

## Introduction

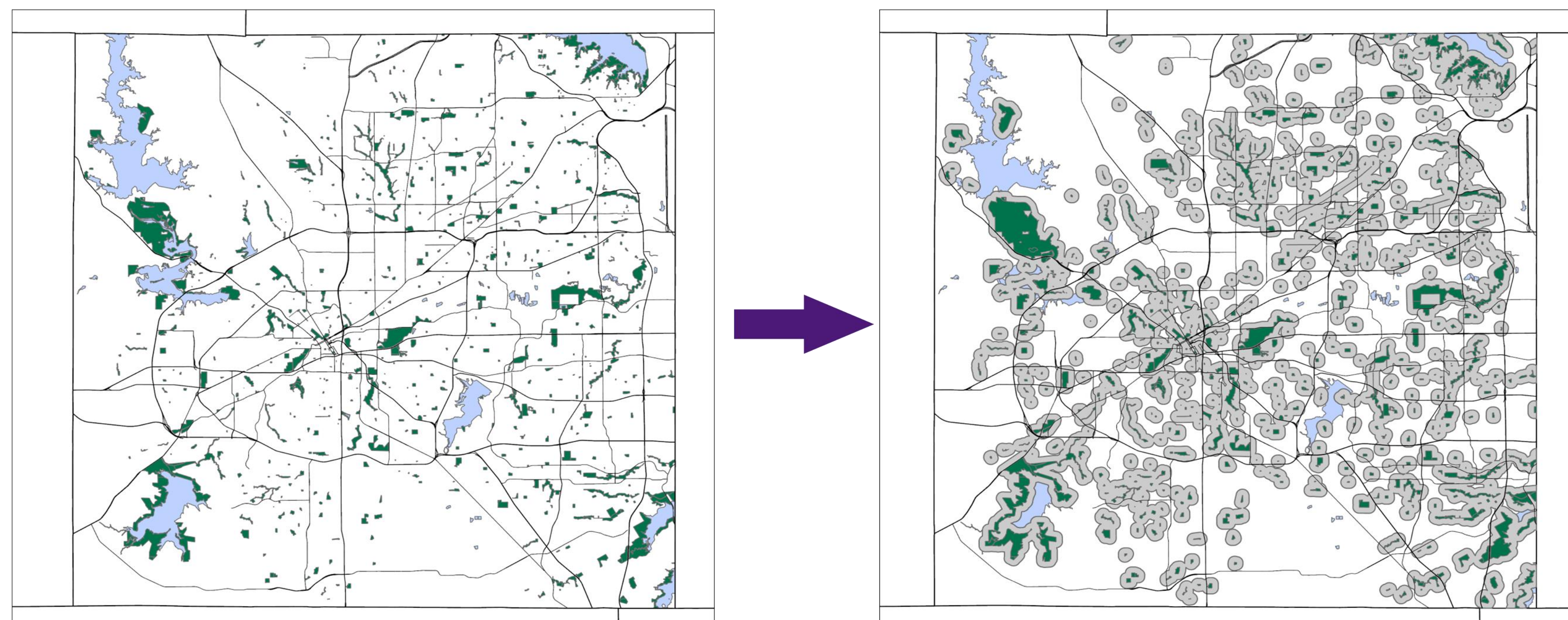
Pollinators are essential to the functioning of terrestrial ecosystems. Approximately 87.5% of flowering plants rely on animal pollination for reproduction (Ollerton, 2017). Due to this, pollinators are vital to the production of human consumed crops and the health of ecosystems. Urbanization drives decreases in pollinator biodiversity, species richness and abundance due to loss of habitat and fragmentation (Turo et al., 2021). Urban characteristics such as densification and impervious surfaces can cause pollinator declines and loss of pollinator services (Wenzel et al., 2020). Studies show that both population density and city size impact pollinator populations (Norton et al., 2016; Sivakoff et al., 2018). Rapid population growth has the potential to impact pollinators and their habitats. Urban green spaces such as parks can be beneficial pollinator refuges (Serret et al., 2022). Connectivity of pollinator habitats is important for species richness and abundance (Graffigna et al., 2023). The objective of this project is to assess the connectivity of pollinator habitats in a highly urbanized county within Texas. This project strives to understand how urban parks as pollinator habitats connect to one another at a range of distances for winged pollinator travel.

