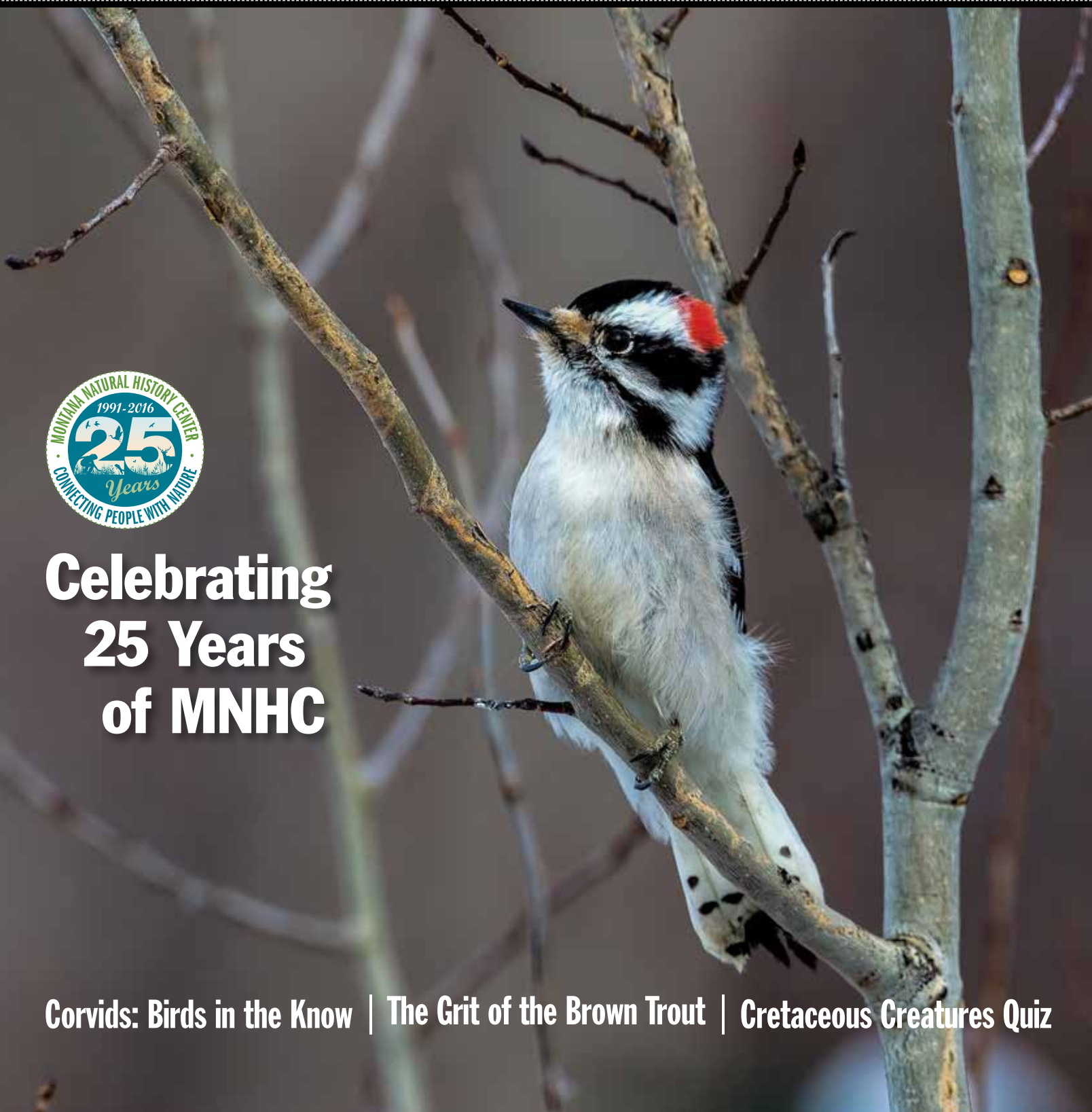
Montana Natural History Center

Winter 2015-2016

MONTANA Naturalist

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



Celebrating 25 Years of MNHC

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Cover – A male Downy Woodpecker *(Picoides pubescens)* hangs out on an aspen tree near Bear Creek in the Bitterroots on a chilly winter day.

Photo by Merle Ann Loman, a naturalist photographer who loves to record ordinary, everyday subjects with a sense of artistry. See more of her work at www.amontanaview.com.

Montana Natural History Center
Connecting People with Nature

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tidings

PHOTO BY BECKY PETERS

Admiring the ancient cedars at the DeVoto Memorial Cedar Grove along Highway 12 in Idaho.

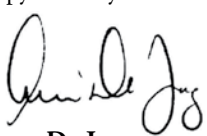
I've been pondering time, lately. As the MNHC staff worked together to create our new Explore Cretaceous exhibit this fall, we delved into research of a period that spanned 79 million years and ended 65 million years ago. I find it difficult to comprehend that kind of time. MNHC celebrating a quarter century—*that* is within my grasp, though 1991 doesn't seem as far away as 25 years. How quickly two and a half decades flew by. Yet how small is the span of a quarter century compared to ~5,000 years of humans' recorded history—which I can only just fathom—and how small is that history compared to the 5-8 million years hominids have existed on earth. Then I try, and fail, to wrap my mind around the ~165-million-year existence of the dinosaurs, and even that incomprehensible span of time is small compared to the ~3.8 billion years life has been present on Earth.

But that 3.8 billion years is made up of the quarter-century chunks of time we can understand, one after another after another. And here is the Montana Natural History Center, embarking on the next quarter century, looking ahead to getting more kids and adults outside to revel in and learn about Montana's birds and trees and insects, its flowers and geology and mammals, the results of all those billions of chunks of time stacked upon one another. It's pretty incredible, the journey of this planet. And, though MNHC's journey has been (much, much, *much*) shorter, it, too, has been pretty special (pgs. 6-7).

Here are we all, embarking on 2016, with so many opportunities to make our own journeys special. I am inspired by people like John Marzluff, who is fascinated by corvids and has made it his life's work to study these intriguing, intelligent birds (pgs. 8-9). And Heather McKee, who takes the time to notice and appreciate creatures such as the brown trout, an introduced species that yet has much to offer (pgs. 15-17). And Brian Williams, whose passion for environmental education has resulted in hundreds of people revelling more fully in the natural world (pg. 18). And Sue Reel, Bob Petty, and Pat Tucker, who turned a good idea into an organization that has been getting people outside and learning about their place for 25 years (pgs. 4-7).

We invite you to spend some of your human-sized bits of time at MNHC—and who knows? Perhaps you'll be with us for the next quarter century of our journey, as people like Sue Reel have been for the first. Learn about the Cretaceous (pg. 11), gather a team for a Naturalist Trivia night, or take your kids (or grandkids) to a miniNaturalist program. Thank you so much for making MNHC's continuing journey a great one—we are humbled and grateful, and glad you're along for the ride.

Happy Holidays!



Allison De Jong
EDITOR
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The Montana Natural History Center celebrates 25 years of connecting people with nature in 2016. For these three issues, *Montana Naturalist* will be adding four extra pages to showcase MNHC's history: conversations with founders and long-time supporters, stories and photos from the archives, and fun memories of all MNHC has accomplished over the past quarter century. Join us for our walk down memory lane!

Celebrating 25 Years of the Montana Natural History Center:

A Conversation with Sue Reel

Sue Reel was one of MNHC's founding parents (along with Bob Petty and Pat Tucker), and she continues to be involved with MNHC 25 years later. I sat down with Sue recently to ask her a few questions about the Montana Natural History Center's beginnings.

ADJ: I'd love to hear your stories and memories of the early days. Tell me how MNHC got started.

SR: In 1989 I got my Forest Service job as a wildlife educator/interpreter, and as I was doing educational programming and interpretation, it became clear to me that it was going to be hard for me to meet all the demand. In August 1990, I was working with Pat Tucker, who was working as an educator for the National Wildlife Federation, to do a display on wolves for a booth at the Western Montana Fair. And I had previously met Bob Petty, who was working as an illustrator for the Division of Biological Sciences at UM. [My husband] Dick was working with Bob on outreach for UM's Bird & Mammal Museum. So there was this synergy between meeting Bob, and Pat and I doing the wolf display. We were all involved in various educational efforts, and we thought, "What we really need is a nature center here in Missoula."

ADJ: So rather than people from a bunch of different organizations doing nature-based education, everything would be in one place.

SR: Yes. We had a group of like-minded people who were all very devoted to education and nature, and we knew we needed some kind of center to do this—so that was the brainchild. Our wolf exhibit at the Fair got a lot of interest, and that made us think, "Well, what can we do next?" We got active really fast, after that. We decided we should become a center, so we went ahead and got our 501(c)3. Right away we articulated what we thought the organization should be. We decided that the best way to move forward would be to go right ahead and do programming instead of doing a lot of planning.

ADJ: Did you focus initially on children's programs, adult programs, or both? What were some of those early programs?

SR: I think *Field Notes* [on Montana Public Radio] and museum tours were the first things we did. Bob and Dick had both been working with the university to increase outreach and do more education with the Bird & Mammal Museum. We all kind of felt, "Let's get stuff on the ground and prove ourselves, show there's a need, show that we can do high-quality programming." The museum tours were being done already, but the capacity was really small. So we decided to build that up. And Pat and I had both been working on traveling trunks—a Wolf Trunk and a Threatened and Endangered Species Trunk. We realized these would be a great way to get natural history curriculum and materials into teachers' hands.

It was great that we started small. We had a very clear goal, we were doing very good programming. We felt we were fitting a niche—there was a lot of demand. When you ask who we reached out to—well, anyone we could, basically, wherever we saw an opportunity. Adults, kids, everyone.

