SCIENTIFIC REPORT

EFSA Journal

APPROVED: 23 June 2021

Annual Report on surveillance for avian influenza in poultry and wild birds in Member States of the European Union in 2020

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Abstract

In 2020, Council Directive 2005/94/EC required EU Member States (MSs) to carry out surveillance for avian influenza (AI) in poultry and wild birds and notify the results to the responsible authority. Based on this, MSs, Iceland, Norway, Switzerland and the United Kingdom implemented ongoing surveillance programmes to monitor incursions of AI viruses in poultry and wild birds. EFSA received a mandate from the European Commission to collate, validate, analyse and summarise the data resulting from the avian influenza surveillance programmes in an annual report. This is the second such report produced using data directly submitted to EFSA by MSs. This report summarises the results of the surveillance activities carried out in poultry and wild birds in 2020. Overall, 24,768 poultry establishments (PEs) were sampled, of which 46 were seropositive for H5 virus strains and seven for H7 strains. Seropositive PEs were found in nine MSs (Belgium, Denmark, Finland, France, Italy, the Netherlands, Poland, Spain and Sweden) and the United Kingdom. As per previous years, the highest percentages of seropositive PEs were found in establishments raising waterfowl game birds and breeding geese. Out of the 53 PEs with positive serological tests for H5/H7, seven tested positive in polymerase chain reaction (PCR) or virology for H5/H7 virus strains: six for Low Pathogenic Avian Influenza (LPAI) and one for Highly Pathogenic Avian Influenza (HPAI). In addition, 13 countries also reported PCR results from 748 PEs which did not correspond to the follow-up testing of a positive serology event (e.g. in some PEs, PCR tests were used for screening). Twenty-five of these PEs were found positive for AI viral RNA. These positive PEs were located in Bulgaria, Estonia, Germany, Romania and Slovakia. A total of 18,968 wild birds were sampled, with 878 birds testing positive to HPAI virus. Fourteen countries reported HPAI-positive wild birds, with all HPAI strains identified as H5. Most positive birds were infected with H5N8, with a smaller number of N1, N3, N5 and unidentified NA subtypes. In addition, there were 317 birds testing positive for LPAI H5 or H7 virus and 429 birds testing positive for non-H5/H7 AI virus, reported by 31 countries. The surveillance findings for poultry and wild birds for 2020 are discussed in relation to the current knowledge of the epidemiology of AI in Europe, in particular the H5N8 epidemic which has been identified late 2020.

Keywords: Avian Influenza, HPAI, LPAI, surveillance, poultry, wild birds

Requestor: European Commission

Question number: EFSA-Q-2021-00340

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Declarations of interest: The declarations of interest of all scientific experts active in EFSA's work are available at https://ess.efsa.europa.eu/doi/doiweb/doisearch.

Acknowledgements: EFSA wishes to thank the following for the support provided to this scientific output: AUSVET, Member State representatives and Verena Oswaldi. EFSA also wishes to thank the AHAW Panel of Experts for endorsing this report.

Suggested citation: EFSA (European Food Safety Authority), Aznar I, Baldinelli F, Papanikolaou A, Stoicescu A and Van der Stede Y, 2021. Annual Report on surveillance for avian influenza in poultry and wild birds in Member States of the European Union in 2020.

ISSN: 1831-4732

The EFSA Journal is a publication of the European Food Safety Authority, a European agency funded by the European Union.

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1. Summary

The European Union's Member States (MSs), Iceland, Norway, Switzerland and the United Kingdom (together referred to as reporting countries, RCs) implement surveillance programmes to detect incursions of avian influenza viruses (AIVs) in poultry and wild birds, particularly migratory wild birds, which are considered the main source of introduction of AIVs to poultry. The present report summarises the results of the EU co-funded surveillance activities conducted in 2020, which consisted of:

- Serological surveys to monitor the circulation of AIV subtypes H5 and H7 in poultry (active surveillance).
- Passive surveillance aiming at the virological detection of AI in wild birds found dead or moribund.

In addition, some MSs also reported the results of active surveillance performed by testing live and hunted birds. AI surveillance in some RCs is based on targeted sampling. Therefore, comparisons of seropositivity rates between different groups presented in this report relate to the specific observations recorded (surveillance samples) only. They cannot be extrapolated to the source populations because sampling was targeted at higher risk groups and the targeting approach may be different between countries, between groups and between years. Risk-based surveillance is designed for early detection and should not be used to measure changes in disease prevalence or incidence.

1.1. Serological surveys in poultry

A total of 31 reporting countries (RCs) reported data on sampling and AI testing in poultry establishments (PEs). In some RCs, establishments were sampled several times throughout the year. For the purpose of this report, each sampling exercise taking place on a specific date and targeting a different poultry category was considered as an independent event and counted as one PE sampled. Therefore, the numbers reported in this report as PEs sampled should be interpreted as the number of sampling events taking place in an RC for each of the reported categories.

Figures on the size of the poultry population under surveillance in the RCs were not available at the time of writing of the present report. In 2020, a total of 24,767 PEs were sampled, roughly the same number of PEs as the previous year. The total number of PEs sampled and reported in each RC ranged from 28 in Malta to 5,035 in Italy.

Sixteen poultry categories have been used to report surveillance results in the present document. None of them were sampled by all RCs. However, laying hen (conventional and free-range), fattening turkey, breeding chicken and gallinaceous game bird establishments were sampled by at least 20 RCs each. Growers and breeding geese were targeted by only few countries. In terms of the number of PEs sampled, backyard flocks were the most sampled category (n = 4,740), followed by conventional and free-range laying hens (n = 4,404 and 3,487, respectively).

A total of 53 PEs (0.21%) were seropositive to either H5 or H7 (hereafter 'H5/H7'), including 46 H5 and 7 H7. The H5/H7 seropositivity rate was around half of that observed in 2019 (0.45%). Ten countries reported H5 seropositive PEs: Belgium, Denmark, Finland, France, Italy, the Netherlands, Poland, Spain, Sweden and the United Kingdom. Spain also reported H7 seropositive PEs.

Most H5/H7 detections (45 PEs out of 53) occurred in countries, which sampled a number of PEs larger than the median number of PEs sampled. The 2020 results confirm an overall decreasing trend in the proportion of H5/H7 seropositive establishments noted since the 2016 H5 outbreaks (with the significant exception of 2019). The number of H5 seropositive PEs detected remained higher than H7 detections, as per previous years.

As observed in previous years, waterfowl game birds and breeding geese were the categories with the highest proportion of H5/H7 seropositive establishments (9.5% and 3.3%, respectively). The proportion of H5/H7 seropositive PEs was 1.8% in breeding duck establishments and below 1% in all other poultry categories. No positive PE were found in the following categories: conventional laying hens, turkeys (fattening and breeding), broilers (heightened risk) and breeding chickens. While backyard establishments and conventional laying hens had the largest numbers tested, one seropositive PE only was identified in the former category, and none in the latter. Ten of the H5/H7 seropositive PEs were identified in June in Spain, among waterfowl game birds, associated with a larger sampling effort in this category at the end of the hunting season. December was the month with the second highest seropositivity rate and did not appear to be associated with a particular category or country.

Serological results for AI subtypes other than H5 and H7 were also reported for some PEs. However, due to the non-mandatory reporting, the results presented in this report do not represent the complete picture of the distribution of these subtypes in reporting countries. In addition, 13 countries also reported PCR results from 748 PEs carried out either as a screening test or subsequent to a negative serological test result. Twenty-five of these PEs were found positive for H5 AI viral RNA (Bulgaria, Germany, Romania and Slovakia) or non-H5/H7 AI viral RNA (Estonia).

In Commission Delegated Regulation (EU) 2020/689[1], MSs are required from April 2021 to carry out complementary risk-based surveillance aiming to detect clusters of establishments (in time and geographical proximity) infected with LPAI viruses. The poultry categories in which this surveillance is recommended to be carried out include, among others, the categories where most of the serological positive results were found in 2020. In order to better understand the data resulting from this complementary surveillance (and poultry surveillance in general), RCs are encouraged to report the link between seropositive establishments, and the results of further follow-up sampling and/or testing carried out in the same or surrounding establishments. Finally, understanding the underlying poultry population will help to better understand the efficiency of the surveillance carried out at a European level. The estimated poultry population could be submitted to EFSA in an aggregated form (by poultry category and NUTS3 level) as a once-off exercise, with updates reported by RC when available.

1.2. Surveillance in wild birds

All 27 EU MSs, Iceland, Norway, Switzerland and the United Kingdom reported results from passive surveillance of AI in wild birds in 2020. Although not mandatory, ten countries also reported results from their active surveillance programmes. Wild bird surveillance in some RCs is not based on representative sampling, and therefore, the results presented here cannot be extrapolated to the source populations. Comparisons are only valid for the specific observations recorded (surveillance samples) and cannot be used to imply differences between years, species or locations.

Results were reported for a total of 18,968 wild birds, including 12,418 birds sampled by passive surveillance. This is a similar total number of birds as in 2019, but with a larger contribution of passive surveillance. The total number of birds tested by passive surveillance by RC ranged from 3 birds in Estonia to 3,041 birds in Germany. As active surveillance results in wild birds are reported to EFSA on a non-mandatory basis, the numbers presented in this document do not represent the full extent of surveillance activities conducted by some RCs.

The distribution of number of birds by quarter was relatively consistent from January to September, with an increase in the last quarter (41% of the total). The distribution within specific countries was highly variable. Almost all birds were fully identified with a species name (9,905 birds). These birds belonged to 259 species distributed in 22 orders. As expected, most samples originated from birds in the order Anseriformes (n = 3,578). The orders Passeriformes, Columbiformes, Accipitriformes and Charadriiformes were also sampled in high numbers (n > 1,000). Forty-four of the 50 species listed by EFSA as target for HPAI surveillance were sampled in 2020. The proportion of birds belonging to target species was 35% and 49% among passive and active surveillance samples, respectively.

A total of 1,624 wild birds tested positive to AI: 878 for HPAI and 746 with LPAI. Most HPAI strains were identified as H5N8 (737 out of 878 positive birds). Three species made up 44% of the HPAI-infected birds (*Branta leucopsis*, *Cygnus olor* and *Anas penelope*). HPAI was identified much more frequently than previous years (163 and 1 HPAI positive wild birds reported in 2018 and 2019, respectively). HPAI-positive birds were reported by 14 countries: Belgium, Denmark, France, Germany, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Slovenia, Spain, Sweden and the United Kingdom. Almost all positive birds were detected from mid-October onwards. These results are in accordance with the widespread epidemic of H5N8 reported in Europe since late 2020, affecting both poultry and wild birds. The last large HPAI epidemic in Europe had been reported in 2016–2017. After a relatively low circulation of HPAI in Europe in 2018 and 2019, it appears that the risk of AI has substantially increased late 2020 throughout the continent.

The 932 wild birds positive for non-HPAI viruses were reported by 16 of the 30 RCs. A total of 21 wild bird species as well as birds from four genera with unknown species were detected as positive for non-HPAI AIVs. Positivity rates were lowest in spring (March to July). Most positive birds were detected from September onwards. The majority of positive LPAI detections were found by active surveillance

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2016.084.01.0001.01.ENG

(93%). Most LPAI-positive birds belonged to the order Anseriformes, which was expected given that this is the order most sampled by both active and passive surveillance.

The report also presents summary data of wild bird observations in the RCs by voluntary contributors, obtained from the EuroBirdPortal project. Despite the limitations of such data, and until further spatial modelling of the distribution and abundance of wild birds in Europe is readily available, the maps presented in this report could help to shed light on areas where the birds of the species belonging to the target list may gather, supporting RCs in carrying out more targeted surveillance activities. Further maps of the distribution of the 50 target species and the number of samples taken by RCs for those species by month and NUTS3 have been uploaded in Zenodo.[2] Considering the seasonality attached to the circulation of avian influenza viruses, these maps may be of help in improving the timing of sampling within targeted surveillance activities.

2. Introduction

Since late 2020, several European countries have been experiencing outbreaks of avian influenza (AI) in domestic poultry, mainly farmed ducks, due to an H5N8 virus subtype.[3] In addition to this virus strain and other high pathogenic avian influenza (HPAI) virus strains identified over the years, low pathogenic avian influenza (LPAI)[4] viruses are regularly isolated from both domestic and wild birds in the EU. To implement appropriate measures to prevent incursions of AI and control the spread of the disease when incursions occur, Member States (MSs) have implemented surveillance programmes in poultry and wild birds, including serological and virological surveillance activities. These activities include sampling of biological materials from different origins, detection of Avian Influenza A viruses (AIV) by various laboratory methods and typing of different antigenic subtypes based on their surface glycoproteins: haemagglutinin (H) and neuraminidase (N). The development and implementation of these surveillance programmes was supported by a legislative frame, which is presented below. Please note that this frame was in place until the 21st of April 2021, date in which the new Animal Health Law was implemented. The Terms of Reference of the European Commission mandate to the European Food Safety Authority (EFSA) related to the production of the present report are also described.

2.1. Background and Terms of Reference

In 2020, EU legislation on avian influenza required Member States to carry out compulsory surveillance programmes in poultry and wild birds.

The objective of the surveillance programme for AI in poultry stated in Annex I of Commission Decision 2010/367/EU was:

> *to inform the competent authority of circulating avian influenza virus with a view to controlling the disease in accordance with Directive 2005/94/EC by the annual detection through active surveillance for:*
>
> *a - LPAI of subtypes H5 and H7 in gallinaceous birds (chickens, turkeys, guinea fowl, pheasants, partridges and quails) and ratites thereby complementing other existing early detection systems.*
>
> *b - LPAI of subtypes H5 and H7 and HPAI in domestic waterfowl (ducks, geese and mallards for re-stocking supplies of game).*

The objective of the surveillance programme for AI in wild birds, as stated in Annex II of Commission Decision 2010/367/EU is:

> *the timely detection of HPAI of the subtype H5N1 in wild birds in order to protect poultry in poultry holdings and safeguard veterinary public health.*

Also, as described in Decision 2018/1136/EU, the identification and review of areas that are at particular risk for the introduction of HPAI viruses into poultry establishments, had to be carried out by

[2] Monthly observations and samples from wild birds on the EFSA list of target species for 2020 by NUTS3 region. The green colour scale represents the number of wild bird observations from the target species, as per data provided by the EuroBirdPortal project. The black dots represent the number of wild bird samples from target species tested within the countries' AI passive surveillance programmes. Wild bird samples reported at NUTS2 level are not shown on these maps. https://doi.org/10.5281/zenodo.4967481

[3] Avian influenza overview December 2020 – February 2021, https://doi.org/10.2903/j.efsa.2021.6497

[4] In the present report, LPAI-positive birds include both birds reported positive for an H5 or H7 AI virus not classified as HPAI and birds reported positive for subtypes other than H5 or H7.

MSs, ensuring that increased passive surveillance of the wild bird populations took place in these higher risk areas.

Guidelines for the implementation of the surveillance programmes have been provided by the EC. The EC guidelines also include a list of wild bird target species which is under constant review as new evidence is generated when HPAI epidemics occur in Europe. As a result, EFSA published a scientific report providing further guidance to adjust wild bird surveillance of susceptible European species for the detection of H5 HPAI by passive surveillance (EFSA AHAW Panel, 2017).

Under Directive 2005/94/EC, MSs were requested to submit the results of these surveillance programmes to the competent authority. Late in 2017, EFSA received a mandate with the Terms of Reference being to: 'collect, collate, validate, analyse and summarise in an annual report the results from avian influenza surveillance carried out by Member States in poultry and wild birds'. In the context of Article 31 of Regulation (EC) No 178/2002, from 2019 onwards, EFSA was requested to provide the technical and scientific assistance to the Commission to deliver on this mandate. This implies that EFSA is in charge of producing the annual surveillance report on AI since 2019.[5] In addition, the collation of all data relevant to the surveillance activities taking place in MSs has been conducted by EFSA since January 2019.

3. Results

3.1. Poultry

3.1.1. Number of poultry establishments sampled

Twenty-seven MSs as well as Iceland, Norway, Switzerland and the United Kingdom, here referred to as reporting countries (RCs), reported their serological surveillance activities in 2020. Data on the total number of poultry establishments present in each RC and on the distribution of poultry categories within RCs were not available for this report. For this reason, the number of samples by poultry category reported below does not include information on the proportion of the population sampled in each RC and poultry category.

A total of 24,768 poultry establishments (PEs) were sampled as part of the RCs' surveillance programmes. In this report, the numbers reported as 'PEs sampled' should be treated with caution as they refer to the total number of poultry sampling events taking place on a specific date, in a specific establishment and for a specific poultry category (see Methods section for further details). Thus, the number of distinct poultry establishments where sampling occurred in each country may be lower than the total number of PEs sampled reported here, where poultry establishments have been sampled more than once in 2020. The reason PEs are defined in this way is because not all RCs submit surveillance data in a non-aggregated manner.

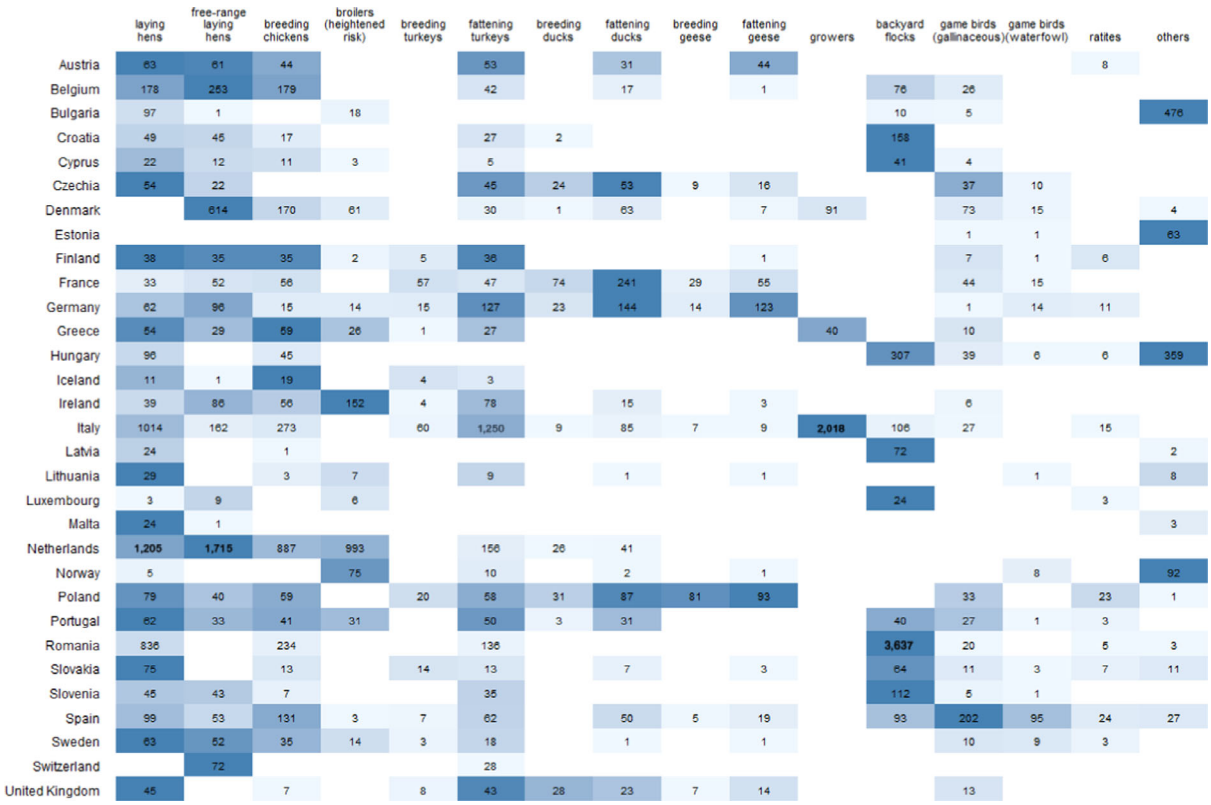
Surveillance in RCs varied in both the number of PEs sampled and the poultry categories targeted for surveillance (Figure 1). Some countries conducted testing in a limited number of poultry categories (e.g. backyard flocks), while others distributed their sampling effort over a larger number of categories. An overview of the total number of PEs sampled by each RC and for each poultry category is provided in Figures 5A and 9A, respectively.

When looking at the poultry categories among which the largest number of samples were taken by RCs, backyard flocks and conventional and free-range laying hens were the three most sampled poultry categories (Figure 1). In addition, Figure 1 also shows the poultry categories which are most frequently targeted (i.e. tested by the largest number of RCs). There were five categories for which surveillance results were reported by at least 20 RCs: laying hens (conventional and free-range), fattening turkeys, breeding chickens and gallinaceous game birds. Only 3 and 7 countries reported taking samples from growers[6] and breeding geese, respectively. Between 10 and 17 countries reported surveillance results for the remaining categories (others, breeding and fattening ducks, breeding turkeys, backyard flocks, waterfowl game birds, ratites, broilers at heightened risk and fattening geese).

[5] The annual report on surveillance for avian influenza in poultry and wild birds in 2019 is available at https://doi.org/10.2903/j.efsa.2020.6349

[6] For the purpose of this report, growers are defined as poultry establishments (different species) in which birds are reared for only part of their productive cycle, to be then sold to other farms belonging to the rural sector where birds will end their production cycle for meat/eggs (Brouwer et al., 2018).

The mapping between current, more detailed reporting categories and the 16 reporting categories used in this report (for consistency with previous reports) is presented in Appendix A (Tables A.1 and A.2).



	laying hens	free-range laying hens	breeding chickens	broilers (heightened risk)	breeding turkeys	fattening turkeys	breeding ducks	fattening ducks	breeding geese	fattening geese	growers	backyard flocks	game birds (gallinaceous)	game birds (waterfowl)	ratites	others
Austria	63	61	44			53		31		44					8	
Belgium	178	253	179			42		17		1		76	26			
Bulgaria	97	1		18								10	5			476
Croatia	49	45	17			27	2					158				
Cyprus	22	12	11	3		5						41	4			
Czechia	54	22				45	24	53	9	16			37	10		
Denmark		614	170	61		30	1	63		7	91		73	15		4
Estonia													1	1		63
Finland	38	35	35	2	5	36				1			7	1	6	
France	33	52	56		57	47	74	241	29	55			44	15		
Germany	62	96	15	14	15	127	23	144	14	123			1	14	11	
Greece	54	29	59	26	1	27					40		10			
Hungary	96		45									307	39	6	6	359
Iceland	11	1	19		4	3										
Ireland	39	86	56	152	4	78		15		3			6			
Italy	1014	162	273		60	1,250	9	85	7	9	2,018	106	27		15	
Latvia	24		1									72				2
Lithuania	29		3	7		9		1		1				1		8
Luxembourg	3	9		6								24			3	
Malta	24	1														3
Netherlands	1,205	1,715	887	993		156	26	41								
Norway	5			75		10		2		1				8		92
Poland	79	40	59		20	58	31	87	81	93			33		23	1
Portugal	62	33	41	31		50	3	31				40	27	1	3	
Romania	836		234			136						3,637	20		6	3
Slovakia	75		13		14	13		7		3		64	11	3	7	11
Slovenia	45	43	7			35						112	5	1		
Spain	99	53	131	3	7	62		50	5	19		93	202	95	24	27
Sweden	63	52	35	14	3	18		1		1			10	9	3	
Switzerland		72				28										
United Kingdom	45		7		8	43	28	23	7	14			13			

Figure 1: Total number of PEs sampled, presented by RC and poultry category, according to 16 poultry categories. The colours are used to indicate the poultry categories with the smallest (lightest blue shade) to the largest (darkest blue shade) number of PEs sampled within a given RC

Within MSs and in addition to the sampling carried out under European funding ('EU co-funded active surveillance', in blue in Figure 2), five countries reported surveillance results from their national programmes (Estonia, Lithuania, Luxembourg, Slovakia and Spain) and one from a private industry sampling programme (Slovakia) (Figure 2). Norway, Switzerland and Iceland reported results from their national programmes, with Iceland also reporting some results obtained via private industry sampling.

