H5N1=HPAI

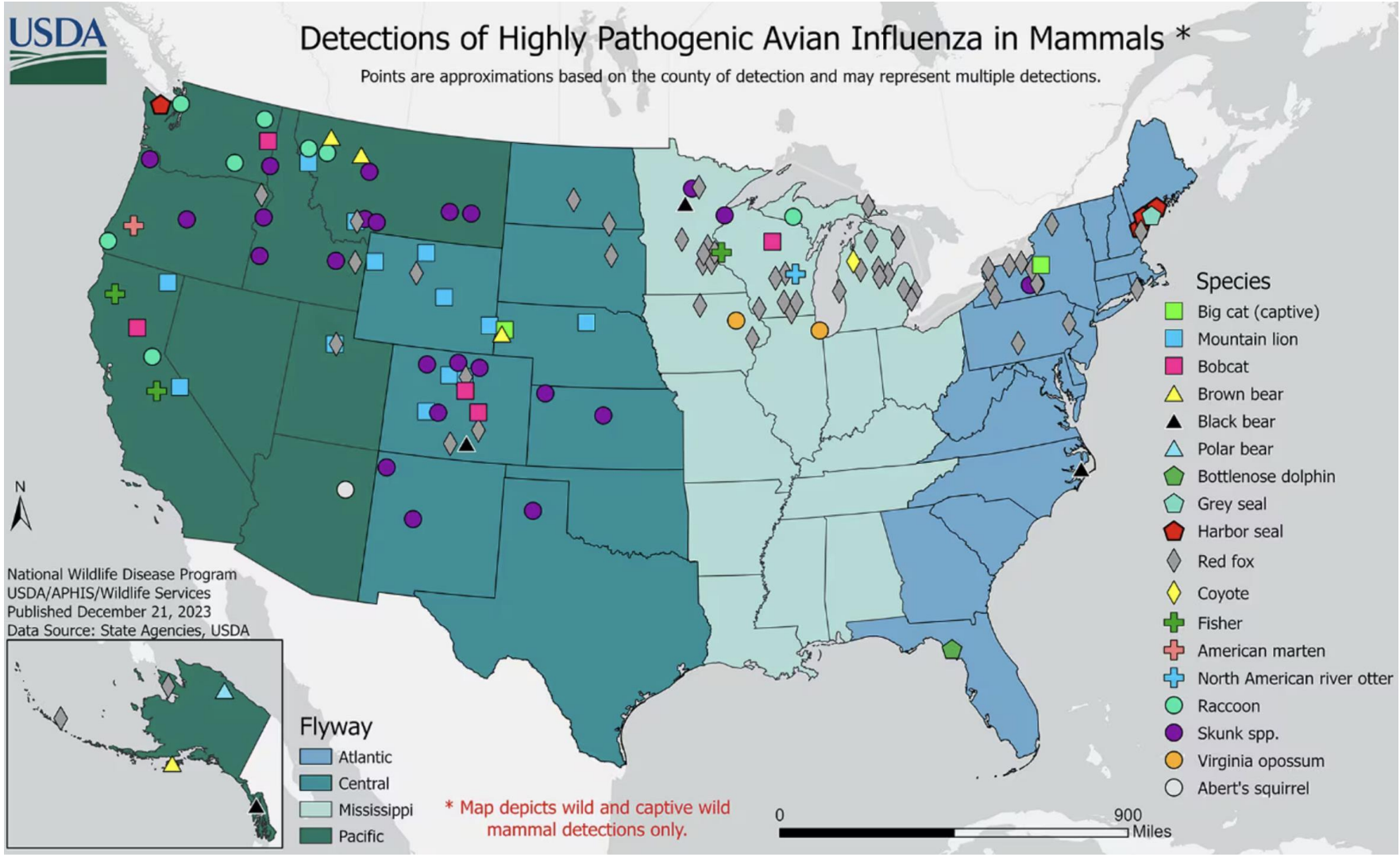
Pictures I had up in the gallery walk showing an outbreak in Turkeys in MN were referring to a different influenza (not an H5N1 strain) that hit in 2014-2015. That strain was NOT spread by wild birds-it WAS spread from facility to facility (CAFO) by people, boots, trucks etc.. Turkey industry was aggressive in “stamping that one out.” Instituted strong Biosecurity protocols and the strain “disappeared.”

