



Montana Natural History Center

Fall 2018

MONTANA Naturalist

TO PROMOTE AND CULTIVATE THE APPRECIATION, UNDERSTANDING AND STEWARDSHIP OF NATURE THROUGH EDUCATION

Wildfires of the Future: Learning to Adapt to the New Era of Wildfire and Climate Change



Spying on Scavengers | Climate Smart Missoula | Wild Rivers | In the Shadow of Rain

inside

Features

4

WILDFIRES OF THE FUTURE

Learning to adapt to the new era of wildfire and climate change

BY GIL GALE

8

SPYING ON OUR CONNECTION TO SCAVENGERS

The Bitterroot Valley Winter Eagle Project

BY MICHAEL MCTEE



4



8



14



15

Cover – A moose cow and calf were feeding at a lake in Glacier National Park when a large bull emerged from the trees. He was intent on getting close to the female but stopped and spent a few moments with his daughter.

Photo by Susan Schalbe, an avid nature photographer who spends every free moment out in nature documenting what she sees.
[flickr.com/photos/susansnaturephotos](https://www.flickr.com/photos/susansnaturephotos)

Departments

3

TIDINGS

11

GET OUTSIDE GUIDE

Kids' Corner: summer camp creations; nature books for kids; fall scavenger hunt; Milltown State Park

15

COMMUNITY FOCUS

Climate Smart Missoula
BY ALLISON DE JONG

16

IMPRINTS

MNHC exhibit update; welcoming Kelli Van Noppen; join us at our annual banquet and auction; As To the Mission; Hunting and Gathering lecture series

18

VOLUNTEER SPOTLIGHT

Kelly Dix

19

NATURALIST NOTES

Moths, native and introduced



16



23

20

FAR AFIELD

In the Shadow of Rain
BY ALISON JAMES

22

MAGPIE MARKET

23

REFLECTIONS

Wild Rivers

No material appearing in Montana Naturalist may be reproduced in part or in whole without the written consent of the publisher. All contents © 2018 The Montana Natural History Center.



Montana Natural History Center
Connecting People with Nature

120 Hickory Street, Suite A
Missoula, MT 59801
406.327.0405
MontanaNaturalist.org

Organizational Support & Outreach:

Executive Director

Thurston Elfstrom

Development Director

Mark Schleicher

Marketing Director

Sarah Millar

Communications Coordinator

Allison De Jong

Front Desk Associates

Alyssa Cornell

Nikola Davis

Educational Programming:

Education Director

Lisa Bickell

Community Programs Coordinator

Christine Morris

Youth Programs Coordinator

Stephanie Laporte Potts

Teaching Naturalist & Volunteer Coordinator

Drew Lefebvre

Teaching Naturalists

Christine Wren

Bailey Zook

Research Specialist & Wings Over Water

Program Coordinator

Jenelle Dowling

ID Nature Coordinator

Kelli Van Noppen

Wings Over Water Program Assistant

Heather McKee

Volunteer Visiting Naturalist Instructor

Rod Snyder

Board of Directors

Ian Foster, *President*

Kelley Willett, *Vice President*

Stephanie Lambert, *Secretary*

Wayne Chamberlain, *Treasurer*

Peggy Christian

Hank Fischer

Katie Guffin

Marcia Kircher

Sarah Megyesi

Edward Monnig

Rick Oncken

Tom Roy

Stephen Speckart

Allison Young

Montana Naturalist Art Director

Eileen Chontos

tidings

I have a new source of joy in my life these days: my son, Rowan, whom my husband and I welcomed into the world this past April. And what a world we got to welcome him into. The day we brought him home was warm and sunny, a startling contrast to the late spring snow and cold we'd had just a few days before. Those first few weeks of Rowan's life, the hills turned green, the spring flowers bloomed in glorious profusion, and we spent hours outdoors every day—walking miles up the Rattlesnake, or Pattee Canyon, or the North Hills, Rowan curled up in his carrier, warm against our chests, then coming home to relax in the sweet haven of our backyard, basking in the brilliance of a western Montana spring.

Time slowed down for me, this spring and early summer. I had the privilege of focusing my attention on this new little life, and in doing so was able to focus as well on some of the simpler pleasures: enjoying the company of friends and family, relishing good food, and simply watching my son take in more of the world every day. We spent a few magical afternoons in a shady nook along Rattlesnake Creek, well provisioned with chairs, blankets, and snacks, all three of us mesmerized by the bright burbling water.

Having this sweet new being in my life has intensified everything I experience. The joy is greater, but so too is the sense of responsibility. So too are the worries and challenges. I want Rowan to grow up in the best world possible, and I worry about climate change, about polluted air and water, about our wild places. I want to do all I can to make this world a better place for him and for all who come after us.

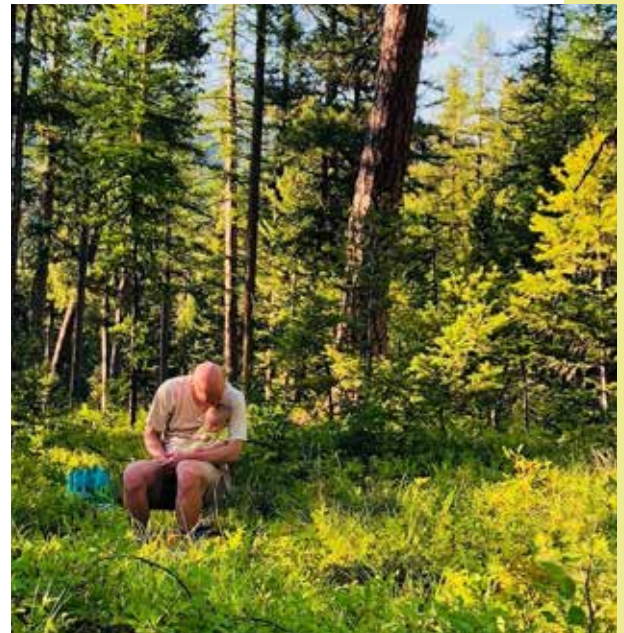
And so I am glad, this year, to celebrate the 50th anniversary of the Wild and Scenic Rivers Act, which protects our rivers for future generations, and to know that the most-recently designated river is East Rosebud Creek, here in Montana's Absaroka-Beartooth Wilderness (page 23). I am inspired by naturalists like Alison James, who remind us of the beauty of phenomena such as the rain shadow effect (page 20). And then there is the work of biologists like Kate Stone and Rob Domenech, who study the way eagles and other animals scavenge carcasses, gaining insight into our local wildlife while also giving citizen scientists an opportunity to participate in scientific research (page 8). I am grateful, too, for ecologists who are studying the effects of climate change on forest fire behavior and brainstorming long-term solutions (page 4), and for the good work of organizations like Climate Smart Missoula, who are helping our community be resilient in the face of our changing climate (page 15).

There are many people who are working to help sustain the beauty and wildness of our natural world in the face of significant challenges. And I look forward to watching my son take his place in this world, watching how he changes it for the better.

Allison De Jong

EDITOR

adejong@MontanaNaturalist.org



Enjoying a golden evening amongst the larches in Pattee Canyon.

PHOTO BY ALLISON DE JONG

**"INTELLIGENCE
IS THE ABILITY
TO ADAPT
TO CHANGE."**

– Stephen Hawking,
physicist

THE WILDFIRE- CLIMATE CHANGE LOOP:

Part 3: Learning to Adapt to the New Era of Wildfire and Climate Change

BY GIL GALE

Top: Early 1900s: Example of a Montana low- to mid-elevation landscape with historic patterns of wildfire frequency and intensity producing a mosaic of vegetation cover types that includes forest, grassland, and shrubland species.

Center: 1980s: The same site as the top photo after more than 70 years of sustained wildfire suppression resulting in dense timber stands with heavy understory fuels.

Bottom: Potential 2100: The same site as above photos showing a potential landscape vegetation scenario under a continually warming and drying climate. An increase in frequency and intensity of wildfires could result in the replacement of the forest cover with grass, forb, and shrub species along with a new set of wildfire behaviors.

The next time you are standing on a ridgetop in the northern Rockies or driving through a Montana river valley, take a few moments to look hard at the forested landscapes around you that haven't yet experienced recent wildfires. What you see now is most likely not the way the land will look in 50 years and beyond.

Wild places are inherently dynamic. Change has always been a permanent natural process in the fire-accustomed wildlands around us, with multiple environmental and social drivers constantly altering what we observe. But human-caused climate change is beginning to impose strikingly unfamiliar scenarios onto our wild places and confronting us with new management challenges, especially in dealing with wildfire behavior.

The two previous articles in this magazine about the climate change-wildfire loop (see the Fall 2014 and Winter 2014-2015 issues) looked at the interplay of long-term weather changes between both historical and newly emerging forest conditions that in turn affect wildfire intensity and frequency in our western fire-adapted landscapes. Those articles explained that the buildup of woody fuel loads over the last 100 years (partially because of fire exclusion) and the broad unbroken continuity of those high fuel loads across forests in the West is thought by scientists and managers to still drive most of the increased size and intensity of wildfires that we've seen over the last 20 years.

