

Genetic profiles of HPAI strains in the Americas (H5 2.3.4.4b)

USDA APHIS VS D&B National Veterinary Services Laboratories, Diagnostic Virology Laboratory
March 2023








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

This work is conducted in collaboration with NAHLN, APHIS Wildlife Services and ARS Southeast Poultry Research Laboratory

Leveraging the real time whole genome together with available epidemiologic information allows understanding of how the virus is moving and when spillovers to poultry occur, insight into how the virus is spreading.

With thousands of wild bird detections across at least 144 species and 49 U.S. states, reassortments of the H5 2.3.4.4b virus with North American viruses continue to predominate at ~86% of detections.

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**Wild Bird Surveillance
December 2014 – July 2016**

Total birds sampled: 53,470
HPAI positive cases : 65
PCR detection only: 35 (2 since June 2015)

Total birds sampled by flyway

Atlantic: 11,959
 Mississippi: 16,167
 Central: 9,741
 Pacific: 15,378
 American Oceania : 116



**Monthly Summary Data from the National Wild Bird Avian Influenza Surveillance Program:
July 2015 to February 2016 ***

Graph 1. Percent of wild duck samples positive for low pathogenic Type A influenza viruses as determined by RT-PCR.

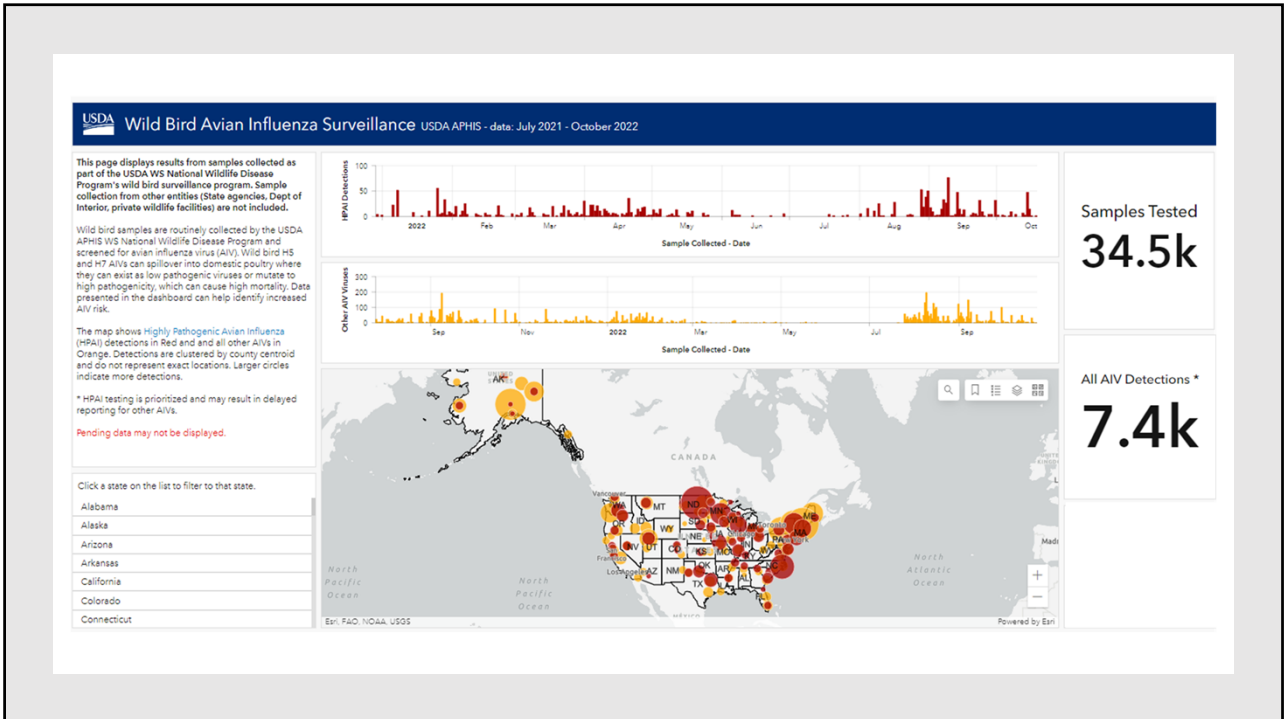


July 2016 – June 2017
 Last Updated: 7/7/2017
 Total birds sampled: 35,747
 Total HPAI positive cases (HA gene sequence confirmed): 2
 HA molecular detection only (HA gene sequence unsuccessful/no virus isolated) cases: 0

