



Ecologists, Educators, and Schools:
Partners in GK-12 Education

Newsletter

Spring

ECOS (406) 243-6016

www.bioed.org/ecos

March 2006

No Child Left Indoors!

ECOS is a partnership program for enhancing science education in K-12 schools in western Montana by using the schoolyard and adjacent open areas as outdoor laboratories for learning about the environment.

Inside:

Student Work

News from the fellows
and schools

Upcoming Events:

March 24-26: NSF Annual
GK-12 Conference

April 12: In Service
Meeting

May 15: Nature art
calendar submissions
due!

May 15: Luncheon for all
new and current ECOS
members

The ECOS program is
sponsored by the University of
Montana's Division of Biological
Sciences & the College of
Forestry and Conservation.



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From the Director: Ecologists enjoy springtime in Missoula



Signs of spring are finally evident in western Montana! As of March 13, twenty two buttercups were in bloom on Mount Sentinel and buds on trees and shrubs are starting to swell. Making observations, asking and answering questions, documenting changes, and sharing what we learn – these are some of the activities of ecologists, scientists whose interest is the field of Ecology. What is Ecology? Ecology is the scientific study of organisms as individuals, as groups, in relation to their physical environment, and in the context of their evolutionary

history. This is an interdisciplinary field relying on knowledge from experts in, for example, biology, genetics, geology, meteorology, physiology, remote sensing, geography, evolution, chemistry, molecular biology, natural history, geology, mathematics and computer science, among others. You can learn about ecologists, their training, and diverse ecological professions on the *Ecological Society of America* "Profiles of Ecologists" website at http://www.esa.org/education/ecologists_profile/EcologistsProfileDirectory/. Also check out the *Kids Do Ecology* website from the

National Center for Ecological Analysis and Synthesis. Ecologists there can answer your ecological questions at <http://www.nceas.ucsb.edu/nceas-web/kids/ecology/ask.html>. Be on the lookout for the first signs of spring - leaves, flowers, insects, and birds - make notes, sketch your observations, and join the community of ecologists in the Missoula Valley!



Carol Brewer, Ph.D.
ECOS Program Director

What's a Scientist?



Ainsley McCutcheon



Lexi Hewitt

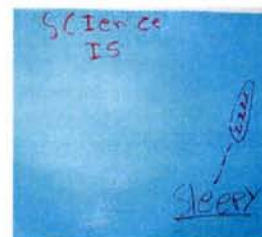


Natasha Erickson

What's a scientist? This is the question that ECOS fellows and teachers at Lewis and Clark posed to their students. As the drawings above illustrate, students knew that scientists are not just curly-haired men in lab coats! Scientists study chemistry, nature, and even the solar system; scientists are men and women; scientists work in all kinds of laboratories, indoors and out. Indeed the diversity of scientists is represented right in the Lewis and Clark classroom by the ECOS team: environmental chemist Katie Hailer, plant ecologist Bruce Threlkeld, and budding ecologist Corissa Crowder. "What's a scientist" and "What is Science" are assessment techniques that can be used in the beginning of the academic year to gauge students' perceptions of science and scientists. After 9 months with Ecologists in Residence, ECOS fellows will again ask students to do this same exercise.

