

Impact of Seasonal Variation on the Duck Distribution in New York City

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Introduction

- When you see a flock of ducks, have you asked yourself, *where do they go and why?*
- Utilizing data and information from eBird, iNaturalist, and other resources, our project aims to explain how the changing seasons influence the diverse responses of different duck species in the urban environment of NYC.
 - eBird and iNaturalist** - both citizen science networks, and they record observations of individual living things (eBird focuses on birds).
- Ducks examined based on behavior:
 - Dabbling:** sit high on the water, and feed on aquatic vegetation and small invertebrates on or near the surface, tend to be found in ponds
 - Diving:** sit much lower in the water, and feed on fish and large crustaceans under the surface, tend to be found in more open water.

Results

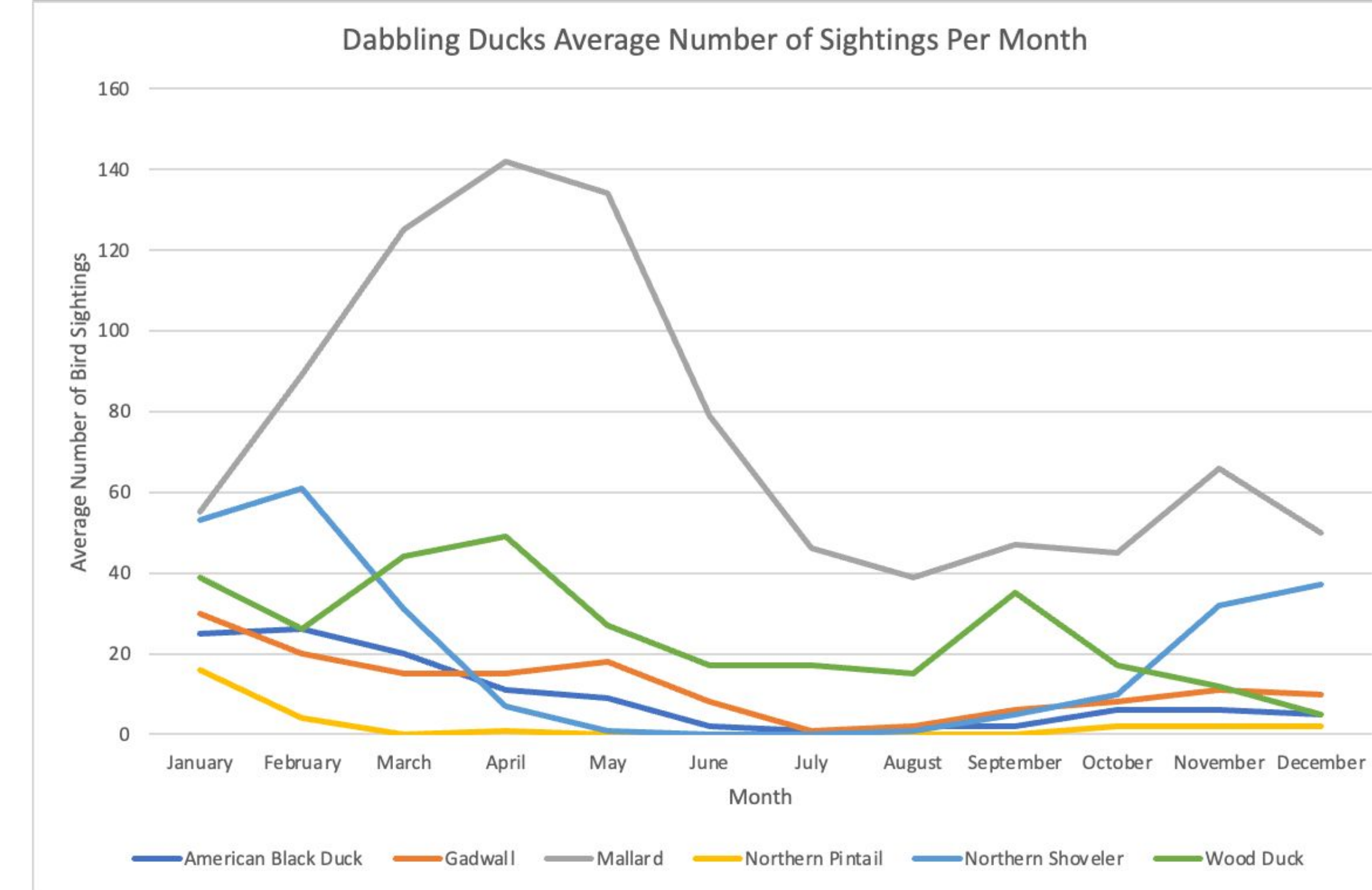


Figure 1. Monthly average sightings of dabbling ducks in New York City, 2022 (Source: iNaturalist datasets)

