

Impacts of Climate Change on Peak Bloom of Cherry Blossoms in High Park and its Ecological Impact on Baltimore Oriole (*Icterus galbula*) populations in Ontario

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INTRODUCTION

Cherry blossom records have been collected since the 9th century in Japan. These records are the longest annual record of phenological data in the world.

High Park in Toronto has been recording peak bloom of its cherry blossom trees. Since 2006, peak bloom times have been recorded to help predict subsequent year peak bloom dates.

During peak bloom times, Baltimore Orioles have been known frequent cherry blossoms and feed on nectar (Figure 1).

The objectives of this study is to determine if :
i) Peak bloom of cherry blossoms is a phenological indicator of climate change.
ii) Peak bloom of cherry blossoms impacts Baltimore Oriole abundance.

I predict that as temperatures increase due to climate change, peak bloom dates will occur earlier in the spring.



Figure 1 - During peak bloom times, Baltimore Orioles have been known to frequent cherry blossoms and feed on nectar (High Park Nature Center, 2016)

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RESEARCH QUESTIONS

- 1) Are higher March daily temperatures associated with earlier peak cherry blossom blooms in High Park?
- 2) Is the peak bloom of Cherry blossoms in High Park associated with Baltimore Oriole (*Icterus galbula*) populations in Ontario from 2006 – 2015?

METHODS

DATA ACQUISITION

- Cherry blossom phenology from 2006 to 2015 were obtained from the High Park Nature Center
- March air temperatures for Toronto from 2006 to 2015 were obtained from Environment Canada
- Accumulative Baltimore Oriole sightings for Ontario from 2006 to 2015 were obtained from the Breeding Bird Survey (BBS)

DATA ANALYSIS

Pearson Correlation Coefficients were calculated and Linear regression models were developed for the following associations:

- 1) Cherry Blossom Date and Temperature
- 2) Baltimore Oriole sightings and Temperature
- 3) Cherry Blossom Date and Baltimore Oriole sightings



Figure 2 – Cherry Blossom bud development (High Park Nature Center, 2016)

