

# LRES Newsletter

## Spring 2017

Stacy Davis  
RedRock Lakes NWR

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### Congratulations Graduates!

The Spring issue is dedicated to celebrating our outstanding students, staff, and faculty. I hope you enjoy reading about our department's many accomplishments as well as the many examples of excellence and classroom engagement.

We would like to recognize those graduating this past year, which includes 15 undergraduates, 21 M.S. recipients and 1 Ph.D. recipient. Students, my warmest regards to each and every one of you; please stay in touch to let us know about the great things you are doing.

*Tracy Sterling, Professor & Department Head*

**"You have untold strengths and resources inside.  
You have your glorious self."  
-Sue Monk Kidd**

### MSU Excellence in Service Award

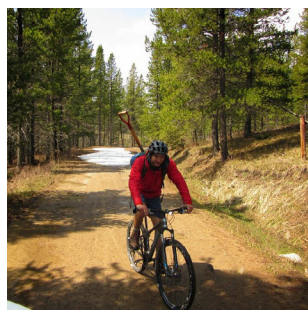


**Rosie Wallander** exemplifies MSU's strategic commitment to integrated learning, discovery, and engagement and her excellence in service begins in her 'classroom': the Engel and Environmental Analysis labs in Leon Johnson. Since 2001, she's personally mentored more than 100 undergraduate and graduate students, several postdocs, and more than a handful of faculty. Often, students arrive in Rosie's lab with little more than the room number; some come bearing soil or plant tissue samples requiring analyses. Rosie not only manages to accommodate this stream of relatively unpolished, unskilled, and unprepared visitors—she befriends them and, in the process, produces student

researchers and critical thinkers, our most valuable MSU product, and one in increasing demand. Rosie's approach is holistic: when students show up asking for her analytical guidance, Rosie will often gently guide the student to a discussion of alternative approaches to analyzing the samples, and the advantages of each. This forces her 'customers' to focus on their objectives and to pick how much precision, how much accuracy, and what level of turnaround time is critical. Rosie leaves those who visit her lab inspired by her creative problem-solving, passion for discovery, and infectious interest in stories behind numbers. Rosie has also donated countless hours, mostly on weekends, to supporting Bobcat and Bozeman community athletes. We can think of no finer exemplar of the spirit of Excellence in Service. She was recognized on April 20th with a gold pin and a \$500 gift.

**"Many of these instruments can be annoyingly temperamental, requiring both operational mastery to ensure high-quality results but also Zen-like patience and focus when it comes to troubleshooting."**

## MSU Awards for Excellence



LRES regularly produces a crop of outstanding students, and this year is no exception. Senior, **Connor Mertz**, Environmental Science, Soil and Water Science option, was recognized at the 35th Annual Awards for Excellence sponsored by the MSU Alumni Foundation.

Forty MSU seniors are recognized each year for their 3.5 or greater grade point average, their campus leadership, and their community service. Students select a mentor to be honored with them; Mertz selected Professor **Tony Hartshorn**.

## Pure Gold



**Jeff Holmes** received the PURE GOLD award at the President's reception in May. His involvement boosts the productivity and quality of field research that is vital to agricultural stakeholders in Montana. He also provides real-world instruction about the "scientific method" to the students who make use of

his lab for their research projects. Jeff's commitment to interdisciplinary teamwork is a daily positive reminder about the true value of MSU's mission of exploration and engagement.

## NACTA Awards

*The North American Colleges and Teachers of Agriculture (NACTA) Teaching Award of Merit recognizes those individuals whose efforts represent the very best in agricultural higher education and inspire all of us to achieve the highest levels of excellence. The department recognized the following awardees, chosen by the College of Agriculture, at our LRES Graduation Celebration on May 5th.*



Ms. **Shannon Dillard**, M.S. candidate, received the NACTA Graduate Student Teaching Award of Merit for her role as Lead TA for our Soils (ENSC245) course in Fall 2016. In that role, she not only shepherded her 48 students in her two lab sections to greater soils literacy, but also helped coach the other 20 teaching assistants in how to manage their own lab sections. She rewrote the laboratory manual, reorganized many of the labs, set up every lab, designed assignment rubrics, and led review sessions. Her accomplishments on behalf of the students, the other teaching assistants, and the teaching lab were inspiring as reflected in a quote from a student, "Best lab I've had so far!" while another noted

"All of my papers were graded and returned ...with a lot of feedback which was really appreciated. You were always available for help which was really important." Shannon's mark on nearly 150 students so far (across all of her lab sections, including Soil remediation [ENSC460] this semester) reflects her deep concern for students, her willingness to meet with students at any time on any day, and her vision for how to streamline instruction to maximize student learning. Finally, Shannon has participated in several iterations of "Teaching applications in LRES" (ENSC458), co-taught by Diana Cooksey and Tony Hartshorn. Shannon was nominated by Tony Hartshorn.



