

ScholarWorks@UMass Amherst

MASTERS THESES 1911 - FEBRUARY 2014

Off-campus UMass Amherst users: To download campus access theses, please use the following link to log into our proxy server with your UMass Amherst user name and password.

Non-UMass Amherst users: Please talk to your librarian about requesting this thesis through interlibrary loan.

Theses that have an embargo placed on them will not be available to anyone until the embargo expires.

Title

Pollinator Populations in Massachusetts Cranberry, 1990 to 2009: Changes in Diversity and Abundance, Effects of Agricultural Intensification, and a Contribution to the North American Pollinator Survey.

Authors

Molly M. Notestine, *University of Massachusetts Amherst Follow*

Document Type

Open Access

Degree Program

Plant & Soil Sciences

Degree Type

Master of Science (M.S.)

Year Degree Awarded

2010

Month Degree Awarded

May

Keywords

agricultural intensification, native bees, bumble bees, cranberry, species diversity, relative abundance, pollinator decline, bee conservation

Abstract

It is now widely accepted that over one-third of the global food supply depends upon pollinators. Risking severe ecological and economic implications, the status of the 4000 species of bees native to North America has been poorly understood due to a lack of long-term survey data. In this study, I conducted bee surveys on Massachusetts cranberry (*Vaccinium macrocarpon* Ait.) bogs from 2007-2009 and compared diversity and abundance data to those from historical surveys performed in 1990-1992 on the same bogs. I found that overall bee diversity declined severely in the 19-year survey period, while total bee abundance remained consistent. My data provide supporting evidence for the loss of North American bumble bees (*Bombus* spp.), but also provide the first evidence for declines in the U.S. in overall wild bee diversity. Maximizing the potential for agricultural landscapes to serve as quality pollinator habitat and identifying appropriate integrated pest management strategies should involve a comprehensive understanding of each species' life history traits and conservation status.

The loss of biodiversity associated with the intensification of agriculture has been well documented for several wildlife species but remains poorly understood for bees, which provide pollination to many agricultural crops. Most pollinator-dependent crops rely heavily on managed honey bees (*Apis mellifera* L.) for pollination. Four thousand other species of bees native to North America may provide pollination insurance in the event of honey bee losses, but without a clear understanding of how agricultural intensification affects wild bees, habitat conservation measures aimed at protecting them may be futile. In the second part of this study, I evaluated six metrics of agricultural intensification with respect to native bee diversity and abundance in Massachusetts cranberry bogs, including honey bee competition, bog management type (i.e. organic versus conventional), distance from epicenter of cranberry-growing region, toxicity of insecticide program, susceptibility of reproductive bees to insecticide, and surrounding land use. I found a clear association between reduced native bee diversity and abundance and the effects of increased agricultural intensification of the landscape. Recognition that native bee communities in North America are diminishing as a consequence of agricultural intensification may help to unify a movement toward improved conservation management.

First Advisor

Anne L. Averill

[Download](#)

DOWNLOADS

Since August 12, 2010

Included in

[Ecology and Evolutionary Biology Commons](#) , [Entomology Commons](#) , [Natural Resources and Conservation Commons](#)

Share

COinS