'Dwyer



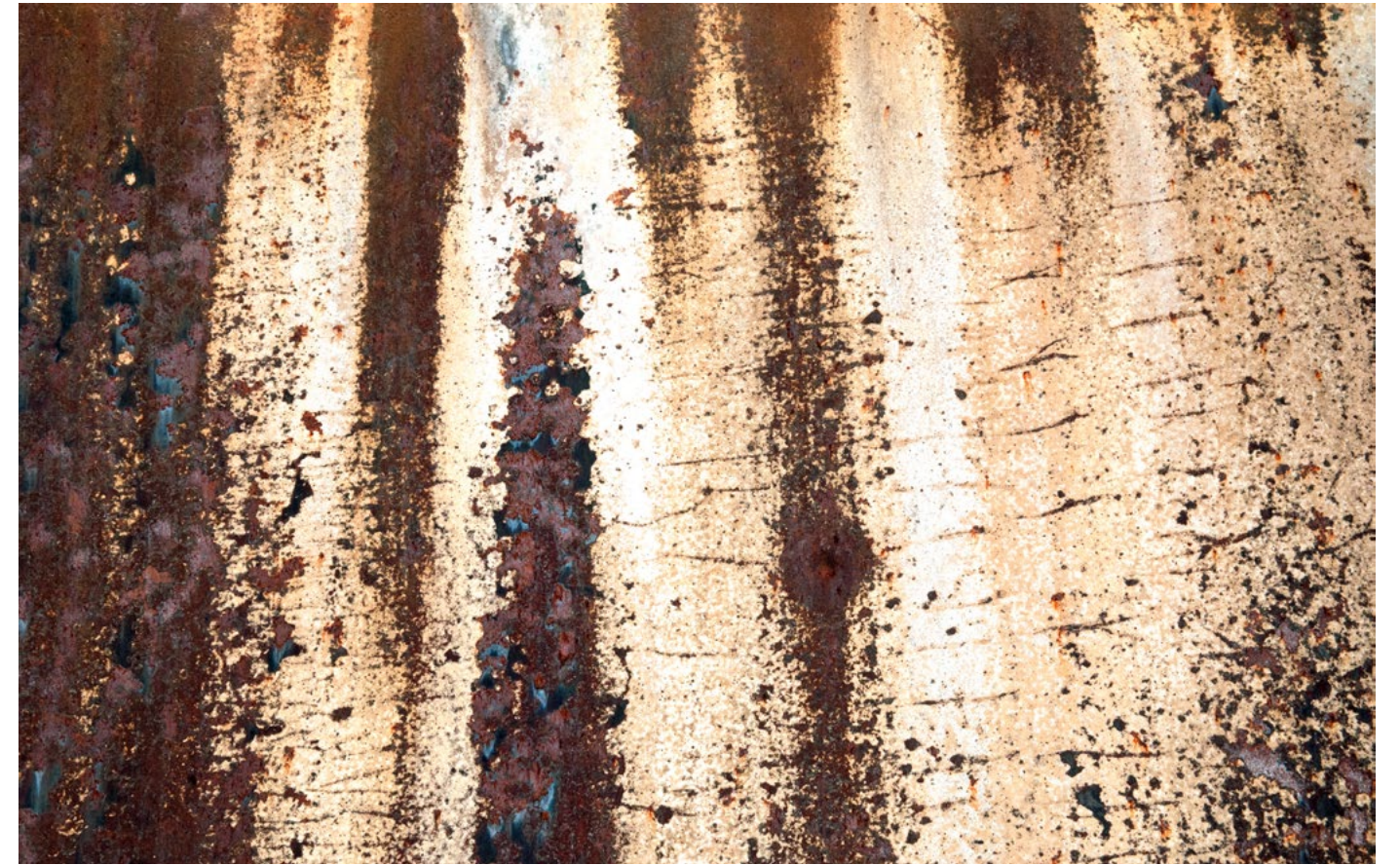
House of Sky/Alan Counihan. Rick and Susie Graetz

THROUGH THE EYES OF THE OBSERVER

Sculpture in the Wild



Montana Pick Up Stix/Picture Frame. Rick and Susie Graetz



Birchbark/Delaney Sawmill Teepee Burner. Rick and Susie Graetz



Shooting Stars/Delaney Teepee Burner. Rick and Susie Graetz



Poetry In The Rough/
Gateway of Change.
Rick and Susie Graetz



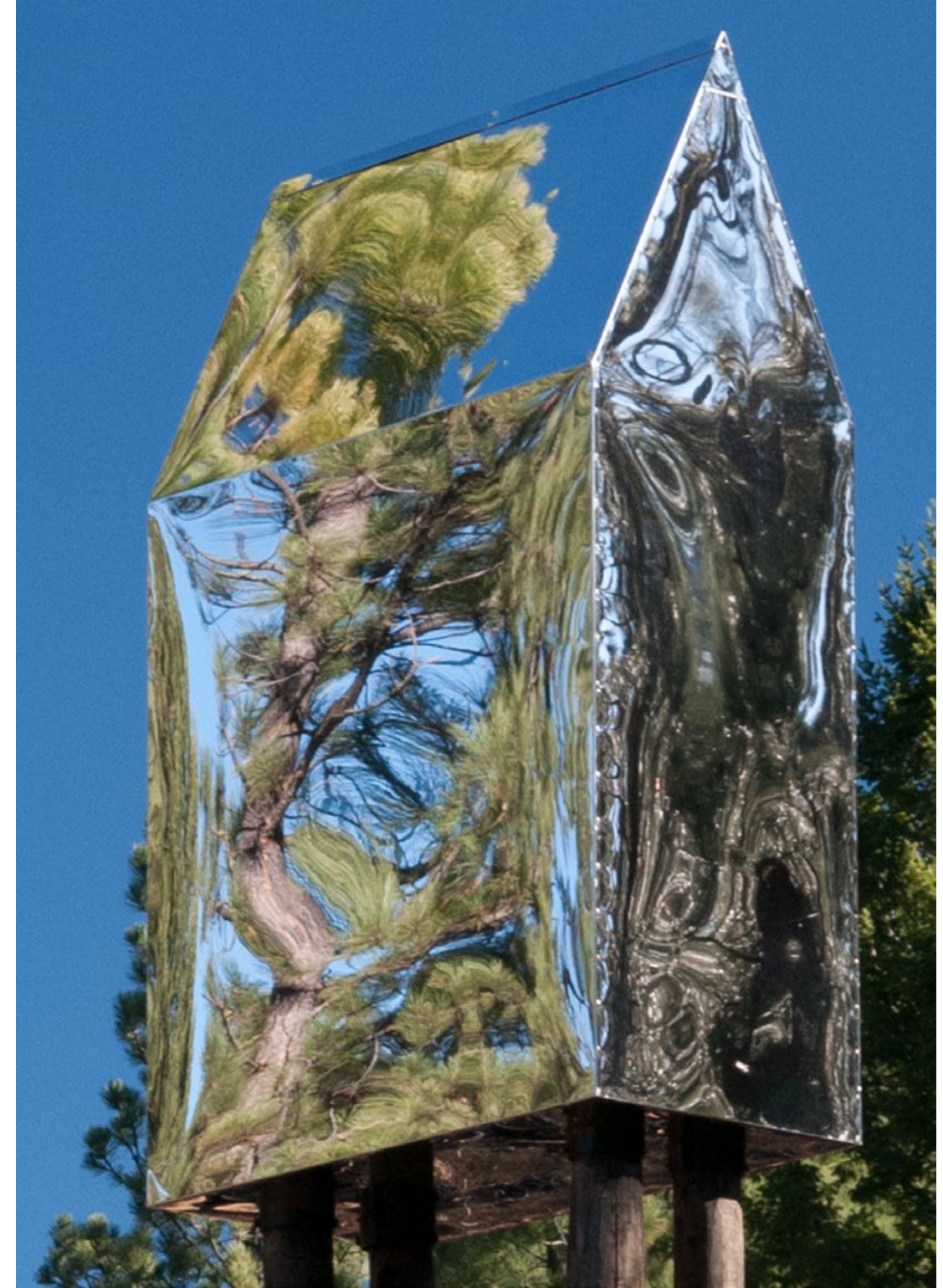
Weathered Words/Hill and Valley. Will Klaczynski

Left to right:
Portrait Of Montana – artist
unknown. Beth Huhtala
Campfire – artist unknown.
Roger Dey
Woodland Color Palette –
artist unknown. Roger Dey





Winter Reflection/House of Sky. Roger Dey



Nowhere To Hide/ House of Sky. Rick and Susie Graetz



Participating Artists

Gateway - 2017

Jaakko Pernu (Finland)

Stringer - 2017

Casey Schachner (USA)

Yet To Be Titled - 2017

Patrick Dougherty (USA)

Ponderosa Whirlpool - 2016

Chris Drury (UK)

Bat Beacons - 2016

Tyler Nansen (USA)

Of Earth, Of Sky, Of Place Between - 2015

Noellynn Pepos (USA)

East West Passage - 2015

Sam Clayton and Mark Jacobs (UK)

**Montana Memory: Re-imagining the
Delaney Sawmill Teepee Burner - 2015**

Kevin O'Dwyer (Ireland)

