

Ross Biological Reserve & Alton A. Lindsey Field Laboratory

Biological Sciences, Purdue Univ., September 2014
Ecology and Evolutionary Biology

RESEARCH FOCUS

Research at the Reserve is a productive blend of experimentation and detection of natural patterns. Dr. Nancy Emery and students aim to understand the ecological and evolutionary factors that determine spatial distributions and abundances

of plants. **Spring ephemeral wildflowers** are particularly sensitive to the timing of rapidly changing climatic and biological conditions in spring woodlands. Experimental manipulation of soil temperature tests the resilience of coordination among plants and their pollinators. This helps us understand the limits of adaptability in an increasingly human-modified landscape.



Dr. Esteban Fernandez-Juricic and students are using the Lindsey Lab and vicinity for studies of **birds' vision and behavior**. Bird species vary in their visual systems regarding fields of view, color sensitivity, and visual acuity. Understanding how these visual abilities translate into feeding behavior and predator avoidance has implications for interactions among species, including humans. For instance, they are developing new aircraft lighting systems tuned to avian eyes to minimize collisions between airplanes and birds. Dr. Jeffrey Lucas and students have been studying **auditory communication in birds**, and find complexity in some species' vocalizations that warrant considering them a language. Songs and calls

are tuned to both the sound-transmission characteristics of the forest and receivers' auditory acuity, including other species. These studies test fundamental ideas that apply to human hearing and vision systems.

Researchers at the Reserve also come from the Departments of **Forestry and Natural Resources** and **Entomology**, studying causes of species' distributions, impacts of exotic species, comparative sound environments, and effects of habitat fragmentation. Research involves many undergraduates conducting honors and independent studies (30 in the last year) and course projects.



The Open House this year was well attended and we were updated on progress on the Sustainable Building Project and outreach programs.



The last year at the Reserve was one of continued research and teaching excellence with substantial improvements in community connections. Purdue classes made good use of the Reserve, including Field Ecology and Conservation Biology. We developed an array of new programs integrating art and science for K-12 students (page 2), and we helped inaugurate a Big 10 coalition of field stations. The Reserve and its programs play an important role as an interpretive center in the Wabash corridor.

A small sample of recent accomplishments:

Josh Shields, PhD dissertation (2014). Effects of Amur honeysuckle (*Lonicera maackii*) invasion and removal on native vegetation and white-footed mice (*Peromyscus leucopus*) in mixed-hardwood forests of IN.

Asya Robertshaw, PhD dissertation (Dec. 2014: Emery adv.) Effects of temperature, resources, and pollinator availability on plant reproductive success in Indiana spring ephemerals.

Gall, MD, T Salameh & JR Lucas. 2013. Songbird frequency selectivity and temporal resolution vary with sex and season. Proceedings of the Royal Society B.

Randolet, J, JR Lucas & E Fernández-Juricic. 2014. Non-redundant social information use in avian flocks with multisensory stimuli. Ethology.

Moore, BA, M Doppler, JE Young & E Fernández-Juricic. 2013. Interspecific differences in the visual system and scanning behavior of three forest passerines that form heterospecific flocks. Journal of Comparative Physiology.



“Green” Building

The Ross Reserve Sustainable Building Project is progressing well in planning for construction in 2015. We have worked through several basic forms including student designs resulting from the “Ecological Principles in Building” course, and settled on the form below.



Planning takes time because we are integrating stakeholders, architects, engineers, ecologists and builders from the beginning, and we are determined to make the building a demonstration of fiscal efficiency as well as **producing its own energy, conserving water and materials, and minimizing direct and indirect environmental impact** for the long term. “Green” building is an important opportunity for leadership in the wider community, and we have the support of Purdue administration at all levels. We combine photovoltaic power, geothermal heating and cooling through hydronics, common-sense passive measures like super-insulation, orientation and shading, on-site waste treatment, and use of repurposed materials throughout (more details on the website). The building will meet LEED platinum requirements and will be the first state-university building to achieve Living Building Challenge certification through support from the Office of University Sustainability. We have raised a third of the funds needed, mostly through the generous support of alumni, faculty and friends, and we have some promising corporate and foundation interest. Most importantly, the building will allow us to expand our **outreach programs** with a rejuvenated faculty and our Artist-in-Residence, Gabriela Sincich. The building will be part of the message in that students will see principles of ecological efficiency displayed in the transparent functioning of the building, and landscaping with native plants will integrate the building with the Reserve.



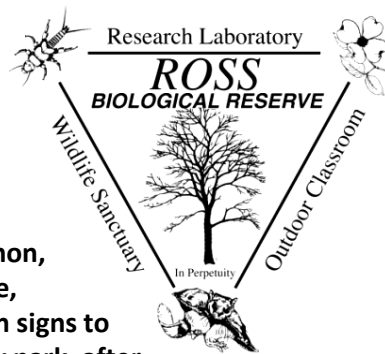
Outreach

Scientific literacy is an important societal mission of the University, and environmental understanding is particularly critical for sustaining a quality of life. Contact with Nature and experience with ecological science promote informed citizenship. Our program in **Conservation of Wetlands and Amphibians** exemplifies the kind of expansion of public outreach we envision, combining basic natural history and field exploration with art, quantification, and participatory “citizen science.” Working with third- and fourth-graders, we conducted a three-day program in the Spring with amphibian expert Ximena Bernal and Purdue Biology students. An in-school visit with live animals presented basic concepts of ecosystem function and threats, along with the life cycles and vocalizations of local frog species. In a day-long field trip, we visited three wetlands including the Reserve, identified many plants and animals, and practiced protocol for the North American **Amphibian Monitoring Program**, including their data sheets. On the third day, the students created landscapes to express their ideas about amphibians and their wetlands.



The Reserve lies between the Ravines golf course and Ross Hills County Park, on

the north bank of the Wabash River in Tippecanoe County. From campus, follow South River Road (becoming Division Road) downstream (southwest) past Fort Ouiatenon, Granville bridge, and the Ravines golf course, turning south (left) on county road 875, with signs to Ross Hills. Just before a turn and the county park, after a golf-course service road, the Reserve sign and entrance are on the left.



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