

# Avian pathogens, the flu, and how disease in birds may pertain to you

Andy Ramey<sup>1</sup> and Mike Petrula<sup>2</sup>

*<sup>1</sup>US Geological Survey, Alaska Science Center*

*<sup>2</sup>Alaska Department of Fish and Game*

# Road map

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1. What are avian pathogens and why we should care about them?
2. Influenza A viruses in wild birds and how they relate to domestic animal and human population health
3. Some general recommendations on how to minimize your exposure risk and how to respond to avian mortality events







Avian pathogens can be:

- bacterial
- viral
- fungal
- parasitic



Is this bird infected with avian malaria?



How about this bird?



We can only be certain using diagnostic tests.



Avian disease outbreaks can:

impact ecosystem health/affect hunting opportunities



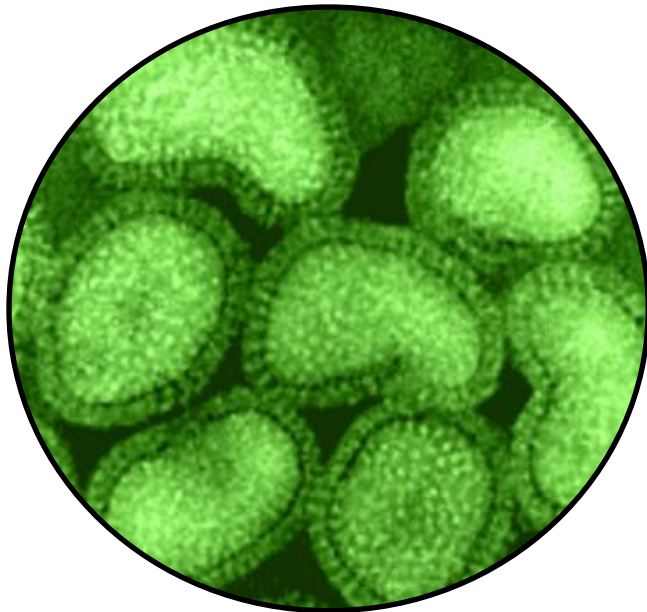
cause poultry losses



and lead to human disease



# Influenza A viruses



Orthomyxoviruses

single-stranded negative sense RNA

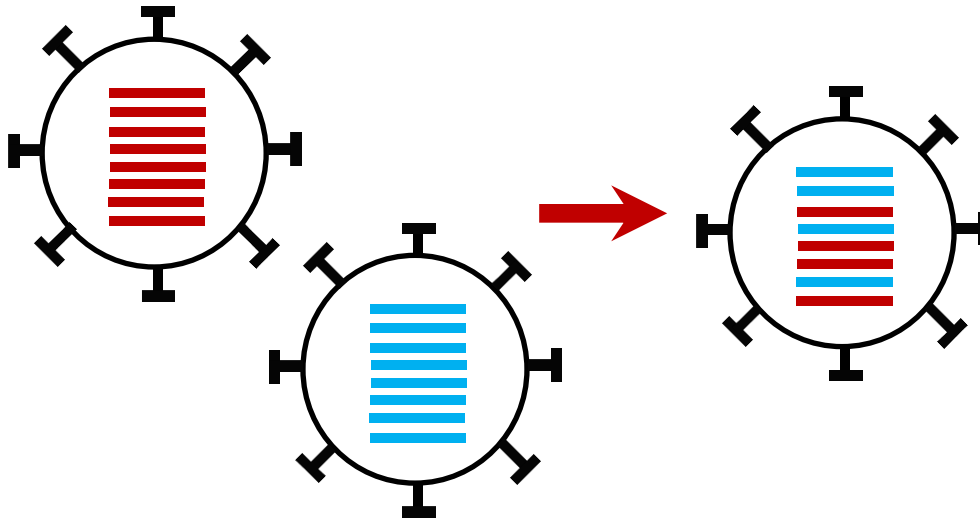
segmented

1. PB2
2. PB1
3. PA
4. HA
5. NP
6. NA
7. M
8. NS



# Evolution of Influenza A viruses

Antigenic shift (i.e., reassortment)



