

# Rapid Risk Assessment

## HPAIV H5 in Germany



In Germany, around 1,200 HPAIV H5 cases in wild birds and 245 outbreaks in poultry and captive birds have been detected since 30. October 2020, six of them in captive birds. In addition, 20 European countries reported new outbreaks of HPAIV subtype H5 in captive birds and wild birds. However, in Germany, a reduction in the number of new outbreaks and cases has been observed in recent days. The risk of spread in waterfowl populations and disease introduction in poultry farms and captive birds is now considered to be moderate. Equally, there is a moderate risk of introduction of HPAIV subtype H5 through virus spread between poultry farms within Germany. Trade with live poultry, including movements between EU member states with high trade volumes, continues to carry a high risk. Biosecurity measures in poultry holdings should be reviewed and optimized where possible.

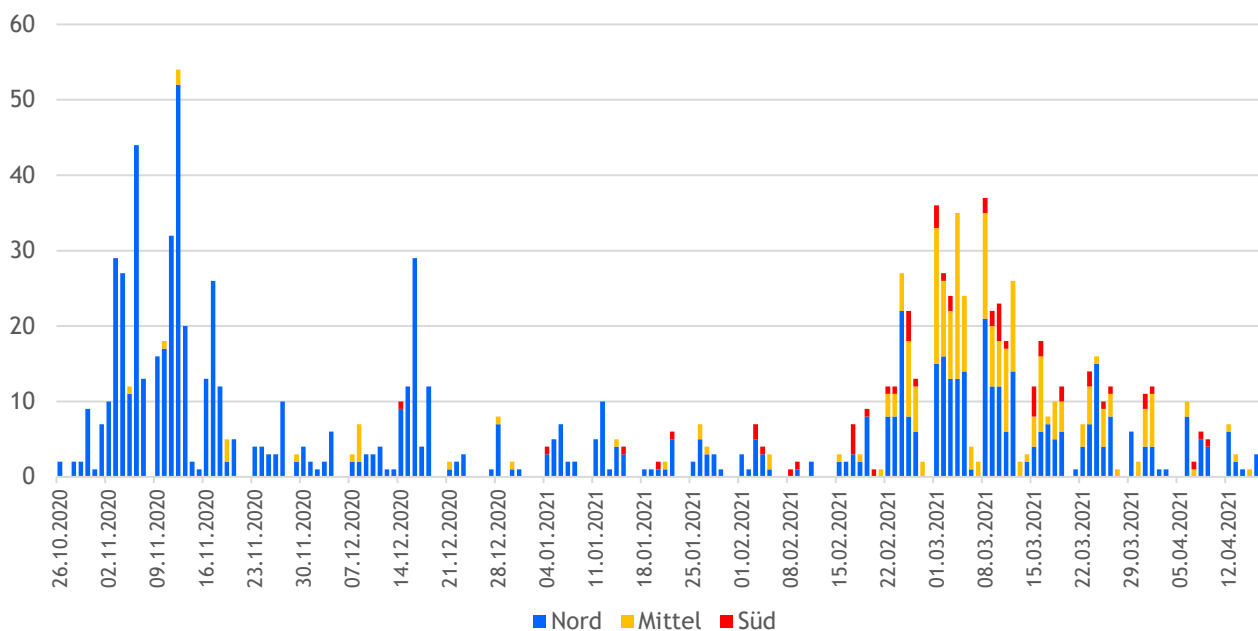
## Rapid Risk Assessment for the introduction and further spread of HPAIV H5 in Germany

### Background

The risk assessment from 25.03.2021 concerned HPAIV H5 events in Germany and Europe. Recently updated sections are highlighted in yellow and include data up until 20.04.2021.

#### Situation in Germany

Since 30 October 2020, HPAIV H5-infected wild birds have been identified predominantly in dead birds on almost a daily basis and subsequently reported via the German Animal Disease Notification System (Tierseuchennachrichtensystem, TSN; Fig. 1). Fourteen federal states are affected thus far (here in chronological order of occurrence of cases): Schleswig-Holstein, Hamburg, Mecklenburg-Western Pomerania, Lower Saxony, Brandenburg, Bremen, Saxony, North Rhine-Westphalia, Bavaria, Berlin, Hesse, Baden-Württemberg, Thuringia and Rhineland-Palatinate (Fig. 2). Cases in wild birds are slowly decreasing (Fig. 1).



**Figure 1:** Chronology of reported HPAIV H5 cases in wild birds by time of sampling, roughly divided into northern (blue), central (orange) and southern (red) Germany. Northern Germany (blue): Bremen, Hamburg, Mecklenburg-Western Pomerania, Schleswig-Holstein, Lower Saxony north of Hanover; Central Germany (Yellow): Berlin, Brandenburg, Hesse, Lower Saxony south of Hanover, North Rhine-Westphalia, Saxony, Saxony-Anhalt, Thuringia; Southern Germany (red): Baden-Württemberg, Bavaria, Rhineland-Palatinate (as of 20.04.2021).

The following federal states reported a total of 245 outbreaks in poultry including outbreaks in captive birds as of 03 November 2020: Schleswig-Holstein (n=10), Mecklenburg-Western Pomerania (n=25), Lower Saxony (n=67), Brandenburg (n=11), Saxony (n=8), Hesse (n=1), Thuringia (n=36), Bavaria (n=12) and Rhineland-Palatinate (n=1), North Rhine-Westphalia (n=11), Berlin (n=1) and Saxony-Anhalt (n=2) (Fig. 2, 5; Table 1). The outbreaks mostly affected commercial farms (n=169), small non-commercial farms (n=70) and six zoos/private bird holdings. Since 22.03.2021, 111 new outbreaks in poultry have been reported, mostly due to secondary spread of virus. Originating from a poultry farm in the district of Paderborn, HPAIV H5N8 spread mainly to small holdings in Baden-Württemberg and Thuringia, through the distribution of live poultry via

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trade routes. Most outbreaks (n=65) were detected between 31.03. and 04.04.2021. More details in relation to outbreaks since 03.22.2021 can be found in Table 1.

