Lessons learnt from harmonised wild bird surveillance for Highly Pathogenic Avian Influenza

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Background

- Migratory wild birds have been implicated in the transmission of highly pathogenic avian influenza (HPAI) H5 of Asian origin to the European continent.

- Multiple incursions between 2005 and 2018 have resulted in two major epizootics within the European poultry industry. HPAI H5N1 clade 2.2 in 2005 – 2007, with sporadic detections in the following years and HPAI H5Nx clade 2.3.4.4 in 2014 – 2018, resulting in a major epizootic 2016/17.

Active surveillance
Active surveillance is initiated by the sampler and birds are targeted within the population irrespective of their disease status. This includes hunting activities where the birds are subsequently designated as clinically healthy or sick, as well as sampling live healthy birds.

Passive surveillance
Passive surveillance is initiated by a dead or moribund animal, which is then detected by a person and submitted for sampling. This includes sampling birds found dead, injured or alive but displaying clinical signs.

Overview

Figure 1. Number of wild bird sampled for Avian Influenza in the European Union and number of Highly Pathogenic Avian Influenza detections for active and passive surveillance activities
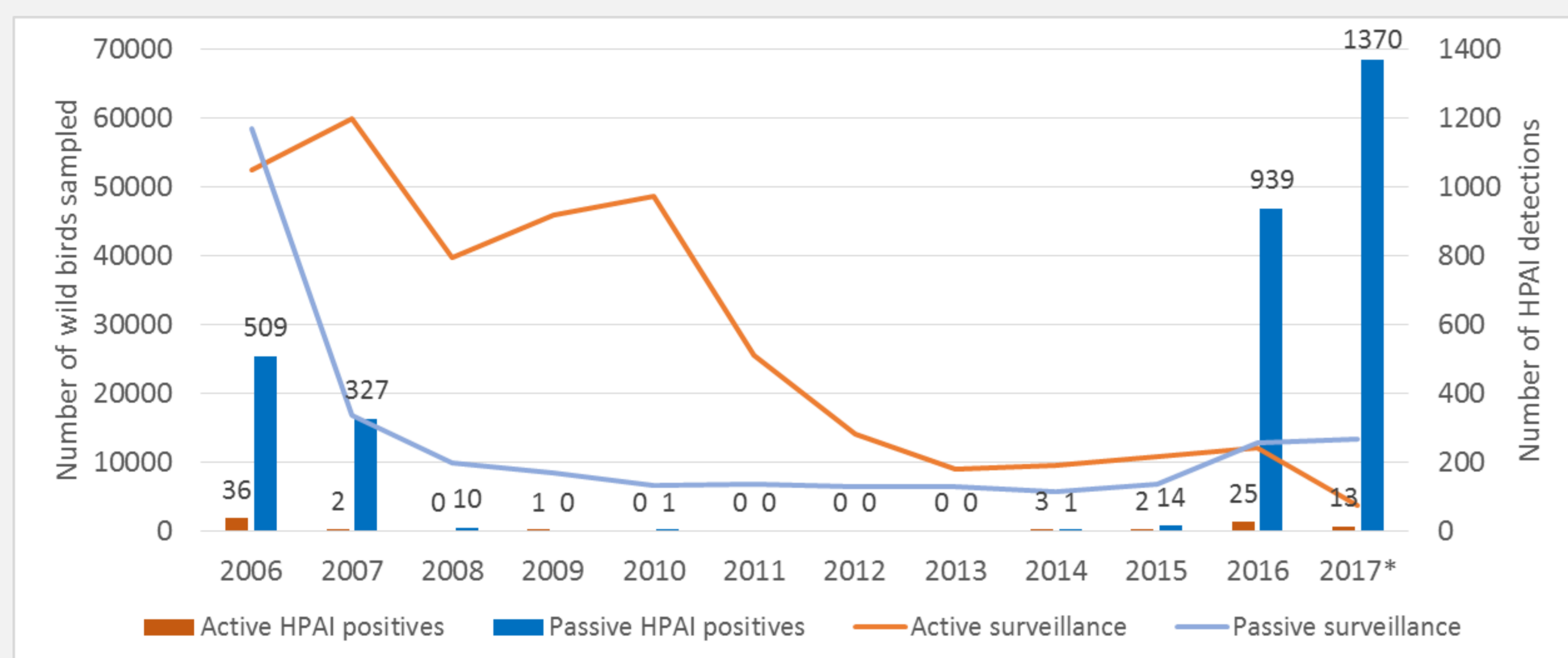