Love Motel For Insects - 2015

Brandon Ballengee (USA)

Hill and Valley - 2014

Steven Siegel (USA)

Gateway of Change - 2014

Jorn Ronnau (Denmark)

House of Sky - 2014

Alan Counihan (Ireland)

Picture Frame - 2014

Jaakko Pernu (Finland)

Montana Line Drawing - 2014

Kevin O'Dwyer (Ireland)

GLORIOUS TIMES: ADVENTURES OF THE CRAIGHEAD NATURALISTS

author Tom Benjey

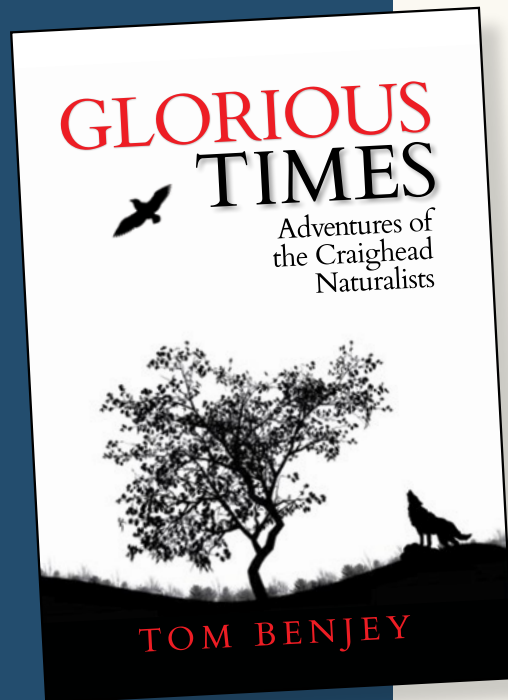
This new publication from the University of Montana Press, *Glorious Times. Adventures of the Craighead Naturalists*, by Tom Benjey, tells the fascinating and important story of an American clan of Scots-Irish origin that settled in the early 1700s in Pennsylvania. And although most members of the family stayed in that region until the early 1900s, more recent generations came west and have made major contributions to our understanding of animal habitats and behaviors, of wildlife conservation strategies, and of a conservation ethic that is necessary for keeping our Greater Yellowstone and Crown of the Continent ecosystems, as well as other wild places, healthy for animals and humans far into the future.

Undoubtedly the most famous of the Craighead Naturalists in our Rocky Mountain region are those whose generation has sadly now passed with the recent deaths of John Craighead at the ripe old age of 100 last year and his wife Margaret a few weeks later. Three siblings in that generation, the children of Frank Craighead Sr., a professional naturalist in his own right, are the ones we likely know best: the twins Frank Jr. and John, and their writer sister Jean Craighead George. A good portion of this inspiring book is dedicated to them, their lives and adventures, and their many accomplishments. It was apparently Jean who suggested during an interview that there were so many outdoorsy adventurers, naturalists, and scientists in the clan one almost had to believe that they inherited a heavy dose of “naturalist DNA.”

In preparation for writing the book, Benjey had the benefit of frequent interviews with and access to images and documents from many members of the Craighead family. The numerous photos contained in the book enhance the well-written text and offer the reader not only insight into the lives of the protagonists in the stories but pictures that help visualize their lives, adventures and important work in informative and delightful ways. For those readers who are somewhat familiar with the accomplishments of “our” Rocky Mountain Craigheads (the twins Frank Jr. and John), they will undoubtedly learn a lot more about their adventurous work in the realm of falconry as teenagers, their groundbreaking, if sometimes controversial, work with Yellowstone grizzlies, and their other habitat and conservation work when they read this book. And those who have read and loved sister Jean’s books, such as *The Summer of the Falcon*, *My Side of the Mountain*, or *Julie of the Wolves*, will learn a great deal about this marvelous author and her life as a Craighead and how her father, brothers and family inspired her writing. And although the book pays much attention to these three remarkable siblings, it is also a biography of their Scots-Irish-American family over three centuries.

We strongly recommend that you pick up this book in your local bookstore, read it, and allow yourselves to be enlightened, amused, and inspired as you head into another outdoor season of exploration, scientific work, or just plain enjoyment in our two special ecosystems or anywhere it is wild. We clearly owe a lot to the Craigheads, but also to Tom Benjey for presenting them to us in this excellent book.

