Using ecological niche models in GIS to predict the occurrence of the hybrid gentian, Gentiana x billingtonii

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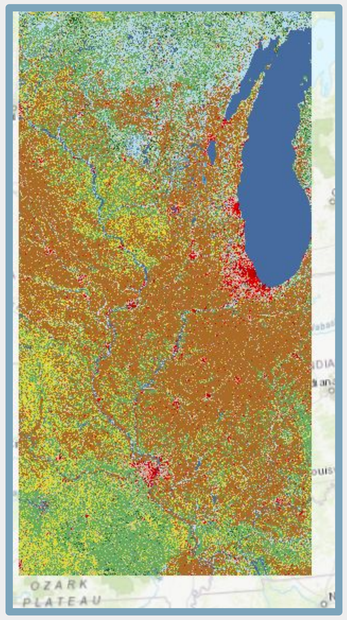
Introduction:

The rare congener Gentiana puberulenta(Downy Gentian) and the common congener Gentiana andrewsii(Closed Bottle Gentian) hybridize under specific circumstances to form Gentiana x billingtonii. This project examines the circumstances that allows the congeners to hybridize and if it will increase the risk of extinction for the Downy Gentian.

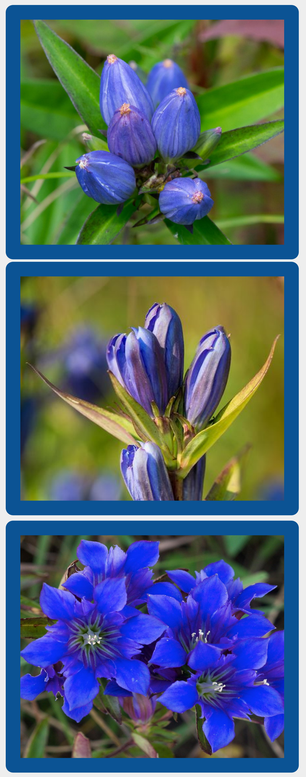
Objectives:

- What conditions cause hybridization?
- To create a species distribution model to predict the occurrence of Gentiana x Billintonii



Canopy Cover

Rainfall



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2	Gentiana ×billingtonii F...	3170049	NA	HUMAN_OBSERVATION	146893108	Magnoliopsida	220	Observations	NA	NORTH_AMERICA
3	Gentiana ×billingtonii F...	3170049	NA	HUMAN_OBSERVATION	94477651	Magnoliopsida	220	Observations	NA	NORTH_AMERICA
4	Gentiana ×billingtonii F...	3170049	NA	HUMAN_OBSERVATION	99261298	Magnoliopsida	220	Observations	NA	NORTH_AMERICA
5	Gentiana ×billingtonii F...	3170049	NA	HUMAN_OBSERVATION	16643524	Magnoliopsida	220	Observations	NA	NORTH_AMERICA
6	Gentiana ×billingtonii F...	3170049	NA	HUMAN_OBSERVATION	7710976	Magnoliopsida	220	Observations	NA	NORTH_AMERICA

Methods:

- Created a species distribution model (SDM) for both gentian species to layer them and find where the hybrid occurs
- Conducting field research to see if there are common pollinators that promote hybridization

Discussion:

As climate change shifts the natural range of species, the Downy Gentian and Closed Bottle Gentian may start to inhabit more of the same areas. This causes more hybridization occur and the Downy Gentian may face extinction if the hybrids have stronger seedlings and pollen.

- SDMs were used in a study by Ding et al. (2020) to determine the potential distribution of Betula microphylla, a species declining toward potential extinction due to climate change and human activities, and two common congeners, Betula tianshanica and Betula platyphylla.

Results:

Although field research is still ongoing, we are looking to find more on the following:

- If there are shared pollinators between the two species
- How strong are the hybrid seedlings compared to the downy seedlings
- Will the rare downy gentian become extinct as the hybrid becomes more common

Acknowledgements:

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References:

Ding, J., Hua, D., Borrell, J. S., A. Buggs, R. J., Wang, L., Wang, F., Li, Z., & Wang, N. (2021). Introgression between Betula tianshanica and Betula microphylla and its implications for conservation. Plants, People, Planet, 3(4), 363-374. https://doi.org/10.1002/ppp3.10182

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