ADJ: Has MNHC's mission, or the way it's been expressed, changed over the years?

SR: I think the mission's been the same, but the way we articulate the mission has changed a little bit. We knew we were an educational organization and not an advocacy group. And then there was a lot of talk about the name. We really admired the phrase "natural history" for all it encompasses, because it means all of our natural history—geology, astronomy, ecology, animals and plants. And we struggled with, "Is it just Missoula?" No, we said, we'll reach out. We have trunks. We have Field Notes. Our audience is the whole state. And we knew that "museum" has kind of a stuffy feel. We knew we wanted to have a place—so we needed a "center," not a society or association. We thought that "center" would give us a location: that's where you learn about the natural history of Montana.

ADJ: So you had a vision for a space even though you didn't have the space right away.

SR: We needed to find a space. The very first office was in Jeannette Rankin Hall [at UM], and then the Botany building, next to the Herbarium. But we soon discovered the Fort, the

THOMAS BAUER/MISSOULIAN

Sue Reel, Dave Dyer (UM Collections Manager), and Bob Petty with some of the specimens at the UM Bird & Mammal Museum in 1993. (Many of these are now on display at MNHC!)

Historical Fort Museum. I was working out there already, so I knew how cool it was to be right on the Bitterroot River. Back then nobody realized how great having such public access to the Bitterroot right there was. We could do programming out there. And then we started the [Native Plant] Garden with Appleseed Foundation money, and then summer camps, and Elderhostel. We realized that we had to have diverse funding sources, and that we couldn't just rely on grants, memberships, etc.—we had to find ways we could get program fees, to pay staff, so that we could continue to grow. I think that's probably what made us successful—that three-legged stool of funding.

Anyway, we had pretty steady programs with quite a bit of neat programming going on. We don't do Elderhostel anymore, but everything else—*Field Notes*, summer camps, traveling trunks—has been sustained, or long-lasting.

ADJ: What else do you think contributed to MNHC's success?

SR: We really tried not to overlap with other groups too much. There have been a lot of groups that have come and gone in the last 25 years. But we're still here. Part of it was to have very high-quality programming, and to have our niche. We offer what we do because it's needed. And we keep finding ways to be unique, and to partner and collaborate when we overlap. I think another one of the strengths of MNHC is having the UM faculty connection. Not many places have high-caliber researchers and educators, college educators, volunteering time to work with them to develop displays, and fundraise, and take people out on field trips. So even though we may not have ended up on campus, we've continued to strengthen our relationship with UM and its faculty. And of course, a huge part of our success has been our amazing staff and all the volunteers who embrace our mission of nature-based education!

ADJ: One last question: Where do you hope we go in the next 25 years? You've been here since the beginning; what do you want to see in our next quarter century?

SR: Of course we can't do everything, but I want to be sure that whatever we're doing now, we're doing the best we can. I'd like to see a strengthening of teacher training, because I've realized, through my time as an educator, that you can multiply your efforts if you can bring teachers into the place-based community. I'd like us to get into more service learning that might help us to reach out to older audiences, from high school on, because I think young people want to be part of the solution. I want more and more people to know about us, and find reason to visit and be a part of MNHC, go on a field trip, take their kids to camp, come see the exhibits. I'd like us to be the go-to place for natural history education in Montana.

The Montana Natural History Center

As gleaned from MNHC newsletters and *Montana Naturalist* magazine

1990s

August 1990 – Sue Reel, Pat Tucker, and Bob Petty, while working on an educational wolf display for the Western Montana Fair, come up with the idea of creating an organization and facility that could unite the many efforts to provide nature education in the Missoula area.

January 1991 – The first *Field Notes* program airs on Montana Public Radio.

1991 – The first Board of Directors is created: Bob Petty, President; Pat Tucker, Vice President; Anne Greene, Secretary/Treasurer; Dick Hutto; and Sue Reel.

June 25-29, 1991 – MNHC offers its first natural history workshop for educators, focusing on the natural history of the Rattlesnake National Recreation and Wilderness Area.

Fall 1991 – MNHC gets its first home, in room M-9 of Jeannette Rankin Hall on the UM campus, with Jennifer Dolese volunteering a few hours a week to staff the office.

January 1992 – The Montana Natural History Center gains its official 501(c)3 non-profit designation, retroactive to July 1991.

June 11, 1992 – The first fundraiser and membership drive is held in the Missoula Public Library's large meeting room, raising $1,324.30.

September 1992 – The first *Field Notes for Kids* program airs on the *Pea Green Boat* on Montana Public Radio.

Fall 1992 – MNHC moves to its second office, in room 302 of the Botany building at UM.

Spring 1993 – *Field Notes* wins the 1993 Environmental Education Media Award presented by the Montana Environmental Education Association.

July 1994 – Diane Friend develops and runs the first summer camps for MNHC's Summer Science Discovery Program for children ages 8-12.

December 1994 – With the help of the Montana Environmental Education Association, MNHC establishes a Teacher Resource Library (later named the Ralph Lee Allen Environmental Education Library).

Spring 1995 – Wendy Moore is hired as MNHC's first (part-time) office staff.

June 1995 – All of Missoula's 6th graders share their knowledge of watersheds at Missoula's first annual Watershed Festival, coordinated by MNHC.

February 1996 – Marilyn Sigman is hired as MNHC's first Executive Director.

Spring 1997 – *Field Notes Quarterly* makes its debut.

Fall 1997 – MNHC offers its first Elderhostel programming.

May 1998 – The first Birds, Bugs and Blossoms Festival (called RiverFest in later years) brings the community together to celebrate spring with bird watching, field trips, demonstrations, and more.

June 1998 – Time to grow! MNHC moves to its new home at the Post Headquarters building at Fort Missoula, a great location near the Bitterroot with room to expand.

Spring 1999 – MNHC creates the Nature Adventure Playground (today called the Native Plant Garden at Fort Missoula) with generous funding from the Appleseed Foundation.

September 1999 Janel Queen begins as MNHC's second Executive Director.

2000s

Fall 2000 – MNHC's popular Glacial Lake Missoula exhibit is created.

Fall 2001 – The Visiting Naturalist Program is piloted in three classrooms, opening to rave reviews. Early lessons focus on wetlands ecology, fire ecology, and restoration ecology.

Summer 2003 – The long-standing magpie logo is replaced by that of a ponderosa pine growing out of a book, created by Taylor Barrett.

June 2003 – Instead of being open to the public on weekdays only, MNHC offers open hours on Saturdays, and begins its first Saturday Discovery Days for families.

Summer 2003 – Brad Robinson becomes MNHC's third Executive Director.

2003-2004 School Year – The Visiting Naturalist program shifts to its current format—providing seven classroom visits and two field trips through the course of the school year. In 2003-2004, the program reaches 20 classrooms.

Spring 2004 – The *Tidings* newsletter and *Field Notes Quarterly* are replaced with the full-color, triannual *Montana Naturalist* magazine, edited by Caroline Kurtz and designed by Eileen Chontos.

May 19, 2004 – After months of planning and fundraising, MNHC purchases its current home, the former Big Sky Brewery building at 120 Hickory Street, and starts in on renovations.

July 2004 – With the help of some generous donors MNHC purchases its first short bus, making it easier to get kids and adults outdoors!

January - May 2005 – Naturalist Brian Williams creates and teaches the first "Becoming a Naturalist" class, the precursor to our wildly-popular Montana Master Naturalist Course.

Through A Quarter Century

April 1, 2005 – Staff and exhibits are (mostly) moved in, and the new building at 120 Hickory Street is open for business!

Spring 2005 – Anita Maxwell becomes MNHC's fourth Executive Director.

March 2006 – MNHC, Northwestern Energy, the Osprey baseball team and Play Ball Missoula collaborate to build a new pole and nesting platform next to the Allegiance Field at Ogren Park. Osprey have nested there almost every year since.

July 15, 2006 – MNHC hosts a fun-filled 15th Anniversary Celebration!

Montana Natural History Center

Summer 2006 – Local artist Nancy Seiler designs MNHC's current dragonfly logo.

Spring 2007 – Arnie Olsen is hired as MNHC's fifth Executive Director.

2007 – A rollercoaster year for MNHC. After months of struggling to pay the hefty mortgage and faced with the prospect of selling our newly-acquired building, MNHC receives an incredibly generous grant of $900,000 from the Kendeda Fund, allowing us to buy our building outright and put future funding into growing our programs.

Fall 2008 – Sue Reel receives MNHC's first Director's Award for her outstanding service, dedication, and contributions to MNHC, including 16 years of service on the Board of Directors.

Spring 2009 – Montana Master Naturalist Certification is now available for the first time in the state, through MNHC's Montana Master Naturalist Course.

2010s

January - February 2010 – The Glacier National Park Centennial Art Display is housed in the newly-designated MNHC gallery for two months, the first of many nature art gallery shows to brighten our walls.

Summer 2010 – MNHC's great horned owl license plate, with art by Joseph Thornbrugh and design by Eileen Chontos, hits the streets.

Summer 2010 – A new live exhibit comes to MNHC: Camo the gopher snake, still one of our biggest draws for kids!

Fall 2010 – Thanks to generous donors and volunteers, the historic garage and storage shed at the Native Plant Garden at Fort Missoula gets a makeover, resulting in new classroom, storage, and outdoor learning space.

Spring 2011 – Kids aged 2-5 flock to MNHC on Thursday mornings for the first miniNaturalist pre-school programs.

May 2011 – Brian Williams and Missoula College Biology professor Greg Peters offer an in-depth look at flowering plants on the first Master Naturalist Field program.

