European Commission

Directorate-General for Health & Consumers

Annual Report on surveillance for avian influenza in wild birds in Member States of the European Union in 2010

About the report

The resources and efforts invested by Chief Veterinary Officers, veterinary services, national reference laboratories, ornithologists, bird watching organisations, hunters and all the people who have contributed to the collection of samples in the conduct of the survey and compilation of this data set are hereby specifically acknowledged.

This Report was prepared by the European Union Reference Laboratory for Avian Influenza, Veterinary Laboratory Agency (VLA), Weybridge, Addlestone, Surrey, KT15 3NB, according to its work programme.

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The European Commission is responsible for the collection of surveillance data from Member States, which is done via an online reporting system operated by the Commission services of Directorate General for Health and Consumers (DG SANCO). For more information on the Commission's online reporting system please contact:
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The European Commission is responsible for the final revision of the Annual Report on surveillance for avian influenza in poultry in the European Union and its publication on the Commission's website:
http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/eu_resp_surveillance_en.htm

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EXECUTIVE SUMMARY

Avian Influenza (AI) is a highly contagious viral infection, which can affect all species of birds. Highly Pathogenic Avian Influenza (HPAI) viruses can spread rapidly, causing serious disease with high mortality in many bird species. To date all HPAI viruses have been of H5 or H7 subtypes. The ongoing H5N1 HPAI epidemic has affected over 60 countries across Asia, Africa and Europe, resulting in the loss of hundreds of millions of birds. Low Pathogenicity Avian Influenza (LPAI) viruses can be of any one of the 16 haemagglutinin subtypes, H1 to H16, and usually cause only mild disease in poultry. LPAI strains of H5 and H7 subtypes have the potential to mutate to HPAI viruses following introduction to poultry populations. Birds of the Orders Anseriformes and Charadriiformes are thought to be the major reservoirs for LPAI viruses. Although historically HPAI infection has been rarely observed in wild birds and almost exclusively in connection with poultry outbreaks, since the continuing outbreaks of H5N1 HPAI, wild birds have been implicated in the spread of the virus. In 2010 H5N1 HPAI was reported globally from 18 countries (increased from 12 in 2009) including Bulgaria and Romania. Wild bird surveillance and the reporting of the results have been compulsory since 2005 in the European Union.

A total of 55,393 wild birds, from 26 Member States of the European Union were tested during the 2010 survey. In 2010, one case of H5N1 HPAI was detected by passive surveillance in a Common Buzzard (*Buteo buteo*), which had been found dead in Bulgaria. This is similar to the situation seen in 2008 and 2009 in that there was only one Member State, previously the United Kingdom and Germany respectively – affected by a single incident of the disease in wild birds. In contrast to 2010, the 2009 H5N1 HPAI occurrence was reported by active surveillance in a Mallard (Anas platyrhynchos) which had been hunted in Germany and showed no clinical signs of disease. Also in contrast to previous years, the clade of H5N1 HPAI virus detected in 2010 was 2.3.2, representing the first incursion of clade 2.3 viruses to Europe.

LPAI viruses of subtypes H5 or H7 were detected in 187 of the birds sampled from 13 Member States: Belgium (2), Czech Republic (1), Denmark (48), Finland (1), France (28), Germany (23), Hungary (2), Italy (3), Netherlands (5), Poland (2) Spain (5), Sweden (66) and United Kingdom (1). Consistent with previous years, the majority of these infections were identified through active surveillance of dabbling ducks (*Anas spp.)*, geese (*Anser spp.* and *Branta spp.*), swans (*Cygnus spp*.) and gulls (*Larus spp.*).

Evidence has accumulated for the potential for wild birds to transfer H5N1 HPAI from one area to another over relatively large distances. However the exact species involved and the role of wild birds in maintaining the virus is not clear. H5N1 HPAI is currently circulating in poultry in Asia and Africa. The areas where H5N1 HPAI is endemic in poultry include wetlands on major water-bird migratory flyways where large numbers of birds will spend time before moving into the EU. The EU survey provides detection of AI incidents in wild birds, independent of outbreaks in poultry, illustrating the value and role of wild bird surveillance as a potential early detection and monitoring system for the presence of H5N1 HPAI in the EU.

GLOSSARY AND ABBREVIATIONS

Animal Disease Notification System	ADNS
Avian Influenza	AI
European Food Safety Authority	EFSA
European Union	EU
European Union Reference Laboratory	EURL
Highly Pathogenic	HP
Highly Pathogenic Avian Influenza	HPAI
Higher-Risk Species	HRS
Low Pathogenic Avian Influenza	LPAI
Member State	MS
National Reference Laboratory	NRL
Nomenclature of Units for Territorial Statistics	NUTS
Notifiable Avian Influenza	NAI
Polymerase Chain Reaction	PCR
Virus Isolation	VI

Table 1: Key to Member State and Non-Member State abbreviations

Abbreviation	Country
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom
CH	Switzerland
NO	Norway

Active surveillance: For the purpose of this report, active surveillance will be used as an equivalent to the surveillance of birds that were live without clinical signs, hunted without clinical signs and hunted with clinical signs.

Bird Origin: Relates to the information on the origin of the bird when sampled. The six categories are: live without clinical signs; live with clinical signs; injured; hunted without clinical signs; hunted with clinical signs and found dead.

Bridge Species: Species that may provide contact between risk species and poultry through sharing wetlands or farmlands with poultry (EFSA, 2006).

DG SANCO: Directorate General for Health and Consumers.

EU 27: Refers to the 27 Member States of the European Union.

EU-data only: Excludes the data submitted by countries not belonging to the EU (Switzerland and Norway).

EURING code: European Union for Bird Ringing; a 5-digit number allocated to a species or subspecies of bird.

Higher-Risk Species (HRS): Species listed as those with an increased probability of contributing to the transmission of the Asian-lineage H5N1 HPAI viruses within Europe as defined in the scientific report by EFSA (EFSA, 2006) and the EC guidelines (EC, 2007) (in total 29 species). The EURING codes corresponding to these species can be found at: http://www.euring.org/data_and_codes/euring_code_list/euring_exchange-code_2000.pdf

HPAI H5N1: H5 HPAI of the "Asiatic strain".

Incident: For the purpose of this report H5N1 HPAI detections were grouped into incidents based on proximity of a 10 km radius, which is equivalent to the size of monitoring areas, and where subsequent detections of H5N1 HPAI within a 10 km radius are deemed to be epidemiologically linked (EC, 2006b).

LPAI H5: Birds positive for LPAI of subtype H5.

LPAI H7: Birds positive for LPAI of subtype H7.

LPAI other: Birds reported as LPAI of other subtypes.

Non-MS data included: Includes the data submitted by countries not belonging to the EU (Switzerland and Norway).

Notifiable Avian Influenza (NAI): Influenza A virus of subtypes H5 or H7, according to the OIE definition (OIE, 2009).

NUTS 3: Nomenclature of Units for Territorial Statistics. At NUTS 3 level this refers to, for example: a region, district, county, municipal or unitary authority (depending on the MS).

Other Positives: Birds positive for Avian Influenza that were not clearly reported as either LPAI or HPAI.

Passive surveillance: For the purpose of this report, passive surveillance will be used as an equivalent to the surveillance of birds that were live with clinical signs, injured and found dead.

Polymerase Chain Reaction (PCR): Polymerase chain reaction is a generic term for laboratory methodology that acts through the amplification of specific viral nucleic acid from clinical specimens.

Positive/ Infected: For the purpose of this report, a positive/ infected case of avian influenza is defined as a wild bird, from which at least one sample tested positive on either PCR or virus isolation.

Virus Isolation (VI): Virus isolation is a laboratory methodology that enables the propagation of infectious virus directly from clinical specimens.

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INTRODUCTION

Avian Influenza (AI) is a highly contagious viral infection, which can affect all species of birds. Highly Pathogenic Avian Influenza (HPAI) viruses can spread rapidly, causing serious disease with high mortality in many bird species. To date all HPAI viruses have been H5 or H7 subtypes. The ongoing H5N1 Highly Pathogenic Avian Influenza epidemic has affected over 60 countries across Asia, Africa and Europe, resulting in the loss of hundreds of millions of birds. Low Pathogenicity Avian Influenza (LPAI) can be of any one of the 16 haemagglutinin subtypes H1 to H16 and usually cause only mild disease in poultry. LPAI strains of the H5 and H7 subtypes have the potential to mutate into HPAI following introduction to poultry populations. Birds of the Orders Anseriformes and Charadriiformes are thought to be the major reservoirs for LPAI viruses. Historically HPAI infections have been rarely observed in wild birds and almost exclusively in connection with poultry outbreaks. However, during the H5N1 HPAI epidemic, wild birds have been implicated in the spread of the virus. Therefore wild bird surveillance and the reporting of the results have become compulsory since 2005 in the European Union.

Wild bird surveillance for avian influenza in the EU is carried out according to Council Directive 2005/94/EC on Community measures to control avian influenza (EC, 2006a) and specific harmonised guidelines (EC, 2007). It is aimed at identifying the risk of introduction of AI viruses (LPAI and HPAI) into domestic poultry. The three main objectives of the surveillance are: The early detection of H5N1 HPAI in wild birds; the investigation of possible carrier or bridge species following an incident of H5N1 HPAI; and baseline monitoring of circulation of LPAI H5 and H7 strains in wild birds. The surveillance results reported here were collected between 1st January and 31st December 2010.

Voluntary surveillance for AI in wild birds in EU MS was first carried out in 2002-2003 under Commission Decision 2002/649/EC (EC 2002), although several MSs had already been conducting wild bird surveillance prior to this. In response to the detections of virus in wild birds and outbreaks in poultry, and the evolving epidemiological situation of H5N1 HPAI principally in Asia, activities with regard to wild bird surveillance were increased. Wild bird surveillance became compulsory in 2005 for all MSs, and information collection on wild birds was extended and harmonised. Application of this system was demonstrated in 2006 and 2007 when H5N1 HPAI activity was relatively widespread in wild birds and incursions to poultry were limited and controlled (Hesterberg *et al.* 2009).

In 2006, EFSA completed a scientific opinion on migratory birds and their possible role in the spread of HPAI (EFSA 2006). This included an assessment of birds of predominantly the Orders Anseriformes and Charadriiformes regarding the likelihood of them introducing H5N1 HPAI following the criteria of gregariousness during migration / wintering periods (group size and group density), degree of mixing during migration wintering periods, main habitat during migration / wintering periods, and degree of mixing with other species. This opinion has led to inclusion of a "Higher Risk Species" (HRS) list into the guidelines for targeting of surveillance. Further to this, in 2008 EFSA provided an update to the opinion on the risk of the introduction and spread of HPAI virus by wild birds, describing the risk of introduction as a regular event due to the constant presence of H5N1 virus in the wild bird population since 2006 (EFSA 2008). Since 2008 the number of detections of H5N1 HPAI has reduced and clade 2.2 viruses appear to have disappeared from wild birds globally with clade 2.3.2 viruses being reported from wild birds more recently.

OBJECTIVES

The main objective of this report is to present the surveillance results of 2010 and to discuss the main findings. The objectives of the EU wild bird AI surveillance are:

1. To ensure early detection of H5N1 HPAI by investigating increased incidence of morbidity and mortality in wild birds, in particular in selected "higher risk" species.

2. In the event that H5N1 HPAI is detected in wild birds, then surveillance of live and dead wild birds shall be enhanced to determine whether wild birds of other species can act as asymptomatic carriers or “bridge species”.

3. To continue a “baseline” surveillance of different species of free-living migratory birds as part of continuous monitoring of LPAI viruses. Anseriformes (waterfowl) and Charadriiformes (shorebirds and gulls) shall be the main sampling targets to assess if they carry LPAI viruses of H5 and H7 subtypes (which would in any case also detect H5N1 HPAI and other HPAI, if present). “Higher risk species” must be targeted (EC, 2007).

THE SURVEY PROGRAMMES

In 2010 the surveys were performed according to the guidelines laid down in Commission Decision 2007/268/EC (EC 2007) which are available at the DG SANCO website under:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2007D0268:20090610:EN:PDF

For 2010, the survey programmes of the MS were evaluated and approved through the Decision 2009/883/EC (EC 2009).

Details of the survey programmes for each MS are available on the internet at:

http://ec.europa.eu/food/animal/diseases/eradication/programme2010/2010_programmes_en.pdf

Samples were tested in accordance with the Diagnostic Manual for avian influenza (EC 2006b).

