

H5N8 HPAI in Bulgaria 2017/18

EU Reference Laboratory for Avian Influenza,
APHA-Weybridge, UK

Prof Ian Brown



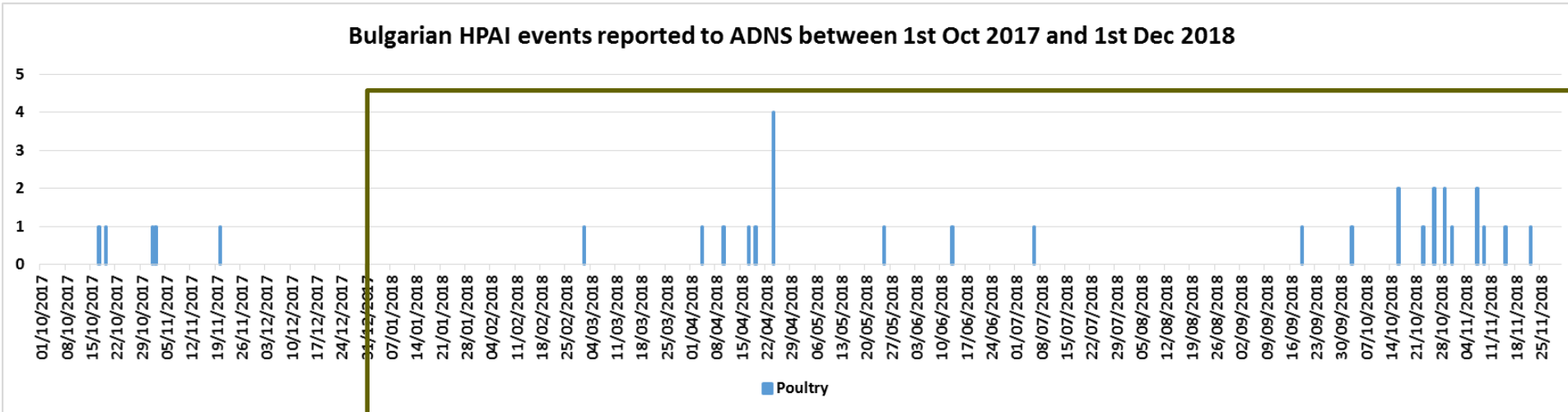
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Overview



- Bulgaria have reported 32 HPAI outbreaks
- All in poultry holdings (no wild birds reported)
- All HPAI H5N8

Bulgarian HPAI events reported to ADNS between 1st Oct 2017 and 1st Dec 2018



Context



- Europe have reported 117 HPAI events in 2018
- 36 outbreaks in poultry/captive holdings (81 wild birds events reported)
- 30 of these outbreaks were H5N8 (27 in BG, 3 in IT)

HPAI 2018	H5N6			H5N8	Total
	Captive	Poultry	Wild birds	Poultry	
Bulgaria	-	-	-	27	27
Denmark	-	-	35	-	35
Finland	-	-	3	-	3
Germany	1	1	3	-	5
Ireland	-	-	3	-	3
Italy	-	-	-	3	3
Netherlands	1	2	5	-	8
Slovakia	-	-	1	-	1
Sweden	1	-	10	-	11
United Kingdom	-	-	21	-	21
Grand Total	3	3	81	30	117



Current study at EURL in collaboration with NVRI, Bulgaria

- Viruses (25/32 outbreaks) supplied by NDRVMI
- Full genome sequencing to determine:
 - Genetic diversity
 - Possible virus origins
 - Molecular epidemiology to establish what if any relationships between events over time and by region
 - Provide insights into disease epidemiology
 - Evidence to assist in surveillance design and control





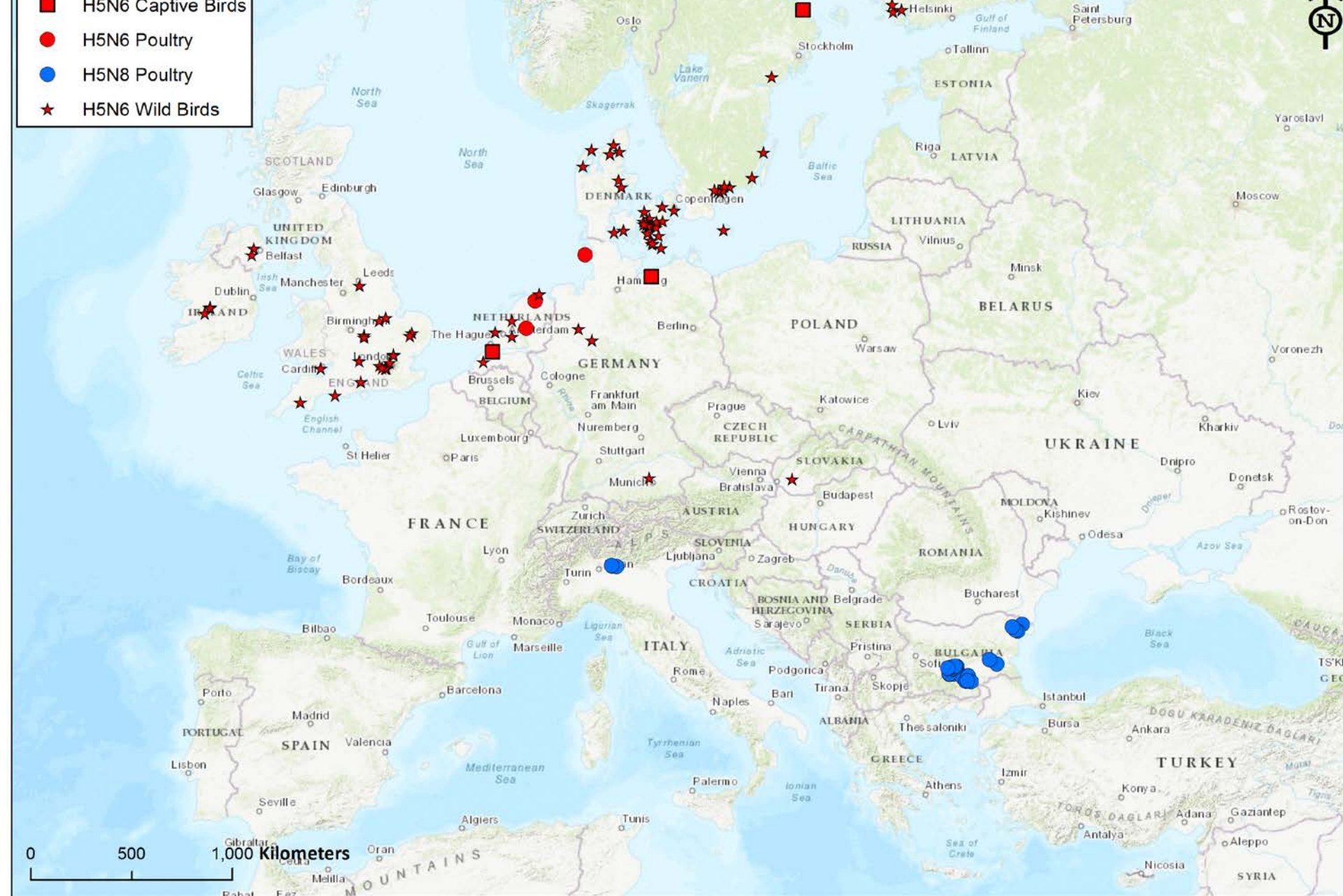
H5Nx HPAI Avian Influenza in Wild Birds in Europe since 1st September 2017 (n=95)

★ H5N6 Wild Birds



H5Nx HPAI Avian Influenza in Wild Birds in Europe in 2018 (n=81)





H5Nx HPAI Avian Influenza in Europe in 2018 (n=117)

Are wild birds the source of virus for ongoing outbreaks

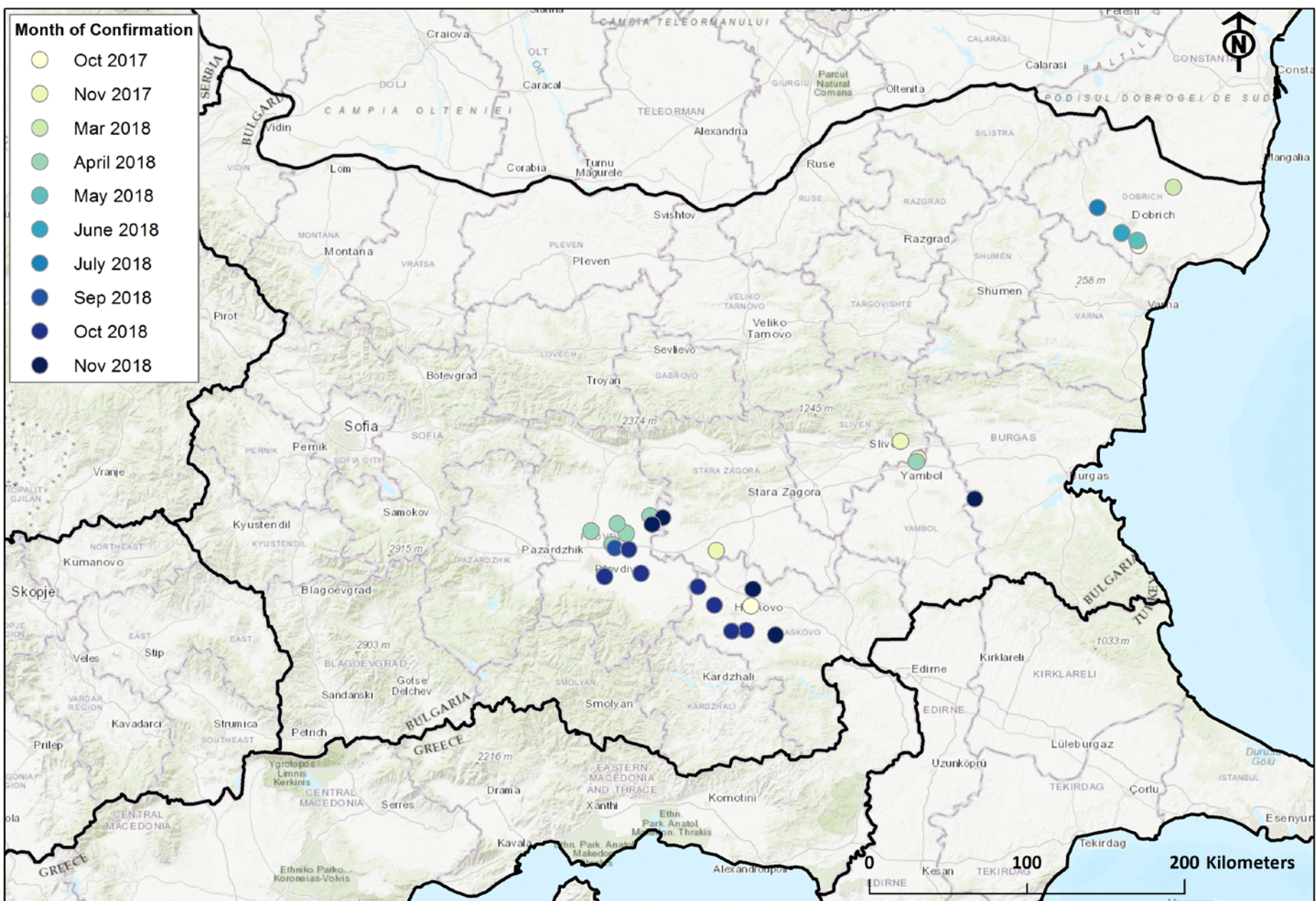
- No
- Genetic data does not support closest relationships to wild bird H5N8 HPAI viruses
- No evidence for continued circulation of H5N8 virus across Europe in 2018
 - The last HPAI in Bulgaria was H5N8 in one common buzzard (*Buteo buteo*) found dead on 15th Feb 2017



