

# ***FROM THE DEAN'S DESK – May 8, 2015***

THE RADFORD UNIVERSITY COLLEGE OF SCIENCE AND TECHNOLOGY NEWSLETTER

## **SPECIAL EDITION: RADFORD AMAZONIAN RESEARCH EXPEDITION**



***RADFORD AMAZONIAN RESEARCH EXPEDITION STUDENT AND FACULTY PARTICIPANTS***

Beginning in Maymester 2015, the Radford Amazonian Research Expedition (RARE) will provide undergraduate students with a unique opportunity to conduct original biological research in a primary Amazonian rainforest ecosystem. Under the supervision of two Radford professors, a group of ten select students will spend three weeks learning and exploring deep in the Peruvian jungle.

This edition of “From the Dean’s Desk” is dedicated to the trip and the participants. Learn more at [www.radford.edu/rainforest](http://www.radford.edu/rainforest) and follow the trip in real time on social media at [www.facebook.com/radforduniversitycsat](https://www.facebook.com/radforduniversitycsat) and [www.twitter.com/rucsat](https://www.twitter.com/rucsat) twitter handle @rucsat

**PAGE 2 – RARE: TRIP PREVIEW**

**PAGE 3 – RARE PARTICIPANTS: EXPLORING THE AMAZON**

## PAGE 2 – RARE: TRIP PREVIEW

In mid-May members of the RARE team will travel from Radford to Puerto Maldonado, a rapidly growing city near Peru's eastern border. In Puerto Maldonado, the team will meet with guides from Tamandua, LLC, a conservation and ecotourism group devoted to the protection and conservation of the Peruvian jungle. From there the RARE team will travel eight hours, first by car and then by boat, to reach the remote Las Piedras Biodiversity Station where they will begin their studies.

The Las Piedras Biodiversity Station is situated within 30,000+ acres of pristine rainforest located along the Las Piedras River, encompassing a wide variety of microbiomes and habitats. The station itself incorporates private dormitories, fully functional showers and toilet facilities, a common meeting hall, and a kitchen with a full-time chef. As part of the RARE project, the station will be equipped with a solar generator as well as a variety of state of the art scientific field and laboratory equipment, including wireless microscope-cameras, sat-fi internet connections, genetic sampling and preservation systems, half a dozen infrared trail cameras and much more.



*Las Piedras River*

In the several weeks they spend in and around the Las Piedras Station, members of the RARE team will conduct multiple original scientific studies that the students themselves worked to design and prepare during the preceding semester. Their research will focus on a wide variety of topics related to exploration of this all but unmapped jungle ecosystem, such as the impact of deforestation on microbial metagenomics, analysis of the antibacterial and antifungal properties of rare plants, cataloging of newly discovered species, and tracking and behavioral studies of megafauna including tapir, jaguars, macaws and monkeys.

In addition to their independent research, RARE students will have the opportunity to explore the forest and river, to learn from local guides and to study under Radford's expert faculty. They will encounter rare and endangered species, visit local markets, see the impact of deforestation first hand, and hike and study in a truly one of a kind place. Following their return to Radford, students will also be encouraged to continue their studies and analysis, conducting follow-up research on the samples and data they have collected for further academic credit.

The RARE project is a component of Radford University's initiative to provide undergraduate students with unique opportunities for transformative academic exploration of the world and their place in it. As participants in RARE, students will be able to enjoy an experience that is equal parts education and exploration, and entirely unforgettable!

## RARE PARTICIPANTS: EXPLORING THE AMAZON

### FACULTY



#### **Assistant Professor of Biology**

Dr. Caughron earned a B.S. from Mississippi State University in 2005, and a Ph.D from the University of Oklahoma in 2011 investigating the impact of aerobic respiration of *Escherichia coli* on the mouse cecum mucus microbiome. She then spent a year as a visiting scholar at Virginia Tech studying the structures of several membrane proteins in *Clostridium difficile* and *Clostridium perfringens* as they relate to mechanisms of gastrointestinal disease.

Since 2013, she has been an assistant professor of biology at Radford University. Projects involving undergraduate students have included development of a real-time bacterial killing assay for micro-blood plasma volumes and mass production of *Apis mellifera* royalactin in transgenic *Escherichia coli* for use in a variety of undergraduate research endeavors.

