Spring/Summer 2010

MONTANA Naturalist

Soar With Eagles

Poop Patrol

Grousing About Energy

Get Outside!

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Montana Natural History Center
Your Base Camp for Discovery

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

Spring/Summer 2010

MONTANA Naturalist

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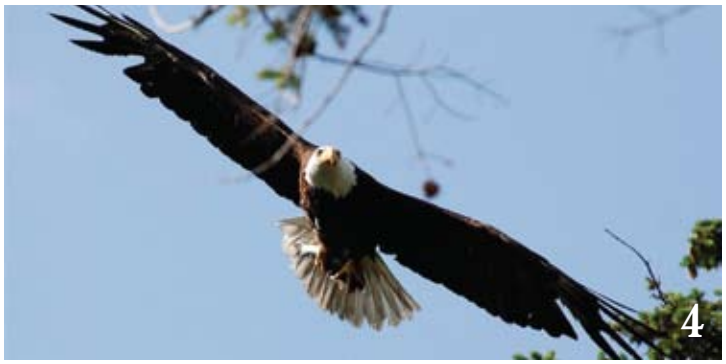

Cover photo – Yellow warbler, photographed by David M. Shumway last June at Duck Creek Park boat landing in Billings, using a Canon 40D camera and a Canon 300/2.8L IS + 2.0TC II (600 mm) lens. Mr. Shumway is staff photographer and adjunct professor of art at Rocky Mountain College See more of his nature images at www.ShumwayPhotography.com.

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Your Base Camp for Discovery

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Male rufous hummingbird

Photo by Eugene Beckes

What a joy it is to put together this spring and summer issue. There's so much to report on – burgeoning buds and beckoning birds. I've been hearing early morning bird chatter for more than a month now, and every week brings new arrivals – bluebirds, meadowlarks, swallows and spotted twohees. As many have noted before, birds make such satisfying subjects, especially for novice naturalists, because rather than avoid publicity, they love to show off their colors and voices. In this issue, we focus on a couple of very different bird species – bald eagles and sage grouse. Learn more about their stories inside. Also, Peter Lesica introduces readers to a strange plant called dodder – hopefully none of you will run into it in your garden this summer! Speaking of gardens, find out about the Nature Adventure Garden at Fort Missoula and the many ways you can develop a native plant garden into a classroom for teaching all kinds of lessons.

As more daylight entices us to stay outside longer, take a walk, hear a talk, go on a field trip. Soon Summer Camp registration opens and your child will be able to choose from a whole world of nature discovery programs – from reptiles and amphibians to bats and bears to building outdoor skills. See pages 16 and 17 for details, and don't forget to stop by the nature center at 120 Hickory St. on Saturday, April 17 to meet some special friends and have a chance to win a free week at camp. See you there!

Caroline Kurtz

Caroline Kurtz
Editor

Restoration Volunteers

Spring 2010 Restoration Projects

Volunteer opportunities for people interested in the community spirit of shared responsibility for stewardship and restoration of public lands.

March 27 **Lower Rock Creek Willow Collection,** 8:30 a.m.-3:00 p.m. Collect willow stems at the mouth of Rock Creek to be planted after spring run-off along Rock Creek Road for river bank cover and better fish habitat. In partnership with Trout Unlimited.

April 7 **Crew Leader Training,** 5:30-8:00 p.m. Learn to be a volunteer crew leader, responsible for leading fellow volunteers during restoration projects. Tool safety, leadership strategies and practical skills for doing restoration work will be covered.

April 10 **Upper Rock Creek,** time TBA. Collect willow stems from upper Rock Creek for planting later in the year. In partnership with the Pintler Ranger District.

April 17 **Crew Leader Training Field Experience,** time TBA. Practice skills from the classroom during an actual restoration day. Experienced crew leaders will guide you through the process as we remove trail tread from short cuts on switch backs, seed and install erosion matting. After successfully completing field-day training, you will be qualified to lead restoration projects during the spring and summer.

May 1 and 2 **Road Seeding in Trout Creek,** time TBA. Work with the Nature Conservancy to reseed old logging roads in the Trout Creek Drainage. Volunteers will spread native seeds on old logging roads that have been ripped by heavy equipment to close them. Improve wildlife habitat and reduce erosion on steep slopes, preventing silt from reaching valuable trout streams. This is a rigorous project that requires a lot of hiking, rewarded by great views of lands that will be turned over to the Fish, Wildlife and Parks Department.

June 5 **Upper Rock Creek Willow Planting,** time TBA. Plant willows along Rock Creek to improve wildlife and stream habitats. We will use our earlier collection to establish willows where they have been removed from the stream bank. This is an excellent opportunity to see how willows can be used to improve cover along stream banks.

If you are interested in participating in a project, contact Graham Roy at royboy1@bresnan.net. You will receive meeting times and places when you register. Please look for more projects as the season continues.

By Jessie Sherburne

A Cause for

Eagles on the rise in Montana

Photo by Kate Davis

Bald eagles are powerful, picturesque raptors that Montanans are fortunate to have residing, nesting and successfully reproducing in this state. Adult bald eagles are easily recognized by their white feathered heads and tails that contrast sharply with their chocolate brown bodies. You frequently can spy one or more perched high in a cottonwood tree alongside a river or on a dead snag overlooking a lake.

While most successful eagle pairs fledge one or two chicks per nesting season, in 2009 several eagle pairs in Montana reportedly fledged four! However, the bald eagle's story has not always been so positive. There was a point when bald eagles were on the verge of disappearing from Montana, and the rest of the United States, forever.

In the mid-1950s bald eagle numbers dropped drastically due to, among other factors, the widespread use of the pesticide DDT. Eagles, like many other bird species, were exposed to DDT through their food source – in the eagles' case, fish. As bald eagles consumed fish contaminated by DDT, the birds accumulated the toxin in their bodies. Over time, this accumulation affected their calcium metabolism and caused them to lay eggs with very thin shells, which tended to break in the nest as they were incubated. This recurring issue of thin egg shells eventually caused the reproduction of bald eagles to come to a screeching halt. By 1963, a bird that once had been populous throughout the country, had dwindled to only 487 known breeding pairs in the lower 48 states, according to the U.S. Fish and Wildlife Service.

Juvenile vs. Adult

Bald eagles aren't considered mature adults until their heads and tails have turned completely white. This typically occurs by the time they are five. Until then, bald eagles are considered juveniles and sport mottled brown and white plumage. In the first year of life, juvenile bald eagles are so brown that some are mistaken for golden eagles.

Bald Eagle stats

Average Weight: 9.5 pounds (females generally are larger than males)

Average Wingspan: 6.5 feet

Nest type: Stick nest located in the fork of a large tree or on a cliff

Photos by Eugene Beckes

Celebration

In 1972, after nearly three decades of application, DDT use was banned in the U.S. because of insect resistance, more effective alternatives and the growing public concern over adverse environmental side effects. But these effects persisted and in the late 1970s bald eagles were still struggling. By 1978, they were listed as an endangered species.

Between 1981 and 2000, however, the bald eagle population in the lower United States multiplied five times, and by 2007 bald eagles were officially delisted as the numbers of breeding pairs across the United States exceeded 9,000 – with 325 pairs reported in Montana alone.

Though bald eagles are no longer protected by the Endangered Species Act, they still are safeguarded by the Bald and Golden Eagle Protection Act, among other legal documents. In addition to protection, these documents provide guidelines for landowners and land managers to reduce the potential for disturbing eagles and to encourage land practices that may benefit them.

According to Montana's Region 2 Fish, Wildlife and Parks Native Species Coordinator Kristi DuBois, the ban on DDT was the most important factor in increasing bald eagle populations. Though other raptors, such as ospreys and peregrine falcons, also were gravely affected by the use of DDT, bald eagles took the longest time to bring their numbers back up to a sustainable level. Dubois says this was because eagles take five to seven years to reach a mature breeding age whereas ospreys, for example, typically reproduce around three years.

