MONTANA Naturalist

Fall 2010

***Dendroctonus* the Destroyer**

Bighorn Health

Memories of Fire

FALL TREASURE HUNT

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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

inside

Fall 2010

MONTANA Naturalist

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Special Pull-Out Section

Cover – Photo by Steven Gnam of ladybugs, taken in early July on a mountain peak in the Swan range (approx. 9,000 feet) looking across at the Mission Mountain Wilderness. For more nature images, go to www.stevengnamphotography.com

Montana Natural History Center
Your Base Camp for Discovery

120 Hickory Street
Missoula, MT 59801
(406) 327-0405
office@MontanaNaturalist.org
www.MontanaNaturalist.org

MNHC Photo

Geology of the local landscape is one of the subjects you can learn about in the Montana Master Naturalist course. Photo taken from atop McCauley Butte.

My eight-year-old daughter says she is terribly afraid of bears. I'm not sure why; she hasn't had any experience with them and doesn't really know anything about them, their habits or life cycle. On the other hand, she is fascinated by snakes. That interest has existed since she was really young, and she seeks out ways of knowing more about these creatures. Recently, she took a herpetology camp at MNHC. It was early June, pretty chilly, not a lot of herp action, yet she still made the connection, exploring reptile and amphibian habitat, learning what species are local, how they find food, shelter, raise their babies.

Simple things like taking a nature camp or regular walks in a natural area, or perhaps spending time in more remote places with little or no evidence of human habitation, where stars seem to come right down to the ridge above your tent like watchful animals that reveal themselves when you're quiet, these can be ways of connecting with the world that refresh, deepen appreciation for natural things, inspire curiosity, satisfy understanding.

I hope articles in this issue of *Montana Naturalist* help in this vein as well, as they try to provide context for what we see and hear going on around us in the Intermountain West. What is behind the current extreme pine beetle outbreak and where is it going? What happened to the herds of bighorn sheep that were hit hard by pneumonia last winter? Could mega-fires like the Great Burn of one hundred years ago happen again?

Helping people find connections with nature is the main impetus behind what we do at MNHC, whether it be through a Nature Art Contest for kids (see page 18), Montana Master Naturalist class, the Visiting Naturalist in the Schools program, an evening lecture or Saturday Discovery activity. These are fun in themselves, but also important ways of preparing us to make choices about resource use that will affect our communities – and the whole planet – for years to come.

We hope you'll find time to visit us this fall and make some nature connections of your own. Enjoy!

Caroline Kurtz

Caroline Kurtz
Editor

Bitterroot bighorns

NAMED FOR THE LARGE, CURLING HORNS BORNE BY MALES, bighorn sheep are an icon of the Intermountain West. They have roamed the East Fork of the Bitterroot Mountains since 1972, when 35 sheep were introduced to the area. Blossoming since then into a herd of about 200, the well-known Bitterroot herd has been the source of some near-record-sized rams and has typically remained vibrant and healthy.

But last winter left wildlife officials digging into their repertoire of management methods after a serious pneumonia outbreak threatened to annihilate the herd completely. Bitterroot Area Wildlife Biologist Craig Jourdonnais was on the scene to help diagnose the outbreak after dead bighorns began to appear on a nearby highway.

"The first ram looked like it might have been hit, but when we went down and loaded it up we noticed no skid marks by it," says Jourdonnais. "The next day, two more rams were dead along the highway with no signs of vehicle impact. We skinned them to see if there was trauma to the body and then sent them to the lab. Sure enough, they came up positive for pneumonia."

Pneumonia-related outbreaks among bighorn sheep can result in herd "die-offs," such as the recent case in the Elkhorn Mountains near Helena, or the incidents in the Highland and Tendoy Mountains in the 1990s. With no vaccines to prevent the spread of pneumonia in wild sheep, scientists typically are left with few options and the disease is allowed to run its course. However, with a core group in the Bitterroot herd that is able to sustain itself, a more proactive strategy – culling sick animals from the herd – seemed appropriate.

"It was a pretty extensive outbreak," says Jourdonnais, "but nothing else had worked and we hadn't really tested that method [culling]. We had an opportunity to try some new things, especially with the ability for onsite testing for pneumonia."

After the decision on strategy, bighorns were euthanized in the field over the next month if they showed tell-tale signs of pneumonia, including such obvious signs as coughing and more subtle behaviors like a stiff gait, reluctance to move around the field or travel uphill, feeding in the same area for an inordinately long time, and standing facing a cliff – an unusual behavior for an animal that relies upon eyesight to detect threats from predators. More than six-dozen sheep were culled in all, and every one tested positive in the laboratory for pneumonia.

The unorthodox management technique appears to have been effective for the time being. According to the latest reports, about 200 bighorns were counted during the hunting season before evidence of the outbreak, and 87 sheep that are not showing outward signs of disease have survived.

In addition, similar outbreaks occurring in other areas of Montana last winter are giving scientists a chance to explore the effectiveness of different response tactics. While culling seemed appropriate for the Bitterroot population, geography sometimes dictates a different response. For example, in Rock Creek, another bighorn pneumonia outbreak site, the steeper terrain mixed with open rolling grasslands made it almost impossible to isolate sick animals from healthy individuals. However, given the small number of outbreak instances that have been managed, the Department of Fish, Wildlife and Parks (FWP) will not be able to draw real conclusions for awhile – at least until the lambs are born next year. This is because lamb survival often plunges for years after a pneumonia outbreak, since bacteria remaining in the herd can kill lambs for a long time after the original die-off.

"That will be the real test," says Jourdonnais, "not all die-offs turn out the same way."

While the exact reason for the pneumonia outbreak in the Bitterroot herd remains unclear, the passage of the bacteria is thought probably to have been exacerbated by several factors. First, the rutting season, when bighorns engage in courtship activities, takes place during November and December, when the pneumonia was first discovered in the herd. Rams attempt to establish a dominance hierarchy that determines access to ewes for mating, leading to horn clashing and other hostile interactions. Male-female social and courtship interactions also take place during this time, which puts bighorns in close proximity and probably facilitates increased disease transmission.

