

Longwood University

Digital Commons @ Longwood University

Fall Showcase for Research and Creative Inquiry

Office of Student Research

Fall 11-18-2020

Population Dynamics of Waterfowl Wintering in the Mid-Atlantic Region, USA

Abigail Harris
Longwood University

Thomas Hoke
Longwood University

Follow this and additional works at: https://digitalcommons.longwood.edu/rci_fall



Part of the [Biology Commons](#), and the [Environmental Sciences Commons](#)

Recommended Citation

Harris, Abigail and Hoke, Thomas, "Population Dynamics of Waterfowl Wintering in the Mid-Atlantic Region, USA" (2020). *Fall Showcase for Research and Creative Inquiry*. 42.
https://digitalcommons.longwood.edu/rci_fall/42

This Poster is brought to you for free and open access by the Office of Student Research at Digital Commons @ Longwood University. It has been accepted for inclusion in Fall Showcase for Research and Creative Inquiry by an authorized administrator of Digital Commons @ Longwood University. For more information, please contact hamiltonma@longwood.edu, alwinehd@longwood.edu.



Population Dynamics of Waterfowl Wintering in the Mid-Atlantic Region, USA

Abigail Harris, Thomas Hoke, & Sujan Henkanaththegedara, Ph.D.
Department of Biological & Environmental Sciences, Longwood University, Farmville, Virginia.

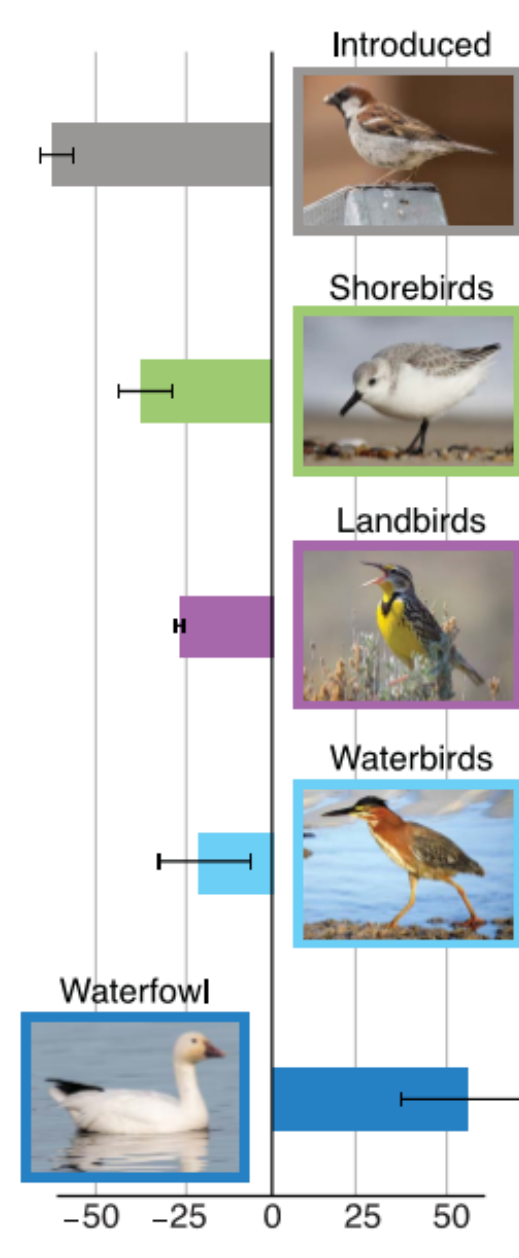


Abstract

A recent study (Rosenberg et al. 2019) has shown that bird populations in North America are experiencing major declines except for a few groups including waterfowl. However, this study focused only on the summer breeding populations and did not focus on regional dynamics. We utilized data from 62 Christmas Bird Count (CBC) count circles to evaluate population dynamics of common wintering waterfowl in the coastal Mid-Atlantic region (Delaware=7, Maryland=16, Virginia=18, North Carolina=21) since 1950. We found a 36% decline of wintering waterfowl relative abundance compared to 1950s. American wigeon and Canada goose had major population decreases while Snow goose had a major population increase. Species wintering in marsh habitats decreased while cavity nesters had an increase. Additionally, omnivore and granivore species had significant declines with no apparent effects on other feeding guilds. Our work suggests significant population declines of many wintering waterfowl species in the Mid-Atlantic region (N = 11; 38% of species studied) despite the continental-scale recovery of waterfowl.

Introduction

- There are **41 species of waterfowl** in North America and they act as wetland indicators, provide ecological services, and are important game species (Austin et al, 2001).
- A severe decline in continental North American breeding populations (Rosenberg et al, 2019).
 - Lost 3 billion birds** in the last 50 years; 29% of 1970 abundance.
 - Nevertheless, **56% increase in waterfowl** populations.
- However, regional dynamics for wintering waterfowl populations may vary.
 - Mallards in Atlantic flyway have declined from 1993 to 2013 (Sauer et al, 2014).
 - Also, wintering Northern pintails in Pacific flyway have declined from 1978 to 2013 (Pandolfino & Handel, 2018).



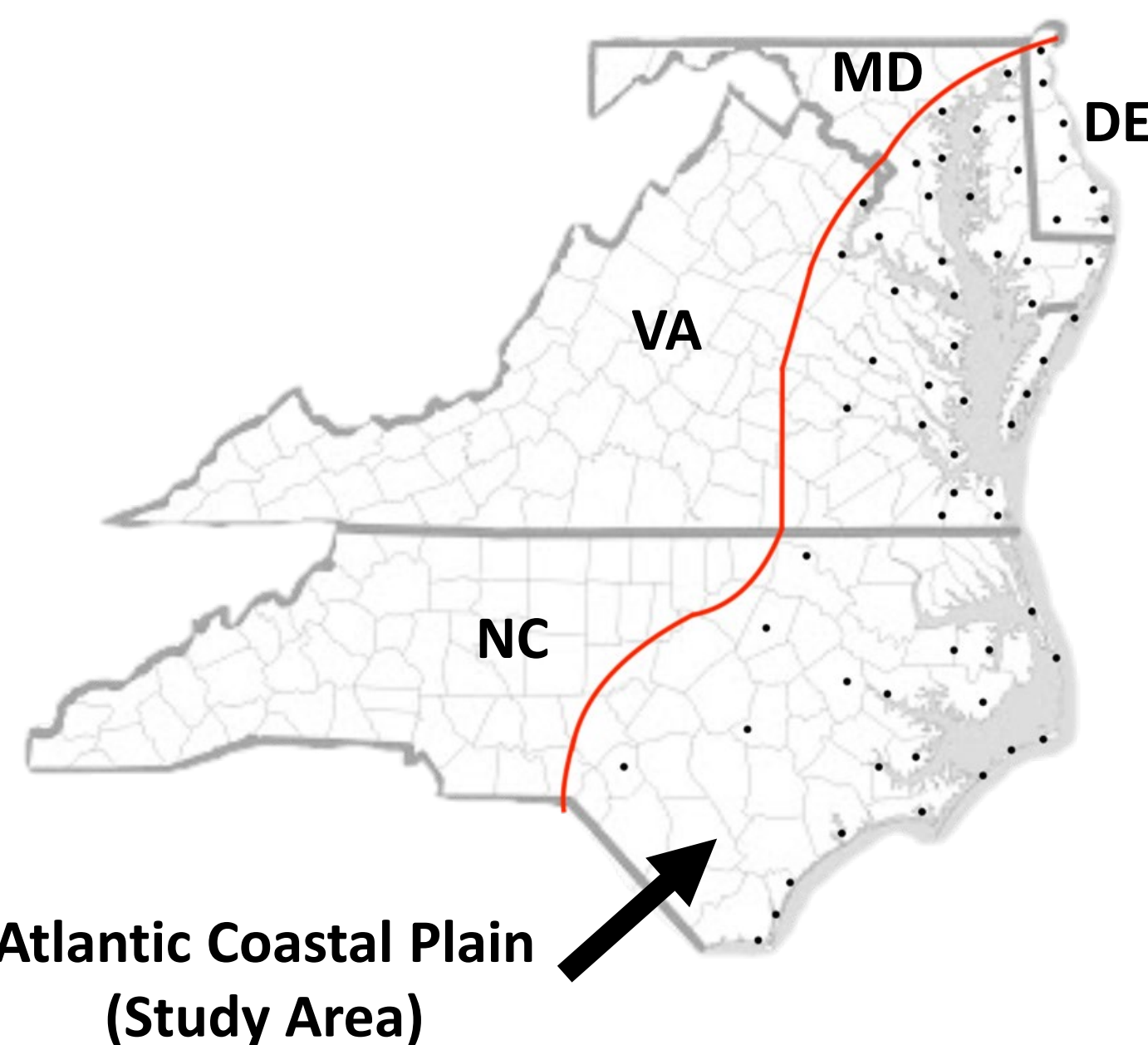
(Rosenberg et al, 2019)

Objectives

- We specifically aim to:
 - Assess the **population abundance and trends** of common wintering waterfowl in the Mid-Atlantic region since 1950.
 - Assess the **changes of community composition** of common wintering waterfowl in the region compared to historical records.
 - Identify species at risk** and inform conservation practitioners and managers.

