Millersville University
SEIZE THE OPPORTUNITY
Department of Biology
Applied Conservation Lab

Radio-telemetry Tracking of *Phasianus colchicus* at Safe Harbor, Pennsylvania: An Educational Pilot Project

Amanda Isabella and Dr. Aaron M. Haines*

INTRODUCTION

Retention rates of Science, Technology and Math (STEM) students in the United States have not kept pace with the global demand for scientific workers (National Science Foundation 2014). Low retention of students in STEM majors may be based on traditional undergraduate STEM programs simply teaching basic concepts through theoretical coursework. The objective of our project was to determine the feasibility of implementing an undergraduate research project as part of an applied course. We had students conduct a pilot project using radio telemetry to obtain spatial data from six ring-necked pheasants *(Phasianus colchicus)*. The purpose of this applied course will be to give undergraduate students early exposure to hands-on ecological techniques to better understand ecological concepts. Research has found that students given early hands-on learning experiences retain information better and are more likely to graduate with a degree in their chosen field (Jones et al 2010, Donelly et al 2006, Singer et al 2013).

Figure 1. Tracking team volunteers left to right : K Klaassen, R Malampy, K Thomas, V Pantenella, and E Neideigh. Not pictured: A Isabella, A Kessler, K Ulrich, and S Way.

METHODS

A student volunteer tracking team was established for this project and were trained by attending a number of sessions to find radio-transmitters hidden on the Millersville Campus (Figure 1). Once training was complete, 6 pen-raised pheasants (3 cocks and 3 hens), donated by a licensed gamebird breeder, were fitted with a VHF transmitter weighing 12 g (Figure 2). Hens were fitted with transmitter frequencies 15, 25, and 35, and cocks with frequencies 45, 55, and 65. The pheasants were then transported to Safe Harbor and released in the Safe Harbor Preserve near the Conestoga River in Lancaster County (Figure 3).

Pheasants were tracked via radio-telemetry by the undergraduate volunteer tracking team (Figure 1). Tracking days were divided into four tracking time slots, morning (0600-0900), noon (1100-1500), evening (1600-1900), and night (2100-2300). Pheasants were tracked at least twice a day. Triangulation was used to narrow in on pheasant locations. Students then proceeded to home in on the birds. Locations of the pheasants were recorded using a hand-held Garmin GPS unit, accurate to ± 5m. The locations of the birds were recorded when they were heard or seen. GPS recordings were labeled based on the pheasant radio frequency number and date, time and weather data were also recorded. Waypoints were downloaded onto a PC using DNRGPS (Minnesota DNR) and spatial data was displayed and analyzed using ArcGIS 10.1 (ESRI 2012).

Figure 2: Radio-collar being placed on a female ring-necked pheasant.

