Veterinærinstituttet
Norwegian Veterinary Institute

Rapport 33 - 2023

The surveillance programme for avian influenza (AI) in wild birds in Norway 2022

REPORT 33/2023

The surveillance programme for avian influenza (AI) in wild birds in Norway 2022

Authors

Silje Granstad, Britt Gjerset, Johan Åkerstedt

Suggested citation

Granstad, Silje, Gjerset, Britt, Åkerstedt, Johan. The surveillance programme for avian influenza (AI) in wild birds in Norway 2022. Surveillance program report. Veterinærinstituttet 2023. © Norwegian Veterinary Institute, copy permitted with citation

Quality controlled by

Merete Hofshagen, Director of Animal Health, Animal Welfare and Food Safety, Norwegian Veterinary Institute

Published

2023 on www.vetinst.no

ISSN 1890-3290 (electronic edition)

Commissioned by / In collaboration with

Norwegian Food Safety Authority

Mattilsynet

Colophon

Cover design: Reine Linjer

Cover photo: Colourbox

www.vetinst.no

Content

Summary

Highly pathogenic avian influenza (HPAI) virus was detected in samples from 105 out of 1041 wild birds examined in the surveillance programme for avian influenza in Norway in 2022. Active surveillance detected 18 cases of influenza A virus infection, of which none were HPAI. Passive surveillance detected 121 cases of influenza A virus infection, of which 105 were verified as HPAI H5 subtype. Fifty-six of the HPAI detections in 2022 were of the subtype A(H5N1), 30 were A(H5N5), and 19 were A(H5Nx) (i.e. the N-type was not identified).

Introduction

The Norwegian Food Safety Authority is responsible for the surveillance programme of avian influenza (AI) in wild birds. The programme is based on virological investigations of samples from live or hunted birds (active surveillance) and dead or moribund birds (passive surveillance). Active surveillance of avian influenza in wild birds has been running from 2005-2007, from 2009-2010, and from 2016 onwards. The Norwegian Veterinary Institute is responsible for planning, laboratory investigations and reporting components of the programmes.

Avian influenza viruses (AIVs) are highly contagious and can evolve rapidly by mutations and reassortment of the genetic material between different AIVs. Wild waterfowl species, such as ducks, geese, swans, waders and gulls are natural reservoir hosts for low pathogenic avian influenza (LPAI) viruses. These birds do not usually develop clinical disease when infected with LPAI viruses, but shed large amounts of virus in their faeces (1).

Most LPAI viruses cause only mild disease in poultry. LPAI strains can potentially mutate into highly pathogenic avian influenza (HPAI) viruses when introduced into poultry populations. HPAI is a serious, highly contagious disease in poultry and other bird species. All HPAI epidemics recorded so far have been of the hemagglutinin subtypes H5 or H7. Wild migratory birds play a major role in the global spread of HPAI viruses (2, 3). In 2020, HPAI was detected for the first time in Norway in wild and captive birds (4).

Aims

The aim of the national surveillance programme is to monitor the prevalence of avian influenza viruses (AIVs) in wild birds, emphasising H5 and H7 subtype viruses. Data from the surveillance programme are used in risk assessments that can be used by the Norwegian Food Safety Authority to timely implement appropriate measures in order to prevent incursions of AIVs in poultry establishments.

Materials and methods

Sampling

Cloacal and tracheal/oropharyngeal swabs from live, hunted, moribund or dead wild birds were screened for influenza A viral RNA using polymerase chain reaction (PCR). For active surveillance, sampling equipment was sent to designated ornithologists and hunters. The recruitment of samplers was based on their geographical location and estimated access to hunted or live birds within the order *Anseriformes* or the family *Laridae*. Geographical regions were mainly targeted for active surveillance by a risk-based approach considering the relative density of poultry farms in a given area and their overlap with the flyways and rest areas of many species of waterfowl (5, 6). In 2022, sampling of wild birds in the Norwegian archipelago Svalbard was also included in the active surveillance programme. Passive surveillance was conducted by collection of swabs from dead or moribund wild birds in the entire country. Inspectors from the Norwegian Food Safety Authority was responsible for the passive surveillance sampling. The wild bird species sampled were generally in accordance with, but not limited to, the EFSA list of target wild bird species for passive surveillance activities (7).