**Table 1:** Confirmed HPAIV H5 outbreaks in poultry and kept birds since 23.03.2021 in Germany. Source: TSN (20.04.2021)

Bundesland	Municipality	Affected poultry	Production type	Confirmation
Bavaria (4)	Schwandorf	Geese	Breeding	29.03.2021
	Ebersberg	Chicken	Layer	29.03.2021
	Mühlendorf am Inn	Chicken	Breeding	31.03.2021
	Erding	Duck	Fattening	31.03.2021
Baden-Württemberg (60)	Böblingen	Chicken	Layer	28.03.2021
	15 x Breisgau-Hochschwarzwald	Chicken	Hobby / Layer	24.3.-6.4.2021
	5 x Emmendingen	Chicken	Hobby	25.3.-1.4.2021
	5 x Freiburg im Breisgau	Chicken	Hobby	25.3.-1.4.2021
	3 x Lörrach	Chicken	Layer	31.03.2021
	Ludwigsburg	Chicken	Layer	25.03.2021
	2 x Ortenaukreis	Chicken	Hobby	31.03.2021
	4 x Ravensburg	Chicken	Hobby	1.4./4.4.2021
	Rems-Murr-Kreis	Chicken	Layer	23.03.2021
	Rottweil	Chicken	Hobby	31.03.2021
	5 x Schwarzwald-Baar-Kreis	Chicken	Hobby / Layer	31.03.2021
	17 x Waldshut	Chicken	Hobby	31.3./3.4.2021
Mecklenburg-Western Pomerania (1)	Landkreis Rostock	Turkey	Fattening	27.03.2021
Lower Saxony (2)	Cloppenburg	Turkey	Fattening	24.03.2021
	Emden	Chicken	Hobby	28.03.2021
North Rhine-Westphalia (5)	Paderborn	Ostriches	Fattening	02.04.2021
	Paderborn	Chicken	Layer	10.04.2021
	Paderborn	Strauße	Hobby	14.04.2021
	Märkischer Kreis	Chicken	Layer	02.04.2021
	Warendorf	Chicken	Hobby	15.04.2021
Thüringia (35)	Erfurt	Chicken	Layer	27.03.2021
	2 x Jena	Chicken	Hobby	29.03.2021
	9 x Saale-Holzland-Kreis	Chicken	Hobby	26.3.-1.4.2021
	Saalfeld-Rudolstadt	Chicken	Layer	01.04.2021
	2 x Sömmerda	Chicken	Layer	27.-29.03.2021
	Weimar, Stadt	Chicken	Layer	01.04.2021
	19 x Weimar-Land	Chicken	Layer	24.3.-2.4.2021
Saxony (4)	2 x Vogtlandkreis	Chicken	Layer	26.03.2021
	Mittelsachsen	Chicken	Hobby	26.03.2021
	Meißen	Chicken	Layer	30.03.2021

In wild birds, HPAIV H5 was most frequently detected in samples from dead barnacle geese (*Branta leucopsis*), wigeon (*Mareca penelope*) and other goose species. Other affected bird species groups include gulls, snipe, owl and raptors (Fig. 4), including individual peregrine falcons (*Falco peregrinus*), white-tailed sea eagles (*Haliaeetus albicilla*) and eagle owls (*Bubo bubo*).

Within one month, and since 23.03.2021, close to 200 wild birds in 12 federal states have been tested positive for HPAIV H5 (Fig.3).

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The number of cases in wild birds, which had risen sharply again since February, is now slowly declining. Currently, mainly geese (greylag and barnacle geese) have succumbed to infection (Table 3; Fig. 4). Since the end of March, there has been a noticeable increase in the number of cases with the H5N1 strain, mainly in wild geese in Lower Saxony in the districts of Leer, Ammerland and Osterholz, as well as in the districts of Nordfriesland and Steinburg in Schleswig-Holstein (Table 2).

Several virus subtypes circulate in wild bird populations (Table 2). Double infections were identified in a wigeon (H5N8+H5N1) and a white-tailed eagle (H5N8+H5N5).

**Table 2:** HPAIV H5 reassortants (subtypes) of clade 2.3.4.4B in wild birds since 01.10.2020 in Germany. Source: TSN. Status: 23.03.2021

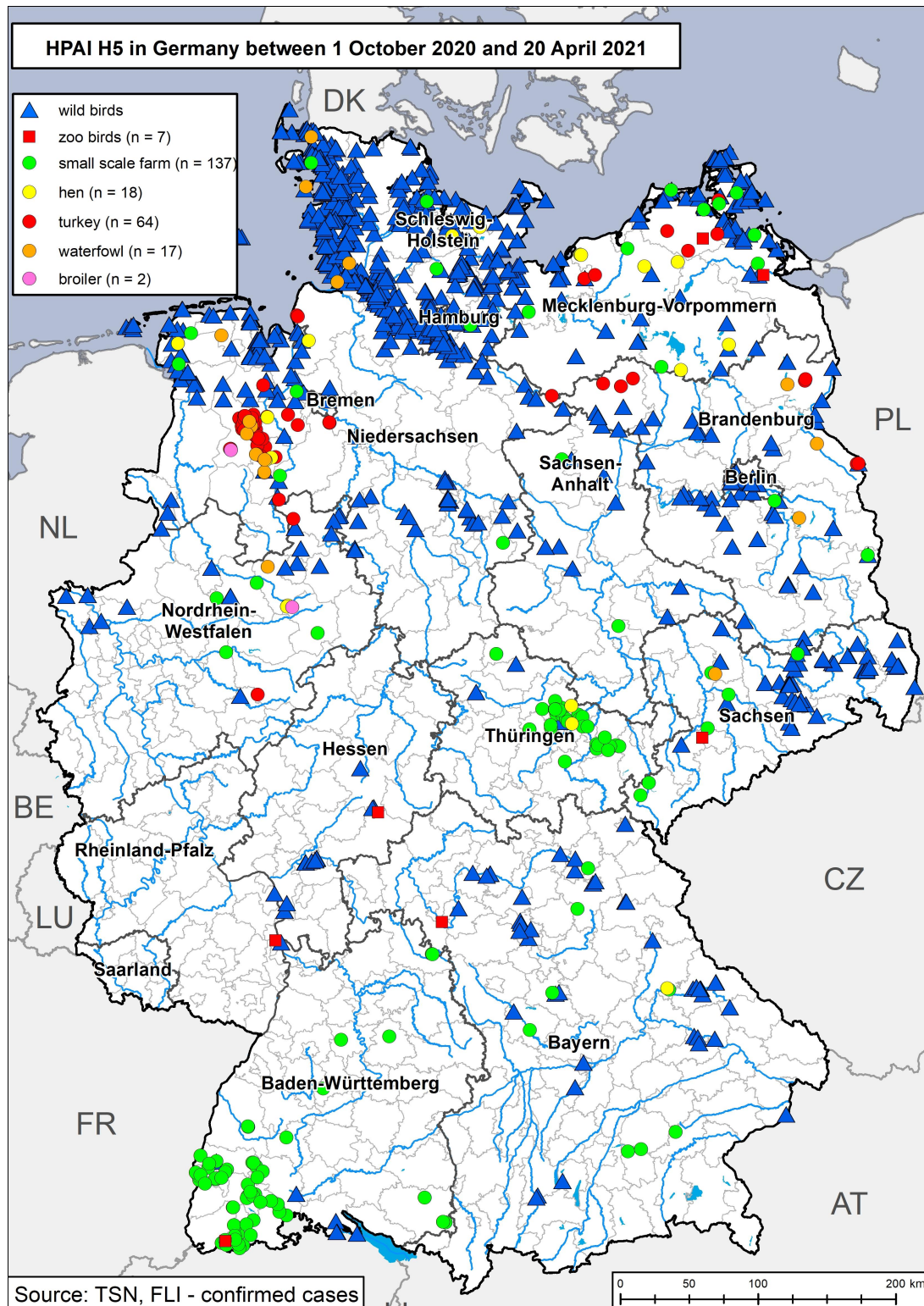
Subtype (reassortant)	proportion	Affected bird species or groups
H5N8	N=941; 91%	ducks, geese, swans all species, birds of prey, owls, gulls, heron, oystercatcher, lap wing, whimbrel, curlew, curlew sandpiper, corvids
H5N3	N=36; 4%	red knot, curlew, peregrine falcon
H5N5	N=23; 2%	Eider duck, wigeon, mallard duck, Canada goose, barnacle goose, bean goose, buzzards, black-headed gull, herring gull, mute swan, crow
H5N4	N=9; 1%	tufted duck, geese, peregrine falcon, herring gull, swans
H5N1	N=22; 2%	barnacle goose, greylag goose, swan, buzzard