Outbreak timing



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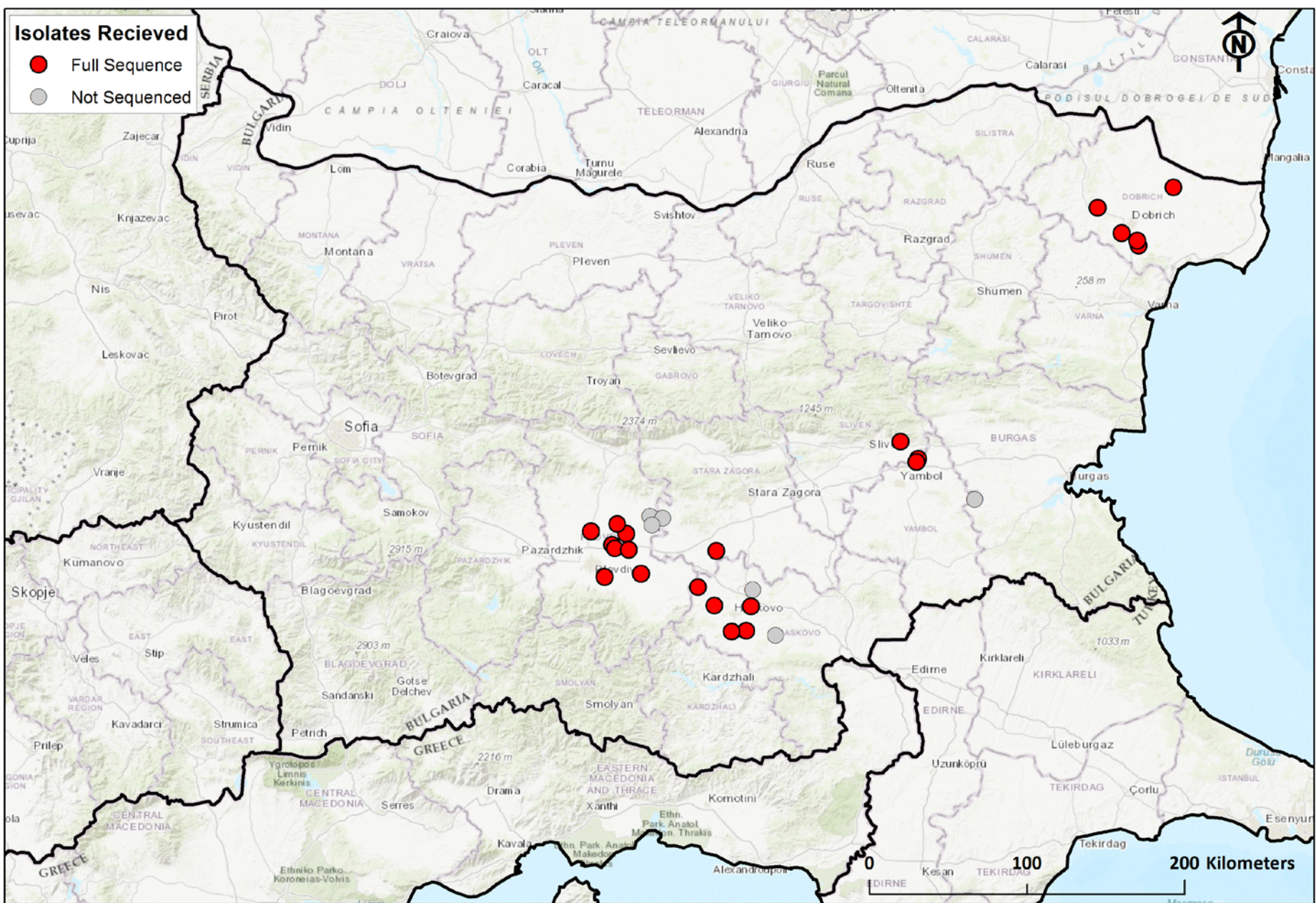


H5Nx HPAI Avian Influenza events in Poultry in Bulgaria Since 17/10/2017 (n=32)

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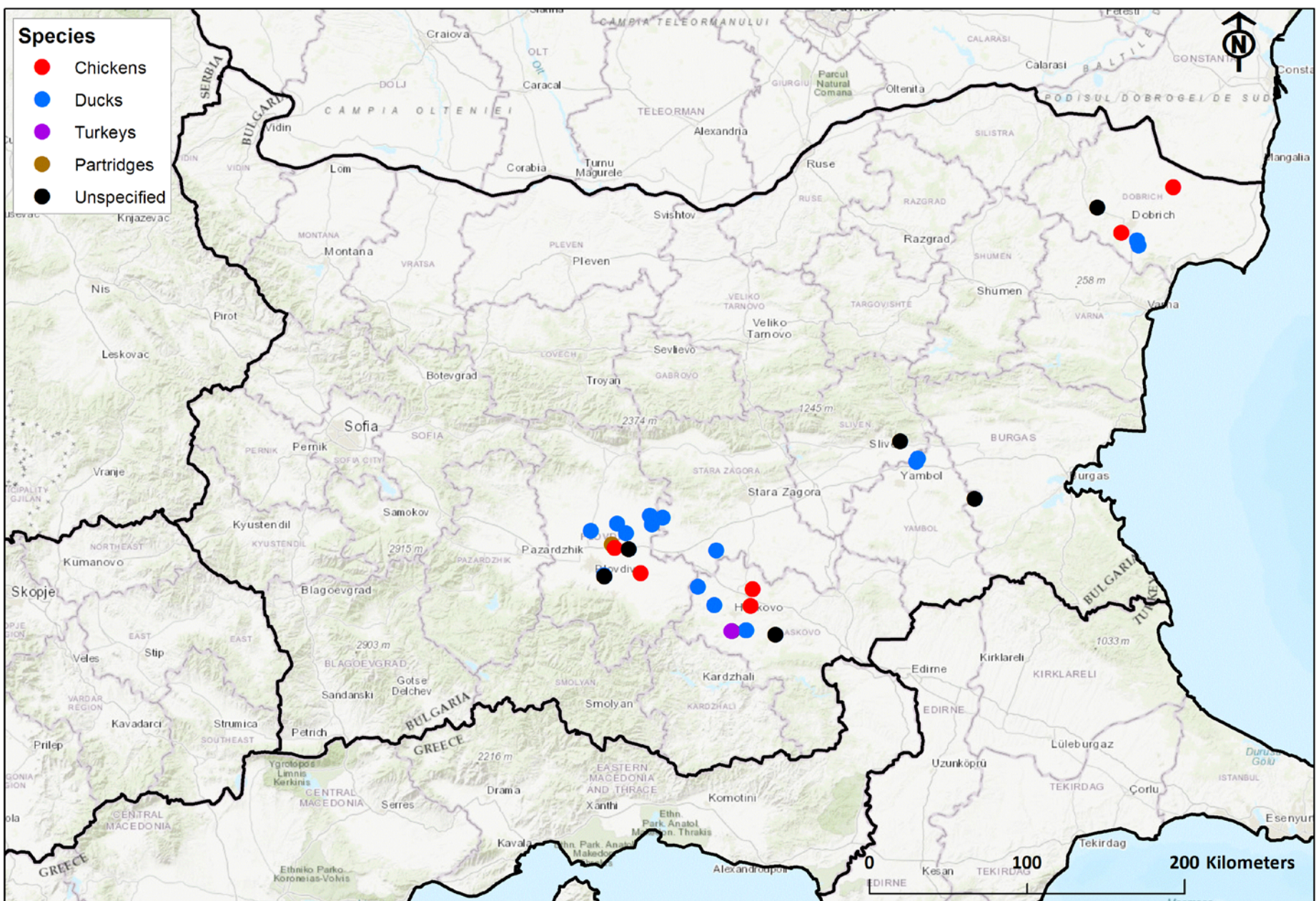
H5Nx HPAI Avian Influenza events in Poultry in Bulgaria Since 17/10/2017 (n=32)

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Hosts/production sectors affected