H5N1 is the current outbreak.
Arrived in 2021 and started to spread.

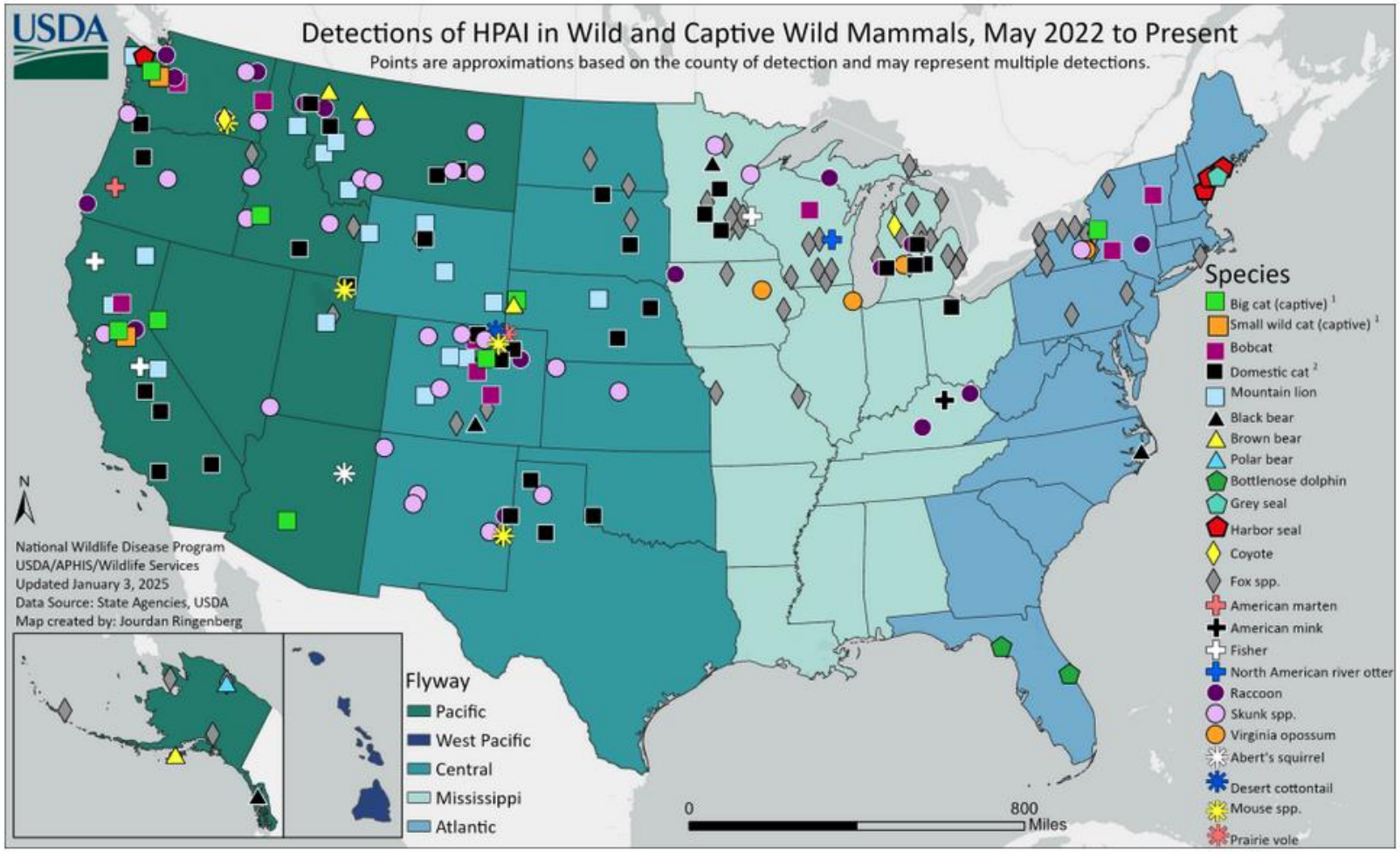
It is clearly being spread from wild birds, to poultry and to wild mammals!