2011-2012 School Year – MNHC pilots the Field VNS program, sending staff naturalists into a few Visiting Naturalist in the Schools classrooms twice per month instead of once.

Spring 2012 – MNHC gladly welcomes new neighbors when Five Valleys Land Trust purchases and remodels the eastern third of our building.

April 2012 – Nineteen western Montana K-12 educators participate in A Forest For Every Classroom, a year-long series of place-based education workshops offered by the partnership of MNHC and the Forest Service.

Summer 2012 – MNHC begins remodeling the exterior of the building both to increase energy efficiency and create a more welcoming facade.

November 2012 – MNHC's popular Naturalist Trivia Night program debuts.

October 4, 2013 – Stephanie Frostad's stunning dragonfly mural, "Radiant," is unveiled, making the exterior renovations officially complete.

Fall 2013 – MNHC begins an extensive remodel of the building's interior, turning the unfinished storage space into offices, a large classroom, conference room, green-screen room, and library.

June 6, 2014 – Nearly 400 of MNHC's supporters attend our Grand Reopening Celebration to admire our completed building metamorphosis!

Fall 2014 – MNHC launches a new distance-learning teacher training program: ID Nature (Interactive Distance Nature Education), using our brand-new green-screen studio and video-conferencing technology to reach teachers across the state.

September 2015 Thurston Elfstrom takes the helm as MNHC's sixth Executive Director.

November 2015 – MNHC debuts its Evening with a Naturalist series, with world-famous paleontologist Jack Horner interviewed by SciShow host Hank Green before a sold-out crowd.

2016 – We're thrilled to celebrate an incredible quarter century of the Montana Natural History Center with our supporters and the Missoula community. ***We'll be hosting a fabulous Community Celebration on June 15th to thank you all for your support—plan to join us!***

MNHC PHOTOS

Getting to Know Your Crow

BY JOHN MARZLUFF

I've been fascinated with corvids—birds in the crow family, including jays, ravens, magpies, and nutcrackers—for most of my life.

As a graduate student in Arizona I kept close company with a flock of Pinyon Jays. This uber-social species lives like a troop of baboons. Several dozen mated pairs and their extended families spend each autumn together ferrying pine seeds they have harvested from trees to communal caching grounds and then nest in a loose colony. They are flexible breeders, typically nesting throughout spring and summer, but will even nest in autumn following exceptional harvests. Ravens and crows hunt for the jays' eggs and chicks with such skill that they literally teach the jays to hide their nests and behave cautiously when they are nearby. Fascinated by this arms race between predator and prey, I dove deep into the world of the raven, taking my wife with me. Together we learned how this avian Einstein shared the whereabouts of rare food bonanzas with casual acquaintances at their evening communal roost sites.

In Seattle, where I now work, I've been co-opted by the American Crow. My graduate students, my colleagues and I are studying crow behavior, seeking answers to everything from how crows' brains enable this familiar species to recognize individual people to why they seem to hold funerals around their dead (we've found that it seems to be, in part, for the birds to learn about danger).

Why corvids? you may ask. Their sinister reputation, brash attitude, and aggressive demeanor put many people off. But take a closer look and I think you'll agree they are wonderful birds, worthy of the respect they garnered as gods and informants to Native Americans, the Norse, and people of the Far East. Montanans are fortunate to live among a rich diversity of corvids. You can peek into the world of Pinyon Jays, crows, and ravens as I've done, but also take a fresh look at the American Magpie, Gray Jay, Clark's Nutcracker, Blue Jay, and Steller's Jay. Here are a few tidbits about Montana corvids to guide your exploration of their world.

ABOVE, CLOCKWISE:

Crows have catholic diets; here a coastal bird tests out a small crab.

The beak of the Clark's Nutcracker is long and is without the usual bristles around the nostrils. This makes an effective tool to extract pine seeds from pitchy cones.

The Gray Jay, aka "camp robber," is a common visitor to high-elevation picnic grounds. Watch your sandwich when this corvid is nearby!

Magpies routinely probe the hides of mammals such as this bighorn sheep, foraging for ticks and other insects.

A group of ravens scavenges the last morsels from a bison carcass.

The coloration of Steller's Jays varies across its wide range. This bird sports the dark blue eyebrows of a Pacific coast individual, while white brows highlight Rocky Mountain jays.

Interested in learning more?

Check out John Marzluff's research lab's web site:
http://www.sefs.washington.edu/research.acl/

Join us at MNHC when John Marzluff is interviewed by SciShow host Hank Green at our second Evening with a Naturalist program on Friday, January 15th! Tickets are $60 and are on sale now at www.MontanaNaturalist.org.

PHOTOS BY JOHN MARZLUFF

I'm barely two steps away from delivering the daily feed to my backyard birds, and three Steller's Jays hit the feeder with a squawk. They anticipate my every move, heading to the feeder as soon as I open the shed where the seed is stored. Quickly they swish their strong beaks through the sunflower and millet to test and reap the handful of peanuts I've buried. By lifting and shaking each shell the jays weigh the contents and select the heaviest. They communicate to one another not only with calls, but also by raising or lowering their crest. A fully raised crest is a signal of dominance and aggression. And they don't just talk to other jays. They frequently mimic the calls of hawks, which may flush other birds from bird feeders, enabling the jays to satisfy their gluttonous appetites.

Learning how to utter new calls is the provenance of songbirds, as they have special circuits in their brains that essentially allow them to record, edit, and reproduce sounds they frequently hear. Corvids include the largest members of the songbird lineage (technically, the oscine branch of the order of birds known as the *Passeriformes*), and, as such, their vocal prowess is legendary. Ravens can bark like dogs, crow like roosters, and sound like dripping water. Crows, ravens, and magpies that are raised by humans regularly pick up our vocabulary. In the 1960s a crow in Missoula was observed talking to dogs and luring them from their yards, commanding them to "Come boy, here boy!" just as their owners would do. And at the Beartooth Nature Center in Red Lodge, visitors can listen to Ted Turner's former magpie say "No!"

Ravens are also known as "wolf birds" because of their close association with wild canids. As wolves reclaim the West, we can watch how ravens follow them and flock to their kills. The abilities of crafty ravens to steal from wolves—one bird often distracts a lobo with a sharp yank of its tail while a second rushes in to beak a treat—is thought to be a major force shaping the pack life of wolves.

Magpies have a keen sense of smell—rare among birds—that allows them to sniff out and scavenge carrion. Their bulky, domed nests hide eggs and chicks from would-be predators. Some magpies move their eggs between alternative nests, perhaps to foil knowledgeable nest raiders.

Crows mate for life, which can stretch across decades. The pair nesting high in your backyard tree can identify you by your face and remember if you have been naughty or nice. Many people receive trinkets from their neighborhood crows. This apparent "gifting" follows kind acts, such as rescuing a trapped bird or feeding.

Clark's Nutcrackers, like all corvids, have large brains relative to their body size. In this respect they are more akin to flying monkeys than birds. This hoarder stashes thousands of pine nuts in the ground each autumn and retrieves them throughout the year. The high fat and protein content of the seeds fuels the nutcracker's breeding and the energetic demands of remembering where it placed all the seeds! The part of its brain used to memorize cache locations literally grows each autumn and shrinks in spring and summer. Precise memory allows these birds to even dig through snow to recover a cache. Gray Jays, on the other hand, avoid that necessity by caching on tree branches rather than in the soil. They have enlarged salivary glands that produce sticky spittle capable of gluing a mash of insects, meat, and pilfered sandwich to a branch.

Many corvids are on the increase throughout Montana and the West. Their tolerance of people, understanding of our actions, and ability to exploit the landscapes we create enable these brainiacs to push beyond the city, ranch and farm into wilder landscapes. There, they may challenge species less able to tolerate human presence, such as sage-grouse, Piping Plovers, Marbled Murrelets, and desert tortoises. By understanding how our activities increase corvid populations we might learn to modify lands less to their liking. Watching ravens, for example, can teach us to reduce roadkill, restore the diversity of native predators, cover landfills, reduce the suitability of power transmission lines as nesting sites, and increase native land cover on farmlands. As I consider all that corvids have to teach us, I know that I'll continue to be fascinated with these influential and knowledgeable birds.

Crows mate for life, which can stretch across decades. The pair nesting high in your backyard tree can identify you by your face and remember if you have been naughty or nice.

A raven eggs on a coyote on a snowy day in Yellowstone.

While ravens closely associate with wolves, crows in coastal British Columbia commune with grizzlies.

—John Marzluff is the James Ridgeway Professor of Forest Resources at the University of Washington and author of several books on corvids and other birds including Dog Days, Raven Nights; In the Company of Crows and Ravens; Gifts of the Crow; *and* Welcome to Subirdia.

HOT SPOTS:

The Surprising Diversity of Hot Springs

BY STEPHANIE LAPORTE POTTS

PHOTO BY JAMES ST. JOHN

The trail is starting to get icy. On the horizon, puffs of steam rise in front of a curtain of cedar boughs. I smile: we're almost there. This little forest oasis is my secret to enjoying long winters in the mountains.

Sinking into the warm water of the hot spring a few minutes later, I close my eyes and open them to a color not often seen in the Montana winter: spring green, sparkling on broad growing leaves. Looking closer, I see a fly. The cedars keep waving in the background, as a dipper hops in the nearby stream. It seems that this place is not so secret of an oasis, after all.

The hot springs of the Rocky Mountains are in fact full of life, including species specifically adapted to the thermal environment, as well as others that take advantage of the respite offered by hot springs' warm micro-climate. The species composition of hot springs vary widely, depending on location, water temperature, mineral content, and surrounding landscape. Yet even in the most hot and acidic springs, life thrives.

