

MONTANA Naturalist

Fall 2005



**Lewis & Clark
Trail Geology**

**Native
Ethnobotany**

**Woody
Draws**

**Weather
watching**

see Get Outside Guide,
page 9

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

MONTANA Naturalist

Features

- 4 Ethnobotany**
Annie Mad Plume Wall shares her knowledge of native plants

- 6 Geologic Observations**
On the Lewis and Clark Trail

Departments

- 3 Tidings**

- 8 Community Focus**
Colstrip students' research projects serve a purpose

- 9 Get Outside Guide**
Seasonal change, be a weather forecaster, where do insects go when it's cold?

- 14 Far Afield**
Woody draws of eastern Montana

- 16 Imprints**
MNHC Grand Opening, RiverFest 2005, save these dates!

- 18 Magpie Market**

- 19 Reflections**
Pieces of a new paleo-ecology exhibit

Cover photo — Brown-eyed parasol mushroom, *Lepiota cristata*, taken last fall by Tim Wheeler along the Woods Gulch Trail, Rattlesnake Recreation Area. This species is fairly common, about one to five centimeters wide and two to eight centimeters tall. It occurs scattered or in groups in forests, lawns and commonly along trails. Roughly 200 species of *Lepiota* have been identified in North America. This one smells sweet but is believed to be poisonous. Wheeler, a geologist/naturalist who enjoys nature photography, took the photo with a tripod-mounted Pentax 35mm camera with a 100mm Macro lens.

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4



6



9



16



14



8

**Special
Pull-Out
Section**



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According to writer Wendell Berry, if you don't know *where* you are, you don't know *who* you are.

Says author Wallace Stegner, Berry "is not talking about the kind of location that can be determined by looking at a map or street sign. He is talking about the kind of knowing that involves the senses, the memory, the history of a family or a tribe...."

We hope this issue of *Montana Naturalist* helps provide a deeper sense of place through articles about Blackfeet women's handed-down knowledge of native plants, how geology helped determine the development of Montana by precluding a Northwest Passage for Lewis and Clark, and how the arid plains of eastern Montana can harbor hidden pockets of deciduous hardwood forests.

To further appreciate the unique natural and cultural history of our particular corner of the state, we hope you will join us in a few weeks, when the Montana Natural History Center formally opens the doors of its new home and exhibit hall in conjunction with the 7th annual RiverFest.

The theme for this year's RiverFest – and a cornerstone for MNHC's exhibits, school and community programs – is "Our Sense of Place." Join us at 120 Hickory St. on September 24 for a day of activities, games and presentations. You'll also be able to wander through and enjoy new exhibits that feature "Montana Through Time and the Seasons." And, by becoming a member of MNHC, you can celebrate with us year-round the natural heritage that makes this place so special. See you there!

Susan Estep
Board of Directors, President

tidings





Blackfeet Botanist

Annie Mad Plume Wall

By Rosalyn LaPier

Ethnohistorian Walter McClintock chronicled the lives of the Blackfeet in the early 20th century in his book “The Old North Trail.” In his study he described how all the Blackfeet women he met were expert “botanists” who were taught “the knowledge of herbs and wild vegetables” from early childhood. McClintock became fascinated by the knowledge these women held and set out to document what they knew. In 1909 he published “Materia Medica of the Blackfeet” with the Berlin Society for Anthropology, Ethnology and History. It was the first comprehensive study of Blackfeet women’s plant knowledge.

“The Old North Trail” also began to document the transition of the Blackfeet away from the buffalo days into the 20th century. My grandmother was raised during this time and the stories told by McClintock reflect the world in which she grew up. The women who raised my grandmother were born and lived during the last of the buffalo days on the northern Great Plains. Their knowledge of the world testified to the intimate relationship they had with their landscape.

Toward the end of the 19th century, individual bands of the Blackfeet tribe settled along rivers and creeks of the reservation. Annie Mad Plume Wall, my grandmother, was born in 1914 on Little Badger Creek, just south of Glacier Park. Her family belonged to the Never Laughs band that settled along Little Badger, which now is both on the reservation and within the Bob Marshall Wilderness. Her grandfather Middle Rider named her Otahkoi-sinopaakii, or Yellow Fox Woman. Her mother died when my grandmother was a baby, leaving her to be raised by her maternal grandparents Kitiaksisskstaki, or Not Real Beaver Woman, and Staahtsi’kayii, or Under Mink, and her great-grandmother Omahkatayaakii, or Big Mountain Lion Woman.

My grandmother recalls the pleasant times of her childhood on Little Badger Creek – family picnics, society gatherings and attending the yearly Okan, the Blackfeet celebration of hope and thanksgiving known to outsiders as the Sun Dance. Her fondest memories are of riding her horse in the foothills and up into Badger Canyon. As she grew up, my grandmother learned about many of the old Blackfeet ways from her grandmothers, including the use of native plants.

The Blackfeet historically made use of more than 200 different plants for food, medicine, and as material for creating useful objects.

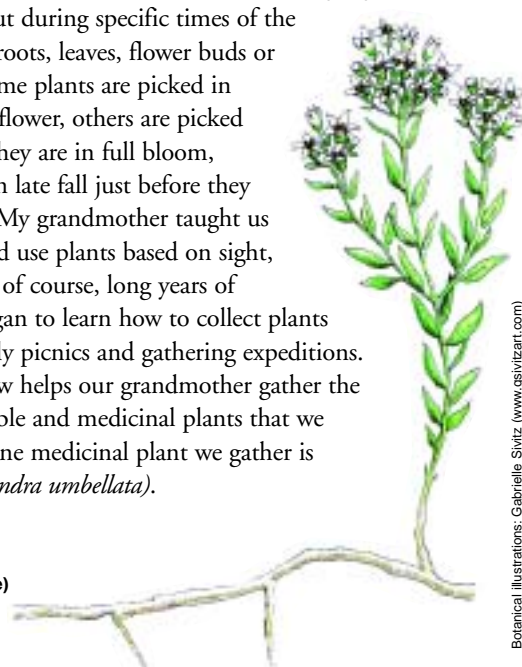
My grandmother and her family gathered a wide variety of food plants, including Pisatsiinikimm (*Allium sp.*), Ka’kitsimo (*Mentha sp.*) and Niistskápa’s (*Perideridia gairdneri*) to use in their cooking. They would also harvest large quantities of berries, such as Okonok (*Amelanchier alnifolia*), Pákkii’p (*Prunus virginiana*) and Mi’ksinítsiim (*Shepherdia argentea*) to use fresh or to dry for winter use. After the Blackfeet settled and began to grow small home gardens of introduced root vegetables people came to rely less and less on native plant foods, but many still continued to use plants for medicinal purposes. My grandmother learned how to use many of these medicinal plants and she continues to gather them today.