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**Table 3:** Reports received from the following regions or waters since 23.03.2021, see also Figure 3:

Bundesland	District	Affected waterbodies/regions	Affected bird species or groups
Berlin		Berlin (Landwehrkanal Friedrichshain-Kreuzberg, Havel, Spree Alt-Treptow)	mute swan, goshawk
Brandenburg	Barnim Dahme-Spreewald Elbe-Elster Oberspreewald-Lausitz Prignitz Uckermark Teltow-Fläming	Borcheltsbusch und Brandkieten, area Biesenthaler Becken, Kiebitzer Baggerteich, isle pond Sassleben, Rosateich bei Ortrand, Nationalpark Unteres Odertal Crieven, Blankensee, Cederbach Garz	mute swan, common buzzard, white-fronted geese, unspecified geese
Baden-Württemberg	Emmendingen	Renaturierte Elz Köndringen	goose merganser
Bavaria	Cham Ingolstadt Hof Erlangen-Höchstadt Weißenburg-Gunzenhausen Kitzingen	Rettenbacherweiher Weiding, Schutter in Ingolstadt, Neumühlenweiher, Regen Laichstätt, Sächsische Saale in Hof, Pentlinger Bach bei Radling, ponds at Oberlindach, farmland Unterwurmbach, Main at Schwarzach, Pösinger See	greylag geese, swans, Egyptian goose
Hamburg		Öjendorfer See, Dove Elbe, Alster, Osterbekkanal Dulsberg, Westensee Allermöhe, Nettelburg	geese, common buzzard, Jay
Mecklenburg-Western Pomerania	Nordwestmecklenburg Ludwigslust-Parchim Vorpommern-Rügen	Plauer See, Wieker Bodden, Rupensdorfer city pond Schönberg, coast baltic sea Kalkhorst, Warnowgraben	greylag goose, barnacle goose, common buzzard, mute swans
Lower Saxony	Leer Ammerland Schaumburg Osterholz Hannover Wolfsburg, Peine Oldenburg Lüchow-Dannenberg Vechta, Stade, Emsland Grafschaft Bentheim Wittmund, Lüneburg Wolfsburg	Emsauen, Zwischenahner Meer Bad Zwischenahn, Deichvorland municipality Jemgum/Ems, south Wesergebirge/Weser, Ellernteich bei Rastede, Ems in Leer, Annateich Kleefeld Hannover, Maschsee Hannover, between Ems und Leda, farmland around Jeddeloh, Westermoor, Sillingsee bei Bookholzberg, Gümser See Seedorf, Irenensee Dahrenhorst, outskirts Lohne, farmland at Katensen, Hinnebecker Fleth, Laascher See, Vechte bei Isterberg, coast at Neuharlingersiel, Weser south of Brake, Weiher Stadthagen, Elbe Seitenkanal Lüneburg	greylag geese, pheasant, goshawk, buzzards, barnacle geese, bean goose, owl
North-Rhine Westfalia	Minden-Lübbecke Olpe Herford Gütersloh Lippe	Pons close to Weser north of Minden, Lahder Marsch, Kurpark Bad Holzhausen, Lenne in Finnentrop, Baringer Bach Lenzinghausen, forest between Amshausen und Hoberge, Sandgrube Grastrup	geese, heron, birds of prey, eagle owl, sparrow hawk, swans
Schleswig-Holstein	Nordfriesland Herzogtum Lauenburg Rendsburg-Eckernförde Steinburg Plön Stormarn Ostholstein Lübeck Segeberg Flensburg Schleswig-Flensburg	Treene, Lauenburger Elbvorland, Coast Sylt (Rantumer Becken), farmland south of Bordesholm, Fleemhuder Meer, farmland at Birkenmoor, Elbe Bloemesche Wildnis, Großer Plöner See, Schwentine, farmland at Siek, Kurpark Schwartau, Marina Heiligenhafen, Baltic Sea coast Scharbeutz, Lübeck, Elbe bei Glückstadt, farmland at Agethorst, forest Trittau, Großer Segeberger See, airport Flensburg, Nehmser See, Mitten im Nirgendwo-Krems II, Kaltenkirchen, Neversdorfer See, farmland Melsdorf, Wieler See, Lütjensee, Hamfelder Beek, Großensee, Schlei, Wardersee	swans, geese, birds of prey, gulls, cormorant
Saxony	Sächsische Schweiz-Ostergebirge, Börde, Meißen, Bautzen	Moritzburger Castle pond, Niederer Großteich Bärnsdorf bei Moritzburg, Pirna, Schwaneberg	greylag geese, swans, ducks
Saxony-Anhalt	Stendal	City pond in Stendal	Unspecified goose
Thuringia	Weimar	farmland northeast of Weimar	buzzard

