



Fall 2017

Department of Geological, Environmental, and Marine Sciences (GEMS) at Rider University  
<http://www.rider.edu/gems>

## GEMS CELEBRATES 50 YEARS OF STUDYING THE EARTH



GEMS celebrated its 50<sup>th</sup> anniversary as a formal department during the 2107 Rider reunions on June 10, with nearly 70 GEMS alumni, faculty, and friends attending the department's campus walk and/or dinner. It was, to say the least, a fantastic day of fun, fellowship, and great memories.

The day began with a morning walk across campus to Centennial Lake and the back woods. Led by **Drs. Kathy Browne** and **Dan Druckenbrod**, the walk focused on the environmental importance of the two campus features and the research past and current GEMS students have carried out on them.



GEMS alumni walk attendees included **Jennifer Durkin Aiken '00**, **Ron Bannister '85**, **Rita Beale '84**, **Jennifer O'Reilly**

**Carlson '01**, **Cheryl Coffee '93**, **Randy Kertes '84**, **Ashleigh Layton '08**, **Harmony Liff '06**, **Mark Manning '01**, **Laura Moritzen '15**, **Jessica Munyan '16**, **Elaine Panuccio '15**, **Hayley Purcell '16**, **Steve Schwartz '15**, **Reed Schwimmer '84**, **Craig Sinkler '15**, **Jillian Spratt '14**, and **Vicki Trucksess '16**. Former faculty member, and first GEMS Chair, **Dr. Walter Spink**, also participated in the walk (see photo above).



**Rosemary Nadeau**, **Mary Jo Hall**, **Walter Spink** (first row), **Randy Kertes**, **Jeannie Alexander**, **Rita Beale**, **Reed Schwimmer**, **Diane Pupa**, and **Jon Husch** (second row) at the GEMS dinner.

In the evening, a 50<sup>th</sup> anniversary dinner was held in Fireside Lounge. Additional GEMS alumni who attended the dinner included **Caroline Baptist '12**, **Steve Bell '79**, **Greg Dietl '95**, **Brita Gove '13**, **Norbert Iari '15**, **Kelly Krolik '14**, **Kate Krsnak '13**, **Susan Zabrocky Long '09**, **Rachel Nangle '16**, **Carl Natter '09**, **Matt Nelson '09**, **Diane Pupa '84**, **Kaitlyn Rose '13**, **Muhammad Sarwar '15**, and **Robert Verrastro '80**. In addition, former GEMS faculty member, **Dr.**

**Mary Jo Hall**, as well as former GEMS faculty spouses, **Jeannie Alexander** and **Rosemary Nadeau**, attended the dinner.

A highlight of the dinner was a wonderful presentation by Robert Verrastro recounting the evolution of his career entitled "Oil and Water Do Mix: My Life as an Earth Scientist." Steve Bell also made some very passionate remarks about the centrality of the Earth Sciences in recognizing and solving many current and controversial environmental issues.

Everyone at GEMS is so thankful and glad so many of you could join us and be part of GEMS Pride!

Finally, many GEMS alumni have given already to *The Campaign for GEMS: Preparing for the Next 50 Years*. In fact, the department has been able to raise over \$47,000 towards the renovation of GEMS lab and teaching space on the first floor of the Science and Technology Center.



*A preliminary plan for the renovated GEMS labs 112 and 111.*

As you may already know, Rider currently is fundraising for a major renovation of the entire Science and Technology Center (Science Hall to the more senior alumni). The first phase of that renovation has already been completed, although it did not include any of the primary GEMS teaching spaces. By donating to *The Campaign for GEMS*, you will help renovate these rooms and make GEMS more attractive to potential students by ensuring that the

department has modern, state-of-the-art teaching classrooms and labs for years to come.

If you wish to donate to *The Campaign for GEMS* and have any questions or require further details, please contact Kathy Browne, GEMS Chair, at [browne@rider.edu](mailto:browne@rider.edu), or Caroline Cleaves, Associate Director of Major Gifts, at [ccleaves@rider.edu](mailto:ccleaves@rider.edu).

Our thanks to all who have donated already and to those who will!

