

# MONTANA Naturalist

Winter 2014-2015

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

## Drama on the Front



**Blue Sky, Blue Snow | A History of Western Forests | Icy Creations**

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BY GIL GALE



**Cover** - This mountain lion (*Puma concolor*) is a captive animal at the Triple 'D' Ranch near Kalispell, MT. Many photographers visit to get close-up images of animals that are difficult to photograph in the wild, but the ranch also provides educational tours for children and adults. Their goals include preserving endangered species, encouraging appreciation for wild creatures, and inspiring visitors to work towards protecting decreasing wildland habitats. Photo courtesy of Elaine Wilson, [www.naturespicsonline.com](http://www.naturespicsonline.com).

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**Montana Natural History Center**  
Connecting People with Nature

120 Hickory Street  
Missoula, MT 59801  
406.327.0405  
www.MontanaNaturalist.org

**Executive Director**

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**Education Director**

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**Assistant Education Director**

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Montana Naturalist & Field Notes**

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# tidings



PHOTO BY ALLISON DE JONG

Watching the winter sun set behind the trees at Lolo Pass.

**This fall I spent a week visiting my sister.** She and her husband had just had their first child, and getting to meet their new little son was magical. He was three weeks old and all the world was new to him. As the most well-rested adult in the house, I spent a lot of time cooking, cleaning, and doing dishes, but hanging out with my nephew was, of course, the highlight. I would walk around the house holding him, his eyes solemnly resting on my face. I was constantly amazed by his complete helplessness and utter dependence on the adults around him, and the weight of responsibility even I, a mere aunt, felt.

And I realized that I felt responsible not only for helping ensure that his immediate needs were met, but for making sure that the world he grows up into is a healthy, diverse, and sustainable one. Will the world he lives in as an adult still have wild places? Wild creatures? Will he get to experience the awe of seeing a moose stalking long-legged through the snow in a quiet forest, of coming across a freshly-laid mountain lion track? When he's the age I am now, will the world be a better place?

There are no easy answers to these questions. But despite the uncertainty, I find myself ever inspired by the people and stories around me, like the folks at spectrUM helping young people explore their world and find what they're passionate about (page 13), or naturalists like Tom McKean, Becca Deysach, and Val Aerni reveling in the natural beauty of the stunning landscapes across our state and sharing their delight with others (pages 4, 14, and 19). And then there are people like Gil Gale, an ecologist and wildland firefighter who's pondering how the fire management decisions we made a century ago are affecting us today in hopes that we can make better decisions for the future (page 6).

Though we can't predict what the future holds, there are myriad ways to work towards making it the best possible. Whether it's finding something we're passionate about and pursuing it, or taking an honest look at both our personal and collective history so that we can learn from our mistakes and make wiser choices, we have the power to create a better world—not only for us but for the children who have just come into it.

*May you enjoy a wonderful holiday season!*

**Allison De Jong**

EDITOR

[adejong@MontanaNaturalist.org](mailto:adejong@MontanaNaturalist.org)



# Loving a Landscape:

BY TOM MCKEAN  
PHOTOS BY ZACK PORTER

## Drama on the Rocky Mountain Front

Ancient reefs erupt across a frozen golden canvas, punctuated by pothole lakes. Beyond is the crown of our continent, a vast expanse of rocky peaks and forest valleys. “I’m here for the birds,” I tell myself as I shrug off a deep chill, but I can’t seem to focus on them. My binoculars drift up and away from the squatting snow geese, and onto the steep distant crags painted a welcoming orange by morning sun. I see the speckles of ponderosa pine in a matrix of grass on the foothills.

I am in love with this landscape, the drama of prairie courting mountains and the resilient life that calls it home. The Rocky Mountain Front of central Montana epitomizes that love for me. I’m here, sharing that experience with friends, watching snow geese at Freezout Lake—an apt name if I have ever heard one.

As the day and our minds warm and the snow geese erupt off the mostly-frozen lake in large contiguous flocks to feed in the barley stubble, we prepare ourselves for a short hike up one of the nearest high points around. Crown Butte, a hunk of layered igneous columns, stands proud and imposing over the prairie.

To access our trailhead, we circumnavigate the butte almost entirely in our cars. Through windows we watch the dihedrals, open books of rock that rise out of the grass below. Crown Butte is a laccolith—an injection of molten rock between two other sedimentary layers which over eons erode away. This laccolith was formed out of a rock called shonkinite in pulses, giving the columns their layered brick and mortar appearance. We step out of our cars and onto the thawing gumbo of a creek bed. A faint trail leads up the sloping side of the Butte’s least fortress-like facet.

As we ascend the trail, the breaks leading into the Sun River Valley come gradually into view. Their broken ground hides away fossils of *Maiaasaur*,



**OPPOSITE PAGE:**

**Looking out over the Rocky Mountain Front from Crown Butte near Simms, MT.**

**THIS PAGE:**

**(Top) Snow geese filling the big sky over Freezout Lake.**

**(Middle) Cresting the top of the Butte.**

**(Bottom) Approaching Crown Butte.**

other extinct creatures, and the paleontologists who search for them. The breaks are made up of ravines and arroyos, dry washes, formed by freezing and thawing earth broken up and sculpted by water. This part of the prairie is not much good for human use, except maybe to lose a cow in its maze-like channels.

The sides of the trail are dotted with whitebark pine, but not the thick and burlled ones

that characterize the species. These are krummholz forms, stunted and twisted trees, shaped by incessant wind. Grey birds with striking black wings and slender black beaks—Clark's Nutcrackers—flit elusively from tree to tree above us on the rocky escarpment as we approach.

The trail steepens once we reach a shoulder of sedimentary ground still clinging to the side of the great laccolith. Small bits of sandstone bulge out from the thin soil on the side hill, spilling crumbly pink sand below. The trail leads to a small notch in the shonkinite rimrock. A short scramble up the exposed igneous rock leads to a wide rolling plateau of Idaho fescue and blue-bunch wheat grass. This grass has never been heavily grazed by cattle and is a glimpse of what the rest of the prairie might have looked like 200 years ago.

We scare a small band of mule deer out from a fold in the plateau; they lope nimbly down the rocky cliff bands out of sight as a cold gust of wind sucks the breath out of my lungs. We press on to the apex of the butte, the most northerly and most fortified end. From this vantage point, I look out over the coulees formed by the Sun River. The sinuosity of the river is always changing, as the steep, loose sides of the cutbanks erode away and deposit their sediment on downstream point bars, the juts of smooth-stoned land that occupy the inside edge of river bends.

