



Summer Population Variations in Five Shorebird Species

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GreenerJC



INTRODUCTION

Hudson County consists of various parks throughout, home to over 300 different species of shorebirds. The Hudson County Park System oversees and maintains the many parks in the area, having over 600 acres of recreational space. The nine parks are nearly all managed by the county, providing habitats for both migratory and residential shorebirds.

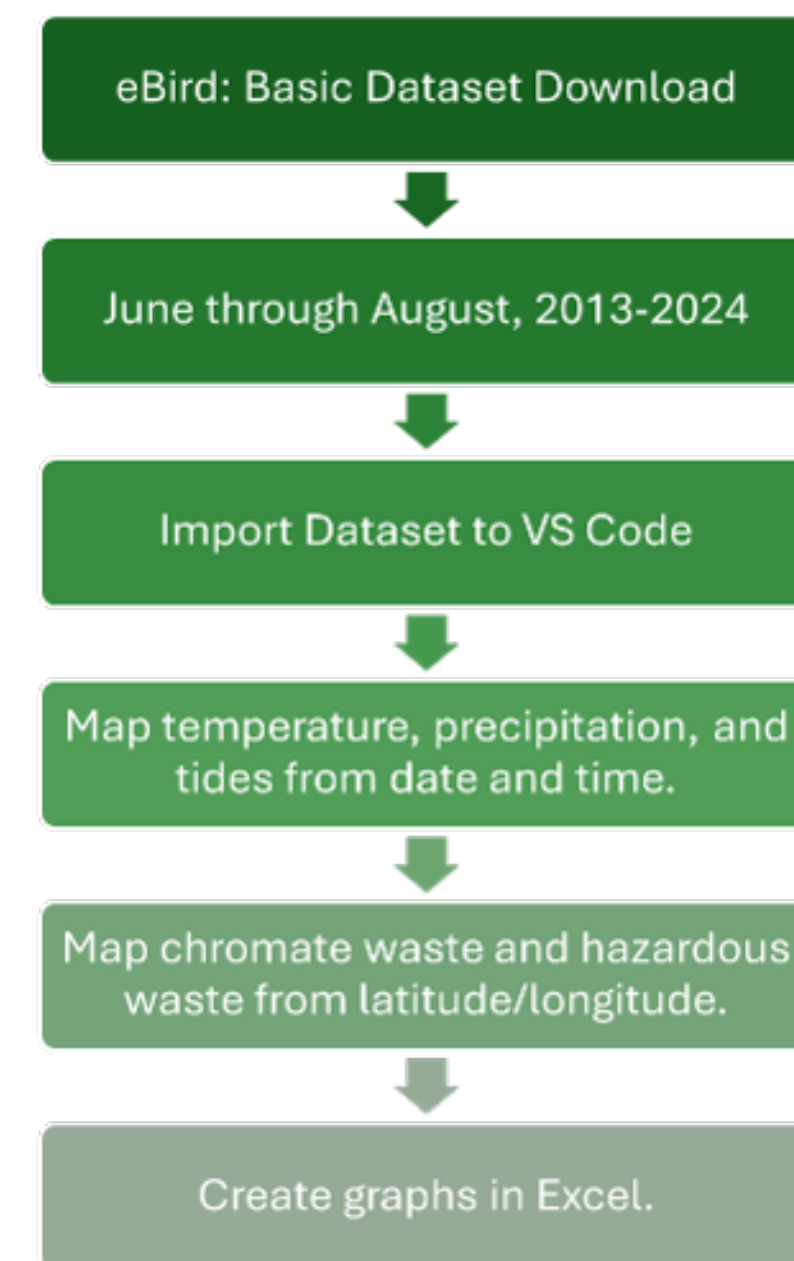
This project utilizes summer population counts of Barn Swallows, Great Egrets, Laughing Gulls, Common Terns, and Mallard Ducks in locations across Hudson County to determine accurate shifts in population, providing valuable insight to possible causes and effects.

These five species are shown to be abundant in all locations, allowing for easier data collection and mapping to find possible trends.

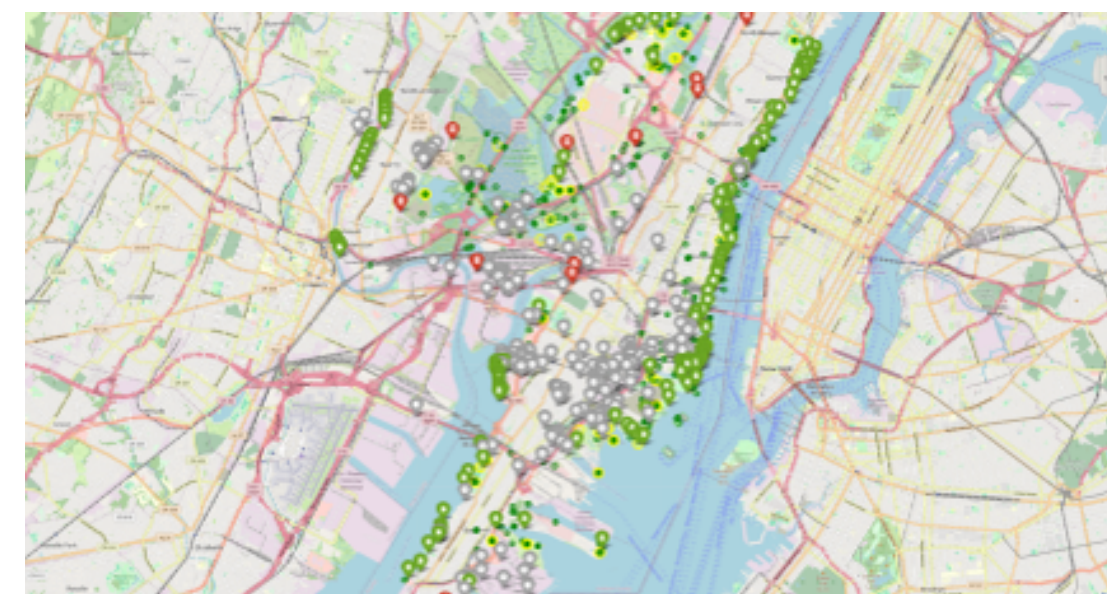
METHODS

The effects of 5 different influences were measured: temperature, tide, precipitation, distance from hazardous waste facilities, the public's access to their habitats, and distance from chromate waste sites. The basic dataset (EBD) by eBird was utilized for this project, as it is the largest open-source dataset eBird provides. Approximately 10,000 data points were gathered, across 5 birds.

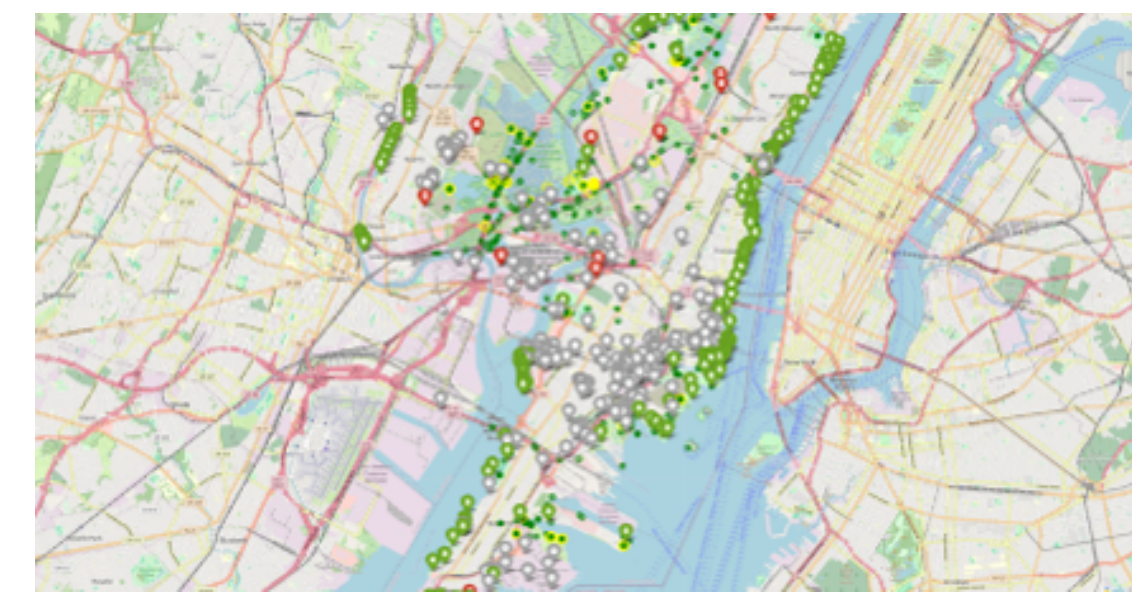
Additionally, a map was constructed using Python's *folium* library, outlining all locations of bird sightings, chromate waste sites, hazardous material facilities, and public-access park entrances.