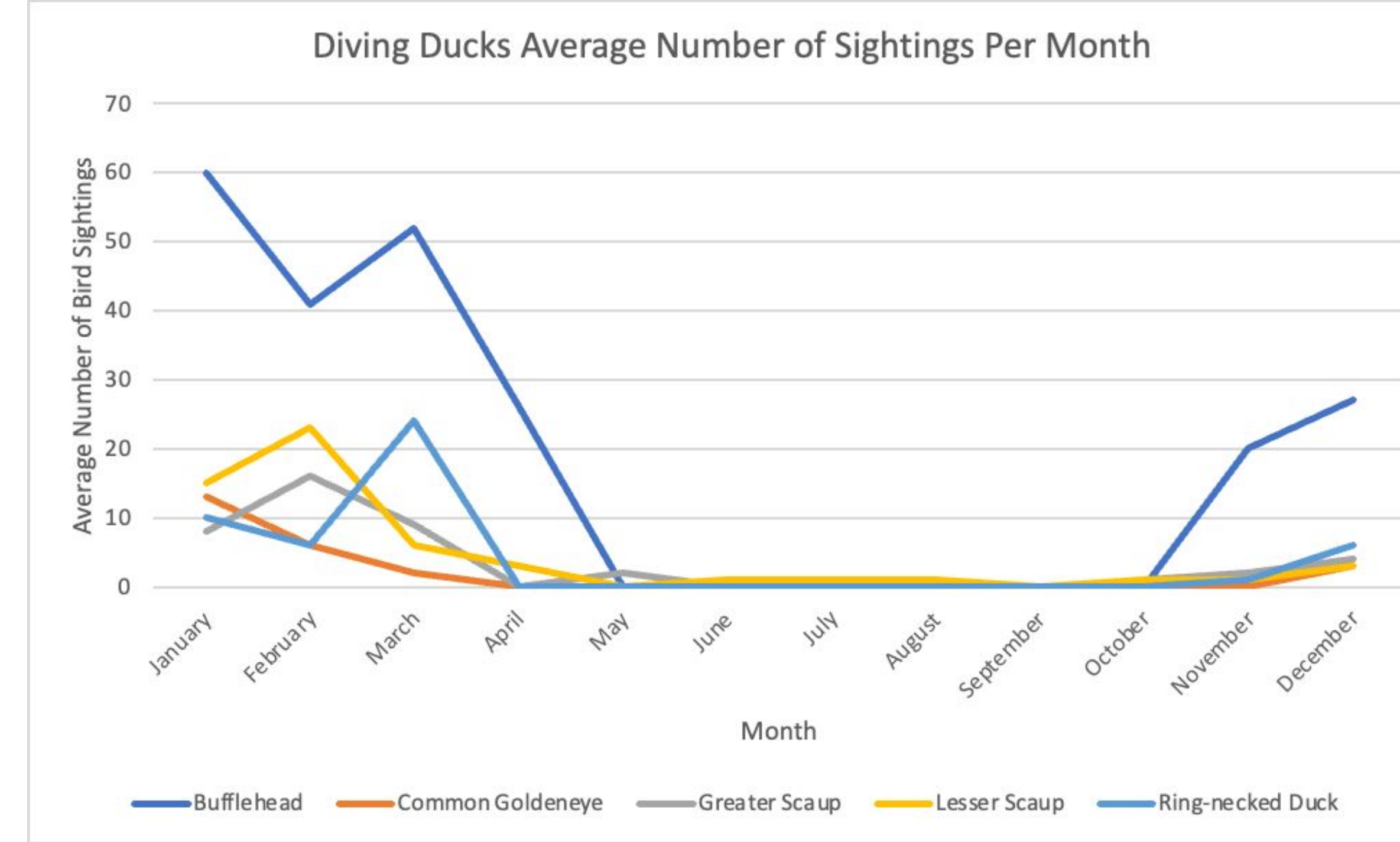