Dubois and others believe that the number of bald eagles in Montana will continue to increase until all suitable habitat around the state, primarily tall trees within a mile of lakes and rivers, has been filled. We should keep this in mind when developing property near water, she says, so that future generations of Montanans can enjoy watching our national emblem carry out its life story.

Photo by Kate Davis

Fish eagle

North America is the only place that the bald eagle *(Haliaeetus leucocephalus)* calls home, and it is one of the largest members of the hawk family (Accipitridae) here. The other North American eagle – the golden eagle *(Aquila chrysaetos)* – also is part of the hawk family. However, it is quite opposite to the bald eagle where diet and habitat are concerned. Bald eagles are considered "fish" eagles – eating fish, carrion, birds and small mammals – and are most commonly seen near rivers or lakes. Golden eagles are considered "booted" eagles, due to the extensive feathering these birds have all the way down their legs to their feet. Golden eagles typically are found in open country near cliffs, hunting live prey, such as medium-sized mammals and birds, as well as eating carrion.

Sky dancers

Bald eagles perform a spectacular courtship dance in which a male and female fly high into the air, lock talons and spiral downward together. They release talons and fly off just before they come in contact with the ground.

Can't believe your ears

The mighty keeeeeeeer call often heard in movies, or on TV and radio, which is used to represent the call of the bald eagle, actually is the call of the red-tailed hawk. A bald eagle's call is less imposing and consists of rather weak, flat chirping whistles.

Eagle trivia:

A group of eagles is called a convocation.

Bald eagles are known for stealing prey from ospreys, kingfishers, gulls, hawks, loons, sea otters and each other.

In 1782 the bald eagle was adopted as our national emblem due to its "fierce" demeanor. Second choice was the wild turkey.

Feed Me,

Audrey has nothing on *Cuscuta*

By Peter Lesica

Like the nightmare potted plant in the "B" movie "Little Shop of Horrors," dodders (*Cuscuta* spp.) surely are among the world's most unusual flora. Although they do not eat flesh, dodders *are* parasitic on other flowering plants and lack leaves or any photosynthetic tissues. This is odd enough, but unlike most other parasitic plants, such as broomrapes (*Orobanche* spp.), paintbrushes (*Castilleja* spp.) or even mistletoes (*Arceuthobium* spp.), dodders have no roots. They can be annuals, arising from seed each year, or perennials, arising from overwintering stem segments. Dodders are closely related to morning glories, but the flowers are inconspicuous, though sometimes with intricately ornamented corollas. There are about 150 species of dodder worldwide, most living in subtropical and tropical America. Our species have yellow or orange twining stems. Only four or five species are reported for Montana, and based on the small number of herbarium collections and my own experience, they are not common in the state. In Montana they often have been collected parasitizing native and introduced legumes, as well as spotted knapweed and other members of the Aster family.

Dodder seeds germinate on the surface of the ground and then forage for their host

In some ways, dodder does act more like an animal than a plant! Other parasitic plants, such as broomrape, have seeds that germinate only when they are contacted by chemicals given off by host plant roots, but not dodder. Dodder seeds germinate on the surface of the ground and then forage for their host (check out "parasitic plant dodder" on YouTube). The stems grow outward while waving around until they reach a host plant. Juvenile stems can reach up to two and a half inches, but none are able to reach twice that far and they must find a host within a few days or die trying.

Photo: Sheri Hagwood @ USDA-NRCS PLANTS Database

Most species of dodder can parasitize many different host plants, but studies have shown that dodder grows better on some hosts than others. Several studies have shown that dodder is able to infect those hosts that provide the most preferentially benefit. Colleen Kelly, from Oxford University, demonstrated this and found that the choice is made based on chemicals that dodder can detect before forming haustoria. Kelly also found that having two different hosts was better than one, although a second independent study failed to confirm this result. RIGHT: ***Cuscuta pentagona*** **in flower.**

Seymour

The way dodder is able to choose a host also is reminiscent of an insect herbivore or parasite. Researchers have demonstrated that dodder stems will orient toward a tomato plant, or even a vial of tomato extract, as long as an odor can be detected. Other studies have shown that dodder can locate a host by the quality of light reflected off the host's leaves and will even preferentially move toward hosts with higher chlorophyll content – in other words, those that are greener and presumably with more sugars.

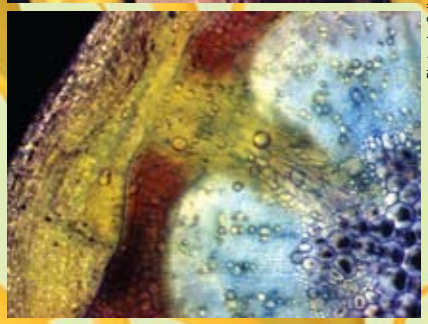
As soon as a dodder stem twines around its host it begins to form haustoria, specialized short stems that tap into the host vascular tissue. Flowering plants have two kinds of vascular tissue. Xylem carries water and mineral nutrients from the roots up the stem; phloem moves energy-rich carbohydrates to the roots or other areas of need. To match this, dodder develops two different extensions from its haustoria: a hand-like form that surrounds the phloem and a straw-like form that pierces the xylem. In this way dodder can obtain everything it needs – water, mineral nutrients and food – from its host.

The effects of dodder go beyond just individual host plants. By the end of a growing season a single dodder plant may form thousands of haustorial connections with many different host species and cover an area the size of a small house. Of course this can have significant effects on the plant community. Since they are somewhat host-specific, dodders can alter community structure by preferentially damaging some species more than others. For example, University of Montana professor Ray Callaway and his collaborators found that dodder reduced the dominance of glasswort *(Salicornia)* in favor of sea-lavender *(Limonium)* in California coastal marshes. Dodders also may damage commercial crops such as tomato, pumpkin and alfalfa. Indeed, this is why we know so much about dodder ecology. Dodders' negative impacts also extend beyond simple parasitism. For example, they can be conduits between host plants for viruses, including disease-causing pathogens. Some diseases can spread more quickly through a crop field infested with dodder than one without.

On the positive side, a native Chinese dodder has been used to control bittervine *(Mikania)*, a serious invasive weed in China as well as in Puerto Rico. The native dodder causes a decline in the invader, resulting in greater nutrient availability to native members of the community.

Although it might seem like host plants are defenseless against the rapacious dodder, this may not always be the case. Recently researchers have found that some host plants transfer messenger RNA (mRNA) into their dodder parasites. Some of these mRNAs can incapacitate dodder's genetic machinery, thereby reducing its ability to make proteins and grow. This discovery has spawned an interest in genetically engineering crop plants that produce dodder-destroying mRNA. Maybe agriculturalists one day will be able to turn dodder's voracious appetite against itself.

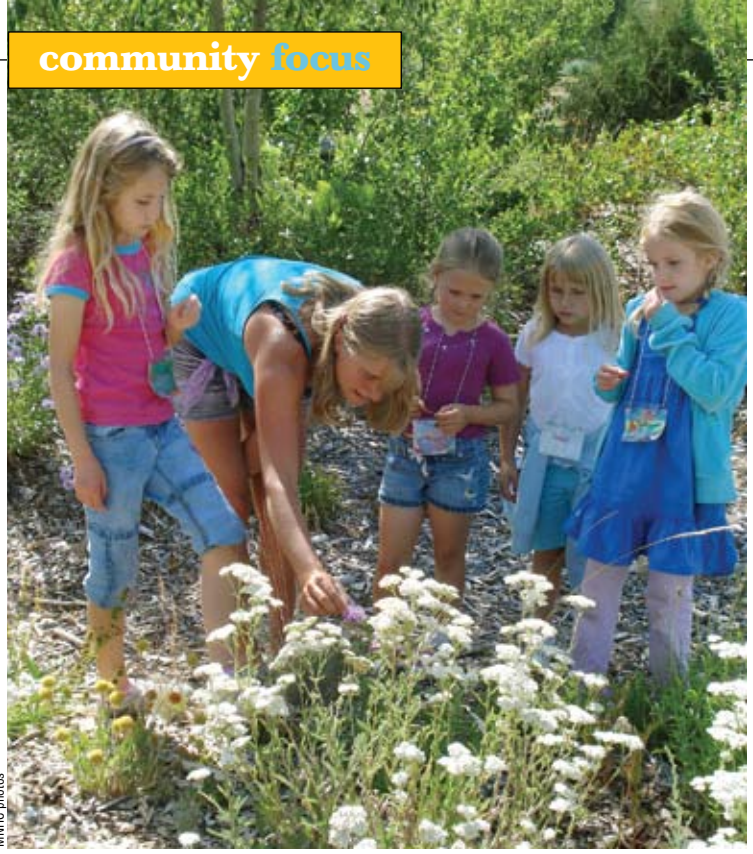
Peter Lesica is a Missoula-based botanist. His article originally appeared in the Spring 2010 issue of Kelseya, *the newsletter of the Montana Native Plant Society (www.mtnativeplants.org).*