Previous Annual Reports on surveillance for avian influenza in wild birds can be found at: http://ec.europa.eu/food/animal/diseases/controlmeasures/avian/eu_resp_surveillance_en.htm

RESULTS

SAMPLING

OVERVIEW

During 2010, 55,400 birds were sampled in total. This includes 55,393 birds sampled by EU Member States (MS) as well as one bird sampled by Norway (NO) and six birds sampled by Switzerland (CH), the two contributing non-MS (Figure 1). Detailed information regarding the number of birds sampled by MS in each quarter is displayed in Annex II and III. In total, 26 of the 27 EU MS submitted data for analysis with Malta (MT) not submitting any data. The Member State with the highest number of birds tested in 2010 was Spain (ES) (n=11,668) and the next highest sampling programme was carried out by Germany (DE) (n=10,123), which together approximate to over a third of the whole EU surveillance effort. Fourteen MS and the two non-MS each sampled fewer than 1000 birds throughout the year.

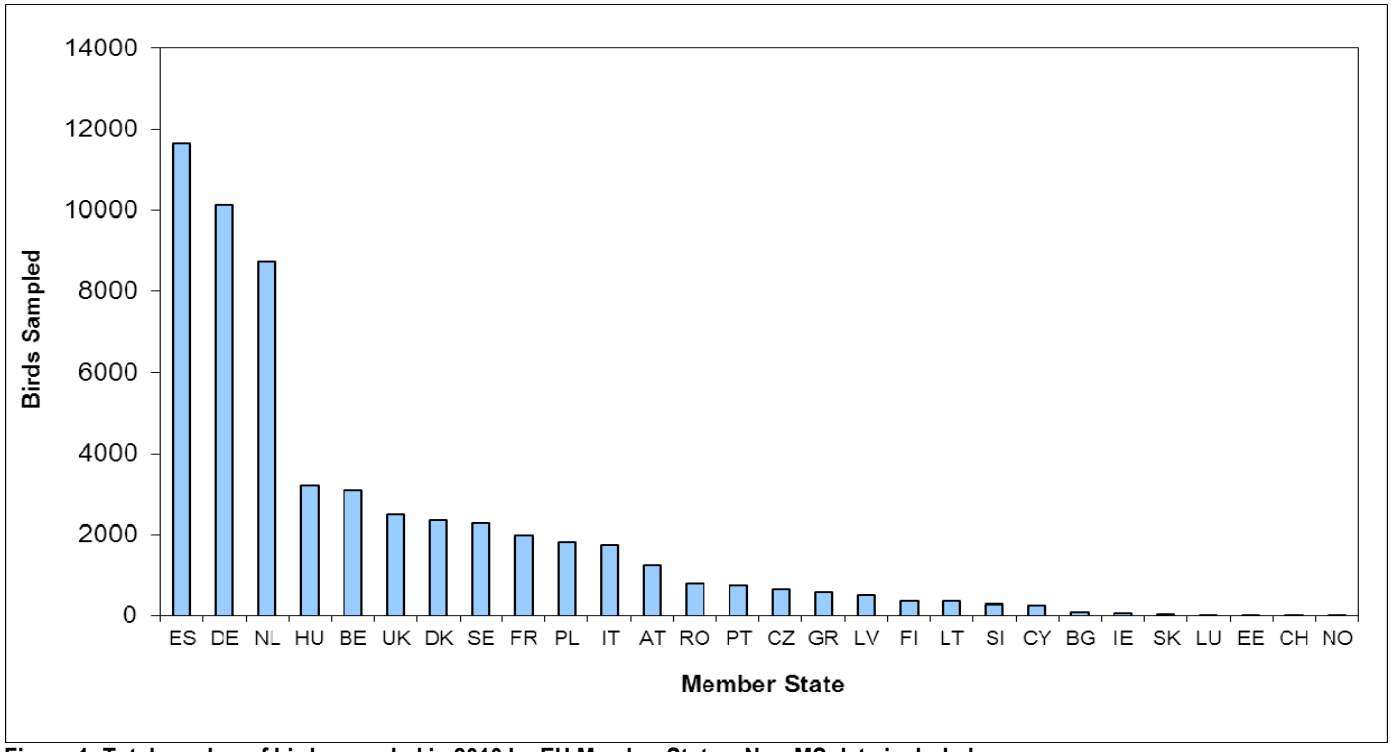


Figure 1: Total number of birds sampled in 2010 by EU Member State – Non-MS data included.

Table 2 displays the number of birds sampled in each MS during 2010 by type of surveillance. All MS, with the exception of Luxembourg, conducted both active and passive surveillance, although the proportion of each varied highly between MS, reflecting 2006-2009 surveillance strategies.

Table 2: Birds sampled in 2010 by surveillance type and MS. The percentage of each surveillance type is shown in brackets – Non-MS data included.

Member State	Number of Birds Sampled	Active Surveillance	Passive Surveillance
AT	1240	1157 (93.3%)	83 (6.7%)
BE	3088	3040 (98.4%)	48 (1.6%)
BG	76	41 (53.9%)	35 (46.1%)
CY	254	109 (42.9%)	145 (57.1%)
CZ	653	500 (76.6%)	153 (23.4%)
DE	10123	7723 (76.3%)	2400 (23.7%)
DK	2344	2288 (97.6%)	56 (2.4%)
EE	7	5 (71.4%)	2 (28.6%)
ES	11668	10684 (91.6%)	984 (8.4%)
FI	354	257 (72.6%)	97 (27.4%)
FR	1973	1807 (91.6%)	166 (8.4%)
GR	584	293 (50.2%)	291 (49.8%)
HU	3206	3098 (96.6%)	108 (3.4%)
IE	68	57 (83.8%)	11 (16.2%)
IT	1724	1379 (80.0%)	345 (20.0%)
LT	350	343 (98.0%)	7 (2.0%)
LU	10	10 (100.0%)	0 (0.0%)
LV	510	499 (97.8%)	11 (2.2%)
NL	8725	8376 (96.0%)	349 (4.0%)
PL	1806	1797 (99.5%)	9 (0.5%)
PT	741	664 (89.6%)	77 (10.4%)
RO	796	623 (78.3%)	173 (21.7%)
SE	2288	2032 (88.8%)	256 (11.2%)
SI	283	104 (36.7%)	179 (63.3%)
SK	28	19 (67.9%)	9 (32.1%)
UK	2494	1826 (73.2%)	668 (26.8%)
EU TOTAL	**55393**	**48731**	**6662**
CH	6	0 (0.0%)	6 (100.0%)
NO	1	1 (100.0%)	0 (0.0%)

Figure 2 displays the proportion of each surveillance type for the 26 MS that submitted data. More than 87% of the birds across the EU were sampled by active surveillance (either hunted or live without clinical signs).

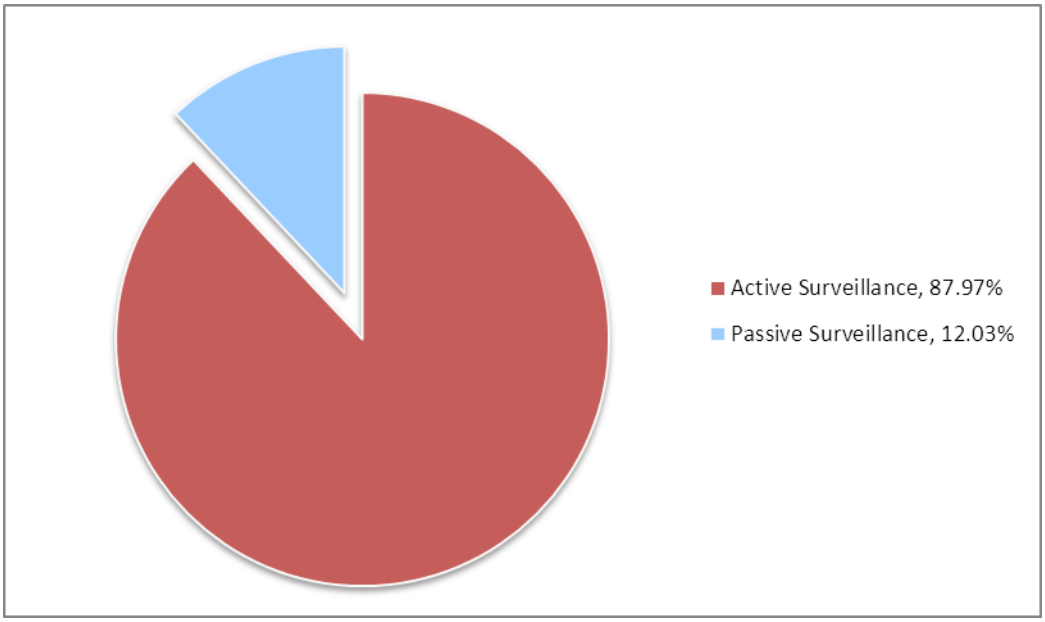


Figure 2: The proportion of birds sampled by surveillance type for all submitting EU Member States – EU-data only

GEOGRAPHICAL TARGETING

Figures 3 and 4 illustrate the distribution of active and passive surveillance respectively on a spatial scale by displaying the number of birds sampled per unit area. For all maps in the report the classification of sampling intensity is grouped by number of submissions per 100 square kilometres - Low: 0.1-25, Medium: 25.1-250, High: 250.1-2500, Very High: Over 2500.Figure 3: Intensity of sampling by active surveillance (live without clinical signs and hunted birds) in EU-MS in 2010 – Non-MS data included.

