

Vita

Candidate's name: Emily Anne Owens

Universities
Attended: University of New Brunswick (2014)
Bachelors of Science

University of New Brunswick (2021)
Masters of Science
Biology

Publications / Conference Presentations:

Owens, E. O., Heard, S. B. and Johns, R. C. (2021) Having it all: Hybridizing conventional and community science monitoring for enhanced data quality and cost savings. FACETS (accepted and in the publication process)

Owens, E., Demerchant, I., Johns, R., Heard, S. (Feb 5, 2020) Comparing data quality and costs/benefits of conventional vs. community science moth monitoring programs: a case study using spruce budworm pheromone traps. SERG-International Workshop, Halifax, NS.

Owens, E., Johns, R., Pureswaran, D., Martel, V., MacQuarrie, C., James, P., Bourassa, S., DeMerchant, I., Shanks, E., Candau, J. (August 20, 2019) Using community science as a tool to engage the public and collect important data over large geographical areas: a case study using the budworm tracker program. Invited symposium. Canadian Society of Ecology and Evolution, Entomological Society of Canada, and Acadian Entomological Society Conference. Fredericton, NB.

Owens, E., Demerchant, I., Johns, R., Heard, S. (July 10, 2019) Comparing data quality and costs/benefits of conventional vs. community science moth monitoring programs: a case study using spruce budworm pheromone traps. International Union of Forest Research Organizations Conference, Québec, QC.

Community Science for Monitoring and detecting Dispersing Insect Pests: A Case Study Using the “Budworm Tracker Program”

UNIVERSITY OF NEW BRUNSWICK
THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of
Master of Science

by

Emily A. Owens

in the Department of Biology

U.N.B., Fredericton, N.B.

Friday, October 15th, 2021
9:00 a.m.

Via MS TEAMS

Examining Committee

Dr. Steve Heard	Co-Supervisor
Dr. Rob Johns	Co-Supervisor
Dr. Amy Parachnowitsch	Internal Examiner
Dr. Joe Nocera	External Examiner
Dr. Adrian Reyes-Prieto	Chair of Oral Examination

Abstract

Community science provides volunteers with the opportunity to participate in research and allows scientists to involve the general public their research projects. The Budworm Tracker community science program uses pheromone traps to track moth dispersal and densities of spruce budworm, *Choristoneura fumiferana* [Clem.]. Spruce budworm is an important outbreaking insect pest of spruce, *Picea spp.* (Mill) Brittain, and balsam fir, *Abies balsamea* (L.) Mill. trees.

In my first data chapter, I compared the Budworm Tracker Program to a contemporaneous and overlapping conventional government-run pheromone trapping program. I quantitatively assessed the geospatial distribution of sites, trap catch abundances and financial costs between these two approaches. I showed that the community science program's geospatial distribution of sites tended to be more clumped near cities and the conventional was more uniformly distributed. I showed that the two approaches had similar trap catch

abundances with the community science program providing some phenological data and that the community science approach was cheaper than the conventional. My results also showed that hybridizing the two approaches may provide a balance of tradeoffs.

For my second data chapter, I ran stable isotope analysis to test if I could use ^{13}C , ^{18}O and ^{15}N isotopes to track the dispersal of budworm moths. Using sleeve cages, I trapped budworm larvae on branches of balsam fir trees then retrieved foliage samples and moth wings from each branch and tested for variation in isotopic ratios among sites. My goal was to determine if this tool could help better understand if moths caught in pheromone traps are locals or dispersed immigrants. This study showed some promising results that ^{13}C and ^{18}O may have the potential be used to monitor the movements of budworm moths but there was no indication that ^{15}N is a suitable isotope for tracking the movements of budworm dispersal.