Photos by Colin Purrington

ABOVE: sometimes known as devil's hair, hell bind or strangleweed, dodder wraps around a host plant stem and forms haustoria, which penetrate host cells to obtain nutrients. BELOW: a mass of dodder vines on *Salicornia* in California.

Photo by Colin Purrington



MNHC photos

Wild Gardening

Welcome to the Nature Adventure Garden

By Leah Grunzke

The idea of planting native gardens has been gaining momentum in recent years. Many people are aware by now of the myriad benefits of gardening with native plants (those regional species that are well-adapted to our growing conditions). Conserving water, cutting down on pesticides and fertilizers, building a tangible connection to the place we live, and simply delighting in our incredible diversity of native wildflowers, grasses, shrubs and trees are reasons enough to get on board the "wild gardening" train. You'll also be playing a key ecological role – that of providing year-round habitat for local wildlife and host plants for native pollinators. And because wild gardening essentially mimics natural systems, you need look no further for inspiration than the wildlands right outside your door.

Outdoor classroom

It is for all these reasons that native gardens make excellent teaching tools as well. Garden planning, installation and caretaking all offer opportunities for real world experiential learning. A diverse collection of native plants is a living history of our natural world, and a starting point for exploring human culture. And within the garden, you'll find a ready-made science lab, teeming with experiments to be performed, measurements to be collected and observations to be recorded.

The Nature Adventure Garden at Fort Missoula is one such model of a native garden used as an outdoor classroom. It sits amid 100 acres of prairie and riparian habitat, near the banks of the Bitterroot River at historic Fort Missoula. The garden was created by volunteers in 1998 to serve as a "natural playground" – a place for children to explore and discover the world. The garden was designed on the belief that, in order to gain appreciation and awareness of environmental issues, children need access to hands-on experiences with plant communities that demonstrate the beauty and diversity of our region.

> "Look deep into nature, and then you will understand everything better."
>
> ~Albert Einstein

In year-round classes, after-school programs and summer camps, students use the Nature Adventure Garden as a starting point for diverse lessons and projects. We're hard-pressed to think of a subject that *can't* be incorporated into garden curriculum. Students design interpretive signs to teach others the historical uses of plants. They hold plant sales and learn practical economics. They practice math and computer skills through mapping projects. Preparing herbarium specimens and botanical sketches are lessons in art and taxonomy. Chemistry comes through in the soil, physics in learning about the seasons and weather, and technical skills are gained through construction projects. Through it all, a deeper understanding of regional biodiversity, wildlife biology, insect ecology, and our local watershed, climate and community are reinforced every time students get their hand dirty. These lessons are put to use when students head out to participate in local restoration and conservation projects. By providing children (and adults) a natural place to explore and discover in their own backyard, they begin to understand themselves, their community and their world a little better.

The Nature Adventure Garden is operated as a partnership between MNHC and the University of Montana Rocky Mountain Field Research Station, and sustained through the generous support of the Montana Native Plant Society, The U.S. Forest Service More Kids in the Woods program and individual donations. If you would like to learn how you can help, attend volunteer events, assist with classes or create a native garden in your own backyard, contact MNHC Restoration Ranger Leah Grunzke, miss_grunzke@yahoo.com, 406-327-0405.

TOP: Leah Grunzke introduces young visitors to yarrow.
RIGHT: students at work on plots at the Nature Adventure Garden.

Scouting for Scat

By Susie Wall Photos by Dave Wall

Illustration: istockphoto.com

During my last hike in the Bitterroots I felt surrounded by animals. Moose, bears, weasels, maybe even a wolf silently watched me from the forest edge. Was I lucky enough to actually see any of these creatures? No. What I saw were their scat piles.

Scat is poop, and while you may not see an animal on your hike, if you know some general information about scat you can get a good idea what animals have been sharing the trail with you. Be aware that weather, the age of the pile and food availability can make it difficult to know exactly what deposited the scat you are trying to identify. But certain species do leave certain shapes of scat, which will allow you to make an educated guess.

Ungulates deposit the easiest scat to identify. Deer, elk and moose munch solely on vegetation and leave behind piles of pellets as they stroll through the woods. Individual pellets usually have an indentation on one end and a point on the other and vary in size depending on the animal. In the summer, the moist succulent plants that make up the majority of an ungulate's diet cause these pellets to stick together to form a ball. At other times of the year, the pellets are drier and scatter as they drop. Look for nuts and seeds sticking out of the scat in the fall and woody material in the winter.

Carnivore scat comes in many different shapes and sizes. Cats such as the mountain lion or Canada lynx leave tubular, blunt-ended scat. Wolf and coyote scat is long and slender with tapered ends. Weasels, martens and minks deposit thin cords with kinks, which make the scat bend back on itself. Despite this diversity of shape, one common factor in carnivore scat tends to be the content and color. A diet made up mostly of other animals shows through on the scat's surface in the form of bone, fur or fish scales. If you know what an animal tends to eat, you know what should be found in the scat. A diet heavy in meat also tends to make scat dark, although weather and age of the scat can play a big part in color and shouldn't be used as the only tool to determine the source.

A dark purple, lumpy pile by the side of the trail means one thing – it's berry season for bears. Bear scat tends to lack a definite shape, but you can easily see what a bear has been eating because the source of their diet shows throughout the pile and bears eat just about anything. Acorn shells cover the pile in fall. Huckleberries dot the scat in late summer. Ant parts can be seen throughout the year. Bears often tear apart downed logs to get at insects, so look for scat piles with both insect parts and woody material near these shredded old trees.

There is no secret to finding scat. Look everywhere. Browsing animals drop scat throughout the woods. Just like domestic cats that use litter boxes, however, animals that stay in one place have a designated spot to deposit waste away from their home, so look for a latrine pile near a den. The base of trees is also a good place to look. Porcupines spend a majority of time in the treetops and don't bother coming down when nature calls. Human hiking trails are convenient walkways for animals, too, so don't be surprised to find all the scat you need right in front of you.

Three piles of poop, CLOCKWISE FROM LEFT: deer, possible black bear, possible coyote.

book corner

Bug Feats of Montana

by Deborah Richie Oberbillig
(Farcountry Press, 2009)

This book is all about bug feats – the fastest flyers, loudest buzzers and the sneakiest ambushers in Montana. Some of them are even record holders! Following her *Bird Feats of Montana*, Oberbillig and illustrator Robert Rath, have created a resource for invertebrate fans of all ages. Forty of the state's most amazing "bugs," living in the air, water, soil and snow, are profiled. The book's considerable information is broken into bite-sized pieces and accompanied by helpful illustrations and bug-finding tips. A great addition to any natural-history library.

Special Pull-Out Section: pull out and post these pages for handy reference.

get outside calendar

April 13 **Volunteer Naturalist Training,** 4:00-5:00 p.m. **Field Trip Orientation.** Learn how to teach kids about flora and fauna of western Montana during May Visiting Naturalist in the Schools field trips. Only one orientation meeting is necessary to participate.

