



Notes from the Field

Spring
2015

The biannual newsletter of the Intercollege Graduate Degree Program in Ecology at The Pennsylvania State University

Volume 12 - No. 1

Table of Contents

Spring 2015 Seminar Series	1
Science Café	1
Exploration-U Outreach	2
Hurteau Lab Outreach	3
Making our CASE	4
Recent Graduates	5
Recent Publications	6
Spring 2016 Seminar Series Announcement. . .	6
Composting	6
Grants, Awards & Achievements	7



Crab spider on *Carduus nutans* (Photo by Joe Keller).

Spring 2015 Ecology Seminar Series Synopsis

By Jackie Harth, Chad Nihranz, and Laura Radville

Another successful spring seminar series has come to a close. The broad theme of this year's seminar series, "Stress in Ecological Systems," allowed us to invite speakers who catered to the diverse interests of the program's members. Speakers Paul Lenhart, David Carr, Quinn Thomas, Creagh Bruener, and Steve Palumbi presented on topics including climate change in corals and stress levels in birds. Our final speaker of the series, PSU alum Fred Allendorf, was afforded a slot in the Huck Distinguished Lecture Series. He joined current and past Penn State community members Michael Sheriff, Eric Yip, and Trinity Hamilton in contributing to what was an excellent lineup of talks.

While an overall success, the series did experience some minor setbacks. Unfortunately, both Mickey Eubanks and Creagh Bruener were forced to cancel their visits. Luckily, we were able to reschedule Creagh's visit for later in the semester and it was well worth the wait.

We would like to thank our many funding sources: the Eberly College of Science, The Huck Institutes of the Life Sciences, the Penn State Institutes of Energy and the Environment, the Department of Biology, the Department of Geography, and the Intercollege Graduate Degree Program in Ecology. Without their generosity, we would not be able to organize this series each year. We would also like to thank all the students and faculty who donated their time by meeting with the speakers and attending the seminars.

Science Café By Andie Chan

The second season of our Science Café series has come to a close, and it is time to start planning for next year! We are looking for more people to help organize and implement the events, specifically if anyone would like to lead efforts in reaching the public. This year, we had roughly 30 people attend each event, however, a number of these participants were Penn State graduate students. While we still encourage graduate students to attend and support their peers, we would really like to increase local participation in our events! In addition, if you are interested in giving a short (5-10 minute) presentation on an interesting science topic in our next series, please let us know! We are always open to new ideas, and this is great outreach experience for grant applications!

Background: Science Cafés are events held in a relaxed environment, such as a coffeehouse, where anyone can engage in discussion with a scientist about a particular subject. There are hundreds of Science Café events going on worldwide, and it is exciting to be a part of this movement to make cutting-edge science available for everyone to enjoy. For more information about Science Cafés, go to <http://www.sciencecafes.org/>.

2015 Season: This year, we put on four Science Café events at Webster's Bookstore Café, starting in January. The first event featured Ecology graduate student Chad Nihranz and Ecology faculty member Dr. John Tooker talking about plant-insect interactions and their relevance to modern agriculture.

Continued on page 3



Coverage of Exploration-U can be found here:

<https://www.youtube.com/watch?v=1QESbrp1K5E&feature=youtu.be>

<http://www.centredaily.com/2014/11/14/4456774/plop-plop-fizz-fizz-boom-bellefonte.html>

<http://www.wearecentralpa.com/story/d/story/keeping-kids-connected-to-science/21023/Tuwl-0TcfEiZOVqu43Yabg>

Exploration-U (left to right): Didem Ikis, Chad Nihranz, David Watts, Andie Chan, Jackie Harth, and Amanda Young (Photo by Anna Maria Gonzalez Angel).

EGSO at Exploration-U By David Watts

Exploration-U is one of the Eberly College of Science's main outreach events, featuring a considerable number of exhibitors from all of the STEM fields, including academically-based groups (departments, centers, etc.), extra-curricular student groups, and even entities like NGOs. The Ecology Graduate Student Organization (EGSO) has, to my knowledge, never participated in Exploration-U before, even when the event was called NASA Exploration Day. After several of us had gotten the itch to try something new and move beyond assisting other exhibitors with their activities and displays, four Ecology students (plus one from Biology and another from Geography) put together a new activity for this spring's Exploration-U, under the heading of the EGSO. The challenge for us was making the world out-of-doors seem palpable.