Neither of these two most recent outbreaks show patterns of transmission to humans….but current H5N1 has been infecting people.

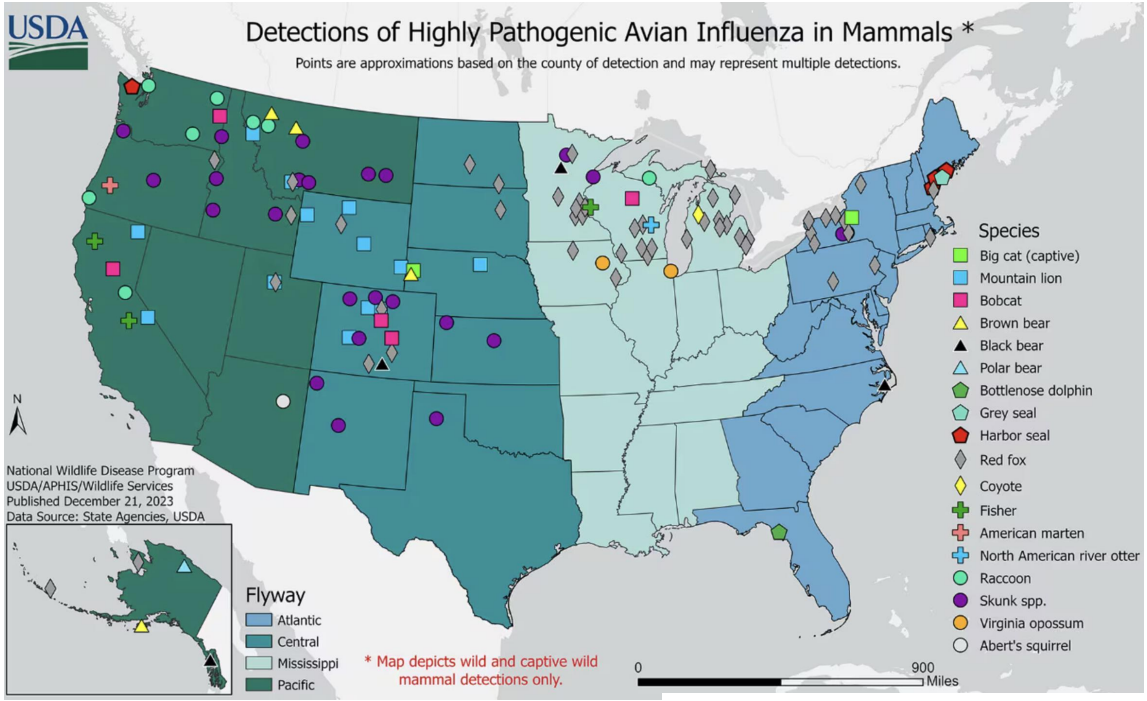
From a year ago…



https://www.cdc.gov/flu/images/avianflu/spotlights/detection-mammals-december.jpg?_=00680?noicon

