BACK TO ROATAN, HONDURAS!

As sea fans sway rhythmically in the warm, shallow water, 16 Rider students snorkel in a coral reef off the coast of Roatan, Honduras. GEMS has again successfully completed the two-week marine science field course at Anthony’s Key Resort and the Roatan Institute for Marine Science (RIMS).

The trip was part of the MAR-229 Introduction to Field Marine Science: Tropical Environments course, team-taught by Dr. Reed Schwimmer and Danielle Schmitt, instructor at Princeton University and adjunct instructor for GEMS.

With more than 30 miles of fringing and barrier reefs, seagrass 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 14 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” through this stay in a tropical paradise are: Ananya Asula ’13, Rachel Awe ’14, Amber Barton ’14, Kriselda Bonifacio ’14, Kristian Feher ’13, Brita Gove ’13, Trevor Hiller ’14, Jade Kels ’13, Kelly Krolik ’14, Taylor Krolik ’14, Ryan McKinney ’14, Erin Mulvenna ’13, Addison Oswald ’13, Brandon Powell ’14, Iris Rivera ’14, and Jody Sokol ’14.

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 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.

Students bound for the next field site.

Research activities during the course include coral mapping; sea fan orientation; and the abundance and distribution of organisms in turtle grass, mangrove, 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.

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.

**Snorkling for sea stars!**

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.

**WELCOME BACK DR. BROWNE!**

Dr. Kathy Browne is looking forward to rejoining the Department in January 2014! She has spent the last ten years in Rider's Teaching & Learning Center offering learning opportunities and support for our faculty, and assisting with numerous academic initiatives as Assistant Provost. She also has been running the Science Education and Literacy Center (SELECT), which works with K-12 science and math teachers in the region to help them succeed in their classrooms. These activities have provided Dr. Browne many opportunities to investigate how people learn and she looks forward to applying this knowledge in the classroom and in work with students pursuing research projects.

Time to pursue science research has been extremely limited over the last several years, but Dr. Browne has been doing a bit. She’s been monitoring the impact of the leaf-eating beetle on the invasive Purple Loosestrife population around the campus lake that was restored several years ago. And she's begun a new project with Dr. Husch and Dr. Sun, with some help from Brita Gove ’13, to study some anthropogenic fulgerites produced nearby courtesy of Hurricane Sandy damage to high voltage power lines. While produced from some very volatile energy transfer, the fulgerite products are soil alterations that appear to be similar to lightning strike fulgerites, but perhaps more complex and much more beautiful....high energy art! The project has Dr. Browne venturing into new realms as fulgerite mineralogy and chemistry are areas pretty far from her carbonate sedimentology and microbialite background!

Over the past ten years, Dr. Browne has had the opportunity to enjoy the products of geologic processes in some of her travels. Some highlights include: icequakes while hiking on a valley glacier outside of Seward, AK; visiting mid-ocean ridge basalt exposures (MORBs) on the coast of western Newfoundland; climbing to the peaks of the tallest sand dunes in North America at Great Sand Dunes National Park, CO; and exploring surface features, mudpots, and mud volcanoes along the San Andreas fault, CA.

We welcome Dr. Browne back to GEMS!

**A YEAR IN THE LIFE OF GEMS’ ICP**

Over the past year, more than 80 students and faculty, from both Rider and other institutions, have used our NSF-funded SPECTRO ARCOS Inductively Coupled Plasma/Optical Emission Spectrometry (ICP) for research and for classes. The new ICP can process 60 samples autonomously, while measuring more...
than 30 elements for each sample. It can detect most elements in low ppb concentrations, including sodium, potassium, calcium, magnesium, arsenic, lead, mercury, etc., even the halogen elements! ICP data were used to complete three GEMS senior thesis and two manuscripts submitted to peer-reviewed journals (see GEMS Student Research section below for details). It certainly was a good year for our newly debuted ICP.