Methods

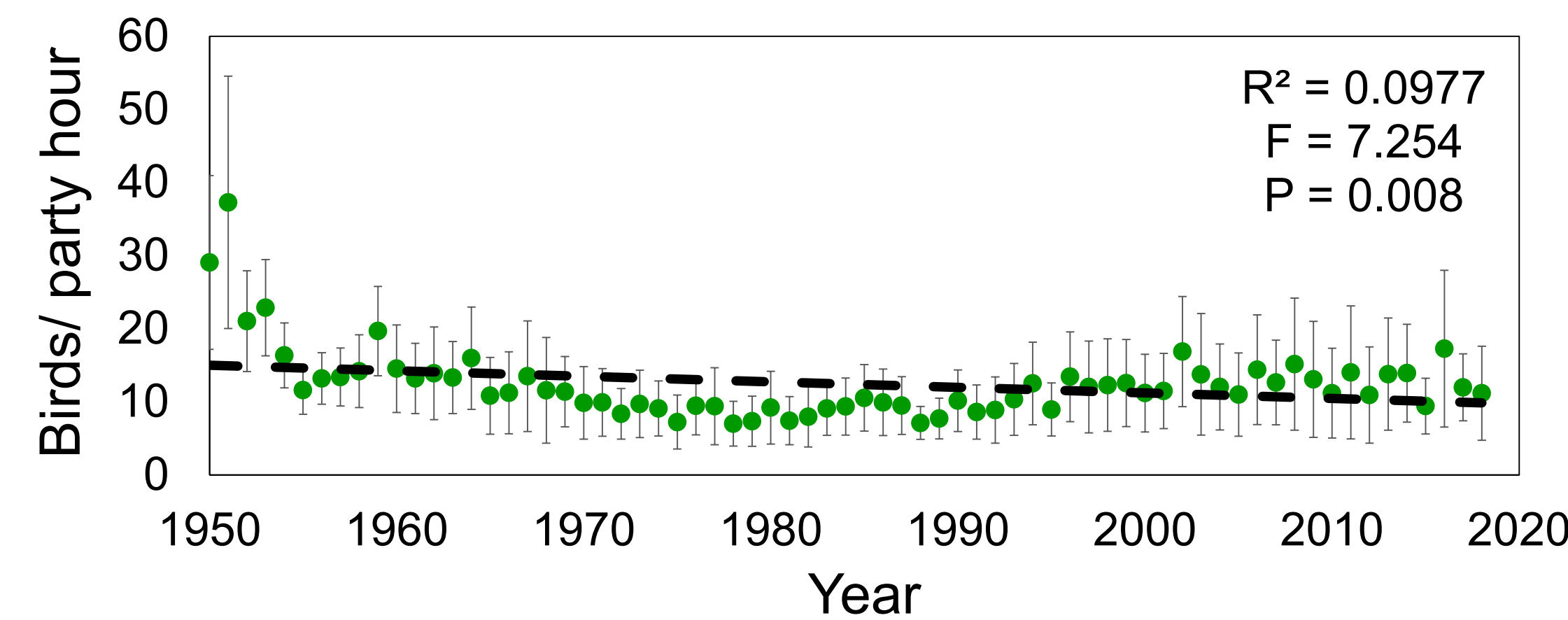
Map Legend
— = Fall Line ● = CBC Count Circle



- 62 Christmas Bird Count (CBC) circles** along the Atlantic Flyway (Delaware, Maryland, Virginia, and North Carolina) were sampled for 29 common waterfowl species.
 - 24 ducks
 - 3 geese
 - 2 swans
- Data was gathered from 1950 to 2018.
- Birds per party hour** is used to standardize data from CBC (Butcher et al, 1990).
- Population trends were analyzed using **Simple Linear Models** for individual states as well as for the overall region.
- Ecological guild** (diet, major habitat, nesting habitat, behavior) dynamics were also assessed.

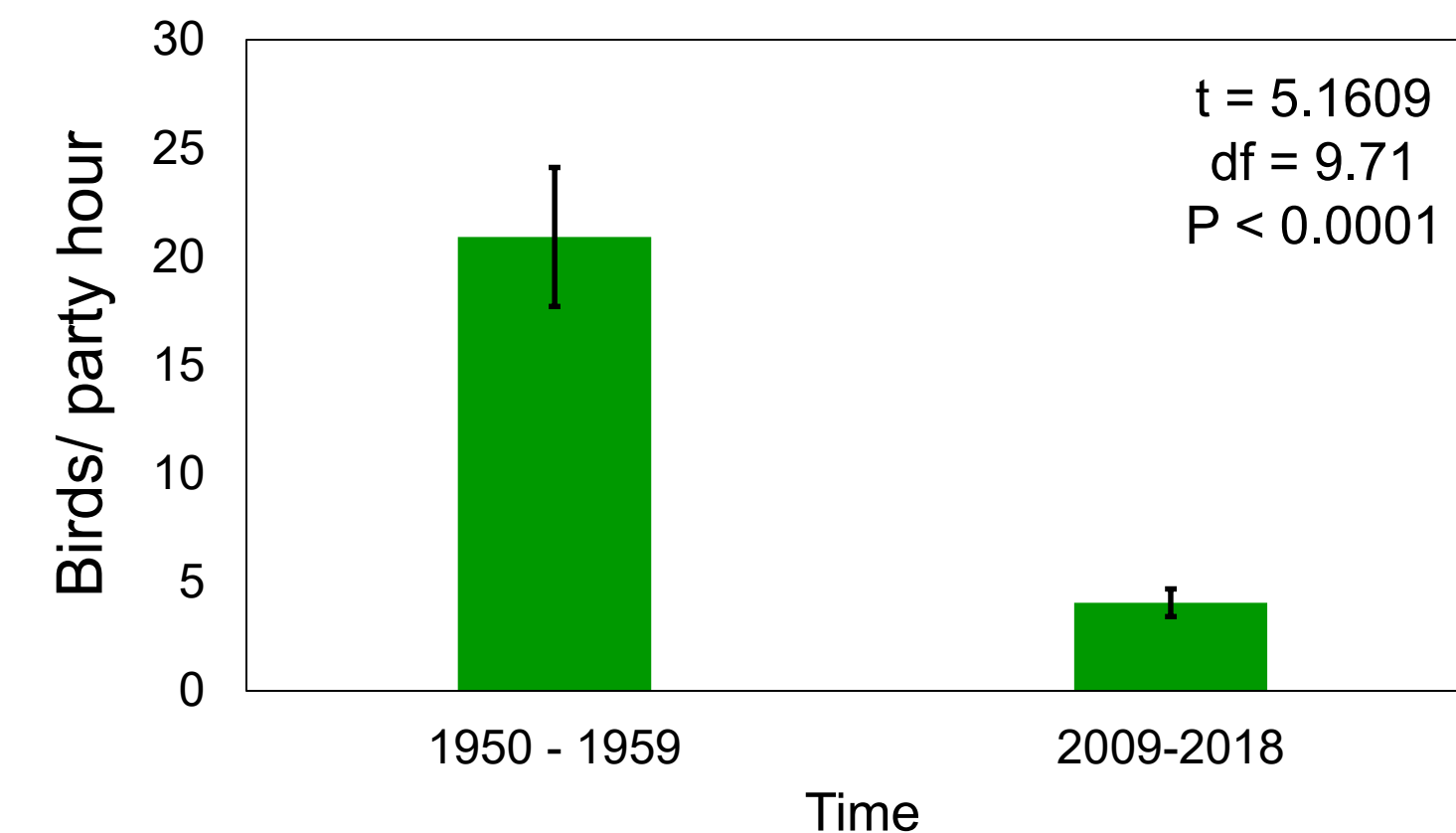
Results

All species (N = 29)