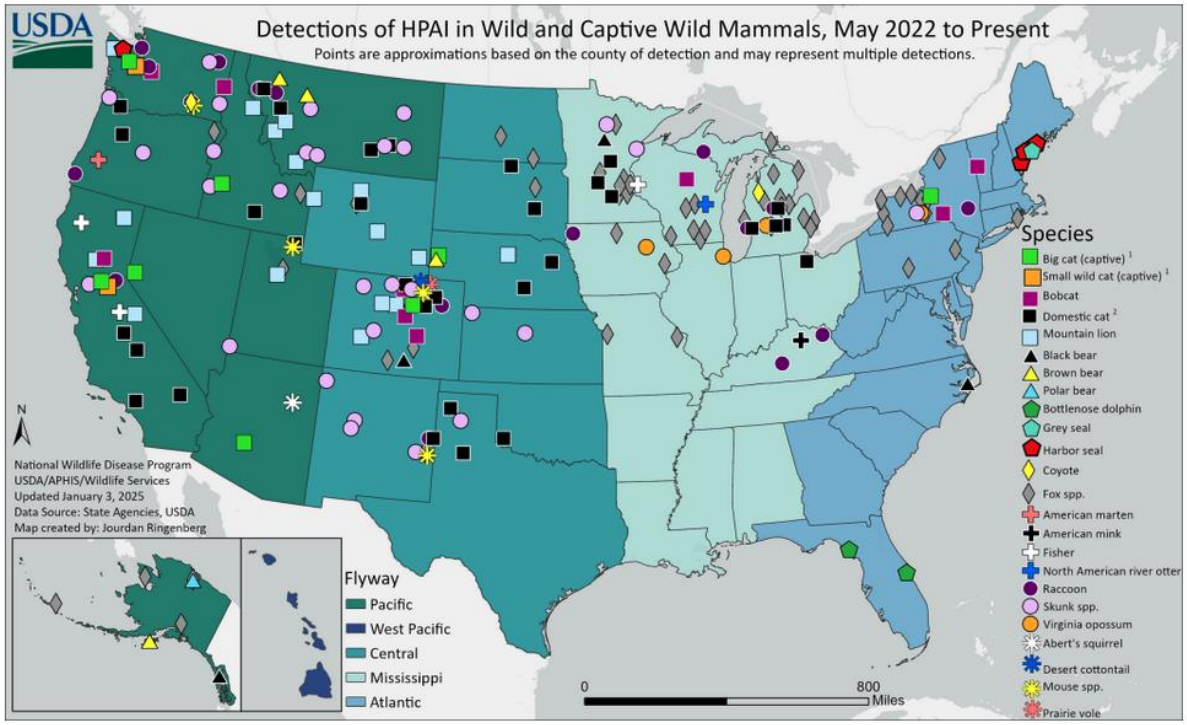


https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/mammals



Same maps side by side!

