

**SWEDE MIDGES AND WHEN THEY
EMERGE: CREATING A PREDICTIVE MODEL
OF THE *CONTARINIA NASTURTII* LIFE
CYCLE**

Jenny Liu, University of Guelph
Supervisor: Dr. Rebecca Hallett



The swede midge



Swede midge damage





© Rebecca Hallett



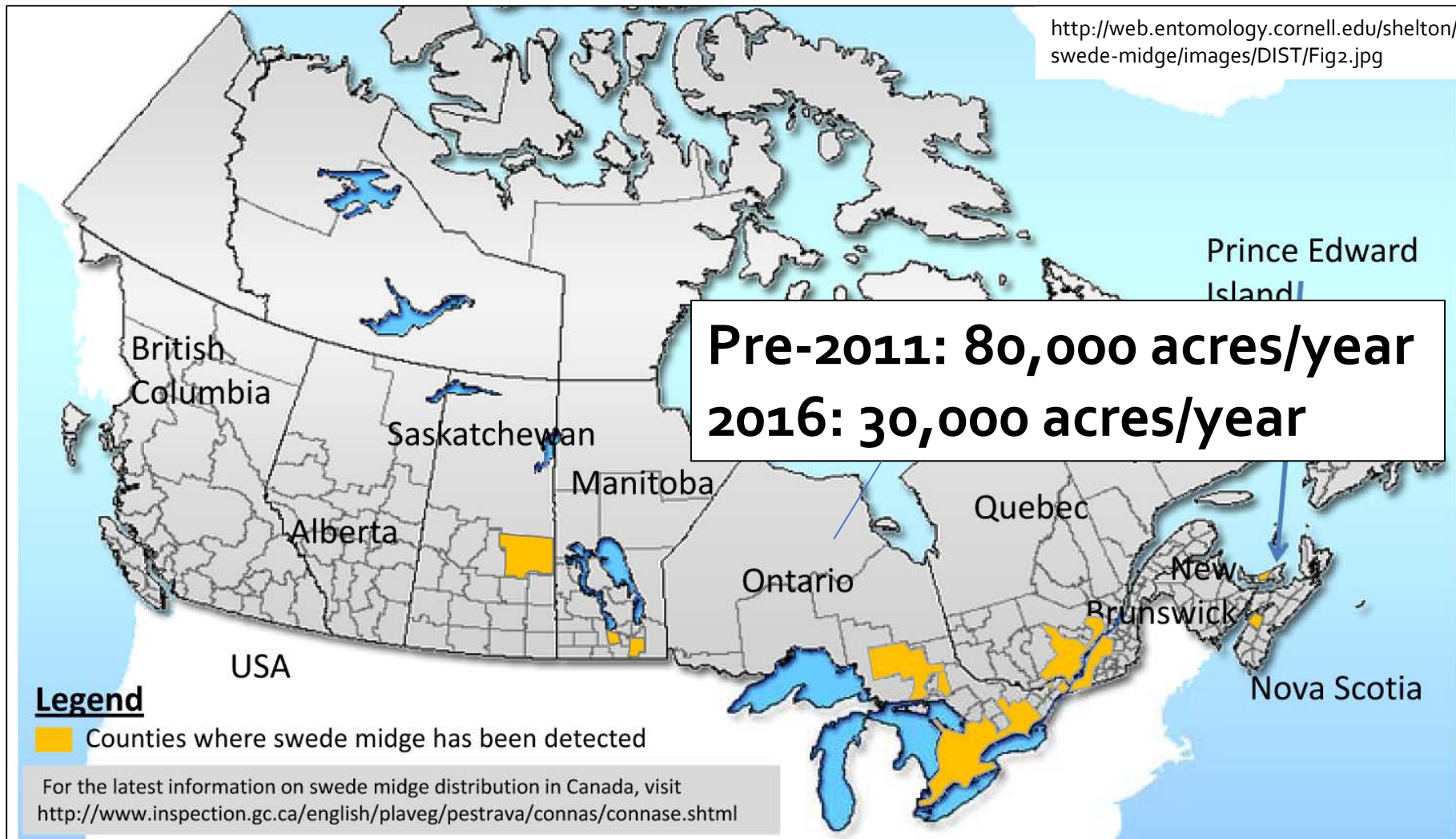
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Canada's Canola Industry

- \$26.7 billion industry
- 250,000 jobs
- \$11.2 billion in employee wages
- 92-99% produced in prairie provinces

Swede midge distribution in Canada (2009)



Swede midge threat remains small out West

Ontario canola growers are seeing the worst of insect pest

Posted Feb. 19th, 2015 by [Robert Amason](#)