Please note that it is not mandatory for MSs to report surveillance results from surveillance activities other than the EU co-funded active surveillance.

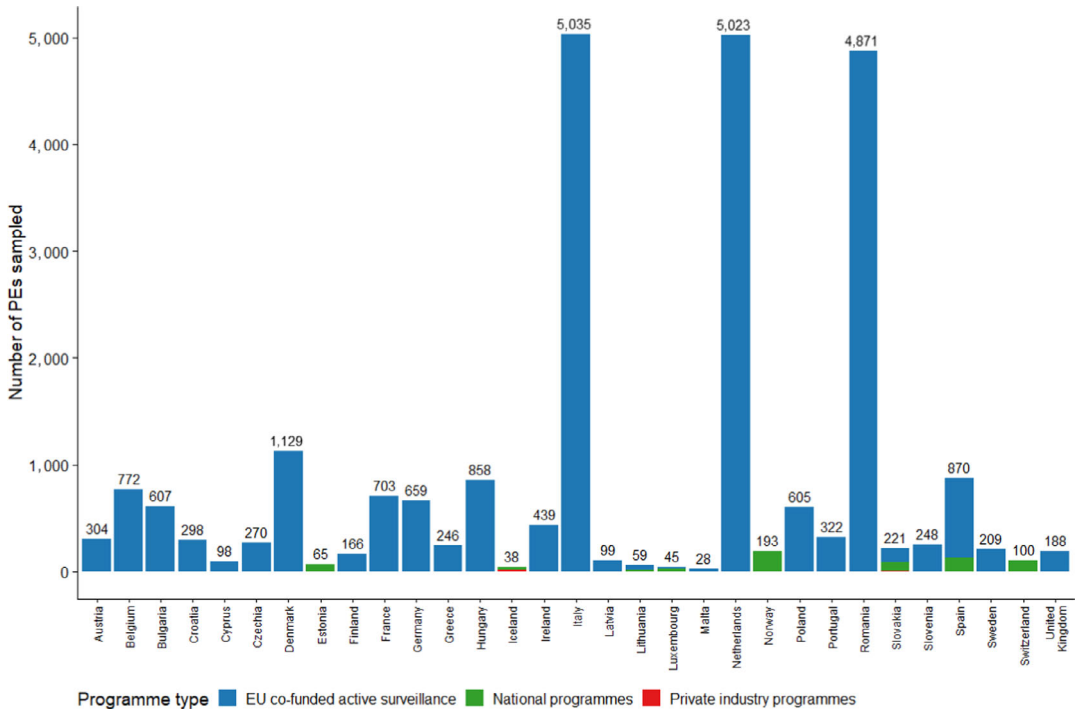


Figure 2: Number of PEs sampled by RCs in 2020 according to the type of active surveillance programme and for which results were reported to EFSA

3.1.2. Timing of sampling in poultry

In terms of the timing of the sampling, 57% of the sampling took place in the second half of the year (July–December). All countries but France conducted sampling activities during both semesters (Figure 3). A total of 14,068 PEs were reported as sampled from July to December 2020, while 10,700 PEs were reported as sampled in the reporting period going from January to June. Figure 3 shows the monthly distribution of poultry sampling in each RC.

Figure 3: Monthly number of PEs sampled in 2020, presented by RC. Note that the scale of the vertical axes is specific to each country

3.1.3. Avian influenza in poultry

3.1.3.1. Serological results overview

In this section, comparisons of seropositivity rates between different groups relate to the sampling results. They cannot be extrapolated to the source populations because:

- the sampling was targeted at higher-risk groups (non-representative sampling strategy) in some RCs,
- the targeting approaches may differ between countries, between groups and between years.

Therefore, the percentages and trends provided in this report relate only to the surveillance samples, not to the underlying population. Temporal trends are based on the assumption that sampling strategies and targeting remain constant over time in all RCs.

In 2020, 46 PEs tested positive for AI H5 and 7 for H7 (Figure 4). None of the PEs sampled tested positive for both H5 and H7. The combined H5/H7 seropositive percentage was 0.21%, lower than the seropositive percentage in 2019 (0.45%). The percentage of AI H5 seropositive PE was 0.19%. This number is lower than that of the previous year (0.36%). The percentage of AI H7 seropositive PEs was 0.03%, lower than the proportion found in 2019 (0.09%). In 2020, the total number of PEs sampled (n = 24,768) was at its highest since 2014. It was lower than the number of PEs sampled in 2013 and in previous years. The downward trend in the number of PEs sampled observed since 2008 may be reverting (Figure 4A).

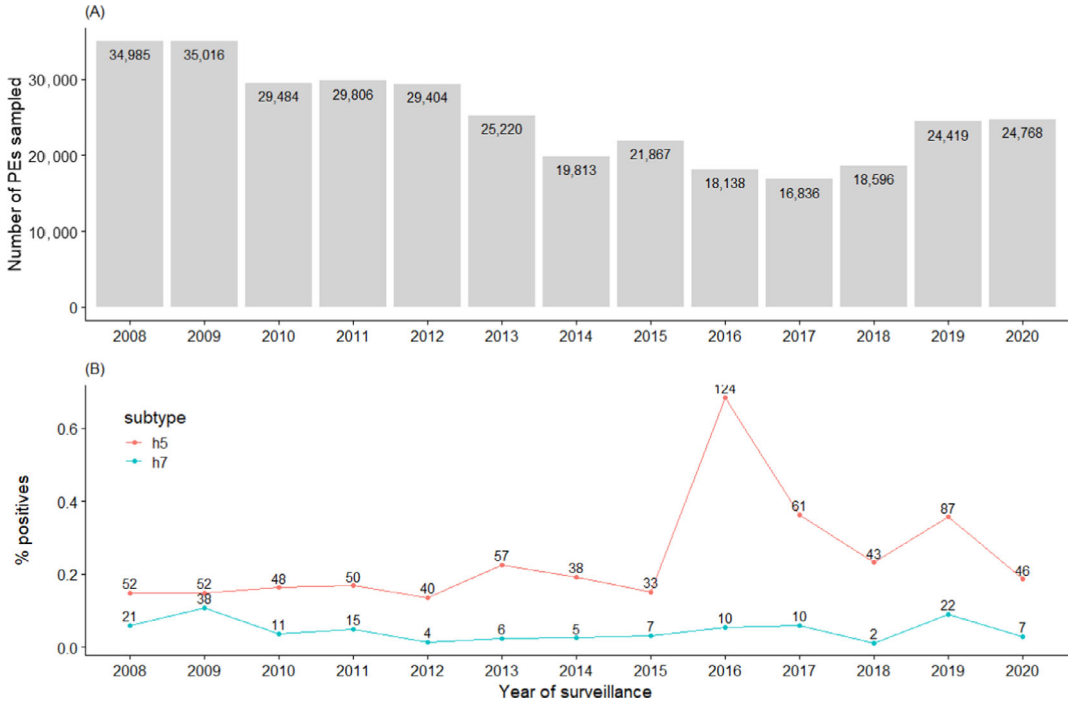


Figure 4: (A) Total number of PEs sampled per year and (B) line graph of the percentage of the AI seropositive PEs of the H5 and H7 subtypes, with the number of seropositive PEs shown per year as labels

3.1.3.2. Serological results by reporting countries

Considerable variation in the number of PEs sampled[7] among RCs was observed in 2020 (Figure 5), as already noted in previous years. Three countries (Italy, the Netherlands and Romania) reported 60% of all PEs sampled over the course of 2020. The total number of PEs sampled among RCs ranged from 28 in Malta, to 5,035 in Italy, with the median number of PEs sampled among RC being 270 (Figure 5). Variation among RCs in terms of the number of PEs testing seropositive to either H5 or H7 AI was also noticed. Ten RCs reported the detection of seropositive PEs for H5 or H7. All ten countries

[7] Please note that throughout this report, "number of PEs sampled" refers to all PEs sampled, regardless of the type of tests conducted on the samples (serology or virology).

reported detection of AI H5 (total of 46 PEs) and only Spain reported the detection of AI H7 seropositive PEs (total of 7 PEs) (Figure 5). Most H5/H7 detections (45 PEs out of 53) occurred in countries which sampled a number of PEs larger than the median number of PEs sampled.

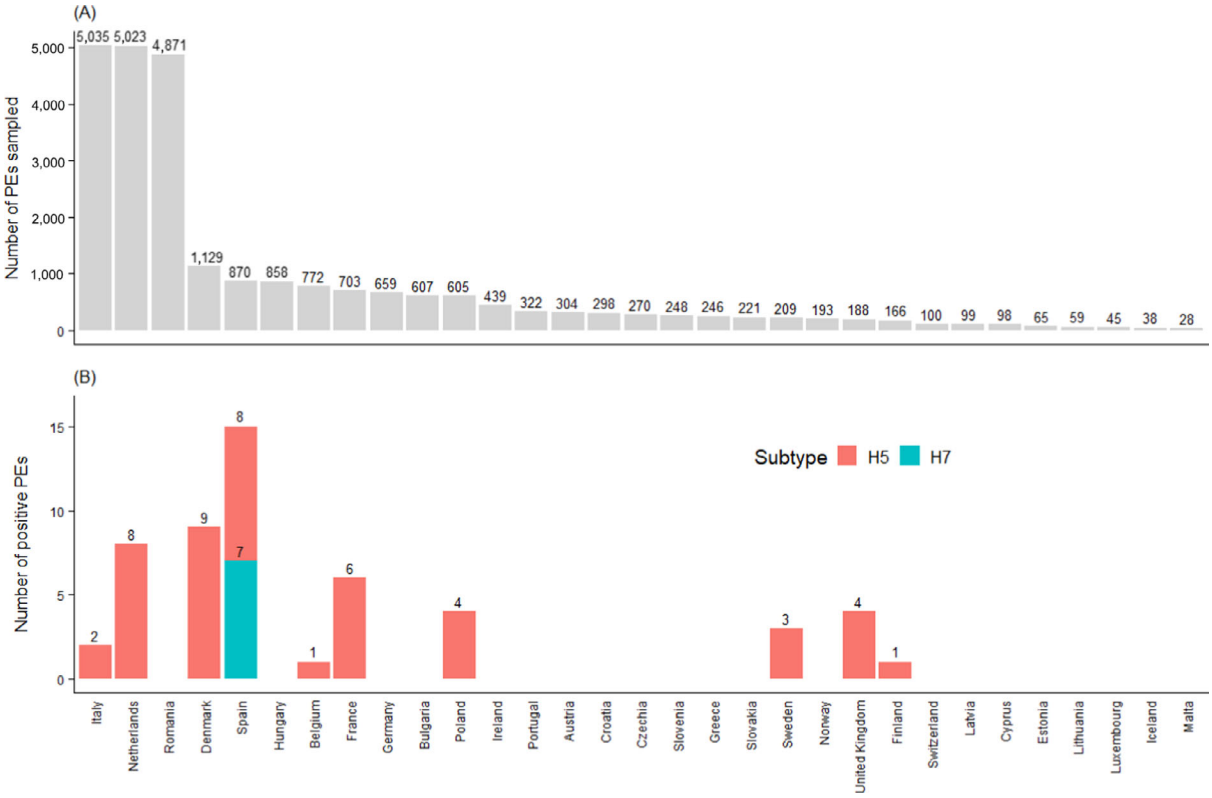


Figure 5: (A) Total number of PEs sampled in 2020 per RC shown in descending order and (B) total number of serologically positive PEs found by H subtype

3.1.3.3. Serological results by administrative units

Surveillance activities in poultry were reported for 32 NUTS2 (Nomenclature of Territorial Units for Statistics, level 2) units and 798 NUTS3 units in 2020. Reporting at NUTS2 level was linked to surveillance activities in Belgium, Germany, Italy and the United Kingdom. Out of the 24,768 PEs, 5,830 and 18,938 were reported at NUTS2 and NUTS3 level, respectively. Out of 53 seropositive PEs, 3 and 50 were reported at NUTS2 and NUTS3 level, respectively.

Figure 6 shows the geographical distribution of the surveillance activities that took place in 2020, as well as the number of H5 or H7 seropositive detections. Data are represented at the NUTS level they were reported at (i.e. the maps show a combination of NUTS2 and NUTS3 units). The sampling density, estimated as the number of PEs sampled per 100 km^2 within an NUTS region, and the distribution of the seropositive PEs for AI H5 or H7 are presented in Figure 6 in the upper and lower maps, respectively.

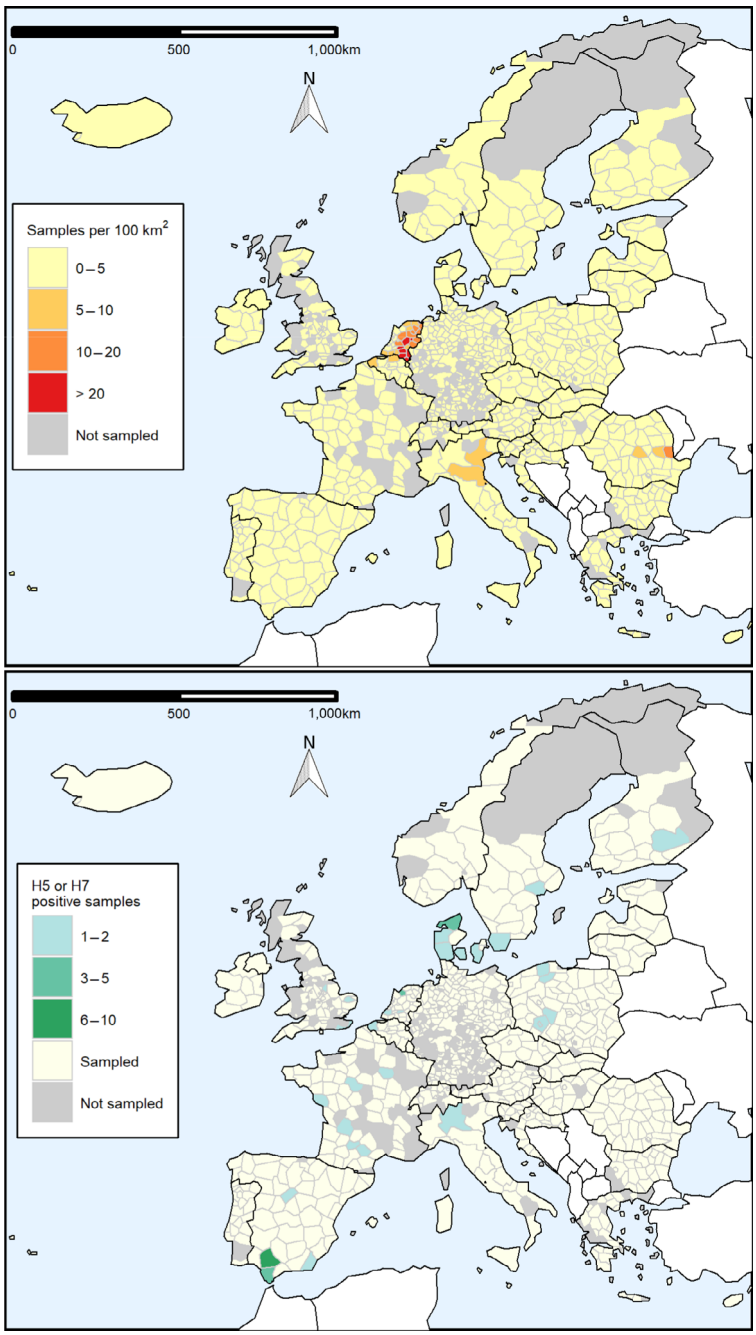


Figure 6: Sampling density expressed as the number of PEs sampled per 100 km^2 (upper map) and geographical distribution of AI H5 and H7 seropositive PEs (lower map) by administrative unit. Non-reporting countries are shown in white

3.1.3.4. Serological results by month

Since 2019, poultry surveillance data have been reported on a monthly basis. The distribution of PEs testing positive for H5 or H7 by month shows that the months with the highest seropositivity rates (and the highest number of seropositive PEs) were February, June, October and December 2020 (Figure 7). During these months, 6, 12, 6 and 9 PEs, respectively, were reported positive, compared to between 1 and 3 PEs during other months of the year. There was no apparent correlation between higher seropositivity rates and higher number of PEs sampled. However, as noted in the previous report, the month with the highest number of positives corresponded to the month where most of the PEs from the category 'game birds (waterfowl)' were sampled. In 2019, this occurred in April, while in 2020, it occurred in June: 76 PEs sampled in June compared to 104 during the remaining 11 months. Out of 17 positive PEs in waterfowl game birds, 10 were identified in June.

For the ten countries reporting H5 or H7 seropositive PEs, the distribution of these events by month is shown in Figure 8.

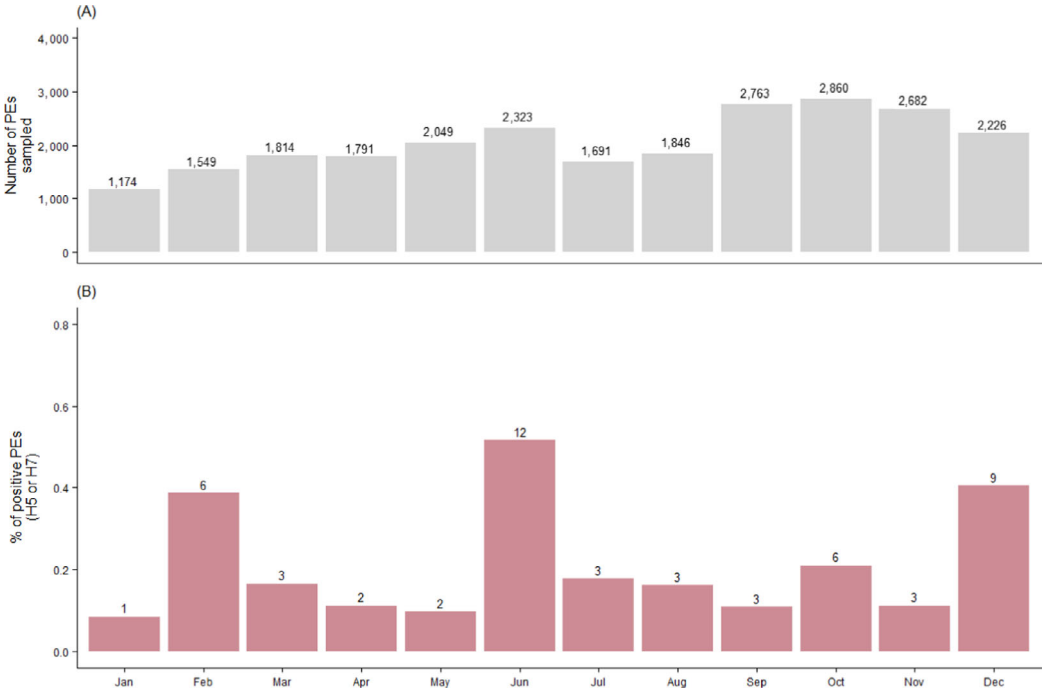


Figure 7: (A) Total number of PEs sampled by month with values above the bars referring to the number of PEs sampled. (B) percentage (y-axis) and number (above bars) of PEs sampled that tested serologically positive to H5 or H7 AI virus by month

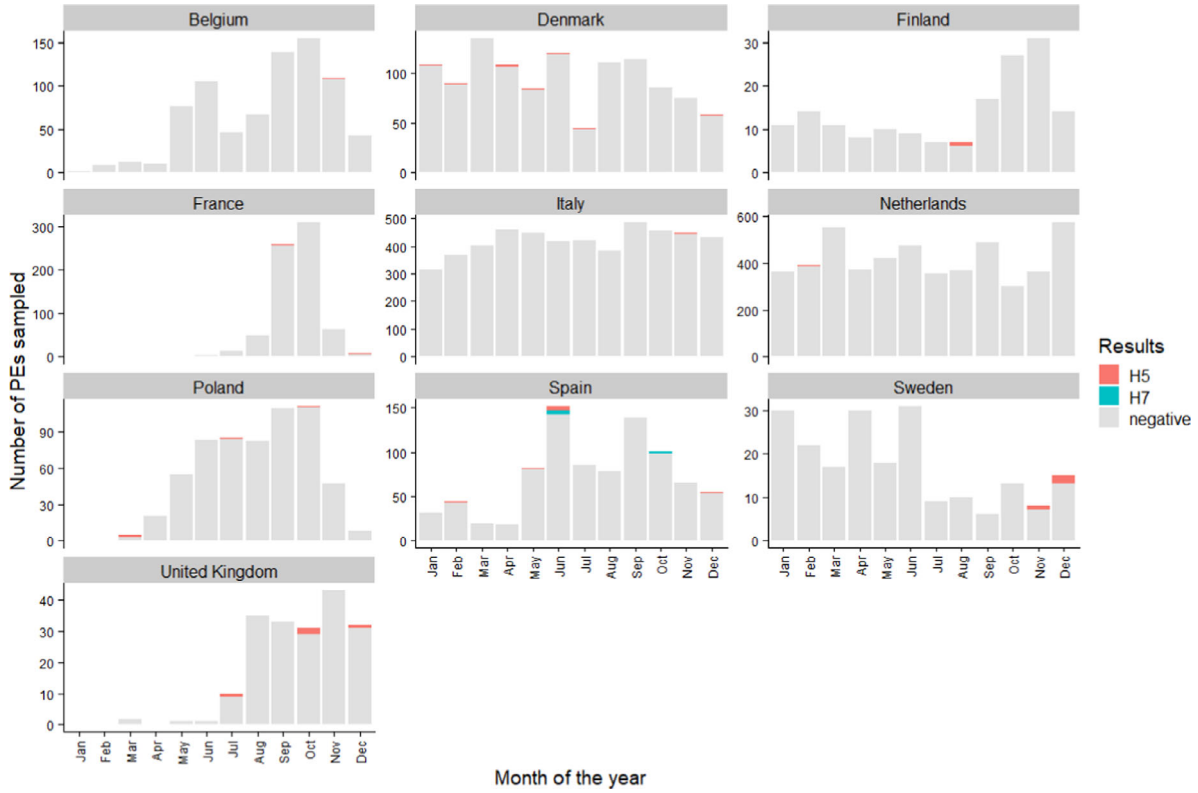


Figure 8: Monthly number of PEs sampled and positive in serology (H5 or H7 only) in 2020, presented for RCs with at least one H5 or H7 positive PE only. Note that the scale of the vertical axes is specific to each country

3.1.3.5. Serological results by poultry category

The highest numbers of PEs sampled by RCs in 2020 were from the backyard and conventional laying hen categories (n = 4,740 and 4,404, respectively) (Figure 9A). These two most sampled categories were the same as in previous years. Other categories sampled in large numbers were the free-range laying hens, breeding chickens, fattening turkeys and growers (Figure 9A).