The editors

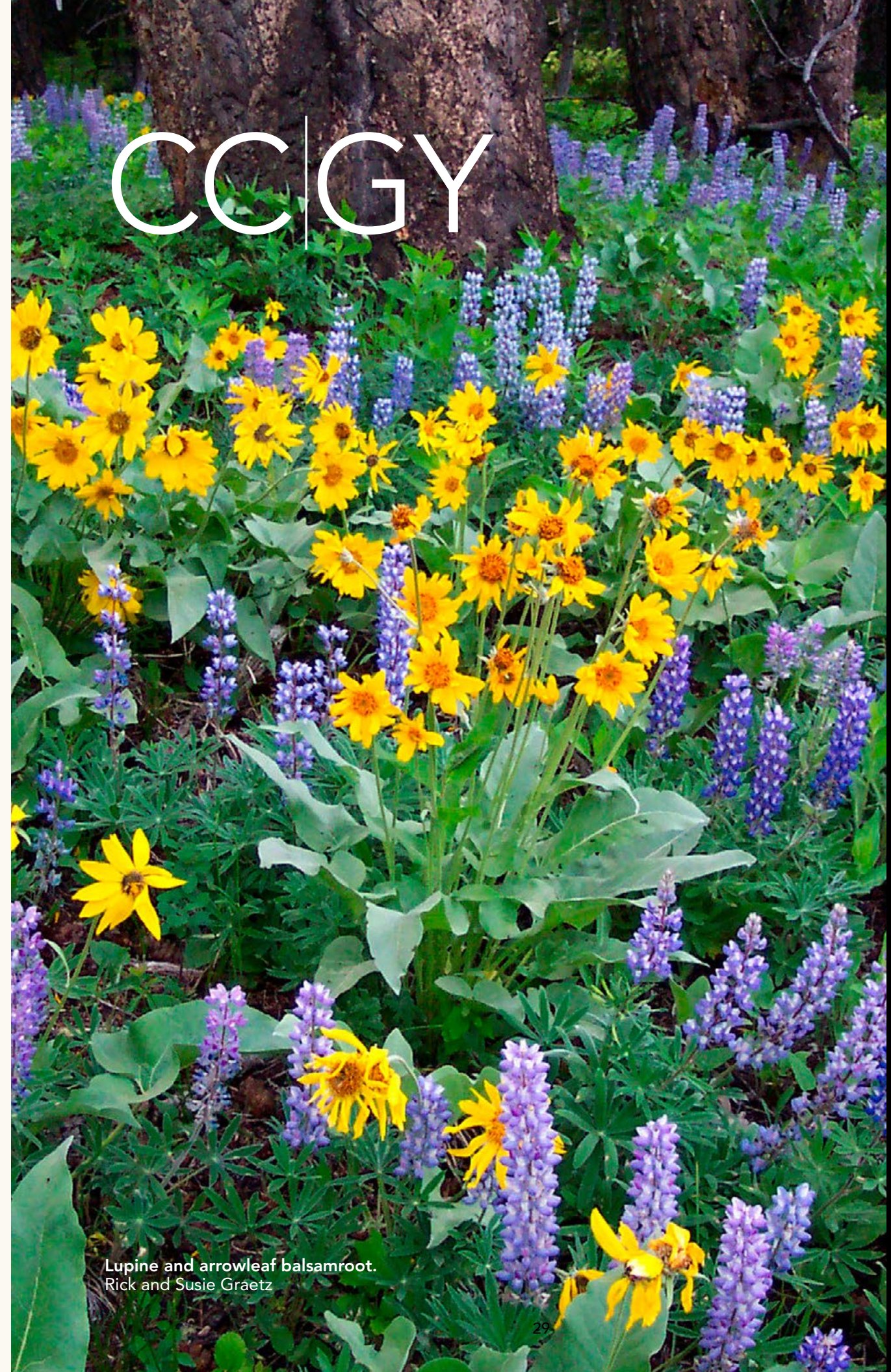


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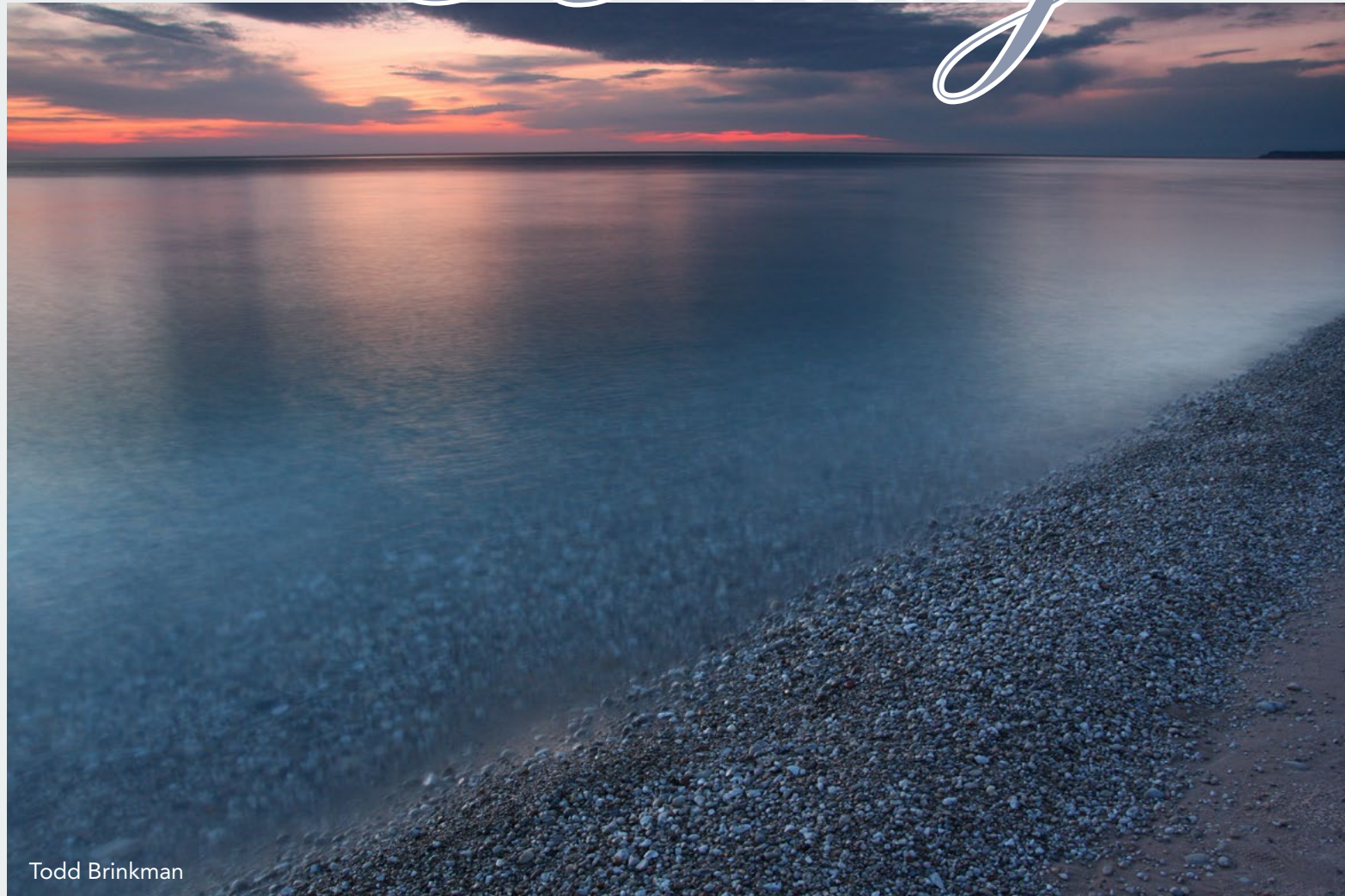
Can be ordered through most bookstores

CC|GY



Lupine and arrowleaf balsamroot.
Rick and Susie Graetz

Beauty and the BEAST



Todd Brinkman



Once filled with sugary white sand, this beach is now covered in razor sharp zebra mussel shells. I knelt to take the photo, and when I stood, my knee was bleeding in 3 places.

Todd Brinkman

Todd Brinkman

by Tom Bansak

Invasive dreissenid mussels have been detected in Montana for the first time! In Fall 2016, Montana Fish, Wildlife & Parks (FWP) announced detections in four locations within the Missouri River Basin, including Tiber and Canyon Ferry Reservoirs. This news is extremely worrisome, and now we (society) must prevent the mussels from spreading from the Missouri into the Yellowstone and Columbia River Basins. Since these mussels are moved around on our boats, trailers, fishing gear and aquatic recreation equipment, we must therefore be the solution to prevent their further spread.

No mussels have been detected in the Flathead watershed nor anywhere west of the Continental Divide. This is important because the Flathead and Clark Fork Basins are the headwaters of the Columbia system, and the Columbia is the last major watershed in the continental US that does not have dreissenid mussels. Therefore the downstream states of the Columbia (i.e., Idaho, Washington and Oregon) are carefully watching how things play out in Montana, because the ecological and economic consequences can be significant.

One economic study estimated that zebra/quagga mussels -



Sizes of quagga mussels.
California Dept of Fish and Wildlife



Mussel clogged propeller.
Tom Britt/Flickr

which can completely clog a 4-inch pipe so no water can get through it – could cost Columbia Basin power producers over \$90 million/year just to keep their infrastructure functioning properly. Any industrial, agricultural, municipal or individual water or power user could be economically impacted by the mussels, and another recent study estimated potential economic mussel impacts to the Pacific Northwest at \$5-6 billion. These are big \$\$ numbers that we all need to take note of.

Another major potential economic impact of aquatic invasive species (AIS) like zebra/quagga mussels is declines in shoreline property values. When an invader makes a lake and its shoreline less desirable, market values adjust. Studies from across the US have shown nearly 20% declines in lakeshore property values with the arrival of new AIS. Since a healthy Flathead Lake elevates shoreline property values by \$6-8 billion, a 20% decline is a very big \$\$ number that everyone needs to take note of.

Despite Flathead Lake's world-

renowned water quality, it has already been impacted dramatically by introduced species. Non-native fishes currently dominate the biological community of the lake, in part due to the arrival of the invasive Mysis shrimp. Adding invasive mussels into the mix could change Flathead Lake again, potentially irreversibly. Here is how:

Ecologically, these mussels can be devastating. They reproduce rapidly (a single female can produce 1 million eggs in a 4-5 year lifetime) and can dramatically change ecosystems by consuming as much as 80% of the edible plankton – the base of the food web. This leaves very little food and energy for other species and can result in major changes to the community including crashes in fish populations. They also outcompete native mussels, concentrate toxins in their tissues and feces, and can cause toxic algal blooms.

The mussels grow in dense congregations (up to 100,000/m2!) on just about anything: rocks, docks, sand, mud, boats, trailers, other

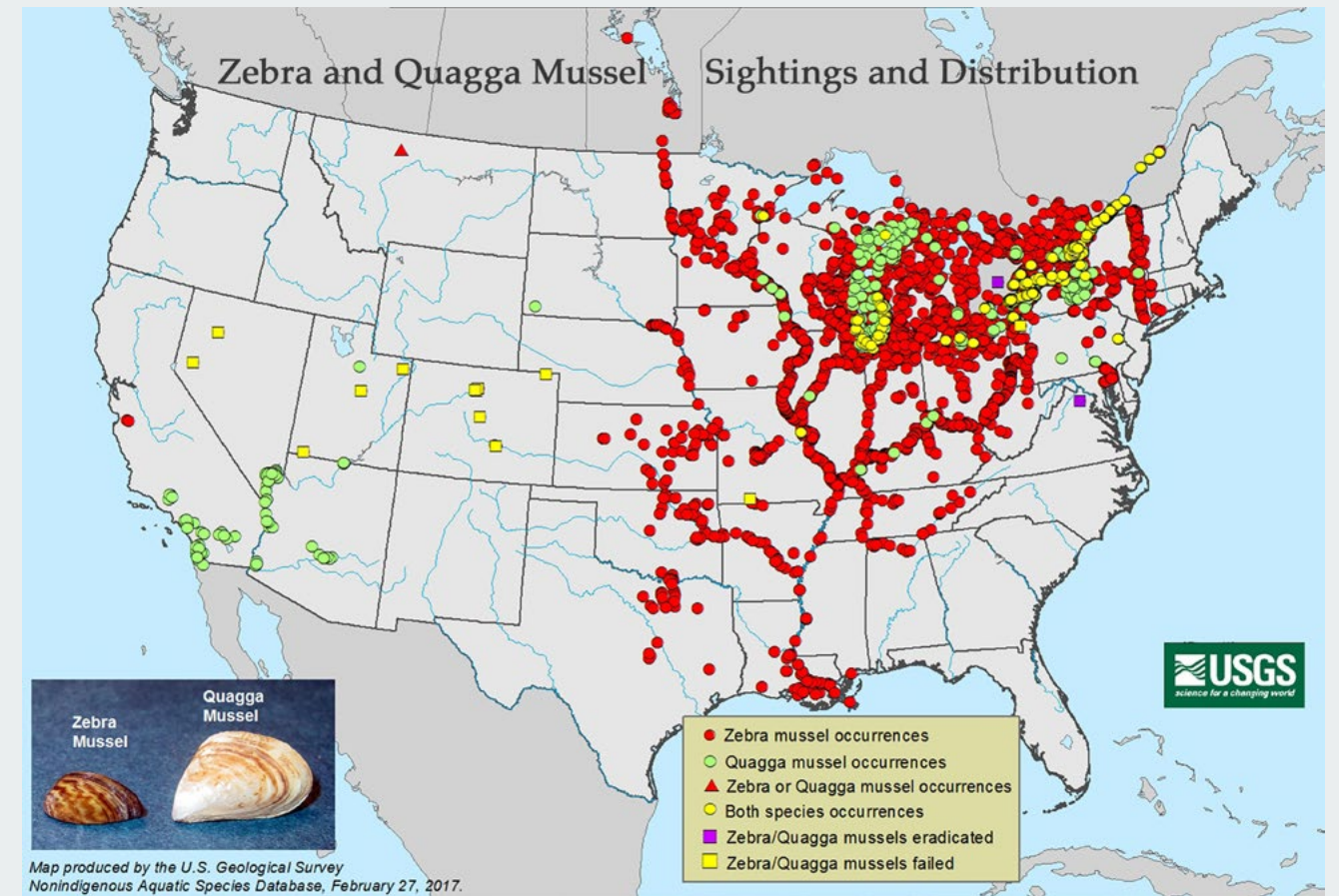
mussels, etc. Our native species do not utilize them as a food source, and there are not any diseases in North America known to affect them. So when they get to a new water body they do extremely well and their populations grow rapidly. And yes, from our examination at the Bio Station they could survive and reproduce in Flathead Lake.