<http://www.producer.com/2015/02/swede-midge-threat-remains-small-c>

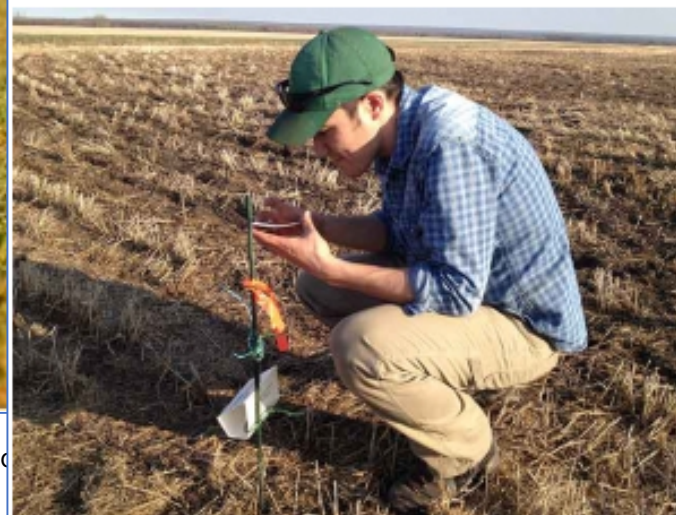
Stamping out swede midge?

Low populations of this pest are spreading across the Prairies.



November 08, 2016

By Donna Fleury



Boyd Mori checking swede midge pheromone traps in

Swede midge first appeared in canola in Ontario in 2003, and recent extreme populations in northeastern Ontario resulted in the Ontario Canola Growers' Association (OCGA) strongly recommending in 2015 that producers avoid growing canola for three years across the New Liskeard region in an attempt to suppress swede midge populations.

"In 2016, swede midge populations in some areas of Ontario seemed to be less of a problem, likely due to a slow spring and very dry conditions," explains Rebecca Hallett, a professor at the University of Guelph. "Earlier in the season, populations were

<http://www.topcropmanager.com/insect-pests/stamping-out-swede-midge-19696>

Plan of attack

Control swede midge populations



Create effective integrated pest management plan



Attack vulnerable life stages to maximize treatment efficiency



Use model to accurately predict adult swede midge emergence times

MidgEmerge

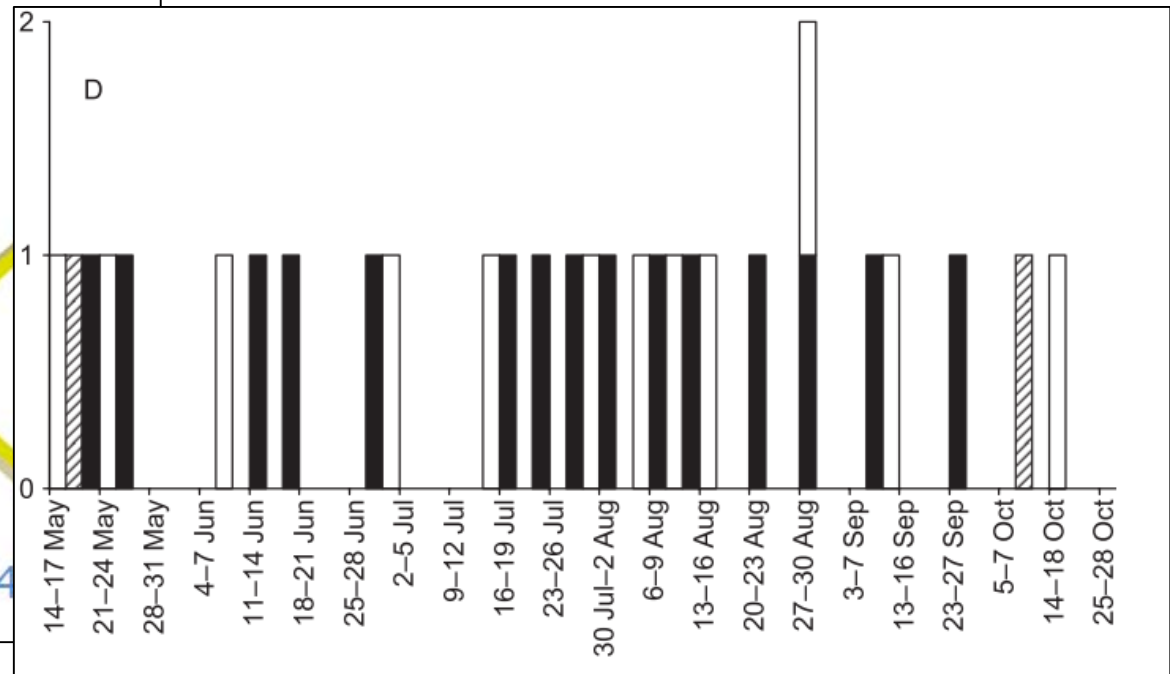


Fig 1. Number of predicted peaks (white bars) and observed peaks (black bars) at study sites in 2003. Figure from Hallett et al. (2009).