The Blackfeet use different parts of plants – roots, leaves and fruit – for different purposes. The gathering and processing of plants was generally the responsibility of women. My grandmother learned which plants to pick and in what seasons by going into the hills with her grandmothers. She also learned how to process and preserve these plants for future use. My grandmother has handed down these same skills to younger generations.

We now go out during specific times of the year to collect the roots, leaves, flower buds or fruit of a plant. Some plants are picked in spring before they flower, others are picked in summer when they are in full bloom, others are picked in late fall just before they become dormant. My grandmother taught us how to identify and use plants based on sight, smell, texture and, of course, long years of experience. We began to learn how to collect plants as children at family picnics and gathering expeditions.

My family now helps our grandmother gather the many different edible and medicinal plants that we continue to use. One medicinal plant we gather is Otahkoyitsi (*Comandra umbellata*).

**Chokecherry (above)
and bastard
toadflax (right)**



Botanical illustrations: Gabrielle Sivitz (www.gsvitzart.com)

We use the clean, dried roots in a poultice to relieve inflammation. Sometimes we burn dried Ootsiisimats (*Letharia vulpina*) like incense and inhale the smoke to relieve headaches. Siiksinoko (*Juniperus horizontalis*) berries are used in a tea to treat kidney problems. We also collect Aapaawapspi (*Vaccinium membranaceum*) leaves for use in a daily tonic, and my grandmother thinks the berries should be used strictly for therapeutic purposes. I once told her that my husband was making huckleberry milkshakes and she gasped disapprovingly, "They're medicine!"

McClintock's observations and documentation of Blackfeet women's botanical knowledge almost 100 years ago provides a valuable resource for Blackfeet today, and for anyone interested in learning about ethnobotany. But there are still a few elder Blackfeet women who retain this knowledge as well. My grandmother continues to use what she learned from her grandmothers on a daily basis. She continues today, at age 91, to gather numerous roots, berries, tea leaves and other plants during the summer and fall and to share with those who seek her knowledge of native plants.

Historian Rosalyn LaPier lives in Missoula with her husband, David Beck, and two daughters, Abaki and Ikotsi. She works for the Piegan Institute in Browning and gives public presentations on Blackfeet ethnobotany. The Piegan Institute is a nonprofit organization on the Blackfeet reservation that researches, preserves and promotes Blackfeet language and history. To learn more, see www.pieganinstitute.org.

Special thanks to Shirlee Crow Shoe of the Piegan Institute for helping with the spelling of some of the Blackfeet words.



Annie Mad Plume Wall prepares fresh Ka'kitsimo, or peppermint (*Mentha piperita*), to hang and dry. The plant, which grows near water, is picked mid-summer. The leaves and stems are used for tea.



"My grandmother in the field," says LaPier. "We were out collecting Apahsipoko, or alumroot (*Heuchera parvifolia*), in the fall. We dig the whole plant and use the root. [Alumroot] grows in open fields and needs to be past its growing cycle and ready to become dormant. The root is cleaned and the outside layer peeled off. The inner root is laid in the sun to dry. It can then be broken into pieces and boiled like tea, up to three times before you need a new batch. We drink it as a tonic or use it externally as an anti-inflammatory or to dry up wounds."



Specimens of chokecherry and yampah from the University of Montana Herbarium.
Photos: Todd Goodrich/University Relations

Lewis and Clark: The Corps of Geologic Discovery

Story and Photos by Robert C. Thomas and Sheila M. Roberts



**Professors Roberts
and Thomas at Clark's
Lookout on the
Beaverhead River.**

2005 is the 200th anniversary of the westbound journey of the Lewis and Clark Expedition through Montana.

A mountain of information now is available, concerning just about every aspect of the expedition except the influence of geology. Why this oversight?

A question of priorities

Geology simply was not considered a high priority for the Corps of Discovery. President Thomas Jefferson had instructed Captains Meriweather Lewis and William Clark to look for good soils, coal, salt deposits and building stone, but nobody expected the expedition to yield much in the way of metallic mineral wealth in the new territory. Lewis did carry a copy of Richard Kirwan's "Elements of Mineralogy," published in 1784, and Jefferson had made sure that Lewis also had some training in rock and mineral identification. However, rock, mineral and fossil descriptions are rare in the journals and not always correct. The explorers apparently collected few geological samples and most of those have been lost.

The basic principles of geology were in their infancy at the time of Lewis and Clark's journey. The science of geology didn't really exist until 1802, when the ideas of Scottish geologist James Hutton (1726-97) – most notably that the Earth is very old and that geologic processes constantly are shaping and reshaping the planet – were first made widely available. It took an additional 30 years before Charles Lyell's book, "Principles of Geology," popularized Hutton's ideas.

Whether the explorers were able to recognize it or not, geology was absolutely central to the progress of the expedition. Their highest priority was to chart a navigable and economically practical water route across the continent, up the Missouri River drainage and down the Columbia River drainage to the Pacific Ocean. To accomplish this directive, they needed to observe and record details of the landscape. Since landscape largely is a product of geologic processes, the landscape information in the journals of Lewis and Clark provide the best insight into the importance of geology to the success of the expedition. It was their observation of the landscape that forever put to rest the hope for a Northwest Passage by water.

Geology of hope

Lewis and Clark expected to have to portage the high ground between navigable sections of the Missouri and Columbia drainages. How difficult that turned out to be would determine the feasibility of commercial water transport across the continent. Nobody was sure what the Continental Divide that separated the two drainages was like, but as the expedition proceeded up the Missouri in the spring of 1805, Lewis and Clark had just enough information to hope that it would be an easy traverse. On April 26, 1805, Lewis wrote:

"the Indians inform that the yellowstone river is navigable for perogues and canoes nearly to it's source in the Rocky Mountains, and that in it's course near these mountains it passes within less than half a day's march of a navigable part of the Missouri. it's extreem sources are adjacent to those of the Missouri, river platte, and I think probably with some of the South branch of the Columbia river."