Second, bighorns may mingle with domestic sheep over the summer and contract pneumonia. Jourdonnais says that around the time the outbreak started in November, members of the public came to him with observations of wild Bitterroot bighorns mixed with domestic sheep in August and September. So after field activities were over, FWP approached the private landowner about collecting samples from the domestic sheep.

endure

By Theodore G. Manno, Ph.D.
Photos by Kevin Fredenberg

the Bitterroot herd continues to maintain a good core of individuals

Bighorn sheep are one of Montana's eight native ungulate – or grazing – species. They easily navigate up and down steep terrain in search of favorite food.

"The landowner allowed that to happen," says Jourdonnais, "he's been great to work with."

The laboratory report on the blood from the domestic sheep showed pneumonia bacteria of a similar strain to that found in the bighorns. As a result, new arrangements with the landowner were made and the domestic sheep will no longer be in the same area. A statewide sheep conservation strategy calls for a 13-mile radius around any new introduction site for bighorn sheep, and if a new landowner were to bring domestic sheep within that radius of an already-existing herd, then FWP would let them know the history of the area regarding pneumonia and work towards an alternative arrangement. As for now, Jourdonnais says the Bitterroot herd continues to maintain a good core of individuals and that the culling halted the pneumonia soon enough so that augmentation – moving individuals from another herd to Bitterroot – should not be necessary.

"There were a lot of steps involved in the success," says Jourdonnais. "We have a win-win situation here that will continue to help us minimize the risk of pneumonia."

Theodore G. Manno, Ph.D. is an educator, football referee and freelance writer based in Yuma, AZ. His research on squirrel behavior has been featured in national news sources such as Discovery News, New Scientist, and Science News.

Pine Beetles

Tiny agents of forest change

By Diana L. Six

Scientific names often describe important features of the organisms to which they are attached. The mountain pine beetle, for example: its genus name, *Dendroctonus*, is formed from "Dendro" – meaning tree – and "tonus" – meaning destroyer. Judging from the beetle's effects on many western forests these days, the name seems particularly apt. It's species name, *ponderosae*, indicates that this beetle is found in ponderosa pine; however, while it often kills substantial numbers of this tree, pine beetles prefer lodgepole pine – and it is in lodgepole that pine beetles develop their largest, most spectacular outbreaks.

The mountain pine beetle is native to western North America and sporadically develops outbreaks that lead to vast expanses of trees killed. These beetles are a natural disturbance agent that, like fire, act to regenerate forests and to maintain the structure and resilience of our dynamic forest ecosystems. However, the current west-wide outbreak is different in many ways from those that have occurred in the past, indicating that the role this insect plays in our forests may be changing. First, the current outbreak is bigger by an order of magnitude – ten times larger – than any recorded beetle outbreak in the past. It is estimated to have affected more than 22 million acres and is still increasing. In fact, 80% of the mature lodgepole pine in British Columbia is predicted to be pine beetle-killed by 2013 (and, in fact, much of those forests are already dead). Second, due to a warming climate, the beetle is expanding its range. The insect now has moved hundreds of kilometers farther north, infesting trees in areas where previously it was too cold for beetles to survive. It also has jumped the northern divide and now is moving across Alberta, where it is attacking jack pine, a species new to the beetle. One fear is that pine beetles may move across the continent in jack pine, and then begin to infest eastern forests.

While lodgepole pine is expected to regenerate well after beetle populations decline, whitebark pine is not expected to recover in many places.

Extent of beetle-killed trees at MacDonald Pass.

MacDonald Pass photo by Jim Streeter, streeterphotography.com; beetle photo by Ron Long, Simon Fraser University, Bugwood.org

Warming temperatures also have allowed pine beetles to move higher in elevation, where they are devastating whitebark pine at treeline. While lodgepole pine is expected to regenerate well after beetle populations decline, whitebark pine is not expected to recover in many places. The loss of this keystone species has serious implications for snow pack retention, wildlife and fisheries, and indeed, the function and structure of our entire western subalpine ecosystem.

What's behind it?

Most of the time, mountain pine beetles are present in our pine forests in very low numbers. So what happens that allows populations to expand into an outbreak? Some observers believe that appropriate stand conditions alone (particularly, pure stands of mature lodgepole pine) can cause an outbreak, but this is not true. Outbreaks require a trigger, and triggers for the mountain pine beetle include warm temperatures and drought. These two factors influence pine beetles in different ways. Each greatly influences the speed at which beetle populations grow, and the rate and amount of tree mortality that occur in an area. Warm temperatures act as a trigger because they better support the growth and survival of the insect, allowing populations to build to the point where beetles can overwhelm even healthy, resistant trees.

Drought acts by stressing trees and reducing their ability to defend themselves against attack. It takes fewer beetles to kill trees with low defenses. The double whammy of better beetle productivity and fewer beetles required to overwhelm a tree's defenses when warm temperatures and drought co-occur can quickly lead to outbreak populations of beetles. Most past outbreaks have occurred during pulses of warm temperatures combined with drought, and the end of these outbreaks usually has coincided with a return of cooler, wetter conditions. This "control" of outbreaks by the return of environmental conditions that are unfavorable for beetles meant that outbreaks usually declined before all mature pines in an area were killed. However with long-term climate change, chronic warm, dry periods mean we cannot rely on a return to "normal" conditions to contain the beetles.

Pine beetle larvae feed on the living layer of cells under bark, supplemented by a type of fungi carried in by adult beetles.

Distinctive blue-stain coloration in a beetle-killed tree.

The exterior of a pine is dotted with pitch tubes, one of ways a tree can defend itself from beetle attack.

A pine beetle is caught and flushed out in the resin flow from an infested tree.