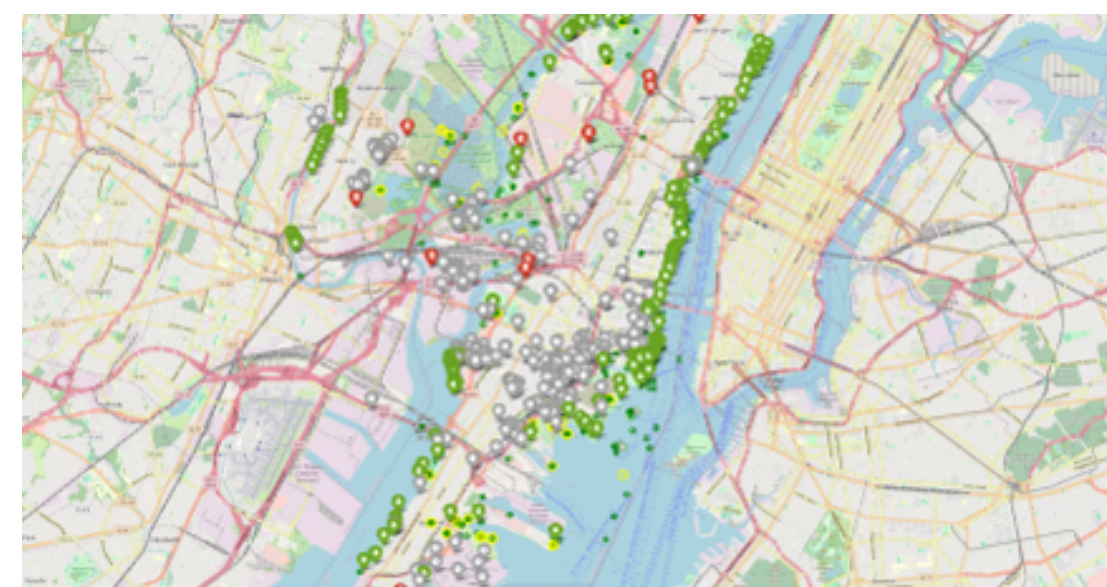
MAPS



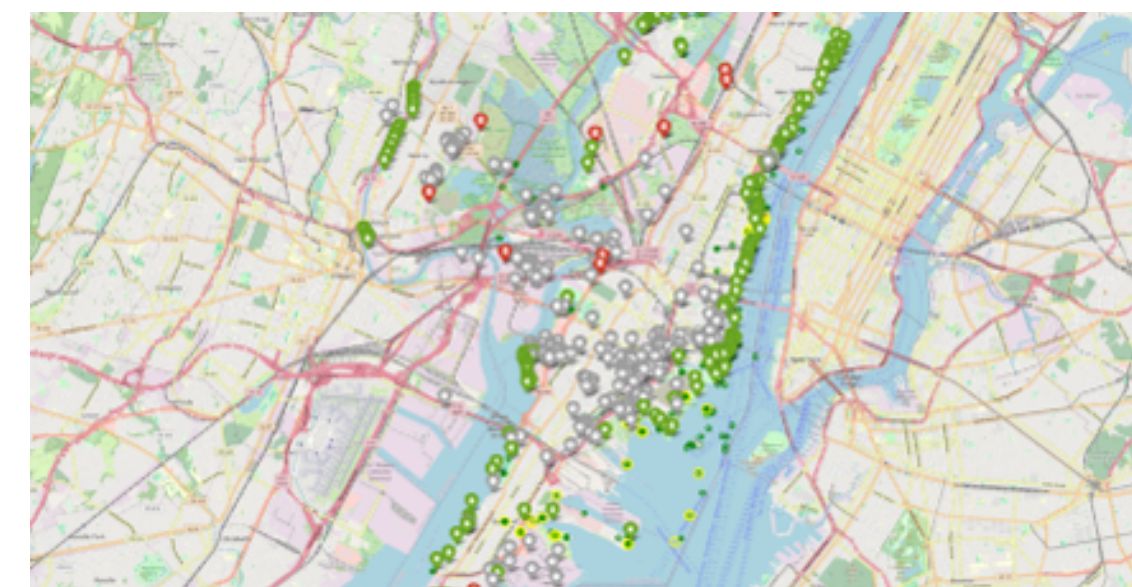
Barn Swallows
Seen most at Liberty SP & Meadowlands



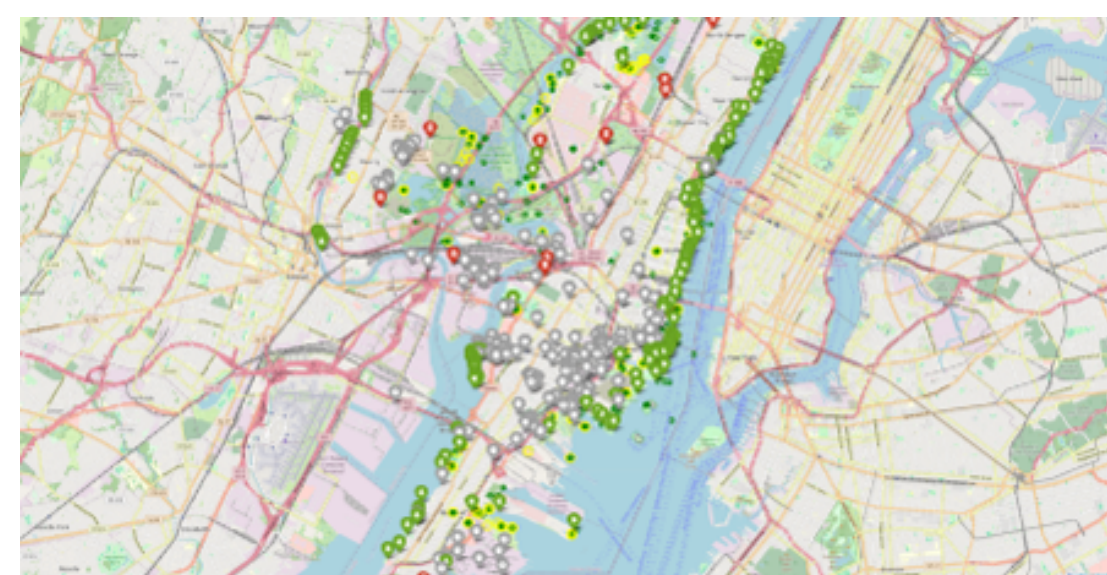
Great Egrets
Seen most at Meadowlands & Liberty SP



Laughing Gulls
Seen most at Liberty SP & Bayonne



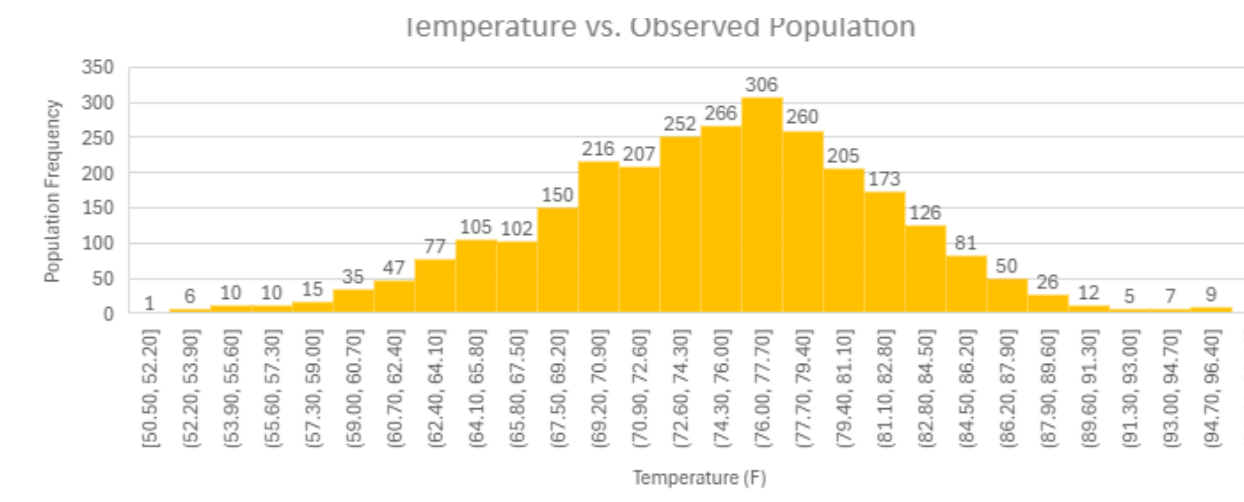
Common Terns
Seen most at Liberty SP & Bayonne