As in 2019 and earlier, the highest percentage of AI H5 or H7 seropositive PEs in 2020 was found in the waterfowl game bird category (9.4% out of 180 waterfowl game bird PEs sampled), followed by breeding geese (3.3% out of 152 PEs) and breeding ducks (1.8% out of 221 PEs). The proportion of seropositive PEs was under 1% in all other poultry categories. The 'other' category had a lower proportion of seropositive PEs compared to the previous year (0.1% out of 1,049 PEs sampled). When considering only gallinaceous species, the highest percentage of H5 or H7 seropositive PEs was observed in the free-range laying hen category (0.4% out of 3,487 PEs sampled). No H5 or H7 seropositive results were found in turkeys (fattening or breeding), broilers (heightened risk), breeding chickens and conventional laying hens. One positive PE was found in each of the growers and ratite categories, unlike in 2019 where no positive PE had been found in these categories.

In addition to H5 and H7 positive results, ten RCs reported non-H5/H7 positive results in poultry (Austria, Belgium, Denmark, Estonia, Germany, Latvia, Luxembourg, Norway, Sweden and Spain). There were 261 PEs seropositive for AI virus strains other than H5 or H7.[8] The categories with the largest numbers of non-H5/H7 seropositive PEs were the laying hens (free-range and conventional), backyard flocks, waterfowl game birds and breeding chickens. Proportions of non-H5/H7 seropositive PEs by poultry category could not be reliably estimated, as not all RCs reported these results. For this reason, Figure 9 does not display the non-H5/H7 results.

For each poultry category, detailed results by month are shown in Figure 10. In addition, surveillance results by bird species and order are shown in Figure B.1 – Appendix B. The figure shows that, regardless of management system, positive PEs were found in Anseriformes (domestic and Mallard ducks as well as geese), chickens, ratites and pheasants. A large number of positive samples were identified in PEs raising game birds from the order Anseriformes for which the bird species was not available.

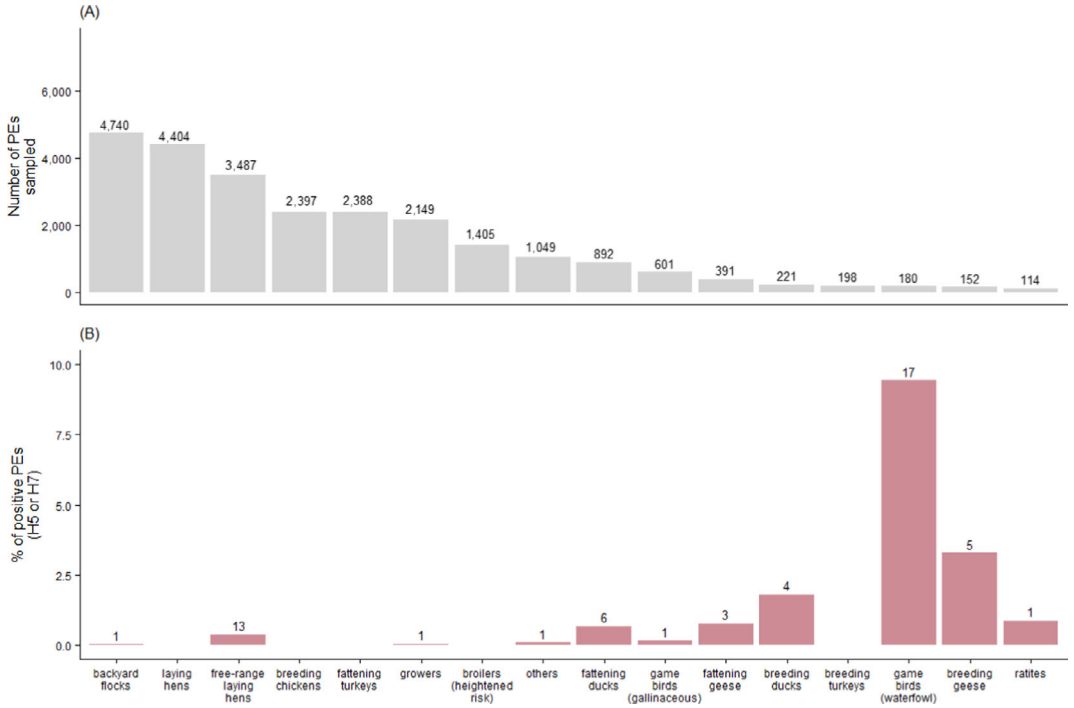


Figure 9: (A) Total number of PEs sampled by poultry category with values above the bars referring to the number of PEs sampled; (B) percentage (y-axis) and number (above bars) of PEs sampled that tested serologically positive to H5 or H7 AI virus by poultry category

[8] Reporting of non-H5 or H7 seropositive PEs by MSs is not compulsory.

Figure 10: Monthly number of PEs sampled and positive in serology (H5 or H7 only) in 2020, presented by poultry category. Note that the scale of the vertical axes is specific to each category. Some positive results (e.g. in laying hens) are not visible due to the small number of positive PE that month (e.g. 1 H5-positive PE only). The asterisks indicate whether there was at least one positive PE in that category and month

3.1.3.6. Serological results: summary

Figure 11 shows the countries and poultry categories in which H5 seropositive birds were detected. Spain, the Netherlands and Denmark were the countries reporting the most H5-positive PEs. Those PEs were reported mainly in free-range laying hens in Denmark and the Netherlands, and mainly in waterfowl game birds in Spain. Spain also reported the detection of H7 seropositive PEs (waterfowl game birds and fattening ducks).

The sensitivity of serological surveillance activities to detect HPAI in RCs depends on several parameters, including the number of poultry establishments in each country, the number of establishments sampled, the sensitivity of within-establishment sampling and the design prevalence (proportion of establishments which is expected to be infected should HPAI be present in the country).

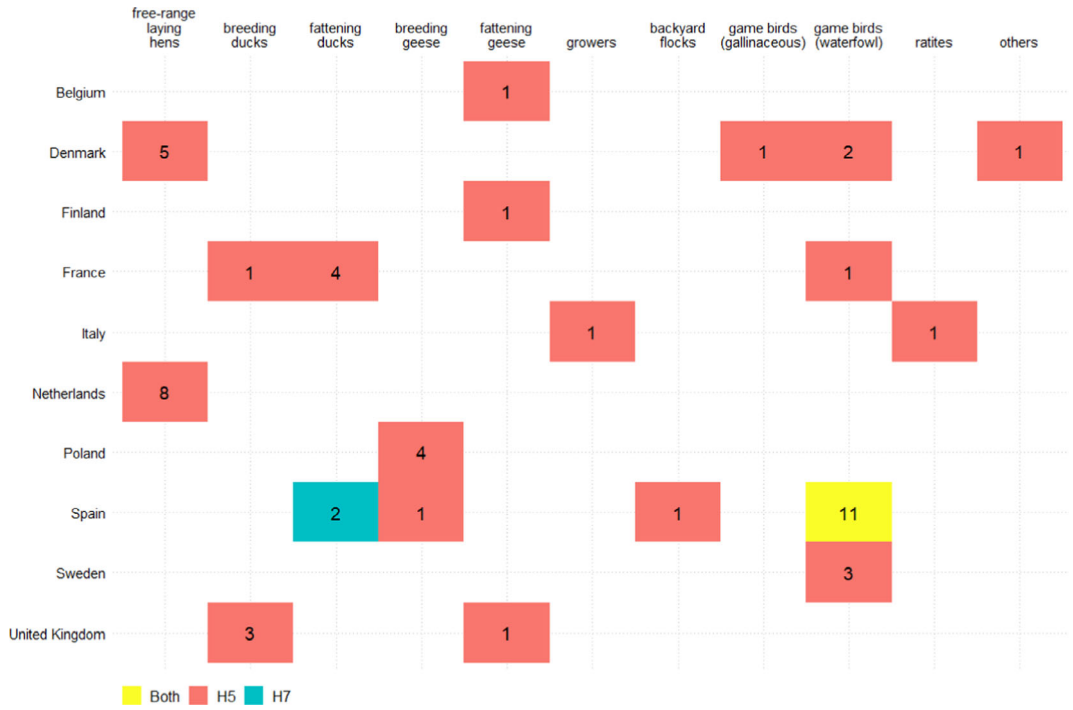


Figure 11: Number of H5 and H7 seropositive PEs by RC and poultry category in 2020, presented for RCs and categories with at least one H5 or H7 positive PE only

3.1.3.7. PCR and virological results

Out of the 53 PEs with positive serological tests for H5 or H7, samples from 46 PEs were tested further for AI viral RNA using polymerase chain reaction (PCR), and seven of these PEs tested positive in PCR:

- two positives in France, one for H5 LPAI and one for non-H5/H7 LPAI, both in fattening ducks.
- one free-range laying hen PE tested positive in the Netherlands for H5 LPAI.
- in Denmark, one laying hen PE tested positive for H5 LPAI and one PE (category 'others') tested positive for H5 HPAI.
- one waterfowl game bird PE tested positive for non-H5/H7 LPAI in Sweden.
- and, last, one breeding duck PE tested positive for H5 LPAI in the United Kingdom.

Most of the seropositive PEs were tested by PCR on the same day (n = 36), while the remainder were re-sampled for PCR testing on average 11 days after the serological tests. No virus isolation results were available for the PEs with positive serological or PCR tests. Virus isolation results were available for samples from four PEs (all in Spain) and were all negative.

In addition, 13 countries also reported PCR results from 748 PEs which did not correspond to the follow-up testing of a positive serology event (e.g. in some PEs, PCR tests were used for screening). Twenty-five of these PEs were found positive for AI viral RNA, including 16 PEs with H5 HPAI in Bulgaria and Germany. The pathogenicity of the virus identified in the other PEs was not available (H5 in Romania and Slovakia, non-H5/H7 in Estonia).

3.2. Wild birds

3.2.1. Number of birds sampled

In 2020, a total of 18,968 wild birds were sampled by 27 MSs as well as Iceland, Norway, Switzerland and the United Kingdom (31 RCs) either by active or passive surveillance.

Within MSs and in addition to the sampling carried out under European funding ('EU co-funded passive surveillance', in blue in Figure 12), four countries reported surveillance results from their national programmes (non-EU co-funding programmes) (Belgium, Estonia, Germany and Spain). Norway, Switzerland and Iceland reported results from their national programmes.

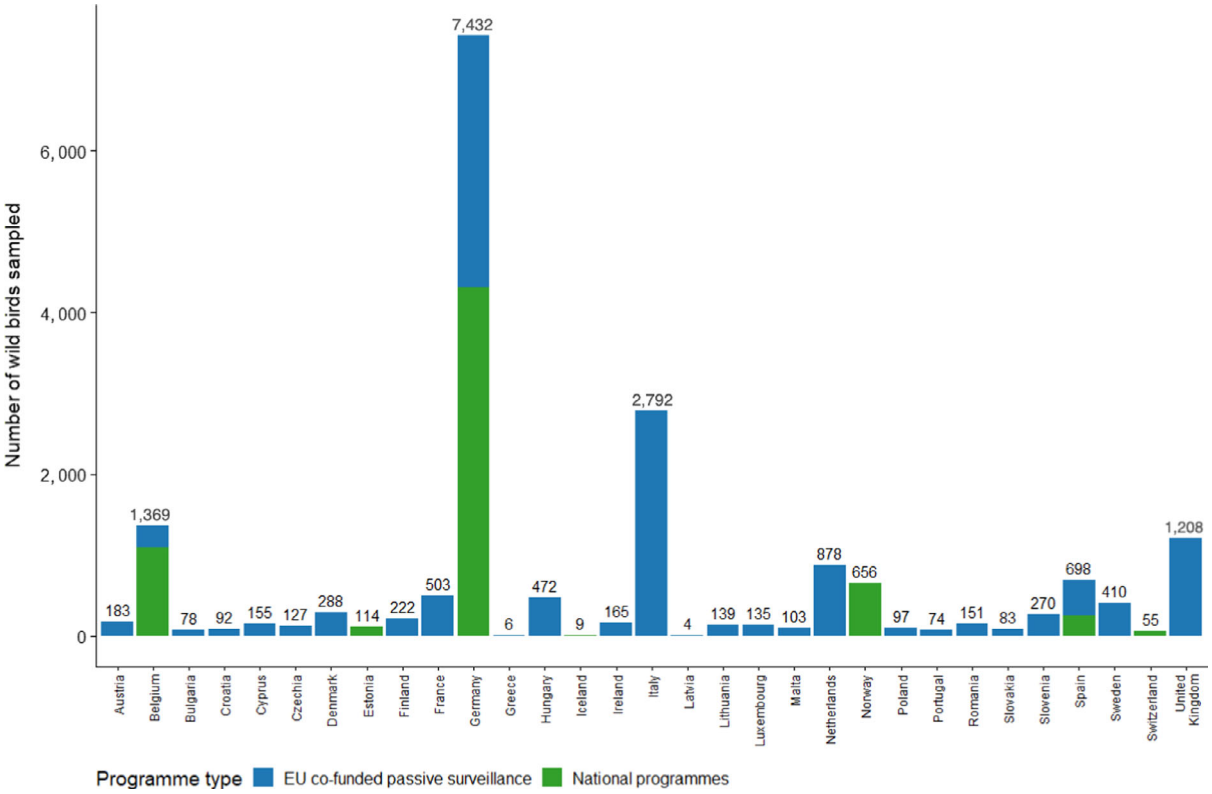


Figure 12: Number of wild birds sampled by RCs in 2020 according to the type of surveillance programme

For the purpose of this report, birds 'found dead' or 'live with clinical signs' were classified under passive surveillance (the latter including injured birds), while birds reported as 'hunted with clinical signs', 'hunted without clinical signs' and 'live without clinical signs' were considered as birds sampled via active surveillance. This is consistent with the classification method followed in previous reports. Passive surveillance is assumed to be undertaken by voluntary contributors.

All 31 RCs reported results from their passive surveillance. From the total number of birds sampled, 12,418 were sampled by passive surveillance in 2020, more than in 2018 or 2019, but less than in 2017 (Table 1). The sensitivity of passive surveillance for AI in wild birds is highly dependent on the probability of contributors discovering and reporting birds found dead, injured or with clinical signs.

Some RCs (n = 10) also performed and reported results from active surveillance data (non-EU co-funding programmes for which reporting is non-mandatory), particularly, Belgium, Estonia, Germany and Norway who sampled a higher number of birds by active than by passive surveillance (Table 1). Although active surveillance was carried out in other RCs, the data shown in the report represent the data submitted to EFSA only. As reporting active surveillance results in wild birds to EFSA is not mandatory, the numbers reported below for active surveillance do not represent the full extent of activities conducted by some RCs. Consequently, this report contains complete data for passive surveillance only and mainly focuses on summarising the sampling activities and results obtained by passive surveillance.

Table 1: Number of wild birds sampled by RC in 2020 (light grey background), with active and passive surveillance presented separately and combined as a total, and number of wild birds sampled by passive surveillance from 2017 to 2019 (no background colour). Small figures or no data for active surveillance do not mean that no active surveillance was carried out in that RC, rather, little or no data were reported to EFSA from that RC

Reporting Country	Passive surveillance				Active surveillance 2020	Total 2020
	2017	2018	2019	2020		
Austria	897	109	85	183	0	183
Belgium	367	237	423	275	1,094	1,369
Bulgaria	47	58	65	70	8	78
Croatia	279	223	160	92	0	92
Cyprus	117	109	87	137	18	155
Czechia	330	94	104	127	0	127
Denmark	154	148	111	288	0	288
Estonia	38	16	8	3	111	114
Finland	316	195	174	222	0	222
France	766	113	158	503	0	503
Germany	8,533	1,711	1,392	3,041	4,391	7,432
Greece	90	13	12	6	0	6
Hungary	703	371	338	472	0	472
Iceland	–	–	2	9	0	9
Ireland	137	142	78	165	0	165
Italy	2,019	2,109	2,719	2,791	1	2,792
Latvia	11	14	15	4	0	4
Lithuania	131	70	63	139	0	139
Luxembourg	61	–	50	135	0	135
Malta	–	–	–	9	94	103
Netherlands	509	663	643	878	0	878
Norway	–	–	28	128	528	656
Poland	209	36	33	97	0	97
Portugal	54	82	126	74	0	74
Romania	528	244	201	107	44	151
Slovakia	513	84	45	83	0	83
Slovenia	556	178	231	270	0	270
Spain	370	344	281	437	261	698
Sweden	452	455	456	410	0	410
Switzerland	162	45	30	55	0	55
United Kingdom	1,194	1,282	816	1,208	0	1,208
Total	**19,543**	**9,145**	**8,934**	**12,418**	**6,550**	**18,968**

3.2.2. Timing of sampling in wild birds

In Figure 13, the quarterly distribution of the number of birds sampled by passive surveillance in 2020 is shown by RC. The highest number of samples were taken during the last quarter (October-December). The distribution of sampling was lower but relatively consistent during the first three quarters:

- Quarter 1: 2,152 birds, 17%
- Quarter 2: 2,352 birds, 19%
- Quarter 3: 2,789 birds, 22%
- Quarter 4: 5,125 birds, 41%

Figure 13 shows some variation among RCs in terms of the sampling distribution throughout the year (percentage of samples taken at each quarter by each RC). For example, around 75% of samples

collected in Poland and Slovakia over the year were taken during the first quarter. All samples collected in Malta were reported for the third quarter. Finally, the sampling was most intensive in the fourth quarter for Denmark, France, Luxembourg and Norway.

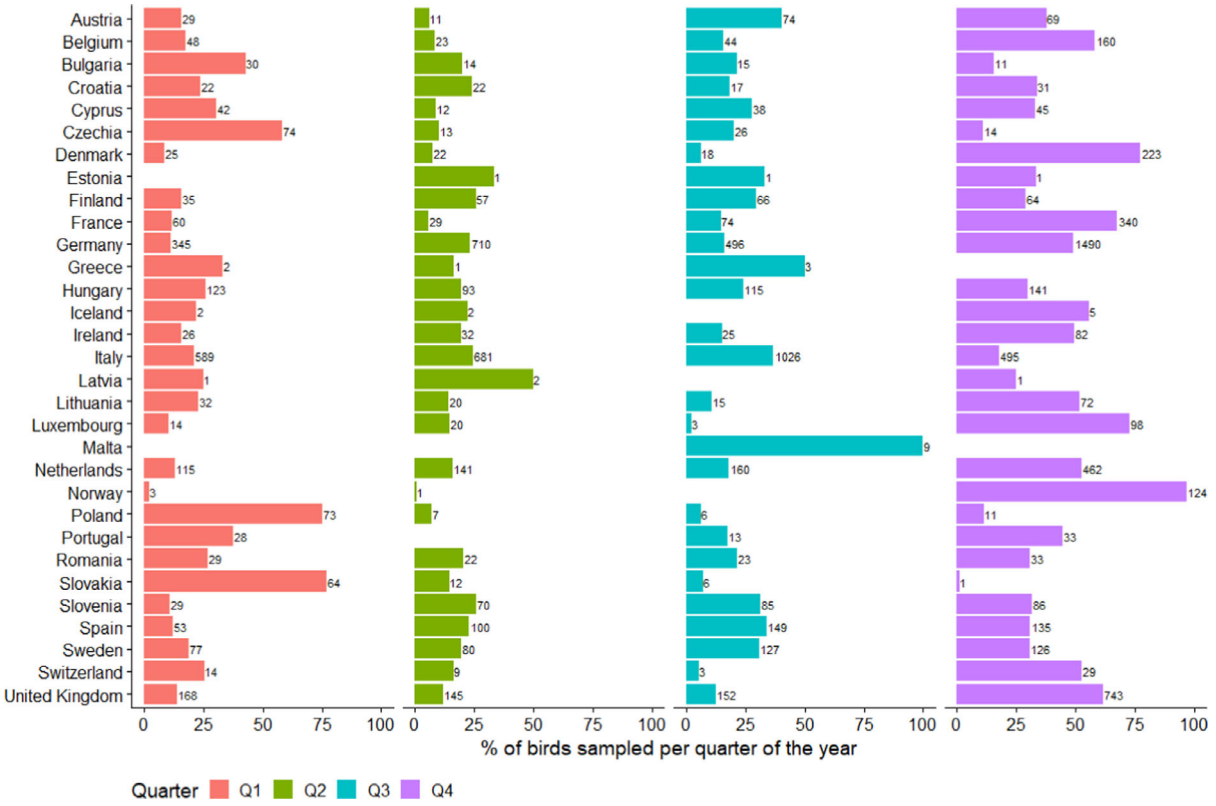


Figure 13: Quarterly percentage (bars) and total number (values) of wild birds sampled by passive surveillance by RC in 2020, with quarter 1 starting in January 2020

3.2.3. Species distribution in wild birds

Among wild birds sampled via passive surveillance, there were:

- 9,905 birds fully identified with a species name. These samples belonged to a total of 259 wild bird species belonging to 22 orders.
- 2,162 birds for which only the genus was identified but not the species (14 orders).
- 123 birds for which only the family was identified but not the species (7 orders).
- 37 birds for which only the order was identified (5 orders).
- 191 birds for which identification information was completely missing. Birds from this category are shown under the group name 'Species unknown' in Figure 14.

The most sampled order was Anseriformes (n = 3,578), which accounted for 28.8% of the total number of birds sampled by passive surveillance. The orders Passeriformes, Columbiformes, Accipitriformes and Charadriiformes were also sampled in high numbers (n > 1,000) (Figure 14).

Active surveillance samples were also mostly taken from birds of the order Anseriformes. A total of 5,153 samples from this order were tested by active surveillance, out of a total of 6,550 samples tested (78.7%). The distribution of birds sampled by order is shown jointly for active and passive surveillance in Figure C.1 – Appendix C.

The majority of the species sampled by passive surveillance belonged to the orders Passeriformes (n = 84 species), Charadriiformes (n = 47), Anseriformes (n = 46) and Accipitriformes (n = 26). In Figure 15, the 40 species with the most birds sampled in 2020 are shown (out of 259 fully identified species).

The four most sampled species (passive surveillance) were *Cygnus olor* (mute swan), *Anas platyrhynchos* (mallard), *Buteo buteo* (common buzzard) and *Columba livia* (common pigeon), similarly to the 2019 results, albeit with a different ranking. All English common names for the species shown in Figure 15 are listed in Table D.1 – Appendix D.

Forty-four out of the 50 recommended target species by EFSA (EFSA, 2017) are included in the 259 species reported (see Table E.1 – Appendix E). Respectively, 34.9% and 49% of the birds sampled by passive and active surveillance belonged to target species (n = 4,334 and 3,207).