## **MARINE SCIENCE IN ROATAN, HONDURAS!**

Once again, GEMS marine science field course (MAR-229) was held on Roatan Island off the coast of Honduras. This summer, 9 Rider students successfully completed the two-week field course based at Anthony's Key Resort and at the Roatan Institute for Marine Science (RIMS). The course was team-taught by **Dr. Reed Schwimmer** and **Danielle Schmitt**, instructor at Princeton University and adjunct instructor for GEMS.



*View of Anthony's Key.*

With more than 30 miles of fringing and barrier reefs, sea grass beds, mangroves, and rocky limestone shorelines, RIMS offers students the ideal venue for research and for gaining valuable field experience. GEMS has cultivated a relationship with RIMS over the past 18 years and is the only college or



university in New Jersey to participate in RIMS's educational programs.

The GEMS majors who had to “suffer” in this tropical paradise are: **Hannah Bayer '18, Sam Cramer '17, Ian Flynn '17, Tiffany Girado '18, Naomi Jainarine '18, Carrie Nyce '18, Miranda Rosen '17, Aleesha Rouse '18, and Samantha Watkins '18.**



*Excitement of the first boat ride!*

RIMS is a renowned research and teaching institution dedicated to the study of tropical marine ecosystems including behavioral research and training of Atlantic bottlenose dolphins housed at the facility. Students



*Dolphin training.*

receive four academic credits, learn about the ecology of Caribbean coral reefs, and developed a deeper understanding of how physical factors influence biological factors in various ecosystems.

Research activities during the course include coral mapping; sea fan orientation; fish diversity; and the abundance and distribution of organisms in turtle grass and rocky intertidal ecosystems. They also spend a day working and swimming with the dolphins as they learn about dolphin behavior. The course culminates with students designing, implementing, and presenting their own independent research project.



*Miranda carefully counting those rock-boring urchins.*

Each day at RIMS involves a full day of instruction, field work, and lab work. The experience is one of constant exploration and discovery in which the students engage in hands-on research. The classroom is connected to a fully equipped dry lab and wet lab, which students can use to collect and analyze data. They are also able to avail themselves of a 42-foot dive boat that transports the students to different marine environments around the island.



*Another long night in the classroom!*

This immersion experience really develops the students' skill set beyond what a semester-based course could provide. They hone their scientific writing skills and sharpened their analytical and research skills. By visiting a different country and by experiencing a different culture, some of the students might



initially feel out of their comfort zone, but this allows them to gain a more global view of human issues, thereby broadening their own perspective on academic subjects. These are valuable real-world experiences that add depth to graduate school applications and to job interviews.

## GEMS 2016-2017 STUDENT RESEARCH

As has been the case for many years, a major strength of a GEMS education is the ability for our students, even freshmen, to become actively involved in independent research, usually under the mentorship and guidance of one of the GEMS faculty. The following is a complete listing of all student research, independent study, and senior thesis topics for the 2016-2017 academic year, including six student projects that resulted in papers being presented at a professional meeting or conference. It really is a very impressive list.

**Mickey Bagnato:** *Age and condition of Largemouth Bass in Centennial Lake*

**Kelly Catino:** *Effect of meteorological conditions on behavior of captive bison at Six Flags Wild Safari Park*

**Ambria Dell'Oro:** *Geochemical identification of erosional pathways of garnets from the Wissahickon Formation, Pennsylvania*

**Nicole Donato and Maria Chaves:** *Variations of lead concentrations in soil profiles near*

*an Interstate highway in New Jersey* (student co-authors of a paper presented at the 2017 Annual Meeting of the Geological Society of America Northeast Section)

**Ian Flynn:** *Past and future rates of stream erosion along Crosswicks Creek, Mercer County, New Jersey* (student co-author of a paper presented at the 2017 Annual Meeting of the Geological Society of America Northeast Section)

**Tim Forrest, Maria Chaves, and Imani Guest:** *Tree growth correlations and spatial distributions in an acid deposition treatment watershed at Fernow Experimental Forest, West Virginia* (student co-authors of a paper presented at the Annual Meeting of the Mid-Atlantic Chapter of the Ecological Society of America)