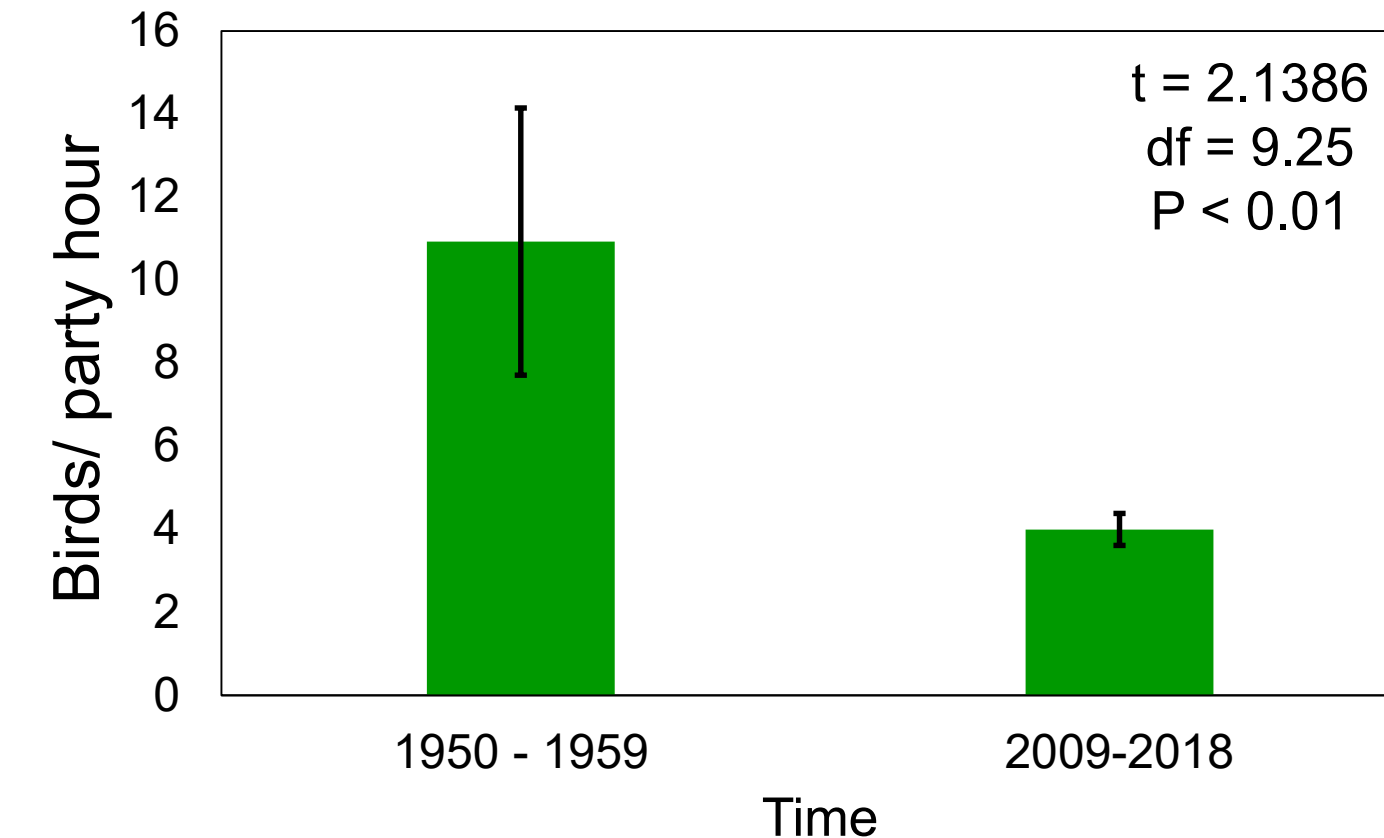


A **36% decline** ($t = 2.6914$, $p = 0.02206$) of the relative abundance of the waterfowl community in study area was reported compared to 1950s.

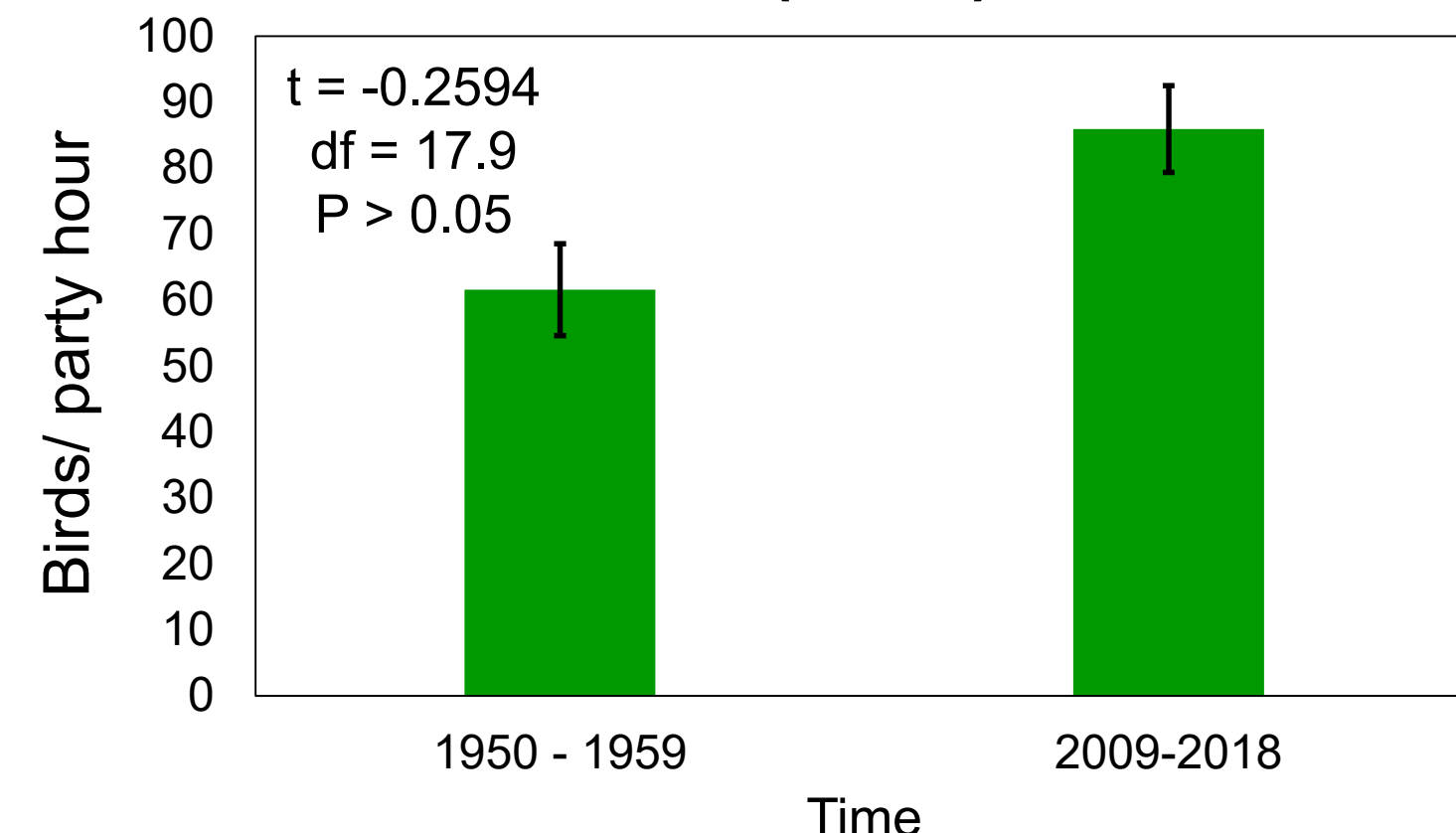
Dabblers (N = 9)