April 14 **Evening Lecture Series. Blackfeet Medicinal Plants,** 7:00 p.m. Join Rosalyn LaPier, enrolled tribal member, as she details the specific plants harvested by the Blackfeet and how they were used for medicinal purposes.

April 17 **Project Learning Tree Educators Workshop,** 9:00 a.m.-3:45 p.m. **Schoolyard Gardens: Connecting Children with Nature through Native Plant Education.** One-day workshop explores using PLT curriculum to introduce students to native plants, pollinators, invasive weeds and conservation principles. See www.MontanaNaturalist.org for workshop details. 6 OPI credits available. Meet at the Nature Adventure Garden at Fort Missoula. Cost is $13; call 327-0405 to register.

April 17 **Family Fun Day,** noon-4:00 p.m. Celebrate the start of Summer Camp registration! Visit with Animal Wonders staff and some of their amazing live animals from around the world from 12:30-2:00 p.m. Then join local author Donna Love for a preview of her new book "The Totally Out There Guide to Glacier National Park," followed by a fun mountain goat art activity. Snacks provided! The first 30 kids to register for camp in person receive an MNHC aluminum water bottle; all in-person registrants will be entered in a drawing to receive a free week at camp or a family membership to MNHC.

April 21 **Volunteer Naturalist Training,** 4:00-5:00 p.m. **Field Trip Orientation.** Learn how to teach kids about flora and fauna of western Montana during May Visiting Naturalist in the Schools field trips. Only one orientation meeting is necessary to participate.

April 24 **National Trails Day. Mt. Sentinel Restoration,** 10:00 a.m.-3:00 p.m. Native plants on sale from the Nature Adventure Garden. Meet at M Trail.

April 24 **Saturday Kids Activity. Beautiful Beetles,** 2:00 p.m. UM Insect Lab Manager and beetle expert Annika Johns presents an up-close look at several species of big, beautiful beetles.

April 28-May 28 **Visiting Naturalist in the Schools. Field Trips.** Weekdays 4th and 5th grade students participate in day-long educational field trips. Volunteers needed. Contact MNHC at 327-0405 for details.

May-August **Nature Adventure Garden Series,** last Thursday of the month, 5:30-8:00 p.m. The native plant teaching garden at Fort Missoula hosts native plant sales, volunteer work parties, guided tours, garden workshops and more. For details on each month's event, contact MNHC Restoration Ranger Leah Grunzke at miss_grunzke@yahoo.com, 327-0405.

May 1 **Saturday Discovery Day. 4th Annual Mt. Jumbo Weed Pull,** 10 a.m.-1:00 p.m. Meet at the Missoula International School, corner of Elm and Harrison Ave. in the lower Rattlesnake. Contact Giles Thelen at 543-2532 or giles@mso.umt.edu for more information.

May 1 **Saturday Discovery Day. Native Plant Garden Workshop,** 1:00-4:00 p.m. David Schmetterling teaches how to turn your yard into a place that wildlife and people will enjoy. Learn about use of space and structure to create a yard that is environmentally friendly and affordable. Bring any garden plans, a sketch of your yard or an aerial photograph

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
April		**Volunteer Naturalist Training,** 4:00-5:00 p.m. **Field Trip Orientation** 13	**Evening Lecture Series. Blackfeet Medicinal Plants.** 7:00 p.m. 14	15	16	**Project Learning Tree Educators Workshop,** 9:00 a.m.-3:45 p.m. **Family Fun Day,** Noon-4:00 p.m. 17
MNHC Hours: Tuesday-Friday, noon - 5 p.m. and Saturday noon - 4 p.m. **Admission Fees: $2**/adults, **$1**/children under 12 (maximum $6) **Free**/children under 3 and MNHC members. 18	19	20	**Volunteer Naturalist Training,** 4:00-5:00 p.m. **Field Trip Orientation** 21	22	23	**National Trails Day. Mt. Sentinel Restoration,** 10:00 a.m.-3:00 p.m. **Saturday Kids Activity. Beautiful Beetles,** 2:00 p.m. 24
25	26	27	**Visiting Naturalist in the Schools Field Trips.** *Weekdays through May 28.* 28	29	**Know Your Mushrooms.** Special screening, 7:00 p.m. 30	**Saturday Discovery Day. 4th Annual Mt. Jumbo Weed Pull,** 10 a.m.-1:00 p.m. **Native Plant Garden Workshop,** 1:00-4:00 p.m. 1
May 2	3	4	5			**Saturday Discovery Day. Spring Plant Walk,** 1-4:00 p.m. **Saturday Kids Activity. Big on Bugs,** 2:00 p.m. 8
9	*Listen for the meadowlarks trill* 10	11	12			MNHC photo 15
16	17		Photo by Lance Schelvan 20	21	**Missoula Children & Nature. Gear Up for Summer Event,** starting at 9:00 a.m. 22	
23	24		**Nature Adventure Garden Series,** last Thursday of the month, 5:30-8:00 p.m. *Through August.* 27	28	29	
30	31	**June** 1	2			**Leaders in Training Orientation,** noon-4:00 p.m. **Saturday Kids Activity. Kids' Birding Festival,** 2:00 p.m. 5
6	7	8	9			Photo by Lance Schelvan 12

Programs and events held at MNHC's new home - 120 Hickory Street - unless otherwise noted.

get outside calendar

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
13	*June 14-18* **Herp Patrol** (Grades 1-3) **Fishing for Fun I** (Grades 1-3) **Super Tracker** (Grades 3-5) **Survivor!** (Grades 5-8) 14	15	 MNHC photo		18	**Saturday Discovery Day. Natural History of Bark-Beetles,** 9:00 a.m.-1:00 p.m. 19
20	*June 21-25* **Wiggly Worms and Slimy Slugs** (Grades K-1) **Mammals of Montana** (Grades 1-3) **Kid vs. Wild I** (Grades 3-5) 21	22			25	**Summer Montana Master Naturalist Class.** *Through July 1.* 26
27	*June 28-July 2* **Jr. Survivor Camp I** (Grades 1-3) **Owls and Osprey** (Grades 3-5) **Hooked on Fishing** (Grades 5-8) 28	29	30	**July** 1	2	3
4	*July 5-9* **Habitat Hunt** (Grades K-1) **Beetles and Butterflies** (Grades 1-3) **Birds of a Feather** (Grades 1-3) **Kid vs. Wild II** (Grades 3-5) 5	6	7	*Dippers, robins, house wrens re-nest* 8	9	**"Got Nature?" Passport Program and Saturday Kids Activity. Big on Bugs,** 2:00-3:30 p.m. 10
11	*July 12-16* **Jr. Survivor Camp II** (Grades 1-3) **Predators and Prey** (Grades 1-3) **Go Fish** (Grades 3-5) **Nature and Technology** (Grades 5-8) 12	13	 MNHC photo			
18	*July 19-23* **Water Skippers** (Grades K-1) **Tracks and Scats of Montana** (Grades 1-3) **Space Camp** (Grades 3-5) 19	20				
25	*July 26-30* **Nature Art** (Grades 1-3) **Wild Wetlands** (Grades 3-5) 26	27	28	29	30	31
1	*August 2-6* **Art Safari** (Grades K-1) **Naturally Spooky!** (Grades 1-3) **Pond Life** (Grades 1-3) **Inside the World of Insects** (Grades 3-5) 2	**August** 3	4	Look for these program symbols in *Montana Naturalist* and on our website at www.MontanaNaturalist.org. **Adult Program** **Youth Program** **Volunteer Opportunity**		**Teacher Workshop. Pollinator Ecology.** Date and location TBA 7
8	*August 9-13* **Creepy Crawlies** (Grades 1-3) **Fishing for Fun II** (Grades 1-3) **Art and Nature Adventures** (Grades 3-5) **Naturalist Adventures** (Grades 5-8) 9	10	*Young ospreys last raptor to fledge* 11	12	13	**Discovery 3-Day Weekend. Women's Intro to Backpacking.** Dates and cost TBA 14

Summer Science Discovery Camps
See Imprints for details, page 16.

for discussion and planning. End with a visit to an established native plant garden. Cost is $35/MNHC members; $40/non-members. Space is limited; call 327-0405 to register

May 8 **Saturday Discovery Day. Spring Plant Walk,** 1-4:00 p.m. Join Paul Alaback to find out what's out. Cost is $10/MNHC members; $15/non-members. Space is limited; call 327-0405 to register.