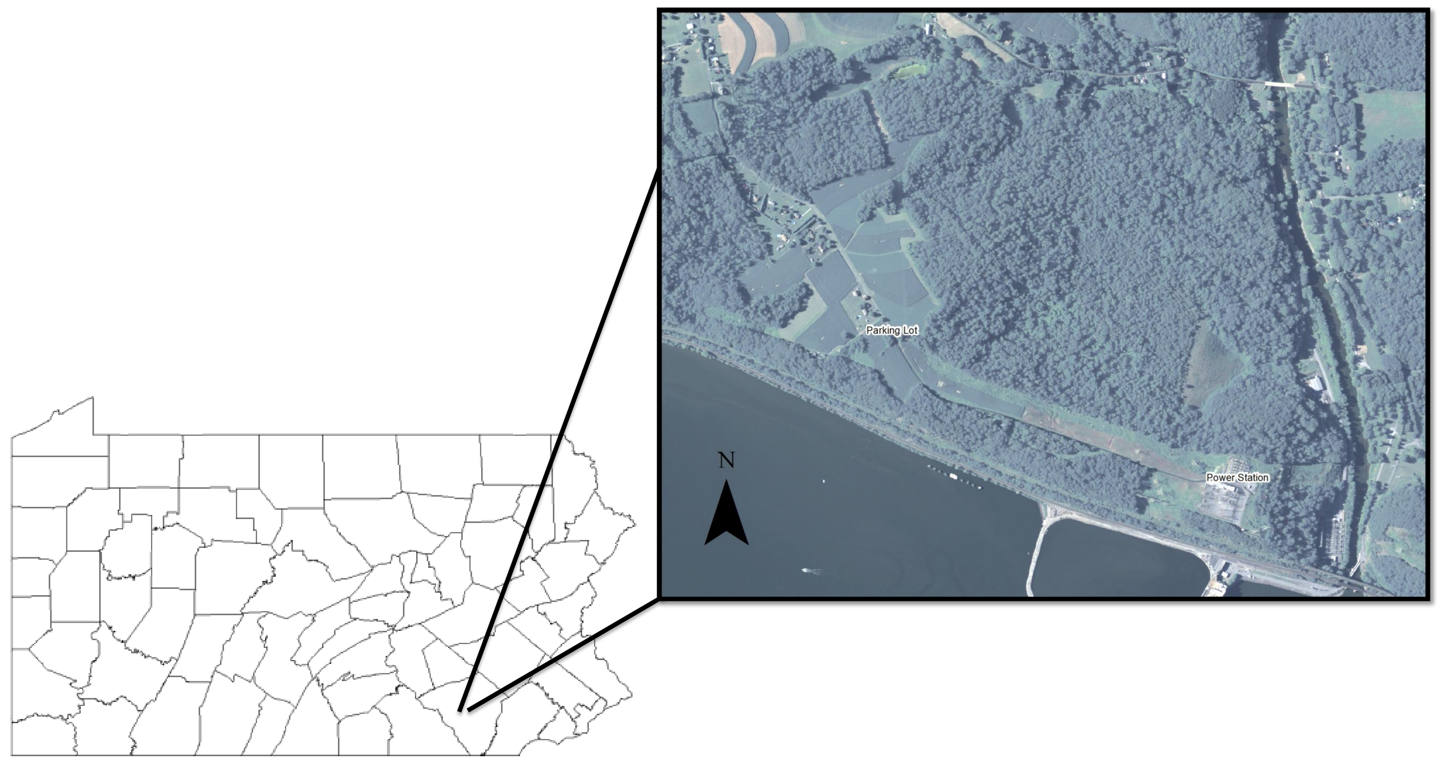

Figure 3: Release location for ring-necked pheasants along the Conestoga river in Safe Harbor, Pennsylvania.

RESULTS

Pheasants were tracked from March 28, 2015 to April 3, 2015. Pheasants generally preferred forest edge habitat (Figure 4). Also, pheasants tended to stay close to their release site, the main exception being bird 65, who, for two inconsecutive days, was outside the range of the VHF antennas. 65's furthest known point from the release site was approximately 1.25 km.

Survivability of the pheasants was low, with all pheasants predated by birds of prey during the first week of tracking. Undergraduate student volunteers were responsible for recording 75% of the GPS locations.

LITERATURE CITED

1. Donelly J. 2006. An invisible revolution? Applied science in the 14-19 curriculum. *The Nuffield Foundation.* ISBN 0 904956 52 0.
2. Esri 2012. ArcGIS Desktop Release 10.1. Redlands CA: Environmental Systems Research Institute.
3. Jones MT, Barlow AEL, Villarejo M. 2010. Importance of undergraduate research for minority persistence and achievement in biology. *The Journal of Higher Education* 81(1) 82-115.
4. Minnesota Department of Natural Resources (DNR) Garmin. http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html
5. National Science Foundation. Science and Engineering Indicators 2014. 2014. *National Science Foundation*. Accessed through NSF. January 2014.
6. Singer S, Smith KA. 2013. Discipline-Based Education Research: Understanding and improving learning in undergraduate science and engineering. *Journal of Engineering Education* 0(0) 1-4. DOI 10.1002/jee.20030.