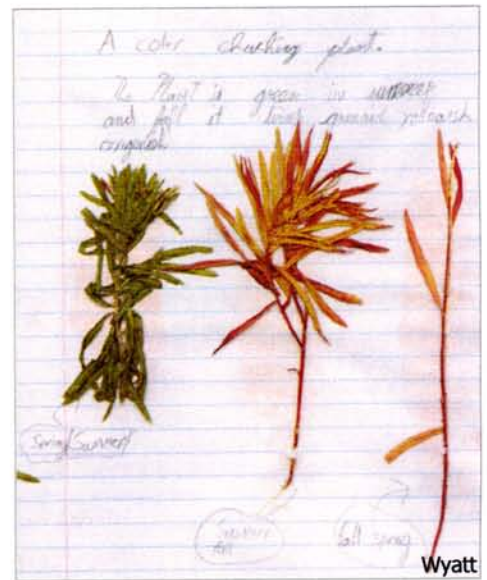
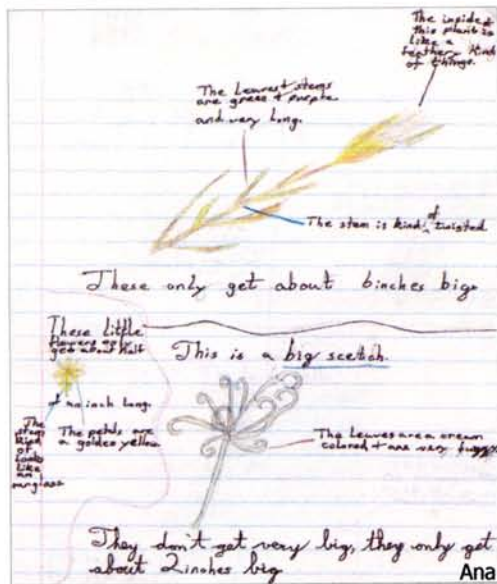
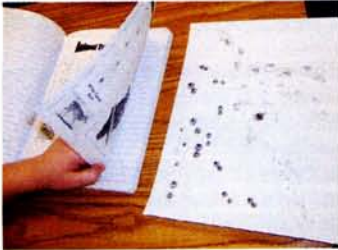
What's Science?

Florence Carlton 8th graders expressed their opinions about science at the beginning of the academic year. After working with ECOS scientists Sam Stier, TJ Fontaine, and Melissa Maggio, we are excited to see what students think about science in June! Stay tuned!



Nature Journaling at Target Range

Just as field ecologists must keep detailed notes, the 4th students at Target Range School began journaling about their activities with ECOS fellows last fall, and continue to work in them throughout the year. Here are just a few pages from these student's journals.



Hellgate Elementary 3rd Graders Write Poetry and Tell Stories

Wolves

Tall Furry

Bite Run play

Antlered Moose Cozy Den

Hunt Kill Sleep

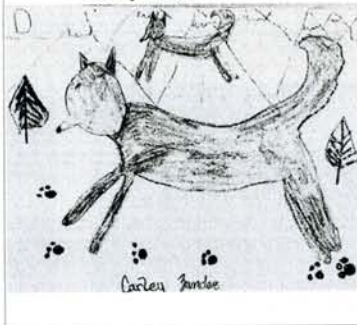
Shy Growing

Mammals

Wesley Acosta

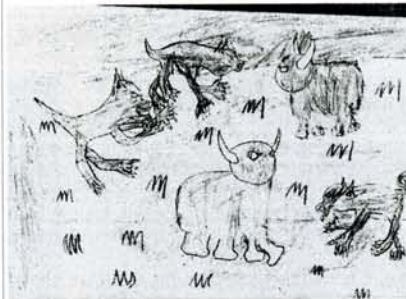
The wolves are playing together and they are hunting in the snow. The wolves are running in the snow. They are hunting for the pack.

Carley Zander



The bison approach the long grass and start to eat. Then a pack of wolves take position. Then they strike! The wolves and bison are fighting. It's a tie. They go home with an empty stomach.

Lexi Vine



Wolf

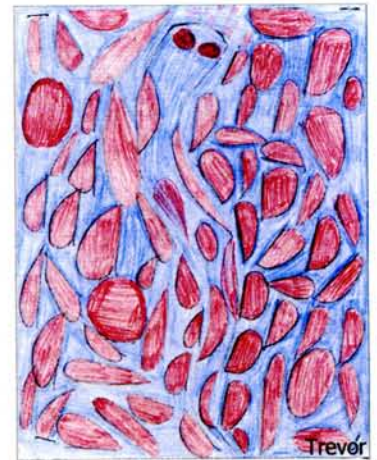
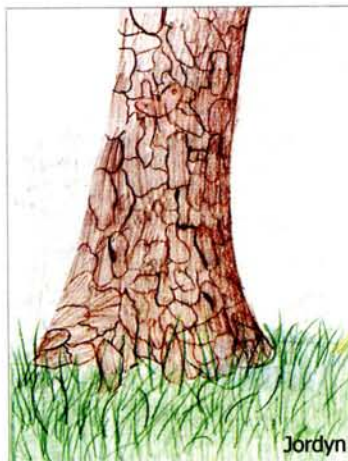
Carnivore Dominant
Hunt Howl Pounce
Big Pack Strongest Male
Play Lead Moving
Fierce Alert
Alpha