Dr. Caughron has taught a number of classes at Radford University, including Fundamentals of Microbiology, Human Biology, Environmental Biology, and an upper level seminar. In concert with Dr. Jason Davis, she has received funding to support an investigation of human impacted vs. pristine soil and water microbiomes from the Peruvian Amazon and will be visiting this area to conduct field studies in May 2015.

#### **Assistant Professor of Biology Co-director of Radford's Ecophysiology Research Laboratory**

Dr. Davis received B.S. degrees in both biology and anthropology from the College of Charleston, Honor's College in 1998 and went on to finish his M.S. and Ph.D. in Neuroscience & Animal Behavior from Emory University in 2005. After graduating he held a post-doctoral research associate position in biology at the University of Washington for three years, followed by a second two-year post-doctoral researcher position jointly between the University of California, Davis and the Chinese Institute of Zoology during which he lived for a year on the Tibetan Plateau.



Since coming to Radford University in 2009, his research has evolved to focus specifically on the role that hormones play in controlling how animals manage energy trade-offs under dynamic environmental conditions. He founded the Ecophysiology lab and built the Selu Conservancy aviary to help answer

these questions with the support of other faculty members and undergraduate researchers. His research students have conducted a number of studies exploring how stress and reproductive hormones interact to influence behavioral profiles and immunological investment in songbirds, and how hormones control reproduction and growth patterns in insects. This work has generated over a dozen student presentations at academic meetings, including meetings of the Society for Integrative and Comparative Biology, as well as several publications in both the academic and popular press.

Dr. Davis has taught a number of classes at Radford University, including Human Anatomy & Physiology, Endocrinology, and Evolutionary Developmental Biology, as well as several upper level seminars. Dr. Davis is also the director of the new Scholarly Outreach and Research Engagement program, a project whose goal is to encourage undergraduate scholars and researchers at Radford to share their work with the broader public in online and multimedia formats.

In autumn of 2013 he traveled to the Las Piedras Biodiversity field station in Peru, and it was this trip that sparked his interest in the Amazon. In concert with Dr. Joy Caughron, he has received funding to support research investigating bacterial metagenomic profiles of polluted and pristine waterways in the Madre de Dios region of the Amazon, and will be returning to this area to conduct further studies throughout 2014.

In his time at Radford he has been awarded the "College of Arts and Sciences Distinguished Teaching Award" for 2012-2013, the "Artis Outstanding Faculty Award for Scholarship & Service" in 2014, has received five research support awards from Radford University, as well as a Research Opportunity Award and TUES grant from the National Science Foundation. Dr. Davis was also the 2014 keynote speaker for the Virginia Outdoor Writer's Association and is Radford University's 2015 nominee for the SCHEV Rising Star Faculty Award.

### **Caitlin Annear**

Caitlin is from Greensboro, N.C., and came to Radford University to play soccer. She just finished her senior year on the women's soccer team. "It was amazing," she recalls. "I was a senior captain and played outside left back."

When Caitlin first came to Radford University, she says that she felt clueless as to what she wanted to do and didn't declare her major as Biology until her sophomore year. "Once I started taking biology courses I fell in love with animal behavior," she says. "After taking a class in comparative behavior I was offered a summer research position working with eastern bluebirds. This project was looking at stress levels and parental care in eastern bluebirds. I've done this for two summers in a row now and it has gotten me interested in doing research on birds in the Amazon."



#### Caitlin's Project:

Caitlin will be studying scarlet macaws (*Ara macao*), the large, red, yellow and blue South American parrots, to determine the impact of native sound versus human created noise. As more people move into the area for a variety of reasons, will the sounds of chainsaws, trucks, and general human activity have an impact on these birds?



#### **Jessi Basham**

Jessi is a junior from Woodbridge, Va., majoring in Physics and Mathematics. She serves as the Society of Physics Students (SPS) President and is also a Planetarium/Observatory presenter for Radford University.

Jessi originally came to Radford hoping to be an astrophysicist, but soon discovered another passion. "Through my experiences here in both the classroom and doing research, I found that what I most enjoy doing is

being out in the field as part of a team working toward a common goal" she says. "One of the biggest experiences that opened my eyes to this was the Arctic Geophysics research we did in Barrow, Alaska in 2014."