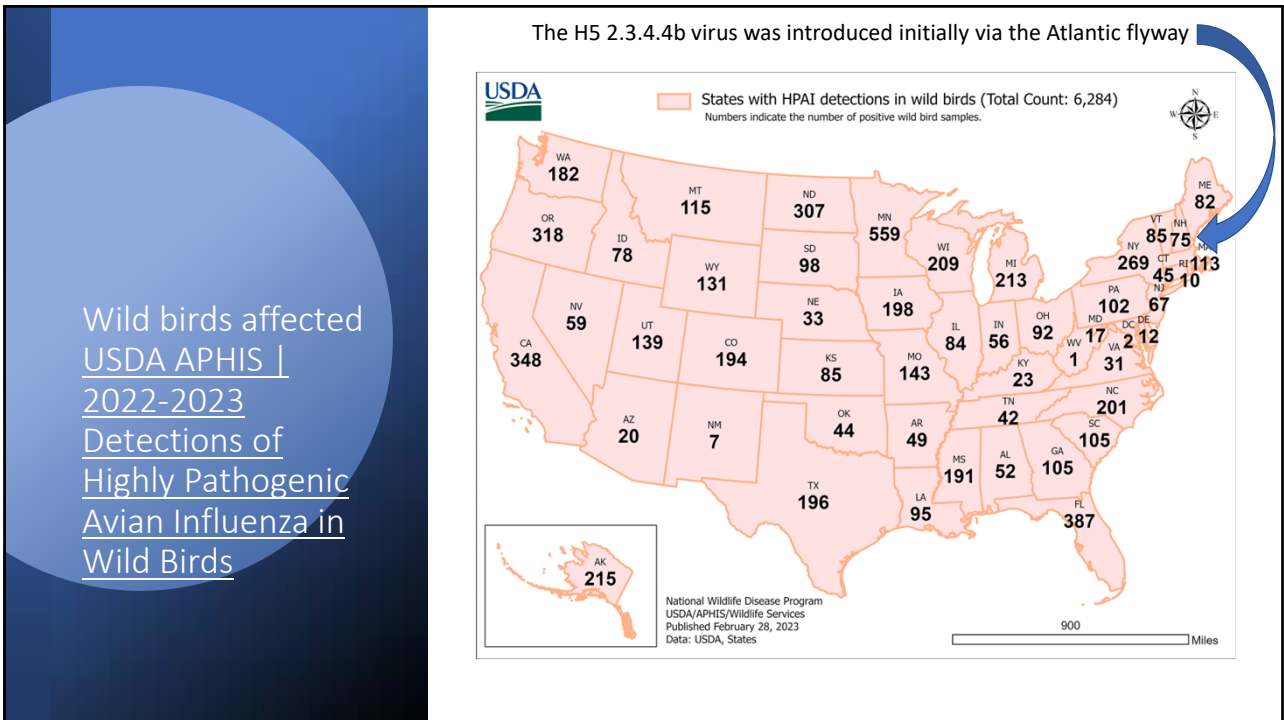
Total birds sampled by flyway
 Atlantic: 9,074
 Mississippi: 9,973
 Central: 7,516
 Pacific: 8,175
 American Oceania : 9

WILD BIRD HIGHLY PATHOGENIC AVIAN INFLUENZA CASES IN THE UNITED STATES ³								
LINE	COLLECTION DATE	SPECIES	COUNTY	STATE	SUBTYPE ⁴	CONFIRMATION DATE	COLLECTING AGENCY	COLLECTION STRATEGY ⁵
1	8-12-2016	Mallard	Fairbanks North Star	AK	EA/AM H5N2	8-25-2016	Alaska DFG	L
2	12-27-2016	Mallard	Fergus	MT	EA/AM H5N2	1-9-2017	USDA-APHIS	H

2022 H5N1 2344b
Introduction



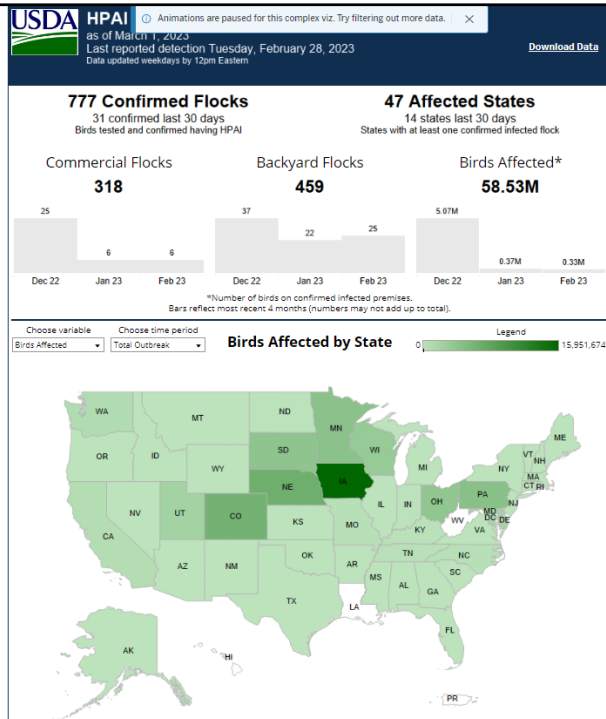
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Wild birds affected
USDA APHIS |
2022-2023
Detections of
Highly Pathogenic
Avian Influenza in
Wild Birds