Table 1. Proportion of HPAI positive detections by surveillance type and year

Year	2006*	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017‘
Active	0.10%	0.003%	-	0.002%	-	-	-	-	0.03%	0.02%	0.20%	0.40%
Passive	0.90%	2.00%	0.10%	-	0.01%	-	-	-	0.02%	0.20%	7.30%	10.20%

*February to December 2006,
‘January to April 2017

Surveillance activities

Elements of both active and passive surveillance had a higher proportion of HPAI detections (**Table 2**).

The highest proportion of HPAI positives were detected in birds that were '**found dead**', through passive surveillance (2.1%).
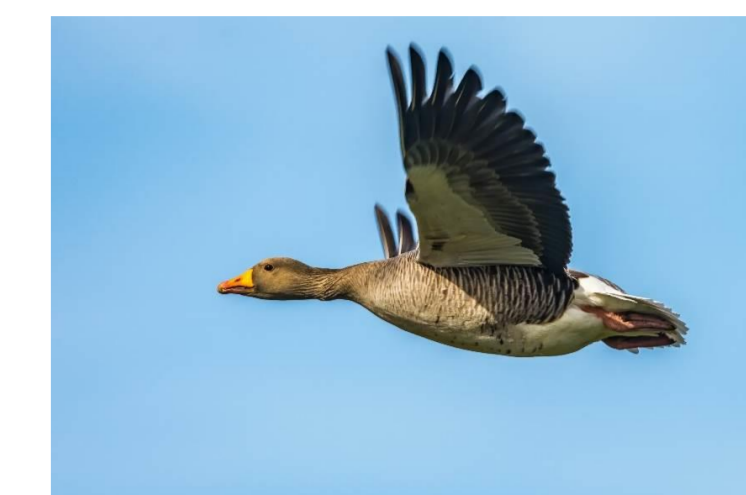
The next highest proportion of positive HPAI detections was in birds that were '**hunted with clinical signs**', an active surveillance activity (1.3%).

Table 2. Number and proportion of wild birds tested and found positive for HPAI by surveillance activity, Feb 2006 to April 2017

| Surveillance activity	No. birds tested	No. HPAI positive	Proportion HPAI positive
Passive surveillance	**158,574**	**3,037**	**1.9%**
found dead	139,230	2,923	2.1%
live with clinical signs	2,538	20	0.8%
Injured	16,806	94	0.6%
Active surveillance	**331,570**	**82**	**0.02%**
hunted with clinical signs	1,057	14	1.3%
hunted without clinical signs	66,799	25	0.04%
live without clinical signs	263,714	43	0.02%
All surveillance	**490,144**	**3,119**	**0.6%**

Seasonality

Detections of HPAI were most frequently made in the colder months, with the initial incursion into Europe coinciding with the autumn arrival of migratory birds overwintering in the EU.

In summer 2007 a mass mortality event was reported in Germany, accounting for most of the 2007 detections, however HPAI was also reported by the Czech Republic and France at this time.