May 8 **Saturday Kids Activity. Big on Bugs,** 2:00 p.m. What's the difference between a grasshopper and a cricket? Learn how to identify common insects and take a walk to collect (and release) insects. Nets and bug boxes provided.

May 22 **Missoula Children & Nature. Gear Up for Summer Event,** starting at 9:00 a.m. Includes a summer program-provider training, free lunch for workshop attendees and families, info on lots of Missoula area summer programs and free admission to the Missoula Children's Theater performance of "Where is the Great Outdoors?" Meet at Missoula Children's Theater, 200 N. Adams St. See www.missoula-childrenandnature.org for details.

June 5 **Leaders in Training Orientation,** noon-4:00 p.m. Training session with summer camp staff for teens 14-17 that want to volunteer with MNHC camps.

June 5 **Saturday Kids Activity. Kids' Birding Festival,** 2:00p.m. Co-sponsored by MNHC and Montana Audubon. Join us for a morning of field trips, including a bluebird hike on Waterworks Hill, a visit to an active osprey nest, nature walks with binoculars and a mist netting program for kids (tentative). Free. Call 327-0405 for more information.

June 19 **Saturday Discovery Day. Natural History of Bark-Beetles,** 9:00 a.m.-1:00 p.m. University of Montana entomologist Diana Six leads a field trip to look at bark beetles and their effects on Montana forests. Cost is $15/MNHC members; $20/non-members. Space is limited; call 327-0405 to register.

June 26-July1 **Summer Montana Master Naturalist Class.** Develop the knowledge, skills and habits of a naturalist with instructors Brian Williams and Charles Miller. This is an intensive week-long program, otherwise similar in content to the Spring Montana Master Naturalist course. Because of the condensed nature of the summer class, however, the certification process will be different. In addition to successfully completing the course, students will need to complete eight hours of volunteer service and 20 field journal entries within two months of course completion (September 1). An optional day of service on the Lee Metcalf National Wildlife Refuge will be held Friday, July 2 to encourage students to complete their service hours. Class meets at the Lee Metcalf National Wildlife Refuge. Cost is $295. Space is limited; call 327-0405 for more information or to register.

August **Discovery 3-Day Weekend. Women's Intro to Backpacking.** Dates and cost TBA; call 327-0405 for more information.

August **Teacher Workshop. Pollinator Ecology.** Day-long training for K-12 educators to help learn about the vital role pollinators play in ecosystems, and how they can be used in authentic scientific inquiries with students. Sponsored by the U.S. Forest Service, Missoula Butterfly House and Insectarium and The University of Montana, with local experts. Contact MNHC at 327-0405 for details.

Visit www.MontanaNaturalist.org for directions. To register or to learn more, call MNHC at 327-0405.

Photo by Lance Schelvan

Get Your Passports Ready!

Schedule of Upcoming Programs

April 24 **"Got Nature?" Passport Program. Intro to Fly Fishing,** 10:00 a.m.-1:00 p.m. Sponsored by Missoulian Angler. Missoula Children & Nature Passport Programs get kids and families outside to learn about the environment, build outdoor skills and develop stewardship of the natural world. Meet at Silver's Lagoon, McCormick Park. Go to www.missoulachildrenandnature.org for latest info.

May 9 **"Got Nature?" Passport Program. Sunday Streets Festival,** time TBA. Sponsored by Missoula Parks & Recreation Department and REI. See www.missoulachildrenandnature.org for latest info.

June 26 **"Got Nature?" Passport Program. The Great American Backyard Campout at Traveler's Rest State Park.** Sponsored by the National Wildlife Federation and Traveler's Rest. See www.missoulachildrenandnature.org for latest info.

July 10 **"Got Nature?" Passport Program and Saturday Kids Activity. Big on Bugs,** 2:00-3:30 p.m. Sponsored by the Montana Natural History Center. Organized by Missoula Children & Nature, Passport Programs get kids and families outside to learn about the environment, build outdoor skills and develop stewardship of the natural world. Meet at MNHC, 120 Hickory St. Go to www.missoulachildrenandnature.org for latest info.

August 7 **"Got Nature?" Passport Program. Farming/Gardening at the PEAS Farm,** 1-3:00 p.m. Meet at the PEAS Farm. See www.missoulachildrenandnature.org for latest info.

Did You Know

There could be two different species of dandelion in your yard this spring. Common dandelion *(Taxicum officinale)* has olive-green seeds, and the leaves usually (but not always) have a large, unlobed terminal portion. "Red-seeded" dandelion *(T. laevigatum)* has brick-red seeds and leaves lobed to the tip. Research suggests that the "red-seeded" species can tolerate drier, stonier soil. Whether you're a dandelion-phile or phobe, check out what's growing in your yard this spring.

USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An Illustrated Flora of the northern United States, Canada and the British Possessions. Vol. 3: 316.

Informational Websites

The National Wildlife Federation has extensive information that helps explain the need for more outdoor time for children, and the website also provides some tools and guidance on how to make it happen. Check out **www.nwf.org** and look at the "Be Out There" information.

naturalist note

Photo by Justin Singleterry

On a blustery spring day last April I was riding my bicycle in a westside neighborhood of Missoula. I heard a raucous commotion that turned out to be a bunch of ravens and crows cawing from the top of a tall elm tree in the yard of a house. Their noise led me to the front where, behind the yard's fence and up against another fence along the property line, I saw a giant raven approaching a red-tailed hawk that was crumpled up, alert but not moving. The raven bobbed forward and back at the hawk as if to attack. The hawk offered no defensive moves in response. I stood at the fence and waved my arms, shooing the corvid peanut gallery away. Finally the threatening raven relented and took off as well.

I called the local Fish, Wildlife and Parks Department to report the red-tail's predicament and get help for the bird. After I talked to the warden, the homeowner arrived and I told her about the hawk by her eastside fence. She went to look more closely and reported that there were *two* red-tailed hawks on the ground and that their talons were interlocked. They were stuck in what I assumed was a courtship embrace and must have fallen hard to earth!

The raven and his cronies probably witnessed this April Fool's joke and had come to harass the couple. Foiled by an urban nature observer!

—reported by Gene Pauli

[Fish, Wildlife and Parks Conservation Specialist Justin Singleterry reports that these hawks were untangled successfully and watched for several hours. They were released and flew away, apparently unfazed by their spring encounter. Whether this encounter was between a male and female, or between two males or two females fighting over territory or nest, is difficult to say. Red-tails are alike in coloration; females typically larger. These two are adults but the photo, taken by cell phone, doesn't reveal for sure what sex. – Ed.]

Photos by Gail Patricelli, University of California at Davis.

Something to Grouse About

Montana's energy development meets the Endangered Species Act

By Theodore Manno, Ph.D.

Stretching from Montana's eastern badlands to its western peaks, Route 2 is a desolate highway that spans small towns, National Parks, and Native American reservations. As I drive on a winding stretch between Malta and Glasgow, my primary concern is "making time" on my way to the Canadian border via the Interstate. But upon seeing movement to my right, I decide to hit the brakes as I become instinctually aware of an opportunity to observe local wildlife. In a few seconds, an icon of competition and cooperation between humans and animals in the American West appears.