In fact, however, millions of years before the expedition, differences in geological processes east and west of the Continental Divide had precluded an easy passage.

The landscape east of the divide had been surprisingly easy to navigate. Following the Missouri River upstream along the mostly gentle gradients of the Great Plains, the explorers encountered a very mountainous terrain in southwest Montana, but the rivers remained navigable. Here, the crust of the Earth has been pulled apart and uplifted like the top of a rising loaf of bread, broken to form towering mountains and broad valleys. Geologists' refer to this landscape as basin and range topography. Slow-moving rivers connect the low-gradient valleys of the upper Missouri drainage so that the idea of a Northwest Passage seemed possible to Lewis. On August 10th, 1805, his small advance party reached the "two forks" of the Jefferson River, just southwest of what today is Dillon, Montana. He wrote in his journal:

"I do not beleive that the world can furnish an example of a river runing to the extent which the Missouri and Jefferson's rivers do through such a mountainous country and at the same time so navigable as they are."

A scene of "immence ranges"

Before he ever saw the landscape west of the Continental Divide, Lewis suspected a problem with the passage because he knew that the west-side drainage must be steeper than the east side. In each case, water has to travel from the same elevation at the divide to sea level, but he realized the distance to the Pacific Ocean was much shorter than to the Atlantic. The steeper gradient might mean faster water with more rapids. But that was only part of the problem.

It turns out that the bedrock geology on the west side of the divide is what really ended all hope for a safe "communication across the continent by water." The realization first hit Lewis as he reached the "most distant fountain" of the Missouri River at what today is Lemhi Pass in southwestern Montana. This vantage point allowed him to see that "immence ranges" extended continuously, seemingly without end, into the horizon.

The rocky foundation for this very different landscape is a large body of hard crystalline (igneous and metamorphic) rock. As the land was uplifted over time, rivers cut into the hard rock, resulting in deeply carved canyons with raging rivers. Such rivers are far less navigable than the placid rivers that developed in the broad valleys east of the divide. Captain William Clark found out just how difficult when he unsuccessfully tried to locate a navigable route down the Salmon River, also known as the River of No Return, in late August of 1805.

The inability to navigate the Salmon River forced the expedition to make a snow-plagued traverse by foot and horseback across the Bitterroot Mountains. This journey was probably the most dangerous time of the entire expedition and spelled the end of a Northwest Passage by water.



View of the Bitterroot Mountains from Lemhi Pass.

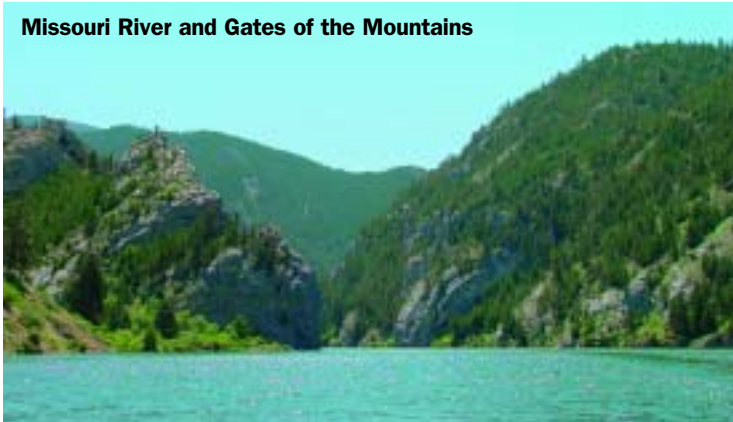
The geology of the inland northwest determined the actual success of the Lewis and Clark expedition in finding a navigable trade route, although it is seldom remarked on in favor of their observations of flora, fauna and encounters with Native Americans. To discover more about the geological significance of the Lewis and Clark Trail in Montana, you can visit a series of new interpretive points across the state (see map) or take a virtual tour at: www.umwestern.edu/shares/lcgeosigns_share.

Drs. Robert C. Thomas and Sheila M. Roberts are professors of geology in the Department of Environmental Sciences at The University of Montana-Western in Dillon. They have led numerous field trips along the Lewis and Clark Trail and have developed a series of geological interpretive signs along the trail in Montana. In addition, they have published a guide titled "Geology of the Lewis and Clark Trail: The Three Forks of the Missouri River to Camp Fortunate" (Geological Society of America Rocky Mountain Section Meeting 2000 Guidebook, p. 207-233). The guide is available for sale at the Montana Bureau of Mines and Geology in Butte.



A few years back, we received a federal appropriations grant to construct geological interpretive signs along the Lewis and Clark Trail from border to border in Montana. Our initial goal was to help people better understand our geologic history and the geologic processes that have shaped our landscape. We were motivated, in part, by the geologic signs that existed along roadways in Idaho and Wyoming, but were lacking in Montana. We focused our efforts on the geology of the trail and how geology influenced the expedition. We covered sites on both the outbound and return trails, totalling about 15 different localities. Most of the signs are just starting to go up. The web site is in its early stages, but eventually we will have pictures of all the signs and information about the sites. — S.R.

Missouri River and Gates of the Mountains



Learning with a Purpose

Colstrip students get results

The more students believe there is a purpose behind their school-work, besides a grade, the more they embrace it," says Colstrip High School biology and environmental science teacher Bernie Smith.

Smith and his wife, Dorothy, a Colstrip earth science, math and chemistry teacher, guide students in ongoing real-world research projects. They find that opportunities for "authentic" science experiences motivate students within their courses and often set them on a path of life-long involvement with the environment.

"Students won't grow up to take an interest in the environment unless they understand what it's about and have an attachment to it," Smith says. By focusing their courses on hands-on experiences, "we're trying to give them some exposure," he says.



Such experiences include breeding and raising biocontrol insects to help manage noxious weeds in Rosebud County, and tracking and collecting information on short-horned lizards to discover more about the life history of this little-known eastern Montana reptile. For the past decade or so, classes also have been monitoring water

quality along the Tongue River, providing long term baseline data on water chemistry and insect communities. Beginning this fall, a new project will have students studying impacts of coal-bed methane discharge water on the river. The coal-bed methane project, which will compare water quality and aquatic invertebrate populations above and below the discharge site, will be one of the only catalogs of what was there pre-discharge.