Figure 2. Detections of HPAI in wild birds by month for H5N1 (clade 2.2) in Feb 2006 to Dec 2007 and H5Nx (clade 2.3.4.4) in 2016 to April 2017
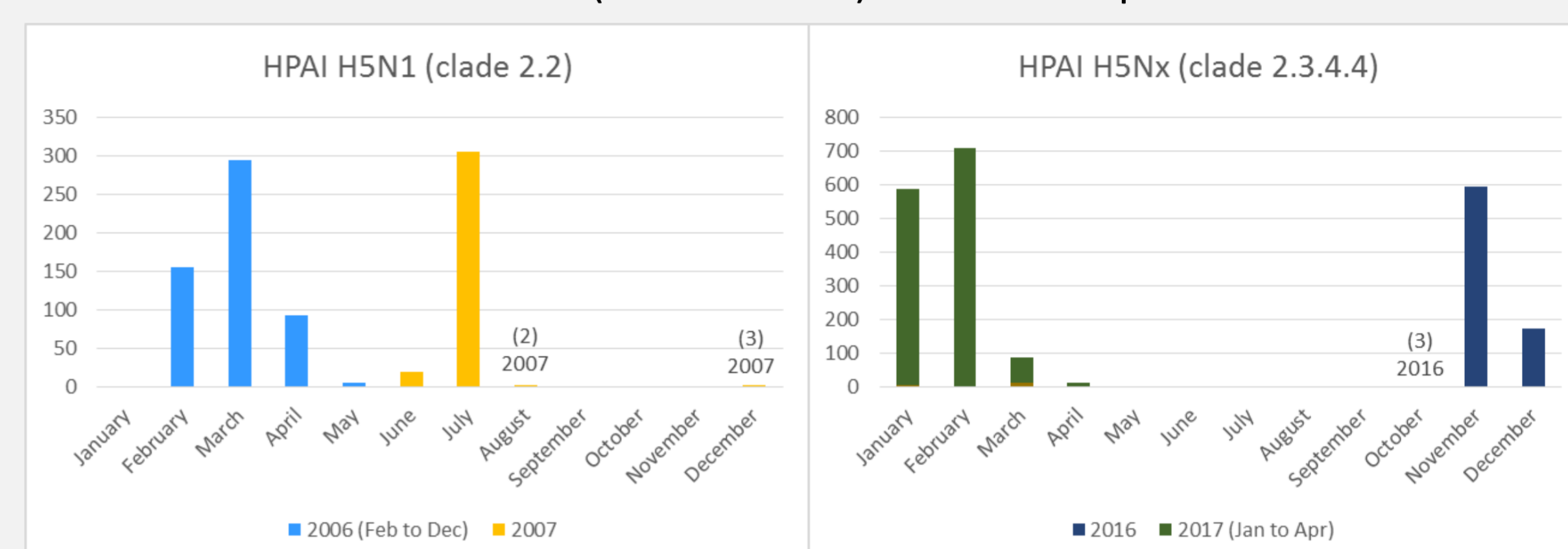
Seasonality within species groups

During the HPAI H5Nx (clade 2.3.4.4) outbreak in 2016/17, the seasonality of HPAI within species groups varied. In autumn and early winter 2016 HPAI was frequently detected in duck and gull populations (November to December). As winter progressed and in early spring the main species groups with detections of HPAI were swans and geese (January to mid-March).