Life and Death

The mountain pine beetle is marvelously adapted to a very difficult lifestyle. This tiny insect (about the size of a grain of rice) must attack and kill trees to produce its young. However, trees fight back with resin and other substances. For the beetle, it literally is a matter of kill or be killed. Despite their small size, beetles overcome trees through a coordinated mass attack initiated and controlled by chemical signals. A beetle chooses a tree and bores in. As she bores (it's always a female that starts the attack), she releases an attractant pheromone that will draw in any nearby mountain pine beetle, male or female. Responding beetles add to the call by releasing more pheromone. If these initial attackers are lucky enough to attract sufficient help, the tree's defenses are overwhelmed and it reaches a "point of no return" from which it cannot recover. At this point, the beetles switch to releasing a repellant pheromone that tells any new arrivals to go away, the tree is full. This allows beetles to avoid overcrowding that would result in the starvation of their offspring.

Even after a tree is overwhelmed, beetles still face big challenges. One the biggest is that their food source – wood – is very poor nutritionally. Beetle larvae feed in the phloem layer just under the bark. Phloem is mostly indigestible cellulose and contains only low amounts of nitrogen and other nutrients that beetles need. To overcome this problem, beetles carry nutritional supplements in the form of fungi. These fungi are carried in little pockets, called mycangia, in the exoskeleton of attacking adult beetles. As beetles tunnel under bark to lay eggs, their fungi are released and begin to grow in the phloem and sapwood of the tree. Larvae feed on the fungi as well as the phloem. This supports their survival and growth by increasing nitrogen and probably other nutrients in their diet. The fungi also support adult reproduction, most likely through providing the sterols beetles need to produce cell membranes and hormones.

So-called blue-stain fungi is obvious in a beetle-infested tree when the bark is peeled off. The blue color of the wood in infested trees is due to melanin (the same compound responsible for the color in human skin) in the cell walls of the fungi. The fungi do not reduce the structural integrity of wood, but the color can downgrade the wood at the mill, decreasing the financial value of logs from beetle-affected trees. On the other hand, in some cases the fungi greatly increase the value of the wood. Some innovative woodworkers have begun to make specialty products, such as furniture and bowls, out of blue-stained wood, capitalizing on the beauty of what is now called "denim pine."

Mountain pine beetles are considered one of the most difficult of all insects to manage in a forest. This is not surprising. The beetle has an amazingly complex biology and is a rapid and strong responder to changes in environmental conditions. Under outbreak conditions, across large areas of forests, there often is little that can be done to reduce the mortality of trees. For homeowners, there are some measures that can be taken. The removal of infested trees is paramount to reducing spread. High-value living pines can be treated with either pesticides or repellant pheromones to help them stave off infestation. And coordinating across a neighborhood also is also important as beetles do not respect property lines!

Diana Six is a professor of forest entomology at the University of Montana. Her research on insects and their ecological relationships within forests spans from the United States to South Africa, Mexico and Canada.

Blue-stain log and pitch tube photos by Jim Streeter, streeterphotography.com; beetle larvae photo by William M. Ciesla, Forest Health Management International, Bugwood.org; resin flow photo by Darren Blackford, USDA Forest Service, Bugwood.org

Nature Scavenger Hunt Checklist

When you're out on a walk this fall, see if you can find these things. Remember to be respectful of the natural environment as you go out seeking and searching!

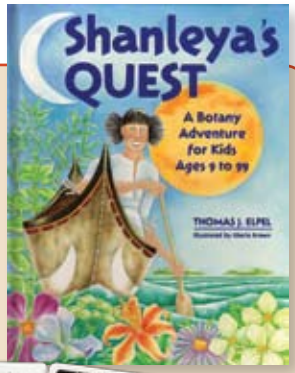
Cool Botany Trivia

Flower parts evolved from modified leaves. In a water lily, for example, there is a visible transition from sepals on the outside to petals and stamens on the inside. The petals are modified sepals, and the stamens (male reproductive parts) are modified petals.

book corner

What shape is the stem of plants in the Mint Family? What is the pattern of parts in flowers from the Mustard Family? How many petals do flowers from the Lily Family really have, or are they "tepals?"

The answers can be found in a fun book called ***Shanleya's Quest: A Botany Adventure for Kids Ages 9 to 99*** by Thomas J. Elpel and illustrated by Gloria Brown. The book tells a story of a girl sent on a mission to collect samples from a number of plant "islands" and thereby learn the keys to identifying major botanical families. The book is a great way to spark or extend an interest in the plant world. There also is an accompanying card game to further practice plant pattern recognition.



Shanleya's Quest grew out of another book by Elpel, *Botany in a Day: The Patterns Method of Plant Identification*. This larger, more scientific text contains a primer on plant evolution, keys to learning plants by families, and keys to figuring out specific types of plants within many groups. The majority of the book is a field guide with numerous illustrations.

Check out these resources at www.hopspress.com or www.wildflowers-and-weeds.com.

get outside calendar

September 1 **Volunteer Naturalist Training,** 4:00-5:00 p.m. **What is a Naturalist?** Volunteer training for Visiting Naturalist in the Schools class visits. No experience necessary.

September 11 **Saturday Discovery Day. Nature Photography Between the Seasons,** 9:00 a.m.-5:00 p.m. Join photographer Lance Schelvan for an outing in the Morrell Peak area. OPI credits available. Cost is $25 MNHC members/$35 non-members. Call 327-0405 to register.

September 17 **Evening Lecture Series. The Wolverine Way,** 7:00 p.m. Author Doug Chadwick speaks about his experience with these elusive animals. Co-sponsored by the Western Environmental Law Center. Reception and book signing to follow. Suggested donation $4/MNHC members free.

September 18 **Saturday Kids Activity. Magnificent Mammals,** 2:00 p.m. With special guests from Animal Wonders. Cost is $3 MNHC members/$5 non-members.

September 18 **Saturday Discovery Day. Ice-Age Floods Institute Fieldtrip to the Giant Ripples of Camas Prairie,** 8:00 a.m.-5:00 p.m. Join MNHC and members of the IAFI Glacial Lake Missoula chapter for a tour of amazing ice-age features around the Hotsprings, MT area, including a chance to walk along the giant ripples of Camas Prairie. OPI credits available. Cost is $35 MNHC members/$45 non-members. Call 327-0405 to register.