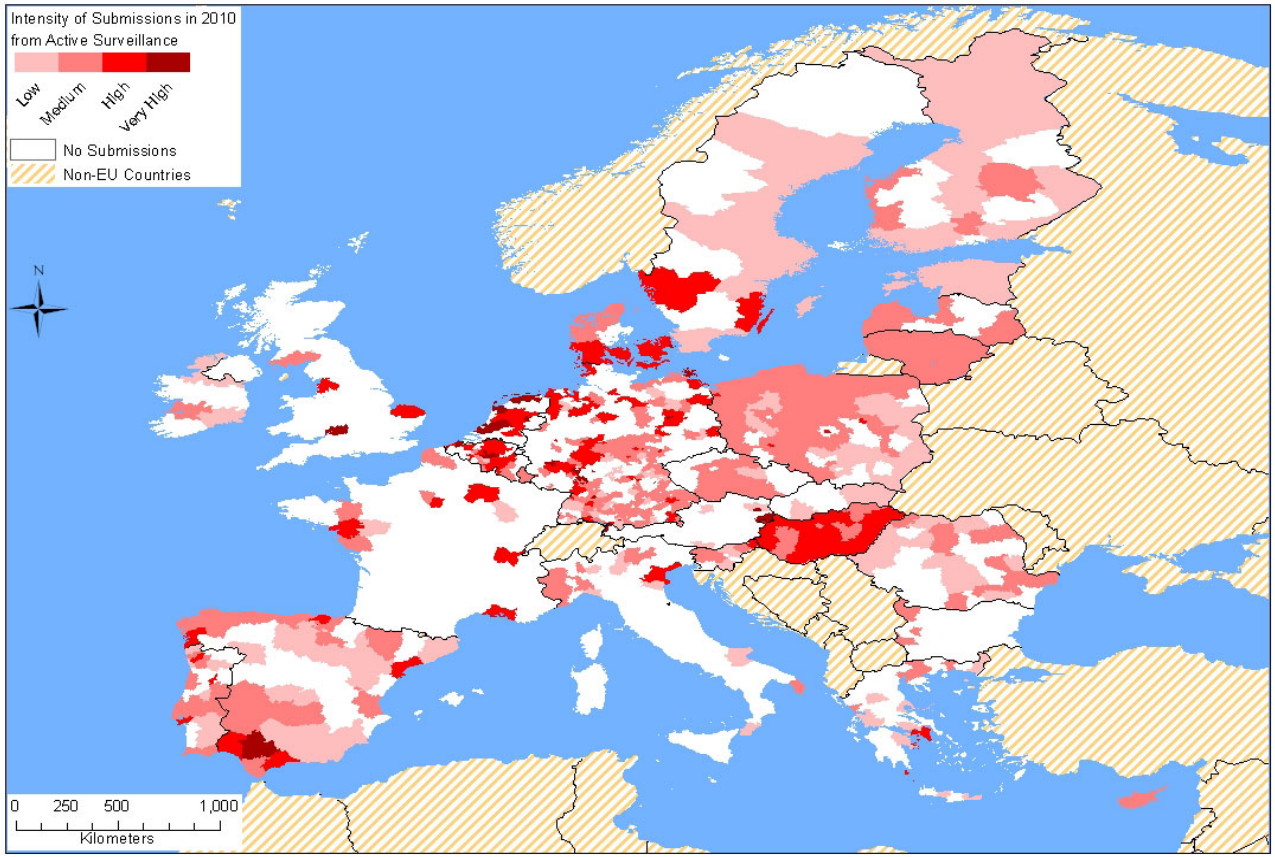
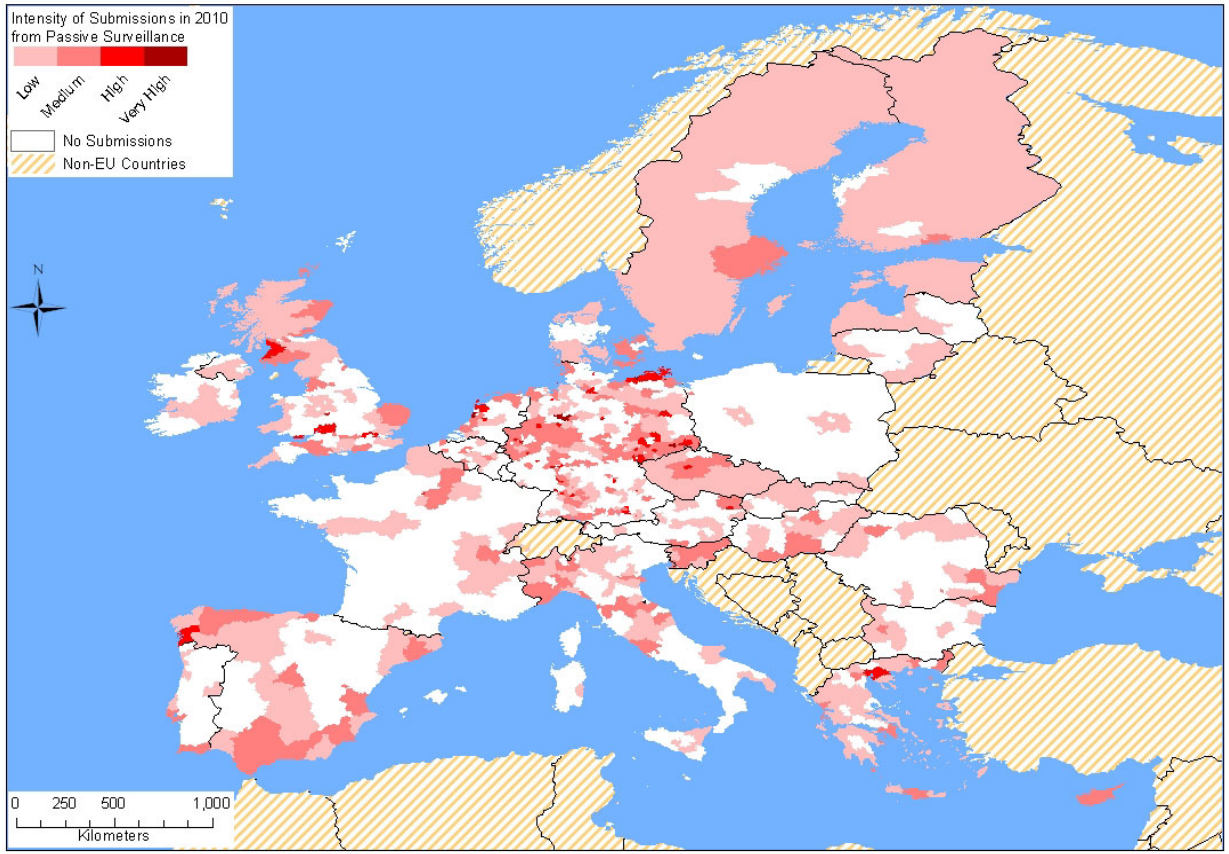
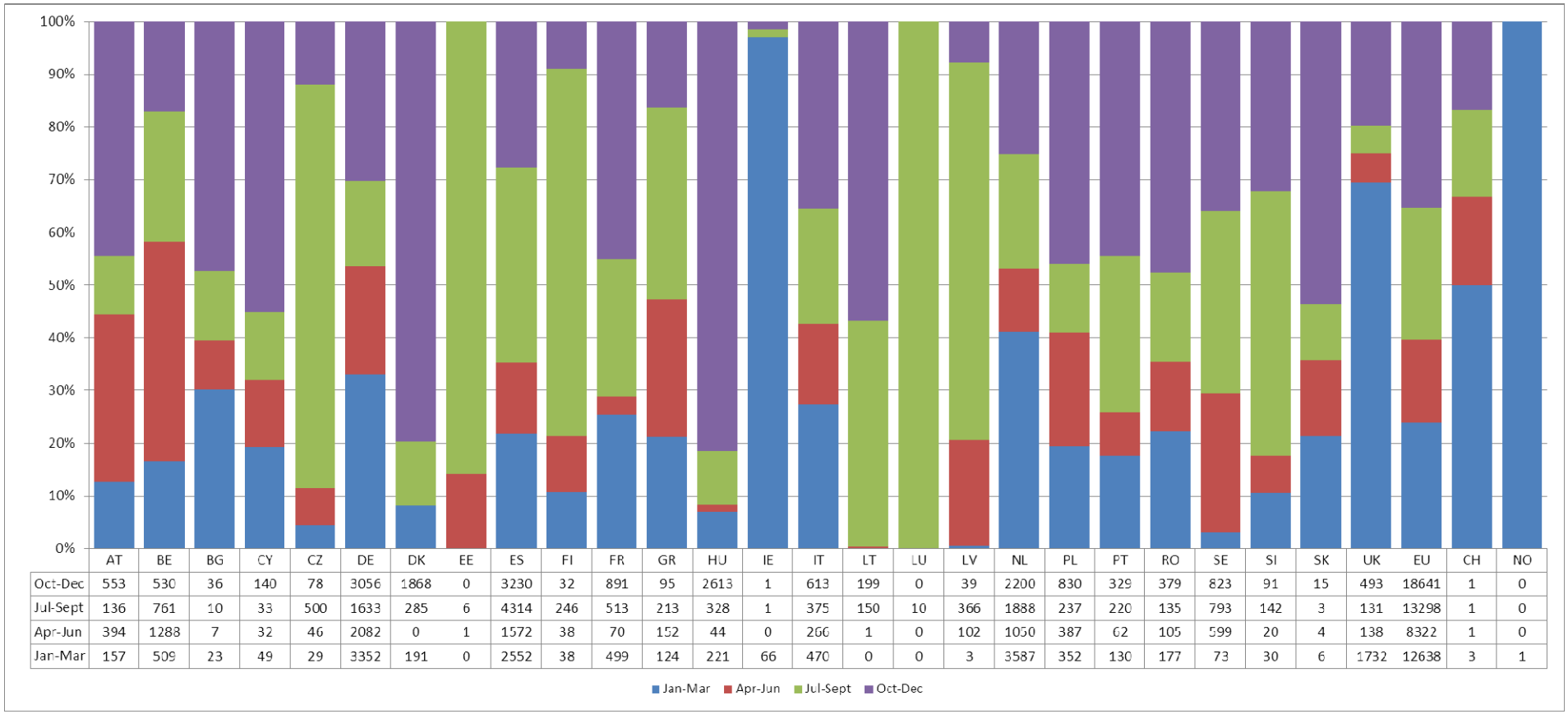


Figure 4: Intensity of sampling by passive surveillance (birds found dead, injured or live with clinical signs) in EU-MS in 2010– Non-MS data included.



SEASONAL TARGETING

Figure 5 displays the percentage of birds sampled by MS in each quarter. For the EU overall, across all 26 participating MS, similar numbers of birds were tested in each of the first three quarters with a significant increase in the final quarter (Oct – Dec). Temporal targeting of sampling varied greatly among MS. Some MS focused their surveillance efforts in the winter months (1st and 4th quarter), such as Bulgaria (BG) and Hungary (HU). Other MS focused much more of the surveillance effort through the spring and summer months, such as Latvia (LV). In other cases, the surveillance was relatively evenly distributed throughout the year, as was the case in Greece (GR).



	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK	EU	CH	NO
Oct-Dec	553	530	36	140	78	3056	1868	0	3230	32	891	95	2613	1	613	199	0	39	2200	830	329	379	823	91	15	493	18641	1	0
Jul-Sept	136	761	10	33	500	1633	285	6	4314	246	513	213	328	1	375	150	10	366	1888	237	220	135	793	142	3	131	13298	1	0
Apr-Jun	394	1288	7	32	46	2082	0	1	1572	38	70	152	44	0	266	1	0	102	1050	387	62	105	599	20	4	138	8322	1	0
Jan-Mar	157	509	23	49	29	3352	191	0	2552	38	499	124	221	66	470	0	0	3	3587	352	130	177	73	30	6	1732	12638	3	1

Figure 5: Proportion of all birds sampled in 2010 by quarter and MS. Raw numbers of birds sampled by quarter and MS are shown in the table below – Non-MS data included.

Figure 6 displays the percentage of birds sampled by quarter over all 26 MS.

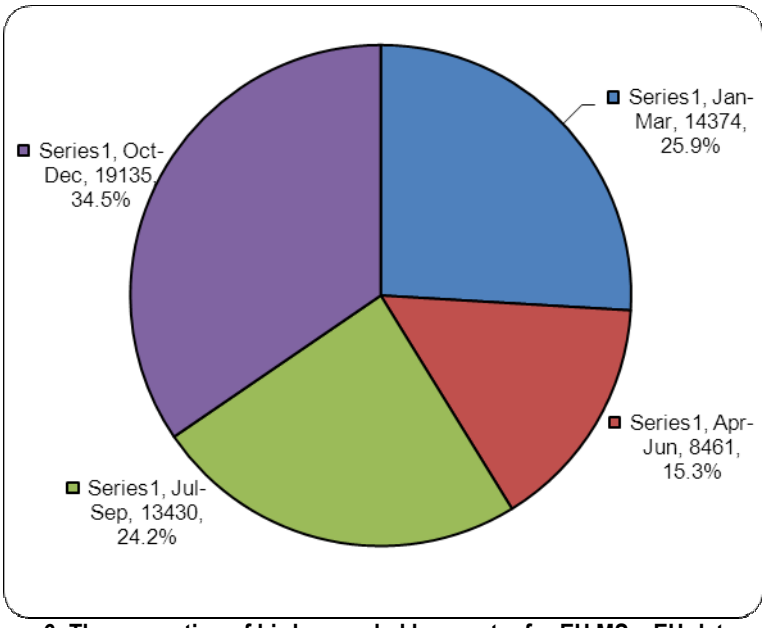


Figure 6: The proportion of birds sampled by quarter for EU MS – EU-data only.

Figure 7 displays the overall number of birds sampled in MS throughout 2010 by surveillance type. Active surveillance peaks in January and then reduces in the spring and summer months, before increasing from September through to December. Passive surveillance, however, remains relatively constant throughout the year with only a very slight decrease in levels during the late spring and early autumn months.

Tables displaying the number of birds sampled according to surveillance type and MS are displayed in Annex I.

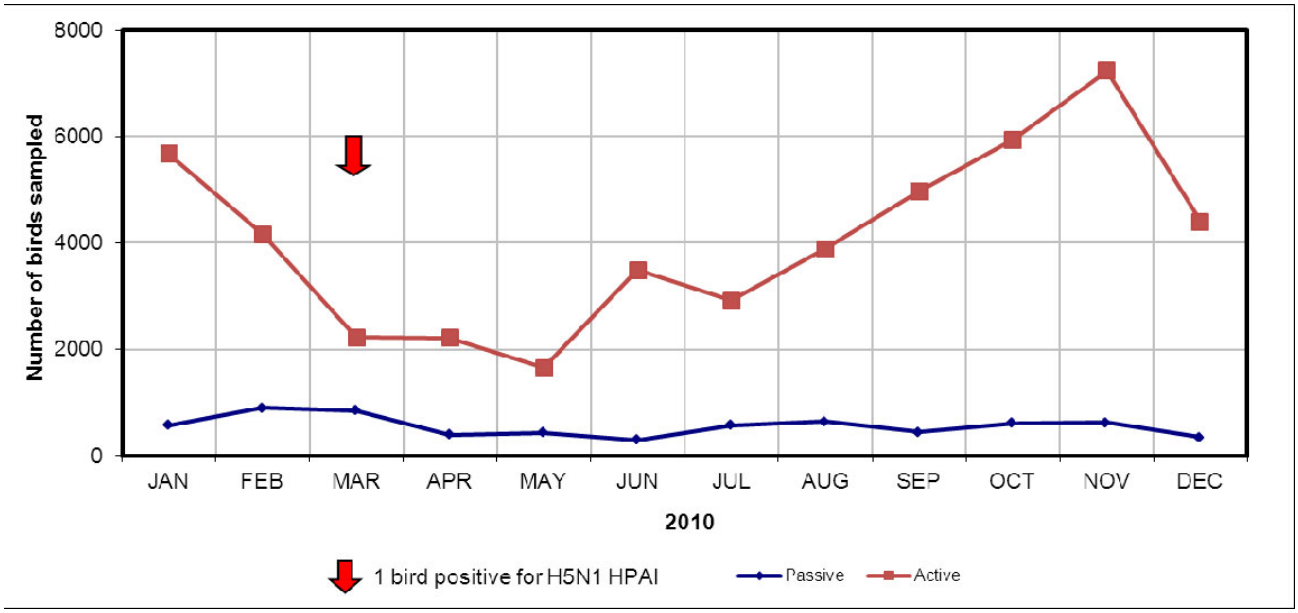


Figure 7: Total number of birds sampled by surveillance type during 2010 showing the incident of H5N1 HPAI (the positive bird is indicated with a single red arrow) – Non-MS data included.

