22nd Annual

Graduate Student Symposium

January 16-17, 2016
Odum School of Ecology

Welcome and Acknowledgements

Welcome to the 22nd annual Graduate Student Symposium (GSS) at the Odum School of Ecology! The Graduate Student Symposium (GSS) is organized by graduate students and serves as a medium to showcase ongoing student research at all stages of development. The goals of the symposium are to offer opportunities to give professional presentations, enhance communication between students and faculty throughout the University of Georgia, and provide a forum for interacting with a successful and prominent keynote alumnus or alumna.

This year's symposium could not have happened without the input of numerous graduate student volunteers on the following seven committees, and their roles in organizing this event are appreciated!

- Program Committee: Rebecca Atkins, Michelle Evans, Wes Flynn, and Reni Kaul
- Undergraduate Poster Committee: Robbie Richards and Michelle Webber
- Judging Committee: Dan Becker, Kait Farrell, and Elizabeth Hamman
- Food & Beverage Committee: Caitlin Conn, Daniel Harris, Kelsey Solomon, Dexter Strothers, and John Vinson
- Souvenir Committee: Daniel Baker, Amy Briggs, and Paige Miller
- Prospective Student Committee: Anya Brown, Cecilia Sanchez, and John Vinson
- GSS Documentation and A/V: Katie Brownson and Liz Guinessey

Many undergraduate and graduate students also cheerfully volunteered to serve as poster and presentation authors, session moderators, audio-visual coordinators, and countless other roles. Furthermore, faculty, post-docs, and students all contributed as presentation judges. The critical, yet friendly feedback obtained from these judges is one of the hallmark components of GSS, and one of the most beneficial elements of the event. Thank you all!

The staff of the Odum School of Ecology provides administrative and technical support throughout the event ranging from computer problems to event publicity to speaker arrangements. In particular, Katherine Adams, Christy Frick, Beth Gavrilles, Brenda Mattox, Emily Schattler, Brian Perkins, Tyler Ingram & Shialoh Wilson are to be acknowledged with highest praise! We also want to thank Seth Wenger for hosting our keynote speaker.

Finally, we thank you for making time out of your busy schedule to attend the event. We hope you will not only hear something new, but will also provide feedback to the student participants, enjoy yourself, and consider contributing next year!

Sincerely,
Jessica Chappell and Rachel Smith
2016 Graduate Student Symposium Coordinators

History of the Graduate Student Symposium

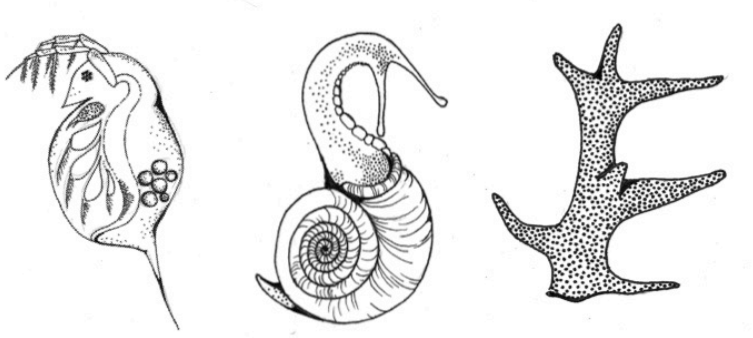
The Institute of Ecology Graduate Student Symposium was founded in 1995 by Janice Sand, Liz Kramer, Bob Hall, and Anne Dix as an outlet for graduate students to give oral presentations in preparation for national and international meetings. The first symposium involved approximately 10 student presentations on rotary slide trays from 35mm film developed in Ecology's dark room! Presentations were followed-up with a convivial potluck dinner. The success of GSS was immediately apparent with all involved having a great time and students winning presentation awards at national meetings! Other academic units at the university soon followed suit by establishing their own student symposia.

The event has grown in popularity and size over the years as the Institute has morphed into the Odum School of Ecology. In 1996, a keynote lecture was invited to the event, and soon thereafter it was decided that the keynote should be an alumna or alumnus of the UGA ecology program. Faculty, post-doctoral researchers, and graduate peers were enlisted to provide friendly feedback on presentations. An undergraduate poster session was established after ecology began a bachelor's degree program. Meals and coffee breaks were catered by local eateries to keep bellies full and attendees alert. Prospective students were soon invited the week of GSS to "get a feel for what ecology is all about." Additional administrative roles were needed to adjust to a growing symposium, and conference committees were organized to take care of invited speakers, program and scheduling, judging, food and drink, prospective student housing, and souvenirs. The table below lists *some* of the people who have been instrumentally involved in GSS.

Year	GSS Organizer(s)	Keynote Speaker	Affiliation at the time
1995	Janice Sand, Liz Kramer, Bob Hall, Anne Dix	NA	NA
1996	Janice Sand, Patty Saunders, Karen Bushaw, Elaine Hardwick, Jen Tougas	Rebecca Sharitz	Savannah River Ecology Laboratory
1997	Larkin Powell	Ronald Pulliam	National Biological Service
1998	Unknown	Unknown	Unknown
1999	Alice Miller	Karen Holbrook	Provost, University of Georgia
2000	Theresa Thom	Karen Kind Eckert	Wider Caribbean Sea Turtle Conservation Network
2001	Laura England	H. Kay Austin	International Joint Commission
2002	Unknown	Jack Webster	Virginia Polytechnic Institute
2003	Dawn Drumtra, Stephanie Madson	Jianguo (Jack) Liu	Department of Fisheries and Wildlife, Michigan State University
2004	Gretchen L. Peltier	Peter Groffman	Cary Institute of Ecosystem Studies
2005	John Kominoski, Caralyn	Carol Couch	Georgia Department of Natural Resources

	Zehnder		
2006	Chrissa Carlson, Carol Flaute	William Cale	University of North Alabama
2007	Andrew Mehring, Sonia Harnendez	Johnathan Ambrose	Georgia Wildlife Resources Division
2008	Ching-Yu Huang, Chip Small	Nick Haddad	North Carolina State University
2009	Dean Hardy, Jamie Winternitz	Evelyn Gaiser	Florida International University
2010	Jessica Joyner, Shafkat Khan	Elizabeth Anderson	Field Museum of Natural History
2011	Peter Baas, Megan Machmuller	Ned Gardiner	National Oceanic and Atmospheric Administration
2012	Kimberly Kellett, Kyle McKay	Matt Whiles	Southern Illinois University – Carbondale
2013	Courtney Collins, Ethan Epps	Wyatt Cross	Montana State University
2014	Carly Phillips, Sam Woolford	Bob Hall	University of Wyoming
2015	Katie Brownson, Elise Krueger	Mike Strickland	Virginia Tech
2016	Jessica Chappell, Rachel Smith	Doug Parsons	Society for Conservation Biology

This year marks the 22nd annual Graduate Student Symposium, and we hope the tradition continues well into the future.



A note on talk formats

Talks are scheduled to start every 15 minutes with the expectation the presenter will speak for a maximum of 12 minutes. The remaining 3 minutes are allocated for questions and transition to next speaker. This year Session III will be a rapid fire session consisting of 2 blocks. Each presenter will have 5 minutes. Time for questions for any of the speakers will be at the end of the block.

Schedule of Events

Friday, January 16, 2015

Session I Moderator: Wes Flynn

9:00	Coffee and Refreshments	
9:30	Dr. John Gittleman	Welcoming remarks.
9:45	Laura Early	Impacts of Land Use Change on Ecosystem Services in the Satilla Watershed, GA
10:00	Robert Richards	Application of New Density Ratio Estimation Methods to Species Distribution Modeling
10:15	Liz Guinessey	Variability in Greenhouse Gas Flux Within a Temperate Salt Marsh Ecosystem.
10:30	Mike Ament	Nutrient Controls on Leguminous N2 Fixation
10:45	John Vinson	The Diversity-Disease Relationship in a Vector-Borne Disease System
11:00	Coffee Break	

Session II Moderator: Allison Williams

11:15	John Spencer	Nutrients and Ions in Urban Streams Along a Gradient of Conductivity
11:30	Elise KY Krueger	Modeling Life-history Tradeoffs of *Chlamydomonas reinhardtii*
11:45	Molly Fisher	Geographic Distribution of Adult Body Mass in Rodents
12:00	Elizabeth Hamman	Aggregation Patterns of Two Corallivorous Snails and Consequences for Coral Dynamics

Lunch 12:15-2:15 catered by Big City Bread

Session III Rapid Fire Moderator: Ashton Griffin

2:15	Lance Paden	Gopher Tortoise Conservation on a South Georgia Heavy Mineral Mine Site
	Davide Zailo	The Use of Videography and Crowdfunding to Support Graduate Research and Create Educational Pieces
	Philipp Nussbaum	Building Public Confidence in Wastewater Treatment through Constructed Wetlands
	Jessica Chappell	Temporal Variation in Riverine Connectivity: The Impact on Tropical Migratory Fauna
2:45	Paige Miller	Optimization of Early Warning Signal Reliability for Emergence and Elimination of Infectious Diseases
	Michelle Evans	Mosquito Dynamics Across An Urban Gradient
	Cara N. Love	Parasite Prevalence in Gray Wolves (*Canis lupus*) from the Radiologically Contaminated Chernobyl Exclusion Zone
3:15	Coffee Break	

