Istituto Zooprofilattico Sperimentale delle Venezie

Tra persistenza e cambiamento: l'influenza aviaria in Italia e nel mondo

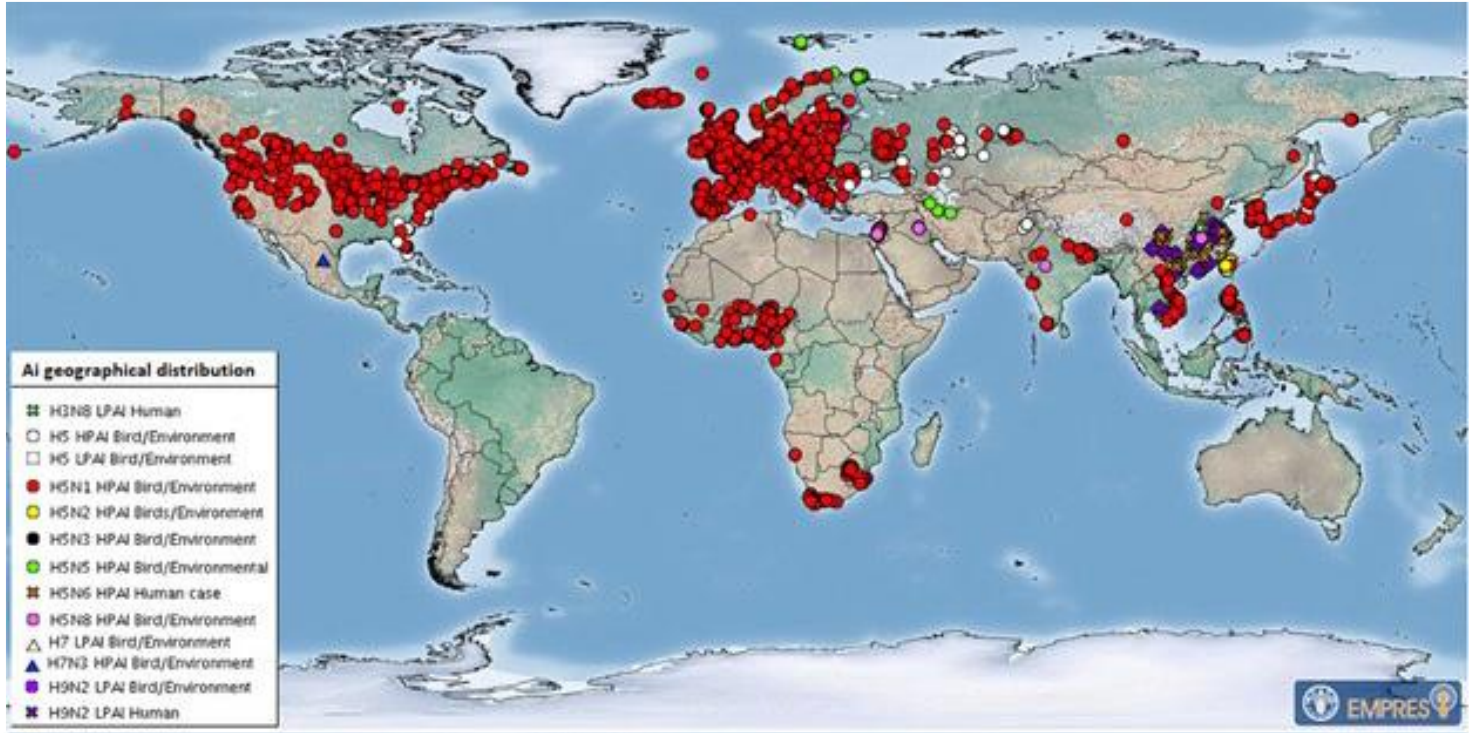
Calogero Terregino

Laboratorio di Referenza dell'Unione Europea/FAO/WOAH e Centro di Referenza nazionale per l'influenza aviaria e la malattia di Newcastle

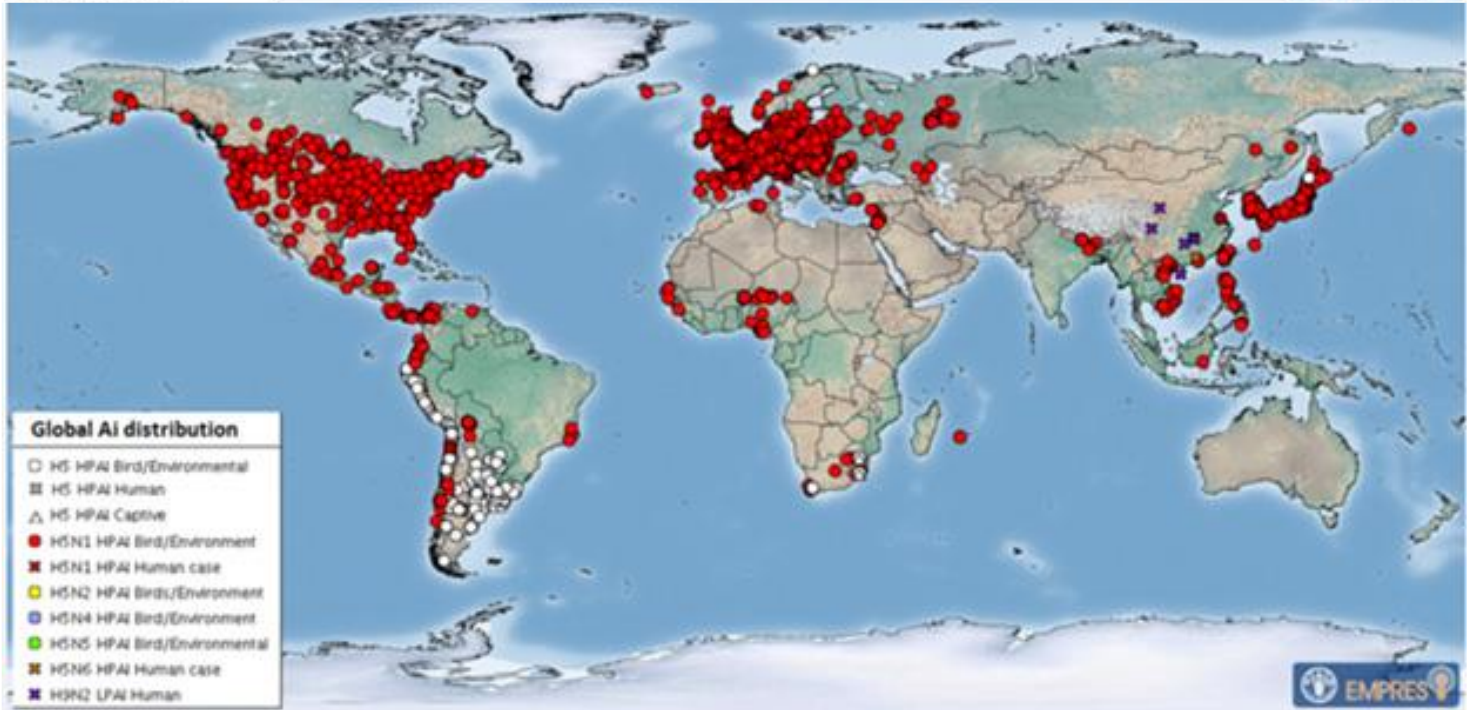
Istituto Zooprofilattico Sperimentale delle Venezie

Convegno S.I.Me.Ve.P. - Roma, 6 Dicembre 2023

Global distribution of H5N1 HPAI virus and other AIVs observed in **2022** (previous wave)



Global distribution of H5N1 HPAI virus and other AIVs observed in **2023**



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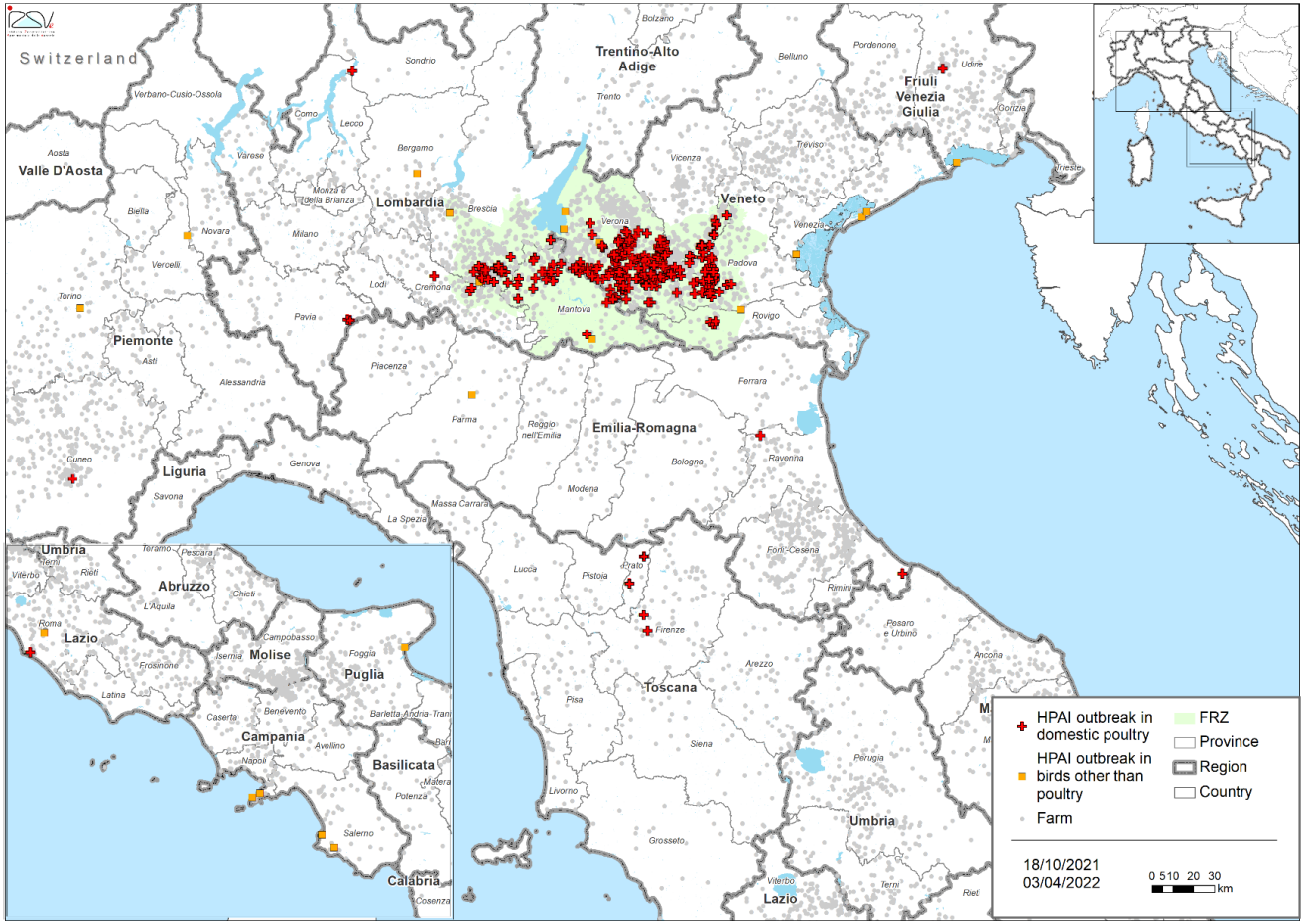
Epidemia HPAI 2021/2022 – the "Big-One"

SELVATICI (n=23)

- 9 Veneto
- 4 Lombardia
- 4 Campania
- 2 Piemonte
- 1 FVG
- 1 E. Romagna
- 1 Lazio
- 1 Puglia

DOMESTICI (n=317)

- 248 Veneto
- 60 Lombardia
- 4 Toscana
- 1 FVG
- 2 E. Romagna
- 1 Piemonte
- 1 Lazio



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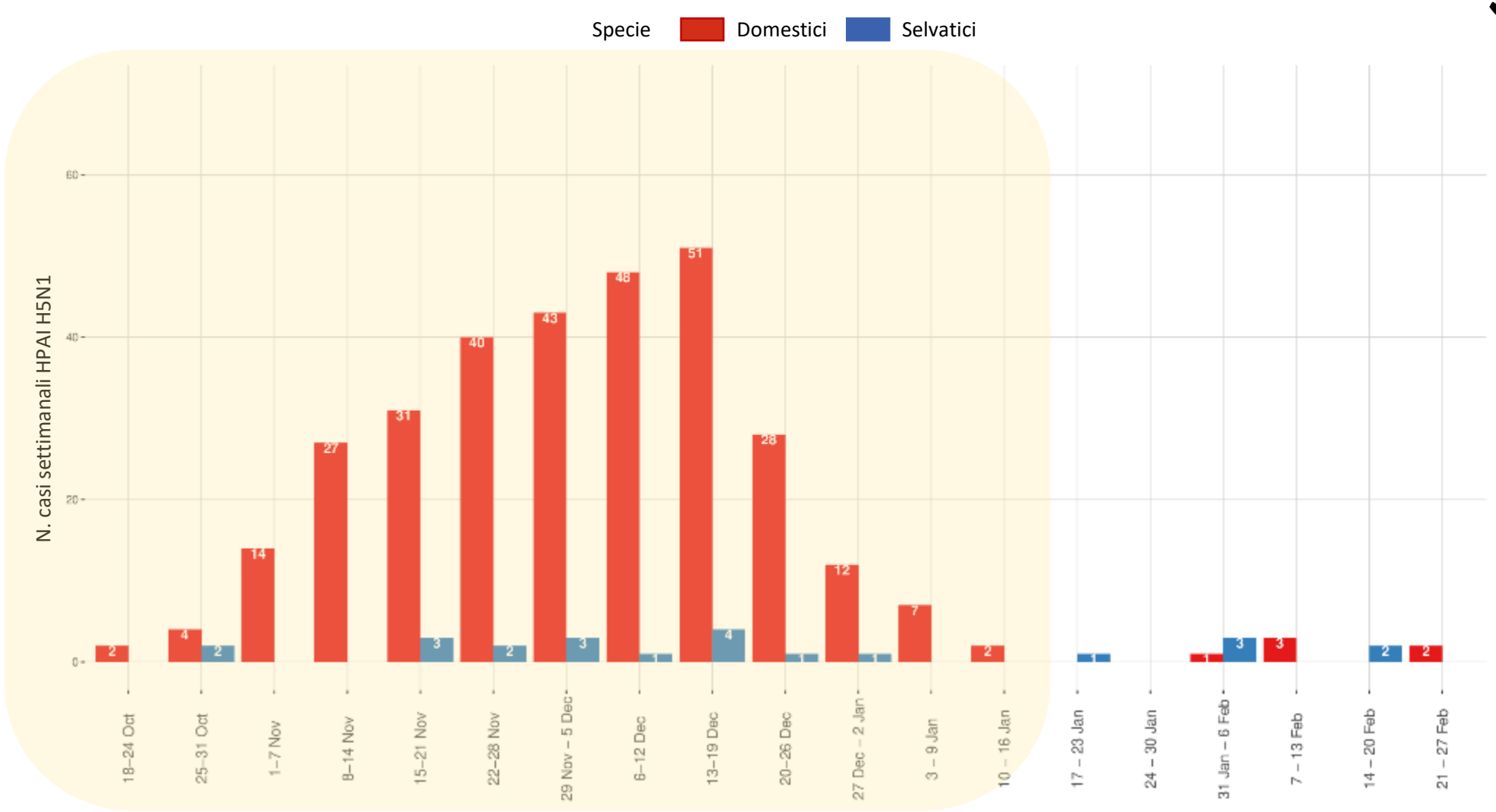
Curva epidemica HPAI H5N1



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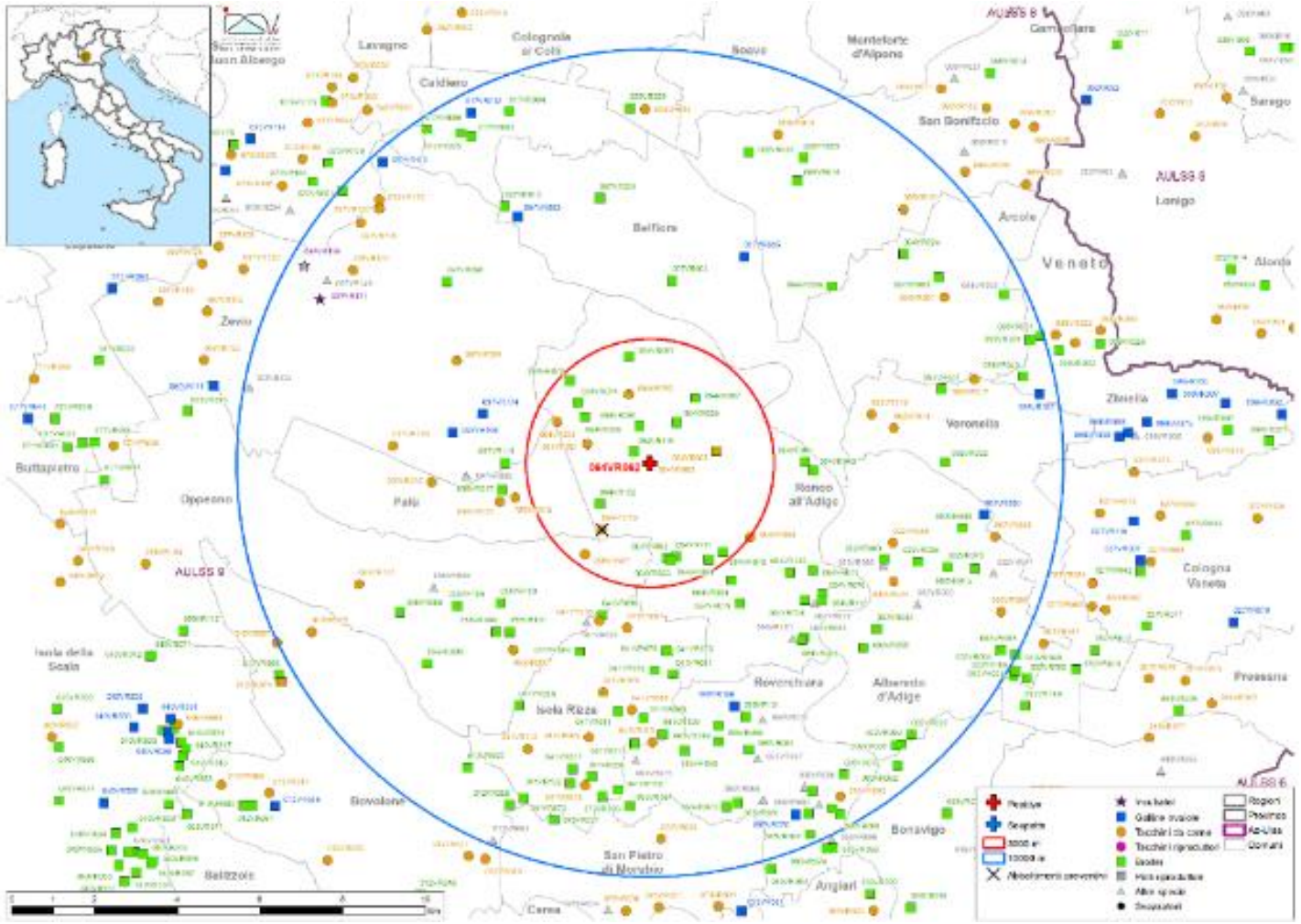
Primo Focolaio (Ronco all'Adige)

- Insorgenza sintomi: 17 ottobre
- Sospetto: 18 ottobre
- Conferma: 18 ottobre
- Abbattimento: 21 ottobre

- Allevamento di tacchini da carne femmine
- Accasamento: 22 luglio 2021
- 13.520 capi accasati



Zona ad alta densità di allevamenti avicoli (DPPA)

Circa 180 allevamenti entro 10 km!

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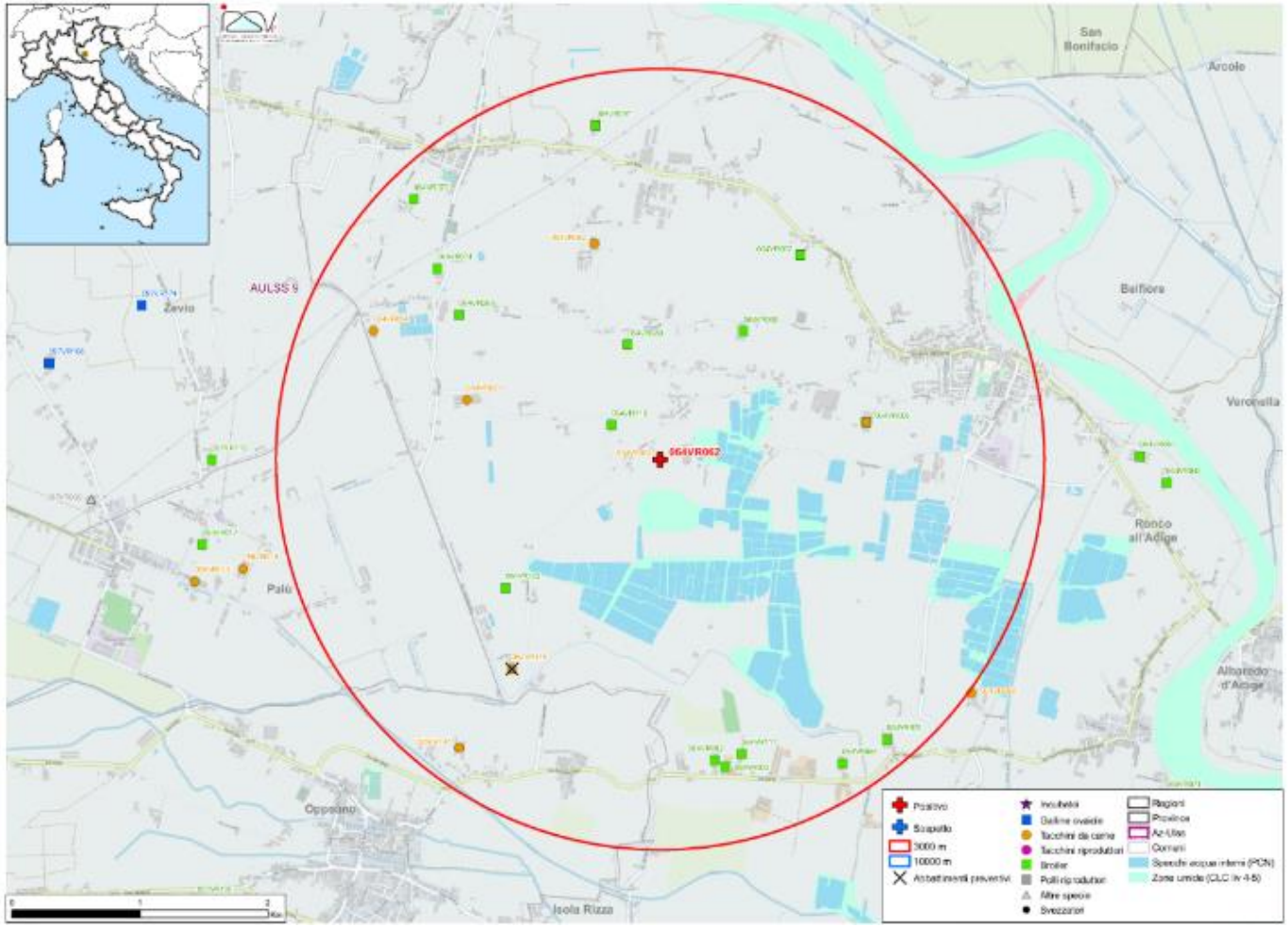
Primo Focolaio - rilievi

- Nessun contatto a rischio nei 21 gg precendenti il sospetto
- Buone pratiche biosicurezza
- Nessun caso di HPAI confermato in Italia da aprile 2021

- <u>Fattori di rischio</u>

  Alta presenza di zone umide
  - Cave/Riserva di caccia private a circa 300-500 m
  - Considerevole popolazione di anatidi selvatici



