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Collaborative Research: Land-Use Practices And Persistence Of Amphibian Populations

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Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	0239915
Project Title:	Collaborative Research: Land-Use Practices And Persistence Of Amphibian Populations.
PD/PI Name:	Malcolm L Hunter, Principal Investigator
Recipient Organization:	University of Maine
Project/Grant Period:	05/15/2003 - 04/30/2013
Reporting Period:	05/01/2012 - 04/30/2013
Submitting Official (if other than PD\PI):	Malcolm L Hunter Principal Investigator
Submission Date:	06/10/2013
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	Malcolm L Hunter

Accomplishments

* What are the major goals of the project?

We had two goals: 1. Aquatic larval growth, survival, and metamorphosis: to test for differences in larval responses to

alteration of the terrestrial habitat surrounding the breeding ponds.

2. Terrestrial juvenile growth, survival, and maturation: The purpose of this experiment is to test for differences in post-metamorphic responses to alteration of the terrestrial habitat surrounding breeding ponds.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities: During the 2012 field season, we expanded our experimental framework to develop tools for quantifying the post-metamorphic movements of juvenile wood frogs. In partnership with the Dept. of Electrical and Computer Engineering, we developed an optimally-sensitive harmonic transponder tag and limited-range radar (harmonic radar; HDF). We performed a systematic evaluation of the effects of our lightweight, passive tag on the short-term fate and behavior of individual juvenile wood frogs and a surrogate species (*Rana pipiens p.*). Finally, we conducted a pilot assessment of this technology *in situ*, by experimentally releasing HDF-tagged juveniles in contiguous forest to examine the mechanisms that influence post-metamorphic behavior and efficacy of the HDF system for field studies. Specifically, we released 20 individuals (10 tagged, 10 untagged) along 400-m forest transects, and tracked individual frog movement paths using a combination of radar and fluorescent-powder monitoring techniques.

Specific Objectives:

Significant Results:

Key outcomes or

Other achievements:

*** What opportunities for training and professional development has the project provided?**

Brittany Cline has made progress on her Phd with comprehensive exams passed and final defense anticipated in early 2014.

Four undergraduate students collectively worked over 18 months on field and laboratory aspects of the project, both during the summer and during the academic year.

*** How have the results been disseminated to communities of interest?**

We had three significant conference presentations:

Cline, B.B., D.V. Popescu, and M.L. Hunter, Jr. Amphibians in Complex Landscapes: Effects of Forestry and Urbanization on Juvenile Movements. (Invited). 7th World Congress of Herpetology, Symposium: The Implications of Habitat Fragmentation on Herpetofauna: A Global Problem with Local Solutions. Vancouver, British Columbia, Canada. 8-14 August 2012

Aumann, H., E. Kus, B. Cline, and N.W. Emanetoglu. 2012. An Asymmetrical Dipole Tag with Optimum Harmonic Conversion Efficiency. 2011. International Symposium on Antennas and Propagation & UNSC/URSI National Radio Science Meeting, 8-13 July 2012, Chicago, IL.

Aumann, H., E. Kus, B. Cline, and N.W. Emanetoglu. 2012. A 5.8 GHz RF Tag for Tracking Amphibians. IEEE International Conference on Wireless Information Technology and Systems in Honolulu, HI, July 29 - August 2, 2012.

Also, undergraduate students are exposed to our work through field trips and volunteer activities.

Products

Books

Book Chapters

Conference Papers and Presentations

Inventions

Nothing to report.

Journals

Aumann, H., E. Kus, B. Cline, and N.W. Emanetoglu. (2013). A low-cost harmonic radar for tracking very small amphibians (in prep).. *Proceedings of the IEEE*. xx xx. Status = UNDER_REVIEW; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Cline, B.B. and M.L. Hunter, Jr. (2013). Juvenile amphibians discriminate among open-canopy habitats: An experimental investigation of habitat permeability.. *Journal of Applied Ecology*. xx xx. Status = SUBMITTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Popescu, V.D., B.S. Brodie, M.L. Hunter, and J. Zydlewski. 2012. *Copeia* 2012(3): 424–431 (2012). Use of olfactory cues by newly metamorphosed wood frogs (*Lithobates sylvaticus*) during emigration.. *Copeia*. 2012 (3), 424-431. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Licenses

Nothing to report.

Other Products

Nothing to report.

Other Publications

Patents

Nothing to report.

Technologies or Techniques

Partnering with electrical engineers we have made progress on a optimally sensitive transponder tag to undertake harmonic radar detection of very small frogs.

Thesis/Dissertations

Websites

Nothing to report.

Participants/Organizations

Research Experience for Undergraduates (REU) funding

Form of REU funding support: REU
supplement

How many REU applications were received during this reporting period? Nothing to

Report

How many REU applicants were selected and agreed to participate during this reporting period? Nothing to Report

REU Comments: None

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Hunter, Malcolm	PD/PI	2
Cline, Brittany	Graduate Student (research assistant)	12
Innes, Greg	Undergraduate Student	4
Krenik, Matthew	Undergraduate Student	5
Kus, Evan	Undergraduate Student	4
Parkhill, Nathaniel	Undergraduate Student	5

Full details of individuals who have worked on the project:

Malcolm L Hunter

Email: mhunter@maine.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: PI

Funding Support: UMaine

International Collaboration: No

International Travel: No

Brittany Cline

Email: brittany.cline@maine.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 12

Contribution to the Project: All aspects of research

Funding Support: NSF EPSCOR

International Collaboration: No

International Travel: No

Greg Innes

Email: Gregory_Innes@umit.maine.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 4

Contribution to the Project: Field assistant

Funding Support: NSF EPSCOR

International Collaboration: No

International Travel: No

Matthew Krenik

Email: mxk087100@utdallas.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 5

Contribution to the Project: Lab work on harmonic radar

Funding Support: NSF EPSCOR

International Collaboration: No

International Travel: No

Evan Kus

Email: Evan_Kus@umit.maine.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 4

Contribution to the Project: Lab work on harmonic radar

Funding Support: NSF EPSCOR

International Collaboration: No

International Travel: No

Nathaniel Scott Parkhill

Email: nathaniel.parkhill@maine.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 5

Contribution to the Project: Field assistant

Funding Support: NSF EPSCOR

International Collaboration: No

International Travel: No

What other organizations have been involved as partners?

Nothing to report.

What other collaborators or contacts have been involved?

NO

Impacts

What is the impact on the development of the principal discipline(s) of the project?

If successful our development of harmonic radar will radically improve animal ecologists ability to track movements of small animals, especially over extended periods. More conceptually our work will highlight the need to understand the role of juvenile dispersal and philopatry in heterogeneous landscapes. Ultimately, our work will inform conservation of natural resources in the context of forest management and land use planning in terms of minimizing the impact of developmental sprawl.

What is the impact on other disciplines?

We have collaborated extensively with electrical engineers in the development of a new approach to harmonic radar as a means for tracking animal movements.

What is the impact on the development of human resources?

We have contributed directly to the education of our field assistants and many dozens of undergraduates have visited our field sites and heard about our work.

What is the impact on physical resources that form infrastructure?

Nothing to report.

What is the impact on institutional resources that form infrastructure?

Nothing to report.

What is the impact on information resources that form infrastructure?

Nothing to report.

What is the impact on technology transfer?

Nothing to report.

What is the impact on society beyond science and technology?

We are collaborating extensively with other UMaine faculty who are using our information to inform natural resource management processes with state and municipal officials.

Changes/Problems

Changes in approach and reason for change

Nothing to report.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.