GEMS NEWS AND AWARDS

It’s been another great year for GEMS with lots of faculty and student activity along with continued program growth and vitality. Total GEMS enrollment, including ISM majors, still stands at approximately 130 majors and minors, an all-time high tied with last year. However, the number of Geosciences majors has increased to 13, almost double what it was a few years ago. And Environmental Sciences majors now number in the mid 30s, the highest ever! Finally, the Earth and Environmental Sciences minor now has 15 students, also the highest ever. It’s nice to be popular!

As far as GEMS faculty are concerned, Dr. Dan Druckenbrod continued as the Program Director for Sustainability Studies at Rider, as well as being cited by an Andrew J. Rider Award recipient for his outstanding and inspirational teaching. He also was awarded a Rider University Summer Research Fellowship and published two journal articles with various co-authors and presented three conference papers. Dr. Druckenbrod also received a Rider University Innovative Faculty Teaching with Technology Grant and is a Co-PI on two large, multi-institutional NSF grant proposals that currently are in review, as well as one submitted to the NEH.

Dr. Bill Gallagher continues in his three-year, full-time Discovery Program appointment, teaching the popular SCI-100 Discovery Sciences course, Introduction to Integrated Sciences, as well as other GEMS courses, including MAR-325 Marine Vertebrates for the first time (very, very successfully we might add), where he completely updated the course curriculum and focus. Dr. Gallagher also presented two conference papers dealing with the paleontological impacts of the Cretaceous/Paleogene extinction event, especially as it pertains to Mosasaurus.

Dr. Jonathan Husch completed his fall research leave and his seventh year as GEMS Chair, still without somehow managing to ruin the department! Dr. Husch also is a co-author on two related manuscripts on segmenting Martian rover microscopic imager photos automatically for granulometric and sedimentologic analysis, which have been accepted for publication by Icarus, and was the lead author of two conference papers on recognizing Martian glacial dropstones.

Dr. Reed Schwimmer presented a talk and field trip on selected educational field sites in New Jersey for K-12 teachers at the Annual Meeting of the Geological Association of New Jersey, as well as serving as a Senior Judge for the Mercer County Science and Engineering Fair. He also completed a Rider University Summer Developmental Fellowship focusing on the continued development of the capstone course for our Integrated Sciences and Math major.

Dr. Gabi Smalley was the lead author of a manuscript published in Aquatic Microbial Ecology and also had Amanda Young ’13, working in her lab on various aspects of algal research. She also continued to serve on the Rider International Education Council, was the Rider Liaison to the NJ Sea Grant Consortium, and was the GEMS Study Abroad Advisor.

Dr. Hongbing Sun is the author of a manuscript on groundwater conductivity tests submitted to the Journal of Hydrology, as well as a related conference paper. He also was a co-author on two related conference papers on the release of heavy metals in a salted
watershed. Dr. Sun also was awarded a Rider Research Leave for Fall 2013.

**Dr. Steve Carson** (adjunct professor) was selected as the recipient of the 2013 Outstanding Earth Science Teacher Award for New Jersey by the National Association of Geoscience Teachers. Way to go Steve!

GEMS students and recent graduates also participated in a variety of research and graduate programs at other institutions and organizations. Christine Sookhdeo '12 entered Old Dominion University's Master's degree program in Chemical Oceanography, Katelyn White '14 was awarded an internship for fall 2012 at Climate Central to work as a production assistant, Juliana Ciccarelli '14 participated in an NSF-REU at Penn State, Andrew Kelly '15 participated in an NSF-REU at the University of South Carolina, Jason Dallas '14 participated in TurtlePop, a multi-institutional research project examining the demographic trends of turtles across North America, Kate Krsnak '13 was a Research Intern working on dinosaur fossils at the Philadelphia Academy of Natural Sciences, and Allison Ingram '13 was a Research Intern at Princeton University, working on the Drought Open-Source Ecology (DOSE) project and analyzing the impacts of the 2012 drought on forest growth and mortality in sites across North America. Laura Moritzen '15 received Honorable Mention as a sophomore in this year's Goldwater Scholarship competition. She will re-apply next year. Jillian Bauman '13 attended geology field camp during the summer of 2012 studying volcanoes in the Kamchatka Peninsula of Russia. Hilary Boff '13 and Sarah Mozes '13 attended geology field camp in Iceland during the summer of 2012 where they studied volcanic and other geologic processes.