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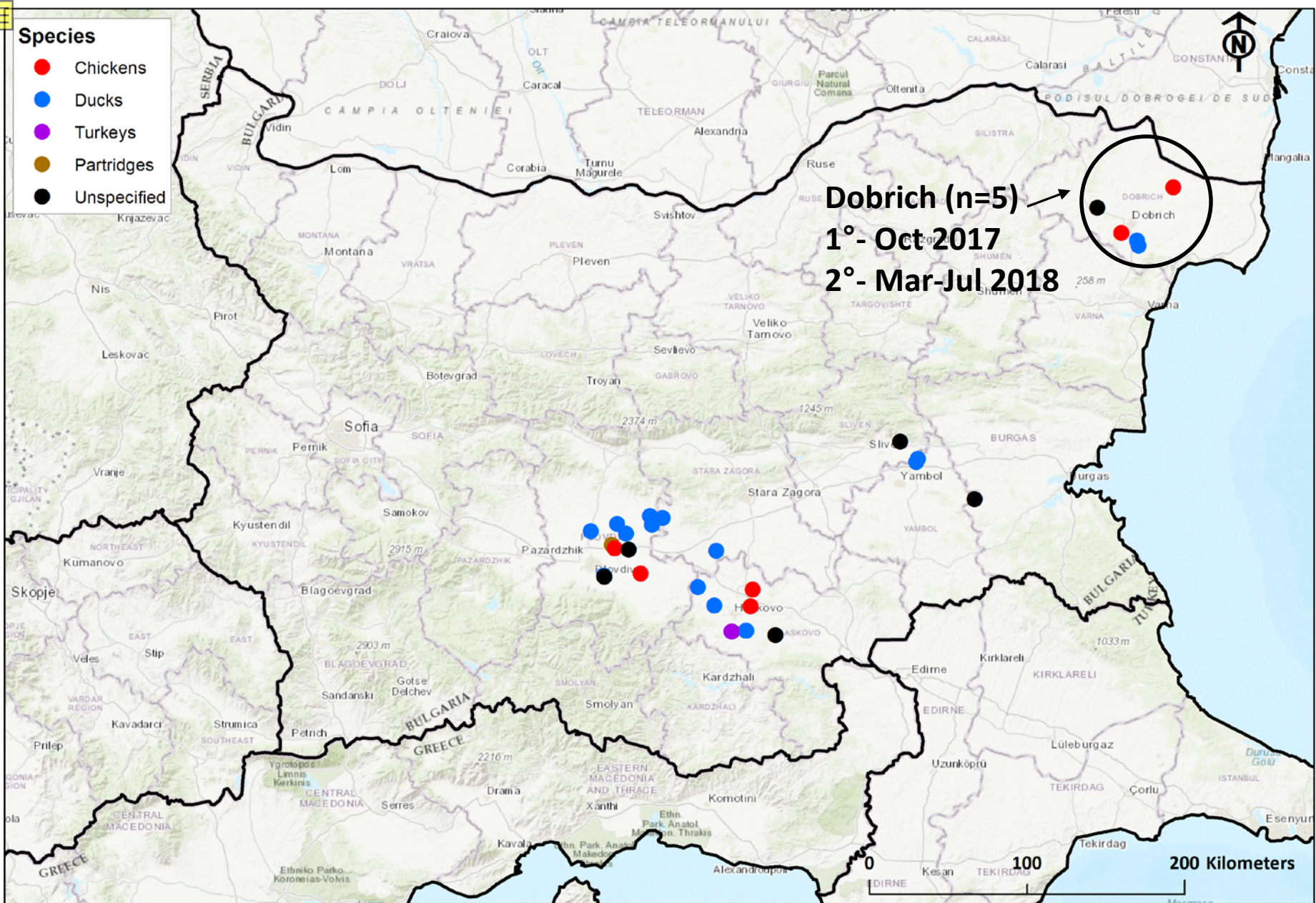
- What is the relationship between viruses associated with outbreaks in different regions of Bulgaria?



Geospatial-temporal relationships



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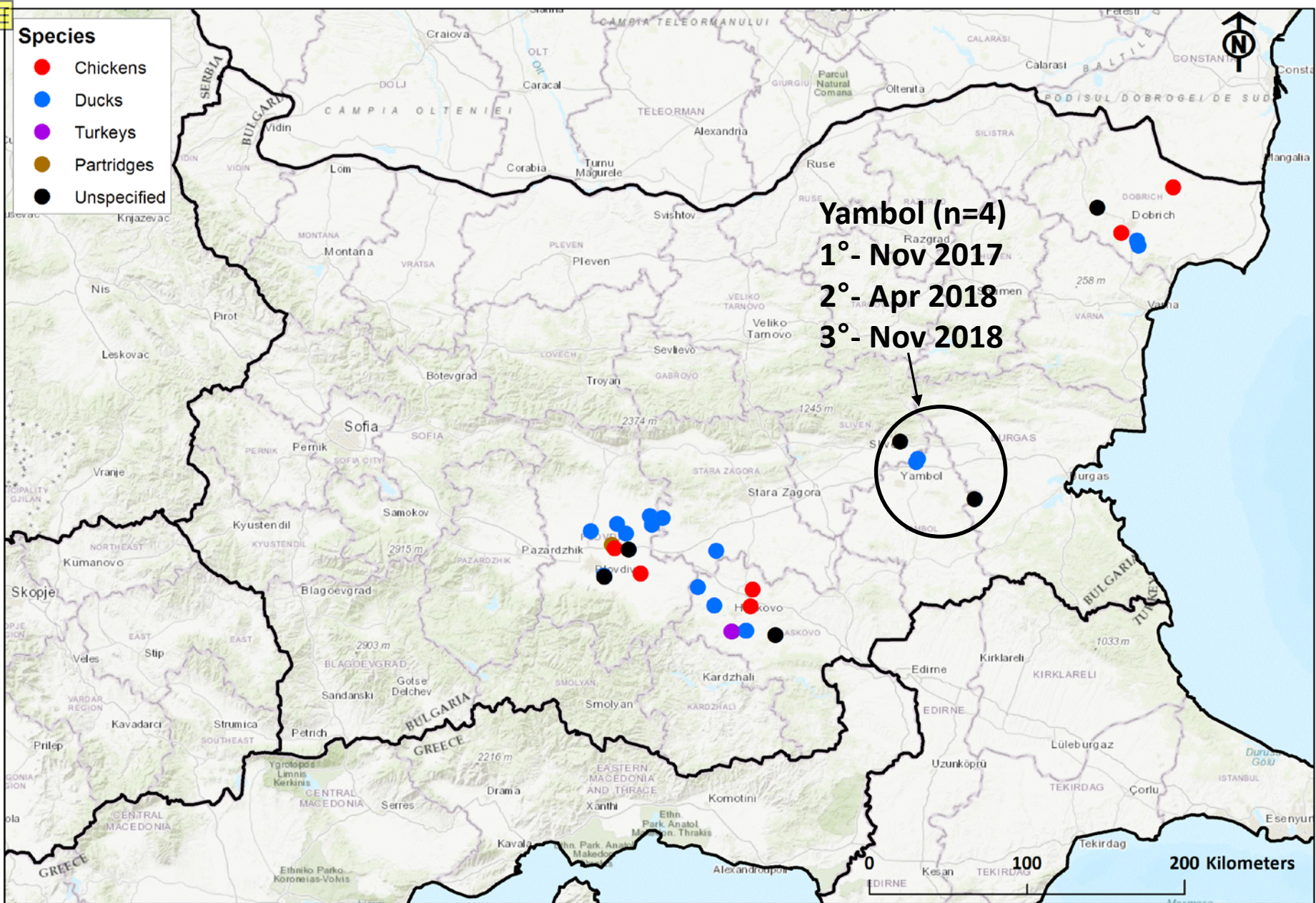


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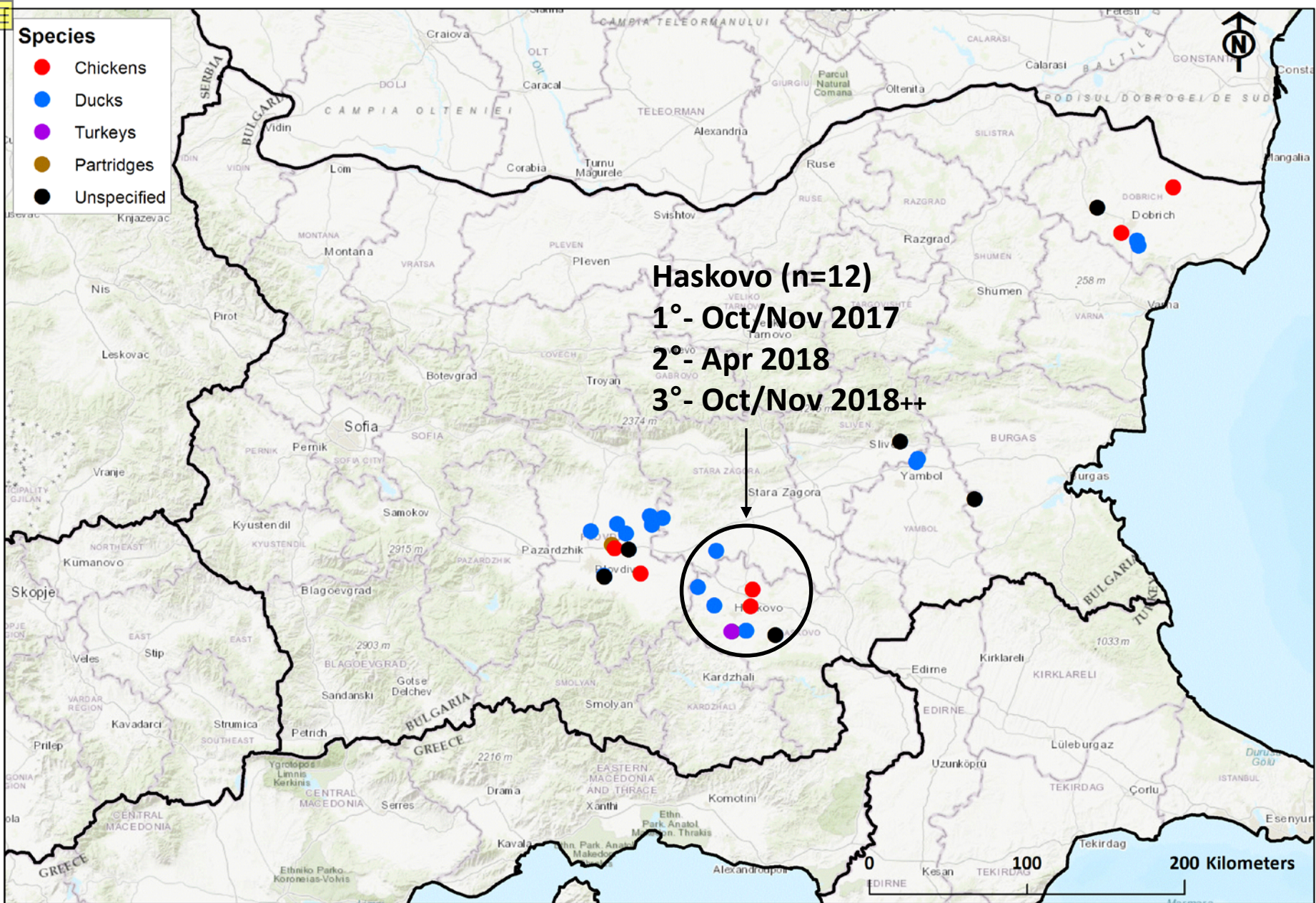