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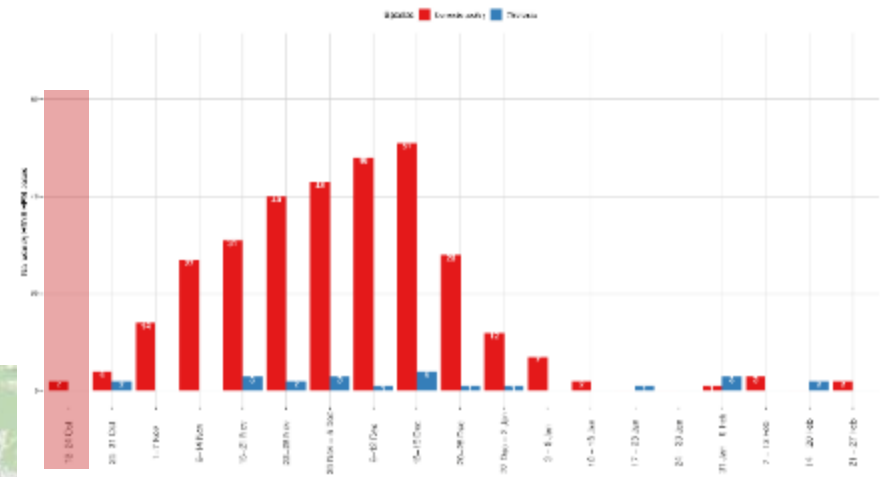
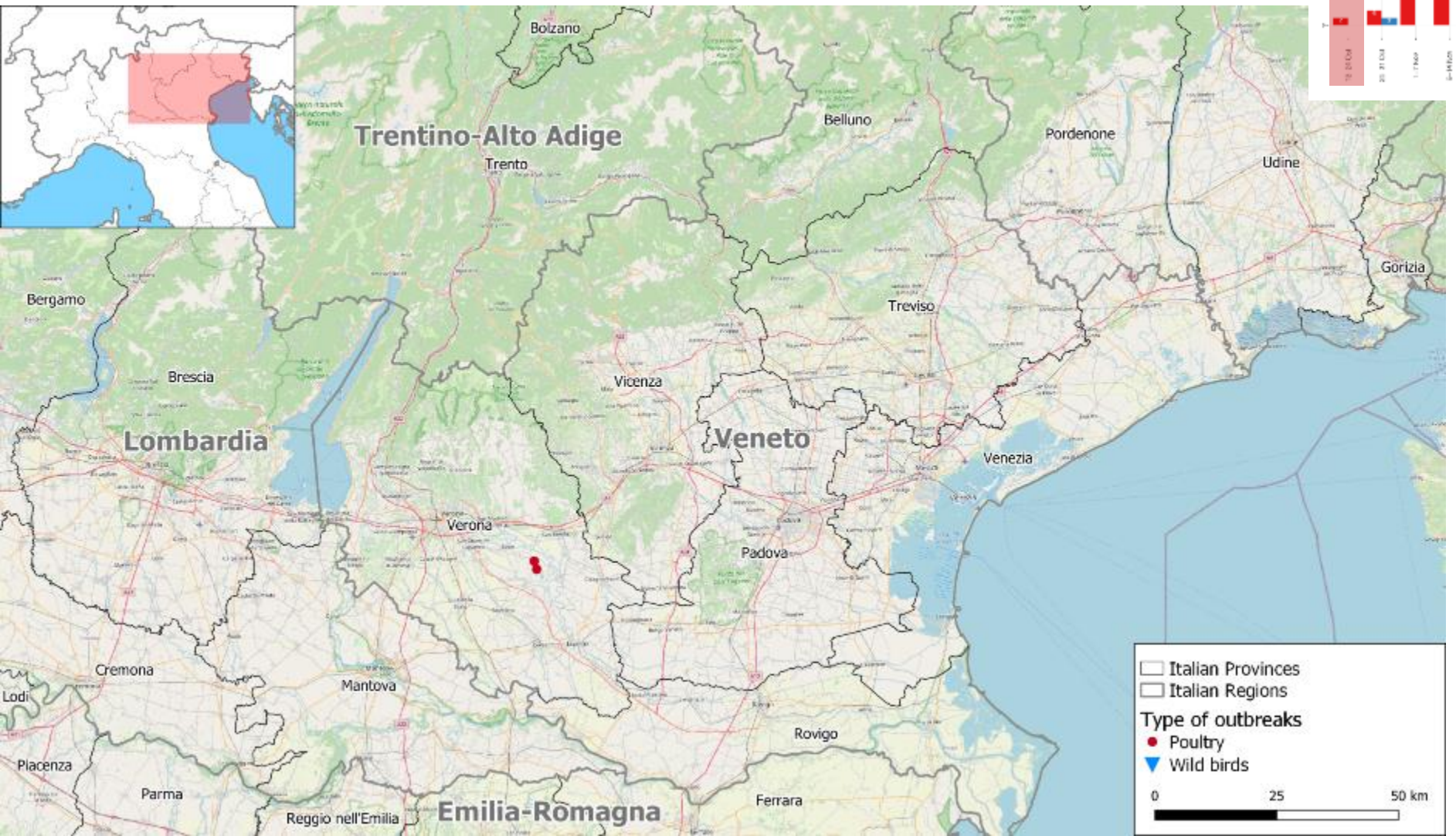
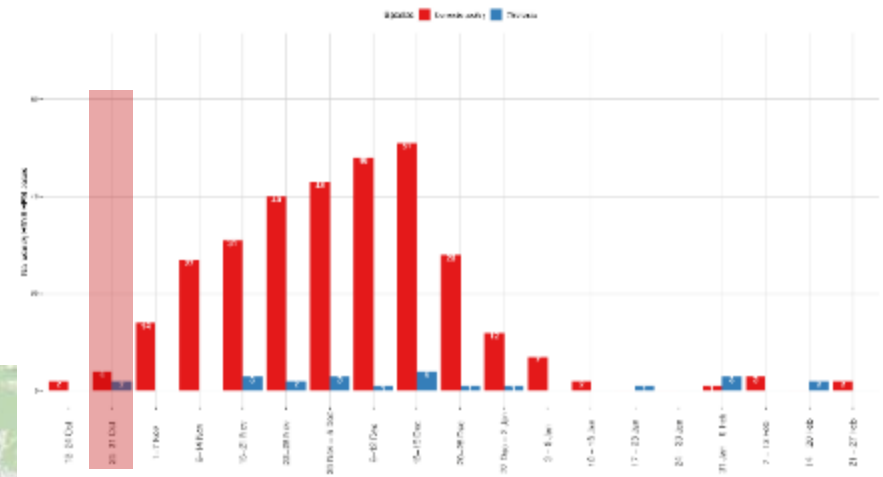
Settimana 1 – 18-24 Ottobre