**Julia Galayda:** *The effect of algal density and diversity on organisms in New Jersey*

**Imani Guest:** *Strengthening a historical climate record in south-central Pennsylvania with tree rings dating back 600 years* (student co-author of papers presented at the Annual Meetings of the Mid-Atlantic Chapter of the Ecological Society of America and at the SAEOPP McNair/SSS Scholars Research Conference)

**Imani Guest:** *The provenance of New Jersey barrier island garnets*

**Rachel Pereira:** *Biodiversity study of macroorganisms with algae communities in Centennial Lake at Rider University*

**Miranda Rosen:** *Examining the effects of coastal zone management techniques on population characteristics of Mole Crabs (*Emerita talpoida*) along the New Jersey shore*

**Miranda Rosen:** *Examining music as a type of environmental enrichment on two California Sea Lions (*Zalophus californianus*) at Six Flags Great Adventure*



**Vicki Trucksess:** *Meerkat lookout behavior in the Philadelphia Zoo's newest attraction: Meerkat Maze* (student author of a paper presented at the 2016 Philadelphia Zoo Research Symposium)

**Vicki Trucksess:** *Precipitation and population variability on South Carolina Firefly populations* (student co-author of a paper presented at the 2016 Annual Meeting of the Association of American Geographers)

## GEMS NEWS, HONORS, AND AWARDS

It's been another very busy and productive year for GEMS, with all the abundant and varied faculty and student activity that has become typical in the department. In particular, GEMS faculty and students continue to make news in all sorts of important ways, including teaching, research, travel, awards, and honors.

As far as GEMS faculty are concerned, **Dr. Kathleen Browne** began work on two new grant funded projects, the first exploring how middle and high school teachers can work with informal science educators to create instructional materials that use the engineering design process to civically engage learners. A second project is designed to pilot a professional development program for K-12 teachers created by the American Museum of Natural History and the Biological Science Curriculum Study. In addition, Kathy was invited by Texas Women's University and the Southwest Regional Center of Innovation for SENCER (Science Education for the New Civic Engagement and Responsibilities) to present some of her work using the Next Generation Science Standards (NGSS) to help K-1 teachers infuse civic engagement into their instruction. She continued to serve as the Co-Director of the SENCER MidAtlantic Regional Center for Innovation. Kathy also mentored **Rachel Pereira '18** on her Centennial Lake algae study and **Mickey Bagnato '17** on his Centennial Lake Largemouth Bass project.

Finally, with **Dr. Husch** stepping down as GEMS Chair, Kathy will be taking on that responsibility. She asks everyone for lots of patience as she figures out how to do the job!

**Dr. Daniel Druckenbrod** continued as the Sustainability Studies Program Director, while also continuing his research program on forest ecology and the analysis of tree rings from North American forests. This research currently is supported by a research grant from the National Science Foundation involving collaborators at Indiana University and the University of Virginia, which will look at forest hydrology and acid deposition. **Maria Chaves '18**, **Tim Forrest, '18**, **Imani Guest '18**, and **Jessica Munyan '16** (UVA graduate student) worked along with Dan collecting tree cores in the Fernow Experimental Forest, West Virginia and from Shenandoah National Park, Virginia (see photo). While the fieldwork was challenging at times, often hiking over ten miles per day up and down heavily wooded ridges, the scenery more than made up for the effort!



**Dr. Druckenbrod and students in Virginia.**

**Dr. Druckenbrod** also authored or co-authored three peer-reviewed journal articles over the past year, including one highlighting the connection of Rider's back woods to Aldo Leopold, who referred to them as the 'Big Woods' when he was a high school student in Lawrenceville in 1904-1905. The article can be downloaded at no charge from the journal *New Jersey Studies*. Dan also gave several invited presentations, including one on tree-ring statistical methods at an NSF-sponsored

workshop at Harvard Forest, and another talk on the forest history of Thomas Jefferson's Poplar Forest Plantation on site in Virginia. Dan also worked with **Maria, Tim, and Imani** to present their research projects on tree rings and forest growth at the Mid-Atlantic Ecological Society of America Annual Meeting at Stockton University in April.