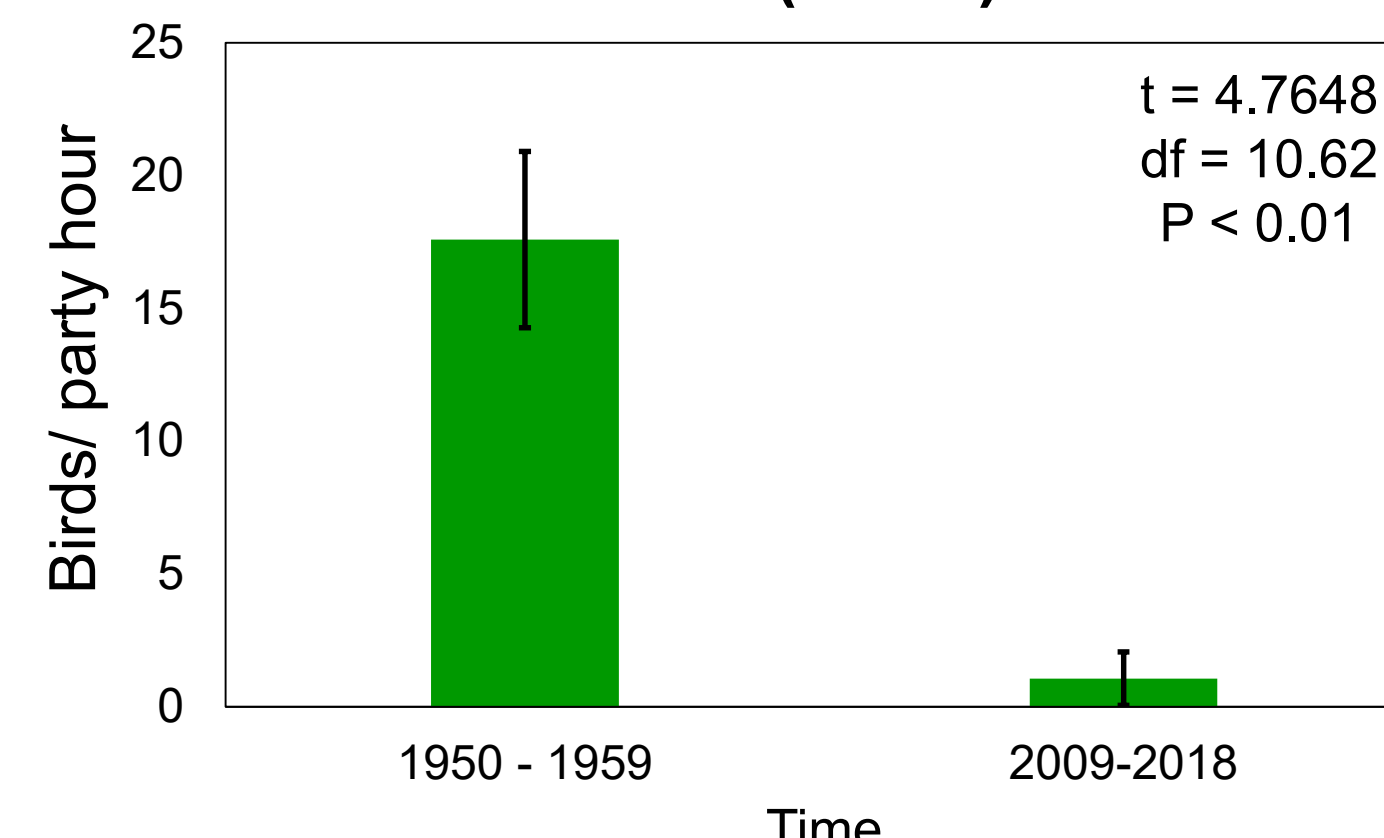
Divers (N = 15)



Geese (N = 3)

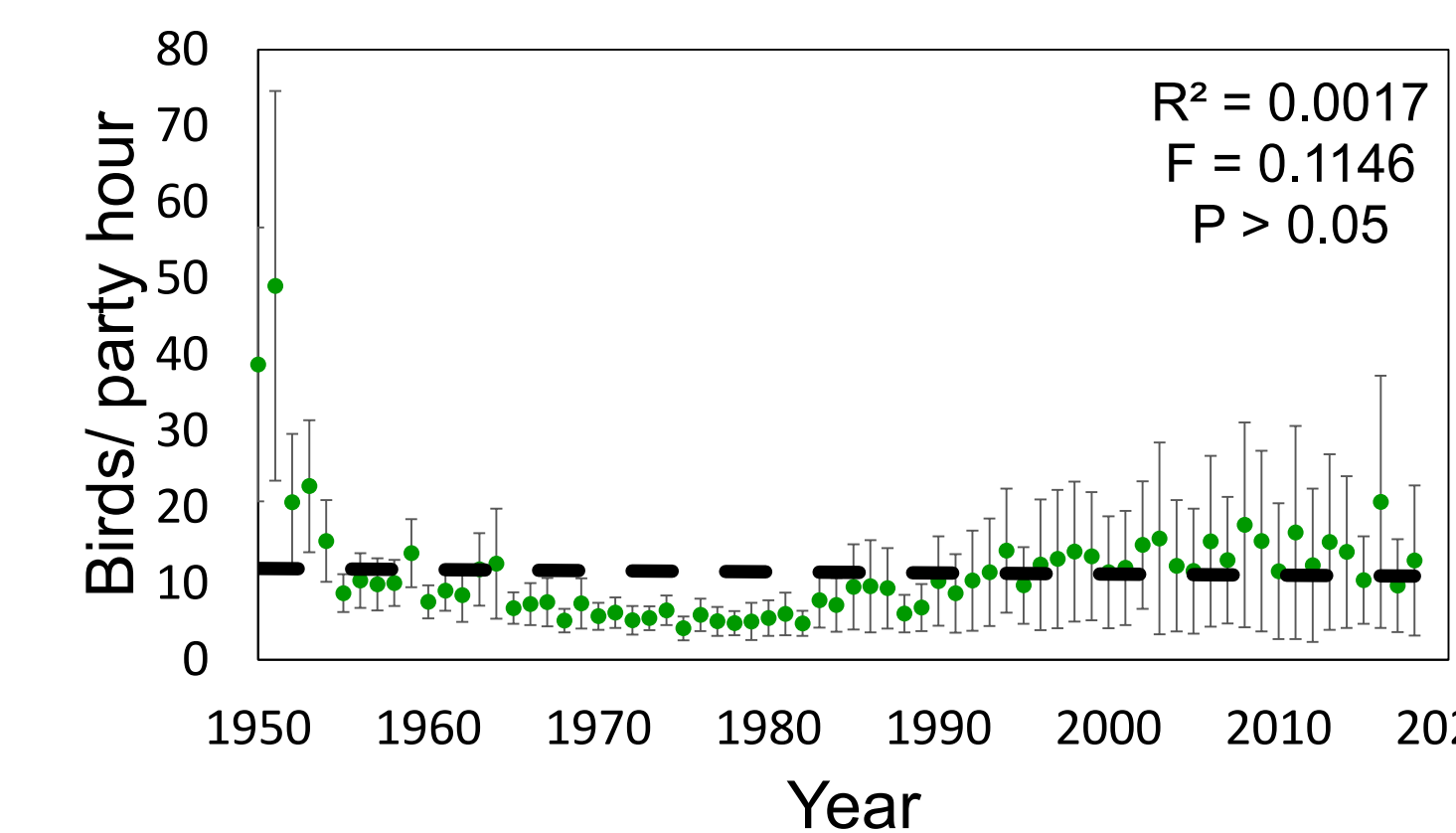


Swans (N = 2)