Mr. **Carlos Romero**, EES Ph.D. candidate, received the NACTA Graduate Student Teaching Award of Merit for his role in redesigning a lab for our Environmental Biogeochemistry (ENSC353) course in Fall 2016. Carlos went beyond the call of duty with the class greenhouse study, where students studied the effect of specific treatments (detrimental amendments such as toxins or beneficial amendments such as nutrients) on plant species of their choice, working in small groups. Carlos helped set up the study: he not only ran germination tests, but also brainstormed how to improve the study in future years. Carlos also led well-received exam review sessions, motivated in part by his personal interest in his students' success. Student evaluation comments for Carlos included "Great TA. Always available to help"; "Carlos did an excellent job at explaining concepts, especially if it was something that I didn't understand"; and "Awesome job - helpful and willing to make the material well understood." Many student comments were reminiscent of the responses he earned while serving as a Teaching Assistant in Soils (ENSC245) in Fall 2014 when a student noted "This lab was awesome! Carlos did a really great job of explaining important concepts and you can tell that he really enjoyed teaching! One of the best TA's I've had at MSU." Another noted "Carlos is super knowledgeable in all things soils and was always prepared for lab. I appreciated how he reviewed material before lab. Thanks Carlos!" Carlos was nominated by Clain Jones.



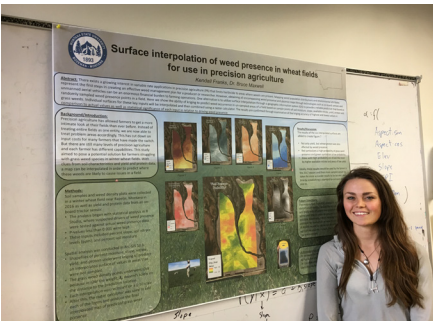
## LRES Outstanding Senior Award



**Emma Bode** has maintained a GPA of 3.97 while taking several Honors courses and has maintained these high standards while being very active in research and service activities. She has received multiple scholarships and the MSU Award for Excellence, Balanced Leadership Award, and student excellence award from the American Society for Photogrammetry and Remote Sensing. During her early years as a Bobcat, she worked with Dr. Rick Engel in his soils lab, where she received extremely high praise and recommendations. Her strong interest in geospatial technologies led her to her current position with the Spatial Sciences Center. As a researcher in the Center, she has joined the Bioenergy Alliance Network for the Rockies (BANR), a multi-institutional effort, funded by a USDA CAP grant, to evaluate converting beetle-killed trees to biofuels. As part of that effort, she helps evaluate feedstocks (i.e., biomass of beetle-killed trees) in the Rockies using Landsat satellite and NAIP imagery. With an amazing aptitude for spatial data modeling, she has become our first student in LRES to be accepted into our "seamless" MS program, working on her current research that will become part of her Master's research, while taking graduate courses during her undergrad degree. She has also presented some of her research at an academic conference on the effects of relative radiometric corrections compared to surface reflectance measurements. Additionally, Emma has had an amazing level of non-academic community commitment. She has committed considerable time and effort over the years to several non-profits and clubs committed to improving the environment and outdoor experiences in our region. She has served as co-President/founder of MSU's Sustainability Now organization and volunteers regularly for the Gallatin Microplastics Initiative. Emma also has won the first two "Science as Art" contests in the College of Agriculture with her depictions of a poplar tree and Montana stream system using GIS imagery. Ms. Bode is indeed an outstanding undergraduate student for MSU, and we look forward to working with her as she pursues her graduate degree.

*Nominator, Rick Lawrence*

## LRES Exceptional Service Award



**Kendall Franks** is a senior graduating with honors in the LRES Department. Kendall majored in Agroecology as part of the Sustainable Food and Bioenergy Systems program. Kendall takes her studies seriously and has demonstrated her mastery of critical thinking and is anxious to apply her knowledge in the "real" world. Not many students demonstrate the breadth of Kendall's undergraduate accomplishments outside normal class work. She has been an Ag Ambassador for the College of Agriculture, she participated in a study abroad program on Rural Moroccan Agroecology and she took *Colt Starting* as an elective where she was handed an unbroken young horse and had to train it.

From Jessica Murdock, the Ag Ambassadors Advisor, "*The CoA Ambassador team represents all academic programs within the College and they work in a recruitment capacity by meeting with prospective students and their families, visiting school groups and providing tours of our facilities. The Ambassadors also represent the College at a variety of events such as MSU Friday, Celebrate Ag Weekend, High School Career Fairs, State FFA Convention, the Young Ag Leaders Conference and more. In her time as an Ambassador, Kendall has enthusiastically represented the College and has demonstrated a willingness to help whomever and however she can. Kendall is open-minded and empathetic by nature; she listens to understand, and is willing to "put herself out there"- a unique combination. She has worked to promote respect and understanding amongst all individuals in the College, and is a role model for her peers in that respect. Kendall is also incredibly kind and humble. Having her on the Ambassador team has been a true highlight for me and I'll sincerely miss her help, her insight and our chats about life.*"

Following graduation, Kendall plans to return to her home in Colorado and help her dad and grandfather manage their animals including mule production and outfitting business. She has toyed with the idea of some small scale vegetable production as well. It is also likely that a graduate program will lure Kendall away from her home once again in the not-too-distant future. From all of the faculty that have enjoyed Kendall in their courses we wish her good luck and expect great accomplishment. Happy trails...