Since they grow on everything, they can turn pleasant beaches into expanses of razor sharp shells. And since they concentrate toxins, their shells can cause infections when people and pets cut their feet. Angling opportunities (and associated economic revenue) can decrease due to fewer fish. Some states have closed mussel infested waters to recreation to prevent spread.

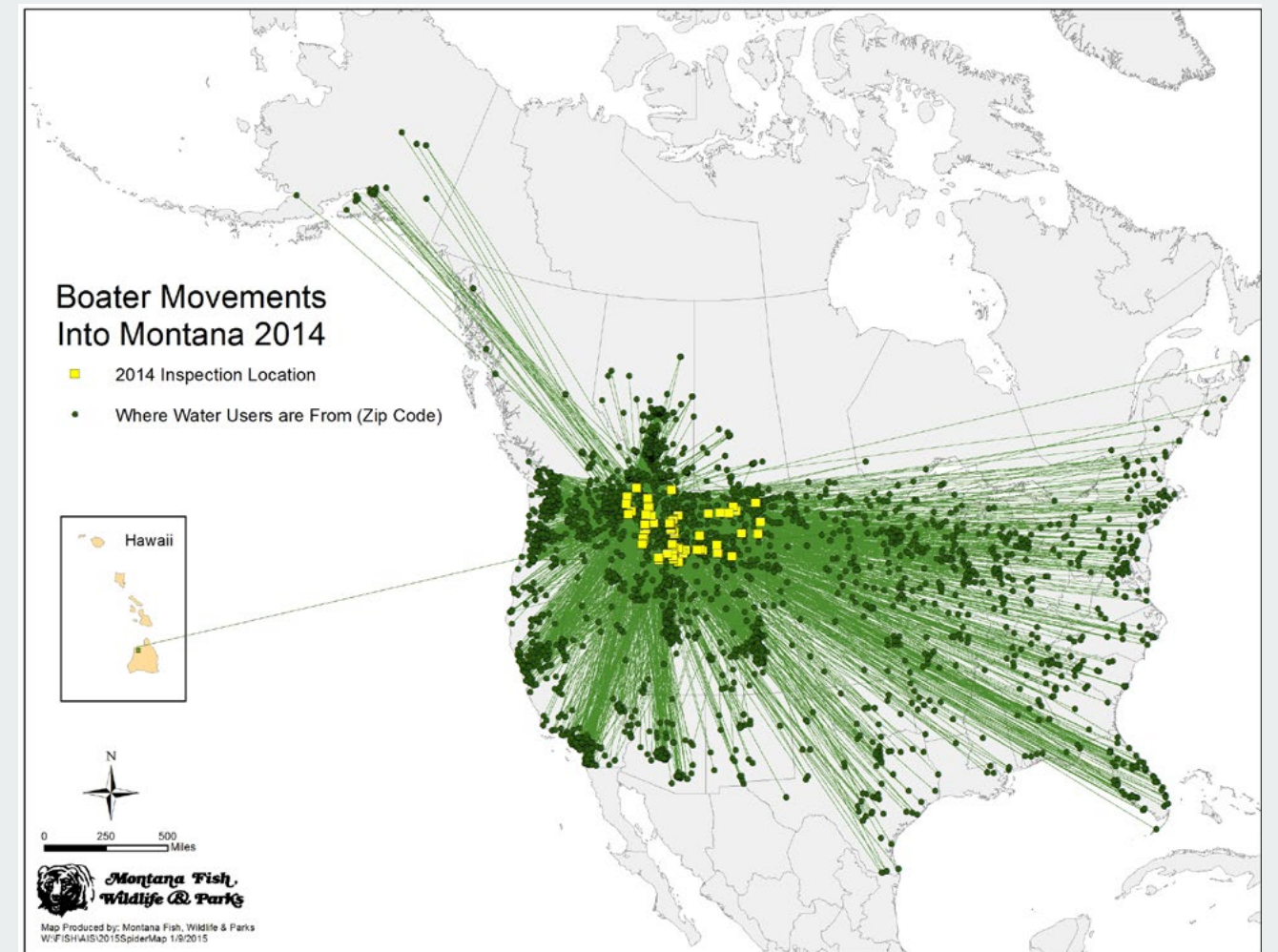
The mussels can spread downstream on their own, but they hitchhike overland and upstream on our boats, trailers, fishing gear and recreational equipment. The adult mussels can close up and survive in the air for days. Juveniles can survive for weeks in water in a boat's bilge, live well or even in the cooling system of its engine.

Flathead Lake is at risk!

It is the most visited water body in Montana and people bring their boats and trailers from all over the nation to enjoy its gorgeous waters. The closest mussel waterbodies, Tiber and Canyon Ferry Reservoirs, are now only a leisurely 2 hour drive from the Flathead. When we go and recreate on mussel waterbodies we run the risk of bringing them back with us to Flathead Lake.



Map produced by the U.S. Geological Survey Nonindigenous Aquatic Species Database, February 27, 2017.



Map Produced by Montana Fish, Wildlife & Parks W:FISH&W:2015SpiderMap 1/8/2015

CLEAN. DRAIN. DRY.



Specially trained dogs sniff out mussels. KQED QUEST



A rotting, foul smelling, mussel covered beach. Courtesy of Kansas Dept of Wildlife, Parks and Tourism

What Must Be Done

Since people are the vector of spread, we must also be the solution. Public awareness and public action are key to success. Other states that have invested heavily up front in educational outreach have fared much better than states that did not address this head on. In recent years, Montana's statewide education and prevention efforts by FWP and the Department of Natural Resource Conservation have ramped up dramatically as have local efforts by watershed stakeholders such as the Confederated Salish and Kootenai Tribes (CSKT) and the Flathead Lakers – there has been a Flathead Basin Aquatic Invasive Species Working Group since 2009.

Boat inspection stations operate around the state and the Flathead, and we are all being urged to “Clean, Drain and Dry” our boating and fishing gear in between uses. Hot water (>140 deg. F), drying and freezing are the best way to kill the mussels and other aquatic hitchhikers. With mussels now in Montana, the state is establishing decontamination stations near Tiber and Canyon Ferry Reservoirs, and mandatory inspection before launching boats in the Flathead/Columbia Basin is being considered by both the state and CSKT.

In the battle against these mussels, early detection is the name of the game. The largest infestation that has been eradicated is only about 30 acres. In localized areas, the mussels can be killed with toxic chemicals or by drawing down the water level to dry them out. However, once they are widely established in a large water body, no one has gotten rid of them. So finding them early in small areas offers the best hope of success.

Therefore state, federal and tribal management agencies, the Bio Station, non-profit and volunteer groups have all been monitoring for the mussels. There are two primary tools in the monitoring tool box. First is microscopy – where a plankton sample is collected with a net during the summer spawning season (July and August), and scientists examine those samples through a microscope for the free-floating juveniles.

The other technique being utilized and advanced by Bio Station researchers, especially Conservation Genetics Professor Gordon Luikart, is environmental DNA (eDNA). DNA from organisms (even from waste and sloughed cells) can be detected year round in the environment in water or plankton samples. For the last 5+ years the Bio Station and numerous partners have been using eDNA to monitor for mussels in 30+ Western Montana lakes. With this emerging technology, we do not even need to catch and find a mussel to know if they are here. We can detect the presence of mussels and other AIS from less than a single cell.

Since the state's announcement of mussels in Montana, the Bio Station has worked closely with local partners like CSKT and the Flathead Lakers to increase early detection monitoring. We collected 120+ eDNA samples from 30 sites around the lake in November/December 2016 (all came back negative), and will be doing this in Spring, Summer and Fall moving forward. If mussels arrive, we need to find them early to have a chance.



Water is collected and tested for the presence of mussels using environmental DNA (eDNA). FLBS

But there is a chance! We are the frontline of defense. Through early detection monitoring, public awareness and agency actions, we CAN keep the mussels from spreading. It has been done elsewhere, and we all are the key to protecting Flathead Lake and the other waters that we love. If we are diligent about “Cleaning, Draining and Drying” our boating gear and talking to our neighbors and out-of-state visitors about this risk we can prevent the spread.

More information (including a video) is available on the Bio Station's website (flbs.umt.edu) and the state's mussel website (musselresponse.mt.gov) and <https://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/> for info on where they are found.

Tom Bansak is the Assistant Director of the University of Montana's Flathead Lake Biological Station.