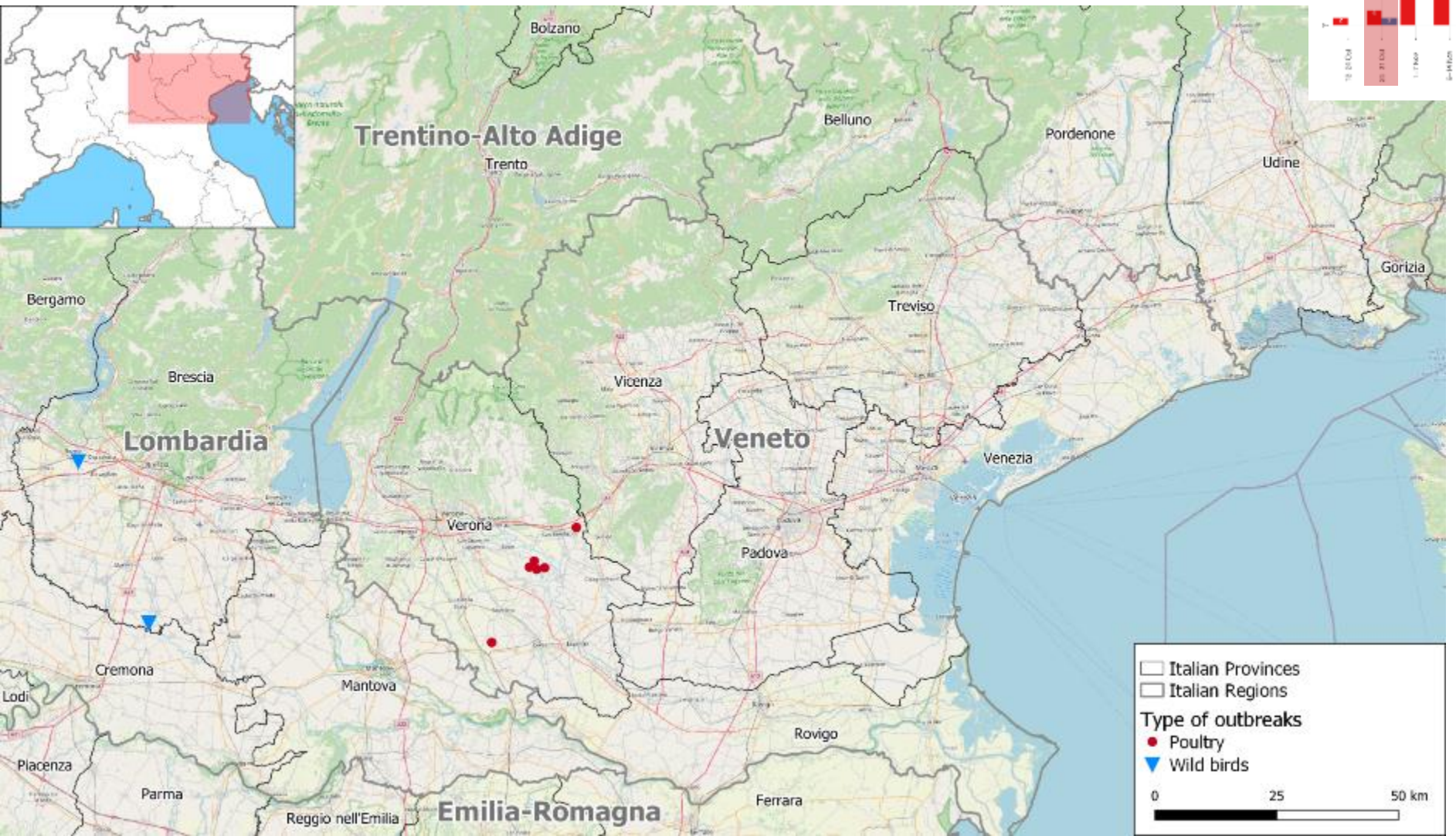




	Dom	Sel
Veneto	2	

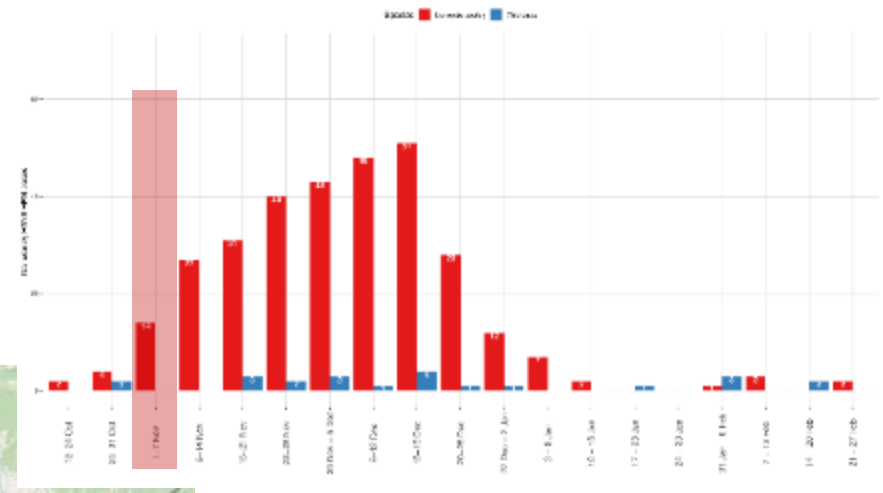
Settimana 2 – 25-31 Ottobre

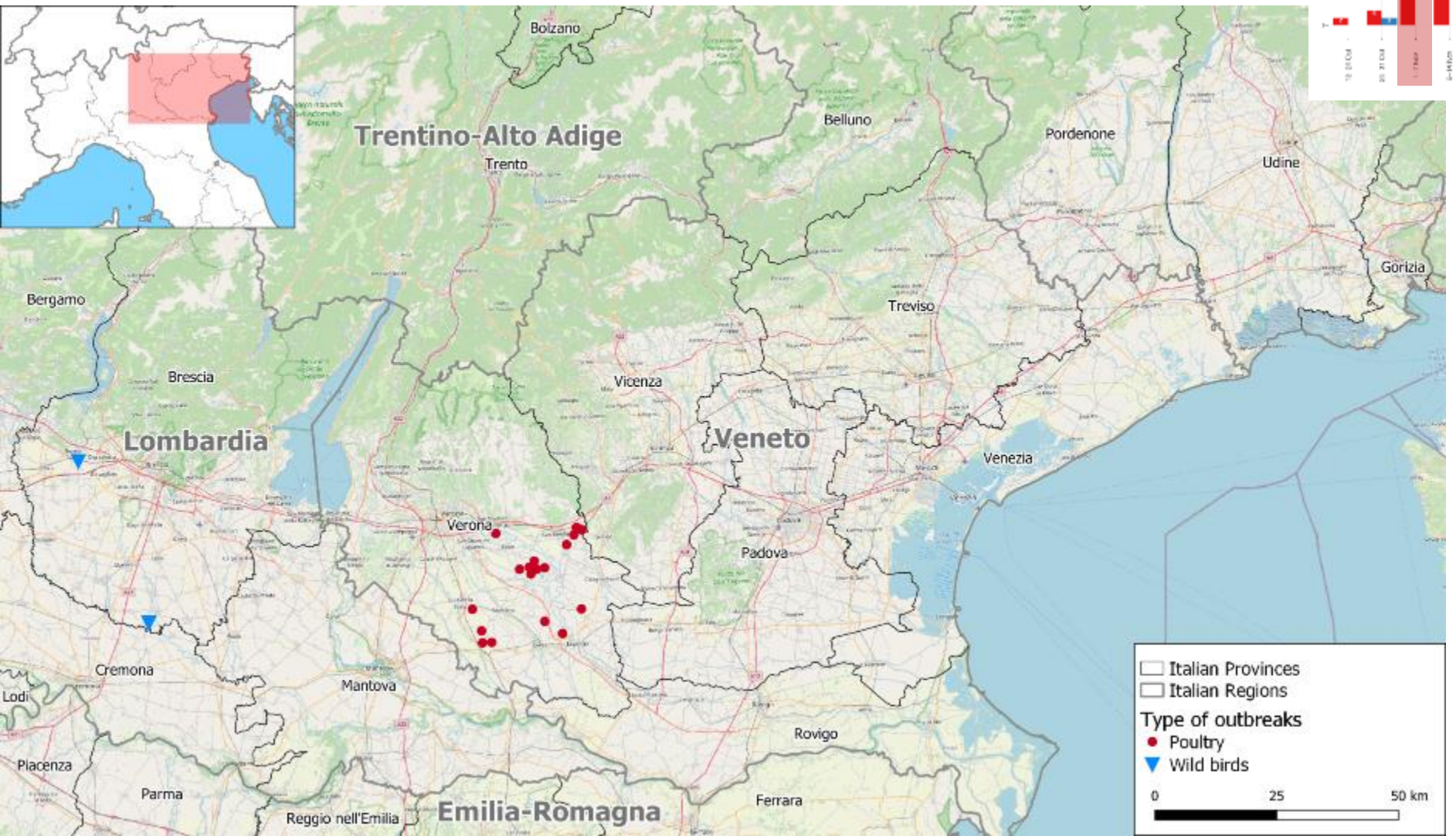




	Dom	Sel
Veneto	6	
Lombardia		2

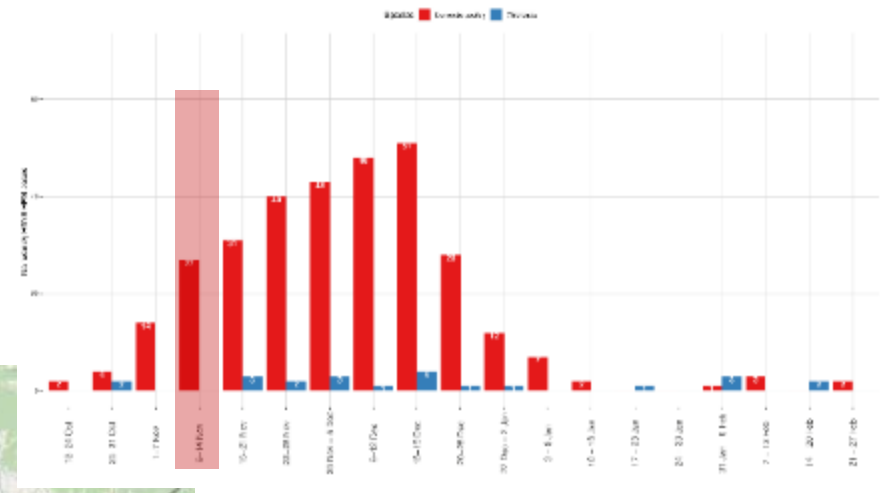
Settimana 3 – 1-7 Novembre

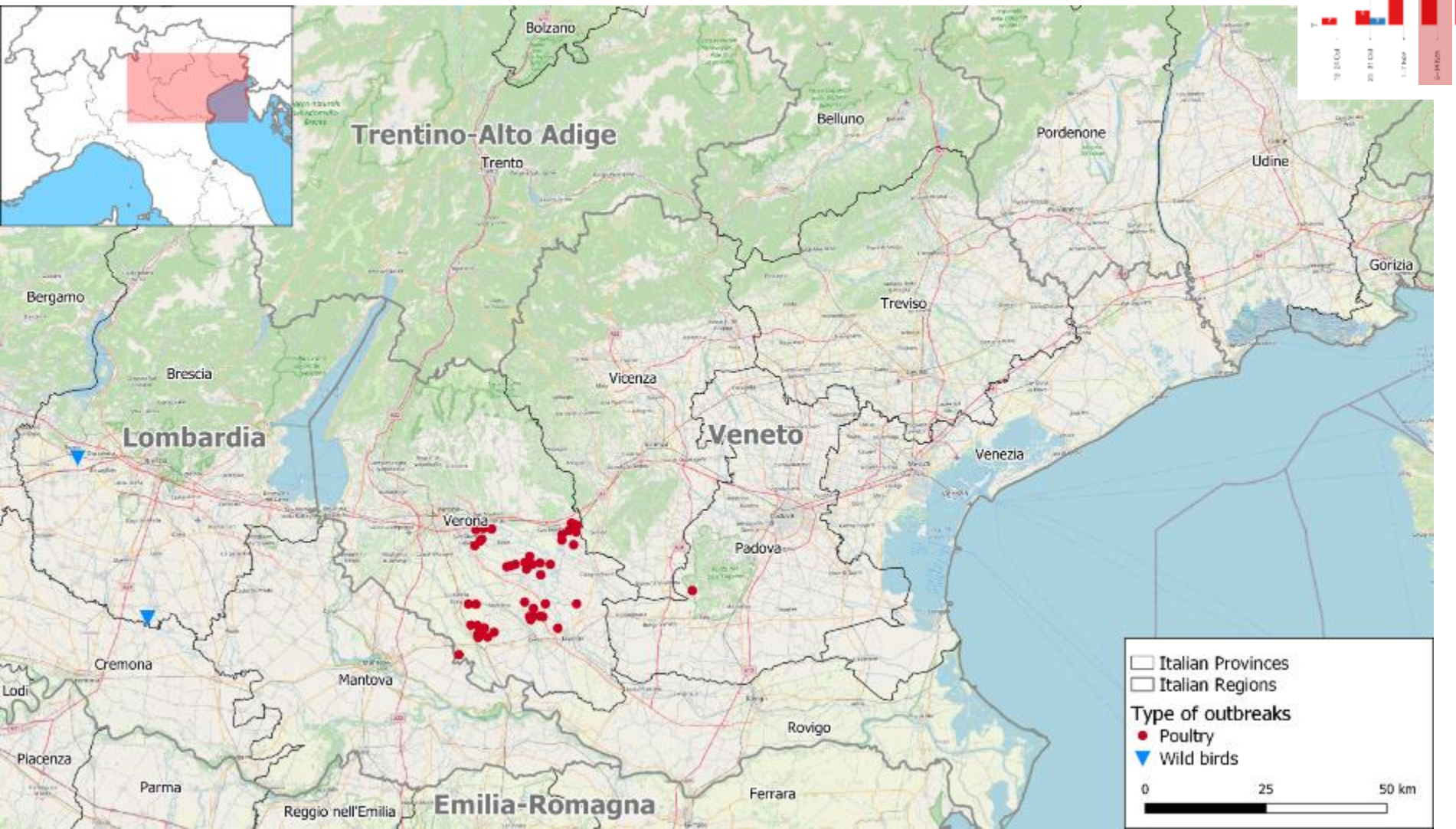




	Dom	Sel
Veneto	19	
Lombardia		2
Lazio	1	

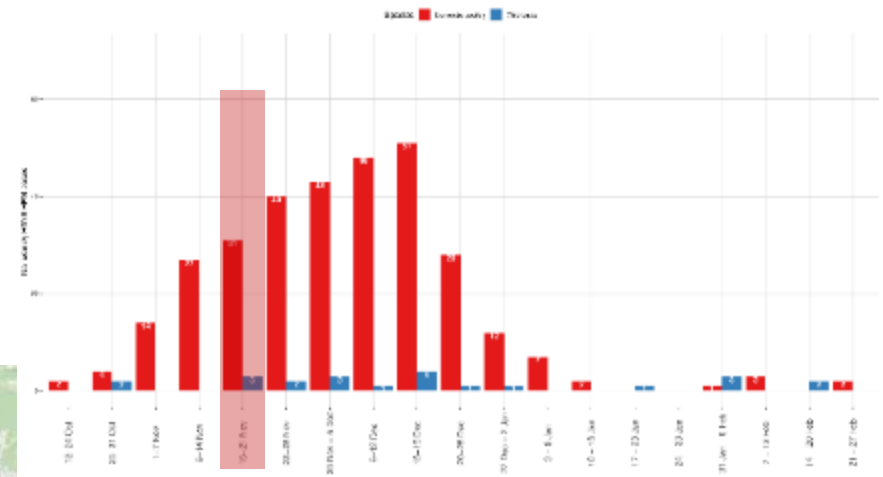
Settimana 4 – 8-14 Novembre

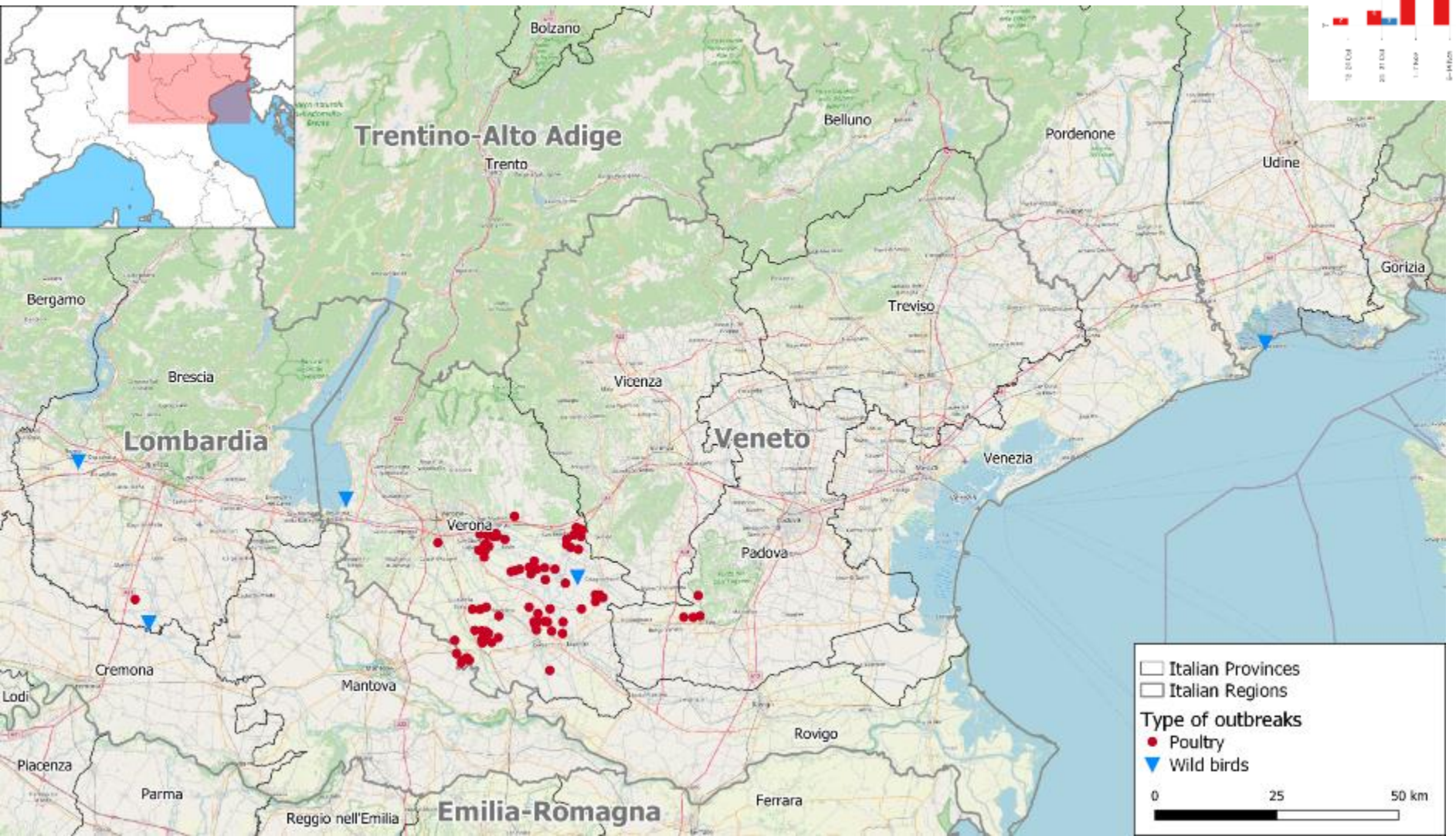




	Dom	Sel
Veneto	46	
Lombardia		2
Lazio	1	

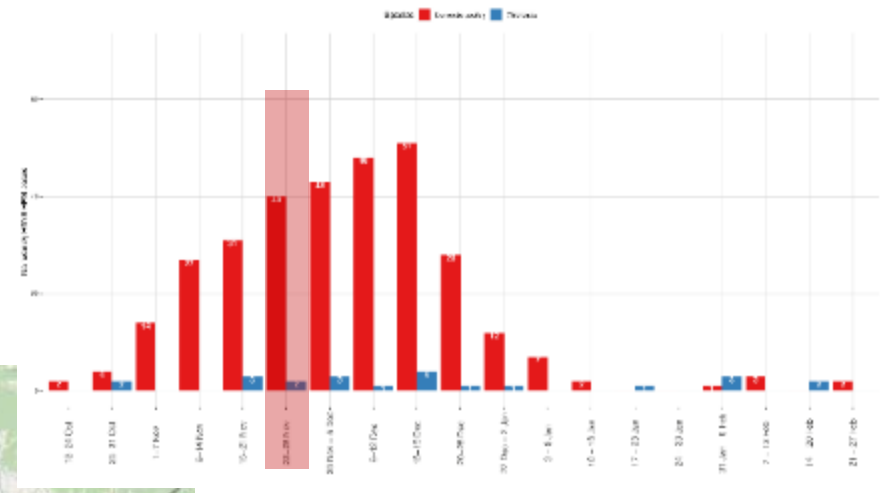
Settimana 5 – 15-21 Novembre

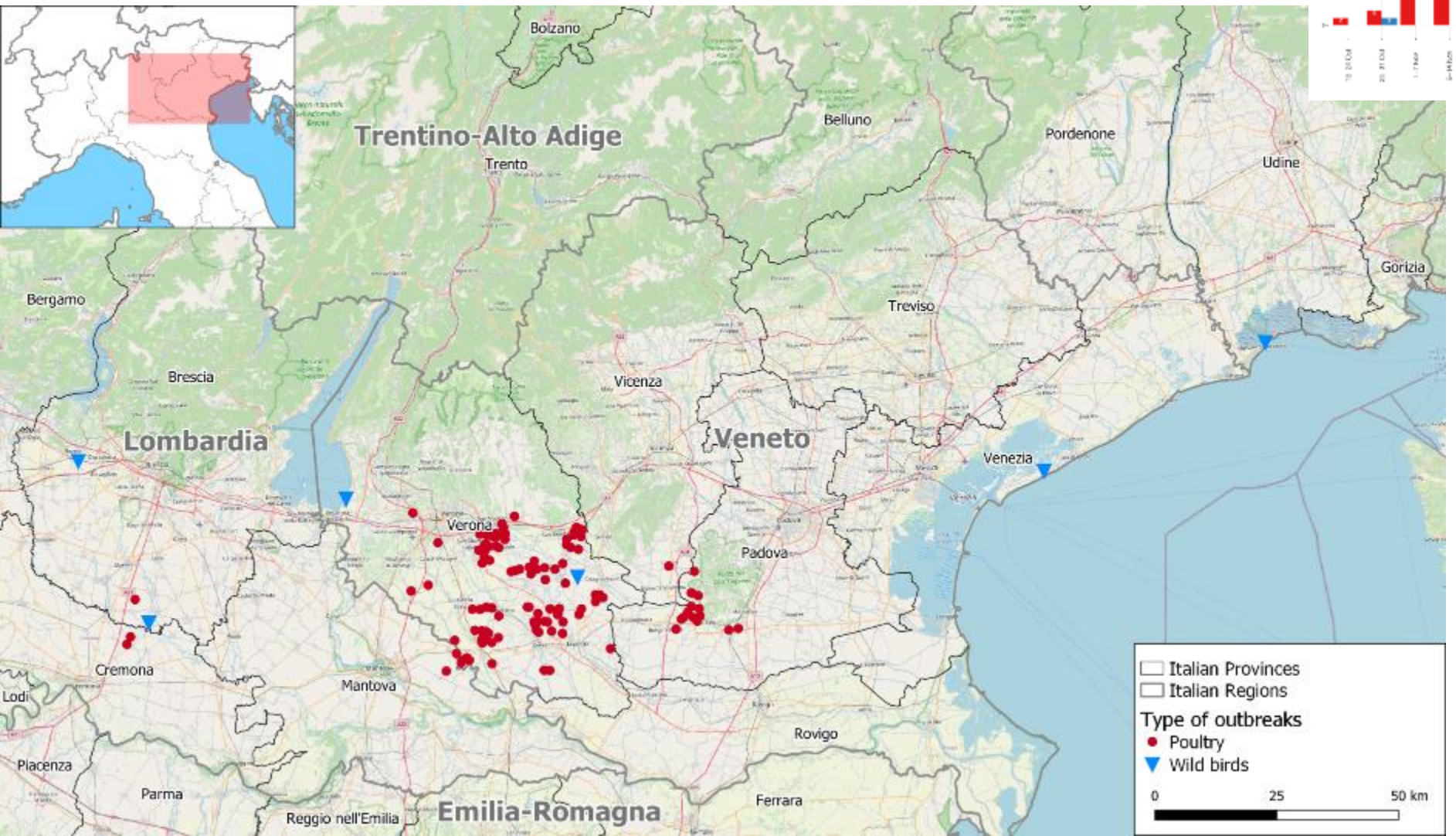




	Dom	Sel
Veneto	75	2
Lombardia	2	2
Lazio	1	
Friuli Venezia Giulia		1

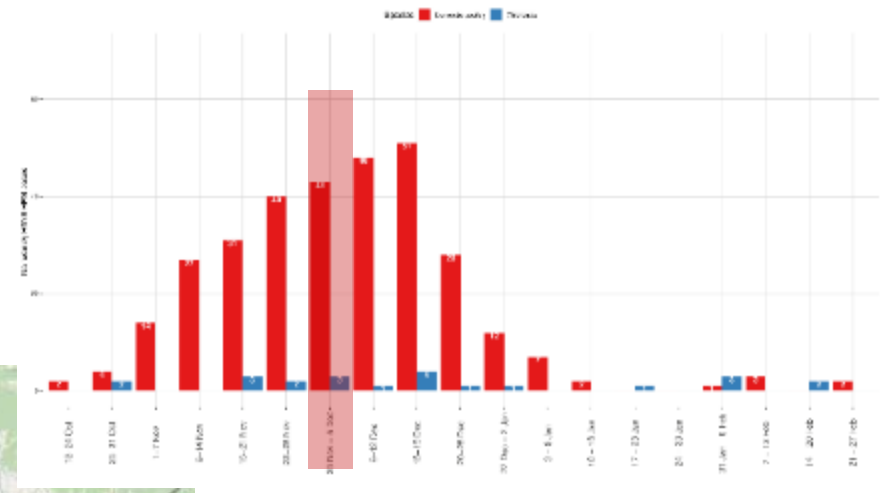
Settimana 6 – 22-28 Novembre

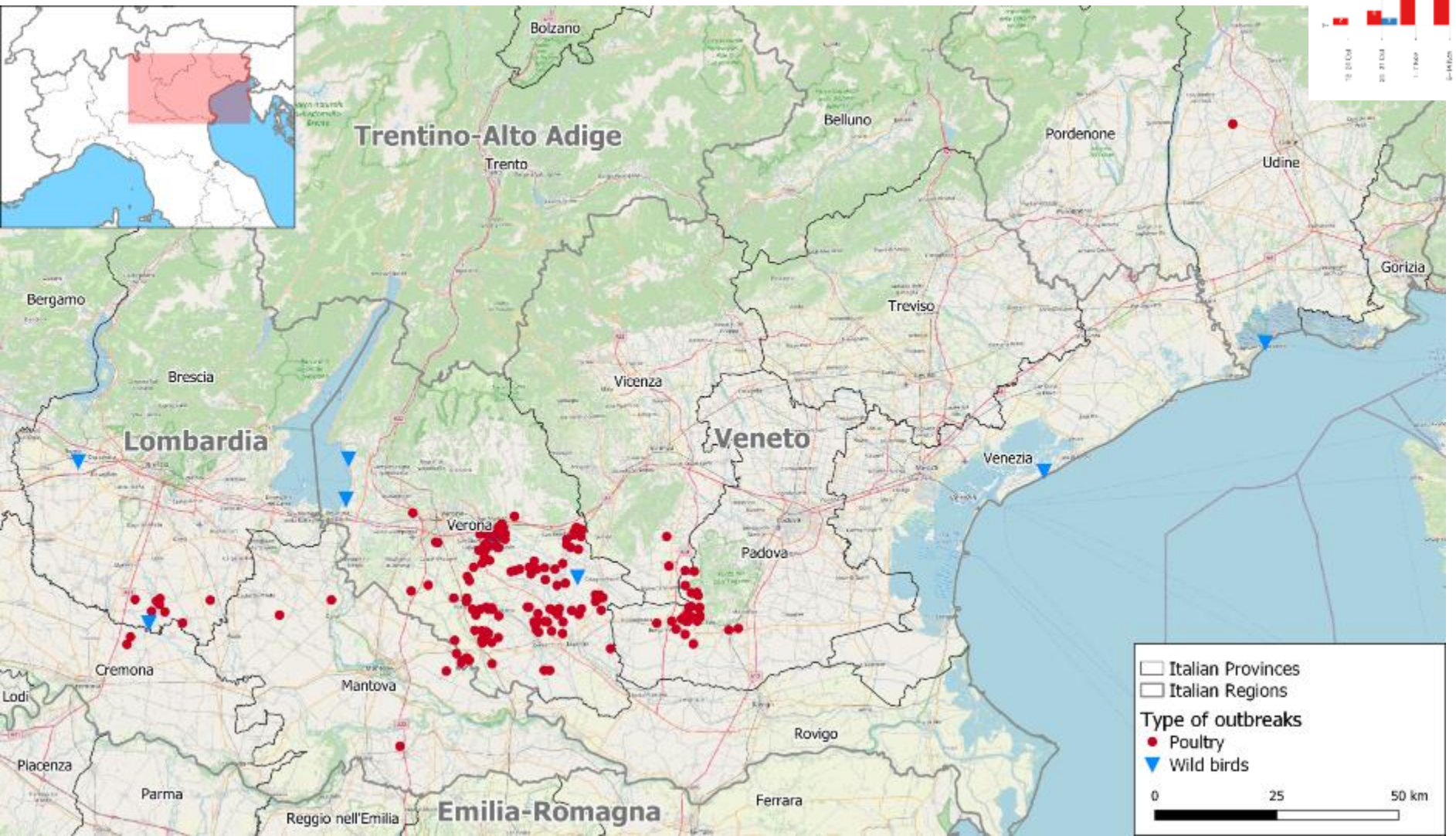




	Dom	Sel
Veneto	111	3
Lombardia	5	2
Lazio	1	1
Friuli Venezia Giulia		1
Emilia Romagna	1	

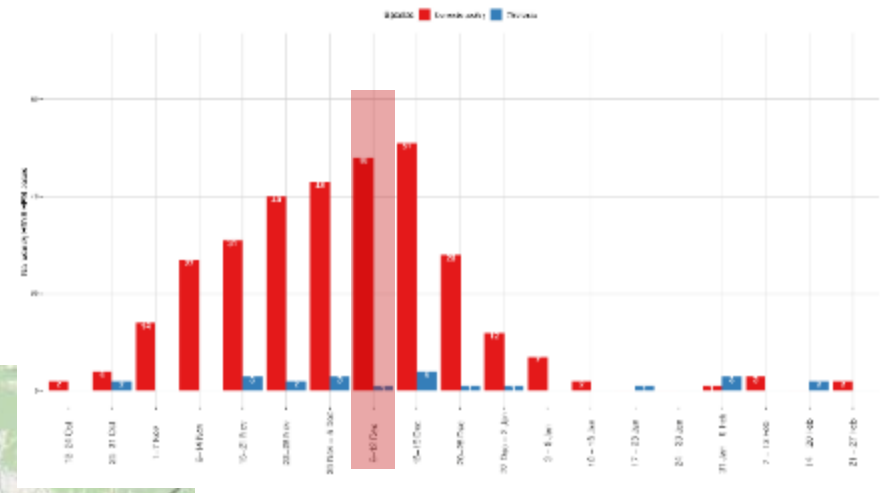
Settimana 7 – 29 Novembre – 5 Dicembre

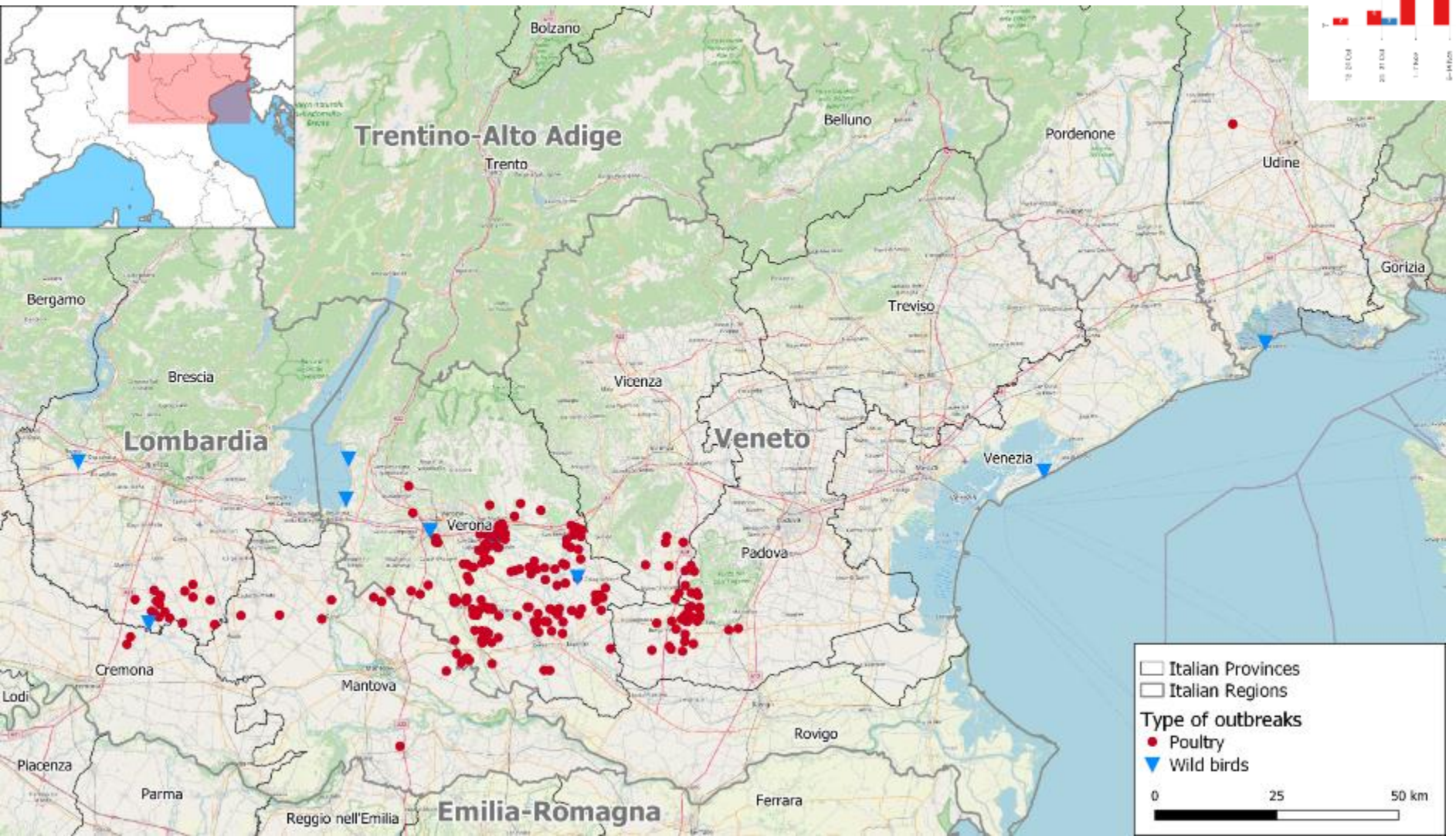




	Dom	Sel
Veneto	143	5
Lombardia	15	2
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	
Puglia		1

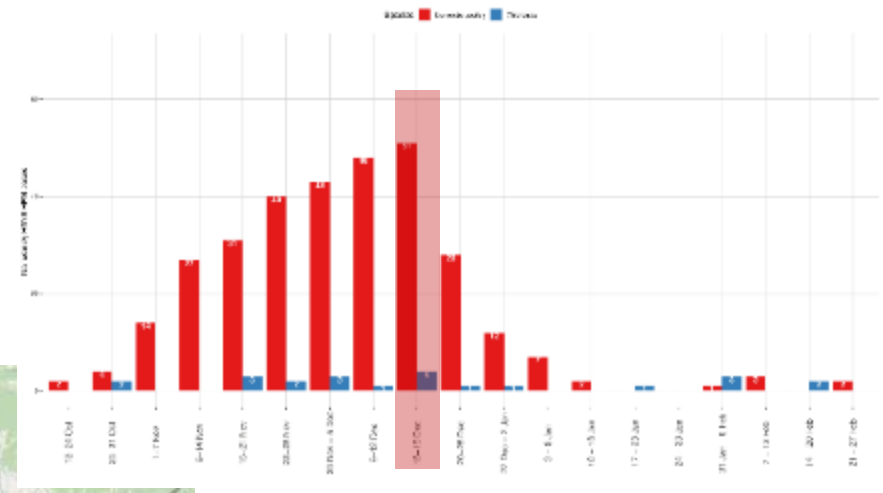
Settimana 8 – 6-12 Dicembre

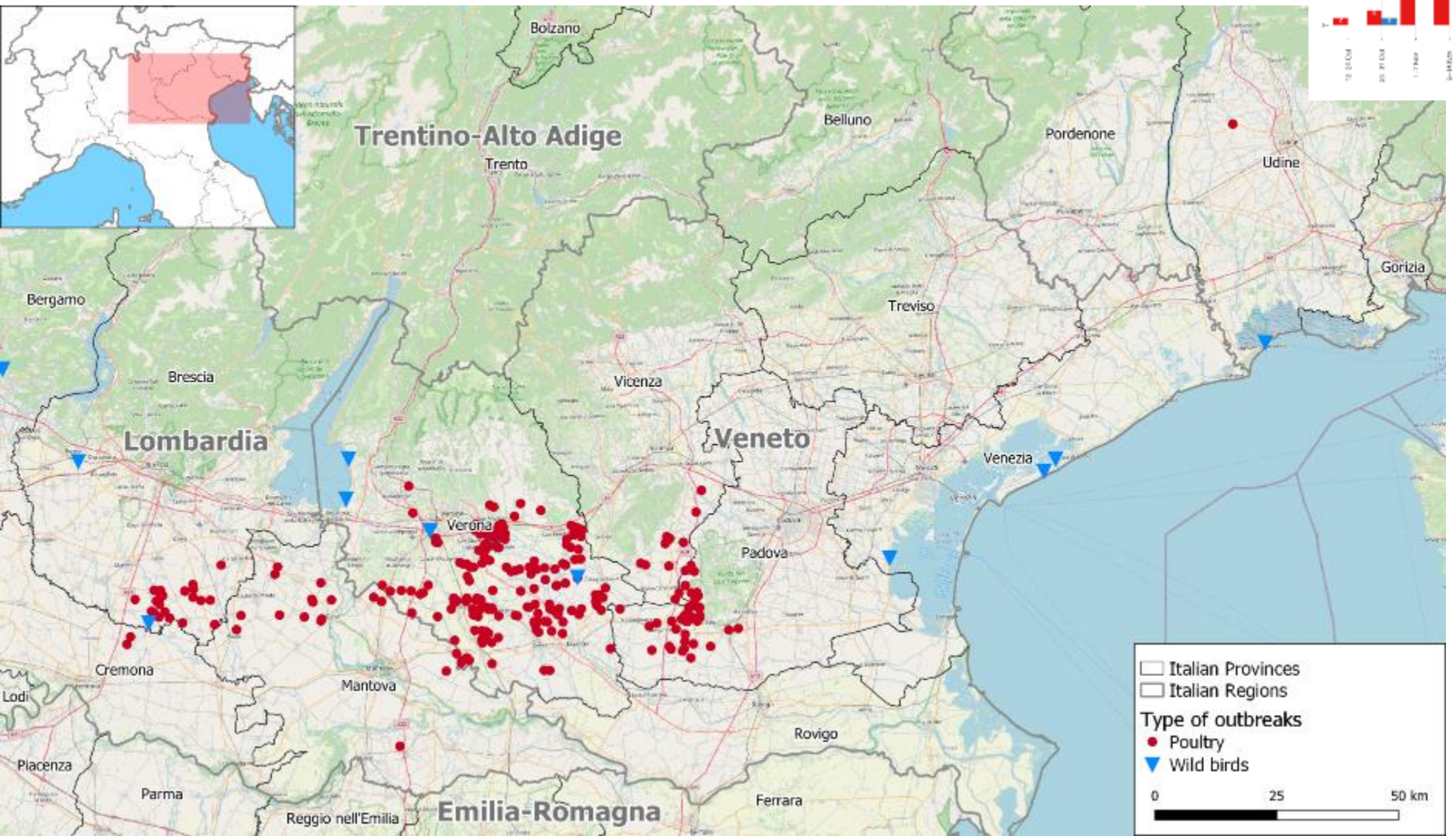




	Dom	Sel
Veneto	178	6
Lombardia	28	2
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	
Puglia		1

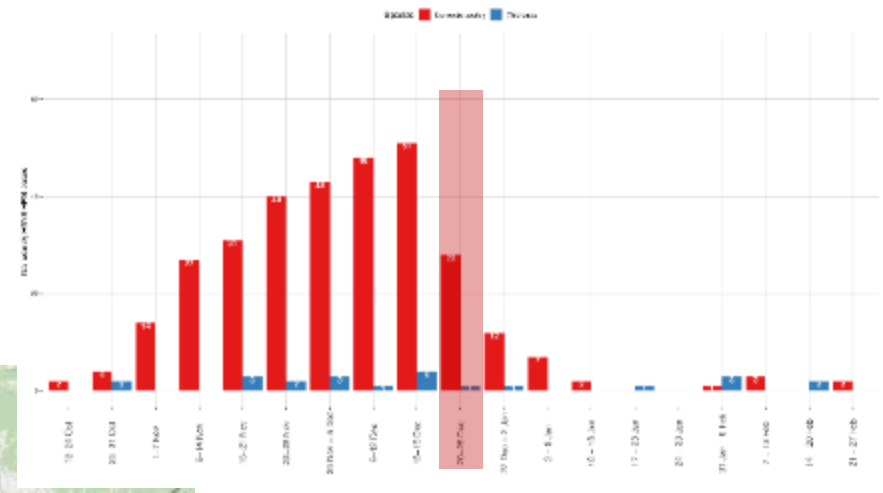
Settimana 9 – 13-19 Dicembre

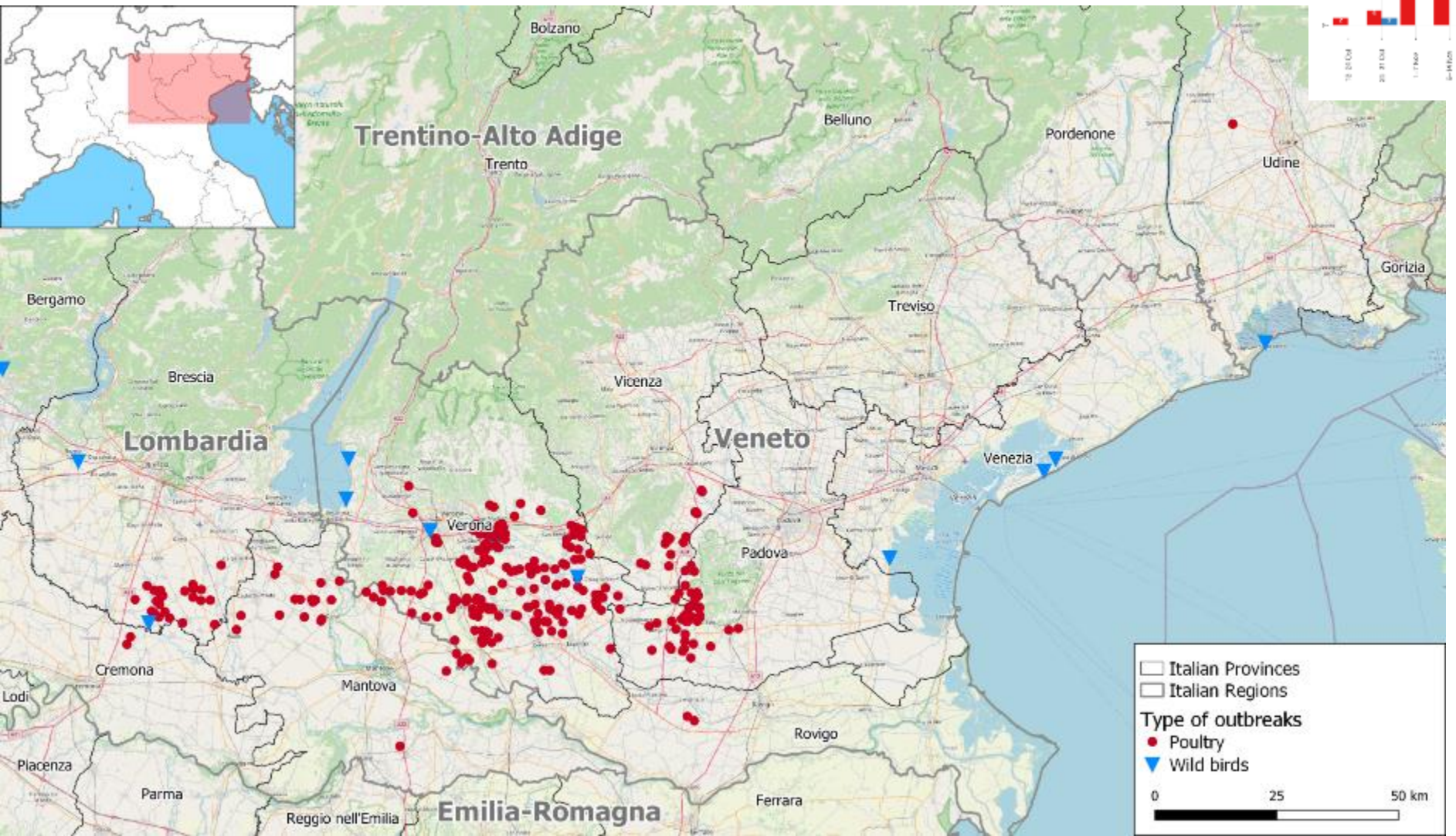




	Dom	Sel
Veneto	216	9
Lombardia	41	3
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	
Puglia		1