Some of the hardiest hot springs residents are too small to see with the naked eye. Thermophilic eukaryotes and prokaryotes live attached to the walls of hot pools, or in mats or long filaments. If you have encountered stringy, slippery, yellow-green strands in an outflow channel at a wild hot spring, chances are you have seen these colonies of microorganisms. Perhaps the most fascinating examples of these tiny creatures are colorful bacterial mats, made famous by places such as the Grand Prismatic Spring in Yellowstone National Park. The mats are an entire community of different microscopic species, layered in such a way that they can all thrive: those most in need of sunlight for photosynthesis near the top, and those more in need of a dark, hot environment located toward the bottom.

But not all thermophilic life is microscopic. Researchers have found a number of macroinvertebrate species adapted to the warm geothermic waters. In Yellowstone, some species of ephydrid flies lay their eggs directly on or in the bacterial mat, helping avoid predation of the eggs as well as benefiting their young larvae, who burrow into and then develop within the protection of the mat. In other hot springs, researchers have found beetles living in water as hot as 125 degrees Fahrenheit. These insects, in turn, form the base of food chains: ephydrid flies are parasitized by mites and wasps, and eaten by spiders, which are eaten by killdeer.

And then there are those like me, who don't need hot springs, but really like the fact that they exist. Some plants, including species of ferns and monkeyflower, take advantage of the almost-tropical environment that they afford. From dippers to elk, animals visit for the open water and snow-free grass created by the warm ground. One of the most surreal experiences of my life was looking up from the Boiling River in Yellowstone, only to see a pair of bison amble past on their way to some green grass near a vent further down the bank.

I think about those bison now. This winter, they will probably go back to Mammoth to "take the waters," as it once was called, and join the many other creatures benefiting from the hot springs. Maybe I will, too. But for now, I look back at the dipper, bouncing on his rock among the cedars, and relax in our winter oasis.

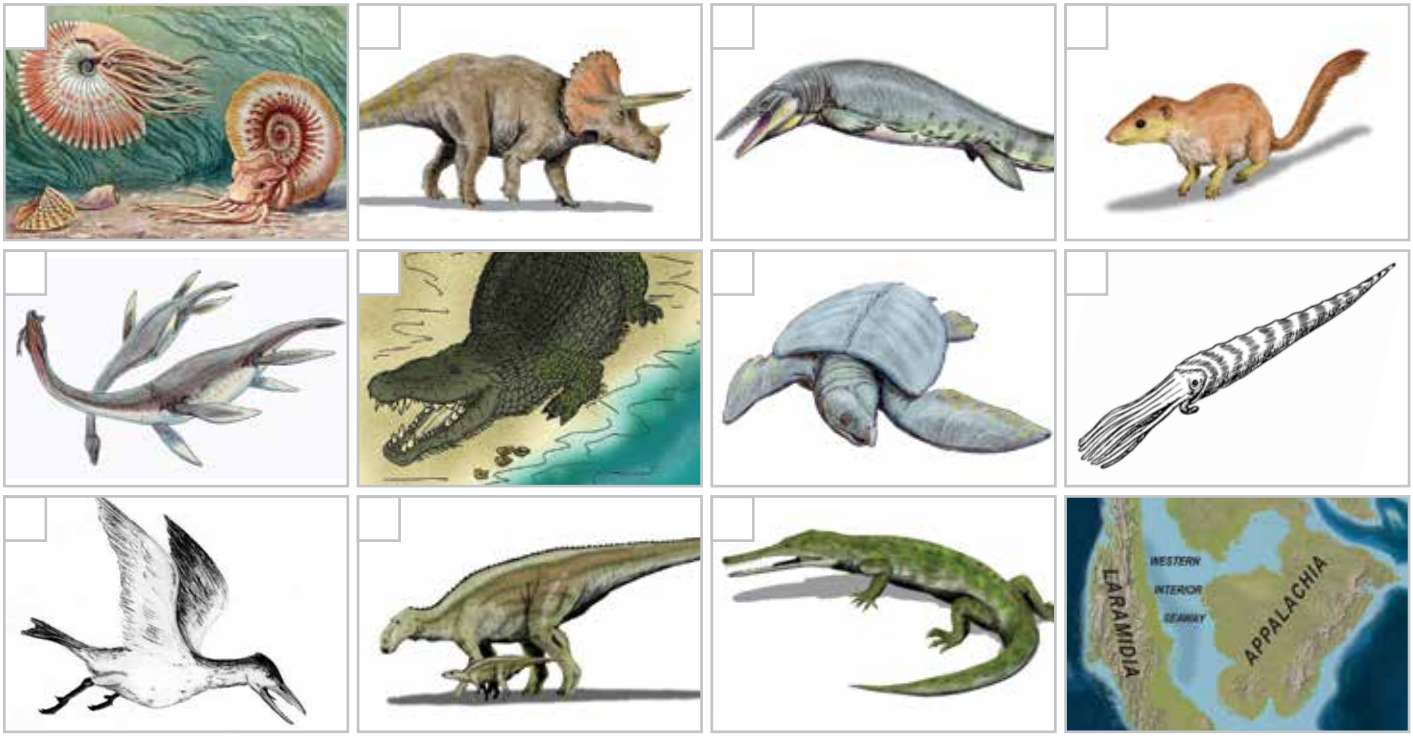
—Stephanie Laporte Potts is the Youth Programs Coordinator at the Montana Natural History Center. She holds an MS in environmental studies from UM, and is passionate about exploring, learning, and getting others excited about Montana's diverse landscapes and species.

Top: Colorful bacteria vivify Yellowstone's Grand Prismatic Spring. Middle: Grass and other plants grow even in winter near hot springs. Bottom: Bison forage for grass near Yellowstone's Boiling River.

PHOTOS BY STEPHANIE AND ADAM POTTS

Cretaceous Creatures Quiz

Though dinosaurs are the best-known animals that lived during the Cretaceous Period (which lasted from 145 to 65.5 million years ago), there were lots of other creatures alive then, too! Prehistoric birds and early mammals evolved during the Cretaceous. Much of the land, including central North America, was covered with warm, shallow seas, which were filled with myriad animals, from predatory marine reptiles to sharks to snails to giant turtles. Take our quiz to learn about some of these fascinating critters (and stop by soon to see our new collection of Cretaceous fossils)! Write the number in the matching box.



FIRST ROW: HEINRICH HARDER, NOBU TAMURA, DMITRY BOGDANOV, NOBU TAMURA. SECOND ROW: DMITRY BOGDANOV, STANTON F. FINK, DMITRY BOGDANOV, TOM MCKEAN. THIRD ROW: ARTHURWEASLEY, NOBU TAMURA; NOBU TAMURA; SAMPSON SD, LOEWEN MA, FARKE AA, ROBERTS EM, FORSTER CA, SMITH JA, ET AL.

1. *Baculite*

Baculites are a genus of cephalopod that ranged in size from 7 centimeters to 2 meters in length. During the Late Cretaceous *Baculites* thrived in marine seas throughout the world. The shell is made up of a series of chambers connected by a tube to keep them buoyant. The prominent head, tentacles, and bilateral symmetry are designs shared today by living cephalopods such as the octopus.

2. *Purgatorius*

Purgatorius was a rat-sized mammal and is believed to be the earliest known relative of all modern primates—including humans! *Purgatorius* ate fruit and insects, and recent discoveries of ankle bones indicate that it probably climbed trees.

3. Champsosaur

Champsosaurs were crocodile-like reptiles with webbed feet and large scales that spent most of their lives in the water. The long, thin snout and conical teeth were used to catch small, aquatic prey. The largest species of champsosaur grew up to three meters long.

4. Plesiosaur

An order of marine reptiles, plesiosaurs had broad bodies, short tails and four long flippers that enabled them to "fly" through the water. They breathed air, bore live young, and may have been warm-blooded. Some species had extremely long necks and small heads and fed on small sea creatures, while others had short necks and large heads and hunted large prey.

5. Ammonite

These cephalopods were squid-like creatures that lived in coiled shells, and used their tentacles to capture their prey of small fish and crustaceans. Ammonites built new protective shell as they grew, but only lived in the outer chamber. Some of them grew larger than three feet across!

6. Mosasaur

Close relatives of modern Komodo dragons, these large marine reptiles hunted in the warm, shallow waters of the inland seaways. Mosasaurs breathed air, gave birth to live young, and had broad tails and four webbed, paddle-shaped limbs, making them powerful swimmers.

7. *Triceratops*

Meaning "three-horned face," *Triceratops*, with its three horns and large bony frill on the back of its head, is one of the most recognizable dinosaurs. This large herbivore ate plants such as ferns and palms, and was similar in size to the African elephant—up to 30 feet long and weighing up to 15,000 pounds.

8. *Maiasaura*

Maiasaura was a plant-eating, duck-billed dinosaur genus that lived in what in what is now Montana. It's our state fossil! It had a flat snout, a crest on its skull, a long stiff tail, and hind legs that were much larger than its front legs. It grew to be about 30 feet long and weighed about 6,000 pounds.

9. *Deinosuchus*

Meaning "terrible crocodile," *Deinosuchus* was very similar to modern crocodiles. It had a long head, broad snout, thick teeth, and long tail. This prehistoric reptile was bigger than today's crocodiles, growing up to 35 feet long. It ate fish and turtles, and may have even hunted and eaten dinosaurs!

10. *Ichthyornis*

Named "fish bird" because of its fish-like back bones, *Ichthyornis* was a genus of toothed prehistoric seabirds that lived along the Western Interior Seaway. These relatives of modern birds were, on average, about the size of a pigeon, and had many small, sharp teeth in the middle part of their upper and lower jaws!