*Nominator, Bruce Maxwell*

# LRES Recognition



**Mathew Bain** won the prestigious Udall Scholarship in April 2017.



*Dr. Littlefield awarded Lifetime Achievement Award at MWCA Conference*

Entomologist, **Jeff Littlefield** was honored with the Barb Mullin Lifetime Achievement Award through the Montana Weed Control Association for his work using insects to manage noxious weeds.

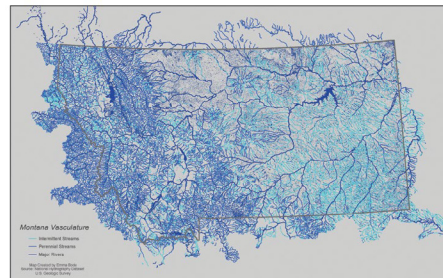


*Drs. Casey Delphia (LRES) and Mike Ivie (PSPP) display bumble bee drawers housed in Montana Entomology Collection.*

**Kevin O'Neill** and Research Scientist **Casey Delphia** were featured in *Linked to Agriculture* for their work with bees in Montana.



LRES Ph.D. alum **Heidi Smith** and advisor **Christine Foreman** published a paper titled “Microbial formation of labile organic carbon in Antarctic glacial environments” in *Nature Geoscience*.



**Emma Bode**, won the College of Agriculture annual “Science as Art” competition this year with “Montana Vasculature”- an aesthetic interpretation of Montana’s hydrology, using national drainage data from the National Hydrology Dataset. (*Linked to Agriculture*- Winter 2017)



**Rosie Wallander’s** “Going Native” garden is located on the East side of the Leon Johnson Hall Annex. Rosie uses locally collected seeds and works with Facilities to maintain the garden.



The MT INBRE Newsletter featured **Bob Peterson’s** Café Scientifique lecture which discussed mosquito-borne disease and the role of scientists in a post-fact media landscape.



**Linda McDonald** attended the Region 8 National Academic Advising Association Conference held on April 10-12 in Missoula, Montana.



**John Priscu** presented his seminar “Hidden Ecosystems Beneath the Antarctic Ice Sheet” as part of the Harrington STEM lectures at SUNY, New Paltz.



**Carlos Romero** placed second at the 54th Alberta Soil Science Workshop in Lethbridge, AB, for his research titled, “Bulk optical characterization of dissolved organic matter from wheat-based croplands in Montana, USA”.

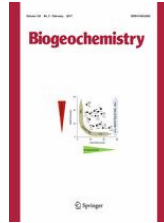


# LRES Recognition

Continued ...



**Brenda Sanchez**, a LRES graduate, has been appointed as the new agricultural water quality specialist in Washington County, Oregon.



science and its role in society.

**Jack Brookshire** co-authored editorial in *Biogeochemistry* in support of environmental



LRES co-sponsored Cuban diplomat, **Miguel Fraga** to present his lecture

on his visit to Montana and “Cuba-U.S. Relations: Current State of Affairs”.



**Emery Three Irons** received a fellowship from the National Institute of



LRES MS Alum, **Jason Baldes** was interviewed by PNW-COSMOS for his advocacy work reintroducing

buffalo to the Wind River Indian Reservation in Wyoming.



LRES undergrad, **Miles Maxcer**, won first place in the MSU Blackstone Launchpad Video Pitch Competition. The Ant Network is an entomology

organization focused on supporting research, creating resources, conducting and training others in education/outreach, and fostering a new community for ant enthusiasts.

Environmental Health Sciences (NIEHS).



**Tyler Brummer**, an LRES M.S. alum, received his Ph.D. from Lincoln University in New Zealand.



Professor **Tony Hartshorn** shared his love of soils and learning in “Meet a Member” featured in

January 2017’s CSA News.



**S. Katie Fogg** was awarded a travel grant award from The Graduate School to attend the

Society of Freshwater Science meeting in Raleigh, NC this June.

## LRES Faculty recognized at Center for Faculty Excellence Celebration

Center for Faculty Excellence Members:  
*William Kleindl & Amy Trowbridge*

Grant Writing Bootcamp Participants:  
*William Kleindl*

Online Teaching & Learning Group:  
*Gretchen Rupp*

Online Teaching Squares Group:  
*Scott Powell*

Early Career Faculty Mentoring Program:  
*Scott Powell, Lisa Rew, & Tracy Sterling*

Online Learning Consortium Mini-Grant Recipient:  
*Scott Powell*

Workshop and Symposium Presenter:  
*Bob Peterson*

Faculty Excellence Grant Recipients:  
*FY17: Kevin O’Neill; FY18: Jack Brookshire & Cathy Zabinski*

### We’d love to hear from you!

To share your research and/or professional accomplishments in an upcoming newsletter, please contact:

**Tracy Sterling**, Department Head,  
tracy.sterling@montana.edu

**Jessie Sheperd**, Administrative Associate,  
lresfrontdesk@montana.edu

## Alumni Awards



LRES Ph.D. alum, **Lisa Kirk**, President of Enviromin, Inc. received a “Shooting Star Business Grant” from the Montana Business and Professional Women Foundation.