From a year ago

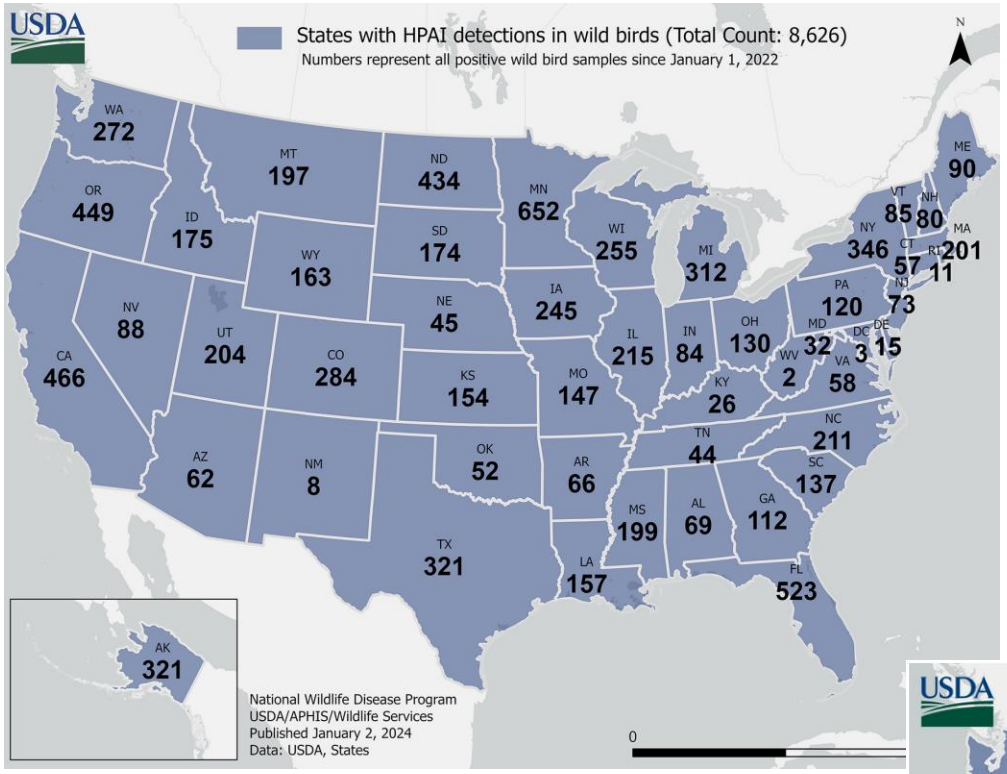


Most recent map

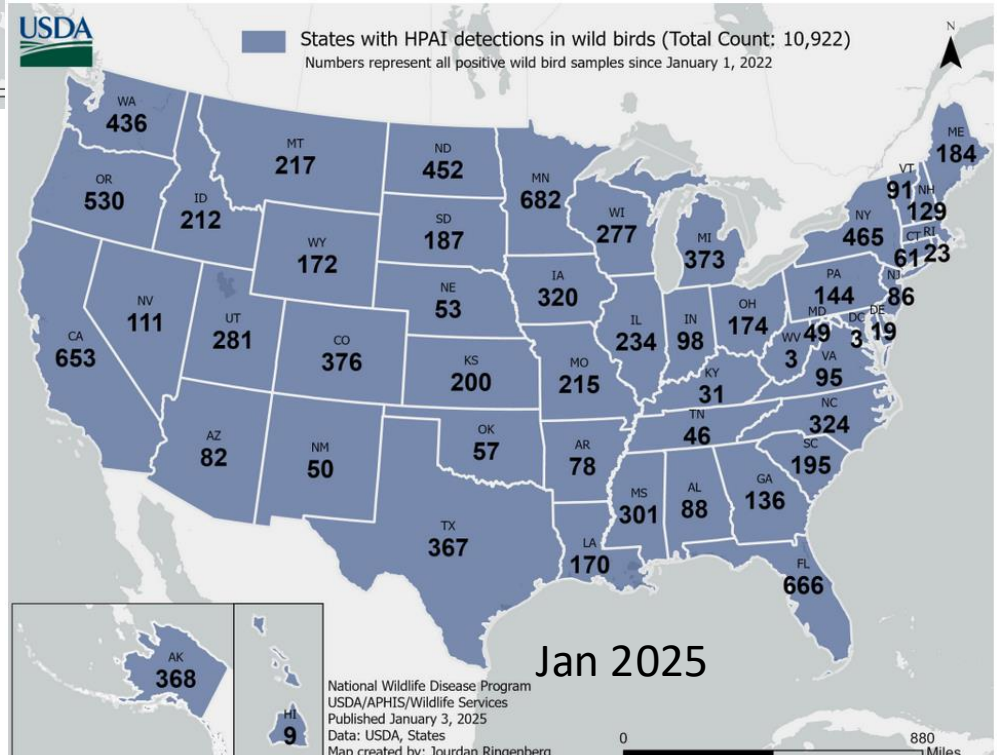
MN cases from the APHIS website

Minnesota	Morrison	12/6/24	12/18/24	EA H5N1	Domestic cat	
Minnesota	Sibley	6/10/24	6/27/24	EA H5N1	Domestic cat	
Minnesota	Sibley	6/10/24	6/27/24	EA H5	Domestic cat	
Minnesota	Kandiyohi	6/18/24	6/21/24	EA H5N1	Domestic cat	
Minnesota	Washington	5/2/24	6/21/24	EA H5N1	Red fox	
Minnesota	Cass	5/1/23	5/23/23	EA/AM H5N1	American black bear	
Minnesota	Hennepin	4/6/23	4/11/23	EA H5N1	Red fox	
Minnesota	Itasca	10/21/22	11/3/22	EA/AM H5N1	Striped skunk	
Minnesota	Scott	5/29/22	6/3/22	EA H5N1	Red fox	
Minnesota	Stearns	5/10/22	5/27/22	EA H5N1	Red fox	
Minnesota	Itasca	5/13/22	5/27/22	EA H5N1	Red fox	
Minnesota	Hennepin	5/10/22	5/12/22	EA H5N1	Red fox	
Minnesota	Dakota	5/10/22	5/12/22	EA H5N1	Red fox	
Minnesota	Washington	5/10/22	5/12/22	EA H5N1	Red fox	
Minnesota	Hennepin	5/10/22	5/12/22	EA H5N1	Red fox	
Minnesota	Anoka	4/22/22	5/10/22	EA H5N1	Red fox	

Cases in wild birds



Jan 2024



Jan 2025

https://www.aphis.usda.gov/livestock-poultry-disease/avian/avian-influenza/hpai-detections/wild-birds

- Please read these two related articles (3 pages total) published in the same volume of the same journal "Science." They overlap quite a bit. H5N1 Outbreak Science Mag #1 H5N1 Outbreak Science Mag#2
- H5N1 Science Editorial 2024 (One page editorial from Summer 2024)
- Novel bird flu strain continues to threaten animal, public health _ American Veterinary Medical Association (From Dec 2024-several pages and overlaps quite a bit with the other readings)

Despite treatment, this bald eagle in Wisconsin became one of many wild birds killed by avian flu.

INFECTIOUS DISEASE

Deadly flu spreads through North American birds

As largest ever H5N1 outbreak hits poultry and wild species, researchers wonder whether virus is here to stay

By Erik Stokstad

When black vultures began to die at Florida's Hontoon Island State

ers scrambling to understand how the virus might spread to mammals and whether it will hang on indefinitely in North America, as it has in Europe and Asia. "It's everyone on board, at max capacity," says Susan Shriner, an ornithologist at the U.S. Department of Agriculture, which is helping coordinate the research effort.