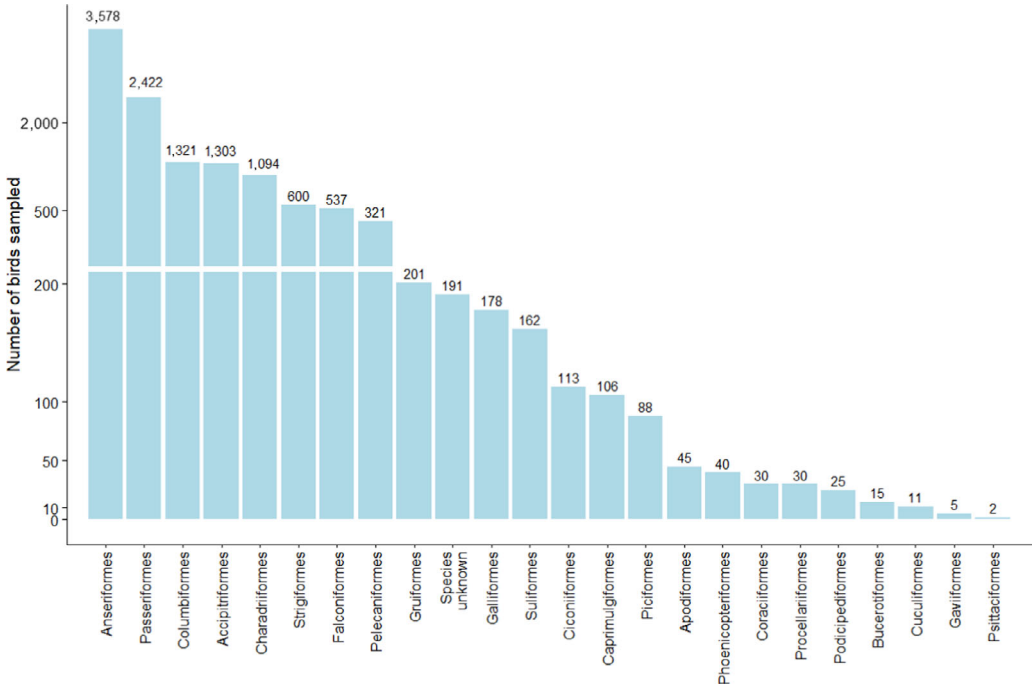


Figure 14: Total number of wild birds of the different orders, sampled by passive surveillance in 2020 (n = 12,418). The Y-axis is presented on a non-linear scale to improve visibility

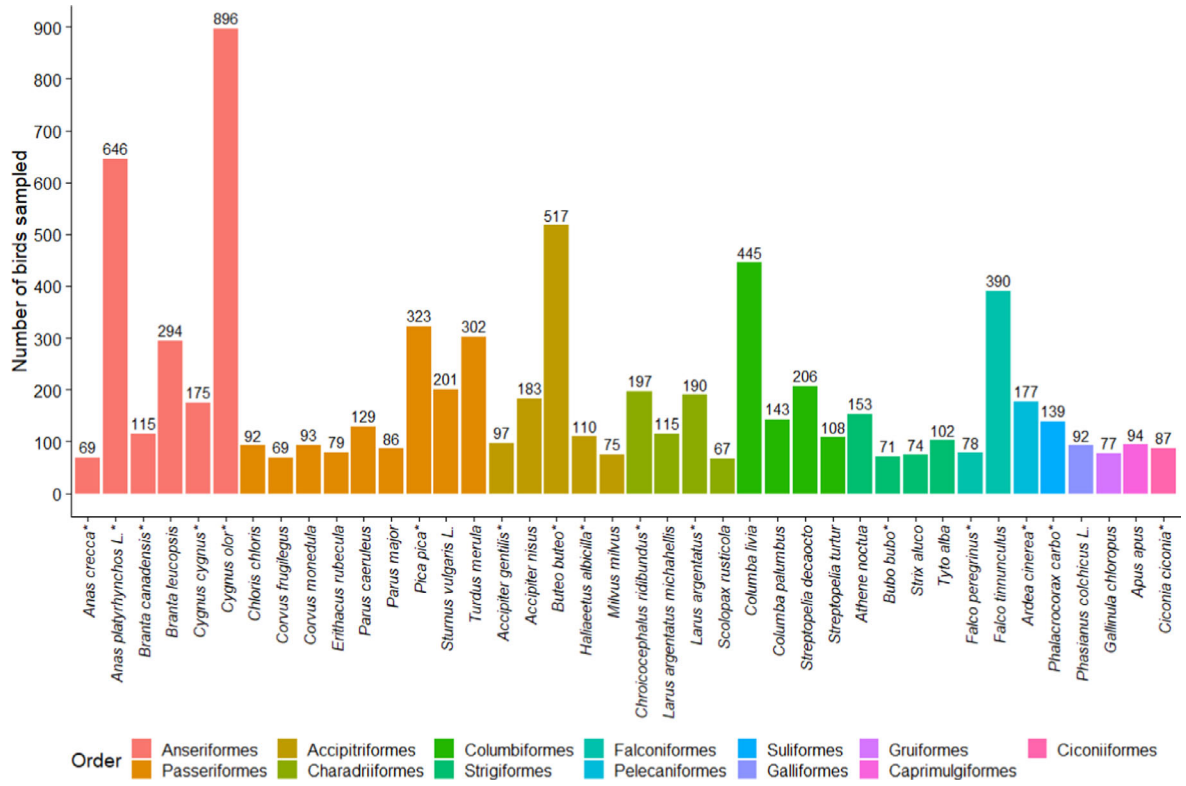


Figure 15: Total number of birds sampled for the 40 most sampled wild bird species reported by passive surveillance in 2020 (7,556 birds out of 9,905 fully identified birds). The bar colours refer to the bird orders. English common names for the species shown are provided in Appendix D

3.2.4. Avian influenza in wild birds

3.2.4.1. Detection of avian influenza virus in samples

When analysing data from both active and passive surveillance, a total of 1,624 (8.6%) birds, out of the 18,968 sampled by RCs, tested positive to AI (Table 2). This proportion was about twice as high as in 2019 (4.7%) or 2018 (3.8%). Of the 1,624 positive birds, 878 were infected with HPAI virus and 746 with LPAI virus.[9]

Most AI-positive birds were found dead (1,157 birds tested AI positive, including 797 testing positive for HPAI). In 2020, the majority of AI-positive birds were found by passive surveillance (72%), a major difference from the previous year (e.g. 7% of AI detections by passive surveillance in 2019). The proportions of positive birds in active and passive surveillance were 7% and 9%, respectively.

Table 2: Avian influenza diagnostic results for birds sampled by passive (no background) and active (light grey background) surveillance by all RCs in 2020, by bird status. The column 'All positive' includes all AI positive birds obtained by polymerase chain reaction (PCR) or virus isolation (VI). All birds with a successful AI virus isolation (column 'Positive in VI') had previously tested positive by PCR

	Bird status	No. of birds sampled	No. of AI positive birds			
			All positive	Positive in VI	HPAI positive	LPAI positive
Active	Hunted with clinical signs	84	33	0	30	3
	Hunted without clinical signs	2,403	313	10	31	282
	Live without clinical signs	4,063	107	35	9	98
	Subtotal	6,550	453	45	70	383
Passive	Found dead	11,904	1,157	11	797	360
	Live with clinical signs	514	14	1	11	3
	Subtotal	12,418	1,171	12	808	363
Total		18,968	1,624	57	878	746

Wild bird sampling was reported for 19 NUTS2 units, 188 NUTS3 units and 9,865 individual coordinate locations in 2020. Italy reported surveillance results at NUTS2 level, while Czechia, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta, Netherlands, Poland, Romania and Spain reported results at NUTS3 level. Norway reported some results at NUTS3 level and some by location coordinates. Other countries reported results by location coordinates only.

Out of the 18,968 wild birds sampled, 2,792 and 3,440 were reported at NUTS2 and NUTS3 level, respectively, while 12,736 were reported by location coordinates. Out of the 878 H5 HPAI-positive birds, 2 and 148 were reported at NUTS2 and NUTS3 level, respectively, while 728 were reported by location coordinates.

Figure 16 shows the geographical distribution of AI surveillance activities conducted by RCs in wild birds in 2020. Data are represented at the NUTS level they were reported at (i.e. the maps show a combination of NUTS2 and NUTS3 units). Data reported with location coordinates were aggregated at NUTS3 level.

[9] For some AI-positive birds, one or more samples tested positive for HPAI while virus pathogenicity results were not available for one or more of the other positive samples. These birds are considered as HPAI-positive in the present report.

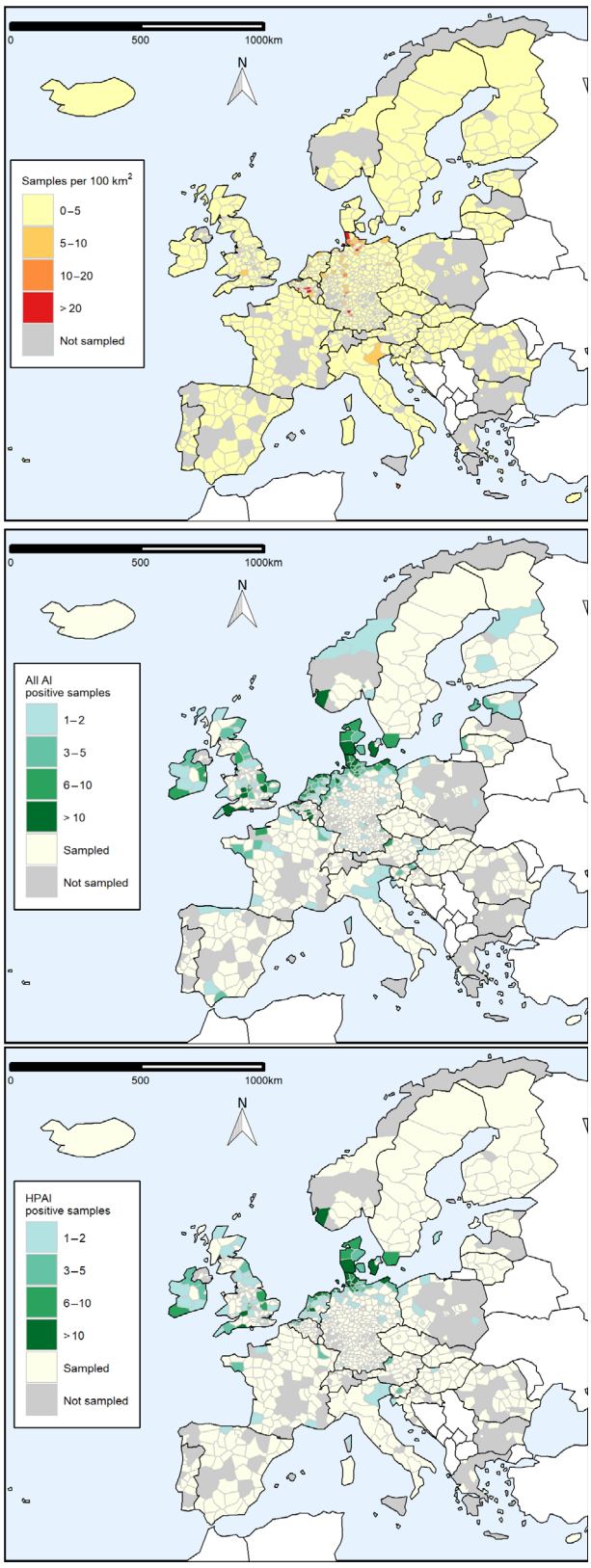


Figure 16: Sampling density, expressed as the number of wild birds sampled per area of 100 km^2 (upper map), and geographical distribution of all AI positive birds (middle map) and HPAI positive birds (lower map), by administrative unit. Non-reporting countries are shown in white

3.2.4.2. High pathogenic avian influenza in wild birds

3.2.4.2.1. HPAI results by neuraminidase type

A total of 878 birds tested positive for HPAI in 2020, more than in 2019 (1 positive bird) and 2018 (163 positive birds). HPAI-positive birds were reported by 14 RCs. All HPAI strains were identified as H5, and most were identified as H5N8 (84%). Figure 21 summarises the reported N subtypes for these positive samples.

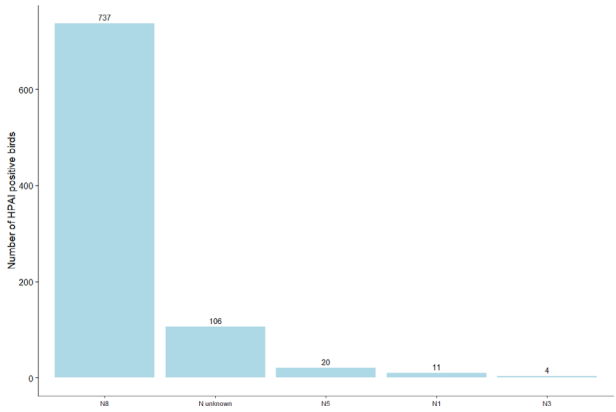


Figure 17: Virus neuraminidase (N) type identified in HPAI-positive wild birds (all HPAI strains were identified as H5). Values are provided above the bars. There were no birds with more than one N antigen identified

3.2.4.2.2. HPAI results by species

A total of 51 wild bird species, birds from 8 genera with unknown species and birds from 2 families with unknown species were detected as positive for HPAI, as well as 30 birds with no species identification (no order, family, genus or species). The HPAI infected birds belonged to the 12 orders as well as unknown orders, as shown in Figures 18 and 19. These two figures show combined data for passive and active surveillance. The same data is presented separately by type of surveillance in Appendices G and H: Figures G.1 and G.2 (passive surveillance), Figures H.1 and H.2 (active surveillance).

Less than half of the HPAI positive birds belonged to the EFSA target species (n = 337, 38%). In particular, the species with the largest number of HPAI-positive samples identified in passive surveillance was barnacle goose (*Branta leucopsis*, n = 264), which is not listed as a target species (Figure 18). The two other species with the largest numbers of HPAI-infected birds were *Cygnus olor* (n = 83) and *Anas penelope* (n = 42), while 80 positive birds were identified as geese at the genus level only (*Anser sp.*).

The percentage of HPAI-positive birds by species shown in Figure 19 must be interpreted carefully, as the number of birds sampled for a given species may be very small. For instance, only one *Cygnus columbianus* was sampled and tested positive, yielding a percentage of 100% for that species.

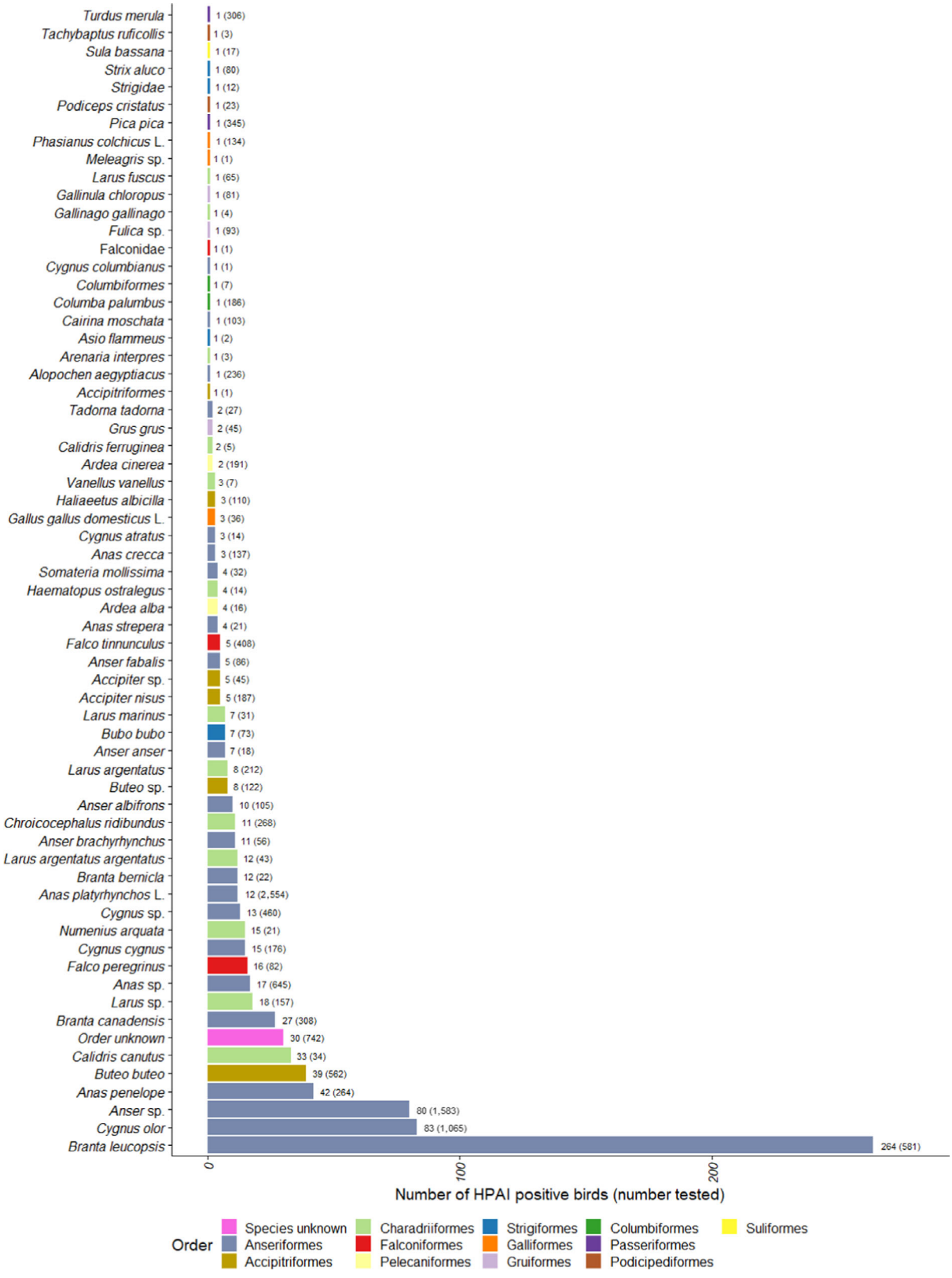


Figure 18: Number of HPAI-positive wild birds detected by both passive and active surveillance, for species with at least one HPAI positive sample. The number of wild birds tested is indicated in brackets. Bars are ordered by increasing number of positives and colour coded to identify the order to which these species belong to. English common names are provided in Appendix D

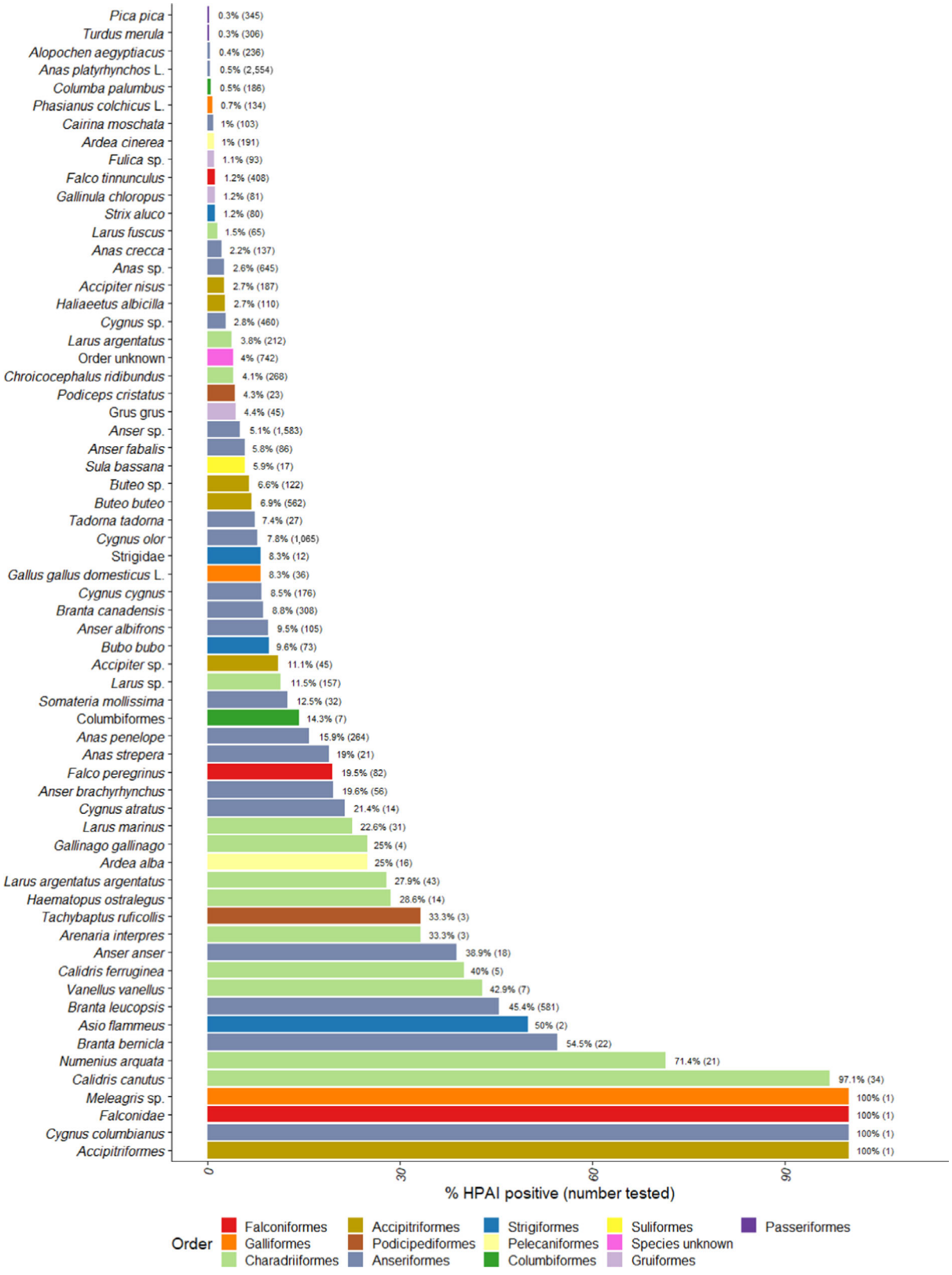


Figure 19: Proportion of HPAI-positive (all types) wild birds detected among birds tested by both passive and active surveillance, for species with at least one HPAI positive sample. The number of wild birds tested is indicated in brackets. Bars are ordered by increasing proportion of positives and colour coded to identify the order to which these species belong to. English common names are provided in Appendix D

3.2.4.2.3. HPAI results by type of surveillance

Table 3 shows the proportion of HPAI-positive birds by type of surveillance. Active surveillance yielded positive results in Germany and Norway only, while passive surveillance yielded positive results in 14 countries. The highest percentages of HPAI positive birds found by passive surveillance were in Denmark (32% of samples), Germany (14%), the Netherlands (12%) and Ireland (12%).