However, we are approaching a point where the scales will tip towards climate change as a main driver of intensified wildfire behavior. Researchers studying available data (such as at landfire.gov/vegetation.php) found that the leading edge of changing forest fire behavior is expressing itself through more frequent fires in the

colder, wetter subalpine (spruce/fir) forests of the northern Rockies. These forest-cover types do not have the abnormally heavy fuel loads that reached critical mass levels in the lower-elevation drier (ponderosa pine and Douglas-fir) forest types by the 1990s. The increased fire activity in those wetter forests, which typically have 200-300-year fire return cycles, is a strong indicator of the warming and drying trends linked to climate change.

The changing nature of wildland fire in response to climate change affects numerous stakeholders, from private landowners to local communities to the Forest Service and other agencies. They are all working together to develop diverse responses to the potential changes and challenges coming our way.

One of the challenges facing the land and people of the northern Rockies is to adapt proactively to this new, climate-changed reality. This challenge has two interconnected features. One includes the complex array of natural resources (plants, animals, soils, water) integrated with the ecological processes (such as nutrient cycling, plant succession, and disturbances) of the landscapes. The other includes the attitudes and actions of the human component of these landscapes. Taken together, these two parts of the wildfire-prone scene define what scientists call social-ecological systems (SES). A basic first step, still in progress, has been to identify the spectrum of systems involved. The most important broad SES category on the radar today groups a number of locations together into the wildland-urban interface, or WUI. This is the zone where developed private properties, neighborhoods, roads, and populations mingle with fire-prone wildland vegetation.

These two interactive features of an SES overlap around us in a variety of forest types—the ponderosa pine stands of the Bitterroot Valley, Douglas-fir along the Clark Fork River, and western larch east of Flathead Lake along Highway 35—that entwine with scores of communities. While sharing some common traits, WUIs are not homogeneous. They take on unique forms that require tailored local solutions to dealing with wildfire.

When, between 1990 and 2010, the WUIs in the West swelled up with almost two million new homes spread out in the path of potential wildfires, land managers

and communities found themselves faced with an urgency to respond with enhanced protection measures. In addition, the greater amount of developed land next to wildlands has contributed to an increase in human-caused fire starts that compounds the impacts from natural lightning ignitions.

The challenges of dealing with wildfires exacerbated by climate change are complex and widespread, but we are working on solutions. One such effort, the 2014 National Cohesive Wildland Fire Management Strategy (forestsandrangelands.gov/strategy/thestrategy.shtml), grew out of a cooperative local, state, tribal, and federal effort to develop a proactive approach to prioritizing wildfire mitigation actions that stretch over a relatively short time frame. The strategy recognizes different SES risks and management opportunities by classifying the 3,109 counties in the U.S. according to their community type (suburban, agricultural, urban, disadvantaged, and advantaged) as well as their ability to recover from major wildfire impacts (based on vegetation, type of development, fire history, prescribed fire opportunities, etc.). This risk-and-opportunity classification helps guide communities and governments to invest their limited resources in the most effective ways to mitigate wildfires.

Folks who are tasked with figuring out the why, the what, and the how of these new approaches to dealing with wildland fires quickly link the word “adaptive” to the word “resilience” in their conversations. “Adaptive” refers to the capability of individuals and groups to manage an SES in a way that matches new conditions. “Resilience” generally describes the way in which a piece of ground responds to disturbances. A system that can absorb a disturbance like wildfire and recover enough to retain the same ecological identity is considered resilient. Scientists and land managers stitch the two terms together to create the concept of “adaptive resilience” to help develop and evaluate the options for living with wildfire.

Adding to the complexity is a current approach developed by a team of research scientists from eight universities in the western U.S. that identifies two different types of adaptive resilience: short-term (years to decades) and long-term (decades to centuries...and longer). The short-term

approach focuses on protecting homes and property, allowing the community to recover economically, maintaining the productivity of the timber resource, or conserving certain species. All valid goals. But does a short-term plan go far enough?

Byron Bonney, the Community Forester with the non-profit Bitter Root Resource Conservation and Development, Inc., has spent a lot of time explaining these goals to private landowners living in the WUI. He says it is essential that people have a solid comprehension of adaptive resilience in order to understand what is best for their private lands, homes, and the larger landscapes around them.

At this time, Byron deals largely with the shorter time frames for developing adaptive resilience. This means his main goal is to help landowners reduce wildfire risk to their properties as much as possible so that when a wildfire does arrive, their houses will not suffer damage and their property will recover and retain its value. He uses a federal grant program through the Montana Department of Natural Resources and Conservation to focus on reducing the short-term risk to residents inside the WUI by thinning the understory of forested stands with tried-and-true silviculture prescriptions. In addition he tries to accommodate their personal objectives for things like wildlife habitat and screening from road traffic in addition to property protection. Other objectives include managing WUI conditions to limit the danger to firefighters by giving them a safer defensible space in which to operate as well as throttling back the skyrocketing costs of fire suppression. Cooperation in this program is growing but is cyclical. Byron says that TV spots and news articles have definitely helped boost participation by landowners, but, he notes, “nothing spikes the interest level like a little smoke.” The intense fire season of 2017 generated a robust jump in calls to the Bitter Root RC&D and to FireSafe Montana (firesafemontana.org), a statewide advisory resource for landowners.

While we’re working on ways to recover from the immediate impacts of wildfire in the WUI over the short timeframe, several research groups have identified specific approaches

to developing a longer-term adaptive resilience in the WUI and other social-ecological systems in general. The long-term approach evaluates how well an SES can adapt to disturbances, like wildfire, that we haven’t encountered before and that fall outside the known past intensities and extents. Taking the long view involves planning that encourages new compositions of tree species and arrangements of fuels, promotes thriving but differently diverse groupings of plant and animal species, and encourages communities to adjust so that all the SES components can coexist with wildfire under a warmer, drier climate in the Rockies.

The need to look at adaptability and resilience over the long term is based on the reasonable expectation that global warming will get worse. Accepting this need requires a fundamental change, or what’s known as a paradigm shift, in our collective responses to wildfire disturbances. We currently devote the bulk of our energies to resisting and suppressing wildfire. But fire is a natural process and an integral part of western landscapes. A shift in perspective could lead to finding creative ways to accept and work with the inevitability of wildfire. Prevention and suppression will always have a place in the fire management toolbox, but there can be supplemental novel tools and approaches to match the novel conditions ahead.

Some of the potential long-term changes can alter entire ecosystems. Forests may be replaced with shrublands and grasslands; some ecological services, such as oxygen production, may be permanently lost; water may be far less available; the number of invasive species may rise; and native species may migrate or be lost altogether. Some ecosystems will survive in the warmer West. Others will not. Human communities in the SES could find themselves grappling with the need to locate or relocate developments away from

A SHIFT IN PERSPECTIVE COULD LEAD TO FINDING CREATIVE WAYS TO ACCEPT AND WORK WITH THE INEVITABILITY OF WILDFIRE.

Fire activity in steep terrain on the Rice Ridge fire, 2017.



fire-prone areas, altering their choices about which wildlife species to conserve, or installing new WUI building codes such as those in Flagstaff, AZ (flagstaff.az.gov/fuelmanagement), which prohibit wood roofs and specify ignition-resistant construction materials.

On the forest management side of the

SES, in 2016, a consortium of scientists, land managers, and a variety of partners embarked on a collaborative effort to set up five experimental silvicultural trials across the U.S. to determine what locally-suited treatments would best prepare forest ecosystems for climate change and the associated disturbances like wildfire (adaptivesilviculture.org). Dr. Elaine Sutherland from the Rocky Mountain Research Station, Forest Silviculturist Melissa Jenkins with the Flathead National Forest, and others established one site on a 400-acre study area in the warm, moist western larch-mixed conifer forests east of Flathead Lake.

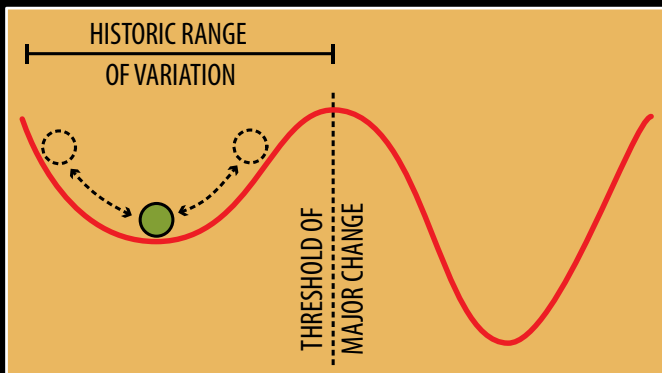
The team is testing long-term unique adaptive strategies that mix more

PHOTO: INCIWEB.MWCG.GOV

GRAPHS: MNHC

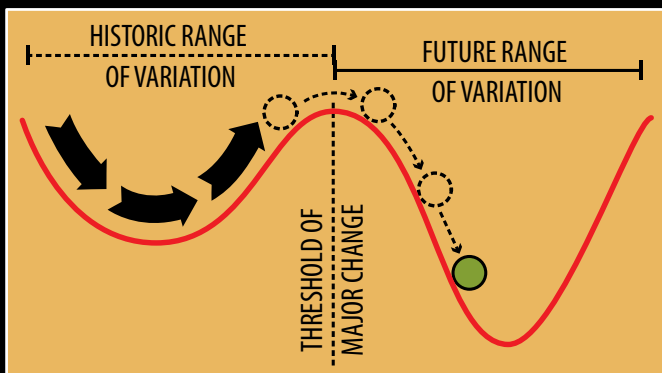


Figure 1: Historic Range of Variation (HRV)



The ecosystem ball ● moves back and forth over time within a known stable historic range of variation state.