**Erik Lehnhoff**, LRES Ph.D. alum, now an Assistant Professor at New Mexico State University, won the Outstanding Weed Scientist - Early Career Award from the Western Society of Weed Science.

## March for Science - Bozeman

*LRES faculty, staff, and students participated in the Bozeman March for Science on Saturday, April 22, 2017.*





## Faculty Spotlight

### Kevin O'Neill, Belize Sabbatical Highlights

During the first half of Dr. Kevin O'Neill's Spring Semester 2017 sabbatical, he travelled to Belize to conduct field research on a group of bees known as orchid bees. Generally, when bees are pollinators, it is females that move from flower to flower, collecting rewards of pollen and nectar while incidentally leaving behind a few pollen grains, thus benefiting the plant. Orchid bees, however, get their name from the fact that their males pollinate certain orchids that provide a unique non-nutritive reward. These orchids produce volatile chemicals that male orchid bees collect and store in cavities in their hindlegs. Later, they use their blend of fragrances as pheromones to attract and court females. There are at least 3 dozen species of orchids in Belize that require the pollination services of male orchid bees.

Orchid bees have been extensively studied in other parts of the neotropics, but very little is known about them in Belize. So, the first step in the research was to conduct a country-wide survey of the species present. Fortunately, efficient collecting of male orchid bees is facilitated by the use of traps baited with fragrances, some of which are similar to those produced by orchids. The fragrances used for the present survey were eucalyptus, vanilla (natural, not artificial – orchid bees are picky!), clove, wintergreen, and a substance called skatole, which is a component of animal feces. Not surprisingly, skatole is somewhat nasty to

work with in high concentrations, but at low concentrations it has a pleasant odor, which is why it is a component (believe it or not) of some human perfumes and ice creams.



A male orchid bee, *Eulaema cingulata*, investigating a bait.

Over 3800 “trap hours” of sampling in 43 jungle and pine savannah sites in Belize garnered >2000 males of ~20 species in four genera. The next step is to complete species identification of the bees and to analyze the preferences of each species for different fragrances, as an aid to designing future studies. During the visit to Belize, Kevin and his colleagues also initiated studies aimed at 1) determining the fragrances naturally collected by Belizean orchid bees and 2) understanding how males detect the chemicals they gather. Along different lines, Kevin's sabbatical is also being used locally to continue a study of the thermal biology of the wasp *Isodontia elegans*, a member of a genus known as grass-carrying wasps.

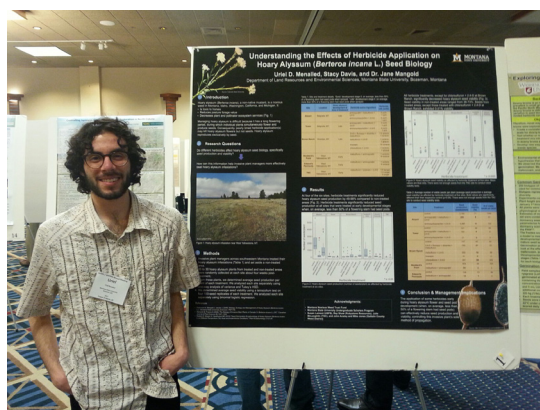
*Kevin O'Neill, Professor of Insect Behavior and Ecology*

### Research & Outreach in Photos



To the left: Professor *Jane Mangold* (second from the right) participated in a live broadcast of “Voices of Montana,” aired through the Northern Broadcasting System, featuring a panel of experts answering questions related to state-listed noxious weeds at the 60th annual meeting of the Montana Weed Control Association in Great Falls, MT on January 11, 2017.

To the right: Undergraduate student *Uri Menalled* presented a poster at the 70th Meeting of the Western Society of Weed Science titled “Understanding the effects of herbicide application on hoary alyssum (*Berteroa incana*) seed biology,” in Coeur d'Alene, ID, March 13-16, 2017.



## Research & Outreach in Photos



Ph.D student **Abdullah Alowaifeer** is studying the bioaccumulation and biomagnification of arsenic and mercury in an aquatic food chain. Every summer, he samples from Yellowstone Lake to understand different accumulation patterns and factors affecting concentration in plankton biomass.