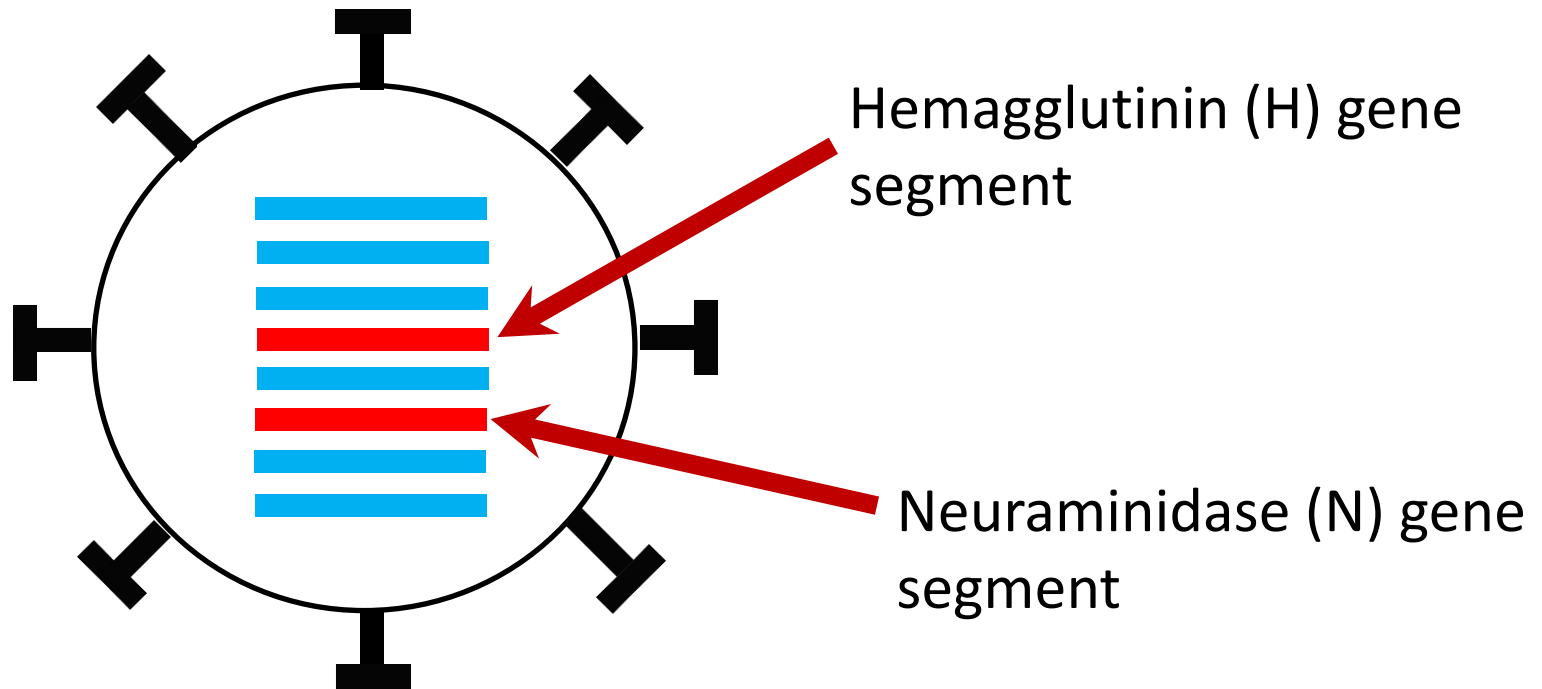
Antigenic drift (i.e., accumulation of point mutations)