RESULTS

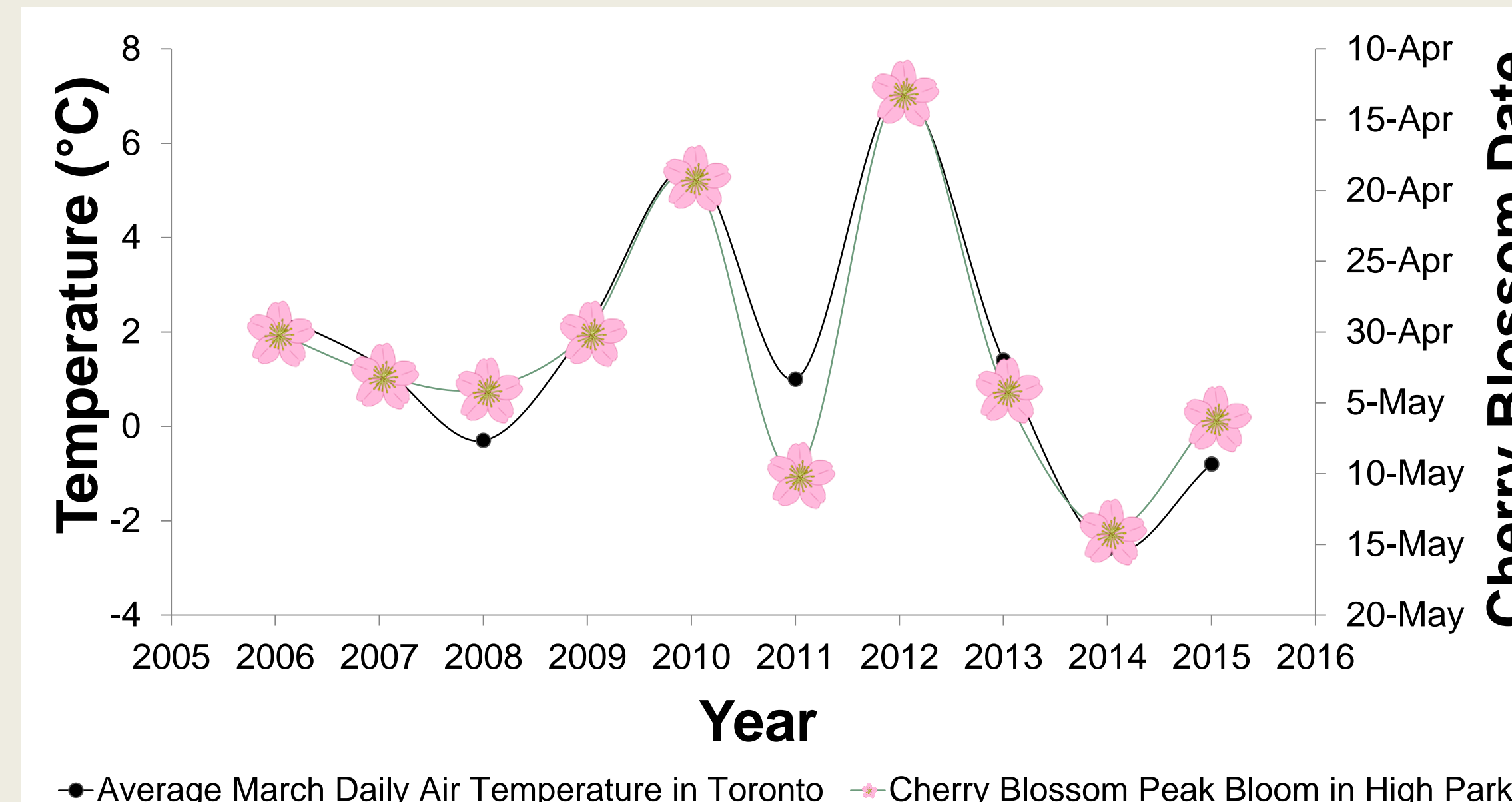


Figure 3 – Time series of peak bloom at High Park and average March daily air temperatures in Toronto between 2006 – 2015.

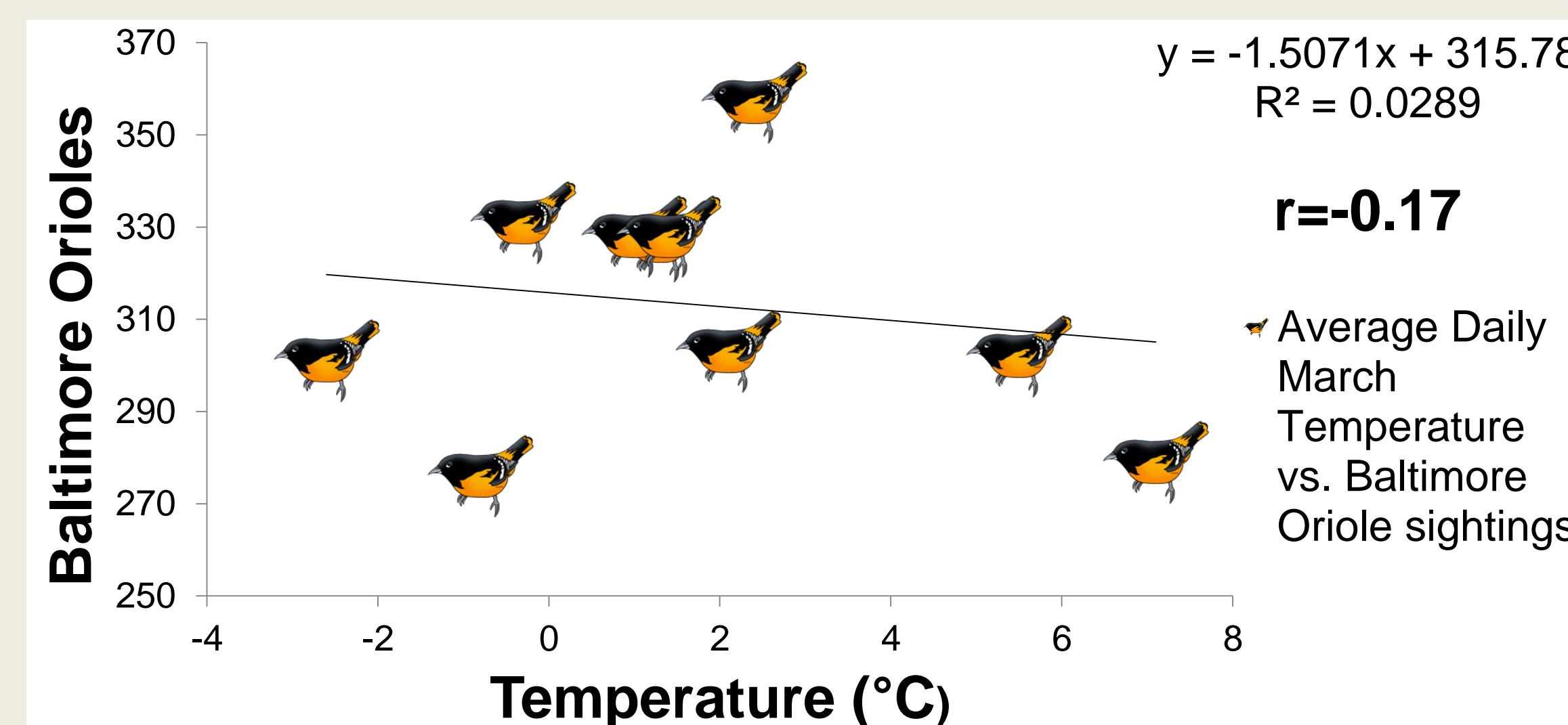


Figure 5 –The relationship between mean March air temperatures in Toronto and Baltimore Oriole sightings in Ontario as reported by BBS from 2006-2015.