The invasive species section team at the 2016 Montana State University Science Olympiad was comprised of members from the Mangold lab. From left to right: **Stacy Davis**, **Shantell Frame-Martin**, and **Noelle Orloff**



## Second Annual Bohart Social



Our second annual LRES Bohart Ranch Social was held on Monday, January 16<sup>th</sup>. The event was well attended with nearly 40 faculty, staff, and students. The morning was spent cross-country skiing, snowshoeing, and playing games. Cravin's catered our lunch at the not-so-warm Warming Hut, thank goodness for the wood stove! Snow conditions were fantastic and overall it was a great day. We are so fortunate to have this beautiful facility here in Bozeman and hopefully the new management will allow us to continue coming back for this annual event.

*Community Chair, Rick Engel*





# Using AnyLogic Multi-method Simulation Software to Model Disease Spread in a Complex Livestock Supply Chain



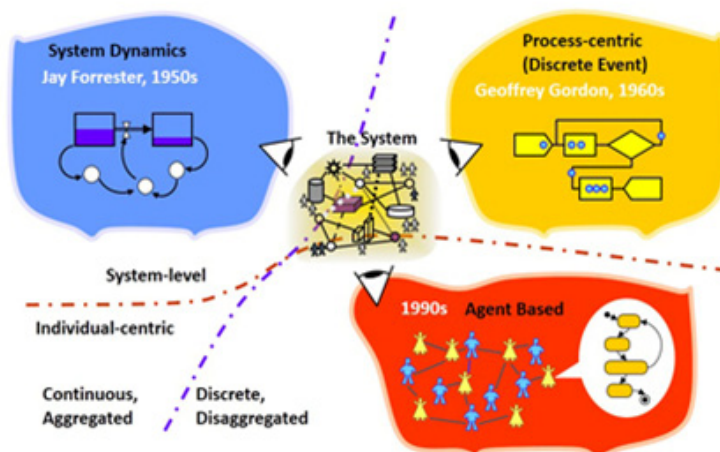
On January 10 through 12th of this year, Mr. Serge Wiltshire, a PhD candidate at the University of Vermont, was a guest of MSU providing technical assistance and a public seminar on AnyLogic multi-method simulation software. Mr. Wiltshire introduced

AnyLogic software as a dynamic and flexible tool valuable for simulating social ecological systems, manufacturing systems, supply chains, public health scenarios, and other systems. The primary simulation demonstrated in his seminar used the hypothetical spread of a pathogen through North Carolina's pork industry (Image 1). Hundreds of disease outbreaks based on spatial, temporal, and social variables of this supply chain can be simulated in seconds. Outbreak simulations can be viewed via a GIS layer, while designated data are collected and available for export to a database or statistical software.

Mr. Wiltshire's broader interests include behavioral economics game development, agent-based computer modeling, computational network analysis, and other complex systems research, with an eye toward improving food system resiliency. He is affiliated with the Social-Ecological Gaming and Simulation (SEGS: [www.uvm.edu/~segs/](http://www.uvm.edu/~segs/)) Lab, a transdisciplinary research lab focused on modeling and simulating Social-Ecological Systems (SEs). During his visit, Mr. Wiltshire also provided peer-to-peer tutoring on AnyLogic and Java. His visit was funded by Land Resources and Environmental Sciences, Animal and Range Sciences, and MSU Extension; he was hosted by Tommy Bass.

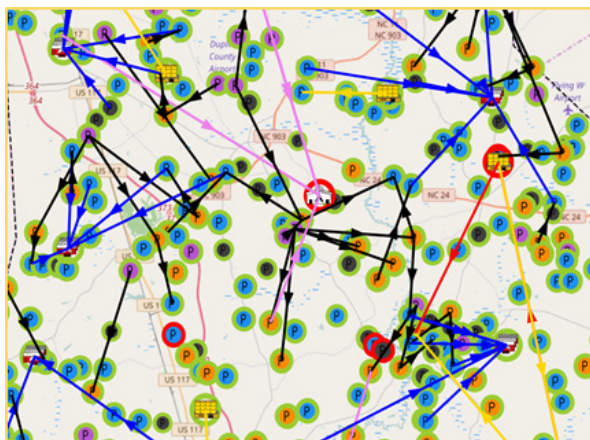
AnyLogic has significant commercial use by logistics

companies and entities that manage complicated supply chains. It is also beginning to have an academic following, particularly in public health research. The University of Saskatchewan offers an annual AnyLogic "boot camp" for researchers each summer. It appears it may be an appropriate tool for studying food system dynamics, particularly flows resources and knowledge through supply chains and social networks. The AnyLogic Company claims it is the first and only tool that brings together system dynamics, process-



centric (Discrete Event), and agent based methods within one modeling language and one model development environment (Image 2). AnyLogic is relatively user friendly and enables the modeler to address varying levels of complexity in business, economic, natural, and social systems. Self-education licenses for AnyLogic are free and academic/research licenses are offered at a discounted rate (<http://www.anylogic.com/>). No commercial endorsements for AnyLogic are implied.