GAUC → GGUC → GGGC → GGGG





# Nomenclature of viruses



# Reservoir of influenza A viruses



AVIAN DISEASES vol. 18 no. 1

Type-A Influenza Viruses Isolated from  
Wild Free-Flying Ducks in California

Richard D. Slemons,<sup>A</sup> Daryle C. Johnson,<sup>B</sup> John S. Osborn,<sup>C</sup> and Frank Hayes<sup>D</sup>

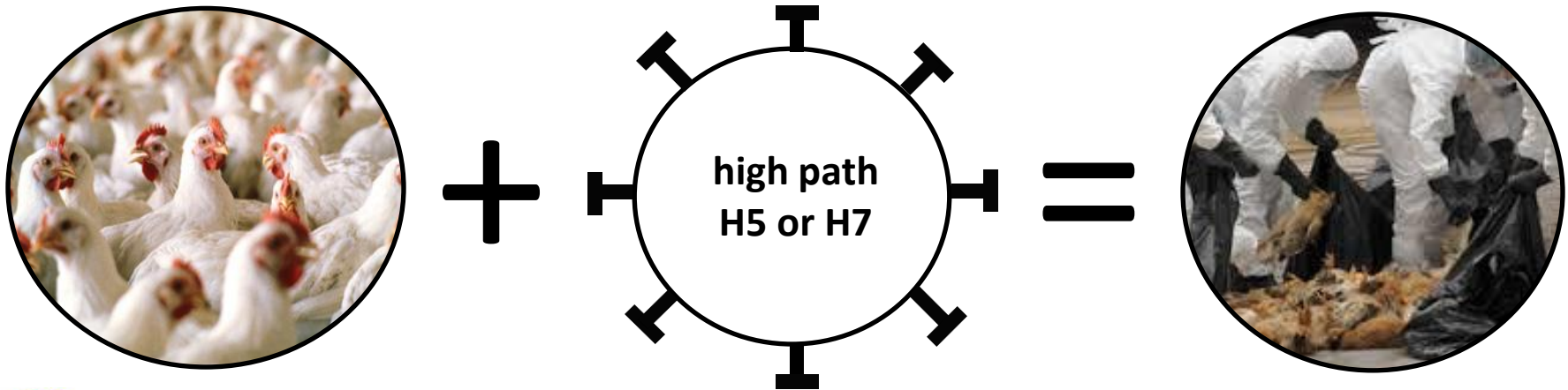
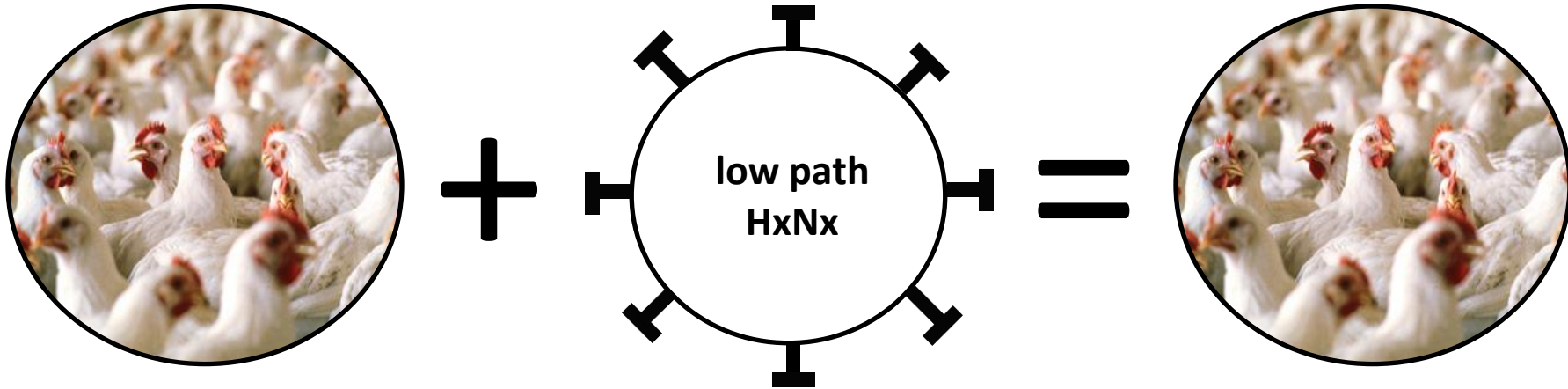
Received 10 September 1973

