



# AVIAN INFLUENZA OVERVIEW MARCH – APRIL 2023

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Animal Health Team

# MONITORING HPAI OUTBREAKS

- Update of the avian influenza situation in **poultry, captive** and **wild birds** in Europe and beyond

- Spatio-temporal
- Evolutionary
- Characterisation



APPROVED: 10 May 2023

doi: 10.2903/j.efsa.2023.8039

## Avian influenza overview March – April 2023

European Food Safety Authority,  
European Centre for Disease Prevention and Control,  
European Union Reference Laboratory for Avian Influenza,  
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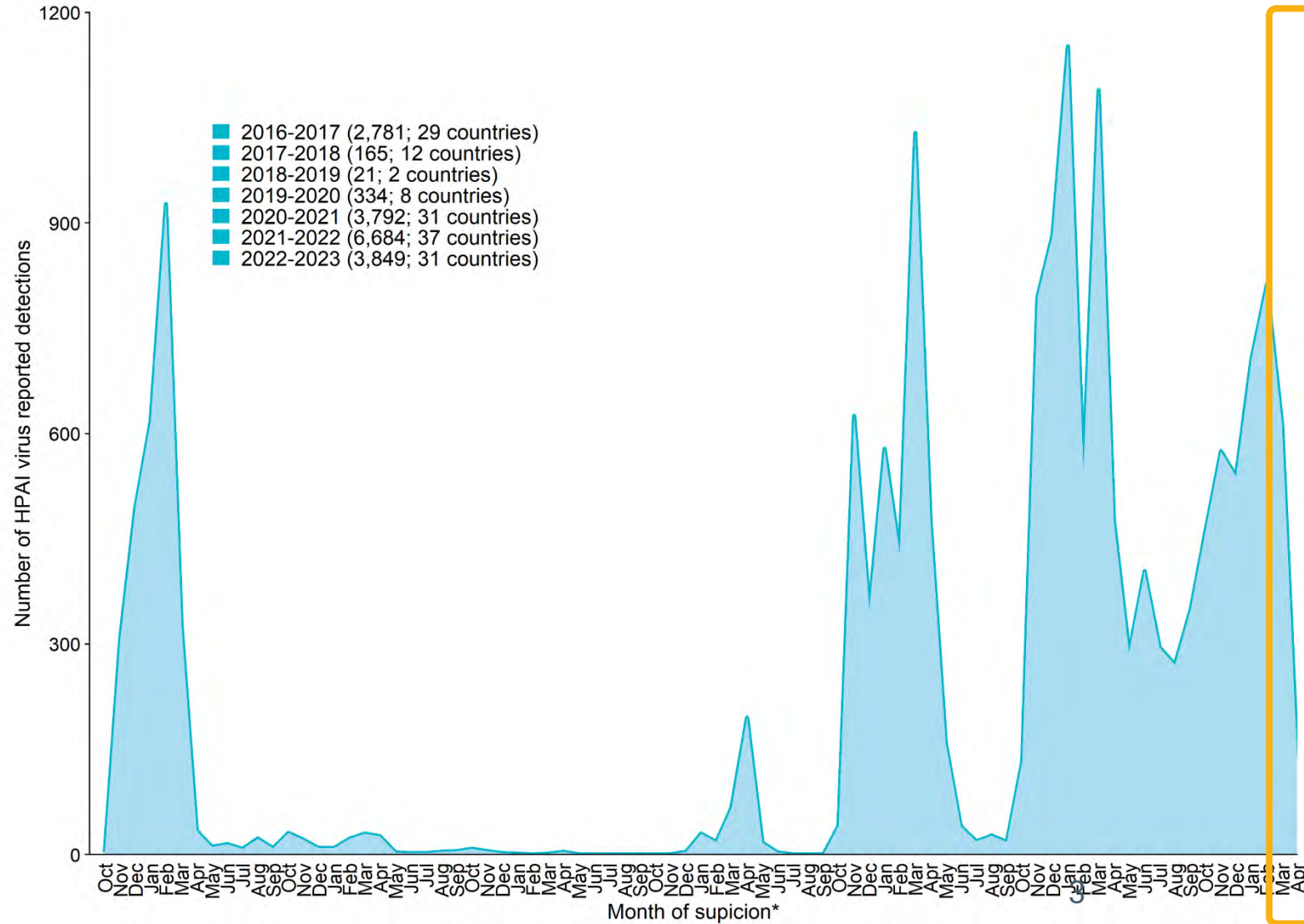
- Joint SC
- Currently



# HPAI IN EUROPE IN BIRDS

Distribution of HPAI virus detections reported in EU/EEA and the UK by epidemic seasons and month of suspicion

1 Oct 2016 – 28 Apr 2023 (17,626)



\*When the date of suspicion is not available then the date of confirmation is used to assign the month of suspicion

Source: EFSA/ECDC/EURL avian influenza reports [https://efsa.onlinelibrary.wiley.com/doi/toc/10.1002/\(ISSN\)1831-4792.avianinfluenza](https://efsa.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1831-4792.avianinfluenza)

