SURVEILLANCE AND MONITORING OF TARGET AND NON-TARGET SPECIES AVIAN INFLUENZA VIRUS
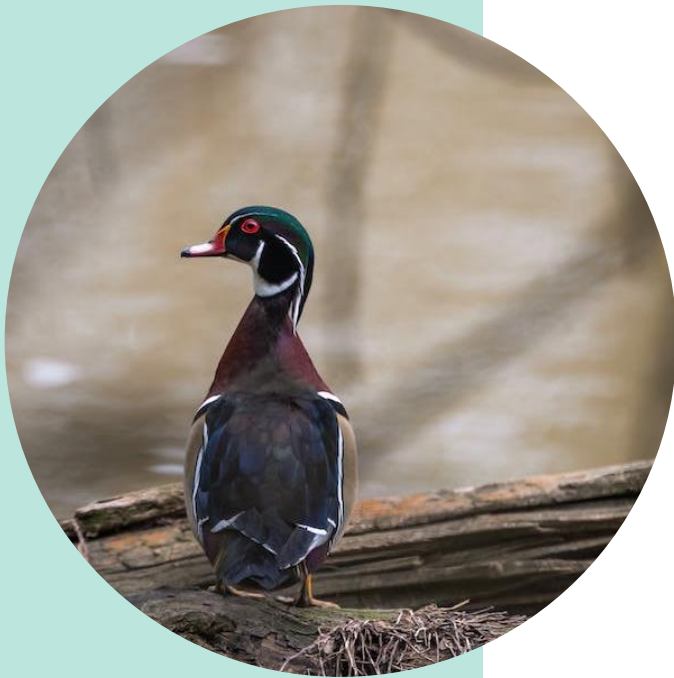
Mini Project by Charlotte Fryday

INTRODUCTION
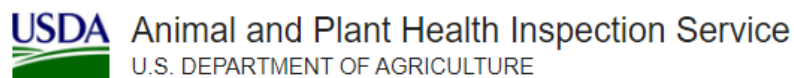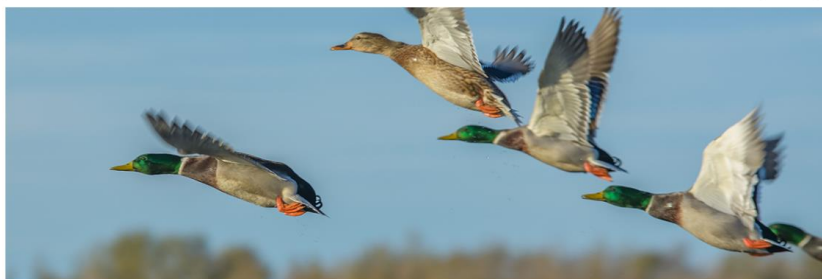
AVIAN INFLUENZA

- Recent increase in its detection globally

- Risk for the wildlife and poultry industry

- Wild migratory birds => primary reservoirs

- Need for effective monitoring strategies

THE DATASET

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

2022-2023 Detections of Highly Pathogenic Avian Influenza in Wild Birds

Last Modified: Feb 14, 2023

🖶 Print

USDA United States Department of Agriculture

USGS science for a changing world

U.S. FISH & WILDLIFE SERVICE

U.S. DEPARTMENT OF THE INTERIOR U.S. Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

NATIONAL FLYWAY COUNCIL
Pacific est. 1952 - Central est. 1948 - Mississippi est. 1952 - Atlantic est. 1952

Implementation Plan for Avian Influenza Surveillance in Waterfowl in the United States

- Records of the detection of highly pathogenic avian influenza in wild birds in the United states 2022 including location (state) and date (month)

Records of detection from:

→ Strategic monitoring of live target species

→ Dead birds of all species

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METHODS

- Split the data between target and non-target species and summarized the counts for State and Month.

- Generalized linear mixed effect model, Poisson distribution

Hypothesis: In HPAI positive detections the deaths of non-target species is predicted by the occurrence in target species.

Formula:
Nontarget ~ logTarget + (1|Month:State)

Target Species for Wild Bird AIV Surveillance	
American Green-winged Teal	Mallard
Northern Pintail	American Black Duck
Wood Duck	Blue-winged Teal
Cinnamon Teal	Northern Shoveler
Mottled Duck	American Wigeon
Gadwall	Muscovy Duck
Fulvous Whistling Duck*	

R

not taxonomically a dabbling duck

RESULTS

HPAI detection data for 606 birds → 324 target and 282 non-target

→ In 24 states over 7 months

SIGNIFICANT

→ As the number of detections in target species increased the number of detections in mortality cases decreased.

Fixed effects	Estimate	SE	z value	p value
(Intercept)	1.75	0.24	7.25	<0.001
logTarget	-0.31	0.14	-2.22	0.02 *
Random effects	Variance	SD		
Month:State	0.90	0.94		

CONCLUSIONS AND FUTURE WORK

Results were different to what was expected.

- Could be significant

→ Lack of detections of mortality do not equate to the absence of disease

- We need more data collected over **larger time periods**

- Employment of larger efforts to collect cases of mortality

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