TARGETING OF BIRD SPECIES

In total 55,400 birds of 22 Orders and at least 340 species were sampled in 2010. Table 3 displays the ten most frequently sampled Orders. As in 2006-2009, the three Orders in which most birds were sampled were: Anseriformes (ducks, geese and swans), Charadriiformes (gulls and waders) and Passeriformes (perching/ songbirds).

Table 4 displays the top 15 species sampled in 2010 throughout all participating MS. Mallard (*Anas platyrhynchos*) was the most frequently sampled species in 2010 (n=18,258) as in 2006-2009. Greylag Goose (*Anser anser*) (n=4,123) and Black-headed Gull (*Larus ridibundus*) (n=3,055) were also sampled in high numbers. Eight of the ten most frequently sampled species were classed as Higher-Risk Species (HRS), the Greater Flamingo (*Phoenicopterus ruber*) (n=1,720) and Pheasant (*Phasianus colchicus*) (n=968) being non-HRS. Table 4 also indicates that the top 15 species account for over two thirds of all birds tested in 2010. The large majority of non-target species were sampled in very low numbers (68% of all birds sampled were HRS).

All of the figures quoted are based on the EU totals only, not including data from the two reporting non-MSs, Norway (NO) and Switzerland (CH).

Table 3: Bird Orders most frequently sampled in 2010 – EU-data only.

Order	Number sampled
Anseriformes	34749
Charadriiformes	7715
Passeriformes	2357
Gruiformes	2295
Phoenicopteriformes	1721
Falconiformes	1592
Galliformes	1472
Ciconiiformes	1138
Columbiformes	703
Strigiformes	461

Table 4: Bird Species most frequently sampled in 2010 – EU-data only.*

Species	Number sampled
Anas platyrhynchos	18258
Anser anser	4123
Larus ridibundus	3055
Phoenicopterus ruber	1720
Cygnus olor	1684
Anas crecca	1563
Fulica atra	1557
Larus canus	1303
Anser albifrons	973
Phasianus colchicus	968
Anas sp.	936
Branta canadensis	900
Aythya ferina	729
Anas penelope	719
Cygnus sp.	580

* Does not include data for 447 birds for which identification was only available to family level

H5N1 HPAI POSITIVES

A differentiation is made between H5N1 HPAI infections and LPAI infections. Unless otherwise stated, all references made to H5N1 refer to highly pathogenic H5N1 virus. In total, just one case of H5N1 HPAI infection was detected in 2010 in wild birds in one MS, Bulgaria. Overall 0.002% of the sampled birds tested positive for H5N1 HPAI. In the MS experiencing H5N1 HPAI infection, Bulgaria, the proportion of H5N1 HPAI positive birds was 1.32% (Table 5).

Table 5: Number and proportion of wild birds positive for H5N1 HPAI in 2010 – EU-data only.

Member State	Number of birds sampled	Number of H5N1 HPAI positive birds	Percentage of sampled birds testing positive
BG	76	1	1.32%

Table 6: Details of H5N1 HPAI incidents in 2010 – EU-data only.

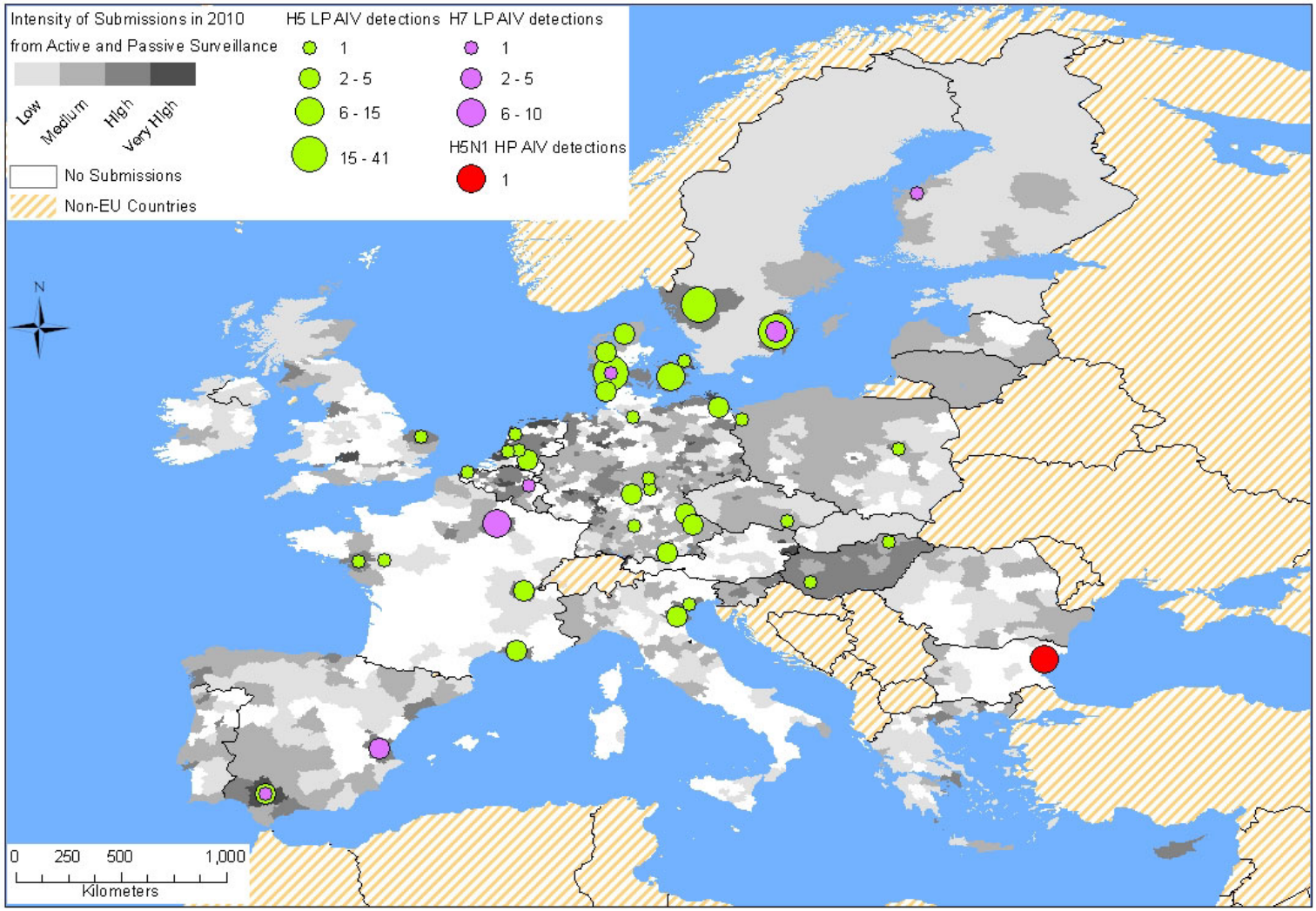
Member State	Incident duration	Species detected	Number of H5N1 HPAI positive birds	Status of bird
BG	15/03/2010 - 15/03/2010	Buteo buteo	1	found dead

DESCRIPTIVE OVERVIEW OF H5N1 HPAI INCIDENTS IN WILD BIRDS

A single incident occurred in Bulgaria in March 2010 (SCFCAH, 2010). No further cases in wild birds were detected. This incident occurred in the same month that H5N1 HPAI was detected in backyard poultry in Romania. Both these detections represent the incursion of a clade (2.3) of H5N1 virus not previously identified in Europe. The most recent outbreak in poultry prior to 2010 was in October 2008 in Germany (DE).

Figure 8 displays the location of the H5N1 HPAI incident in a wild bird. A single incident occurred. The map also shows the location of H5/H7 LPAI findings in wild birds, discussed in the section on LPAI.

Figure 8: Intensity of sample submission from active and passive surveillance and distribution of H5N1 HPAI incident and LPAI detections (H5 and H7) in wild birds in EU MS in 2010 – Non-MS data included.



TEMPORAL PATTERN OF H5N1 HPAI WILD BIRD INCIDENTS

The timing and number of birds involved in the H5N1 HPAI incident in wild birds in Bulgaria is presented in Figure 9, as well as the number of birds tested by week in the EU in 2010. Similarly, in 2009 the only incident of H5N1 HPAI occurred early in the year (during January) in Germany.

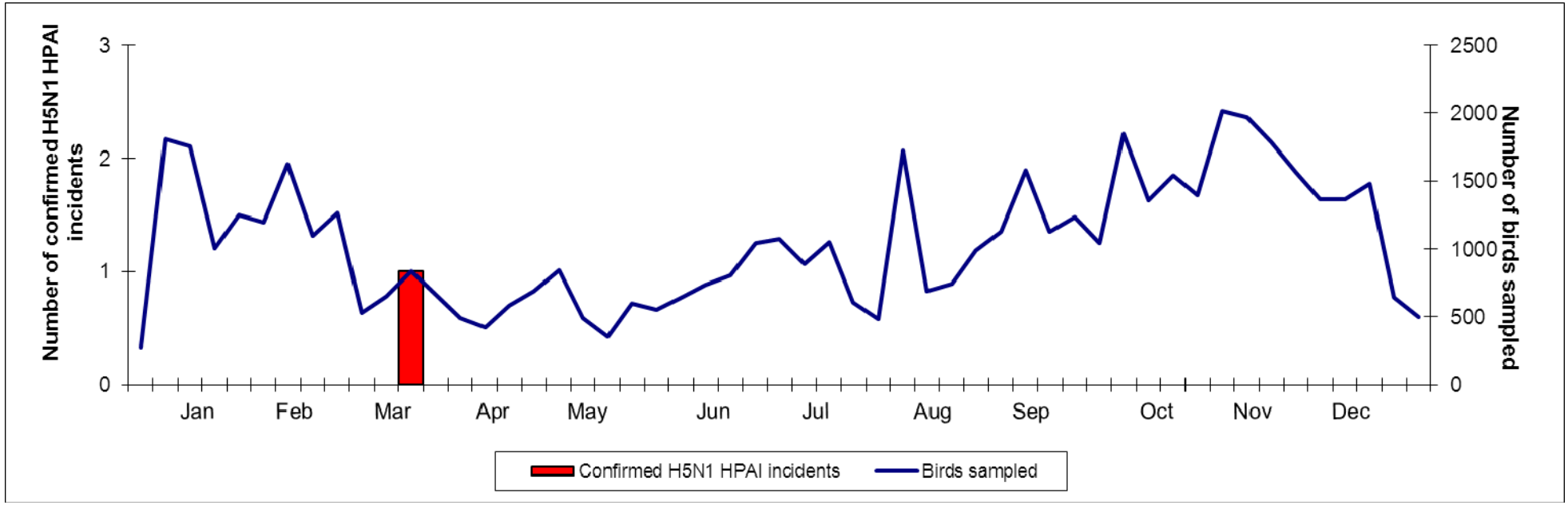


Figure 9: Number of H5N1 HPAI incidents in wild birds and number of wild birds sampled in the EU by week in 2010 – Non-MS data included.

ORIGIN OF THE H5N1 HPAI INFECTED BIRDS

The single incident in 2010 was detected through passive surveillance. The single bird testing positive for HPAI H5N1 was detected as a bird found dead. This is similar to 2006, 2007 and 2008 when the great majority of incidents were detected via passive surveillance, with the majority of birds tested having been found dead. However this is in contrast to 2009, when a single incident of HPAI H5N1 was detected through active surveillance in a bird that was hunted without clinical signs.