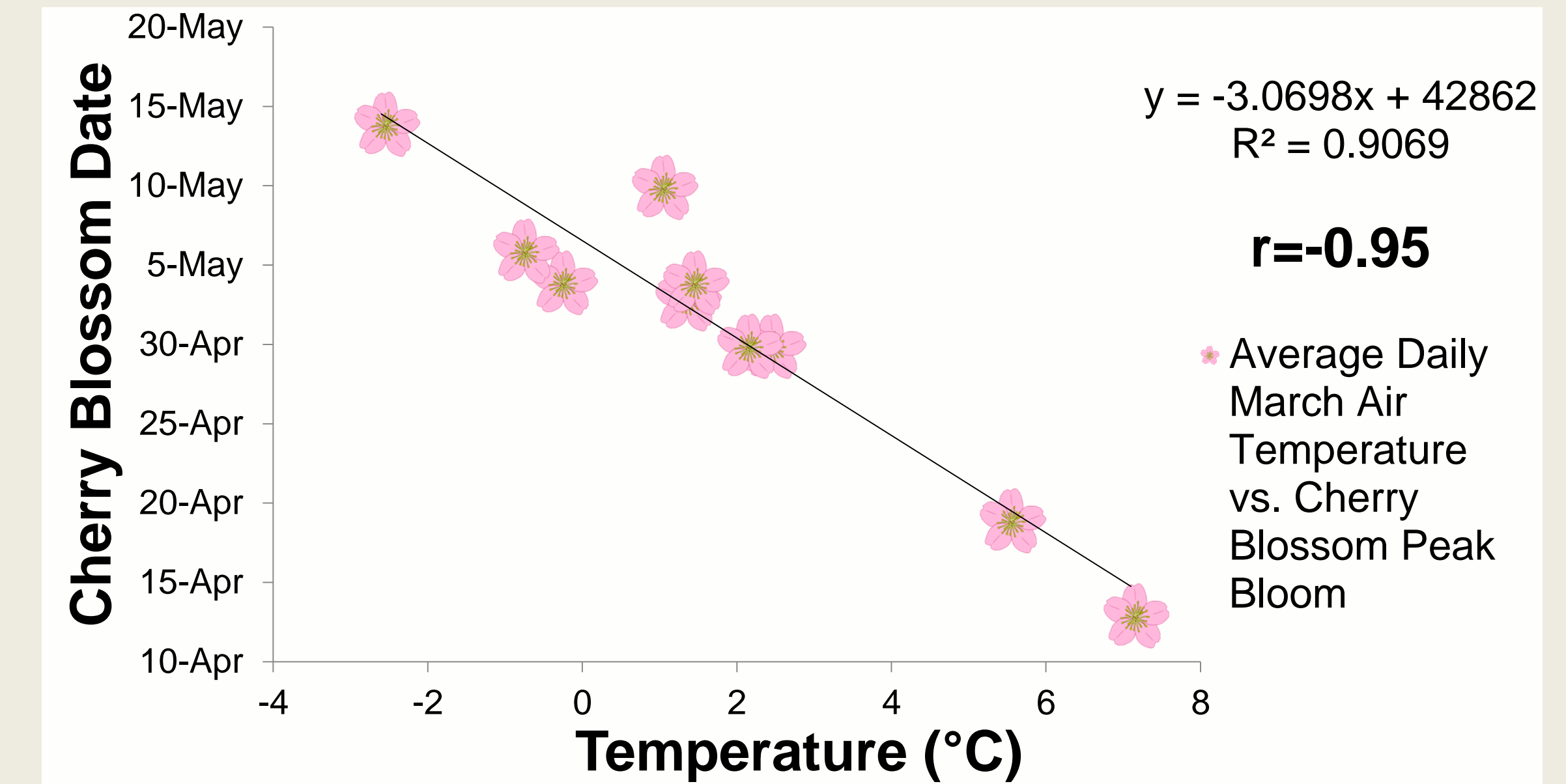


Figure 4 –The relationship between mean March air temperatures in Toronto and cherry blossom peak bloom in High Park from 2006-2015.