Sometimes, it can seem that other STEM fields have an advantage over Ecology when it comes to outreach. For instance, many chemistry concepts can be brought to life via dramatic, but small-scale experiments that students can actively participate in. Large-scale ecological ideas, however, can be difficult to convey in a compelling way when crammed into the sterile hallways of a local school. Our goal was to bring the phenomena we study in the outside world into the State College Area High School in an engaging way.

In the end, we came up with what we called the "Island Biogeography Game."

The goal was for the participants to try to colonize islands of various sizes and distances from the coastline. With two folding tables arranged one after the other lengthwise, we created a mainland with some neighboring island groups. On the beach, there were five different species, each with ten individuals: lizards rafting on logs (illustrated ice pop sticks), dandelions (hand copters), snakes (paperclips), coconuts (mini Easter eggs), and frogs (small bouncy balls). We usually started each round of the game by asking the kids whether they thought it would be easier to get from the mainland to a big island or a small island, and similarly with near and far islands. Generally speaking, these questions were answered correctly, and so we would follow that up with seeing if their predictions would stand up to testing. Depending on the number of participants, we aimed to have each child steer a single species.

After all 50 (or 40 once we decided the bouncy balls were just a *little bit* too hectic) individuals had left the beach, we had the kids check whether they found it easier, i.e. whether it was more likely, for the species to colonize islands near or far, large or small. Most results realized the classic island biogeography theory predictions – though there was certainly a particular demographic that saw small, distant islands as a challenge and biased their attempts toward those targets!

In the end, it was clear that a good time

was had by the vast majority of participants (both old and young, because let's be honest, who wouldn't want to throw bouncy balls and launch hand copters). More importantly, the lion's share of kids, both as active players in our game, as well as shy but curious onlookers, came away with an understanding of a simple but germane principle in ecology, and I believe that a decent number of them will retain that lesson. While we think there are certainly ways we can work to improve the game for future iterations of the activity, we all felt pretty proud of what we put together on basically no budget whatsoever.



Grad students guide participants through the "Island Biogeography Game." (Photo by Andie Chan)

Hurteau Lab Outreach to Military Bases

By Shuang Liang

This spring, the Hurteau Lab visited three military bases (Fort Benning, Georgia; Camp Navajo, Arizona; Fort Lewis, Washington) to impart our carbon accounting methodologies and research findings to local land managers, as part of a Department of Defense (DoD) funded project.

Forest carbon sequestration can be used to mitigate changing climate conditions. However, sequestering carbon in forests carries a risk that disturbance will revert this carbon back to the atmosphere. This reversal risk can be mitigated using ecologically-based silvicultural prescriptions. The objective of this project was to develop a methodology for examining the impacts of different forestry practices on carbon sequestration over a wide range of forest types: ponderosa pine at Camp Navajo, Douglas-fir at Fort Lewis, and longleaf pine at Fort Benning. Our team developed a range of treatment scenarios for each installation, through a modeling technique, to determine the contribution of different scenarios to each installation's carbon footprint and other ecosystem services, like habitat provision. We provided the treatment scenarios and modeling techniques to local land managers. These methodologies can be used to quantify the influence of future management practices on carbon sources and sinks in these forested DoD lands.



Douglas-fir (*Pseudotsuga menziesii*) in Seattle, Washington.
(Photo by Shuang Liang)



Top photo: Shuang Liang (left) and Matt Hurteau (second from right) with Fort Benning workshop attendees. Bottom photo: Danelle Laflower (left) and Shuang Liang (far right) with Joint Base Lewis-McChord workshop attendees.

Science Café continued from page 1

In February, Katy Barlow and Joe Keller discussed plant invasion ecology in Pennsylvania. For our third event, Megan Kepler Schall and Will Miller informed us that wild animals get sick too! They shared their experiences with diseases in small mouth bass and white-tailed deer – two important Pennsylvania fish and game species. Finally, in April we had our last event featuring Laura Radville and Alison Grantham talking about the importance of roots in below-ground ecology, and how to improve your own garden by starting a compost system!

Interested? Email Andie Chan (anc164@psu.edu) to get involved in the 2016 season!!!

This publication is available in alternative media upon request. Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce.

U.Ed. # GRD 15-22.