September 22 **Volunteer Naturalist Training,** 4:00-5:30 p.m. **VNS Field Trip Training.** Learn how you can help teach kids about the flora and fauna of western Montana during the October VNS school field trips. Training is mandatory to participate; no prior experience necessary.

October 2 **Saturday Kids Activity. Fall Fun,** 2:00 p.m. Cost is $1 MNHC members/ $3 non-members.

October 6 **Evening Lecture Series,** 7:00 p.m. **Fires of 1910** (tentative). Presented by Mark White, U.S. Forest Service archeologist. Suggested donation $4/MNHC members free.

October 16 **Saturday Discovery Day. Fall Naturalist Hike,** 9:00 a.m.-4:00 p.m. Join Montana Master Naturalists Vicki Cox and Marcia Kircher on a fall ramble. All participants will be entered into a drawing to win great naturalist gear. Location TBA. Free.

October 20 **Evening Lecture Series,** 7:00 p.m. **Native Hunting Techniques and Technologies.** Presented by Tim Ryan, founder of AST Northwest and a member of the Salish and Kootenai Confederated Tribes. Suggested donation $4/MNHC members free.

October 30 **Saturday Kids Activity. Big on Bats,** 2:00 p.m. Costumes welcome! Cost is $1 MNHC members/$3 non-members.

September

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
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.		31	**Volunteer Naturalist Training,** 4:00-5:00 p.m. **What is a Naturalist?** 1	2	3	4
5	6	7	8	*Quieter mornings as birds begin migrations* 9	10	**Saturday Discovery Day. Nature Photography Between the Seasons,** 9:00 a.m.-5:00 p.m. 11
Streamside cottonwoods turn golden 12	13	14	15	16	**Evening Lecture Series. The Wolverine Way,** 7:00 p.m. 17	**Saturday Kids Activity. Magnificent Mammals,** 2:00 p.m. **Saturday Discovery Day. Ice-Age Floods Institute Fieldtrip,** 8:00 a.m.-5:00 p.m. 18
			**Volunteer Naturalist Training,** 4:00-5:30 p.m. **VNS Field Trip Training.** 22	23	24	25
			Robins gorge on chokecherries and hawthorn berries 29	30	1	**Saturday Kids Activity. Fall Fun,** 2:00 p.m. 2

YNP Photo

October

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
3	4	5	**Evening Lecture Series. Fires of 1910** (tentative), 7:00 p.m. 6			9
10	*Snakes enter winter dens* 11	12	13			**Saturday Discovery Day. Fall Naturalist Hike,** 9:00 a.m.-4:00 p.m. 16
17			**Evening Lecture Series,** 7:00 p.m. **Native Hunting Techniques and Technologies.** 20	21	22	23
24			27	28	29	**Saturday Kids Activity. Big on Bats,** 2:00 p.m. Costumes welcome! 30

U.S. Fish and Wildlife Service

Photo by Mark A. Wilson, Department of Geology, The College of Wooster

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

get outside calendar

November

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
31	1	2	**Volunteer Naturalist Training,** 4:00-5:00 p.m. **Flowers & Fruits.** **Evening Lecture Series. Dragonflies,** 7:00 p.m. 3	4	5	**Saturday Discovery Evening. The November Night Sky,** 7:00 p.m. 6
Mountain whitefish ready to spawn 7			10	11	12	13
14			**Evening Lecture Series. Topic TBA,** 7:00 p.m. 17	18	19	**Saturday Kids Activity. Totally Turkeys,** 2:00 p.m. 20
21	22	23	24	25	26	27
28	29	30	**Volunteer Fall Fiesta,** 4:30-6:00p.m. 1	2	3	**Saturday Kids Activity. Snowshoe Stomp,** 2:00 p.m. 4
5	6	7	**Evening Lecture Series. Wildlife Corridors,** 7:00 p.m. 8	9	10	**Saturday Discovery Day. Soaking up the Natural History of Montana's Hot Springs.** Time and location TBA. 11
					17	18
					Badgers search out a meal of sleeping ground squirrels	25
					31	1

YNP Photo

YNP Photo

December

November 3 **Volunteer Naturalist Training,** 4:00-5:00 p.m. **Flowers & Fruits.** Volunteer training for November VNS class visits. No experience necessary.

November 3 **Evening Lecture Series,** 7:00 p.m. **Dragonflies.** Presented by Bob Martinka, aka Bird Man Bob, a retired Fish, Wildlife and Parks biologist from Helena. Suggested donation $4/MNHC members free.

November 6 **Saturday Discovery Evening. The November Night Sky,** 7:00 p.m. With the Western Montana Astronomical Association, weather permitting. Alternate date if cloudy November 13. OPI credits available. Call 327-0405 to register.

November 17 **Evening Lecture Series,** 7:00 p.m. Topic TBA.

November 20 **Saturday Kids Activity. Totally Turkeys,** 2:00 p.m. Cost is $1 MNHC members/$3 non-members.

December 1 **Volunteer Fall Fiesta,** 4:30-6:00p.m. Enjoy food and drink with fellow MNHC volunteers and staff in appreciation of your time and effort!

December 4 **Saturday Kids Activity. Snowshoe Stomp,** 2:00 p.m. Co-sponsored by Missoula Children and Nature. Location TBA. Free.

December 8 **Evening Lecture Series. Wildlife Corridors,** 7:00 p.m. Presented by Mike Schwartz, geneticist and educator with the U.S. Forest Service and the University of Montana. Suggested donation $4/MNHC members free.

December 11 **Saturday Discovery Day. Soaking up the Natural History of Montana's Hot Springs.** Time and location TBA. OPI credits available. Call 327-0405 to register.

January 5 **Visiting Naturalist Training,** 4:00-5:00 p.m. **Winter Adaptations.** Volunteer training for January VNS class visits. No experience necessary.