Figure 2: Future Range of Variation (FRV)



Disturbances like climate change and intense wildfire push the ecosystem ball into a new state of unstable future range of variation conditions.

fire-resilient and drought-tolerant native species such as ponderosa pine and western white pine into sites that will become warmer and drier with the changing climate. They are also crafting how best to harvest and thin trees to produce higher tree crown heights and lower tree densities, which will create a more fire-tolerant landscape. But, as Dr. Sutherland says, “trees are not tomato plants,” and it will be many years before we will know how effective these strategies are.

The final ecological term to keep in mind on this topic is “range of variation.” To appreciate the complexity of planning for wildfires into the future, we also need to understand the burn patterns of different intensities, frequencies, and sizes that have emerged over the last several thousand years.

Over the last decade, land managers have based their objectives and planning for timber harvest, fuels treatments, and wildland fire behavior on the range of conditions that occurred prior to European settlement, often referred to as “historic range of variation” (HRV), that reaches back about 2,000 to 4,000 years. Dr. Bob Keane, Research Ecologist with the Rocky Mountain Research Station, stresses the need to now look into the future if we are going to adapt to new climate-altered wildfire and vegetation conditions. Scientists have coined the term “future range of variation” (FRV) in order to set a context for the potential long-term changes mentioned earlier. Dr. Keane says that the HRV remains useful as a guide but that under potential future ranges of variation the “safe operating space is shifting” and forest management should attempt to manage within the HRV-FRV overlap zone.

There are multiple possible FRV scenarios at this point because we don’t know how far the warming trend will go. Will the earth warm by one degree Celsius or five degrees Celsius in the next 100 years? Computer modeling of the effects of those possible global warming pathways generates different pictures of the future landscapes. Some FRV modeling scenarios overlap with familiar HRVs but others do not. Dr. Keane says that under worst-case scenarios, it could be several hundred years before northern Rockies ecosystems reach some sort of equilibrium status and establish a more stable new future range of variation (see Figures 1 and 2). There could be two to six times more wildfire in our area over the next 100 years. Eventually, though, as habitats change and tree species move upslope to higher elevations, some models even predict a reduction in wildfire for some areas.

With such a high degree of uncertainty about how far climate change will go, it remains a difficult task for land managers and communities to find the best tools for setting clear goals for wildfire resilience and for ramping up their preparation for major changes. It is important to be thinking proactively about all this. And a growing cadre of citizens is doing just that. 🦋

—Gil Gale recently retired from the U.S. Forest Service after 38 years as a rangeland manager, ecologist, wildland fire strike team leader, resource advisor, and prescribed fire burn boss on several National Forests in New Mexico and Montana.

Spying on Our Connection to SCAVENGERS



BY MICHAEL MCTEE

IF YOU WOULD LIKE TO HELP CLASSIFY IMAGES OF EAGLES AND OTHER SCAVENGERS, GO TO ZOOVERSE.ORG AND SEARCH FOR THE WESTERN MONTANA WILDLIFE PROJECT.



PHOTO BY ESTELLE SHUTTLEWORTH

Although Bald Eagles share carrion more often than Golden Eagles, this juvenile Bald Eagle must evade the talons of an older adult.



Giddy with anticipation, Eric Rasmussen and Kate Stone pull a memory card from a remote camera to see which scavengers visited a deer carcass.

A Golden Eagle dug its talons into the frozen ribs of a white-tailed deer carcass, tearing away bits of red flesh with its beak. As the eagle ate, two coyotes approached through the crunchy snow. When the first coyote lunged in, the eagle extended its seven-foot wingspan and charged, sending the outmatched coyote into a hasty retreat. But when the eagle turned its back and hopped toward the carcass, both coyotes rushed in with their tails whirling in excitement and their mouths ready to bite. The eagle whipped around to confront the coyotes again, beating its wings on snow and propelling itself forward for another fight.

Unbeknownst to the scavengers, a remote camera mounted on a nearby Douglas-fir captured the event, which has now been viewed by almost one hundred thousand people. Thanks to Kate Stone, an ecologist from MPG Ranch, and her Bitterroot Valley Winter Eagle Project, this video, along with over half a million photos of scavengers interacting with carcasses, are available to armchair naturalists. The images and videos from this project shine a light on the tightly linked relationship between humans and scavengers that has endured for millennia.

Slinging Carcasses

The idea to photograph scavenging eagles with remote cameras started in late 2016. Stone and Rob Domenech, the founder and executive director of Raptor View Research Institute (RVRI), a non-profit organization based out of Missoula, Montana, were brainstorming how they could re-encounter more of the Golden Eagles RVRI had tagged. For 14 years, they had been fitting Golden Eagles with blue wing tags. The vinyl tags are highly visible to observers and have yielded a 23 percent re-encounter rate, 87 percent of those being observations of live birds. This improves upon the traditional metallic leg bands that are difficult to see and have yielded only a ten percent re-encounter rate; about 95 percent of those being when someone finds a dead eagle. These re-encounters help researchers learn about the migratory ecology, longevity, and overall natural histories of these birds.

PHOTO BY MICHAEL MCTEE

As opportunistic feeders, Golden Eagles often target carrion in the winter, creating hotspots of activity. Stone and Domenech figured they could improve their encounter rate by putting game cameras on carcasses throughout the Bitterroot Valley, but they would need land to do it. Stone saw this as an opportunity to engage private landowners. The project could bring together different demographics of people and show them the importance of private land to wildlife conservation. “Everyone’s got their little biases or interests. This seemed like a project that might bridge some of those barriers,” says Stone. She began networking and building community support until she had secured roughly 30 locations for bait stations, the majority being on private land.

Most days in the winter, someone from the Bitterroot Valley Winter Eagle Project drives Highway 93 looking for roadkill to put at bait stations. Sometimes they spot carcasses hidden in ditches, but more often, they retrieve ones already collected by the Montana Department of Transportation. “I’m a scavenger for scavengers,” says Eric “Kerr” Rasmussen, who considers himself the number one “carcass slinger” on the project. Luckily for him (and not so luckily for other motorists), State Farm Insurance estimated in 2016 that drivers in Montana had the second highest odds in the country of colliding with an animal. Those odds translate to Rasmussen and the other carcass collectors finding over 100 dead animals each winter, most being white-tailed deer. They drive the carcasses to the bait stations, where they secure them to the frozen ground with masonry stakes and steel wire to help prevent large scavengers from dragging the carcass away.

Shooting Supper for Scavengers

It may seem unnatural for Stone and her team to leave carcasses for scavengers, but humans have a long history of doing so, particularly through hunting. Dan Flores, author and former A.B. Hammond Professor of Western History at the University of Montana, says that humans have engaged with scavengers for the 15,000 years we have been on this continent. “Virtually the whole economy of the folks who immigrated to North

America was hunting,” he says. “Any time you hunt and bring down animals, you are going to have scavengers hanging around your campsites and villages.” And what was true for ancient hunters remains true today.

The United States Fish and Wildlife Service estimates that hunters in the country provide 1.5 billion pounds of carrion annually to scavenging wildlife. Much of this food availability coincides with hunting in the fall and scavengers seem to know it. In and around the National Elk Refuge near Grand Teton, Wyoming, for example, some eagles use the area as a stopover site during fall migration. Here they can feast on gut piles from the thousands of animals that hunters kill each year. These food subsidies help fuel their flight south, but unfortunately, the carcasses can also contain lead bullet fragments.

When a lead bullet hits an animal, tiny particles of lead can fragment from the bullet and be left in the carcass for scavengers to ingest. When raptors ingest too much lead, they may die, but more

According to Russell Kuhlman, the former non-lead outreach coordinator for the Institute of Wildlife Studies and contributor to huntingwithnonlead.org, most hunters do not realize lead is a problem. When they find out, he says, many voluntarily switch to copper ammunition while hunting. Copper ammunition is effective and allows hunters to provide “clean” carcasses to scavengers. Kuhlman, an avid hunter and outdoorsman himself, hopes that when non-hunters develop their opinion about hunting, they will see hunters as the ones feeding the scavengers, not poisoning them.

Dead Livestock and Eagle Lollipops

For more than a century, livestock has also been an important food source for scavengers in Montana. According to Flores, when bison herds were decimated between the 1870s and 1880s, stockmen, especially from Texas and Oklahoma, were driving cattle northward into places like



Mary Scofield, a biologist at Raptor View Research Institute, draws blood from a Bald Eagle for lead analysis.

often, they experience sub-lethal effects, such as reduced flight performance and nervous system impairment. This is bad news for raptors that must be agile to ambush prey with aerial dives and defend carcasses from competitors. Researchers from RVRI know this problem well. In an ongoing study, they have found that 87 percent of wintering eagles in the Bitterroot Valley have elevated levels of lead.