ORDER AND SPECIES OF BIRDS AFFECTED BY H5N1 HPAI INFECTIONS

Table 7 shows the Order of birds in which the H5N1 HPAI case was found in 2010 and the percentage of birds from this Order testing positive. Falconiformes was the only Order in which H5N1 HPAI was detected in 2010. Falconiformes also had detections of H5N1 HPAI in 2006 and 2007; however H5N1 HPAI was not detected in this Order in 2008 or 2009.

Table 7: Number tested and percentage positive for H5N1 HPAI in 2010 by Order – EU-data only.

Order	Total number tested	Number positive for H5N1 HPAI (percentage of birds testing positive)
Falconiformes	1592	1 (0.063%)

Table 8 below displays the detection of H5N1 HPAI in the single species in which it was detected. Detailed information regarding the number of birds tested and positive birds by MS and species that were either of the HRS or tested positive for H5N1 HPAI or LPAI H5/H7 is displayed in Annex IV. The only species positive for H5N1 HPAI in 2010 was a Common Buzzard.

Table 8: Number of birds tested and number positive for H5N1 HPAI in 2010 by species – EU-data only.

Species	Total number tested	Number positive for H5N1 HPAI (percentage of birds testing positive)
Buteo buteo	394	1 (0.254%)

LPAI

This section focuses on the analysis of H5/H7 LPAI unless specifically mentioned.

As some virus-positive birds were reported with virus pathotype “unknown”, “pending”, “missing” etc, birds that tested positive on PCR or virus isolation are reported in four groups in this section:

1) “LPAI H5” are birds positive for LPAI H5.

2) “LPAI H7” are birds positive for LPAI H7.

3) “LPAI other” are birds reported as LPAI of other “H” subtypes.

4) “Other Positives” are birds positive for influenza A by PCR or Virus isolation but were not reported as either LPAI or HPAI.

OVERVIEW OF LPAI RESULTS

In total 1,502 birds tested positive for subtypes other than H5N1 HPAI. There were no positive birds detected in Norway (NO) or Switzerland (CH), the two reporting non-MS.

LPAI H5 was detected in 166 birds from 12 MS: Belgium (1), Czech Republic (1), Denmark (47), France (18), Germany (23), Hungary (2), Italy (3), Netherlands (5), Poland (2), Spain (2), Sweden (61) and United Kingdom (1).

LPAI H7 was identified in 21 birds from 6 MS: Belgium (1), Denmark (1), Finland (1), France (10), Spain (3) and Sweden (5).

LPAI of other subtypes (LPAI Other) were detected in 1,315 birds from 13 MS and one bird from the non-MS Norway (NO), while “Other Positives” were detected in a further 371 birds in 13 MS.

Table 9 indicates the total number and proportion of wild birds testing positive for LPAI H5, LPAI H7, LPAI other and “Other Positives” by Member State. Figure 8 maps the geographical distribution of LPAI H5 and H7 positives.

Overall a very low proportion of birds tested positive for LPAI H5 (0.29%). This is slightly higher than the findings of 2007, 2008 and 2009 when an overall LPAI H5 proportion positive of 0.13%, 0.14% and 0.23% was detected respectively.

Detections of LPAI H7 in 2010 in the EU were similar to previous years at 0.04% compared with 0.02% (2006), 0.01% (2007), 0.05% (2008) and 0.06% (2009).

Table 9: Total number and proportion of birds testing positive for LPAI H5, H7 and other subtypes for MS detecting LPAI viruses during 2010 – Non-MS data included.

Member State	Number of Birds Sampled	Number of H5 LPAI cases (proportion of total sampled)	Number of H7 LPAI cases (proportion of total sampled)	Other LPAI cases (proportion of total sampled)	"Other positives" with pathotype unspecified (proportion of total sampled)
AT	1240	-	-	-	10 (0.81%)
BE	3088	1 (0.03%)	1 (0.03%)	65 (2.10%)	68 (2.20%)
BG	76	-	-	-	-
CY	254	-	-	-	-
CZ	653	1 (0.15%)	-	76 (11.64%)	-
DE	10123	23 (0.23%)	-	-	197 (1.95%)
DK	2344	47 (2.01%)	1 (0.04%)	180 (7.68%)	2 (0.09%)
EE	7	-	-	-	-
ES	11668	2 (0.02%)	3 (0.03%)	3 (0.03%)	11 (0.09%)
FI	354	-	1 (0.28%)	15 (4.24%)	-
FR	1973	18 (0.91%)	10 (0.51%)	242 (12.27%)	-
GR	584	-	-	-	5 (0.86%)
HU	3206	2 (0.06%)	-	10 (0.31%)	-
IE	68	-	-	-	1 (1.47%)
IT	1724	3 (0.17%)	-	7 (0.41%)	-
LT	350	-	-	22 (6.29%)	-
LU	10	-	-	-	-
LV	510	-	-	-	19 (3.76%)
NL	8725	5 (0.06%)	-	686 (7.86%)	22 (0.25%)
PL	1806	2 (0.11%)	-	5 (0.28%)	7 (0.39%)
PT	741	-	-	-	-
RO	796	-	-	-	-
SE	2288	61 (2.67%)	5 (0.22%)	-	11 (0.48%)
SI	283	-	-	4 (1.41%)	2 (0.71%)
SK	28	-	-	-	-
UK	2494	1 (0.04%)	-	-	16 (0.64%)
EU TOTAL	**55393**	**166 (0.30%)**	**21 (0.04%)**	**1315 (2.37%)**	**371 (0.67%)**
CH	6	-	-	-	-
NO	1	-	-	1 (100.0%)	-

TIMING OF LPAI H5/H7 DETECTIONS

Figure 10 displays the calendar week of LPAI H5 and H7 detections by MS. Figure 11 displays the number of LPAI H5/H7 detections and the number of birds sampled by week. In both figures 10 and 11 the first and last weeks are incomplete as 2010 did not begin on a Monday. The first week is three days long and the last week contains data for five days. LPAI H5 was mainly found in the autumn, while LPAI H7 infections occurred throughout the year.

	JAN					FEB				MAR				APR					MAY				JUN				JUL					AUG					SEP					OCT				NOV				DEC				
MS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
BE					1																							1																										
CZ																																										1											
DE																																				1					3	3	3	4	1	2	4	1		2				
DK																																				1	3	14		1	1	6	4	2			14		2					
ES													1																										2											2						
FI																																			1																			
FR																																			4		2	5	1	1		2		2						10				1	
HU																																						1																
IT																																																3						
NL					2																																	1		1													
PL													1																														1											
SE																																	6	16	1	12	3		3	1	2	9	1	7	4	1							
UK								1																																														

Figure 10: Number and week of detection of LPAI H5 (in green) and H7 (in purple) positive birds by EU MS. Each week has been assigned to the month in which most days fell – EU-data only.

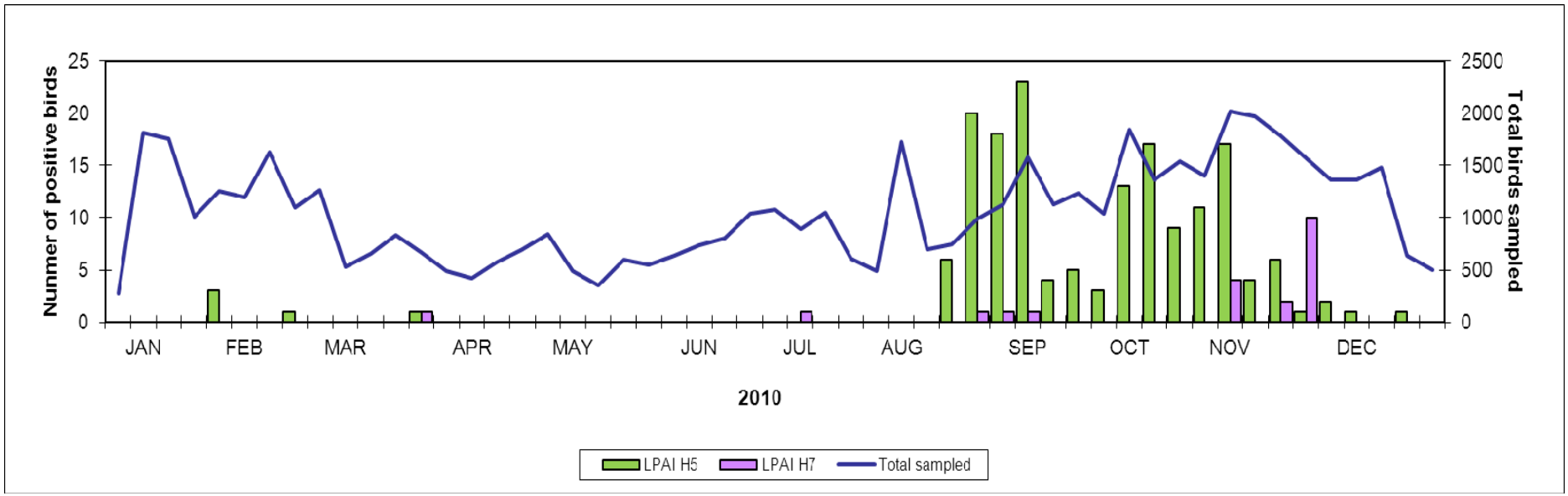


Figure 11: Number of LPAI H5 and H7 detections and the number of birds sampled in the EU by week in 2010 – Non-MS data included.

As was the case in 2008 and 2009 there is an apparent seasonality to the occurrence of H5 and H7 LPAI. The majority of H5 LPAI detections appeared between September and December, with a few detections in January to March. This coincides with the peak time for active sampling and may not reflect a seasonal trend. H7 detections occurred throughout the year, with the majority falling in November and December (Figure 11).

ORIGIN OF LPAI H5/H7 POSITIVE BIRDS

Table 10 displays the number of LPAI H5/H7 detections by Member State and shows the proportion of these detections by each surveillance type. Fewer LPAI H5/H7 positive birds were identified through Passive surveillance than Active surveillance. In 2010 the proportion of Passive surveillance that yielded positive detections of either LPAI H5 or H7 was 0.08% (n=5/6,662), while in 2009 this figure was 0.2% (n=17/8,363).

Active surveillance had a slightly higher level of detection for LPAI H5/H7 in 2010 with 0.37% of samples testing positive (n=182/48,731) compared with 0.31% of samples testing positive in 2009 (n=145/45,723).

Table 10: Number and percentage of Birds positive for LPAI H5 or H7 by surveillance type in 2010 - EU-data only.

Member State	Total sampled	Total number LPAI H5/H7 positive birds	Total proportion of birds positive for LPAI H5/H7	Active surveillance		Passive surveillance	
				Total number of LPAI H5/H7 positives	Proportion of birds positive for LPAI H5/H7	Total number of LPAI H5/H7 positives	Proportion of birds positive for LPAI H5/H7
BE	3088	2	0.06%	2	0.07% (n=3040)	0	0.00% (n=48)
CZ	653	1	0.15%	1	0.20% (n=500)	0	0.00% (n=153)
DE	10123	23	0.23%	19	0.25% (n=7723)	4	0.17% (n=2400)
DK	2344	48	2.05%	48	2.10% (n=2288)	0	0.00% (n=56)
ES	11668	5	0.04%	5	0.05% (n=10684)	0	0.00% (n=984)
FI	354	1	0.28%	1	0.39% (n=257)	0	0.00% (n=97)
FR	1973	28	1.42%	27	1.49% (n=1807)	1	0.60% (n=166)
HU	3206	2	0.06%	2	0.06% (n=3098)	0	0.00% (n=108)
IT	1724	3	0.17%	3	0.22% (n=1379)	0	0.00% (n=345)
NL	8725	5	0.06%	5	0.06% (n=8376)	0	0.00% (n=349)
PL	1806	2	0.11%	2	0.11% (n=1797)	0	0.00% (n=9)
SE	2288	66	2.88%	66	3.25% (n=2032)	0	0.00% (n=256)
UK	2494	1	0.04%	1	0.05% (n=1826)	0	0.00% (n=668)
EU Total	**55393**	**187**	**0.34%**	**182**	**0.37% (n=48731)**	**5**	**0.08% (n=6662)**

ORDER AND SPECIES OF BIRDS POSITIVE FOR LPAI H5/H7

LPAI H5 and LPAI H7 were detected in Anseriformes and Charadriiformes. “Other Positives”, including other LPAI positives were also detected in Ciconiiformes, Falconiformes, Galliformes, Gruiformes, Passeriformes and Phoenicopteriformes (Table 11).