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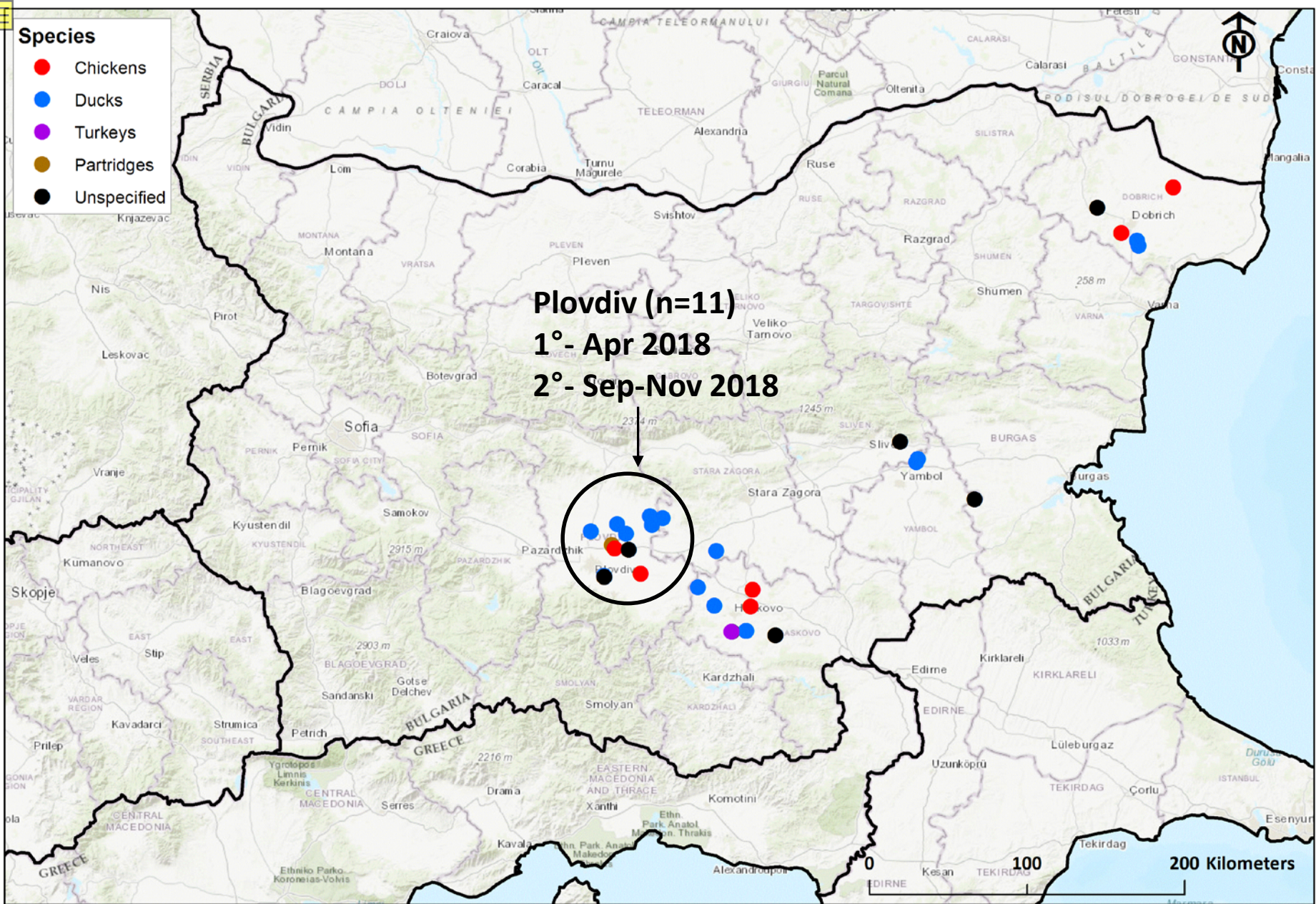


**H5Nx HPAI Avian Influenza events in Poultry in Bulgaria
 Since 17/10/2017 (n=32)**

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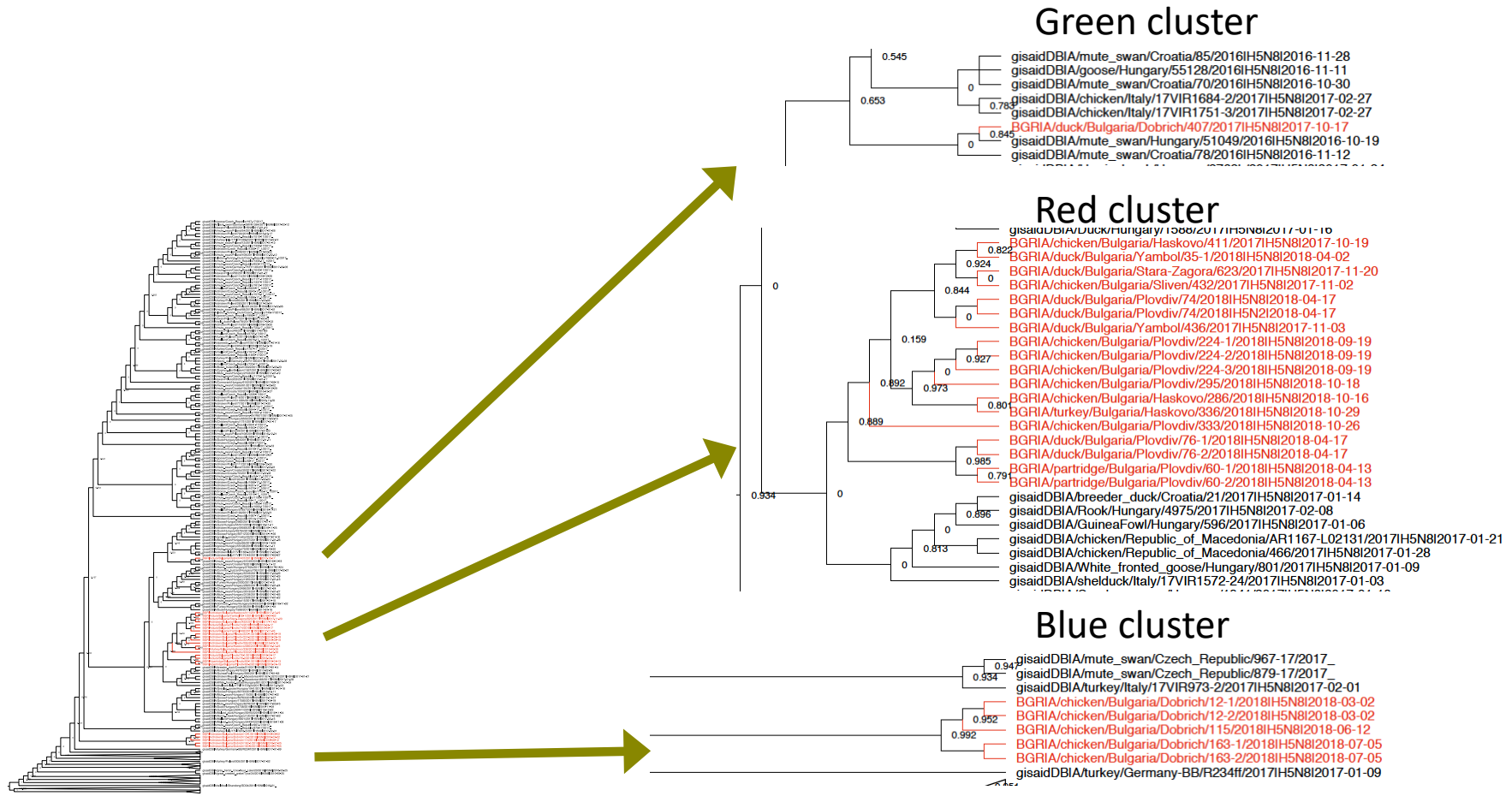
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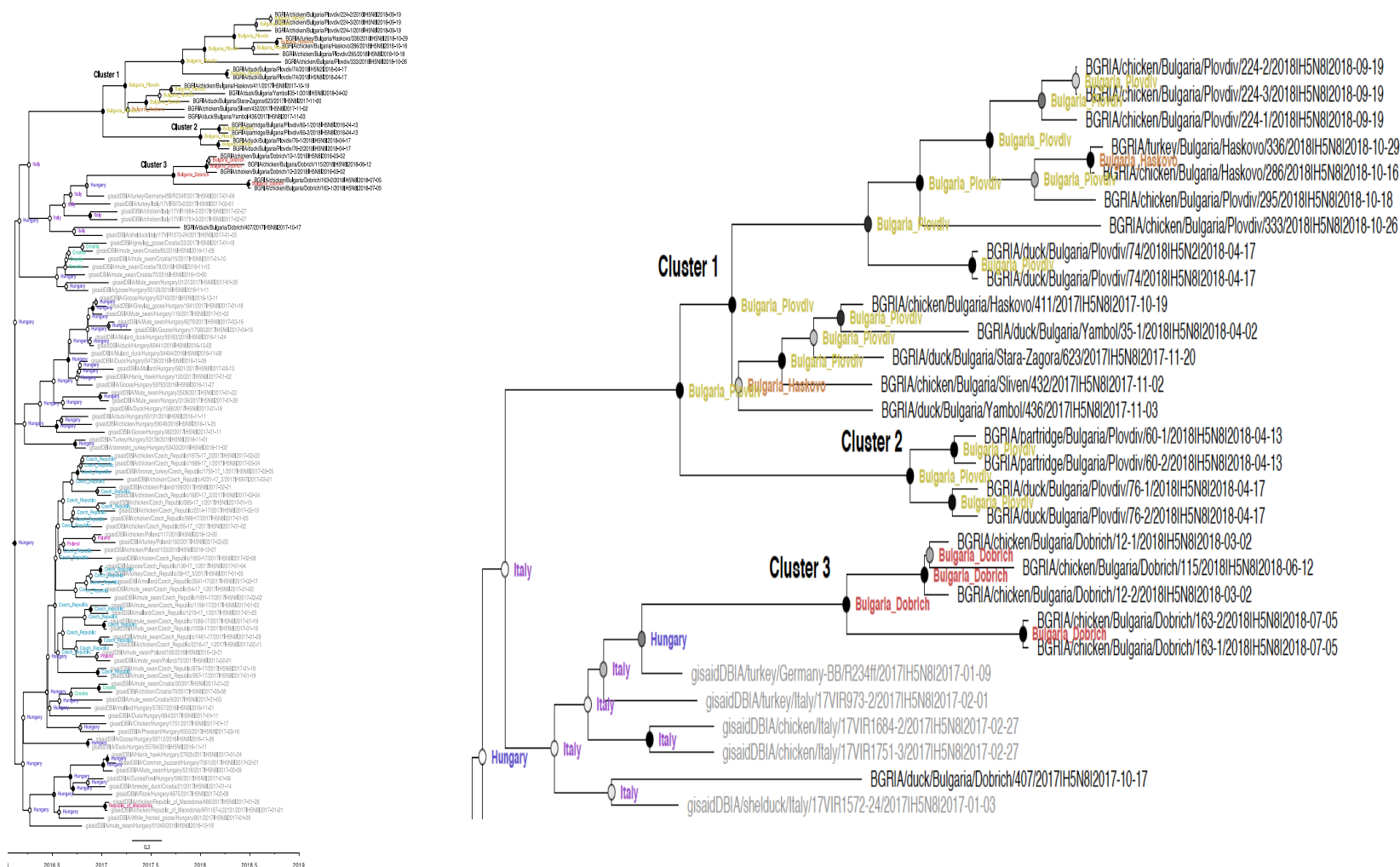