The most important HPAI lineage, part of the H5 group of viruses, arose in the late 1990s in domestic geese in Asia. Soon it reassorted with flu strains found in wild waterbirds. In poultry, infections cause pneumonia, seizures, and hemorrhaging with mortality rates of up to 100%. Further mutations enabled those early waves of H5 viruses to infect people—H5N1 has killed 466 since 2003—raising fears that the viruses could cause a pandemic. But so far, they have not gained the ability to readily spread from person to person.

The H5 viruses did, however, cause catastrophic losses of poultry in Southeast Asia. And migratory birds carried the H5N1 strain out of Asia, first to Europe, where it killed an array of water birds, predatory birds, and scavengers such as buzzards. During the earliest outbreaks, the risk was highest during peak fall migration, when waterfowl arrived in Europe. But in the past 2 years, the virus has become endemic in Europe, present at some level year-round in wild birds. The virus "is not something that is going to go away anytime soon," says Arjan Stegeman, a veterinary epidemiologist at Utrecht University.

Because of the persistence of the virus—and the emergence of an apparently more pathogenic strain of H5N1—Europe has been experiencing ever-worsening largest outbreak of HPAI (p. 459). Since the virus was first spotted in eastern Canada in November 2021, it has been spreading across the continent with migrating waterfowl (see

INFECTIOUS DISEASE

Resurgence of avian influenza virus

Unprecedented outbreaks of the H5N1 highly pathogenic avian influenza virus raise concern

By Michelle Wille[1,2,3] and Ian G. Barr[2,3]

Highly pathogenic avian influenza viruses (HPAIv) have recently been detected on the East coast of Canada (December 2021) and the United States (January 2022) and have been found in both wild birds and poultry (1). This comes after the same strain (known as H5N1) swept through Asia, Africa, and Europe in late 2021, replacing the previous HPAIv and causing widespread outbreaks and millions of deaths in poultry and wild birds. These HPAIv are of concern not only to birds but also to humans because they pose a potential pandemic risk. How has this virus emerged and spread so rapidly, and what does it mean for poultry, wild birds, and humans?