A larger herd of perhaps a dozen mule deer runs across the ground nearly a thousand feet below us. They move with ease up and down the foothills surrounding the butte. We watch crows maneuver in the wind, riding gusts from near ground level up to above our heads. Are they searching for

food and roost, or simply playing?

The cold wind chaps my face, but I am cheered by the midday sun, uninhibited by clouds or pollution—so pure I think I can smell it. I look south to Haystack Butte and beyond to Steamboat Mountain. The prairie gets more dimensional the closer it gets to the mountains, like surf breaking on a rocky coast.

*The prairie gets more dimensional the closer it gets to the mountains, like surf breaking on a rocky coast.*


It is getting late in the afternoon as we lounge, sketch, and take pictures, almost time for the snow geese to return to the lake for the evening. It is quite a spectacle watching them all return at once. Hundreds of distinctive v-formations break down into seemingly unorganized and awkward gaggles descending toward the ice. It is not a sight to miss.

We plod back to our notch in the rimrock and carefully lower ourselves down. It is hard to watch our footing with such a beautiful vista drawing our attention. The sun is throwing long shadows toward us. We need to pick up our pace. We are tired from shivering and waking up for sunrise.

"But we are here for the birds," we think. So we pick up our feet. 🦋

*—Tom McKean is a wildlife biology student at the University of Montana and an intern at the Montana Natural History Center. When not exploring the Rocky Mountain Front, he can be found riding his mountain bike or wading through piles of homework.*





# THE WILDFIRE- CLIMATE

BY GIL GALE

**There are a few Big Hole Valley cowboys still around who remember back to the 1940s and 50s when you could mount your horse and ride the foothills of the Bitterroot Range for miles with hardly a tug on the reins.**

You can't do that now. In the second decade of the 21st century, you're better off going cross-country on foot because, instead of a park-like open forest floor, you'll encounter dog-hair thickets of lodgepole pine, barricades of fallen snags and clusters of shade-tolerant subalpine firs popping up everywhere, making you weave around, climb over and duck under for most of the day. Occasionally, you'll break out into a stand of timber that looks a lot like the forest of 70 years ago and you'll be able to pick up your pace, striding along on a straight course—for a short while, anyway.

Up and down the rugged chain of the Rocky Mountains, you'll encounter the same kind of clogged forest understory: lots of branches and vegetation filling the space below dense forest canopies. While our forested hills may seem like an unchanging constant to some folks, a time-lapse photo series stretching back centuries, before European settlement of the West, would show landscapes where timber, shrub stands and grasslands move up, down and across slopes in a slow-motion dance. A dance in which forests give way to expanses of grasses, fireweed or other herbaceous species and then, in turn, give way to shrubfields. At any time in the Rockies before settlement, you could see all the different

vegetation covers coexisting in a diverse mosaic pattern. An old timer in western Montana once insisted to me that a ravaged stream channel we were trying to restore “has just always been this way.” He didn't understand that his definition of “always” started with his adult memories. And his memories were only a single heartbeat in the life of the landscape around him.

So let's look at a piece of the big picture and focus on the latest thinking about how fire and climate change are interacting before our eyes today on this dynamic landscape. The major question that came up in the first installment was whether or not climate change is the primary force causing the increase in fire intensity in the Rocky Mountains over the last decade or more. The prevailing opinion among several leading scientists in fire ecology research is that the controlling factor at this point is, hands down, forest fuel conditions. It's a bit of a mixed bag, but the nod still goes to fuel conditions, rather

than climate change, as the dominant factor in current fire behavior.

And it's not just the amount of woody fuel buildup that is the problem. More importantly, it is the continuity of fuels over miles of wildland terrain. As you make your way across the flanks of the Bitterroot Range in the Big Hole, not only are you contending with heavier concentrations of the dead and live wood that ladders up into the tree canopy, but you'll find that the breaks in the heavy fuels are few and far between. Your cross-country travel would be slow and circuitous for many continuous miles.

It is now generally recognized that the dogmatic and aggressive fire suppression policy since 1910 was causing more problems than it was solving. That issue alone is a story unto itself. In the last thirty years, western forest managers began to realize that they needed to somehow reverse the dramatic unnatural buildup of woody fuels. The buildup was the result of





## Part 2, What We Know—And What We Don't

# CHANGE LOOP:



**OPPOSITE PAGE:** (Left) Landscape view from the early 1900s representing open grass-shrub cover type maintained by frequent fires. (Right) Same location in the 1980s, showing the uninterrupted growth of heavy timber, all of a similar age, resulting from the suppression of wildfires.

**THIS PAGE:** (Left) Landscape view from the early 1900s showing a diverse forest mosaic of grassland, shrub cover, and different ages and densities of tree stands. Some timber harvesting is evident in the background. (Right) Same location in the 1980s, showing an unbroken carpet of mature trees with very little diversity, the result of fire suppression and lack of thinning by fire.

**IT IS NOW GENERALLY RECOGNIZED THAT THE DOGMATIC AND AGGRESSIVE FIRE SUPPRESSION POLICY SINCE 1910 WAS CAUSING MORE PROBLEMS THAN IT WAS SOLVING. THAT ISSUE ALONE IS A STORY UNTO ITSELF.**

a policy that directed armies of firefighters to smother and quench every wildland fire, no matter how small. Over the last 100 years, that practice has disrupted the normal dynamics of the fire-adapted forests of the Rockies and elsewhere. The effort to find solutions that reduce those fuel loads is ongoing, expensive and controversial.

A quick look at forest vegetation data from the 1930s shows how the structure of western forests has changed over the last century. Historical Fire Ecologist Jack Losensky explains that the lodgepole pine stands through which the Big Hole cowboys rode decades ago were made up of

young lodgepole pines growing in an open understory. Today that same area holds four times more trees because the rigid suppression policy of the time did not allow fires to thin out the stands.

The data also contained only a couple of references to the presence of subalpine fir lightly scattered through the lodgepoles. In the 2000s, however, subalpine fir, a shade-tolerant species, was much more common in those same older, higher-elevation stands. The firs have created a new fuel ladder that boosts fires into the tree canopy where a running crown fire can start. Subalpine fir also ignites easily and likes to fling its sap-saturated embers into the wind, igniting spot fires that help the original blaze to grow even faster.

So the unnaturally high amounts of woody fuels and the continuous vertical and horizontal fuel layers stretching out through the far reaches of Montana's

forested landscapes produce fires that burn hotter and longer, eating their way across large expanses of unresisting territory. At the same time, the mixed bag of causes does contain some items contributed by climate change conditions. While not yet in a dominant role, global warming is beginning to play a part in wildfire behavior in the West in both direct and indirect ways.