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HA gene clusters



Phylogeny by location



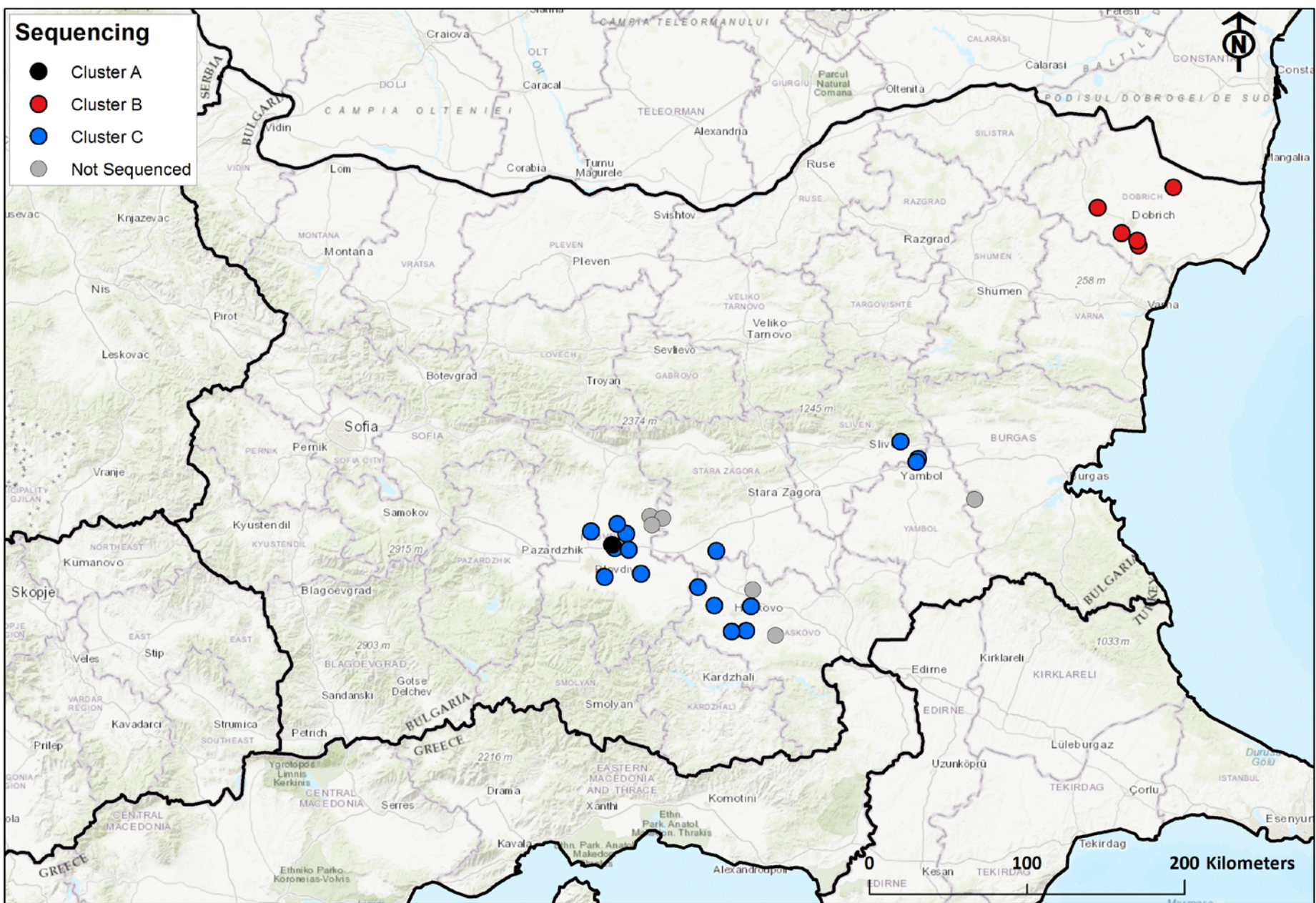
Two major events by region

- Plovdiv/Haskovo - ongoing
- Dobrich – resolved?



Sequencing

- Cluster A
- Cluster B
- Cluster C
- Not Sequenced



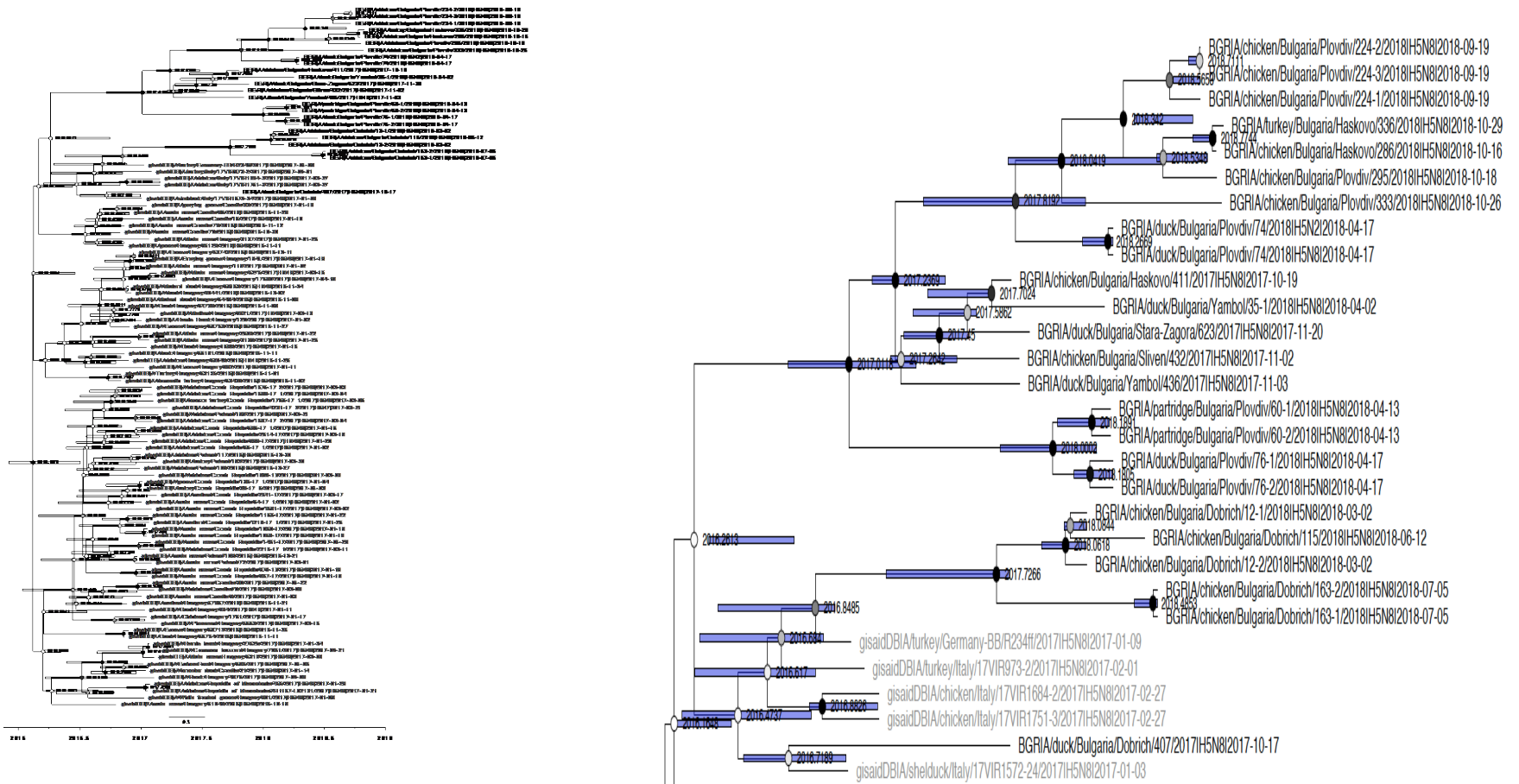
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Tree by time



How many separate primary introduction events?