Table 3: Total number of wild birds sampled and positive for HPAI by passive and active surveillance in each RC. Cells with a grey background indicate that no positive birds were detected in that country via the corresponding surveillance activity

Country	Passive surveillance		Active surveillance	
	No. of birds	No. HPAI positive (%)	No. of birds	No. HPAI positive (%)
Austria	183	0 (0%)	0	–
Belgium	275	18 (6.5%)	1,094	0 (0%)
Bulgaria	70	0 (0%)	8	0 (0%)
Croatia	92	0 (0%)	0	–
Cyprus	137	0 (0%)	18	0 (0%)
Czechia	127	0 (0%)	0	–
Denmark*	288	92 (31.9%)	0	–
Estonia	3	0 (0%)	111	0 (0%)
Finland	222	0 (0%)	0	–
France	503	11 (2.2%)	0	–
Germany	3,041	436 (14.3%)	4,391	61 (1.4%)
Greece	6	0 (0%)	0	–
Hungary	472	1 (0.2%)	0	–
Iceland	9	0 (0%)	0	–
Ireland	165	19 (11.5%)	0	–
Italy	2,791	2 (0.1%)	1	0 (0%)
Latvia	4	0 (0%)	0	–
Lithuania	139	0 (0%)	0	–
Luxembourg	135	0 (0%)	0	–
Malta	9	0 (0%)	94	0 (0%)
Netherlands	878	109 (12.4%)	0	–
Norway	128	5 (3.9%)	528	9 (1.7%)
Poland	97	5 (5.2%)	0	–
Portugal	74	0 (0%)	0	–
Romania	107	0 (0%)	44	0 (0%)
Slovakia	83	0 (0%)	0	–
Slovenia	270	6 (2.2%)	0	–
Spain	437	1 (0.2%)	261	0 (0%)
Sweden	410	7 (1.7%)	0	–
Switzerland	55	0 (0%)	0	–
United Kingdom	1,208	96 (7.9%)	0	–

*: Active surveillance data were not reported to EFSA, nonetheless, Denmark confirmed that active surveillance took place in 2020, with two positive HPAI H5 results being reported in ADNS.

3.2.4.2.4. HPAI results in time

Figure 20 presents a timeline of the detection of HPAI in RCs in 2020, for passive and active surveillance separately (blue and red colours, respectively). HPAI was detected from week 42 onwards (mid-October), with the highest proportion of positive birds in weeks 45 and 46. During these two weeks, respectively 24% and 21% of samples (passive and active surveillance combined) tested positive for HPAI virus. As noted above, an increase in the sampling effort was also observed in the last quarter associated to the mass mortality events observed in this epidemic.

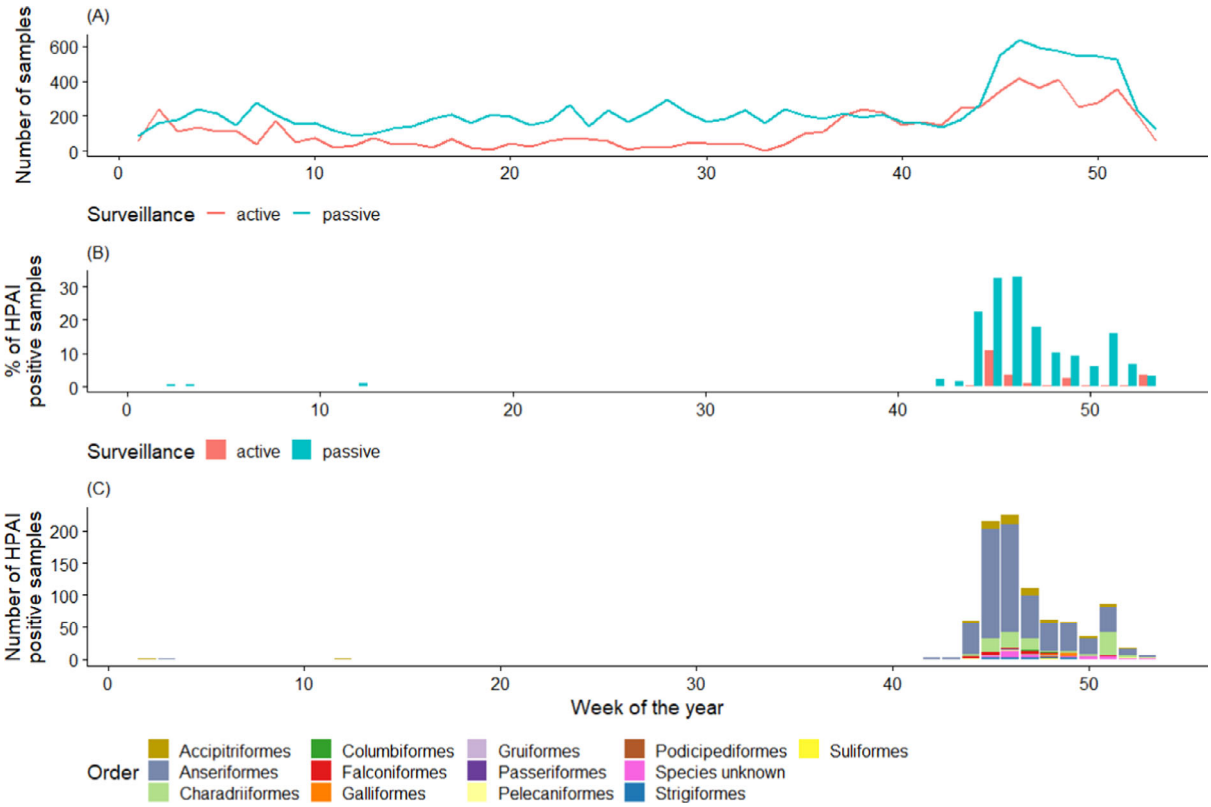


Figure 20: (A) Weekly number of wild birds sampled by both, passive and active surveillance, (B) weekly percentage of HPAI-positive wild birds found and (C) weekly number of HPAI-positive wild birds by taxonomic order

3.2.4.3. Low pathogenic avian influenza in wild birds

Among the 746 birds which tested positive for non-HPAI virus, 101 birds were infected with viruses reported as low pathogenic, while no virus pathogenicity results were available for the remaining 645 birds. Out of the 645 birds for which information on the pathogenicity was not available, there were 277 birds positive for H5 and 1 bird positive for H7. For the remainder of this section, 'LPAI-positive' birds include all positive birds which were not positive for HPAI (n = 746). This is consistent with previous reports.

LPAI-positive birds were reported by 17 RCs. Among these positives, 310 were subtyped as H5 and 3 as H7. The majority of the LPAI viruses detected were reported as non-H5/H7 (n = 334), without further information on the virus subtype provided. Figure 21 summarises all the identified and reported LPAI subtypes.

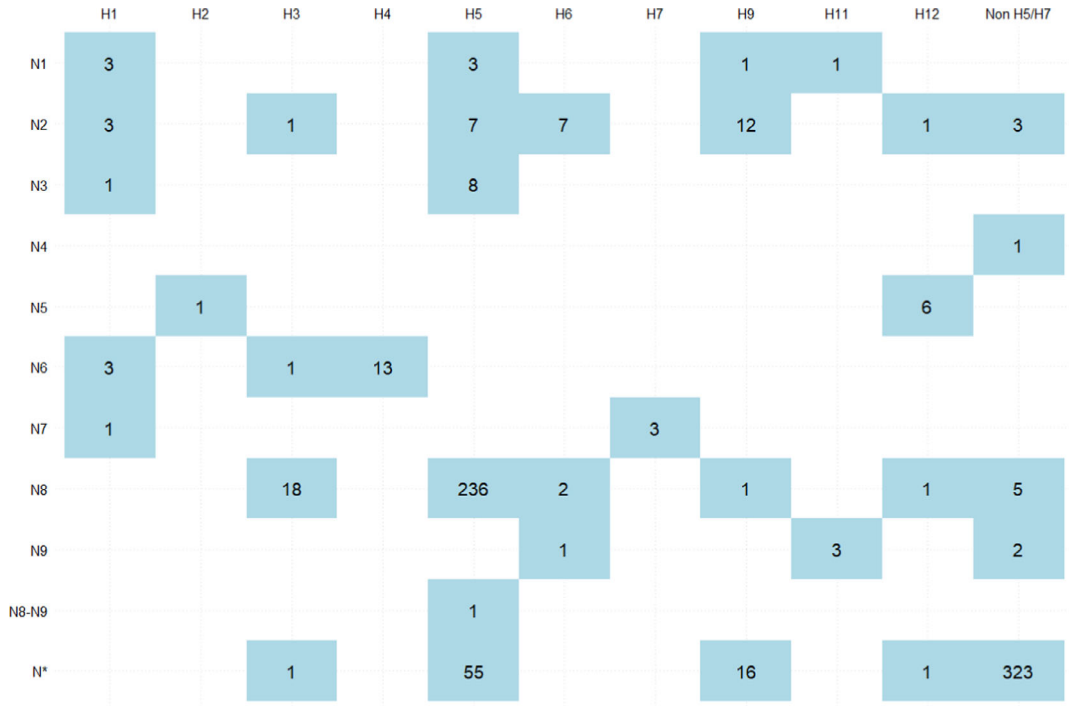


Figure 21: AI virus haemagglutinin (H) and neuraminidase (N) types identified in LPAI-positive wild birds. Note: birds for which positive samples could not all be typed (e.g., one sample was characterised as H5 and another sample from the same bird as H-antigen unknown) are classified under the available H or N type (in this example, H5). There were no birds with more than one H antigen identified

As shown in Figure 22, most LPAI-positive results were found from August onwards (starting week 29) for both types of surveillance. There were very few positive birds between March and July. Most LPAI-positive birds belonged to the order Anseriformes (Figure 22C), which is the order most sampled by both active and passive surveillance.

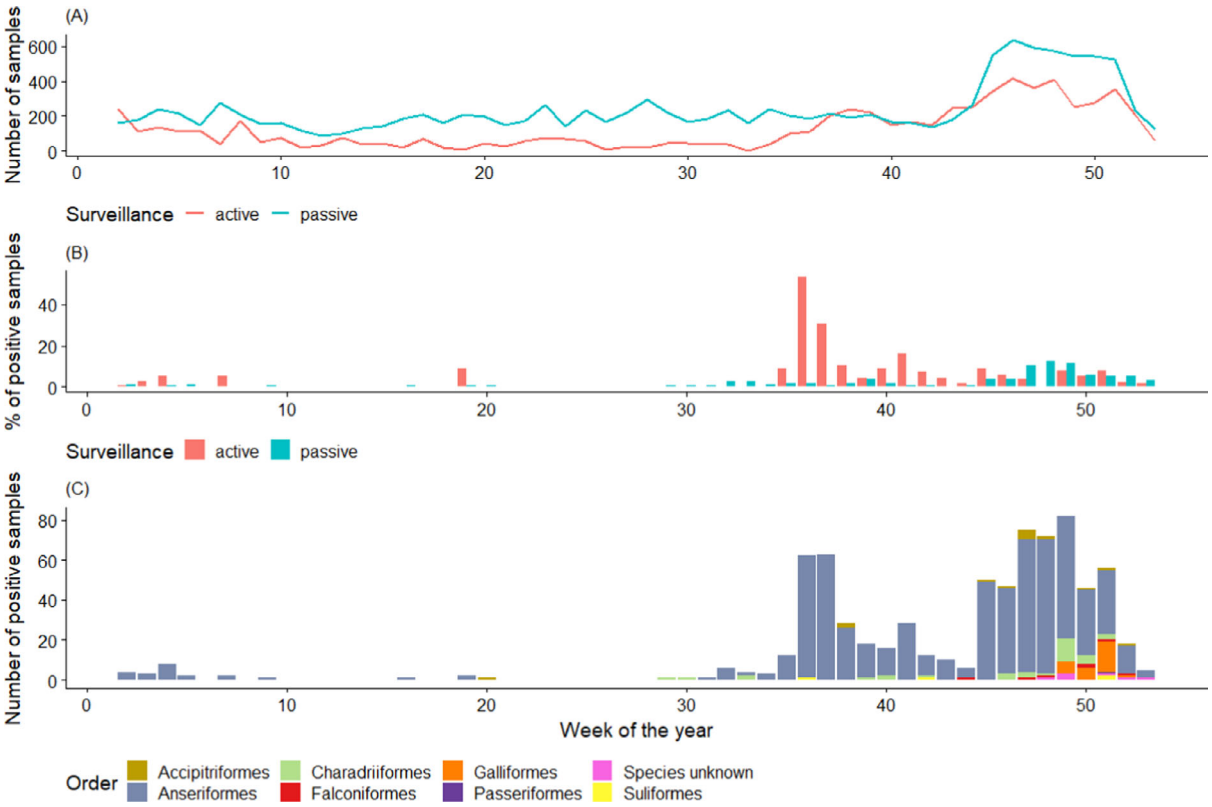


Figure 22: (A) Weekly number of wild birds sampled by both, passive and active surveillance, (B) weekly percentage of LPAI-positive wild birds found and (C) weekly number of LPAI-positive wild birds by taxonomic order

3.3. Abundance and distribution of wild birds in Europe

Voluntary contribution data on abundance and distribution of the wild bird species have been made available to EFSA by the EuroBird Portal (EBP). EBP[10] is one of the three major monitoring projects run by the Euro Bird Census Council (EBCC). This project mobilises year-round observational data submitted by volunteer birdwatchers to the online bird recording portals operating across Europe (c. 50 million bird records from c. 100,000 bird observers annually). Information on the distribution of the 50 species included in the EFSA target list of wild bird species is now submitted to EFSA annually, aggregated at NUTS3 and monthly level. The data come to EFSA with two measures for each NUTS3 and month:

- the total number of birds observed at that specific location during that month, and,
- the number of birds of each of the 50 species included in the target list of species observed at that location during that month.

The total number of birds observed is a function of abundance and observation effort. This value may be used as an indirect measure of the effort that took place in a given location. However, it cannot be directly interpreted as the observation effort, as this would assume that abundance is constant across locations.

Figure F.1 in Appendix F shows the density of birds observed in a specific location (upper map), as well as the density of birds of the 50 target species (lower map), each estimated as the total number of observations in the NUTS3 region divided by the surface of the area (also available in Zenodo[11]). This figure shows that the highest densities of observations of wild birds (all species, i.e. an indirect measure of observation effort) were mostly in Belgium, the Netherlands and some regions of France, Germany, Switzerland and the United Kingdom. The density was lowest in Bulgaria, Croatia, Greece, Hungary, Ireland and Romania. No data were available for Lithuania. In 2020, some data were also

[10] https://eurobirdportal.org/ebp/en/#home/HIRRUS/r52weeks/CUCCAN/r52weeks/
[11] http://doi.org/10.5281/zenodo.5017128

available for Iceland and Slovenia, unlike in 2019. Within countries, the variability between NUTS3 regions was high. During the course of the year, wild bird observations were reported at least once for 1,314 NUTS3 in total in the countries for which EBP data were available. Birds from the EFSA target list were reported in all but 1 of these NUTS3 (Figure F.1, lower map).

Showing these two types of records, observation effort and density for given species, provides an indicator of the reliability of the data presented. For example, if a small number of wild birds of the species included in the list of target species is observed for a certain NUTS3 and month, in an area where the observation effort is high (large number of total observations), our confidence in the reliability of that information would be higher than if the total number of observations was low.

Additional maps are available in Zenodo[12] at the monthly-level: these maps display both the number of birds from target species observed in each NUTS3 (EBP data) and the number of birds from target species sampled by passive surveillance (RC data).

Figures F.2 and F.3 (Appendix F) show the distribution of bird observations according to the EBP data, by bird orders and species for the entire year, for the 50 species included in the EFSA target list (Appendix E). Almost half of the observations reported concerned Anseriformes, followed by Pelecaniformes, Charadriiformes, Accipitriformes and Passeriformes. It was not possible to compare these distributions with the distribution of orders and species sampled for AI surveillance, given that detailed data was only available for the target list species. For instance, Columbiformes ranked 3rd in terms of sampling, but were not reported in the available EBP data.

Last, there were also some discrepancies between the wild birds reported as observed and the dead wild birds collected by the passive surveillance programmes. There were 2,438 records of dead bird samples from EFSA target species for a given species, NUTS3 and month. Among those, 442 were not associated with a corresponding observation in the EBP data. Therefore, it is difficult to use the EBP observation data to assess the quality of the passive surveillance in reporting countries.

4. Discussion and conclusions

It is important to note that risk-based sampling strategies are used for AI surveillance in some RCs, and that these strategies may vary between countries. Therefore, the differences observed between countries in this report in terms of AI incidence, both in poultry and wild birds, should be interpreted with caution and direct comparisons between countries avoided.

A targeted (non-representative) sampling approach helps to increase the efficiency of detection of AIV, but prevents valid assessments of measures of disease, differences between locations, categories or species, or trends over time. Comparisons of seropositivity rates between different time periods, categories, species or locations are valid for the specific observations (surveillance results) only and cannot be extrapolated to the source populations. The seropositivity rates are not only influenced by disease, but also the efficiency of targeting of the risk-based sampling approach. Therefore, increases in rates overtime may be due to changes in the disease situation, but also to improved targeting. As the risk-based surveillance is designed for early detection, it should not be used to measure changes in prevalence or incidence. If such an interpretation is required, representative sampling would need to be undertaken using methodologies that have been standardised between RCs.

4.1. Poultry

An increasing trend in the number of PEs sampled is observed since 2017, after a decrease observed over the previous years. Both the number and the proportion of H5/H7 seropositive establishments were lower than observed in 2019, and similar to those observed in 2018. However, variations in sampling activities among RCs and between years mean that it is difficult to make valid inferences about the detection percentages. In 2020, 46 PEs tested positive for H5 virus and 7 for H7 virus. This suggests a more active circulation of H5 viruses compared to H7 viruses in Europe, consistently with previous years.

The two months with the highest H5/H7 seropositivity rates were June and December 2020. As noted for April 2019, the large number of positive PEs in June 2020 coincided with intensive sampling in waterfowl game bird holdings in Spain. Although this poultry category is sampled throughout the year, a large proportion of the sampling takes place at the end of the hunting season in the spring. On the other hand, the higher seropositivity rate in December did not appear to be associated with a particular category or country.

[12] http://doi.org/10.5281/zenodo.4967481

The serosurveillance results by species from 2020 are consistent with findings from previous years. The highest risk of circulation of LPAI remains in aquatic birds (game birds, geese and ducks), while gallinaceous birds (in particular chickens and turkeys) were at low risk overall. While backyard establishments and conventional laying hens had the largest numbers tested, one seropositive PE only was identified in the former category, and none in the latter. In Commission Delegated Regulation (EU) 2020/689[13], from April 2021 MSs are required to carry out a complementary risk-based surveillance aiming to detect clusters of establishments (in time and geographical proximity) infected with LPAI virus. The poultry categories where this surveillance is recommended include the categories where most of the serological positive results have been found in recent years.

Active surveillance provides useful insights into the circulation of AIVs in poultry establishments, in particular for LPAI and for poultry species or categories who exhibit little or no symptoms when infected. However, the sensitivity of such a surveillance approach remains limited as it does not provide a high coverage in terms of population and time. Therefore, the results obtained from other surveillance approaches should always be considered when interpreting the present results.

According to Commission Decision 2010/367/EU, MSs should follow up PEs with positive serology results by performing PCR testing on the same flock and/or neighbouring flocks.

Follow-up PCR results were not available for 7 of the seropositive PEs at the time of writing of the present report. This value shows a significant improvement from the 2019 surveillance reporting (29 seropositive PEs were not followed by PCR in 2019). Reasons for the lack of follow-up included birds sampled at the slaughterhouse and premises which had been fully investigated in the previous months and tested positive again for the same flock. It is important to note that no investigation identifiers were available at the time of analysis. Therefore, if follow-up testing was conducted on neighbouring flocks rather than on the same flock (i.e. with a different holding identifier), these events could not be linked and the seropositive event would have been classified as not followed up. The data collection allows to report follow-up activities ('sampInfo_origSampId'), and it is recommended that RCs use this feature accordingly.

Finally, it is important to note that no data on the underlying poultry population were available to EFSA. This poultry population data could be submitted to EFSA in an aggregated manner (by poultry category and NUTS3 level) as a once-off exercise, with updates reported when available. Understanding the underlying population of the different poultry categories would improve the interpretation of the AI surveillance results at the European level.

4.2. Wild birds

The number of wild birds tested by passive surveillance in 2020 was substantially higher than in 2019 and 2018. Twenty-two countries, out of 31 RCs, sampled more birds by passive surveillance as during the previous year. Some countries also reported a large number of birds sampled under active surveillance activities (e.g. Belgium, Germany).

While one bird sample had tested positive for HPAI in 2019, a large number of birds tested positive for HPAI in 2020. Out of the 878 HPAI-positive birds, 797 were birds found dead identified by the passive surveillance system. These values continue to support the importance of this surveillance approach for AI surveillance in wild bird species. A large proportion of both the sampling and HPAI positive results occurred in the fourth quarter of 2020. This can be linked with the large epidemic of H5N8 virus which started in October 2020 in EU/EAA countries and the UK. This event has been associated with over 1,000 outbreaks to date, in both domestic poultry and wild birds and is the largest H5N8 HPAI epidemic recorded in the EU since the 2016/2017 epidemic[14] . The outbreaks in Europe appear to be linked with a wider epidemic including Russia, Iraq and Kazakhstan (Lewis et al., 2021; Verhagen et al., 2021). Details about the HPAI cases in poultry, captive birds and wild birds have been reported by EFSA in the quarterly reports describing the AI situation in Europe and outside EU, during the last quarter of 2020[15] and at the beginning of 2021.[16]

The respective proportions of birds sampled by passive surveillance and of HPAI-positive birds belonging to the list of target species recommended by EFSA remain relatively low (35% and 38%, respectively). As this list includes species that are more likely to die if infected with HPAI, reporting countries are encouraged to target these species in their passive surveillance activities when possible.

[13] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2016.084.01.0001.01.ENG
[14] Avian influenza overview October 2016–August 2017. https://doi.org/10.2903/j.efsa.2017.5018
[15] Avian influenza overview August–December 2020. https://doi.org/10.2903/j.efsa.2020.6379
[16] Avian influenza overview December 2020–February 2021. https://doi.org/10.2903/j.efsa.2021.6497

The present results suggest that the list could be adjusted with recent knowledge about the species of interest depending on their likelihood of dying when infected with HPAI.

Summary data provided by the EuroBirdPortal project are presented (Appendix F) to describe the number of wild bird observations reported by voluntary contributors in 2020. These data may provide some context regarding the performance of passive surveillance of AI in wild birds in the EU. However, it is important to note that the density of wild bird observations is the product of two factors:

- the density of wild birds (which depends on species-specific factors such as the location, biotope, time of the year, etc.)
- the probability that a wild bird is observed by someone and reported in a relevant database, given that it is present. This is also known as the 'effort' put into wild bird observations.

As a consequence, areas with low density of observations may correspond to areas where the sensitivity of passive surveillance is low due to a lower 'effort' or to habitats which are simply not favourable to birds (low density of birds) or both. A previous study in Sweden warned that contributor-based data should be used with care, given the limitations of this data collection method (Snäll et al., 2011). Despite the limitations of the voluntary observation data presented in this report, and until further spatial modelling of the distribution of wild birds in Europe by species is readily available, the maps presented in this report (and also those linked to this report and shown in Zenodo), could help to shed light on areas where the birds of the species belonging to the target list may gather, supporting RCs in carrying out more targeted surveillance activities.

5. Methods

5.1. Framework for reporting

Directive 2005/94/EC on Community measures to control avian influenza established in its Article 4 the legal basis for the obligatory conduct of surveillance programmes in poultry and wild bird populations. Both surveillance programmes must be carried out following harmonised guidelines which were laid down in 2010/367/EU.

Surveillance programmes of the MSs are evaluated and approved for co-financing by Commission's procedures that are detailed on the Commission's website: http://ec.europa.eu/dgs/health_food-safety/funding/cff/animal_health/vet_progs_en.htm.