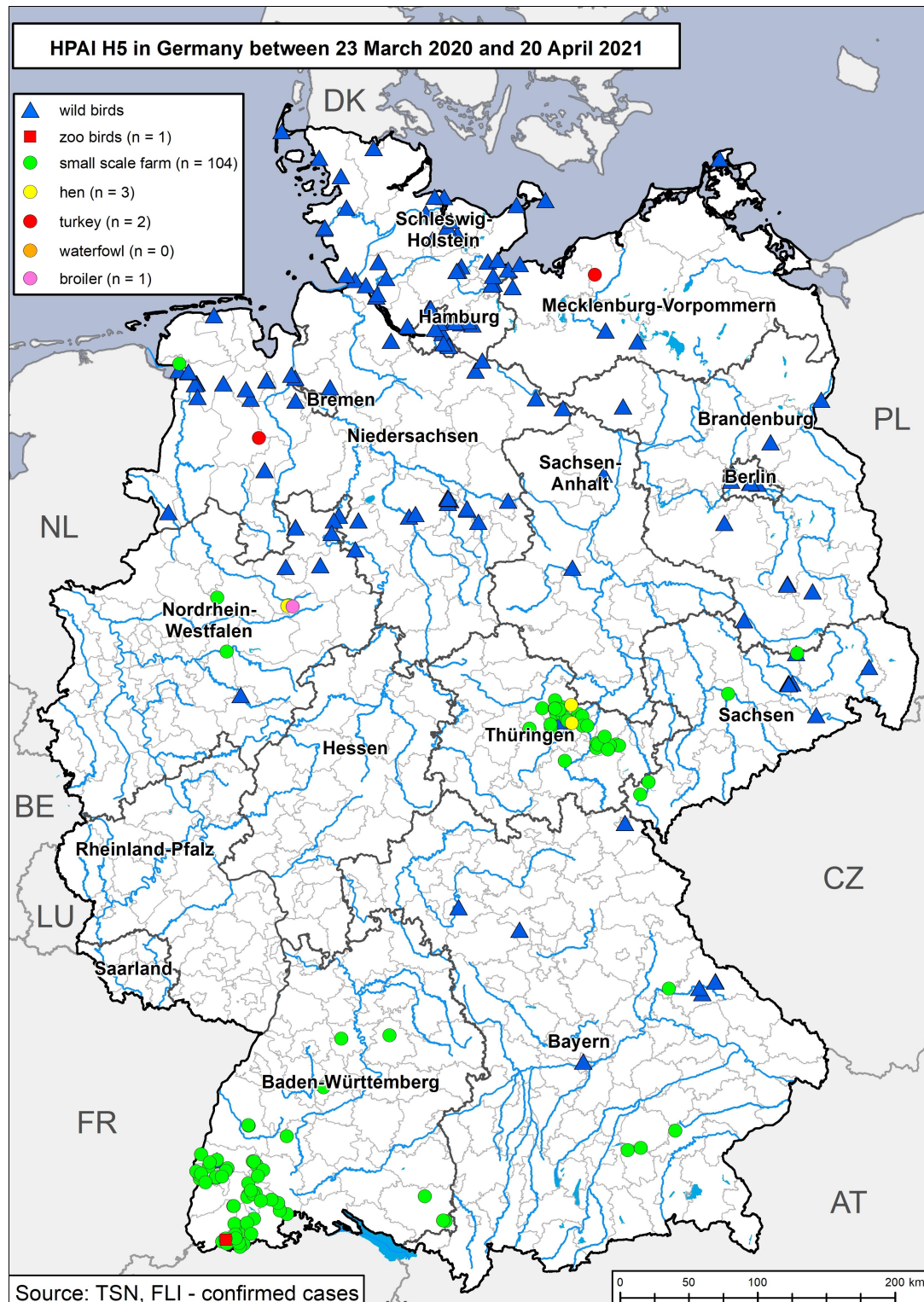
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**Figure 2:** HPAIV H5 outbreaks in poultry and captive birds and cases in wild birds in Germany reported via TSN since 01 October 2020. (date: **20.04.2021**). Symbols: See legend. Small-scale farming refers to poultry farms with up to 500 birds.

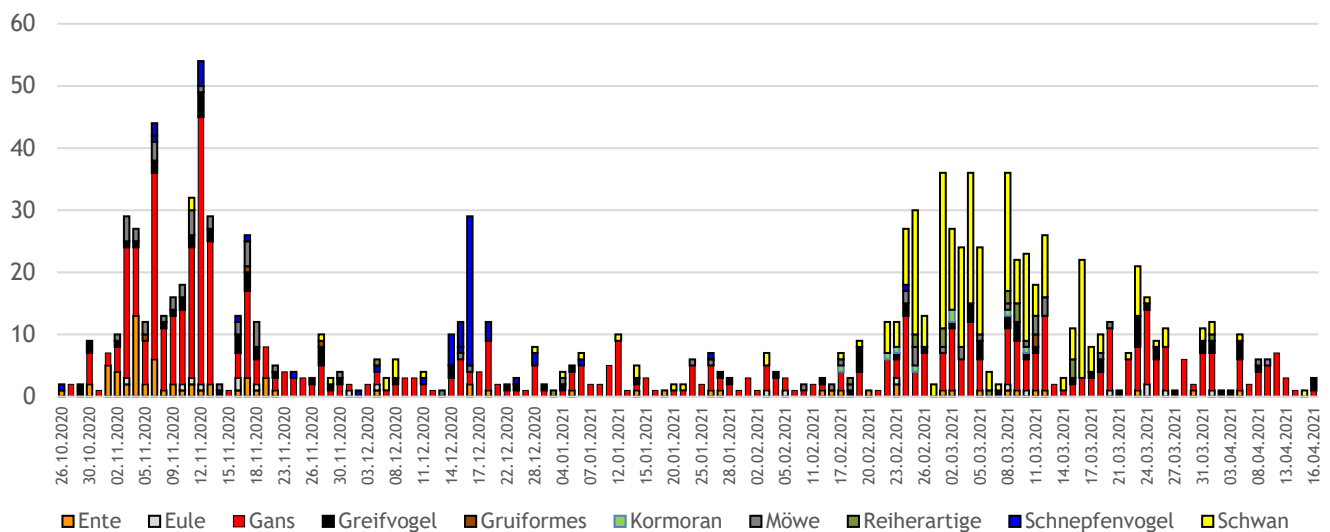


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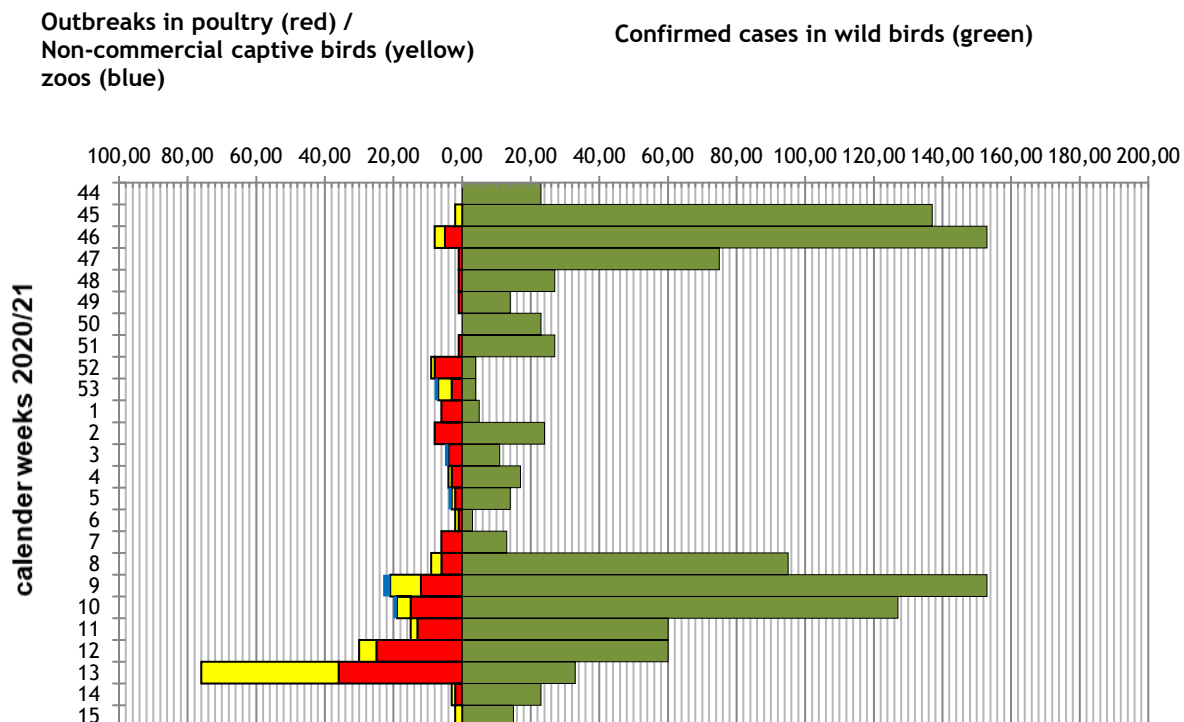


**Figure 3:** HPAIV H5 outbreaks in poultry and captive birds and cases in wild birds in Germany reported via TSN since March 23<sup>rd</sup> 2021. (date: 20.04.2021). Symbols: See legend. Small-scale farming refers to poultry farms with up to 500 birds.