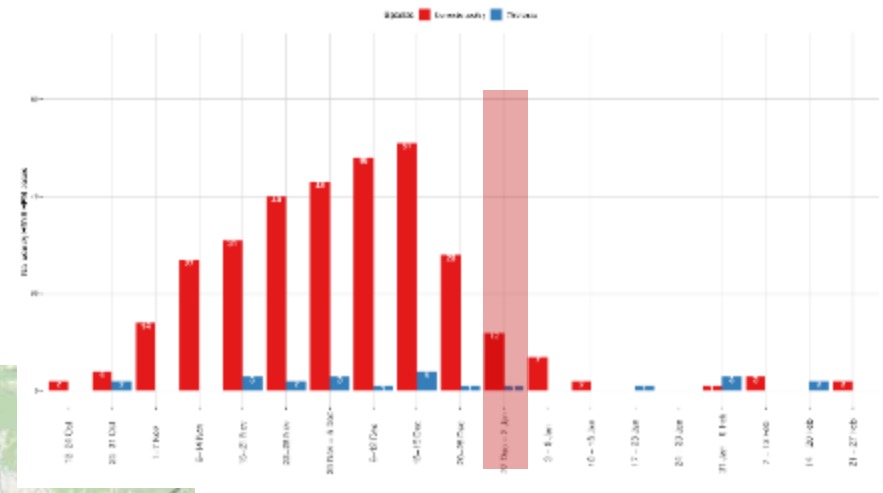
Settimana 10 – 20-26 Dicembre

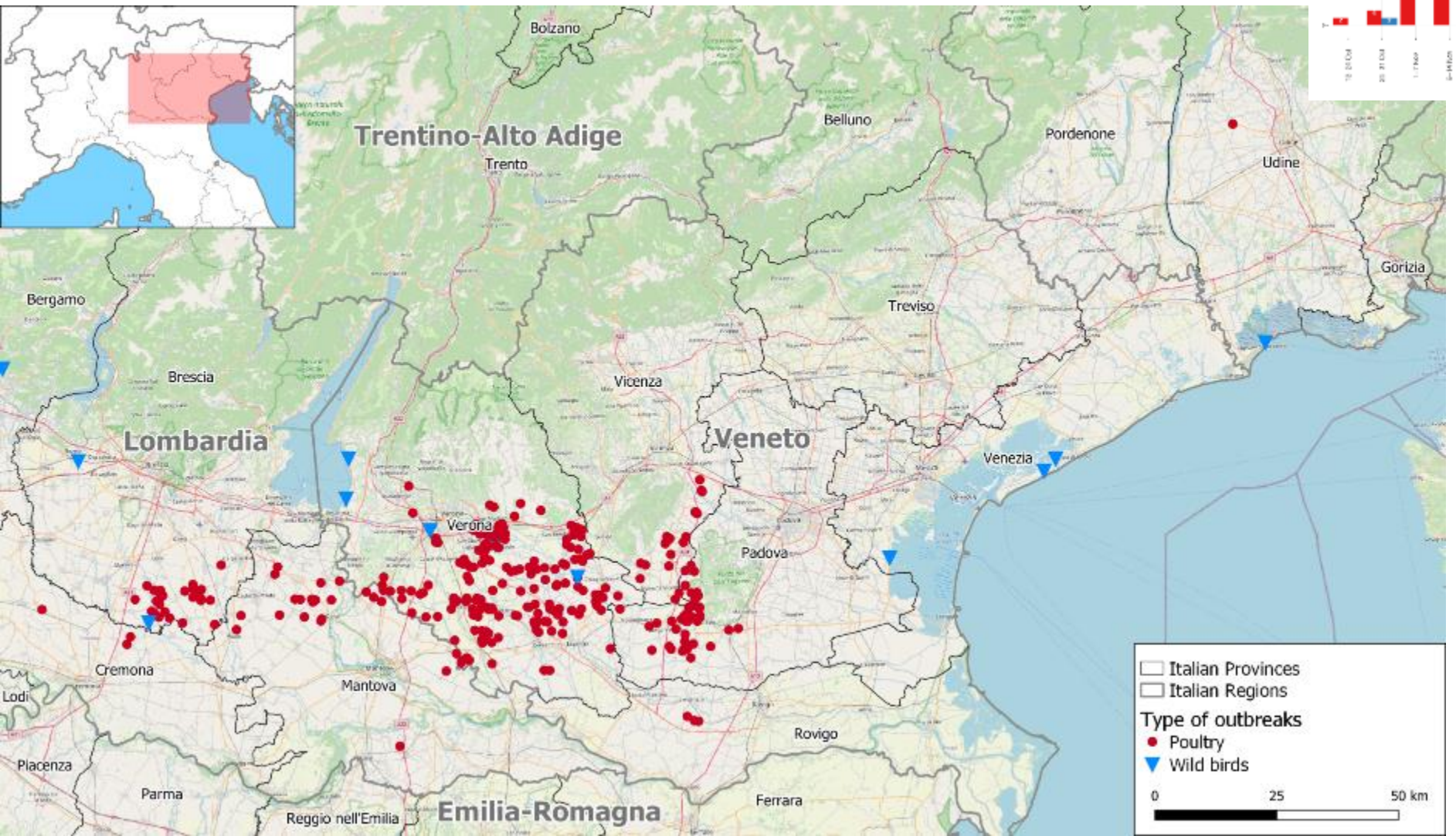




	Dom	Sel
Veneto	235	9
Lombardia	50	3
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	1
Puglia		1

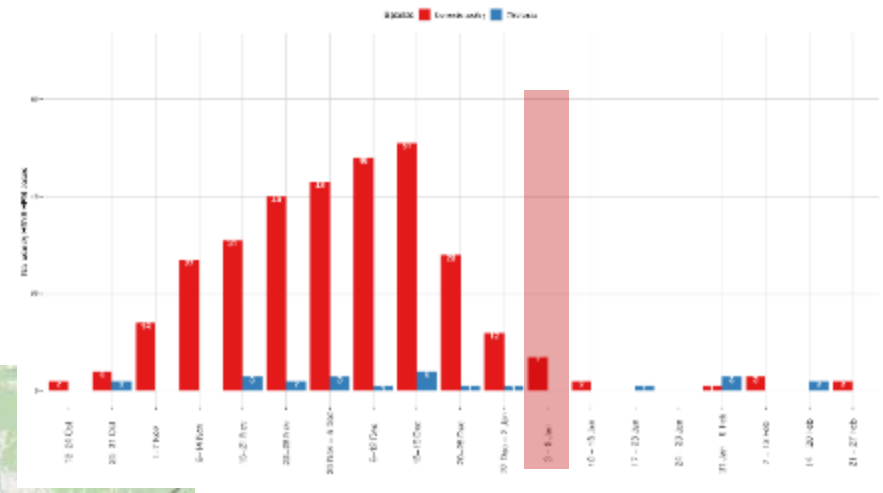
Settimana 11 – 27 Dicembre – 2 Gennaio

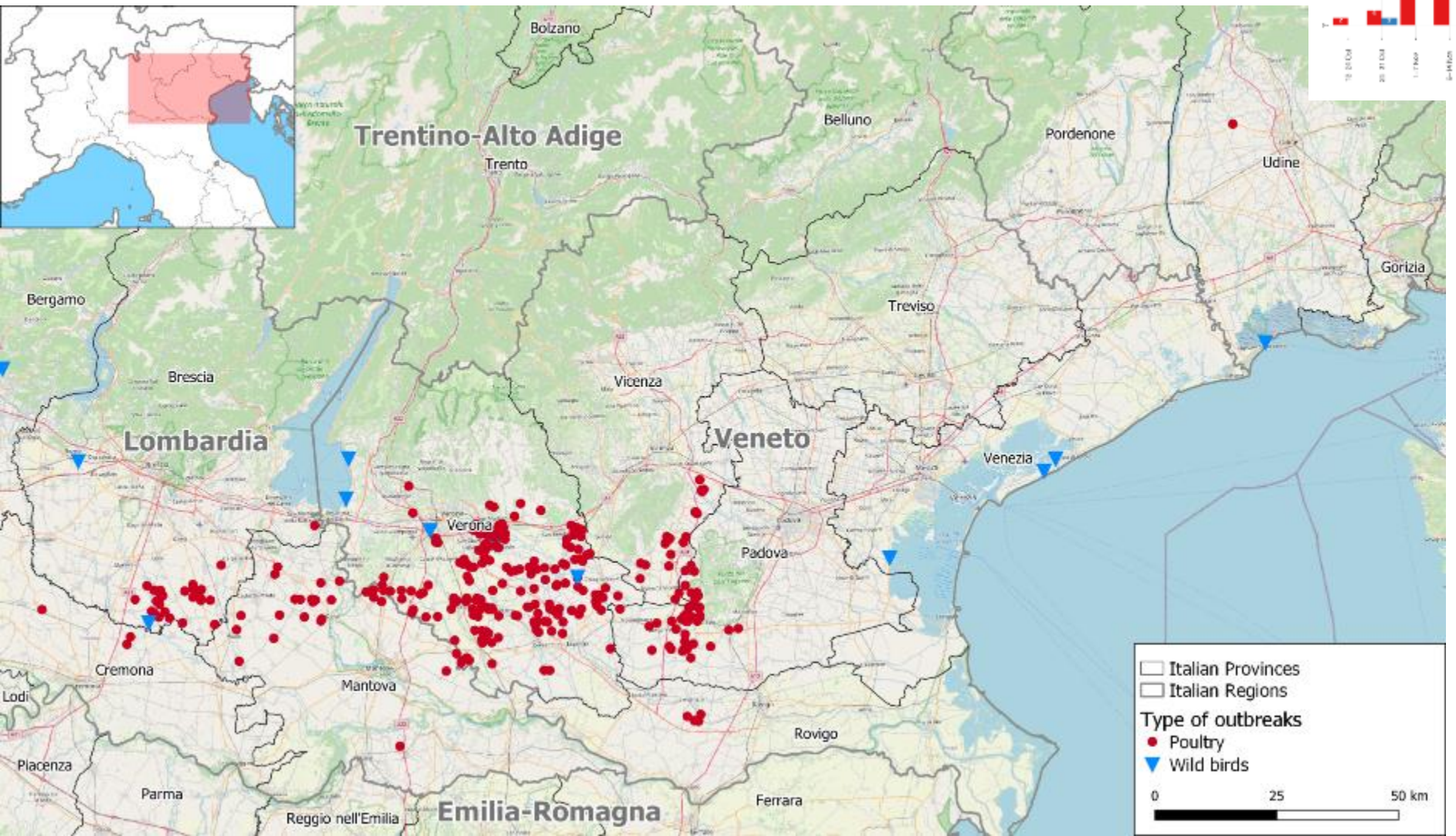




	Dom	Sel
Veneto	244	9
Lombardia	53	3
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	1
Puglia		1
Campania		1

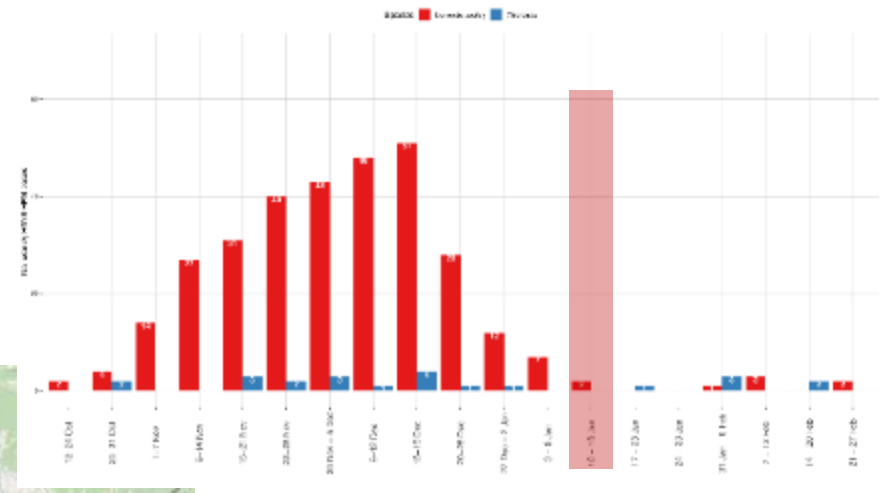
Settimana 12 – 3-9 Gennaio

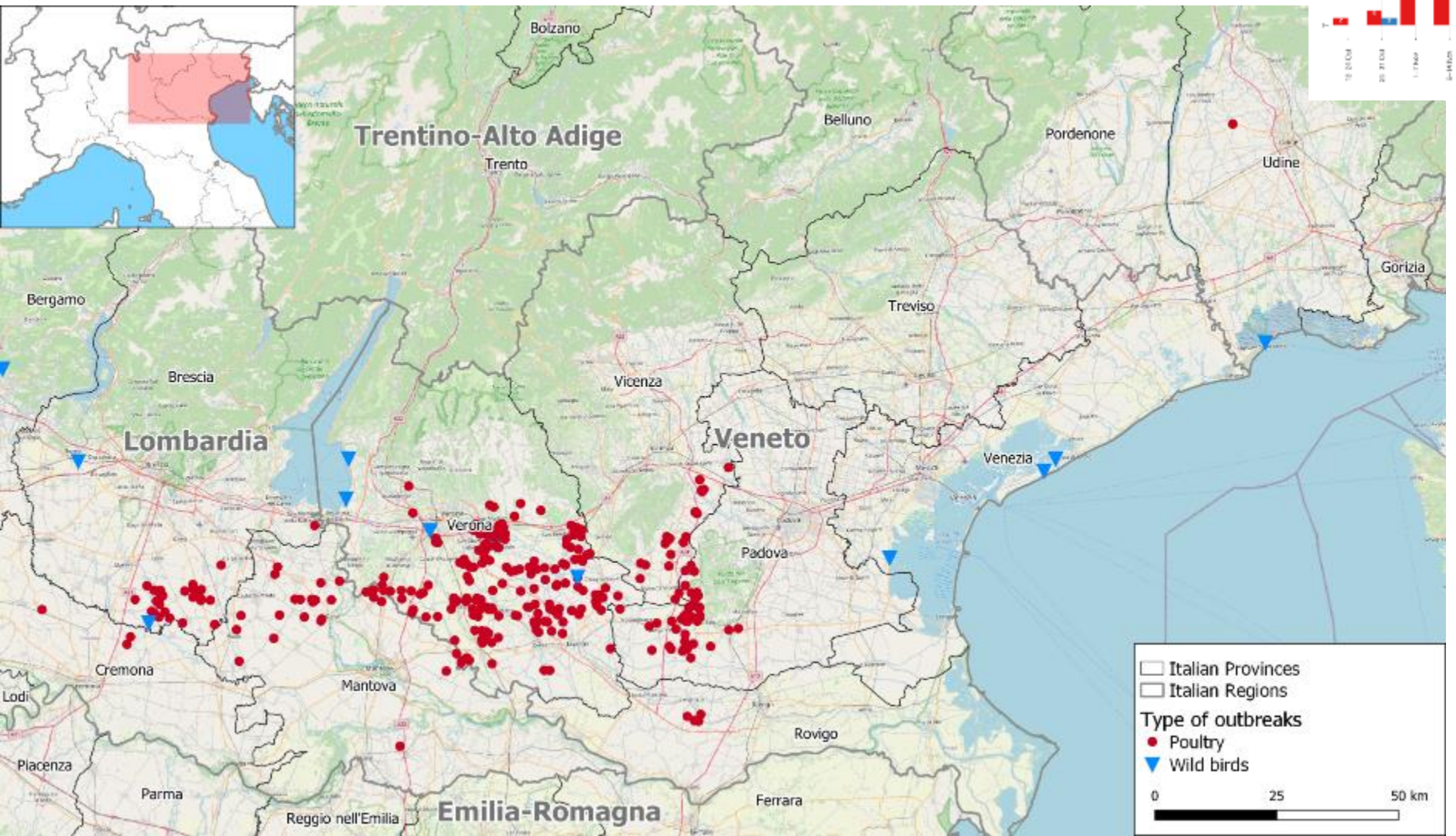




	Dom	Sel
Veneto	247	9
Lombardia	57	3
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	1
Puglia		1
Campania		1

Settimana 13 – 10-16 Gennaio





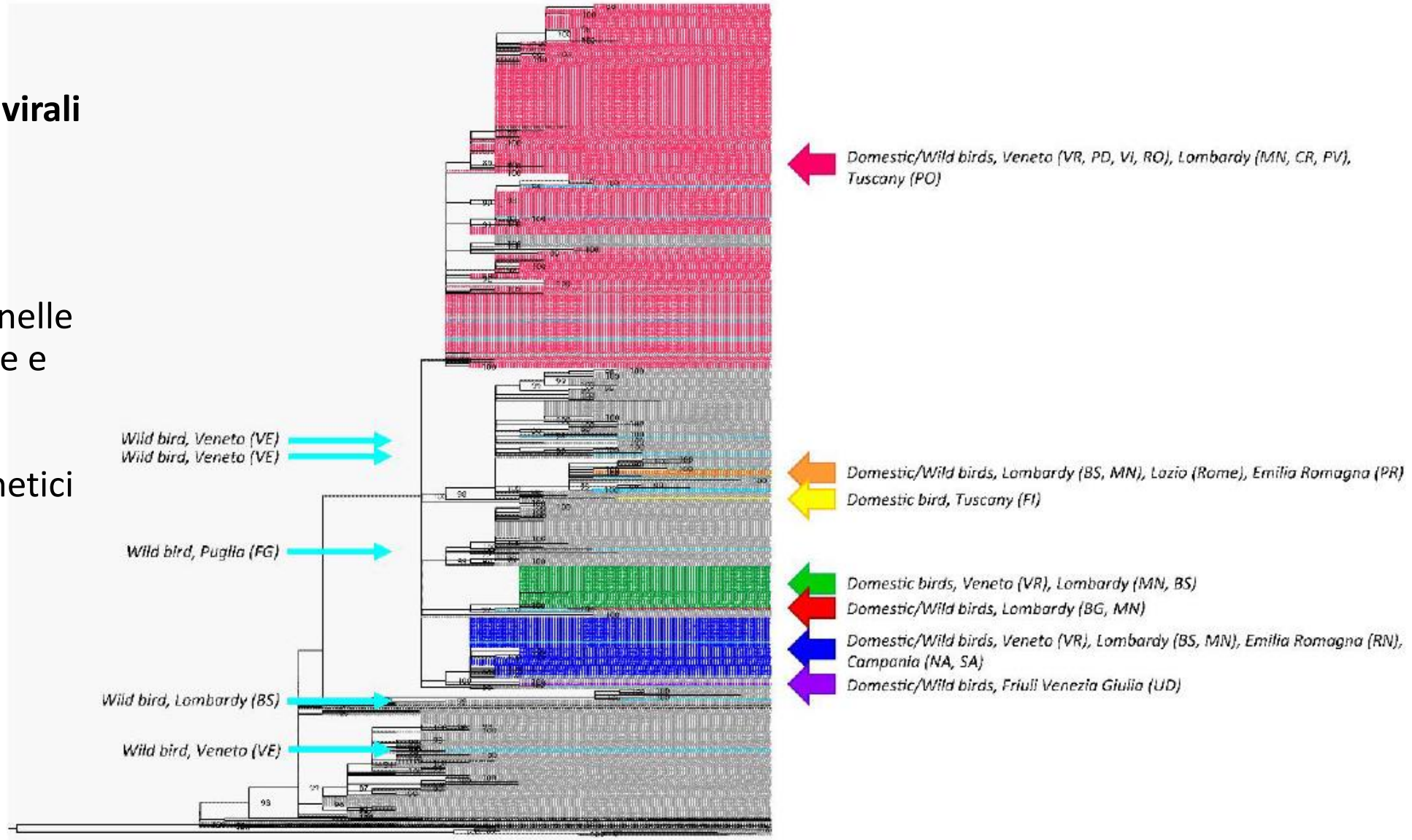
	Dom	Sel
Veneto	248	9
Lombardia	57	3
Lazio	1	1
Friuli Venezia Giulia	1	1
Emilia Romagna	1	1
Puglia		1
Campania		1
Toscana	1	

Analisi filogenetiche virus HPAI 2021-2022

12 differenti introduzioni virali

- 7 nel settore avicolo
- 5 nei selvatici

introduzioni differenti nelle popolazioni domestiche e selvatiche sostenuta dall'aggregazione delle sequenze in gruppi genetici ben distinti e non sovrapposti



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viruses

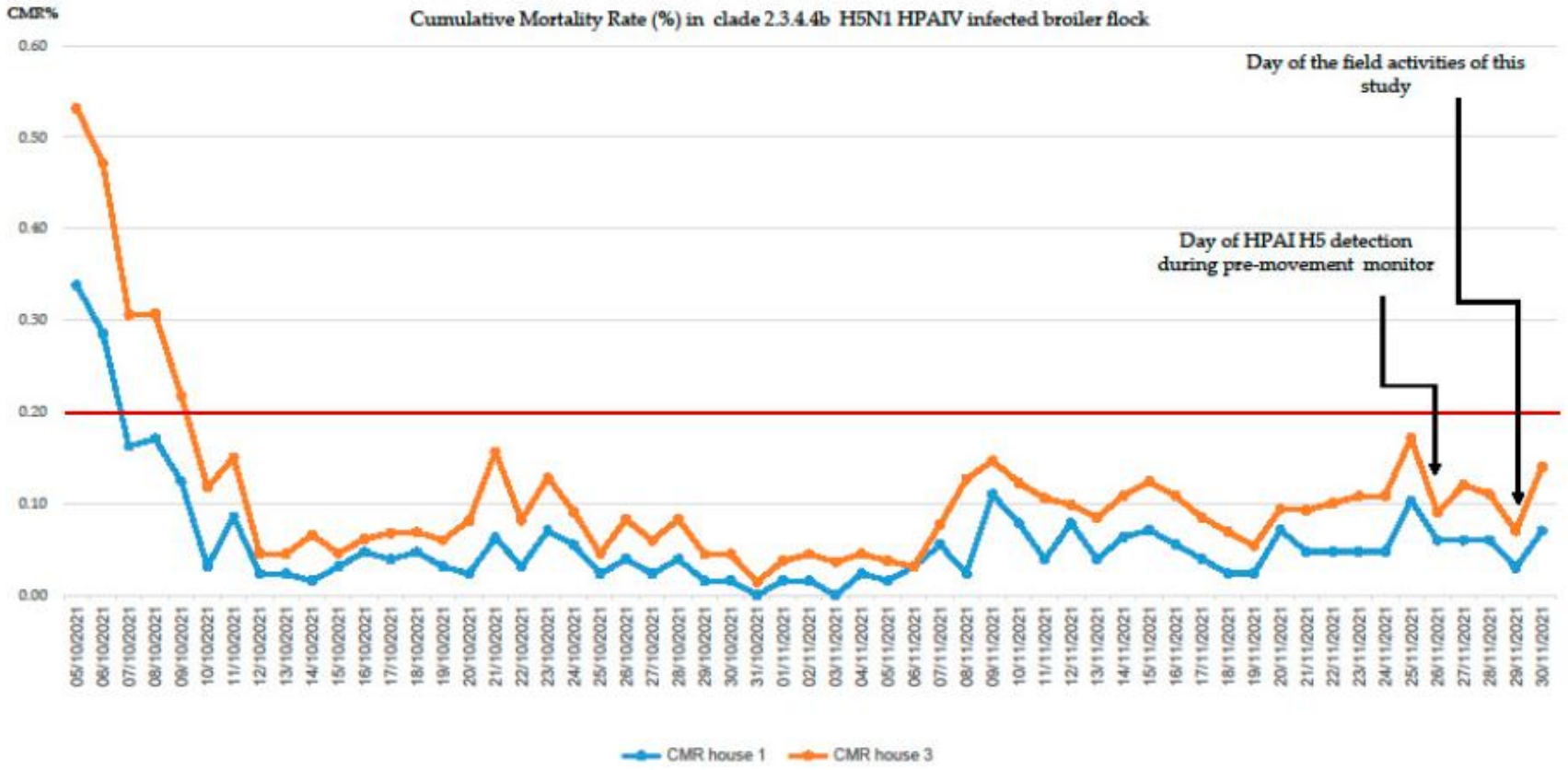
MDPI

Article

Silent Infection of Highly Pathogenic Avian Influenza Virus (H5N1) Clade 2.3.4.4b in a Commercial Chicken Broiler Flock in Italy

Federica Gobbo [1,*], Claudia Zanardello [2], Marco Bottinelli [3], Jane Budai [1], Francesca Bruno [1], Roberta De Nardi [4], Tommaso Patregnani [4], Salvatore Catania [3] and Calogero Terregino [1]

MATERIALE: TAMPONE TRACHEALE (BROILER) PIANO MONITORAGGIO/ERADICAZIONE / MOVIMENTAZIONE		
ANALISI (Metodo)	**Campione**	**Risultato**
INFLUENZA VIRUS TIPO A (REVERSE TRANSCRIPTASE REAL-TIME PCR QUALITATIVA / PDP VIR 018 2020 Rev.6)	1 - POOL DI 10	NEGATIVO
	2 - POOL DI 10	NEGATIVO
	3 - POOL DI 10	NEGATIVO
	4 - POOL DI 10	NEGATIVO
	5 - POOL DI 10	NEGATIVO
	6 - POOL DI 10	NEGATIVO
	7 - POOL DI 10	NEGATIVO
	8 - POOL DI 10	NEGATIVO
	9 - POOL DI 10	NEGATIVO
	10 - POOL DI 10	**POSITIVO**
	11 - POOL DI 10	**POSITIVO**
	12 - POOL DI 10	**POSITIVO**
	13 - POOL DI 5 TAMPONI DA TESTE	NEGATIVO



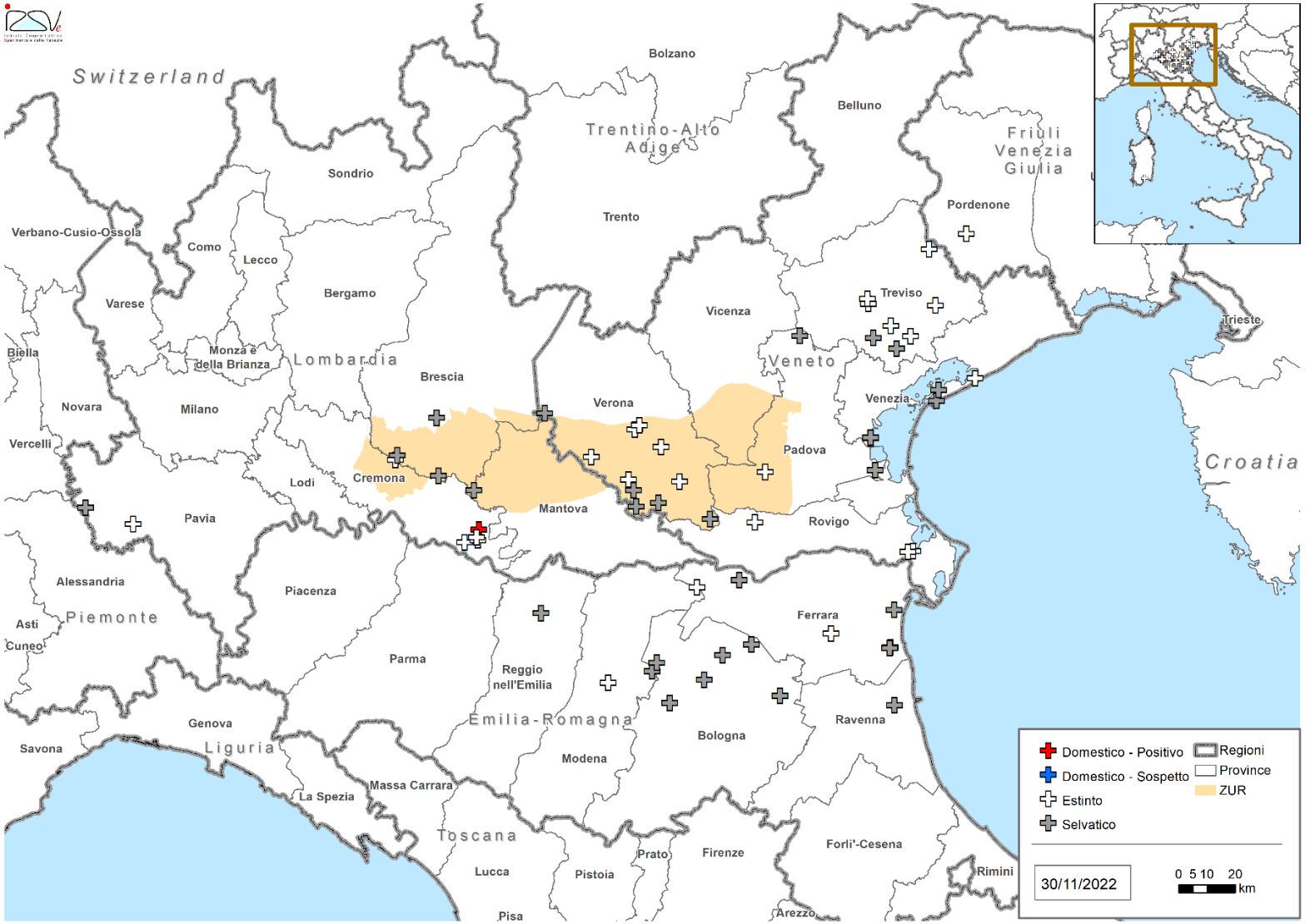
Epidemia HPAI 2022/2023 – "the Strange One"