Three

Plovdiv/Haskovo/Yambol/Stara Zagora -1

Dobrich - 2

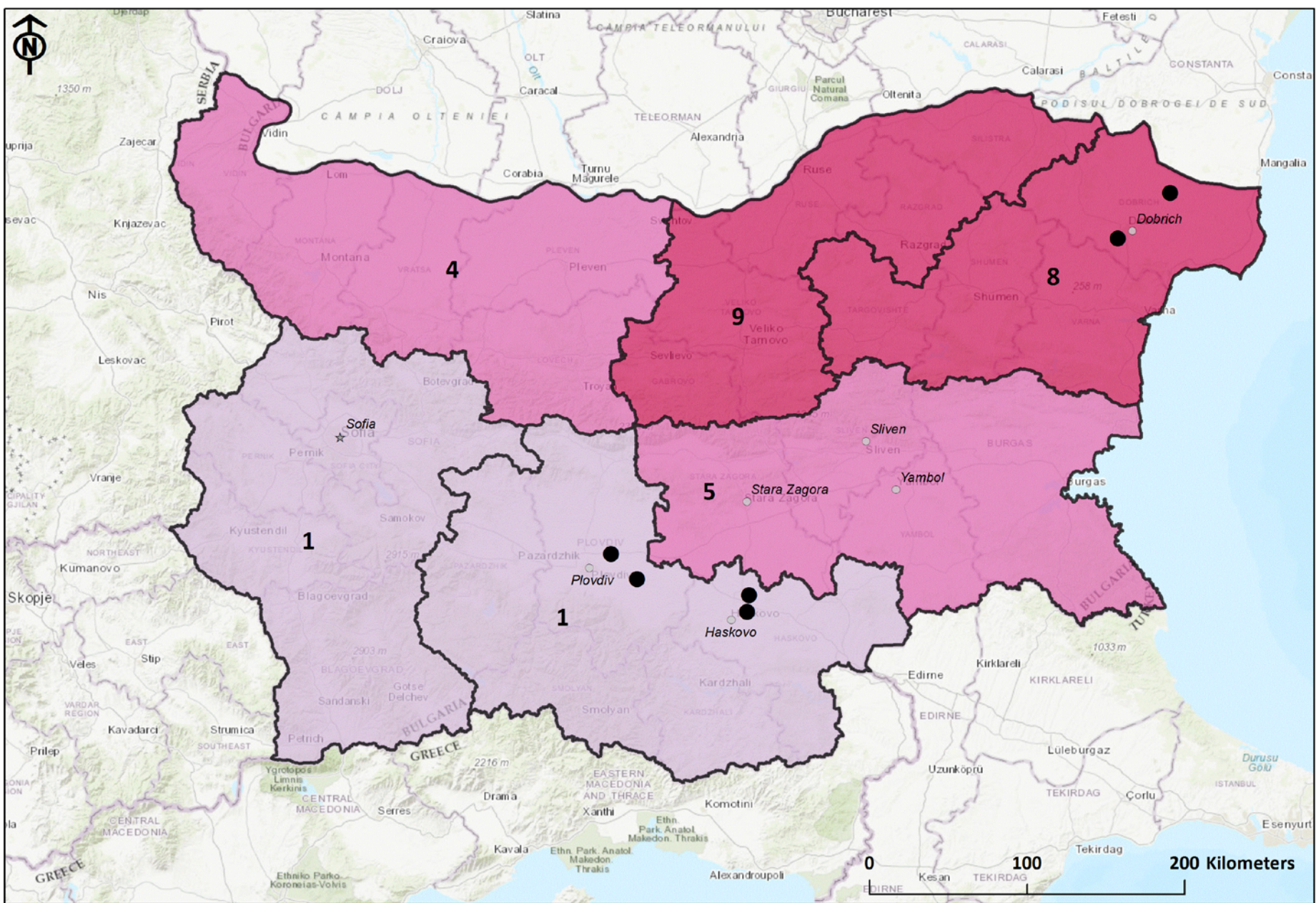


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How may the virus be maintained and spread?



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Poultry Holdings by NUTS2 regions of Bulgaria Chicken Breeders

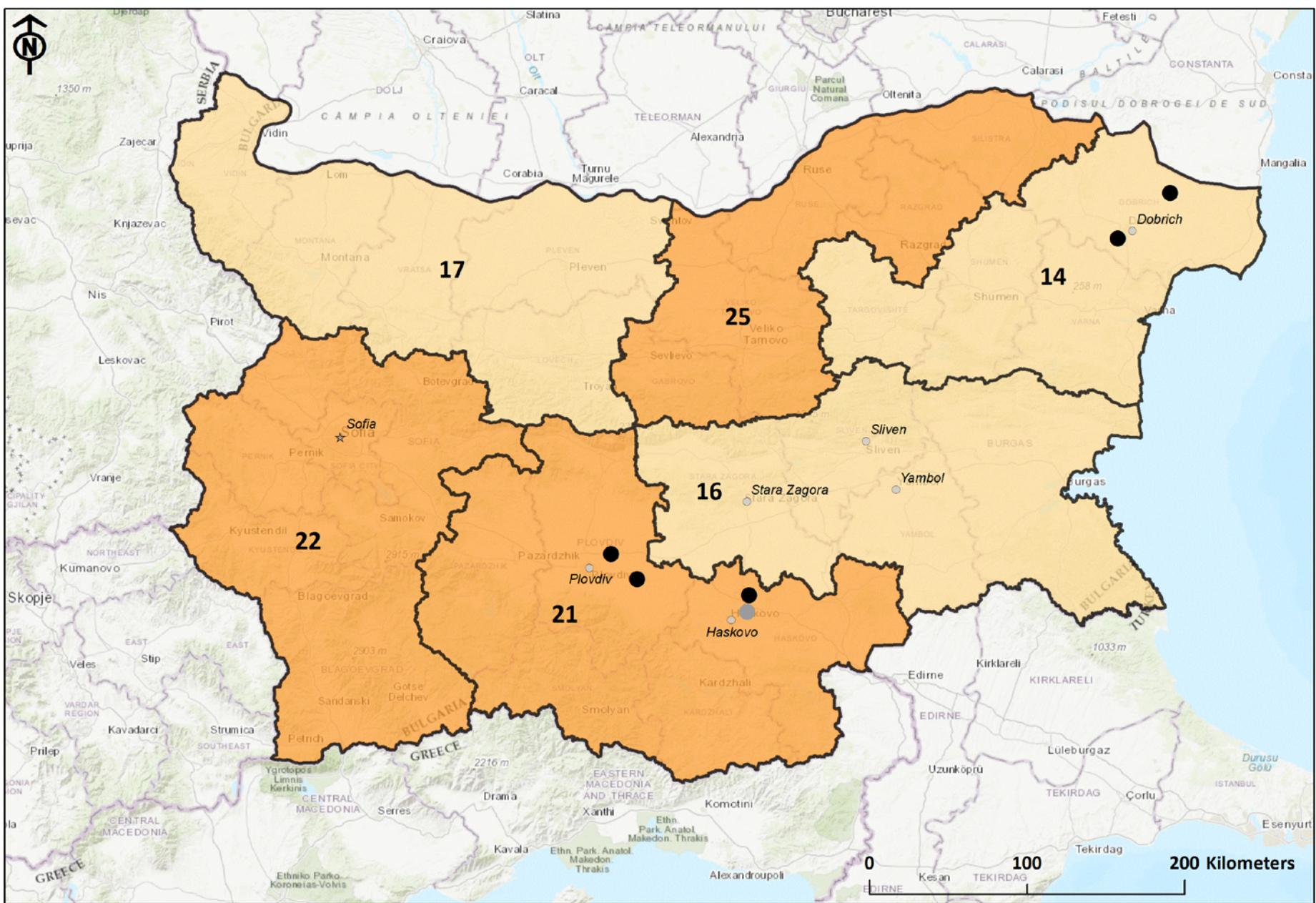
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● H5N8 outbreaks in Chickens*

*No outbreaks in Breeder flocks



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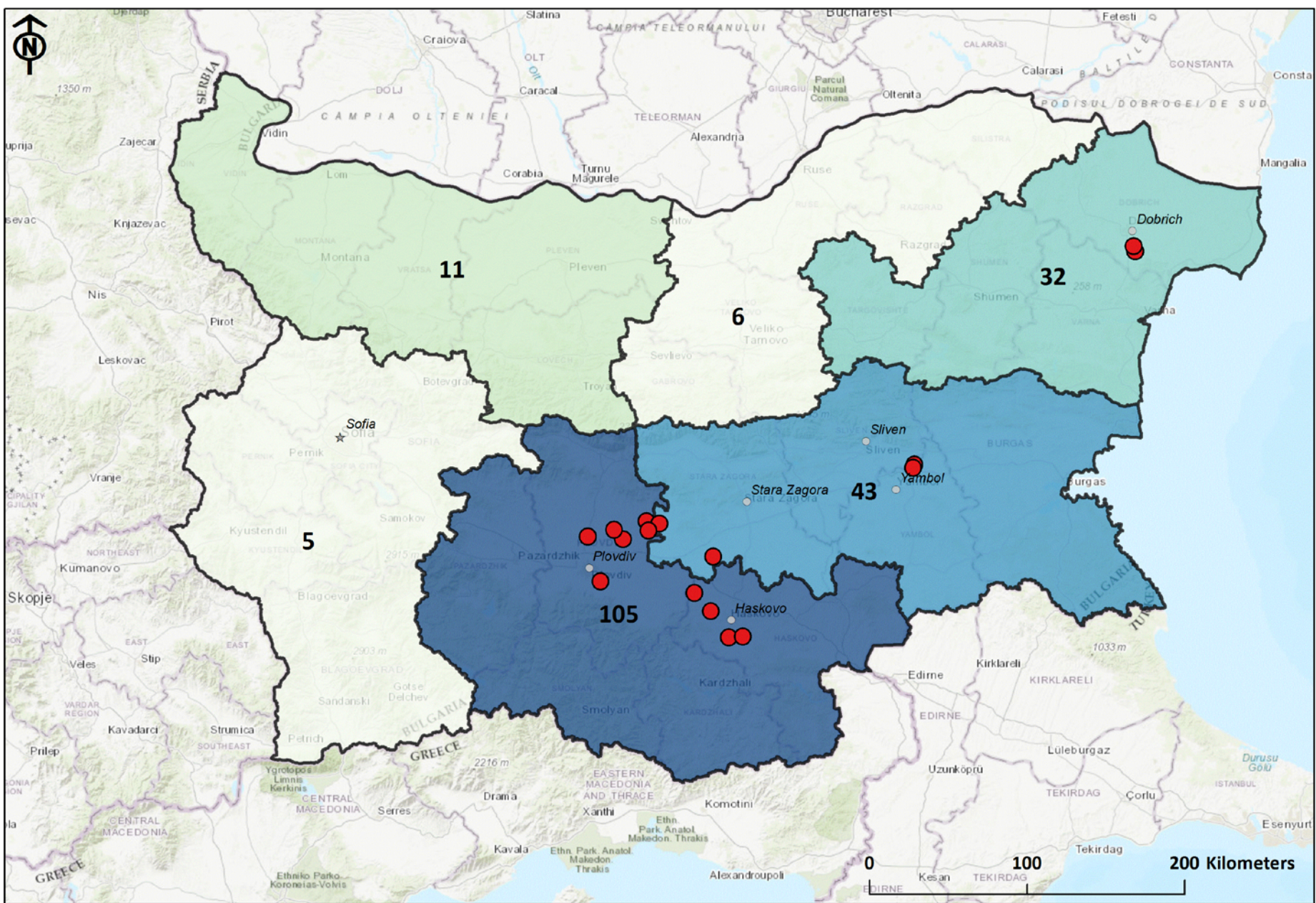
Poultry Holdings by NUTS2 regions of Bulgaria