For starters, the shoulder parts of the fire season are measurably longer as a result of global warming. Fire Ecologist Bob Keane notes that, in the last twenty years, the average fire season has lengthened by 20 to 30 days, starting earlier in the spring and ending later in the fall. (This does not translate into more intense fires, however, because fires occurring in the shoulder seasons are generally dampened by cooler temperatures and nighttime humidity.) The trend in higher average temperatures also pumps more energy into





**(Left)** Landscape view from the early 1900s showing a grass-shrub cover type maintained by frequent fires.

**(Right)** Same location in the 1980s, showing the uninterrupted growth of heavy timber resulting from the suppression of periodic wildfires.



the atmosphere, creating more frequent high wind events—instead of happening every 20 years or so, we're now seeing extreme wind events every ten years, usually late in the fire season. While this late-season timing may not always lead to the explosive fires we experience in high summer, the fact that these anomalies are happening more often does show that climate change is a contributing factor.

An indirect effect of climate change which most western Montanans will recognize is tied to the insect outbreaks over recent years. The increase in temperatures in the West is thought to be a result of human-caused climate change. As many folks have noticed, we don't see the sustained subzero temperatures in the middle of winter that used to be common a couple of decades ago. Those extreme cold temperatures routinely froze large numbers of the bark beetle species that like to feed on lodgepole and ponderosa pines. The warming winter temperatures have triggered the current beetle epidemic by allowing vast numbers of the insects to survive, propagate and feed on the host trees. As the infected trees die, they add to the glut of heavy woody fuel over large swaths of the northern Rockies.

The pulse of beetle-infested trees is also one reason it's become harder to predict how fires will behave—and the ability to make these predictions is essential to wildland fire managers. Mark Wilson, Lead Fire Management Officer and Fire Behavior Analyst for the Bitterroot National Forest, notes that infected trees add a huge amount of aerial (i.e., from the canopy to just above the ground) fuels to a forest for a number of years after a beetle attack in some places. In addition to killing trees, with the resulting dead, dry and red-needled upright timber, beetles feed on green trees, reducing their moisture levels and making them more

flammable as well. Since the fire behavior models developed in the 1980s were based mostly on how fire moves along the forest floor, they did not include the massive amount of highly flammable aerial fuels produced by the recent beetle epidemic across western Montana forests.

**SINCE THE FIRE BEHAVIOR MODELS DEVELOPED IN THE 1980S WERE BASED MOSTLY ON HOW FIRE MOVES ALONG THE FOREST FLOOR, THEY DID NOT INCLUDE THE MASSIVE AMOUNT OF HIGHLY FLAMMABLE AERIAL FUELS PRODUCED BY THE RECENT BEETLE EPIDEMIC ACROSS WESTERN MONTANA FORESTS.**

A second reason it's become harder to predict fires can be traced back to the origin of current fire behavior models. Wilson notes that the data for developing the models was collected about 30 to 40 years ago. That time period, he says, overlapped the coldest and wettest weather cycle of the last 2,000 years. Since then, we have been in the middle of a warmer, drier cycle. Bob Keane confirms that cooler/wetter and warmer/drier cycles have regularly occurred in the ecological record before any sign of human-caused climate change showed up. In North America, the cycles generally repeated every 20 to

40 years. This means that the current fire models were based mostly on the cooler/wetter potential weather scenarios for our area, and did not include fire behavior that might occur in a warmer/drier climate cycle. What's really to blame, then, for our inability to accurately predict fire behavior right now is not climate change but the partial and incomplete data on which our current computer models are based.

So for now it seems that the hotter, more intense western wildfires we've been experiencing lately are caused more by forest fuel conditions than the direct effects of global warming. Many professionals in the field think that we really don't know, at this time, if the extreme fires of recent years are the result of long-term climate change or if they simply typify the wildfire anomalies and cycles of the last few thousand years. Scientists do agree, however, that unmitigated climate change will transport us out of any historic range of variation of fire behavior and into uncharted terrain where ecological chaos and disequilibrium become the rule rather than the exception. 🦋

*—Gil Gale has 35 years of experience as an ecologist, public land manager and wildland firefighter with the U.S Forest Service.*

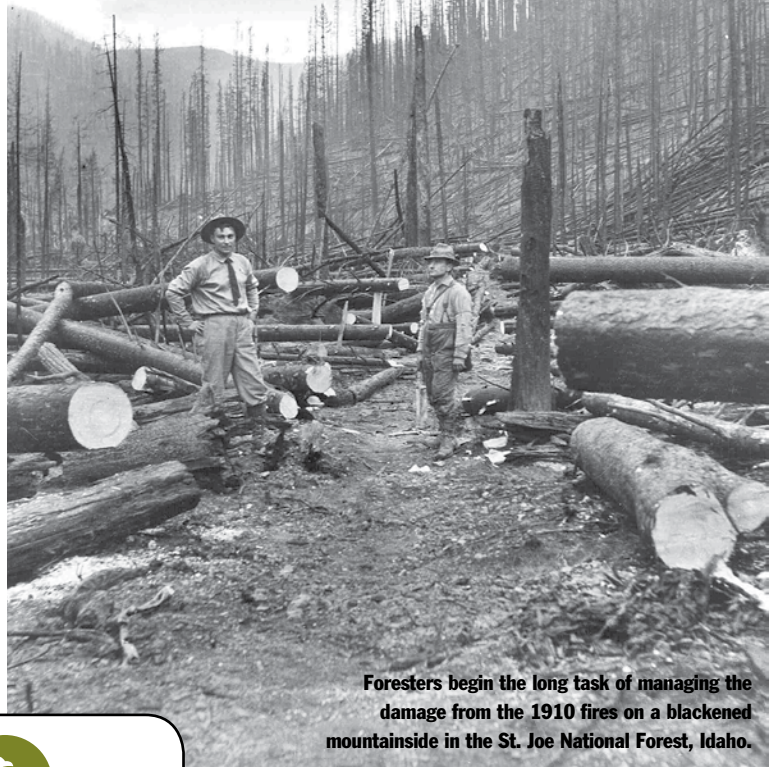


# Fire Ferocity: Wildfires of the Past

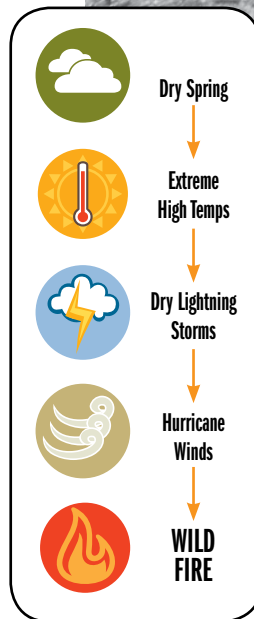
BY GIL GALE

**While we can all remember fierce fire years in recent history, this is not the first time that extreme fires have roared through the West.** If we look to the past, we can find occurrences of intense fires that devastated western landscapes long before human-caused climate change emerged. Historical Fire Ecologist Jack Losensky likes to remind folks about the extreme fire years of 1889 and 1890 in the West. The fires of 1889 set the stage for the “big burn” that would make the history books twenty years later. While human activities such as logging and railroading contributed to the 1910 fires by adding fuels and sparking new fires, the primary cause was a classic perfect storm of natural events.