Diagnostic procedures for testing the samples collected within the surveillance programmes are outlined in Diagnostic Manual for avian influenza as set out in Decision 2006/437/EC[17] .

Previous Annual Reports and more information on surveillance for avian influenza in poultry and wild birds can be found at: https://ec.europa.eu/food/animals/animal-diseases/diseases-and-control-measures/avian-influenza_en.

5.2. Survey design

5.2.1. Poultry

The epidemiological unit for reporting surveillance in poultry is the holding, which is defined in Council Directive 2009/158/EC[18] as: 'a facility used for the rearing or keeping of breeding or productive poultry. For the purposes of avian influenza surveillance, this may include facilities that only contain poultry during certain months of the year (i.e. poultry do not need to be present all year round)'. In this report, the word 'holding' was replaced by 'poultry establishment'[19] to be aligned with the Regulation (EU) 2016/429 (Animal Health Law). Detailed guidelines for the design of surveillance based on representative sampling or risk-based surveillance as well as the identification of the target

[17] Commission Decision 2006/437/EC of 4 August 2006 approving a Diagnostic Manual for avian influenza as provided for in Council Directive 2005/94/EC. OJ L 237, 31.8.2006, p. 1–27.

[18] Council Directive 2009/158/EC of 30 November 2009 on animal health conditions governing intra-Community trade in, and imports from third countries of, poultry and hatching eggs. OJ L 343, 22.12.2009, p. 74–113.

[19] According to Regulation (EU) 2016/429 'establishment' means any premises, structure or, in the case of open-air farming, any environment or place, where animals or germinal products are kept, on a temporary or permanent basis, except for: (a) households where pet animals are kept; (b) veterinary practices or clinics. (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'). OJ L 84, 31.3.2016, p. 1–208.

population (poultry species and production categories) and guidelines for calculation of sample size at holding and bird level are described in Annex I of the Commission Decision 2010/367/EU.

5.2.2. Wild birds

The epidemiological unit for surveillance in wild birds is the bird. Procedures for surveillance design are outlined in Annex II of the Commission Decision 2010/367/EU.

5.3. Sampling procedures and laboratory testing

Sampling and laboratory testing procedures for both poultry and wild birds are described in Annex I and II, respectively, of Commission Decision 2010/367/EU. In this Commission Decision, the procedures to carry out epidemiological investigations following positive detections are also outlined.

Following the events of previous years (2014–2017), when HPAI virus with N subtype other than N1 were detected in poultry and wild birds, it was expected, particularly in the case of wild bird samples, that MSs would proceed to identify the specific N subtype, either by using national reference laboratories or submitting the samples to the EU reference laboratory for its identification. The only HPAI subtype identified in wild birds in 2018 and 2019 was H5N6.

The definition of Low Pathogenic Avian Influenza (LPAI) provided by Annex I of Directive 2005/94/CE includes any H5 or H7 AI virus not classified as HPAI and excludes all other subtypes of Influenza A viruses. For the purpose of the present report, and for consistency with the previous report, birds reported positive for subtypes other than H5/H7 and not classified as HPAI are also included as LPAI.

5.4. Data and data processing

Data collation and validation as well as exploratory and statistical analysis were carried out using the statistical software R (R Core Team, 2020).

In some RCs, establishments were sampled several times throughout the year, this was the case for establishments containing one or different poultry categories. For the purpose of this report, each sampling exercise taking place on a specific date, at a specific establishment and targeting a specific poultry category was considered as an independent event and counted as an establishment sampled. As a result, an overestimation of the total number of establishments sampled could occur for some RCs, with this number being higher than the total number of establishments of a specific poultry category in a specific RC. Therefore, the numbers reported in this report as 'poultry establishments (PEs) sampled' should be interpreted as the number of sampling events taking place in a RC for each of the reported categories. Throughout the report, the term 'number of PEs sampled' refers to all PEs sampled, regardless of the type of tests conducted on the samples (serology or virology).

For the wild bird data analysis, data submitted by RCs as the year of sampling' ('sampY'), month of sampling ('sampM') and day of sampling ('sampD') were used as sampling date. As for the 2018 and 2019 reports, the updated EFSA list of target species (EFSA, 2017) was used instead of the target list provided in the Commission Decision 2010/367/EU. Pooled testing takes place in some MSs when more than one wild bird from the same species are collected at the same time and location (as indicated by variable 'sampMethod'). In such cases, the variable 'sampSize' was used to report the number of birds from which samples were pooled. When positive results were obtained from pooled samples (this occurred with pools of up to five birds), all the birds included in the pool were considered positive, given that no further information was available.[20]

Eurostat reference shapefiles were used to create the maps: 'Countries 2016' (version 3/6/2019) and 'NUTS 2016' (version 14/3/2019). These versions were used to match the units reported in the surveillance data for 2020. Maps plotting the geographical distribution of the sampling events and the location of positive results were aggregated at NUTS2 level for both poultry and wild birds in the present report. However, maps at NUTS3 level are also provided as high-quality images in the Zenodo repository for this report,[21] for countries which provided data at NUTS3 level. To summarise sampling activities, the intensity of sampling, calculated as the number of samples taken within a NUTS2 region per 100 km^2, was displayed, given that the total number of poultry establishments present in a given

[20] This assumption very likely resulted in an over-estimation of the bird-level prevalence of LPAI. To address this issue, either samples in positive pools should be re-tested individually, or, if available, more detailed data on pooling strategies and results could be used for statistical estimation of bird-level prevalence using a tool such as EpiTools (https://epitools.ausvet.com.au/pooledprevalence).

[21] http://doi.org/10.5281/zenodo.5017128

region was not available. Samples with geocoordinates which could not be match to a NUTS region from the country reporting the data are not displayed in the maps, but are accounted for by all other figures and tables in the document.

The results presented in this report are based on the data reported by RCs under Commission Decision 2010/367/EU. As a result, data may differ, particularly with regard to HPAI detections in wild birds, from data reported to the Animal Disease Notification System (ADNS), the World Animal Health Information Database (WAHID) or individual national surveillance databases.

5.5. Uncertainty

The assessment of uncertainty was undertaken following the EFSA 'Guidance on Uncertainty Analysis in Scientific Assessments' (EFSA Scientific Committee, 2018a), the EFSA scientific opinion on 'The principles and methods behind EFSA's Guidance on Uncertainty Analysis in Scientific Assessments' (EFSA Scientific Committee, 2018b) and the checklist for applying EFSA's uncertainty guidance in a case-specific assessment. As in this document a summary of the data reported by RCs is made, with no further risk assessment, specific notes of caution were explicitly described for some of the conclusions made in the report.

References

Brouwer A, Huneau A, Kuiken T, Staubach C, Stegeman A, Baldinelli F, Verdonck F and Aznar I, 2018. Reporting Avian Influenza Surveillance. EFSA Journal 2018;16(11):e05493. https://doi.org/10.2903/j.efsa.2018.5493

EFSA (European and Food Safety Authority), 2017. Avian Influenza Overview September 2017. EFSA Journal 2017;15(12):5141. https://doi.org/10.2903/j.efsa.2017.5141

EFSA AHAW Panel (EFSA Panel on Animal Health and Welfare), More S, Bicout D, Bøtner A, Butterworth A, Calistri P, Depner K, Edwards S, Garin-Bastuji B, Good M, Gort Azar Schmidt C, Michel V, Miranda MA, Nielsen SS, Raj M, Sihvonen L, Spoolder H, Thulke H-H, Velarde A, Willeberg P, Winckler C, Breed A, Brouwer A, Guillemain M, Harder T, Monne I, Roberts H, Baldinelli F, Barrucci F, Fabris C, Martino L, Mosbach-Schulz O, Verdonck F, Morgado J and Stegeman JA, 2017. Scientific Opinion on Avian Influenza. EFSA Journal 2017;15(8):4991, 233 pp. https://doi.org/10.2903/j.efsa.2017.4991

EFSA Scientific Committee, 2018a. Guidance on uncertainty analysis in scientific assessments. EFSA Journal 2018;16(1):5123. https://doi.org/10.2903/j.efsa.2018.5123

EFSA Scientific Committee, 2018b. The principles and methods behind EFSA's guidance on uncertainty analysis in scientific assessment. EFSA Journal 2018;16(1):e05122. https://doi.org/10.2903/j.efsa.2018.5122

Lewis NS, Banyard AC, Whittard E, Karibayev T, Al Kafagi T, Chvala I, Byrne A, Meruyert S, King J, Harder T, Grund C, Essen S, Reid SM, Brouwer A, Zinyakov NG, Tegzhanov A, Irza V, Pohlmann A, Beer M, Fouchier RAM, Akhmetzhan (Akievich) S and Brown IH, 2021. Emergence and spread of novel H5N8, H5N5 and H5N1 Clade 2.3.4.4 highly pathogenic avian influenza in 2020. Emerging Microbes & Infections, 10, 148–151. https://doi.org/10.1080/22221751.2021.1872355

R Core Team, 2020. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria.

Snäll T, Kindvall O, Nilsson J and Pärt T, 2011. Evaluating citizen-based presence data for bird monitoring. Biological Conservation, 144, 804–810. https://doi.org/10.1016/j.biocon.2010.11.010

Verhagen JH, Fouchier RAM and Lewis N, 2021. Highly pathogenic avian influenza viruses at the WildDomestic bird interface in Europe: future directions for research and surveillance. Viruses, 13, 212. https://doi.org/10.3390/v13020212

Abbreviations

AI	Avian Influenza
AIV	Avian Influenza A Virus
H	Haemagglutinin
HPAI	High Pathogenic Avian Influenza
LPAI	Low Pathogenic Avian Influenza
MS	Member State
N	Neuraminidase
NUTS	Nomenclature of Territorial Units for Statistics
PE	Poultry Establishment
RC	Reporting Country

Appendix A – Comparison of detailed poultry establishment categories with previous reporting categories

Table A.1: Total number of PEs sampled and testing positive in 2020, according to the 16 poultry categories used in this report and to the detailed reporting categories available to MSs

Reporting category used in this report	Detailed reporting category	Number of sampling events	Number of H5 or H7 positive events
Backyard flocks	Backyard	4,740	51
Breeding chickens	Breeding chickens	2,393	34
	Free-range breeding chickens	4	0
Breeding ducks	Breeding ducks	203	4
	Ducks	18	0
Breeding geese	Breeding geese	151	7
	Geese	1	0
Breeding turkeys	Breeding turkeys	198	3
Broilers (heightened risk)	Broilers	1,234	1
	Free-range broilers	171	0
Fattening ducks	Fattening ducks	858	23
	Free-range fattening ducks	34	1
Fattening geese	Fattening geese	343	9
	Free-range fattening geese	48	1
Fattening turkeys	Fattening turkeys	2,363	9
	Free-range fattening turkeys	25	0
Free-range laying hens	Free-range laying hens	3,487	65
Game birds (gallinaceous)	Farmed game birds (Gallinaceous)	323	5
	Guinea-fowl	17	0
	Partridges	40	0
	Pheasants	184	1
	Quails	37	0
Game birds (waterfowl)	Farmed game birds (Waterfowl)	155	45
	Mallard ducks	25	3
Growers	Chickens	128	0
	Generic poultry	2,021	1
Laying hens	Laying hens	4,404	38
Others	Chickens	189	10
	Ducks	601	1
	Geese	112	1
	Other	34	0
	Parrots	3	0
	Turkeys	110	0
Ratites	Free-range ostriches	11	0
	Ostriches	44	0
	Ratites	59	1

Table A.2: Detailed mapping of the 16 poultry categories used in this report and the detailed reporting categories available to MSs, comprising the species, production method and purpose of raising poultry

Reporting category used in this report	Detailed reporting category	Poultry species	Purpose of raising	Production methods
Backyard flocks	Backyard	Anseriformes (as animal)	Not Available	Backyard farming – growing
		Duck (as animal)	Growers	Backyard farming – growing
		Duck (as animal)	Not Available	Backyard farming – growing
		Duck breeding flock (as animals)	Not Available	Backyard farming – growing
		Duck fattening animal (as animal)	Not Available	Backyard farming – growing
		Gallus gallus (chicken) (as animal)	Growers	Backyard farming – growing
		Gallus gallus (chicken) (as animal)	Not Available	Backyard farming – growing
		Gallus gallus breeding flock (as animals)	Not Available	Backyard farming – growing
		Gallus gallus broiler (as animal)	Not Available	Backyard farming – growing
		Gallus gallus laying hens (as animal)	Not Available	Backyard farming – growing
		Generic poultry (as animal)	Growers	Backyard farming – growing
		Generic poultry (as animal)	Not Available	Backyard farming – growing
		Goose (as animal)	Not Available	Backyard farming – growing
		Goose breeding flock (as animals)	Not Available	Backyard farming – growing
		Goose fattening animal (as animal)	Not Available	Backyard farming – growing
		Guinea-fowl (as animal)	Not Available	Backyard farming – growing
		Turkey (as animal)	Not Available	Backyard farming – growing
		Turkey breeding flock (as animals)	Not Available	Backyard farming – growing
		Turkey fattening animal (as animal)	Not Available	Backyard farming – growing
Breeding chickens	Breeding chickens	Gallus gallus breeding flock (as animals)	Breeding purpose	Not Available
		Gallus gallus breeding flock (as animals)	Not Available	Not Available
	Free-range breeding chickens	Gallus gallus breeding flock (as animals)	Not Available	Outdoor/free-range growing condition
Breeding ducks	Breeding ducks	Duck breeding flock (as animals)	Breeding purpose	Not Available
		Duck breeding flock (as animals)	Game purpose	Not Available
		Duck breeding flock (as animals)	Not Available	Not Available
	Ducks	Duck (as animal)	Breeding purpose	Not Available
		Duck laying hens (as animal)	Breeding purpose	Not Available

Reporting category used in this report	Detailed reporting category	Poultry species	Purpose of raising	Production methods
Breeding geese	Breeding geese	Goose breeding flock (as animals)	Breeding purpose	Not Available
		Goose breeding flock (as animals)	Not Available	Not Available
	Free-range breeding geese	Goose breeding flock (as animals)	Not Available	Outdoor/free-range growing condition
	Geese	Goose laying hens (as animal)	Breeding purpose	Not Available
Breeding turkeys	Breeding turkeys	Turkey breeding flock (as animals)	Breeding purpose	Not Available
		Turkey breeding flock (as animals)	Not Available	Not Available
Broilers (heightened risk)	Broilers	Gallus gallus broiler (as animal)	Breeding purpose	Not Available
		Gallus gallus broiler (as animal)	Meat production purpose	Not Available
		Gallus gallus broiler (as animal)	Not Available	Not Available
	Free-range broilers	Gallus gallus broiler (as animal)	Not Available	Outdoor/free-range growing condition
Fattening ducks	Fattening ducks	Duck fattening animal (as animal)	Breeding purpose	Not Available
		Duck fattening animal (as animal)	Game purpose	Not Available
		Duck fattening animal (as animal)	Meat production purpose	Not Available
		Duck fattening animal (as animal)	Not Available	Not Available
	Free-range fattening ducks	Duck fattening animal (as animal)	Not Available	Outdoor/free-range growing condition
Fattening geese	Fattening geese	Goose fattening animal (as animal)	Meat production purpose	Not Available
		Goose fattening animal (as animal)	Not Available	Not Available
	Free-range fattening geese	Goose fattening animal (as animal)	Not Available	Outdoor/free-range growing condition
Fattening turkeys	Fattening turkeys	Turkey fattening animal (as animal)	Breeding purpose	Not Available
		Turkey fattening animal (as animal)	Meat production purpose	Not Available
		Turkey fattening animal (as animal)	Not Available	Not Available
	Free-range fattening turkeys	Turkey fattening animal (as animal)	Not Available	Outdoor/free-range growing condition
Free-range laying hens	Free-range laying hens	Gallus gallus laying hens (as animal)	Not Available	Outdoor/free-range growing condition

Reporting category used in this report	Detailed reporting category	Poultry species	Purpose of raising	Production methods
Game birds (gallinaceous)	Farmed game birds (Gallinaceous)	Galliformes (as animal)	Game purpose	Not Available
		Galliformes (as animal)	Not Available	Not Available
		Peafowl (as animal)	Not Available	Not Available
	Free-range partridges	Partridge (as animal)	Game purpose	Outdoor/free-range growing condition
	Free-range pheasants	Pheasant (as animal)	Game purpose	Outdoor/free-range growing condition
	Guinea-fowl	Guinea-fowl (as animal)	Not Available	Not Available
	Other	Game or wild bird (as animal)	Game purpose	Not Available
	Partridges	Partridge (as animal)	Breeding purpose	Not Available
		Partridge (as animal)	Not Available	Not Available
		Partridge breeding flock (as animals)	Game purpose	Not Available
		Partridge breeding flock (as animals)	Not Available	Not Available
	Pheasants	Pheasant (as animal)	Breeding purpose	Not Available
		Pheasant (as animal)	Game purpose	Not Available
		Pheasant (as animal)	Not Available	Not Available
		Pheasant breeding flock (as animals)	Breeding purpose	Not Available
		Pheasant breeding flock (as animals)	Game purpose	Not Available
		Pheasant breeding flock (as animals)	Not Available	Not Available
		Pheasant laying hens (as animal)	Not Available	Not Available
	Quails	Common Quail (as animal)	Not Available	Not Available
		Grey Partridge (as animal)	Not Available	Not Available
		Quail (as animal)	Not Available	Not Available
		Quail breeding flock (as animals)	Breeding purpose	Not Available
		Quail fattening animal (as animal)	Not Available	Not Available
		Quail laying hens (as animal)	Not Available	Not Available
	Turkeys	Turkey (as animal)	Game purpose	Not Available
Game birds (waterfowl)	Ducks	Duck (as animal)	Game purpose	Not Available
	Farmed game birds (Waterfowl)	Anas (as animal)	Not Available	Not Available
		Anseriformes (as animal)	Game purpose	Not Available
		Anseriformes (as animal)	Not Available	Not Available
		Anseriformes (as animal)	Not Available	Outdoor/free-range growing condition
		Common Goldeneye (as animal)	Not Available	Not Available
		Velvet Scoter (as animal)	Not Available	Not Available
		Wood Duck (as animal)	Not Available	Not Available
	Free-range mallard ducks	Mallard (as animal)	Game purpose	Outdoor/free-range growing condition
	Mallard ducks	Mallard (as animal)	Game purpose	Not Available
		Mallard (as animal)	Not Available	Not Available

Reporting category used in this report	Detailed reporting category	Poultry species	Purpose of raising	Production methods
Growers	Chickens	Gallus gallus (chicken) (as animal)	Growers	Not Available
	Generic poultry	Generic poultry (as animal)	Growers	Not Available
	Turkeys	Turkey (as animal)	Growers	Not Available
Laying hens	Laying hens	Gallus gallus laying hens (as animal)	Breeding purpose	Not Available
		Gallus gallus laying hens (as animal)	Not Available	Not Available
Others	Chickens	Gallus gallus (chicken) (as animal)	Not Available	Not Available
	Ducks	Duck (as animal)	Meat production purpose	Not Available
		Duck (as animal)	Not Available	Not Available
		Duck laying hens (as animal)	Not Available	Not Available
	Free-range chickens	Gallus gallus (chicken) (as animal)	Not Available	Outdoor/free-range growing condition
	Free-range ducks	Duck (as animal)	Not Available	Outdoor/free-range growing condition
	Geese	Goose (as animal)	Not Available	Not Available
		Goose laying hens (as animal)	Not Available	Not Available
	Other	Cattle Egret (as animal)	Not Available	Not Available
		Common Cuckoo (as animal)	Not Available	Not Available
		Eurasian Spoonbill (as animal)	Not Available	Not Available
		Falco (as animal)	Not Available	Not Available
		Greater Flamingo (as animal)	Not Available	Not Available
		Pigeon (as animal)	Not Available	Backyard farming – growing
		Pigeon (as animal)	Not Available	Not Available
		Saker Falcon (as animal)	Not Available	Not Available
	Parrots	Parrots (as animal)	Not Available	Not Available
		Psittaciformes (as animal)	Not Available	Backyard farming – growing
		Psittaciformes (as animal)	Not Available	Not Available
	Pigeon breeding flock	Pigeon breeding flock (as animals)	Not Available	Not Available
	Turkeys	Turkey (as animal)	Not Available	Not Available
Ratites	Free-range ostriches	Ostrich (as animal)	Not Available	Outdoor/free-range growing condition
	Free-range ratites	Ratite (as animal)	Not Available	Outdoor/free-range growing condition
	Ostriches	Ostrich (as animal)	Game purpose	Not Available
		Ostrich (as animal)	Not Available	Not Available
		Ostrich breeding flock (as animals)	Not Available	Not Available
		Ostrich fattening animal (as animal)	Not Available	Not Available
	Other	Emu (as animal)	Not Available	Not Available
	Ratites	Ratite (as animal)	Not Available	Not Available

Appendix B – Serological results by poultry species

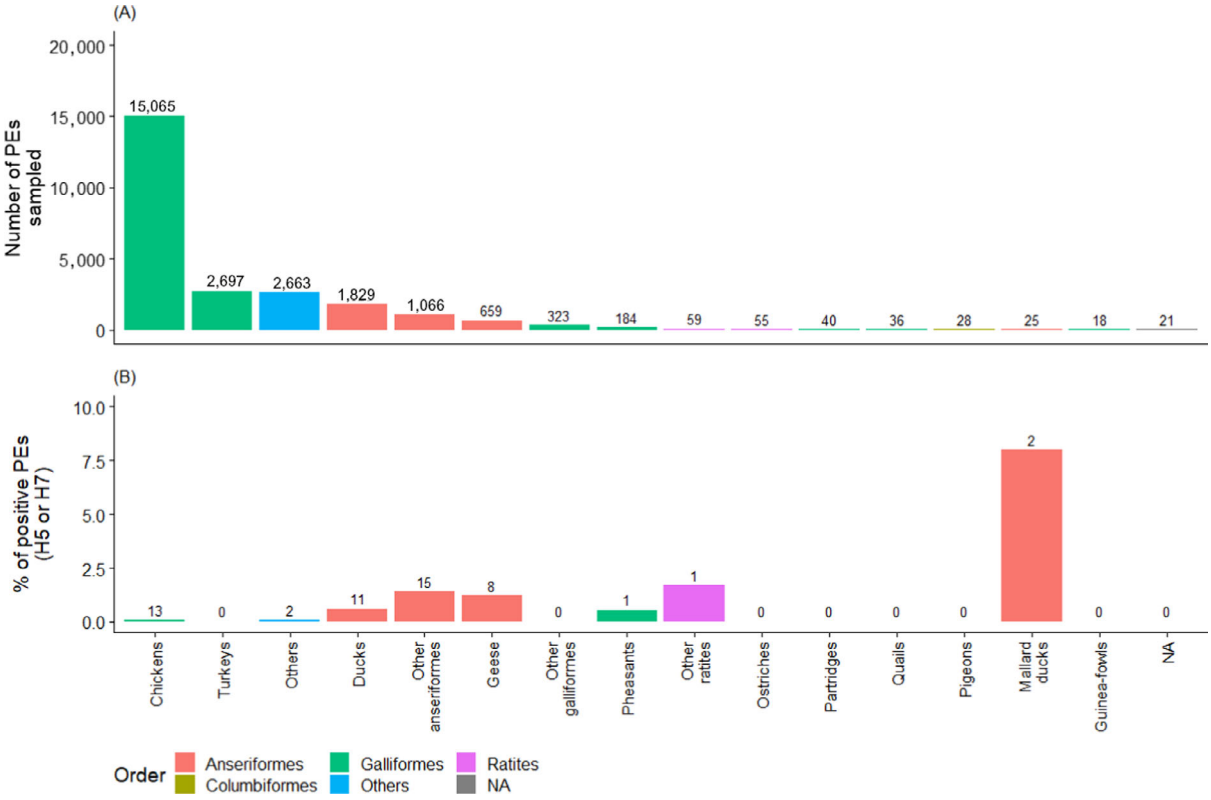


Figure B.1: (A) Number of PEs sampled by poultry species; (B) Proportion of PE sampled that tested positive for H5 or H7 AI virus in serology. The numbers above the bars indicate the number of seropositive PEs. Bars are colour coded to identify the order to which these species belong to. The species name was not reported for some PEs, which were only identified at the bird order level. Ostriches, emus and other ratites were classified under the term 'ratites' which is not an order, given that species names were not always available