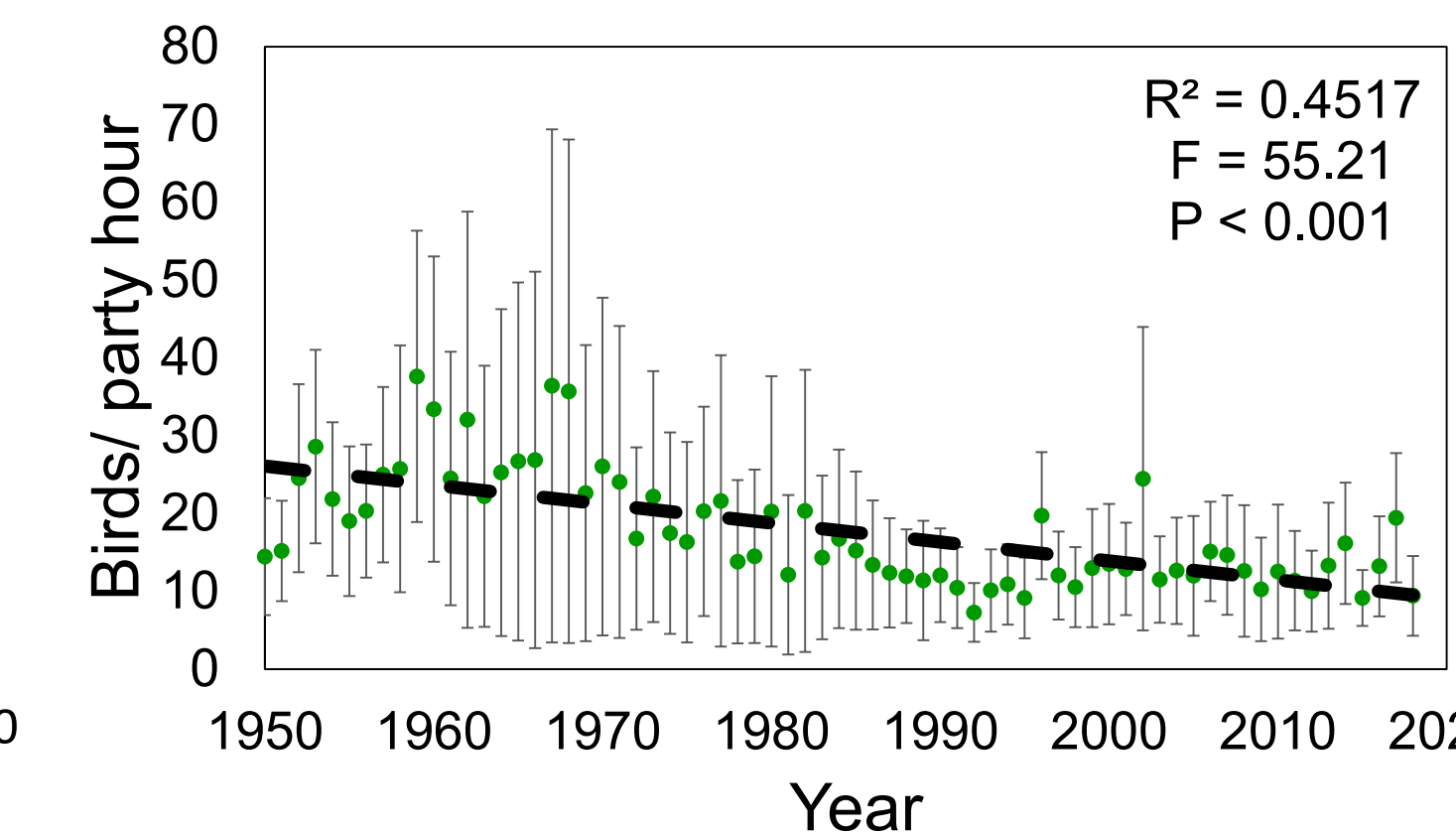


Dynamics across habitats

Lakes and Ponds (N = 19)

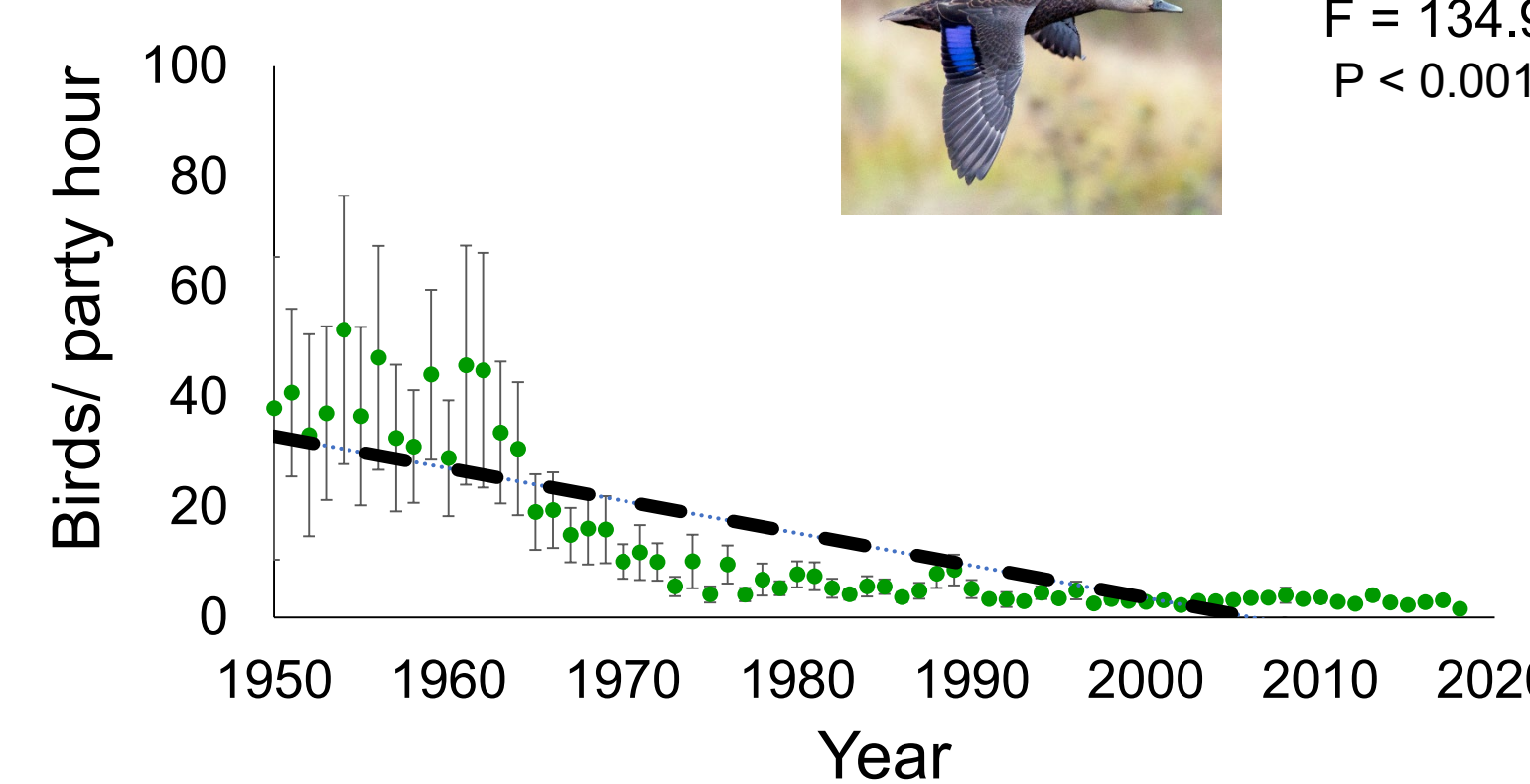


Marshes (N = 8)