Session IV Moderator: Reni Kaul

3:30	Tad Dallas	Species Centrality in Multi-Species Disease Networks
3:45	Rachel S. Smith	Mangroves on the Move: Engineering Community Change From the Bottom-Up
4:00	James Wood	Does Water Velocity Influence Herbivory Pressure on *Podostemum ceratophyllum,* a Widespread Macrophyte in Eastern Rivers?
4:15	Ania Majewska	Gardening for Monarchs With Tropical Milkweed (*Asclepias curassavica*): Implications for Migration and Disease
4:30	Wes Flynn	Quantifying Evolutionary Potential and Phenotypic Divergence of an Amphibian Population with Long-Term Exposure to Coal Combustion Wastes

Poster Session 5:00 – 7:00 Refreshments and light fare provided

Saturday, January 17, 2015

Session V Moderator: Sarah Bowden

9:30	Coffee and Refreshment	
10:00	Megan Winzeler	Effects of Multiple Stressors on Amphibian Development
10:15	Cara McElroy	Determining Landscape Connectivity through Patterns of Amphibian Community Composition across a Land-Use Gradient
10:30	Rebecca Atkins	Causes and Consequences of Intraspecific Variation within Salt Marsh Snail Populations Across Space and Time
10:45	R. Daniel Harris	Drones for Ecotones: A Bird's Eye View of Ecosystem Engineer Spatial Relationships.
11:00	Coffee Break	

Session VI Moderator: Rebecca Atkins

11:15	Cecilia Sánchez	Nutrition and Viral Prevalence in Two Species of Australian Flying Fox
11:30	Linsey Haram	Transformation of Estuarine Mudflats by Invasive Ecosystem Engineer Shifts Foraging Behavior of Top Predators
11:45	Daniel Becker	Livestock-dense Habitat Functions as an Ecological Trap for Vampire Bats
12:00	Alyssa Gehman	A Tale of Offset Humps: How Temperature Affects Host-parasite Interactions
12:15	Katherine Brownson	Monitoring Matters: A Preliminary Assessment of Monitoring and Evaluation Protocols Utilized by Payment for Watershed Services Programs in the United States and Costa Rica

Lunch 12:30-2:30 on your own

Session VII Moderator: Alyssa Gehman

2:30	Matt Carroll	Impacts of *Gambusia* Predation on Ecosystem Processes in Wastewater Treatment Wetlands
2:45	Sarah Bowden	Larval Competition Alters the Thermal Niche of Vector Mosquitoes
3:00	Julie Tierney	How Does Biological Nitrogen Fixation Facilitate Ecosystem Recovery?
3:15	Kaitlin J. Farrell	Seen One Stream and You've Seen Them All? The Unique Roles of Different Sized Streams in River Networks
3:30	Coffee Break	

Keynote: *Science in the Age of Trump* by Doug Parsons (4:00)

See next page for description; Dinner by Dondero's to follow

Keynote Speaker

Dr. Doug Parsons
North American Policy Director for the Society for Conservation Biology

M.S. in CESD (’00)

Science in the Age of Trump

4:00-5:00 PM, January 16, 2016
Odum School of Ecology Auditorium

Doug Parsons received his Masters through the CESD program in the Odum School of Ecology, where he worked with Dr. Cathy Pringle. He graduated from the program in 2000, and since that time, he has gained experience in a wide diversity of positions through which he has actively bridged ecology and policy. After graduating from the Odum School, he worked at the Georgia Conservancy, where he led the creation and implementation of the organization’s natural areas policy. After a few years with the Conservancy, he moved to Brisbane, Australia to work as a policy analyst for the Queensland Natural Resource Management Groups Collective. In his time there, he developed policies for climate change mitigation and adaptation within the agriculture industry, among other projects in land management and water planning. Following a few years in Australia, Doug returned stateside to work with the Florida Fish and Wildlife Conservation Commission. Here, he continued to focus on developing policies related to climate change adaptation, and helped integrate tenets of climate change adaptation into agency programs. Notably, Doug developed a sea level rise coordinator position for the agency, which was the first of its kind for a wildlife agency. Following his time in Florida, Doug moved to Washington D.C. to work for the Climate Change Response Program with the National Park Service. Here, he helped guide climate change policy at a federal level, and became actively involved in developing science communication strategies within the agency. Most recently, Doug has been working as the North American Policy Director of the Society for Conservation Biology, where he spearheads projects designed to increase the delivery of services to SCB members and ensure SCB has a voice in important policy conversations around their core conservation priorities.

Oral Presentation Abstracts

Nutrient Controls on Leguminous N2 Fixation

Michael Ament[1], and Nina Wurzburer[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Savannas are fire-dependent ecosystems that often occur on nutrient poor soils where plant growth is co-limited by nitrogen (N) and phosphorus (P). Fires can induce N-limitation by volatilizing large fractions of the N contained in understory biomass and organic soil horizons. N2-fixing legumes have the capacity to alleviate N-limitation by fixing atmospheric N_2, but could be constrained by the supply of soil nutrients. Here, we investigated how different elements (N,P, and Mo) regulate leguminous fixation by conducting a nutrient addition experiment on 7 legume species native to longleaf pine savannas. Our results indicate that legume growth and fixation increase with P additions, but not with Mo additions. Moreover, N had no effect on legume growth, but decreased fixation in certain species, which could reflect species differences in fixation strategies. Increased N and P availability following fire may therefore interact in complex ways to modulate ecosystem recovery.

Causes and Consequences of Intraspecific Variation within Salt Marsh Snail Populations Across Space and Time

Rebecca Atkis[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Southeastern US salt marshes are some of the most productive ecosystems in the world. Within these marshes, the marsh periwinkle, *Littoraria irrorata*, is a dominant grazer of saltmarsh cordgrass, *Spartina alterniflora*. At high densities, *Littoraria* can denude expansive swaths of cordgrass, destroying associated ecosystem services. My previous research in a Georgia saltmarsh has demonstrated that both small and large *Littoraria* can shift the *Littoraria-Spartina* interaction from beneficial (+) at low densities, to deleterious (-) at high densities, and that changes in consumer interaction strength with pant biomass can be predicted based upon the total metabolic demands of the consumer population (i.e., as determined by both size-structure and density). However, mechanisms underlying the transition from beneficial to deleterious effects (e.g., resource use) are unknown, as is the potential for variation in this transition among different marsh sites. Initially, I intend to explore spatial and temporal variation in *Littoraria* populations and

Littoraria-Spartina interactions in salt marshes spanning Florida to Virginia. I expect that changes in temperature (e.g., due to climate change or latitude) will lead to variation in consumer population size structure and biomass, and may shift the point (i.e. consumer biomass) at which consumer effects transition from being positive to deleterious, due to effects of temperature on population energetic demand.

Livestock-dense habitat functions as an ecological trap for vampire bats

Daniel Becker[1], Sonia Altizer[1], Alexandra Bentz[2], Gabor Czirjak[3] and Daniel G. Streicker[1,4,5]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Department of Poultry Science, University of Georgia, Athens GA
(3) Department of Wildlife Diseases, Leibniz Institute of Zoo and Wildlife Research, Berlin, Germany
(4) Institute of Biodiversity, Animal Health, and Comparative Medicine, University of Glasgow, Glasgow, United Kingdom
(5) Medical Research Council?University of Glasgow Centre for Virus Research, Glasgow, United Kingdom

Wildlife in urbanized habitat can benefit from food provided by human activities. The abundance and predictability of these provisioned resources can alter animal behavior and physiology, influencing infectious disease dynamics. In particular, responses of wildlife condition and immune defense to resource shifts can determine whether provisioning amplifies or dampens pathogen transmission. We here tested relationships between provisioning, host condition, and immunity through a cross-sectional study of 275 vampire bats (*Desmodus rotundus*) across 16 sites in Peru and Belize. This species has potentially benefited from livestock rearing, which provides blood-feeding bats with accessible and widespread food. Livestock could reduce starvation stress and energy spent foraging, allowing bats to invest more in immunity. We thus predicted that bats captured in sites of high livestock density would have better condition, display lower chronic stress and inflammation, and show higher humoral immunity. Although we found no relationship between livestock density and bat condition, bats from high-livestock habitats showed greater levels of stress and inflammation. Bats from livestock-dense sites also had lower immunoglobulin G, suggesting immune impairment or lower pathogen exposure. If the latter, our finding of higher stress and inflammation could be driven more by competition and crowding in high-resource habitat than by infection risk. Because we also found bat density to increase with livestock density, our findings suggest livestock-dense habitats function as ecological traps by producing source populations of immunologically impaired hosts. Increasing the abundance of provisioned habitat could therefore amplify bat susceptibility and contribute to pathogen spread.

Larval Competition Alters the Thermal Niche of Vector Mosquitoes

Sarah Bowden[1], and John Drake[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Temperature is known to affect survival and development time of larval mosquitoes, as well as survival, size, and longevity of adult mosquitoes. As vectors of disease, temperature has been shown to alter competence (ability to maintain and transmit a pathogen) of some mosquito species, as well as pathogen incubation period. Understanding how temperature interacts with larval mosquito community dynamics is vital for modeling how vector communities and vectorial capacity may be altered by climate change. We aimed to answer the following question: can vector community composition alter the thermal niche of mosquito species through interspecific larval competition? We performed laboratory microcosm experiments to explore the effects of interspecific larval competition on the thermal niche of three vector mosquito species (*Culex quinquefasciatus*, *Aedes albopictus*, and *Aedes aegypti*). Using measurements of survival, development time, and body size, we estimated population growth rates for each species in mono-, bi-, and tri-specific treatments. We then fit curves to these data to estimate the thermal niche (i.e., the temperature range in which population growth rate is non-negative) of each species under each competition scenario. We found *Aedes aegypti* to be the most robust to interspecific competition, as its thermal niche was not altered in any treatment. *Culex quinquefasciatus* exhibited a shift in its thermal response curve due to interspecific competition with *Aedes aegypti*, where the population growth rate peaked at a lower temperature than in other treatments. Competition with *Aedes aegypti* resulted in a narrowing of the thermal niche of *Aedes albopictus* at lower temperatures.