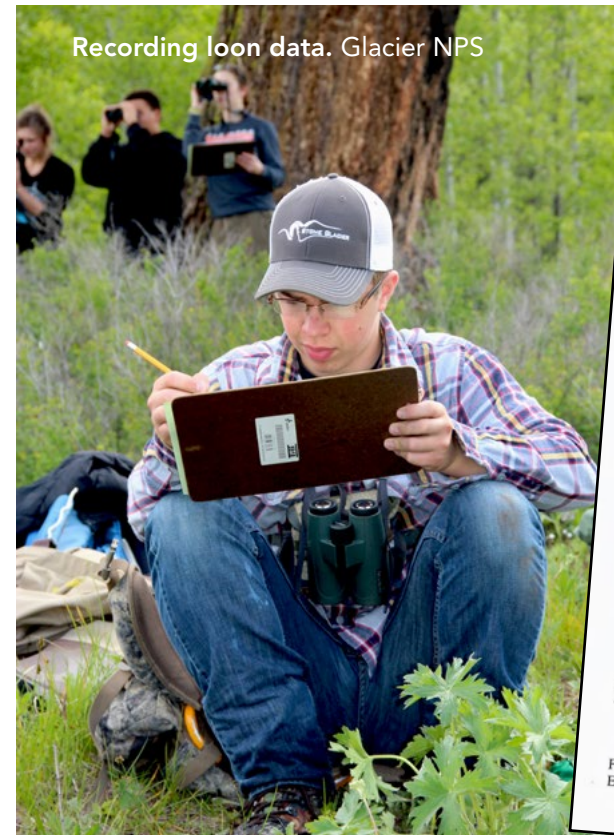
SCIENCE WANTS YOU!

Recruiting Citizen Scientists for essential data gathering



Celebrating working for Mother Nature. GlacierNPS

Recording loon data. Glacier NPS



GNP conservation form. Jane Ratzlaff

2016 GLACIER NATIONAL PARK LOON OBSERVATION FORM

Lake Name: Lower Twin med + Pray Observers: Jane Ratzlaff + Debra Leves Date: May 17, 2016

Phone/Email: Jane @ mtoutdoorlegacy.org Avg weather during survey (temp, wind, precip): 48 on arrival 64 on departure. Windy partly sunny

Start/End of Day: 6:00 am - 3:30 pm (Add'l Start/Stop) _____

Observation time: Start Time _____ Stop Time _____

Summary

# of Pairs	# of Singles	Total Adults	# of Chicks/Juveniles	# of Subadults

Total People we saw: Co. in lot - 12 Chick Stage: Downy young Small young Large young

People (on shore): 8 # of Boats (in water): 0 Type of Boats: _____

Significant Observations: _____ Confirmed Nesting: Y/N

Nest Status: Incubating Abandoned Hatched

GPS locations of nest site or other significant observations (in NAD 83): _____

BANDED BIRDS:

Color of Bands _____ Loon: (A1, C1...): _____

Left Leg _____ Right Leg _____

Closest to Body _____ Closest to Body _____

Closest to Foot _____ Closest to Foot _____

Space to sketch map (or include w/provided lake map; include locations of loon nests, chick/nursery areas, courtship and territorial behaviors, eagles/ravens, other important wildlife, landmarks, observation points, etc as to help us gain more concise data)

We did not see any loons. We did see 12 Bighorn Sheep on Rising Wolf. We also counted 2 goats on Rising Wolf and 9 at the Goat Lick on the way home.

Return form within one week of observation to:
 Mailing address: GNP-CCRLC
 Citizen Science Loon Project
 P.O. Box 128
 West Glacier, MT 59936
 Fax: (406) 888-7903 Phone: (406) 888-7986
 Email: GLAC_Citizen_Science@nps.gov

by Jane Ratzlaff

Through experiences like grizzlies and sage grouse being placed on the endangered or threatened species list, history teaches us that we simply need more data to ensure that humans, wildlife and wild places can co-exist. The introduction of the mycosis shrimp and lake trout in Flathead Lake without cause and effect research is now an expensive remediation. But research data and surveys are expensive. Enter citizen scientists, people just like me, who care about our lands, waters, and the living things they sustain. Here's my journey as part of that group.

Computer modeling and prior studies have helped pin point sites where a particular species is likely to be found. In order to find these areas, I was trained to use a GPS to find the waypoints to locate a predetermined site to conduct my survey. In addition, I learned basic safety rules to apply in the outdoors. After successfully completing my training sessions, I chose a location I wanted to survey. I was allowed to borrow the necessary equipment (GPS, spotting scopes, binoculars) or use my own. Some of the hikes into the survey sites are short day hikes while others are overnight stays and sometimes with a seasoned biologist. Not only am I helping to study the animals at the survey site, but I make observations as I

hike to and from the site.

While all citizen scientists are trained, we do not have the depth of knowledge of a biologist that has years of education and training. Mistaking a goat for a sheep, a black swift for a little black bird or a mouse for a pika can happen. In order to compensate for these things, multiple volunteers survey the same sites at different times. We are also asked to take pictures to help verify our sightings and data. Repetition is a wonderful way to get better at doing a survey! Once you have gone out on a survey, you begin to understand why research is time consuming and expensive.



Studying food chains of low elevation lakes. Glacier NPS



UM professor Dr Diana Six with the catch of the day... a large leech. Glacier NPS

As a citizen scientist, my job can include many things like:

***Hiking to an exact survey site (knowing that I may not see any animals) and sitting for an hour with my binoculars and spotting scope. If they are in the area, I count them, write down as many details as I can (including activities and gender), take pictures and observe other animals and birds in the area. What a wonderful way to enjoy taking an hour to enjoy the scenery, sounds and smells of nature!**

***Helping to trap animals and birds like ducks, bats and goats for collaring or to get blood samples. A seasoned biologist led the effort and I helped to acquire the data they needed to complete their research requirements. I also helped with a bat survey-done in the middle of the night in grizzly country-to search for signs of white nose syndrome.**

***Finding little critters like the pika, study their behavior and bring back some samples of their scat for DNA studies. Learning about them really heightened my interest in these adorable little rabbit family**

members. Now a peep out of them grabs my attention on every hike.

***Collecting dirt samples near permanent snow fields or glaciers to study vegetation. I thought stripes made the terrain interesting and learned more about soil supporting vegetation as we collected samples for a student research project. Going out with young aspiring scientists is just simply amazing.**

***Documenting nests for loons and raptor studies.**

Not only have I helped collect data that will be invaluable for researchers, I have grown and learned. Now every time I hike I am more aware of animals and their behaviors and pay special attention to those being studied. I didn't even know what a black swift was until I went out on a survey or that pikas are the canaries of global climate change. These days when I hike, I am more present and watchful for wildlife. I understand more of

their habitat and what to look for while hiking. I share data even when I am not on an official study and I am proud to do my part in contributing to a healthy eco system. It made me realize that being a conservationist is critical, that each of us has a role in co-existing with nature and that I cannot take the outdoors I love for granted. It also taught me to slow down and focus on the journey!

*Jane Ratzlaff is the Executive Director of Montana's Outdoor Legacy Foundation.
www.mtoutdoorlegacy.org*



Collecting samples with dip nets. Glacier NPS

If you are interested in citizen science, below are a few of the many environmental entities you can contact.

Greater Yellowstone Coalition
Email: sdrimal@greateryellowstone.org
Phone: Shana 406-556-2813

Crown of the Continent Research Learning Center
Email: glac_citizen_science@nps.gov
Phone: 406-888-7986
www.crownsience.org/getinvolved/citizen-science
www.nps.gov/rlc/crown/index
www.nps.gov/rlc/crown/bioblitz

Miistakis Institute (Canada)
www.rockies.ca/projects.php

Montana Audubon
www.mtaudubon.org/about/get-involved

Montana Wilderness Association
Phone: Amanda Hagerty 406-443-7350
Email: ahagerty@wildmontana.org
www.wildmontana.org/discoverthewild

The Nature Conservancy
www.blog.nature.org/science/category/citizen-science/

US Environmental Protection Agency
www.epa.gov/citizenscience

University of Montana Wilderness Institute
www.cfc.umt.edu/wi/education/citizen-science/volunteer.php

Yellowstone Wolf Project
www.yellowstonewolf.org



Bighorn sheep. Tim Rains/NPS



Surveying for bighorn sheep. Glacier NPS

WHO'S AFRAID OF THE BIG BAD WOLF?

by Brandon Keim

IN 2007

, a family of wolves in Idaho's Sawtooth National Forest killed nine sheep. Ranchers who owned the sheep asked government wildlife managers to kill the wolves; but local wolf supporters and conservationists protested, asking instead for a non-lethal solution. So began what became the Wood River Wolf Project, a landscape-scale, multi-year experiment in how ranchers, livestock, and wolves can live together peacefully.

Nearly a decade later, the results are in—and it was a resounding success. In one of the most intensively grazed regions around, non-lethal wolf control led to “the lowest loss rate among sheep-grazing areas in wolf range statewide,” write Wood River Wolf Project researchers in the *Journal of Mammalogy*. Coexistence, not killing, was best for livestock.