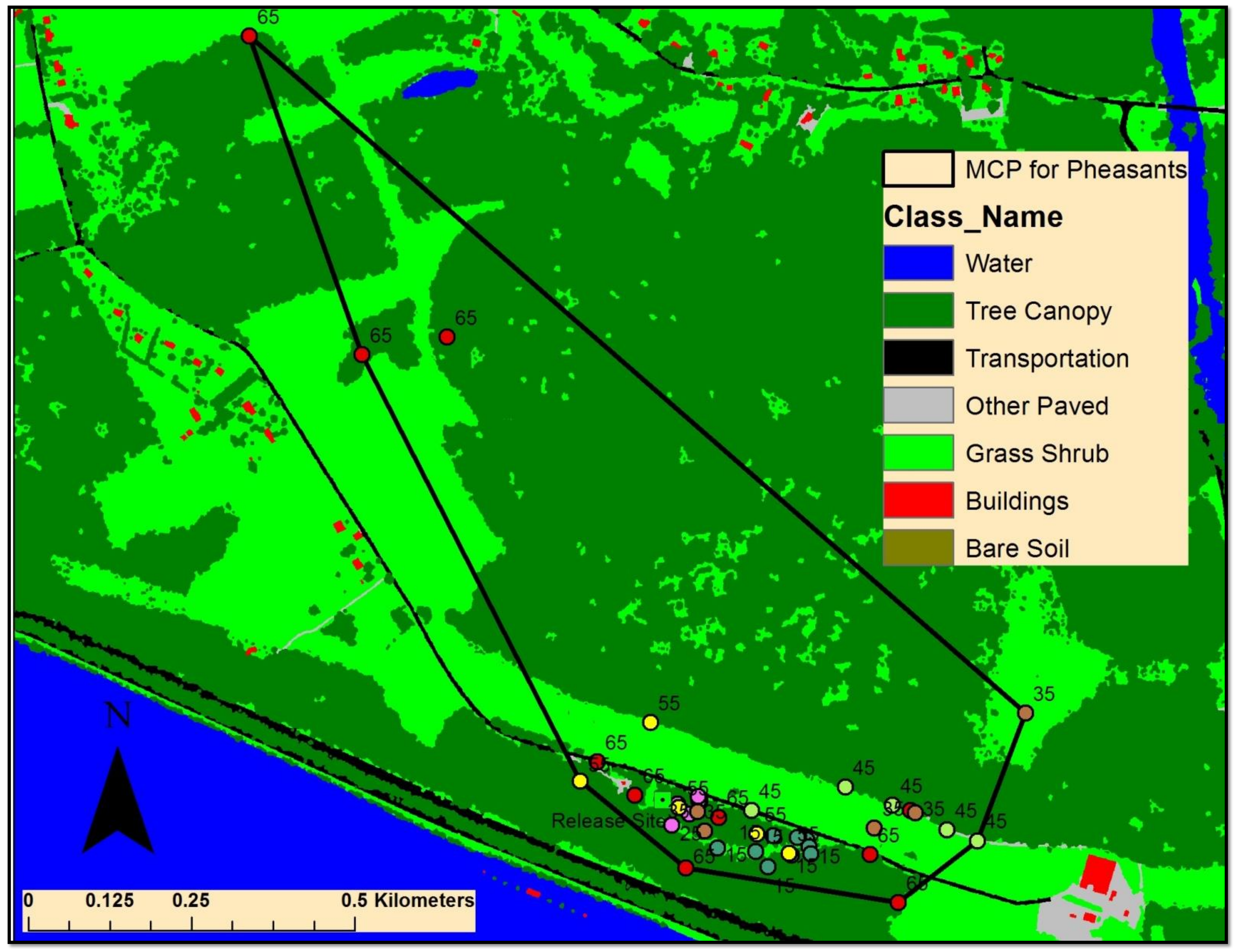

Figure 4. Spatial locations of six ring-necked pheasants released at the Safe Harbor Preserve showing land-cover types used by the pheasants. A minimum convex polygon was created to show the minimum range the pheasants inhabited post-release. Individual pheasants are identified by their transmitter frequency.

DISCUSSION

Through this pilot project, it was proven that a controlled radio-telemetry experiment implemented as an applied teaching model could be successful. Although bird survivability was low, useful data was still obtained that could then be used for further analysis. For example, students could now take this spatial data and then collect ecological data such as soil structure, vegetation types, invertebrate animal communities and compare differences between areas pheasants used compared to what they did not use. Thus, undergraduates could use data from this controlled research project to answer ecological questions to help them become more familiar with theoretical ecological concepts.

In addition, volunteer participation and effort was high, indicating that students were interested in a hands-on curriculum and spatial data collection. Many volunteers commented on the beneficial aspects of the project. If students where enthusiastic to *volunteer* for this project, this enthusiasm would also translate if this project was part of their coursework. Applying an educational model such as this to other STEM related courses could help increase retention rates for STEM students throughout the United States.

ACKNOWLEDGMENTS

Special thanks to Red Fox Farms for their donation of six pheasants; the Biology Student Investigator Grant for funding; and the student volunteers, without whom this project would not have been impossible: Anthony Kessler, Vince Pantenella, Sarah Way, Kayli Thomas, Emily Neideigh, Kira Klaassen, Rachel Malampy, Katie Newcamp, and Kelsey Ulrich.