Montana. These livestock, along with sheep, then became prey for the predators and scavengers that once relied on bison. Today, scavengers continue to rely on livestock for food, whether it be by eating the afterbirth from calving or livestock that die.

The Bitterroot Valley Winter Eagle Project even managed to include livestock

in their study. In mid-winter, a rancher near Stevensville found his horse dead in an icy field. He figured it slipped and broke its neck. The frozen ground prevented him from digging a hole to bury it, so instead, he donated it to the eagle project. He loaded the horse on a flat-bed truck and drove it to a pasture across the road from Stone's house. "The horse was huge," Stone says. "We had to have two cameras on it because there was no way to get the whole thing in a single camera frame."

At the peak of scavenging, over 30 Bald Eagles were feeding on the horse. "I was so distracted," Stone says. "There would be eagles on the ground, on the horse, on the center pivot, on every post. They were like eagle lollipops. The horse was definitely more visible in the pasture from the main road than I had anticipated." She says that cars began pulling into her driveway to get a look at the eagles. Amish buggies even stopped.

Among the dozens of Bald Eagles that helped dispose of the horse, one was wearing a red leg band and a satellite transmitter. Stone and her team learned that the eagle had been captured in the winter of 2008 near Flagstaff, Arizona. They are still awaiting additional details about the eagle's wanderings, but its mere presence 800 miles away from its initial capture location ten years later attests the species' migratory nature and longevity.

Bringing the Scavengers to the People

After two seasons of working on the Bitterroot Valley Winter Eagle Project, the team has collected over half a million photos. Sorting through them to find



Bald Eagles of various age classes help dispose of a deceased horse.

tagged eagles poses a daunting task, so the team asked for help. With the assistance of MPG Ranch's technology team, they partnered with Zooniverse, an online platform where citizen scientists participate in scientific research. Participants view photos and count the number of each species that interact with the carcass, while recording any eagles wearing a wing tag or leg band.


It may take several years before all the photos are classified and the team can fully understand the scope of their results. Nonetheless, the project is already a success. Participants on Zooniverse see that both wildlife and livestock carcasses create one of nature's greatest gathering places, and also learn about some of the challenges facing wildlife. While they classify photos, a blue banner at the top of the screen informs them that many eagles in the Bitterroot Valley have elevated levels of lead in their



Carcasses can provide easy meals for predators. This bobcat rests after scavenging a white-tailed deer.

blood. It also encourages them to learn about alternatives to lead ammunition.

The project has also had a positive impact at a local level because landowners are witnessing the value of their land to wildlife. "We have landowners that weren't really involved in the conservation community who are now currently coming to events that we have," Stone says. At these events, landowners quickly find common ground. They often swap scavenger stories, whether it be about watching two eagles lock talons in mid-air or photographing a bobcat resting on a deer carcass.

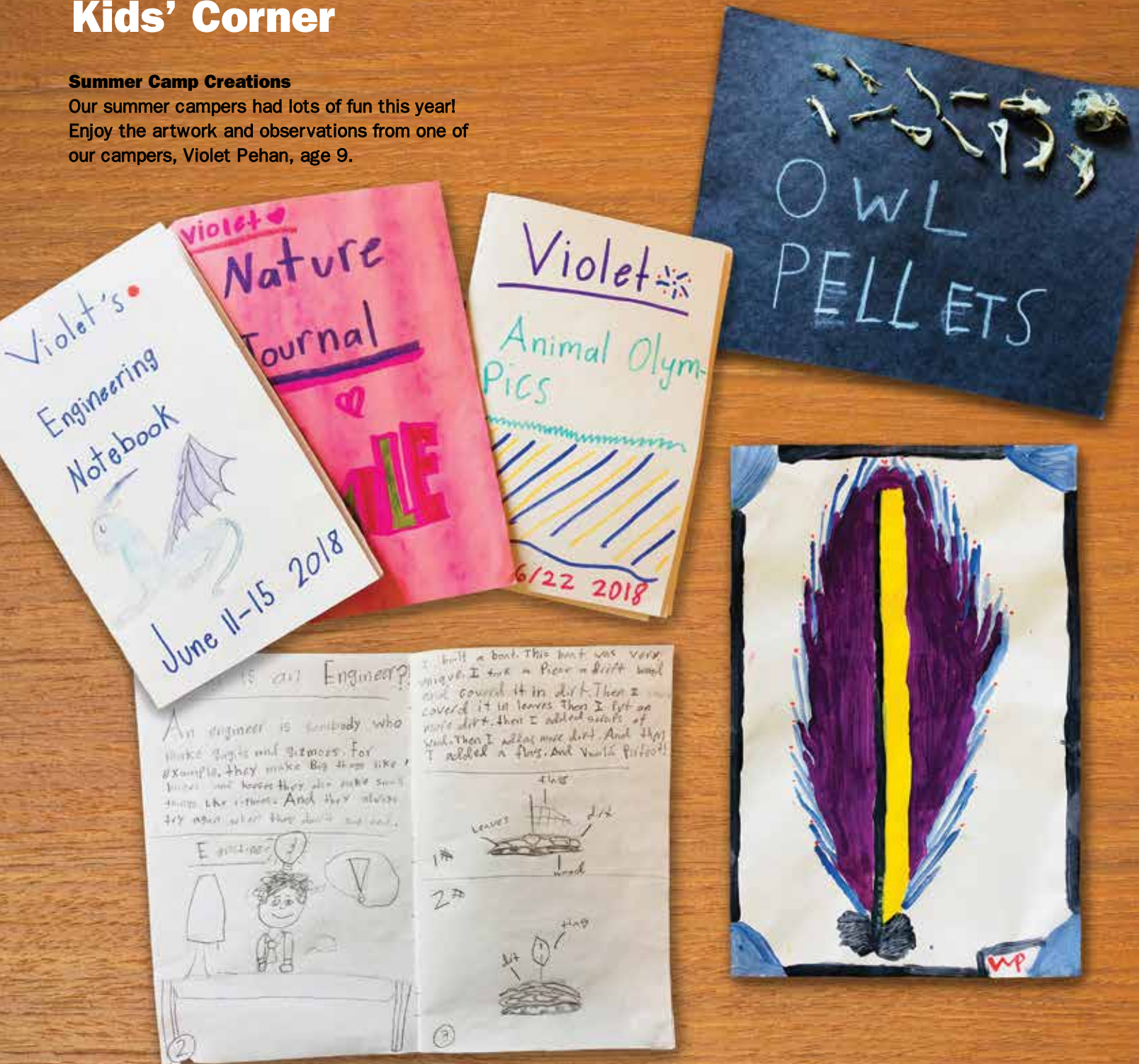
Stone enthusiastically shares her stories too, particularly from her favorite bait station in the wooded foothills of the Bitterroot Mountains. Only an hour after she and her team had placed a deer carcass, a pregnant mountain lion appeared. The cat fed on the easy meal, leaving a blanket of deer hair and bones. This helped the mountain lion save energy for her future cubs rather than exerting it while chasing prey. Mountain lions are rarely observed scavenging, but seeing a Golden Eagle fight off two coyotes is rare, too. With the help of studies like the Bitterroot Winter Eagle Project, researchers like Stone can reveal the behaviors that we have helped influence over thousands of years. 

—Michael McTee is an environmental scientist at MPG Ranch in Montana's Bitterroot Valley.

Kids' Corner

Summer Camp Creations

Our summer campers had lots of fun this year! Enjoy the artwork and observations from one of our campers, Violet Pehan, age 9.



Calling All Kids!

Do you have any nature art, photography, poetry, or stories you'd like to share? We showcase kids' work in every issue in our "Kids' Corner"—and here's your chance for that work to be yours! Send submissions to Allison De Jong, Editor, at 120 Hickory Street, Missoula, MT 59801 or by email to adejong@MontanaNaturalist.org.



get outside calendar

MNHC Hours:

Monday-Friday, 9 a.m. - 5 p.m.

Saturday, noon - 4 p.m.

Admission Fees: \$3/adults (18+),
\$1/children (4-18), \$7/family rate
Free/children under 4 and MNHC members

Programs for Kids

September 1 Saturday Kids' Activity, 2:00-3:00 p.m.
Wonderful Wings. Program free with admission.

September 6, 13, 20, 27 miniNaturalist Pre-K Program, 10:00-11:00 a.m. Program free with admission.

September 22 Saturday Kids' Activity, 2:00-3:00 p.m.
Wonderful Wings. Program free with admission.

October 4, 11, 18, 25 miniNaturalist Pre-K Program, 10:00-11:00 a.m. Program free with admission.

October 6 Saturday Kids' Activity, 2:00-3:00 p.m.
Mystical Creatures! Program free with admission.

October 27 Saturday Kids' Activity, 2:00-3:00 p.m.
Mystical Creatures! Program free with admission.

November 1, 8, 15, 29 miniNaturalist Pre-K Program, 10:00-11:00 a.m. Program free with admission.

November 3 Saturday Kids' Activity, 2:00-3:00 p.m.
Track Detective! Program free with admission.

November 17 Saturday Kids' Activity, 2:00-3:00 p.m.
Track Detective! Program free with admission.