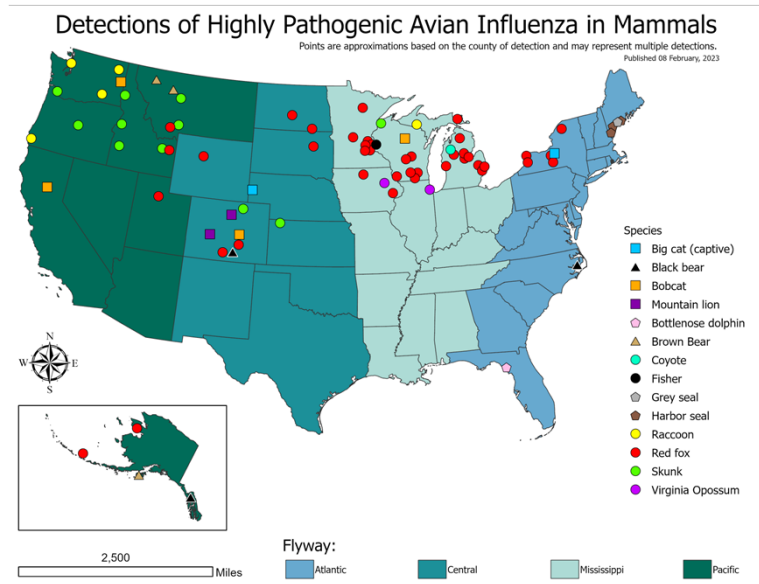
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Poultry species affected
 USDA APHIS | 2022-2023 Confirmations of Highly Pathogenic Avian Influenza in Commercial and Backyard Flocks



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Mammalian species affected
 USDA APHIS | 2022-2023 Detections of Highly Pathogenic Avian Influenza in Mammals

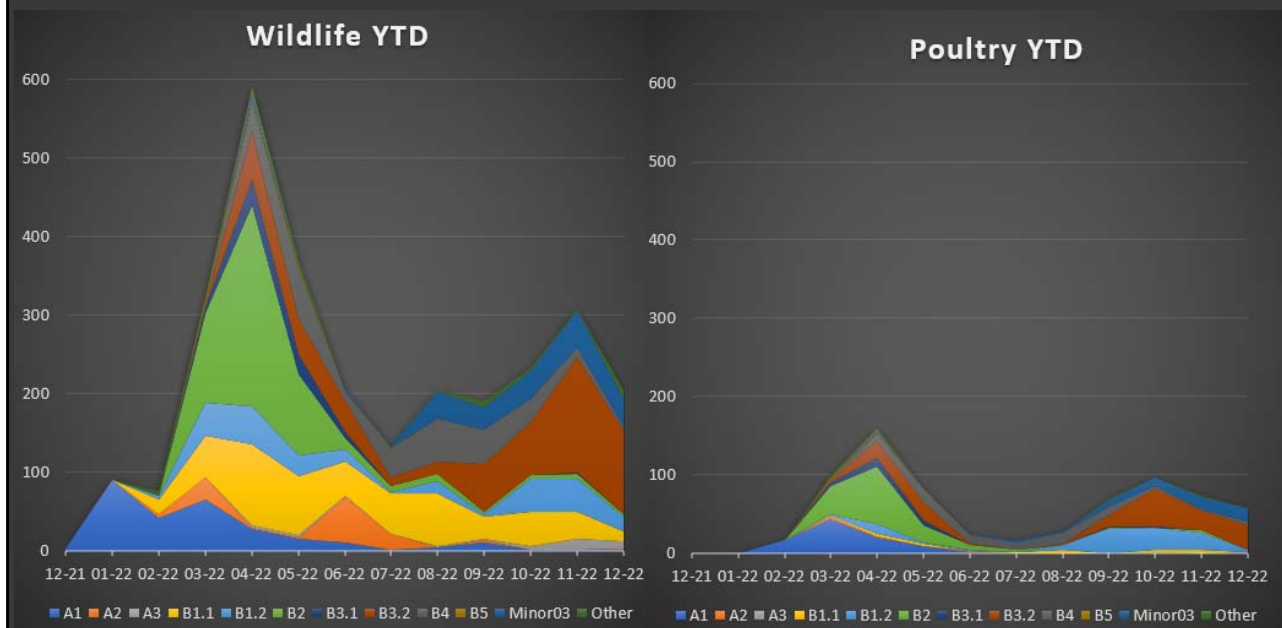


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2022 H5N1 2344b Phylogenetic Overview