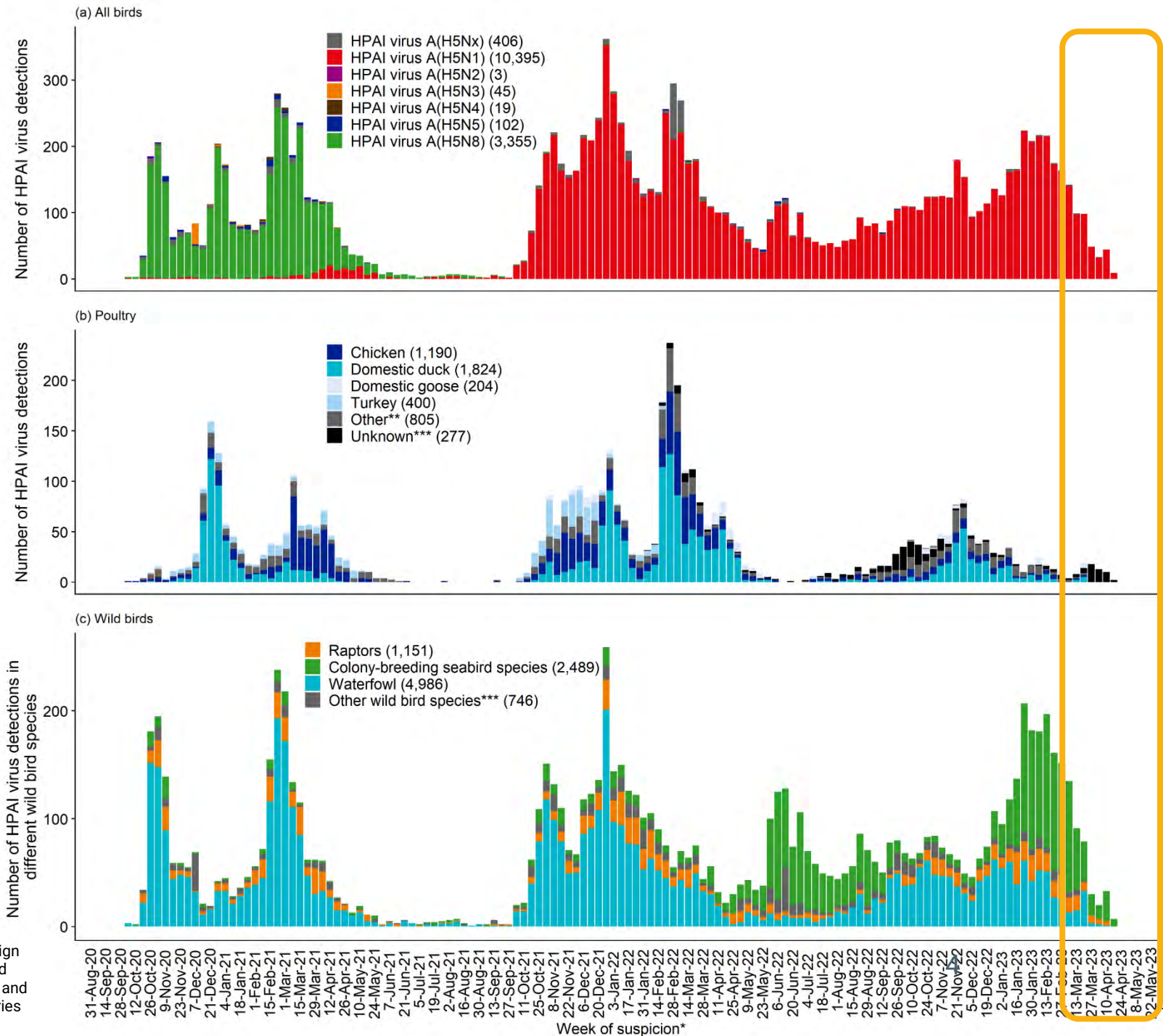


# HPAI IN EUROPE IN BIRDS

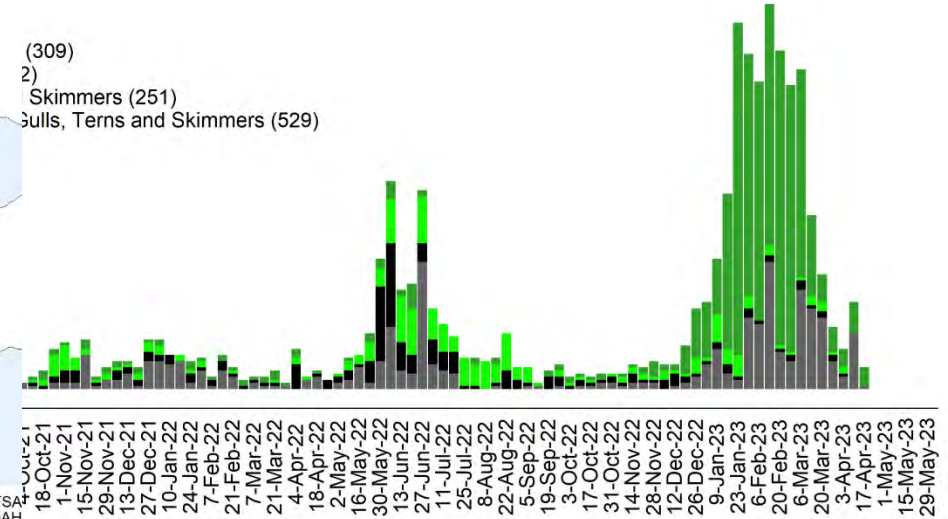
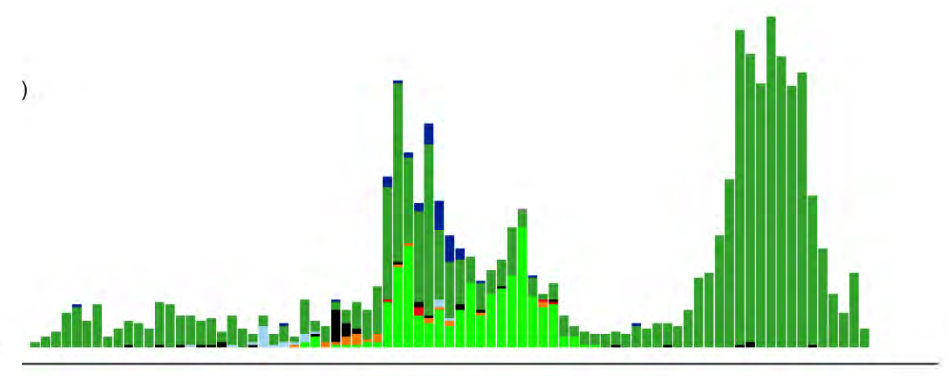
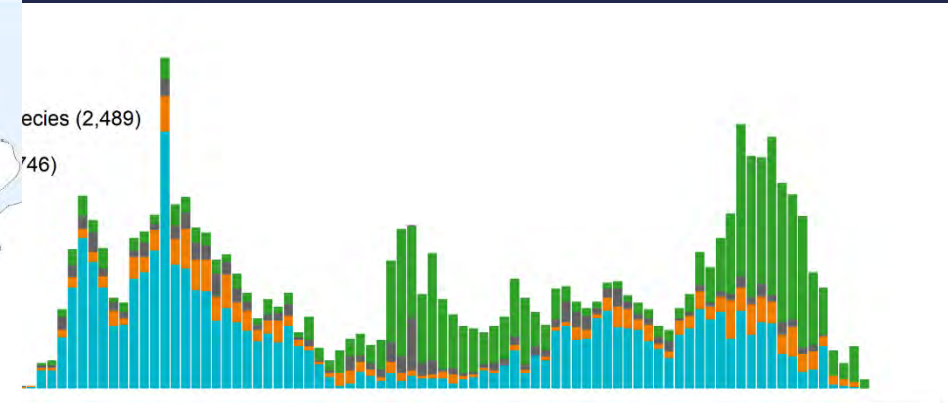