11. *Archelon*

A genus of extinct sea turtle, it is most closely related to the modern leatherback turtle. *Archelon* lived in the shallow inland seaway, and was a huge animal—the largest fossil found was 13 feet long and 16 feet wide from flipper to flipper.

Western Interior Seaway:

North America, ~75 million years ago

ANSWERS:
FIRST ROW: 5. Ammonite, **7.** Triceratops, **6.** Mosasaur, **2.** Purgatorius
SECOND ROW: 4. Plesiosaur, **9.** Deinosuchus, **11.** Archelon, **1.** Baculite
THIRD ROW: 10. Ichthyornis, **8.** Maiasaura, **3.** Champsosaur

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

January 7 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

January 9 **Saturday Kids' Activity,** 2:00-3:00 p.m. **Make Art with Madeline.** Free with admission.

January 14 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

January 21 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

January 28 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

February 4 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

February 11 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

February 13 **Saturday Kids Activity.** 2:00-3:00 p.m. **Glow-in-the-Dark Party.** Free with admission.

February 18 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

February 25 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

March 3 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

March 10 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

March 12 **Saturday Kids Activity.** 2:00-3:00 p.m. **Rockhounding!** Free with admission.

March 17 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

March 24 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

March 31 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

April 7 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

April 14 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

April 16 **Saturday Kids' Activity,** 2:00-3:00 p.m. **Go Birding!** Free with admission.

April 21 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

April 28 **miniNaturalist Pre-K Program,** 10:00-11:00 a.m. $3; $1 MNHC members.

Adult Programs

December Gallery, all month. **Rebecca Durham: Where It Grows.**

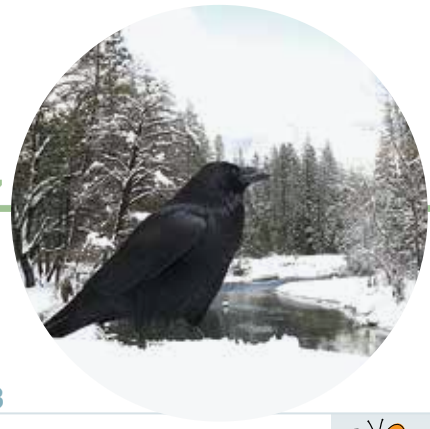
December 9 **Naturalist Trivia Night,** 7:00 p.m. $4 suggested donation; MNHC members free.

December 16 **Glacial Lake Missoula Chapter Meeting,** 4:00 p.m. Free and open to the public.

January Gallery, all month. **Rebecca Durham: Where It Grows.** No First Friday.

January 13 **Secret Science Night,** 7:00 p.m. **Nature Art on Tap** with MNHC Artist in Residence Madeline Mikolon. $15; $10 MNHC members.

SUN	MON	TUE	WED	THU	FRI	SAT
December 20	21	**December Gallery,** All month. **Rebecca Durham: Where It Grows.** 22	23	***Closed for the Holidays Dec. 24-26*** 24	*Christmas Day* 25	26
27	*Ravens active, foraging in all kinds of weather* 28	29	30	***Closed for the Holidays Dec. 31-Jan. 1*** 31	*New Year's Day* **January** 1	**January Gallery,** All month. **Rebecca Durham: Where It Grows.** 2
3	4	5	6	**miniNaturalists Pre-K Program,** 10-11 a.m. 7	8	**Saturday Kids' Activity,** 2-3 p.m. **Make Art with Madeline.** 9
10	*Deer and elk begin to shed antlers* 11	12	**Secret Science Night,** 7 p.m. **Nature Art on Tap.** 13	**miniNaturalists Pre-K Program,** 10-11 a.m. 14	**Evening with a Naturalist: John Marzluff,** 7 p.m. 15	16
17	18	19	**Secret Science Night,** 7 p.m. **Naturalist Trivia.** **Glacial Lake Missoula Chapter Meeting,** 4 p.m. 20	**miniNaturalists Pre-K Program,** 10-11 a.m. 21	22	**Open Drawing with MNHC Artist in Residence,** noon-4 p.m. 23
24	25	26	27	**miniNaturalists Pre-K Program,** 10-11 a.m. 28	29	30
31	**February** **February Gallery,** All month. **Madeline Mikolon, MNHC Artist in Residence.** 1	**Spring Master Naturalist Course,** 4-7 p.m. Tuesdays to May 3 2	3	**miniNaturalists Pre-K Program,** 10-11 a.m. 4	**First Friday Gallery Opening,** 4:30-6:30 p.m. **Madeline Mikolon, MNHC Artist in Residence.** 5	6
7	*Great horned owls begin nesting* 8	9	10	**miniNaturalists Pre-K Program,** 10-11 a.m. 11	12	**Saturday Kids' Activity,** 2-3 p.m. **Glow-in-the-Dark Party.** 13
14	15	16	**Secret Science Night,** 7 p.m. **Naturalist Murder Mystery Dinner.** **Glacial Lake Missoula Chapter Meeting,** 4 p.m. 17	**miniNaturalists Pre-K Program,** 10-11 a.m. 18	19	**Spring Master Naturalist Course,** full-day field trip. 20



BROCKEN INAGLORY

DAVID STEPHENS, BUGWOOD.ORG

TERRY SPIVEY, USDA FOREST SERVICE, BUGWOOD.ORG

Programs and events held at MNHC - 120 Hickory Street - unless otherwise noted.

SUN	MON	TUE	WED	THU	FRI	SAT
21	22	23	24	25 **miniNaturalists Pre-K Program,** 10-11 a.m.	26	27
28	29	**March** 1 **March Gallery,** All month. **TBA.**	2	3 **miniNaturalists Pre-K Program,** 10-11 a.m.	4 **First Friday Gallery Opening,** 4:30-6:30 p.m. **TBA.**	5 **Spring Master Naturalist Course,** full-day field trip.
6	8	*Canada geese reclaim nesting territories*	9	10 **miniNaturalists Pre-K Program,** 10-11 a.m.	11	12 **Saturday Kids' Activity,** 2-3 p.m. **Rockhounding!**
13	15	16 **Glacial Lake Missoula Chapter Meeting,** 4 p.m.	17 **miniNaturalists Pre-K Program,** 10-11 a.m.	18	19	
20	21	22	23 **Secret Science Night,** 7 p.m. **Naturalist Trivia.**	24 **miniNaturalists Pre-K Program,** 10-11 a.m.	25	26
27	28	*Pussywillows pop*	5	6 **miniNaturalists Pre-K Program,** 10-11 a.m.	7 **miniNaturalists Pre-K Program,** 10-11 a.m.	8 **April** **First Friday Gallery Opening,** 4:30-6:30 p.m. **TBA.**
1	2	3 **Spring Master Naturalist Course,** full-day field trip.	4	5	6	7
8	9	*Hungry bears feed on new green shoots of many plants*	10	11 **miniNaturalists Pre-K Program,** 10-11 a.m.	12 **Insects & Flowers Community Slide Show,** 7 p.m.	13 **Saturday Kids' Activity,** 2-3 p.m. **Go Birding!**
15	16	17 **Glacial Lake Missoula Chapter Meeting,** 4 p.m.	18 **Volunteer Naturalist Training,** 4:00-5:30 p.m.	19 **miniNaturalists Pre-K Program,** 10-11 a.m.	20	21
22	23					

CHRIS EVANS, ILLINOIS WILDLIFE ACTION PLAN, BUGWOOD.ORG

VERN WILKINS, INDIANA UNIVERSITY, BUGWOOD.ORG

ALFRED VIOLA, NORTHEASTERN UNIVERSITY, BUGWOOD.ORG

January 15 Evening with a Naturalist: John Marzluff hosted by Hank Green, 7:00 p.m. $60.

January 20 Secret Science Night, 7:00 p.m. **Naturalist Trivia** hosted by the Clark Fork Coalition. $4 suggested donation; MNHC members free.

January 20 Glacial Lake Missoula Chapter Meeting, 4:00 p.m. Free and open to the public.

January 23 Open Drawing with MNHC Artist in Residence Madeline Mikolon, noon-4:00 p.m. Free with admission.

February Gallery, all month. **Madeline Mikolon, MNHC Artist in Residence.**

February 2 Spring Master Naturalist Course, 4:00-7:00 p.m. Tuesdays to May 3, with three full-day field trips on February 20, March 5, and April 2. $395; 3 college credits available. Call 327.0405 to register.

February 5 First Friday Gallery Opening, 4:30-6:30 p.m.

February 17 Secret Science Night, 7:00 p.m. **Naturalist Murder Mystery Dinner.** $15; $10 MNHC members.

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

March Gallery, all month. **TBA.**

March 4 First Friday Gallery Opening, 4:30-6:30 p.m. **TBA.**

March 16 Glacial Lake Missoula Chapter Meeting, 4:00 p.m. Free and open to the public.

March 23 Secret Science Night, 7:00 p.m. **Naturalist Trivia Night.** $4 suggested donation; MNHC members free.

April Gallery, all month. **TBA.**

April Gallery, First Friday Gallery Opening, 4:30-6:30 p.m. **TBA.**

April 14 Insects and Flowers Community Slide Show, 7:00 p.m. Cohosted by the Clark Fork Chapter of the Montana Native Plant Society and the Missoula Insectarium. $4 suggested donation, MNHC members free.

April 20 Glacial Lake Missoula Chapter Meeting, 4:00 p.m. Free and open to the public.

April 29 Evening with a Naturalist: Emily Graslie hosted by Hank Green, 7:00 p.m. $60.