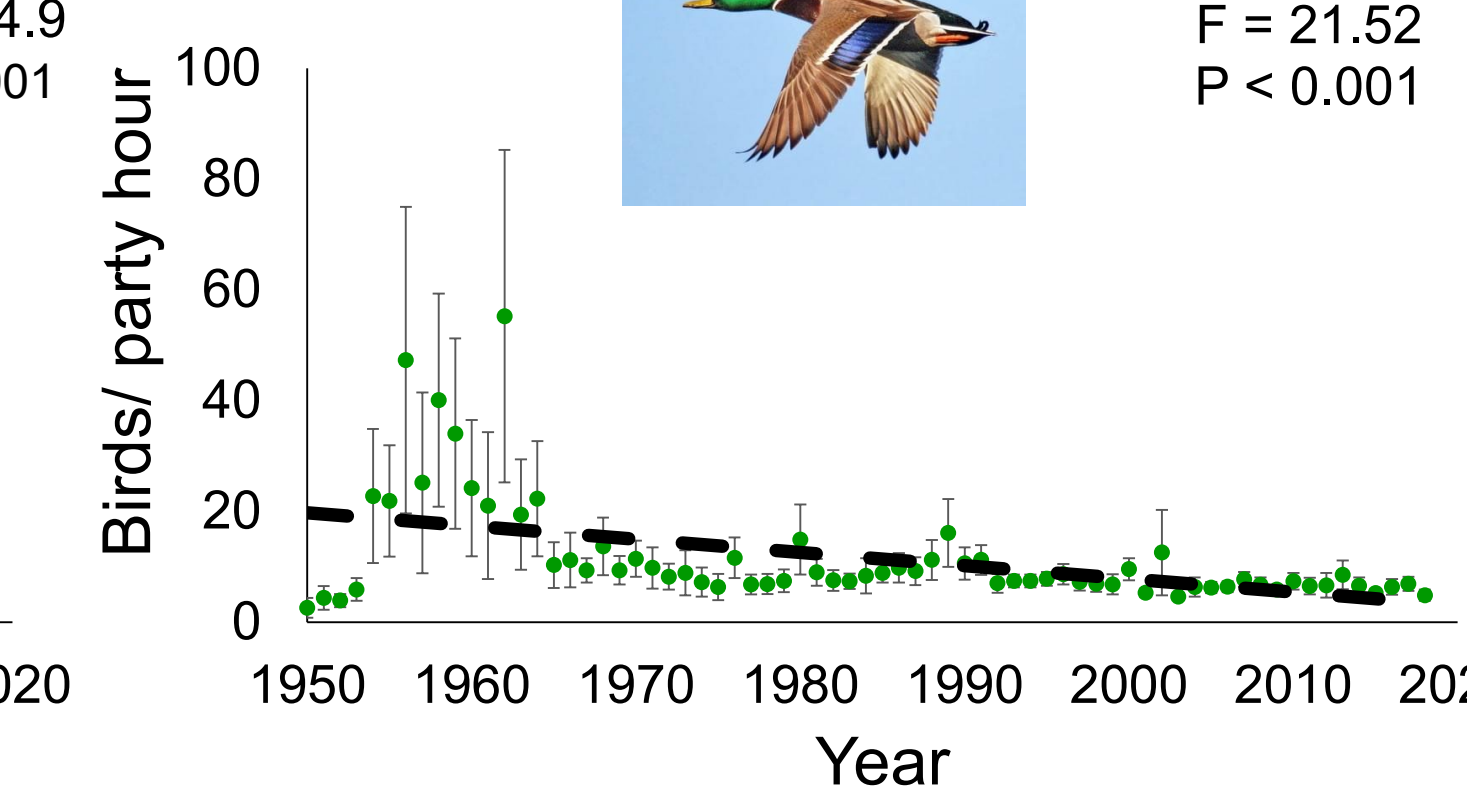


Dynamics of selected species

American Black Duck

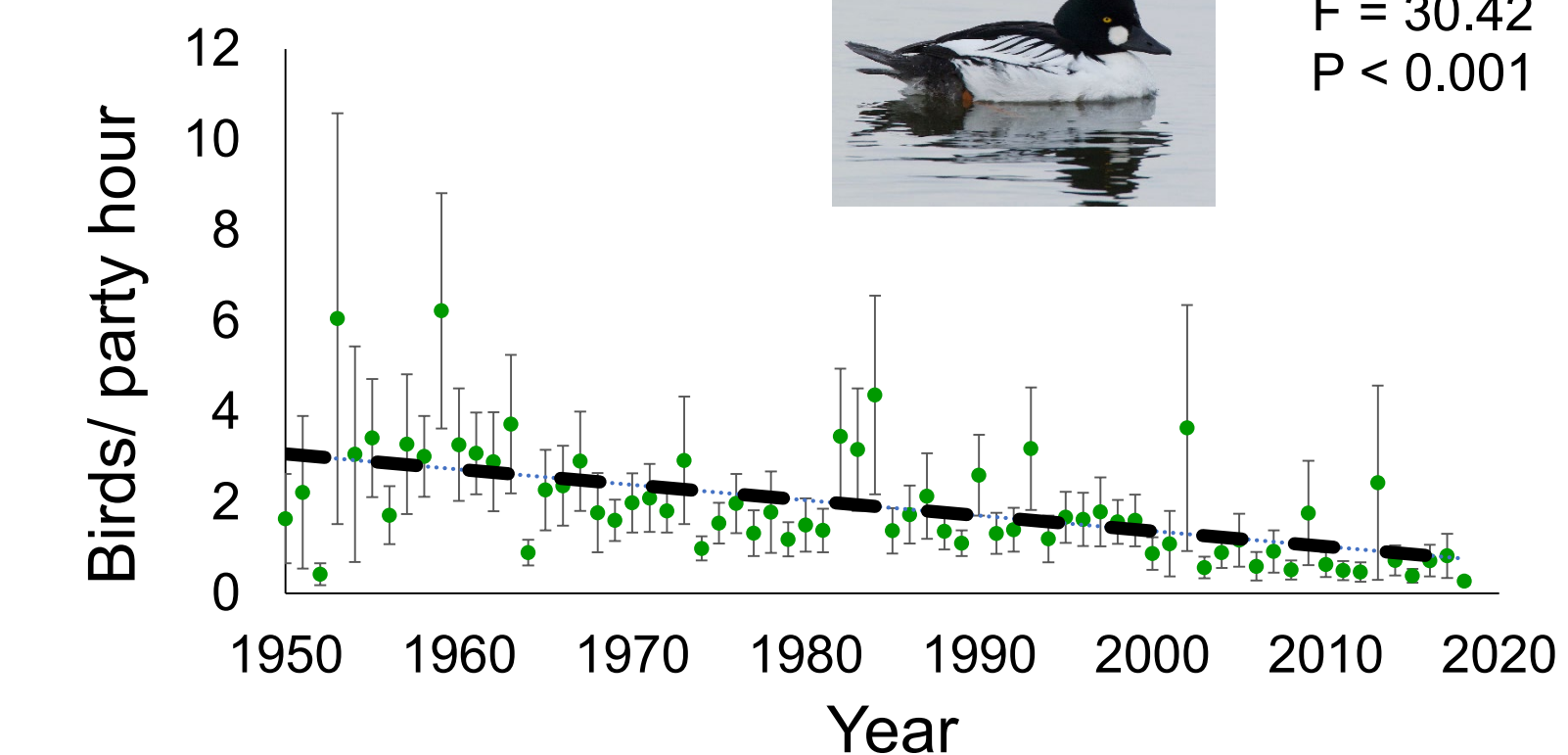


Mallard

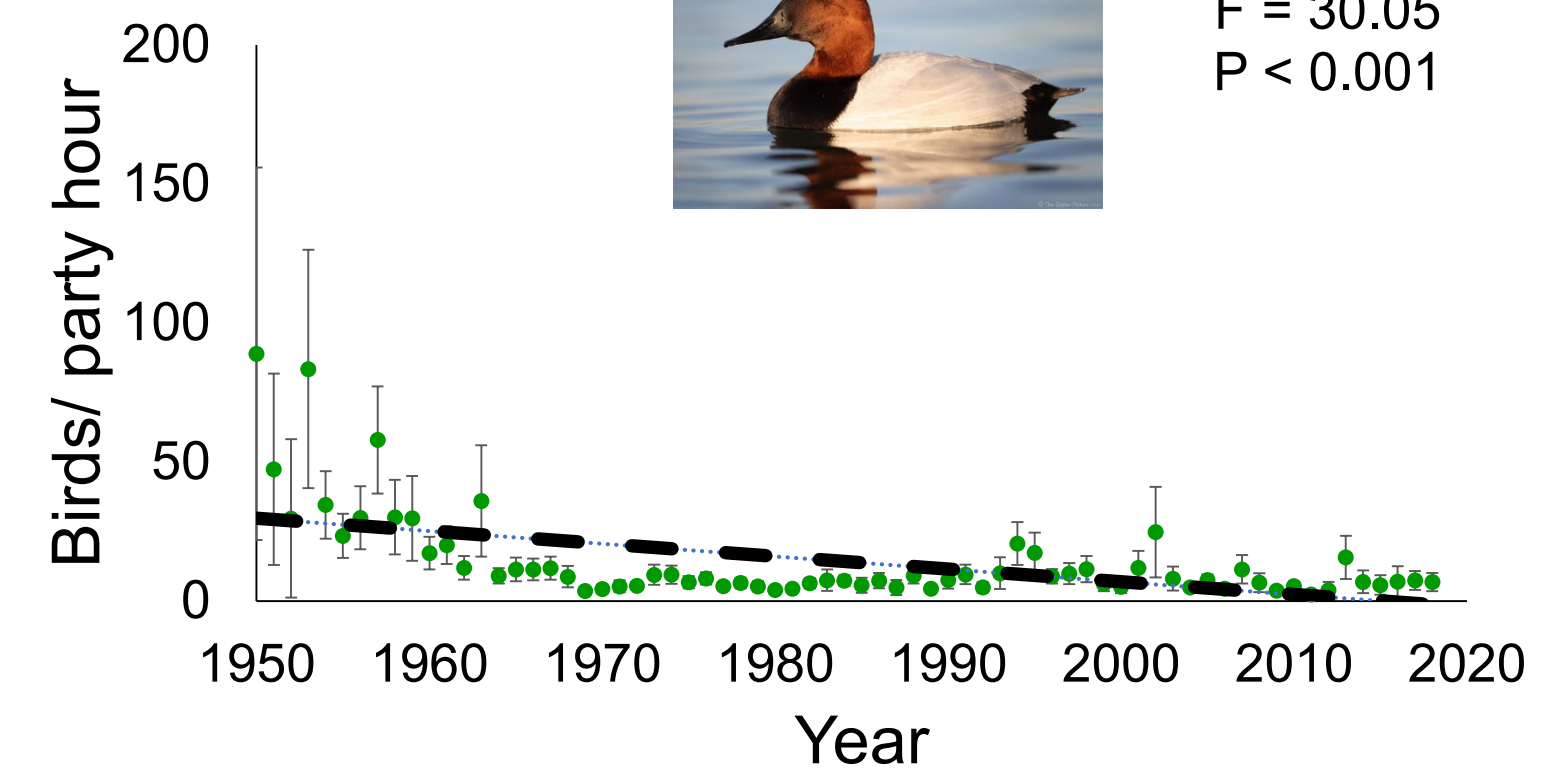


Results

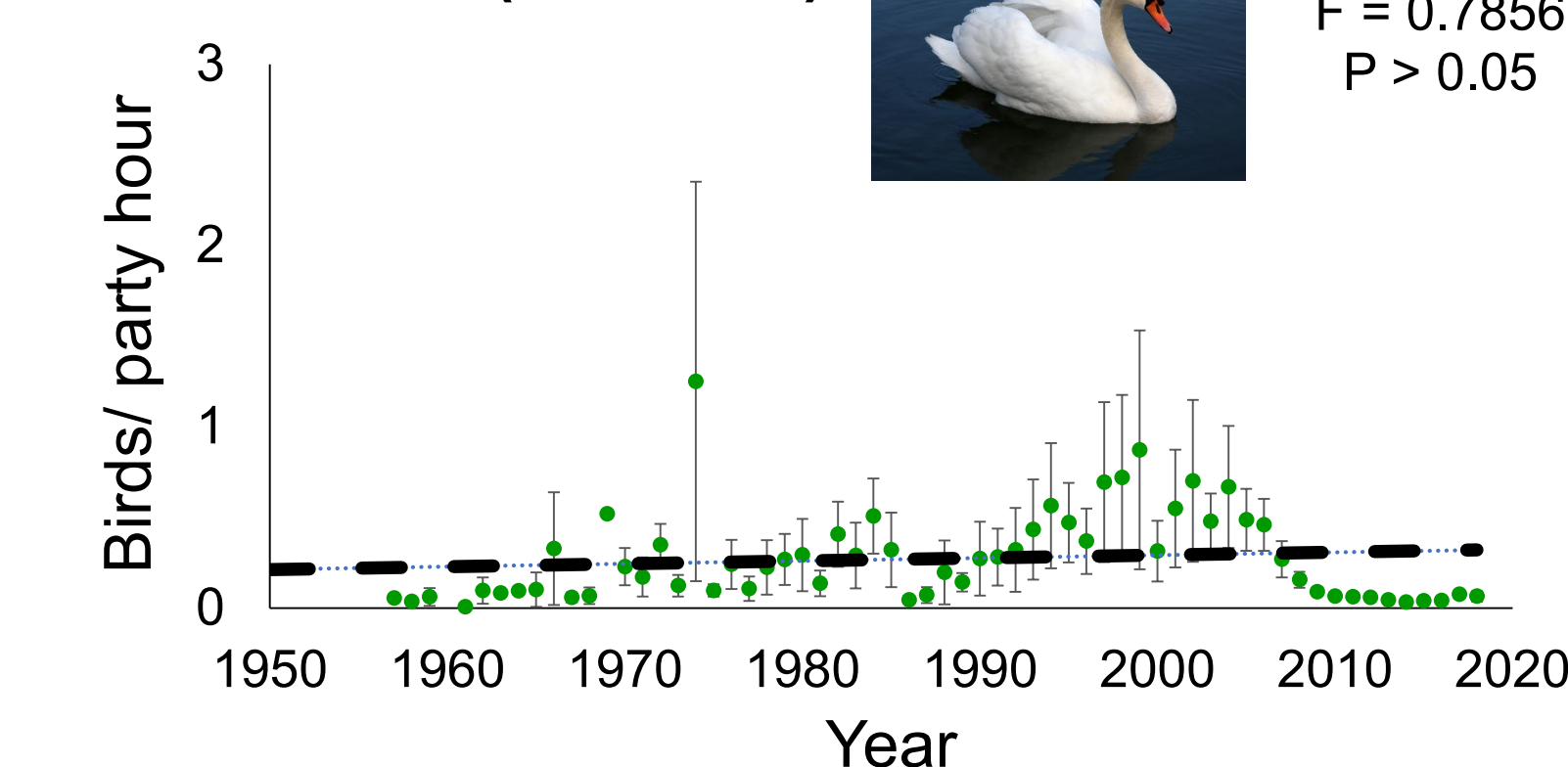
Common Goldeneye



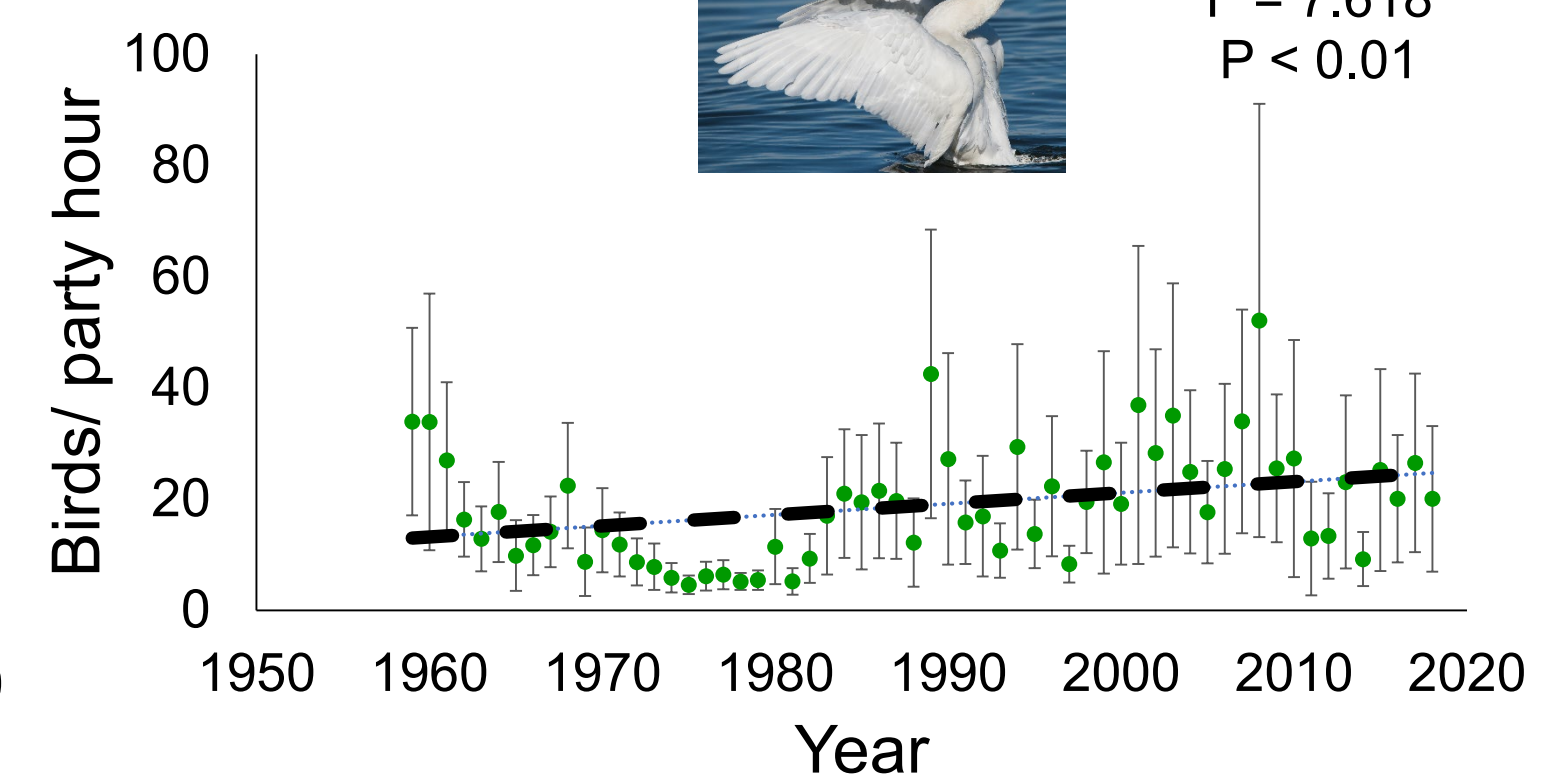
Canvasback



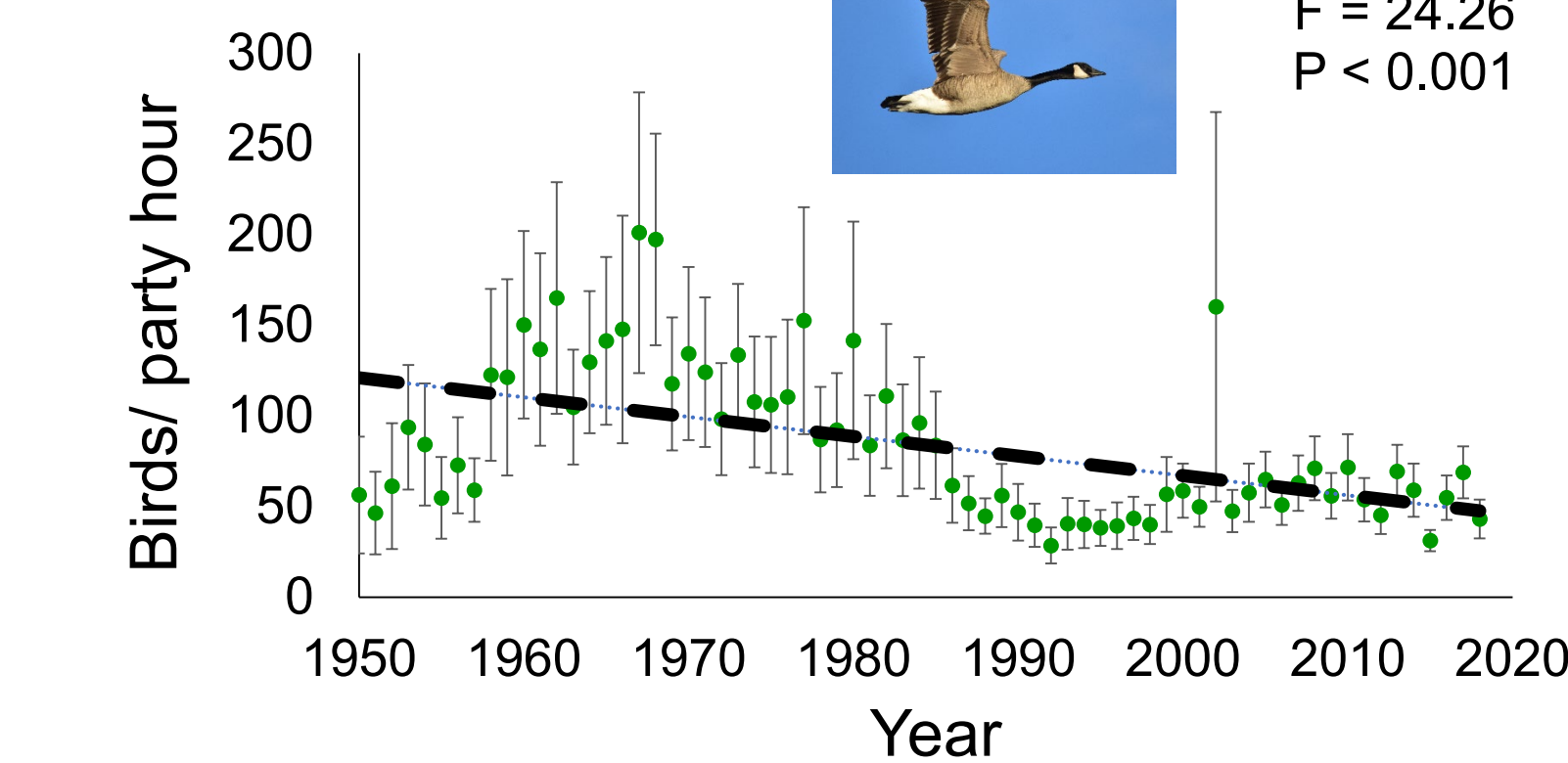
Mute Swan (Invasive)



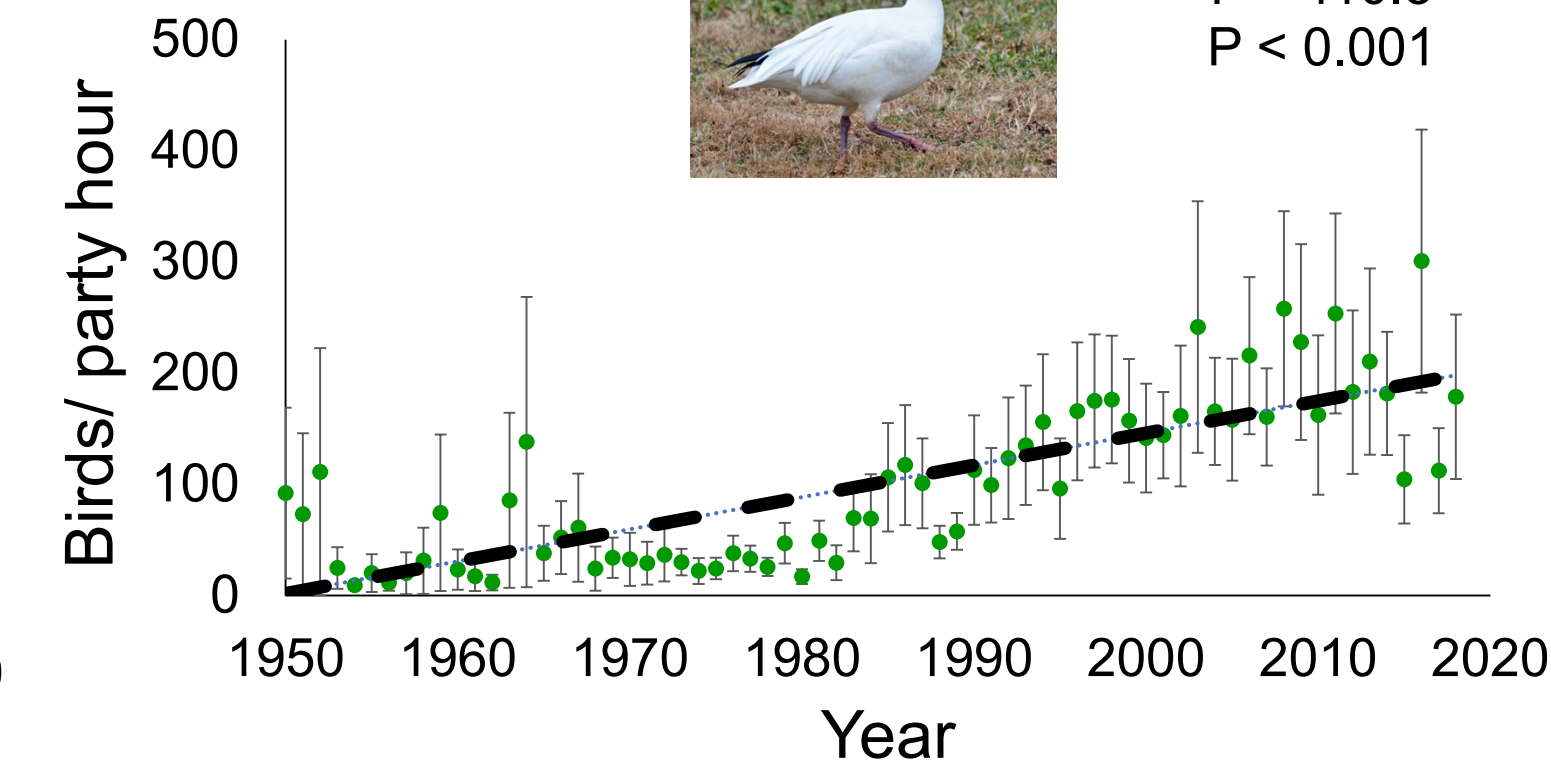
Tundra Swan



Canada Goose



Snow Goose



Discussion and Conclusions

- Our research highlights population dynamics of common wintering waterfowl in the Mid-Atlantic region over the **last 70 years**.
- Compared to 1950s, we observed a **36% decline** of the relative abundance of the waterfowl community in study area.
- American wigeon and Canada goose had major **population declines** while Brant, American black duck, Canvasback and Mallard showed moderate declines.