When she heard about the RARE project, she was excited about the opportunity to conduct more field research. "In preparing for this experience I have a newfound love for conservation and plan to pursue this in my graduate studies," adds Jessi.

She says, "I am excited to be a part of another team and to help everyone with all of the different research projects that will be going on - especially the invertebrate group that I am a part of. I have always liked bugs. When I was young I usually spent recess chasing grasshoppers and whatever else I could find. If that makes me weird so be it! I have the chance to go to one of the coolest places on earth to study ants and see some of the strangest creatures that the world has to offer. Bring it on, Amazon!"

#### Jessi's Project:

Motion in ants may seem to be a complicated subject, but perhaps it isn't as complex as we might think. The purpose of this study is to relate Amazonian ant movement to the motion of simple particles. The study uses obstacles of various shapes and sizes to interrupt ant streams along the jungle floor and also aims to employ the use of a magnetic field within the obstacles through the placement of neodymium magnets. The anticipated outcome of this research is that ant movement around the obstacles will mirror the motion of simple particles relative to their size, and that the introduction of a magnetic field will simulate a bioelectric field which will attract the ants to the obstacles. The findings of this project may prove useful in depicting movement patterns in insects.

### **Cassie Bonavita**

Cassie is a senior majoring in biology. She is also a transfer student, originally attending East Carolina University. "When I got here I changed my major four times before finding my home in biology my junior year," Cassie says. "I am really interested in epidemiology and zoonotic diseases."



Cassie is a military kid who spent a lot of her childhood overseas so travel is a favorite thing for her to do. "I am convinced that the best way to learn is in a foreign place, culture shocks are good, they make you think, learn, change your view on the world around you," she states.

After her Maymester research trip last year, Cassie became even more excited to explore a new and amazing place. "The amazon is one of the last truly wild places," says Cassie. "To get to experience it, and then possibly have a role in protecting it at this level of schooling is super exciting and I can't wait to be there."

#### **Cassie's Project:**

While in Peru I will be collecting mosquitoes and animal samples to determine the status of dengue virus in wild forest, rural, and urban areas. My goal is to assess the microbiome of infected vs. not infected mosquitoes to form a correlation between disease status and internal bacteria. Additionally I will be examining the correlation between clear-cutting of the rain forest and dengue fever prevalence.



### **Skyler Carrel**

Skyler is a junior double majoring in biology and psychology. "My interest is in understanding neurological functions behind behaviors," he states. "My goal is to go on to graduate school aspiring to have a career in research along with being a professor." In addition, Skyler's hobbies are reading, hiking, and learning about and discussing new discoveries in science.

He works with Dr. Davis in the Eco-Physiology lab. "My particular research in the lab is studying the social behavior of the Madagascar hissing cockroaches," says Skyler. "The experience I've gained in the lab will be applied to my project in Peru. The project I will be doing in Peru will be studying social spiders and their social recognition of other spiders from their same colony along with different colonies."

### Skyler's Project:

Unlike most spiders, *Anelosimus eximius* is a social species. In other words, these particular spiders live communally. *Anelosimus eximius* function much like a pack of wolves or lions; they sleep together, hunt together, and thrive together. In turn, due to the large numbers that live with each other in a single colony there is a high rate of inbreeding. With this in mind, in my proposed experiment I will be testing the relationship of relatedness and familiarity. This will be tested by placing two spiders from the same colony and measuring the distance from each other to measure the preference. The same process is repeated for two spiders from different colonies. These two processes determine the familiarity of the spiders. We hypothesize that spiders will prefer to be closer to conspecifics from the same colony while avoiding those from different colonies, regardless of the distance between the colonies. Learning about the social behavior of *Anelosimus eximius* allows us to better understand the evolution of sociality and how relatedness and familiarity interact.

### Will Dowd

Will was raised in Smithfield, Va. Always an independent spirit, Will received his GED at 15 with a special waiver to test from the school board. "I have had many different work and life experiences before coming to Radford University in 2012 to major in geospatial science, environmental concentration, after earning an associate degree in general education from VWCC," he recalls.