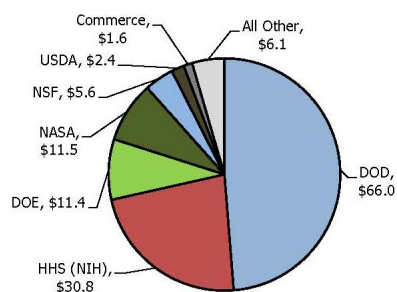
Hepatica nobilis var. *obtusa* (Photo by Erynn Maynard).

Making our CASE By Chris Thawley

On April 12, PSU Chemistry grad student, Jared Mondschein, and I battled through horrible traffic to attend the American Association for the Advancement of Science (AAAS) policy workshop in Washington, D.C. The Making our CASE (CASE=Catalyzing Advocacy in Science and Engineering; DC loves acronyms) workshop brought together students from over 40 different institutions to learn about how our government funds science, how science serves the public interest, and how we, as scientists, can better be a part of those processes.

The workshop began with a session, led by AAAS staff and folks from the legislative and executive branches of the U.S. government, including the Office of Science and Technology Policy (OSTP, of course), about the federal budget process and the role of various agencies in creating and advising on the budget. The first workshop covered the history of Research and Development (R+D) funding in the budget, and discussed how R+D funding generally increased to ~2004, but has since leveled off. In general, Defense spending accounts for about half of all the nation's R+D expenditures, which was a little bit of a surprise to me. I was also surprised to learn that the National Science Foundation (NSF, which has been the major funder of almost all of my graduate research), makes up a relatively small portion of the R+D budget. For the life sciences, the greatest source of funding by far is the National Institutes of Health (NIH). We learned that there has been strong bipartisan support for R+D, including basic research, as this is broadly recognized as a driver of economic growth

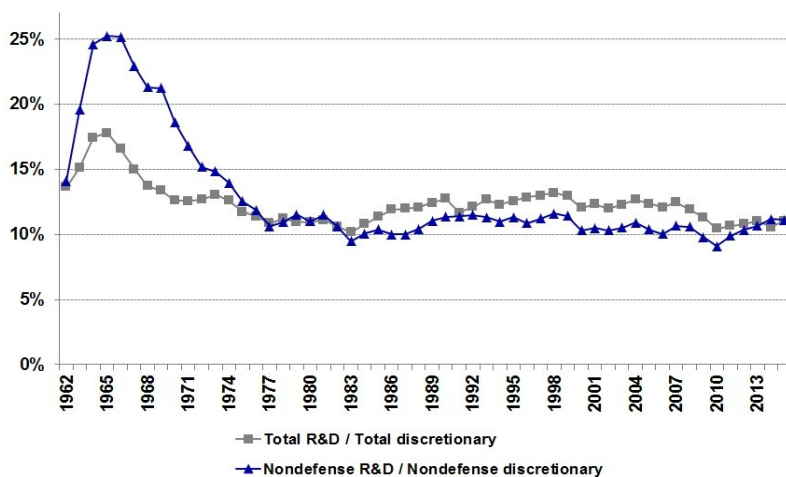
Figure 2: R&D by Agency, FY 2014
budget authority in billions of dollars



Source: OMB R&D data, agency budget justifications, and other agency documents and data. R&D includes conduct of R&D and R&D facilities.
© 2014 AAAS

R&D as Percent of Discretionary Spending

percentage of outlays, 1962 - 2015



Source: Budget of the U.S. Government FY 2015. © 2014 AAAS

and development. However, sequestration and other budget-cutting moves reduced discretionary spending, including R+D funding, which may remain lower through 2021. Much of the workshop focused on the particulars of how science funding is actually determined (proverbially, "how the sausage is made"). In this case, the R+D budget is determined in broadly the same way as other types of funding. The President puts forth a budget request, which is followed by proposed budgets from both the House and Senate. The two arms of Congress attempt to produce a budget that reconciles their spending differences and that will not be vetoed by the President. If this is not achieved by the end of each September, the government may shut down...oops! As such, the proportion of the budget devoted to science is balanced with many other factors. However, since a decline following the Space Race, the proportion of federal discretionary spending allocated to R+D has remained fairly constant.

The afternoon session featured a role-playing activity where participants acted as congressional committee members to reconcile an appropriations bill and to make hard science-funding decisions. We also learned about the distinction between *Policy for Science* and *Science for Policy*. *Policy for Science* refers to the

government's funding of science, and directives for how the government prioritizes and allocates funding to various agencies in different research areas. *Science for Policy* is the use of scientific information to make informed policy decisions. *Science for Policy* is one way in which scientists can serve the greater community.