The extreme kinds of conditions that marked the spring and summer of 1910 commonly cause exceptional disturbances in the natural world. Ecologists call these exceptions anomalies. A normal snowpack during the winter tapered off into the driest spring in memory throughout the northern Rockies. As the summer matured, soaring temperatures sucked the moisture from the air, the grass, and the trees. Updrafts from the baking terrain generated an unusual number of dry lightning storms, dribbling raindrops that never hit the ground. The lightning strikes started almost 2,000 fires across a wide area. Then, over that infamous two-day period in August, sustained hurricane-force winds tore their way across Washington, Idaho and Montana. The confluence of those natural events fanned the horde of



Foresters begin the long task of managing the damage from the 1910 fires on a blackened mountainside in the St. Joe National Forest, Idaho.



wildfires into a conflagration that consumed three million acres and altered the course of public land management in the West for almost a century.

But the 1910 fires weren't caused by climate change. Those fires, fierce though they were, were an “exceptional disturbance,” an anomaly. They were considered normal—the very edge of normal, perhaps, but still not outside of the range of what had happened in nature before. And history shows other examples of wildfire anomalies caused by conditions not related to climate change. Now, however, we are standing on the cusp between “natural environmental anomalies” and the unprecedented effects of climate change. Who knows what kind of wildfires the future will bring?



## Explore with **spectrUM** During Winter Break!

Looking for something fun for your kids to do over the winter break? Check out spectrUM's winter break camps! From “CSI: Who Stole Frosty the Snowman?” to “Winter Wonders: Extreme Animals,” these four day-long camps are a great opportunity for kids to keep exploring and discovering in the last days of December. (Also check out their no-school camps in January, February, and April.) \$50/camp. For ages 6-7 and 8-10; call 728.STEM or visit [www.spectrum.umat.edu](http://www.spectrum.umat.edu) for more information.

# get outside calendar

## MNHC Hours:

Tuesday-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

December 18, January 8, January 15  
**miniNaturalists Pre-K Program**,  
Thursdays, 10:00-11:00 a.m. \$3;  
\$1 MNHC members.

January 17 **Saturday Kids' Activity**,  
2:00-3:00 p.m. **Hibernation Celebration!**  
\$3; \$1 MNHC members.

January 22, 29 and February 5, 12, 19  
**miniNaturalists Pre-K Program**,  
Thursdays, 10:00-11:00 a.m. \$3;  
\$1 MNHC members.

February 21 **Saturday Kids Activity**,  
2:00-3:00 p.m. **Winter Ecology Walk**.  
\$3; \$1 MNHC members.

February 26 and March 5, 12, 19, 26  
**miniNaturalists Pre-K Program**,  
Thursdays, 10:00-11:00 a.m. \$3;  
\$1 MNHC members.

March 28 **Saturday Kids Activity**,  
2:00-3:00 p.m. **How to Draw Animals and Birds**.  
\$3; \$1 MNHC members.

April 2, 9, 16 **miniNaturalists Pre-K Program**,  
Thursdays, 10:00-11:00 a.m. \$3;  
\$1 MNHC members.

April 18 **Saturday Kids' Activity**, 2:00-3:00 p.m.  
**Fantastic Fossils**. \$3; \$1 MNHC members.

## Adult Programs

December Gallery, all month.  
Melissa Madsen: *Strange Birds*.

December 17 **Glacial Lake Missoula Chapter Meeting**, 4:00 p.m. Free and open to the public.

December 17 **Secret Science Night**, 7:00 p.m.  
**Chemistry of Hot Springs with Nancy Hinman**. \$4 suggested donation; MNHC members free.

January Gallery, all month. **Staff Picks**.  
No First Friday.

January 14 **Secret Science Night**, 7:00 p.m.  
**Becoming a Beekeeper with Don Linton**. \$4 suggested donation; MNHC members free.

January 21 **Glacial Lake Missoula Chapter Meeting**, 4:00 p.m. Free and open to the public.

January 28 **Secret Science Night**, 7:00 p.m.  
**Naturalist Trivia with Five Valleys Audubon**. \$4 suggested donation; MNHC members free.

February Gallery, all month. **David Jacobson and Neil Moore: Naturalists as Artists**.

SUN	MON	TUE	WED	THU	FRI	SAT
<b>December</b>						
	 December Gallery, all month. Melissa Madsen: <i>Strange Birds</i> .		 Glacial Lake Missoula Chapter Meeting, 4 p.m.  Secret Science Night, 7 p.m. Hot Springs	 miniNaturalists Pre-K Program, 10-11 a.m.		
14	15	16	17	18	19	20
	Deer, elk and bighorns forage along river bottoms 					
21				25	26	27
				<b>January</b>		
					 January Gallery, all month. <b>Staff Picks</b> . No First Friday.	
28	29	30	31	1	2	3
				 miniNaturalists Pre-K Program, 10-11 a.m.		
4	5	6	7	8	9	10
			 Secret Science Night, 7 p.m. <b>Becoming a Bee Keeper</b> .	 miniNaturalists Pre-K Program, 10-11 a.m.		 Saturday Kids' Activity, 2-3 p.m. <b>Hibernation Celebration!</b>
11	12	13	14	15	16	17
			 Glacial Lake Missoula Chapter Meeting, 4 p.m.	 miniNaturalists Pre-K Program, 10-11 a.m.		
			20	21	22	23
			 Secret Science Night, 7 p.m. <b>Naturalist Trivia Night</b>	 miniNaturalists Pre-K Program, 10-11 a.m.		
25	26	27	28	29	30	31
<b>February</b>						
Lynx pursue snowshoe hares		 February Gallery, all month. David Jacobson and Neil Moore: <i>Naturalists as Artists</i> .	 Spring Master Naturalist Course, 4-7 p.m.	 Secret Science Night, 7 p.m. TBA.	 miniNaturalists Pre-K Program, 10-11 a.m.	 First Friday Gallery Opening, 4:30-6:30 p.m. David Jacobson and Neil Moore: <i>Naturalists as Artists</i> .
		1	2	3	4	5
			 Spring Master Naturalist Course, 4-7 p.m.		 miniNaturalists Pre-K Program, 10-11 a.m.	
8	9	10	11	12	13	14