Chicken Layers

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- Laying Hens
- Backyard Chickens



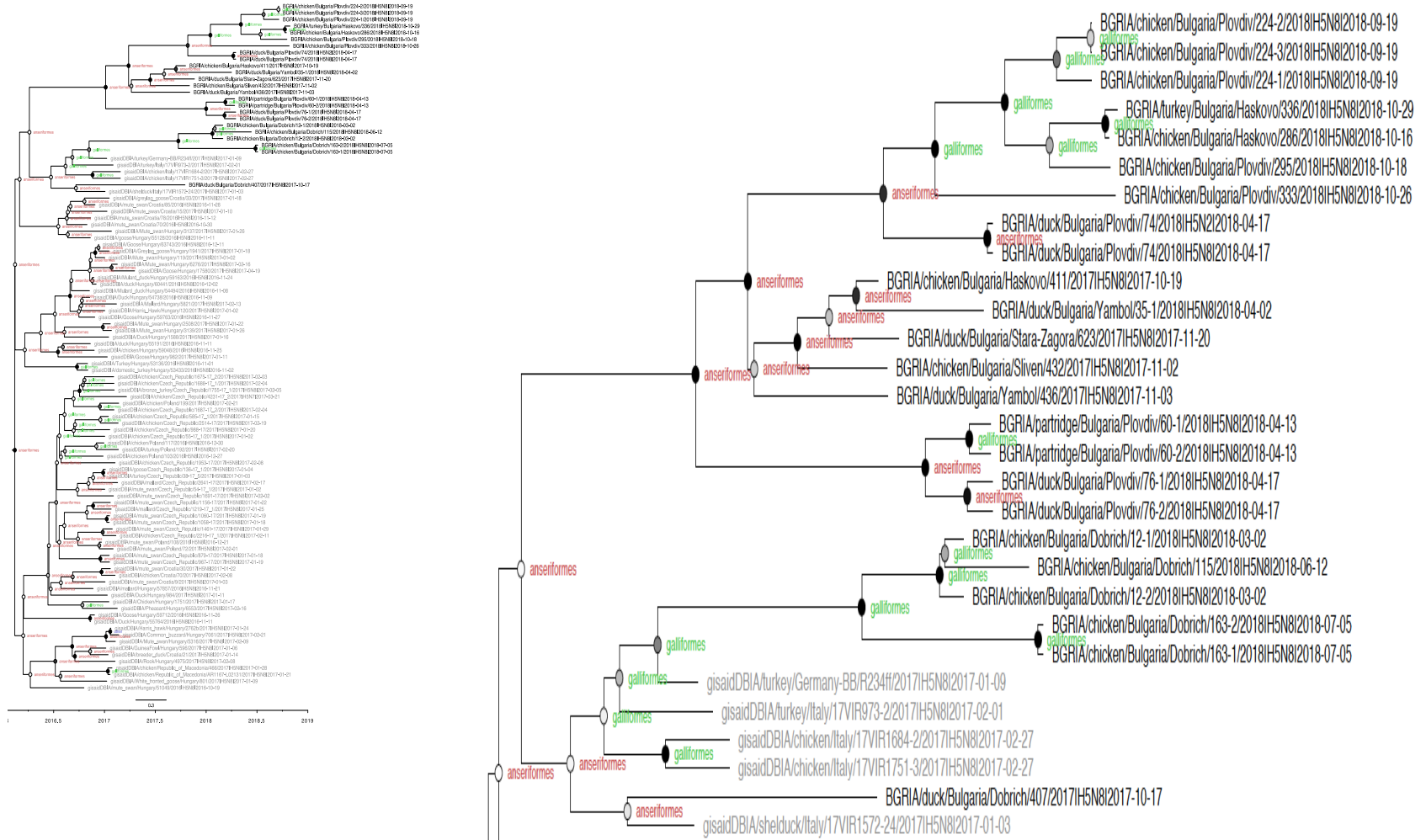


Poultry Holdings by NUTS2 regions of Bulgaria Ducks and Geese

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● H5N8 outbreaks in Ducks

Phylogeny by host



Reservoir/spread mechanism

- The virus can be maintained in ducks
 - Husbandry of Foie Gras lends to fomite pathways
 - People activity; vehicles, equipment (crates etc)
 - Contiguous premises in high density areas
- Ducks source of virus for other sectors but some within sector spread cannot be excluded
- Caveat moderately small dataset so some uncertainties
- Need to link to detail of actual surveillance activities



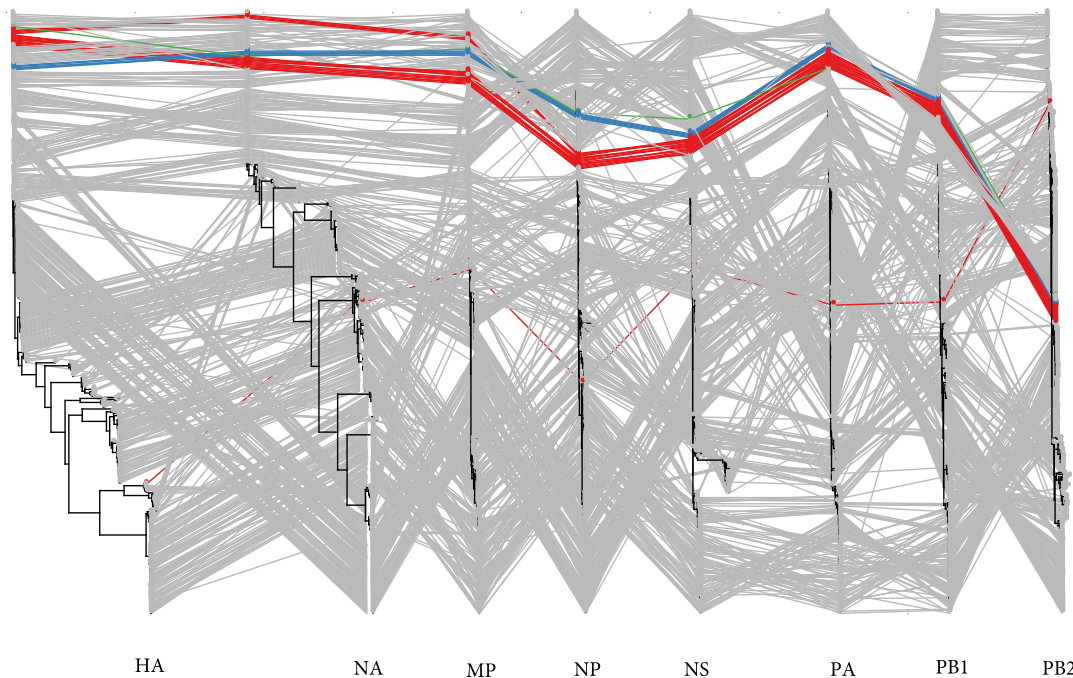
Is the virus changing as it is maintained?



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Genetic 'fingerprint' or genotype of viruses

Baltic incongruence analyses to assess reassortment and gene constellations



Green ('Hungary-like' 2017)-
Dobrich small event

Red: mixed locations, 'two' MP variants

Blue: Dobrich only, only shares similarity to Red for NS, PA, PB1 and PB2



- Little genetic mixing with other viruses leading to genetic reassortment despite extended timeline
- No strong evidence that there is strong selection pressure
 - Already well adapted?



Key conclusions

- Wild birds are not the continuing source of viruses causing poultry outbreaks in BG
- Three major introductions with regional linkage
- The Plovdiv/Haskovo/Yambol/Stara Zagora duck density creates single biggest risk area for virus maintenance
- Dobrich outbreaks appear resolved
- Fomite pathways and practices in Foie Gras production key
- Spill over to other sectors but uncertainties
- The virus is relatively stable once established