By Daniel Penley

Florence Carlton Students Learn about Camouflage

After their inquiry "Pipe Cleaner Camouflage", fellows at Florence Carlton School assessed the students abilities to hide an organism within its habitat. Can you find the moth, bird and the snake in these drawings?

You can find this inquiry on the web at <http://www.bioed.org/ECOS/inquiries.aspx>



Building Teaching Laboratories in Schoolyards

No child left indoors applies to all seasons in Montana! This winter our teams wrote and implemented curricula that correspond to their demonstration projects. You can learn more about ECOS curricula and these projects as www.bioed.org/ECOS



Entrance to the schoolyard laboratory



PhD fellow Katie Hailer and 5th grader Mariah Juneaus observe seeds and dispersal mechanisms

The **Lewis and Clark** ECOS team is in the midst of enhancing their outdoor native garden, located on the school grounds. The garden contains a wide variety of native plants, many of which were first identified by Lewis and Clark on their exploration of the West in the early 1800s. The ECOS teams identified and will permanently label the plants growing in this native garden. Also nature guides for the schoolyard were written for the teachers and students at Lewis and Clark that incorporate the unique history and ecology of the West. Fellows have written and tested complimentary curricula about mapping and plant identification for student investigations in the garden

Over at **Hellgate Elementary and Middle School**, the ECOS team has begun building four learning centers on the schoolyard. The four learning centers focus on separate aspects of western Montana ecology and are aligned with the expertise of the ECOS fellows. The Behavioral Ecology Learning Center gives students a chance to investigate the behavior of Hellgate's fauna, including squirrels, insects and birds. The Insectory will house knapweed root boring weevils, allowing students, fellows and teachers to evaluate the effect of this weevil on invasive knapweed. The Rock Walk will transform a sidewalk into a walk back through geologic time, incorporating regional rock samples and student artwork. The Native Plant Garden is a tool for teaching plant ecology along with local Native American history and culture. Accompanying curricula for student investigations can be found at www.bioed.org/ECOS/inquiries.aspx



Fellows install interpretive signs for the schoolyard learning centers



PhD fellow Johnny MacLean helps students read maps that describe plate boundaries



Montana College of Technology generously donates time and equipment to building the outdoor classroom



PhD fellow Brooke McBride assists students in making careful observations of study skins

At **Target Range School**, the ECOS team and students are transforming a degraded cottonwood grove at the edge of the schoolyard into an outdoor classroom and nature observatory which can be enjoyed by the entire school. Currently, the major excavation and landscaping work is nearly complete. This spring, students will work to construct walking trails in and around the grove, and will restore native vegetation around the perimeter of the grove. With ecology backpacks created by fellows, the outdoor classroom will become a laboratory for studying ecology by all grade levels at the school. ECOS fellows have already led inquiries in the schoolyard to compliment their project, including winter tracking and plant identification studies.

After a school wide clean up and weed pull in the Fall, the ECOS team at **Florence Carlton School** is on its way to improving the Outdoor Classroom trail, which will include stations where K-12 students participate in various ecology lessons. In addition, the team is developing additional curricula to implement in the Outdoor Classroom in all seasons. The Florence Carlton team has included several classrooms in their enhancement work of the Outdoor Classroom, including art students that have contributed to the signs and booklets. Students already have had lessons in the outdoor classroom, including studies of microclimate, tree sampling, and animal camouflage.