Influenza A viruses infect humans and a wide range of animal species such as pigs, poultry, and many wild birds, including waterbirds, the natural hosts of these viruses. Influenza A viruses are classified based on differences in their two most abundant surface proteins, hemagglutinin (H) and neuraminidase (N), of which there are 16 and 9 different subtypes, respectively, that infect avian species; these occur in different combinations, defining the virus (e.g., H5N1). Wild birds are infected with low-pathogenic avian influenza viruses (LPAIv), which they can carry asymptomatically. Only two H subtypes (H5 and H7) have repeatedly emerged as HPAIv to date, and these usually occur when LPAIv H5 and H7 viruses cross from wild birds into poultry, where changes in the H protein transform them into HPAIv, causing severe disease, devastating out-

After the emergence of a novel lineage and associated outbreaks in 2003, it spread to Asia, the Middle East, Africa, and Europe, where >400 million chickens, turkeys, and domestic ducks were culled and >600 human cases of H5N1 HPAIv were recorded within 5 years (3). These viruses became endemic in the poultry of many countries in Asia and Africa, with the gs/GD lineage diversifying into several genetic clades as a result of high infection rates, vaccination pressure, and circulation of this virus in an array of avian hosts. Since 2014, after evolution of the H gene, a new gs/GD lineage designated 2.3.4.4 has emerged, and these HPAIv have subsequently dominated outbreaks globally.

Why has the H5N1 subtype combination become globally dominant again? The reasons for the current 2021–2022 wave of H5 HPAIv are likely to be multifactorial. The reversion back to using N1 is probably serendipitous, but the current H5N1 virus clearly has a fitness advantage over the previous H5N8 or H5N8 HPAIv that predominated from 2014 to 2021. This has allowed H5N1 to rapidly displace other H5Nx viruses. Normally such a dramatic global sweep would be caused by a major change in the influenza H protein, but the H of the current H5N1 is similar to that of the previous H5N6 and H5N8 viruses, falling into the same genetic lineage (2.3.4.4). This leaves properties in the N1 or changes to other viral genes through reassortment or mutation as possible reasons for increased fitness. However, there may be other host factors leading to this spread, such as being able to infect a broader range of wild birds or reaching higher viral loads in birds, causing larger and more intense outbreaks. These

the United States from January 2022 (1) (see the figure). H5Nx HPAIv have now been introduced into all continents except Australia, South America, and Antarctica, which have probably been spared because of ecological barriers to waterfowl migration from areas of endemic circulation; however, this situation could change.

What are the consequences of the H5N1 HPAIv spread? Although wild birds are able to spread these viruses through migration, the viruses may also cause their own mass mortality events. These mortality events in wild birds come with substantial conservation concern. For example, H5N1 HPAIv caused the death of hundreds of red knots (*Calidris canutus*) in the Netherlands in 2021 (5), 10,000 migratory common cranes (*Grus grus*) in Israel in December 2021 (6), ~10% of the Svalbard breeding population of barnacle geese (*Branta leucopsis*) in late 2021 (7), and hundreds of Dalmatian pelicans (*Pelecanus crispus*) in northern Greece in 2022.

Outbreaks of H5Nx HPAIv have also had a substantial impact on poultry production and cost the sector billions of dollars since their emergence. Data reported to the World Organisation for Animal Health (OIE) found that between 2005 and 2019, there were 16,620 outbreaks in poultry reported across 76 countries. In 2020–2021 alone there have been more than 3000 HPAIv events reported (8), with ~15,000,000 poultry losses (died or culled) globally as a result of H5Nx. The United Kingdom has experienced its biggest outbreak due to H5N1 HPAIv, with millions of poultry culled; there have also been 2804 outbreaks in Europe since October 2021 (up to 23 March 2022) (8, 9).