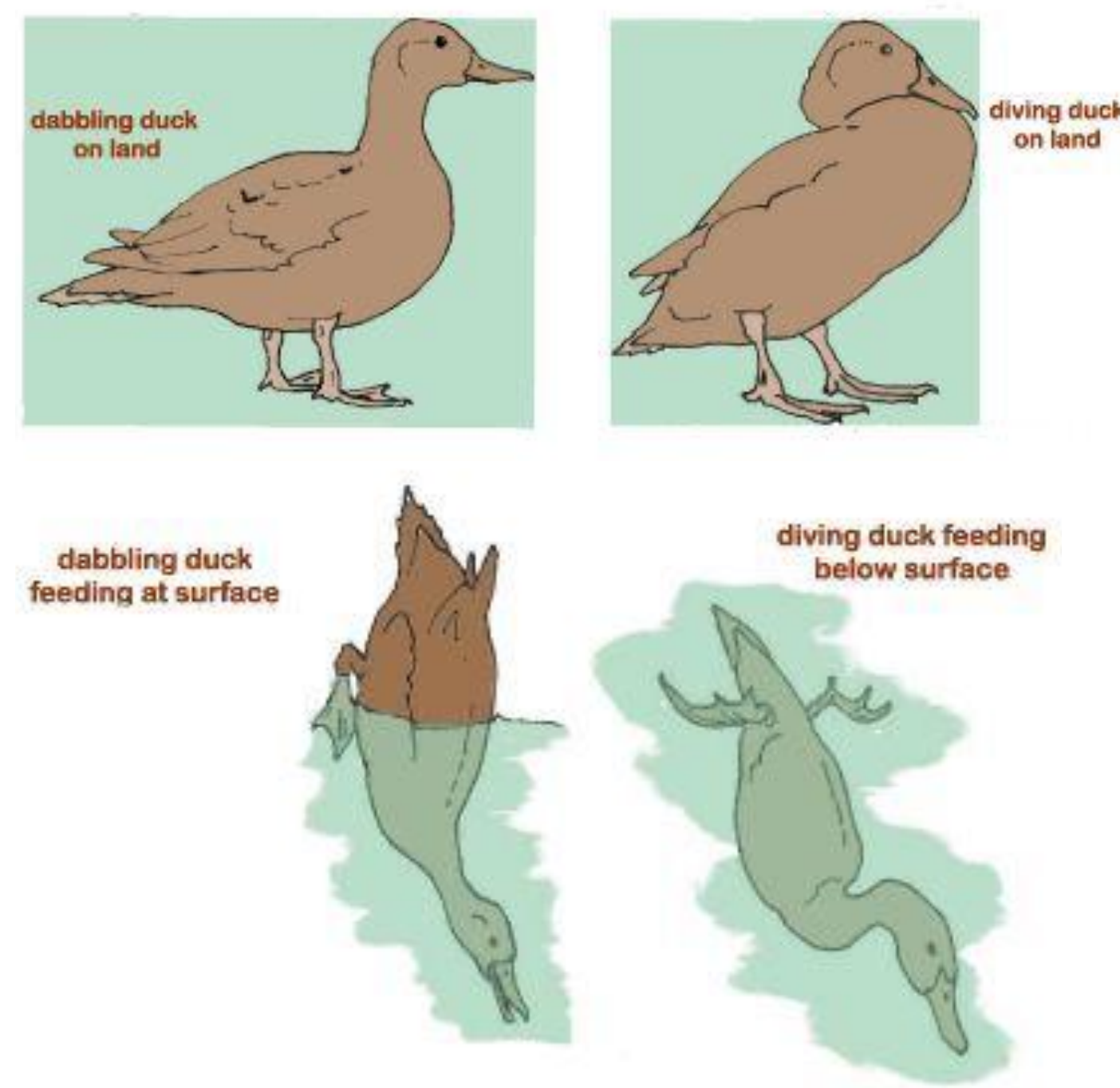