A large number of GEMS students received various awards and recognition for their many academic achievements. Kate Krsnak '12 graduated with honors in Geosciences, Allison Ingram '12 graduated with honors in Environmental Sciences, and Amanda Young '12 graduated with honors in Marine Sciences. Jason Dallas '14, Jade Kels '13, Kelly Krolik '14, Taylor Krolik '14, Laura Moritzen '15, Gregory Stoto '13, and Amanda Young '13 were inducted into the Tri-Beta Honor Society, and John Alexander '14, Brita Gove '13, Kate Krsnak '13, and Eric Pezzi '13 were inducted into Sigma Xi. Deanna Boccuzzo '14, Mick Centurione '15, Eric Cottrell '14, Melissa D’Ascoli '15, Danielle deLisi '15, Amy Hunt '15, Stephanie Michal '15, Chelsea Mueller '13, and Marin Naya '15 were inducted into Kappa Delta Pi. Allison Ingram '13 was inducted into Pi Delta Phi, and Kate Krsnak '13, and Laura Pantin '13, were inducted into Omicron Delta Kappa. Allison Ingram '13 was selected as the outstanding graduate in the French Minor (c’est magnifique!), Kate Krsnak '13 received a Certificate of Excellence in Science Education, and Laura Pantin '13 received a Certificate of Excellence in Elementary Education. Laura Pantin '13 also was selected for inclusion in the 2013 edition of Who’s Who Among Students in American Colleges and Universities. However, our very special congratulations must go to Sarah Sell '13, who was inducted into Kappa Delta Pi and Omicron Delta Kappa, received a Student Education Association Citation for Excellence, as well as a Certificate of Excellence in Middle School Education, was selected for inclusion in the 2013 edition of Who’s Who Among Students in American Colleges and Universities, and was nominated for the NJ Commissioner’s Distinguished Student Teacher Award!
And, as if all these awards and honors were not enough, 49 GEMS students earned Dean’s List recognition for the fall 2012 semester and 51 (the most ever!) earned that recognition for the spring 2013 semester. Congratulations to all our students for all their hard work and their accomplishments! We could not be more proud.

GEMS STUDENT RESEARCH 2012-2013

One of the great strengths of GEMS is the ability for our students, even freshmen, to become involved in independent research, usually under the mentorship and guidance of one our faculty. The following is a listing of student research and senior thesis topics for the 2012-2013 academic year, including two student co-authored papers presented at professional meetings. It really is quite impressive.

Dr. Sun, LeeAnn Sinpatanasakul ’11, Maria Huffine ’10, and Dr. Husch: Na/Cl molar ratio changes during a salting cycle and its application to the estimation of sodium retention in salted watersheds. This manuscript was published in Journal of Contaminant Hydrology.

Dr. Sun, John Alexander ’14, Brita Gove ’13, Eric Pezzi ’13, Nicole Chakowski ’12, and Dr. Husch: Mineralogical and Anthropogenic Controls of Stream Water Chemistry in Salted Watersheds. This manuscript is in review in Journal of Applied Geochemistry.

John Alexander ’14: Common ion and heavy metal concentrations in stream and soil water from the Centennial Lake watershed, Lawrence Township, New Jersey.

John Alexander ’14, Kristian Feher ’13, Brita Gove ’13, Eric Pezzi ’13, and LeeAnn Sinpatanasakul ’11: Release of heavy metals from soil due to application of winter deicing salt in a watershed (student co-authors on a paper receiving honorable mention for best student poster presentation at the 2013 Annual Meeting of the America Water Works Association-New Jersey Section, Atlantic City, NJ).