The study's lead author is Suzanne Stone, a wolf conservation expert at Defenders of Wildlife, a prominent animal advocacy

group. The second author is ecologist Stewart Breck of the US Department of Agriculture's Wildlife Services program, which over the last several years has been widely criticized for wantonly killing predators. That ostensibly opposed parties should find common ground seems fitting.

As described in their study, researchers from the Wood River Wolf Project collaborated with ranchers to make roughly 450 square miles of rangelands off-limits to killing wolves. Field technicians worked with them to deploy deterrents—guard dogs, wolf-scaring flags, increased human presence—and change practices, such as leaving carcasses on the landscape that invited predation. On an adjacent rangeland of equivalent size, wolves were allowed to be killed. Business there continued as usual.

Between 2008 and 2014, wolves in the protected area killed just 30 sheep. Wolves in the unprotected area killed 314 sheep. When



Kris Thoreson sets up a camera trap.
Lauren Hennelly



Range riders patrol public and private ranch lands.
Suzanne Stone



Fladry – a flag fence used to ward off wolves. Suzanne Stone

Golden wolf. Oregon Dept of Fish and Wildlife



adjusted for the industry metric of “sheep days,” or the total number of days spent grazing by sheep, livestock mortality rates were a full 3.5 times higher where wolf-killing continued. Both regions had similar wolf populations and similar landscapes; in the protected area, wolves simply focused on eating wild animals and left livestock mostly alone. “The solution becomes pretty obvious,” says Stone. “If you’re going to be on the landscape for a long period of time, you find ways to coexist.”

Stone is excited about the results. Home to some of the highest concentrations of sheep in the United States, the Sawtooth National Forest makes for a dramatic demonstration site. “The US Fish and Wildlife Service told ranchers in our area that because it’s such a large-scale sheep operation, they’d always have problems with wolves if they didn’t kill them,” says Stone. “We picked this region partly for that reason. If any place would be a good test to disprove that belief, this was it.”

An even more difficult challenge than protecting sheep may be convincing ranchers to try coexistence. Wolf issues are extremely controversial, and even potentially amenable ranchers “think their neighbors might judge them badly, if they’re supportive of wolf conservation,” Stone says. Hopefully the numbers will be persuasive. “When we step back from the politics and look at the goals here,” she says, “for them it’s to keep livestock alive and for us it’s to keep wolves alive. And these methods make the most sense. They do both.”

Ranchers open to coexistence will also need help. While sheepherders took over after several years from the project’s field technicians, that early assistance was invaluable. Such

Finding Common Ground

The Wood River Wolf Project (WRWP) is becoming one of the largest and most comprehensive wolf coexistence efforts in the country.

Inspired by the success of the WRWP model, wildlife biologists in other states and researchers from Europe and Australia are developing similar stakeholder-driven projects to address wildlife and livestock conflicts.

Since its inception in 2008, the Wood River Wolf Project has:

- Kept sheep losses to wolves at less than 1%, which is 90% lower than losses reported in the rest of the state.
- Kept the number of wolves killed by Wildlife Services in the project area at zero.
- Provided agencies and livestock cooperators with training in radio telemetry monitoring, turbofladry, sound and light deterrents, radio-activated alarm systems, carcass removal, and other nonlethal deterrent techniques.
- Co-sponsored wolf-livestock coexistence workshops with the Blaine County Commission to educate area ranchers, state and federal agencies, and international researchers about the project.
- Served as a testing ground for nonlethal coexistence methods.
- Created a site-analysis system to collect data and recommend best practices for individual ranchers and landowners.

Techniques Used

Human Presence

Increasing human presence is the most effective way to keep wolves away. WRWP is coordinating to have groups of volunteers camp with the sheep when wolves are nearby. The scent and sounds of humans make wolves wary.

Dogs

Invaluable partners in the effort to reduce conflicts between livestock and wildlife, Livestock Guardian Dog breeds have been used for centuries to protect livestock. The most well-known in the US are the Great Pyrenees, Anatolian Shepherds, Akbash and Maremma. On sheep ranches, puppies are kept with a few ewes to ensure that they bond with sheep. They learn from their mother and other older dogs to fiercely guard their sheep and to sound the alarm when predators are nearby. The dogs are often outfitted with collars spiked with long nails to help protect them if they should need to engage with wolves or other raiders.

Hikers and bikers may encounter guard dogs in the backcountry. If they bark aggressively, they are doing their job; usually, a very firm, loud “No!” will keep them at a distance.

Band Kits, which accompany each sheep band, contain the tools needed that herders and volunteers can deploy when wolves are nearby.

Foxlights – deliver a computerized varying flash that uses 9 LED bulbs that project 360 degrees and can be seen from 1 kilometer away. These lights make it appear that someone is patrolling with a flashlight. Battery- and solar-powered Foxlights are being used all over the world to protect livestock from lions, snow leopards, wolves, bears, foxes, and other predators.

High-powered spotlights - used in addition to headlamps when herders are keeping watch over the sheep at night.

Fladry - a string of flags on temporary stakes. Put off by the motion of the flags, wolves shy from crossing a properly maintained fladry barrier, often for long enough to keep lambs and calves safe

Turbofladry - consists of cording with colored flagging spaced evenly along its length. Strung on electric fencing material, if a wolf does overcome its initial fear of normal fladry and attempts to pass, a shock is delivered and reinforces the avoidance instinct. Fladry is best used in certain environments and is not suitable for all situations.

Three different noisemaker tools used on an irregular basis keep wolves from becoming conditioned to one type.

Starter pistol - uses .22 blanks and is a safer alternative to bringing actual firearms into the backcountry and firing them at night and also reduces the chance of accidentally starting a wildfire.

Boombboxes - loud noise of the music is unfamiliar to the wolves and will make them wary of approaching the sheep band.

Airhorns - extremely loud and jarring.

woodriverwolfproject.org



Suzanne Stone



Suzanne Stone



Suzanne Stone



Courtesy of Defenders of Wildlife

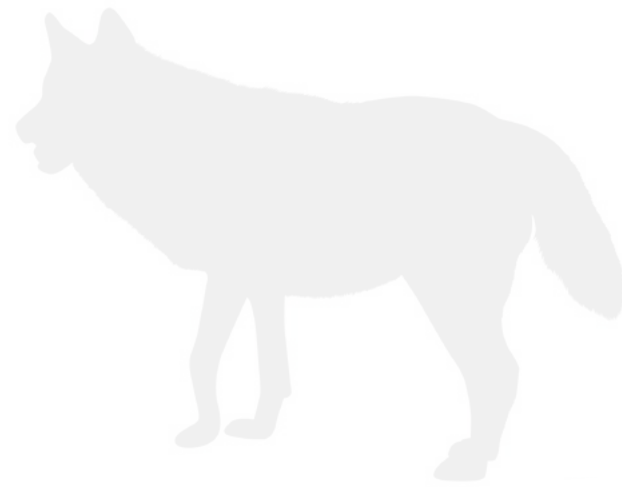
guidance needs to be made widely available. That's slowly starting to happen as wildlife agencies respond to pressure from an animal-loving public. "We're seeing entire states take on this new mandate," Stone says, and the project's lessons—not each individual wolf-detering tactic, necessarily, but its general approach to reducing conflict—may extend to other animals.

"A lot of the methods we're using also apply to coyotes, mountain lions, bears, and fox," contends Stone. "It's good for all wildlife, not just wolves."