Not only do students learn about biology, ecology, chemistry and math through these projects, they also acquire fundamental data-taking skills that can open doors to research jobs in college and elsewhere. And there's a ripple effect.

"When you expose kids to issues in the outdoors, it plugs right into their parents," Smith says. "Many times we've had parents say to us, jokingly, they wish we'd stop teaching their kids so much, that they're sick of hearing about every native plant or animal they see out the car window."

In a more serious vein he adds that students' knowledge of such issues as water quality and coal-bed methane development rubs off on voter parents. Rosebud County coal-bed methane projects and those of other companies will have to bond at a higher rate than the state requires for reclamation purposes. "We can't take credit [for this policy decision]," Smith says, "but [our data] may have helped."

All of the Smiths' projects begin with a perceived need in the community and include interested parties and partners,

which serves to strengthen the rigor of the projects, Smith says. Students present their results to a variety of audiences, which have included the State of Montana Weed Board, Montana Environmental Education Association conferences and at reclamation symposia, lending further authenticity to their experience.

The Smiths give credit to their school district for allowing them to teach in this manner. "They've been very good about supporting us with travel funds and substitute teachers while we're in the field," says Bernie Smith. "But it's really more about attitude than dollars."

In his opinion, schools have become more and more hesitant to allow students to go anywhere outside. Money is part of the problem, but often administrators don't see the value of field experiences and are worried about liability.

To help counter this attitude, the Smiths encourage their local administrators to join classes on field outings. They see how students engage with the project and, as a result, have been willing to add some financial support for their courses on top of the grant money the Smiths must get to purchase expensive field and laboratory equipment.

Despite financial constraints in the public schools, the Smiths remain dedicated to teaching in Montana and to improving the skill level of new teachers. Through their work with the Montana Environmental Educators Association – Bernie is past president and Dorothy is a district chair – they are planning a pre-service training program for new teachers that will help them get students into the field.

"Many of our students, though raised in rural areas, have little to no contact with the environment around them. The kind of educational experiences we provide may be the first step in awareness and the start of the cycle," he says.

Past and present partners on the Smith's field research projects include Montana Fish, Wildlife and Parks, WalMart Project Green Program, Rosebud County Conservation District, Rosebud County Weed District, PP&L Montana, Western Energy Company (Westmoreland Resources), BLM Miles City, Brown Cattle Company, Tongue River Water Users, Colstrip School District, Montana Watercourse and the Montana Weed Board.

Photos courtesy Bernie & Dorothy Smith



Our Changing Seasons

(From the MNHC Visiting Naturalist in the Schools curriculum)

Seasons change in Montana, we all know that, but do you ever notice *when* or *how* they change? In the coming weeks, try to notice when it gets dark in the evening and light in the morning, the first time you see geese flying in V formation, leaves changing color or falling off, the first frost or snow. With changes in season come changes in general weather patterns.

Weather is what's happening outside right now – is it rainy, snowy, sunny, cloudy, warm or cool? – or what is likely to happen tomorrow or in the near future. **Climate** is the general weather conditions or average weather for a particular area. Knowing what the weather is like helps you decide what clothes to wear; knowing what the general climate is like helps you decide what clothes to buy. Remember – there is no good or bad weather, only good or bad choices of what clothes to put on!

Changes in weather and climate can have a big effect on both the living and non-living elements of our environment. Sometimes, as in the case of snow accumulating to form a glacier, change is hard to see. A more obvious change is the annual fall migration of birds and other animals, heading for warmer places with more food. **Phenology** is the study of the annual cycles of plants and animals and how they respond to seasonal changes in their environment. Learning when glacier lilies bloom, when cutthroat trout spawn and when you can find ripe huckleberries is all part of studying phenology. You can track such events for any species of plant or animal from one year to the next and compare them to find general trends. By keeping a journal of your observations, you can see the role that varying temperature, moisture and sunlight have on plant and animal life cycles. Keeping a phenological record can be useful for establishing the best planting times, planning pest control efforts or evaluating global warming trends. Also, keeping close track of events outside is a fun way to get to know and appreciate a place.

Weather and Phenology Resources:

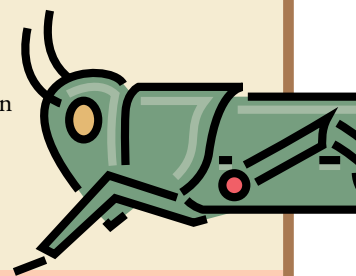
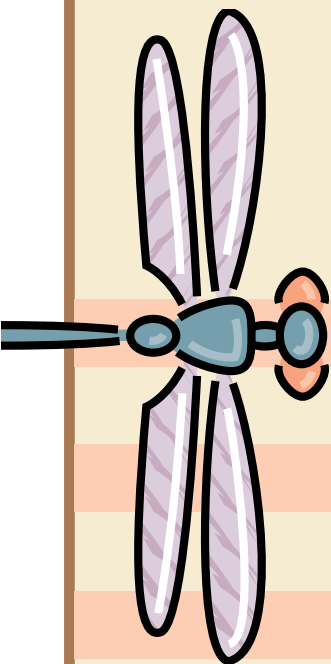
www.weather.com
 www.intellicast.com
 www.nws.noaa.gov
 www.accuweather.com
 www.weathernotebook.org
 "For Everything There Is A Season," by Frank C. Craighead, Jr. (Falcon Press, 1994).

Where Have All the Insects Gone?

(from Hands-On Nature, Vermont Institute of Science)

We often can see what plants and animals do to get ready for winter, but what about insects? Insects can survive the cold season because each species spends the winter in the particular life stage and place that will give it the best protection.

Name	Stage	Where
Ladybug	adult	Ladybug, ladybug, where have you gone? To hide under leaves near last summer's corn.
Honeybee	adult	Honeybees you can no longer make honey. You're in your warm hive and sneak out when it's sunny.
Monarch butterfly	adult	Monarch butterflies we know where you go. You fly thousands of miles to Mexico.
Housefly	adult	Houseflies you hide in cracks out of sight. But when there's warm sun, you crawl into its light.
Woolly bear caterpillar	larva	Woolly bears under leaves you're sound asleep. But I've seen you on snow, how slowly you creep.
Dragonfly	nymph	Dragonfly nymph you live in the pond. It's the mud at the bottom of which you are fond.
Grasshopper	egg	Grasshopper eggs you were laid under grass To be snug under snow until winter is past.



