

Providence College

DigitalCommons@Providence

---

Biology Student Scholarship

Biology

---

Spring 5-19-2023

## Precipitation Effects on Butterfly Species Richness

Maggie Ritchie

*Providence College*

Follow this and additional works at: [https://digitalcommons.providence.edu/bio\\_students](https://digitalcommons.providence.edu/bio_students)



Part of the [Biology Commons](#)

---

Ritchie, Maggie, "Precipitation Effects on Butterfly Species Richness" (2023). *Biology Student Scholarship*. 33.

[https://digitalcommons.providence.edu/bio\\_students/33](https://digitalcommons.providence.edu/bio_students/33)

This Poster is brought to you for free and open access by the Biology at DigitalCommons@Providence. It has been accepted for inclusion in Biology Student Scholarship by an authorized administrator of DigitalCommons@Providence. For more information, please contact [dps@providence.edu](mailto:dps@providence.edu).



# PRECIPITATION EFFECTS ON BUTTERFLY SPECIES RICHNESS

Maggie Ritchie, Rachael E. Bonoan, Peter J. Rogers

Providence College, Biology Department

PRISM Climate Group, Oregon State University, <https://prism.oregonstate.edu>, data created 4 Feb 2014, accessed 16 Dec 2020.

Michielini, James; Dopman, Erik; Crone, Elizabeth (2020), Changes in Flight Period Predict Trends in Abundance of Massachusetts Butterflies, [], Posted-content, <https://doi.org/10.22541/au.158880221.19641425>

## BACKGROUND

Butterflies are important pollinators that have been impacted due to climate change(1). Studies have looked at how the increasing temperatures and precipitation due to climate change may be playing a role in decreasing populations among some species in Mediterranean climates(2). However, the effects of precipitation have not been considered when looking at changing butterfly populations around the United States. Therefore, increasing precipitation amounts due to climate change may contribute to the decreasing populations of butterflies in Massachusetts.



## METHODS

Butterfly species richness was measured by the Massachusetts Butterfly Club. Volunteer observers alone or in small groups where the volunteers recorded the number of each species seen on each outing was recorded, as was the date, observers, and location. The number of each species was found for each month and year to find species richness in each county. The weather data was collected by the PRISM Climate Group. The PRISM climate mapping system has recorded weather data all over the country in the different stations since 1895. The Massachusetts data is sectioned by county.



## RESULTS

Each month of the year, brings a very different amount of precipitation and conditions for the butterfly species. An early spring month (April) and a mid summer month (July) were examined because climate change is impacting the months in different ways (3).

As precipitation average increases in the month of April, there is not a significant effect on the average species richness in that same month (lmm,  $X^2=0.1037$ ,  $Df= 1$ ,  $p>0.1$ ). Despite there being a slightly positive slope in the graph (fig 1), it is not significant enough to predict the trend.