Volunteer Opportunities

April 20 Volunteer Naturalist Training, 4:00-5:30 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 May VNS school field trips for 4th & 5th graders. No prior experience necessary.

Closed for the Holidays December 24-26 and Dec. 31-Jan 1.

Kids' Corner

Kids' Art

In digging into our archives, we found some great art created by kids back in MNHC's early days. Enjoy!

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.

Winter Scavenger Hunt

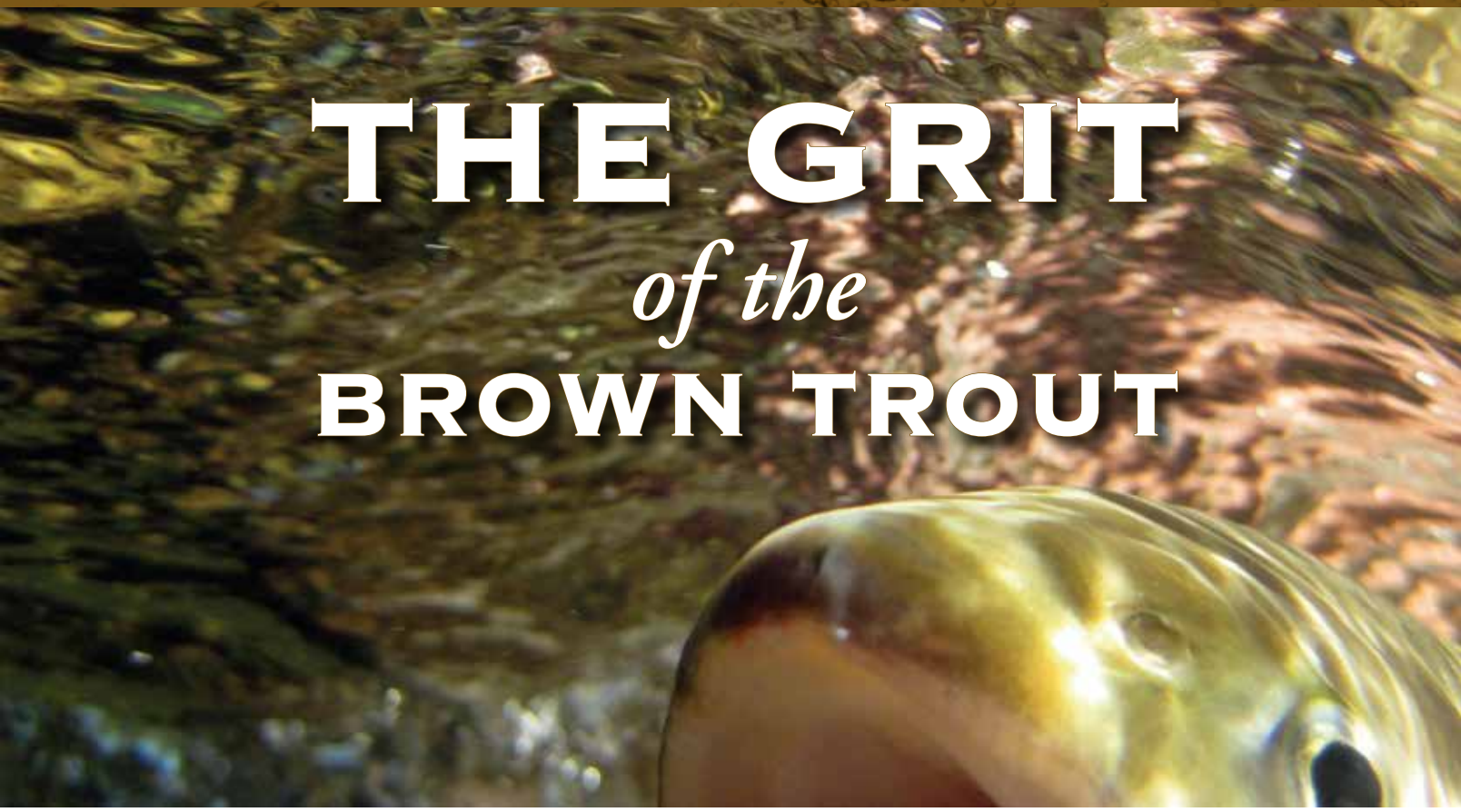
The next time you go on a wintry exploration, take along this list and see what you can find! (If you want to take the scavenger hunt to the next level, take photos as you go and email your favorite(s) to Allison at adejong@montananaturalist.org—we may just share your adventure on Facebook or our blog!)

{ } birds fluffed up against the cold
{ } frost patterns on a window or windshield
{ } the longest icicle you can find
{ } wildlife scat of any kind
{ } snowshoe hare tracks
{ } mountain ash berries
{ } ski or snowshoe tracks
{ } rosehips
{ } look at a snowflake up close!
{ } bubble trapped in ice
{ } a snowperson or snow fort
{ } your breath
{ } deer tracks

And if you want a little more of a challenge:

{ } snowfleas (they look like pepper on the snow–but, unlike pepper, they jump!)
{ } wolf lichen (it's bright green–you can't miss it!)
{ } look at hoarfrost up close, and see if you can find two—or more—differently shaped kinds
{ } black treehair lichen (makes good beards and mustaches)
{ } shrew or vole tracks on the snow
{ } shrew or vole tracks leading beneath the snow (tree wells are great places to look)
{ } a cat track (housecat...or bobcat, lynx, or mountain lion!)
{ } a dog track (domestic dog...or fox, coyote, or wolf!)

Tenacity and Tolerance:



THE GRIT *of the* BROWN TROUT

BY HEATHER MCKEE

On Thanksgiving, while our turkey roasts under a sheen of butter, icy snow glazes our farm in Missoula. I bundle up my 2-year-old and we crunch our way down to the small slough at the back of the farm. The bright greens of summer and effervescent bird activity are long gone; the land is quiet and a thin, biting wind wraps around the grey cottonwoods flanking the water.

Our neighbor is there, standing very still, a few feet back on the opposite bank, nearly invisible in his olive jacket and brown Carhartts. He is watching something. We slow our gait, and creep forward. He flicks his bright blue eyes up at us and nods toward the water.

I get on my knees on the ice, thankful for my warm coveralls, and scooch closer to the slough, holding my son against my belly as we inch forward. The slough burbles quietly under the one-plank bridge. The wind lifts and twirls a few dry grasses. My son fidgets.

Then—*splish.* Splish, splash. My son whips around to look at me with questioning eyes. I hold a finger to my lips and point back to the water. A ripple riding high, a small olive submarine twists against the current, pauses, labors toward us again. Splish, splash. A moment of silence. *Splish-splash-splish-swish-swish-splash-splish-swish-splash.* In a burst of energy, a lone female brown trout struggles past us, heaving her body upstream, through mere inches of water, dragging her gravid belly over river rock until she is nose first into the small beaver dam that will mark the end of her passage.

She wriggles in the tangle of branches and flotsam, the water deeper and darker beneath the dam, obscuring the finer details of her activity. But I know she is fighting to twist her flank parallel to the stream floor, to beat it in rapid undulations against the pebbles, sweeping out a shallow redd for her eggs. A few orange jelly eggs float to the surface, bubbling along the edge of a piece of submerged grass. Behind her, at the mouth of the tiny slough, more submarines approach.

Males or more females? Male brown trout follow females upstream to blanket the eggs with their milt. Under the silver water, body parts flip and flash. I should look for the elongated

PHOTO COURTESY OF UNIVERSITY OF MICHIGAN SCHOOL OF NATURAL RESOURCES & ENVIRONMENT; SNRE.UMICH.EDU

This page, left: **The icy waterfall at the slough, where all the magic happened on Thanksgiving.**
Above: **The author (in camo) looking for more spawning trout by headlamp Thanksgiving night.**

Opposite page, left: **The author's husband and son peering into the grasses to look for fingerlings in the water.**
Opposite page, right: **View of the waterfall now obscured by grasses, but where the fingerlings were hidden.**

PHOTOS BY HEATHER MCKEE

heads of the males and see if I can spot their breeding *kype,* a seasonal upturned hook on their lower lip. But in the thin winter light of late afternoon, the camouflaged forms are anonymized, and my focus is split between the fish and my son's delight in seeing them. He is transfixed—his little hands clutch my knees as he cranes his neck to get a better look.

OUR SLOUGH IS ONE OF DOZENS OF SMALL CHANNELS ALONG THIS SECTION OF THE CLARK FORK RIVER. From the sky they form a curvy plaid over the valley, each lined in grey rocks and brown grasses, interrupted by stands of cottonwoods. Because the river relaxes unpredictably over the wide flat valley so often here, it's been left alone for the most part, houses built cautiously away from its reaches.

In these waters, brown trout mingle with rainbow and native trout. Brown trout are exotics. Not in the sense that they are flashy—although they have a buttery gold belly, and males can exhibit more colors during breeding, they have evolved to look like river rocks speckled with algae. They are exotic in that their stock is originally European. In Montana, the first brown trout were introduced to the Madison River in 1889, near the then-fledgling Yellowstone National Park.

As early as the 1850s, some areas of the country were experiencing major declines in freshwater fish populations. Stocking native varieties as well as introduction of newer, possibly hardier—or simply more interesting—species turned into the latest craze. Only later did scientists, and to a lesser degree the public, begin to realize what problems can arise from introduced species—competition, unpredictable behavior, new diseases.

The fish in front of us is not native, but because of her kind's fight on the line, she has been adopted whole-heartedly by many fly fishers. In other eyes, she is an interloper, an invasive aggressor muscling out native trout from their river-ledge haunts and rightful place in their original ecosystem.