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**Figure 4:** Chronological sequence of reported HPAIV H5 cases in wild birds by time of sampling, divided by bird group (orange=duck; grey=owl; red=goose; black=bird of prey; brown= gruiformes; green=cormorant; grey=gull; dark green=herons; blue=snipe bird; yellow=swan). Three waves can be identified: Wave 1: November 2020 predominantly in barnacle geese and wigeons; Wave 2: mid-December to end of December 2020 predominantly in red knots; Wave 3: since the end of February predominantly in swans and geese (Grey-lag and Canada geese) (status: 23.03.2021).



**Figure 5:** HPAIV H5 cases and outbreaks in poultry/captive birds on a weekly basis (date of sampling) between 26.10.2020 and 20.04.2021. Source: TSN.



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Epidemiological situation in Europe between 23.03.2021 and 20.04.2021 (fig. 6, table 4)

Many European countries are reporting new cases of HPAI in poultry or wild birds on a daily basis; a total of 833 outbreaks in poultry and 30 in captive birds, amounting to the loss of millions of birds, have been reported from 27 European countries, excluding Germany. Since 23.03.2021, nine European countries reported a total of 180 new HPAI outbreaks, Poland alone issued 149 new reports. Seventeen European countries reported 141 new wild bird cases to the European Animal Disease Notification System (ADNS). Greece and Serbia announced their first cases in wild birds related to the current epidemic.

While in France far fewer outbreaks have been recorded in wild birds and only three new outbreaks in poultry: broilers and ducks in southern France and 1 outbreak in a mixed holding in western France, Poland reported 149 new outbreaks in poultry since 23.03.2021, mainly in chickens and ducks. In total, more than four million birds have been affected, from both small-scale and commercial holdings. In addition, 32 new wild bird cases with HPAIV H5N8 have been detected in Poland (mute swan, raven, buzzard and white stork). Since April 20<sup>th</sup>, a further 51 outbreaks have occurred in poultry in Poland, scattered across the country and affecting different types of poultry and holdings of all sizes.

The Netherlands reported 6 new wild bird cases since the end of March, mainly HPAIV H5N1 (greylag and barnacle geese and a guillemot), but also HPAIV H5N8 (barnacle goose and buzzard).

Belgium reported an outbreak in captive birds on 15 April.

Denmark reported HPAI H5 wild bird cases since the end of March, the majority of which were geese (greylag and barnacle geese) and birds of prey (buzzard, goshawk, peregrine falcon) that tested HPAIV H5N8 positive. In one case, HPAIV H5N1 was detected in a Barnacle goose and HPAIV H5N5, one case each, in a jackdaw, mute swan, peregrine falcon and common buzzard. In addition, in one small private holding, keeping four chickens only, HPAIV H5N5 was also identified. On 20.04.2021, an outbreak of HPAIV H5N8 was also confirmed in a large commercial holding with almost 20,000 waterfowl (ducks and geese).

Since April, Greece reported a total of five HPAIV H5N8 positive Dalmatian pelicans found dead in the Prespes National Park in the North-West and the Kerkira National Park in the North-East of the country and at Lake Kastoria.

Sweden has reported further cases of HPAIV H5 in wild birds since the end of March, mainly of the H5N8 subtype (geese, swans, Peregrine falcons, Mergansers). HPAIV H5N5 was detected in a mute swan and in one eagle owl. In addition, three outbreaks were detected in poultry, two in private holdings (HPAIV H5N8, HPAIV H5N5). On 20.04.2021 one outbreak caused by HPAIV H5N8 in a large organic laying hen holding with almost 20,000 chickens was identified.

Norway reported six cases of HPAIV H5N8 in swans, greylag geese and Canada geese as of 20.03.2021.

Hungary reported one HPAIV H5N8 outbreak on 13.04.2021 in a holding keeping close to 12,000 turkeys.

The Czech Republic reported new HPAIV H5N8 cases exclusively in poultry (n=22) and captive birds (n=1) since 23.03.2021. These include 11 commercial duck holdings totalizing almost 100,000 ducks but also a number of small-scale farms, on all of which exclusively HPAIV H5N8 was detected.

Romania reported HPAIV H5 in 12 mute swans in a lake near the Black Sea on 09.04.2021.

In Croatia, a third dead HPAIV H5N8 positive swan was reported on 23.03.2021.

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In Finland, a total of eight new HPAIV H5 cases have been reported in dead wild birds (6 mallards, goshawk and whooper swans) since the end of March.

In Estonia, six new HPAIV H5N8-positive swans have been reported since 22.03.2021.

Lithuania also reported a total of 4 HPAIV H5 cases in mute swans since 22.03.2021.

Serbia reported, retrospectively, a total of three HPAIV wild bird cases to ADNS on 06.03, 12.03 and 18.03.2021 without providing detailed information.

The Ukraine reported a total of 90 HPAIV H5 positive mute swans from Kherson oblast near the Black Sea on 23.03.2021.

The United Kingdom reported three wild bird cases to the OIE, in one case HPAIV H5N1 in a red kite, HPAIV H5N8 in pheasants and a peregrine falcon. In Utttoxeter, an outbreak with HPAIV H5N8 was detected in a holding with 1,557 birds on 21.03.2021.

Russia reported a total of 100 cases of HPAIV H5N5 in Dalmatian pelicans from the West coast of the Caspian Sea to the OIE at the end of March.

**Table 4:** Reports of HPAIV H5 outbreaks in captive birds and confirmed cases of HPAIV H5 in wild birds in Europe. Source: ADNS, OIE (date: 20.04.2021).