August 16 Prairie Keepers Knapweed Biocontrol Collection, 6:00 p.m. Help collect knapweed root-boring insects (*Cyphocleonus achates*) for redistribution around Missoula. You can take some home if you help collect for the common good! Meet at the Nature Adventure Garden at Fort Missoula.

August 24 MNHC Member's Night BBQ, 5:00 p.m. We will be showing the premiere of *Kit Fox: An American Tale* filmed by award-winning Rob Whitehair for National Geographic. Film shows at 7:00 p.m., free to the public.

August 27 Saturday Discovery Day with the Ice Age Floods Institute, 8:00 a.m. – 6:00 p.m. A Glacial Lake Missoula field trip. Forest Service Geologist Jim Sheldon and other GLM experts serve as guides for "Shorelines, Erratics, Ripples, Kolks and Varves," a day-long bus tour of sites that illustrate the natural history of the ancient glacial lake and the floods that shaped the landscape of the Northwest. Space is limited; registration required. \$75/\$50 MNHC members/\$40 IAFI members. Fee includes lunch, transportation and all presentations. For more information, call the Glacial Lake Missoula Chapter of IAFI, 370-5987, or visit www.iceagefloodsinstitute.org. To register, call MNHC, 327-0405 by August 19th.

August 30 Prairie Keepers Prairie Seed Collecting Workshop, 6:00 p.m. Learn to collect seeds from wildflowers and native bunchgrasses. The seeds will be used in local restoration projects. This is a great activity for families and kids. Meet at the Fort Missoula Native Prairie.

September 10 Saturday Discovery Day. Take the Fear Out of Nature Drawing with Nancy Seiler Anderson, 10:00 a.m. – 1:30 p.m., including lunch break. Don't be afraid to put a line on paper! In this three-hour class Nancy will show you how to really "see" what you're drawing. Learn to observe your subject and understand the difference between positive and negative space and how it can help your drawing. We will begin inside, practicing these techniques using mounted birds and animals. Afterwards, we'll head outside, weather permitting, to the Moon-Randolph Homestead for some drawing practice using found natural objects. Bring a sack-lunch. The materials list will be mailed to you and also will be available on Nancy's website, www.nancyseiler.com. Class-size is limited; registration required. Adults and children over 13 welcome. \$20/\$15 MNHC members.

September 17 Prairie Keepers, 11:00 a.m. Pull knapweed, scatter wildflower seeds and cover eroding trails on Mt. Sentinel. Meet at the M trailhead.

September 17 Astronomy Series, 8:00 p.m. **Sky Viewing with Binoculars**. Presented by Bill Lawrenson and the Western Montana Astronomical Association.

September 20 Prairie Keepers Native Plant Rescue, 6:00 p.m. Help rescue native plants from a local subdivision. The wildflowers and grasses will be used in local restoration projects and gardens. Location TBA.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
August		 Prairie Keepers Knapweed Biocontrol Collection , 6:00 p.m. Meet at the Nature Adventure Garden at Fort Missoula.			<i>Bull elk shed velvet</i>	
14	15	16	17	18	19	20
		MNHC Photo 16 Prairie Keepers Knapweed Biocontrol Collection , 6:00 p.m. Meet at the Nature Adventure Garden at Fort Missoula.	 MNHC Member's Night BBQ , 5:00 p.m. <i>Kit Fox: An American Tale</i> film, 7:00 p.m.			 Saturday Discovery Day with the Ice Age Floods Institute , 8:00 a.m. – 6:00 pm. A Glacial Lake Missoula field trip.
		23	24	25	26	27
		 Prairie Keepers Prairie Seed Collecting Workshop , 6:00 p.m. Meet at the Fort Missoula Native Prairie.		September		
		30	31	1	2	3
						 Saturday Discovery Day Take the Fear Out of Nature Drawing with Nancy Seiler Anderson, 10:00 a.m. – 1:30 p.m., including lunch break.
4	5	6	7	8	9	10
						 Prairie Keepers 11:00 a.m. Meet at the M trailhead.
11	12	13			16	17
<i>Fall hawk migration begins</i>		 Prairie Keepers Native Plant Rescue , 6:00 p.m. Location TBA.				 RiverFest 2005! Noon to 4:00 p.m. MNHC Grand Opening
18	19	20			23	24
25	26	27	28	29	30	1
October		Introduction to Botanical Illustration Using Graphite Tuesdays through November 8, 6:00 – 8:30 p.m.		<i>Brown and brook trout spawning</i>		 A Soup and Stars Saturday Discovery Day , 6:00 p.m. Astronomy Under the Big Sky.
2	3	4	5	6	7	8
				Glacial Lake Missoula Public Program. Time TBA.		
9	10	11	12	13	14	15

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
16	17	18	19	20	21	22
 <div>MNHC Photo</div>			Ice forming on ponds and streams			 MNHC Annual Gala and Down by the River Auction
		25	26	27	28	29
	November					
		1	2	3	4	5
6	7	8	9	 <div>MNHC Photo</div>		12
13	Glacial Lake Missoula Public Program, 7:00 – 8:00 p.m. Tentative		16			19
	Waterfowl seek open water					
20	21	22	23	24	25	26
				December		
27	28	29	30	1	2	3
 <div>MNHC Photo</div>						 Wild Gift Bazaar, 10:00 a.m.
		6	7	8	9	10
		13	14	15	16	17

September 24 RiverFest, noon – 4:00 p.m.
RiverFest is an annual community celebration of our local natural history. *Celebrate the grand opening of the Montana Natural History Center!* and kick off a day filled with activities, a scavenger hunt, speakers and performers, food vendors and display booths. Riverfest 2005 is provided by the Montana Natural History Center and the Missoula County Weed District. This event is free and for all ages.

October 4 Introduction to Botanical Illustration Using Graphite with Nancy Seiler Anderson. Tuesdays through November 8, 6:00 – 8:30 p.m. Learn how to create a classical botanical illustration in graphite in this six-week introductory course for adults with some drawing background. Nancy is a local botanical illustrator certified through The Denver Botanic Gardens. You'll learn to compose a drawing, set up your workspace and specimen, and explore perspective and light. Practice drawings will highlight techniques such as line, form, texture, surface contour and detail. We'll also touch on the fascinating history of botanical illustration and discuss simple botany to understand your specimen better. A materials list will be mailed to registrants and also will be available on Nancy's website, www.nancyseiler.com. Space is limited; registration required. \$135/\$125 MNHC members; includes a \$25 non-refundable deposit required at registration.

