

# Functional reorganization of North American wintering avifauna

Juan Pablo Quimbayo<sup>1</sup>, Stephen Murphy<sup>1</sup>, and Marta Jarzyna<sup>1</sup>

<sup>1</sup>The Ohio State University

October 6, 2023

## Abstract

Wintering birds serve as vital climate sentinels, yet they are often underrepresented in comprehensive surveys and overlooked in studies of avian diversity change. Here, we provide a continental-scale characterization of change in multiple facets of wintering avifauna and examine the effects of climate change on these dynamics. We reveal a strong functional reorganization of wintering bird communities marked by a distinct east-west gradient in functional diversity change, along with a superimposed north-south gradient in trait composition change. Assemblages in the eastern US saw an expansion of the functional space and increases in functional originality, evenness, and divergence, while the western US saw contractions of the functional space. Shifts in functional diversity were underlined by significant reshuffling in trait composition, particularly pronounced in the northern US. Finally, we find strong contributions of climate change to this functional reorganization, underscoring the importance of wintering birds in tracking climate change impacts on biodiversity.

## Functional reorganization of North American wintering avifauna

**Authors:** Juan Pablo Quimbayo<sup>1\*</sup>, Stephen Murphy<sup>1</sup>, Marta Anna Jarzyna<sup>1,2</sup>

### Affiliations:

<sup>1</sup>Department of Evolution, Ecology and Organismal Biology, The Ohio State University

<sup>2</sup>Translational Data Analytics Institute, The Ohio State University

**Email addresses:** Juan Pablo Quimbayo: quimbayoagreda.1@osu.edu

Stephen Murphy: murphy.1132@osu.edu Marta Anna Jarzyna: jarzyna.1@osu.edu

**Short title:** *Functional diversity trends of wintering birds*

**Keywords:** Birds, Christmas Bird Count, climate change, functional divergence, functional diversity, functional evenness, functional originality, functional richness, temporal trends

**Type of article:** Letter

**Word Count:** 4997 (main text), 150 (abstract)

**Number of references:** 98

**Number of figures:** 4

**\*Corresponding author:**

Juan Pablo Quimbayo

Email: quimbayoagreda.1@osu.edu

Mailing address: 318 W. 12th Ave.

300 Aronoff Laboratory 456 room Columbus, OH 43210

Tel. number: +1 (443) 44077-13

## AUTHOR CONTRIBUTIONS

JPQ and MJ conceived the idea. JPQ, and SJM, conducted analyses. JPQ and MJ wrote the paper.

## DATA AVAILABILITY STATEMENT

All data files needed to replicate these analyses, including abundance estimates, and trait and environmental data are archived at Zenodo (<https://doi.org/10.5281/zenodo.8404486>). The R code is available through GitHub ([https://github.com/quimbayo-jp/WinteringBirds\\_FD\\_Reorganization](https://github.com/quimbayo-jp/WinteringBirds_FD_Reorganization)).

## Hosted file

2\_Quimbayo et al - Abstract\_Page.docx available at <https://authorea.com/users/219687/articles/671247-functional-reorganization-of-north-american-wintering-avifauna>

## Hosted file

3\_Quimbayo et al - Main\_text.docx available at <https://authorea.com/users/219687/articles/671247-functional-reorganization-of-north-american-wintering-avifauna>