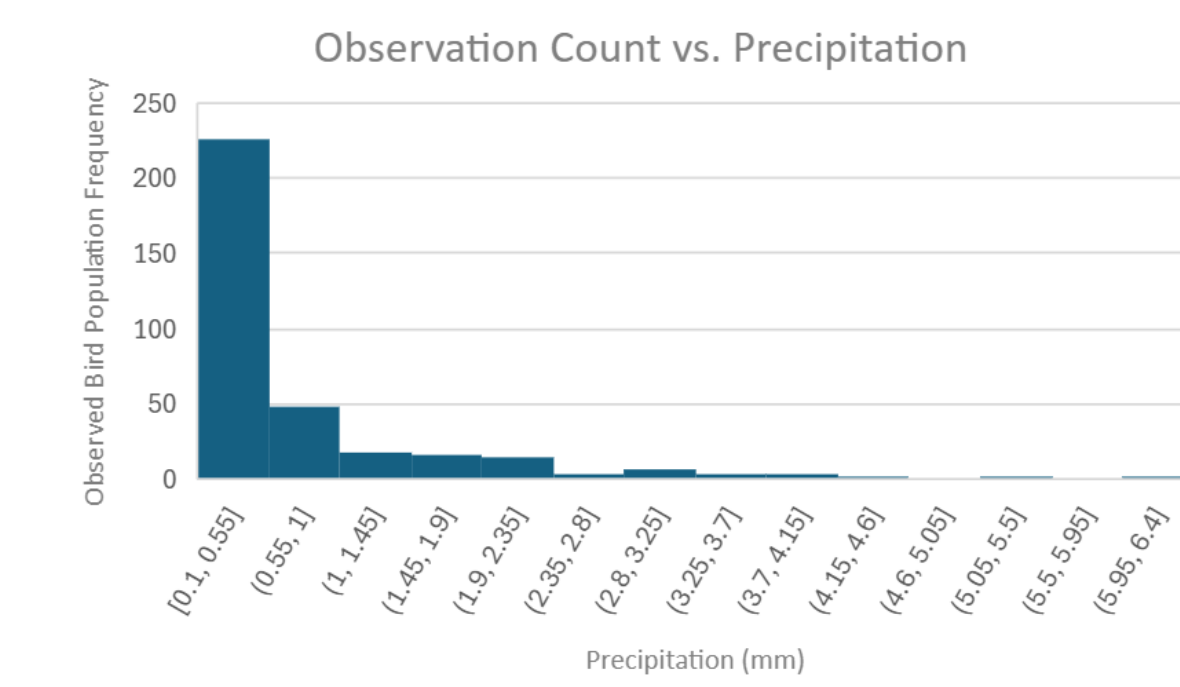
Mallard Ducks
Populous nearly everywhere

Key
Grey icons: Chromate waste sites
Green icons: Public park entrances
Red icons: Hazardous facility locations
Small green circles: <10 birds sighted.
Large yellow circles: 10+ birds sighted.

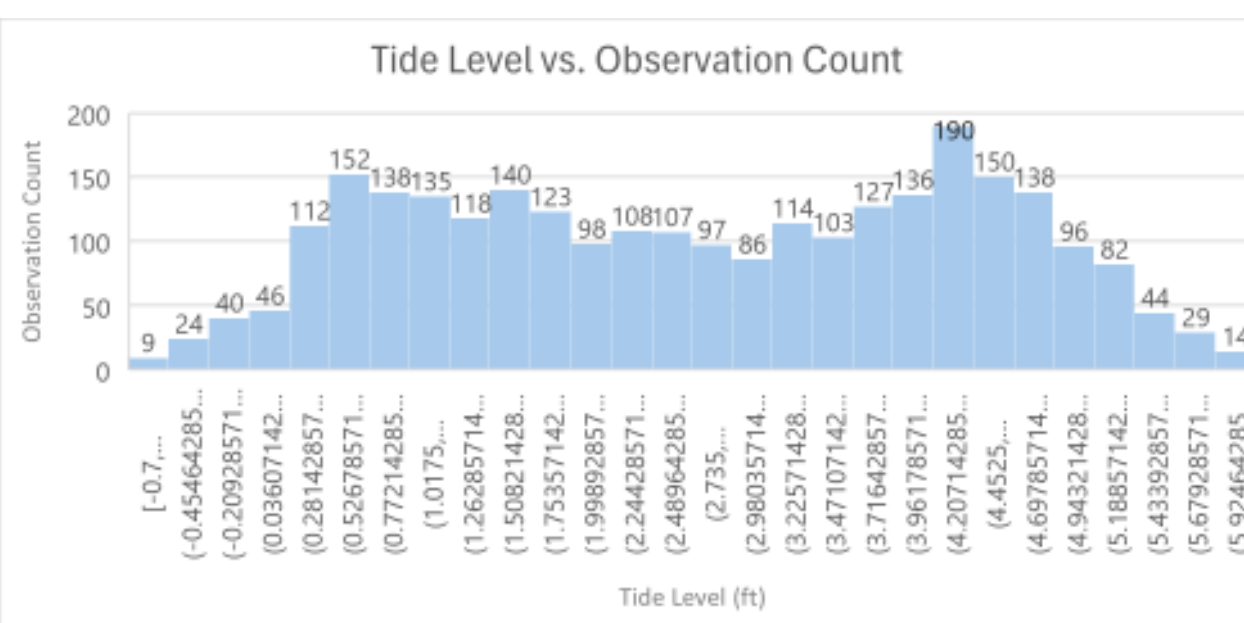
RESULTS



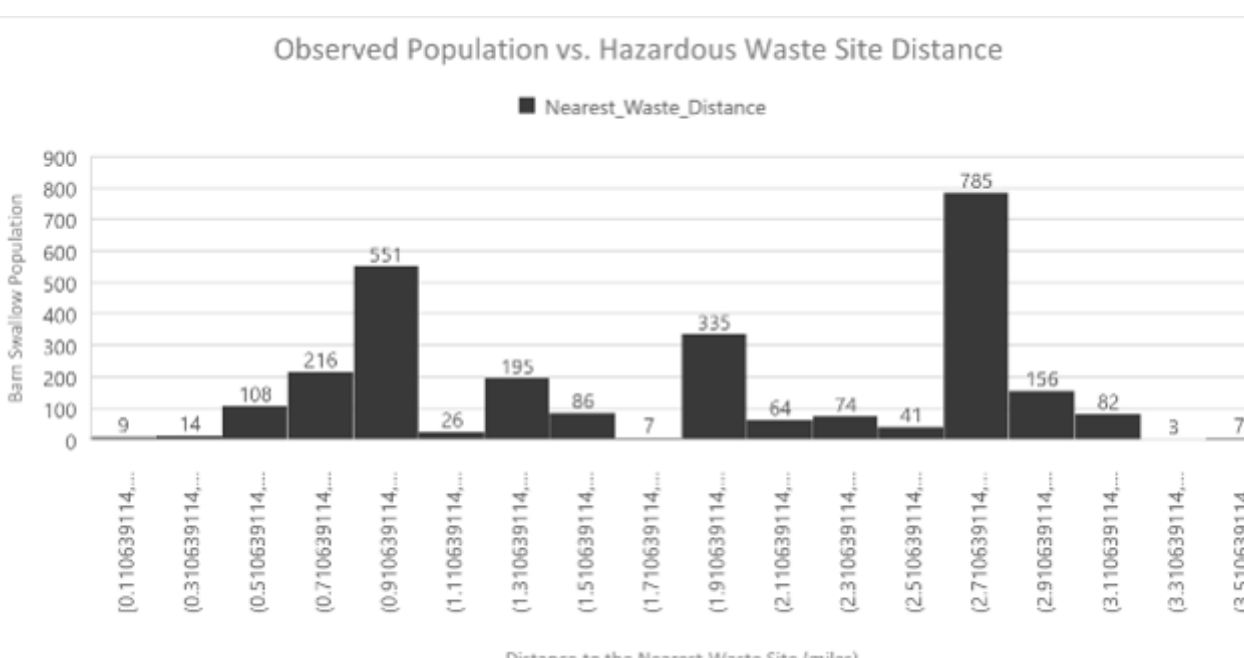
Temperature vs. Barn Swallow Population
Most preferred temperature: 76 - 77.70.