Andrew Kelly ’15: Measuring Particulate Phosphorus: A Comparison of Two Methods. As part of an NSF REU program, Andrew spent part of the summer working with colleagues at the University of South Carolina. His research focused on comparing the effectiveness of two methods that determine total particulate phosphorous levels of estuarine sediment samples. Because phosphorous is a macronutrient and is an important factor in primary productivity, it is necessary to be able to accurately measure its concentration. Andrew’s poster can be seen on the second floor of the STC, near the ICP room.

Rachel Awe ’14: The use of garnet compositional data to help determine the provenance of New Jersey barrier island sands.

Nicole Chakowski ’12, Brita Gove ’13, Nicholas Mazza ’12, and Eric Pezzi ’13: The possibility of road salt-induced release of heavy metals from soil in a watershed (student co-authors on a paper presented at the 2012 Annual Meeting of the Geological Society of America, Charlotte, NC).

Brita Gove ’13: Impact of deicing salt on the release of common ions and heavy metals in the Centennial Lake watershed.


Kate Krsnak ’13: Indicated faunal turnover between the Maastrichtian and Campanian boundary in the western United States.
**Jessica Munyan ’16 and Rachel Nangle ’16:** Introduction to tree-ring research (Freshman Science Honors Program project).

**Eric Pezzi ’13:** Sources of metals, including heavy metals, in the Centennial Lake watershed.

**Amanda Young ’13:** Effects of large dorsal fins on *Betta splendens* mating selection and their ability to swim against a current.

**Joshua Zangakis ’12:** Using dendrochronology to date three timbers from Littlestown, Pennsylvania.

**GEMS ALUMNI CONTRIBUTIONS REACH AN ALL-TIME HIGH!**

Nearly $7,000 was donated to GEMS this past year by alumni and corporate matching gifts, the largest total amount in any 12-month period! These donations allowed the department to purchase much needed equipment, including binocular, inverted, and petrographic microscopes, which could not have been funded by the yearly operating budget alone. Everyone at GEMS thanks our alumni for their generosity and support.

As many of you know, the “Friends of GEMS” alumni group is committed to increasing the number of active members and donations to the department. If you would like to join “Friends of GEMS”, and help make the GEMS experience even better for our current and future students, please contact **Randy Kertes ’84**, Senior Project Manager at Sadat Associates (Trenton, NJ) and GEMS Adjunct Instructor, at 609-826-9600, ext 149, or at rkertes@sadat.com. You’ll be glad you did!

**ALUMNI UPDATE**

As usual, many GEMS alumni either stopped by the department for a visit or contacted us with their latest news. 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.

**Robert Verrastro ’80** wrote recently to bring us up to date on what he’s been up to for the past 33 years. After graduating from Rider, Bob attended the University of Louisiana-Lafayette on a teaching assistantship and received his Master’s Degree in Geology in 1982. He then worked in petroleum exploration for Conoco (now ConocoPhillips) in Lafayette and Houston. In 1989, Bob and his wife, Marcy, moved to Palm Beach, Florida and began a career in the environmental/hydrogeology field. For the past 13 years, Bob has been working for the South Florida Water Management District, the state agency responsible for planning and controlling water levels throughout the southern half of the Florida peninsula; he now is the program manager for a large component of the massive Everglades Restoration Project, overseen by the State of Florida in partnership with the U.S. Army Corps of Engineers. His program involves the testing and construction of very large, deep wells that are intended to store massive quantities of water in underground aquifers.

**Wayne Froehlich ’84** lives in Palmyra, NJ and is still working for EMSL Analytical, Inc., one of the nation’s leading environmental testing firms. Wayne specializes in the identification and analysis of asbestos with electron microscopy.