SELVATICI (n=56)

- 19 Veneto
- 17 Emilia Romagna
- 9 Lombardia
- 2 Friuli V.G.
- 2 Sardegna

DOMESTICI (n=30)

- 19 Veneto
- 7 Lombardia
- 3 Emilia Romagna
- 1 Friuli Venezia Giulia



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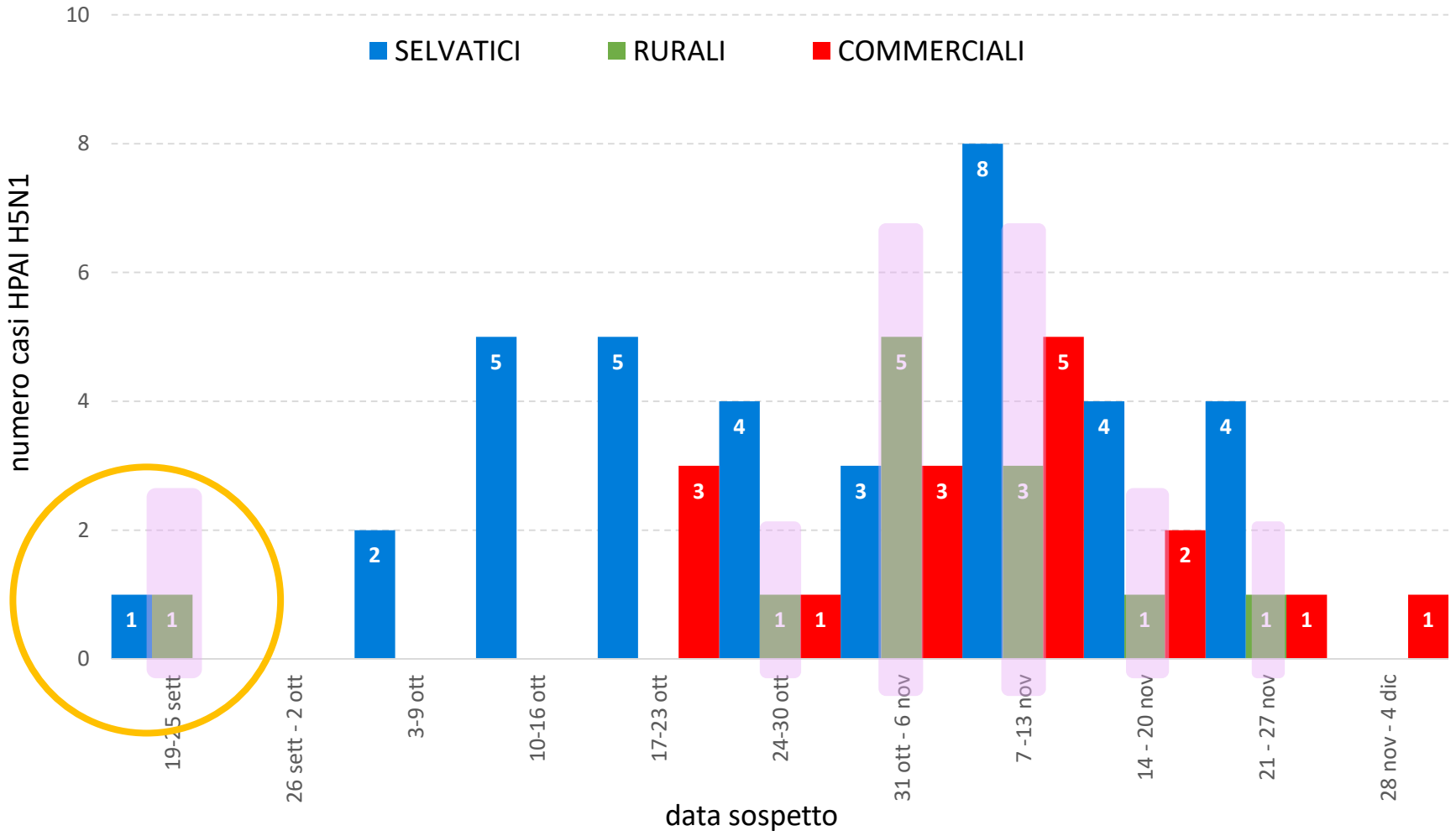
aggiornamenti: https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/italy-update/

Epidemia HPAI 2022/2023



Molti focolai in un area considerata a basso rischio (TV)

Istituto Zooprofilattico Sperimentale delle Venezie

Diversità genetica dei virus HPAI H5N1 circolanti in Italia

settembre - dicembre 2022

albero filogenetico HA

poultry farms
backyards/captive birds
wild birds

L'albero filogenetico del gene HA mostra in **rosso** i virus isolati nei domestici, in **verde** i virus dei rurali ed ornamentali ed in **blu** i casi isolati dai selvatici.

1. Si osserva una elevata correlazione fra i virus isolati nei domestici e quelli isolati nei selvatici. Ciò suggerisce che nella maggior parte dei casi i volatili selvatici sono stati la principale fonte di introduzione del virus nel pollame

2. 6 differenti gruppi genetici→ *introduzioni virali multiple*

3. Una elevata correlazione genetica fra i virus isolati dai focolai domestici si è osservata in rari casi

La novità degli episodi di mortalità di massa per HPAI

✓ **40** HPAI outbreaks in poultry (21/04/2023)

- **24** Veneto
- **8** Lombardia
- **4** Emilia Romagna
- **1** Friuli Venezia-Giulia
- **1** Toscana

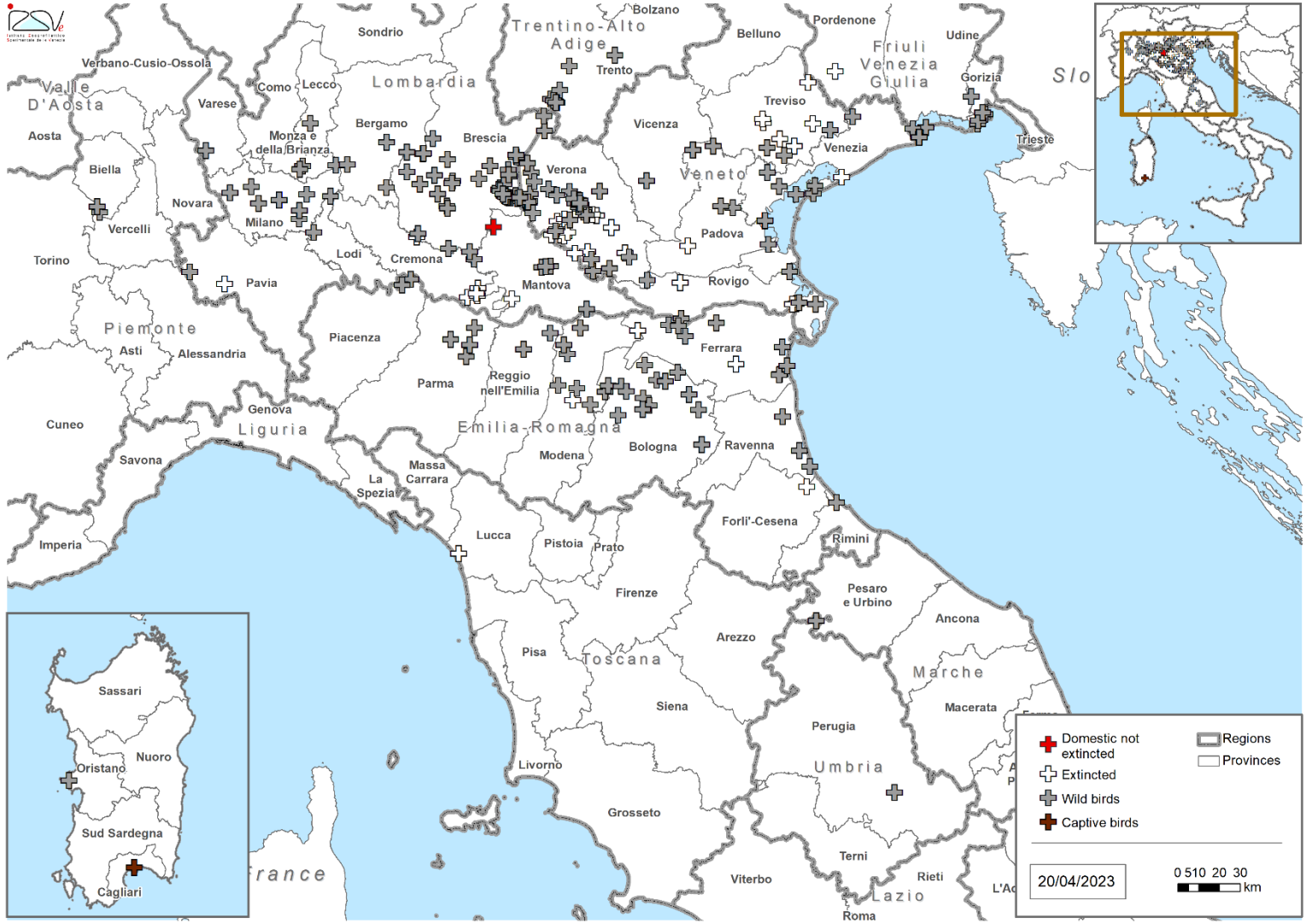
+ 10
from January

✓ **215** HPAI outbreaks in wild birds (21/04/2023)

- **79** Lombardia
- **63** Veneto
- **41** Emilia Romagna
- **16** Trentino - Alto Adige
- **10** Friuli – Venezia Giulia
- **2** Sardegna
- **2** Umbria
- **2** Piemonte

+ 160
from January

Estimated over 1,000 cases



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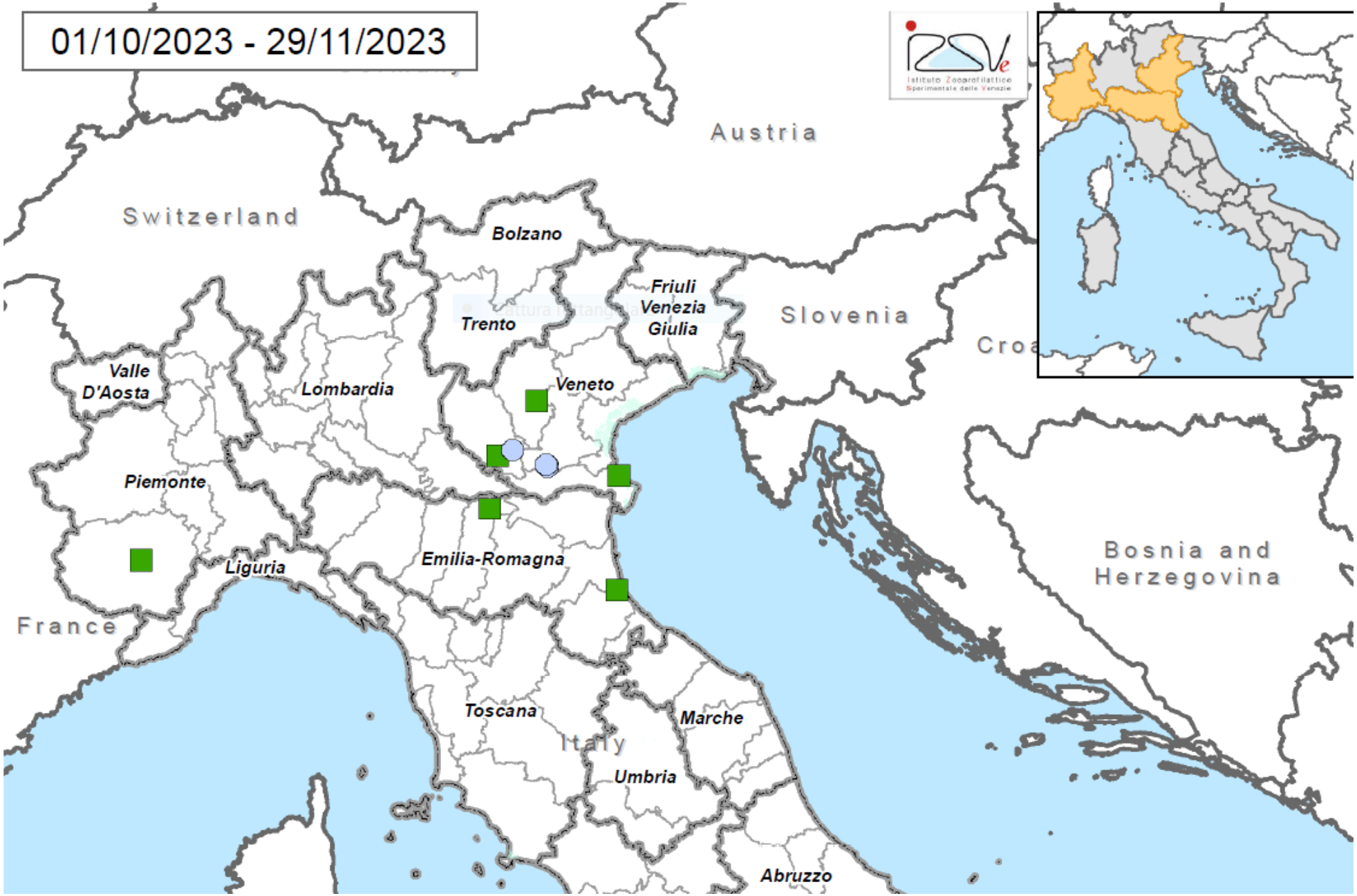
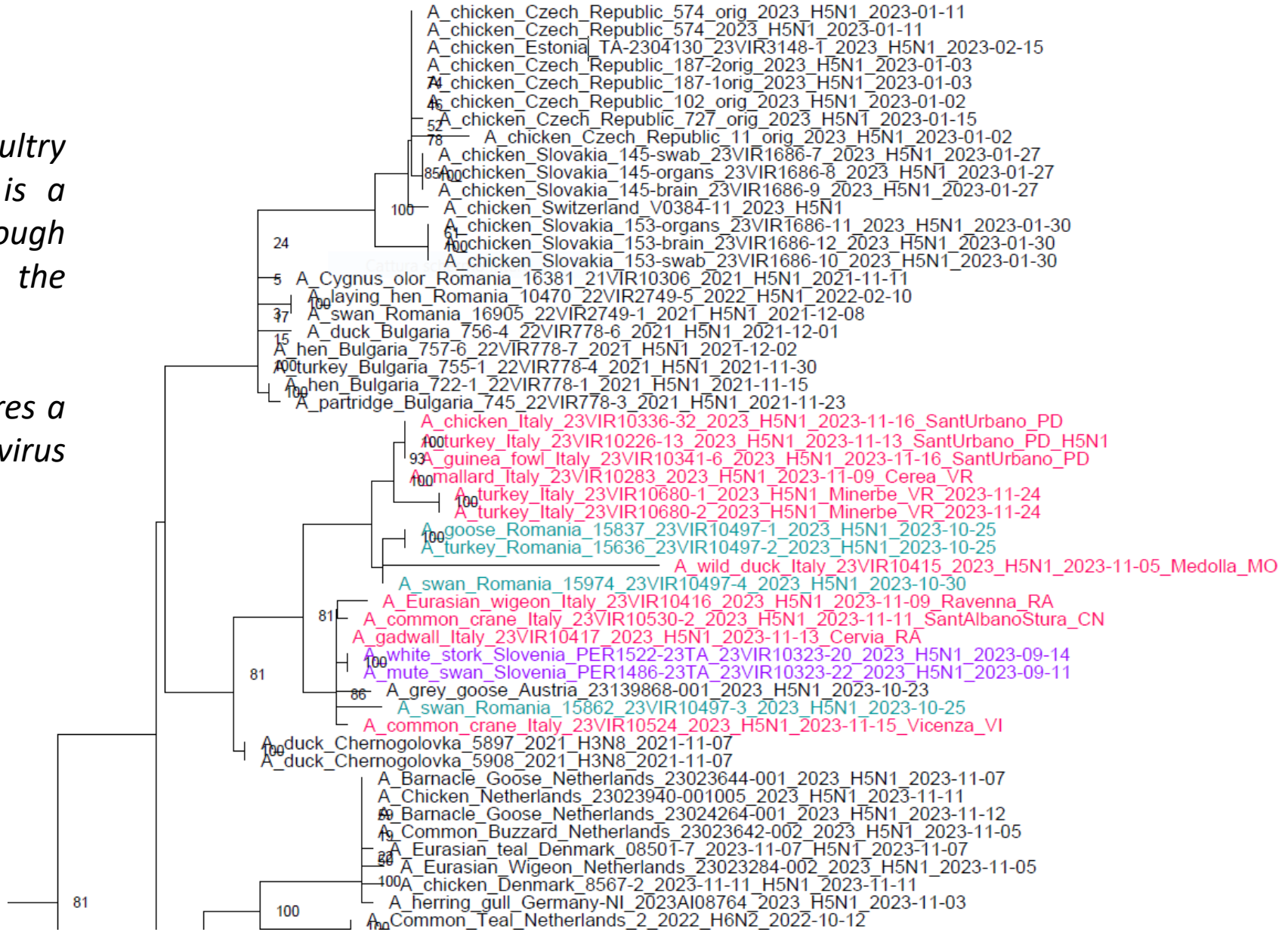
Regular update on: https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/italy-update/

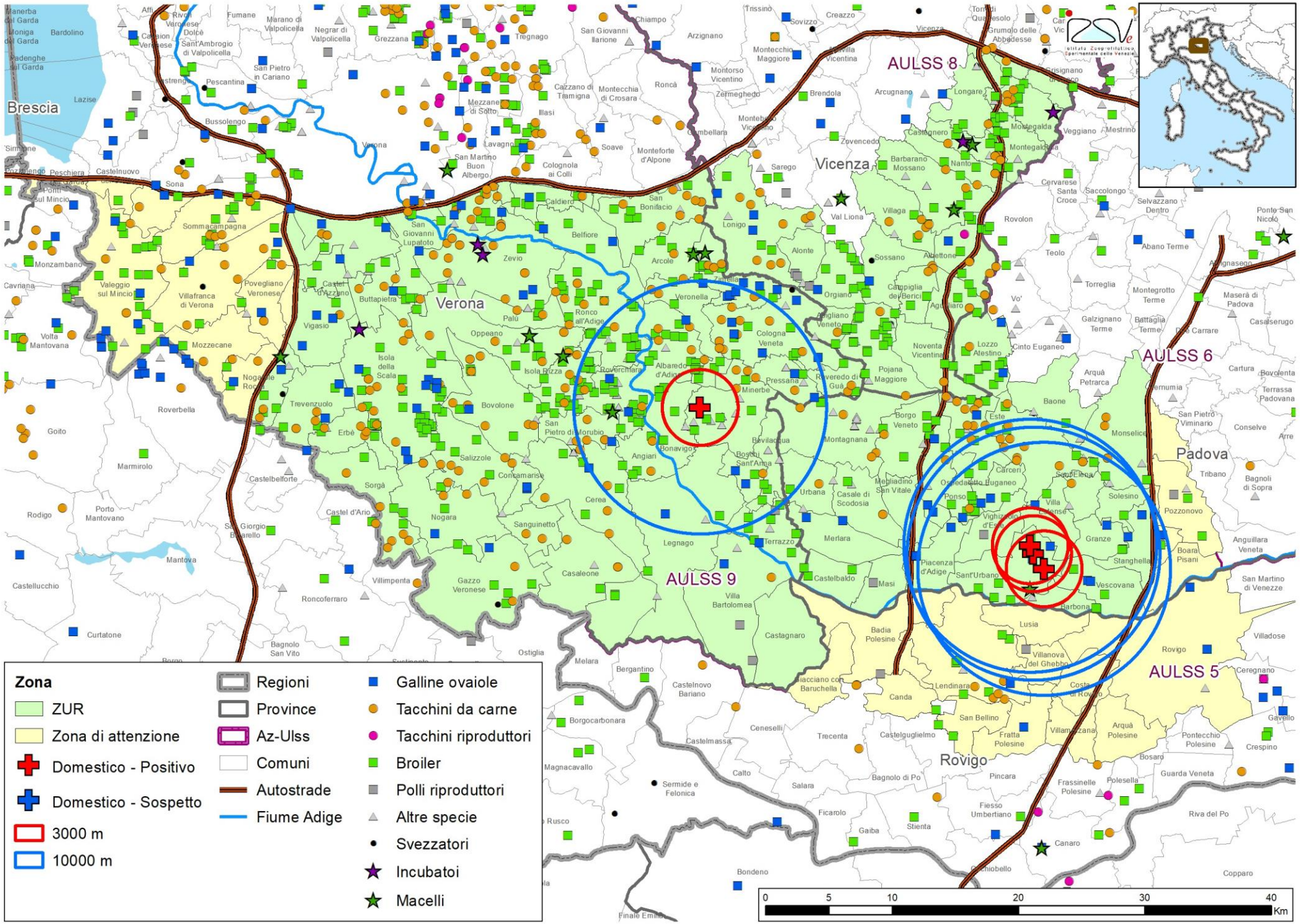
La situazione attuale



The viruses identified in Italy in poultry ***belongs to a new genotype*** *and it is a reassortant virus generated through multiple reassortment events among the European HPAI viruses and LPAI viruses.*

Worthy of note*: the Italian viruses shares a high identity with the HPAI H5N1 virus* identified wild birds.

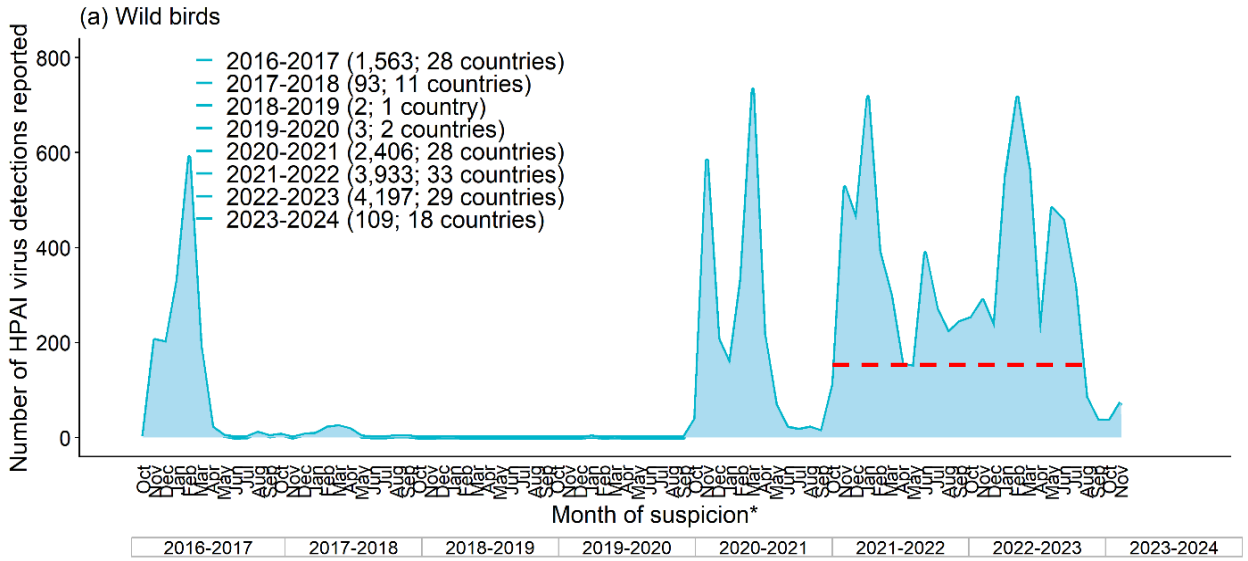


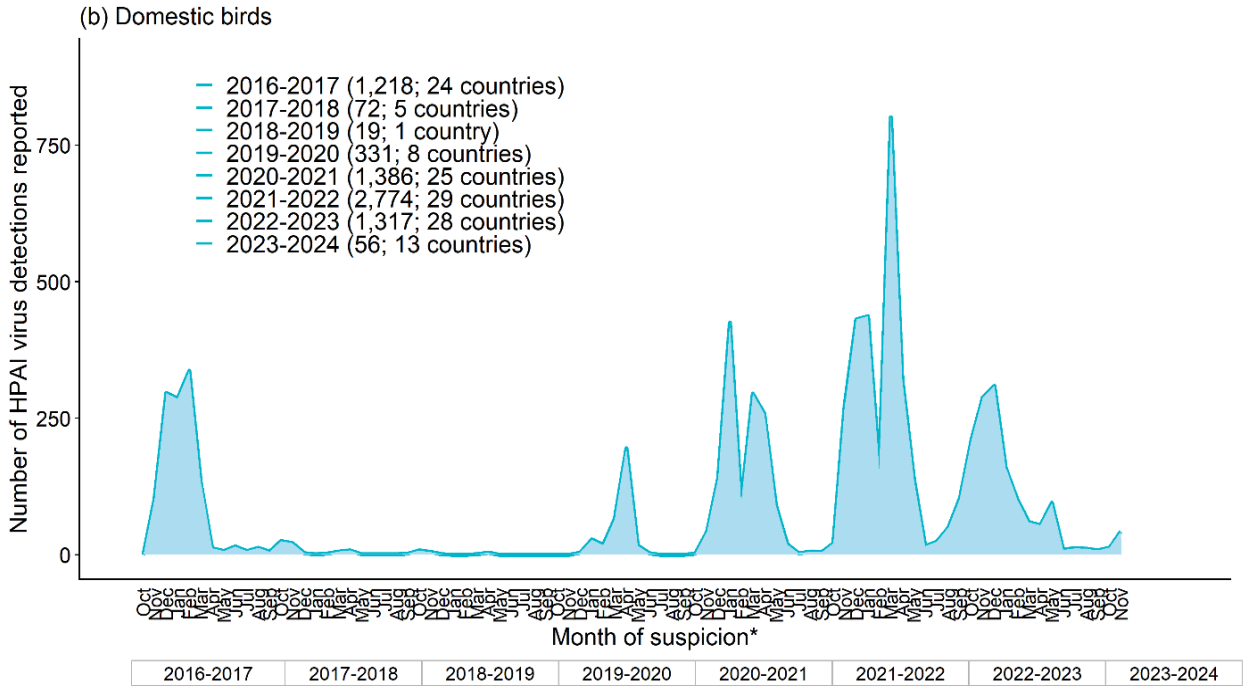

Zona
ZUR
Zona di attenzione
Domestico - Positivo
Domestico - Sospetto
3000 m
10000 m
Regioni
Province
Az-Ulss
Comuni
Autostrade
Fiume Adige
Galline ovaiole
Tacchini da carne
Tacchini riproduttori
Broiler
Polli riproduttori
Altre specie
Svezzatori
Incubatoi
Macelli
AULSS 8
AULSS 9
AULSS 6
AULSS 5
Verona
Vicenza
Padova
Rovigo
Brescia
0 5 10 20 30 40
Km

HPAI in EU/EEA e UK: distribuzione dei casi dal 2016

L'epidemia di HPAI osservata negli uccelli selvatici nell'anno epidemiologico 2022-2023, già a settembre aveva superato l'anno epidemiologico precedente (2021-2022) in termini di numero totale di rilevamenti di virus HPAI segnalati negli uccelli selvatici (ad oggi notificati **4.197** vs 3.936 del 2022).