Acknowledgements

EURL, Animal and Plant Health Agency

Adam Brouwer

Nicola Lewis

Steve Essen

Natalie McGinn

James Seekings

RVC –London

Divya Venkatesh

NVRI- Sofia

Gabriela Goujgoulova, NDRVMI

Bulgaria competent authority

EU commission for funding via EURL/Defra-DAs



Thank you for your attention

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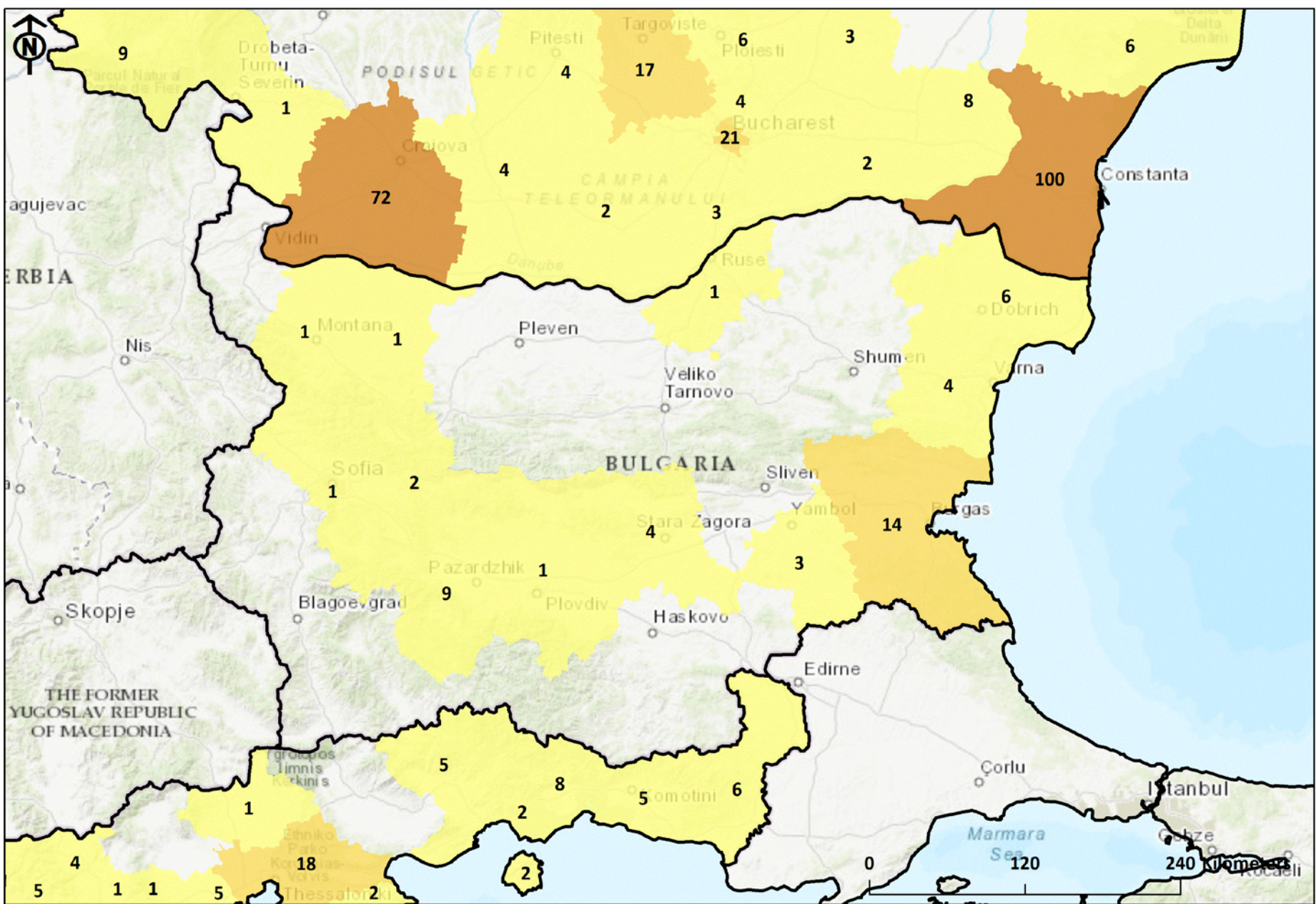
<http://flu-lab-net.eu/>

Email: aiwrl@apha.gsi.gov.uk



MP reassortment

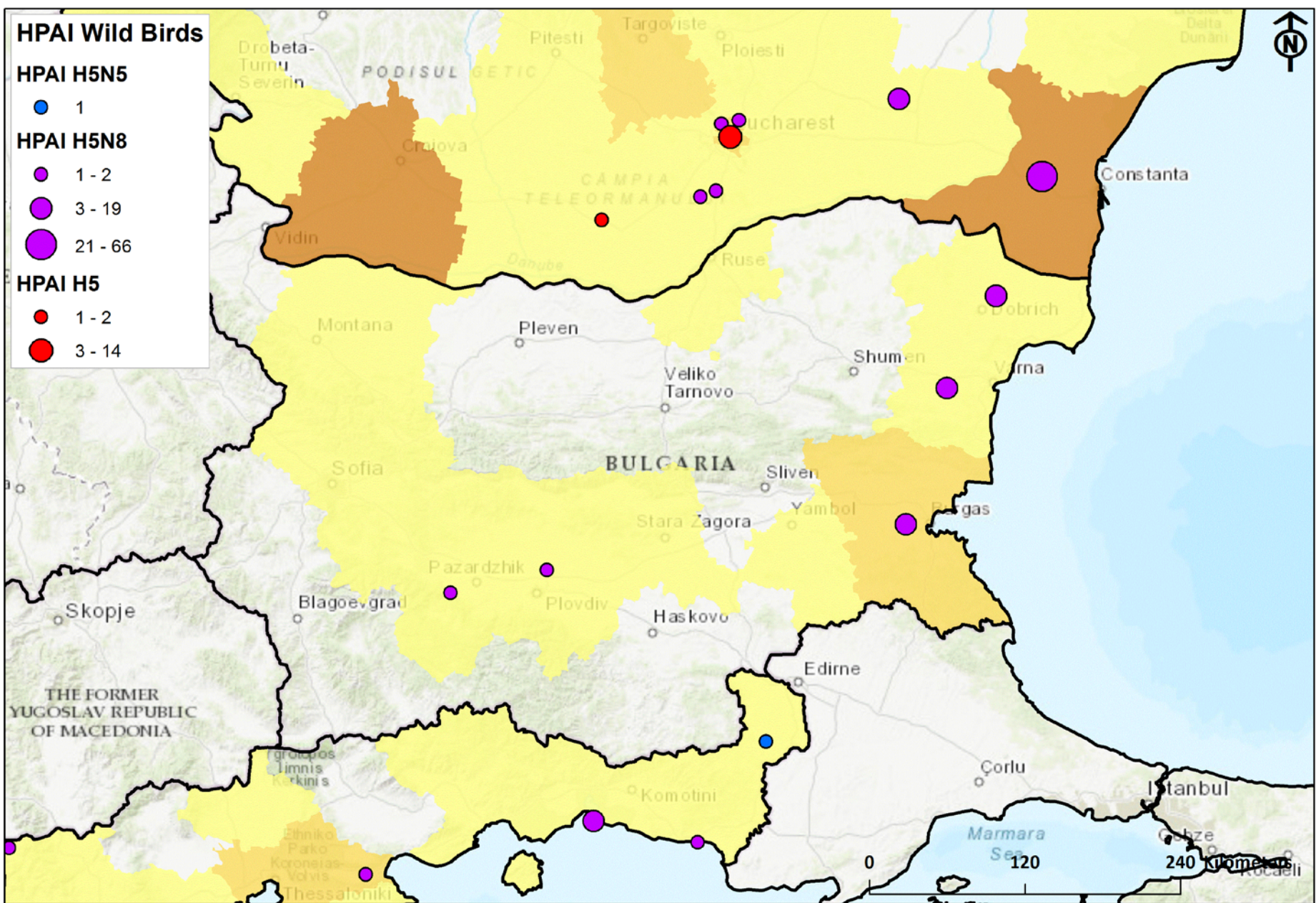




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2017 Submissions**

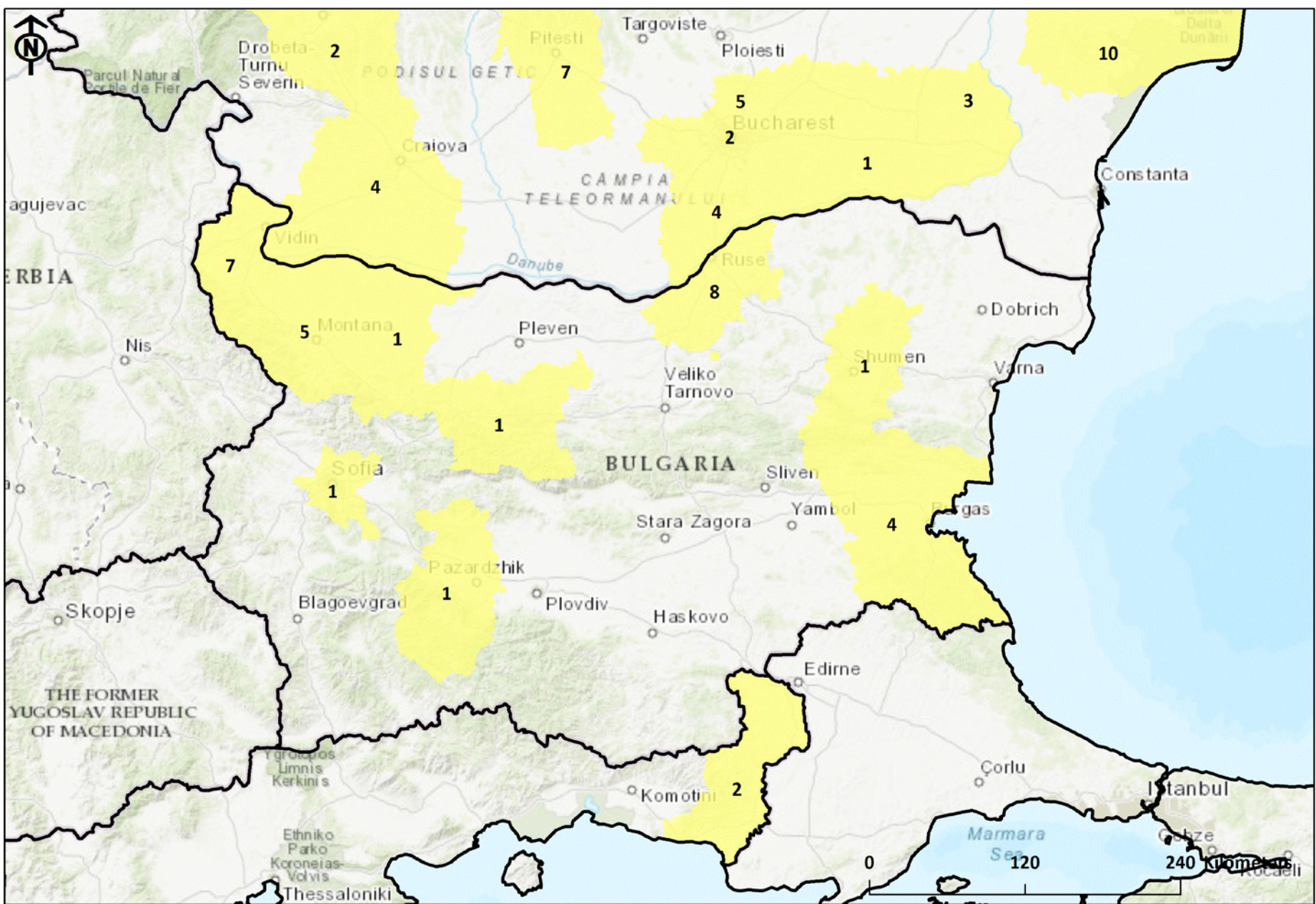
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**Passive Wild Bird Surveillance in the Balkans
2017 Submissions + HPAI Positives**

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**Passive Wild Bird Surveillance in the Balkans
2018 Submissions (Initial Reporting, not finalised) - Jan-Jul**

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