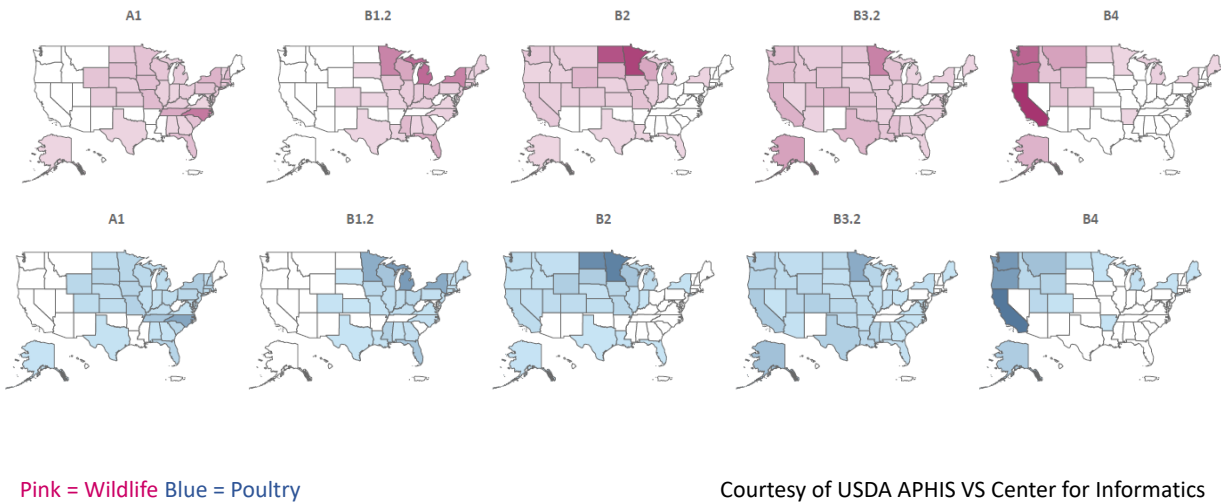
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Genotypes December 2021 to December 2022



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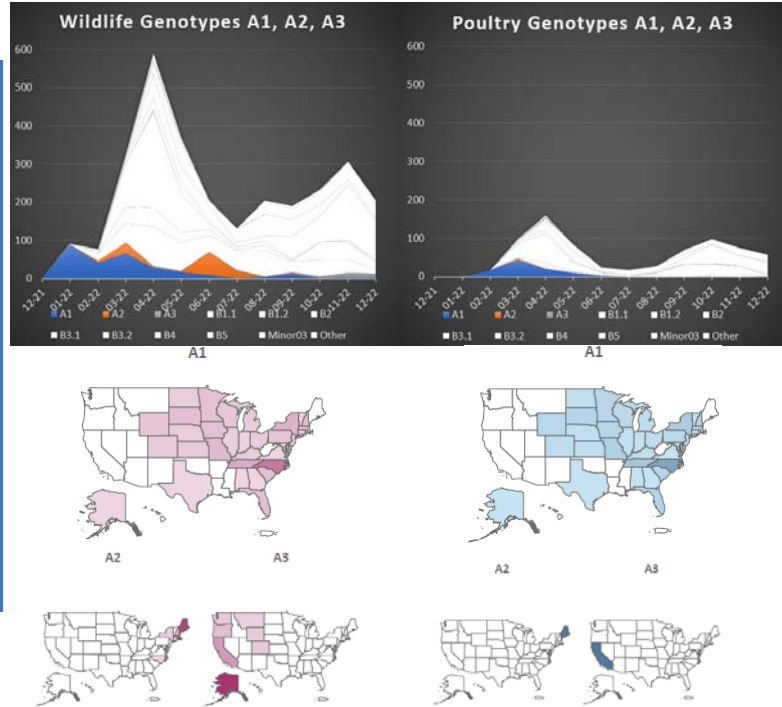
Most Predominant Genotypes by State