TERRY L. SPIVEY, TERRY SPIVEY PHOTOGRAPHY, BUGWOOD.ORG

TERRY SPIVEY, USDA FOREST SERVICE, BUGWOOD.ORG



SUN	MON	TUE	WED	THU	FRI	SAT
15	16	17	18	19	20	21
		Spring Master Naturalist Course, 4-7 p.m.	Secret Science Night, 7 p.m. TBA. Glacial Lake Missoula Chapter Meeting, 4 p.m.	miniNaturalists Pre-K Program, 10-11 a.m.		Saturday Kids Activity, 2-3 p.m. Winter Ecology Walk. Spring Master Naturalist field trip, all day.
22	23	24	25	26	27	28
March		Spring Master Naturalist Course, 4-7 p.m.	Secret Science Night, 7 p.m. Naturalist Trivia Night	miniNaturalists Pre-K Program, 10-11 a.m.	First Friday Gallery Opening, 4:30-6:30 p.m. Diane Olhoeft: Watercolors.	Spring Master Naturalist field trip, all day.
1	2	3	4	5	6	7
		Spring Master Naturalist Course, 4-7 p.m.	Western screech owls begin breeding	miniNaturalists Pre-K Program, 10-11 a.m.		
8	9	10	11	12		
		Spring Master Naturalist Course, 4-7 p.m.	Glacial Lake Missoula Chapter Meeting, 4 p.m. Secret Science Night, 7 p.m. Short Grass Prairie	miniNaturalists Pre-K Program, 10-11 a.m.		
15	16	17	18	19	20	21
		Spring Master Naturalist Course, 4-7 p.m.		miniNaturalists Pre-K Program, 10-11 a.m.		Saturday Kids' Activity, 2-3 p.m. How to Draw Animals and Birds.
22	23	24	25	26	27	28
		Spring Master Naturalist Course, 4-7 p.m.	April Secret Science Night, 7 p.m. Montana Peatlands.	miniNaturalists Pre-K Program, 10-11 a.m.	First Friday Gallery Opening, 4:30-6:30 p.m. Santos Fuatos: Landscape Fire Photography. Show runs all month.	
		31	1	2	3	4
		Spring Master Naturalist Course, 4-7 p.m.		miniNaturalists Pre-K Program, 10-11 a.m.		Spring Master Naturalist field trip, all day.
		Earthworms surface				
5	6	7	8	9	10	11
		Spring Master Naturalist Course, 4-7 p.m.	Glacial Lake Missoula Chapter Meeting, 4 p.m. Secret Science Night, 7 p.m. Naturalist Trivia	miniNaturalists Pre-K Program, 10-11 a.m.		Saturday Kids' Activity, 2-3 p.m. Fantastic Fossils.
12	13	14	15	16	17	18

**February 3 Spring Master Naturalist Course,** 4:00-7:00 p.m. Tuesdays to May 5, with three full-day field trips on February 21, March 7, and April 11. \$395; 3 college credits available. Call 327.0405 to register.

**February 4 Secret Science Night,** 7:00 p.m. TBA. \$4 suggested donation; MNHC members free.

**February 6 First Friday Gallery Opening,** 4:30-6:30 p.m. David Jacobson and Neil Moore: Naturalists as Artists.

**February 18 Glacial Lake Missoula Chapter Meeting,** 4:00 p.m. Free and open to the public.

**February 18 Secret Science Night,** 7:00 p.m. TBA. \$4 suggested donation; MNHC members free.

**March Gallery,** all month. Diane Olhoeft: Watercolors.

**March 4 Secret Science Night,** 7:00 p.m. Naturalist Trivia Night. \$4 suggested donation; MNHC members free.

**March 6 First Friday Gallery Opening,** 4:30-6:30 p.m. Diane Olhoeft: Watercolors.

**March 18 Glacial Lake Missoula Chapter Meeting,** 4:00 p.m. Free and open to the public.

**March 18 Secret Science Night,** 7:00 p.m. The Short Grass Prairie with Vicky Dreitz. \$4 suggested donation; MNHC members free.

**April Gallery,** all month. Santos Fuatos: Landscape Fire Photography.

**April 1 Secret Science Night,** 7:00 p.m. Western Montana Peatlands and the Search for the Northern Bog Lemming with Kristi DuBois. \$4 suggested donation; MNHC members free.

**April 3, First Friday Gallery Opening,** 4:30-6:30 p.m. Santos Fuatos: Landscape Fire Photography.

**April 15 Glacial Lake Missoula Chapter Meeting,** 4:00 p.m. Free and open to the public.

**April 15 Secret Science Night,** 7:00 p.m. Naturalist Trivia. \$4 suggested donation; MNHC members free.



## Volunteer Opportunities

**April 22 Volunteer Naturalist Training,** 3:30-5:00 p.m. VNS Field Trip Training. Learn how to teach kids about the flora and fauna of western Montana during the May VNS school field trips for 4th & 5th graders. No prior experience necessary.

## Ice Art

**Want something new to do during the next cold snap? Have fun with ice!**

### Ice Ornaments

Take a wintry walk and collect a variety of natural items—feathers, pebbles, leaves, berries (mountain ash berries add a great pop of color!). Arrange them in a shallow layer in a plastic container, then place a piece of string or ribbon so that both ends are in the container, with a loop outside for a hanger. Boil a kettle of water, allow it to cool, then boil and cool it again; this removes the air bubbles from the water and makes the ice clear rather than cloudy. Pour the water in a shallow layer over the items and the string ends, then place the container outside or just put in the freezer. Once frozen, hang your ice ornaments outside and enjoy!



PHOTO BY ANNE SALO

### Ice Lanterns

Find two small plastic containers of different sizes (one needs to be able to fit inside the other). Fill the larger one half full of water; place a few rocks in the small one and set it inside the large one, making sure the small one floats a finger's breadth above the large one. If it's cold enough, put them outside; otherwise just stick them in the freezer for a few hours. When the water is frozen, gently remove the ice from the containers, put a candle inside, and light up your backyard with softly-glowing ice lanterns! You can also experiment with freezing small items in the water—pine needles, leaves, twigs—or using food coloring or glitter.