**Tommy Bass, Ph.D. Student  
Associate Extension Specialist**



*To the left: Image 1 demonstrates a hypothetical simulation of pathogen spread through North Carolina's pork industry.*

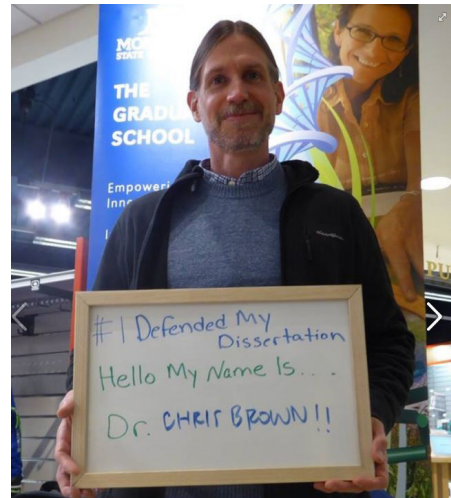
*Above: Image 2 illustrates the system dynamics modeled within AnyLogic. The tool was created to model process-centric (Discrete Event) and agent based methods in tandem.*

*Photos by Tommy Bass*

## Graduate Student Corner



LRES online graduate student, **Emily Lankau** presented her professional paper on the “Application of Remote Sensing to Monitoring Black-Tailed Prairie Dog (*Cynomys ludovicianus*) Colonies in South Dakota”.



**Chris Brown** defended his dissertation, “Natural Enemy Abundance and Biocontrol in BT Maize Using Simulations of Predator-Prey Interactions”.

## SNOW: Climate Science Forum



On Wednesday, April 5th, Sustainability Now (SNOW), a Montana State University club dedicated to unifying the student body voice around climate change, and local sustainability partnered with MSU’s Extension Climate Science Team to put on a Climate Science and Outreach Forum. The event highlighted researchers, educators, and community activists’ climate-related projects and experiences they and their colleagues are working on. A diverse range of professionals with backgrounds ranging from soil science, climatology, economics, agriculture, climate policy, and politics presented their work. From 1-5 PM, ten-minute talks graced the SUB ballrooms under three headings: 1) Climate Research 2) Climate Communications and 3) Climate Policy. A representative from Senator Tester’s office also gave a statement regarding Climate Change impacts to Montanans. After each section the speakers were asked to come to the front for Q&A from the audience. The diverse perspectives of speakers allowed for unique questions and overall great community engagement. For those wishing to learn more about the event, or see the slides discussed, all presentations will be posted on MSU’s Extension Climate Science website.

*Kory Kirby, LRES Student*



Left: Professor **Fabian Menalled** presents on “Perceptions about Climate Change” at the Climate Science Forum

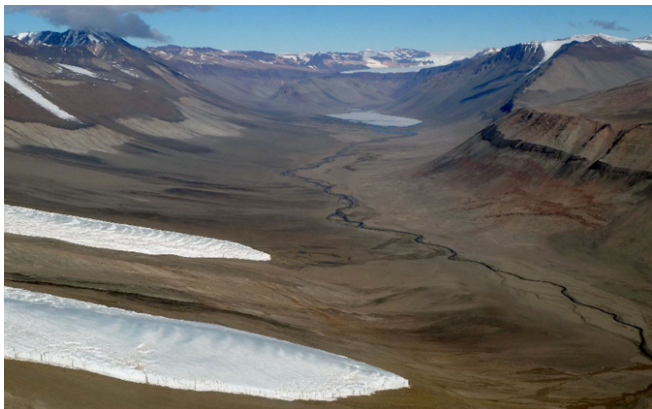


Right: Professor **Tony Hartshorn** discussed COO Carbon Concepts



## Antarctica LTER Update

The Priscu Research Group (<http://www.montana.edu/priscu/>) will begin its 25th year of research this fall in the McMurdo Dry Valleys, Antarctica, as part of the Long Term Ecological Research (LTER) program. The LTER is a National Science Foundation funded program with the goal of collecting long-term data for the purpose of documenting and analyzing environmental change. The McMurdo Dry Valleys LTER site is one of two Antarctic LTER sites. It is located in an anomalous area, which covers only 0.03% of the continent, where loose gravel and rocks canvas the ground instead of the polar ice cap. Air temperatures, which average about  $-20\text{ }^{\circ}\text{C}$  over the year, reach  $0\text{ }^{\circ}\text{C}$  for about 4-10 weeks each year. During this time, glaciers melt into short-lived streams, which flow into lakes permanently covered with up to 5m of ice.



Dr. Priscu's research is focused on the lakes of the McMurdo Dry Valleys. His teams have visited these lakes for 34 years, collecting biological, chemical and physical data on the water column and ice covers. Despite the cold-water temperatures ( $-5^{\circ}$  to  $+4^{\circ}\text{ C}$ ) and low light (only 1-3% of incident irradiance penetrates the thick ice covers) nature of these lakes, in concert with 6 months of polar night, they are home to microbes adapted to surviving in extreme conditions.