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Genotypes A1, A2, A3

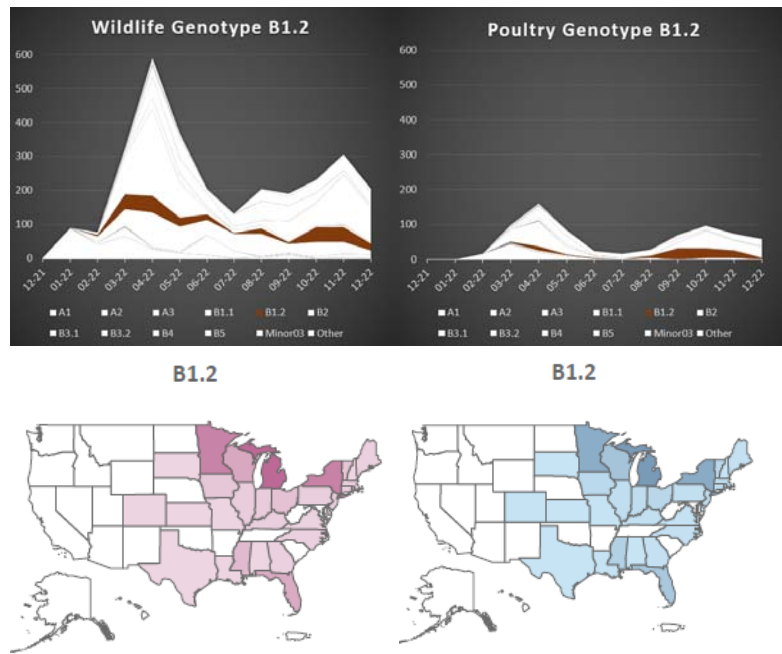
- Native constellation
- Atlantic Flyway
 - A1 most significant including reassortment
 - A2 limited to Atlantic flyway
- Pacific Flyway
 - A3 – initially detected in AK, Canada
 - Limited to Pacific flyway



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Genotype B1.2

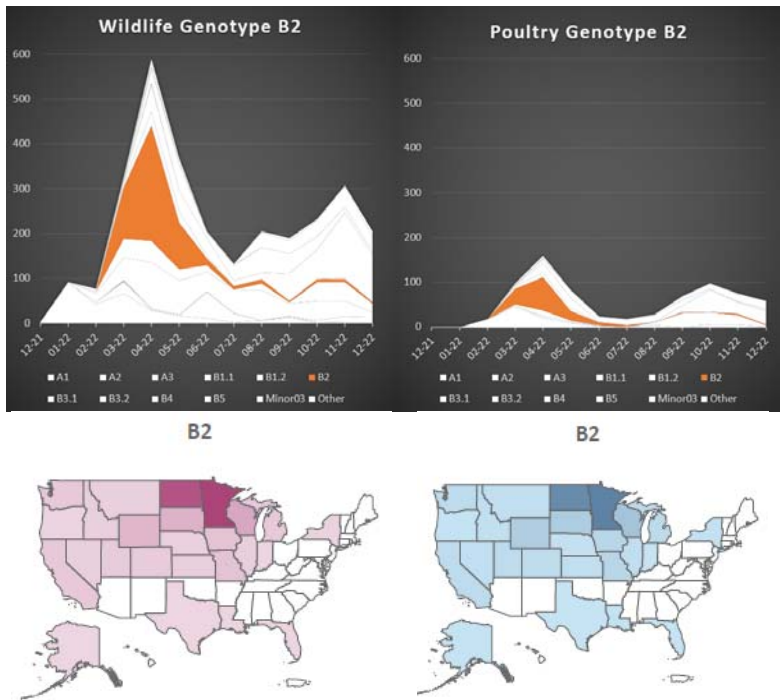
- Reassorted A1 lineage
 - AM: PB2, PB1, PA, NP
- Primarily focused in the Mississippi flyway in the spring
 - Steady detections throughout
- Steady presence in the Eastern 2/3 of the US in the fall
 - Wider range, overall similar numbers