SUMMARY

From 6 October 1972 to 3 December 1972, 41 type-A influenza virus isolants were recovered from free-flying wild ducks, and 7 isolants from domestic ducks in southern California. The type-specific antigen (ribonucleoprotein) was identified by the agar-gel-diffusion test, and tentative identification of one strain-specific antigen (hemagglutinin) was attempted by the hemagglutination-inhibition test. These isolants support the theories that wild birds play an important role in the dissemination of type-A influenza viruses and may provide optimum conditions for genetic interaction of type-A influenza viruses, resulting in new hybrid strains.



# Pathogenicity of viruses





# Highly pathogenic H5N1 influenza A



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**MMWR**

*Weekly*

December 19, 1997 / 46(50);1204-1207

## Isolation of Avian Influenza A(H5N1) Viruses from Humans -- Hong Kong, May-December 1997

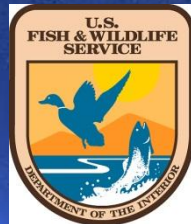
### News Focus

As H5N1 reaches Europe, scientists debate the role of wild birds but agree on the need for greater surveillance

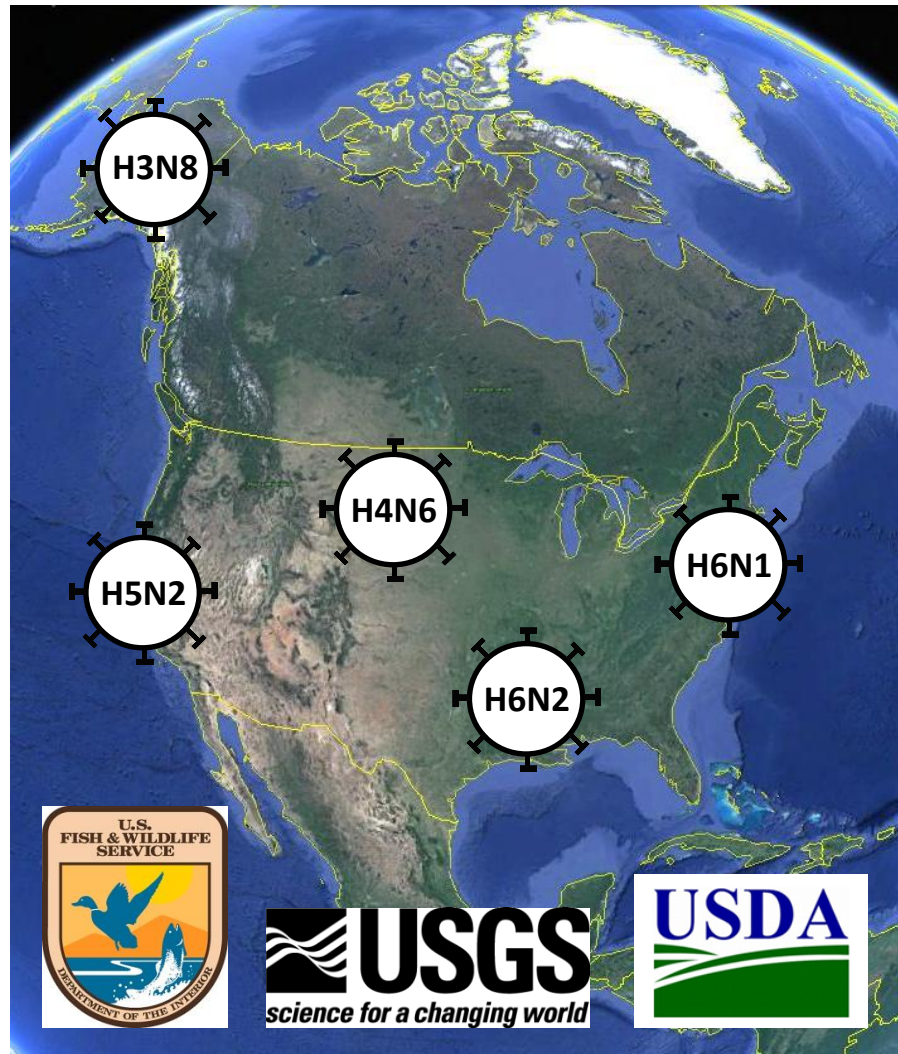
## Are Wild Birds to Blame?