October 8 A Soup and Stars Saturday
Discovery Day, 6:00 p.m. Astronomy Under the Big Sky. Presented by Jerry Rude. Join MNHC and the Western Montana Astronomical Association for a catered light dinner and talk, followed by a sky-viewing field trip, weather permitting. \$15/\$10 MNHC members.

October 13 **Glacial Lake Missoula Public Program**, time TBA.

October 29 MNHC Annual Gala and Down by the River Auction.

November 5 Astronomy Series, 7:00 p.m.
Getting Started in Backyard Astronomy.
 Presented by Mike Hawkaluk and the
 Western Montana Astronomical Association.

November 12 **Saturday Discovery Day**, time TBA.

November 14 **Glacial Lake Missoula Public Program, 7:00 – 8:00 p.m. Tentative.**

December 10 Wild Gift Bazaar, 10:00 a.m.

Look for these program symbols in *Montana Naturalist* and on our website at www.MontanaNaturalist.org.

-  Volunteer Naturalist Training
-  Summer Science Day Camps
-  Elderhostel
-  Saturday Discovery Days
-  Prairie Keepers
-  Astronomy Series
-  Volunteer Opportunity

Can You Tell the Future?

Try making daily or weekly weather observations, and see how good a weather forecaster you can be! Simple measurements of temperature, wind speed and direction, precipitation, humidity, sky conditions and air pressure can help us see how weather and overall climate conditions affect life on a daily basis. Use the observation sheet and forecast guide to record outside conditions and see if you can predict what the weather will be like in 12 hours. Try to do this early enough so you can see whether you were right!



MNH Photo

Wind Speed Scale

1. Look about 10 feet off of the ground into the trees.
2. Watch the branches and leaves for about a minute.
3. Look for the observation that matches what you see.
4. Record the wind speed based on your observation.

Observation	Description	Speed in miles per hour
No movement in tree branches	Calm	Less than 1 mph
Leaves rustle	Slight Breeze	4-7 mph
Leaves and twigs move	Gentle Breeze	8-12 mph
Small branches move	Moderate Breeze	13-18 mph
Large branches sway	Strong Breeze	25-31 mph
Whole trees move	Moderate Gale	32-38 mph
Branches break	Strong Gale	47-54 mph
Trees are blown down	Whole Gale	55-63 mph
Widespread damage	Violent Storm	64-72 mph

KEY:

Wind direction – means where it's coming from, not where it's blowing to. Orient yourself facing north and toss a few leaves or blades of grass into the air to figure it out. What other indicators could you use?

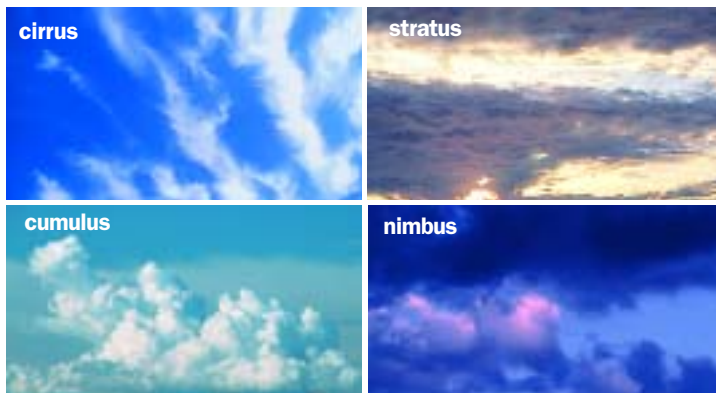
Wind speed – look into some trees for about a minute and match what you see with descriptions on the Wind Speed Scale.

Clouds – you can focus on four main types for simple forecasting: cirrus (curled or wispy), stratus (layered), cumulus (puffy) and nimbus (dark and stormy). Use a field guide to help you decide what type you see.

Humidity – the percentage of water vapor (water in its gas state) in a volume of air compared to what the air could hold at a given temperature. Check the internet or local newspaper for the day's humidity in your area.

Air pressure – measured by a barometer, which can indicate clear or changing weather depending on whether it detects high or low pressure. If you don't have a barometer, check the internet or newspaper for the day's air pressure in your area.

Air temperature – usually recorded as a high and low. The day's lowest temperature usually occurs in the early morning. Why do you think that is? Check the internet or newspaper for the low, then use a thermometer or estimate the day's high (usually between noon and 2 p.m.)



The 12 Hour Forecast

Observations

1. Place: _____
 2. Today's Low Temperature: _____ Current Temperature: _____
 3. Sky (circle one): Cloudy Mostly Cloudy Partly Cloudy Clear
 4. Dominant Cloud Type (circle one):
 Cirrus Stratus Cumulus Nimbus None
 5. Barometric Pressure: _____ Is it rising, falling or steady? _____
 6. Wind Speed: _____
 7. Wind Direction (direction it is coming from): _____
 8. Precipitation (circle one): Snow Rain None
- Today's 12 hour forecast is _____

Simple Guide to the 12 Hour Forecast

Fair Weather Expected

Wind from the north = cool clear weather on its way
 Rising barometric pressure = clear skies
 Cirrus or high clouds = fair weather, no precipitation
 Small, light cumulus clouds = no precipitation

No Change in the Weather Expected

No wind, slight wind or no change in speed = no change in current weather
 Barometric pressure is steady = no change

Clouds Expected with Precipitation Possible

Increase in wind speed = a change in weather is coming
 Falling barometric pressure = clouds increasing
 Stratus or low, blanket-like clouds = precipitation is possible

Storms are Coming

Nimbus clouds
 Low barometric pressure (falling fast)
 Big increase in wind

GRAND OPENING

*Take a Walk on the Wild Side at
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Exhibits

Journey with us as we explore Montana through time and the seasons. From Bear Gulch to bison and Glacial Lake Missoula to fire ecology, discover the natural heritage in our backyard. Center tours available.