Here, now, I can't help but admire her. The female trout under the waterfall is tenacious, and I am impressed. Buried under an avalanche of cold water, she compresses her stomach and tries to further her own line. We are bundled in coats, scarves, boots, and bellies full of brunch. She has scraped insect larvae from rocks for her energy, and gives birth, naked, after climbing an icy river.

In June, the temperatures balloon to scorching, and my son wants to dip his toes in the slough. The water in the marsh above the waterfall only provides a quiet trickle now, slowed enough that the pasture grasses and forget-me-nots have crept out from the banks. My son holds my hand as we wade toward the weedy waterfall. We admire the rusty orange and brick red rocks, brilliant in the sun and shallow water. We reach to touch some soft algae, and that is when I notice some incongruent ripples in the water.

My eyes struggle to adjust to see past the sun sparkling on the surface of the water, and the dark linear shadows of grasses. I squat to get a different angle, and suddenly dozens of tiny wriggling bodies become visible. The trout babies! Or rather, *fingerlings,* at this point. They are about three inches long, and I am dumbfounded that with all our visits to the slough we haven't seen them until now. It is testimony to their perfect camouflage—both their ambiguous algal color, and their rippling movement that mimics the water.

From then on, each day, my son and I visit them. We become more conscious of the Great Blue Heron who flies overhead each day, and poises himself in the small marsh just above their hiding place. Each day we think the fry are gone—then my son's eyes or mine will catch a slight nuance in color and motion, and they become visible, tiny mouths facing the dam, bodies rippling parallel to the bank.

June is hot, record-setting hot, with three consecutive days of over 100 degrees, which heats up the rivers too. Temperatures in the rivers vary 30 degrees or more annually, but dissolved oxygen dwindles as the water warms, and each species has a different cut-off for thriving. Born of glacial melt, native trout like the cutthroat and brook are stressed by water temperatures mid-60s and above. Browns do not begin to get stressed until the water reaches 73 degrees.

In the first days of July, a fly fisherman friend complains to me about "hoot-owl" restrictions, limiting fishing on the rivers to the cooler hours of midnight to 2 p.m. Three consecutive days of water temperatures 72 degrees or higher trigger this. My friend is used to these restrictions late in the summer—but it's never happened this early.

On July 4th, the USGS station in Superior, Montana, measures the Clark Fork River temperature at a tepid 77 degrees. These days, snowpack is melting earlier and faster, reducing its ability to deepen and cool the rivers through the summer months. Over the past 50 years, the snowpack measured on April 1st throughout the Northern Rocky Mountains has decreased by an average of 30 percent.

As our climate warms, the more heat-tolerant brown trout may be able to maintain a finhold in our beloved rivers' ecosystems better than our natives. Her fall spawn allows her to take advantage of late fall flows when irrigation pressure is removed. And she maintains a partial resistance to whirling disease, which may increase in other species in warmer waters. Could this introduced species be our best bet at wild trout in our rivers in the future?

Winter is fast approaching again, and I wonder if we will see the mothers laboring over the rocks in the slough, pursued by determined males, perhaps grateful for the waterfall that they cannot jump over that will end their journey, perhaps frustrated that they can get no farther. Once again, I hope to see just a few of the brilliant orange globes float to the surface, stark and bright against an otherwise white and brown world.

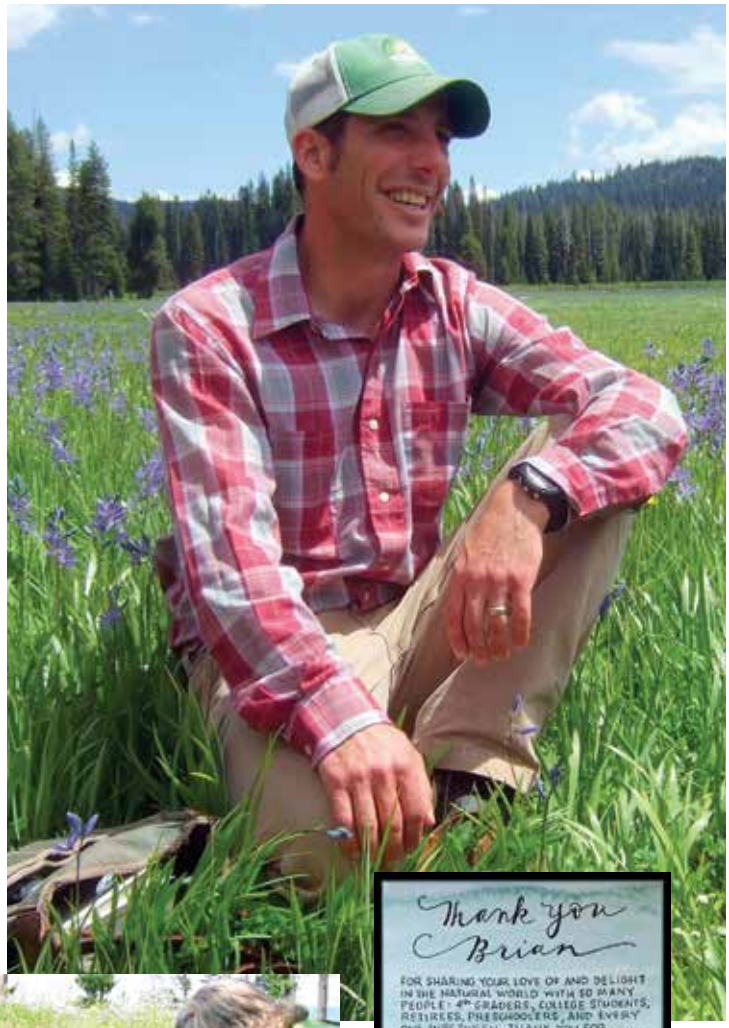
—Heather McKee is an adjunct professor of Environmental Studies at the University of Montana. She and her husband have a small farm in Missoula, where they are raising two budding naturalists.

Honoring Brian Williams

BY CHRISTINE MORRIS

At this year's Fall Celebration and Auction, the Montana Natural History Center was thrilled to honor Brian Williams, our long-time naturalist educator in both the Visiting Naturalist in the Schools and Master Naturalist programs, who recently left MNHC to teach first grade at Hawthorne Elementary.

Brian first became involved with MNHC in 2004. While earning a Master's degree in Environmental Education at the University of Montana, Brian taught at MNHC as a summer camp instructor, developed new programming as the Watershed Festival Coordinator, then created and instructed the Montana Master Naturalist Course. This course, the first for Montana, was driven by Brian's desire to enrich environmental education with naturalist study and provide others with the skills needed to further decipher and enjoy the natural world.



Center: **Brian identifies butterflies with a group of Master Naturalists.**

Bottom: **Brian teaching about riparian habitat on a field trip.**

After a stint as a naturalist for the King Ranch in Texas, Brian and his wife Carin returned to Montana in 2007. At MNHC Brian jumped right back in to teaching the Master Naturalist Class, his acutely honed birding knowledge enhancing the already successful course. Under Brian's direction the Master Naturalist Course became a model for other organizations in the state. Now four other courses run each year using the curriculum he created. Brian will continue to be involved with the Master Naturalist program as a teacher and mentor.

Brian earned the Sense of Wonder Award from the Montana Environmental Education Association in 2009 and became MNHC's Assistant Education Director in 2010. He redesigned the Visiting Naturalist in the Schools program with new, effective curriculum, increased the scope from 29 classes to 60 classes, and attracted a corps of dedicated Master Naturalist volunteers to help implement the program. Thousands of 4th- and 5th-grade students have learned from a Naturalist mentor in the classroom every month during this far-reaching program.

Brian's skill set continues to grow as he has now become certified as an elementary school teacher. His first grade class at Hawthorne Elementary is a perfect fit, where his passion for teaching will enrich and inspire new students each year. He and Carin are also the proud parents of two wonderful children: Jack, age three, and Ada, age one. Brian, Carin, Jack, and Ada spend family time outdoors camping, exploring and naturalizing whenever possible.

Though we are sad to see Brian leave, we are grateful for the years of excellent environmental education he provided to kids and adults alike, and for the legacy he's left with MNHC. Thank you, Brian!

MNHC PHOTOS

As To The Mission...

To put it simply, our mission at the Montana Natural History Center is to foster a meaningful connection of people to nature through education. This is not a new concept and we are not alone in this mission. In fact, it's largely recognized now that if you want to connect people with nature it's a good idea to get them outside and exploring when they're kids. And there's an added benefit—multiple researchers have found that exposure to the outdoors improves both mental development and academic performance.

So it was that in the fall of 2001, we began a program called Visiting Naturalist in the Schools (VNS). The idea was simple: why not support teachers in meeting their core science standards by teaching kids scientific principles while getting them outside and focused on the form and function of Montana's plants and animals?

Today, VNS is one of our flagship programs. Over the course of every month throughout the school year, we visit 64 fourth and fifth grade classrooms in the greater Missoula area. We teach kids how to sketch and describe natural things in their journals, how to listen for bird song, spot owls, observe animal tracks, examine scat—we even dissect things! (Okay, snapdragon flowers...) We take these kids, almost 1600 of them, on two day-long field trips per year and literally get them outside.

Thanks to very generous supporters, we will be expanding VNS to even more classrooms in 2016—bringing our coverage of the greater Missoula area to 100 percent and serving approximately 1700 students.

To learn more about VNS and how you can volunteer or support, please visit online: www.montananaturalist.org/visiting-naturalist-program.

Thurston Elfstrom,
Executive Director

Get Your Explore Cretaceous T-shirt!