The second day of the workshop featured other engaging presentations, at the Congressional Visitor's Center in the Capitol building. We had a long wait on a rather rainy day, but once inside we were treated to a meeting with Rush Holt, former representative (D-NJ), plasma physicist, five-time Jeopardy champion and defeater of IBM's Watson, and current CEO of AAAS. We also learned how Congress is structured, and the finer points of how subcommittees pass budgets that become the law of the land. Then we heard from a panel of congressional and committee staffers about how committees negotiate bills and the best ways to discuss issues with staffers. The final sessions of the workshop included discussions with lobbyists and advocates, some science policy career advice, and discussions of jobs and fellowships, including the AAAS Science & Technology Policy Fellowships.

Continued on page 5

Making our CASE

continued from page 4

Day three was designated as a lobby day. To prepare, Jared and I worked together to craft an approach for the meetings with legislators and staff on the Hill that Penn State had lined up for us. We had to create a simple, clear message that we could deliver in the 10-15 minute meetings that we had with the offices of various representatives and senators. We focused on how Penn State supports a diversity of research programs, from my basic ecological research to Jared's work searching for new materials for fuel cells, and highlighted how this diversity is requisite for meeting the ecological and technological challenges of living in a rapidly changing world. Both of our labs are supported by NSF, the primary government agency supporting basic research. We described how Penn State encourages collaborations between departments and researchers and supports us in developing our projects.

On our last day in DC, Jared and I worked the Hill from 9 a.m. to 7 p.m. We met with staff from the offices of Pennsylvania's two Senators, Bob Casey (D-PA) and Pat Toomey (R-PA), as well as Steve Israel (D-NY), Jared's Congressman. We also spoke with representatives Pat Meehan (my own Congressman!, R-PA) and Glenn Thompson (R-PA District 05, which includes University Park). In general, the folks we talked to were supportive of science funding at both the federal level and at Penn State in particular, but they ac-

Pennsylvania Congressional Representative Glenn Thompson (left), chemistry graduate student Jared Mondschein, and ecology graduate student Chris Thawley.



knowledgeed that most types of discretionary spending are under pressure in the current Congress.

We also had the chance to attend an informal Penn State alumni get-together and debate science funding with other representatives and staff from multiple agencies. We hope that our visits and discussions have put a personal face to scientific research and communicated the importance of continuing federal support for scientific research.

All in all, the CASE workshop was a unique (and exhausting...so many meetings!) experience for me, and an introduction to a part of the scientific process I have rarely considered. I hope to use this experience to better communicate science to a broad range of audiences,

including our elected officials, and advocate for science throughout my career.



Dutchman's breeches (*Dicentra cucullaria*) is a native, ant-dispersed (myrmecochorous) wildflower. Seeds are attached to an elaiosome (specialized, fleshy organ) which ants transport back to their nests and consume. The remaining viable seed is discarded to a refuse pile. (Photo by Erynn Maynard)

Supporting the Ecology Program

The Intercollege Graduate Degree Program in Ecology Gift Fund supports various elements that have made Penn State Ecology one of the nation's top graduate programs. Gifts to Penn State Ecology support student stipends, seminar speakers, faculty/student social events and opportunities for students to attend meetings and workshops. This fund enhances Penn State's commitment to providing a quality graduate education for our students. Your philanthropic support is beneficial and appreciated. To make your gift online, go to <http://www.giveto.psu.edu/GradEcology>.

The Ecology Program values the philanthropic support of its alumni, parents and friends, and has developed specific programs based on donor interest, such as the Andersen Travel Award. For more information about how your financial support can positively impact the Ecology Program, please contact Dave Eissenstat, program chair, at dme9@psu.edu or 814-863-3371.

Spring 2015 Ecology Graduates

Warm congratulations to all of our graduates!

Emily Almberg, Ph.D.

Denise Finney, Ph.D.

Katie Gaines, Ph.D.

Jennifer Tennesen, Ph.D.

Recent Publications

Cahoon, S.M.P., P.F. Sullivan, E. Post (in press) Carbon and water relations of contrasting Arctic plants (*Betula nana* and *Poa pratensis*): implications for shrub expansion in West Greenland. *Scientific Reports*.