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

Adult Program

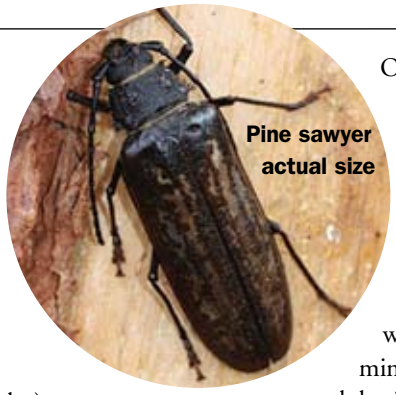
Youth Program

Volunteer Opportunity

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

What Is It?

By Charles Miller



Pine sawyer actual size

Last week while cutting firewood I found a huge larval grub about the thickness of my little finger! It turned out to be the larva of a pine sawyer beetle, sometimes called the Ponderosa pine borer. This is one of the roundheaded beetles (Family Cerambycidae), same as the long-horned beetles, as opposed to the flatheaded (Buprestidae) type. Pine sawyers are the largest beetles in western North America. They can be up to two-and-a-half inches long with dull reddish wings and darker head and neck. Their body shape is almost rectangular, slender and flattened. The mandibles of pine sawyer larvae are impressive, perhaps giving rise to the idea for the cutting teeth on the modern chain saw.

Adult pine sawyer beetles lay eggs in the cracks of bark on Ponderosa pine and Douglas-fir trees in western Montana, usually in forests above 4,000 feet. Larvae take up to two or three years to mature (this is not exceptional; many insect larvae take a long time to mature). During this time, the huge grubs excavate large tunnels in the heartwood, or dead inner part of a tree. This naturally occurring event can cause damage and diminish the value of salvage logs.

On the other hand, larvae speed up the deterioration of dead trees, helping nutrients to cycle. Trees that are stressed or dead from wildfires often are mined at their base by adult pine sawyer beetles, causing the trees to fall quickly and deter forest crown fires.

I found an adult beetle in the same downed tree as the larva. This one measured about two inches long. Although uncommon, pine sawyer beetles can be found throughout western Montana and in other western states and north to British Columbia. Look for adults on snags, stumps and in downed logs. Identifying pine sawyers is fairly easy, not only because of their size but also because of the several large and few small spines projecting along their "necks." The base of their antennae are partially surrounded by their rather large, notched eyes and their mandibles are quite large, too, a carryover from the larval stage. Be careful when handling these creatures as they can bite. The next time you hike through any of our pine or fir forests, look for this amazing insect or drop by MNHC to see specimen I caught.

In contrast to the giant pine sawyer beetle, bark or engraver beetles are in the Family Scolytidae. These are smaller, ladybug-size beetles. Their larvae mine the underside of bark, leaving characteristic galleries or tunnels. Some bore into the tree, feeding on the wood or fungi that grow on the tunnel walls. As a group, bark beetles are often considered the most destructive to forests, particularly the mountain pine beetle, *Dendroctonus ponderosae* (see article page 6). It is the most aggressive and persistent beetle in western pine forests. A tree that has been attacked by mountain pine beetles has characteristic popcorn-shaped masses of resin, called pitch tubes, on the surface of the bark. Needles turn yellow, then red eight to 10 months after being attacked, as the beetles essentially cut the tree's circulatory system. In a healthy ecosystem, woodpeckers and cold winters help keep beetle numbers in check. Long-term climate changes may be altering the balance of these native insects, by speeding up their life cycles and allowing them to expand their range.

Beetle photo by David Leatherman

Robert Dzwonkowski, Bugwood.org

Art Project: A Thaumatrope

A thaumatrope is an optical illusion. When you spin the disk, the two pictures spin so fast that your eye is tricked into thinking that they are one.

You'll need:

- A square of stiff cardboard
- A hole punch
- Two pieces of string
- Markers, crayons or colored pencils
- Scissors

1. Cut a circle out of the cardboard
2. Punch a hole on each side of the circle
3. Draw a picture on each side of the circle. When put together, the two pictures should make one, such as a bird and nest, mother and baby animal, flower and a pot. To make sure that the pictures will fit together, hold the circle in front of you. Flip it over from the bottom. This picture on the other side should be right side up.
4. Tie a piece of string to each side of the cardboard circle.
5. Hold one string in each hand and wind up the thaumatrope. When you release the circle, the pictures spin and form one image.

Did you know…

… that ladybugs often gather in large numbers from spring to fall on the tops of hills and peaks as high as 10,000 feet – even when the summit is covered with snow? There are different ideas for why this may happen. Are these familiar backyard friends migrating? Mating? Finding good places to spend the winter? Or are they merely windblown travelers? Some people have reported grizzly bears feeding on ladybug concentrations, but it's also been said that the grizzlies actually are foraging for army cutworm moths (or something else) and the ladybugs just happen to be in the vicinity. The proof is in the scat!

Photo by Steven Gram, stevengramphotography.com

A trumpeter pair and cygnets

Story and photos by Nancy Schwalm

A Story of Swans

As distinctive as the bugle of an elk or the haunting laugh of a loon, the sound of the trumpeter swan is a true voice of wilderness. For most people who encounter them, trumpeter swans evoke something steadfast and pure. Now, for the first time in nearly 200 years, the voice of the trumpeter can be heard again over the wetlands of the Blackfoot Watershed.

Trumpeter swans were hunted nearly to extinction not long after they first were observed by Meriwether Lewis in July 1806, as thousands of swan skins were shipped from America to feed the European demand for snowy-white plumage to adorn ladies' hats. Where once they were abundant and widespread in North America, by the end of the 19th century these swans had disappeared from much of their historic range. By 1932, only 69 trumpeters remained in the United States, most of which were in Red Rock Lakes National Wildlife Refuge in southwestern Montana. From this remnant population, restoration efforts began in the Greater Yellowstone Ecosystem. Swans did not reach the Blackfoot Watershed until 2000, when a pair decided to make it their new home.