Table 11: Detections of LPAI by Order in EU MS in 2010 – EU-data only.

Order	Total sampled	Positive for LPAI H5	Positive for LPAI H7*	Other LPAI positives	"Other positives" Pathotype undetermined
Anseriformes	34749	162	21	1256	342
Charadriiformes	7715	4	0	56	14
Ciconiiformes	1138	0	0	0	1
Falconiformes	1592	0	0	1	1
Phoenicopteriformes	1721	0	0	0	1
Gruiformes	2295	0	0	2	11
Passeriformes	2357	0	0	0	1
Galliformes	1472	0	0	1	0

Further details and tables regarding sampling and results for higher-risk and other species by MS can be found in Annex IV. As in previous years, observations of LPAI H5 in 2010 were made in dabbling ducks, diving ducks, geese, gulls, swans and waders (Table 12).

In 2010 most observations of LPAI H5 were made in Mallards (*Anas platyrhynchos*). In 2010, all species excluding Teal (*Anas crecca*) and Common Snipe (*Gallinago gallinago*) had a proportion of LPAI H5 positive birds below one percent, the percentage positive for *Anas crecca* and *Gallinago gallinago* was also low at 1.3% and 1.4% respectively, which is broadly consistent with the detection rates in 2006-2009. All detections of LPAI H7 were made in dabbling ducks and geese in 2010 (Table 12). Results from 2009 were similarly limited to dabbling ducks and geese.

In total, 38 species tested positive for AI subtypes other than HPAI. Of these species, 20 were Anseriformes. Ten species were Charadriiformes, three were Falconiformes, and one species from each of Ciconiiformes, Galliformes, Gruiformes, Passeriformes and Phoenicopteriformes.

Table 12: Detections of LPAI H5 and H7 by species in EU MS in 2010 – EU-data only.

Species	Total sampled	Positive for LPAI H5	Positive for LPAI H7	Other LPAI positives	"Other positives" Pathotype undetermined
Anas crecca	1563	21	1	91	2
Anas penelope	719	4	0	76	2
Anas platyrhynchos	18258	124	17	966	269
***Anas* spp.**	936	2	0	3	10
Anas strepera	408	1	0	12	1
Anser albifrons	973	3	0	59	0
Anser anser	4123	2	0	1	25
***Anser* spp.**	346	1	0	0	0
Aythya ferina	729	1	0	5	1
Branta canadensis	900	0	1	0	5
Cygnus cygnus	395	2	0	0	1
***Cygnus* spp.**	580	1	0	0	0
Gallinago gallinago	145	2	0	4	0
Larus argentatus	250	1	0	8	6
Larus ridibundus	3055	1	0	36	4

Does not include data for 447 birds for which identification was only available to family level

DISCUSSION

Avian Influenza (AI) is a highly contagious viral infection, which can affect all species of birds. Highly Pathogenic Avian Influenza (HPAI) can spread rapidly causing serious disease with high mortality in many poultry species. To date all HPAI viruses have been of H5 or H7 subtypes of influenza A. Since 2005, the ongoing H5N1 HPAI epizootic has affected over 60 countries across Asia, Africa and Europe, resulting in the loss of hundreds of millions of birds. Historically HPAI infection has rarely been observed in wild birds, and nearly always in connection with poultry outbreaks. However, since the current H5N1 HPAI epizootic, wild birds have been one of the vectors implicated in the long distance spread of this virus. Currently the exact species involved as vectors, and the role of wild birds in maintaining the virus is not clear.

The HPAI H5N1 virus is currently circulating in poultry in parts of central and east Asia and northeast Africa and was reported globally from 18 countries in 2010 (increased from 12 in 2009) including Romania (poultry) and Bulgaria (wild bird).

Low Pathogenicity Avian Influenza (LPAI) can comprise subtypes H1 to H16 and usually causes a mild disease in poultry. LPAI strains of the H5 and H7 subtypes have the potential to mutate into HPAI following introduction to poultry populations. Birds of the Orders Anseriformes (ducks, geese and swans) and Charadriiformes (waders and gulls) are thought to be the major reservoirs for LPAI viruses.

The first objective of AI surveillance in wild birds in the EU is to ensure early detection of H5N1 HPAI through the investigation of increased mortalities. The detection of incidents in wild birds not associated with outbreaks in poultry illustrates the value of wild bird surveillance in the early detection of the presence of H5N1 HPAI in a country (*e.g.* Hesterberg *et al.* 2009). Detections of such infections require the implementation of control measures (EC 2006a) and are important to maintain and raise vigilance amongst the poultry sector, especially keepers of free-range poultry.

The second objective of EU wild bird surveillance relates to the investigation of asymptomatic carriers and bridge species in the event of H5N1 HPAI virus detection. Evaluation of the importance of carrier and bridge species is perhaps best fully investigated through a multidisciplinary approach with ornithologists, ecologists, virologists and epidemiologists; since such an approach can evaluate factors such as size of local populations, local and migratory bird movements, and functional links with the affected site, all of which are relevant to better understanding the epidemiology of the local outbreak and role (if any) of bridge species. Information collection and dissemination on the epidemiology of wild bird incidents and influential factors, such as details of resident wild bird populations and environmental sampling, could play an important role in increasing the knowledge on the epidemiology of H5N1 HPAI in wild birds.

The third objective of the EU wild bird surveillance, the baseline surveillance of the prevalence of LPAI H5 and H7 in wild birds, appears to be best addressed through active surveillance of live birds. Consistent with previous years, the large majority of detected LPAI virus infections in 2010 were identified through active surveillance of HRS, especially Anseriformes (ducks, geese

and swans). During 2010 0.37% of birds sampled by Active Surveillance tested positive for H5 or H7 LPAI viruses. The proportion of birds testing LPAI positive by Passive Surveillance (0.08%) was markedly lower than 2009 (0.20%).

A total of 55,393 wild birds, from 26 Member States of the European Union was tested during the 2010 survey. Additionally one bird was sampled by Norway and six birds were sampled by Switzerland, the two reporting non-Member States. As in 2008 and 2009, H5N1 HPAI was reported in wild birds from only one MS. The 2010 incident was detected through testing of samples from a Common Buzzard *(Buteo buteo)*, which was a single bird found dead in Bulgaria in March 2010. This is in contrast to the situation seen in the only EU incident of 2009, an infected Mallard (*Anas platyrhynchos*) shot dead as part of a group of 34 birds not displaying clinical signs. Also, the viruses detected in the Common Buzzard in Romania and the backyard poultry in Bulgaria in 2010 were from a different clade (2.3.2) to those detected previously in wild birds or poultry in Europe (Reid *et al.,* 2011). This indicates a change in the infection and evolutionary dynamics of HPAI in Europe and highlights the need for ongoing surveillance and awareness of the epidemiological situation.

LPAI viruses of subtypes H5 or H7 were detected in 187 birds from 13 Member States: Belgium (2), Czech Republic (1), Denmark (48), Finland (1), France (28), Germany (23), Hungary (2), Italy (3), Netherlands (5), Poland (2), Spain (5), Sweden (66) and the United Kingdom (1). Consistent with previous years, the large majority of these infections were identified through active surveillance of HRS, especially those of the order Anseriformes (ducks, geese and swans). These results and surveillance in previous years show consistent presence of H5 and H7 LPAI viruses in wild birds in the EU indicating a continual risk to poultry in this area.

There are several aspects of the data that should be considered when interpreting the results: cluster effects occur and were not accounted for in the analysis; surveillance programmes were variable between MS with respect to a number of parameters including sample size, weighting between active and passive surveillance and differential targeting of species and areas. Therefore only limited inferences can be made by direct comparisons of detections in different MS, species and seasons. The non-random nature of the sampling means that the proportion positive observed in a species, Member State or time period cannot be assumed to be the true prevalence in the population sampled.

The proportion of all wild bird samples that yielded any AI virus is small (3.4% in 2010 and around 2-3% in other years) and a minority are HPAI or LPAI H5 or H7 virus positive; the targets of this surveillance. Therefore, the majority of the resource dedicated to wild bird surveillance detects an absence of infection in individual birds. While this “negative” data is of value, the low proportion of wild bird populations (which can be highly abundant – hundreds of thousands, or millions of individuals of some species) that are sampled and heterogeneity in bird movements and disease ecology allows only modest confidence in determining a population or region to be free of infection at any point in time.

There may be opportunities to increase targeting of passive surveillance by utilising existing migratory information in conjunction with outbreak data to identify priority areas for surveillance in real time. If, for example, an outbreak occurs in an area neighbouring the EU or within the EU, migratory data such as available through the BTO migration mapping tool (Atkinson *et al*., 2007) could be used to identify areas of increased vigilance for passive surveillance, based upon the areas and times migratory species are likely

to arrive from affected regions. Also, following the detection of an H5N1 HPAI outbreak within or outside the EU, increased surveillance could be conducted based on the locations and times that migratory species are likely to arrive from the affected area and the proximity of these species to poultry holdings. In addition local weather conditions, especially the 0ºC isotherm, have been associated with waterbird aggregations and H5N1 HPAI outbreaks in wild birds in Europe (Reperant *et al*., 2010). However, it should be noted that some migratory species introducing the virus to the EU may not die or display clinical signs when infected. Ongoing review of the results of avian influenza surveillance, the global picture of avian influenza and scientific research in this field, accompanied by on-going review of the EU guidelines for AI surveillance will further improve avian influenza prevention and control as well as the appropriate allocation of resources in this area.

MATERIALS AND METHODS

THE TESTING OF SAMPLES

Laboratory tests were carried out in accordance with the EU diagnostic manual for avian influenza (EC, 2006c).

It was recommended that samples should initially be tested using M gene PCR (to detect presence of AI virus), with rapid testing of positives for H5, and if possible N1, and that analysis of the haemagglutinin cleavage site should be undertaken to determine the pathogenicity of the AI virus.

DATA PROCESSING

The data presented in this report is limited to data collected under Commission Decision 2007/268/EC (EC 2007) submitted to the database in the required format. Consequently the data may differ from other reporting systems such as the Animal Disease Notification System (ADNS). HRS were based on the guidelines 2007/268/EC and the EFSA scientific opinion (EFSA, 2006).

Maps were produced using the ArcMap function of Arc GIS version 9.2.

Sampling intensity is displayed per unit area at NUTS 3 level.

DATA COMPLETENESS (EU 27)

Note: Graphs and tables in this report were created using the information that was available and records where no information was available were omitted in some instances. Since with the exception of missing subtype/pathotype information this only concerned in a very low proportion of records this is not thought to have impacted on the overall results, but should be kept in mind when comparing tables that made use of this information and where it was impractical for reasons of readability and interpretability to display the proportion of missing data.

SPECIES OF BIRDS

Species information was of high quality with 52,047 birds identified to species level (93.9%), while a further 2,892 (5.3%) were identified to genus. In addition, 447 (0.81%) birds were submitted with identification to family level. Only 14 (0.03%) submissions were from unidentified species and of these only four were due to incorrect EU Ring codes being used on the submissions.

BIRD ORIGIN

Information on the status of the bird at sampling (e.g. live, found dead etc...) was complete with 100% of birds sampled for the year 2010 having this information submitted.

SUBTYPE / PATHOTYPE INFORMATION

Of the 1875 birds testing positive, 907 (48.4%) had H subtype information supplied and 1504 (80.2%) were identified as either LPAI or HPAI.

DATE OF SAMPLING

For all birds sampled in 2010, all MS provided a localisation date (from when the bird was sampled in the field).

SPATIAL INFORMATION

Of the submitted spatial information for 2010, 32,447 (59.6% of birds sampled during this period) were provided with NUTS 3 codes or better for mapping. A further 22,807 (41.2%) birds could be located at NUTS 3 via geo-coordinates provided. Additionally, 15 (0.03%) birds were supplied with NUTS codes that could not be identified, and 131 (0.2%) birds were supplied with geo-coordinates that did not place them within the reporting country. These unidentified birds were all negative for AI and have not been represented in the sampling intensity in the maps.

ASSUMPTIONS

An incident was defined in this report as H5N1 HPAI infected bird(s) that were found within 10 km (size of the monitoring area (EC, 2006b)) of another H5N1 HPAI infected bird.

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ANNEX I – DIAGNOSIS

This section reports the samples collected and the associated test results. The present guidelines (EC 2007) recommend oro-pharyngeal (tracheal) and cloacal swabs to be collected from healthy free living birds and cloacal and oro-pharyngeal swabs and/ or tissues from dead or shot birds. The totals for testing regimes are shown below.