Because this frozen environment hovers on the edge of melting during summer, small changes in climate can have magnified effects on the ecology of the system, making it a sensitive indicator of climate change. The streams that flow into the lakes can turn on-and-off like a faucet. A small increase in air temperature or a sunny day can result in glacial melt and the "turning on" of streams, which can deliver an increased load of nutrients to the lakes, or in surface melting and thinning of the lake ice covers, resulting in increased solar energy to lakes. Watching the ecosystem react to temperature and solar changes throughout the day is intriguing. In the morning a streambed may be dry, and a few hours later it is home to a flowing river. The lake ice may be solid in the morning, and by the afternoon the team is wading through melt pools to reach the sample site, hoping to finish the day with dry feet.

We begin our 25th year of research in the McMurdo Dry Valleys knowing not only that our research is contributing to an understanding of how microbes survive in extreme environments, but with the knowledge that we are monitoring an ecosystem that is one of the most sensitive indicators of environmental change. The dry valleys ecosystem is a relatively simple system, completely microbially dominated, and exempt from human impacts, land-use influences, pollution, and allochthonous inputs. Understanding the response of this simpler system to changes can provide insight into how more complex temperate systems may respond to a warming climate.



*Amy Chiuchiolo, Research Associate*



*Above: Priscu Lab Ph.D. student Madie Willis, and the team with the drill used to make a sampling hole in the lake ice.*

*Left: A team member attempts to get out of a melt pool on the surface of a study area during an extremely warm season.*

# NEW COURSE

## ENSC 466: Chemical Ecology with Professor Trowbridge



### Chemical Ecology ENSC 466/LRES 566

Fall 2017 (3 CR)

MWF 9:00-9:50 Linfield Hall 109A



Chemical communication among plants, insects, animals, and microbes -- from genetic coding to global environmental processes.

This course highlights the

synthesis,  
function,

ecology, and

evolution of secondary metabolites as they relate to interactions  
between organisms and their environment.

Special emphasis on chemically mediated plant-plant, plant-insect,

and plant-microbe interactions

Questions? Contact Dr. Amy Trowbridge

([amy.trowbridge@montana.edu](mailto:amy.trowbridge@montana.edu))

Why are chiles spicy? Do microbes engage in chemical warfare? Can plants and fish communicate underwater? These are just a few of the questions we address in this course that focuses on understanding the chemically-mediated interactions between plants and organisms. We discuss the multiple roles of plant secondary metabolites (PSMs) and the complex interplay between PSMs, multi-trophic level interactions, and the environment to understand the importance of these relationships across multiple scales of ecological organization. Specific topics include recent methodological advances in the field (namely metabolomics, transcriptomics, and proteomics), plant-plant signaling, natural selection for anti-herbivore PSMs, temporal changes in PSM production, climate induced changes in PSMs and ecological interactions, the role of PSMs in determining soil microbial community dynamics, plant foliar defenses, PSMs and food chains/community dynamics, and other emerging concepts in the field.

*Amy Trowbridge, Assistant Professor of Chemical Ecology*

## UPDATE: LRES Undergraduate Club



*The LRES Undergraduate Club's Research Mixer was an opportunity for faculty and students to network, discuss research projects taking place in the department and find employment opportunities for the summer and fall semesters.*

*Top Left: Professor Fabian Menalled discusses his research.*

*Top Right: Professors Tony Hartsorn & Jane Mangold attended the research mixer.*

*Bottom: Participants of the LRES Research Mixer.*





# 7th Annual LRES Research Colloquium



*Tracy Sterling welcomes attendees.*

On April 25th, 2017, the LRES Graduate Student Organization (GSO) hosted the 7th annual LRES Research Colloquium which was, yet again, a huge success and a great end of the semester event showcasing the diverse graduate and undergraduate research within the department.

The colloquium offered 21 students the opportunity to present their research to faculty, staff, and students from across campus. Participation and turnout for the event was great and provided a welcoming environment for discussion while enjoying good food and drinks. A poster session kicked off the colloquium followed by oral presentations and wrapped up with a very interesting keynote talk by Scott Patterson from the Montana Department of Environmental Quality. Mr. Patterson's talk titled "A public health perspective of nitrates in Montana's drinking water," provided explanation of several case studies which described the underlying mechanisms driving nitrate pollution in drinking systems throughout the state.