Figure 2. Monthly average sightings of diving ducks in New York City, 2022 (Source: iNaturalist datasets)

Conclusion

- Our results strongly support that **seasonal variation has a significant correlation with the distribution of duck species** in New York City.
- Dabbling Ducks** display a **gradual migration** pattern by departing once summer begins and returning early-winter while maintaining a presence year-round.
- Diving Ducks** exhibit a **rapid departure** once spring ends and promptly return towards the end of autumn; minimal sightings in the summer.
- Plausible factors for this seasonal absence:
 - Breeding Conditions:** Dabbling ducks migrate to shallow wetlands, that otherwise dry up in the city, to establish nests and raise their young. Similarly, diving ducks migrate to northern latitudes.
 - Water & Food Availability:** Dabbling ducks prefer shallow waters with ample vegetation for food, so if the water dries up, they would migrate to areas with better food options. Moreover, summer food may not be compatible or as abundant for them.
 - Climate Preferences:** Both ducks demonstrated a preference for colder weather.
 - Molting Period:** Both duck types shed their feathers during the summer, so they may travel to quieter places away from the urban environment.
- Our reliance on eBird and iNaturalist datasets has limitations due to observer variability and land coverage biases. Future projects should employ additional data sources for more accurate findings.

Dabbling Duck vs Diving Duck



Dabbling Ducks



Present during the winter and spring months before disappearing in the summer and returning in the fall.



Present in both the winter and spring, disappearing briefly in the summer months and returning in the fall.



Only a low presence during the winter months.



Presence year-round; the number does drop during the summer months, and most ducks are seen during the spring and fall.

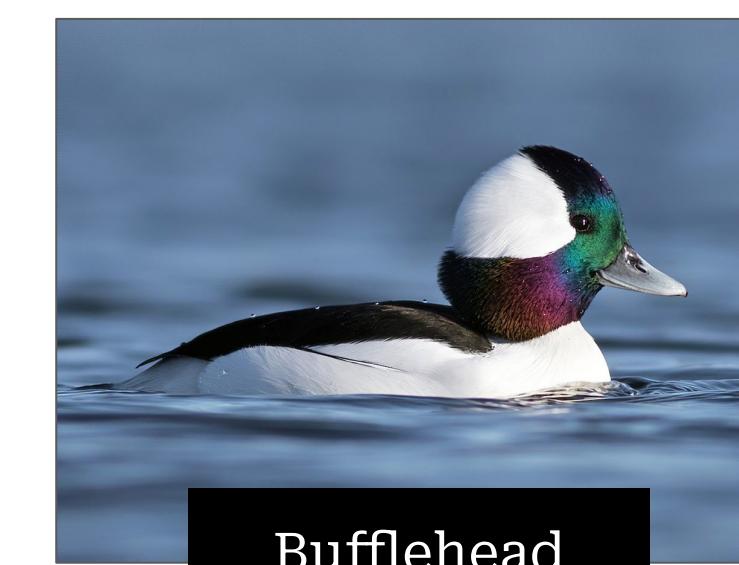


Strong presence year-round; the number does drop during the summer months, and most ducks are seen during the spring.

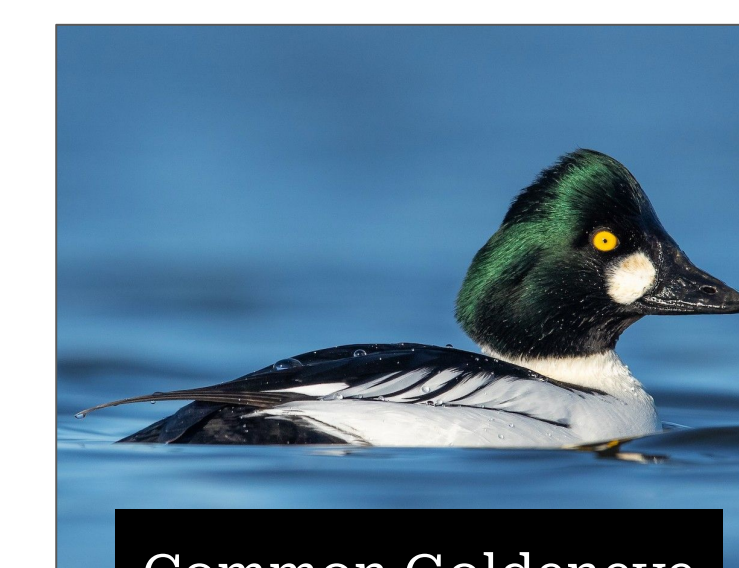


Strong presence in the winter months, before a steady decrease in the spring and disappearing completely in the summer; returns in the fall.