Pre-release smile

In the spring of that year a pair of trumpeter swans landed on a private pond east of Lincoln and stayed through the summer, returning the next two springs. In 2003 they began courting and mating rituals, followed by nest construction. The pen, or female, laid four eggs while the cob, the male, remained by her side. One evening as the pen left the nest to feed at a nearby wetland she flew into a power-line and was killed. Quick thinking by the landowner turned tragedy into opportunity. He gathered the four eggs and took them to the Montana Waterfowl Foundation near Ronan, where a surrogate pair of trumpeters was given the eggs to hatch and rear. At ten weeks old, the cygnets were returned home where their father still guarded the wetland for his absent brood. The cob took them under his wing and by mid-October ushered his family south. That first family never returned to the Blackfoot, but was reported near Jackson, Wyoming. Their legacy lives on, however, as the birth of the Blackfoot Trumpeter Swan Restoration Program.

Return of a native

Trumpeter swans require open water for landing, standing vegetation for nest-building and underwater vegetation for food. The Blackfoot Watershed has nearly 30,000 wetlands, with 30 sites identified as ideal swan habitat and lacking dangerous obstructions such as power-lines. In 2005, the U.S. Fish and Wildlife Service, Wyoming Wetland Society and the Blackfoot Challenge began releasing swans into the Blackfoot Watershed. As of June 2010, 130 swans have been released between Ovando and Lincoln with the goal of establishing seven breeding pairs.

Restoring a native species to its former range provides an amazing opportunity to engage citizens in learning about this species of concern, as well as about its food and habitat requirements. The Adopt-A-Swan Program was created by the Blackfoot Challege to engage middle-school students in learning about trumpeters through a six-lesson curriculum, education trunk, field trip with outdoor learning stations and the opportunity for each school to release their "adopted" swan back into the wild. Public swan releases are held each spring for local citizens to become involved, and the swan website was designed to engage folks from all over the world in learning more about trumpeter swans. As with all migratory birds, swans face many obstacles to survival, such as power-lines, parasites, disease, predation, habitat loss and starvation. But with careful stewardship, people in Montana may one day have the same experience as John James Audubon when he wrote, "Imagine a flock of fifty swans sporting before you. I have more than once seen them. And you will feel, as I have felt, happier and freer of care than I can describe."

For more information about trumpeter swans, to track swan migration, watch streaming video of a swan family, catch up on the latest swan news, ask a question or report a sighting, please visit our website at blackfootchallenge.org/SwanProject/.

Nancy Schwalm works as the Education Coordinator for the Blackfoot Challenge, developing conservation education programs for seven communities and eleven schools within the Blackfoot Watershed.

Banded trumpeters make for the water

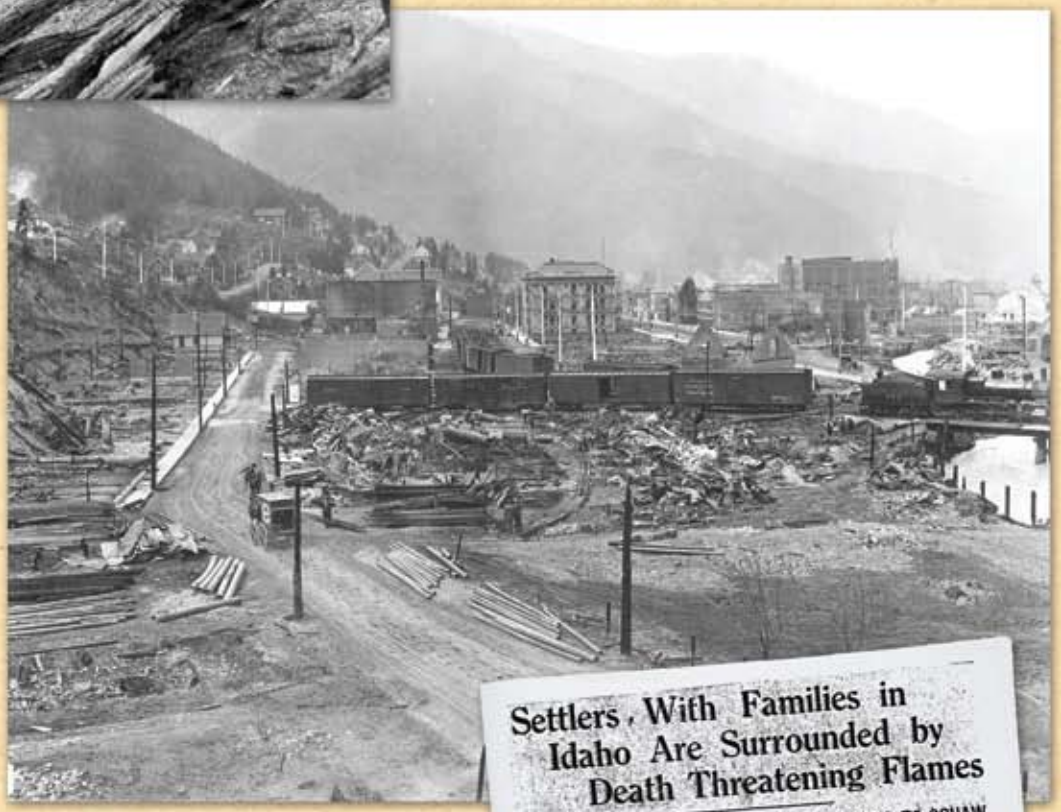
Totally denuded trees lie like broken matchsticks in photo from September, 1910.

Historical map of burned areas in Idaho and Montana.

Courtesy U.S. Forest Service Region One Archives

A gale of hurricane force swept through most of the national forests of northern Idaho and western Montana…. This was a wind-fed fire – a wild, surging, fierce, screaming, unrelenting, furnace-like fire that lapped up trees and wildlife and buildings and men…. There was no stopping it…

From *The Big Burn: The Northwest's Great Forest Fire of 1910,* by Don Miller and Stan Cohen



Burned over homes in Wallace, Idaho. Every house, approximately 200 in this area alone, was destroyed.