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A kid-friendly space for toddlers to early elementary-school-aged children to explore hands-on materials

MNHC Market

A great source of nature-related books and games, other learning materials, arts and crafts



Public/School Programs

Saturday Discovery Days, Summer Camps, Astronomy Series, Visiting Naturalist in the Schools

Other Resources

Meeting space for business members
and local nonprofit organizations
Member and teacher library



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WHERE NATURE IS THE CLASSROOM



Courtesy Helen Atthowe



Courtesy Peter Lesica



Courtesy Peter Lesica

TOP: Peter Lesica measures the girth of a large *Ulmus americana*, growing in a hardwood draw in Wibaux County. Other species in this deciduous forest included green ash (BOTTOM LEFT) and wildflowers such as bluebells (BOTTOM RIGHT). “Hardwood draws are a great place to take a nap in the middle of a hot day on the prairie,” Lesica says.

Montana’s Beautiful Deciduous Forests

By Peter Lesica

I have always liked deciduous trees. It’s probably because I grew up in the upper Midwest among forests of ash, elm, maples and oaks.

Of course I like our western Montana forests of pines, firs and spruce, but there is just something magical about the gradual greening each spring and the colorful leaves of fall, first on the trees and then blanketing the forest floor. When I came out west I fell in love with mountains and prairies and clear rushing streams and being able to see for miles, but I always went back each fall to see the oaks and maples change color. “Make new friends but keep the old.” It wasn’t until many years later that I realized Montana has deciduous forests too.

Twenty years ago The Nature Conservancy asked me to go to eastern Montana and identify important landscapes in need of conservation effort. I spent much of my time visiting what people out there call “woody draws,” “hardwood draws” or “ash draws.” These forests can be found on north-facing slopes and along dry drainages in the hilly country of the eastern third of the state. The main trees are ash, maple and elm, just like the forests I grew up with. Boxelder (*Acer negundo*) is the maple; the ash is green ash (*Fraxinus pennsylvanica*), and the elm is American elm (*Ulmus americana*). All three species are common in forests east of the Mississippi River, and the latter two reach their western limits on the arid plains of eastern Montana. While these trees may reach as high as 75 feet in the eastern U.S., Montana’s champion elm and ash are barely 40 feet tall. Even though the trees are smaller, and there are fewer species, Montana’s hardwood draws remind me very much of the eastern deciduous forests I grew up with. The forest floor is covered with leaves, and in the spring there are familiar wildflowers like bluebells, violets and anemone. The understory is full of tree saplings and bushes such as golden currant, rose, chokecherry, pin cherry and American plum. Another old, though less welcome, friend found in Montana’s woody draws as well as Wisconsin deciduous forests is poison ivy. I was allergic to it as a kid, and I still am. Even so, hardwood draws are a great place to take a nap in the middle of a hot day on the prairie.

Although hardwood draws occupy only one to four percent of the eastern Montana landscape, they provide critical habitat for many animals, including migrant songbirds. Larry Thompson, formerly a biologist for the Montana Department of Natural Resources, found that the highest total biomass and diversity of breeding birds in McCone County occurred in hardwood draws. Craig Faanes, a U.S. Fish and Wildlife researcher, recorded 47 species of breeding birds in

nearby western North Dakota woody draws; of these, 22 species were neotropical migrants. Seeing and hearing the ovenbirds, brown thrashers and robins scratching in the leaf litter is another reminder for me of Wisconsin forests. Hardwood draws are also important elements of mule deer summer and winter range and critical winter habitat for white-tailed deer. During the fall and winter months hardwood draws provide food and shelter for sharp-tailed grouse.

Granville Stuart, an early cattle rancher and founder of the Montana Historical Society, described the country along Rosebud Creek and the Tongue River of southeast Montana in 1880 as having “plenty of big scrubby ash trees along the dry creeks and bluffs” and “small groves of ash and box elder in ravines and along little creeks.” When I studied these forests five years ago I found that most ash trees were 60 to 75 years old. This means they got started around 1930, during the driest decade of the last century. This apparently anomalous finding can be explained by knowing that all three dominant tree species are capable of sprouting from the base if their trunks are destroyed. I asked some old-timers around Terry, including 96-year-old Carl Hopkins, and they explained what happened. That part of eastern Montana was inundated with homesteaders around 1910. These newcomers needed wood for houses, barns, fences and fuel, so by the late 1920s they had cut down most of the trees in the woody draws. Then came the “dirty thirties,” and most homesteaders abandoned the land. The cattle and sheep that browsed the young tree stems were gone too, and the tree sprouts grew into mature trees. You can often tell a tree that grew back from sprouts because it has multiple stems from the base.



Courtesy Peter Lesica

About one-third of the ash trees in eastern Montana woody draws today have more than one stem.

Unfortunately, these days there are few young trees in the majority of Montana’s woody draws. Forests that once had undergrowth dominated by shrubs and saplings are being replaced by scattered old trees with little or no tree regeneration, few shrubs in the understory and a ground layer dominated by introduced sod-forming grasses. Some younger trees may resprout, but this won’t maintain the presettlement forest structure. The lack of tree reproduction from seed is thought to be due to the dense sod which thrives in the



Courtesy Peter Lesica



Courtesy Peter Lesica

TOP: Landscape view of a woody draw near Cabin Creek in Fallon County. MIDDLE: Such forests are in decline, with few or no new trees or shrubs and a ground layer dominated by introduced sod-forming grasses. BOTTOM: Opportunities for food and shelter attract many bird species to hardwood draws, such as this brown thrasher with newly hatched chicks.

sunnier environment under open canopies. Drier climate during the past one or two decades may also be playing a role in the decline of our woody draws. The Bureau of Land Management, the Natural Resources Conservation Service and Montana Fish, Wildlife and Parks are working together to try to find a way to restore woody draws, but we don’t know how successful the project will be. It could also be that some future period of wet weather will trigger tree regeneration. I hope so. It’s really nice to have ash and maple forests here in Montana even if they are 500 miles away. 🐦

Peter Lesica is a botanist and member of the Montana Native Plant Society. He frequently writes and speaks about native plant research and conservation.



MNHC Photo

Our Sense of Place

Join us September 24, from noon to 4:00 p.m., for our 7th annual RiverFest celebration and the Grand Opening of our new home at 120 Hickory St., just minutes from the Clark Fork River and downtown Missoula. Our theme for this year is "A Sense of Place," exploring what makes the Missoula Valley so special through activities, presentations and the debut of MNHC's new natural history exhibits.