Monitoring Matters: A Preliminary Assessment of Monitoring and Evaluation Protocols Utilized by Payment for Watershed Services Programs in the United States and Costa Rica

Katherine Brownson[1], and Laurie Fowler[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) River Basin Center, Odum School of Ecology, University of Georgia, Athens GA 30602

The use of market-based approaches for watershed conservation has expanded rapidly in recent years and has been promoted as an efficient way to improve water supply, water quality and flow regulation. Under simple Payment for Watershed Services (PWS) schemes, downstream users of watershed services purchase services from upstream land managers. However, implementation of PWS can vary depending on a number of factors, including program size, relevant stakeholders, regulatory context, and other environmental and social program objectives. PWS programs also vary in their monitoring and evaluation practices, but these practices are often inadequate to demonstrate that services are being provided, inhibiting adaptive management and threatening the economic sustainability of programs by limiting additional investments by services users. Using surveys and semi-structured interviews with program managers, I explore the characteristics of various PWS programs to identify drivers and obstacles for adopting robust monitoring and evaluation protocols. I investigate programs in both the United States and Costa Rica to determine how these drivers and obstacles vary in these particular environmental, socioeconomic and regulatory contexts. Furthermore, I assess the implications of monitoring and evaluation practices for adaptive management and program sustainability.

Impacts of *Gambusia* predation on ecosystem processes in wastewater treatment wetlands

Matthew Carroll[1]

(1) River Basin Center, Odum School of Ecology, University of Georgia, Athens GA 30602

Gambusia sp. have been introduced worldwide as a potential biocontrol of mosquito populations. Constructed wetlands used to treat wastewater are one of the many habitats in which they have been introduced. My study assesses the impacts *Gambusia sp.* have on invertebrate populations and ecosystem processes, which aid in water purification in constructed wetlands.

Temporal Variation in Riverine Connectivity: The Impact on Tropical Migratory Fauna

Jessica Chappell[1], Kyle McKay[2], and Catherine Pringle[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Environmental Laboratory, U.S. Army Engineer Research and Development Center, Athens GA

Given dramatic declines in riverine connectivity resulting from dams, managers have recognized the need to balance tradeoffs between ecosystem integrity and socioeconomic needs for freshwater. Watershed connectivity is crucial to the life history of many aquatic migratory organisms. To this end, a variety of connectivity indices have emerged to quantify the effects of dams and other infrastructure on migratory organisms with different life histories. Although rivers are temporally dynamic, connectivity is typically calculated as static through time. Here, we propose to examine the role of intra- and inter-annual variations in connectivity for watersheds in El Yunque National Forest of eastern Puerto Rico. These tropical rivers host a variety of amphidromous taxa that require both freshwater and estuarine ecosystems to complete their life cycle. We focus on freshwater shrimp, American eel, mountain mullet, and gobies. Low-head dams, which are associated with water withdrawals, have the potential to block the migration of these organisms during periods of low stream flow. We plan to use a set of connectivity indices to analyze temporal and spatial variation in riverine connectivity in all 9 major watersheds which drain El Yunque. Once each species has a specific connectivity index value, we can determine how connectivity fluctuates on a per species basis. While tradeoffs exist, this analysis will attempt to demonstrate current water withdrawal schemes are inefficient and may be improved to better maintain watershed connectivity at the stream community level. Additionally, the importance of evaluating connectivity through time and space for multiple organisms will be highlighted.

Species centrality in multi–species disease networks

Tad Dallas[1], John Drake[1], and Barbara Han[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Cary Institute Of Ecosystem Studies, Millbrook, NY 12545

Parasites typically infect multiple host species, and the number and identity of host species infected can change over time. More similar hosts tend to share more parasites. Therefore, the likelihood of parasite sharing may be predictable using information on host

traits. Here, we used the Global Mammal Parasite Database to build parasite sharing networks, and calculated metrics of host centrality, which measure the tendency of a host species to serve an important role in the network. We examined three such measures (betweenness, closeness, and eigenvector centrality), which capture unique aspects of host importance in the network. These centrality measures were predicted with high (but sometimes variable) accuracy by models trained on host trait data. Taken together, this suggests that different centrality measures may be more difficult to predict than others, and that host species roles in networks of parasite sharing may be predictable. The latter suggestion could provide a way to target mitigation efforts, or to predict the likelihood of novel parasite transmission to human hosts.

Impacts of Land Use Change on Ecosystem Services in the Satilla Watershed, GA.

Laura Early[1], and Laurie Fowler[1]

(1) River Basin Center, Odum School of Ecology, University of Georgia, Athens GA 30602

Two of the greatest identified threats to coastal Georgia ecosystems are unplanned and unrestricted growth and changes in land use. With an exponentially growing population, it is imperative to understand how human activities like land use change are effecting biodiversity, ecosystem functions, and the services they provide. Using InVEST modeling software, we quantify the provisioning of ecosystem services at alternate land use scenarios in the Satilla River watershed in the coastal plain of Georgia. This analysis focuses on water quality, water yield, carbon sequestration, and recreation services. Alternate land use scenarios evaluated include the Future Land Use Plans developed by county governments within the watershed, population growth as projected by SLEUTH models, and widening of riparian buffers. Through a spatially-explicit ecosystem services analysis of the current land use/land cover and future development alternatives, we can better understand the impacts land use change patterns pose to ecological systems. Understanding the tradeoffs between land use changes and environmental impacts may encourage local governments to embrace conservation planning.

Mosquito Dynamics Across An Urban Gradient

Michelle Evans[1], and Courtney Murdock[2]

(1) Integrative Conservation and Ecology, University of Georgia
(2) Odum School of Ecology and Dept. Infectious Diseases, College of Veterinary Medicine, University of Georgia, Athens GA 30602

Urban areas are expected to increase by more than two thirds by 2050, with the majority of growth taking place in areas at high risk for vector-borne disease. The effect of urbanization on mosquito dynamics, and the diseases they vector, is still relatively unknown. Urbanization is expected to significantly alter the microclimate mosquitoes experience, thereby affecting their life history traits and, ultimately, population dynamics. In order to further explore the relationship between urban microclimate and vector-borne disease, we investigated Aedes albopictus mosquito populations across rural, suburban, and urban land use sites in Athens, GA. We found microclimate to differ significantly across the gradient, with urban sites hotter than rural sites, evidence of a heat island effect. Mosquito traits were similarly affected. Mosquitoes emerged 24-hours earlier in urban than rural sites, however mosquitoes from urban sites were smaller than those from other land-use types. Suburban sites had the highest per capita growth rate, suggesting that disease risk may be higher in suburban areas due to increased mosquito densities. Our study found that slight changes in microclimate due to urbanization significantly impact mosquito life history traits and, therefore, urbanization may similarly alter vector-borne disease dynamics.

Seen One Stream and You've Seen Them All? The Unique Roles of Different Sized Streams in River Networks

Kaitlin J. Farrell[1], Amy D. Rosemond[1], Ford Ballantyne IV[1], and John S. Kominoski[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Department of Biological Sciences, Florida International University, Miami FL

Understanding how and why ecosystem process rates vary across space is critical to making functional metrics relevant for natural resource managers and decision-makers. Many empirical, ecosystem-scale studies are single-site, or cross-site comparisons of individual sites that span broad environmental gradients. In inland fresh waters, we need to understand how stream size and location within river network influence ecosystem processes and services. To begin to address this, we quantified ecosystem processes (ecosystem respiration [ER], gross primary production [GPP], ammonium uptake [NH_4])

and organic matter stocks (coarse and fine benthic organic matter, biofilm Chlorophyll-a) using recirculating chambers in nine first- to fourth-order, forested streams throughout the Coweeta Creek basin (Macon County, North Carolina). We estimated chamber-scale process rates using linear regression of changes in dissolved oxygen concentrations (ER, GPP) and log-linear regression of changes in dissolved ammonium concentrations (NH_4) over time. We found that chamber GPP and ER were correlated, and that both rates increased with stream order and distance downstream. NH_4 uptake was correlated with the GPP:ER ratio, with higher uptake in sites where respiration exceeds primary production. Using estimates of the proportion of stream area from first-to-fourth-order streams within the network, we can model chamber-scale process rates to the reach and river network scale to estimate the relative importance of each stream size in oxygen production and consumption and in processing nitrogen inputs. Because headwater streams currently lack protection under the Clean Water Act, their specific role in the stream network, and the consequences of their loss, must be considered.

Geographic Distribution of Adult Body Mass in Rodents

Molly Fisher[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Abstract unavailable.