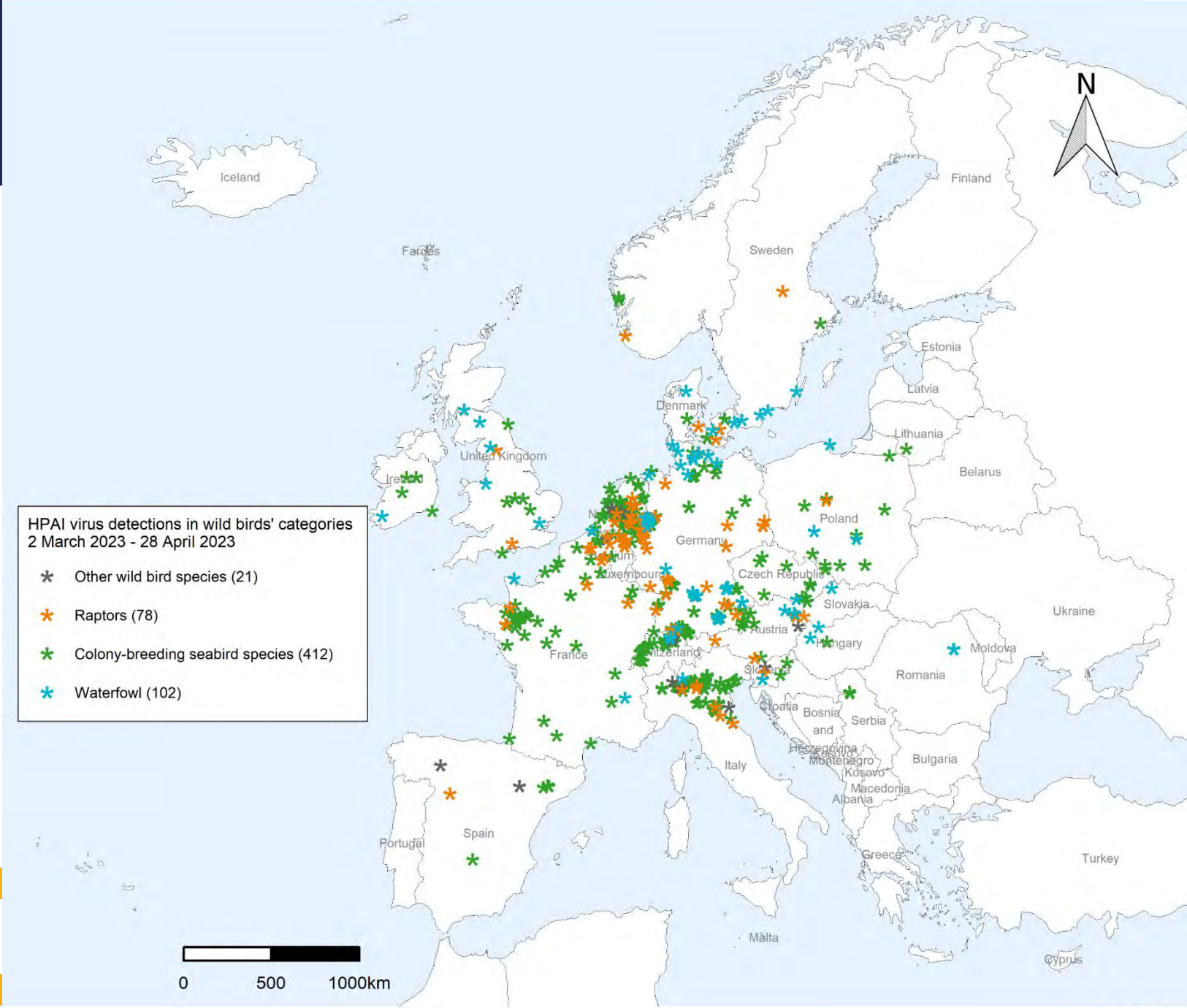
Distribution of total number of HPAI virus detections reported in Europe by week of suspicion and

- a. virus subtype
- b. affected poultry categories
- c. affected wild bird categories