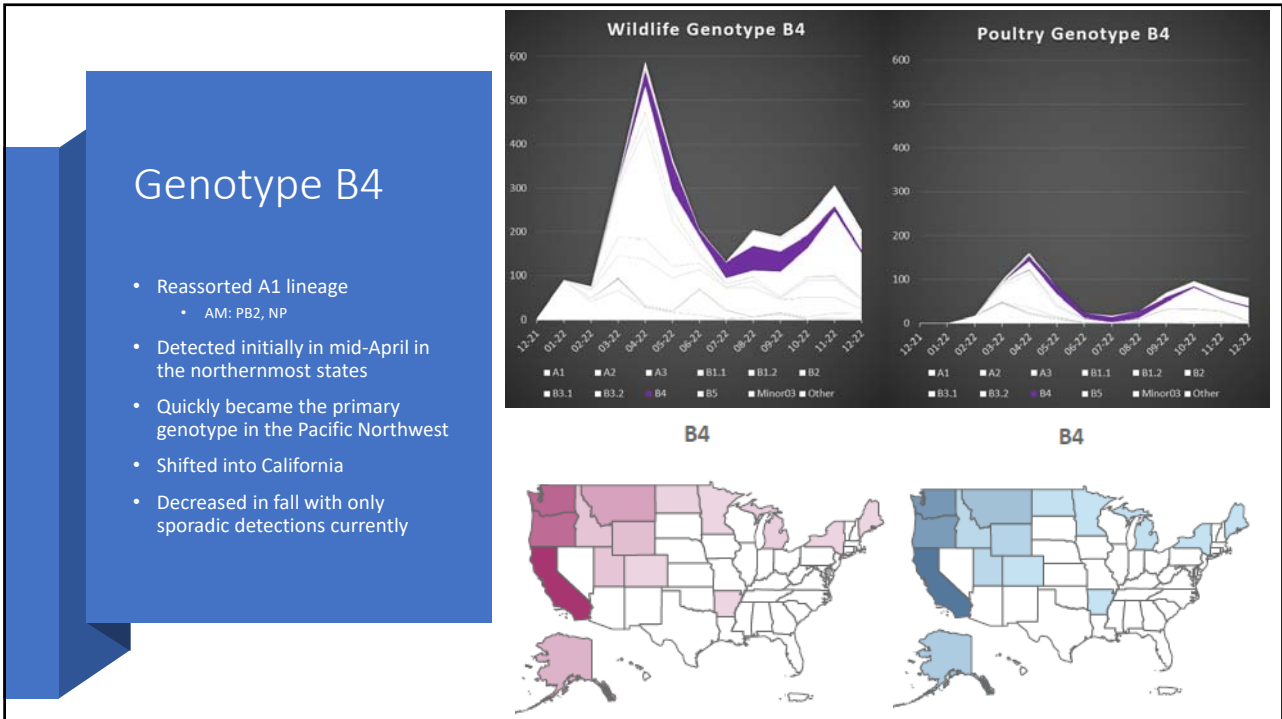
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Genotype B2

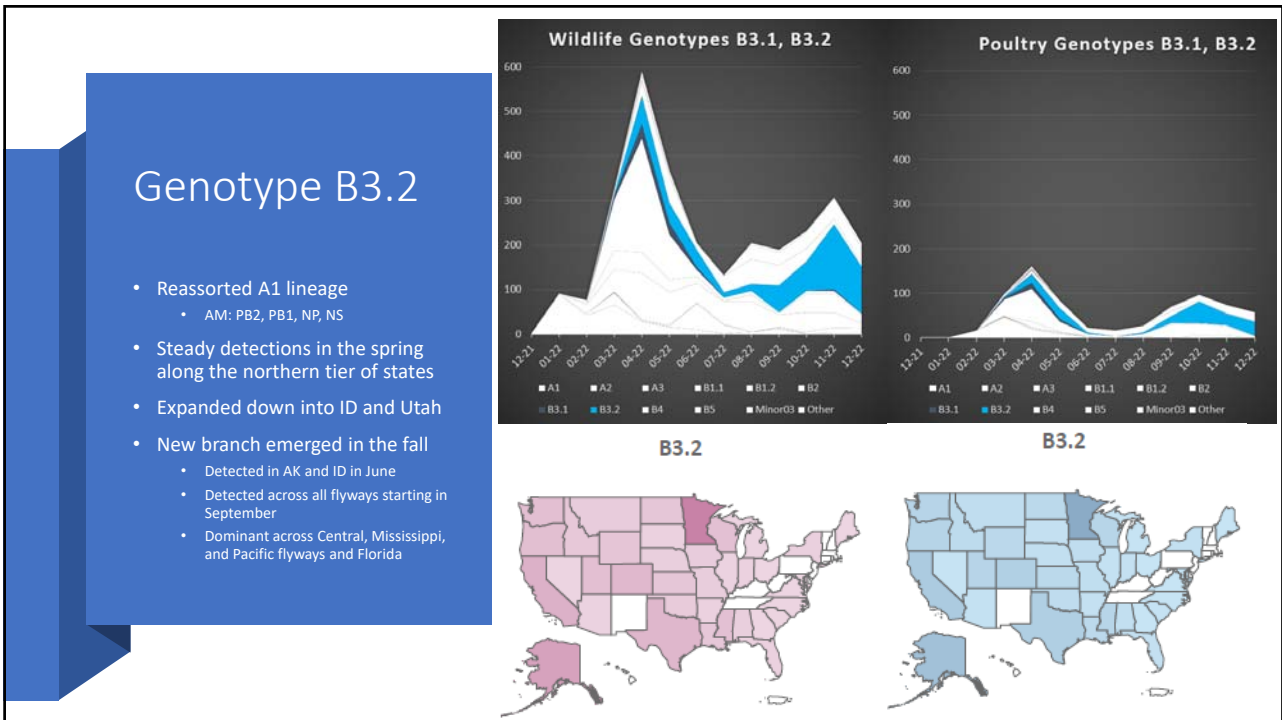
- Reassorted A1 lineage
 - AM: PB2, NP
- Very dominant in the upper Midwest in the spring
 - Wild bird mortalities
 - Poultry detections in MN, ND, SD, ID
- Dropped significantly by June 2022
- Sporadic ongoing detections
 - Low prevalence but wider distribution in the fall