Quantifying Evolutionary Potential and Phenotypic Divergence of an Amphibian Population with Long-Term Exposure to Coal Combustion Wastes

Wes Flynn[1], Allison Welch[2], and Stacey Lance[1]

(1) Savannah River Ecology Lab, Odum School of Ecology, University of Georgia, Aiken SC 29802
(2) Department of Biology, College of Charleston

Environmental change can push wildlife beyond their range of optimal conditions, which necessitates populations either adapt to new conditions or suffer decreased viability. Contamination of aquatic habitats with coal combustion waste (CCW) products is widespread and can negatively impact a number of organisms including amphibians; however, little is known about long-term consequences of this type of environmental change for amphibian populations. To understand the potential for amphibians to adapt

in response to this type of contamination, we compared a CCW-exposed population of southern toads (*Anaxyrus terrestris*) with a naive population in an *in situ* reciprocal transplant design. Our aims were 1) to quantify additive genetic (i.e., primary determinant of rate of evolutionary change) and non-genetic variances (e.g., maternal effects) underlying morphologic and life history traits and 2) to compare phenotypic responses of aquatic life-stages to contaminated and uncontaminated environments at the population level. We detected significant additive genetic variation for most traits, suggesting the life histories of both populations would be responsive to selection. Maternal effects were present for traits in early life-stages, but faded rapidly as development progressed. While we found no evidence that the genetic structure of traits differed between populations, individuals from the exposed population had greater larval growth and survival in contaminated conditions than those from the naive population. Further, though development was overall more rapid in the uncontaminated environment, the CCW-exposed population was not able to develop as rapidly as the naive population in absence of contaminants. Our results demonstrate how anthropogenically induced environmental changes could act as selective pressures and alter the expression of multiple life history traits.

A tale of offset humps: how temperature effects host-parasite interactions

Alyssa Gehman[1], Richard Hall[1], and James Byers[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Temperature has predictable, often non-linear, effects on many biological processes. Parasites of ectothermic hosts may have similar non-linear responses to temperature, however the effects of temperature on parasites are less well understood compared to that of free-living animals. We conducted lab experiments developing thermal optimum curves for reproduction and mortality in the parasitic castrator *Loxothylacus panopaei* in its mud crab host *Eurypanopeus depressus*. Parasitized and unparasitized hosts were exposed for 209 days to a range of temperatures (5 to 35°C in increments of 5°C) commonly experienced in the field. All parasitic larvae released from crabs were collected, quantified and measured; survival was recorded for both hosts and parasites. Reproductive output of the parasite was maximized at 20°C, with frequency of larval release occurring approximately every 7 days at 20°C and above. Time between releases was longer for temperatures below 20°C. Survival of uninfected hosts was maximized at 20°C, whereas survival of parasitized hosts was maximized at 10°C, creating an offset in the optimum between uninfected and infected hosts. This work reveals that temperature has a non-linear effect on parasite rates of survival and reproduction, and will need to be explicitly included in future models to obtain accurate predictions of infection as a response to ecosystem change.

Variability in greenhouse gas flux within a temperate salt marsh ecosystem.

Elizabeth Guinessey[1], Ford Ballantyne[1], and Elizabeth King[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Odum School of Ecology and Warnell School of Natural Resources, University of Georgia, Athens GA 30602

The salt marsh ecosystem plays an integral role in the global carbon budget and can act as a significant carbon sink. Along with carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4) can significantly impact the global system; in fact these two greenhouse gases are several times more potent than carbon dioxide. This past summer I conducted research on Jekyll Island, on the southeastern coast of Georgia, to determine how the flux rates of CO_2, CH_4, and N_2O differ in each of four main salt marsh zones. Each salt marsh zone (Tall Spartina alterniflora, Short Spartina alterniflora, Juncus roemerianus, and dieback patches) occurs along a gradient of salinity and inundation level and can act as a proxy for these abiotic conditions. I collected samples using soil respiration chambers and ran the gas samples on an SRI gas chromatographer in the lab. The results of my study show that CO_2 and CH_4 flux rate did vary significantly by plant community ($p=0.00217$ and $p=0.00737$, respectively), but the N_2O flux rate did not ($p= 0.123$). The greatest differences in flux rate are between Tall Spartina alterniflora and Juncus roemerianus; these two zones have the greatest variation in salinity and inundation levels. By identifying these patterns in gas flux rate and salt marsh zone, there is a possibility to use zone as a proxy for scaling up greenhouse gas emissions to provide information to stakeholders at a larger scale. In particular, this research can be used to inform the creation of blue carbon markets, which shift economic favor toward the restoration and protection of coastal habitats and away from their degradation. My future research aims to further explore the technical feasibility of the salt marsh in blue carbon markets as well as institutional and financial feasibility.

Aggregation patterns of two corallivorous snails and consequences for coral dynamics

Elizabeth Hamman[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Spatial heterogeneity plays an important role in consumer-resource interactions. It arises from variability in the underlying distribution of the resource and/or the consumer, as well as the habitat in which the consumer-resource interaction occurs. In some cases, the

resource is the habitat, especially when the habitat is biogenic (e.g. kelp, corals, seagrasses). In these systems, the resulting dynamics can be particularly rich because the consumer-resource interactions are coupled with changes in the habitat (i.e., resource) that are due to the consumer-resource interaction. In Moorea, French Polynesia, two corallivorous snails, *Coralliophila violacea* and *Drupella cornus*, feed and live on massive *Porites* corals. Here, we 1) document the spatial patterns at multiple spatial scales; 2) examine the drivers of smaller-scale aggregations; 3) test the effects of aggregations of snails on coral growth by manipulating snail density. The distributions of both snails were highly heterogeneous among sites across the island, and both species were spatially aggregated both among and within corals. The source of chemical attraction that caused the small-scale clustering differed between the two snails. *D. cornus* was attracted to conspecifics and corals damaged by conspecifics, whereas *C. violacea* was attracted to damaged corals (regardless of the cause). Increasing snail density caused a linear decline in coral growth that was similar for the two snail species. The combination of the clustered spatial pattern of both snail species and their negative effects on coral growth could lead to important feedbacks in this consumer-resource interaction.

Transformation of estuarine mudflats by invasive ecosystem engineer shifts foraging behavior of top predators

Linsey Haram[1], Kaitlin Kinney[2], Erik Sotka[3], and James Byers[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) University of Georgia, Ohio State University
(3) College of Charleston

The invasive seaweed *Gracilaria vermiculophylla* continues to expand its range along the coasts of Europe and North America. Of particular interest is the *G. vermiculophylla* invasion in the coastal communities of Georgia and South Carolina. Unlike other invaded regions across the globe, these states have very low diversity of native seaweeds, making *G. vermiculophylla* a new life form and increasing availability of physical structure. With the introduction, a shift in distribution of invertebrates has been observed, whereby invertebrates concentrate on mudflats with *G. vermiculophylla* present. Such a shift in the distribution of marine invertebrates can have cascading impacts on reliant trophic guilds. Through a series of studies, I am investigating the role of *G. vermiculophylla* in the transformation of Southeastern salt marshes trophic dynamics, asking: 1) How does the invasive seaweed change the trophic structure and distribution of marine invertebrate communities, and 2) To what extent do these effects translate to higher trophic levels, namely shorebirds?

Drones for Ecotones: A Birds Eye View of Ecosystem Engineer Spatial Relationships.

R. Daniel Harris[1], and James E. Byers[1]

(1) Odum School of Ecology, University of Georgia, Athens, GA

Edge relationships between distinct habitats within ecosystems are poorly understood. How these relationships adjust to climate change will likely have large community wide implications. Climate change is driving current sea level rise and increased storm frequency and intensity. This trend is predicted to intensify and will have a dramatic effect on coastal habitat patterns. While landscape ecology provides a useful toolbox for studying environments, where patch, edge and matrix relationships can be observed over large spatial scales by remote sensing, it is underdeveloped in coastal environments. Here we apply landscape ecology methods to study spatial relationships between plant and invertebrate ecosystem engineers across an estuary. Ecosystem engineer spatial patterns within an ecotone were documented using aerial photography, and observed to change across intertidal and estuarine scale gradients. These observations provide resource managers with the tools needed to improve living shoreline design, marsh dieback research and a baseline from which to predict ecosystem engineer response to climate change and sea level rise.

Modeling Life-history Tradeoffs of *Chlamydomonas reinhardtii*

Elise Krueger[1], and Ford Ballantyne IV[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Chlamydomonas reinhardtii populations may consist of two morphologically distinct stages, single-celled individuals and multicellular aggregates. I used a stage-structured model of population growth was to investigate how tradeoffs between growth and reproduction in *C. reinhardtii* influence population growth rates. Transitions between stages are determined by a decision to grow as a single cell or to form a colony and a decision as to remaining a colony or reproducing into single daughter cells. Pseudo-stages were incorporated into the model to more accurately reflect the need of each stage to reach a biomass threshold before transitioning to the alternate stage. Under identical rates of biomass accumulation and mortality, maximum growth rates (λ) are achieved when the probability of transitioning to either stage is greater. The proportion of single-celled individuals within the population increases as the propensity of colonies to reproduce into daughter cells increases. Decreasing mortality of aggregates raises the

maximum growth rate more quickly than declining mortality of single cells, however the shape of this tradeoff is largely symmetrical indicating that this effect is minor. This initial model provides a basis for building models with additional stages which may help determine scenarios ecological and evolutionary trade-offs may be important. Additionally, as this model is focused on the life-history of an abundant primary producer, the eventual goal will be to examine how changes in life-history may alter carbon allocation.