5 Oct 2020 – 28 Apr 2023

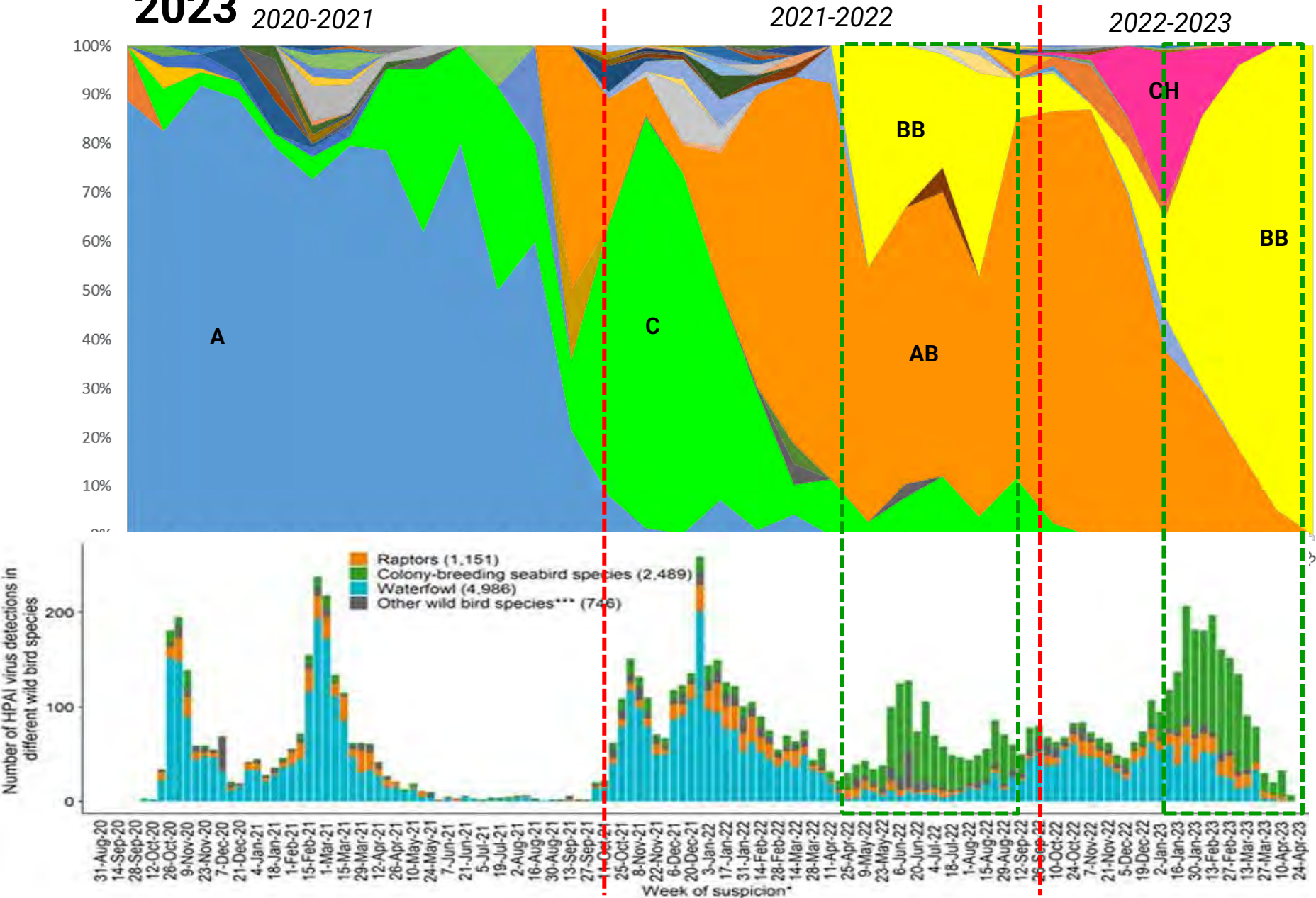


\* When the date of suspicion is not available then the date of confirmation is used to assign the week of suspicion. \*\* 'Other domestic species' category contains mixed, unknown bird species, or categories different from those displayed (i.e guinea fowl, peacock, pheasant and quail). \*\*\* 'Other wild species' category contains mixed, unknown bird species, or categories different from those displayed





# Temporal dynamics of the virus genotypes: January 2021 - April 2023



**H5N1-Genotype C**  
Eurasian wigeon/Netherlands-like

**H5N1-Genotype AB**  
Duck/Saratov-like

**H5N1-Genotype BB**  
Herring gull/France-like

PB2  
 PB1  
 PA  
 HA  
 NP  
 NA  
 M  
 NS

■ H5N1 A/duck/Saratov/29-02/2021-like  
■ gull-adapted H13 subtype

Source: EFSA, Scientific report: Avian influenza overview March-April 2023. EFSA Journal 2023:  
<https://doi.org/10.2903/j.efsa.2023.8039>

# Mutations identified in A(H5N1) from avian species in Europe (2022-2023)

EFFECT: enhance polymerase activity and replication in mammals or mammalian cells		
PB2	T271A	1
	I292V	9
	K389R	All/almost all viruses
	V598T/I	All/almost all viruses
	627K	2
NS1	D701N	1
	I106M [I101M]	All/almost all viruses
	C138F	All/almost all viruses
EFFECT: in vitro increase binding to human-type receptors alpha2,6-SA		
HA	S137A	All/almost all viruses
	S158N	All/almost all viruses
	T160A	All/almost all viruses
	T192I	1
	S159N	8
	Q196R	1
	V214I	15
	S128P-R496K (R167K)	1

