Using large participatory science datasets to study recent range expansions in the Lesser Black-Backed Gull (*Larus fuscus*)

Riley Simon '26

In recent decades, anthropogenic forces have begun reshaping the distribution of species across the planet. In response to warming climates, many species have shifted their geographic distributions toward higher latitudes or elevations.[1] Surprisingly, however, many other species are moving in the opposite directions.[2] Therefore, understanding the consequences of anthropogenic change requires analyses of individual species and populations.

The Lesser Black-Backed Gull (*Larus fuscus*) is a seabird currently undergoing a massive, unprecedented range expansion. Originally endemic to Europe, this species expanded its breeding range into Iceland and Greenland during the early 20th century.[3] Even more recently, sightings of these birds have skyrocketed across the eastern United States and Canada.[4] Once a prize for North American birders, these gulls have become commonplace in many parts of the continent.

In this project, we used participatory science data to understand the ecological dynamics of modern range shifts through the lens of the Lesser Black-Backed Gull. eBird is a participatory science platform that compiles billions of global bird sightings spanning decades with geolocation data, photographs, and audio recordings.[4] With these data, we investigated the following question: is the growing number of Lesser Black-Backed Gulls in North America a migratory population or an exploratory breeding population? If this species is establishing a migratory population, we predict increased sightings of adult, breeding-age birds in the winter. If the gulls are exploratory individuals pushing the edge of the breeding range, we predict increased sightings of young, non-breeding birds during the summer breeding season.

Our analysis confirmed that Lesser Black-Backed Gull abundance in North America has more than doubled in the last 25 years. We also identified a clear seasonal trend. Lesser Black-Backed Gulls in North America are much more abundant and widely distributed in the winter (November–February) than in the summer (May–August). Abundance is also increasing at a much faster rate in the winter than in the summer, indicating that they are establishing a migratory wintering population. Supporting previous statements that these gulls are drawn from Greenland.[5] we can infer that they are migrating from Greenland in the winter to spend the non-breeding season in North America.

After this summer, we will continue our analysis by incorporating more complex modeling techniques, such as random forest models. These models will allow us to investigate other characteristics of this Lesser Black-Backed Gull range expansion, including spatial, temporal, environmental, and age trends, giving us a full picture of the ecological dynamics at play in this unique range expansion.

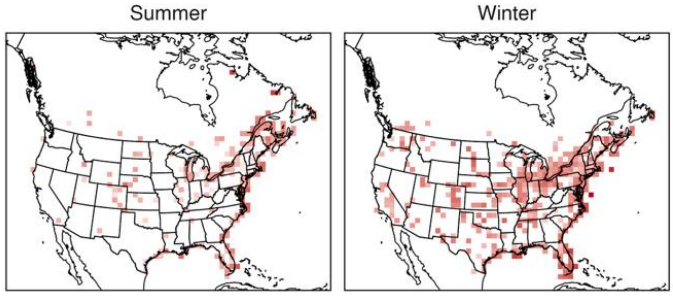

Figure 1. Relative abundance of Lesser Black-Backed Gulls in the winter and the summer.

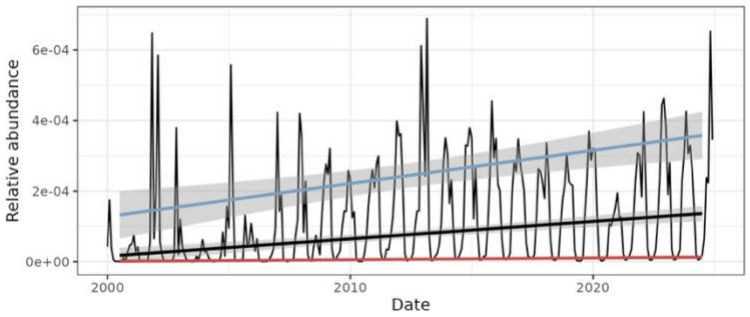

Figure 2. Relative abundance of Lesser Black-Backed Gulls over time. Blue line shows winter trend abundance, red shows summer trend, black shows overall trend.

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Funded by the Gibbons Summer Research Program

References

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