Gómez, S., L. Gonda-King, C.M. Orians, D.A. Orwig, R. Panko, L. Radville, N. Soltis, C.S. Thornber, E.L. Preisser, 2015. Interactions between invasive herbivores and their long-term impact on New England hemlock forests. *Biological Invasions* 17:661-673.

Finney, D.M., S. Eckert, and J.P. Kaye. 2015. Drivers of nitrogen dynamics in ecologically based agriculture revealed by long-term, high frequency field measurements. *Ecological Applications*. In press.

Martin, K.M., M.D. Hurteau, B.A. Hungate, G.W. Koch, and M.P. North. 2015. Carbon tradeoffs of restoration and provision of endangered species habitat in a fire-maintained forest. *Ecosystems* 18:76-88.

Nguyen, N., P. Fashing, D. Boyd, T. Barry, R. Burke, C. Goodale, S. Jones, J. Kerby, B.S. Kellogg, L.M. Lee, C.M. Miller, N.O. Nurmi, M.S. Ramsay, J.D. Reynolds, K.M. Stewart, T.J. Turner, V.V. Venkataraman, Y. Knauf, C. Roos, and S. Knauf. 2015. Fitness impacts of tapeworm parasitism on wild gelada monkeys at Guassa, Ethiopia. *American Journal of Primatology* 77:579-594.

Radville, L., L. Gonda-King, S. Gómez, I. Kaplan, E.L. Preisser. 2014. Are exotic herbivores better competitors? A meta-analysis. *Ecology* 95:30-36.

Venkataraman, V., J. Kerby, N. Nguyen, Z. Ashenafi, P. Fashing. 2015. Solitary Ethiopian wolves increase predation success on rodents when among grazing gelada monkey herds. *Journal of Mammalogy* 96 (1): 129-137.

Making a Difference through Composting

By Danelle Laflower

At the American Geophysical Union (AGU) conference last December, I was pleased to see recycling and composting in the conference halls. What I found however, was that many attendees did not realize that the "plastic" beer cups were compostable. Many "greenware" cups were thrown in the trash can. While removing what I could, I diverted people to the compost bin. Another attendee decided to help me, with a



Danelle rescuing "greenware" to compost. (Photo by Shuang Liang)

pinky promise, (his idea) to tell AGU to highlight what was compostable and have "compost advisers" to orient attendees. When the AGU survey came, I filled it out, as promised. Since over 24,000 people attended this conference, and AGU provided free beer every afternoon, the number of cups used was not inconsequential.

Why is composting so important? According to the U.S. Environmental Protection Agency (EPA), in 2012, organic matter (OM) (such as paper, paperboard, yard trimmings, food waste) accounted for 55% of municipal solid waste. Organic matter is physically and chemically broken down by macroorganisms, fungi, and bacteria to create nutrient-rich humus during the composting process. Instead of increasing the burden on landfills, organic resources become a desired soil amendment that improves structure and fertility.

Because 96% of food wastes and 86% of plastic containers and packaging end up in landfills, composting food and other OM (and recycling non-compostables) can make a difference. Although decomposable plant-based plastics account for a minute fraction of plastic usage, total plastic accounts for 18% of all containers and packaging by weight. Reducing the use of disposable products/packaging is the most effective waste reduction treatment, but using and composting bio-plastics is a viable second choice. As societies increasingly recognize that "there is no away" and landfill costs increase, municipal composting will increase. We can do our part by being conscious of what we buy and where we put it when we are finished. Penn State makes the "where we put it" part easy (see link).

EPA 2012 Municipal Solid Waste (MSW):

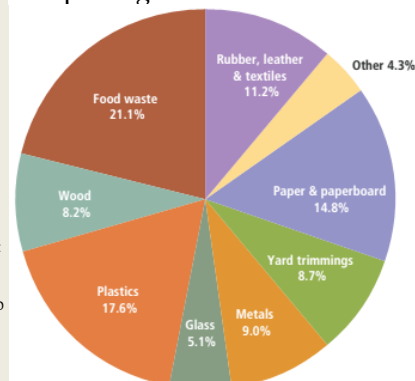
www.epa.gov/osw/nonhaz/municipal/pubs/2012_msw_fs.pdf

Greenware: www.fabrikal.com/product-solutions/greenware-faq/

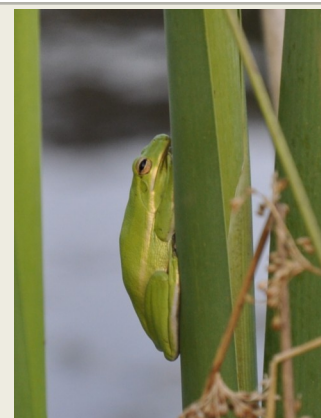
Recycle at Penn State:

www.sustainability.psu.edu/sites/default/files/documents/Recycle%20%26%20compost%20information%20sheet.pdf

EPA: 2012 total MSW discards by material AFTER recycling and composting.