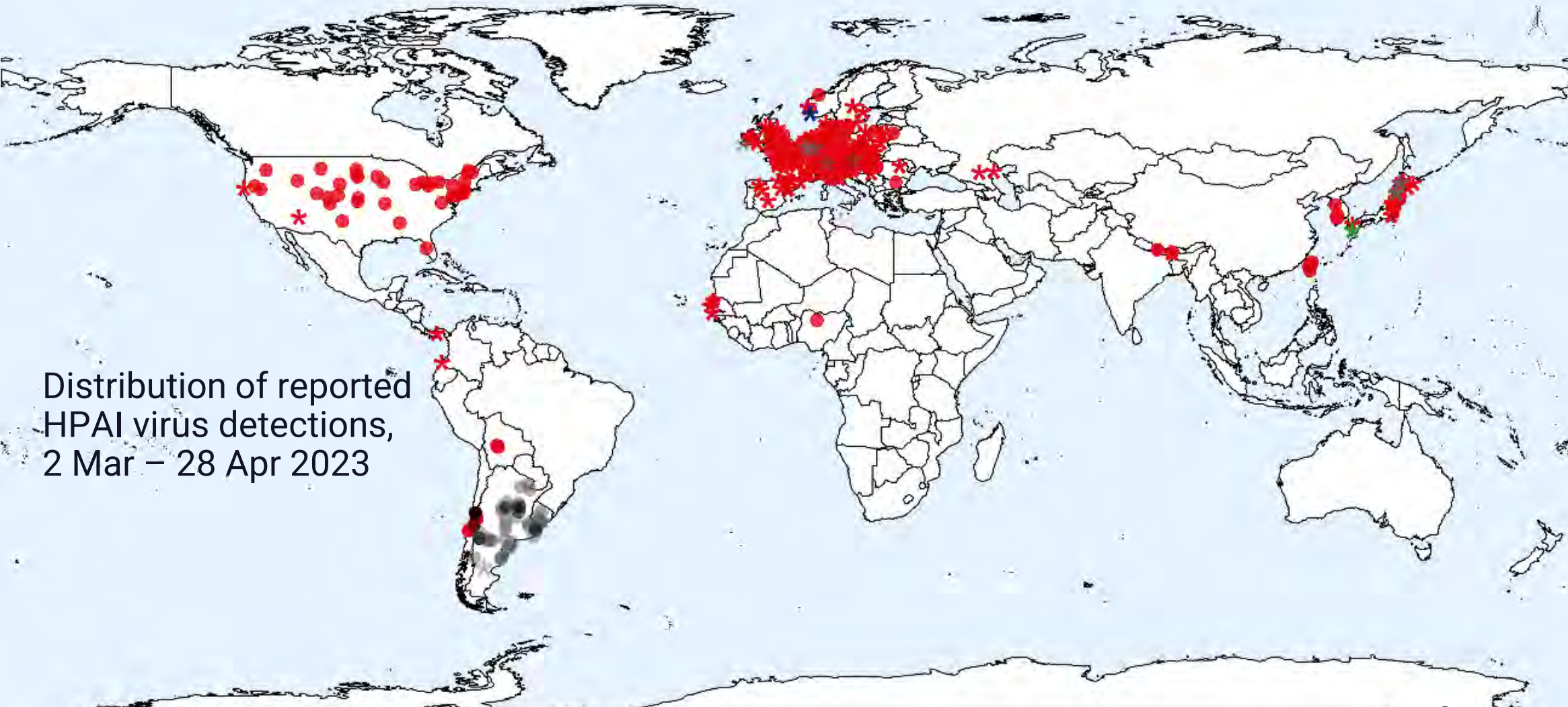
EFFECT: increase virulence			
NS1	P42S	All/almost all viruses	
	V149A	All	
	L103F, I106M	All/almost all viruses	
	K55E, K66E, C138F	All/almost all viruses	
	227ESEV230 (PDZ domain)	All/almost all viruses	
EFFECT: resistance toward antiviral drugs			
M2	27I	3	
PA	A36V	3	
EFFECT: decrease antiviral response in ferrets			
NS1	N205S (with NS2: T47A)	All/almost all viruses	
EFFECT: disruption of the second sialic acid binding site (2SBS)			
NA	S369I	266	BB
	S369C/N/R	17	
	K432E/N	33	
EFFECT: evade human BTN3A3 (a potent inhibitor of avian but not human influenza A viruses replication)			
NP	Y52N	354	BB

Molecular analyses of the studied A(H5N1) viruses circulating in birds in Europe during the 2022–2023 epidemiological year indicate that these viruses continue to be well-adapted to avian species, as they retain a preferential binding for avian-like receptors

The real effect of these mutations on the biological characteristics of the viruses is still unknown and further studies are needed to improve existing knowledge



# HPAI WORLDWIDE IN BIRDS



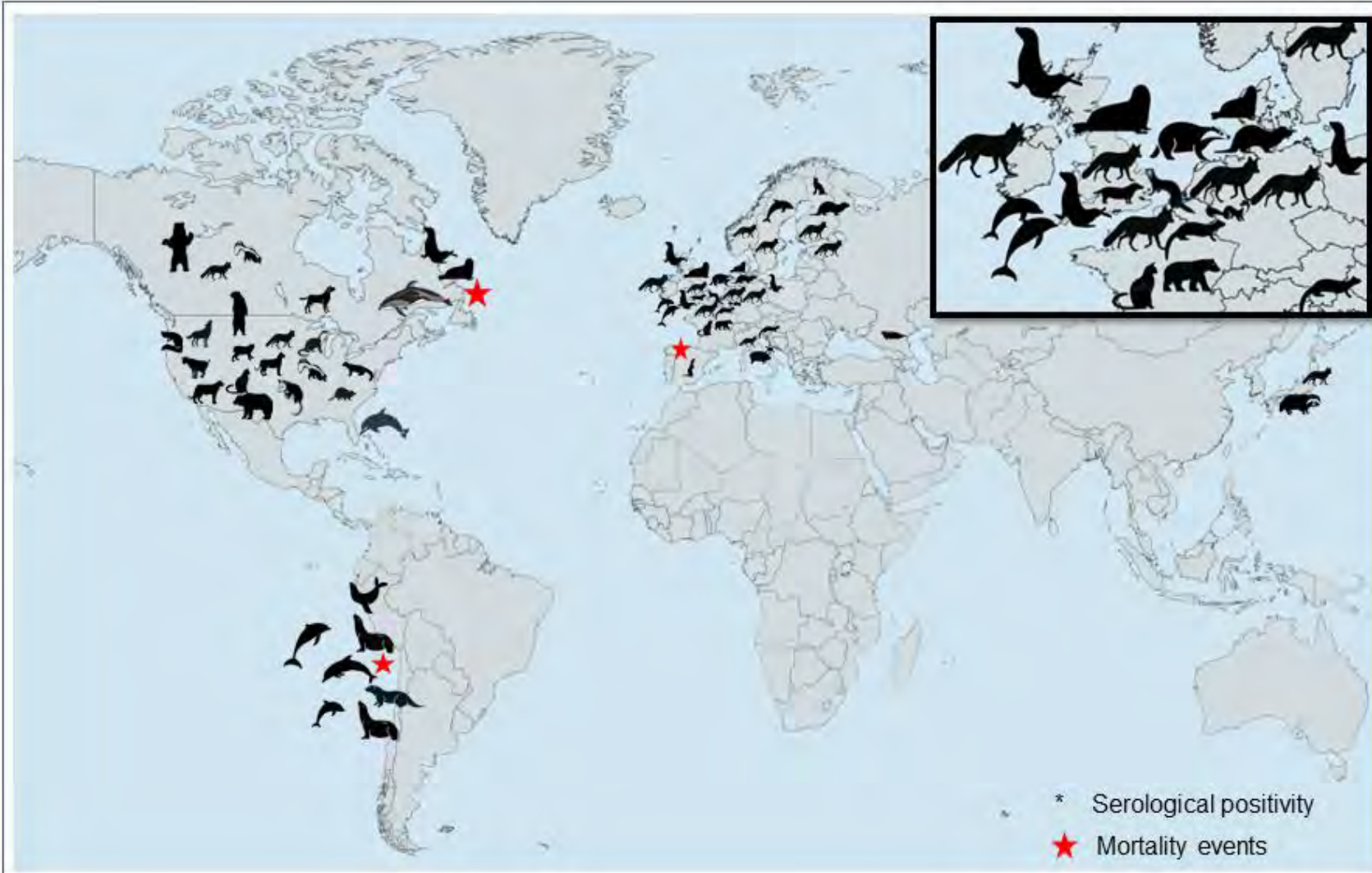
Distribution of reported HPAI virus detections, 2 Mar – 28 Apr 2023