**Dr. Jonathan Husch** completed his eleventh, and final, year as GEMS Chair, once again managing, somehow, to not destroy the department entirely. He now is looking forward to spending the next few years before retirement living the good life as a plain (very) old faculty member. This past year, in addition to his duties associated with being department chair, Jon served as a member of the Rider University Strategic Planning Institutional Reputation and Branding Working Group. He also had the pleasure of cruising along the Straits of Magellan and the Beagle Channel with his extended family, enjoying the beautiful sites and fantastic geology of Patagonia at the southernmost tip of Chile and Argentina, including a very windy, chilly, and rainy stop at Cape Horn (see photo).



***Dr. Husch and family at Cape Horn***

**Dr. Reed Schwimmer** continued to serve as a Head Judge for the Mercer County Science and Engineering Fair, as well as being a judge for Rider's ISCAP Day student research presentations. He also continued to write and review questions for the ETS PRAXIS Earth and Space Science teacher certification exam and to lead the department's assessment activities. In addition, Reed co-authored a

conference paper with **Ian Flynn '17** on documenting changes in stream morphology of Crosswicks Creek that was presented at the 2017 Meeting of the Geological Society of America. Reed also worked with **Imani Guest '18** and **Ambria Dell'Oro '17** on two projects focusing on the geochemistry and provenance of garnet grains from NJ and PA shorelines. Both projects were presented at Rider's ISCAP Day.

**Dr. Gabi Smalley** continued her research on the effects of chemicals produced by phytoplankton on feeding by micro-zooplankton, in collaboration with scientists at the University of Maryland and University of Akron. Together with **Dr. Browne**, she also piloted an independent study opportunity for GEMS students to conduct animal behavior research at Six Flags Great Adventure's Wild Safari Park. This spring, she worked with two students to conduct research at the park: **Kelly Catino '18** studied the effect of temperature on bison behavior and habitat use, while **Miranda Rosen '17** investigated the effect of music on sea lion behavior. **Dr. Smalley** continues to serve as the Rider University Liaison to the New Jersey Sea Grant Consortium and as the GEMS Study Abroad Advisor. She also is Chair of Rider's Undergraduate Research and Scholarship Awards (URSA) Committee, as well as being responsible for organizing the ISCAP Day student research presentation program.

**Dr. Hongbing Sun** continued his ongoing research on the mobilization of arsenic, lead, mercury, and other ions from soil into ground and surface water due to the application of winter deicing salt. He mentored and co-authored a paper with **Nicole Donato '17**, **Maria Chaves '18**, and **Muhammad Sarwar '15** on the *Variations of Lead Concentrations in Soil Profiles Near an Interstate Highway in New Jersey*, which was presented by **Nicole** and **Maria** at the Geological Society of America Northeastern Section Annual Meeting.

**Dr. Sun** also has expanded his research interests into the general area of environmental health science and recently has authored three separate research articles on the potential connection between environmental pollutants and the occurrence of Multiple Sclerosis, Parkinson's Disease, and Alzheimer's Disease, published in the Journal of Multiple Sclerosis, Environmental Geochemistry and Health, and the Journal of Alzheimer's Disease, respectively. Hongbing also has accepted an invitation to be a 2018 Associate Editor for the Journal of Alzheimer's Disease. He welcomes students who have an interest in environmental health science to join him on this cutting-edge research.

As for our students, **Ambria Dell'Oro '17**, and **Ian Flynn '17** are starting graduate studies this fall, although in rather different areas within the geosciences. **Ambria** is attending the University of Arizona and will pursue a Master's Degree in Hydrology. **Ian** is heading to the University of Pittsburg (with a full tuition waiver and a teaching assistantship stipend) for his Master's Degree in Planetary Geology/Remote Sensing and hopes to eventually pursue his doctorate in the same fields. Congratulations to both!