Modelling Difficulties Of The Swede Midge

1. Outdated development information from European populations
2. Critical factors that have never been studied
 - Temperature-dependent mortality



© Cornell University

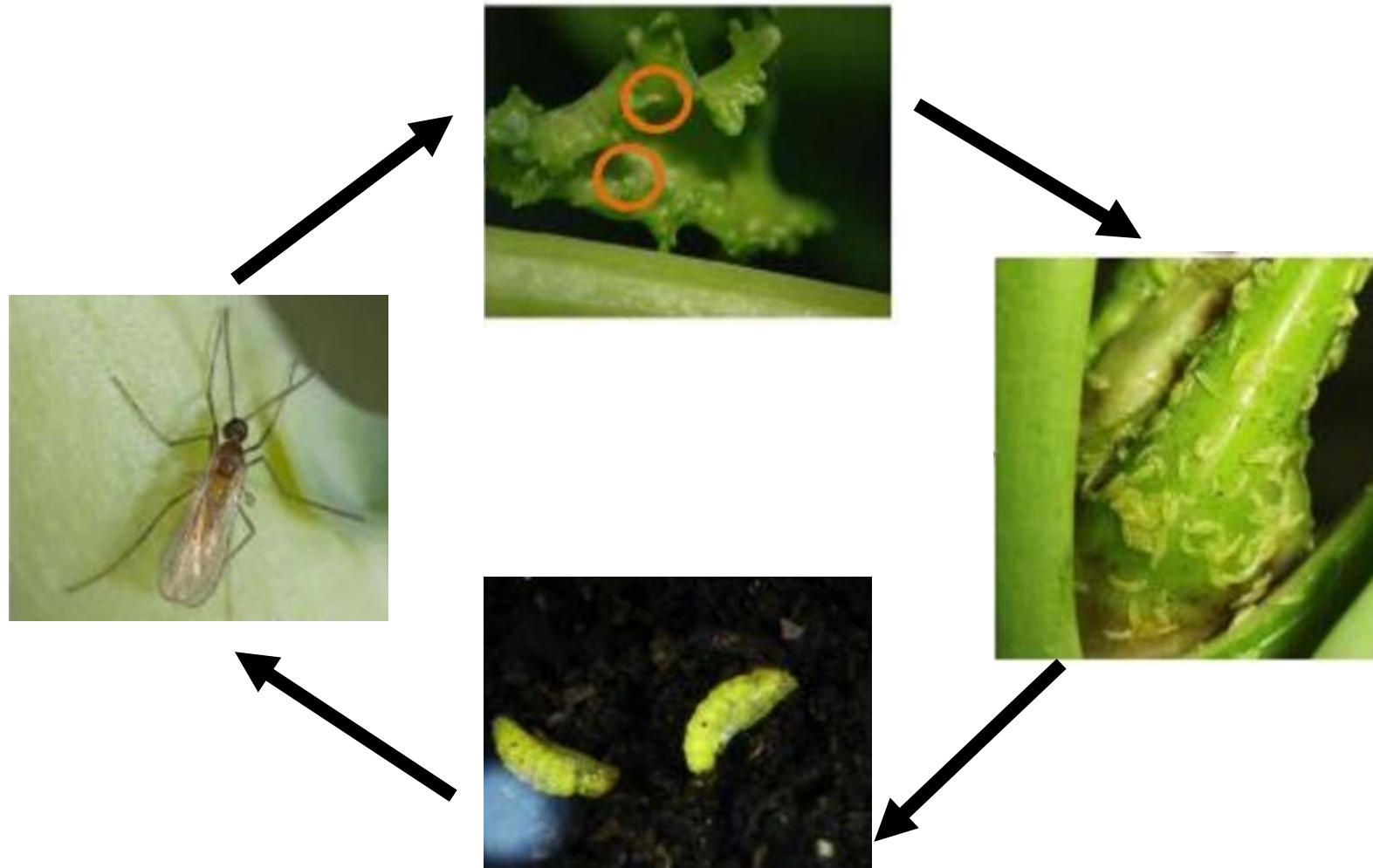
Project Objectives

1. Update development and mortality information for Ontario swede midge populations.
2. Revise current swede midge population model, MidgEmerge, with this new information.
3. Determine climactic factors that contribute to swede midge outbreaks by comparing data from Timiskaming, Ontario, with those at select southern Ontario sites.

Methods for Objective 1: Updating Developmental Information

	Egg	Larva	Pupa	Adult
Incubation	✘			
Viability	✘			
Development		✘	✘	
Mortality		✘	✘	
Longevity				✘

Methods for Objective 1: Updating Developmental Information



Methods for Objective 1: Updating Developmental Information



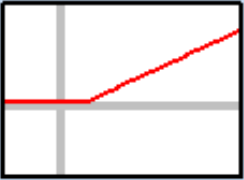
Midges remained in these chambers until they:

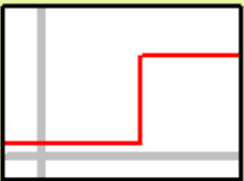
- Graduated to next life stage
- Died
- Remained unchanged