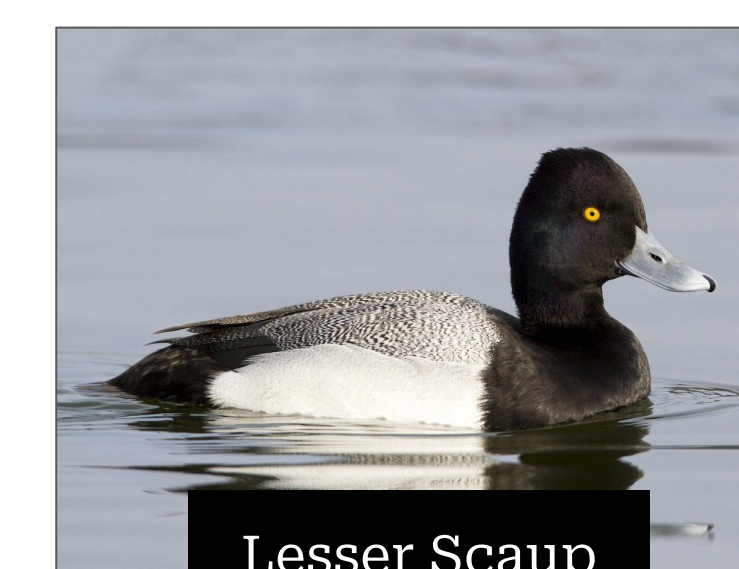
Diving Ducks



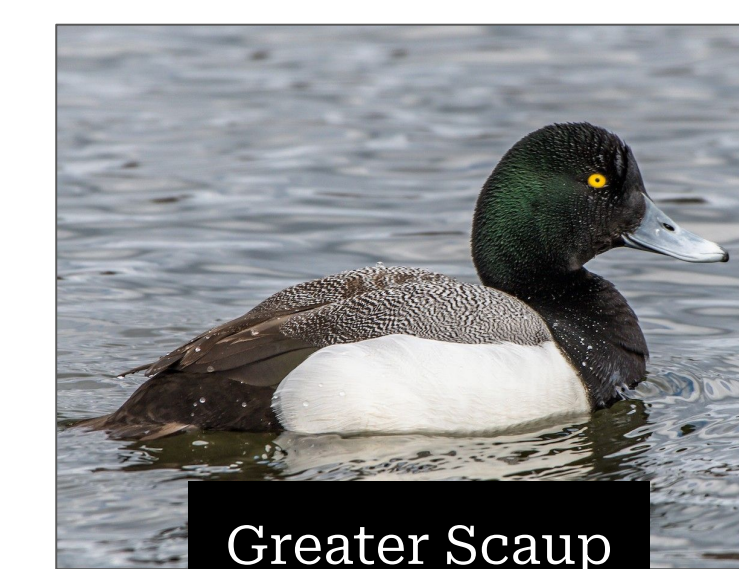
Large presence in the winter but drops off completely during the spring and summer, before its return in the fall.



Present in the winter but drops off completely during the spring and summer, before its return in the winter.



Present in the winter, but starts to drop off earlier than the other diving ducks, disappearing in the spring and returning in the winter.



Present in the winter but drops off completely during the spring and summer, before its return in the winter.



Sharp increase in the early spring before presence drops off completely and returns in the winter.

Materials and Methods

Data Collection: Population datasets of 11 different duck species across NYC in 2022 from eBird and iNaturalist. Also retrieved Visual Crossing's Annual Weather Data in New York City in 2022, including temperature and precipitation trends.

Data Analysis: Grouped species by behavior (dabbling versus diving) and graphed the population trends for each behavioral group.

Tools: Microsoft Excel and Google Sheets

Our Hypothesis

Seasonal variation significantly influence the distribution of duck species in New York City.

Why does this matter?

- Opens the avenue for other exploration of the factors influencing duck distribution such as urban noise, artificial lighting, or human activity.
- Collaborating with citizens, researchers, and conservationists present an opportunity to enhance understanding of urban duck ecology, growing initiatives to protect and conserve our duck neighbors.

Literature Cited
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