HPAI detection

- Red circle: A(H5N1), domestic birds (189)
- Red star: A(H5N5), wild birds (1)
- Grey circle: A(H5Nx), domestic birds (41)
- Dark grey circle: A(Not typed), domestic birds (9)

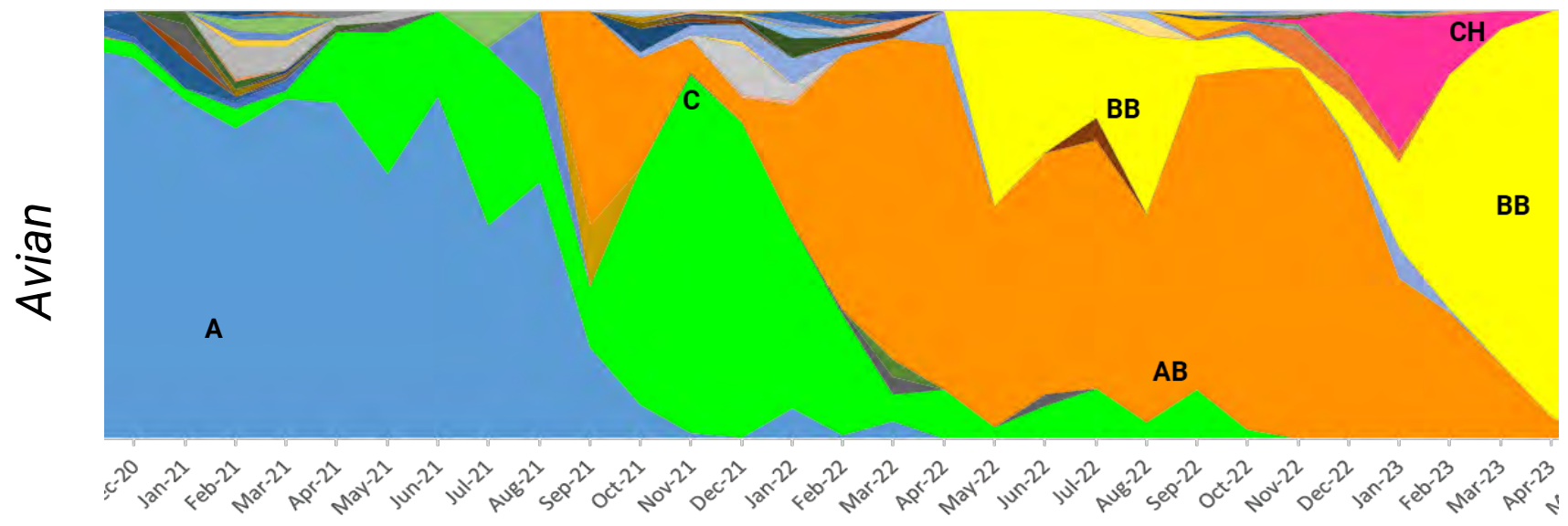
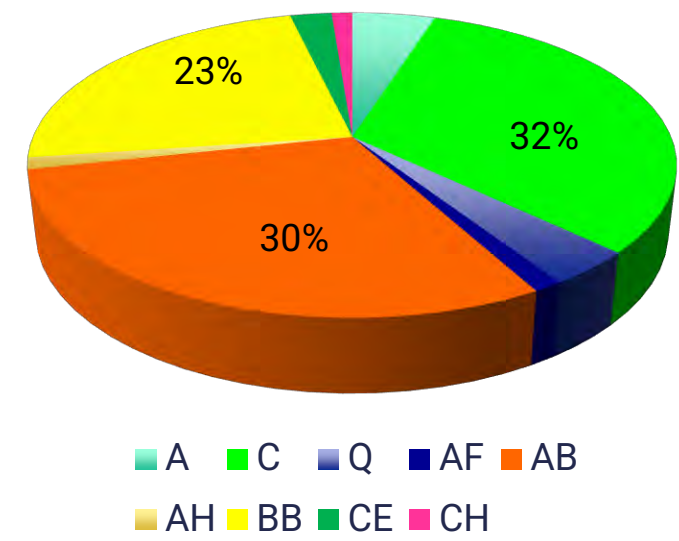
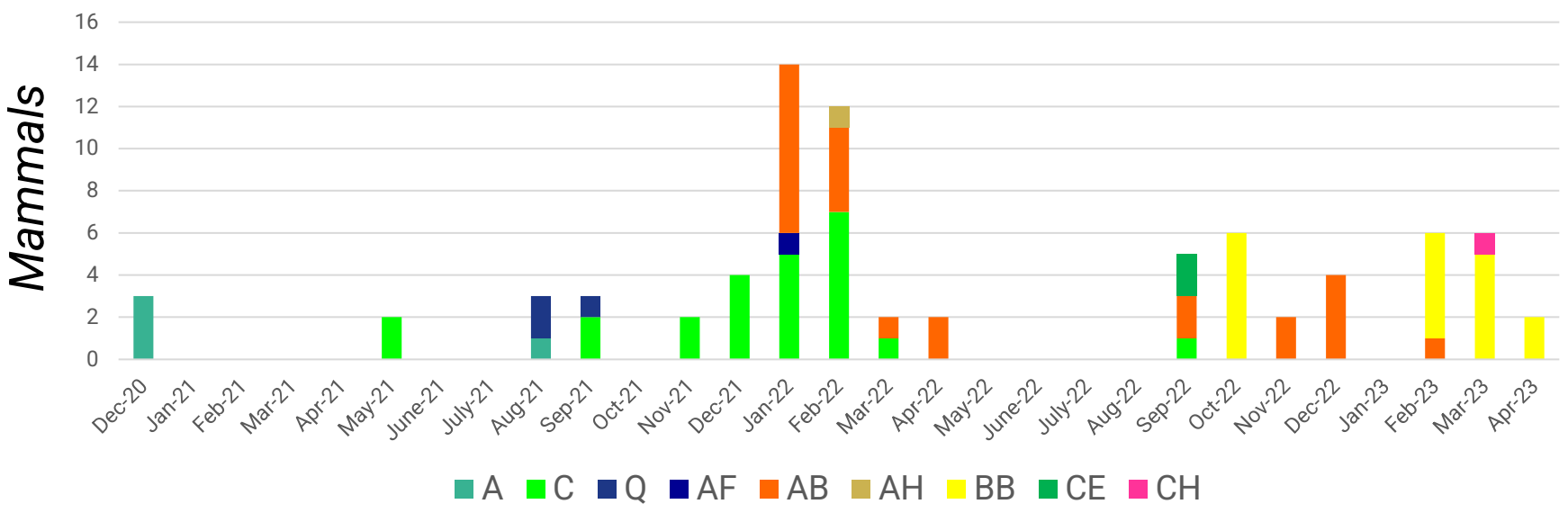