**Jonathan Cooper ’03** wrote recently to say that he has been working for a turf and plant care company since 2004. Jonathan is the company’s lead consultant and salesman in all matters of plant care. He says his job is very rewarding, as well as an outlet for innovation in the science and business world, especially since the company bases its care of turf and plants on environmentally responsible methods. Jonathan also says he is fortunate
enough to have married Stephanie Cooper and to have two wonderful children, Lucas and Catherine (see photo). When time permits, Jonathan enjoys writing and playing original music. He plays the guitar (self-taught) and is currently taking on the difficult task of teaching himself the drums. Jonathan also is working on completing and releasing his second full-length independent album, recorded in his home studio. We can't wait to hear it.

Bethany Eden Smith ’05 received her Masters in Biological Oceanography in 2008 from the Virginia Institute of Marine Sciences (VIMS) of The College of William and Mary and married Jon Smith in November 2010. They now own a home in the historic tobacco port town of Urbanna, VA along the banks of the Rappahannock River. Congratulations on all accounts! After working for the Virginia Marine Resources Commission (VMRC) in Newport News, VA as a Marine Specialist, Bethany has been teaching Marine and Environmental Science for the past four years to academically advanced high school students at the Chesapeake Bay Governor's School (CBGS) in Warsaw, VA. Bethany also was selected as an Educator at Sea by Dr. Robert Ballard’s (the rediscover of the Titanic) group, Ocean Exploration Trust. She spent more than two weeks at sea this past summer on board Ballard’s exploration vessel, Nautilus, as a member of the Corps of Exploration. Her main responsibilities were translating the cruise's scientific missions and results for publication on the NautilusLive website and communicating with audiences across the country who visited one of several aquariums that received daily broadcasts from the Nautilus. Sounds very cool!

Alison Golinski Goldberg ’06 received her Ph.D. in endocrinology and animal biosciences from Rutgers University in May 2013. Congratulations Dr. Goldberg! Her doctoral dissertation was titled Evolutionary Plasticity in the Pleiotropic Regulation of Sexually Dimorphic Traits in Gekkotan Lizards. While at Rutgers working on her doctorate, Alison received a fellowship in 2008 from the Central Europe Summer Research Institute (CESRI), which was funded by the National Science Foundation and the International Institute of Education. As a CESRI fellow, she conducted research on the hormonal regulation of sexually dimorphic traits in gecko lizards with her collaborator, Dr. Lukas Kratochvil, at Charles University in Prague, Czech Republic. The following year, Alison received a Fulbright Fellowship to continue her work in Prague with Dr. Kratochvil. In 2011 Alison married her college sweetheart, Stephen Goldberg ’06 (Biology), and they now live in Philadelphia, PA where Stephen is completing medical school. Again, our congratulations!

Dan Hewins ’07 was awarded his Master's Degree with honors in Biology in 2010 and defended his doctoral dissertation on various aspects of desert organic matter decomposition this past summer at New Mexico State University (NMSU). Our congratulations to Dr. Hewins! Dan already has presented the results of his research in the journal Ecosystems and at annual meetings of the American Geophysical Union and the Ecological Society of America. While at NMSU, Dan was awarded an NMSU travel scholarship, a research scholarship from the Native Plant Society of New Mexico, a Preparing Future Faculty Fellowship from NMSU, a Howard Hughes Medical Institute Scientific Teaching Fellowship, and the NMSU Traylor Biology Graduate Student Scholarship.
Next up for Dan is a postdoctoral fellowship position at the University of Alberta in Edmonton, AB where he'll be working in the Department of Agriculture, Food and Nutritional Science with Drs. Edward Bork, Scott Chang, and Cameron Carlyle while studying the potential for greenhouse gas sequestration in Albertan rangelands. At this point, Dan thinks the ultimate objective of his research will be to improve rangeland management practices for large land managers, as well as improving government policy and incentives. Dan's project will have access to ~120 field sites with varying management histories across 5 soil climatic zones and he will be sampling both above and below ground to better relate stocks of carbon to the various management practices. Sounds ambitious!