PHOTO BY ALLISON DE JONG

## Wintry Word Search

B	L	N	Y	F	S	X	S	B	H	N	N	T	F	L
O	L	P	A	K	R	O	N	B	D	A	E	R	W	V
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I	L	I	Z	S	W	Y	Z	V	I	C	I	C	L	E
Y	N	I	T	Z	C	O	I	E	Z	S	H	K	J	U
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V	C	E	V	C	B	R	E	S	P	E	W	O	E	L
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B	N	A	S	T	S	O	R	F	S	D	N	T	P	P
D	S	N	O	W	F	L	A	K	E	I	D	L	J	U
Q	O	R	C	O	L	D	U	I	W	N	U	E	W	A
C	Q	E	R	M	N	K	K	K	L	G	B	O	P	R
X	S	B	S	L	A	T	S	Y	R	C	N	R	D	G
S	X	I	A	R	X	A	N	Y	M	S	A	O	R	B
F	Y	H	P	S	B	X	G	F	I	A	C	X	X	R

BLIZZARD  
BRRR  
CHILL  
COLD  
CRYSTALS  
FROST  
FROZEN  
GRAUPEL  
HIBERNATE  
ICICLE  
LYNX  
SKIING  
SLEDDING  
SNOW  
SNOWFLAKE  
SNOWMAN  
SOLSTICE  
SUBNIVEAN  
TRACKS  
WHITE  
WIND  
WINTER

### Calling All Kids!

Do you have any nature art, photography, poetry, or stories you'd like to share? We'll be showcasing 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](mailto:adejong@montananaturalist.org).



PHOTO BY LOGAN PHOTOGRAPHY



## Walking the Pathway of Learning: spectrUM inspires kids to find their passions

BY ALLISON DE JONG

**T**he spectrUM Discovery Area has been a part of the Missoula landscape for the last seven years, and has grown in leaps and bounds over that time. Last year spectrUM made a big splash when it moved into its beautiful new space downtown, complete with BrainLab, rotating hands-on science exhibits, and gift shop. I recently sat down to talk with some of the lovely folks at spectrUM, including Holly Truitt, spectrUM's Executive Director; Maury Valett, Professor of Systems Ecology at UM, STEM role model, and collaborator on the Institute on Ecosystems exhibition; and Annie Schmautz, a freshman chemistry student at UM and participant in spectrUM's Science Career Ladder. I quickly learned that, while spectrUM's Discovery Area is an important part of the organization, what happens outside spectrUM's walls is even more impressive.

"We're really in the business of inspiring the next generation of Montanans in science, technology, engineering and math (STEM)," Truitt told me. "Our end goal is to close traditional knowledge, opportunity, and achievement gaps for Montana children." spectrUM's in-museum programs serve 24,000 Montanans a year,

while its outside programs—including its mobile science program, professional development workshops, and deep engagement activities based in three communities around the state—reach more than 25,000 people annually.

Truitt believes that one of spectrUM's most important programs is the Science Career Ladder, which is embedded in both the organization's museum experience and its outreach. The Science Career Ladder is based on the idea that young people will be more empowered and inspired to pursue the sciences and higher education if they can see, as Truitt says, "the whole pathway of learning," from being passionate about biology or chemistry classes in high school to becoming a passionate astronomer, wildlife biologist, or, like Maury Valett, an ecologist whose excitement about floodplains is contagious. The Science Career Ladder provides young people with role models along every step of the way.

**"We want each one of these children to feel empowered about their learning and empowered about their future."**

Annie Schmautz is one of about 35 high school and college students working as paid educators in the museum. As a freshman at Hellgate, she was fascinated by


**Students in Florence, MT, experiencing spectrUM's popular "Brain: World Inside Your Head Exhibition," where they explored neuroscience and related careers.**

science. Her science teacher pointed her towards spectrUM, and it was love at first sight. She quickly became one of spectrUM's high school explainers—teaching kids only

a few years younger than herself about science. "As time went on," she says, "I got more and more interested in science. Just learning about all these different things, from astronomy to sound to dry ice, opened up broader fields of science that I wouldn't have been able to get into without this experience." She found herself particularly fascinated by forensic science, and is now at UM working towards her goal of becoming a homicide detective.

spectrUM's reach goes beyond high school and college students, too. Its core audience is the elementary/early-middle-school age group, both in the museum and with the mobile science program. In addition, the organization has recently begun offering professional development workshops for both formal and informal science educators around the state, with great success. spectrUM also focuses a great deal of energy on reaching rural and tribal communities in Montana, places that might not have the same access to STEM role models and technology that we have in Missoula.

Ultimately spectrUM's goal is to inspire young people to find their passion. "We are very hopeful that we are creating future scientists," says Truitt. "But we are equally excited if what they find is something that sparks a connection

or an interest that is not necessarily in the sciences, but in higher education. We want each one of these children to feel empowered about their learning and empowered about their future." 



# Snow, Sky, and the Color Blue

BY BECCA DEYSACH

I am running downhill through wet snow on a hill above Lolo Pass, thinking to myself, “So this is what it feels like to be Sasquatch.”

Only that giant creature has a body to match the size of his feet.

Mine are strapped into a pair of big, red snowshoes, making me buoyant on the two feet of new snow. With each leap forward, I plant a ski pole into the cold whiteness, and nearly half of it is swallowed up. As the hill levels out, I slow down enough to look beyond the fallen trees I am trying to avoid. Big, wet snowflakes coat my glasses. The boughs of the lodgepole pine and western larch weigh heavy with frozen water vapor. The mountain sky is a single sheet of cloud, so smooth it is hard to find the line between earth and sky.

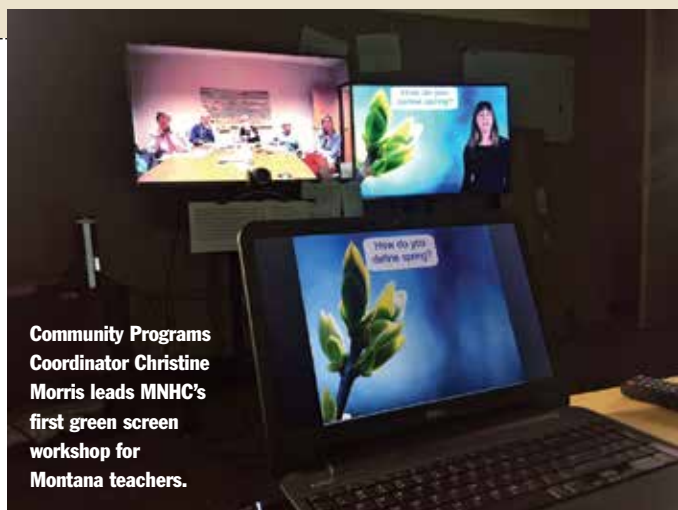
One more clumsy snowshoe step, and I find myself staring into the deep hole left by the pole of the traveler in front of me. The hole is blue. Ice blue, bubble-gum blue, as blue as the background screen of my new computer. I think about other wild blues I have known—the blue-green of new ice growing on a mountain river, the neon blue of glacier ice. The clear, sunlit sky. How many times have I been given a physics-laden explanation for the cerulean sky? At least as many times as I have forgotten it, and far more than I have understood. But suddenly, running through rolling folds of snow as soft as a giant cumulus cloud, I know in my bones why the distant sky shares this azure with the impression left by a ski pole.