# HPAI IN MAMMAL SPECIES OTHER THAN HUMANS



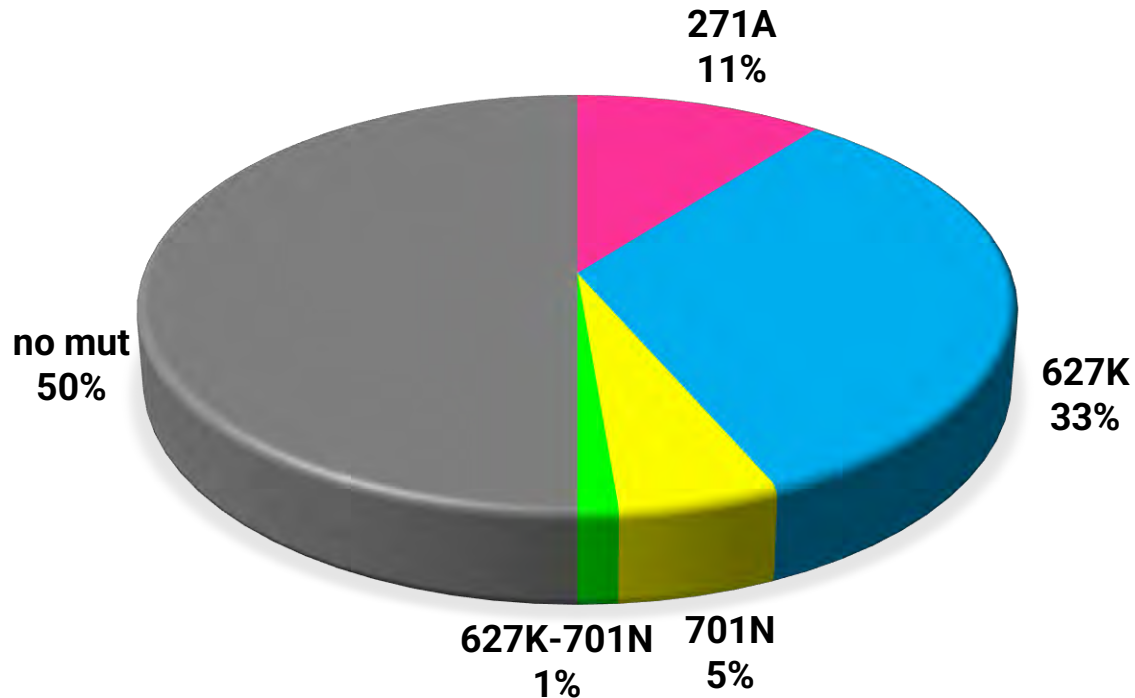
- |   |  |
|---|--|
| American black bear ( <i>Ursus americanus</i> )         | Burmeister's porpoise ( <i>Phocoena spinipolus</i> )   |
| American mink ( <i>Neogale vison</i> )                  | Caspian seal ( <i>Pusa caspica</i> )                   |
| American pine marten ( <i>Martes americana</i> )        | Cat ( <i>Felis catus</i> )                             |
| Amur leopard ( <i>Panthera pardus orientalis</i> )      | Chilean dolphin ( <i>Cephalorhynchus eutropia</i> )    |
| Amur tiger ( <i>Panthera tigris</i> )                   | Common dolphin ( <i>Delphinus delphi</i> )             |
| Asiatic black bear ( <i>Ursus thibetanus</i> )          | Coyote ( <i>Canis latrans</i> )                        |
| Bobcat ( <i>Lynx rufus</i> )                            | Dog ( <i>Canis familiaris</i> )                        |
| Beech marten ( <i>Martes foina</i> )                    | Eurasian badger ( <i>Meles meles</i> )                 |
| Bottlenose dolphin ( <i>Tursiops truncatus</i> )        | Eurasian lynx ( <i>Lynx lynx</i> )                     |
| Brown bear ( <i>Ursus arctos</i> )                      | Eurasian otter ( <i>Lutra lutra</i> )                  |
| European polecat ( <i>Mustela putorius</i> )            | Porpoise ( <i>Phocoena phocoena</i> )                  |
| Ferret ( <i>Mustela furo</i> )                          | Raccoon ( <i>Procyon lotor</i> )                       |
| Fisher cat ( <i>Pekania pennanti</i> )                  | Red fox ( <i>Vulpes vulpes</i> )                       |
| Grey seal ( <i>Halichoerus grypus</i> )                 | Skunk ( <i>Mephitis mephitis</i> )                     |
| Harbour seal ( <i>Phoca vitulina</i> )                  | South America fur seal ( <i>Arctophoca australis</i> ) |
| Japanese raccoon dog ( <i>Nyctereutes viverrinus</i> )  | South American bush dogs ( <i>Speothos venaticus</i> ) |
| Kodiak grizzly bear ( <i>Ursus arctos horribilis</i> )  | South American sea lion ( <i>Otaria flavescens</i> )   |
| Marine otter ( <i>Lontra felina</i> )                   | Virginia opossum ( <i>Didelphis virginiana</i> )       |
| Mountain lion ( <i>Puma concolor</i> )                  | White-sided dolphin ( <i>Lagenorhynchus acutus</i> )   |
| North American river otter ( <i>Lontra canadensis</i> ) | Pig ( <i>Sus scrofa</i> )                              |