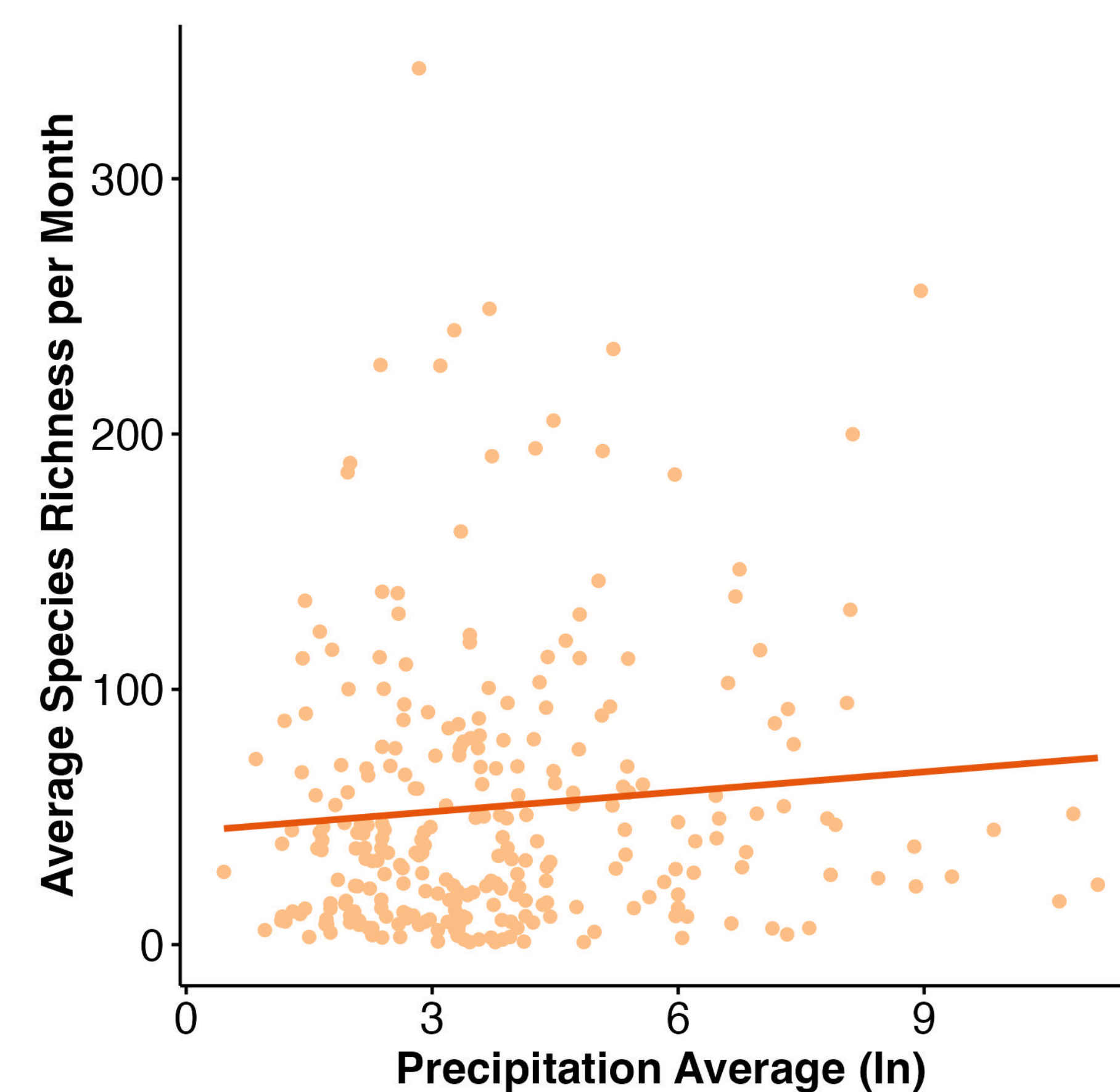


Fig. 1 Average precipitation effect on the average species richness in April

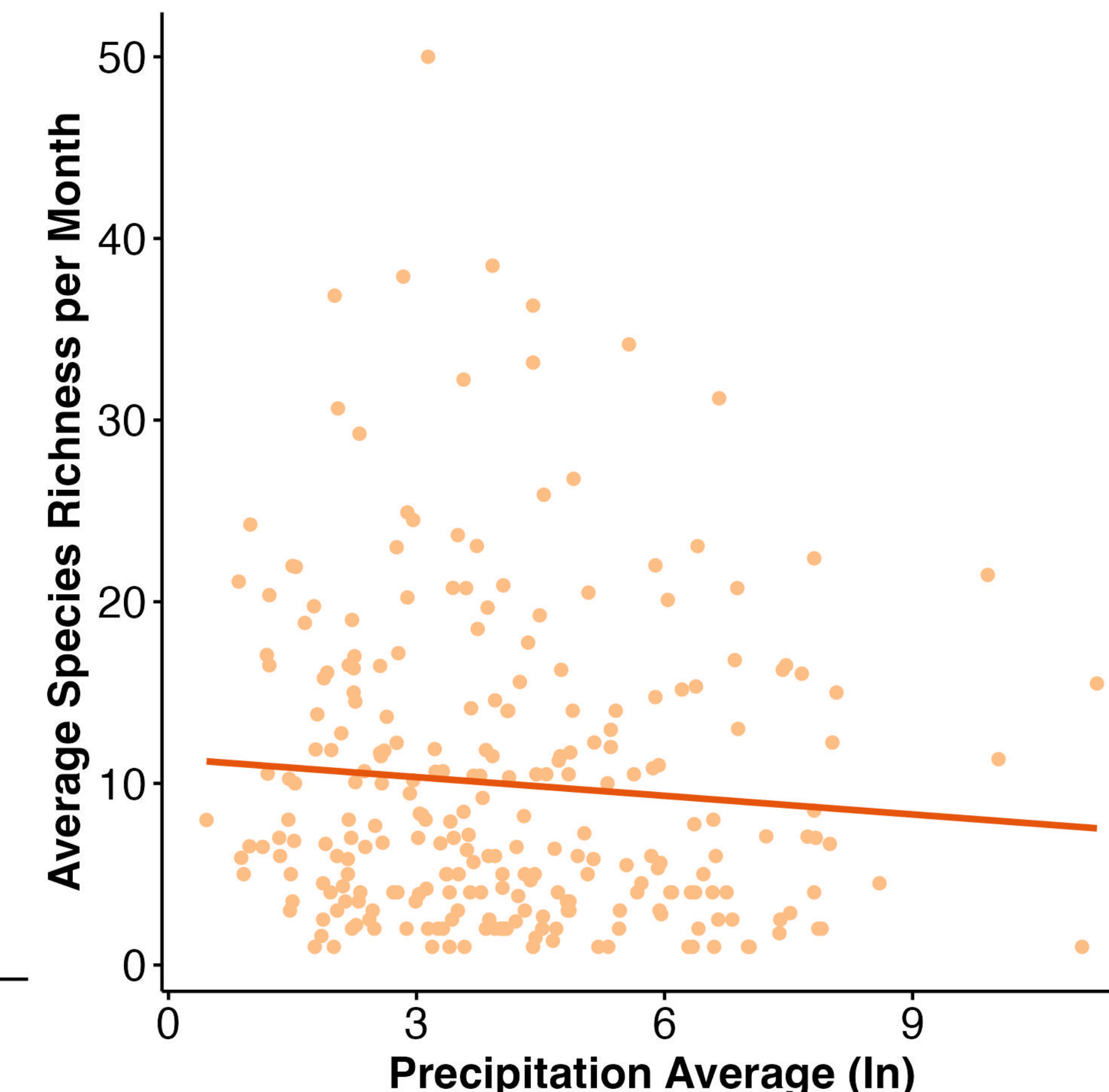


Fig. 2 Average precipitation effect on the average species richness in July

As precipitation average increases in the month of July, there is not a significant effect on the average species richness in that same month (lmm,  $X^2=2.3947$ ,  $Df= 1$ ,  $p>0.1$ ). While the relationship is not significant, there is a slight negative slope in the graph (fig. 2) which seems to be the opposite of the early spring month.



## CONCLUSION

While there is no significant between the average precipitation a month on the average species richness in the month, there were slight trends that could be seen that may lead to significant results in the future. In future research looking at all the months instead of just two could show more significant results. Also, looking at the populations of specific species instead of the number of species could make these relationships stronger since each species has a different flight season and has different features which may help or hurt them in precipitation. As climate change continues to change precipitation rates, this effect may become more prominent.

## ACKNOWLEDGEMENTS

Thank you to Dr. Rogers for helping guide my research and provide me with proper resources. Thank you to Dr. Bonoan for supporting my project and guiding me through wrangling my data and setting up my models. Another thanks to the Massachusetts Butterfly Club and PRISM for providing me with data suitable for my research question.

## REFERENCES

- (1)Roy DB and Sparks TH. 2000. Phenology of British butterflies and climate change. *Global Change Biology* 6(4):407-16.
- (2) Herrando S, et al. 2019. Contrasting Impacts of Precipitation on Mediterranean Birds and Butterflies. *Sci Rep* 9
- (3)Dore MH. 2005. Climate change and changes in global precipitation patterns: What do we know? *Environ Int* 31(8):1167-81.