The sky, like the land through which I am wading, is dense with water vapor. The only difference is that the vapor beneath me is frozen, while that above is wild and free in its gaseous form. All day, the sun radiates its bright, electromagnetic spectrum. This band of radiation includes the white light that we see, which is composed of all the colors of the rainbow, each of which has a wavelength all its own. As light travels by wave from our star into the earth's atmosphere, it strikes the particles flying around in the sky. Light's collision with water vapor, dust, and other gases results in the scattering of the different hues that comprise it. The long, lazy waves of red and yellow are slow to disperse, and quick to be absorbed by water molecules. Blue, however, with its short wavelength, gets bounced all over the sky. By the time the sun's light has reached our eyes, most of its components have been taken up by the gases above; blue and violet alone wander the sky.

So, why the blue hole in front of me? The sun's white light hits the snow and begins its travels full of collision, dispersion, and absorption. The surface snow shines white because light has not yet traveled far enough to be soaked up by the snowflakes. A two-foot depression made by my ski pole, however, reveals how quickly the long-waved colors of the spectrum are absorbed by water. If my poles were long enough to make a five-foot cavity, I would be even more entranced, for the farther that light travels through snow, the more particles there are to take in the undulating reds and yellows. Before long, all that is left to remind us of light's complexity is a stunning sapphire glow. 🐾

—This essay first aired as a Field Note on Montana Public Radio in January 2004. Becca Deysach is a mindfulness-based clarity coach and retreat facilitator based in Portland, Oregon. When she's not doing that, she loves chasing lichen up mountain creeks, skiing and hiking through the Oregon woods, and riding her star-studded bike in search of strong coffee. She blogs regularly at [www.cultivateclarity.net](http://www.cultivateclarity.net).





Community Programs Coordinator Christine Morris leads MNHC's first green screen workshop for Montana teachers.

## MNHC Dives Into Green Screen Technology

MNHC is launching into a whole new field of programming: video-conferencing workshops using green screen technology. Through our newest program, ID Nature (Interactive Distance Nature Education), we are now providing professional development workshops for teachers across Montana.

Through training and support provided by Inspired Classroom and Alter Enterprises, we hosted our first workshops this fall featuring the online citizen science program "Journey North." Teachers participating in the workshop learned how to use nature-based study to meet their classroom science standards.

Learning to use our brand-new green screen to provide interactive programming has been a fun challenge, and we look forward to all the great programming we can do with this new technology. In the next year we expect to develop several new ID Nature workshops to help connect classroom teachers across the state—and, through them, their students—with Montana's natural history. Want to learn more about ID Nature? Want to participate in a workshop? Contact us at 406.327.0405 or via our website ([www.MontanaNaturalist.org/contact-us](http://www.MontanaNaturalist.org/contact-us)).



## Test Your Nature Knowledge at MNHC's Naturalist Trivia Nights!

Do you know how many bat species live in Montana? Can you recognize the call of a ruby-crowned kinglet?

Do you know the differences between frogs and toads? Missoula has plenty of trivia options, but MNHC is the only place to go for naturalist trivia! We host a fabulous Naturalist Trivia Night several times throughout the

fall and winter, where naturalists of all levels of expertise gather to test their Montana nature knowledge. Join us on January 28th, March 4th, or April 15th—bring your own food and drink, come with a group of friends or join a team once you arrive!



## Bitterroots and Mourning Cloaks and Osprey, oh my!

Sign up for our **Spring 2015 Montana Master Naturalist Course** and learn all about the trees, flowers, birds, insects and landscapes of the place we call home. Students spend time learning both in class and in the field, and develop their naturalist skills through nature journaling and in-depth lessons. Taught by MNHC Naturalist Brian Williams (with a few guest lecturers sharing their expertise on certain topics), our popular 12-week course will be offered from 4-7pm on Tuesday evenings from February 3rd to May 5th, with three full-day Saturday field trips on February 21, March 7, and April 11. Cost is \$395; 3 UM credits are available. Call 327.0405 to register.

Looking for a more compact experience? Check out our five-day intensive **Summer 2015 Montana Master Naturalist Course**, also taught by Brian Williams, which runs from June 17th-23rd (Wednesday-Friday and Monday-Tuesday, with the weekend off); the class meets from 8am-4pm each day. The summer class is a little different from our spring course—it takes full advantage of the early summer weather, and students spend most of their days afield. Students will go more in depth on fewer topics: flowers/trees, birds, and insects. Cost is \$395; 2 UM credits are available, pending approval.

# imprints



Marilyn Marler, Val Aerni and Carolyn Pardini with their MNHC Awards.

## Director's Award: Marilyn Marler

**Marilyn** served on the Montana Natural History Center Board of Directors for about 8 years. Well before her term on the Board and continuing to the present, she has been a strong advocate for MNHC. She has been serving on the Missoula City Council for nine years now, and has worked for the University of Montana as a land managing botanist, taking care of Mount Sentinel and other natural areas for over 15 years. Marilyn grew up in the southern Sierra Nevada, attended UC Davis and moved to Missoula 20 years ago. She lives with her wonderful husband David and a menagerie of rescued pets. Her home also serves as a teaching site for their business, Butterfly Properties, where she and David work as garden coaches, teaching and encouraging people to grow native landscapes at home for native wildlife and resource conservation. *Thank you, Marilyn!*

## Volunteer of the Year: Val Aerni

**Val's** relationship with MNHC began in 2010 when she worked as an AmeriCorps volunteer with the Montana Conservation Corps. She and her co-leader helped out with the Visiting Naturalist program's classroom visits that spring and finished up by helping lead a number of the VNS May field trips. After 2010 Val kept on coming back to volunteer, giving us a huge helping hand every year with the Fall Celebration and Auction. This past year, we got to see her much more often, as she was our Education and Forest for Every Classroom intern while finishing up her master's degree in Curriculum and Instruction from the University of Montana.

Val loves to run and hike with her family and friends, especially with her wonderful husband Greg and their dog Oatis. She enjoys rock climbing, mountain biking, and

exploring nature with youth. Since graduating from UM in the spring of 2014, Val has moved away from Missoula and started work as the Program Coordinator with Bitterroot Ecological Awareness Resources, a non-profit in the Bitterroot whose focus is on outdoor mentoring for youth. Val is sad to have left Missoula, but she hopes to stay engaged with the Montana Natural History Center as much as possible. And of course she'll always be outdoors working on her naturalist skills!