# Genetic diversity of A(H5Nx) in mammals in Europe (2020-2023)



All the characterized viruses belong to 9 different A(H5N1) and A(H5N8) genotypes previously identified in birds, with most of the viruses (86%) belonging to the 3 most widespread genotypes in birds in Europe: C, AB and BB

# Mutations identified in A(H5Nx) from mammals In Europe (2020-2023)



**50%** of the characterized viruses from mammals contain at least **one of the adaptive markers** associated with an **increased virulence and replication in mammals** in the **PB2** protein (E627K, D701N or T271A) (Suttie et al., 2019).

These mutations have rarely been identified in the HPAI A(H5) viruses of clade 2.3.4.4b collected in birds in Europe since October 2020 (<0.5% of viral sequences from birds).



# HUMAN CASES DUE TO AVIAN INFLUENZA, 2023



Subtype	New cases in 2023	Total cases (deaths)	Countries reporting human cases
A(H3N8)	One case: China	3 (0) Since 2022	China
A(H5N1)	Seven cases: Cambodia, Chile, China and Ecuador  2 United Kingdom (asymptomatic, involved in culling during outbreak)	876 (457) Since 2004	23 countries reported cases,  EU/EEA: Spain with virus fragment detections in two poultry workers considered contamination and no productive infections
A(H5N6)	No new case	84 (33) Since 2014	China (83), Laos (1)
A(H9N2)	Five cases: China	123 (2) Since 998	No EU/EEA country;  China (107), Egypt (4), Bangladesh (3), Cambodia (2), Oman (1), Pakistan (1), India (1), Senegal (1)

# RISK ASSESSMENT REMAINS VALID



The risk of human infection due to avian influenza viruses of the currently circulating clade 2.3.4.4b in Europe is assessed as low for the general population and low to moderate for people occupationally or otherwise HPAI virus exposed

**But...**

Sporadic human infections with severe disease in the EU/EEA cannot be excluded

## OPTIONS FOR RESPONSE

- Passive surveillance in poultry could be complemented by active surveillance (**bucket sampling**) and testing of birds before slaughter is highly recommended to increase early detection
- **Close monitoring of seabird** breeding colonies, including black-headed gulls, for unusual mortality will allow for the early detection of HPAI virus and, if appropriate, to **remove carcasses** for the reduction of environmental contamination and therefore reduced mortality
- **Serological surveillance in seabirds**, in particular in endangered species, is urgently needed to evaluate the real level of virus circulation in those species as well as their immune protection
- **Species identification** remains of utmost importance for the correct interpretation of passive surveillance efforts in wild birds





## OPTIONS FOR RESPONSE

- Better, **more accurate and timely reporting of HPAI virus detections in mammals** in a way that reliable numbers of infected animals could be used as quantitative information for risk assessment
- **Avoid exposure of carnivore pets to dead or diseased animals** (mammals and birds) in areas where mortality in gulls or other potentially HPAI virus-infected animals are reported
- Extended and **enhanced surveillance** of both wild **mammals** (particularly carnivores and cetacean) and farmed mammals (particularly **American mink and domestic pigs**) in risk areas where HPAI is present in wild birds and poultry is recommended
- Thoroughly **investigate the dynamic of the infection in case of mass mortality** events associated with HPAI virus detected in mammalian species



# EXPERT INVOLVED

## Member State representative for avian influenza


### Working group members

- ADLHOCH Cornelia (ECDC)
- FUSARO Alice (EURL)
- GONZALES Josè (WUR)
- KUIKEN Thijs (Erasmus MC)
- MIRINAVICIUTE Grazina (ECDC)
- NIQUEUX Eric (ANSES)
- STAHL Karl (SVA)
- STAUBACH Christoph (FLI)
- TERREGINO Calogero (EURL)

### EFSA

- BALDINELLI Francesca
- BROGLIA Alessandro
- KOHLNE Lisa
- KERO Linnea
- LANFRANCHI Barbara





Thank you for your  
attention

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