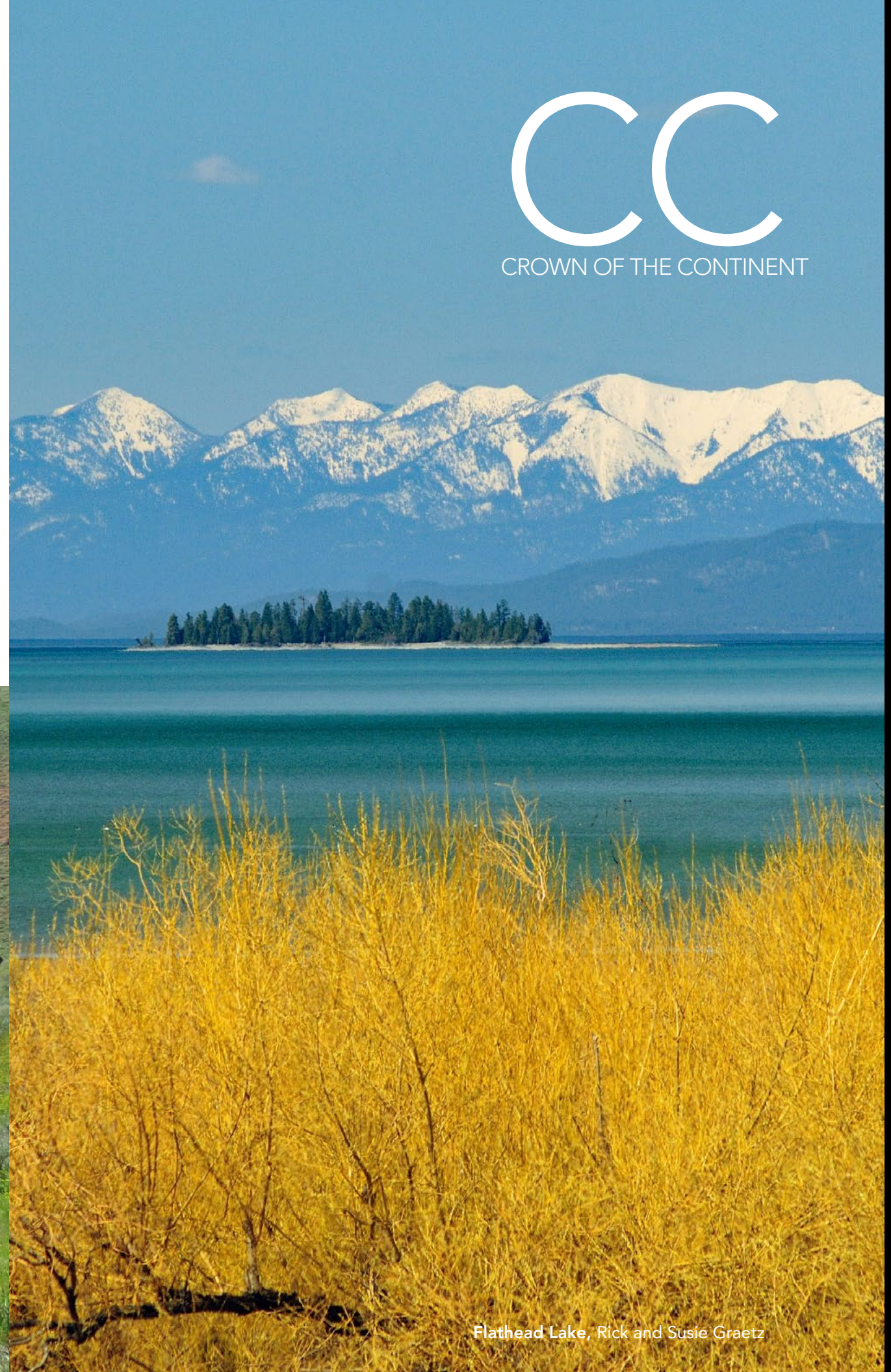
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Brandon Keim is a freelance journalist specializing in science, animals and nature. He is also the co-founder of an insect-based cat food company.

Anthropocene is a digital, print, and live magazine, whose mission is to curate a global conversation about data, technology, and innovation that lead to solutions to the persistent environmental challenges of our time. anthropocene.org



Suzanne Stone



Flathead Lake, Rick and Susie Graetz

ADORABLE, BUT IN DANGER

by Sharon Levy

Oct 13, 2010 in *onearth.org* <http://archive.onearth.org/article/adorable-but-in-danger-as-climate-changes>

I hustle to keep pace with Chris Peterson, a tall, lanky man who strides along a steep slope just below Logan Pass in Montana's Glacier National Park. Lugging a 14-pound camera lens doesn't even slow him down. At the edge of a talus field—a swath of boulders that lie heaped and tumbled across the mountainside—Peterson stops, and we both settle down to watch and listen. Our quarry is a petite, furry cousin of the rabbit known as a pika, which in the American West, has become a sentinel for climate change.

I fell for pikas when I first hiked the Rockies and Cascades in the 1970s. They were easy to track back then, crying out from the entrances of their homes in high mountain crevices, their calls echoing off boulders. But in Oregon and California, where I've lived for most of my adult life, pikas are vanishing from the lower-elevation, easier-to-reach parts of their range. I haven't seen or heard one in more than 20 years. So I crouch next to Peterson and listen.

Petite relatives of the rabbit, pikas are disappearing from some parts of their range. A visit to one of the places where they still flourish rekindles a decades-old love affair.





Peterson has done a lot of sitting still here. He's the editor and publisher of *Glacier Park* magazine, but on this trip, he's also part of a citizen science project designed to monitor and track pikas and mountain goats, both of which face dramatic warming in their high-elevation habitats. Pikas are the only mammals that survive alpine winters without hibernating or migrating down-slope. Huddled in rocky crevices, they wait out the cold months, feeding on hay collected during the

summer. But the thick fur that used to serve them well on cold, wind-swept mountainsides may cause the little critters to overheat as climate change brings warmer summer temperatures to the mountains of the West. And during the winter, deep snowpacks that once served as good insulation for the animals—like the thick-walled igloos that keep Arctic residents warm—are thinning.

With less protection from extreme cold, some pikas may freeze to death on icy mountaintops.



Chris Peterson

Glacier's high country where pikas like to live. Tim Rains/NPS

“Protecting the pika is about getting the word out and encouraging people to change the culture...”

If more people could fall for pikas the way that I did back in the '70s, perhaps more people would care that they're threatened. That's part of the idea behind the project that's sending volunteers like Peterson to remote alpine rock piles to look and listen for them. The data collected will also help scientists track the impacts of climate change on the park's wildlife.

In a way, it's a frustrating experiment, because their findings are unlikely to suggest a solution beyond the obvious one—stop polluting and heating up the atmosphere. But that's partly the point. "Protecting the pika is about getting the word out and encouraging people to change the culture," says Lucas Moyer-Horner, a University of Wisconsin graduate student who studied Glacier's pikas for three years. "People actively participating as citizen scientists are doing just that."

At this point, the pikas appear to be surviving better here than the glaciers that give the park its name. The latest forecast predicts that all of the park's glaciers will have melted away by 2020. But Moyer-Horner has found

that, so far, all the talus piles of any size in the park seem to shelter pikas. He and other biologists found that while the animals busily foraged in the early morning and late afternoon, they cut back on their activity and sheltered beneath boulders during the heat of the day. Pikas were more active and more numerous at higher elevations in the park and in places that have bigger boulders and deeper talus deposits, which offer better shelter from the heat.

Pikas farther south aren't doing so well, though. In the late 1990s, biologist Erik Beever searched for pika populations that had been previously documented in the Great Basin, a vast sweep of land dotted with 314 mountain ranges and encompassing parts of California, Nevada, Utah, Oregon, Idaho and Arizona. He found that seven of 25 populations had vanished, an extirpation rate of about 30 percent. Pikas disappeared from the warmer, lower elevation parts of their range; those that survived were found in higher, colder habitats. A separate study found that pikas in the Sierras



Scanning a talus slope for pikas (Citizen Science). Glacier NPS

Janine Waller/NNP



Fun PIKA facts

- Related to rabbits, North American pikas (*Ochotona princeps*) have evolved to live in cold climates on the fringe of talus slopes and meadows with suitable vegetation. The pika's small size allows it to find cover under rocks to avoid predators such as weasels and birds of prey.
- Solitary herbivores, they spend the summer months gathering plant materials and storing them under rock enclosures. Known as haystacks, these collections of grasses, sedges, twigs, moss and flowers allow them to endure the harsh climate of the mountains without having to hibernate or go to lower elevations.
- Through scent-marking and aggression, individual pikas defend home territories of approximately 4,300 square feet. Generalized as herbivores, they also eat their protein-filled fecal pellets. Not only do they feed on grasses, sedges, twigs, moss, flowers and pellets, but collect and store them as well. Since pikas do not hibernate, these storage caches, known as hay-piles, provide supplemental nutrients to help them survive the nine-month alpine winter. Excellent cold-climate survivalists, their thick, furry coat and high metabolism keeps their body temperature at 104°F. These attributes benefit pikas in the winter, but are ineffective for staying cool in warmer weather. In fact, a pika begins to

experience potentially fatal stress levels when its body temperature reaches 109°F. Predicted warming, due to climate change, may pose problems. A succession of hot days may force them to spend more time underneath the talus to regulate their body temperature, which would mean less time spent above ground foraging for food.

- Over 8,000 years ago, pikas lived in valley bottoms and grassland habitats in North America rather than the colder alpine areas of today. If the alpine warms at predicted rates, even the mountain summits may not be cold enough to sustain their populations. Warming temperatures may also affect the rock rabbits' reproduction.

Averaging only 2-3 offspring per litter, a pika's first of two litters is conceived one month prior to the melting alpine snow pack. Timing is critical because it provides the lactating female with an abundance of food when she needs it most. Earlier snowmelt and unpredictable winter snow pack depths may disrupt natural timing, potentially leaving the offspring and mother susceptible to starvation.

- Climate models predict that the average temperature in North America will rise 2-10 °F by the end of the 21st century. Northwest Montana's average temperature has already risen 2.34 °F (1.8 times the global average) in the last century, with high elevation areas warming at

an even faster rate. Increasing temperatures could reduce the amount of suitable pika habitat. Conifers encroaching into alpine or subalpine meadows could reduce available forage as well as obstruct a pika's ability to detect predators.

The Crown of the Continent Research Learning Center coordinates several citizen science programs. Surveys are conducted by volunteers to determine distribution of pikas in the park, and to monitor any changes in that distribution. Glacier is one of eight national parks conducting these surveys. The data collected will establish a foundation for long-term monitoring of this charismatic creature.

**Crown of the Continent
Research Learning Center**
www.crownsience.org



Janine Waller/YNP

in Yosemite National Park had moved 1,700 feet higher up the mountains over the past 90 years. These findings suggest that as temperatures continue to climb, pikas will become increasingly isolated on small islands of alpine rock, unable to cross the warm valleys. That's a recipe for genetic isolation and more local extinctions.