# Intensive interagency surveillance sampling



# Intensive interagency surveillance sampling



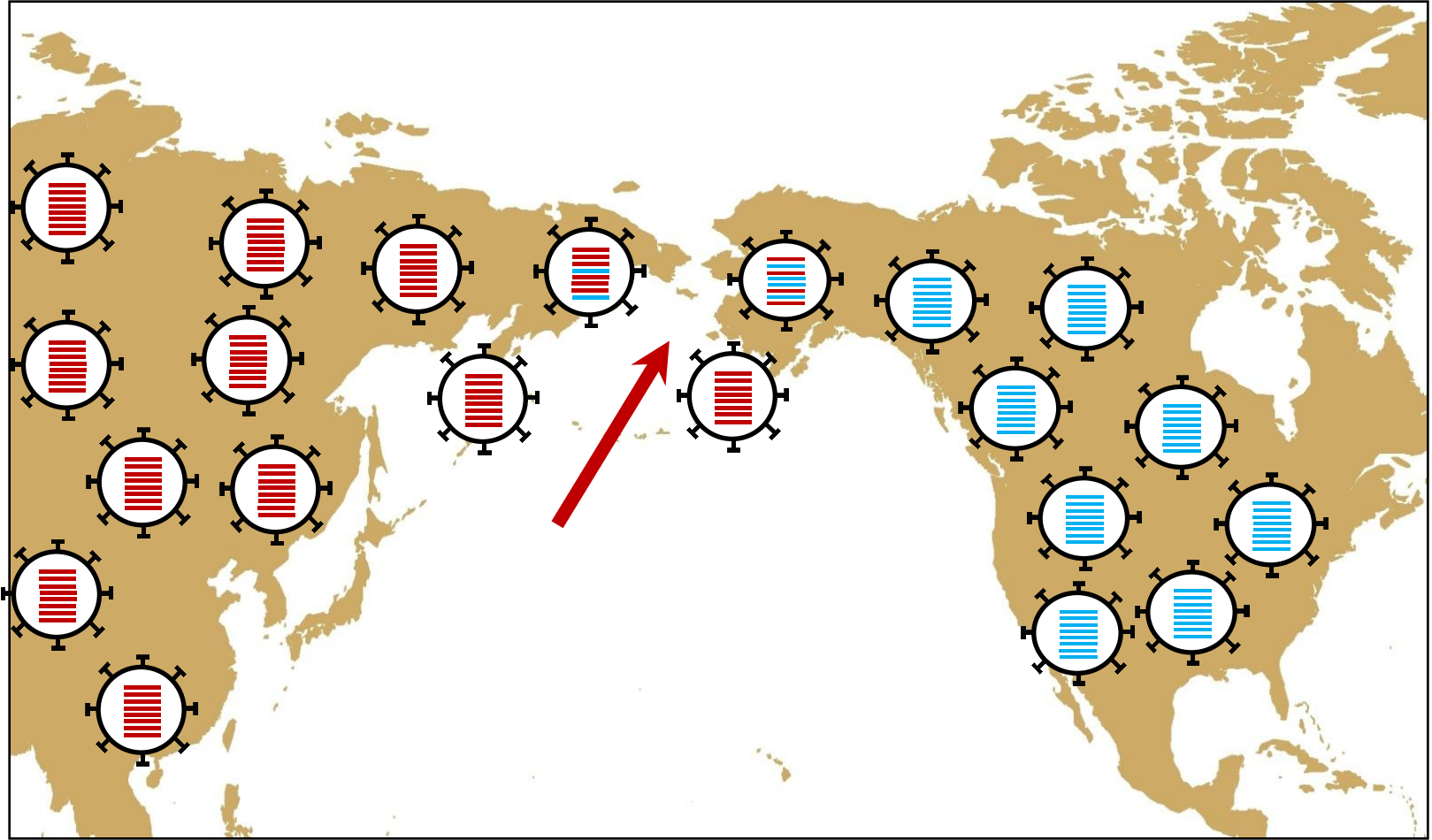


# Can genomic characterization inform surveillance?





# Can genomic characterization inform surveillance?



# Novel Reassortant Influenza A(H5N8) Viruses, South Korea, 2014

To the Editor: Highly pathogenic avian influenza (HPAI) viruses have caused considerable economic losses to the poultry industry and poses potential threats to animal and human health ([www.oie.int/en/](http://www.oie.int/en/) and [www.who.int/en/](http://www.who.int/en/)).

Occurrence of highly pathogenic avian influenza in South Korea (H5N8 subtype) (~ January 2014)

(Information of February 1 date and time point, 2015) **New!**