Appendix C – Total number of wild birds of the different orders sampled by passive and active surveillance

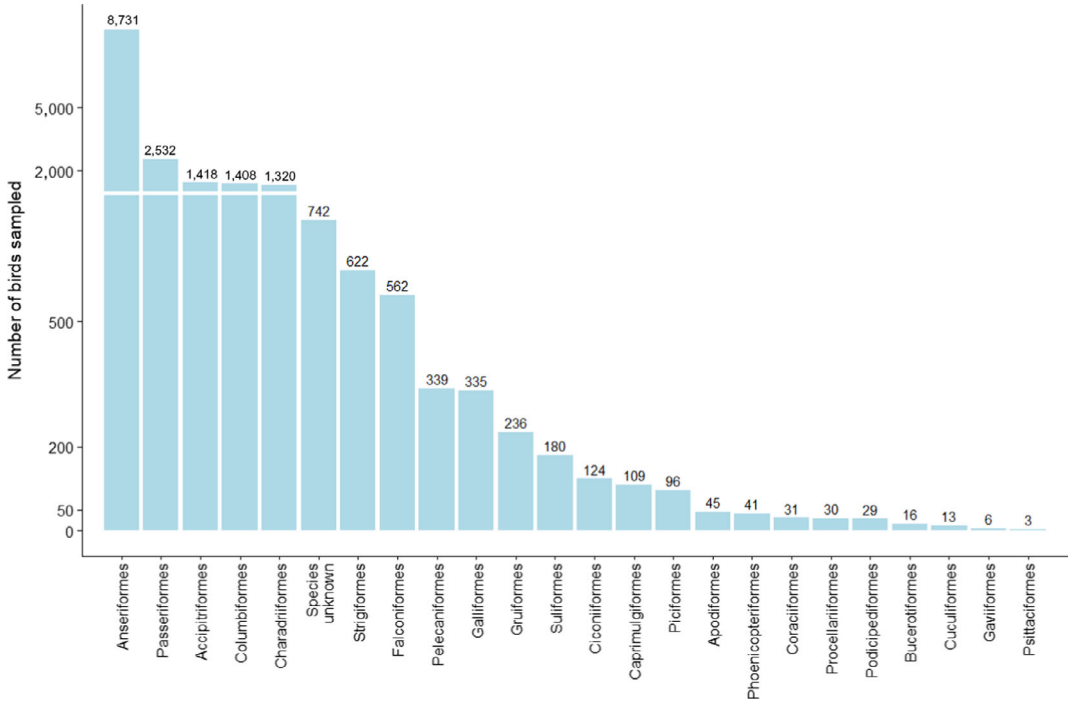


Figure C.1: Total number of wild birds of the different orders sampled by passive and active surveillance by RCs in 2020. The group 'Species unknown' includes all birds for which data on species and order were not available. The Y-axis is presented on a non-linear scale to improve visibility

Appendix D – Scientific and common names of wild bird species

Table D.1: English common names and scientific names of wild bird species sampled in 2020

Latin name	English common name
Accipiter gentilis	Northern Goshawk
Accipiter nisus	Sparrowhawk
Aegolius funereus	Boreal Owl
Aegypius monachus	Cinereous Vulture
Aix galericulata	Mandarin Duck
Aix sponsa	Wood Duck
Alauda arvensis	Eurasian skylark
Alca torda	Razorbill
Alcedo atthis	Common Kingfisher
Alectoris chukar	Chukar partridge
Alectoris rufa	Red legged partridge
Alle alle	Little Auk
Alopochen aegyptiacus	Egyptian Goose
Anas acuta	Northern Pintail
Anas clypeata	Shoveler
Anas crecca	Common Teal
Anas penelope	Eurasian Wigeon
Anas platyrhynchos L.	Mallard
Anas strepera	Gadwall
Anser albifrons	Greater White-fronted Goose
Anser anser	Greylag goose
Anser brachyrhynchus	Pink-footed Goose
Anser cygnoides	Swan Goose
Anser fabalis	Taiga Bean Goose
Anthus trivialis	Tree Pipit
Apus apus	Common swift
Apus melba	Alpine swift
Apus pallidus	Pallid swift
Aquila adalberti	Spanish Imperial Eagle
Aquila chrysaetos	Golden Eagle
Ardea alba	Great White Egret
Ardea cinerea	Grey Heron
Ardea purpurea	Purple Heron
Ardeola ralloides	Squacco Heron
Arenaria interpres	Ruddy Turnstone
Asio flammeus	Short-Eared Owl
Asio otus	Long-Eared Owl
Athene noctua	Little Owl
Aythya ferina	Common Pochard
Aythya fuligula	Tufted Duck
Aythya marila	Greater scaup
Aythya nyroca	Ferruginous Duck
Bombycilla garrulus	Bohemian Waxwing
Branta bernicla	Brant Goose
Branta canadensis	Canada goose
Branta leucopsis	Barnacle Goose
Branta ruficollis	Red-Breasted Goose

Latin name	English common name
Bubo bubo	Eurasian Eagle-Owl
Bubo scandiacus	Snowy Owl
Bubulcus ibis	Cattle Egret
Bucephala clangula	Common Goldeneye
Burhinus oedicnemus	Eurasian Stone-curlew
Buteo buteo	Common Buzzard
Buteo lagopus	Rough-legged Hawk
Buteo rufinus	Long-legged Buzzard
Cairina moschata	Muscovy duck
Calidris alba	Sanderling
Calidris alpina	Dunlin
Calidris canutus	Red Knot
Calidris ferruginea	Curlew Sandpiper
Calidris minuta	Little Stint
Calonectris diomedea	Scopoli's Shearwater
Caprimulgus europaeus	European Nightjar
Carduelis carduelis	European goldfinch
Carduelis flammea	Common redpoll
Carduelis spinus	Eurasian Siskin
Cepphus grylle	Black Guillemot
Certhia familiaris	Eurasian Treecreeper
Charadrius alexandrinus	Kentish Plover
Charadrius hiaticula	Common ringed plover
Chloris chloris	European greenfinch
Chroicocephalus ridibundus	Black-headed Gull
Ciconia ciconia	White Stork
Ciconia nigra	Black Stork
Circaetus gallicus	Short-toed Snake Eagle
Circus aeruginosus	Western Marsh Harrier
Circus cyaneus	Hen harrier
Circus pygargus	Montagu's Harrier
Clamator glandarius	Great Spotted Cuckoo
Coccothraustes coccothraustes	Hawfinch
Columba livia	Pigeon
Columba oenas	Stock dove
Columba palumbus	Common woodpigeon
Corvus corax	Common Raven
Corvus corone	Carrion Crow
Corvus corone cornix	Hooded crow
Corvus corone corone	Carrion Crow
Corvus frugilegus	Rook
Corvus monedula	Jackdaw
Coturnix coturnix	Common Quail
Coturnix japonica	Japanese Quail
Crex crex	Corn Crake
Cuculus canorus	Common Cuckoo
Cyanopica cyanus	Azure-winged Magpie
Cygnus atratus	Black Swan
Cygnus bewickii	Bewick's Swan
Cygnus columbianus	Tundra Swan

Latin name	English common name
Cygnus cygnus	Whooper swans
Cygnus olor	Mute swan
Delichon urbica	House Martin
Dendrocopos major	Great spotted woodpecker
Dendrocopos syriacus	Syrian Woodpecker
Dryocopus martius	Black Woodpecker
Egretta garzetta	Little Egret
Emberiza citrinella	Yellowhammer
Erithacus rubecula	European robin
Estrilda astrild	Common Waxbill
Falco cherrug	Saker Falcon
Falco columbarius	Merlin
Falco naumanni	Lesser Kestrel
Falco peregrinus	Peregrine Falcon
Falco rusticolus	Gyrfalcon
Falco subbuteo	Eurasian Hobby
Falco tinnunculus	Common Kestrel
Falco vespertinus	Red-Footed Falcon
Ficedula albicollis	Collared Flycatcher
Ficedula hypoleuca	European Pied Flycatcher
Fringilla coelebs	Chaffinch
Fringilla montifringilla	Brambling
Fulica cristata	Red-Knobbed Coot
Gallinago gallinago	Common snipe
Gallinula chloropus	Moorhen
Garrulus glandarius	Eurasian Jay
Gavia arctica	Black-throated loon
Gavia immer	Common Loon
Gavia stellata	Red-Throated Loon
Geronticus eremita	Northern Bald Ibis
Glaucidium passerinum	Eurasian Pygmy Owl
Grus grus	European crane
Grus virgo	Demoiselle Crane
Gypaetus barbatus	Bearded Vulture
Gyps fulvus	Griffon Vulture
Haematopus ostralegus	Eurasian Oystercatcher
Haliaeetus albicilla	White-tailed eagle
Hieraaetus fasciatus	Bonelli's Eagle
Hieraaetus pennatus	Booted Eagle
Himantopus himantopus	Black-winged Stilt
Hippolais icterina	Icterine Warbler
Hirundo rustica	Barn swallow
Ixobrychus minutus	Little Bittern
Lanius collurio	Red-backed Shrike
Lanius excubitor	Great Grey Shrike
Lanius minor	Lesser Grey Shrike
Larus argentatus	European Herring Gull
Larus argentatus argentatus	European Herring Gull
Larus argentatus cachinnans	Caspian gull
Larus argentatus michahellis	Yellow-legged Gull

Latin name	English common name
Larus canus	Mew Gull
Larus fuscus	Lesser black backed gull
Larus marinus	Great Black-backed Gull
Larus melanocephalus	Mediterranean gull
Limosa lapponica	Bar-tailed Godwit
Limosa limosa	Black-tailed godwit
Linaria cannabina	Common Linnet
Loxia curvirostra	Red Crossbill
Luscinia megarhynchos	Common Nightingale
Lymnocryptes minimus	Jack Snipe
Marmaronetta angustirostris	Marbled Duck
Melanitta fusca	Velvet Scoter
Melanitta nigra	Common Scoter
Mergus albellus	Smew
Mergus merganser	Common Merganser
Mergus serrator	Red breasted merganser
Merops apiaster	European Bee-eater
Microcarbo niger	Little Cormorant
Milvus migrans	Black Kite
Milvus milvus	Red kite
Monticola saxatilis	Rufous-Tailed Rock Thrush
Morus capensis	Cape Gannet
Motacilla alba	White Wagtail
Motacilla cinerea	Grey Wagtail
Muscicapa striata	Spotted Flycatcher
Myiopsitta monachus	Monk Parakeet
Netta rufina	Red-crested Pochard
Numenius arquata	Eurasian Curlew
Nycticorax nycticorax	Night heron
Oenanthe oenanthe	Northern Wheatear
Oriolus oriolus	Eurasian Golden Oriole
Otus scops	Eurasian Scops Owl
Oxyura jamaicensis	Ruddy Duck
Oxyura leucocephala	White-headed Duck
Pandion haliaetus	Osprey
Parus ater	Coal tit
Parus caeruleus	Blue tit
Parus major	Great tit
Passer domesticus	House sparrow
Passer montanus	Eurasian tree sparrow
Pelecanus crispus	Dalmatian Pelican
Pelecanus onocrotalus	Great white pelican
Perdix perdix	Grey Partridge
Pernis apivorus	European Honey-buzzard
Phalacrocorax aristotelis	European Shag
Phalacrocorax carbo	Great Cormorant
Phasianus colchicus L.	Pheasant
Phoenicopterus roseus	Greater Flamingo
Phoenicopterus ruber	American Flamingo
Phoenicurus ochruros	Black Redstart

Latin name	English common name
Phoenicurus phoenicurus	Common Redstart
Phylloscopus collybita	Common Chiffchaff
Phylloscopus sibilatrix	Wood Warbler
Phylloscopus trochilus	Willow Warbler
Pica pica	Eurasian Magpie
Picus viridis	European Green Woodpecker
Platalea leucorodia	Eurasian Spoonbill
Plegadis falcinellus	Glossy Ibis
Pluvialis squatarola	Grey Plover
Podiceps auritus	Horned Grebe
Podiceps cristatus	Great crested grebe
Poecile palustris	Marsh Tit
Porzana parva	Little Crake
Porzana porzana	Spotted Crake
Prunella modularis	Dunnock
Psittacula krameri	Rose-Ringed Parakeet
Puffinus puffinus	Manx Shearwater
Pyrrhula pyrrhula	Eurasian Bullfinch
Rallus aquaticus	Water rail
Recurvirostra avosetta	Pied Avocet
Regulus ignicapillus	Firecrest
Regulus regulus	Goldcrest
Riparia riparia	Sand Martin
Rissa tridactyla	Black-legged Kittiwake
Scolopax rusticola	Eurasian woodcock
Serinus serinus	European Serin
Sitta europaea	Eurasian Nuthatch
Somateria mollissima	Common Eider
Stercorarius parasiticus	Parasitic Jaeger
Stercorarius skua	Great Skua
Sterna hirundo	Common tern
Sterna paradisaea	Arctic Tern
Streptopelia decaocto	Collared Dove
Streptopelia turtur	European turtle dove
Strix aluco	Tawny Owl
Strix nebulosa	Great Grey Owl
Strix uralensis	Ural Owl
Sturnus unicolor	Spotless Starling
Sturnus vulgaris L.	Starling
Sula bassana	Northern Gannet
Surnia ulula	Northern Hawk-Owl
Sylvia atricapilla	Eurasian Blackcap
Sylvia borin	Garden Warbler
Tachybaptus ruficollis	Little grebe
Tadorna ferruginea	Ruddy Shelduck
Tadorna tadorna	Common Shelduck
Tetrao tetrix	Black Grouse
Tetrao urogallus	Western Capercaillie
Tetrastes bonasia	Hazel grouse
Tringa erythropus	Spotted Redshank

Latin name	English common name
Tringa glareola	Wood Sandpiper
Tringa totanus	Common redshank
Troglodytes troglodytes	Eurasian wren
Turdus iliacus	Redwing
Turdus merula	Common blackbird
Turdus philomelos	Song Thrush
Turdus pilaris	Fieldfare
Tyto alba	Barn Owl
Upupa epops	Eurasian Hoopoe
Uria aalge	Common murre
Vanellus vanellus	Northern Lapwing

Appendix E – EFSA list of target wild bird species for avian influenza surveillance

Table E.1: List of target wild bird species published in December 2017 as part of the EFSA-ECDC-EURL scientific report (species not sampled in 2020 are highlighted in grey)

Family	Subfamily, tribe or genus	Species
Coots, crakes and rails (Rallidae)		Western swamphen (Porphyrio porphyrio)
Cormorants and shags (Phalacrocoracidae)		Great cormorant (Phalacrocorax carbo)
Corvids (Corvidae)		Eurasian magpie (Pica pica)
Ducks, geese and swans (Anatidae)	Dabbling ducks (Anatinae)	Eurasian teal (Anas crecca)
		Eurasian wigeon (Anas penelope)
		Gadwall (Anas strepera)
		Mallard (Anas platyrhynchos)
		Northern pintail (Anas acuta)
	Diving ducks (Aythyini)	Common pochard (Aythya ferina)
		Greater scaup (Aythya marila)
		Red-crested pochard (Netta rufina)
		Tufted duck (Aythya fuligula)
	Sea ducks (Mergini)	Common eider (Somateria mollissima)
		Common goldeneye (Bucephala clangula)
		Goosander (Mergus merganser)
		Smew (Mergus albellus)
	Shelducks and sheldgeese (Tadorninae)	Common shelduck (Tadorna tadorna)
	Shelducks and sheldgeese (Tadorninae)	Egyptian goose (Alopochen aegyptiacus)
	Swans (Cygnus)	Black swan (Cygnus atratus)
		Mute swan (Cygnus olor)
		Whooper swan (Cygnus cygnus)
	True geese (Anser, Branta, Chen)	Brant goose (Branta bernicla)
		Canada goose (Branta canadensis)
		Greater white-fronted goose (Anser albifrons)
		Greylag goose (Anser anser)
		Lesser white-fronted goose (Anser erythropus)
		Pink-footed goose (Anser brachyrhynchus)
		Taiga bean Goose (Anser fabalis)
Grebes (Podicipedidae)		Black-necked grebe (Podiceps nigricollis)
		Great crested grebe (Podiceps cristatus)
		Little grebe (Tachybaptus ruficollis)
Gulls, terns and allies (Laridae)		Black-headed gull (Chroicocephalus ridibundus)
		European herring gull (Larus argentatus)
		Great black-backed gull (Larus marinus)
		Mew gull (Larus canus)
Herons (Ardeidae)		Eurasian bittern (Botaurus stellaris)
		Great white egret (Egretta alba)
		Grey heron (Ardea cinerea)
		Little egret (Egretta garzetta)
Pelicans (Pelecanidae)		Dalmatian pelican (Pelecanus crispus)
		Great white pelican (Pelecanus onocrotalus)

Family	Subfamily, tribe or genus	Species
Raptors (Accipitridae, Falconidae, Strigidae)		Common buzzard (Buteo buteo)
		Eurasian eagle-owl (Bubo bubo)
		Northern goshawk (Accipiter gentilis)
		Peregrine falcon (Falco peregrinus)
		Rough-legged buzzard (Buteo lagopus)
		White-tailed eagle (Haliaeetus albicilla)
Sandpipers (Scolopacidae)		Green sandpiper (Tringa ochropus)
Storks (Ciconiidae)		White stork (Ciconia ciconia)
Thrushes (Turdidae)		Fieldfare (Turdus pilaris)

Appendix F – Wild bird observations by voluntary contributors

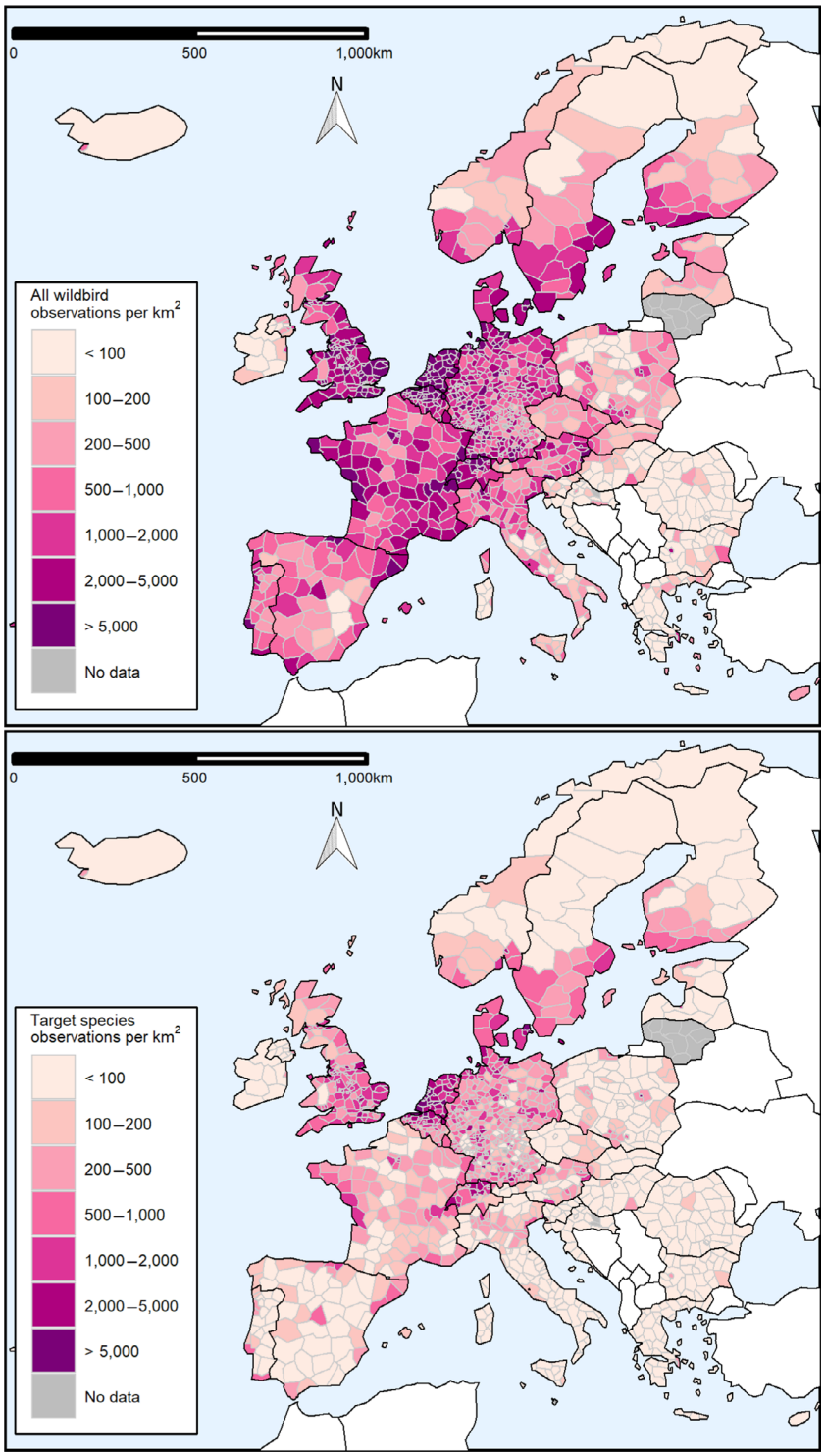


Figure F.1: Density of wild bird observations for 2020 by NUTS3 region, as per data provided by the EuroBirdPortal project. The density of observations was estimated as the total number of observations in the NUTS3 region divided by the surface of the area. The upper map shows all bird species, while the lower map is restricted to species from the EFSA target list