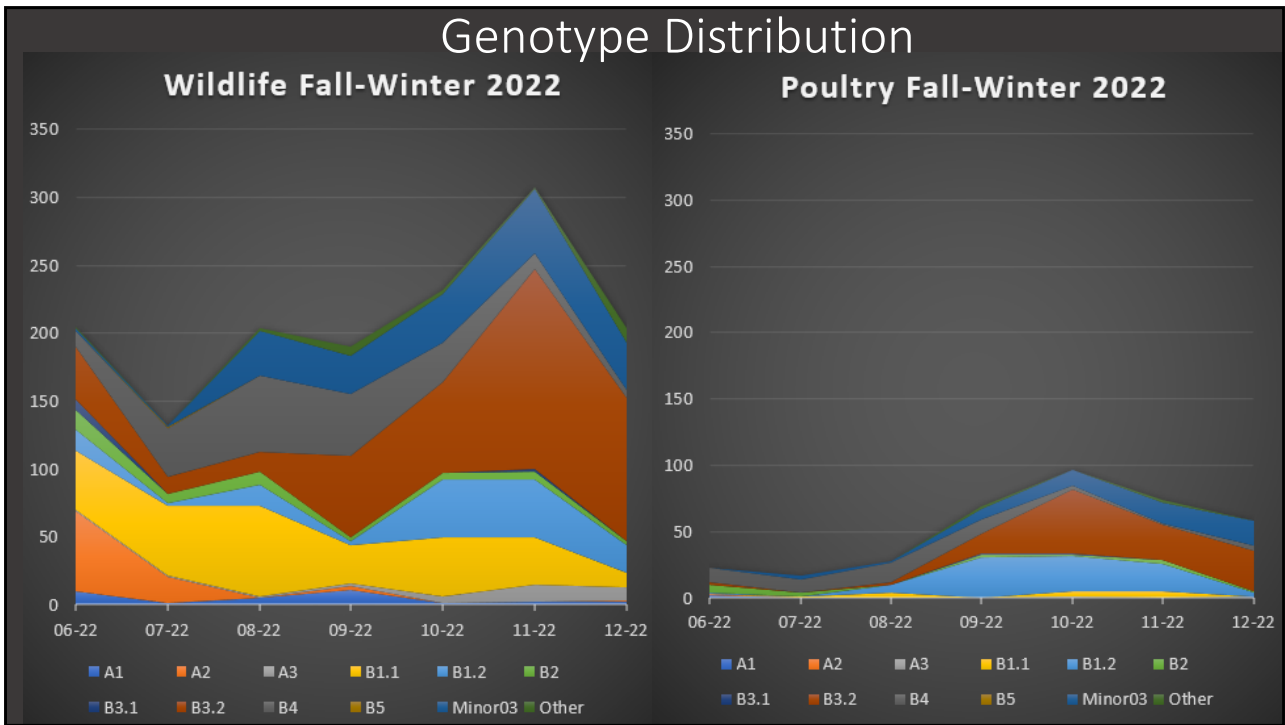
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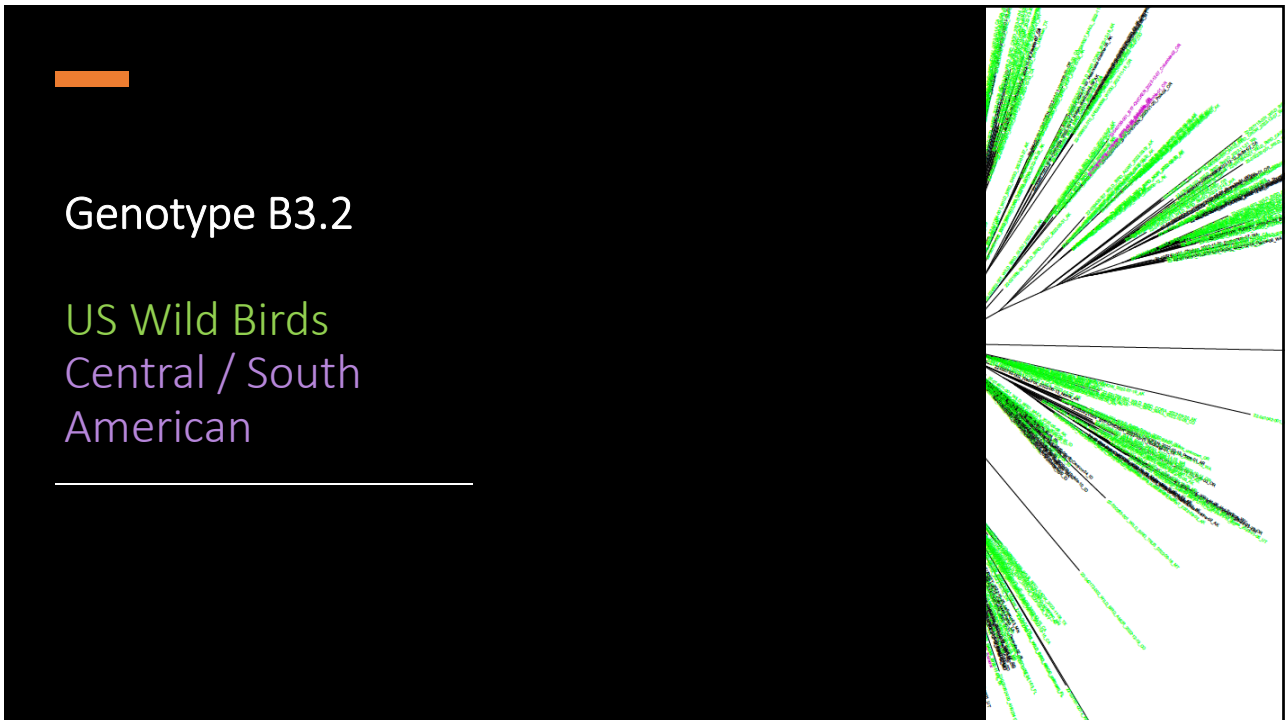
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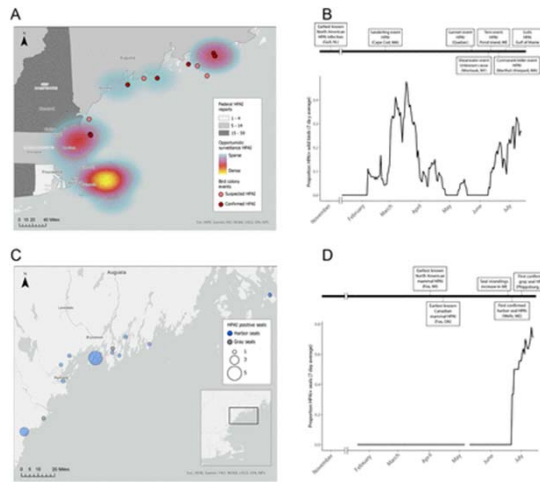