## H5N8 strikes birds in Netherlands, possibly England

Filed Under: **Avian Influenza (Bird Flu)**

Robert Roos | News Editor | CIDRAP News | Nov 17, 2014

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The H5N8 variety of avian influenza virus, which hit hard in Korea earlier this year, is now raising alarm among European poultry owners, with an outbreak detected in the Netherlands and a probable one reported in Britain over the weekend, following one in Germany earlier this month.

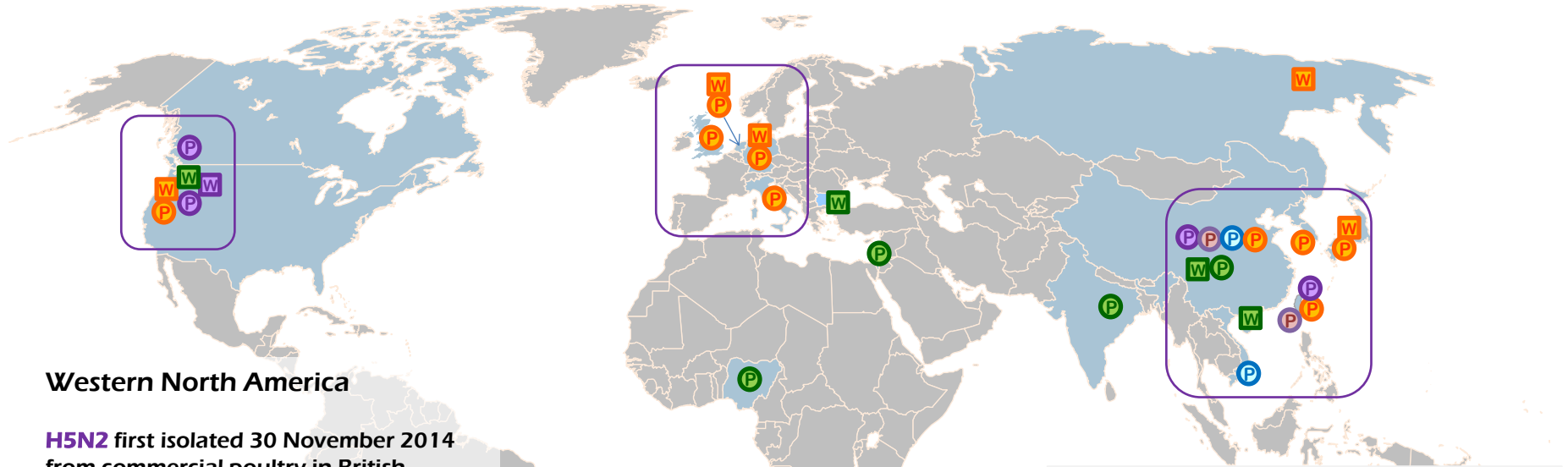
The virus, which has never been reported to infect humans, may have used wild birds to catch a ride from East Asia to Europe, European authorities and the United Nations Food and Agriculture Organization (FAO) said today.