Currently Will is the resident caretaker at Radford University [Selu Conservancy](#), a job that he is very passionate about. "I am the president of the Selu Garden and Service Club," he states. "The club's mission is to raise student awareness and engagement at the conservancy through the running of a garden on the property as well as doing other service projects there. The produce grown in the Selu garden is donated to local food banks."

Will is passionate about conservation in general, which is what attracted him to the RARE trip. "I feel that bringing awareness, as well as adding to a body of knowledge about the current situation in and around the Madre De Dios region of Peru, is critical and worthwhile work," he says.

Will adds, "I love my major and am continually fascinated by the fast pace at which the technology advances our ability to study the world around us." Will also discovered a love for ceramic arts here at Radford University. "I have taken Ceramics 1 and am currently enrolled in an independent study of ceramics," he recalls. "The dichotomy between geospatial science and ceramic arts is very refreshing to me. Something relatively brand new to humans and something completely timeless makes for good thinking."

The Radford experience has been extremely positive for Will. "In general, I think Radford University is a great school and I have had opportunity after opportunity offered me since coming here," he says. Some

of the biggest opportunities Will has enjoyed are a 2013 Summer Undergraduate Research Fellowship (SURF) grant, living and working at Selu, and the RARE trip.

**Will's Project:**

The goal of my project will be to develop an ecological profile of certain medicinal plant species and to determine whether certain plants, trees, soil types or vegetative structures co-occur or can help predict the likelihood of occurrence for medicinal plants. The specific medicinal plant that I will be profiling will be determined once I am in Peru through discussions with our local guides and preliminary site surveys.



**Steve Gallas**

Steve is a biology major from Williamsburg, Va., and is thrilled to be a part of the RARE team, specifically with the microbial research team. "My focus is seeing how microbes in the environment interact with one another in ways that are positive (mutualism) and negative (competition)," he says.

Steve came to Radford University after attending another institution that was not the perfect fit. "My brother, who is now an alumnus, talked me into coming here," recalls Steve.

"Radford really gave me an opportunity to really find what I wanted to do, but it hasn't always been easy. My college experience as a whole has been a bit of a roller coaster but thanks to the good people here at Radford, especially Dr. Davis and Dr. Caughron, I'm on the upswing and I couldn't be happier. I can't wait for the Amazon!"

**Steve's Project:**

Microbial life is very diverse and is found in just about all environments. Some species are incredibly adaptable, being able to live in heavily polluted environments such as water sources found in urban environments. It may seem that microbes that can survive in these harsh urban environments would be able to out-compete microbes from a pristine, jungle environment. However, that may not be the case. The purpose of this study is to determine how microbes from different ecological profiles interact with each other, and to see if one profile is dominant to another. To test this it will be necessary to grow up samples gathered from the urban environment and then streak them with samples collected from the jungle environment, and vice-versa.



### **Emily Guise**

Emily is a senior biology major from Mineral Wells, Texas. "I came to Radford as a transfer student and immediately felt at home," she recalls. "I grew up in a small town in Texas, but ended up on the east coast after moving to Leesburg, Va., in the middle of high school."

A path to her current major was not clear to Emily when she entered classes at Radford University. "I began here as a nursing student, but after trying out research, I found my passion and quickly changed my major to biology," she states. "I've been participating in research ever since, and plan to go to graduate school to eventually be a professional researcher."

Emily's current research is exploring endocrine disrupting chemicals, most specifically a synthetic androgen called trenbolone. "It is commonly used in the beef cattle industry to "beef" up the cattle to make extra money," she says. "I've been exploring the effects of trenbolone on mosquitofish, which are often stocked in cow ponds as a natural mosquito control method."

In the Amazon she will be exploring medicinal plants and their potential mechanisms.

Emily adds, "I'm very excited to go to the Amazon to do research of my choosing; it is the opportunity of a lifetime!"