Country	HPAIV in wild birds*	HPAIV outbreaks in poultry*	HPAIV outbreaks in captive birds (zoo)*	Total*
France	19 (+3)	484 (+3)	1 (+1)	504 (+7)
Italy	18	3		21
Netherlands	73 (+6)	11	11	95 (+6)
Belgium	25	2	2 (+1)	29 (+1)
United Kingdom	124 (+3)	20 (+1)	2	146 (+4)
Ireland	27	1		28
Denmark	296 (+61)	11 (+1)	3 (+1)	310 (+63)
Spain	3			3
Austria	29 (+1)			29 (+1)
Finland	14 (+4)	1		15 (+4)
Norway	27 (+7)		1	28 (+7)
Sweden	69 (+27)	15 (+1)	7 (+2)	91 (+30)
Greece	3 (+3)			3 (+3)
Czech Republic	19	35 (+20)	1 (+1)	55 (+21)
Estonia	24 (+6)	2 (+1)		26 (+7)
Hungary	3	7 (+1)		10 (+1)
Poland	86 (+13)	221 (+149)	1	308 (+162)
Slovenia	6			6
Bulgaria	2 (+2)	4		6 (+2)
Latvia	36			36
Lithuania	9 (+1)	1		10 (+1)
Romania	8 (+1)	2		10 (+1)
Slovakia	5	1	1	7
Croatia	3 (+1)	1		4 (+1)
Serbia	3 (+3)			3 (+3)
Switzerland	2			2
Ukraine	4 (+2)	14		18 (+2)
<b>Total</b>	<b>937 (+144)</b>	<b>836 (+177)</b>	<b>30 (+6)</b>	<b>1805</b>

\*In brackets, the outbreaks/cases that have been newly reported since the last risk assessment. Note: The numbers of wild birds are derived in parts from initial reports and present a section of data only. The number of wild birds with confirmed virus detection is much higher.

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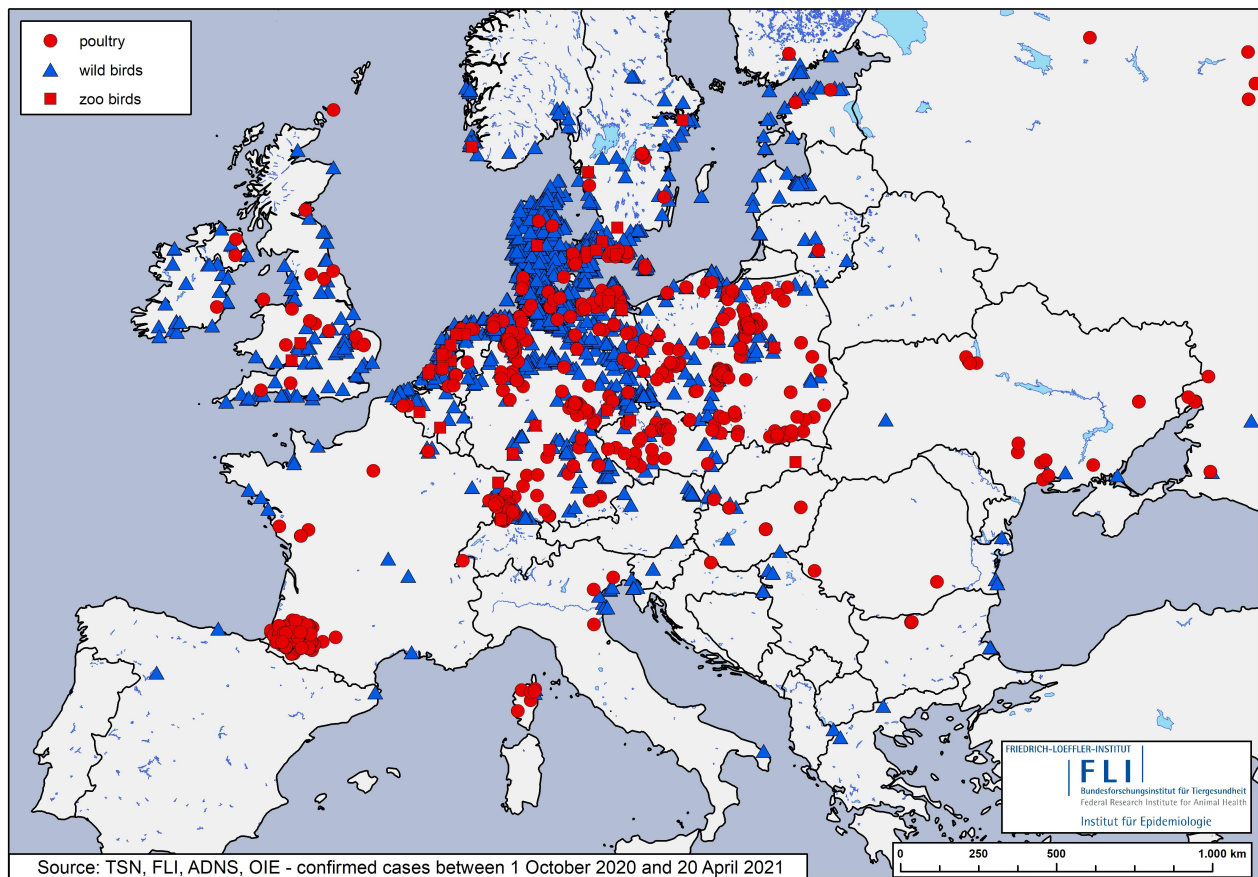


Figure 6: HPAIV H5 outbreaks in poultry, captive birds and cases in wild birds in Europe reported to ADNS, OIE and TSN since 01 October 2020. (Date: 20.04.2021). See legend for symbols.

### Assessment of the situation

An active HPAIV H5 outbreak in the summer of 2020 in southern Siberia and neighbouring northern Kazakhstan had already led to initial concerns that HPAI H5 viruses could reach Europe through the autumn migration. In the past, several such outbreaks have coincided spatio-temporally in line with the autumn migration of water birds, leading to the spread of viruses in Europe and Africa.

Subsequently, HPAI H5 could be confirmed from October 2020 onwards; numerous HPAIV H5-positive wild birds were identified in the Netherlands, Germany, the United Kingdom, Ireland, Denmark, Belgium, Sweden, Norway, Finland, Lithuania, Latvia, Estonia - mainly along the coasts - and has continued to spread to the southern and south-eastern parts of Europe to the Czech Republic, Austria, Switzerland, Hungary, Bulgaria, Romania. Since the end of February, a second peak was recorded regarding the number of outbreaks in poultry and cases in wild birds (currently mainly swans and geese). Germany's current epidemic exceeds the dimension of 2016/2017 and it is still mounting.

Phylogenetic studies of the HPAI H5 viruses suggest a new entry. Although the viruses analysed so far belong to clade 2.3.4.4b, like the HPAIV H5N8 introduced since 2016, they are not directly phylogenetically linked to the H5N8 viruses that caused outbreaks in Europe in the first half of 2020. Instead, the analysed viruses

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have a new genetic signature that show similarities to several viruses from Eurasia in recent years. For the H5N8 viruses, the available full genome sequences show a possible entry from western or central Asia as early as spring/summer 2020 via neighbouring regions of the Russian Federation. The H5N5 viruses show a similar genetic background but with reassortant NA5 and PA segments. These show similarities to NA5 viruses from the Russian Federation, as well as LPAI viruses from Eurasia in 2018, indicating that the current virus strain allows for clustered genetic reassortment (e.g., H5N5, H5N1, H5N3, H5N4), similar to 2016/17. An analysis of the genome sequences confirms the high genetic variability of the currently circulating viruses of clade 2.3.4.4b. In Europe, at least 14 different reassortant viruses of different subtypes were determined. Viruses of the H5N8 subtype are dominant, as is the case in Germany: three different H5N8 reassortants, as well as viruses of the subtypes H5N1, H5N3, H5N4 and H5N5 have been genetically characterised. These viruses also show a distinct neurotropism with partially very high viral loads in the brain.