December 6, 13, 20, 27 miniNaturalist Pre-K Program, 10:00-11:00 a.m. Program free with admission.

December 8 Saturday Kids' Activity, 2:00-3:00 p.m.
Wild Gift Workshop: Drawing from Nature. Program free with admission.

December 15 Saturday Kids' Activity, 2:00-3:00 p.m.
Wild Gift Workshop: Drawing from Nature. Program free with admission.

Adult Programs

September Gallery, all month. Kalon Baughan: Wildlife Camera Fine Photography.

September 7 First Friday Gallery Opening, 4:30-6:30 p.m. Kalon Baughan: Wildlife Camera Fine Photography.

September 19 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. Free and open to the public.

September 19 Evening Program, 7:00 p.m. Hunting and Gathering Lecture Series: Early Mining for Flint and Gold with Ted Antonioli. \$5 members; \$10 non-members; students FREE.

September 26 Evening Program, 7:00 p.m. Sip and Sketch: Science Illustration with Sean Edgerton. \$30; \$25 MNHC members. Registration required.

September 29 Annual Banquet and Auction, 5:00-9:00 p.m. at the University Center Ballroom. Bid on naturalist experiences, exciting trips, and other fun items in our live and silent auctions, enjoy a delicious dinner, and celebrate another great year with us! \$50.

October 3 Evening Program, 7:00 p.m. Fire is Essential and Irrepressible in Western Forests with Stephen F. Arno. \$5 suggested donation; MNHC members free.

SUN	MON	TUE	WED	THU	FRI	SAT
August				 miniNaturalist Pre-K Program, 10-11 a.m.	September	
26	27	28	29	30	1	
Monarch butterflies head south	 September Gallery, all month. Kalon Baughan: Wildlife Camera Fine Photography.	 Volunteer Naturalist Training, 4:30-5:30 p.m.		 miniNaturalist Pre-K Program, 10-11 a.m.	 First Friday Gallery Opening, 4:30-6:30 p.m. Kalon Baughan: Wildlife Camera Fine Photography.	 Saturday Kids' Activity, 2-3 p.m. Wonderful Wings.
	3	4	5	6	7	8
			Fall hawk migration begins	 miniNaturalist Pre-K Program, 10-11 a.m.		
		11	12	13	14	15
	 Volunteer Naturalist Training, 4:30-6 p.m. Visiting Naturalist in the Schools Field Trip Training.	 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. Evening Program, 7 p.m. Hunting and Gathering Lecture Series: Early Mining for Flint and Gold with Ted Antonioli.	 miniNaturalist Pre-K Program, 10-11 a.m.		 Saturday Kids' Activity, 2-3 p.m. Wonderful Wings.	
	16	17	18	19	20	21
			 Evening Program, 7 p.m. Sip and Sketch: Science Illustration with Sean Edgerton.	 miniNaturalist Pre-K Program, 10-11 a.m.	 Annual Banquet and Auction 5-9 p.m. University Center Ballroom	22
23	24	25	26	27	28	29
October				 miniNaturalist Pre-K Program, 10-11 a.m.	 Community Discovery Day, 1-4 p.m. Writing and Drawing Nature with Nancy Seiler and Peggy Christian.	
		Brown and brook trout spawning	 Evening Program, 7 p.m. Fire is Essential and Irrepressible in Western Forests with Stephen F. Arno.	4	5	 Saturday Kids' Activity, 2-3 p.m. Mystical Creatures!
	2	3		 miniNaturalist Pre-K Program, 10-11 a.m.		 Naturalist Field Day: Lichens with Tim Wheeler. 9 a.m.-5 p.m.
		 Evening Program, 7 p.m. Hunting and Gathering Lecture Series: Edible Fungi with Tim Wheeler.	9	10	11	12
		 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. Evening Program, 7 p.m. Sip and Sketch: Abstract Bones with Nancy Seiler.	 miniNaturalist Pre-K Program, 10-11 a.m.			Balloon spiders disperse
14	15	16	17	18	19	20
		 Evening Program, 7 p.m. Naturalist Trivia Night!	 miniNaturalist Pre-K Program, 10-11 a.m.		 Saturday Kids' Activity, 2-3 p.m. Mystical Creatures!	
21	22	23	24	25	26	27

DAVID CAPPAERT, BUGWOOD.ORG

SAGEHEN CREEK FIELD STATION, FLICKR.COM

SUN	MON	TUE	WED	THU	FRI	SAT
November						
 <p>Milkweed pods release their last seeds</p>			Western larch turn golden  miniNaturalist Pre-K Program, 10-11 a.m.  November Gallery, all month. John Ashley: Night Shift 31	 miniNaturalist Pre-K Program, 10-11 a.m. 1	 Volunteer Appreciation Day, 9 a.m.-5 p.m.  First Friday Gallery Opening, 4:30-6:30 p.m. John Ashley: Night Shift: Montana's Nocturnal Animals. 2	 Saturday Kids' Activity, 2-3 p.m. Track Detective! 3
	6	7		8	9	10
		 Evening Program, 7 p.m. Naturalist Trivia Night! 11		 miniNaturalist Pre-K Program, 10-11 a.m. 12		 Saturday Kids' Activity, 2-3 p.m. Track Detective! 13
	12	13		14	15	16
			 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. 18			17
	19	20		21	22	23
 <p>Waterfowl seek open water</p>			 Community Discovery Day, 12:30-3:30 p.m. Holiday Wreath Class. 27	 miniNaturalist Pre-K Program, 10-11 a.m. 28	December	
					 December Gallery, all month. Claudia Paillao: Felted Birds. 30	1
	2	3		 miniNaturalist Pre-K Program, 10-11 a.m. 4	 First Friday Gallery Opening, 4:30-6:30 p.m. Claudia Paillao: Felted Birds and Pop-up Sale. 5	 Saturday Kids' Activity, 2-3 p.m. Wild Gift Workshop: Drawing from Nature. 6
		7		8	9	10
			 Evening Program, 7 p.m. Sip and Felt: Bird Ornaments with Claudia Paillao. 9	 miniNaturalist Pre-K Program, 10-11 a.m. 10		11
	12	13		14	15	16
			 Glacial Lake Missoula Chapter Meeting, 3:30 p.m.  Evening Program, 7 p.m. Naturalist Trivia Night! 16	 miniNaturalist Pre-K Program, 10-11 a.m. 17		18
	19	20		 miniNaturalist Pre-K Program, 10-11 a.m. 23		24
						25
	26	27		28	29	30
				 <p>Non-hibernators remain on the prowl</p>		31

October 6 Community Discovery Day, 1:00-4:00 p.m. **Writing and Drawing Nature** with Nancy Seiler and Peggy Christian. \$30; \$25 MNHC members. Registration required.

October 10 Evening Program, 7:00 p.m. **Hunting and Gathering Lecture Series: Edible Fungi** with Tim Wheeler. \$5 members; \$10 non-members; students FREE.

October 13 Naturalist Field Day, 9:00 a.m.-5:00 p.m. **Lichens** with Tim Wheeler. \$80; \$70 MNHC members. Registration required.

October 17 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. Free and open to the public.

October 17 Evening Program, 7:00 p.m. **Sip and Sketch: Abstract Bones** with Nancy Seiler. \$30; \$25 MNHC members. Registration required.

October 24 Evening Program, 7:00 p.m. **Naturalist Trivia Night!** \$5 suggested donation; MNHC members free.

November Gallery, all month. **John Ashley: Night Shift: Montana's Nocturnal Animals.**

November 2 First Friday Gallery Opening, 4:30-6:30 p.m. **John Ashley: Night Shift: Montana's Nocturnal Animals.**

November 14 Evening Program, 7:00 p.m. **Naturalist Trivia Night!** \$5 suggested donation; MNHC members free.

November 21 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. Free and open to the public.

November 28 Community Discovery Day, 12:30-3:30 p.m. **Holiday Wreath Class.** \$35; \$30 MNHC members. Registration required.

December Gallery, all month. **Claudia Paillao: Felted Birds.**

December 7 First Friday Gallery Opening, 4:30-6:30 p.m. **Claudia Paillao: Felted Birds and Pop-up Sale.**

December 12 Evening Program, 7:00 p.m. **Sip and Felt: Bird Ornaments** with Claudia Paillao. \$35; \$30 MNHC members.

December 19 Glacial Lake Missoula Chapter Meeting, 3:30 p.m. Free and open to the public.

December 19 Evening Program, 7:00 p.m. **Naturalist Trivia Night!** \$5 suggested donation; MNHC members free.

Volunteer Opportunities

September 4 Volunteer Naturalist Training, 4:30-5:30 p.m. Introduction to volunteering with the Visiting Naturalist in the Schools Program. No prior experience necessary.

September 18 Volunteer Naturalist Training, 4:30-6:00 p.m. **Visiting Naturalist in the Schools Field Trip Training.** Learn how to teach kids about the flora and fauna of western Montana during the October VNS school field trips for 4th & 5th grades. No prior experience necessary.

November 2 Volunteer Appreciation Day, 9:00 a.m.-5:00 p.m. Drop in any time so we can thank you for your help with our October VNS field trips and other programs! Enjoy special treats just for volunteers and a visit with MNHC staff.