bariskaradeniz / iStock



# H5 HPAI reports from North America November 2014 through January 2015 (OIE)



## Western North America

**H5N2** first isolated 30 November 2014 from commercial poultry in British Columbia; outbreak continues into 2015.

**H5N8** first isolated 10 December 2014 from captive wild birds in Washington; later isolated from backyard poultry in Oregon. Similarly, **H5N2** identified in US wild birds and backyard poultry.

**H5N1** first isolated 29 December 2014 from wild duck in Washington.

**H5N8** isolated 19 January 2015 from commercial turkey farm in California.

## Western Europe

**H5N8** first isolated 4 November 2014 from commercial poultry in Germany; also isolated in November from a wild duck.

By mid-December, **H5N8** was isolated from commercial poultry in The Netherlands, United Kingdom, and Italy.

## Eastern Asia

Reports of H5 HPAI subsided in the region during summer 2014. Then in September, outbreaks of **H5N1**, **H5N2**, **H5N6**, **H5N8** HPAI occurred in China.

Original **H5N8** outbreak occurred January-April, 2014, most intensely in S. Korea and Japan. After 5 months with no reported cases, H5N8 was detected again, 24 September, in S. Korean commercial poultry. It was detected again in Japan in November.

**W** H5N1 in wild birds  
**P** H5N1 in poultry

**W** H5N2 in wild birds  
**P** H5N2 in poultry

**W** H5N3 in wild birds  
**P** H5N3 in poultry

**W** H5N6 in wild birds  
**P** H5N6 in poultry

**W** H5N8 in wild birds  
**P** H5N8 in poultry

# General recommendations for hunters

- Do not handle or eat sick game.
- Prepare game in a well-ventilated area.
- Wear rubber or disposable latex gloves while handling and cleaning game.
- Wash hands and thoroughly clean knives, equipment and surfaces that come in contact with game.
- Do not eat, drink, or smoke while handling animals.
- All game should be thoroughly cooked to an internal temperature of 165 degrees





If you observe unusual avian mortality\*  
contact:

National Wildlife Health Center  
(608) 270-2480  
NWHC-epi@usgs.gov

\* sick/dead waterfowl, sick dead scavengers/raptors, mortality events exceeding 500 birds, or mortality events in close proximity to domestic birds



Dead or sick domestic birds should be reported to  
the Department of Environmental Conservation:

(907) 375-8215

for more information, contact Dr. Bob Gerlach

[bob.gerlach@alaska.gov](mailto:bob.gerlach@alaska.gov), (907) 375-8214

Dead or sick wild birds may also be reported to  
ADF&G Wildlife Health and Disease Surveillance

Program: (907) 328-8354

email: [dfg.dwc.vet@alaska.gov](mailto:dfg.dwc.vet@alaska.gov)

or to the U.S. Fish and Wildlife Service Avian Disease

Hotline:

1-866-527-3358



# For further information:

The USGS National Wildlife Health Center:

<http://www.nwhc.usgs.gov>

The Alaska Department of Fish and Game:

<http://www.adfg.alaska.gov>

The USGS Alaska Science Center:

<http://alaska.usgs.gov>