RiverFest is an annual community celebration of our local natural history. We are planning an afternoon filled with a variety of activities, speakers and performers, food vendors and display booths. Past RiverFest events have included butterfly walks, native plant gardening demonstrations, fly-fishing lessons, bird walks, weed pulls, river clean ups, backcountry skill and cross-cut saw demos, and presentations by Raptors of the Rockies and Critterman.

Riverfest 2005 is made possible through the cooperation of non-profit organizations and state and federal agencies led by the Montana Natural History Center and the Missoula County Weed District. Past participating organizations have included the Wilderness Institute, Sierra Club, US Forest Service, Fish, Wildlife & Parks, Aldo Leopold Institute, Backcountry Horsemen, Trout Unlimited, and Missoula Parks and Recreation, among others. We hope to see you there!

Here Come the Visiting Naturalists

With generous support from the Steele-Reese Foundation, MNHC has been able to solidify and expand the Visiting Naturalist in the Schools program over the past two years to include approximately 400 students in 22 classes at 11 schools for the 2005-2006 school year. Thank you Steele-Reese for helping us enrich science curricula and bring hands-on nature experiences to Missoula schoolchildren.

2005-2006 participating elementary schools are: Lolo, DeSmet, Missoula Homeschool, Clinton, St. Joseph, Franklin, Lowell, Hawthorne, Hellgate and Missoula International School.



MNHC Photo



Save the Date

MNHC's annual gala dinner and Down by the River Auction will take place Saturday, October 29. Call us if you would like to attend and haven't received an invitation by mid-September. For more information or to donate to the auction, contact Betsy Maier at 327-0405. Don't forget to save the date!



Montana Through Time and the Seasons

Change, on annual and geologic timescales, is the unifying theme of MNHC's new temporary exhibits, which will be unveiled September 24 at our Grand Opening and RiverFest celebration.

Through these interpretive displays you can learn about Glacial Lake Missoula and how it and other Ice Age floods shaped our landscape; discover Montana's prehistoric past through fossils and illustrations that depict the paleo-ecology of organisms inhabiting this region hundreds of millions of years ago; understand the ecological roles and habitats of native species such as grizzly bears, bison and birds; find out about the many impacts, both positive and negative, of fire in an ecosystem, and explore and try out the various tools that naturalists use to study nature.

Other displays will feature nature art and Montana at Night, an exhibit of nocturnal animals and the night sky.

This represents Phase I of our exhibit plans. Get involved with MNHC – as a member, volunteer, program participant – and help us plan our permanent exhibits in the years to come.



Wild Gifts Support Education

Even though we still have plenty of warm days left, it's not too soon to make your holiday shopping plans. The MNHC Market features a large selection of tools and resources to help you discover the natural world, including field guides, books, magnifying glasses and more. The Market also offers shirts, posters and signed prints of "Six Magpies" by Kendall Jan Jubb, as well as our special blend of Hunter Bay organic coffee, games and puzzles from World Games of Montana and nature-inspired work by local

artists, including silkscreened note-cards by Sue Spanke, photography by Pam Voth, stainless steel images by Jim Clark, handmade paper lampshades by Krissy Frost, colored silks by Adrienne Veseth and carved flutes and walking sticks by Papa John Herring.

The Market is open Tuesday through Friday, from 10 a.m. until 5 p.m. Mark your

calendars for this year's Wild Gift Bazaar, where you'll be able to browse among dozens of booths featuring a wide selection of regional handcrafted goods and edibles. The Wild Gift Bazaar will be held Saturday, December 10 at 120 Hickory St.



Peek Behind the Scenes

On Friday evening, September 23rd, everyone who has made a gift to MNHC's building campaign is invited to dinner and a behind-the-scenes tour of our new home and exhibits. The event kicks-off six months of festivities, building up to our 15th Anniversary Party in June, 2006. Haven't made your gift to the building yet? That's O.K. Make one now and come to the party! Contact Betsy Maier at 327-0405 for details.



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The Market at MNHC offers a fine selection of tools and resources to help you discover the natural world – field guides, books, magnifying glasses and much more.

The Market also offers shirts, posters and signed prints featuring the stunning image of Kendahl Jan Jubb's "Six Magpies."

Or pick up our special blend of Hunter Bay coffee, games and puzzles from World Games of Montana and nature-inspired work by local artists.

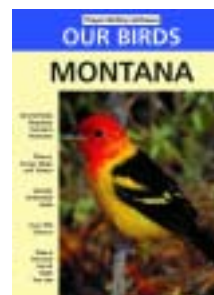
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Field Notes welcomes new writers and sponsors. Contact the Montana Natural History Center at 327-0405 for details.

Montana Public Radio





This past summer several students from the University of Montana lent their artistic talents to the creation of MNHC's new exhibit, *Montana Through Time and the Seasons*.

Paintings, drawings and scientific illustrations by Melisa Beveridge, Nathan Birr, Jose Allana and Fawn Helms enhance displays about Montana's plant and animal communities, including some discovered in ancient fossil beds.

This painting is part of a larger piece made by Jose Allana, a geology graduate student. His master's thesis proposal includes using art to bring to life the paleo-ecology of organisms found in the Bear Gulch Limestone of central Montana. Bear Gulch sediments were deposited in shallow, tropical marine conditions approximately 320 million years ago and contain one of the most diverse fossil fish assemblages in the world.

Yes! I want to become a member and support the
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*Make nature your classroom with a visit to our website – www.MontanaNaturalist.org
Become a member on-line, explore our programs and discover where the Montana Natural History Center
can take you! Fill out and mail to Montana Natural History Center, 120 Hickory Street, Missoula, MT 59801 or Fax: 406.327.0421*



Basic Membership Benefits

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Free admission to the
MNHC Discovery Center

Invitations to special programs

Membership card & vehicle decal

Access to the Ralph L. Allen
Environmental Education Library

Free passes to visit participating nature
centers throughout the country

Discounts on all programs and
in the MNHC Market

Business Membership Benefits

2 free basic memberships

Invitations to special programs

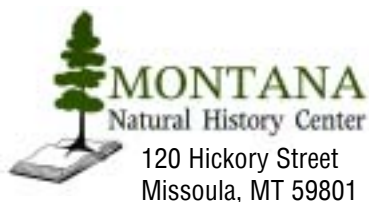
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