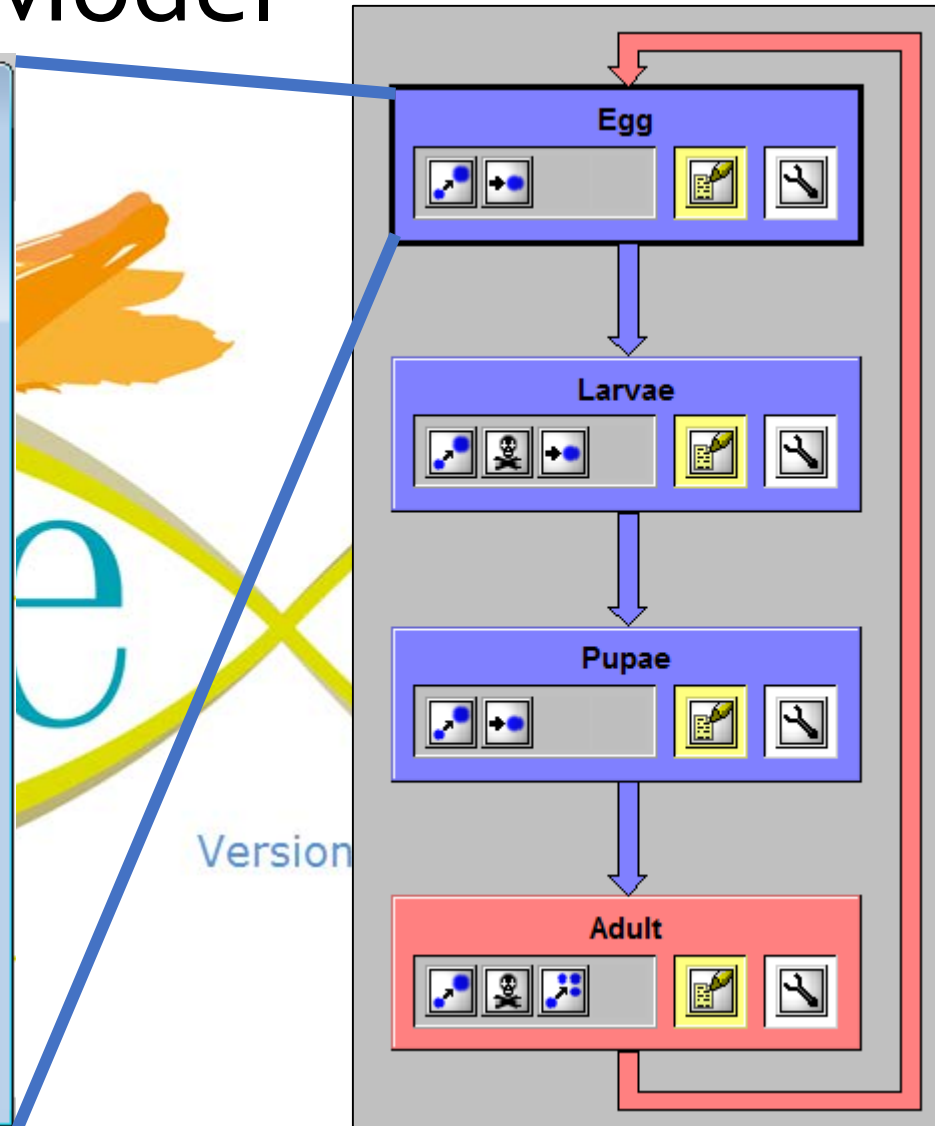
Methods for Objective 2: Revision of Current MidgEmerge Model