- However, snow goose had a major **population increase** with moderate increases for Tundra swan and Lesser scaup.
- Waterfowl wintering in **marsh habitats (N = 8)** showed the steepest declines.
- Omnivore (N = 4) and granivore (N = 2)** waterfowl had significant declines with no apparent effects on other feeding guilds (fish, plants, invertebrates).
- Cavity nesters (N = 5)** increased in abundance; however both float-nesters (N = 2) and ground nesters (N = 22) showed significant declines.
- Our work suggests **significant population declines** of many wintering waterfowl species (N = 11; 38% of species studied) in the Mid-Atlantic region despite the continental-scale recovery of waterfowl.

References

Austin, J.E., Buhl, T.K., Guntenspergen, G.R., Norling, W., Sklebar, H.T. 2001. Duck populations as indicators of landscape condition in the prairie pothole region. *Environmental Monitoring and Assessment*, 69: 29-47.

Butcher, G.S., Fuller, M.R., McAllister, L.S., Geisler, P.H. 1990. An evaluation of the Christmas Bird Count for monitoring population trends of selected species. *Wildlife Society Bulletin*, 18: 129-134.

Pandolfino, E. R., Handel, C. M. 2018. Population trends of birds wintering in the Central Valley of California, in Trends and traditions: Avifaunal change in western North America (W. D. Shuford, R. E. Gill Jr., and C. M. Handel, eds.), pp. 215-235. *Studies of Western Birds 3*. Western Field Ornithologists, Camarillo, CA

Rosenberg, K.V., Dokter, A.M., Blancher, P.J., Sauer, J.R., Smith, A.C., Smith, P.A., Stanton, J.C., Panjabi, A., Heilt, L., Parr, M., and Marra, P.P. 2019. Decline of the North American avifauna. *Science*, 366: 120-124.

Sauer, J.R., Zimmerman, G.S., Klimstra, J.D., Link, W.A. 2014. Hierarchical Model Analysis of the Atlantic Flyway Breeding Waterfowl Survey. *Journal of Wildlife Management*, 78: 1050-1059.