Emily's project:

Medicinal plants from the Amazon rainforest are an integral part of Peruvian life and culture. However, there is much speculation as to the legitimacy of the claims made about medicinal plants. Therefore, the plants and their potential medicinal mechanisms should be explored. I will be researching the legitimacy of plants claimed to have medicinal benefits. Such plants may have antimicrobial compounds that reduce the growth of bacteria and fungi to diminish nutrient consumption in close proximity, and therefore reduce nutrient competition. These same microbial compounds could also reduce the growth of bacteria and fungus that could be found on the skin. Having antimicrobial compounds could help prevent a wound from becoming infected by decreasing growth of nearby microbes. I will be testing Amazonian plants used for wound treatment for the ability to reduce growth against microbes typically found living on human skin.

## **Sarah Herbert**

Sarah, from Powhatan, Va., is an environmental biology major and is a certified Master Naturalist. "I have a slight addiction to frogs and it has always been my dream to go to the amazon rain forest," she says.

Outside the classroom, Sarah also works for [RU Outdoors](#) and is currently working toward becoming an assistance trip leader for caving. "I love hiking, camping, caving, swimming and in general if it is outdoors I enjoy it," she adds.



### **Sarah's Project:**

Chytrid fungus is the top killer of frog species, followed by deforestation and pollution. Chytrid is transported through water into the frog's skin where the fungus thrives until the host dies. Chytrid is present in frogs from many areas, but it is unknown whether frogs in the Las Piedras watershed are infected. The experiment will be carried out through the capture of frogs. Each specimen will be measured, photographed, swabbed and recorded extensively. Capturing will be from pools set up in different microbiomes, as well as any in field walks and exploration.



## **Diego Kendall**

Diego is an Environmental Biology major from Fairfax, Va. A transfer student to Radford University, Diego has always been deeply interested in biology.

"Ever since I was young I dreamed of going to places like the Amazon to explore and uncover life's little secrets," he says. "I am a Virginian born and raised and I'm glad to be getting such an opportunity while attending a Virginia university."

Diego is looking to the future as he hopes that the experience he gains on this trip will be a stepping stone to even greater things. "I hope to be applying to several internships in the months following my return," he says. "I would absolutely love to work somewhere like the Smithsonian's environmental research center."

Biology is not his only passion. "In my spare time I'm somewhat of a chef, and I love whipping up delicious dishes for friends and family," he states. "I have a pet cat named Jack and he's basically the only thing that keeps me sane with the stress of school. I enjoy a good time and love being around friends and making people smile."

### Diego's Project:

This study is designed to examine the ecological roles of parasitoid wasps; wasps that spend a portion of their life cycle parasitizing other insects. In many known species of these wasps, there is a tendency to specialize in one host insect. Through collection and dissection of various potential host insects, this experiment seeks to answer the question: are particular species of insect larvae more likely than others to be targeted by parasitoid wasps and what environmental features might relate to parasitization? In answering this question, the role of parasitoids as biological control organisms can be better understood.

### Caroline Leggett

Caroline is Media Studies/Appalachian Studies major from Salem, Va., who will be producing a film on the RARE experience.

Prior to her enrollment at Radford University, Caroline served in the United States Navy on both coasts and the Arabian Gulf. "I decided to use college as a career change and am pursuing a medley of media studies (production technology), Appalachian Studies, outdoor recreation leadership, and biology," she says. "I chose Radford University because it is on the small side, in a great location, and has a good balance of liberal arts and scientific study."



### Michelle Maurer

Michelle is from Fairfax, Va., and graduated from Radford University in the fall of 2014 with a degree in Biology and a concentration in Pre-Health. She is in the process of working toward a second degree in Nursing.

Originally, Michelle planned to pursue veterinarian school but found that though she has a passion and respect for wildlife, it didn't feel like the right path for her future career. "Science was the only thing I knew for sure that I had a passion for, so I turned that love toward people," she recalls. "I started to pursue a second degree my junior year and am now waiting to hear back from Radford's School of Nursing and other nursing programs to finish that degree."

Michelle's experience with the Biology program has helped expand her view of the world. "I've learned that it's always important not to just take things at face value," she says. "My professors always talked

about making sure to always ask your own questions. As I'm continuing into the nursing field, those professors want the same thing. A good nurse knows the information, but a great nurse knows it and understands why and applies that knowledge."