Precipitation vs. Observed Population
Birds come out when it's dry.



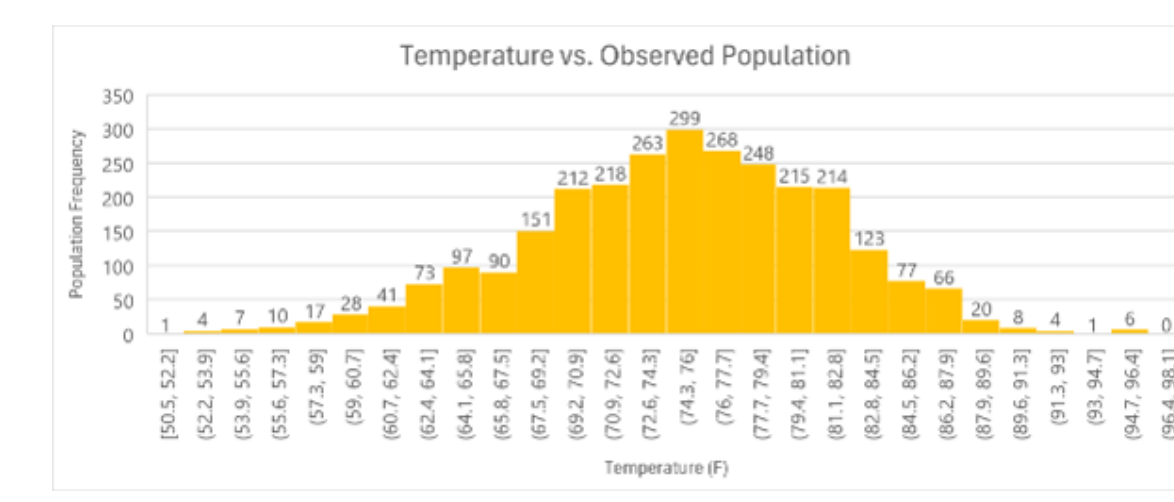
Observed Population vs. Tide Level
Swallows prefer mid-low and mid-high tide.



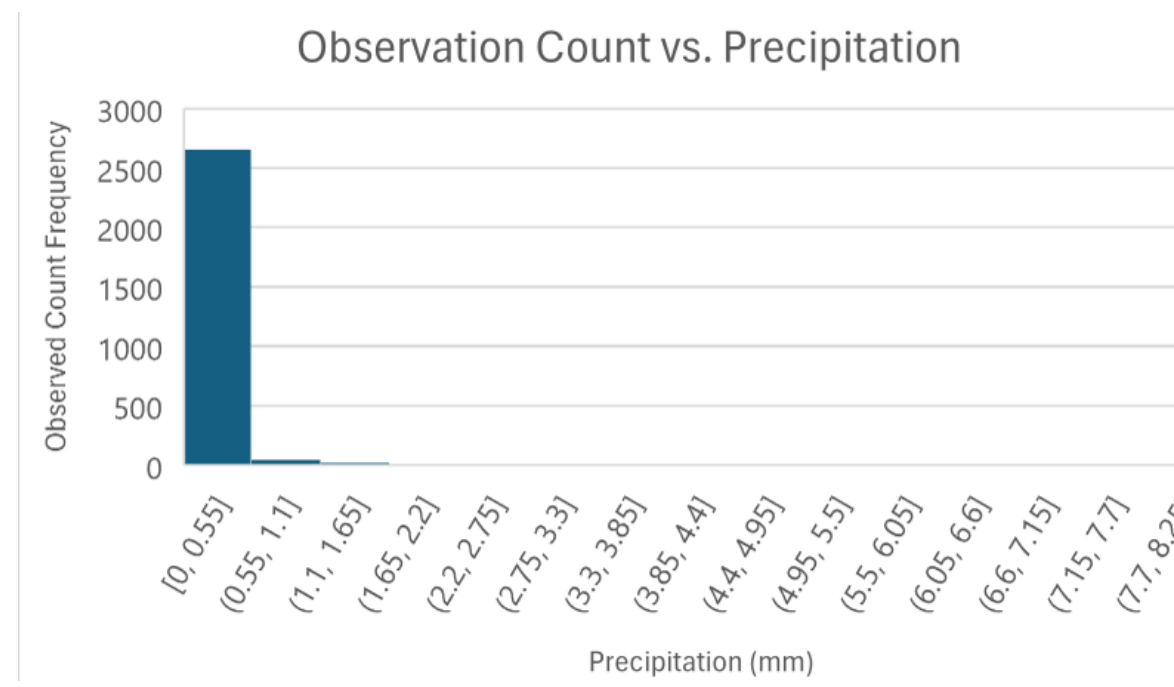
Observed Population vs. Waste Site Distance
There's no observed correlation.

There were more observed swallows at sites that allow fishing, at sites that don't allow playgrounds, and at sites that don't offer food and drink purchases. There was no correlation between barn swallows and chromate waste distance nor parking availability.