Since November 2020, outbreaks in poultry and captive birds, and cases in wild birds, have occurred in a total of 27 European countries. Poland is currently particularly affected by large numbers of outbreaks in poultry. Regionally sporadic outbreaks in fattening ducks in southern France and turkey farms in Germany appear to reflect disease spread scenarios similar to those in 2017, when secondary virus transmission between neighbouring flocks was considered a likely factor in spread. Furthermore, the sale of live poultry as part of mobile trade, can lead to further spread and ultimately a wide geographical distribution of outbreaks (see below).

Regarding HPAIV, there is always the potential for a change in virus characteristics, including host range. Equally, sporadic transmissions to humans can occur, especially in cases of high viral loads as could be expected in affected poultry farms. For example, in February, Russian authorities announced for the first time human infections with HPAIV of the H5N8 subtype clade 2.3.4.4b. Human infections with HPAIV H5 have also been reported recently in Nigeria, following a large number of HPAIV H5N8 and H5N1 outbreaks in poultry in the North of the country. No further spread (human to human) was observed. Sporadic spillover of HPAIV H5 virus into mammals has also been reported in the UK, where one fox, one grey seal and four harbour seals were affected by HPAIV H5N8 infection. Despite the current, extensive outbreaks in poultry and cases in wild birds, there is to date no evidence that humans have been infected and no natural infections in mammals have occurred in Germany.

### POULTRY and CAPTIVE BIRDS in Germany

In Germany, 245 outbreaks have occurred so far in poultry, including captive birds in zoological facilities. Wherever there are potential contacts between wild birds and domestic poultry, especially waterfowl, infections can be introduced and new sources of infection can emerge unless an escape of virus from affected flocks can be prevented. Virus-contaminated material (footwear, vehicles, objects, litter) is considered the most likely source of infection. Poultry farms that share and move litter or other materials or tools, or even batches of birds, between units are particularly at risk.

Between Dec. 21, 2020, and Jan. 16, 2021, a series of 18 HPAI H5 outbreaks occurred in turkeys (mostly fatteners) and one in ducks in the district of Cloppenburg, a region with high poultry density. The sources

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of infection are unknown. However, the full genome sequences of the viruses from the affected holdings are almost identical, so that secondary spread between the flocks can be assumed.

Another series of outbreaks relating to HPAIV H5N8 occurred since the end of February in the district of Cloppenburg that recorded 18 outbreaks, including 16 turkey fattening farms. Here, the full genome sequences of the analysed viruses demonstrated genetically clearly distinguishable viruses compared to the viruses of the outbreaks in December and January in the same county. In this case, too, there are indications, based on the closely matching full-genome sequences, that there must have been spread between some flocks.

A series of secondary infections, affecting several federal states, was caused by the distribution of infected live poultry in mobile trade. Approximately 100 new outbreaks in poultry, mostly in small holdings, especially in Thuringia and Baden-Württemberg, were caused as described above in a short period between the end of March and the beginning of April. However, all outbreaks were controlled quickly and effectively, although it is of concern that potential disease spread due to mobile trade of poultry remains a threat.

### WILD BIRDS

Similar to the HPAIV H5N8 event in 2016/2017, increased mortality is now observed predominantly in waterfowl and bird species that also feed on carrion, e.g. various raptors, owls and gulls. The range of species affected is similar across Europe. Exceedingly high mortality rates were observed in barnacle geese, wigeons and red knots in the Schleswig-Holstein Wadden Sea National Park in December 2020. The situation there has calmed down in the meantime.

Deceased and infected birds of prey, gulls and owls are indicators of a localized outbreak in the area. Multiple findings of HPAIV H5-positive droppings of mallards, teals and wigeons highlight that ducks can excrete the virus without becoming visibly ill or dying. Due to the fact that not all wild waterfowl can be fully surveilled, the actual spread of HPAI H5 viruses can only be estimated via sporadic case identifications. It must be assumed that the viruses continue to spread in wild birds in Germany, possibly without a noticeable increase in mortality.

Infected but asymptomatic wild birds or those incubating the disease can be seen as mobile virus carriers that have the potential to spread the virus further. Many waterfowl species (e.g. geese, swans, some duck species) move between farmland (especially grassland, maize stubble and winter rapeseed and cereal crops), where they feed during the day, and resting waters, which they visit in the evening and at night. They can excrete the virus via their droppings and contaminate the land and water that they visit. In addition, sick and dead waterfowl that may be predated by mammals such as foxes and martens, but also birds of prey and crows may lead to considerable environmental contamination on arable and grazing land in cases where high viral loads exist. Further indirect spread of virus through people or vehicles entering such areas can lead to the introduction of the virus into poultry farms.

Although no large waterfowl aggregations (e.g. swans, ducks during winter rest) remain, the spring migration of northern waterfowl has not yet been completed. The successive migration of barnacle geese from the coastal areas of Germany to their breeding grounds may continue until May. Other northern geese species,



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such as white-fronted and bean geese, as well as whooper and bewick swans, have largely moved to their breeding areas. Local breeding birds (e.g. greylag geese) have started breeding some time ago: during this period the birds have hardly any intra- or interspecies contact. By the end of April, most winter visitors among the ducks will also have left for their breeding grounds. Non-breeding geese and swans, on the other hand, will gather in smaller groups, which will grow in size again at traditional moulting sites with the start of the moulting migration from mid-May.

### Risk assessment and recommendations

Findings of HPAI H5 viruses in wild birds in Germany are declining, but cases of infected birds (especially geese and birds of prey) continue to be reported, especially from Lower Saxony, Schleswig-Holstein and Hamburg (Table 3). The spring migration of waterbirds is not yet complete, therefore further population dynamics, albeit declining, can be expected.

The risk of HPAI H5 viruses spreading to waterfowl populations within Germany and Europe is **moderate**.

The risk of HPAI H5 virus incursions into German poultry holdings and bird populations in zoological institutions through direct and indirect contacts with wild birds is also considered to be **moderate**.

Since the beginning of April, outbreaks in poultry have been on the decline. The distribution of infected live poultry in the mobile trade had led to a high number of secondary outbreaks in March and April, mainly in small holdings, but these were effectively controlled within a short time. However, a series of outbreaks, especially in waterfowl, in Poland and the Czech Republic, are of concern. It is of note that HPAIV H5 may also be released into wild bird populations through affected poultry flocks.