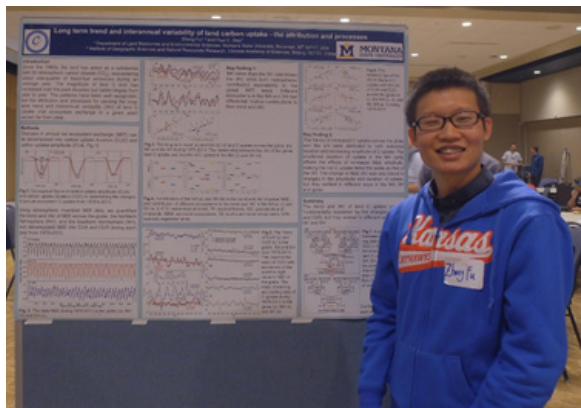
Excellent door prizes were again donated by local businesses, leading to many event goers leaving with more than they came with, besides a full stomach and

head full of thought. Both oral and poster sessions were judged for the opportunity to win great prizes. Poster judges were Drs. Jia Hu and Yuriko Yano from the Ecology Department, Dr. Qian Wang and Ms. Amy Chiuchiolo from the LRES Department. Oral presentations were judged by Drs. Ryan Thum and Laurie Kerzicnik from Plant Sciences & Plant Pathology and Dr. Lindsey Albertson from Ecology. A huge thank you to all the judges for volunteering their valuable time and energy to make the LRES Colloquium a successful event.

Presentations were very competitive and the judges were left with a difficult decision in assigning winners for each category. The first, second, and third place awards for oral presentations went to Subodh Adhikari, Audrey Harvey, and Uriel Menalled, respectively. The top two poster awards were awarded to Kelsey Wallisch-Simon and Madison Nixon. Winners had their pick of several prizes including two portable, waterproof, Bluetooth speakers, a two-person tent, an inflatable kayak, and a Crazy Creek camp chair. Congratulations to this year's winners and thank you to all oral and poster presenters putting in the time and energy to make the colloquium a great success! Everyone did a great job!

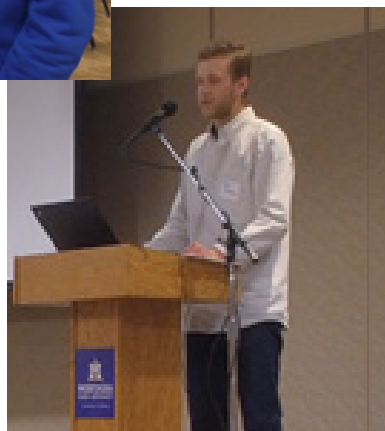
Thank you to the LRES Department and the MSU Office of Student Engagement for providing generous funding for this great event. Many thanks to the GSO for putting in their time and effort to make the 7th Annual LRES Research Colloquium a huge success and to Dr. Jane Mangold for advising us and keeping us in line!

*GSO Leadership: Tessa Scott, Keenan Brame, Kim Roush, Madie Willis, Buddhi Achhami, Chris Caron*



*Above: Visiting Ph.D. student, Zheng Fu presented a poster during the colloquium.*

*To the left: LRES undergrad Paul Hegedus gives his oral presentation on "Assessing spatial factors influencing evolution of herbicide resistance in populations with an Individual Based Model".*



## 2017 Colloquium Winners:

### Poster Presentation

1st Place: Kelsey Wallish-Simon  
2nd Place: Madison Nixon

### Oral Presentation

1st Place: Subodh Adhikari  
2nd Place: Audrey Harvey  
3rd Place: Uri Menalled

# LRES Degrees Awarded Spring 2017

## Bachelor's Degrees

### Environmental Sciences-Environmental Science

*Benjamin Farrick, with Highest Honors*

### Environmental Sciences - Environmental Biology

*Jessica Chrisp, with Honors*

*Jeremiah Mathis*

*Chance Noffsinger, with Highest Honors*

### Environmental Sciences - Soil & Water Science

*Hayden Altenburg*

*Hannah Johnson, with Highest Honors*

*Connor Mertz, with Highest Honors*

### Geospatial & Environmental Analysis

*Emma Bode, with Highest Honors*

### Land Rehabilitation

*Zachary Eddy*

*Kory Kirby, with Honors*

### Sustainable Foods & Bioenergy Systems-Agroecology

*Kendall Franks, with Honors*

## Graduate Degrees

### Master of Science

#### Land Resources & Environmental Sciences

*Sarah Fogg (Summer)*

*Jeffrey Patriarche*

*Nar Ranabhat*

*Tara Saley (Summer)*

*Lora Soderquist*

### Online Master of Science

#### Land Resources & Environmental Sciences

*Autumn Coleman (PMSEM\*)*

*Lucus Gamble (PMSEM\*)*

*Emily Lankau*

*Cianne Martin*

*Hayley Smith*

### Doctor of Philosophy

#### Ecology & Environmental Sciences

*Christopher Brown (Summer)*

*Krista Ehlert*

*Carlos Romero (Summer)*

*Angela Tang (Summer)*

*Jason Wood (Summer)*

*\*Professional Master in  
Science and Engineering  
Management (PMSEM)  
with LRES Track*

## Opportunities to Support LRES

A gift to the department is a great way to support student and faculty endeavors. Donations can be earmarked for student scholarships or internships, graduate fellowships, undergraduate and graduate student programs, endowed professorships, and more. For information about making a donation to the Department, please contact Kevin Brown, MSU Alumni Foundation, College of Agriculture, Director of Development (406-994-4815 or [kbrown@msuaf.org](mailto:kbrown@msuaf.org)).