The Radford Amazonian Research Expedition (RARE) is only the latest in Michelle's journeys. "I participated in the biology department's study abroad trip down to the Virgin Islands last spring and got my first taste of what it will be like to go out and do my own research," she states. "Now that I know what to expect, and with a longer time frame, here's hoping I can encourage other nursing students to want to go out and do the same. In a field where things are constantly updating, it's kind of a fun thought to have that the work I'm doing could be part of that change."

Michelle is incorporating her interest in nursing into her RARE research projects. "At the moment I plan to track our health in general while we're in Peru, but also I plan to look at insect attraction and inflammation responses to this," she says. "While visiting last fall, Dr. Davis described how even though he got eaten alive, the locals seemed to have no bites to show." Michelle adds, "When he asked them about this they replied *...it's not because we don't get bitten, it's because we don't swell ...* and this gives me great interest to study inflammation as a part of my research."

#### Michelle's Project:

People all over the world are accustomed to the environment that they grow up in. This includes diet, exercise, and how their bodies react to the environment and organisms around them. As field researchers coming from Southwest Virginia to the Peruvian Amazon, our bodies will be forced out of their comfort zones and will need to adapt in order to continue to function as close to normal as possible. As a culture that is centered around easily accessible foods 24 hours a day and diets high in carbs and sugar, it is my prediction that with easy access to processed food out of the equation, locally grown food and home cooked meals along with daily activities including plenty of cardiovascular exercise (ex: hiking), I expect to see increased health in the members of our research team.

Along with the researchers entering into an environment that isn't their own, they will also be introducing themselves to the organisms that already live there; including those of the biting, bloodsucking insect variety. There are many things that attract insects to specific humans, including blood type, body heat, respiration, and moisture/sweat. It is my prediction that the team members who have type O blood, higher average body temperatures, breathe heavily and/or frequently, and/or sweat more will experience a higher number of bites than others. It is also my prediction that by the end our stay at the station, the group as a whole will have fewer and fewer new bites and show less responses to them as their bodies adjust.

## Hanna Mitchell

Hanna is a sophomore applied mathematics major from Vienna, Va., Although, she is a second year in college, this is only her first year at Radford University. Financial barriers lead her to choose Radford, but she quickly fell in love with the small community and limitless opportunities.

Hanna chose mathematics, after getting to college and being encouraged by a business calculus professor to peruse math as a major. She says “I went from hating mathematics because I didn’t understand it to loving it because it was a challenge and logical.”



Shortly after being accepted into Radford University, Hanna was selected to be a Next-Gen Scholar. This helped her find her fit in the College of Science Technology as she worked to complete the graduated requirements as a scholar, like being the Vice President of the Math Club.

As for life after college, Hanna is unsure of her plans. Right now, she is working on pre-medical school requirements in addition to her major as she has desires to be a doctor. In whatever she does as a career Hanna wants to be in a position to help others directly.

Hanna was motivated to do research abroad after visiting South Africa in June of 2014. In Peru, Hanna is excited to use her mathematical knowledge and apply it to real world and significant work while expanding her knowledge of biology. She says, “Peru is a place I would have never dreamed of going, but not I can’t stop thinking about what it’s going to be like.”

### Hanna's Project:

The Peruvian Amazon has not been studied quite as much as the rainforests of its neighboring country, Brazil. With the increasing reduction in rainforests every year it is hard to save what we do not know about. Fungus is a kingdom of life which is not regularly studied in depth, making identification of species difficult because of the lack of complete and centralized information available. Fungal decomposers are important to the health of the ecosystem, and understanding their phylogeny provides toward understanding their role. In addition, faster identification will allow for endangered or unknown species to be studied, because the vast amount of time will not have to be spent on determining the actual species name. To solve this problem, there should be centralized information which allows researchers to easily identify the species of fungus they seek to gain information on. By creating software to categorized groups of fungi using multiple variables, we hope to solve this problem. Phylogenetic categorization based on categorical distribution will allow for quick and easy identification of fungal species. The unknown fungal species will be studied in the Peruvian Amazon and compared to known fungal species that are used as parameters in the program, in order to find the closest species or genus.



### **Josh Oliver**

Josh is a Geospatial Science major with an environmental concentration from Rocky Mount, Va. He came to Radford University after graduating high school in fall 2010, and actually withdrew from the university due to personal issues. "I didn't think I was mentally ready to come to college," recalls Josh. "After taking a year and a half off, I came back to Radford University in fall 2012 and I fought my way up to being one of the best in my major."