Nature Books for Kids



Some Bugs
by Angela DiTerlizzi,
illustrated by
Brendan Wenzel



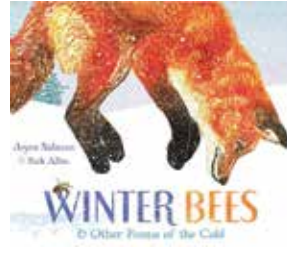
When Green Becomes Tomatoes: Poems for All Seasons
by Julie Fogliano,
illustrated by
Julie Morstad



Here We Are: Notes for Living on Planet Earth
by Oliver Jeffers



Over and Under the Pond
by Kate Messner,
illustrated by
Christopher
Silas Neal

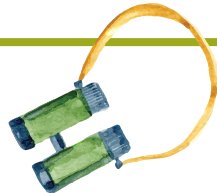


Winter Bees and Other Poems of the Cold
by Joyce Sidman,
illustrated by
Rick Allen



Nightsong
by Ari Berk,
illustrated by
Loren Long

Fall Scavenger Hunt



Fall is a great time to explore outdoors!

Use our scavenger hunt as inspiration to get outside and observe some of the signs of fall in Montana. Can you think of any others?

Take pictures of what you find, then submit your scavenger hunt photos to MNHC for a chance to win a Family Membership! Email your photos to contest@MontanaNaturalist.org.

- ☐ Larch needles changing color
- ☐ A feather (do you know what kind of bird it came from?)
- ☐ A colorful sunset
- ☐ Mountain ash berries
- ☐ Canada Geese migrating south for the winter
- ☐ Yellow cottonwood or aspen leaves
- ☐ A rock with lichen on it
- ☐ An animal track (in mud or snow) (do you know what animal made it?)
- ☐ A red or yellow maple leaf
- ☐ An insect (do you know what kind it is?)
- ☐ Brown/yellow grasses (native grass is preferable!)
- ☐ A blooming fall flower (do you know what kind it is?)
- ☐ Lichen on a tree
- ☐ A conifer cone (do you know what kind of tree it came from?)
- ☐ You in one of your favorite places to go in fall



PHOTO: FRIENDS OF 2 RIVERS

Visit Milltown State Park!

Looking for a new spot to explore? Check out Montana's newest state park: Milltown State Park, just a few miles east of Missoula. At the newly restored confluence of the Clark Fork and Blackfoot Rivers, the park encompasses more than 500 acres where visitors can hike, bike, fish, float, birdwatch, and more. Enjoy a family picnic, learn about the area's history from the interpretive displays, hike through the floodplain, or simply sit back, relax, and take in the sound of the water.



Directions to the Milltown State Park Confluence Area:

Take Broadway/Highway 200 east out of Missoula, going through East Missoula. 4.5 miles from Missoula you'll turn right onto Tamarack Road, which goes under I-90 and becomes Juniper Drive. The park entrance is at the end of the road.

Climate Smart Missoula: Creating a Climate-Resilient Community

BY ALLISON DE JONG

During the smoke-filled weeks of the past two summers, many of us in western Montana relied on the Montana DEQ's air quality website to determine if we could open our windows to cool the house down at night or safely go on a trail run that day. Another immensely helpful source is Climate Smart Missoula's *Summer Smart* program (missoulacclimate.org/summer-smart), which has excellent recommendations and resources for keeping one's home as cool, healthy, and smoke-free as possible.

Climate Smart Missoula grew out of multi-year efforts to create local climate action plans, and was launched in 2015. With

Executive Director Amy Cilimburg at the helm, Climate Smart took on the task of implementing the community action plan and making sure it was integrated into the City's priorities. From working with myriad community partners to caring for the most vulnerable members of our community to being part of a statewide and nationwide response to climate change, Climate Smart is helping Missoula both reduce its carbon footprint and become more resilient in the face of changing climate conditions—like the hotter, drier summers and longer, more intense fire seasons we've already begun to experience. [Read more about the connection between climate change and wildfire on pages 4-7.]

Starting this fall, Climate Smart is working with the city and the county to develop a climate adaptation plan, identifying ways the community can be prepared for climate change. At the same time, Climate Smart is working on a climate mitigation plan, collaborating with local partners to map out Missoula's path

to 100 percent renewable electricity. As for other projects—"We need to hear from the community and know what the priorities are," says Amy. "We'd like to have more opportunities for people to be engaged."

While some may feel there is little they can do to combat climate change, Climate Smart encourages people to do what they can. "We help people find things to do that keep them connected, keep them



Climate Smart collaborated with a number of community partners to build and design this shade shelter along the river trail, providing a cool, classy place to rest.

motivated, keep them caring about the issue," says Abby Huseh, Climate Smart's Energy Program Coordinator. "Individual actions are important." Whether it's minimizing water usage or commuting sustainably or installing solar panels, everyone can do something—and all of those smaller things contribute to the larger changes that need to happen. "We also encourage people to do something a little harder, to step out of their comfort zone," Amy adds. "Maybe you start by looking out for your neighbors, making sure they have the right filters in their home during fire season. Build some community, and go from there."

Climate Smart is leading the way by helping vulnerable populations—babies, pregnant women, seniors, those with health issues—to stay healthy even on the smokiest days. The past two fire seasons they've worked to provide HEPA air



Max Longo, Climate Smart's Energy Corps Member, installs blinds on the outside of Climate Smart's windows—one of many ways to help cool a building without air conditioning.

filters to those who most need them, from homebound seniors to daycares. Their efforts also include sharing the stories of what other people and communities are doing to be part of the solution. "When we tell the stories of what different people are doing," says Amy, "it builds that positive momentum. It shows how pooled efforts can really make a difference."

Ultimately Climate Smart is focused on creating a better future, and helping the Missoula community be a part of that. "There are so many people here who want to be part of a more sustainable world," Amy says. "We help them see the links between the world we have today and the world we want to see." 🐾

RESOURCES:

Climate Smart website:

missoulacclimate.org

Montana Wildfire Smoke website:

montanawildfiresmoke.org

The *Sustainable Missoula* column in the *Missoula Current*: missoulacclimate.org/sustainable-missoula-column

Want to get involved?

Join Climate Smart's monthly meetups at Imagine Nation Brewing the first Thursday of every month, 5-7 p.m.

You can also donate—directly to their HEPA air filter program or more generally to support their work in creating a climate smart and resilient Missoula: missoulacclimate.org/donate.

imprints



MNHC Exhibit Update!

If you visited the Center this summer, you saw our gorgeous new exhibits: our Montana Ecosystems exhibit and our Magic Planet. The Montana Ecosystems exhibit focuses on the landscape, climate, flora, and fauna of the four main bioregions of Montana: montane forest, intermountain foothills, plains grasslands, and sagebrush steppe. We also added a naturalist corner for fun, hands-on explorations of native pollinators and other insects. Come on by and learn more about the marvelous biodiversity of our state!



us unveil the Magic Planet this past May. "This is a tremendous tool for giving everybody a global perspective of things," Steve says, "and a global perspective of the dynamics of things you just don't ever see otherwise." Come explore!

Come Party with Us at Our Annual Banquet and Auction!

SATURDAY, SEPTEMBER 29TH

5:00-9:00 p.m.

University Center Ballroom

Join us to support and celebrate the Montana Natural History Center with dinner, drinks, conversation, and bidding on our fabulous live and silent auction items! Reserve your tickets today by going online to MontanaNaturalist.org or calling 406.327.0405. \$50 per person (\$60 per person after September 18th).



SPOTLIGHT:

Kelli Van Noppen, ID Nature Coordinator

This fall we are thrilled to welcome Kelli Van Noppen, our new ID Nature Coordinator. She'll be teaching natural history to students across Montana, bringing our Virtual Naturalist Program to 15 classrooms around the state, from Rapelje to Ekalaka to Plentywood.

Kelli grew up all over the Pacific Northwest. From splashing in the Puget Sound and hanging out with shore crabs to skiing the Cascades of central Oregon and relishing the smell of sagebrush after a lightning storm, she couldn't help but develop a love of the natural world. Kelli earned her B.A. in General Social Science from the University of Oregon in 2007. Rather than attending graduation, she and her husband loaded up a moving truck and moved to Missoula and never looked back. She received her M.Ed. in Curriculum and Instruction in 2010, then worked for seven years as a classroom teacher in Missoula, where she fell in love with science education. Deciding to concentrate her efforts and sprinkle the wonder even further, Kelli jumped at the chance to become MNHC's ID Nature Coordinator. She looks forward to delivering engaging science to a wider audience and working to empower classroom teachers to rediscover the joy in science education.

Welcome, Kelli!

EXHIBIT PHOTO: NANCY SEILER

PHOTO: TOM BAUER/MISSOULIAN

Join Us for Our 2018 Lecture Series!

Hunting & Gathering: Learning to Read the Landscape

Join us for an exploration of the tradition of hunting and gathering, from food and medicine to the naturalist's habit of creating collections. Each of our six speakers will share their expertise, from identification and use of the object of the hunt to identifying the landscape or phenology clues that will help hunters and gatherers to find what they're looking for.