Pink lady's slipper (*Cypripedium acaule*) is a locally common spring orchid, especially in acidic forests where ericaceous plants like blueberry (*Vaccinium* spp) occur. (Photo by Erynn Maynard)



A male green treefrog (*Hyla cinerea*) awaits the coming dusk when he will engage in a shouting match with fellow competitors to attract a mate. (Photo by Jenny Tennesen)

2016 Spring Seminar Series

"Novel Ecosystems: Evolution and Invasions" by Erynn Maynard, Staci Amburgey, Laura Radville, Katy Barlow, Shannon White.

Fellowships, Awards, Grants, and Achievements

Emily AlMBERG's work on wolves in Yellowstone, "Social living mitigates the costs of a chronic illness in a cooperative carnivore," was the top story for May 15, 2015, on the NSF "Science 360 News" website.

Iliana Baums received a Huck Institute 2015 Biotechnology Mini Grant.

Sean Cahoon was awarded the Huck Institutes Travel Stipend and the Department of Biology Graduate Travel Grant for travel to Shropshire, UK for a workshop entitled, "The Arctic in the 21st century: Kangerlussuaq (SW Greenland) as a sentinel of rapid, non-linear change." Sean will be leading the C-cycle section.

Andie Chan received an NSF East Asia and Pacific Summer Institutes Fellowship for coral research in Taiwan for summer 2015.

Jeff Kerby was co-awarded a National Geographic Waitt Grant (\$15,000) to link monkey facial morphometrics to behavioral and evolutionary questions.

Lauren Chaby was awarded the ESM Outstanding Undergraduate Student Teaching Assistant Award.

Courtney Davis was awarded the PSU Academic Computing Fellowship Award.

Katie Gaines received the Intercollege Graduate Student Outreach Achievement Award.

Christina Grozinger received a Huck Institute 2015 Biotechnology Mini Grant.

Anjel Helms received the Alumni Dissertation Award.

Margot Kaye received the Bellis Award and the ESM Outstanding Undergraduate Teaching Award.

Joe Keller received a spring 2015 Center for Landscape Dynamics Graduate Research Award.

Joe Keller received the J. Ben and Helen D. Hill Memorial Fund Award and the PA NASA Space Grant Award to support his work investigating how climate change will affect management for the musk thistle (*Carduus nutans*).

Jeff Kerby was named Technical Director at ConservationDrones.org.

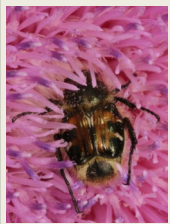
Erynn Maynard received a spring 2015 Center for Landscape Dynamics Graduate Research Award.

David Munoz was awarded a NSF Graduate Research Fellowship for his research "Determining multi-scale climate adaptation potential in a dispersal limited species."

David Watts received the J. Brian Horton Award.

Shannon White was awarded a NSF Graduate Research Fellowship to answer the question, "Can plasticity protect populations from rapid environmental fluctuation?"

The joint Ecology/ESM team for the Grad Cup Contests, "Son of a Niche," won 3rd place overall, fastest in the three-legged race, and fastest in the spoon/golf ball race.



A flower scarab beetle (*Trichiotinus* sp.) visits the flower head of an invasive musk thistle (*Carduus nutans*) at the Russell E. Larson agricultural Research Center on June 27, 2014. (Photo by Joe Keller)

The red-backed salamander is integral to forest ecosystems in eastern N.A. and serves as a great model species to understand amphibian climate adaptation. (Photo by David Muñoz)



Wolves, several of which are infected with sarcoptic mange, from Yellowstone National Park, Wyoming. (Photo credit National Park Service)



Ecology/ESM Grad Cup Team members (left to right). Front row: Jen Boulay, Laura Radville, Jackie Harth, David Watts, Andie Chan, Laura Gigliotti, Patrick Boleman; back row: Joe Keller, Chad Nihranz, Dean Taylor. Missing: Lauren Chaby, David Ensminger, and Abigail Barenblitt.