Lifestage: Egg

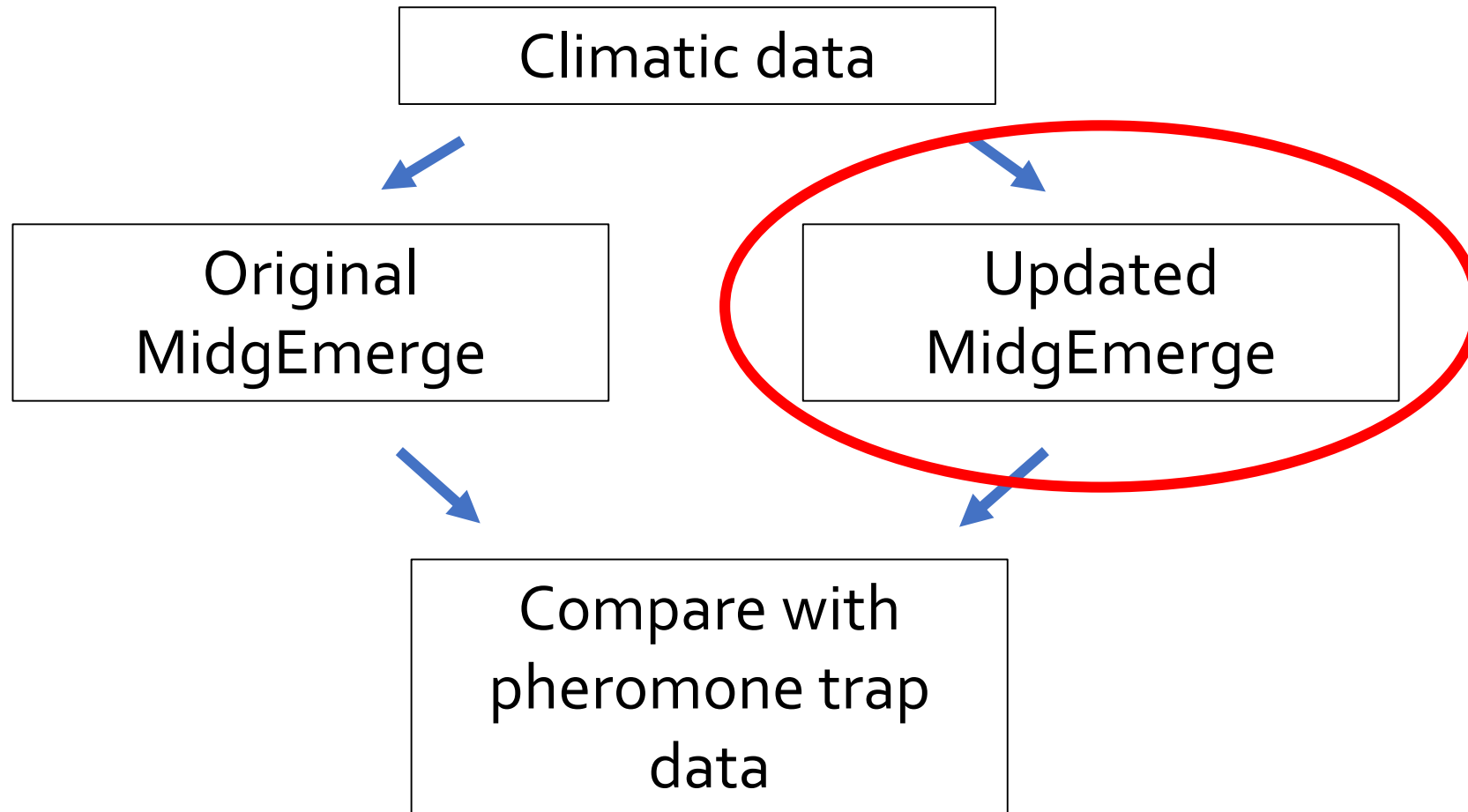
Immigration	
[Establishment]	Not used
[Continuous]	Not used
[Exit]	Not used

Physiological Age	
[Establishment]	Not used
[Continuous]	
Development of Eggs	

Transfer to Larvae	
Egg stage transfer	



Methods for Objective 2: Revision of Current MidgEmerge Model



Currently...

- Focusing on predicting crucial first spring emergence

Swede midge life cycle

Mid-May



Degree-day model



Diapause larvae
(overwintering)

EMERGENCY YEAR

01-Jan

02-Jan

03-Jan

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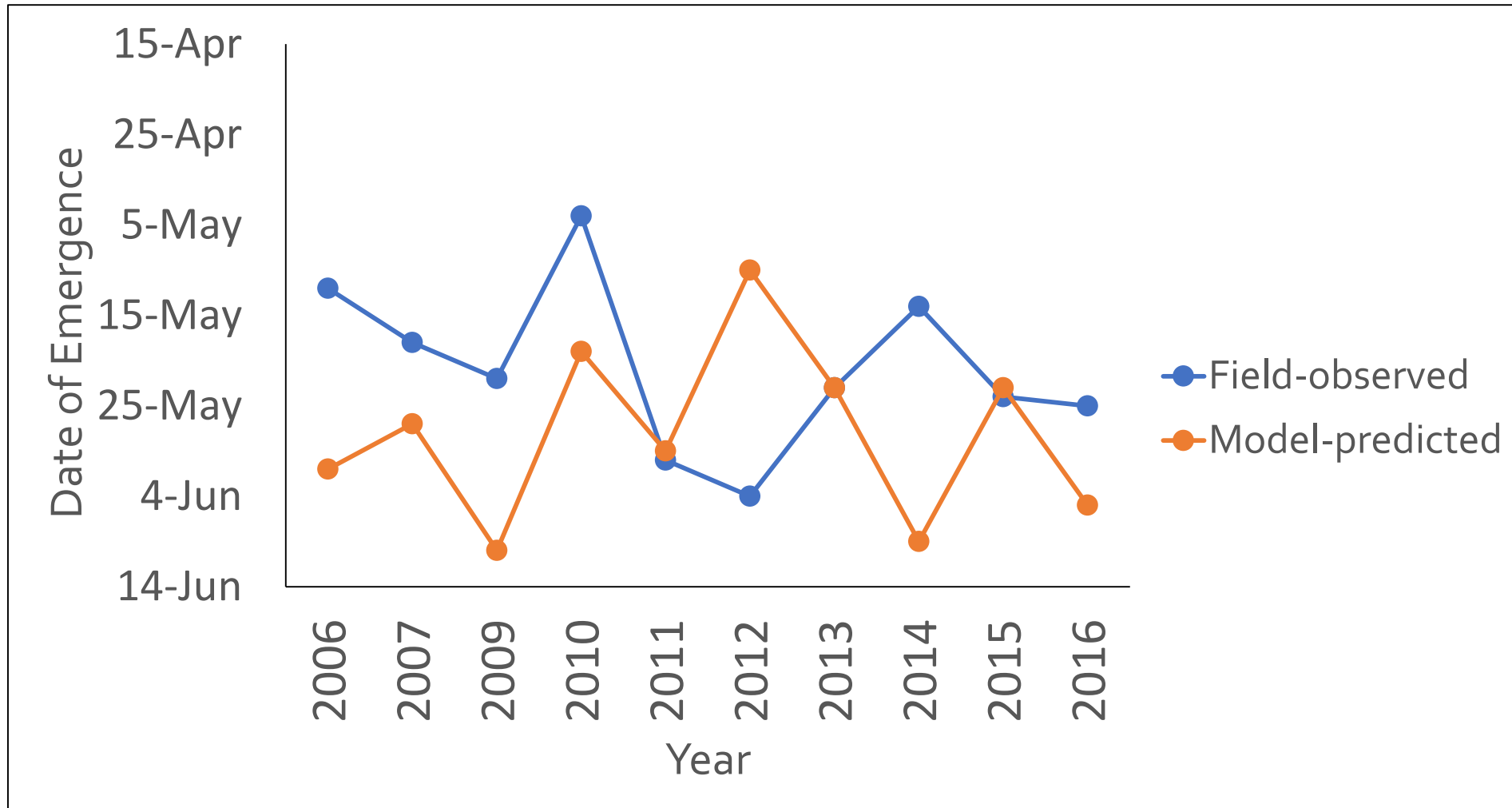
21-May