Moyer-Horner has wrapped up his pika study, which means that keeping track of what happens to the little rock rabbits in Glacier will fall mostly to volunteers like Peterson. Jami Belt, who coordinates Glacier's citizen science program, tells me that most of the 100-plus volunteers are locals who can reach the park with an hour or two of driving, and all have a passion for the mountains. Many have told Belt that they need a reason to get out to the park more often. Others say that volunteering is a way to give back to a place that feeds their souls.

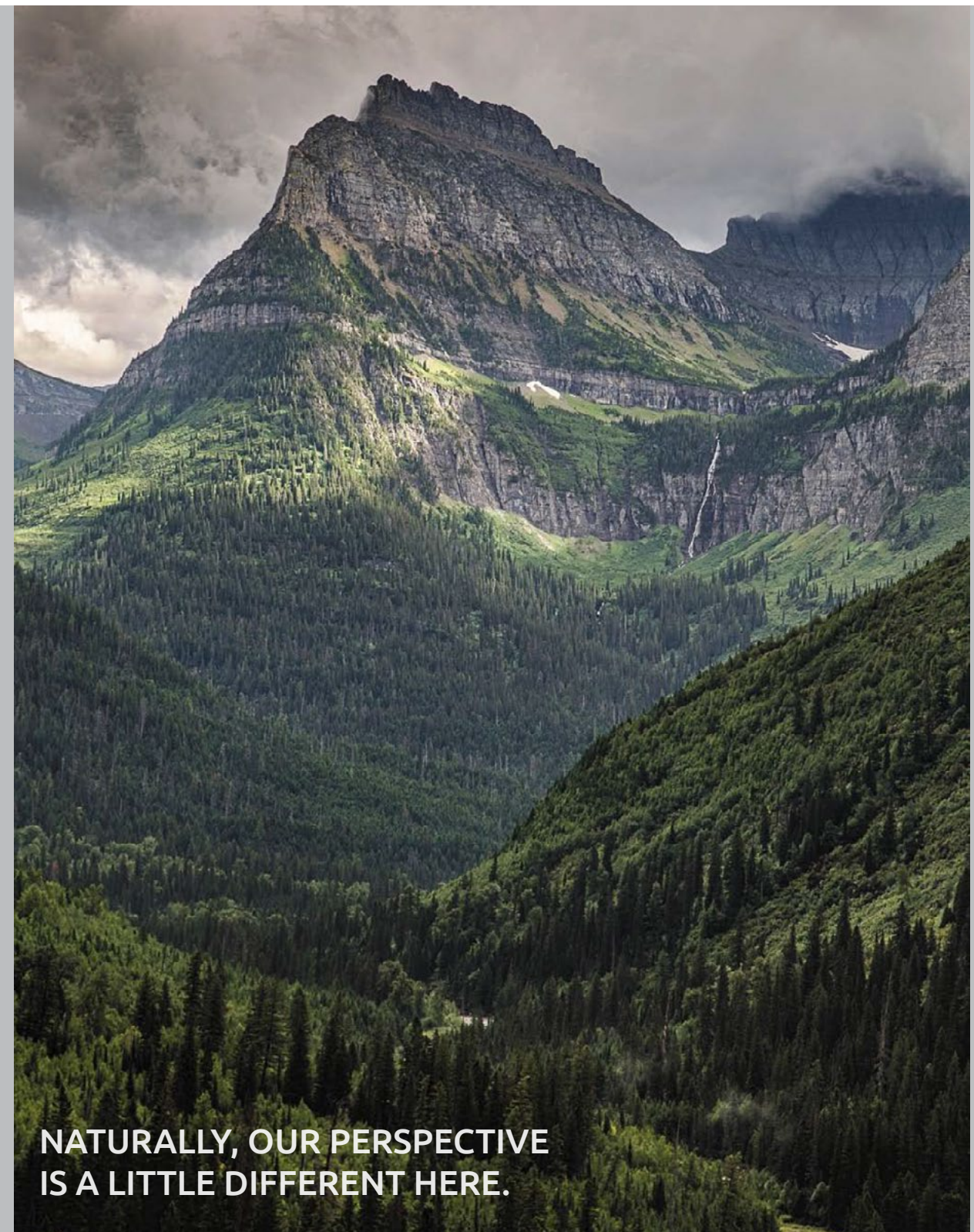
Peterson understands that feeling. He estimates that he hiked about 180 miles of trail last year looking for pikas and mountain goats. He's documented several previously unknown pika populations during his marathon walks. A few minutes after we settle in at the edge of our talus field at Logan Pass, he points out the shape of a bighorn ram camouflaged above us on a gray-brown cliff. While a dark cloud drizzles rain onto our parka hoods, Peterson

scrambles easily among the boulders. He uncovers the remnants of an old pika hay pile, a heap of brown, desiccated fir needles, asters, and penstemon. The same plants now flourish around us in bright summer shades of green, purple and yellow.

After the cloudburst has passed, we hear the distinctive, high-pitched exclamation of a pika announcing its territorial rights. Following the sound, we spot it twitching at the entrance to its rocky warren, scanning for competitors of its own kind. Seen up close, the pika is painfully cute, its black eyes shining, nose twitching, short ears swiveling to capture sound. I feel my heart beat a bit faster. It's good to know that these tough, charming creatures still haunt some of the high mountains of the west, even if they've faded from some of the places I first saw them decades ago. And I'm glad a small army of dedicated volunteers is keeping watch over them.

I savor the moment, then head back uphill toward my car. Peterson lingers, clicking close-up portraits of the pika. "I always have trouble saying goodbye," he explains.

Sharon Levy spent a decade working as a field biologist in the woods of Northern California before taking up science writing full time. She is a regular contributor to National Wildlife and BioScience. sharon@sharonlevy.net



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Heavens Peek. Jacob W. Frank/NPS



INTERNATIONAL DARK SKY PARKS DESIGNATION

Waterton and Glacier national parks already share a boundary and three joint international designations: International Peace Park, Biosphere Reserve, and World Heritage Site.

Now, they add a fourth designation... the first trans-boundary IDA International Dark Sky Park.

Dark skies are integral not only for human health and enjoyment, but play an essential role in wildlife

health. Unnatural light can disrupt migration and other natural processes, putting wildlife at risk. Night skies are also important culturally, and are prominently featured in regional tribal creation stories. Recent studies suggest that upwards of one-third of the world's population is unable to see the Milky Way due to light pollution around populated areas.

Parks Canada and the National Park Service have been working cooperatively to achieve Dark Sky Status since 2006. To achieve the designation, each park completed a significant number of lighting improvements to reduce light pollution as well as committing

to completing further lighting retrofits in the coming years. The parks will also continue to educate visitors about the importance and significance of the dark night sky resource.

Parks Canada is installing dark sky-compliant lighting in the community of Waterton and others areas within Waterton Lakes National Park as part of infrastructure projects over the next three years. All new development will adhere to Dark Sky requirements.

Parks Canada offers dark sky theater programs and stargazing through telescopes at special events led by staff and volunteer

astronomers. For more information call (403-859-2224) or email: waterton.info@pc.gc.ca

To date, Glacier National Park has retrofitted approximately 29% percent of its fixtures. The park received significant philanthropic support from the Glacier National Park Conservancy to make this designation a reality. The GNP Conservancy will kick off a campaign this summer to raise funds for the remainder of the needed improvements that must be completed by 2019.

Glacier's night sky programs are the most popular programs in the park with some Logan Pass star party events attracting upwards of 700 participants a night. This coming year, the GNP Conservancy will support the popular solar viewing and night sky viewing parties that regularly see 30,000 visitors each year.

The Canadian Food Inspection Agency warns that the entire Oldman River watershed, including Waterton Lakes National Park, is infected with whirling disease. Predominantly affecting rainbow, westslope, brook, cutthroat trout, and mountain whitefish, the disease can cause them to swim in a circle (chase their tail, so to speak), develop a black tail, acquire deformities, and die prematurely.

First detected in the upper Bow River in September 2016, the infected area now extends to the Canada-US border, where the concern is that waters in and around Glacier National Park could possibly become infected.

Whirling disease only affects members of the trout and salmon family. The infective stage of the disease is not capable of penetrating human skin and tissues, and cannot survive at human body temperature. While the disease can devastate fish populations, swimming in the infected waters or eating an infected fish is totally harmless to humans.

WHIRLING DISEASE STRIKES AGAIN

Not as deadly as once feared, however, this trout killer is still a potential threat to our coldwater fisheries.



Notice the curved tails. Courtesy of Oregon State University

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Thanks very much!

The editors—Rick Graetz, Susie Graetz, and Jerry Fetz

CC|GY

CROWN of the CONTINENT and the GREATER YELLOWSTONE MAGAZINE

A photograph of a traditional teepee in a grassy field. The teepee is made of light-colored fabric with a blue band near the top and a red band with white circular patterns at the bottom. It is supported by several wooden poles. In the background, there is a wooden fence, rolling hills, and a large rainbow arching across the sky. The sky is a mix of blue and grey, suggesting a recent rain.

Shoshone-Bannock, Nez Perce, and other tribes favored the Centennial Valley for its rich hunting grounds. Rick and Susie Graetz