Grouse in the house

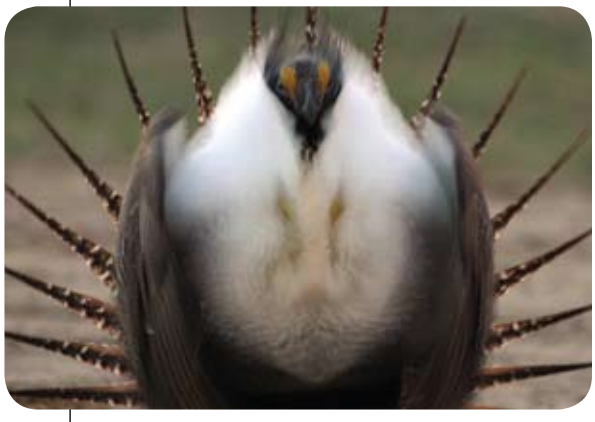
Sage grouse are the largest grouse species in North America. Named for the sagebrush-dominated habitat they prefer, sage grouse have mottled brown, black and white bodies with long, pointed tail feathers and legs feathered to the base of the toes. These grouse are known far and wide for their elaborate courtship rituals and mating calls, which they exhibit on communal breeding grounds called leks. In these areas, males display their attractiveness to females by inflating a large round ruff around their necks.

But the mating calls that once echoed loudly across Montana's mountain-prairie regions are beginning to fall silent. Studies suggest that breeding populations of sage grouse in Montana have declined as much as 30 percent. A host of human-induced factors, such as cultivation and livestock grazing, threaten the sage habitats on which grouse depend for food. Fire regimes, over-hunting, disease and insecticide treatments also have taken their toll.

The long-standing debate over how much sagebrush habitat to set aside for agriculture continues, but a more topical controversy has emerged. Much of our nation's oil and gas resources lie under sage grouse habitats, and these reserves are of paramount importance to the economy of Montana—so much so that "Petroleum" is one county's namesake. According to a new study published in the peer-reviewed journal PLoS ONE, projected oil and natural gas development could reduce sage grouse populations by as much as 19 percent across the western United States, including certain areas of Montana. The authors denote a wide area of sage grouse habitat between Lewistown and Miles City that is expected to have minimal impact from energy development. But they also report places in the eastern portion of the state where drilling is projected to occur directly in sage grouse strongholds—along Route 2 in Valley County, the Powder River Basin in the southeast and near Route 12 on the border of the Little Missouri National Grassland.

"This decline is in addition to the estimated range-wide population decline of 45-80 percent that has already occurred," says co-author David Naugle, a wildlife landscape ecologist at the University of Montana.

The study, led by sage grouse program coordinator Tom Christiansen from the Wyoming Game and Fish Department, is based on estimates from the Bureau of Land



In order to attract mates, male sage grouse puff up and vibrate a large, whitish ball sack on their chest, making a soft drumming noise, and strut around in full regalia with their pointed tail feathers displayed. Scientists are studying whether these mating vocalizations may be interfered with by compressors, drilling rigs, and road noise at energy development sites.

Management (BLM) that almost 96,000 new oil and gas wells will be drilled over the next 20 years across six states in the interior West. By mapping the areas with oil and gas prospects and using a computer model to overlap those areas with known sage-grouse habitat, the researchers determined that the wells could fragment almost 12 million acres of sagebrush shrub and grassland habitat that is crucial for sage grouse and perhaps other species, such as pronghorn and mule deer.

Future status

The results come as a March deadline to decide whether sage grouse should be listed as a threatened or endangered species under the Endangered Species Act (ESA) nears. Sage grouse were not listed at the time of this article, and despite a lawsuit heard by an Idaho judge over this 2005 decision that led to the new deadline, many officials feel that the same conclusion is likely with the coming ruling. The decision is an important one, because given the potential for energy development in Montana and other interior western states, an ESA listing would likely change land use policy and have massive economic repercussions.

According to scientists, with this new research potential areas of conflict have been identified and now can be avoided by drilling away from the most sensitive habitat. In accordance with this philosophy, Montana has collaborated with 10 other states to develop a conservation plan for sage grouse that provides for long-term conservation of the habitat in question "in a manner that supports sage grouse and a healthy diversity and abundance of wildlife species and human uses." The plan also establishes a process to achieve sage grouse management objectives and provides a framework to guide local management efforts and coordinated management with other Western states. Some oil companies are even pledging tens of millions of dollars to re-create sage grouse habitat if necessary, all in an effort to avoid what would be a cumbersome ESA listing.

"The answer to energy development in the West is not 'no', but rather 'where', says Naugle," "I think our nation's energy independence is paramount. Thus, the way we designed this study was to be helpful."

Sounds of Nature

Studies that look for relationships between sage grouse and energy development gained urgency after researchers like Matt Holleran of the University of Wyoming and PLoS study co-author Kevin Doherty of the University of Montana

"It is not likely that development will stop, so then the question becomes, how can we reduce the impact of this development on the birds?"

Sage grouse are at the center of a controversy involving the alleged impacts of energy development on sagebrush habitats. With two major areas in Montana where sage grouse habitat and energy prospects potentially overlap, researchers are looking for ways to continue energy development while minimizing impact on wildlife.

Sage grouse have a short mating season in spring during which males display at communal breeding grounds called leks. Here, a male and female *in flagrante delicito* during a morning courtship.

Grouse photos by Gail Patricelli, University of California at Davis.

Mining photo courtesy of the film "Powder River Country", www.highplainsfilms.org

found that numbers of male sage grouse in leks were significantly lower near coalbed methane fields than in areas farther from drilling. So why do sage grouse shy away from oil and gas development areas? The answer remains unclear, but could have to do with the grouse's elaborate courtship rituals—and the sounds they make while attracting the other sex.

Robert Gibson, a biologist at the University of Nebraska at Lincoln who has been studying sage grouse for decades, says that sage grouse have a short mating season in spring during which males display at traditional lek sites each morning. He has described in his writings how males puff up a large, whitish ball sack on their chest, make a soft drumming noise, and strut around in full regalia with pointed tail feathers displayed. "While on their lek territories, males repetitively perform a "strut" that contains visual and acoustic components," he says. "The interval between the two popping notes that terminate the strut display…is a consistent predictor of male mating success."

Those drumming and popping noises are the focus of study by University of California at Davis graduate student Jessica Blickley and her mentor Gail Patricelli, which hopes to determine whether noise from energy development interferes with sound emitted during breeding activity.

"It is not likely that development will stop, so the question becomes, how can we reduce the impact of this development on the birds?" says Blickley. "If noise from energy development does interfere with sage-grouse breeding behavior, then we would recommend stricter noise standards be put into place for energy development sites."

"Once noise sources were characterized, we conducted a series of experiments to investigate how grouse respond to controlled noise placed at a variety of distances from their leks," says Patricelli.

Truck traffic in the Powder River Country

"We expect that our results are going to have wide applications for a lot of states with declining sage grouse populations, including Montana."

The researchers conducted their experiments to investigate how sage grouse respond to noise from compressors, drilling rigs and road noise placed at different distances from their leks. They plan to develop a model of potential effects of noise that will allow managers to predict how different sound sources at given locations will affect grouse breeding behaviors.

"Noise can be reduced through use of alternative equipment, seasonal and daily timing of activities and installation of noise barriers," says Blickley. "While many of these measures would impose additional expenses on energy companies, some of them would be relatively simple and cheap to implement. This experimental approach allows us to compare the attendance patterns and behavior of sage-grouse on leks with introduced noise with that of birds on leks with no noise."

For areas of Montana where sage grouse reside atop oil reserves, the results of the study could identify opportunities to pursue the country's energy independence while reducing conflict with sage grouse and other species in the ecosystem. But the researchers warn that noise reduction is not a comprehensive tactic, and it's important to continue searching for ways to maximize the areas effectively—both for sage grouse and energy resources.

"One important caveat is that while noise may be contributing to sage grouse declines, it is only one of many factors," says Blickley. "Regulations to reduce noise levels may lessen the impact of energy development on sage grouse, but will not stop or reverse the declines."