22-May

23-May



Emergence dates; DD starting from January 1



EMERGENCY YEAR

01-Jan

02-Jan

03-Jan

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21-May

22-May

23-May

PRECEEDING YEAR

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01-Oct

02-Oct

03-Oct

04-Oct

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EMERGENCY YEAR

01-Jan

02-Jan

03-Jan

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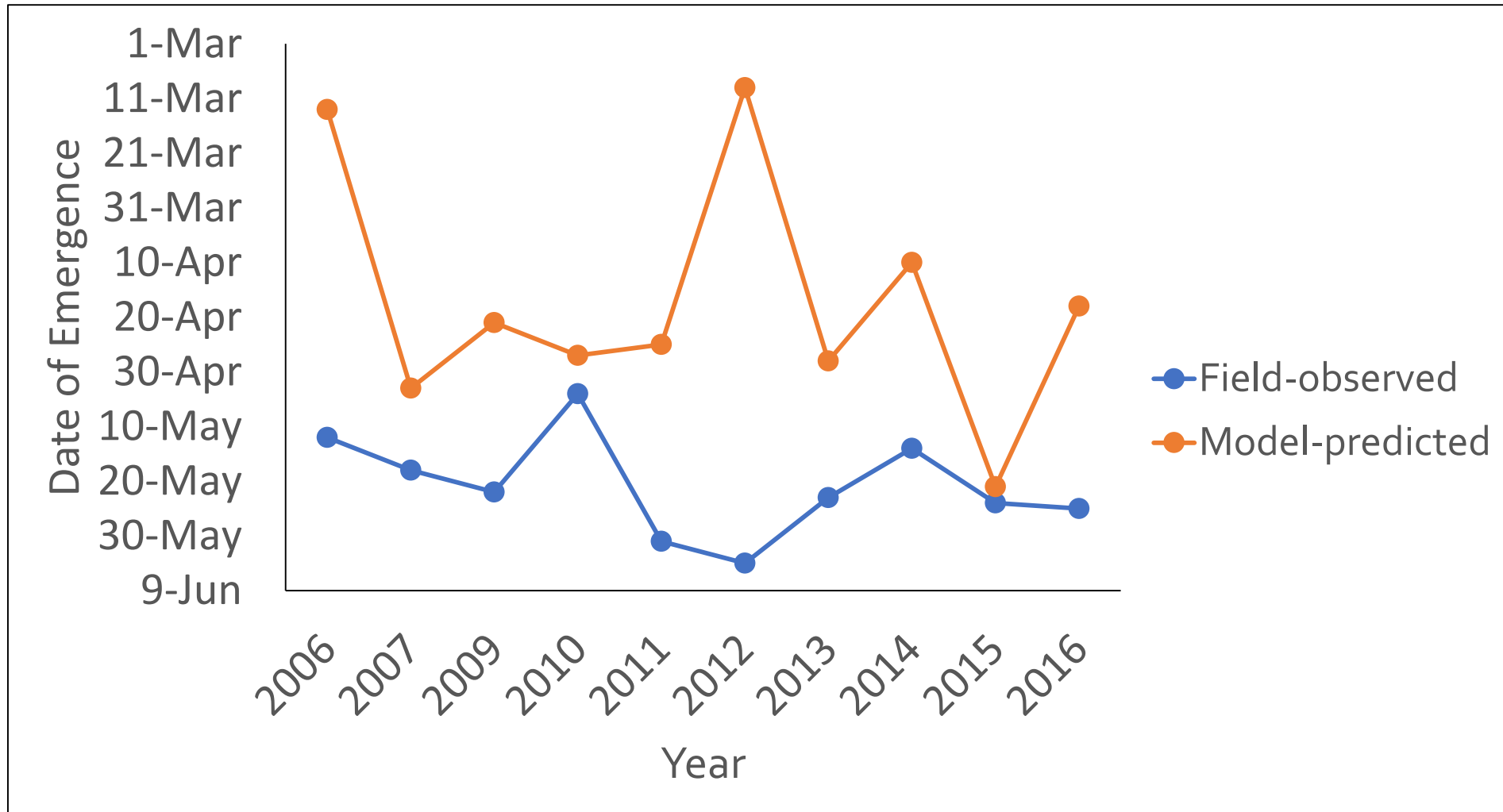
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21-May