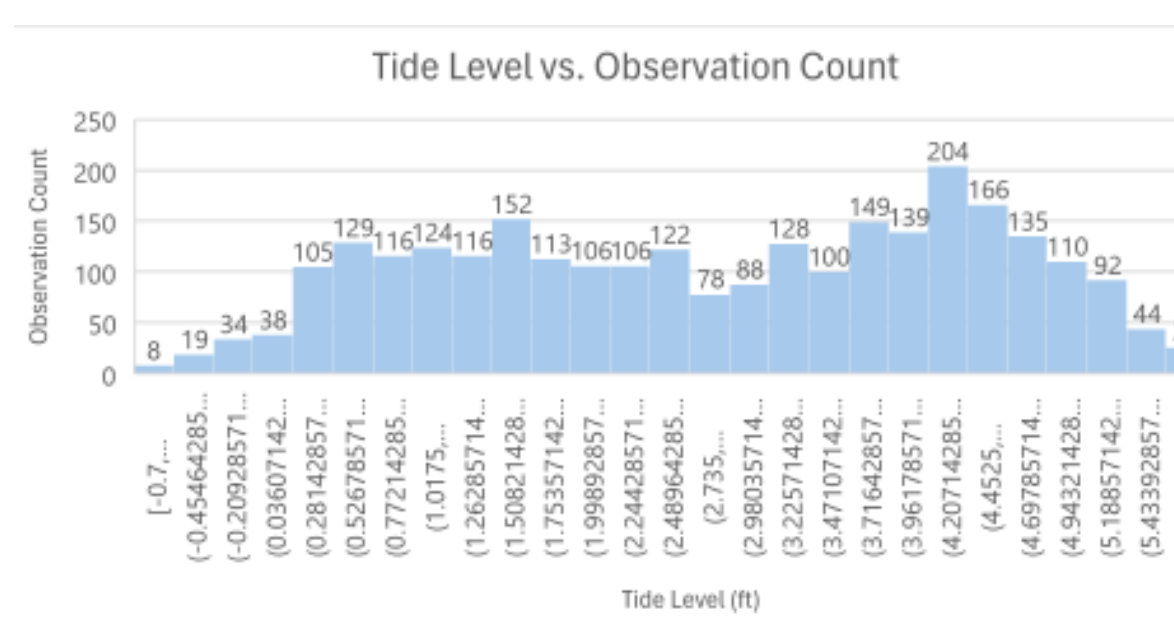
Barn Swallow



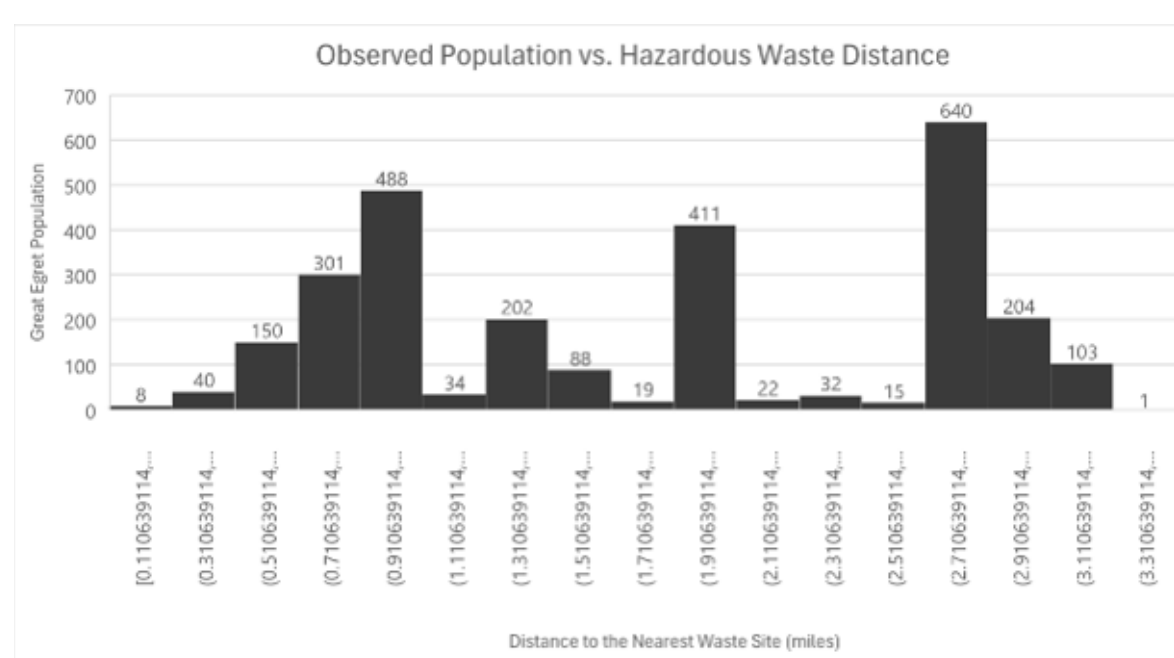
Temperature vs. Egret Population
Most preferred temperature: 74.3 - 76.



Precipitation vs. Observed Population
Birds almost only come out when it's dry.



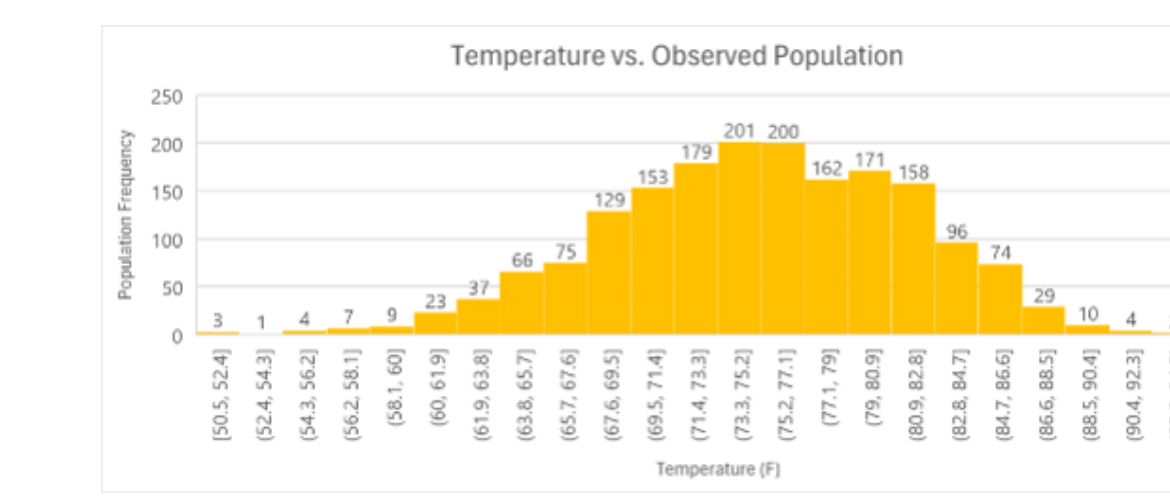
Observed Population vs. Tide Level
Egrets prefer mid-low and mid-high tide.



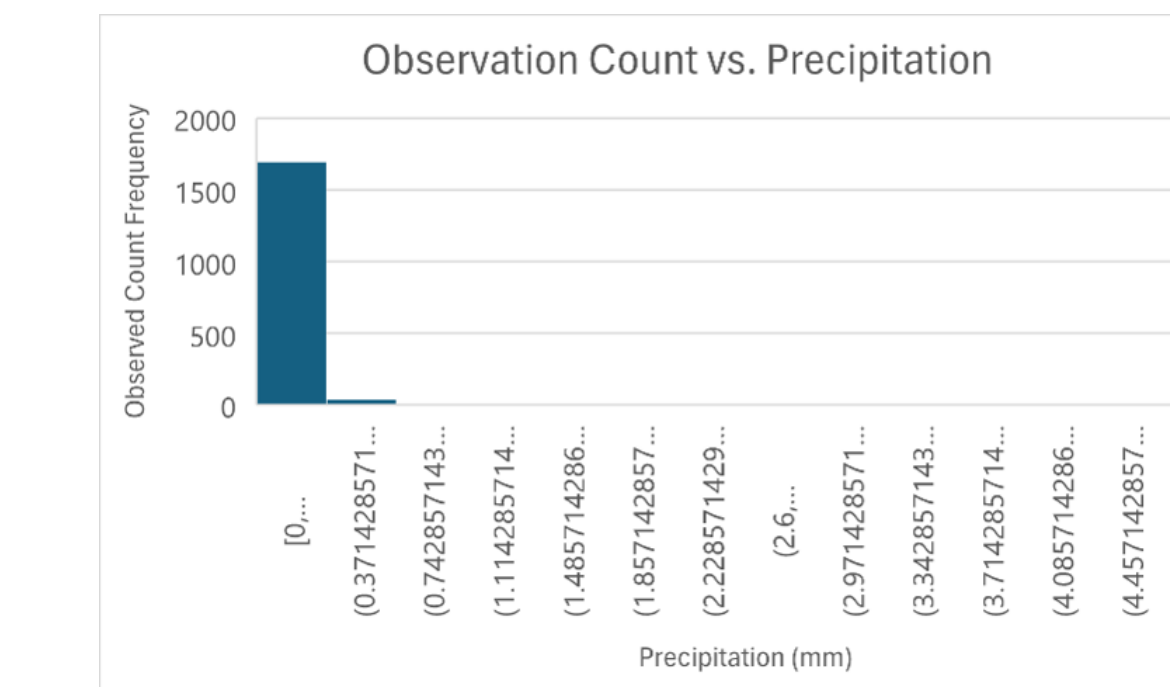
Observed Population vs. Waste Site Distance
There's no observed correlation.