## Research Question

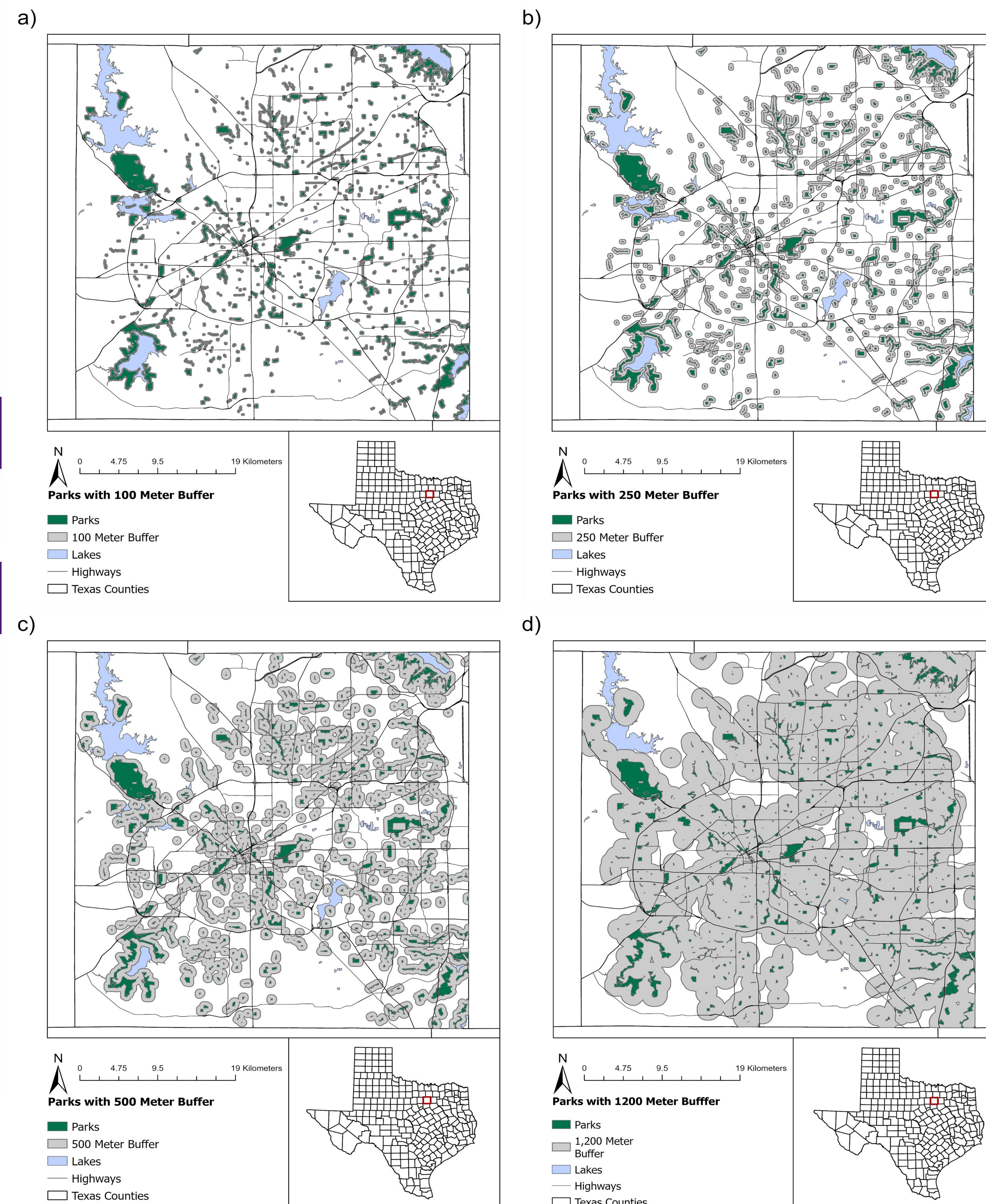
How well connected are urban parks in Tarrant County for winged pollinator movement?

## Methods

My study area is Tarrant County, a part of North Central Texas containing two highly urbanized and fast-growing cities, Fort Worth and Arlington. Tarrant County has a population of 2,110,640 and encompasses 865.2 square miles in of land north central Texas (United States Census Bureau, 2020). It is also the 15<sup>th</sup>-most populated county in the United States (United States Census Bureau, 2024). Tarrant County is also located in a major pollinator migratory pathway (National Park Service, 2019). This geographic information system used the Texas North Central state plane coordinate system. The Parks and lakes shapefiles were downloaded from the North Central Texas Council of Governments website (North Central Texas Council of Governments, 2023). The major highways shapefile was downloaded from the Texas Department of Transportation website (Texas Department of Transportation, 2024). All three files were clipped to the study area. The county boundary shapefile and inset map of Texas shapefile was downloaded from the United States Census Bureau (United States Census Bureau, 2023). Buffers of 100 m, 250 m, 500 m, and 1,200 m were placed around the parks using the buffer tool to assess connectivity. To analyze the connectivity of the parks at different spatial scales, I calculated the total area encompassed by each buffer and the percentage of Tarrant County encompassed by the buffers.



## Results



**Figure 1.** a) Parks with a 100-meter buffer b) Parks with a 250-meter buffer c) Parks with a 500-meter buffer d) Parks with a 1,200-meter buffer

**Table 1.** Area of the county, parks, and buffers

	Area (M <sup>2</sup> )	Area (Mi <sup>2</sup> )	Percent of Tarrant County
Tarrant County	2,340,239,395	903	-
Tarrant County Parks	107,064,000	41	4.58%
100 Meter Buffer	240,759,794	93	10.29%
250 Meter Buffer	472,420,605	182	20.19%
500 Meter Buffer	890,908,755	344	38.07%
1,200 Meter Buffer	1,662,853,018	642	71.05%

## Discussion and Conclusions

Distance between urban green spaces impacts different species of winged pollinators and individuals within those species unevenly. For example, maximum foraging distances for small, medium, and large bees are 1,100 meters, 1,275 meters, and 1,400 meters respectively, but 50% of small sized females do not travel further than 100 to 225 meters and 50% of large sized females do not travel further than 300 meters (Zurbuchen et al., 2010). Only 10.29 to 20.19% of the study area is connected to facilitate movement of 50% of smaller pollinators. With 71.05% of land connected by the 1,200-meter buffer, Tarrant County is best suited for the percentage of medium and large pollinators that can travel the maximum foraging distances of 1,275 meters and 1,400 meters. Additional green spaces should be added throughout Tarrant County to increase connectivity for smaller pollinators and at least half of individuals within species that do not travel the maximum foraging distances. This study does not consider the resistance that major roads, increasing densification, and water bodies may have on pollinator movement within Tarrant County and could be a topic for further study.

## Acknowledgements

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## References