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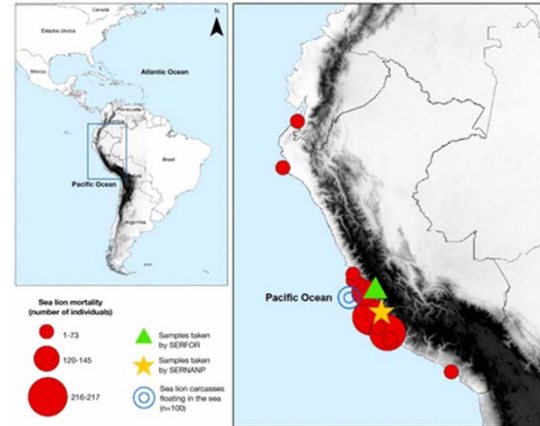


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[Outbreak of Highly Pathogenic Avian Influenza H5N1 in New England Seals | bioRxiv](#)



[First Mass Mortality of Marine Mammals Caused by Highly Pathogenic Influenza Virus \(H5N1\) in South America | bioRxiv](#)



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Acknowledgments



- We are grateful for the dedicated people and institutions working hard to combat this virus including the DVL team!
- Many thanks to our NAHLN and state partners as well as other academic institutions and states that continue to contribute to surveillance in wildlife.
- This analysis is possible thanks to our collaboration with Wildlife Services, ARS Southeast Poultry Research Laboratory, and our colleagues at the Center for Epidemiology and Animal Health.



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For more information