Annex I: Table 1: Number and proportion of samples collected by Status of bird 2010 - EU-data only.

Sample type	Status of Bird					
	Found dead	Hunted with clinical signs	Hunted without clinical signs	Injured	Live with clinical signs	Live without clinical signs
Blood	2	0	1	3	3	193
Cloacal	914	36	4404	150	66	12377
Faecal	25	0	3	0	1	6048
Other	172	0	148	4	1	3808
Tissue	1641	11	511	81	11	48
Tracheal	761	13	753	2	19	1798
Blood and Cloacal	0	0	0	0	0	3
Blood and Faecal	0	0	0	0	0	1
Cloacal and Tissue	8	1	1	0	0	2
Cloacal and Tracheal	2285	43	4414	248	145	12341
Faecal and Other	1	0	0	0	0	0
Faecal and Tissue	15	0	0	2	0	0
Faecal and Tracheal	0	0	0	0	0	1506
Tissue and Tracheal	3	0	1	0	0	0
Blood, Cloacal and Tracheal	0	0	0	0	0	224
Blood, Tissue and Tracheal	10	0	0	0	0	0
Cloacal, Other and Tracheal	1	0	0	0	0	1
Cloacal, Tissue and Tracheal	85	0	41	2	1	0

The majority of live caught birds were sampled either by cloacal swab or faeces; 32% of the birds were sampled with cloacal and oro-pharyngeal (tracheal) swabs and an additional 32% were sampled with cloacal swabs only. In hunted birds over 43% of the samples were cloacal and oro-pharyngeal (tracheal) swabs. For dead birds, the most commonly tested single sample type was tissue (28% of birds) however the majority of samples were cloacal and oro-pharyngeal (tracheal) samples, with 39% of dead birds being sampled in this way.

H5N1 HPAI positives

Table 2 displays the H5N1 HPAI diagnostic test results for each sample type collected for dead birds. Only one sample was taken, and this was found to be positive both by PCR and virus isolation.

Annex I: Table 2: Test-results and samples taken of dead birds positive to H5N1 HPAI - EU-data only.

Sample type	Total positives	PCR + VI+	PCR + VI-	PCR+ VI N/A
Other	1	1	0	0

Other Positives (LPAI, pathotype not reported, unidentifiable and pending)

Table 3 shows the test results of samples collected from live birds that were positive for other pathotypes (not HPAI). For all sample types a high proportion of those tested by both PCR and virus isolation were PCR positive only and VI negative. Approximately 25% of positive live and healthy birds that had oro-pharyngeal (tracheal) and cloacal swabs collected, only tested positive on the oro-pharyngeal (tracheal) swab. Approximately 43% of positive live and healthy birds that had an oro-pharyngeal (tracheal) and cloacal swabs taken only tested positive on the cloacal swab. For birds from which faecal and oro-pharyngeal (tracheal) swabs were collected, 75% of birds tested positive only for the faecal sample and just over 13% tested positive only for the oro-pharyngeal (tracheal) swab. For the one bird from which cloacal and tissue samples were taken, only the cloacal sample was positive.

Annex I: Table 3: Test-results and samples taken for live birds without clinical signs positive to subtypes other than H5N1 HPAI - EU-data only. Where more than one sample has been taken per bird parenthesis indicate under which test result (Test 1 or Test 2) the data for that sample is displayed.

Sample type	Total sampled	Total positive	Test 1				Test 2			
			PCR + VI+	PCR + VI-	PCR+ VI N/A	PCR- Test2 +	PCR + VI+	PCR + VI-	PCR+ VI N/A	PCR- test1 +
Cloacal (1)	12377	72	7	46	19	N/A				
Faecal (1)	6048	35	7	12	16	N/A				
Tracheal (1)	1798	1	0	1	0	N/A				
Other (1)	3808	120	20	100	0	N/A				
Cloacal (1) and Tissue (2)	2	1	1	0	0	N/A	0	0	0	1
Cloacal(1) and Tracheal(2)	12341	777	41	461	81	194	17	353	75	332
Faecal(1) and Traceal(2)	1507	68	0	0	59	9	0	0	17	51

Tables 4 and 5 display the test results for collected samples in hunted and found dead birds respectively. In all categories a relatively high proportion of birds were positive on the PCR, and negative for virus isolation when both PCR and virus isolation were performed.

For positive hunted birds just over 2% birds that had oro-pharyngeal (tracheal) and cloacal swabs collected only tested positive on the oro-pharyngeal swab, and just under 68% only tested positive on the cloacal swab.

Of the positive found dead birds that had both oro-pharyngeal (tracheal) and cloacal swabs collected, 9% tested positive on the oro-pharyngeal swab alone, and 29% tested positive exclusively for the cloacal swab. One bird that was found dead and tested positive had three samples taken (cloacal, oro-pharyngeal (tracheal) and other), however, only the other sample returned a positive result.

Annex I: Table 4: Test-results and samples taken for hunted birds with and without clinical signs positive to subtypes other than H5N1 HPAI - EU-data only. Where more than one sample has been taken per bird parenthesis indicate under which test result (Test 1 or Test 2) the data for that sample is displayed.

Sample type	Total Sampled	Total positive	Test 1				Test 2			
			PCR + VI+	PCR + VI-	PCR+ VI N/A	PCR- Test2 +	PCR + VI+	PCR + VI-	PCR+ VI N/A	PCR- Test1 +
Cloacal (1)	4440	269	0	0	269	N/A				
Other (1)	148	2	0	0	2	N/A				
Tissue (1)	522	2	1	1	0	N/A				
Tracheal (1)	766	22	0	0	22	N/A				
Cloacal(1) and Tracheal(2)	4457	441	54	221	155	11	1	17	124	299

Annex I: Table 5: Test-results and samples taken for found dead birds positive to subtypes other than H5N1 HPAI - EU-data only. Where more than one sample has been taken per bird parenthesis indicate under which test result (Test 1, 2 or 3) the data for that sample is displayed.

Sample type	Total sampled	Total positive	Test 1				Test 2				Test 3		
			PCR + VI+	PCR + VI-	PCR+ VI N/A	PCR- Test 2 or 3 +	PCR + VI+	PCR + VI-	PCR+ VI N/A	PCR- test 1 or 3 +	PCR + VI+	PCR + VI-	PCR+ VI N/A
Cloacal (1)	914	12	2	2	8	N/A							
Tissue (1)	1641	11	0	1	10	N/A							
Tracheal (1)	761	3	0	0	3	N/A							
Cloacal (1) and Tracheal (2)	2285	34	2	1	28	3	0	4	20	10			
Cloacal (1) Tracheal (2) Other (3)	1	1	0	0	0	1	0	0	0	1	0	1	0

ANNEX II – TYPE OF SURVEILLANCE BY QUARTER

The following Tables 1 and 2 display the number of birds sampled in 2010, by both passive and active surveillance.

Annex II: Table I: Number of birds tested in active surveillance by Member State (hunted and live healthy birds) – Non-MS data included.

Member State	Quarter							
	1		2		3		4	
	Hunted	Live	Hunted	Live	Hunted	Live	Hunted	Live
AT	0	117	0	379	0	118	0	543
BE	82	425	0	1287	195	550	0	501
BG	0	19	0	0	0	3	0	19
CY	6	14	10	10	0	7	54	8
CZ	0	0	0	0	444	0	56	0
DE	248	1775	2	1786	223	996	892	1801
DK	0	150	0	0	59	222	908	949
EE	0	0	0	0	3	2	0	0
ES	35	2347	2	1475	4	4052	94	2675
FI	1	0	2	0	232	0	21	1
FR	476	0	53	0	446	0	832	0
GR	41	40	8	102	12	48	20	22
HU	199	5	0	32	0	299	2154	409
IE	56	1	0	0	0	0	0	0
IT	435	18	10	72	232	53	513	46
LT	0	0	0	0	147	0	196	0
LU	0	0	0	0	0	10	0	0
LV	0	0	0	100	361	0	38	0
NL	0	3473	0	973	0	1793	0	2137
PL	0	348	0	386	0	233	0	830
PT	20	102	0	52	0	185	0	305
RO	79	77	15	51	62	13	262	64
SE	7	0	3	535	10	719	11	747
SI	2	1	0	2	25	10	64	0
SK	4	0	0	0	0	0	15	0
UK	0	1452	0	0	0	0	0	374
EU Total	1691	10364	105	7242	2455	9313	6130	11431
CH	0	0	0	0	0	0	0	0
NO	0	1	0	0	0	0	0	0

Annex II: Table 2: Number of birds tested in passive surveillance by Member State (injured, diseased and dead birds) – Non-MS data included.

Member State	Quarter			
	1	2	3	4
AT	40	15	18	10
BE	2	1	16	29
BG	4	7	7	17
CY	29	12	26	78
CZ	29	46	56	22
DE	1329	294	414	363
DK	41	0	4	11
EE	0	1	1	0
ES	170	95	258	461
FI	37	36	14	10
FR	23	17	67	59
GR	43	42	153	53
HU	17	12	29	50
IE	9	0	1	1
IT	17	184	90	54
LT	0	1	3	3
LV	3	2	5	1
NL	114	77	95	63
PL	4	1	4	0
PT	8	10	35	24
RO	21	39	60	53
SE	66	61	64	65
SI	27	18	107	27
SK	2	4	3	0
UK	280	138	131	119
EU Total	2315	1113	1661	1573
CH	3	1	1	1
NO	0	0	0	0

ANNEX III – NUMBER OF BIRDS OF HIGHER-RISK SPECIES AND NON-HIGHER RISK SPECIES SAMPLED BY MS AND QUARTER

Annex III: Table 1: Number of Higher Risk Species sampled in each quarter by Member State – Non-MS data included.

Member States	1		2		3		4	
	HRS	Non-HRS	HRS	Non-HRS	HRS	Non-HRS	HRS	Non-HRS
AT	135	22	272	122	128	8	410	143
BE	321	188	321	967	726	35	513	17
BG	0	23	1	6	3	7	21	15
CY	0	49	0	32	0	33	3	137
CZ	25	4	30	16	497	3	78	0
DE	2504	848	1108	974	907	726	2412	644
DK	187	4	0	0	269	16	1708	160
EE	0	0	1	0	6	0	0	0
ES*	1704	827	538	988	1442	2832	2146	744
FI	1	37	9	29	204	42	16	16
FR	374	125	60	10	379	134	722	169
GR	52	72	7	145	5	208	19	76
HU	135	86	1	43	184	144	1451	1162
IE	53	13	0	0	1	0	1	0
IT	404	66	39	227	24	351	501	112
LT	0	0	1	0	142	8	199	0
LU	0	0	0	0	10	0	0	0
LV	0	3	99	3	340	26	38	1
NL	3492	95	1006	44	1796	92	2134	66
PL	218	134	235	152	128	109	570	260
PT	28	102	0	62	71	149	38	291
RO	90	87	49	56	35	100	232	147
SE	7	66	411	188	714	79	749	74
SI	21	9	5	15	47	95	76	15
SK	0	6	1	3	1	2	0	15
UK	1374	358	56	82	35	96	374	119
EU Total	11125	3224	4250	4164	8094	5295	14411	4383
CH	0	3	1	0	0	1	1	0
NO	0	1	0	0	0	0	0	0

* Does not include data for 447 birds for which identification was only available to family level

ANNEX IV – OVERVIEW OF RESULTS FOR HIGHER-RISK AND OTHER SPECIES

Table 1 displays the detection of H5N1 HPAI and number of that host species sampled in each Member State.

Table 2 displays the detections of LPAI H5 reported in HRS and the number of those species sampled in each MS.

Table 3 displays the detections of LPAI H5 reported in non-HRS species and the number of those species sampled in each MS.

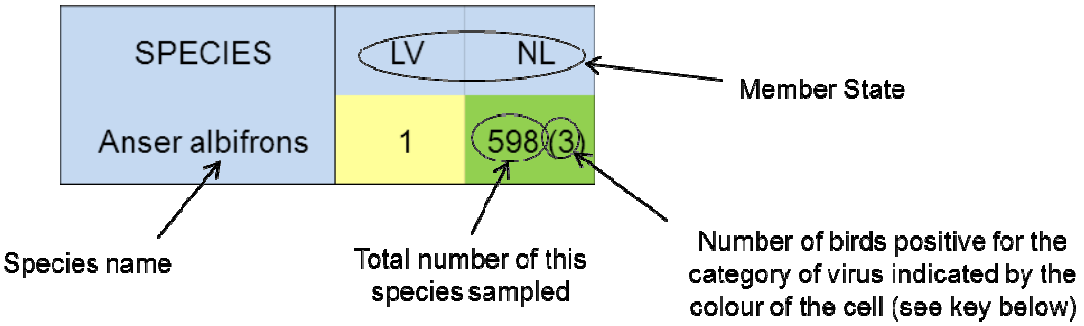
Table 4 displays the detections of LPAI H7 reported in HRS and the number of those species sampled in each MS.