Al 30 novembre 2023, nell'anno in corso sono stati superati i **1.300** focolai nel pollame.

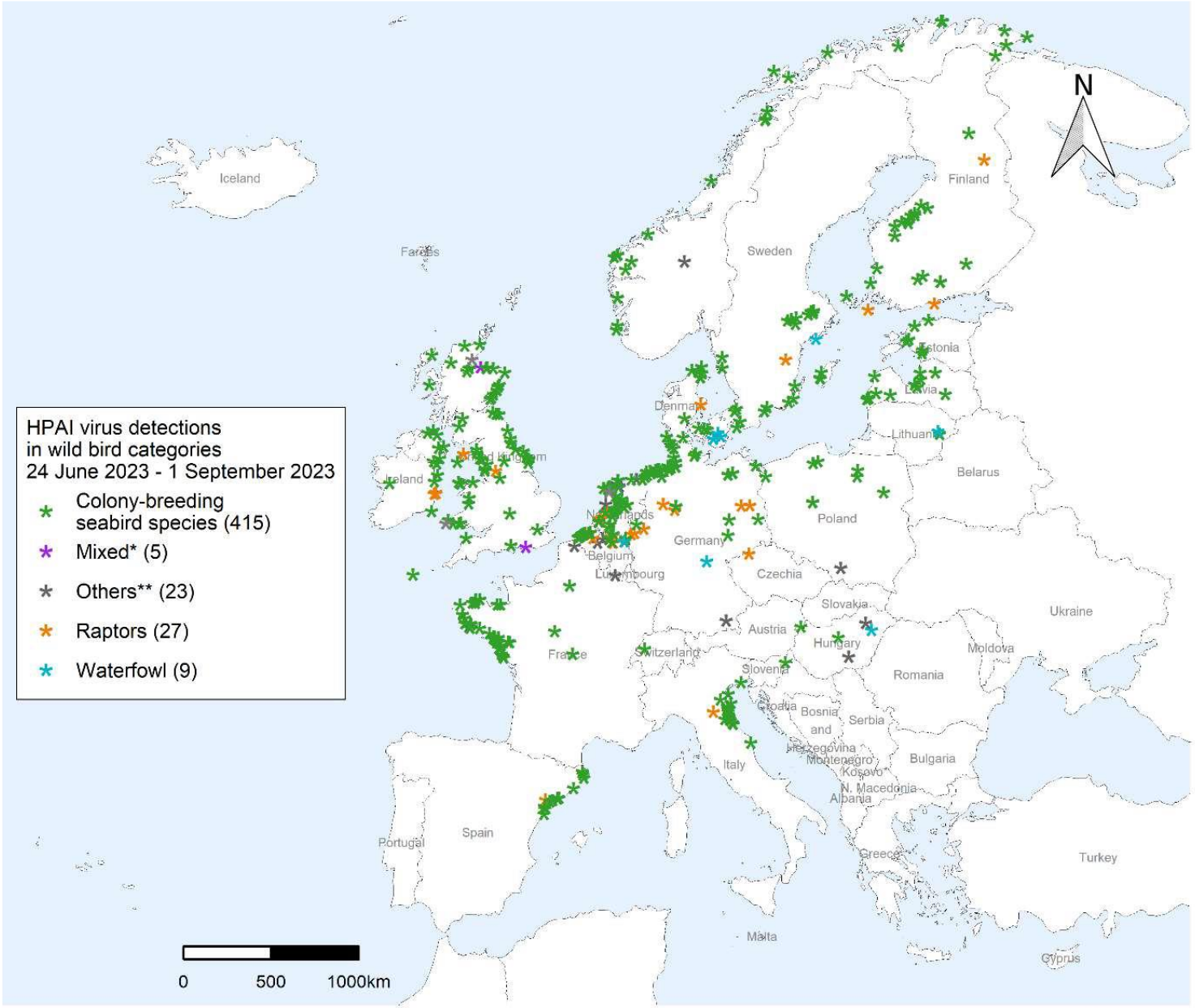




Istituto Zooprofilattico Sperimentale delle Venezie

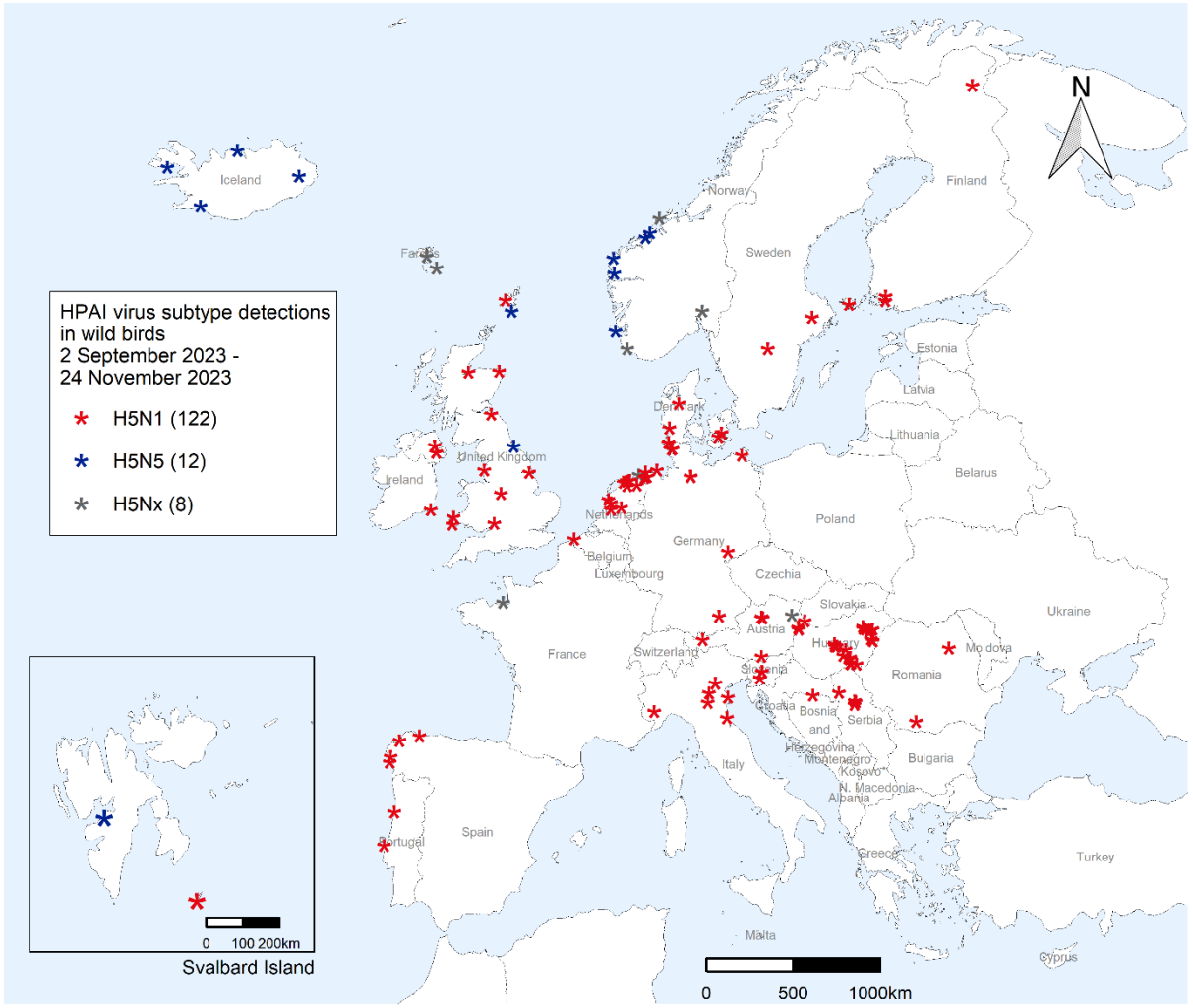
Source: EFSA/ECDC/EURL avian influenza reports
https://efsa.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1831-4732.avianinfluenza

Persistenza del virus in estate

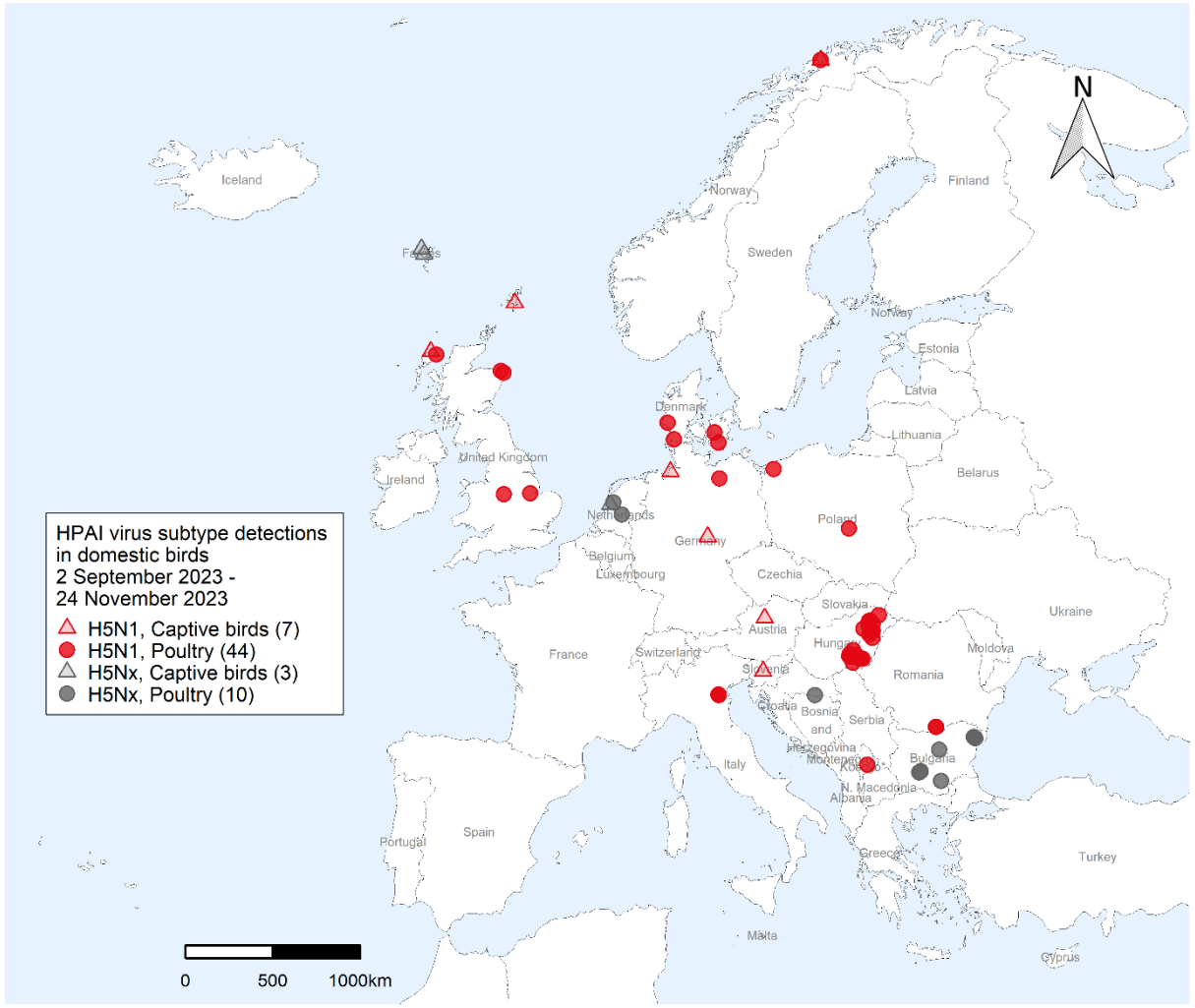


Author: EFSA
Data sources: ADIS, WOAH
Date updated: 01/09/2023

Incremento dei casi in autunno

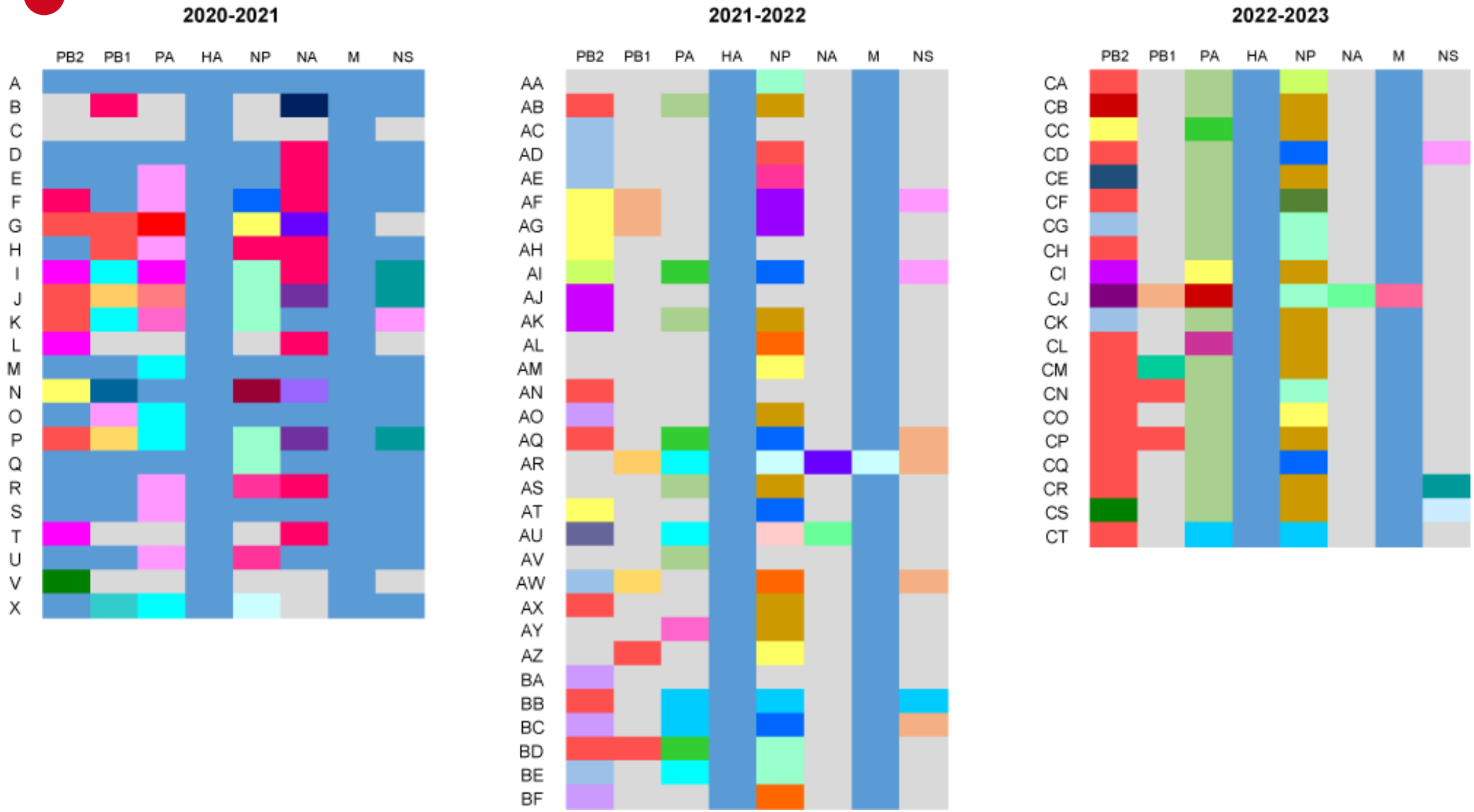


Author: EFSA
Data sources: ADIS, WOAH
Date updated: 24/11/2023



Author: EFSA
Data sources: ADIS, WOAH
Date updated: 24/11/2023

Diversificazione del virus in miriadi di varianti



73 genotypes

Color legend — Reference sequences

1 A/Eurasian_Wigeon/Netherlands/1/2020_H5N1
2 A/garganey/Bangladesh/38920/2019_H7N4
3 A/yellow-legged_gull/Switzerland/15-0039/21VIR3035/2021_H5N4
4 A/duck/Bangladesh/18D1577/2021/H3N2/2021-01-04
5 A/Eur_Wig/NL-Groningen/16015376-003/2016_H5N8
6 A/chicken/Ireland/005930_20VIR5487-1/2020_H6N1
7 A/duck/Mongolia/210/2018_H3N8
8 A/Anas_platyrhynchos/Belgium/204_0003/2020_H4N6
9 A/common_teal/Novosibirsk_region/3559k/2020_H4N6
10 A/Chicken/Netherlands/17014215-026-030/2017_H5N2
11 A/turkey/England/057679/2021_H5N1
12 A/guinea/fowl/Germany-NW/AI01184/2020_H5N8
13 A/teal/Dagestan/1017/2018_H12N5
14 A/duck/Mongolia/876/2019_H3N8
15 A/teal/Egypt/MB-D-487OP/2016_H7N3
16 A/Mallard/Netherlands/11/2021_H5N2
17 A/mallard/France/20P017917/2020_H5N3
18 A/Mallard/Netherlands/17/2021_H5N3
19 A/Anas_platyrhynchos/Belgium/10402_H195386/2017_H1N1
20 A/chicken/Iraq/1/2020_H5N8
21 A/mallard_duck/Netherlands/18/2012_H4N2
22 A/Anas_platyrhynchos/Belgium/10413_0003/2020_H5N2
23 A/mallard/Netherlands/19001282-001/2019_H5N1
24 A/mallard_duck/Netherlands/1/2014_H10N7
25 A/mallard/Novosibirsk_region/1894k/2019_H4N6
26 A/mallard/Ukraine/AN-221-13-01/2020/H7N2
27 A/mallard/Novosibirsk/964k/2018_H12N5
28 A/duck/Bangladesh/17D747/2016_H3N5
29 A/green_sandpiper/Kurgan/1048/2018_H3N8
30 A/northern_shoveler/North-Kazakhstan/20/2018_H3N8
31 A/duck/Mongolia/451/2018_H4N1
32 A/Anas_platyrhynchos/Belgium/7828/2018_H12N5
33 A/Anas_platyrhynchos/Belgium/11025_44/2017_H11N1
34 A/Eurasian-teal/Egypt/P2-29/2017_H6N2
35 A/mallard_duck/Netherlands/59/2015_H6N5
36 A/Eurasian_teal/Netherlands/1/2011_H3N8
37 A/teal/Egypt/MB-D-125OP/2015_H7N3
38 A/mallard/Bangladesh/37909/2019_H8N4
39 A/Chroicocephalus_ridibundus/Belgium/13464/2020_H13N8

Europe: Emergence of H5 clade 2.3.4.4b reassortants

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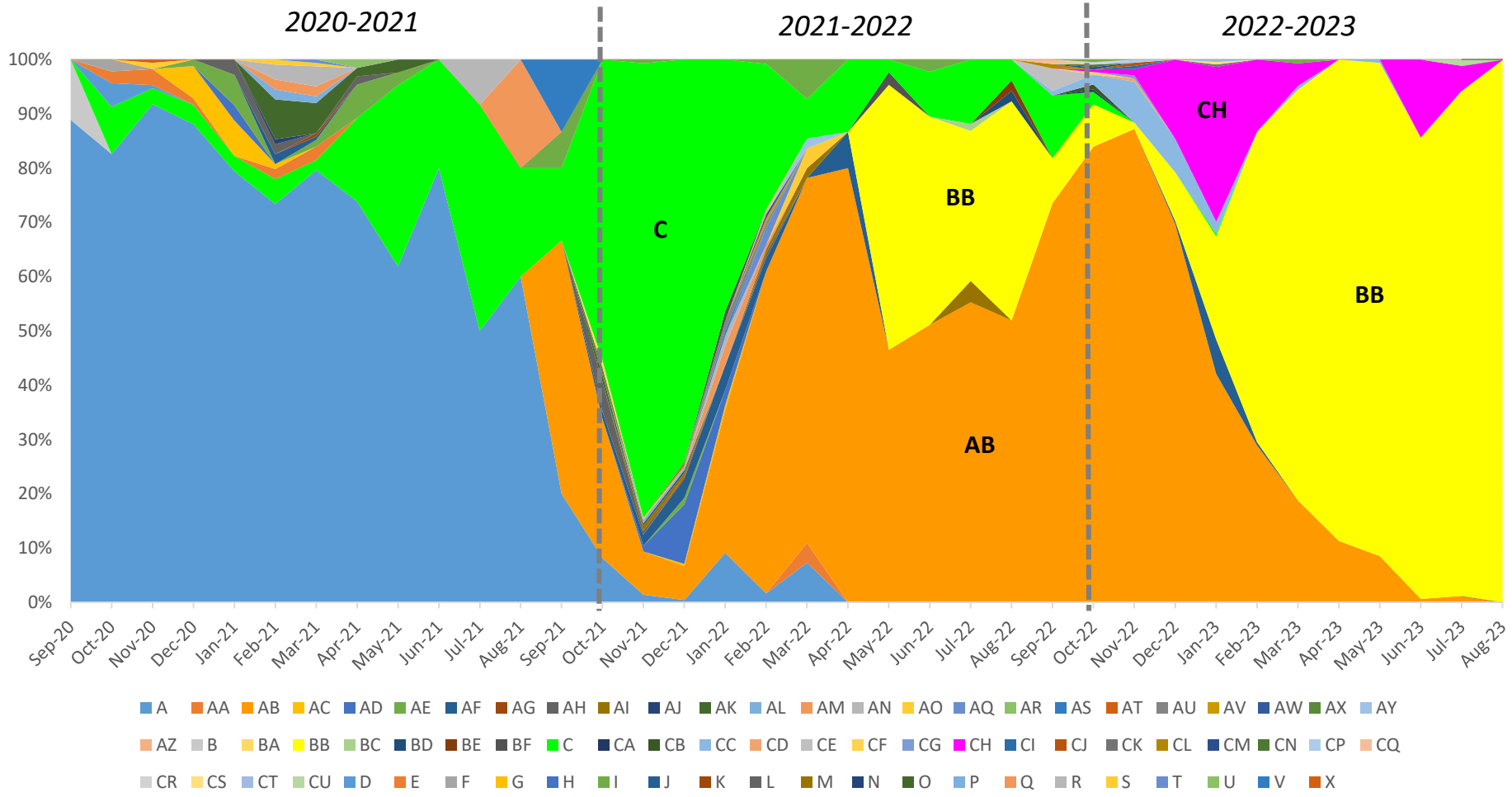
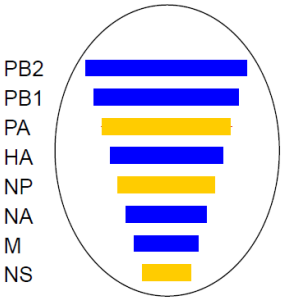
Cambiamenti continui dei genotipi circolanti