Parasite prevalence in gray wolves (*Canis lupus*) from the radiologically contaminated Chernobyl Exclusion Zone

Cara Love[1], Sarah Webster[2], James Beasley[2], and Thomas Hinton[3]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Warnell School of Forestry and Natural Resources, University of Georgia, Athens GA 30602
(3) Fukushima University,Institute of Environmental Radioactivity

Acute radiation exposure has been shown to cause increased mortality, endocrine disruption, and immunosuppression, yet studies investigating the health effects of chronic, sublethal exposure are lacking. The Chernobyl accident occurred 29 years ago and the surrounding contaminated landscape (the Chernobyl Exclusion Zone, CEZ) offers an ideal model system to investigate these long term effects. The CEZ contains heterogeneous radiation contamination levels ranging from 40 - >7,500 kBq m^2 and the landscape supports a diversity of wildlife species, including gray wolves (Canis lupus). During fall 2014 and spring 2015, we collected gray wolf scat throughout the CEZ for parasite and genetic analyses. We used microsatellite markers to assign scat to individual gray wolves. Using fecal float techniques we calculated internal parasite loads for individuals from the CEZ and investigated correlations between radiation level and parasite loads. We identified nematode and trematode parasite species in low, medium, and high radiation exposed gray wolves and found no significant difference between radiation exposure and parasite loads. These data may suggest that the radiation levels currently experienced in the CEZ are not altering the ability for individual wolves to fight off internal parasite infection. Future research will examine other aspects of health and potential sublethal effects of chronic radiation exposure.

Gardening for monarchs with tropical milkweed (*Asclepias curassavica*): implications for migration and disease

Ania Majewska[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Decline of native pollinators such as the monarch butterfly (*Danaus plexippus*) is a pressing conservation problem arising from climate change, disease and habitat loss. Butterfly gardens could replace lost breeding habitat by providing larval host plants, yet despite their conservation potential, the effect on the pollinators is unclear. Understanding how non-native plants in backyard gardens can impact monarch butterflies, which drastically decline in the last two decades, is key to promoting their conservation. This study examined how tropical milkweed (*Asclepias curassavica*) a non-native host plant of the can impact local monarch population, disease risk and migration behavior.

Determining Landscape Connectivity through Patterns of Amphibian Community Composition across a Land-Use Gradient

Cara McElroy[1], Jeffery Hepinstall-Cymerman[2], Lora L. Smith[3], and Travis C. Glenn[4]

(1) Joseph W. Jones Ecological Research Center, Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Warnell School of Forestry and Natural Resources, University of Georgia, Athens GA 30602
(3) Joseph W. Jones Ecological Research Center
(4) Environmental Health Science, University of Georgia

Amphibians in geographically isolated wetlands (GIWs) occur in complexes of wetlands embedded within an upland matrix that provides juvenile and adult habitat. To better understand the effects of anthropogenic land conversion on amphibians, I compared species richness, evenness and similarity of the amphibian species in 36 GIWs within the Dougherty Plain region of southwestern Georgia. Study wetlands were chosen to allow comparison of species along a disturbance gradient, from wetlands embedded in intact longleaf pine *Pinus palustris* forests to those in extensive agricultural land use. Wetlands were sampled monthly with dipnetting and automated audio surveys to detect adult anurans and larval anurans and salamanders. We found that amphibian species richness was similar among reference and disturbed wetlands, but longleaf pine habitat specialists such as gopher frogs *Lithobates capito* and striped newts *Notophthalmus perstriatus* were

not detected at wetlands without sufficient surrounding forest cover. In contrast, wetlands in agricultural fields were dominated by generalist species fare well in disturbed landscapes. Greater disturbance of landscapes tended to lead to high densities of one or two generalist species, such as *Lithobates sphenocephalus* (southern leopard frog) or *Hyla squirella* (squirrel treefrog.) These results suggest that to preserve amphibian diversity southeastern GIWs, there must be greater emphasis on the preservation of wetlands within intact forest.

Optimization of early warning signal reliability for emergence and elimination of infectious diseases

Paige B Miller[1], and John M Drake[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Many complex systems, ranging from ecosystems to financial markets and the climate, have critical transitions (i.e., tipping points) at which the system shifts abruptly from one state to another (i.e., a regime shift). Predicting these regime shifts is notoriously difficult but highly desirable, especially in the context of infectious disease emergence. Much recent research has focused on early warning signals (EWS) as a potential to forecast these critical transitions for dynamical systems. Early warning signals are statistical properties (e.g. standard deviation) that change in characteristic ways prior to a critical transition. They can be a consequence of critical slowing down, which means that as the system approaches the critical transition, it becomes slower at recovering to equilibrium following a perturbation. However, classical EWS can only be used for non-periodic time-series (in which the statistical properties do not vary with time) because the fluctuations due to critical slowing down are so small (relative to periodic oscillations). Since infectious disease data sets are often periodic and critical transitions in periodic systems are not well understood, I propose to develop new EWS that use wavelet analysis to separate the forcing period of a near critical system from its inherent fluctuation and thereby overcome the current limitation of this method. In initial experiments, I found that wavelet based methods were more reliable at detecting the critical transition to emergence in an infectious disease model than classical EWS.

Building Public Confidence in Wastewater Treatment through Constructed Wetlands

Philipp Nussbaum[1], Laurie Fowler[2], Deborah McGrath[3], and Emmie Oliver[3]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) River Basin Center, Odum School of Ecology, University of Georgia, Athens GA 30602
(3) University of the South

In collaboration with the Odum School of Ecology, the University of the South, located in Sewanee, TN, is undertaking a pilot constructed wastewater treatment wetland project with a $590,000 grant from the Coca-Cola Foundation. The project was proposed and originally designed by graduate students in the University of Georgia's Environmental Policy Practicum. The constructed wetland (CW) will be built on a site provided by the Sewanee Utility District (SUD) and will provide additional polishing between the initial treatment lagoon and final application of the wastewater to adjacent forest. The primary goal of the project is to determine whether CWs are cost-effective in removing pharmaceuticals and endocrine disruptors that are incompletely and expensively treated by most conventional wastewater systems and are likely to be regulated pursuant to the federal Clean Water Act in the future. The second major goal is to build public confidence in and awareness of CWs through a comprehensive public education campaign. As a pilot project, the treatment wetland has the potential to encourage other communities throughout the southeastern US as well as internationally to adopt CWs to treat wastewater more effectively and inexpensively. As construction of the wetland is expected to begin in February 2016, we are currently involved in pre-assessment through a survey and focus groups to understand the Sewanee community's current knowledge and perceptions of water issues as well as the means they rely on for this information. The data we collect will help us develop the public education and communication campaign including a major spring kickoff event.

Gopher Tortoise Conservation on a South Georgia Heavy Mineral Mine Site

Lance Paden[1], and Kimberly Andrews[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Savannah River Ecology Lab, Odum School of Ecology, University of Georgia, Aiken SC 29802

Georgia's sandhills ecosystem is increasingly imperiled largely due to habitat fragmentation and degradation. Silviculture practices have drastically changed much of

southeast Georgia in particular. These practices have left many species in the region clinging onto subpar habitat in a fragmented landscape. Here I present mitigation practices currently employed by myself and other researchers at The University of Georgia on a Southern Ionics Minerals Inc. heavy mineral sand mining operation. Additionally, I will outline prospective thesis research topics involving gopher tortoise communities in this sandhills ecosystem. Extensive surveys over the past year have identified and demographically described gopher tortoise subpopulations. To date, surveys have guided management and mitigation efforts through relocation and sequestration of gopher tortoise subpopulations and subsequently numerous commensal species. As mining operations at this site continue, previously mined land will be gradually restored to it's previous state or improved through native vegetation planting. Research opportunities abound as far as quantifying the response of 'natural' communities to restoration efforts. We hope to take advantage of these opportunities to conduct studies looking at growth and health responses of hatchling tortoises in various restoration planting regimes, response of adults and sub-adult tortoises to sequestrations, as well as total subpopulation response to longer range relocations when relocated as previously identified subpopulations. As these topics are still in the planning stages, feedback regarding prospective research is much appreciated.

Application of New Density Ratio Estimation Methods to Species Distribution Modeling

Robert Richards[1], and John Drake[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Species distribution modeling (SDM), the use of known species distribution data and environmental information about localities to predict the distribution of species on a broader landscape, is broadly applicable and widely used across many fields of ecology, conservation, and management. Generally the explicit probability of a species being present at a location, given its environmental state, is difficult to calculate because it relies on an accurate knowledge of the total prevalence of the species across the landscape. Luckily, for most applications, knowledge of the relative suitability of each location is more than enough to inform scientists and managers of where to begin searching for species or what locations are most important to preserve. We have designed and implemented two new methods of estimating this relative suitability score, relying on bootstrap aggregation resampling approaches, and tested these methods against simpler implementations and MaxEnt, the leading approach, using a publicly available data set of 106 plant species systematically sampled across 550 plots in the Swiss Alps. We also developed a method of evaluating the learning rate of these models (i.e. the way in which

model fit changes when it is trained on between 1 and the maximum number of available species presence points) which provides insight into the performance of models across broad ranges of data quality. Our two new models generally performed as well as MaxEnt with one model performing better than all others at low training point numbers.

Nutrition and viral prevalence in two species of Australian flying fox

Cecilia Sanchez[1], and Adam McKeown[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) CSIRO Land and Water Flagship

Poor nutrition can affect animal health and susceptibility to infectious diseases. It can also alter behavior, leading undernourished wildlife to seek food in urban environments, which can increase human-wildlife contact and create the potential for zoonotic disease transmission. In Australia, *Pteropus* flying foxes are the natural reservoir of Hendra virus (HeV). HeV transmission from bats to horses, and occasionally from horses to humans, typically results in fatal disease in both secondary hosts. Horse infections follow a highly seasonal pattern, with most cases occurring May-October. Recent work suggests this pattern could be driven in part by increased flying fox susceptibility to HeV infection owing to nutritional stress. During June-July 2015, we captured 92 spectacled and grey-headed flying foxes from four roosts in Queensland and New South Wales, Australia. We collected blood samples and took morphological measurements to assess bat nutrition and condition, and collected urine samples to screen for HeV and related paramyxoviruses using quantitative PCR. Flying foxes varied by age, sex, and species in nutrition and body condition as measured by ranges for 10 micronutrients and vitamins as well as morphometric data. All urine samples collected (n = 39) tested negative for 11 paramyxoviruses, including HeV, previously found in flying foxes.