In spring of 2014, Josh received a SURF fellowship with Dr. Stockton Maxwell, assistant professor of geospatial science. "I worked on "A Tree-Ring Reconstruction of New River Streamflow, a statistical analysis of tree-ring width and streamflow volume," says Josh. "I presented this research at the Student Engagement Forum and at the Annual SEDDAG Conference in Athens, Ga., November 23-25, 2014." Currently he is working on writing a research manuscript for this project to be published in an academic journal.

In addition to this project, Josh is busy with several other research endeavors. He is currently working on a project with Dr. Christine Small, chair of the Biology department, and Jesse Daniels, a senior biology student, using statistical predictive models based on site dynamics and physical gradients to detect unknown locations of invasive plant species in the central Appalachian region.

For his senior capstone project, Josh is conducting research using remote sensing predictive models to locate unknown wetland areas to determine the rate of wetland deterioration in Southwest Virginia. "I will be presenting both projects at either the Student Engagement Forum or at conferences and I will be writing manuscripts for both to be published in academic journals in the future," Josh says. "I feel like I have been part of a Cinderella type story: From thinking I wasn't mentally ready to start my college career to becoming a bright researcher for Radford University."

Josh adds, "In my free time I enjoy spending time with my family and girlfriend Sarah, who has been my support group throughout my college career. I also enjoy playing tennis, basketball, and golf."

#### **Josh's Project:**

Under the canopy of the Peruvian Amazon Rainforest, there are many complex and widely varying systems of vegetation. The main purpose of my research is to categorize and distinguish these ecologically unique areas into semi-discrete microbiomes. The sites chosen will be visually compared based on tree species composition, canopy height and canopy cover. Furthermore, the sites will be evaluated based on other significant ecological variables for differentiating microbiomes such as soil pH and soil nutrients, terrain, and moisture content. From this point, the difference between variables studied will be validated using statistical software to insure that these microbiomes are accurately distinguishable. By categorizing these areas of the Peruvian Amazon Rainforest, my findings will allow for a great understanding of this very unique forest for future protection efforts.

## Fallon Parker

Fallon is a Biology major with a concentration in Environmental Studies and a minor in Geospatial Sciences from Dandridge, Tenn. "My life has always revolved around the outdoors and water," Fallon recalls. "I have been a competitive swimmer for 15 years and have spent the past six years or so coaching swimming." Her passions include many outdoor sports such as snowboarding, hiking, surfing, wake boarding, sailing, snorkeling, and scuba diving. "The latter of these began my love of marine ecology and has been one of my main drives to be a part of the Radford University Amazon trip," she recalls.



In Peru, Fallon will be studying bacterial colonies in fish and how the trophic web is structured with the invertebrates in two streams flowing opposite directions. "Past research I have done is nearly all aquatic including both freshwater and marine," she says. "I spent time at Conservation Fisheries Inc. breeding and caring for freshwater fish that are classified as threatened and endangered."

Through another Radford University study abroad opportunity In the U.S. Virgin Islands, Fallon studied the abundance and distribution of four Caribbean reef fish species by size class. "I also studied abroad with the Biology department going to the Galapagos Islands focusing on adaptation and evolution," she states. Fallon spent the summer of 2014 working with the Tennessee Department of Environmental Conservation doing stream invertebrate surveys.

Fallon adds, "One of my favorite things in life is new exploration and adventures. I see the Amazon Rainforest of Peru as the ultimate adventure!"

### Fallon's Project:

The freshwaters of the Peruvian Amazon rainforest have been relatively unexplored. As one of the most biodiverse hotspots in the world we might presume that there is much there yet to be discovered. In addition many areas there, such as Las Piedras watershed, have been rarely encroached upon by human disturbances. I predict that there will be a more varied number of aquatic organisms such as fish and invertebrates in larger streams further from human habitation than smaller streams closer to human habitation. Also, water and soil with more varied microbial life will also be the streams with a larger variety of fish and invertebrates. Areas with higher habitat assessment scores should have a higher abundance and variety of aquatic organisms.