It seems the mating dance of the sage grouse is a delicate act—much like the dance between billion-dollar oil companies and the chorus of activists who say that conservation efforts are failing. It will be those companies that continue to draw criticism, not because cattle grazing, urban sprawl, and disease have not contributed, but because the drilling invades some of the bird's last unmolested habitat in the Power River Basin. Using land for multiple purposes is likely to be an avenue that is explored further as policymakers move forward.

"There's a broad issue of how can you develop energy but not destroy the best habitat for sage grouse," agrees Naugle. "If we can find those heavy human footprints on the landscape and focus development in those areas, we can reduce risks and impacts to wildlife and still secure our energy future."

Theodore G. Manno, Ph.D., is a teacher and freelance writer in Yuma, AZ. His scientific research on squirrels has been featured in national news sources such as Discovery News, New Scientist, *and* Science News.

Photo by Lance Schelvan

SUMMER DAY CAMP FUN

Nature All Day

Discoveries galore await children outside this summer. Get going with our Summer Science Discovery Day Camps for kids entering kindergarten through 8th grade. MNHC weeklong camps engage children in the study of nature through field trips, arts and crafts and scientific exploration. Teens can gain experience with our Leaders-in-Training Program. Camp themes and content are geared toward students entering the grade categories listed in the fall of 2010. This allows instructors to plan activities that work best for students in those grades.

Camps run Mondays through Fridays, 9 a.m.-4 p.m., with free before and after-camp care available from 8-9 a.m. and 4-5 p.m. Half-day camps run from 9 a.m.-1 p.m. Costs for camps are $175/MNHC members; $220/non-members. Half-day camps are $75/MNHC members; $120 non-members. Please inquire about financial assistance. Registration is confirmed only when a $50 non-refundable deposit (per camp, per child) is received. Most camps begin and end at MNHC and include field trips to surrounding natural areas. Half-day camps meet at the Missoula International School.

Grades K-1

Wiggly Worms and Slimy Slugs *Half-Day Camp!*
June 21-25
Jump into the world of invertebrates! We'll learn about these critters without backbones, including insects, how they grow and their place in the food web. We'll spend plenty of time outside using nets and bug boxes to collect creepy crawlies. We'll create an insectarium in our classroom to observe our discoveries!

Habitat Hunt *Half-Day Camp!*
July 5-9
An adventure begins when you walk out your door! Spend the week looking for animal signs, searching for insects, watching for birds and peeking at plants. We'll learn about habitats while using naturalist tools and following our curiosity and adventurous spirits!

Water Skippers *Half-Day Camp!*
July 19-23
Explore the wonders of watery habitats through stories, crafts and exploration walks. We'll learn about the plants and animals that like watery homes. We'll even make a habitat in our classroom to observe some of our aquatic friends!

Art Safari *Half-Day Camp!*
August 2-6
Explore the natural world while trying out a variety of art media, such as colored pencils, water colors, clay and collage to create works of art. We'll host an art show for parents at the end of the week to show off our discoveries and creations!

Grades 1-3

Herp Patrol
June 14-18
Join us for a week of discovery as we dive into an exploration of amphibians and reptiles! Learn about Montana's frogs, snakes and turtles, use nets to collect and observe aquatic creatures, explore food chain connections and discover fun facts about aquatic habitats.

Fishing for Fun I
June 14-18
Learn about stream ecology, Montana fish and how to catch the big one! We'll visit local streams and ponds to explore the food web and aquatic habitats, learn how to fly fish, and use waders, nets and fishing rods to reel in adventure! Same program as Fishing for Fun II.

Mammals of Montana
June 21-25
Montana's magnificent mammals will amaze you as we explore different habitats, from forests to prairies. Examine study skins and skulls, read stories, play games, explore the habitats and take a trip to the Bison Range to see Montana's largest mammal!

Jr. Survivor Camp I
June 28-July 2
Want to learn some useful outdoor skills? Spend the week learning about shelter building, how to stay safe and not get lost, how to use a compass, read a map, bear awareness and how to fireproof your home. We'll also investigate some adaptations animals have to survive, and how some human inventions mimic these! Same program as Jr. Survivor Camp II.

Beetles and Butterflies
July 5-9
Crawl behind an ant! Hop with a grasshopper! We'll spend the week looking for incredible invertebrates, using nets, hand lenses and microscopes to discover who they are, where they live, what they do and how they add to the amazing diversity around us.

Birds of a Feather
July 5-9
From ravens to raptors and hummingbirds to herons, we'll investigate the bird world to learn about beaks and feet, feathers and wings, nests and eggs, and songs and food through exploration, stories, art and by using binoculars to observe birds in the field.

Jr. Survivor Camp II
July 12-16
Want to learn some useful outdoor skills? Spend the week learning about shelter building, how to stay safe and not get lost, how to use a compass, read a map, bear awareness and how to fireproof your home. We will also investigate some adaptations animals have to survive, and how some human inventions have mimic these! Same program as Jr. Survivor Camp I.

Predators and Prey
July 12-16
From birds to mammals, predators make their living by eating other creatures while prey have developed adaptations to stay alive! Explore predators and their prey, learn about food webs, study skulls, pick through owl pellets, and discover the amazing adaptations that predators and prey have to survive.

Tracks and Scats of Montana
July 19-23
Learn how to read the signs that animals and insects leave behind. We'll learn how to identify tracks and different animal homes, and how to use clues left by animals to tell their stories. We'll even create our own plaster animal track and tracking guides to keep.

Nature Art
July 26-30
Use crayons, paint, sculpture and even elements from nature to create works of art! We'll learn about different habitats, from forests to grasslands, and explore different media, from drawing to watercolor to printmaking, as we create nature-inspired work. We'll host an exhibit at the end of the week to show off our creations!

Naturally Spooky!
August 2-6
From snakes to bats to stink bugs we'll explore the animals (and plants) in Montana that most people try to avoid! We'll learn all about their natural habitats, what they really eat, hear stories and discover the truth that makes them…not so scary!

Pond Life
August 2-6
Explore life in ponds and wetlands from waddling waterfowl to tiny tadpoles! We'll spend the week investigating ponds and wetlands nearby, and learning about the importance of wetlands and the animals that use them. We'll even create an indoor pond in a fish tank as we build a laboratory for learning!

Creepy Crawlies
August 9-13
Spend the week looking for insects and other invertebrates using nets, hand lenses and microscopes to learn more about what makes these creatures so unique. We'll make our own bug nets to keep, set traps to lure insects in and get a special "behind-the-scenes" peak at the electron microscope at the University of Montana!

Fishing for Fun II
August 9-13
Learn about stream ecology, Montana fish and how to catch the big one! We'll visit local streams and ponds to explore food webs and aquatic habitats, learn how to fly fish, and use waders, nets and fishing rods to reel in adventure! Same program as Fishing for Fun I.

Grades 3-5

Super Tracker
June 14-18
Learn how to identify animal tracks and signs, explore tools used by professionals for studying animals and learn basic skills for outdoor exploration. We'll practice our tracking skills in the field, create plaster tracks of our favorite Montana mammals, make our own tracking books and, through "Nature Clue," test our super tracker skills!

Kid vs. Wild! I
June 21-25
Do you have what it takes to make it in the wild? Spend the week learning some techniques for basic survival, including fire and shelter building, orienteering, mapping, first aid, Leave No Trace, bear awareness and even how to predict the weather. We'll also meet the Missoula County search and rescue team and learn about river survival! Same program as Kid vs. Wild II.

Owls and Osprey
June 28-July 2
Raptors are an amazing group of birds with adaptations specifically for capturing prey. We'll study owls, osprey, eagles, hawks and falcons to learn more about these adaptations, and where different raptors can be found. We'll also study pellets to see what they eat and use binoculars to observe them in the field.