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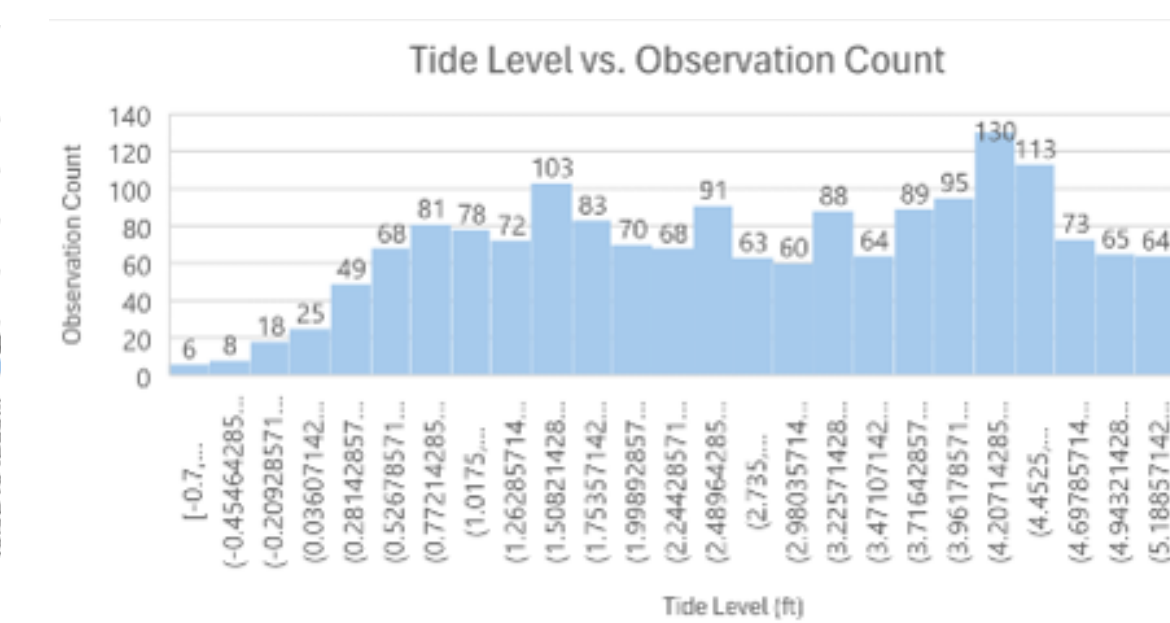
Great Egret



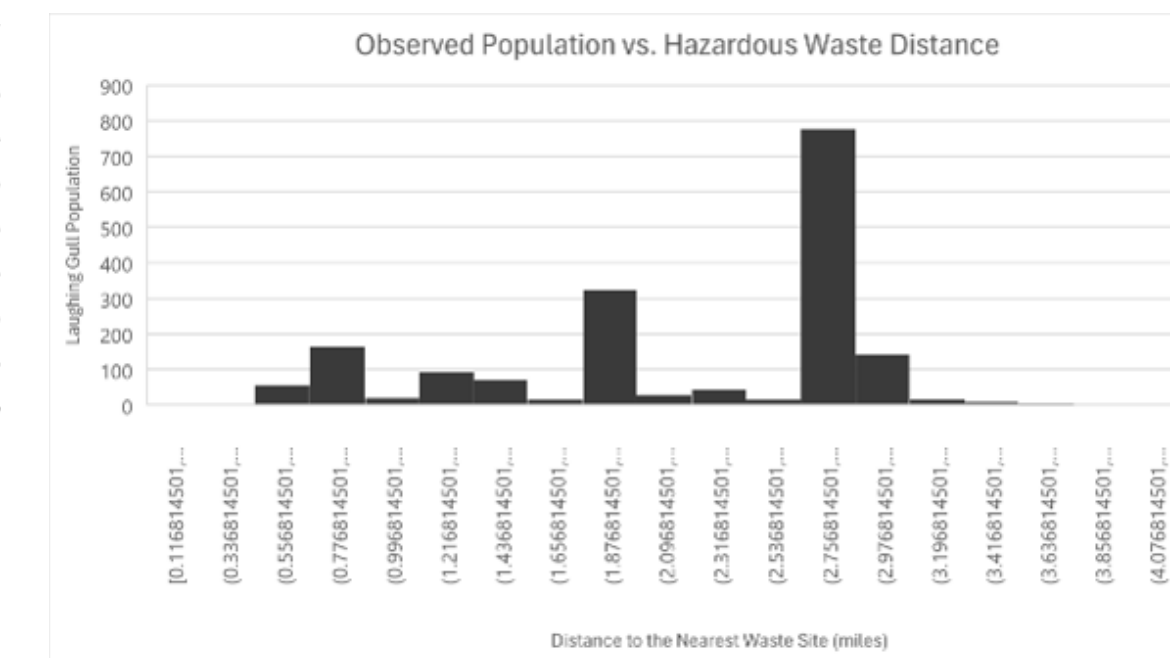
Temperature vs. Gull Population
Most preferred temperature: 73.3 - 77.1.



Precipitation vs. Observed Population
Birds almost only come out when it's dry.



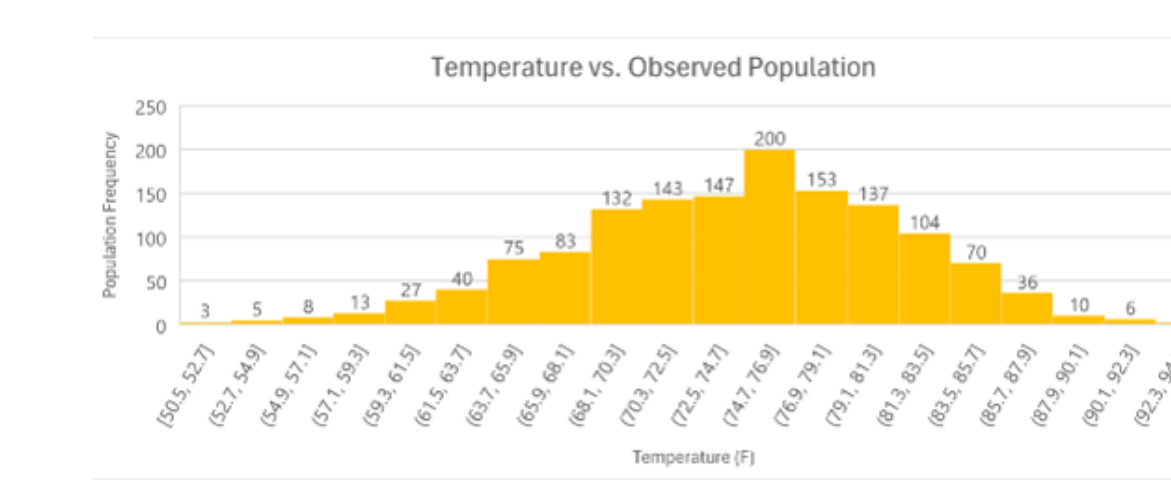
Observed Population vs. Tide Level
The population is rather evenly distributed.



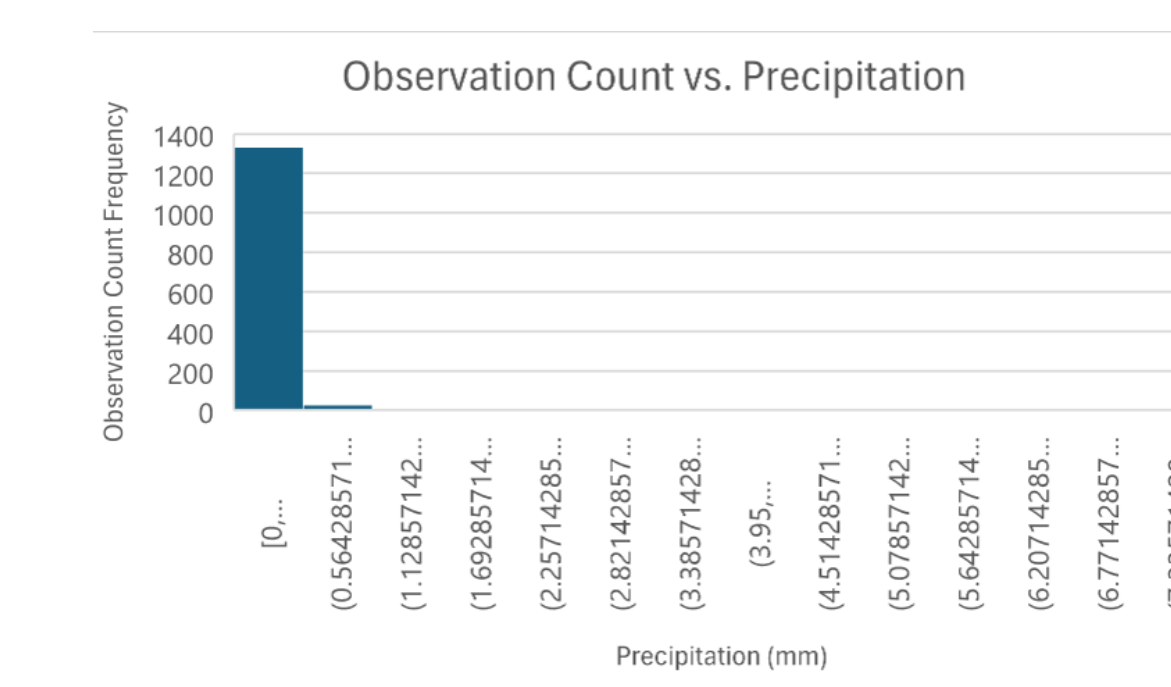
Observed Population vs. Waste Site Distance
There's no observed correlation.

