CENTER OF EXCELLENCE
STUDENT SUMMER RESEARCH PROGRAM
PROPOSAL (Approximately 1 page)

DUE DATE: February 17, 2014

TITLE OF PROPOSAL: **What happens to the mosquito and its obligate parasite population after construction of a wetland?**

MENTOR(S): Rebecca Trout Fryxell, Assist. Prof. Medical & Veterinary Entomology in EPP

DEPARTMENT OF PRIMARY MENTOR: Entomology and Plant Pathology

PROJECT DESCRIPTION: The emergence of infectious agents around the world has been recognized as one of the major causes of wildlife population declines and extinctions (Smith et al. 2006). *Plasmodium reticulum* the causative agent for avian malaria (a protozoan agent) and *Dirofilaria immitis* the causative agent for canine heartworm (a filarial nematode) are two obligate agents transmitted by mosquitoes. The prevalence of either pathogen is dependent upon the distribution range of mosquitoes serving as competent vectors and prevalence of the pathogen in vertebrate hosts. In 2012, mosquitoes from the Cherokee Woodlot were collected, identified, and screened for both *Plasmodium* and *Dirofilaria* just prior to construction of a wetland. At that time nine different mosquito species were recovered of which *Plasmodium* was recovered from 14 of 74 mosquito pools (from six different mosquito species) and *Dirofilaria* was not identified. The objective of this study is to determine the current state of the mosquito, *Plasmodium* and *Dirofilaria* population at a site with a newly constructed wetland by collecting mosquitoes during the summer of 2014. Mosquitoes will be identified to species and the head and thorax will be stored in 95% ethanol. Parasite and mosquito DNA will be extracted, and the extracted DNA will be screened via PCR for *Plasmodium* and *Haemoproteus* parasite DNA (cyt *b*) and for *Dirofilaria* species DNA (ITS-2 rDNA). Positive PCR amplicons will be bi-directionally sequenced to confirm positivity. The confirmation of either pathogen and/or a change in the mosquito composition will begin to unravel the complex relationships that intimately tie together habitats with their vectors and parasites. The proposed research will provide a significant contribution to the knowledge of the diversity of mosquito parasites present in Tennessee and the role wetland construction has in their presence/absence.

Hypothesis: The objective of this project is to determine the preliminary effects of wetland construction on mosquito (and their parasite) populations.

Hypothesis 1. The mosquito population did/not change.
Hypothesis 2. The *Plasmodium* population did/not change.
Hypothesis 3. The *Dirofilaria* population did/not change.

STUDENT'S ROLE IN PROJECT:
The student will collect mosquitoes at each of the sites, identify the mosquitoes to species, conduct molecular procedures (DNA extraction to PCR amplification), and analyze the results.

What the student is expected to learn: This project will provide the student with field, laboratory, and analytical techniques. In the field, the student will learn collecting skills such as proper trapping and storage methods. In the laboratory, the student will learn how to identify arthropods and conduct molecular procedures such as DNA extraction and PCR. The student will learn analytical skills by comparing prevalence rates among and between sites and mosquito species.
Ultimately, the student will learn the importance of arthropods in wildlife diseases and the role arthropods play in population decline.

SPECIAL REQUIREMENTS IF ANY (such as prior experience):

IACUC or IRB approval? **N/A**

If no, IACUC or IRB submitted? ❑ Yes ❑ No

IACUC approval for research involving animals, must be in place before the student begins work – allow at least 2 months for approval.

Email forms to skania@utk.edu or lfrank@utk.edu