Upcoming Speakers:

Ted Antonioli,
September 19th:

Early Mining for
Flint and Gold

Tim Wheeler,
October 10th:
Edible Fungi:
From Forest Floor
to Fine Cuisine

\$5 members;
\$10 non-members;
students FREE.

For more information and to purchase tickets, visit:
MontanaNaturalist.org/hunting-and-gathering

*Thank you to The Dram Shop for providing beer
and wine for these events!*



Want to dig even deeper into these topics? Join us for our
Naturalist Field Day: **Lichens with Tim Wheeler** on October 13.
\$70 members; \$80 non-members.



**GOOD
FOOD
STORE**

The Montana Natural History Center

thanks the

GOOD FOOD STORE

for Sponsoring our 2018 Lecture Series -

HUNTING AND GATHERING:

LEARNING TO READ THE LANDSCAPE



As To The Mission

As I write this it has been three years since I accepted the position as Executive Director at the Montana Natural History Center.

As I reflect on these past three years, I am so thrilled to be part of such an impactful organization. As a team, the staff and board at MNHC have accomplished so many things. Yet there is also a clear cycle to our year. This notion had me thinking about the phenology of the Montana Natural History Center.

If you aren't familiar with the term, phenology is the periodic study of nature throughout the seasons and over time—noting when flowers bloom in spring and summer, observing when birds migrate south in the fall.

Thinking about the phenology of our nature center, there are several important and interrelated programs and events that are part of our yearly rhythms, and perhaps one of the most important seasons that shapes our year at MNHC is autumn.

As the leaves turn yellow and the days grow shorter, we are busy preparing for the next twelve months. Of course, it is back to school for our programs, with Visiting Naturalist in the Schools, miniNaturalists, and Saturday Kids' Activities all in session. Also in the fall comes our annual auction and banquet—that great celebration of all things MNHC.

As it is in the wondrous nature that surrounds us here in western Montana, autumn at MNHC is a time of transition that sets the tone for much of our year.

Please join us this fall and observe MNHC for yourself—there are many opportunities to participate, from attending Evening Lectures to volunteering for Visiting Naturalist in the Schools and other programs to celebrating with us at our 27th Auction and Banquet.

We look forward to sharing this season with you.

Thurston Elfstrom,
Executive Director



Museums for All

The Montana Natural History Center is proud to be part of the national Museums for All program. We offer free admission to individuals and families receiving food assistance; simply show your EBT card and a photo ID. Please come and visit!



Become a Member of the Montana Natural History Center!

MNHC members get all kinds of great benefits: free admission to our Center; an annual subscription to *Montana Naturalist* magazine; discounts on MNHC classes, programs, and summer camps; and, through our participation in the Association for Science-Technology Centers' passport program, reciprocal admission to more than 300 science centers in North America.

Check out astc.org for a complete list of participating centers. We offer three membership levels: \$35 individual membership, \$60 family membership, and our \$75 grandparent membership, which is a great option for the whole family—it includes you, your children, grandchildren, and any other family/visitors.

Join us...renew your membership or become a member today!



volunteer spotlight



PHOTO COURTESY KELLY DIX

Kelly Dix

When Kelly Dix moved from New Mexico to Montana in the spring of 2016, she knew she wanted to help kids get outside. Spending time outside has always been her way to stay centered, and she'd enjoyed volunteering with field trips at her local nature center in New Mexico. And as a retired scientist, she highly values STEM and science education. "When I found MNHC, I thought, 'This is perfect,'" she says. She started out by helping with our Visiting Naturalist in the Schools (VNS) spring field trips, spending all day outside with fourth- and fifth-grade students, and she's been volunteering ever since, helping in VNS classrooms, assisting with our Wings Over Water (WOW) Osprey program, and volunteering at our annual banquet and auction.

Kelly spent her career as a toxicologist in biomedical nonprofit research, and enjoyed working with people who came from a variety of backgrounds. She's been glad to find that at MNHC as well. "Everyone brings something to the table," she says. Whether it's observing MNHC naturalists teaching kids in different ways or watching how teachers in the WOW program put their own spin on a curriculum, she loves seeing how different approaches resonate with the kids—and with the volunteers, too. "There's not a day I go into the field that I don't learn something," she says.

But Kelly has so much to teach, too. She shares her background in science and natural history with a contagious enthusiasm, inspiring the kids with her personal interest in birds, plants, and all things nature-related. "Kids love working with Kelly," says Drew Lefebvre, MNHC's Volunteer Coordinator. "She meets them at their level but is never condescending; they ask for her by name when she's not around!"

Kelly loves working with kids, and has been struck by how inherently connected those in Missoula are to their landscape, recognizing bird calls and spending so much time exploring outdoors. "Seeing the kids get excited is great," she says. "When they smell a ponderosa pine for the first time—that look on their face. When you see them put connections together. I love it. The kids are the main reason I'm here."

And we're so glad to have her here at MNHC.

Thank you, Kelly!

Naturalist Notes *from Western Montana and Beyond*

●●● 7 August 2018
Missoula County
MPG Ranch,
Duck Mahal

We caught these two striking members of the moth family Sphingidae (sphinx & hawkmoths) in a UV blacklight bucket trap: Leafy Spurge Hawkmoth (*Hyles euphorbiae*) (top) and White-lined Sphinx Moth (*Hyles lineata*) (bottom). They are related genetically but have quite unrelated life histories.

H. euphorbiae is a Eurasian species. It was introduced in dry sagebrush rangelands and short-grass prairies in some western states (including Montana) in the mid-1960s as the first classical biological control agent for leafy spurge (*Euphorbia esula*). Adults fly May-August in our area.

H. lineata is a native moth and occurs just about everywhere in the continental United States and a large portion of Central and North America. It is found at a wide range of elevations and habitats, including urban areas. They are deft fliers and often seen hovering in front of ornamental garden flowers sucking nectar with their rather long proboscis, and are sometimes referred to as “hummingbird” moths because of this behavior. Adults fly late spring through late fall.

~Mat Seidensticker, Kate Stone,
William Blake, biologists at the MPG Ranch,
and Eli DiBari and Benji Fine, wildlife interns

●●●

What have you observed outside lately?
What wild creatures, flora, and weather
exist near your home? What makes your
place unique?

Tell us about the natural history of your
place—and it could get published!
Send your Naturalist Notes (up to
350 words) and a photo or drawing,
if you wish, to Allison De Jong, Editor,
at adejong@MontanaNaturalist.org.

IN THE SHADOW

BY ALISON JAMES

I love driving from Missoula to Helena or Great Falls or Bozeman, over the big passes of the Continental Divide and along some of our country's most spectacular rivers. On the west side of the Divide, we pass green foothills, huge ponderosas and larch, and soaring Bald Eagles and Osprey. Dropping down onto the east side, we start to see grasslands, sagebrush, mule deer, and pronghorn. Travelers in Montana know that the climate on the east side of the Continental Divide is suddenly and significantly different than on the west side. Wondering why is a good thing to ponder on a long drive....

Though many variables impact climate, one of the most important factors in the immediate difference between the western side of the Rockies and the eastern side is the effect of rain shadow. The American Meteorological Association defines rain shadow as “a region of sharply reduced precipitation on the lee side of an orographic barrier, as compared with regions upwind of the barrier.” The lee side, as sailors and mountaineers know, is the side the wind doesn't hit. And an orographic barrier is just a meteorologist's way of saying “the mountains.” We have many beautiful orographic barriers in Montana.

In western Montana, warm, wet weather systems blow in from the Pacific Ocean. As those systems travel across the landscape, the mountains force the air up to higher elevations. As the air goes higher, it cools and condenses, dropping rain and snow on the western slopes. The clouds collect against the mountainsides and get wrung out like a sponge. As the air moves over the mountains and down, it dries out. On the east side, the now-dry air actually absorbs moisture from the earth, making the landscape all the more arid.

The average yearly precipitation in Helena is 11 inches—just shy of desert. Kalispell gets about 15 inches of precipitation a year, and Missoula gets about 14 inches. As that warm ocean air moves west and up, snow and rain hydrates western Montana. On a walk in the woods, you'll find ferns and cedar trees, mushrooms and huckleberries. But if you take a hike on the other side of the Divide, you'll see organisms adapted to survive in dry climates: prickly pear, sagebrush, limber pine, rattlesnakes.

OF RAIN

Many species, like bears, elk, deer, cottonwood trees, ponderosa pine, knapweed, and people, can thrive on both sides of the Divide.

The rain shadow effect can be seen all over the world. The plains of eastern Washington and Oregon are in the rain shadow of the Cascades. Nevada and California's massive deserts (like Death Valley) are in the rain shadow of the Sierra Nevada range. The Tibetan plateau is in the rain shadow of the Himalayas. And many Montanans claim a favorite side of Glacier National Park—the green, verdant west side versus the spare, windblown expanses of the east side. They are two different worlds, hinged together at the top of the Rocky Mountains.