**Imani Guest '18** and **Naomi Jainarine '18** participated in National Science Foundation (NSF) Research Experience for Undergraduate (REU) programs during the summer. **Imani's** REU was at the University of Hawaii-Manoa, where she studied volcanology and the petrology and geochemistry of mantle and crustal xenoliths found in basalts from Hawaiian volcanoes. She also learned how to operate an advanced, state-of-the-art electron microprobe. **Naomi's** REU was at the Oregon State University Hatfield Marine Science Center, where she studied the effects of natural and anthropogenic climate change on the reproductive success of the economically important Black Rockfish (*Sebastes melanops*) in the eastern Pacific Ocean.

**Ambria Dell'Oro '17** and **Nicole Donato '17** attended the same geology field camp run by the South Dakota School of Mines and Technology and held in the Himalaya Mountains of Nepal! Despite the high elevation, rough terrain, and somewhat primitive living conditions, they both said the camp was an unforgettable experience, one that was well worth the physical effort, long airline flights (via Doha, Qatar!), and culture shock. They also said the geology, scenery, and Nepalese people were truly amazing.

During the 2016-2017 academic year and over this past summer, a number of GEMS students participated in off-campus internship and research programs. **Loreena Avery '19** interned with the Global Cause Foundation, doing research in China on habitat suitability for Giant Panda reintroduction. **Maria Chaves '18** worked in a research lab at Rutgers University, studying the impact of nanoparticles on human health. And, **Lauren Margel '19** interned at the New Jersey League of Conservation Voters, where she asked political candidates at public meetings around the state their positions on various environmental issues.

At Rider, **Alina Bardaji '20**, **Kristen Castronuovo '20**, **Tim Forrest '18**, and **Starla Newman '20** interned with Frank Sherman, of the Spiezle Group (campus architects), and **Dr. Druckenbrod**, working on an assessment of the amount of carbon stored in forests on Rider's Lawrenceville campus. **Tim** and **Amanda Schopf '18** also began an internship focused on conducting a campus wildlife survey under the mentorship of **Dr. Browne** and **Mark Manning '01**. And, **Veronika Geiger '17** taught an on-campus summer sustainability and technology course to high school students from Italy.

A number of GEMS students also received various honors, awards and recognition for their many academic and service achievements.

**Julia Galayda '17** graduated with honors in Environmental Sciences and Marine Sciences, and **Miranda Rosen '17** graduated with honors in Marine Sciences.

**Larissa DeScala '17, Courtney Earnest '17, Christopher Katona '17, Lauren Murphy '17, and Jennifer Schwartz '17** were inducted into the Kappa Delta Pi Honor Society; and **Courtney, Christopher, Lauren, and Justine Rawlings '17** were inducted into the Omicron Delta Kappa Honor Society.

**Christopher Katona '17** also received a certificate for Outstanding Service in the Mathematics Skills Lab and a Student Education Association Award, while **Emily Daigle '17** was inducted in the Admissions Honor Society.

Finally, **Courtney Earnest '17** and **Christopher Katona '17** received Center for the Development of Leadership Skills Leadership Certificates and were inducted into Who's Who Among Students in American Universities and Colleges.

And, as if all these awards and honors were not enough, 26 GEMS students in the fall 2016 semester and 34 students in the spring 2017 semester earned Dean's List recognition. Congratulations to all GEMS students for all their hard work and their accomplishments! We could not be more proud.

## **GEMS ALUMNI UPDATE**

In addition to the 33 GEMS alumni who attended the department's 50<sup>th</sup> anniversary celebration during the June 10 Rider Reunions (see separate article), many GEMS alumni either stopped by the department for a visit or contacted us with their latest news over the course of the last year. If you haven't done so recently, please bring us up to date with what is going on in your life.

You can find additional alumni news, including specific contact information, on the

GEMS alumni web page, located at <http://bit.ly/NTJeO2>. As always, we look forward to hearing from you.

**Trish Tardona Adams '85** has been a teacher in Austin, Texas for the past 14 years and currently is teaching math and science to fourth graders. She says that whenever she gets the chance she "brags on geologists and how much fun it is to be one." Way to go, Trish!