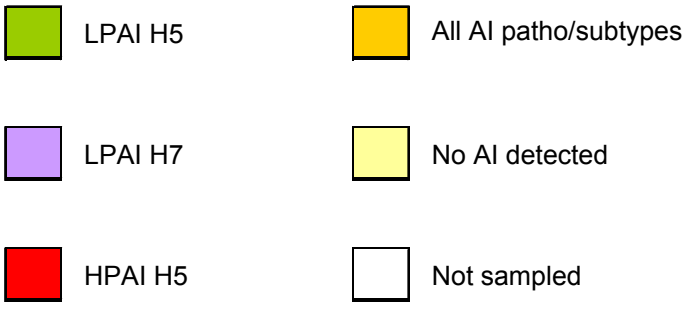
Table 5 displays detections of all AI types in HRS by MS.

Table 6 displays detections of all AI types in non-HRS by MS.

The aim of these tables is to provide context of AI detections taking into account bird species and the number of birds sampled by MS.

Key to tables





Annex IV: Table 1: Detection of H5N1 HPAI and number of that host species sampled in each Member State – EU-data only.

Species	AT	BE	BG	CY	CZ	DE	DK	EE	ES*	FI	FR	GB	GR	HU	IE	IT	LT	LU	LV	NL	PT	PT	RO	SE	SI	SK	EU Total
Buteo buteo		70	2 (1)			112	1		98	2		14		24		8				12	16		10	8	17		392 (1)
* Does not include data for 447 birds for which identification was only available to family level																											

Annex IV: Table 2: Detections of LPAI H5 (in brackets) that were reported in HRS and the number of those species sampled in each MS – EU-data only.

SPECIES	AT	BE	BG	CY	CZ	DE	DK	EE	ES*	FI	FR	GR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK	EU Total
Anas crecca						27	221 (9)		63	55	310 (5)	13	46	17	126 (1)	3		33	119	10	19	47	72 (6)			382	1563 (21)
Anas penelope						32	27 (1)		3	18	22	4		19	201 (2)			6	327 (1)				3			57	719 (4)
Anas platyrhynchos	539	535	24	1 (1)	558	2868 (19)	1156 (36)	2	2081 (2)	125	643 (8)	24	1591 (1)	5	465	312		345	4126 (1)	662 (1)	88	170	1612 (55)	106	2	218	18258 (124)
Anser albifrons	149					157	26					4	21					1	598 (3)			17					973 (3)
Anser anser	231					1780	62 (1)	1	1756	1	8								42	68 (1)	2	7	135			31	4124 (2)
Aythya ferina		7				8			201		192 (1)		6		43			22		10						240	729 (1)
Cygnus cygnus						4		1	1	16	18 (1)			5	10		10	1	1	10			5			313	395 (2)
Larus ridibundus	1	114	1		3	340	107		667		28	7	18 (1)		26			18	1606	50			24			45	3055 (1)
* Does not include data for 447 birds for which identification was only available to family level																											

Annex IV: Table 3: Detections of LPAI H5 (in brackets) reported in non-HRS species and the number of those species sampled in each MS – EU-data only.

Species	AT	BE	BG	CY	CZ	DE	DK	EE	ES*	FI	FR	GR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK	EU Total
Anas sp.				11		558 (2)			16		42	1			30					214	62					2	936 (2)
Anas strepera		2				11	74		26		30 (1)	7			88			21	47	5	30	12	11			44	408 (1)
Anser spp.						128 (1)			4											214							346 (1)
Cygnus sp.	64					434 (1)			1			1			3			5		65					3	4	580 (1)
Gallinago gallinago		3				1			3		118 (2)	1		10								8	1				145 (2)
Larus argentatus		29 (1)					70		9	12	3				3			6	95	15	1		3			4	250 (1)

* Does not include data for 447 birds for which identification was only available to family level

Annex IV: Table 4: Detections of LPAI H7 (in brackets) that were reported in HRS and the number of those species sampled in each MS – EU-data only.

Species	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	GR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK	EU Total
Anas crecca						27	221		63	55 (1)	310	13	46	17	126	3		33	119	10	19	47	72			382	1563 (1)
Anas platyrhynchos	539	535	24	1	558	2868	1156 (1)	2	2081 (1)	125	643 (10)	24	1591	5	465	312		345	4126	662	88	170	1612 (5)	106	2	218	18258 (17)
Branta canadensis		521 (1)				253	2			3	82								1			1	8			29	900 (1)

* Does not include data for 447 birds for which identification was only available to family level. Two LPAI H7 positives were detected within birds belonging to the family Anatidae.

Annex IV: Table 5: Detections of all AI types (in brackets) in HRS by MS – Non-MS data included.

SPECIES	AT	BE	BG	CY	CZ	DE	DK	EE	ES*	FI	FR	GR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK	EU Total	CH	NO
Anas acuta		1				3	95 (8)		16	6	7				26			3								305 (2)	462 (10)		
Anas clypeata							6		114	1 (1)	57 (1)	4	1	3	36			20 (1)	35 (3)							1	278 (6)		
Anas crecca						27	221 (31)		63	55 (4)	310 (46)	13	46	17 (1)	126 (3)	3		33	119 (23)	10	19	47	72 (6)			382 (1)	1563 (115)		
Anas penelope						32	27 (1)		3	18 (2)	22 (1)	4 (2)		19	201 (2)			6	327 (74)				3			57	719 (82)		
Anas platyrhynchos	539	535 (120	24	1	558 (77)	2868 (164	1156 (178	2	2081 (8)	125 (7)	643 (196	24	1591 (11)	5	465 (2)	312 (22)		345 (16)	4126 (483	662 (9)	88	170	1612 (71)	106 (6)	2	218 (6)	18258 (1376)		
Anser albifrons	149					157	26 (1)					4	21					1	598 (61)			17					973		
Anser anser	231 (7)					1780 (12)	62 (1)	1	1756 (5)	1	8								42 (1)	68 (1)	2	6	135			31 (1)	4123 (28)		
Anser fabalis						143		1		1			58			1			212 (3)	104		3					523 (3)		
Aythya ferina		7				8			201		192 (6)		6		43			22 (1)		10						240	729 (7)		
Branta canadensis		521 (1)				253 (5)	2			3	82								1			1	8			29	900 (6)		
Branta leucopsis		81				120	2	1		1									296 (25)				2			1	504 (25)		
Cygnus cygnus						4		1	1	16	18 (1)			5	10		10	1	1	10			5			313 (2)	395 (3)		
Cygnus olor	25 (1)	136			68	722 (8)	265 (2)		2	1	12	12	13	4		7			21	135 (2)		45	13	41		160 (3)	1684 (16)	2	
Fulica atra		83		2	1	352 (11)	38 (2)		802		28	4	17		24	12			57	9		103	1	2		22	1557 (13)		
Larus canus		13				49	150	1	9	1	30	7							951	85 (1)		1	2			4	1303 (1)		
Larus ridibundus	1 (1)	114	1		3	340 (2)	107 (2)		667 (1)		28 (3)	7	18 (1)		26 (1)			18	1606 (30)	50			24			45	3055 (41)		

* Does not include data for 447 birds for which identification was only available to family level. Three birds belonging to the family Anatidae were positive for AIV.

Annex IV Table 6: Detections of all AI types (in brackets) in non-HRS by MS - Non-MS data included.

Species	AT	BE	BG	CY	CZ	DE	DK	EE	ES*	FI	FR	GR	HU	IE	IT	LT	LU	LV	NL	PL	PT	RO	SE	SI	SK	UK	EU Total	CH	NO
Accipiter gentilis		152		2		10			6	14					2					5	1	1	6	1		1	202		1 (1)
Accipiter nisus		102	1			13	1 (1)		30	1			3		8						1	1	2	4		6	173 (1)		
Alopochen aegyptiacus		35				303 (1)													26	7		1					372 (1)		
Anas sp.				11		558 (11)			16		42 (3)	1			30					214 (1)	62					2	936 (15)		
Anas strepera		2				11	74		26		30 (3)	7			88			21 (1)	47 (10)	5	30	12	11			44	408 (14)		
Anser spp.						128 (1)			4											214							346 (1)		
Ardea purpurea				3					4 (1)			4	2														13 (1)		
Arenaria interpres		6 (3)							6												1						13 (3)		
Buteo buteo		70	2 (1)			112	1		98	2			24		8				12		16	10	8	17		14	394 (1)		
Cairina moschata	90								1			3 (1)							1		5	1					101 (1)		
Cygnus sp.	64					434 (4)			1			1			3			5		65					3	4	580 (4)		
Gallinago gallinago		3				1			3		118 (6)	1		10								8	1				145 (6)		
Lagopus mutus															1 (1)												1 (1)		
Larus argentatus		29 (9)					70 (2)		9	12 (2)	3				3			6	95	15	1		3			4	250 (13)		
Larus argentatus argentatus						239 (1)					8				24												271 (1)		
Larus argentatus cachinnans									17			130 (1)												5			152 (1)		
Larus melanocephalus		69					1				71 (4)	2							15								158 (4)		
Larus sp.	74 (1)	1		5		7			191				7		4 (1)					37	19	12		3			360 (2)		
Numenius arquata		6 (2)				2			1					2					1							1	13 (2)		
Phoenicopterus ruber				22					1697 (1)			1															1720 (1)		
Pica pica						11			26	1		28 (1)	13		300							73	4			2	458 (1)		
Tadorna tadorna						3	12 (1)		1			5			1				4				124			193 (2)	343 (3)		

* Does not include data for 447 birds for which identification was only available to family level. Three birds belonging to the family Anatidae were positive for AIV.

ANNEX V – SCIENTIFIC AND ENGLISH NAMES OF BIRDS SPECIES

Annex V: Table 1: All Higher Risk Species as well as all other bird species that tested positive for AI in 2010, giving English and Latin names - HRS are shown in bold.

Scientific name	English name
Accipiter gentilis	Northern Goshawk
Accipiter nisus	Eurasian Sparrowhawk
Alopochen aegyptiacus	Egyptian Goose
Anas acuta	**Northern Pintail**
Anas clypeata	**Northern Shoveler**
Anas crecca	**Eurasian Teal**
Anas penelope	**Eurasian Wigeon**
Anas platyrhynchos	**Mallard**
Anas querquedula	**Garganey**
Anas sp.	Duck spp
Anas strepera	Gadwall
Anser albifrons	**Greater White-fronted Goose**
Anser anser	**Greylag Goose**
Anser brachyrhynchus	**Pink-footed Goose**
Anser erythropus	**Lesser White-fronted Goose**
Anser fabalis	**Taiga Bean Goose**
Anser spp.	Goose spp
Ardea purpurea	Purple Heron
Arenaria interpres	Ruddy Turnstone
Aythya ferina	**Common Pochard**
Aythya fuligula	**Tufted Duck**
Branta bernicla	**Brant Goose**
Branta canadensis	**Canada Goose**
Branta leucopsis	**Barnacle Goose**
Branta ruficollis	**Red-breasted Goose**
Buteo buteo	Common Buzzard
Cairina moschata	Muscovy Duck
Cygnus columbianus	**Tundra Swan**
Cygnus cygnus	**Whooper Swan**
Cygnus olor	**Mute Swan**
Cygnus sp.	Swan spp
Fulica atra	**Eurasian Coot**
Gallinago gallinago	Common Snipe
Lagopus mutus	Rock Ptarmigan
Larus argentatus	European Herring Gull
Larus argentatus argentatus	Scandinavian Herring Gull
Larus argentatus cachinnans	Caspian Gull
Larus canus	**Common Gull**
Larus melanocephalus	Mediterranean Gull
Larus ridibundus	**Black-headed Gull**
Larus sp.	Gull spp
Limosa limosa	**Black-tailed Godwit**

Marmaronetta angustirostris	**Marbled Duck**
Netta rufina	**Red-crested Pochard**
Numenius arquata	Eurasian Curlew
Philomachus pugnax	**Ruff**
Phoenicopterus ruber	American Flamingo
Pica pica	Eurasian Magpie
Pluvialis apricaria	**European Golden Plover**
Tadorna tadorna	Common Shelduck
Vanellus vanellus	**Northern Lapwing**

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