22-May

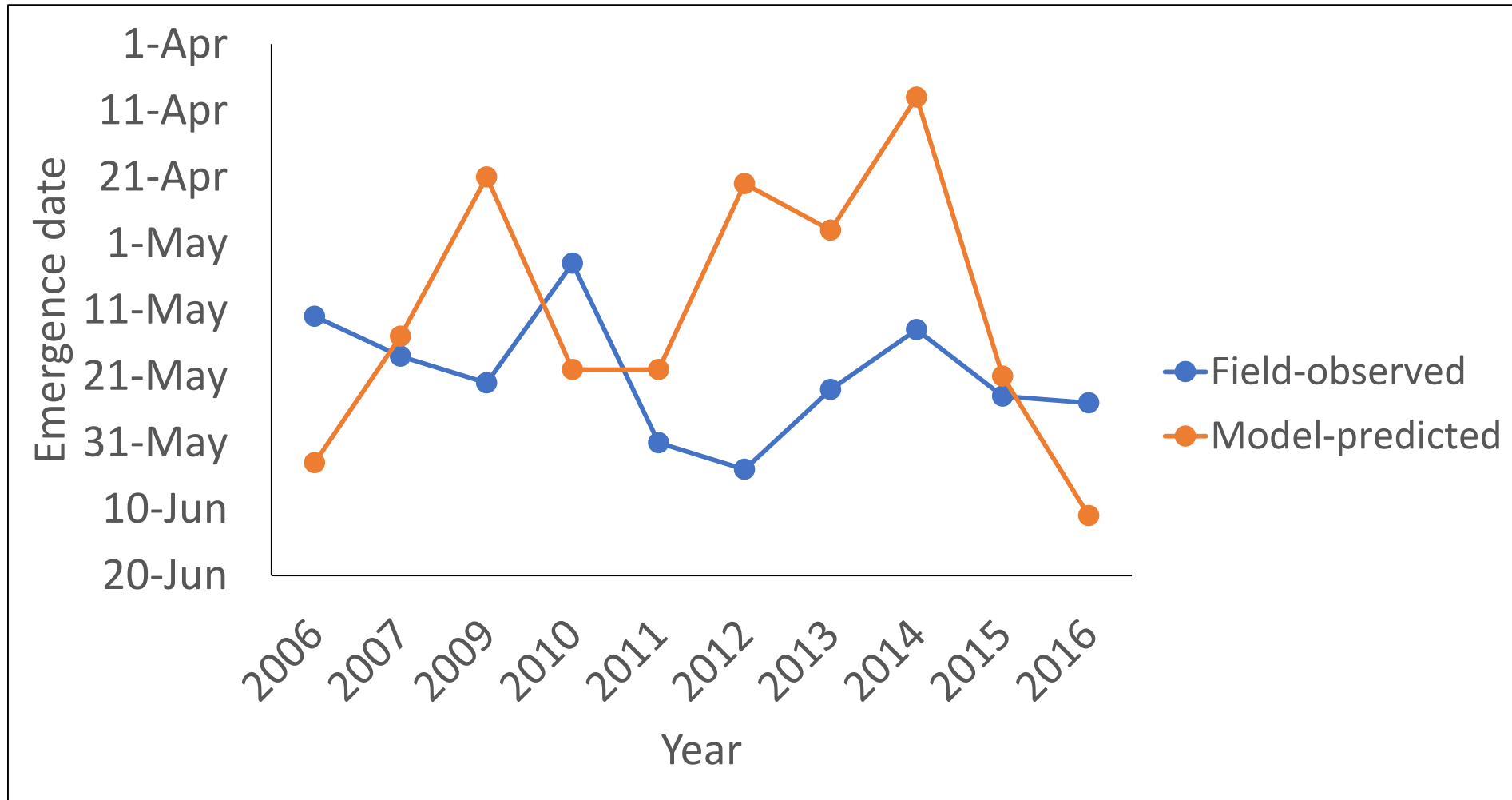
23-May

Emergence dates; DD starting from October 1 of previous year

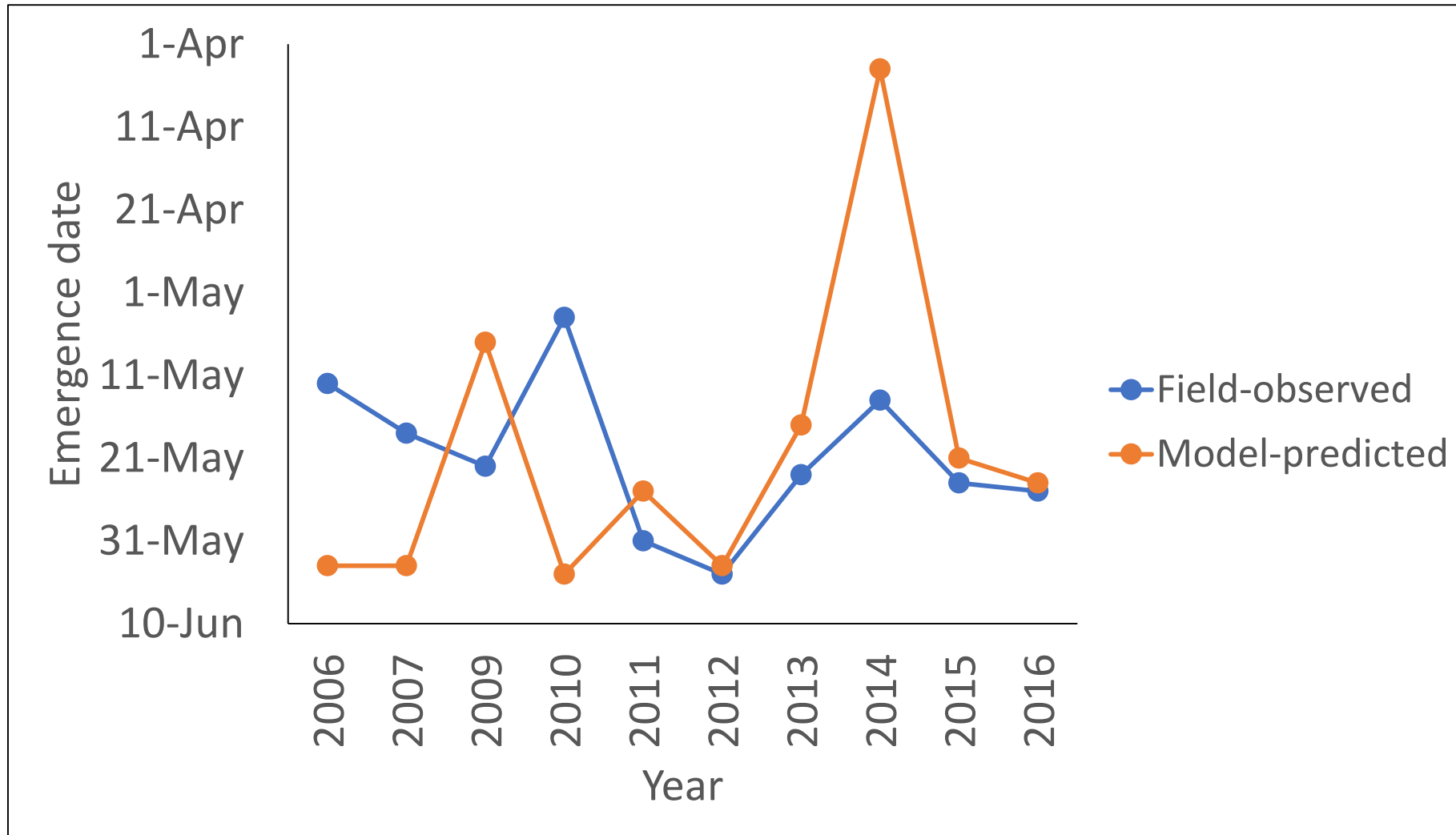




Emergence dates; DD starting from October 1 of previous year, including snow-inhibited diapause larval growth



Emergence dates; DD starting from October 1 of previous year, including snow-inhibited diapause larval AND pupal growth



Methods for Objective 3: Determining Environmental Conditions for Outbreak



Timiskaming
District

Out-thinking the swede midge

What happens when the best recommendation is to stop growing the crop?

By **Ralph Pearce** **FOLLOW**
CG Production Editor

Published: February 25, 2016
Canola, Crops
2 Comments



<https://www.country-guide.ca/2016/02/25/out-thinking-the-swede-midge/48284/>

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Ontario growers give up on canola

Posted Jun. 18th, 2015 by [Robert Arneson](#)



Tiny Swede midge larvae are nearly translucent. | Ontario Agriculture photo

Swede midge pressure in northeastern Ontario has cut into canola acreage — the province once had up to 80,000 acres but this year it's less than 30,000

<http://www.producer.com/2015/06/ontario-growers-give-up-on-canola/>

Acknowledgements



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Dr. Boyd Mori



Dr. Rebecca Hallett
Dr. Jonathan Newman



A wide-angle photograph of a vast field of yellow flowers, likely rapeseed, stretching to the horizon. The sky is filled with heavy, dark grey clouds, with a bright patch of light breaking through near the horizon. The overall mood is dramatic and serene.

Thank you!