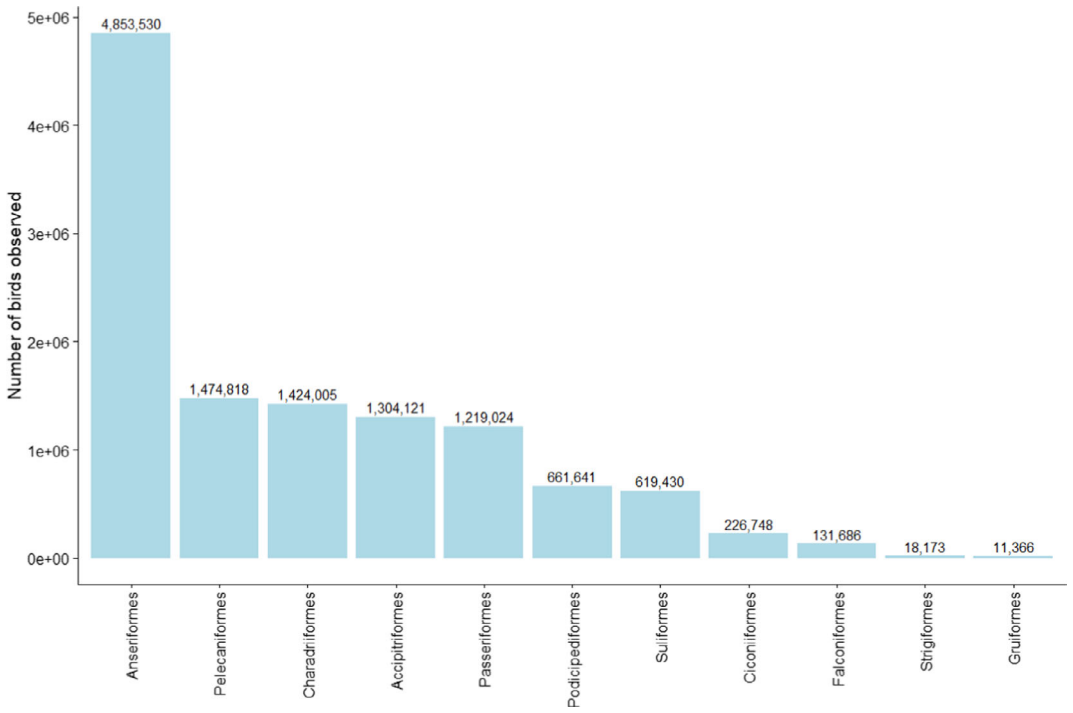


Figure F.2: Number of wild birds from the EFSA list of target wild bird species (N = 50) observed in 2020 and recorded in the EuroBirdPortal project, aggregated by bird order

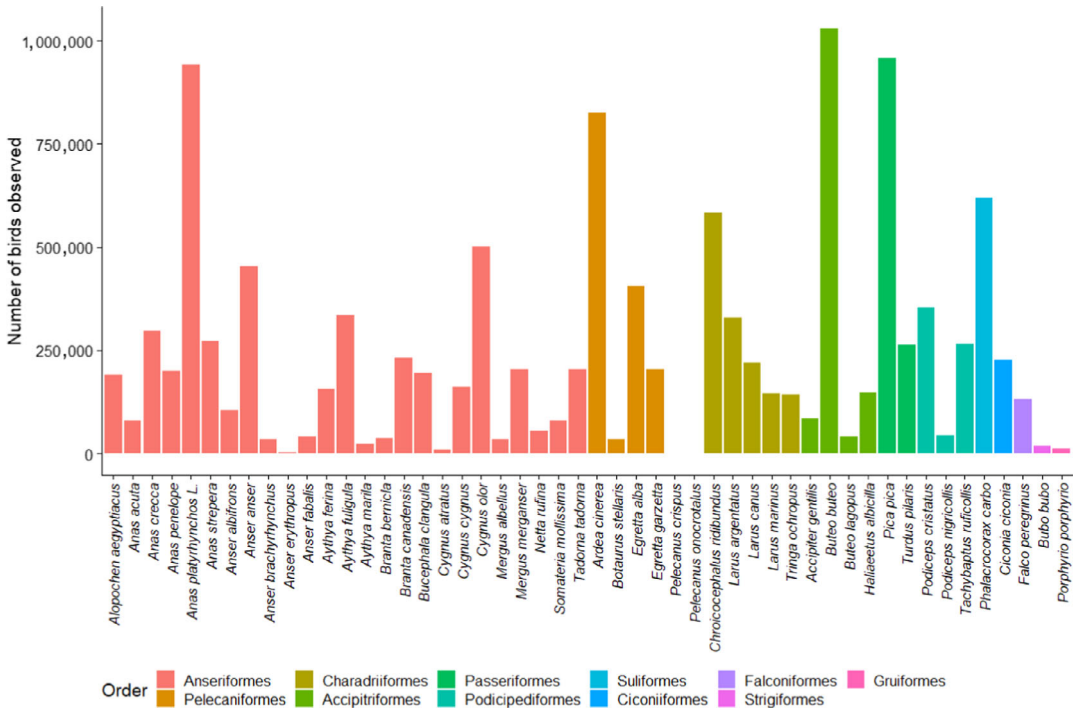


Figure F.3: Number of wild birds from the EFSA list of target wild bird species (N = 50) observed in 2020 and recorded in the EuroBirdPortal project, aggregated by bird species

Appendix G – Wild bird species detected with HPAI virus in passive surveillance

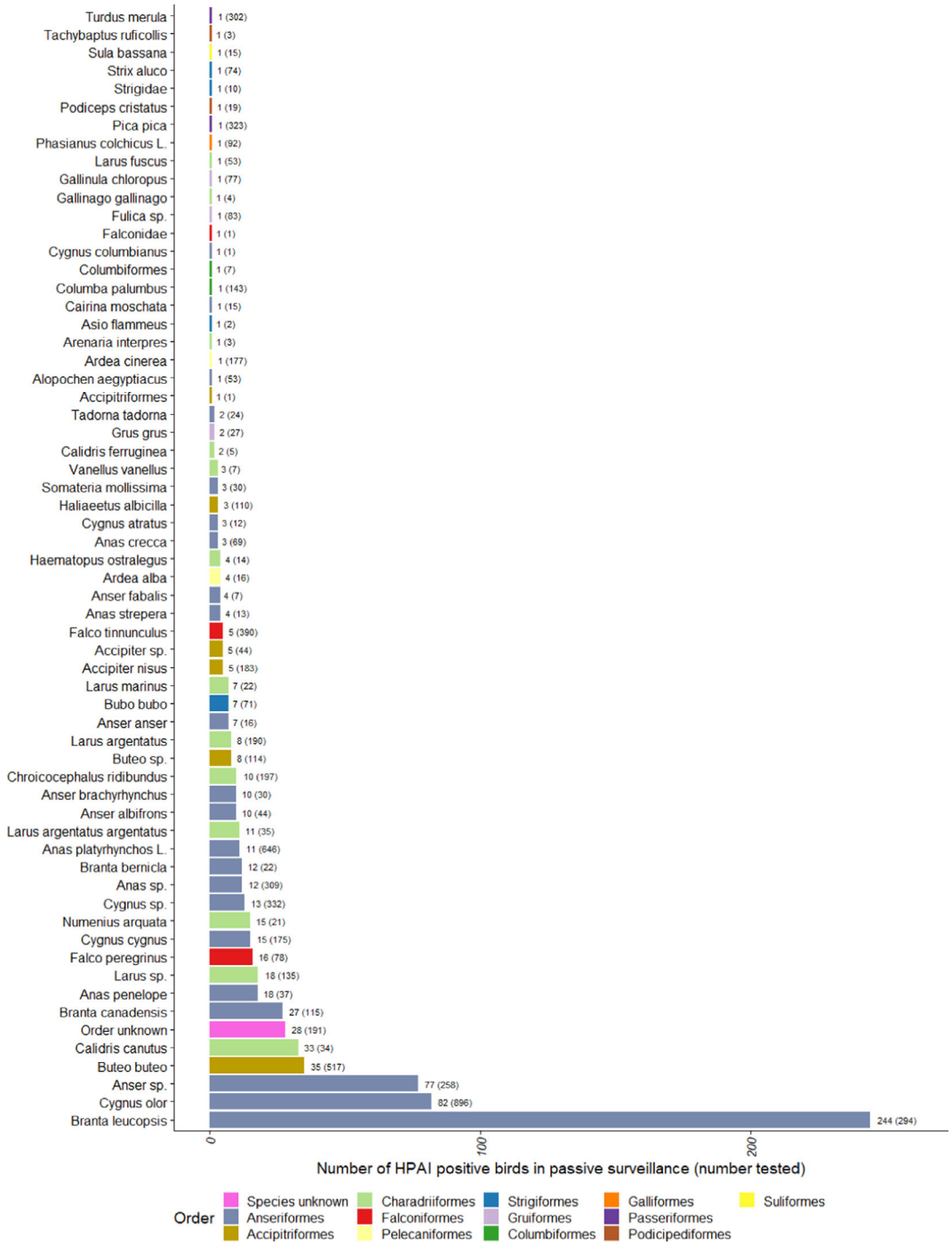


Figure G.1: Number of HPAI-positive wild birds detected by *passive* surveillance, for species with at least one HPAI positive sample. The number of wild birds tested is indicated in brackets. Bars are ordered by increasing number of positives and colour coded to identify the order to which these species belong to

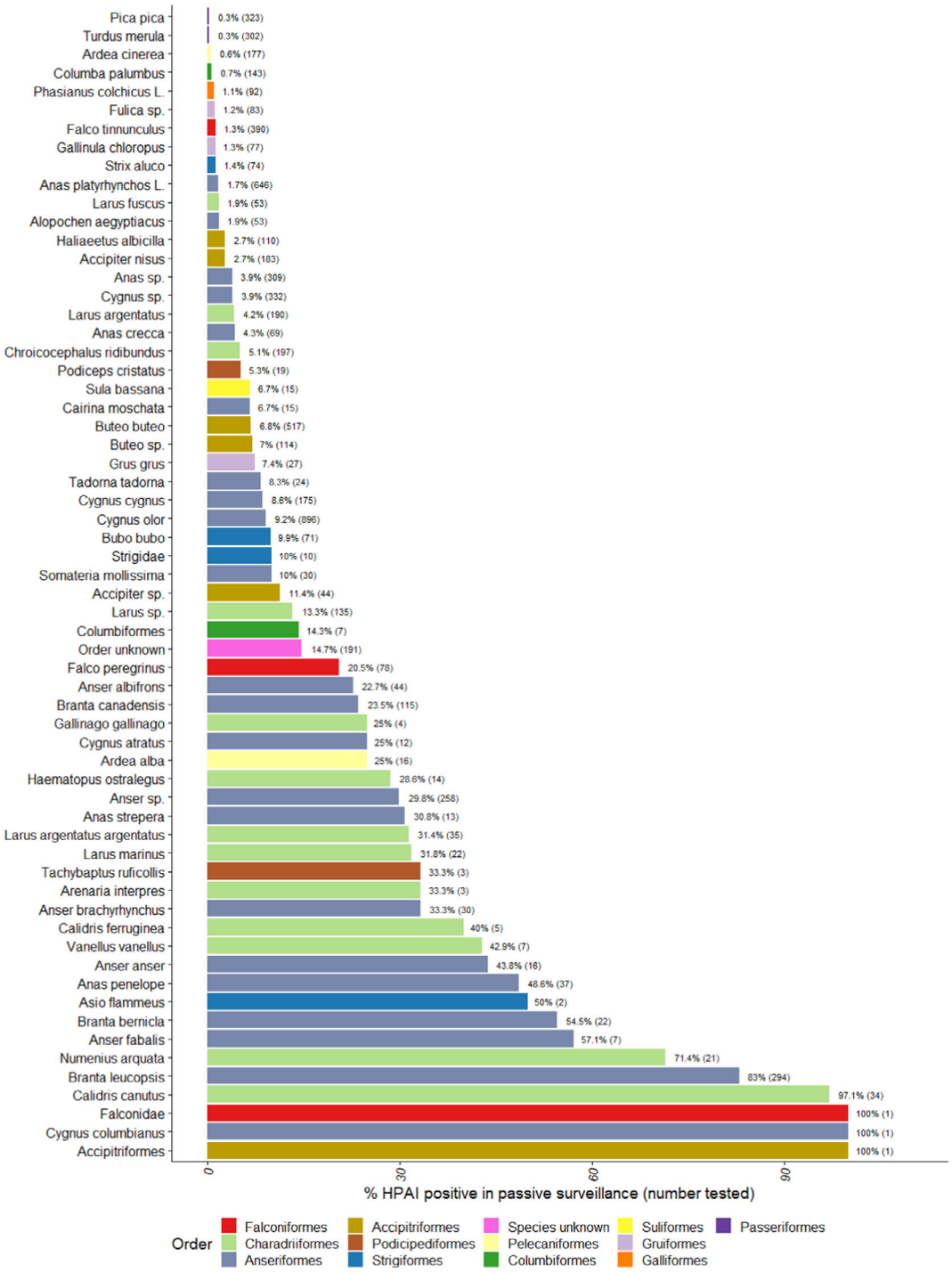


Figure G.2: Proportion of HPAI-positive (all types) wild birds detected among birds tested by *passive* surveillance, for species with at least one HPAI positive sample. The number of wild birds tested is indicated in brackets. Bars are ordered by increasing proportion of positives and colour coded to identify the order to which these species belong to

Appendix H – Wild bird species detected with HPAI virus in active surveillance

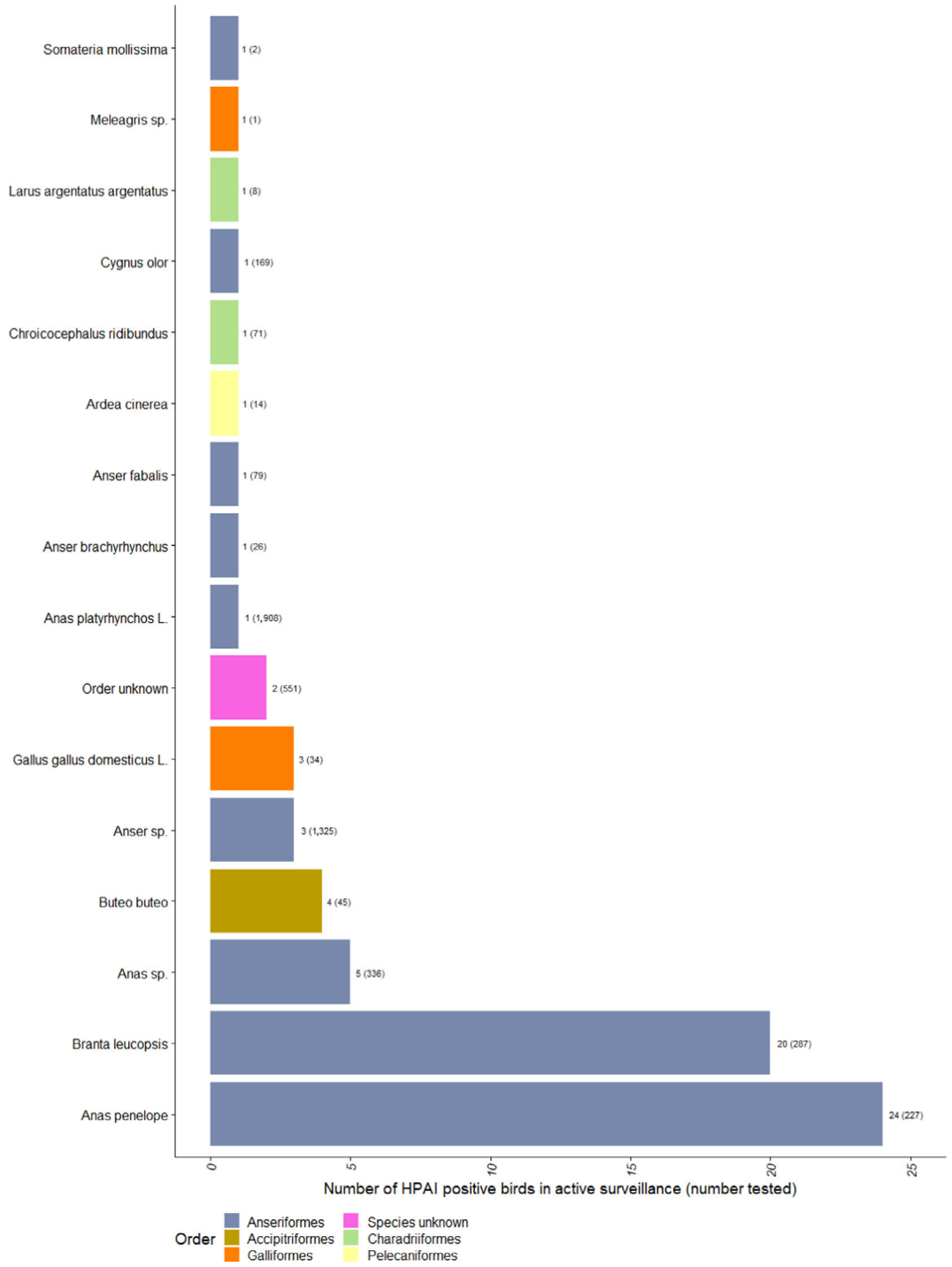


Figure H.1: Number of HPAI-positive wild birds detected by *active* surveillance, for species with at least one HPAI positive sample. The number of wild birds tested is indicated in brackets. Bars are ordered by increasing number of positives and colour coded to identify the order to which these species belong to

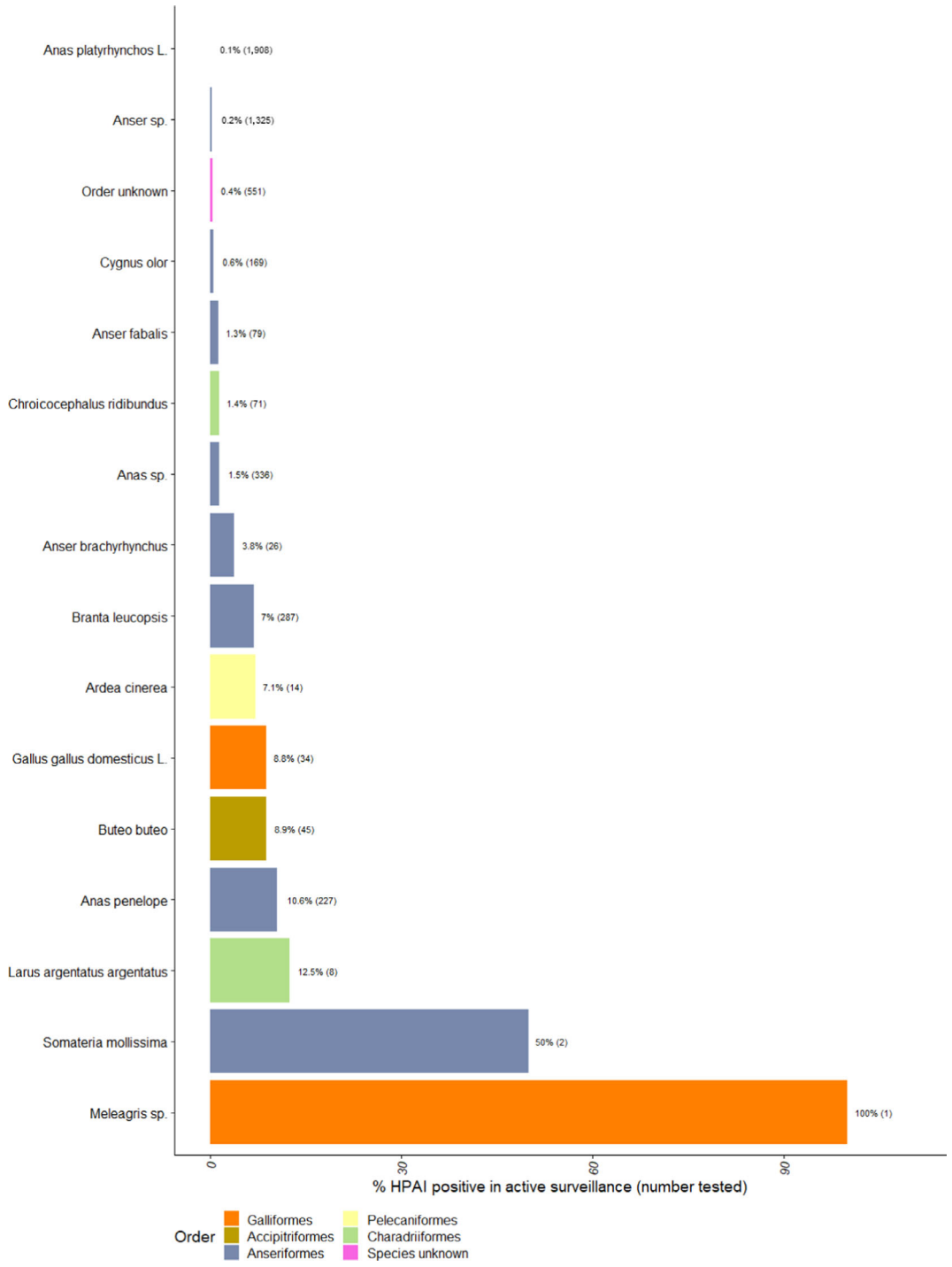


Figure H.2: Proportion of HPAI-positive (all types) wild birds detected among birds tested by *active* surveillance, for species with at least one HPAI positive sample. The number of wild birds tested is indicated in brackets. Bars are ordered by increasing proportion of positives and colour coded to identify the order to which these species belong to

Appendix I – Country data sets

Table I.1: Links to the avian influenza data sets for 2020 by reporting country. All country data sets containing the tables on the occurrence of avian influenza per country are available on the EFSA Knowledge Junction community on Zenodo. The countries that submitted data sets on the 2020 surveillance data year are: the 27 EU Member States and 4 non-EU Member States

Country	Link to the data set
EU Member States	
AT	https://doi.org/10.5281/zenodo.4976213
BE	https://doi.org/10.5281/zenodo.4978606
BG	https://doi.org/10.5281/zenodo.4978635
CY	https://doi.org/10.5281/zenodo.4978649
CZ	https://doi.org/10.5281/zenodo.4978657
DE	https://doi.org/10.5281/zenodo.4978667
DK	https://doi.org/10.5281/zenodo.4978707
EE	https://doi.org/10.5281/zenodo.4978737
EL	https://doi.org/10.5281/zenodo.4978755
ES	https://doi.org/10.5281/zenodo.4978810
FI	https://doi.org/10.5281/zenodo.4978826
FR	https://doi.org/10.5281/zenodo.4978883
HR	https://doi.org/10.5281/zenodo.4979073
HU	https://doi.org/10.5281/zenodo.4979147
IE	https://doi.org/10.5281/zenodo.4979159
IT	https://doi.org/10.5281/zenodo.4979197
LV	https://doi.org/10.5281/zenodo.4979493
LU	https://doi.org/10.5281/zenodo.4983814
LT	https://doi.org/10.5281/zenodo.4983876
MT	https://doi.org/10.5281/zenodo.4983948
NL	https://doi.org/10.5281/zenodo.4984003
PL	https://doi.org/10.5281/zenodo.4984071
PT	https://doi.org/10.5281/zenodo.4984115
RO	https://doi.org/10.5281/zenodo.4984147
SI	https://doi.org/10.5281/zenodo.4984194
SE	https://doi.org/10.5281/zenodo.4985565
SK	https://doi.org/10.5281/zenodo.4985658
Non-EU Member States	
CH	https://doi.org/10.5281/zenodo.4976114
IS	https://doi.org/10.5281/zenodo.4976066
NO	https://doi.org/10.5281/zenodo.4975941
UK	https://doi.org/10.5281/zenodo.4976132