Settlers, With Families in Idaho Are Surrounded by Death Threatening Flames

FIFTY MOUNTED MEN HURRY FROM STITES TO SQUAW CREEK IN EFFORT TO SAVE NUMBER OF WOMEN AND CHILDREN.

Headline from Butte *Miner* article of August 14, 1910.

Lessons from the Past

Reflections on the fires of 1910

by Minie Smith

Could it happen again? The significance of the great fires that swept across the Bitterroot Mountains of Montana and Idaho in August, 1910, burning more than 3 million acres in 48 hours, has not been lost on foresters, agency administrators and anyone with an interest in the future of forests in the Intermountain West. As we move beyond the commemorative events that have marked the fires' centennial this summer in communities that survived the infernos, such as Superior, Thompson Falls and Trout Creek in Montana, and Avery and Wallace in Idaho, this fundamental question remains.

By now many people have climbed the two-mile trail and inspected the mineshaft where Ranger Edward Pulaski managed to save 40 of his crew from the roaring flames. The graves of some 85 known victims (although undoubtedly there were many more) have been re-dedicated at St. Maries, ID, and a new Firefighters Memorial erected in Wallace. Visitors to the Historical Museum at Fort Missoula have become reacquainted with Missoula's role both as host to 1,000 refugees and as the center of action for District 1; supplies and most of the firefighters, (rangers, federal troops and men conscripted from bars) passed through there en route to the fires.

Many more people have read Tim Egan's "The Big Burn," a new account of the fire, or Stephen Pyne's excellent history "The Year of the Fires" or Elizabeth Spencer's 1958 account "The Big Blowup," which includes first-hand interviews with participants in the fire. Our knowledge of the history of "The Great Burn" has improved, but we are still left with the nagging question, could it happen again?

This past May, more than 200 fire and forestry experts met in Wallace at a Society of American Foresters Conference to address this subject, along with commemorating the events that happened. Beginning with U.S. Forest Service Chief Tom Tidwell, talks included ones by eminent fire-historian Pyne and retired fire-management expert Bob Mutch, who offered historical perspectives on the fire and resultant policy of fire suppression that has dictated fire management for most of the last 100 years. It was left to retired director of Forest Service Fire and Aviation Jerry Williams, as the final speaker, to deal with the question full on. His short answer was yes, such a fire could happen again, and, yes, it probably will.

Williams based his remarks on his participation in a Forest Service study from 2003 to 2008 conducted on the so-called mega-fires, some nine fires that occurred between 1998 and 2007. Unlike the Great Burn of 1910, which was fought with almost no budget and even less experience, these recent enormous fires still occurred despite huge firefighting budgets and the latest firefighting technology.

Williams described mega-fires as an "unwelcome new reality." Most fires, he explained, fall into an "initial attack" category, 95% of which are contained and suppressed rapidly. About 4% of the remainder transition into what he called "extended initial attack," where about 70% of fatalities typically occur. Here, sudden unusual conditions cause the fire to flare up in unexpected ways.

Under even more violent wind and weather conditions, about 1% of fires transition further into truly large fires. Finally under extreme drought and weather conditions, a few of these become mega-fires.

"Their size and impact seems limited only by the depth of the drought, the amount of available fuels and the velocity of the wind," Williams said. The 2000 Valley Complex fire in the Bitterroot Valley, which burned 212,030 acres, was one of these mega-fires; the 2009 Australian bushfires, another. Although infrequent, Williams stressed, these last category fires account for 95% of the total acres burned and 85% of fire suppression expenditures.

Williams cited the elements that produce mega-fires today: "drought, extreme fire weather, heavy continuous fuels over extensive undisturbed landscapes, multiple large fires all burning at the same time and a severe late season wind," elements which, upon convergence, almost ensure disaster. Warming climate conditions, widespread bug infestations and landscape homogeneity only add "fuel" to this equation.

The answer for fire management that grew out of the 1910 fire was simple – suppression. The so-called 10 a.m. rule, where all fires had to be out by 10:00 a.m. the following morning, became the norm. In William's view however, "We have not yet acknowledged the limits of suppression…. We may have reached a remarkably high success rate with this doctrine, but the consequences of that remaining 1% represent nearly all our costs, losses and damages."

Williams noted that the megafire study found that upholding the goals of air quality, endangered species habitat and watershed protection by land management decisions that keep the land undisturbed actually appear not to have worked under current conditions.

"Holding onto undisturbed, late-successional stand conditions over very large areas in short-interval fire regimes may have been feasible in a cool, wet climate cycle, but it is proving unsustainable in a hot, dry climate cycle," he said.

Williams' conclusion is that we cannot continue supporting fire management that produces conditions that lead to mega-fires. Rather he advocates solutions "that integrate the disturbance dynamics of wildland fire to ensure a safer, more sustainable 'whole'." This implies removing vegetation in some manner that mimics fire behavior or disturbance that produces a more diverse landscape. Examples of this type of management already exist outside of the Intermountain West, and we should look at these for possible use, he said.

His arguments were necessarily more complex than can be expressed here, but Jerry William's assessment of the "new kid on the block," the mega-fire, clearly suggested that fire management must be much different in the future. Although there is not yet a consensus on what that management will be, the conference in Wallace provided a forum to bring challenging ideas to the forefront.

Minie Smith is a former land conservation specialist and longtime volunteer librarian at MNHC.

imprints

News from the Montana Natural History Center

MNHC Photo

CALL NOW!

Fall Master Naturalist Class Starts Soon

MNHC now is offering a six-week Montana Master Naturalist Course, taught by naturalist Alyssa McLean, in addition to the full-semester spring course. The fall class will meet at MNHC from 4:00 to 7:00 p.m. on Tuesdays and Thursdays from September 7 to October 14. There will be three, full-day Saturday field trips as well. Students may obtain Master Naturalist Certification with 8 hours of post-class volunteer service. College credit also is available.