Figure 3. Species groups with detections of HPAI during the 2016/17 epizootic
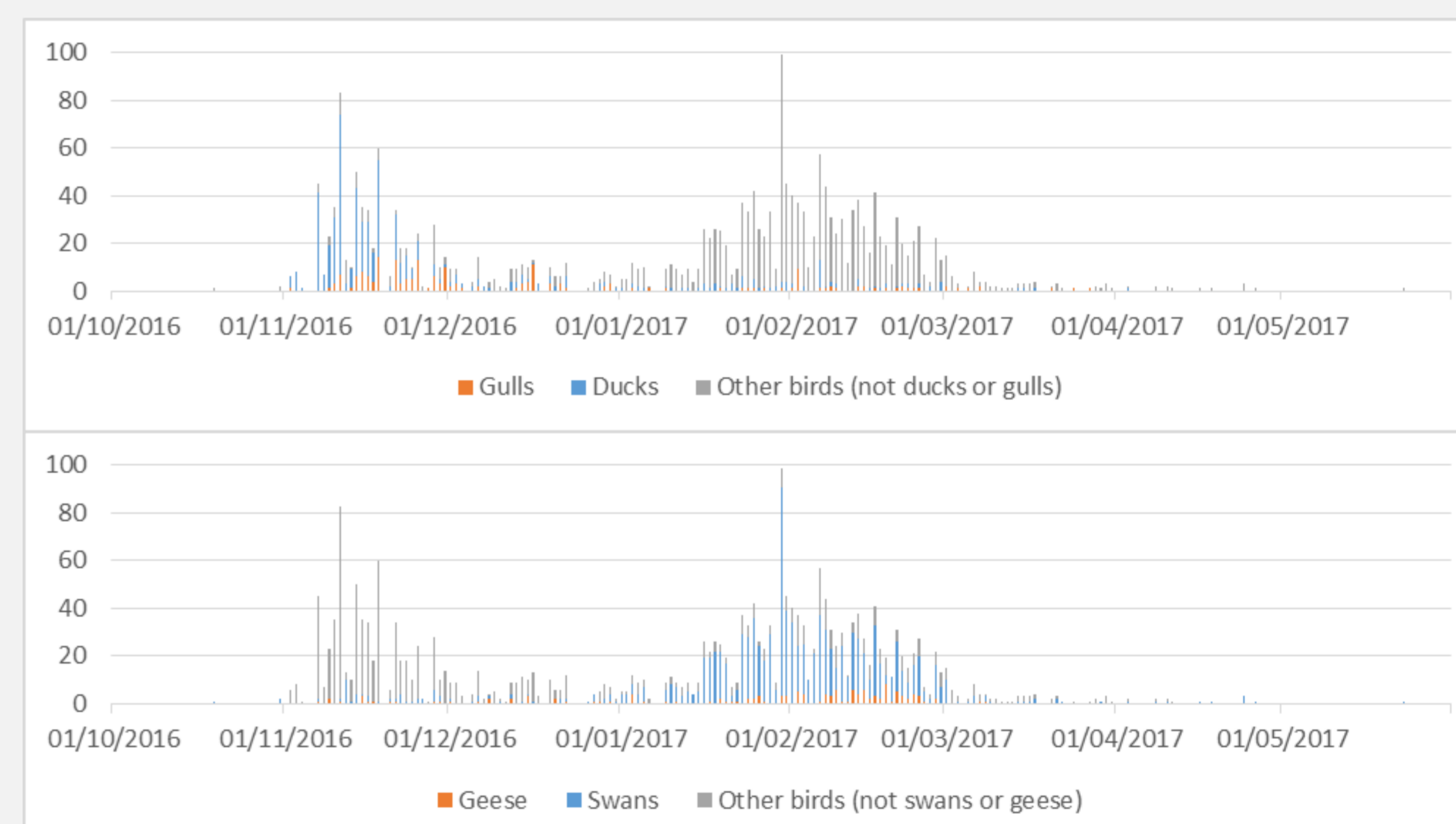
Species with HPAI detections

Table 3. Species ranked by proportion of HPAI positive detections made by passive surveillance between 2014 and 2017, and the rank for those species in 2006 to 2010

Rank	Species	Proportion HPAI positive (no. positive/no. tested) (2014 to April 2017)	Rank* (2006 to 2010)
1	Greater Scaup (*Aythya marila*)	75% (n=9/12)	N/D
2	Tufted Duck (*Aythya fuligula*)	54% (n=337/627)	5
3	Great Black-backed Gull (*Larus marinus*)	53% (n=31/58)	N/D
4	Dalmatian Pelican (*Pelecanus crispus*)	48% (n=11/23)	N/D
5	Black Swan (*Cygnus atratus*)	35% (n=6/17)	N/D
6	European Herring Gull (*Larus argentatus argentatus*)	30% (n=56/185)	N/D
7	Common Pochard (*Aythya ferina*)	26% (n=25/97)	14
8	Mute Swan (*Cygnus olor*)	24% (n=637/2623)	11
9	Whooper Swan (*Cygnus cygnus*)	23% (n=124/551)	9
10	Common Eider (*Somateria mollissima*)	17% (n=4/23)	N/D
11	Eurasian Wigeon (*Anas penelope*)	17% (n=8/48)	N/D
12	Common Goldeneye (*Bucephala clangula*)	17% (n=3/18)	N/D
13	Little Grebe (*Tachybaptus ruficollis*)	15% (n=4/27)	8
14	Lesser White-fronted Goose (*Anser erythropus*)	14% (n=3/21)	N/D
15	Greylag Goose (*Anser anser*)	12% (n=64/523)	20

*N/D = Not detected

Key Messages

- **Surveillance type:** Overall, passive surveillance was more effective at detecting HPAI than active surveillance.

- **Seasonality:** There is a winter bias in detections, but there is also potential for sporadic cases in summer.

- **Species:** For HPAI H5Nx clade 2.3.4.4 viruses, an expanded host range was seen, but for introduction and spread migratory waterfowl were key.

- This data was the basis for defining a new higher risk species list for targeted passive surveillance (Brown et al., 2017).

Reference: Brown, Ian, et al. "Avian influenza overview September–November 2017." EFSA Journal 15.12 (2017).