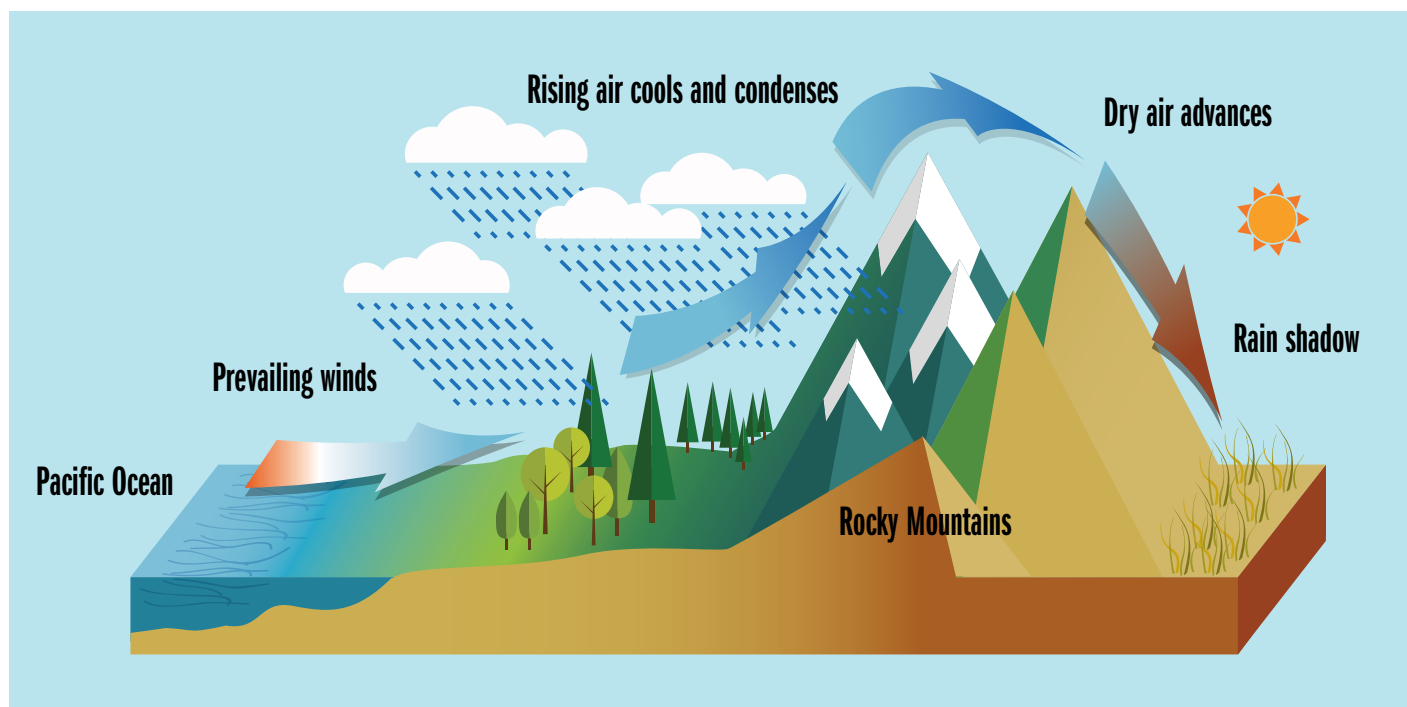
As I travel from west to east I'm reminded of the words of Wallace Stegner: "The Rocky Mountain West is a region of bewildering variety. Its life zones go all the way from arctic to subtropical, from reindeer moss to cactus, from mountain goat to horned toad. Its range of temperatures is as wide as its range of precipitation; it runs through twelve degrees of latitude and two miles or more of altitude. It is bald, alkali flats, creosote-bush deserts, short-grass plains, irrigated alluvial valleys, subarctic fir forests, bare stone."

Driving over the mountain pass, I feel grateful. I'm grateful for good tires to navigate these mountain roads in changing weather conditions. And I'm grateful to live in a place where life zones come together, in the rain and in the rain shadow, where we can see so much variety and beauty, sometimes within just a few miles. 🦋

—This essay first aired as a Field Note on Montana Public Radio this past May. Alison James is a first-generation Montanan who is deeply grateful to her parents for planting her here. She believes that all Montanans, new and old, should work together to care for this extra-special place.

Above: View from Mount Helena, on the east side of the Divide.

Below: The rain shadow effect occurs when warm, wet air is forced upward over the mountains. Moisture is squeezed out as rain or snow on the west side, and on the east, the dry air descends and warms, causing evaporation.

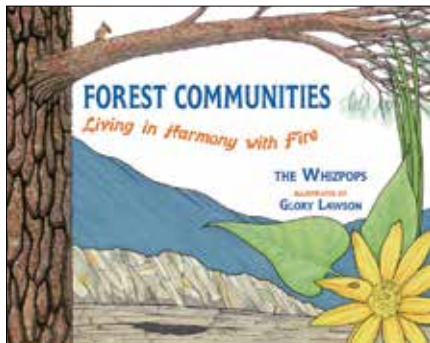




S T O R E

www.goodfoodstore.com

1600 S. 3rd St. West | Missoula | 406.541.3663



Forest Communities **The Whizpops**
32 pages, 11 x 8.5, \$14.00 cloth (INCLUDE \$4 FOR S/H)

MP Mountain Press
PUBLISHING COMPANY 800-234-5308
www.mountain-press.com



True to you.

You. Who loves to bike and paddle
and hike and hunt, and who sometimes
needs a tune-up to keep the motor running.
Who makes a mean venison stew.
Who volunteers on the weekends.
Who lives here because, why anywhere else?
You. Who trusts her care to Providence.

montana.providence.org



4567 Wildfowl Lane,
Stevensville, MT 59870
406.777.5552



**Montana
Rail Link**

for supporting
our

**MUSEUMS
FOR ALL
PROGRAM!**



 www.3RPD.com

 406.393.3773

 2680 Washburn St
Missoula, MT 59801

**We give patients the
time and expertise
they deserve.**



upcycling since 2005



www.recreatedesigns.com





East Rosebud Creek

PHOTO: MIKE FIEBIG

Celebrating 50 years of Wild and Scenic Rivers: 1968-2018

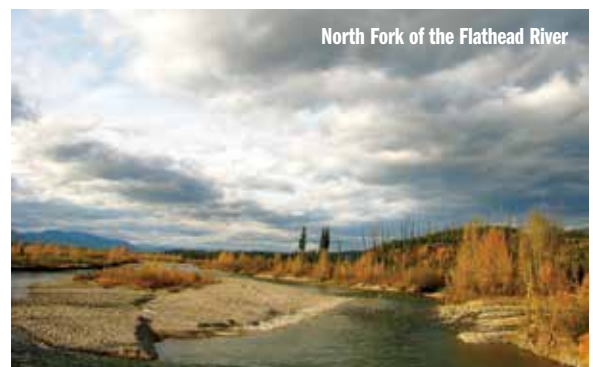
Montana is home to many beautiful rivers, which we celebrate in myriad ways: paddling, fishing, rafting, swimming, or just sitting along the banks listening to the tumbling water.

Five of those rivers are particularly special, however: they are “protected for the benefit and enjoyment of future generations” by the Wild and Scenic Rivers Act, passed in 1968. 2018 marks its 50th anniversary, and Montanans have an extra reason to celebrate—the most recent river to join the Wild and Scenic ranks is East Rosebud Creek in the Absaroka-Beartooth Wilderness. It joins Montana’s four other Wild and Scenic Rivers: 149 miles of the Upper Missouri River, and the North Fork, Middle Fork, and South Fork of the Flathead River.

PHOTOS: ALLISON DE JONG



Upper Missouri River



North Fork of the Flathead River



Montana Natural History Center

Connecting People with Nature

120 Hickory Street, Suite A
Missoula, MT 59801
MontanaNaturalist.org

NON-PROFIT
ORGANIZATION
US POSTAGE
PAID
PERMIT 569
MISSOULA, MT

Montana Natural History Center is an equal opportunity service provider.
Montana Natural History Center trips are permitted on the Lolo National Forest (Clause VII.B).

Yes! I want to become a member and support the
Montana Natural History Center. *All memberships are annual.*

- ☐ Family Membership: \$60 ☐ Individual Membership: \$35
- ☐ Grandparent Membership: \$75 **A great option for the WHOLE family!**
This includes you, your children, grandchildren, and any other family/visitors!
- ☐ Montana Naturalist magazine subscription only: \$10
All gifts are tax deductible to the full extent of the law.
- ☐ I am enclosing payment by check.

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

☐ I would like to pay with credit card (circle): AMEX VISA Mastercard Discover

Account Number _____ Exp. Date _____

Signature _____

☐ Sign me up for the monthly email newsletter.

Email address: _____

☐ I want to volunteer! Send me a volunteer application.

☐ I would like more information on making a planned gift or gift of stock.

Start getting connected with a visit to our website – **MontanaNaturalist.org**.
Become a member online, explore our programs, and discover where the
Montana Natural History Center can take you!

**Fill out and mail to Montana Natural History Center,
120 Hickory Street, Suite A, Missoula MT 59801 or Fax: 406.327.0421**



All your waste and recycling
needs, handled by one provider



- Committed to a cleaner environment
- Your Montana community partner
- Now offering All-in-One curbside recycling

Get started now. It's easy.
Visit us at RepublicServices.com



We'll handle it from here.