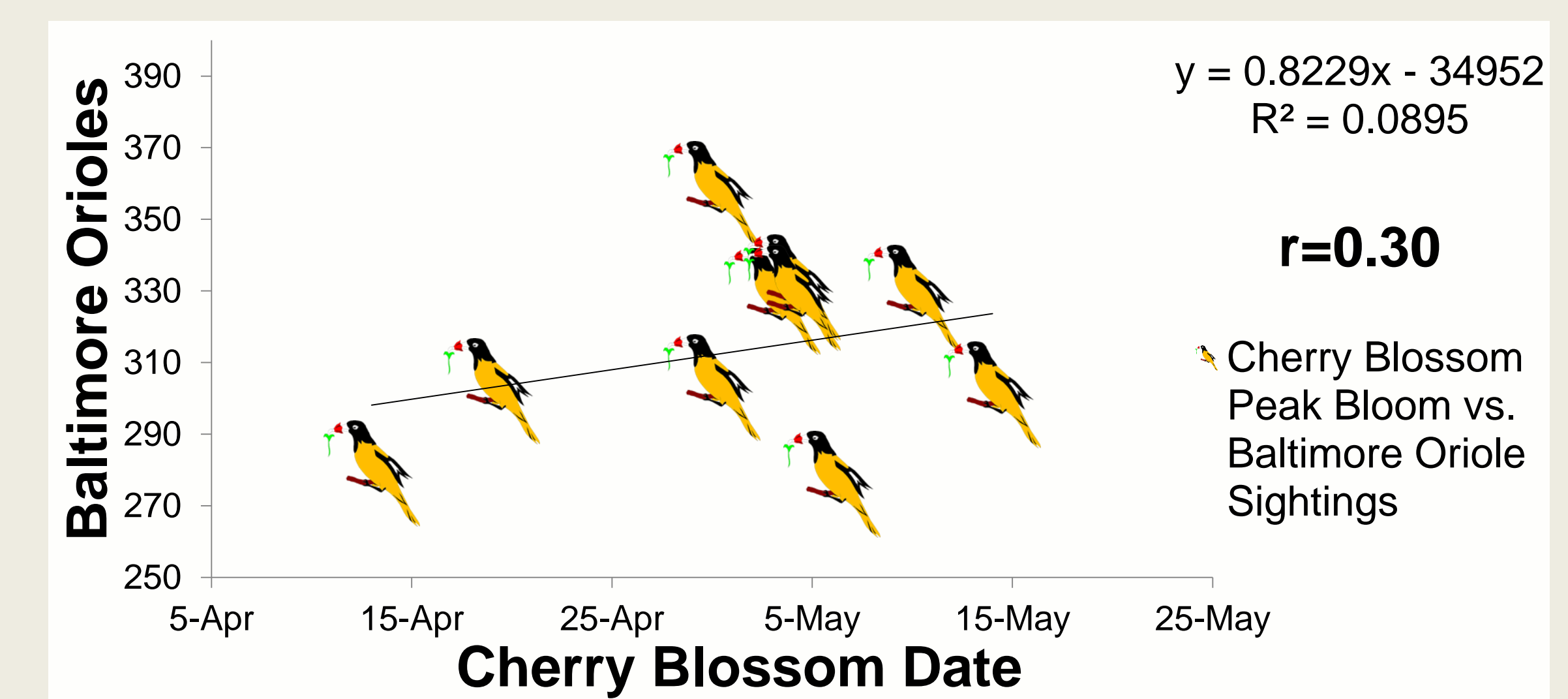


Figure 6 –The relationship between date of peak bloom of cherry blossoms in high Park and Baltimore Oriole sightings in Ontario as reported by BBS from 2006-2015.

MAIN FINDINGS

- Higher March air temperatures were strongly, associated with earlier Cherry blossom Peak bloom dates ($r=-0.95$; $R^2=0.91$)
- Baltimore Oriole sightings and average daily March air temperatures were weakly, negatively correlated ($r=-0.17$; $R^2=0.029$)
- Cherry Blossom peak blooms were moderately associated with increased Baltimore Oriole sightings ($r=0.3$; $R^2=0.089$)

DISCUSSION

This study suggests that warmer March air temperatures were associated with earlier peak bloom dates of cherry blossoms. However, timing of the peak bloom was not associated with the abundance of Baltimore Orioles. Exploring the relationship between climate change, flowering times and bird populations provides valuable information about the many ecological interactions that remain unknown. I found that cherry blossom peak bloom is an excellent phenological indicator in High Park, as it has been in Japan since the 9th century (Aono 2015).

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ACKNOWLEDGEMENTS

I would like to thank Dr. Sapna Sharma for her support and mentorship. Without her enthusiasm for climate research and expertise in effective and informative science communication, this poster would not have been possible.