LEFT: Undergraduate fellow Melissa Maggio improves the outdoor classroom by planting native plants



RIGHT: Students learn about camouflage by searching for elusive pipe cleaner animals in the outdoor classroom



Target Range students collect data for their insectory project

Two ECOS fellows, **Rachel Loehman** and **Jeff Piotrowski**, have been working hard to enhance the ECOS Project. Jeff has created a traveling herbarium which contains loads of local plants, which were mounted, laminated and described. This fabulous resource soon will be available for teachers or fellows to check out. Rachel has continued working on the implementation and use of schoolyard insectories at two local schools. Participating classes complete investigations about schoolyard entomology, plant identification, and plant ecology, and then construct insectories at their schoolyards, release the biocontrol agent (root boring beetle) into those insectories, and monitor changes in vegetation within the insectories and control plots through time. Students collect a number of different types of data, including percent cover of different vegetation types, number of weeds within study plots, soil temperature, and soil cores.

ECOS networks with Montana educators at the 2006 Montana Environmental Educators Association Conference

Three ECOS participants attended the 2006 MEEA conference in Bozeman, MT on March 3rd-4th. Dave Oberbillig, a Big Sky High School science teacher, and ECOS Co-PI, along with Ph.D. fellows Brooke McBride and Alison Perkins delivered a 60-minute workshop entitled "No Child Left Indoors: Connecting Scientists with Educators". In the workshop, participants tried out ecological inquiries and learned how to create demonstration projects in

various ECOS schoolyards like the ones ECOS has developed. The ECOS team also attended seminars, workshops, and break-out sessions with educators from across Montana.

The conference provided a unique opportunity to meet with an array of science educators from diverse backgrounds. Of about 130 people in attendance, roughly one-third were traditional classroom teachers, and two-thirds were from outdoor

science schools, non-profit education centers, or state programs (e.g., Fish, Wildlife, and Parks). ECOS was a great addition to the conference because it was the only program to specifically involve university scientists in K-12 education. Clearly ECOS fills a vital niche in Montana's current science education initiatives.



Dave Oberbillig and Alison Perkins prepare a mark-recapture cricket inquiry. You can find this investigation at www.bioed.org/ECOS/inquiries.aspx

ECOS Staff

Carol Brewer, PhD Director

Carol has a PhD in Botany and directs research programs in both plant ecology and ecological education. She serves as the VP of the Ecological Society of America and is an Associate Editor for the journal *Conservation Biology* (Education).

Josh Burnham, Webmaster

Josh is responsible for the design, management, and maintenance of the ECOS website. He also provides much appreciated technology support to ECOS staff, fellows, and teachers.

development, and tracking progress at the school sites. Jen also is in the Interdisciplinary Program studying museum exhibit design and curriculum development.

the College of Forestry and Conservation.



Paul Alaback, PhD Co-Director

Paul has a PhD in Forest Ecology. His research centers on disturbance ecology and plant biodiversity patterns. His skills have allowed ECOS to develop a fantastic local plant guide.

Jennifer Marangelo, Program Coordinator

Jen is responsible for ECOS recruiting, web content

Kim Notin, Administrative Assistant

Kim is responsible for all the odds and ends of the ECOS project. She is a second year Masters student in

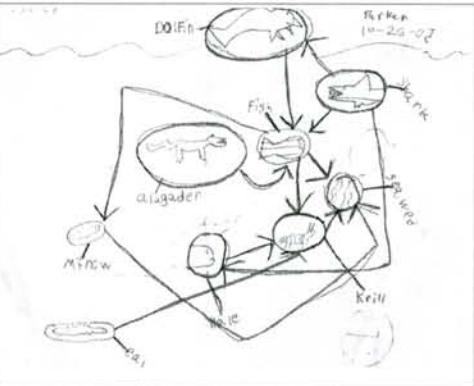


Undergrad Corissa Crowder shows a wolf pelt to Ms Greil's 1st and 2nd grade students at Lewis and Clark Elementary



DIVISION OF BIOLOGICAL SCIENCES
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TO:



Parker McDavid's Food Web (Lewis and Clark Elementary)