At present, there is a **moderate** risk of virus spread between holdings (secondary outbreaks) within Germany. A high density of poultry and live poultry trade, as well as intra-Community movement of poultry, from and to countries with high incidences, pose particularly high risks.

For waterfowl farms, the risk of undetected circulation of HPAI H5 virus and subsequent spread between poultry flocks is also considered to be **high**.

The highest priority is to protect farmed birds from HPAI H5 incursions and the associated risk of further spread of HPAIV infections. To this end, the recommended biosecurity measures and surveillance activities must be reviewed and consistently adhered to. Poultry farmers are legally obliged to comply with basic biosecurity rules. In addition, the establishment of a functioning physical barrier between wild waterfowl habitats (e.g. bodies of water, fields where geese, ducks or swans congregate) and poultry holdings is essential. Housing poultry and other biosecurity measures minimize the risk of direct and indirect contact with infected wild birds. Particular focus must be placed on the prevention of virus introduction via contaminated feed, water or contaminated litter and equipment (footwear, wheelbarrows, vehicles, etc.). Virus spread between poultry holdings must be avoided. To this end, strict biosecurity measures must be taken, including continuous cleaning and disinfection of clothing, shoes, equipment and vehicles.

Sick or dead wild birds should be reported without delay to the veterinary authorities for safe removal and examination. Documentation of affected species should, where possible, be carried out in close cooperation

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with the nature conservation authorities in order to evaluate the occurrence of disease in relation to the occurrence and movements of bird populations. Prompt removal and safe disposal is important to prevent chains of infection from carrion-eating birds. Prevention and biosecurity measures in zoos and poultry farms, especially those with outdoor and free-range systems, should be urgently reviewed and, if necessary, optimized. The requirements for poultry housing systems should be handled in a flexible way by the district authorities, depending on the local risk assessment.

**Specifically, the following recommendations are made:**

- Revise the feasibility of the measures prescribed as part of contingency plans in the event of an epidemic and update the plans as necessary.
- Prevent, or strictly monitor the sale of live poultry esp. of mobile trade, in order to prevent the spread of HPAI infection
- Raise awareness of biosecurity measures and ensure compliance with biosecurity measures regarding poultry movements within the EU, with a focus on EU countries with ongoing outbreaks. Ensure thorough cleaning and disinfection of poultry transport vehicles returning from particularly affected countries.
- Personnel caring for poultry should work exclusively on one farm.
- Veterinarians and other people who visit poultry flocks on a professional basis should refrain from undertaking further visits and observe the 48 hours grace period if they have entered a flock in which clinical signs, including increased mortalities, are suggestive of HPAI.
- Due to the recent report of HPAIV infections (H5N8) in humans in Russia, it is recommended that anyone coming into close contact with infected poultry, for example staff during catching and killing duties, should look out for respiratory symptoms and/or conjunctivitis for at least 10 days. If symptoms occur, the advice is to seek immediate medical attention and initiate testing. In addition, general hygiene rules apply. Dead birds should not be handled without the use of personal protective equipment; hands should be washed thoroughly with soap and water if contact has occurred. Anyone exposed to prolonged contact with infected birds should consider the use of antiviral medications as a prophylactic measure. The Robert Koch Institute provides a number of recommendations (German version only) at the following link: [https://www.rki.de/DE/Content/InfAZ/Z/ZoonotischeInfluenza/Empfehlungen\\_1.pdf](https://www.rki.de/DE/Content/InfAZ/Z/ZoonotischeInfluenza/Empfehlungen_1.pdf)  
[https://www.rki.de/DE/Content/InfAZ/Z/ZoonotischeInfluenza/Monitoring\\_exponierter\\_Personen\\_bei\\_Ausbruch\\_von\\_aviaerer\\_Influenza.html](https://www.rki.de/DE/Content/InfAZ/Z/ZoonotischeInfluenza/Monitoring_exponierter_Personen_bei_Ausbruch_von_aviaerer_Influenza.html)
- Increased virological surveillance waterfowl holdings and early testing of sick birds as well as fallen stock in order to identify HPAI infections as early as possible.
- Avoid the sharing of any equipment between holdings, including carcass bins, and vehicles.
- Restrict vehicle access and personnel on poultry farms.
- Ensure risk-based housing of free-range poultry (at least around HPAIV H5 detection sites).
  - Please use TSIS to view wild bird cases in the counties [https://tsis.fli.de/Reports/Info\\_SO.aspx?ts=015&guid=b44005eb-c430-4398-880a-d4b926ce3752](https://tsis.fli.de/Reports/Info_SO.aspx?ts=015&guid=b44005eb-c430-4398-880a-d4b926ce3752)

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- Poultry flocks that have been excluded from a housing order should be clinically and virologically tested at a maximum interval of 3 weeks.
  - Minimize direct and indirect contact between poultry and wild waterfowl and natural water bodies (e.g., cover ponds on premises, etc.).
  - Avoid direct contact with people, pets and sick or deceased wild birds.
  - In areas that record frequent deaths of wild birds, dogs should be required to be kept on a leash.
  - Restrict the hunting of waterfowl in affected areas so as not to flush out potentially infected animals.
  - Hunters and persons who have come into contact with wild birds should not enter poultry buildings for the next 48 hours.
  - Review, optimize and consistently implement the correct biosecurity measures in poultry facilities, including the use of available guidelines, e.g. DEFRA ([https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/953018/biosecurity-poultry-guide.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/953018/biosecurity-poultry-guide.pdf))
- Ensure the implementation of minimum biosecurity measures in small holdings, zoological gardens, animal parks and shelters in accordance with the Avian Influenza Protection Order.
- Ensure increased vigilance for rapid detection of suspected cases in poultry and seek diagnostic clarification without delay.
  - Ensure intensification of passive and active wild bird monitoring with emphasis on waterfowl and birds of prey:
    - We ask the public to report observations of abnormal behaviour in waterfowl (e.g. head and neck twisting) but also report fallen wild birds and mammals (especially marten-like and free-roaming cats) to the veterinary authorities as soon as possible in order to accelerate early detection.
    - Dead birds should be collected immediately and sampled for the presence of Influenza-A infection at the state wildlife investigation offices. The birds should then safely disposed of to avoid environmental contamination or further transmission via carrion-eating birds. At least one swab per geographic area should be taken from each bird species during random testing. All deceased birds should be documented by species, age, and location of their finding.
    - In areas with high incidences of bird mortalities, deceased wild mammals and free-ranging mammals should also be tested for HPAIV.
    - Observations in bird sanctuaries can be particularly helpful: targeted examination of waterfowl (e.g., white-fronted geese, whistling ducks) faeces should also be considered to assess local risk.

Further guidance:

The European Food Safety Authority (EFSA) provides an overview regarding the Avian Influenza situation in Europe/EEA and the UK at the following link:

<https://efsa.onlinelibrary.wiley.com/doi/epdf/10.2903/j.efsa.2021.6497>

Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health  
Headquarters: Insel Riems, Südufer 10, D-17493 Greifswald-Insel Riems, [www.fli.de](http://www.fli.de)  
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