There were more observed gulls at sites that allow fishing, at sites that don't allow playgrounds, and at sites that don't offer food/drink purchases. There was no correlation between barn swallows and chromate waste distance nor parking availability.

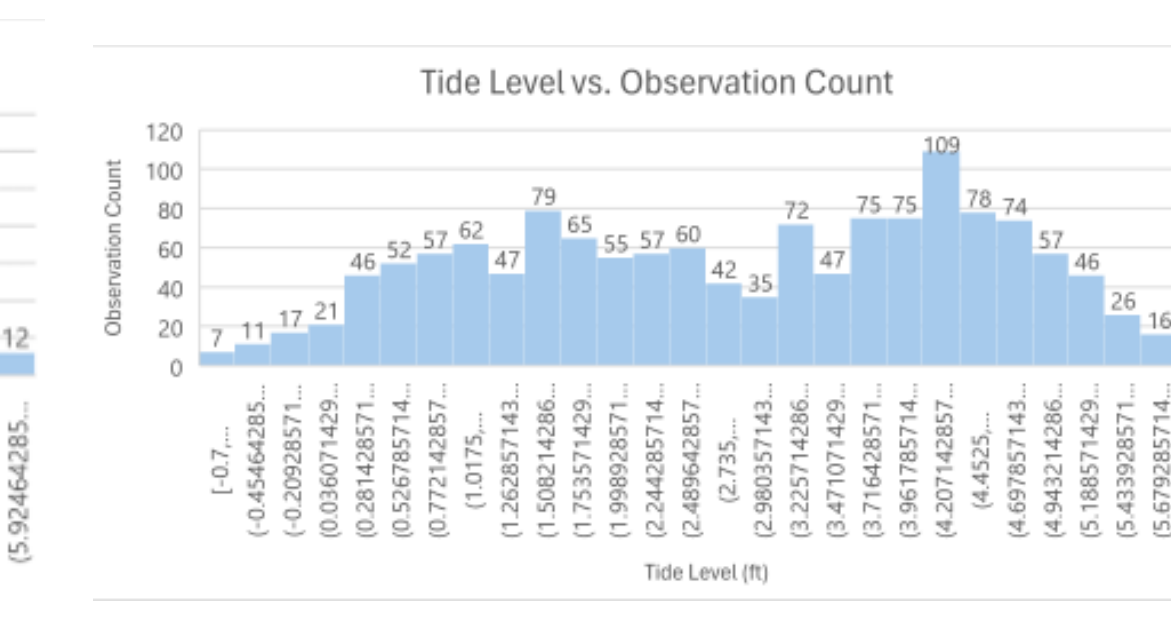
Laughing Gull



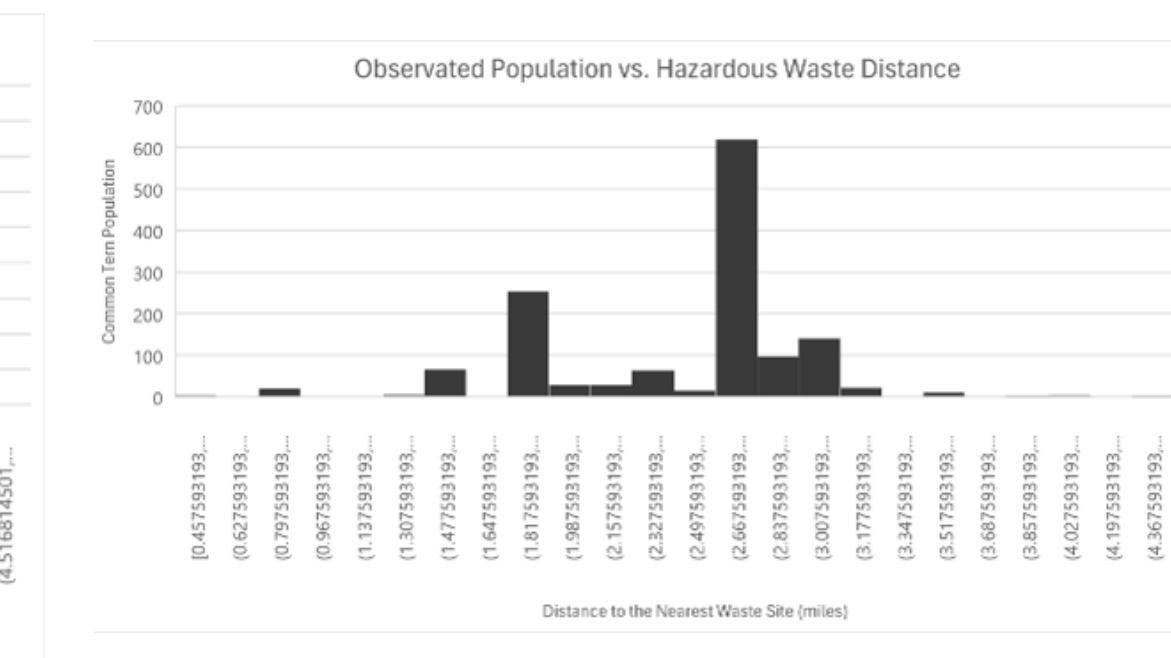
Temperature vs. Tern Population
Most preferred temperature: 74.7 - 76.9.



Precipitation vs. Observed Population
Birds almost only come out when it's dry.



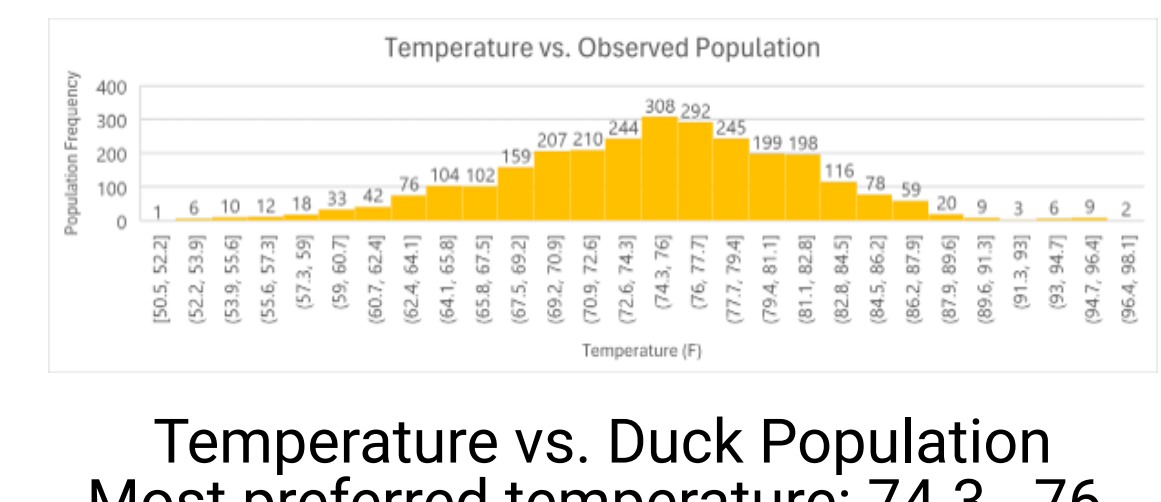
Observed Population vs. Tide Level
Terns prefer mid-low and mid-high tide.