Mangroves on the move: engineering community change from the bottom-up

Rachel Smith[1], Todd Osborne[2], and James Byers[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Whitney Laboratory for Marine Bioscience, University of Florida

Tropical mangrove species are expanding into temperate saltmarshes worldwide, representing a global, climate-driven transition. Along the north Florida coast, the

tropical engineer, black mangrove *Avicennia germanins*, is rapidly expanding into native saltmarshes, replacing the dominant saltmarsh species, smooth cordgrass *Spartina alterniflora*. Both mangroves and saltmarsh are detrital-based systems that perform similar ecosystem functions, but these two ecosystems differ greatly in provided habitat structure, as well as the frequency, quantity and quality of detrital inputs. We were interested in how changed habitat context and the presence of novel detrital inputs affect detrital invertebrate community composition following mangrove expansion. Litter from both *Avicennia* and *Spartina* was placed in mangrove and saltmarsh habitat within the mangrove-saltmarsh ecotone, as well as across a regional gradient of mangrove density from West Palm Beach, FL to Savannah, GA. Detrital invertebrate community composition was assessed after 3 months, and habitat context and identity of detrital input were shown to be important drivers of invertebrate community composition at both the local and regional scale. Crabs were the primary driver of the observed community changes, and an additional structural mimic experiment showed that crabs utilize both saltmarsh and mangrove detritus primarily for structural habitat refuge. Overall, our work suggests that mangrove expansion into saltmarshes may change detrital invertebrate composition by altering both habitat context and the structural qualities of detrital inputs.

Nutrients and Ions in Urban Streams Along a Gradient of Conductivity

John Spencer[1], Seth Wenger[1], and Amy Rosemond[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Abstract unavailable.

How Does Biological Nitrogen Fixation Facilitate Ecosystem Recovery?

Julie Tierney[1], and Nina Wurzburger[1]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602

Ecosystem recovery depends on the supply of mineral nitrogen (N), which is often dictated by the rate at which biological N_2 - fixation (BNF) introduces new N to the ecosystem. But, how BNF responds to disturbance is unclear. Longleaf pine savannas provide a model ecosystem to study how BNF facilitates recovery from disturbance because they are inherently N poor due to a dependency on frequent fire and they house

a number of organisms capable of fixing N_2. My research investigates if, when and to what extent BNF provides new N to recovering longleaf pine savannas across a stand age gradient established at two military bases in Georgia and Florida. Present findings suggest that ecosystem N demand, induced by tree growth, peaks at an intermediate stage in development while the abundance of N_2 -fixing legumes remains exceptionally low until stand maturity. This pattern challenges the assumption that BNF is greatest during early stages of ecosystem development, and raises questions about how fire interacts with stand age to influence the contribution of legumes and other N_2 -fixers to BNF. In order to investigate the organization of BNF throughout time and if inputs from BNF track N demands throughout ecosystem development in longleaf pine systems, I will 1) quantify BNF contributions by groups of N_2 -fixers by determining their relative abundance and N_2 fixation rates and 2) estimate N demands due to net primary productivity. This will provide insight into how BNF alleviates N deficiencies that inhibit ecosystem development in restored longleaf pine savannas.

The Diversity-Disease Relationship in a Vector-Borne Disease System

John Vinson[1], and Andrew Park[1,2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) Dept. Infectious Diseases, College of Veterinary Medicine, University of Georgia, Athens GA 30602

With global changes in diversity, an understanding of how decreased host diversity will affect disease transmission is crucial. The dilution effect hypothesis has emerged which generally posits that decreased host species diversity leads to an increase in disease risk and is well-debated. Evidence for the phenomenon has been observed in both West Nile Virus and Lyme disease systems, which are transmitted through vector species. However, these studies have not implemented a framework to explore the generality of the relationship. Here, a multi-host SI model with vector-borne transmission was developed to explore the conditions under which decreased disease risk (dilution) occurs, using the reproductive ratio (R_0) of the parasite as a measure of disease risk. The conditions were developed for communities decreasing from two host species to one as well as for a general host community disassembly. Extending from these, host communities integrating basic community interactions, such as interspecific competition and predation, were simulated to further explore under what predictive community disassembly strategies these conditions are supported. It was found that changes in relative host abundance and host competence after disassembly are crucial for determining the impact of disease risk to the host community. Furthermore, the community disassembly strategy is pivotal on the change in disease risk. From these results, the generality of the dilution effect

hypothesis is not supported but rather dependent on the community structure (interactions) between host species and the competency of the host species.

Effects of Multiple Stressors on Amphibian Development

Megan Winzeler[1], David Scott[1], and Stacey Lance[1]

(1) Savannah River Ecology Lab, Odum School of Ecology, University of Georgia, Aiken SC 29802

Amphibians experience multiple stressors during their development, and the effects of these stressors include decreased survival, lengthened larval periods, and other physiologic changes. In a previous study we found a correlation between presence of metal contaminants, including copper (Cu), and increased prevalence of amphibian pathogens. Our study examines the effects of exposure to environmental stressors (Cu and hydroperiod) on the susceptibility of larval marbled salamanders (*Ambystoma opacum*) to a FV3-like ranavirus. We reared individual larvae in a 2x2x2 factorial design, with treatments including exposure to Cu (0 and 30$\mu g\ l^{-1}$), different hydroperiod lengths (none or periodic removal of water), and exposure to a FV3-like ranavirus (sham or 1.71 x 105 $PFU\ mL^{-1}$), with 30 replicates of each treatment. The Cu and shortened hydroperiod treatments began upon hatching while the ranavirus exposure occurred at 30 days post hatching. We measured survival and total length on days 0, 30, and 60 to calculate growth rates and quantified viral load of ranavirus using qPCR at day 60. All individuals exposed to ranavirus were positive for the virus, but none displayed clinical signs. There was no significant difference among the hydroperiod and Cu treatments for total length ($p = 0.316$), growth rate ($p = 0.481$), or survival ($p = 0.339$). Exposure to ranavirus had a significant effect on growth rate ($p - value = 0.0002$), causing individuals with greater loads to have smaller growth rates, and viral loads correlated with growth rate ($p = 0.01$). These results suggest that exposure to ranaviruses can cause significant sublethal effects, and potentially alter life histories, in larval salamanders in areas without ranavirus induced die-offs.

Does water velocity influence herbivory pressure on *Podostemum ceratophyllum*, a widespread macrophyte in eastern rivers?

James Wood[1], Jon Skaggs[1], and Mary Freeman[2]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) US Geological Survey, Patuxent Wildlife Research Center

Podostemum ceratophyllum has been described as the 'Poster Child' of river impairment in Piedmont rivers due to the widespread decline of the plant, however surprisingly little is known about the plant's ecology and what loss of the plant means to riverine ecosystems. We conducted a reciprocal transplant experiment in the Middle Oconee River to investigate herbivory on textitPodostemum ceratophyllum and how herbivory may be regulated by water velocity. We then excluded macroconsumers for 98 days using electrified exclosures to estimate growth rate and the effect of herbivory on plant biomass. Our results indicate top-down regulation of plant biomass and water velocity mediated herbivory pressure. Because *Podostemum* may be consumed by a variety of riverine fauna, developing a better understanding of how consumption and growth rates are influenced by water velocity can inform the development of streamflow management strategies that support persistence of this macrophyte.

The Use of Videography and Crowdfunding to Support Graduate Research and Create Educational Pieces

Davide Zailo[1], Kimberly Andrews[2], John Maerz[3], and Mike Byrne[4]

(1) Odum School of Ecology, University of Georgia, Athens GA 30602
(2) University of Georgia and Georgia Sea Turtle Center
(3) University of Georgia
(4) Nova Southeastern University

Crowdfunding is an emerging tool that can be used by individuals, commercial organizations, universities, and non-profit organizations to raise money for specific causes. As a graduate student at the University of Georgia working towards a Master's degree in Conservation Ecology and Sustainable Development, I created a Crowdfunding video to raise funds to help cover my final year of fieldwork and research equipment expenses. The video illustrates the conservation issues facing diamondback terrapins (*Malaclemys terrapin*) in coastal Georgia. In addition to assisting with our funding needs, the footage we acquired has been used for social media posts, outreach tabling events, a video exhibit at the Georgia Sea Turtle Center, and to complement seminars and lectures at

universities in both Georgia and South Carolina. This talk is meant to be informal in nature; rather than presenting upon a strict scientific piece it is meant to help attendees think of utilizing more non-conventional methods of fundraising and disseminating information in addition to standard journal publications.