H5N1-Genotype C
Eurasian wigeon/Netherlands-like

H5N1-Genotype AB
Duck/Saratov-like

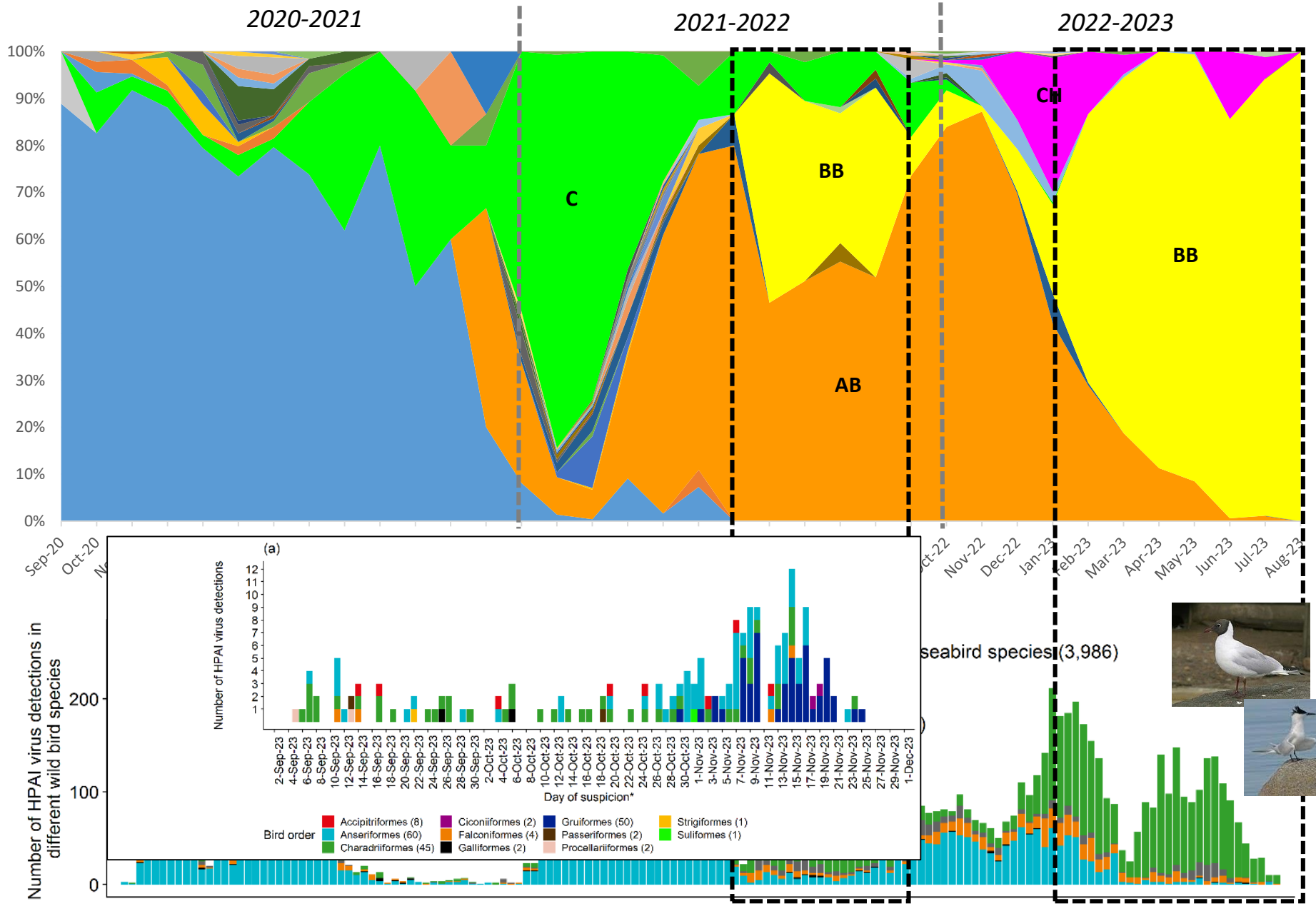
H5N1-Genotype BB
Herring gull/France-like



H5N1 A/duck/Saratov/29-02/21-like

gull-adapted H13 subtype

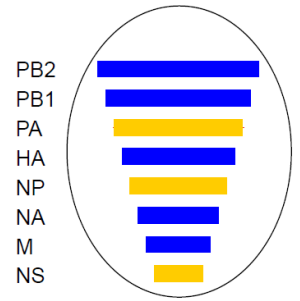
Cambiamenti continui dei genotipi circolanti



H5N1-Genotype C
Eurasian wigeon/Netherlands-like

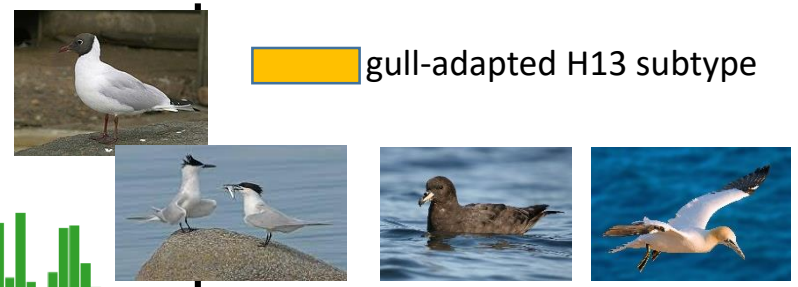
H5N1-Genotype AB
Duck/Saratov-like

H5N1-Genotype BB
Herring gull/France-like



H5N1 A/duck/Saratov/29-02/21-like

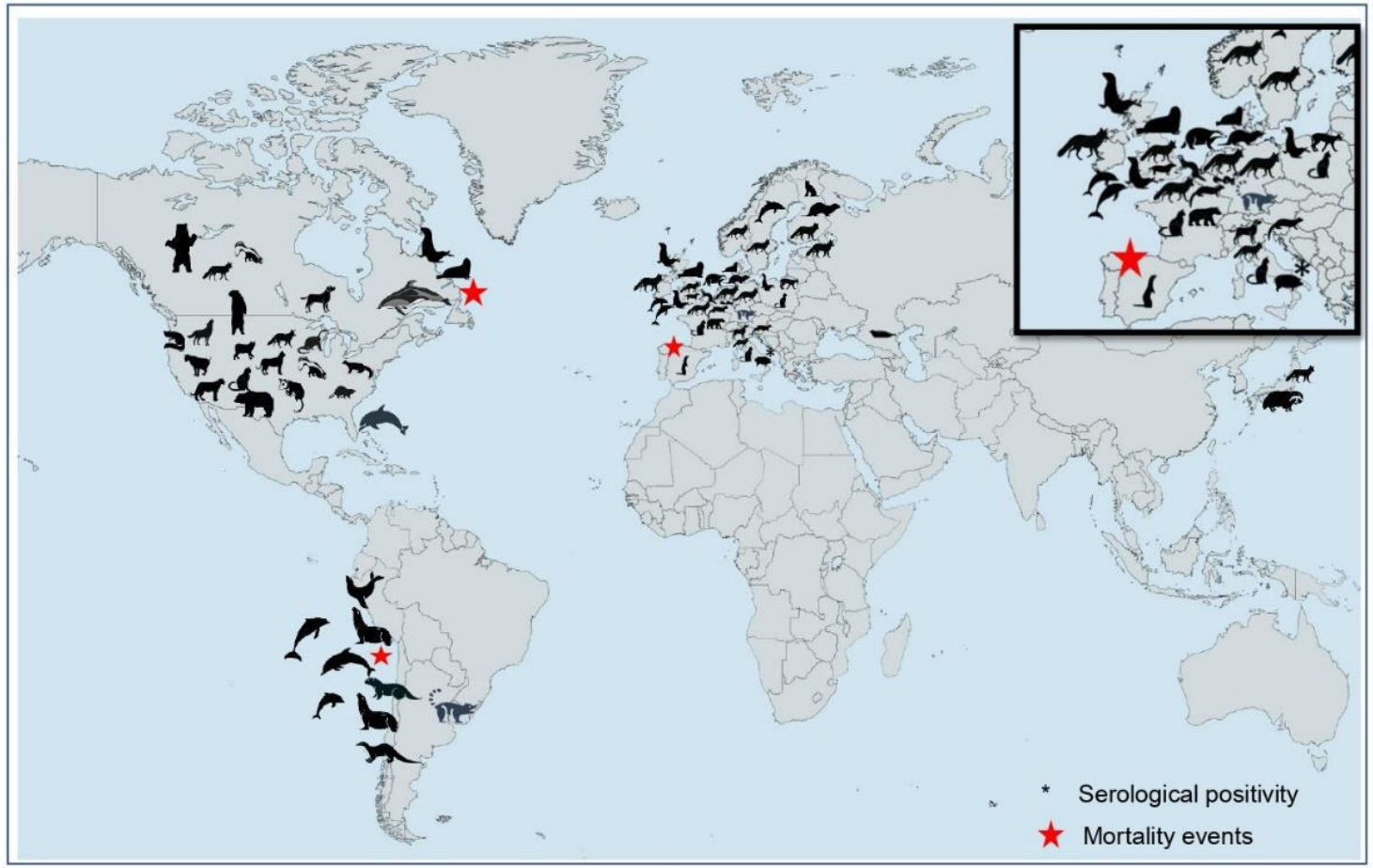
gull-adapted H13 subtype



Source: EFSA, Scientific report: Avian influenza overview June-September 2023. EFSA Journal 2023

Coinvolgimento sempre più vasto di nuove specie

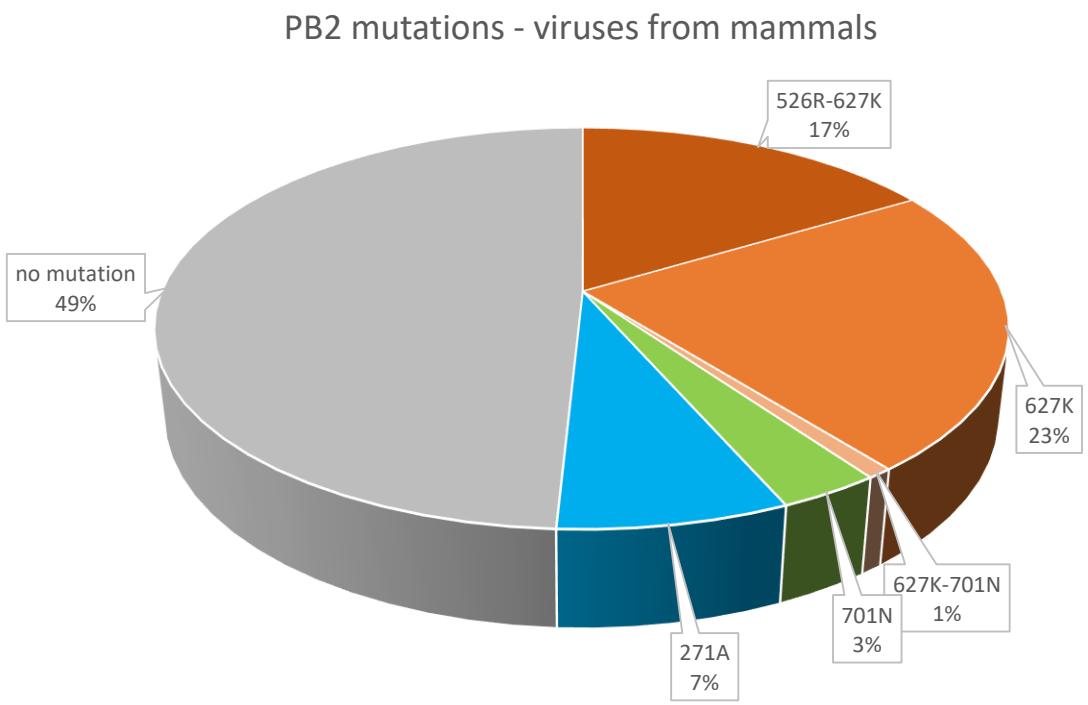
Geographic distribution of HPAI virus detections in non-human mammals



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

Source: EFSA/ECDC/EURL avian influenza reports
https://efsa.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1831-4732.avianinfluenza

Segnali di progressive adattamento ai mammiferi



Il 60% dei virus analizzati presso l'EURL da ospiti non aviari contiene almeno uno dei marcatori adattivi associati a una maggiore virulenza e replicazione nei mammiferi nella proteina PB2 (es. E627K, D701N o T271A) o N (es. NA-396V).

Queste mutazioni (T271A) (E627K, D701N) sono state trovate anche in alcuni virus HPAI A(H5) del clade 2.3.4.4b identificati negli uccelli in Europa dall'ottobre 2020 (circa lo 0,5% delle sequenze virali dagli uccelli).

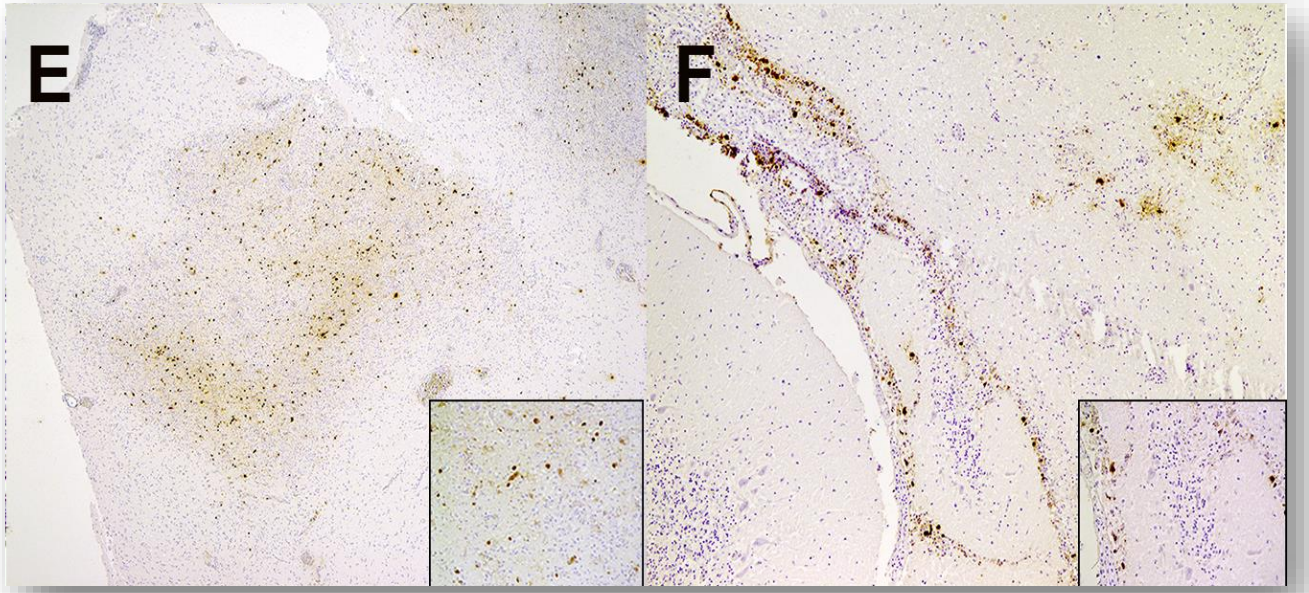
Journal of Infection
Volume 87, Issue 4, October 2023, Pages e70-e72

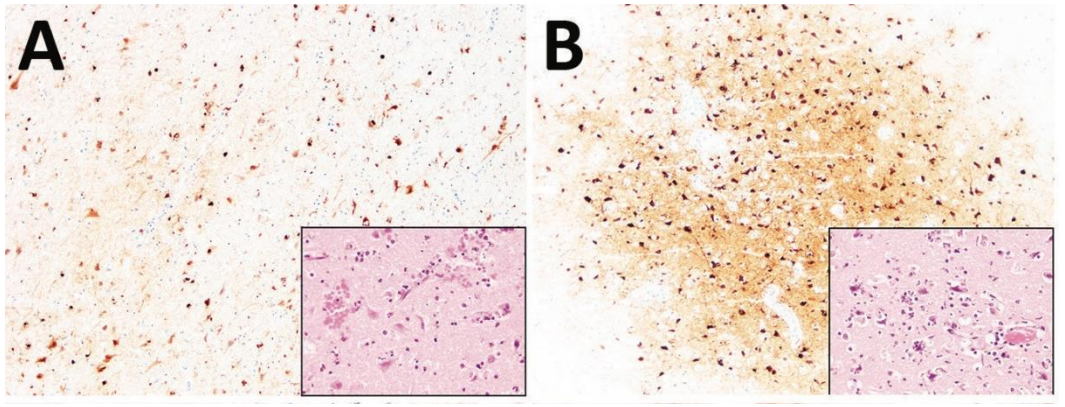
Letter to the Editor

Emergence of a novel reassortant H5N6 subtype highly pathogenic avian influenza virus in farmed dogs in China

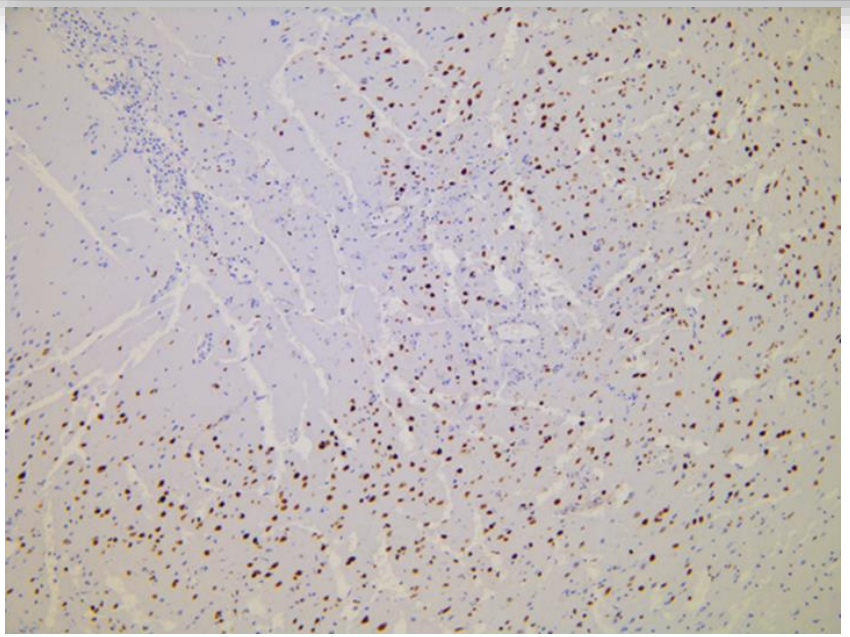
Xin-Yan Yao, Chun-Yang Lian, Zhi-Hang Lv, Xue-Lian Zhang, Jia

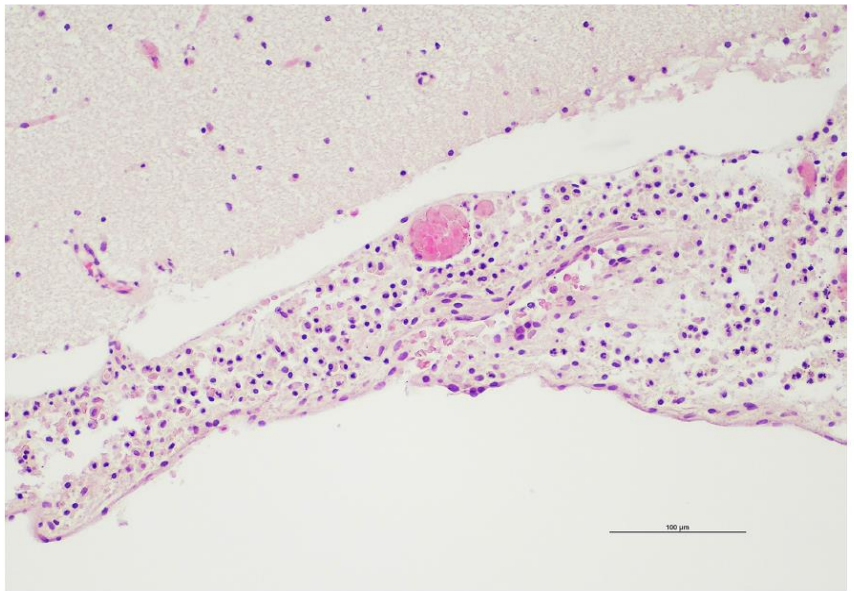
Genetic analysis revealed that the HA proteolytic cleavage site of GX30/H5N6 possessed six basic amino acids motif (RERRRKR/GLF), indicating potential for increased pathogenicity.[9] Notably, the Q226L substitution, a human-like biomarker on the receptor-binding site (RBS), was observed in GX30/H5N6, suggesting a binding preference for human-like receptors (sialic acid alpha2,6-galactose). Additionally, six amino acid changes (137A, 158N, 160A, 192I, 222Q, and 227R), which could enhance binding to human-like receptors, were also observed within the RBS of the HA protein (Table S1). Like most





Il riscontro anatomopatologico più frequente nei casi nei mammiferi selvatici e domestici è una grave encefalite/meningoencefalite





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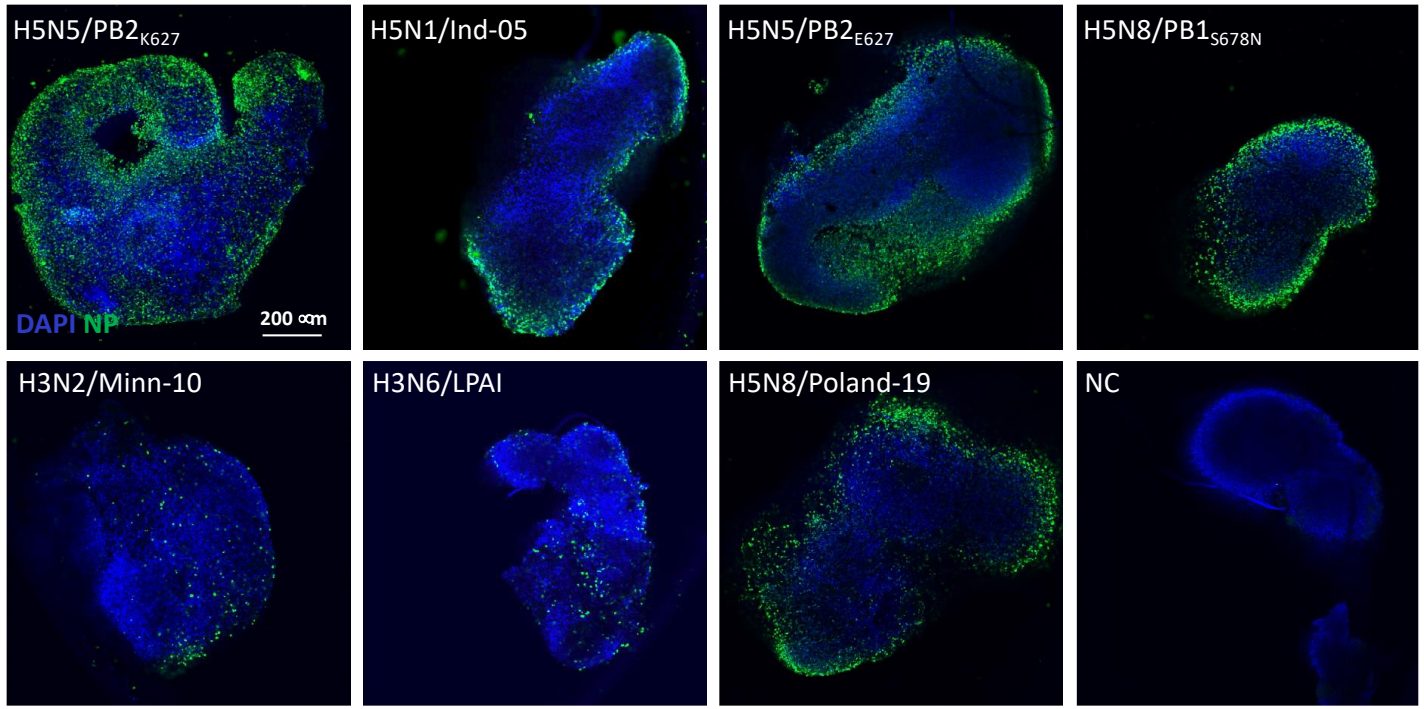
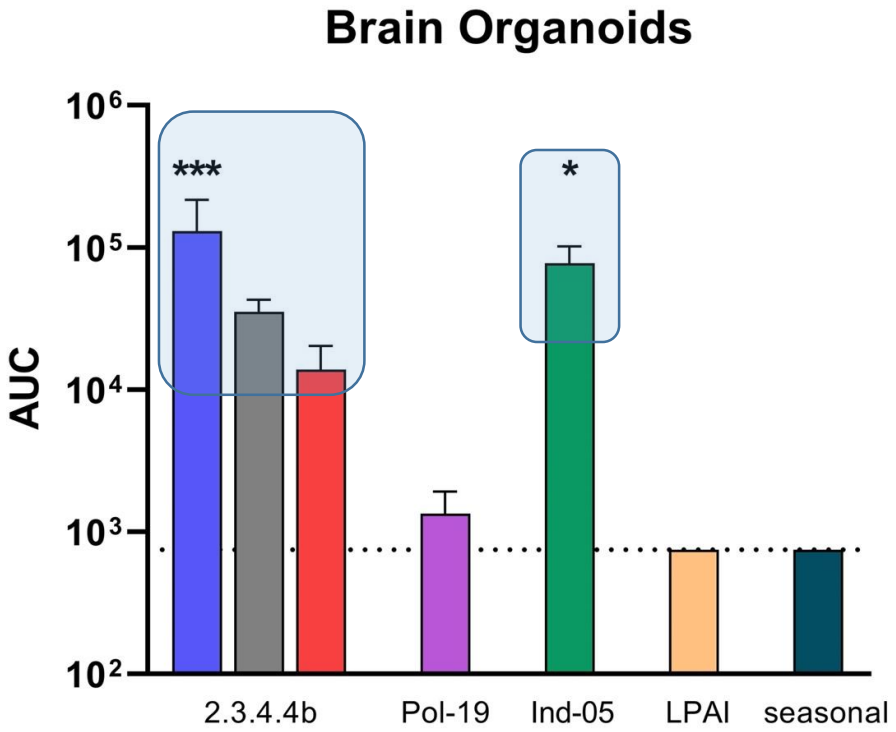
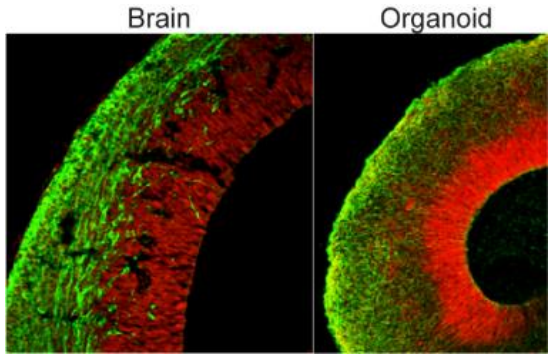
Piattaforma di fenotipizzazione presso il CRN AI





FONDAZIONE RICERCA BIOMEDICA AVANZATA ONLUS V.I.M.M.



(neural stem cells in red and neurons in green)

2.3.4.4b from 2021/22

2.3.4.4b from 2019/20

Zoonotic neurotropic strain

H5N5
H5N5
H5N8
H5N8 A/turkey/Poland/23/2019
H5N1 A/Indonesia/5/2005
H3N6 LPAI
H3N2 A/Minnesota/11/2010

Che possiamo fare per prevenire eventi di spillover?