Older (Spring 22) when H5N1 was just starting to spread

EDITORIAL

Stop H5N1 influenza in US cattle now

The relentless march of a highly pathogenic avian influenza virus (HPAIV) strain, known as H5N1, to become an unprecedented panzootic continues unchecked. The leap of H5N1 clade 2.3.4.4b from Eurasia and Africa to North America in 2021 and its further spread to South America and the Antarctic have exposed new avian and mammalian populations to the virus and led to outbreaks on an unrivaled scale. The virus has infected wild birds across vast geographic regions and caused wildlife deaths in some of the world's most biodiverse ecosystems. Hundreds of millions of poultry have died or been culled, affecting global food security in some of the world's poorest regions. Numerous mammalian species, including sea lions and fur animals, have been infected. Outbreaks in dairy cows in the United States have been occurring for months, seemingly unchecked in most affected states. Why is there not a greater sense of urgency to control these infections?

Although the H5 2.3.4.4b virus seems poorly optimized for infection or spread in humans, with fewer than 20 cases since 2016, influenza leaves no room for complacency. The sheer number of infected wild birds and poultry has caused spillover infections to occur in wild carnivores, marine mammals, and farmed animals, providing additional pathways for exposure and perhaps infection in humans. The H5 virus has evolved continuously since 1996 but has never infected so many bird species nor been able to transmit to and replicate in cows. The more than 140 dairy cattle in the United States must therefore be brought under control quickly. Key measures that should be initiated or intensified immediately include surveillance of all US dairy farms by testing, for example, bulk milk for influenza virus RNA, implementation of strict quarantine for infected cattle, and restriction of within-state transport to stop the circulation of the virus in cows. Only a couple of states are attempting this currently. Biosecurity and hygiene measures on US dairy facilities must be enhanced to avoid virus spread and spillover infections. This should include simple and practical steps such as keeping work clothing on the farm, thoroughly decontaminating stock vehicles and equipment, ensuring restricted access and movement of personnel among premises, and providing appropriate personal protective equipment. Human influenza surveillance should be bolstered during the summer and before the usual human seasonal influenza wave begins in the fall. The timely development of vaccine candidates for both livestock and humans should be undertaken along with associated policies on their distribution. This is the ultimate insurance against a worst-case scenario in which viral variants emerge that spread more easily in mammals.

> "Why is there not a greater sense of urgency to control these infections?"

Globally, surveillance of mammalian cases should be intensified and real-time genomic information on the virus should be made publicly available, especially in at-risk populations (such as pig and fur animal farms). There must be in-

Nicola Lewis is director of the Worldwide Influenza Centre, The Francis Crick Institute, London, UK. nicola.lewis@crick.ac.uk

Martin Beer is head of the Institute of Virology and vice president of the Friedrich-Loeffler-Institut, Greifswald, Germany. martin.beer@fli.de

AVMA American Veterinary Medical Association

Join/Renew Insurance Store Careers

MEMBERSHIP ADVOCACY EDUCATION & CAREER RESOURCES & TOOLS EVENTS NEWS ABOUT

HOME ▸ AVMA NEWS ▸ NOVEL BIRD FLU STRAIN CONTINUES TO THREATEN ANIMAL, PUBLIC HEALTH

AVMA | News

Novel bird flu strain continues to threaten animal, public health

Government response strengthened as outbreak nears fourth year

Newer (Fall 24)- it has spread far and wide!

Life

Bird flu has killed 20 critically endangered California condors

A recent outbreak of avian flu has killed 7 per cent of the wild population of California condors, and officials are bracing for the virus' spread

By Corryn Wetzel

26 April 2023