Poster Abstracts

XENOPHOBIC ANTS: SOCIAL FORM DISCRIMINATION IN THE TROPICAL FIRE ANT

Kip D Lacy, Kenneth G Ross
Odum School of Ecology, University of Georgia, Athens, GA
Department of Entomology, University of Georgia, Athens, GA

Elucidating the genetic components of animal social behavior continues to be a biological holy grail. Fire ants have become a model system in which to explore the intricacies of social behavior. They exhibit the highest level of animal sociality—eusociality—and are often socially polymorphic within species. This is the case with the Tropical Fire Ant, Solenopsis geminata, in which there are two social forms: monogyne (single queen colonies) and polygyne (multiple queen colonies.) In this study I investigated the interaction between workers and queens across different social forms and sites of origin by conducting behavioral choice assays for queen acceptance or rejection. I found that polygyne workers rejected all queens not from their site of origin, regardless of social form. Since ants presumably recognize each other on the basis of genetically determined pheromones, this inability to recognize such closely related conspecifics as kin may indicate unusual reproductive modes in the polygyne social form.

EVALUATING THE IMPORTANCE OF LOCAL ADAPTATION AND FUNCTIONAL DIVERSITY OF INVERTEBRATES TO LEAF DECOMPOSITION IN FORESTED HEADWATER STREAMS.

David Stoker[1], Amber J. Falkner[1], Kelly M. Murray[2], Ashley Lang[1], Catherine M. Pringle[1], Jeffrey Hepinstall-Cymerman[3], Michael J. Conroy[3], and Robert J. Cooper[3]
[1]Odum School of Ecology, University of Georgia, Athens, GA
[2]Department of Entomology, University of Georgia, Athens, GA
[3]Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA

Resource subsidies and biodiversity are important for communities and ecosystems, but the pathways through which subsidies and biodiversity simultaneously affect ecosystem function are unclear. Forested headwater streams depend on leaf litter inputs, and are a model system for investigating this link. We conducted a reciprocal transplant experiment between two low- and two high-elevation streams in which representative leaf packs of each elevation were deployed in home or away sites. This design allowed us to evaluate the relative importance of local adaptation of stream communities and leaf pack type to leaf decomposition. We were also able to investigate how these resources differ in their effects on the detrivore community. We did not find that communities were adapted to locally-derived leaf litter. Instead, decomposition differed by leaf pack type. By using structural equation modeling, we found the leaf pack types differed in decomposition due to contrasting effects propagated through the detrivore community. Detrivore biomass and functional diversity were the primary drivers of leaf decomposition. Our research shows that functional diversity can be an important for ecosystem function, and its effects depend on the subsidy the ecosystem receives.

INFLUENCES OF PREDATORS ON PARASITE PREVALENCE IN CRASSOSTREA VIRGINICA

Meghan K. Tait, Jennafer C. Malek, James E. Byers,
Odum School of Ecology, University of Georgia, Athens, GA

Host-parasite relationships do not occur in isolation. It is increasingly recognized that other species, like predators, may both directly and indirectly influence the dynamics between hosts and parasites. If predators preferentially feed on infected or uninfected hosts, they may influence parasite prevalence in the remaining host population. Furthermore, when predators feed on infected hosts, they may release parasites from the prey facilitating their spread to new hosts. In this study we investigated if the blue crab, *Callinectes sapius*, preferentially selects prey (the eastern oysters, *Crassostrea virginica*), infected by one of its most prevalent parasites, *Perkinsus marinus*. Using a series of choice trials in laboratory mesocosms, we presented blue crabs with two oysters. Once the crab had committed to consuming one oyster, we removed both oysters from the mesocosm and assessed their *P. marinus* infection status. Using all trials that included a choice between one infected and one uninfected prey, we analyzed the preference of each predator. Blue crabs did not exhibit preferential feeding as a function of *P. marinus* infection status. Our data thus suggests that crab predators will not alter prevalence patterns of oyster populations through differential predation. This gives us a better understanding of the relationship between the biotic environment and host-parasite interactions.

LIVESTOCK INTENSIFICATION IS ASSOCIATED WITH SMALLER RED BLOOD CELLS IN WILD VAMPIRE BATS

Ruth Schade,[1]* Daniel Becker,[2] Andrew Davis,[2] and Sonia Altizer[2]
[1]Department of Foods & Nutrition, College of Family & Consumer Sciences, University of Georgia, Athens, GA
[2]Odum School of Ecology, University of Georgia, Athens, GA
*Email: ruth.schade25@uga.edu

Novel and abundant food resources provided by urbanization and agriculture can strongly influence wildlife behavior and physiology, with consequences for infectious disease dynamics. The common vampire bat (Desmodus rotundus) is a reservoir host for several zoonotic pathogens and has potentially benefited from intensification of livestock rearing, which provides blood-feeding bats with accessible and widespread food. Frequent feeding on livestock could reduce bat starvation risk and thus provide nutritional benefits that translate into greater survival, fecundity, and immunity. We here tested if livestock rearing confers subtle benefits to vampire bat health by applying digital image analysis to blood slides collected from over 30 individuals across 8 sites varying in livestock density in Peru. For each bat, we used ImageJ software to quantify the size and variability in red blood cells (RBCs), which are responsible for oxygen transport through the body. Overall smaller RBCs can indicate dehydration, while greater variability in RBC size is suggestive of anemia. We therefore predicted that bats captured in livestock-dense habitat with ample feeding opportunities would have larger RBCs and less within-bat variation in RBC size. However, contrary to this prediction, we found that increasing

livestock density was associated with smaller RBCs but not variation in RBC size. This associative effect far exceeded that of other relevant covariates such as latitude, elevation, or bat size. Therefore, our results suggest vampire bats in areas of abundant livestock suffer from reduced hydration, which could counterintuitively arise from fewer successful feeding opportunities or from other factors associated with agricultural change.

INVESTIGATING THE BIOTIC AND ABIOTIC EFFECTS OF LEAF-CUTTING ANT SPECIES ATTA CEPHALOTES ON PLANT GERMINATION, GROWTH, AND SURVIVORSHIP AT LA SELVA BIOLOGICAL STATION

Suzanne Henderson, University of Georgia

Atta cephalotes, a common leaf-cutting ant (LCA) species, is the dominant herbivore of the Neotropics. Its active role in herbivory and symbiotic fungus cultivation and nest excavation indirectly influences light and soil nutrient availability and soil structure at nest sites. This study conducted at La Selva Biological Research Station in Costa Rica aimed to investigate the influence of A. cephalotes on various stages of early plant development. Specifically, these included (1) seed germination success, (2) seedling growth, (3) and seedling survivorship. Common tree species V. koschnyi and Dipteryx panamensis were used for germination in field and shadehouse germination trials and seedling plantings in the field. Plots were established by soil type (alluvial and residual) and forest type (primary and secondary) and lastly, nest versus non-nest locations. In the field, germination success in alluvial nest plots was slightly higher than control plots ($p = 0.08$), whereas in the shadehouse, germination on residual nest soils was significantly lower compared to the control ($p < 0.001$). Dipteryx panamensis seedling growth was not significantly different between nest and non-nest plots. Percentage of herbivory and seedling mortality was significantly greater in alluvial primary forest sites than any other plot type. A lower seedling survivorship in control plots suggested that impacts of Atta cephalotes herbivory on local plant communities may be significant, due to their extensive foraging trails. This study leads to bigger questions regarding the complex biotic and abiotic processes of this dominant herbivore that may significantly shape plant community composition and structure in tropical forests. As LCA species A. cephalotes becomes more abundant with increasing forest fragmentation and other human-induced disturbance, its role in tropical ecosystems must be further studied in both anthropogenic and ecological contexts.

RISK FACTORS FOR HUMAN TO HUMAN TRANSMISSION OF EMERGING PATHOGENS

Joseph Walker, John Drake
Odum School of Ecology, University of Georgia, Athens, GA

Over the past several decades, emerging infectious diseases have become a major concern for pu blic health. While novel diseases like Ebola and MERS dominate headlines, there are a wide ran ge of microorganisms that might adapt to become both pathogenic and readily transmissible amo ng humans. Such infectious diseases could become endemic in the population and exact a heavy burden on human health. A better understanding of the risk factors associated with human transm

issibility would enable proactive identification and response before such emerging diseases beco mes public health crises.
Here, I have compiled a database of the characteristics and features of known viral and bacterial pathogens, and am currently in the process of analyzing this data using regularized regression me thods. The purpose of this research is to quantify how different pathogen features determine or are associated with transmissibility in humans.

EFFECT OF FIRE ON AQUATIC FUNGI

Sarah Clement, Maura Dudley, Catherine Pringle
Odum School of Ecology, University of Georgia, Athens, GA

Fires are an important structuring element of forest ecosystems, both naturally occurring and those used for forest management, and can vary in their severity and impact. Nutrient enrichment in the form of nitrogen and phosphorous is one of the known short-term effects of forest fires. Nutrient enrichment studies have been shown to cause an increase in fungal reproductive output, as well as an increase in fungal abundance and species richness. There are few studies on the effects of fire on stream fungi. This study aims to test if nutrient release from fires causes a similar effect on stream fungi as nutrient enrichment. The study will compare a severe burn, a mild burn, and a control stream, to see how fungal species richness and biomass varies with different levels of fire damage. I predict that the severe burn will result in the greatest nutrient enrichment, causing an increase in stream fungal biomass and conidia production for certain species, but a decrease in overall species richness. The mild burn will result in slight nutrient enrichment, but the effect on fungal production and species richness will be negligible. Water and soil nutrient levels will be monitored and compared for the three treatments, to evaluate fire effects. Fungal productivity will be measured. Water samples will be filtered and dyed so spores can be quantified and identified. We will use ergosterol extraction to estimate fungal biomass. We will compare productivity rates to spore production and biomass, to determine changes in reproductive output pre-burn and post-burn.