We have so appreciated Val's hard work, dedication, and enthusiasm over the past four years. Her creative energy, love for children and the outdoors, and constant curiosity about the natural world are an inspiration to us at MNHC and to all the kids who were lucky enough to learn from her. *Thank you, Val!*

## Educator of the Year: Carolyn Pardini

**Carolyn** is a 4th grade teacher at Pablo Elementary School in the beautiful Mission Valley on the Flathead Indian Reservation. As a Forest for Every Classroom program graduate, Carolyn has launched an effort to take her students outside to learn about their local environment while meeting her education standards. Her curriculum, *Our Water Comes from the Mission Mountains*, has students learning math, science, language arts, and social studies while working in a local wetland, pulling weeds, identifying animal tracks, and experiencing outdoor adventure. Carolyn is a passionate educator who loves to ski, swim, hike, and paddle. And, in her words, "I have the greatest job because I get to spend the day with 9- and 10-year-old kids—they are very good at letting me know what is important."

*Thank you, Carolyn!*

PHOTOS BY JOCELYN CATTERSON





## A Record-Breaking Year!

Once again, we'd like to convey our sincere thanks to everyone who attended MNHC's Fall Celebration and Auction at the DoubleTree Hotel on October 10th. Some 250 wonderful folks helped us raise a record \$100,000 in support of nature education for children and adults. We are especially grateful for your outstanding response to our elementary school programs challenge, which will enable us to continue providing quality natural history education to area schoolchildren in 2015 and beyond. And, of course, we couldn't have done it without the following businesses and individuals whose generosity and hard work made the whole event possible. (Please accept our apologies for any missed names.) **Thank you!**

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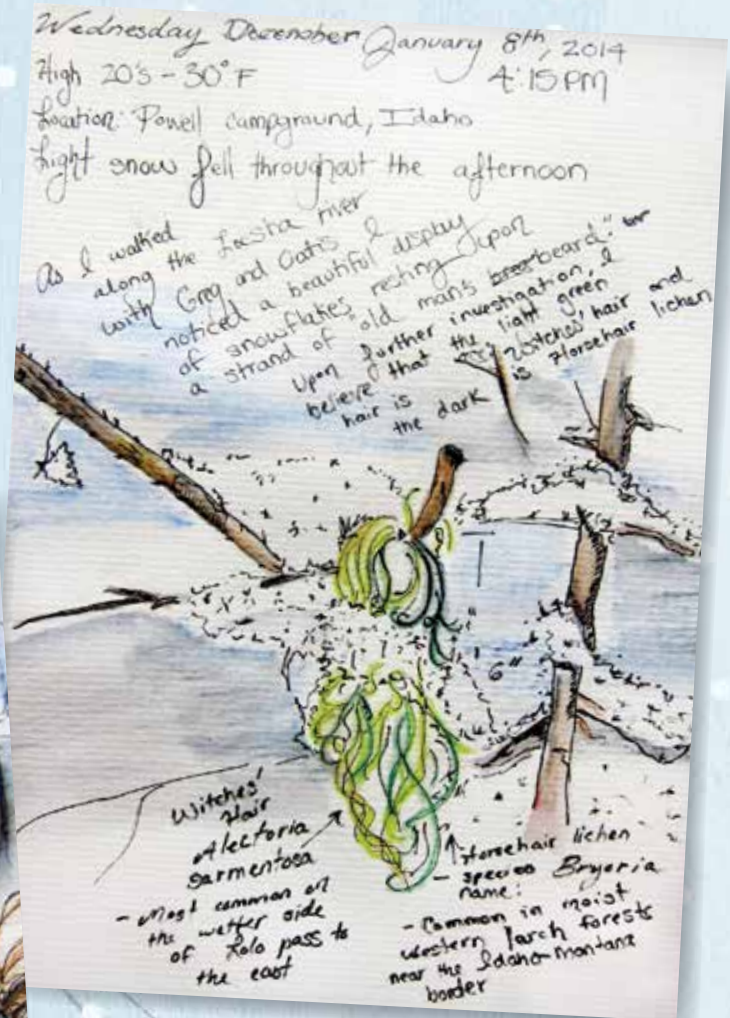
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To volunteer or for information, contact Allison De Jong, Volunteer Coordinator at 327.0405 or [adejong@montananaturalist.org](mailto:adejong@montananaturalist.org).

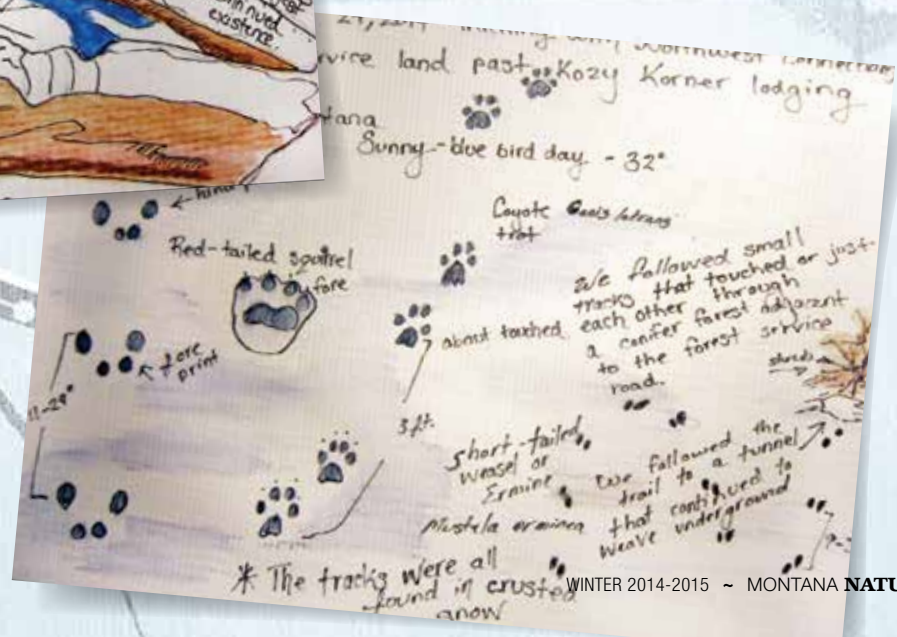




# Winter Observations from a Master Naturalist



Val Aerni is a certified Montana Master Naturalist and loves playing in the outdoors, honing her naturalist skills. These are entries from the nature journal she began in the Master Naturalist course.





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