**Brandon Muffley '96** recently changed jobs and now is a Fishery Management Specialist for the Mid-Atlantic Fishery Management Council in Dover, Delaware. Prior to that, Brandon was the Bureau Chief for the Bureau of Marine Fisheries, New Jersey Department of Environmental Protection, where he oversaw all of the Bureau's operations, budgets, personnel, regulation development, and fisheries research and interstate management programs.

**Michael Eldert '97** is now the Emergency Department Manager at the Citrus Park Emergency Room for the Medical Center of Trinity, located near Tampa, Florida. Prior to this position, Mike served as Project Manager-Hospital Emergency Management Coordinator for Sentara Healthcare in Norfolk, Virginia where he also was an emergency medical technician and trainer for the Virginia Beach Emergency Medical Services.



**Gretchen Mattes '98** sent a short note saying she is now a registered nurse working at a hospital in Doylestown, Pennsylvania.

**Jennifer O'Reilly Carlson '01** and her husband, John, moved to the Seattle, Washington area about two years ago after living in northern Virginia for over 10 years. Jen is now an Assessment and Policy Coordinator for the Environmental Assessment



Program at the Washington State Department of Ecology. Her job involves water quality assessment, serving as the legislative lead for her program, and leading strategic planning and performance metric reporting. Jen also is involved with several work groups focused on protecting and restoring Puget Sound. Outside of work, Jen and John have started a beekeeping hobby and love to hike and camp in the Olympic peninsula and San Juan Islands.

**Dan Hewins '07** visited Rider this past year to give a talk on his current research as part of the Rider Science Seminar Series. Since graduating from Rider, Dan earned his Master's in biology in 2010 and his doctorate in 2013 from New Mexico State University (NMSU) working on various aspects of desert organic matter decomposition. After finishing at NMSU, he moved to a postdoctoral position in the Department of Agriculture, Food and Nutritional Science at the University of Alberta, Edmonton, Canada. While there, Dan and his collaborators were awarded two research grants to assess the effects of livestock grazing in leaf litter decomposition, as well as biogeochemical cycling in the grasslands of Alberta. These grants funded two large-scale field projects measuring leaf litter decomposition, microbial enzyme activity in litter and soil organic matter pools, and greenhouse gas emissions from grassland ecosystems.

In August 2016, Dan started a tenure-track position as an Assistant Professor of Biology at Rhode Island College (RIC) in Providence. In his first semester there, he received a RIC Center for Research and Creative Activity Grant to fund a hybrid course that will investigate and measure carbon pools across a range of sites on the RIC campus. Starting this past summer, Dan established his RIC research lab and began a project on the role of forestry on biogeochemical cycling in New England forests. Our congratulations to Dr. Hewins on all accounts!

**Norbert Iari '15** is now working as an Environmental Scientist II at Mott McDonald Consulting, a global engineering, management, and development company. Prior to this new position, he was a Geologist/Field Technician at Earth Engineering, Inc.

**Laura Moritzen '15** recently completed her Master's in Marine Biology at the University of Massachusetts-Dartmouth. Congratulations! Since May 2017, Laura has been working in a full-time position at the New Jersey Chapter of the Nature Conservancy as a Coastal Science Specialist. She is involved in a project there assessing the use of dredged material for restoring salt marshes.

**Elaine Panuccio '15** now is working for the Delaware River Basin Commission (DRBC) in Ewing, New Jersey as a Water Resource Technician. Elaine's position requires her to provide technical services in support of water quality monitoring, modeling, and data management. This includes meter calibrations and troubleshooting, laboratory/equipment maintenance, and analysis of basic water quality parameters such as dissolved oxygen and nutrients. She also prepares Quality Assurance Project Plans, which are written documents with directions that should be followed to ensure proper sampling techniques, which require approval by the USEPA. Elaine spends time in the lab, office, and field, which she says provides plenty of challenges and room to grow.

**Muhammad Sarwar '15** is now working as a consultant for Golder Associates at their Mt. Laurel, New Jersey office.

**Vicki Trucksess '16** started a new full-time position as a zookeeper at the Bergen County Zoo in Paramus, New Jersey. This follows her various internships at the Philadelphia Zoo where she was involved in Environmental Education and Animal Behavior and Care.