Kid vs. Wild! II
July 5-9
Do you have what it takes to make it in the wild? Spend the week learning some techniques for basic survival, including fire and shelter building, orienteering, mapping, first aid, Leave No Trace, bear awareness and even how to predict the weather. We'll also meet the Missoula County search and rescue team and learn about river survival! Same program as Kid vs. Wild I.

Go Fish!
July 12-16
Explore local ponds and rivers from top to bottom. Learn about stream ecology, Montana fish and practice your casting technique. We'll look at food webs and aquatic habitats, learn how to fish with spinning rods, and use waders and nets to reel in adventure!

Space Camp
July 19-23
Join us as we launch a journey into the galaxy and beyond! We'll learn about stars, constellations, black holes, phases of the moon, properties of energy and light and amazing space missions. We will also talk about what makes our own planet, and others, unique. We'll try building a comet, a space shuttle glider and a rocket!

Wild Wetlands
July 26-30
Get your feet wet exploring local wetlands. We'll use waders, nets and hand lenses to observe the aquatic insects, reptiles, amphibians and fish we find. We'll learn to identify a few wetland birds and discover why wetlands are important places for plants, animals and people!

Inside the World of Insects
August 2-6
Who dominates the sky? Who patrols the forest floor? Insects make up the largest group of animals on the earth. Learn about the basic structure of creepy crawlies that inhabit our region, their adaptations and what they need to survive. We'll use insect nets, create insectariums and observe insects in their natural habitat.

Art and Nature Adventures
August 9-13
Inspiration often comes from the natural world. What better way to celebrate nature than through art. Explore plants and animals outside using different media, including sketching, painting, printmaking, sculpture and even some natural materials. We'll host an exhibit at the end of the week to show off our creations!

Grades 5-8

Survivor!
June 14-18
Spend the week learning techniques for basic survival, including how to start a fire without matches, how to construct a shelter that will keep you warm, how to filter your own water, make a fishing pole, predict weather, make your own string and perform basic first aid. We'll also make our own compass, learn about bear awareness, and get a chance to meet the Missoula County search and rescue team and hear tips for survival from experts!

Hooked on Fishing
June 28-July 2
Already an avid angler? Never tried fishing but want to learn? We'll spend the week learning all about fishing in Montana, from stream ecology to stewardship. We'll also explore aquatic habitats with waders and nets, practice our fly casting techniques, and learn some fish ID to help us know more about our local streams and ponds.

Nature and Technology
July 12-16
Interested in how nature and technology can come together? Come learn all about the fields of biomimicry and "green" design. You'll see some examples of great inventions, practice your observation skills using microscopes and field study, create a solar-powered motor boat, and use ideas from biomimicry to come up with fantastic inventions. This camp is developed in cooperation with The Biomimicry Institute.

Naturalist Adventures
August 9-13
Are you interested in a little adventure this summer? We'll spend the week hiking some fantastic trails and using naturalist tools, like field guides and compasses, hearing adventure stories about famous naturalists, learning how to set up a tent and a safe backcountry camp and even kayaking on a nearby lake! We'll also learn about plants and animals common to our region as we get out and explore.

Teens!

Leaders-in-Training Program
All Summer
Teens aged 14-17 may volunteer for a Leader-in-Training position and gain experience in child care and summer camp instruction by assisting camp instructors with programs. Contact MNHC at 327-0405 for applications or more information.

Know Your Mushrooms.

Special Screening of a new film, featuring mushroom experts Gary Lincoff and Larry Evans as they lead a hunt for wild mushrooms and the deeper cultural meanings attached to them.

Guest appearance by Larry Evans.

Friday, April 30, 7:00 p.m. at MNHC.
Cost is $2/MNHC and WMMA members; $4/non-members.
Call 327-0405 for more information.

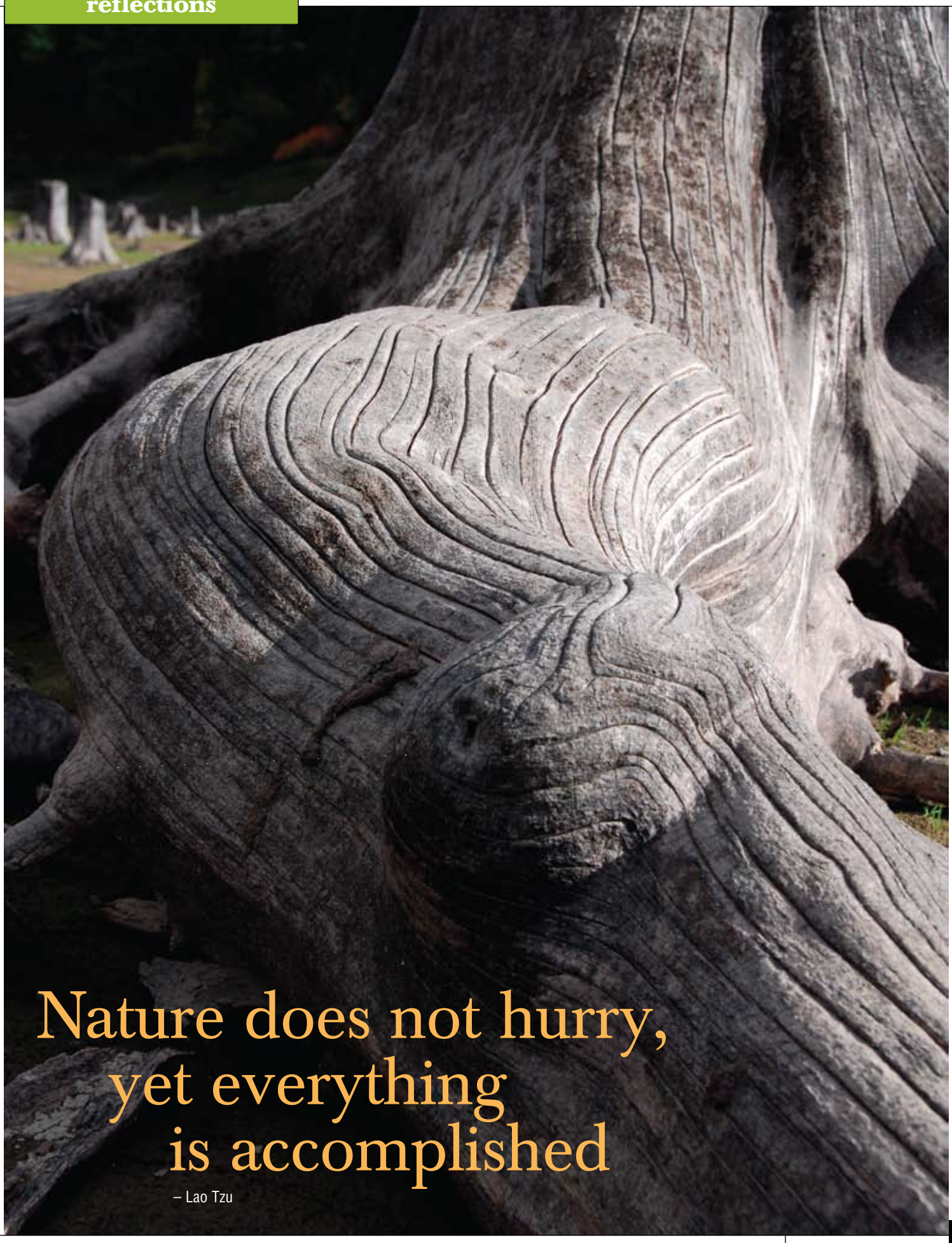
Love kids? Love nature?

Volunteer with our Visiting Naturalist full-day field trips!

Field trips run every school day from April 28 - May 28.

Spend a day (or three) outside with 4th and 5th grade students teaching them about our big, beautiful world!

To volunteer or for information,
contact Allison De Jong, Volunteer Coordinator at 327-0405 or adejong@montananaturalist.org.



Nature does not hurry, yet everything is accomplished

– Lao Tzu

Montana Natural History Center
Your Base Camp for Discovery

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

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

☐ Basic Membership: $50 ☐ Student Membership: $25

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