Dan Carlson '09 stopped by campus and filled us in on what he's been up to since he graduated. From June 2009 until June 2013, Dan was an Associate Project Scientist for Weston Solutions at their Edison, NJ office under an EPA contract to conduct environmental investigations and risk assessments for Region 2 to determine Superfund site eligibility. In June 2013, he accepted a new position with the Antea Group, an environmental consulting firm outside of Baltimore, as a Project Professional where he'll be managing up to 15 separate projects, mostly involving site assessment and remediation. In addition, Dan is approximately halfway through a Masters of Science Degree in Environmental Assessment that he's taking through a distance education program at North Carolina State University. Dan also mentioned that he would be very interested in hosting a Rider GEMS student at his job as part of the University's Shadowing Experience Program.

Elise Proctor '09 currently is working at the U.S. National Aquarium in Baltimore, MD as an Aquarist Aide in the Fishes Department. Since joining the National Aquarium in 2010, initially as a volunteer, Elise has worked on a number of exhibits, including Atlantic Coral Reef, Surviving Through Adaption, Wings in the Water, and the new (opened July 2013) Blacktip Reef. Among her many duties, she is responsible for the daily care and upkeep of literally thousands of individual animals, including numerous species of sharks, rays, eels, fish, and corals. In addition, Elise works with cold, tropical, fresh, brackish, and quarantine water systems in both large tank and small tank installations. She even gets to assist in medical procedures and necropsies! As if that weren't enough, Elise also is involved with Aquarium VIP guest tours and Making Connection Talks, which are designated times when Aquarium staff step out into the public areas and talk about the animals they are responsible for and educate visitors about marine environments. Elise says she loves her job.

Elissa Connolly-Randazzo ’11 now lives in the Florida Keys (well someone has to!) where she works as a science instructor and naturalist. For the past two years, Elissa has been educating young minds and adults about the organisms and processes of the ocean at John Pennekamp State Park. She has been assisting with several organizations in shark tagging, fish census, and coral restoration, as well as advancing in her SCUBA diving skills and certification.

Caroline Baptist ’12 was accepted into Columbia University's Bridge to Ph.D. Program in the Natural Sciences. For two years, Caroline will be a full-time Research Assistant for two professors at Columbia's Lamont-Doherty Earth Observatory in Palisades, NY, while also taking a course in her area of interest (Marine Sciences) each semester. The goal of Columbia's Bridge to the Ph.D. Program is to enhance the participation of students from underrepresented groups in Ph.D. programs in the natural sciences. To achieve this, the Bridge Program provides an intensive research, coursework, and mentoring experience to a select group of post-baccalaureates from around the country seeking to strengthen their graduate school applications and to prepare for the transition
into Ph.D. programs. Congratulations to Caroline for her acceptance into this very prestigious program!

Nicole Chakowski ’12 is an Associate Chemist working for BASF at their Union, NJ facility. She is testing precious metal samples utilizing an Inductively Coupled Plasma (ICP) Emission Spectrometer (she learned how to operate one at Rider) to determine their purity. In particular, Nicole will be analyzing material extracted from automobile catalytic converters for platinum, palladium, and rhodium. She also mentions that BASF has lots of internship and part-time work opportunities for undergraduates looking for experience.

Nicholas Mazza ’12 recently switched jobs and now is working as a Staff Scientist for JM Sorge, Inc. where he is involved in a lot of GIS projects. Prior to his present position, Nick worked at Bluestone Environmental where he did field investigations, consisting of soil-core and water sampling.

Allison Ingram ’13 spent this past summer as a Research Intern for Dr. Kelly Caylor, Department of Civil Engineering, in his Ecohydrology Lab at Princeton University. Allison worked on the Drought Open-Source Ecology (DOSE) project, analyzing the impacts of the 2012 drought on forest growth and mortality in sites across North America by measuring the ring-widths of tree cores. She is hoping to continue working on the project through the fall of 2013.