HOW DO STREAMS “WORK” IN CITIES?: ARE MICROBIAL METABOLIC RATES STIMULATED OR SUPPRESSED WITH WATERSHED URBANIZATION

Rachel Usher, James Wood, Amy Rosemond
Odum School of Ecology, University of Georgia, Athens, GA

Healthy streams and ecosystem services they provide depend on energy sources to fuel food web production and pollutant uptake. Carbon from surrounding terrestrial landscapes is a vital source of energy for headwater streams where sunlight is limited and biofilms are comprised largely of heterotrophic microorganisms, bacteria and fungi. Streamwater nutrients associated with urbanization can stimulate, while other contaminants can suppress, microbial metabolic rates. We measured respiration and breakdown rates of wood and cellulose in 9 streams in Athens-Clarke County, GA to assess the effects of watershed urbanization on metabolic processes. We used wood and cellulose samples to determine how these streams cycle recalcitrant and labile

carbon. Respiration and breakdown rate were measured weekly for 28 days in addition to surface water chemistry (DIN, SRP, conductivity). Preliminary data shows that urbanized streams (with increased percent impervious surface) have higher levels of biofilm respiration in both sponge and wood samples. Over the 4 week study, respiration rates on wood and sponge samples increased in all streams with rates approximately double on sponge compared to the wood. The sponge samples degraded faster over the course of the experiment compared to the recalcitrant wood samples. Overall, microbial metabolic rates were higher in streams with more urban land cover potentially impacting the retention and transport of energy sources in streams.

CAN OYSTER LARVAL RECRUITMENT AND SURVIVAL BE PREDICTED THROUGH CHEAPLY OBTAINED, REMOTELY SENSED DATA?

John Coffin, Erick Gavilanes, Daniel Harris,
Odum School of Ecology, University of Georgia, Athens, GA

While *Crassostrea virginica* (oyster) reefs provide key ecosystem services, oysters worldwide have been reduced by 85%. Restoration managers need better recruitment and survivorship data. This study investigates whether current and wave energy are good predictor variables for oyster recruitment and survivorship, and if wave fetch and water body width are good proxies for those variables. Cheap, Arduino microcontroller-based sensors will be deployed throughout an estuarine gradient and will broadcast real-time current and wave energy data over a radio network. Rigs will be placed at 60 sites over a wide range of current and wave regimes. Adult and juvenile oyster recruitment and survivorship will be monitored at each site. Biological and physical data will be coupled to determine if there is a significant relationship between current and wave energy and oyster success. GIS analysis will be used to predict current and wave energy data from water body width and prevailing wind fetch data gleaned from analysis of aerial photography. This will show whether these variables can serve as proxies for the current and wave energy data collected in the field. We expect recruitment and survivorship to increase with current speed and to decrease with increased wave energy. We predict high wave and medium current sites (sounds) will have medium recruitment and low survivorship; the low wave and high current sites (rivers/creeks) will have high recruitment and survivorship; and the low wave and current sites (creek heads) will have low recruitment and survivorship due to high deposition rates in the low current environment.

DOES WATER VELOCITY MEDIATE TROPHIC DYNAMICS OF PODOSTEMUM CERATOPHYLLUM?

Jonathon Skaggs[1], James Wood[1], and Mary C. Freeman[2]
[1]Odum School of Ecology, University of Georgia, 140 East Green Street, Athens, Georgia 30602, USA
[2]U.S. Geological Survey, Patuxent Wildlife Research Center, University of Georgia, 180 East Green Street, Athens, Georgia 30602, USA

Surface water withdrawals and impoundment have significantly impacted the natural flow regime of freshwater rivers around the world, but there is little research on how flow manipulation impacts trophic dynamics of macrophytes in these streams and rivers. *Podostemum ceratophyllum* is a widespread aquatic plant that grows submerged in rivers throughout the Appalachian region, and plays an important role in maintaining healthy ecosystem structure and function. The presence of *Podostemum* has been shown to significantly increase macroinvertebrate biomass, and may positively affect fish abundance and diversity. Preliminary research suggests that *Podostemum* is also widely consumed by riverine consumers, and top-down control of *Podostemum* is important in limiting its growth. In this study, I modelled the effect of flow velocity on the complex trophic dynamics of *Podostemum*, periphyton, snails, and omnivorous crayfish using data from laboratory mesocosm experiments and field experiments in the Middle Oconee in Athens, Georgia. Results of this study will examine into the role of flow velocity in regulating trophic cascades and indirect interactions in local stream food webs and provide further insights into the effect of flow manipulation on stream structure and function.

COMPARING IMMUNE DEFENSES AND PATHOGEN SUSCEPTIBILITY IN CLOSELY RELATED HOST SPECIES

Hayley Schroeder, Sonia Altizer, Paola Barriga, Alexa McKay and Dara Satterfield
Odum School of Ecology, University of Georgia, Athens, GA

Closely related species often share immune defense responses against parasites. However, exceptions occur and closely related species can use different immune responses as defense mechanisms against shared parasites. Monarch (*Danaus plexippus*) and queen (*D. gilippus*) butterflies belong to the subfamily Danainae and are known to host *Ophryocystis elektroscirrha* (OE), a protozoan parasite. Preliminary data showed that OE is a specialist parasite for Danaus spp. Despite similar levels of exposure, queens are more resistant to experimental OE infection than monarchs and show a lower prevalence of infection in the wild. These observations suggest that monarchs and queens could have different immune defense responses to shared parasites. The goal of this study was to investigate if these closely related butterfly species differ in susceptibility and immune responses to a generalist pathogen commonly found in insects. We also tested if fitness measurements varied among species after infection. We inoculated both queens and monarchs with a generalist pathogen *Serratia marcescens*. The results indicated that queens were innately better defended, as demonstrated by higher hemocyte concentrations and greater phenoloxidase activity. There was also a trend of lower mortality in queens, but a larger sample size is required to determine if this trend is significant. Because monarchs must energetically invest heavily in migration, the possibility for a trade-off exists where monarchs might be less well defended, making them more susceptible to infection by both generalist and specialist pathogens than queens.

DIVERGENT SELECTION IN THE CONTEXT OF SOURCE-SINK DYNAMICS IN VACCINIUM ELLIOTII

James Noah Workman, Jill T. Anderson

Odum School of Ecology, University of Georgia, Athens, GA

Environmental conditions vary through time and across space, exposing natural populations to different abiotic and biotic regimes. In turn, divergent selection can favor specialization to contrasting environments, leading to the evolution of local adaptation. *Vaccinium elliotti*, a native species of blueberry, grows in two different habitats in the southeastern United States: drought-prone upland forests and flood-prone bottomland forests. Upland forests have dry nutrient-poor sandy soils, high light penetration into the understory, and increased susceptibility to drought. In contrast, bottomland forests flood 1-2 times annually, have nutrient-rich clay soils, and dark understories. We hypothesized that natural selection in upland forests would favor traits that promote fitness under drought, including deep roots and high root:shoot ratios. In contrast, we expected selection to favor flood tolerance in wetland populations.
Vaccinium elliotti presents an interesting case study because this species shows evidence of source-sink dynamics, with higher fitness in upland forests and asymmetric gene flow from upland into bottomland populations. In source-sink demographic systems, there is variation in habitat quality among patches. Gene flow from the source habitat allows the population in the sink to persist, despite less favorable conditions. This symmetric gene flow could inhibit adaptive divergence between the two populations, reducing the potential for bottomland (sink) populations to adapt to local conditions. To investigate patterns of selection in *Vaccinium elliotti* we conducted a greenhouse experiment simulating one of the primary ecological differences between the bottomland and upland habitats: long term flooding and drought.

INVESTIGATING THE INFLUENCE OF FARM-SCAPE GEOSPATIAL CHARACTERISTICS ON SPIDER DIVERSITY

Katherine Russell[1], Dawn Olsen[2], Alisa Coffin[2], and Jason Schmidt[3]
[1]Odum School of Ecology, University of Georgia, Athens, GA
[2]U.S. Department of Agriculture, Agricultural Research Service, Tifton, GA
[3]University of Georgia, Coastal Plain Experiment Station, Tifton, GA

Biodiversity is an important aspect of sustainable crop management and agricultural production. Maintaining biodiversity within agricultural ecosystems, especially in regards to predator species, promotes natural pest control and many other ecosystem services. Spiders (Araneae) often prey upon common pest species, making them a beneficial component of agroecosystems. Spider diversity varies across landscapes and is often correlated with certain abiotic factors. This project investigates the effects of geospatial characteristics on spider abundance and diversity within *Miscanthus giganteus* and cotton crops. Samples were obtained by placing pitfall traps in the *Miscanthus* and cotton fields along a grid pattern. Spiders were later removed, preserved in alcohol, and manually counted and identified. Counts and species data were compiled into a spreadsheet and correlated with site location and characteristics. Environmental attributes analyzed include topography/grade, soil type, and site proximity to edge habitat. Final results are pending. It is hypothesized that the abundance of spiders will be greatest on the edges of the field and lowest in the centers. Likewise, greater species diversity is predicted in sites that are closer to edges, with diversity decreasing as one moves away from the heterogenous border habitat. Preliminary analysis shows at least 10 different species of spiders present across the farm-scape,

with wolf spiders (Lycosidae) demonstrating the greatest numerical abundance. Further identification of spiders and more in-depth analysis will allow for greater exploration of the relationship between spider abundance, diversity, and the farm-scape's geospatial attributes.