Cost for the course is $295; a $50 deposit is required for registration. Call 327-0405 or email office@montananaturalist.org to register.

Summer Camp Highlights

Camps this summer focused on hands-on projects for kids, from making fishing poles and insect nets to constructing bird nests and boats using only natural found materials to creating personal field guides, survival kits and nature mobiles. There also was plenty of opportunity to see science in action with osprey monitoring and migratory bird banding – and to get wet and dirty in search of aquatic insects, reptiles and amphibians, and more.

MNHC Photo

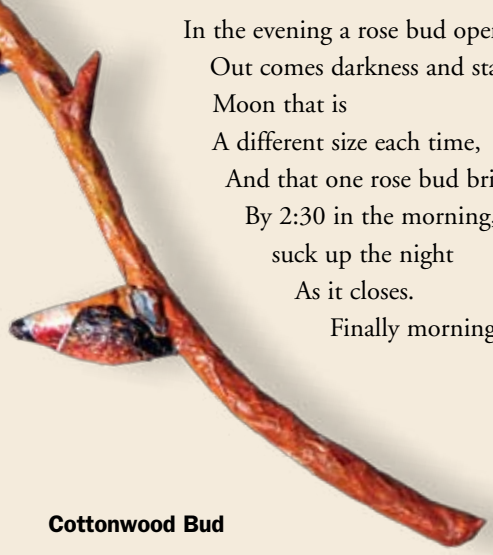
Noah mixing paint for his bud

Photos courtesy of Shirley Atkins, CFS teacher

Dreams of Buds

By Noah Van de Wetering

In the evening a rose bud opens.
Out comes darkness and stars, and a
Moon that is
A different size each time,
And that one rose bud brings on night.
By 2:30 in the morning, it starts to
suck up the night
As it closes.
Finally morning appears.



Cottonwood Bud

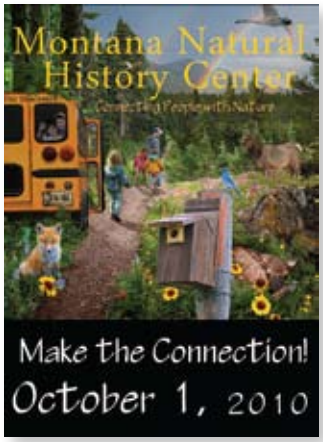


Image courtesy of Lance Schelvan

Make the Connection

MNHC's annual Banquet & Auction is set for Friday, October 1 at the Doubletree Hotel. There'll be trips and experiences to bid on, surprise raffle items, special awards and more. Join us and reserve your tickets today by calling 327-0405.

Get 'Em While They're Hot

Now there's a new way to support your favorite nature-education organization. MNHC license plates picturing a wise owl are available for purchase at your local County Treasurer's Office. The new plate features artwork by Bitterroot artist Joseph Thornbrugh and design by Eileen Chontos. First-time cost for the plate is $40, which includes a $20 donation to the Montana Natural History Center. The renewal fee is only $20, all of which goes to support our programs. You don't have to wait until your current plate expires – buy one today!

spotlight:

New Faces at MNHC

We'd like to introduce two new staff members at the nature center:

Deb Jones, our office manager, has a degree in Business Administration from Eastern Washington University and has been working in business development and marketing for the past four years in western Washington. She and her husband recently moved to Missoula and have "fallen in love" with everything that is western Montana. She enjoys reading, cooking, hiking with her dog and "getting away to the beach whenever possible."

Tina Hanke has taken over as Community Programs Coordinator. Tina earned her B.A. in Geography from the University of Wisconsin-Madison. Since leaving her home state, she has worked for a variety of educational programs, including at a YMCA camp in northern Minnesota, an outdoor education program with Alaska Pacific University, as an AmeriCorps organic gardener and, most recently, the with the Boys & Girls Club of Rhode Island. "I'm excited to be living in the mountains now and plan on making the most of them," she says. Tina likes to hike, cross-country ski, garden, cook, listen to live music and add to her "Brewery Life-List" (she is from Wisconsin after all!)

Tina takes over from Jessie Sherburne, who shepherded MNHC community programs for the past three years. Jessie is starting the raptor biology master's program at Boise State and we wish her all the best with her new endeavors!

Visioning Nature

Clark Fork Students learn from Artist in Residence

Working in the American naturalist tradition, where art and science are seamlessly blended, students at the Clark Fork School spent the 2009-2010 school year working with Artist in Residence Claire Emery on field sketching and in-depth natural history art projects. Their work recently was on display at MNHC.

According to Emery, students focused during the fall on their drawing skills while studying the fruits and seeds of local plants. These were then incorporated into wordless "Object Poems," inspired by the work of Dillon artist Cathy Weber. In the winter, students concentrated on twigs and buds, resulting in beautiful, three-dimensional "Buds of Dreams" with accompanying poetry that was facilitated by Missoula Writing Collaborative head poet Sheryl Noethe. The spring months were devoted to rendering plein-air landscapes using watercolor.

Funded by the Montana Arts Council, the Artist Residency is a great example of how a school can bring its mission to life by working with a professional artist, says Emery. To find out how to bring Claire Emery to your school, or to learn more about her work, visit her website at www.emeryart.com. To find out more about the Montana Arts Council and the Artist Residency, go to http://art.mt.gov.

Corinn Whitney works on her bud

Nature Art

Making the Connection

We received a number of wonderful drawings from children in response to this summer's Nature Art Contest, which asked kids to "Show Us How You Connect with Nature." After much deliberation, we proudly present the winner and those pieces chosen to receive honorable mention. Each artwork offers a look at the unique ways children perceive nature and its importance to them. Thank you so much to everyone who submitted a picture, and stay tuned for announcements about future contests!

WINNER
Abby Baldwin, 3rd Grade

Emma Peasley,
4th Grade

Quinn Brownell,
4th Grade

Julian Morse,
2nd Grade

Abbey Flynn,
3rd Grade

Griffin Downey,
5th Grade

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Make us your base camp for discovery 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

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