Attuare quanto previsto nel Piano Pandemico Nazionale

Sorveglianza nel pollame e altre specie sensibili

Sorveglianza negli uccelli e nei mammiferi selvatici

Istituto Zooprofilattico Sperimentale delle Venezie

Attuare quanto previsto nel Piano Pandemico Nazionale

Sorveglianza nel pollame e altre specie sensibili

Sorveglianza negli esposti

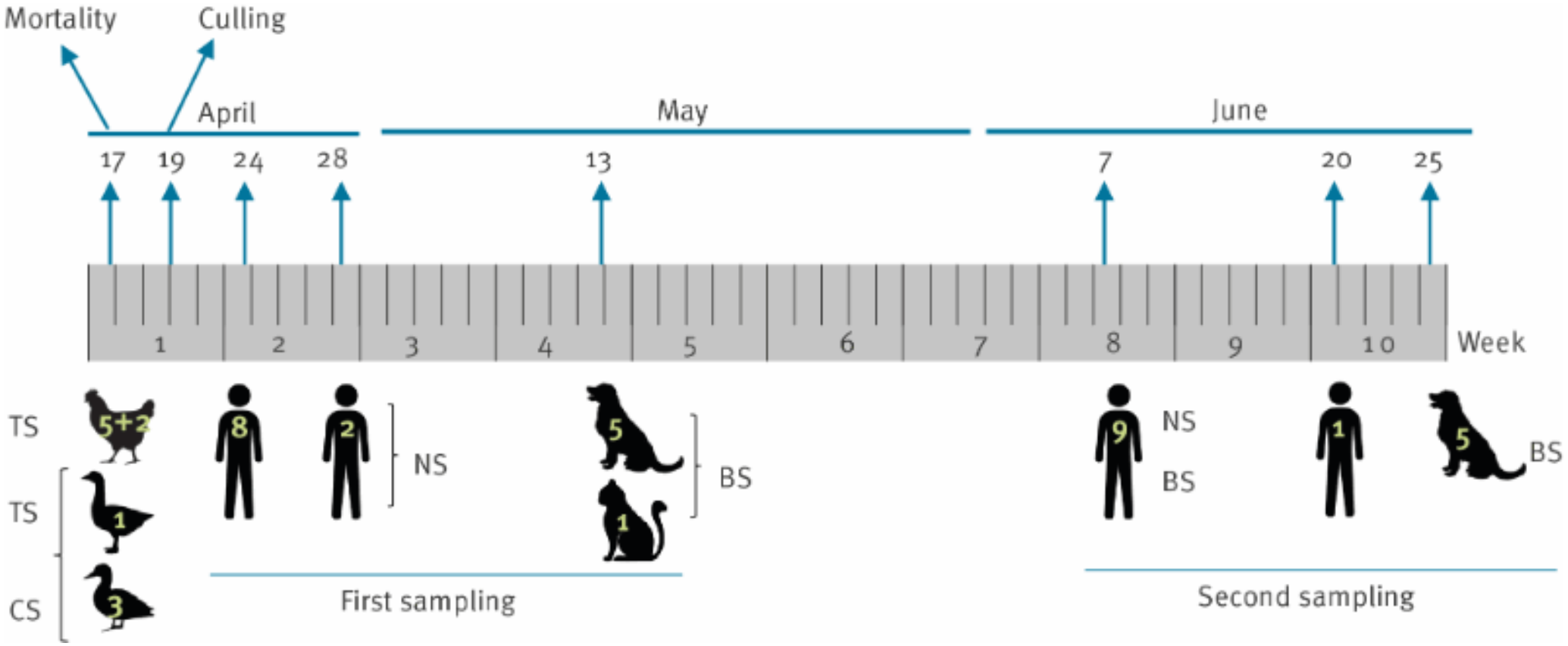
Sorveglianza negli uccelli e nei mammiferi selvatici

Istituto Zooprofilattico Sperimentale delle Venezie

Asymptomatic infection with clade 2.3.4.4b highly pathogenic avian influenza A(H5N1) in carnivore pets, Italy, April 2023

Ana Moreno , Francesco Bonfante, Alessio Bortolami, Irene Cassaniti, Anna Caruana, Vincenzo Cottini , Danilo Cereda , Marco Farioli , Alice Fusaro, Antonio Lavazza , Pierdavide Lecchini, Davide Lelli , Andrea Maroni Ponti, Claudia Nassuato , Ambra Pastori, Francesca Rovida, Luigi Ruocco, Marco Sordilli, Fausto Baldanti, Calogero Terregino

Euro Surveill. 2023;28(35):pii=2300441. https://doi.org/10.2807/1560-7917.ES.2023.28.35.2300441



II

(Non-legislative acts)

REGULATIONS

COMMISSION DELEGATED REGULATION (EU) 2023/361

of 28 November 2022

supplementing Regulation (EU) 2016/429 of the European Parliament and the Council as regards rules for the use of certain veterinary medicinal products for the purpose of prevention and control of certain listed diseases

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2016/429 of the European Parliament and of the Council of 9 March 2016 on transmissible animal diseases and amending and repealing certain acts in the area of animal health ('Animal Health Law') ([1]), and in particular Article 47(1) thereof,

SCIENTIFIC OPINION

ADOPTED: 13 September 2023

doi: 10.2903/j.efsa.2023.8271

Vaccination of poultry against highly pathogenic avian influenza – part 1. Available vaccines and vaccination strategies

EFSA Panel on Animal Health and Animal Welfare (AHAW), European Union Reference Laboratory for Avian Influenza,
Søren Saxmose Nielsen, Julio Alvarez, Dominique Joseph Bicout, Paolo Calistri, Elisabetta Canali, Julian Ashley Drewe, Bruno Garin-Bastuji, Jose Luis Gonzales Rojas, Christian Gortázar, Mette Herskin, Virginie Michel, Miguel Ángel Miranda Chueca, Barbara Padalino, Helen Clare Roberts, Hans Spoolder, Karl Stahl, Antonio Velarde, Christoph Winckler, Eleonora Bastino, Alessio Bortolami, Claire Guinat, Timm Harder, Arjan Stegeman, Calogero Terregino, Inmaculada Aznar Asensio, Lina Mur, Alessandro Broglia, Francesca Baldinelli and Arvo Viltrop

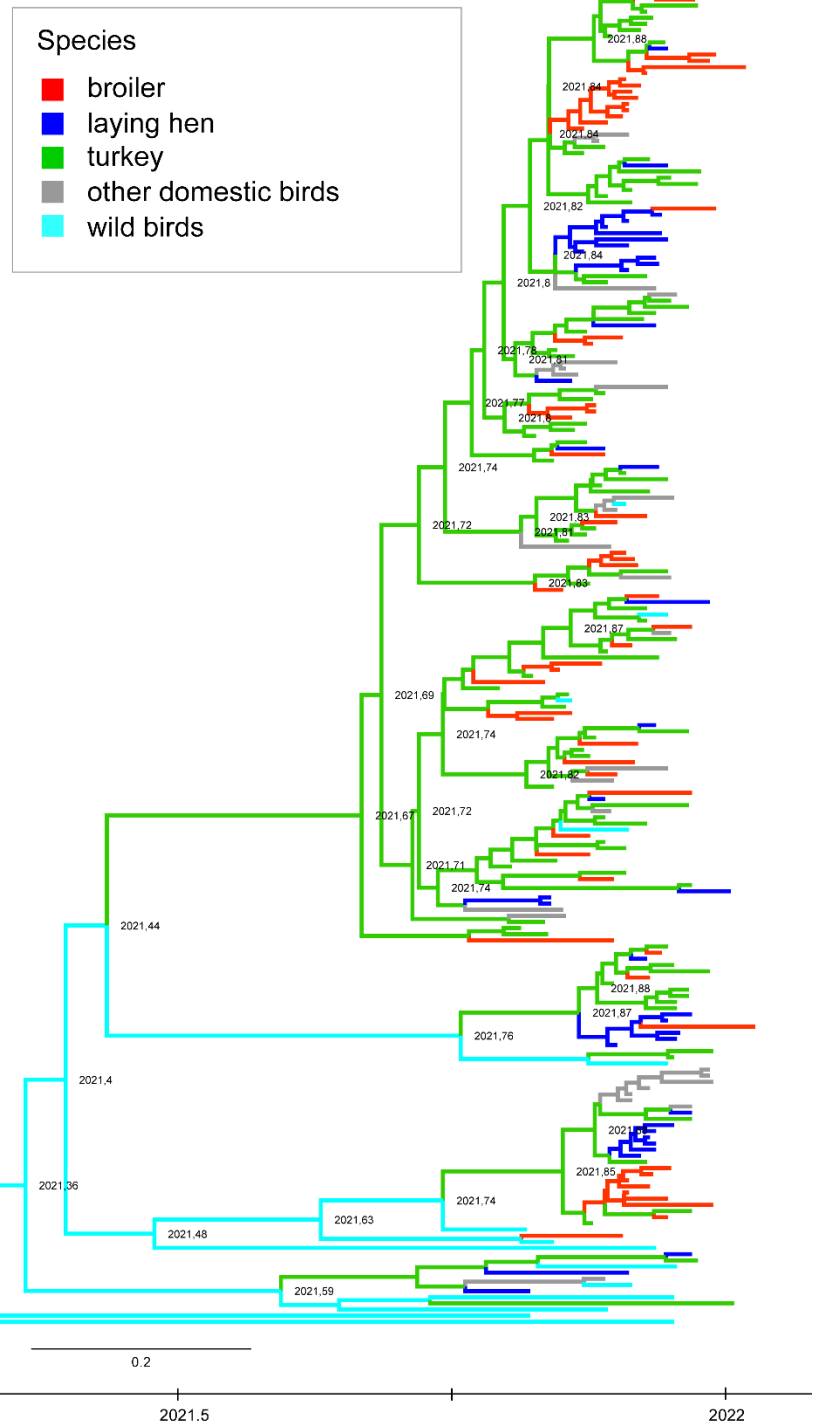
Abstract

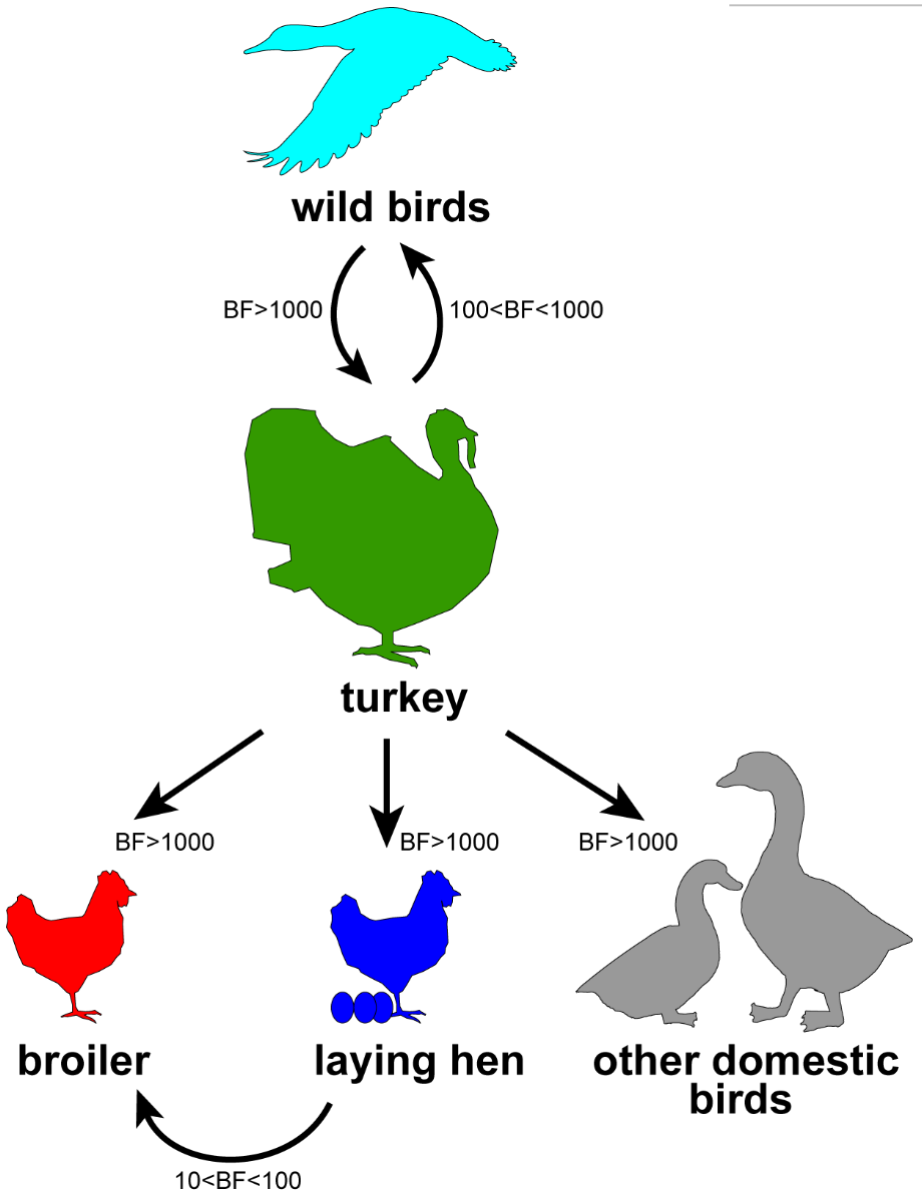
Several vaccines have been developed against highly pathogenic avian influenza (HPAI), mostly inactivated whole-virus vaccines for chickens. In the EU, one vaccine is authorised in chickens but is not fully efficacious to stop transmission, highlighting the need for vaccines tailored to diverse poultry species and production types. Off-label use of vaccines is possible, but effectiveness varies. Vaccines are usually injectable, a time-consuming process. Mass-application vaccines outside hatcheries remain rare. First vaccination varies from *in-ovo* to 6 weeks of age. Data about immunity onset and duration in the target species are often unavailable, despite being key for effective planning. Minimising antigenic distance between vaccines and field strains is essential, requiring rapid updates of vaccines to match circulating strains. Generating harmonised vaccine efficacy data showing vaccine ability to reduce transmission is crucial and this ability should be also assessed in field trials. Planning vaccination requires selecting the most adequate vaccine type and vaccination scheme. Emergency protective vaccination is limited to vaccines that are not restricted by species, age or pre-existing vector-immunity, while preventive vaccination should prioritise achieving the highest protection, especially for the most susceptible species in high-risk transmission areas. Model simulations in France, Italy and The Netherlands revealed that (i) duck and turkey farms are more infectious than chickens, (ii) depopulating infected farms only showed limitations in controlling disease spread, while 1-km ring-culling performed better than or similar to emergency preventive ring-vaccination scenarios, although with the highest number of depopulated farms, (iii) preventive vaccination of the most susceptible species in high-risk transmission areas was the best option to minimise the outbreaks' number and duration, (iv) during outbreaks in such areas, emergency protective vaccination in a 3-km radius was more effective than 1- and 10-km radius. Vaccine efficacy should be monitored and complement other surveillance and preventive efforts.

Bayesian maximum clade credibility (MCC) tree:
Contributo della **specie** alla diffusione virale

Le nostre analisi suggeriscono:

- Diverse introduzioni virali dagli uccelli selvatici a quelli domestici.
- Tra le specie coinvolte, il tacchino ha agito come la fonte più probabile del virus per gli altri uccelli domestici.





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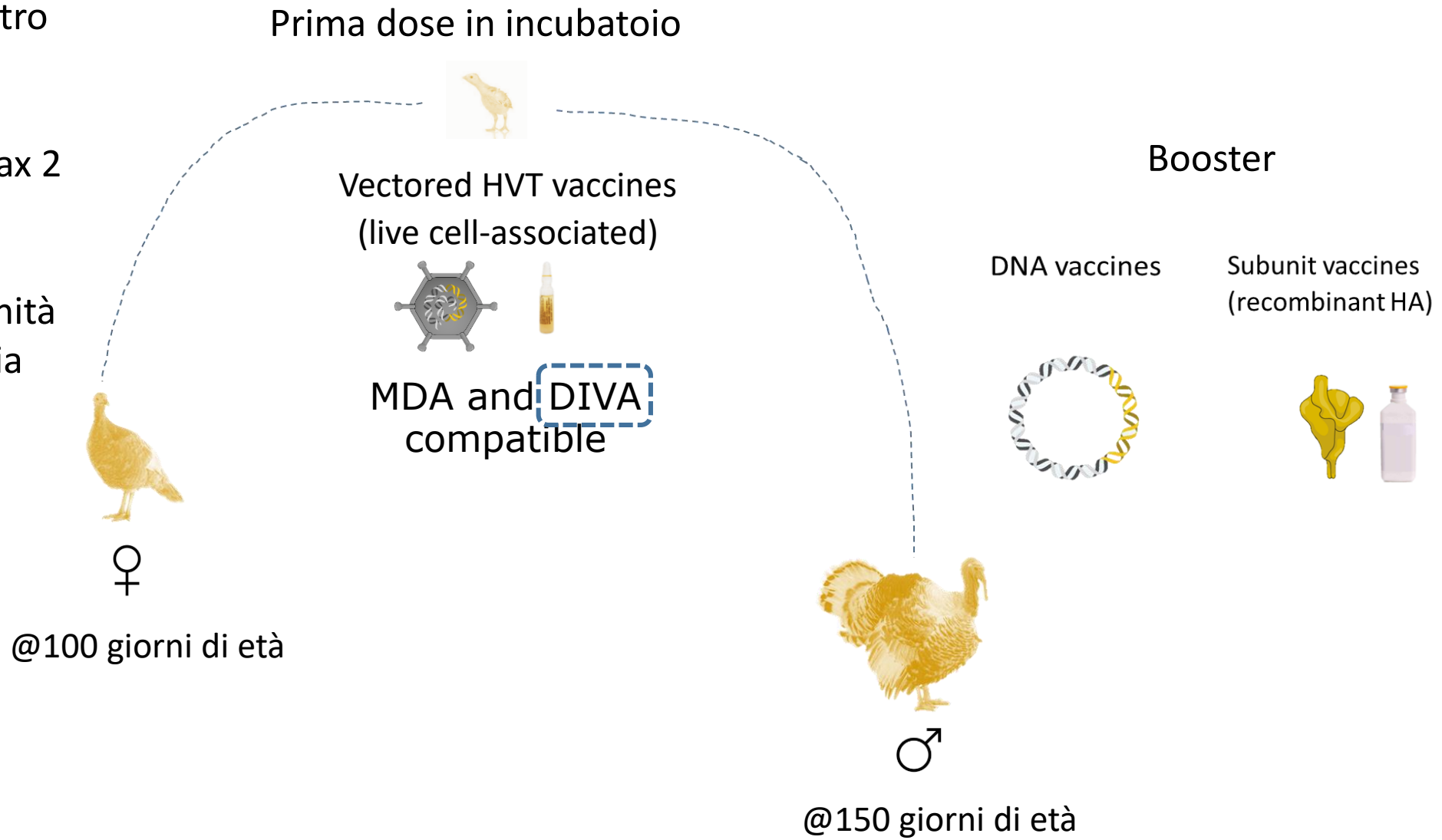
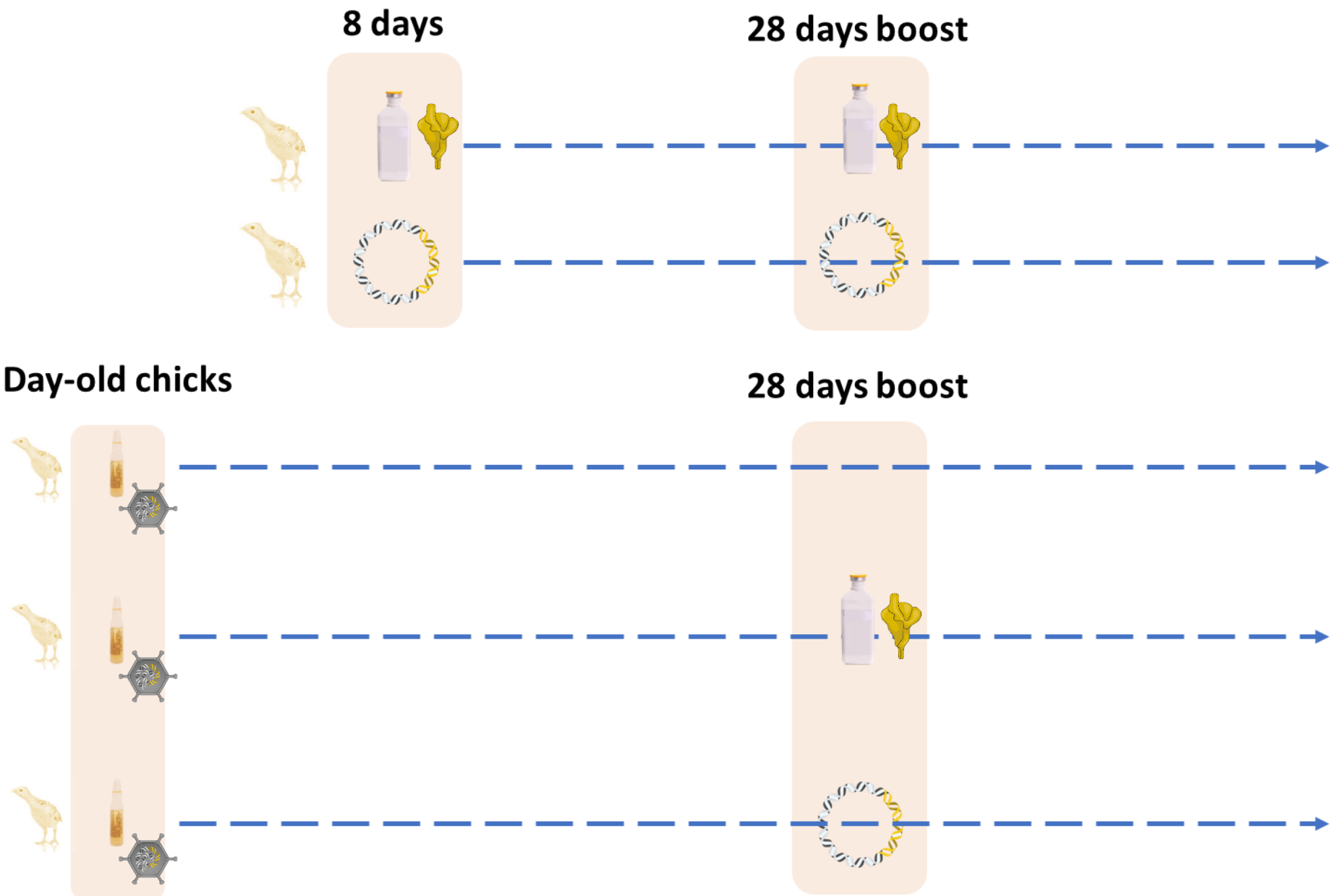
Vaccini e strategia testasti presso il CRN AI

- Vaccini di nuova generazione efficaci contro il clade 2.3.4.4b;
- Schema vaccinale sostenibile in campo (max 2 interventi entro il primo mese);
- Lunga durata dell'immunità
- Compatibile con strategia DIVA



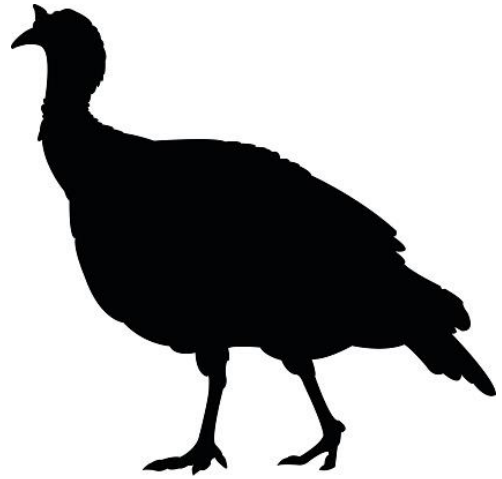
Experimental design



Sintesi dei risultati fin ora ottenuti

I trial condotti a 50 gg di età con i vaccini vettorizzati hanno dato buoni risultati in termini di protezione clinica e riduzione dello shedding, a 100 gg età di i test hanno evidenziato una protezione clinica subottimale per entrambi i boost eterologhi, con una migliore performance del richiamo basato su vaccini a subunità.

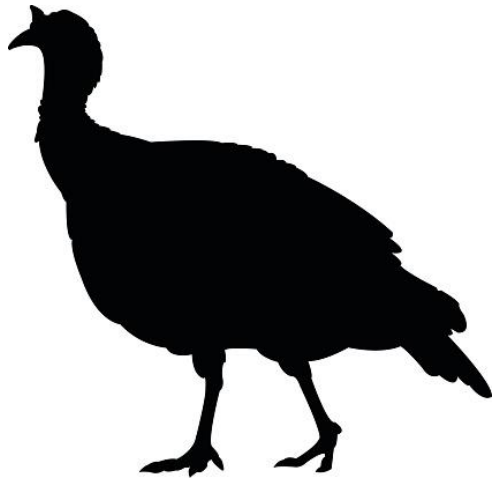
La combinazione omologa non è stata particolarmente efficace nella protezione del tacchino già a 50 giorni di età.



In corso (fine stimata nuovi test febbraio 2024)

Nuove combinazioni eterologhe con HVT e booster basati su vaccini tradizionali (spenti water-in-oil) e ad RNA.

Test con un vaccino HVT esprimente una emoagglutinina derivata da virus H5 del clade dominante (2.3.4.4b).



Conclusioni

- L’influenza aviaria è una malattia nota da tempo ma rappresenta sempre di più una sfida per la sanità animale e la salute pubblica che può essere vinta solo con un approccio integrato;
- Alla capacità di adattamento del virus si associa spesso un’insufficiente capacità di risposta dei sistemi di prevenzione e contrasto;
- Misure di biosicurezza realmente applicate ed efficaci, un rapido sistema di compensazione delle perdite economiche che rendono accettabili e sostenibili le strategie di controllo imposte e una riorganizzazione del settore avicolo nazionale sono fondamentali per rendere efficaci gli sforzi messi in campo in questa nuova era dell’Influenza aviaria.

Grazie dell'attenzione!

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