Looking for holiday gift ideas? We have a fabulous new t-shirt to go along with our new Cretaceous exhibit. Designed by former MNHC intern Tom McKean, it sports a prehistoric cephalopod, the *Baculite*. We have S-XL adult sizes (including a women's cut option). $20/shirt. ***Get yours today!***

SPOTLIGHT:

This fall we were happy to welcome two new staff to MNHC: our new Executive Director, Thurston Elfstrom, and Office Manager Holly Klier.

Thurston has spent the past 20 years developing digital experiences to market the State of Montana as a vacation destination. He grew up in western Montana and earned a degree in Anthropology from Montana State University in 1993. Prior to joining the staff at MNHC, Thurston worked in cultural resource management archaeology before coming to work at the Montana Office of Tourism. Returning to Missoula in 2008 he coincidentally uncovered his passion for the community, philanthropy and fundraising. When Thurston and his wife, Suzanne, have a few spare moments, they like to run the trails in and around Missoula. Thurston has also been known to wet a line in his travels around the state and afterward, seek out a craft beer in local breweries.

Holly has spent the last 13 years working with nonprofits and comes to MNHC from Homeword and, prior to that, the University of Montana Foundation. Holly has extensive experience in managing offices and enjoys streamlining office procedures. She and her husband, Patrick, have lived in Missoula for 13 years and enjoy growing fruit trees and making copious amounts of jam. Before their trek to Missoula, they resided in Alaska for 25 years where they grew enormous vegetables, caught, canned and smoked a whole lot of salmon, and raised their two daughters. Holly attended the University of North Dakota where she majored in creative writing. When she isn't at work or canning jam, she is spending time with her four wonderful grandchildren and answering very frank and poignant questions such as, "So, Grandma, when you retire, are you going straight to heaven?"

MNHC PHOTOS

imprints

MNHC's Evening with a Naturalist a Smashing Success!

This November, MNHC offered the first event in our exciting new program series, **Evening with a Naturalist hosted by Hank Green**, during which well-known paleontologist Jack Horner was interviewed by SciShow host and new media entrepreneur Hank Green before our sold-out crowd. Weren't able to make the event? Join us at the next one! Several times over the next year we'll be bringing in a regionally (or nationally!) known naturalist for an exclusive, dynamic evening of not only an entertaining and informative interview, but drinks provided by the Dram Shop, hors d'oeuvres from the Good Food Store, and the opportunity to chat with a famous naturalist (and get a book signed, too).

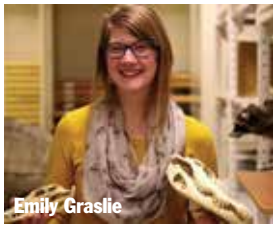
Upcoming Evenings with a Naturalist:

Friday, January 15: John Marzluff, Professor of Wildlife Science and corvid researcher from the University of Washington (see his article on pages 8-9 of this issue)

Friday, April 29: Emily Graslie, Chief Curiosity Correspondent for Chicago's Field Museum and host of the Brain Scoop on YouTube

Tickets are $60/person—go to www.MontanaNaturalist.org or call us at 327.0405 to purchase.

John Marzluff



Emily Graslie

Many thanks to this program's sponsors and partners:

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A Big Thanks to Ron Clausen!

In June we had the pleasure of spending some evenings out at Rock Creek as the beneficiary of Ron Clausen's Montana Extravaganza 2015. Ron has been a tireless champion of Montana's outdoor places for many years. He also holds a special place in his heart for making sure that people, especially children, are able to get outside and experience all the natural wonders Montana has to offer.

Through Ron's generosity, we purchased a new bus for transporting kids during our summer camp seasons, adults as they attend our Master Naturalist courses, and people of all ages during our field trips to places like Freezout Lake for the annual snow goose migration.

We hope you will notice all three of our new snazzy buses around town. Thanks to the generosity of Big Sky Brewing's Summer Concert Series, Ron Clausen's Montana Extravaganza 2015 and our generous Fund A Dream donors at our fall auction we now have safe, reliable, efficient, and accessible transportation. *Thank you to all who helped make this happen!*

© "SUSPENDED" BY MADELINE MIKOLON

MNHC Welcomes Artist in Residence

We are excited to have our first Artist in Residence, Madeline Mikolon, join us this January. Madeline's work, she tells us, "revolves around site and scape making, which utilizes the element of suggestion–small encouragements and denials of definite forms. My pieces have always been heavily invested in organic line and form, which are inherently open-ended and susceptible to the viewer's unique standpoint and experience. My work favors duality, chance, and cycle. I think this residency will be very supportive of these methods of making paintings, and I look forward to being inspired by the many biological specimens the Natural History Center has to offer."

Madeline will be offering several nature art programs throughout the month of January, culminating with an art show in our gallery in February.

January 9: Saturday Kid's Activity: Make Art with Madeline, 2:00-3:00 p.m. Program free with admission.

January 13: Secret Science Night: Nature Art on Tap, 7:00-9:00 p.m. $15; $10 MNHC members.

January 23: Open Drawing with MNHC specimens, 12:00-4:00 p.m. Program free with admission.

February 5: First Friday Gallery Opening, 4:30-6:30 p.m. ***Free!***

KEITH BRUST, PBS.ORG.

COURTESY OF THE BRAIN SCOOP

MNHC PHOTOS: EVENING WITH A NATURALIST AND BUS

A Record-Breaking Year…Again!

Once again, we'd like to convey our sincere thanks to everyone who attended MNHC's Fall Celebration and Auction at the University Center Ballroom on October 3rd. More than 300 generous guests helped us raise a record $104,000 in support of nature education for children and adults. We are especially grateful for your outstanding response to our Fund A Dream challenge, which has enabled us to purchase the remaining two new buses we needed to continue getting kids and adults outdoors and connecting with nature in 2016 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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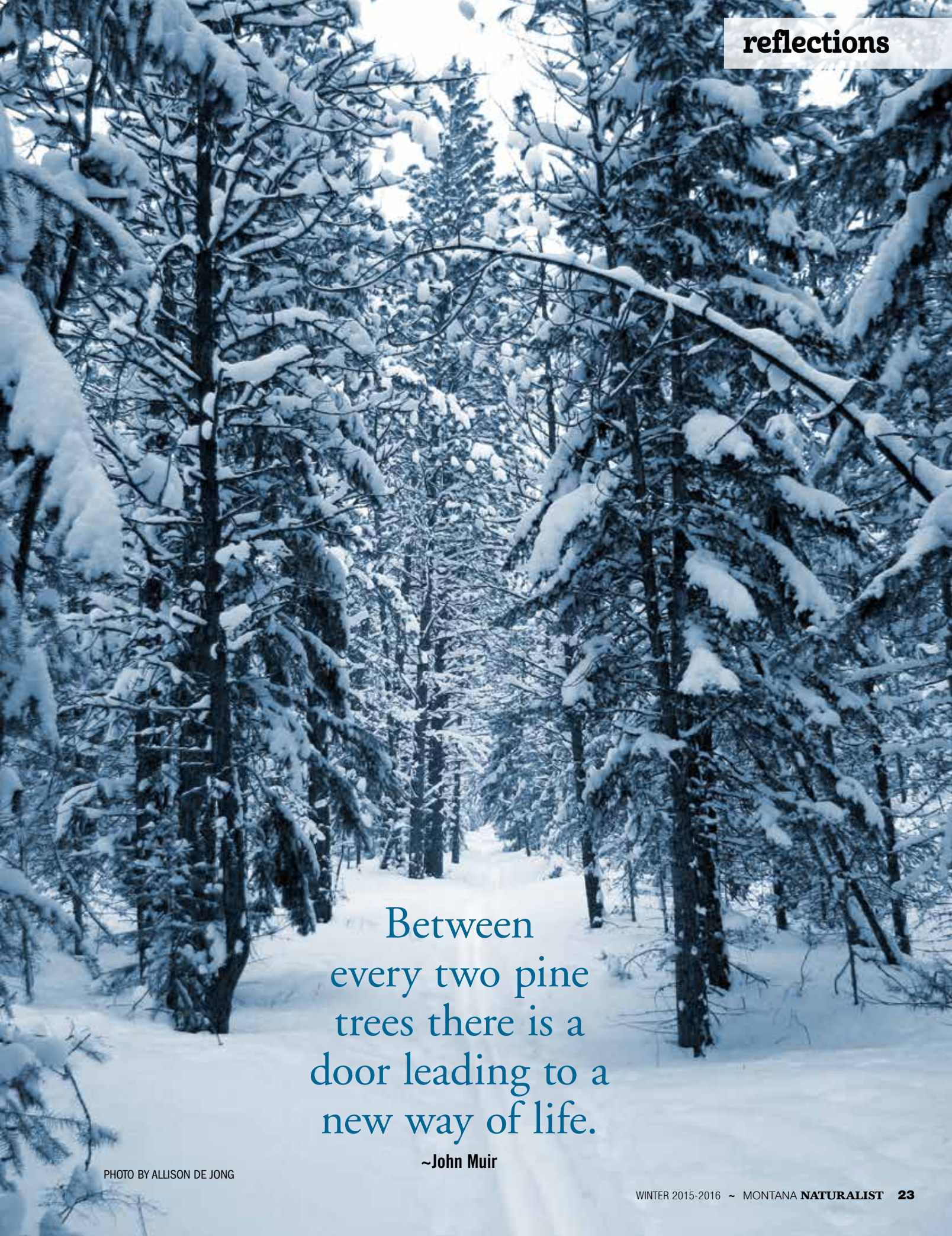

Between every two pine trees there is a door leading to a new way of life.

~John Muir

PHOTO BY ALLISON DE JONG

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