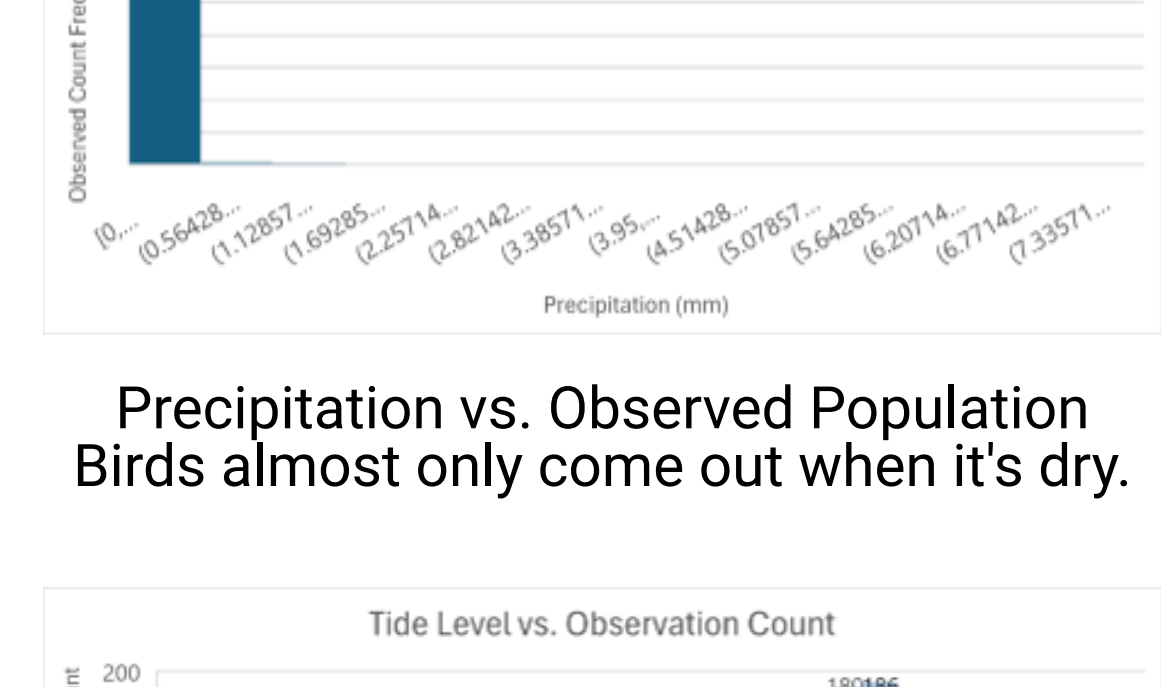
Observed Population vs. Waste Site Distance
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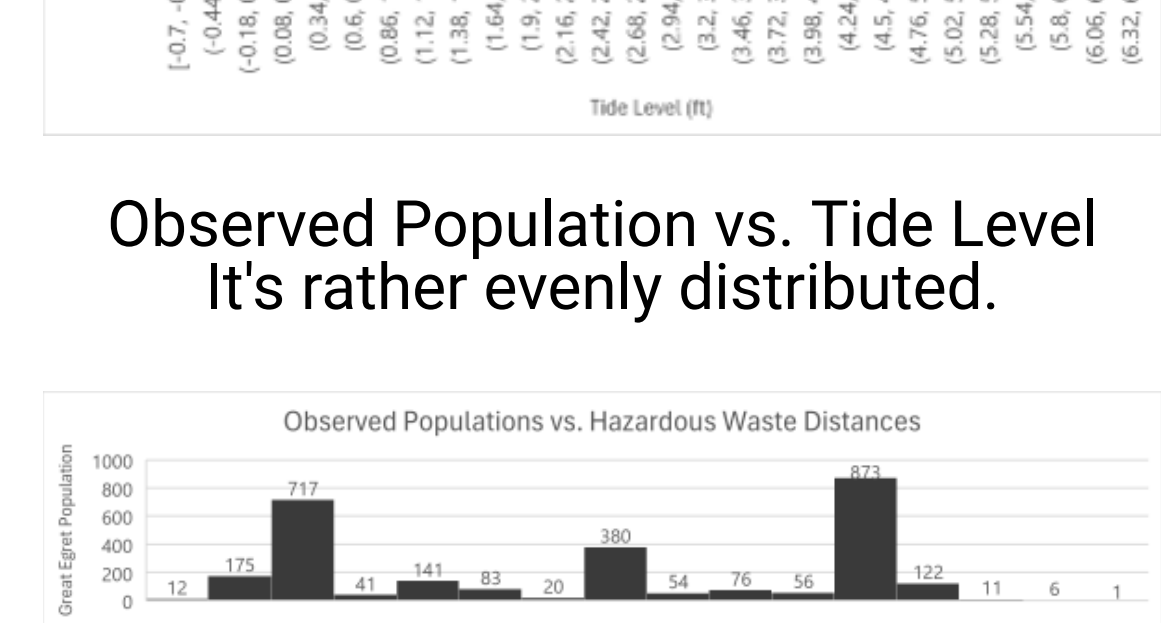
Common Tern



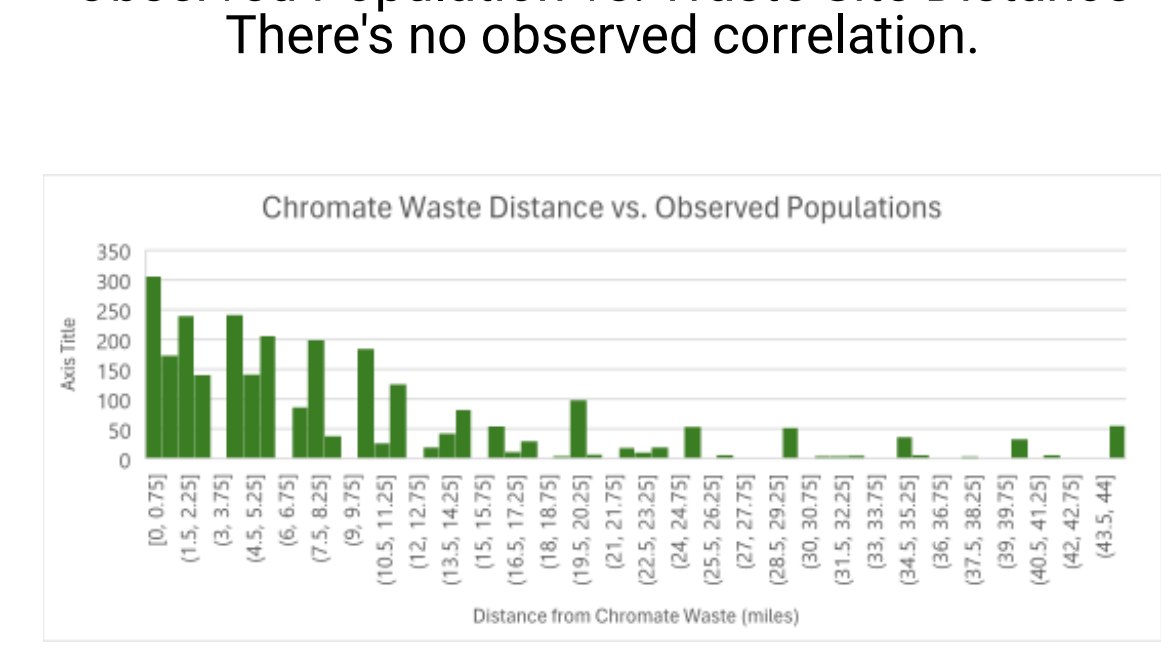
Temperature vs. Duck Population
Most preferred temperature: 74.3 - 76.



Precipitation vs. Observed Population
Birds almost only come out when it's dry.



Observed Population vs. Tide Level
It's rather evenly distributed.



Observed Population vs. Waste Site Distance
There's no observed correlation.

There were more observed terns at sites that allow fishing, at sites that don't allow playgrounds, and at sites that don't offer food/drink purchases. There was no correlation between barn swallows and chromate waste distance nor parking availability.

Mallard Duck

CONCLUSION

These 5 birds are some of the most plentiful seen in Hudson County, being populous nearly everywhere. The Common Tern is the exception, largely preferring the east side over the west side of the county. The temperatures support the understanding that birds prefer medium temperatures over extreme highs or lows, with all birds being the most present during the temperatures of 73 to 77. The results for precipitation levels were also to be expected, as birds do not often fly in the rain. The data for tide levels is new as it was believed that birds preferred medium tide; however, across all species, birds came out the most in mid-low tide and mid-high tide, with a slight drop around medium tide and large drops during extreme low and extreme high tide. In relation to park activities like fishing and buying food/drinks, the results were expected.

The effects of hazardous waste facilities and chromate waste was unexpected, as it was believed that these would have a much greater effect on bird sightings. However, the only correlation seen was with Mallard Ducks, with more Mallards noticed closer to chromium waste sites, rather than farther. This may be due to adaptability or better precautions taken around chromium waste, ironically leading to more ecological friendly zones where chromium contamination was known. Additionally, there was no correlation between bird populations and parking availability; birds were predicted to prefer areas away from parking lots, but this was shown to have no effect.

ACKNOWLEDGEMENTS

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REFERENCES