Staff involved in sampling activities received written instructions on sampling procedure and were requested to fill in registration forms for individual cases. Swabs were placed in transport medium immediately after sampling and shipped directly to the Norwegian Veterinary Institute. Upon arrival, samples were registered and processed immediately or stored for a few days at 4°C until testing.

Analyses

Samples were screened for AIVs using a real-time reverse transcriptase polymerase chain reaction (rRT-PCR). The screening rRT-PCR used was an influenza A virus matrix gene method recommended by the European Union Reference Laboratory (EURL) for Avian Influenza (8). The matrix gene rRT-PCR can detect all subtypes of influenza type A viruses, however, the method does not distinguish the specific hemagglutinin (HA) or neuraminidase (NA) subtype in influenza-positive samples. Therefore, the samples found positive in the initial matrix rRT-PCR were further analysed using H5- and H7-specific PCRs (8). If samples were H5- or H7-positive, the HA cleavage site was sequenced in order to determine pathogenicity and confirm HPAI or LPAI virus infection. From June 2022, pathotyping by sequencing was replaced by a more rapid HPAI H5-detection rRT-PCR assay recommended by the EURL (9). Additional neuraminidase (NA) subtyping rRT-PCR was performed on positive samples by methods recommended by EURL (10). Representative HPAI-positive samples from the surveillance programme are further characterized by genome sequencing.

Results and discussion

In total, samples from 1041 wild birds were analysed for the presence of influenza A virus (Table 1). Results showed that samples from 139 (13.4%) wild birds were positive for influenza A virus. Of these, one bird was H7-positive (0.10%) and 120 were H5-positive (11.5%). Testing revealed highly pathogenic avian influenza (HPAI) virus in samples from 105 (10.1%) wild birds in 2022.

Active surveillance in 2022 detected 18 influenza A virus positive cases from a total of 636 wild birds sampled (2.8%, Table 1). None of the cases were HPAI-positive.

Passive surveillance in 2022 detected 121 cases of influenza A virus infection from a total of 405 wild birds (29.9%). Among these, HPAI viruses was found in 105 cases. Fifty-six of the HPAI detections from dead or moribund wild birds in 2022 were of the subtype A(H5N1), 30 were A(H5N5) and 19 were A(H5Nx). In the latter group, NA subtyping was not successful due to low viral load. The number of wild birds sampled from each county or territory are shown in Figure 1.

***Table 1**: Number of wild birds sampled in the surveillance programme for avian influenza in Norway in 2022.*

	2022	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Active surveillance													
LPAI H7Nx	1								1				
Other influenza A*	17								1	6	9		
Influenza A negative	618		67	19	45	17	35	3	103	83	125	121	
Total	**636**		**67**	**19**	**46**	**17**	**35**	**3**	**105**	**89**	**134**	**121**	
Passive surveillance													
HPAI H5N1	56	2	1	2		3	28	4	5	4	3	4	
HPAI H5N5	30		1	3		8	12	4		1	1		
HPAI H5Nx	19						15	2	1				1
H5N1	3	1	1		1								
H5Nx	12				1	4	4	3					
Other influenza A*	1			1									
Influenza A negative	284	11	13	31	11	10	44	54	52	26	19	7	6
Total	**405**	**14**	**16**	**37**	**13**	**25**	**103**	**67**	**58**	**31**	**23**	**11**	**7**
Active and passive surveillance													
Total	**1041**	14	83	56	59	42	138	70	163	120	157	132	7

*Other influenza A: H5/H7-negative

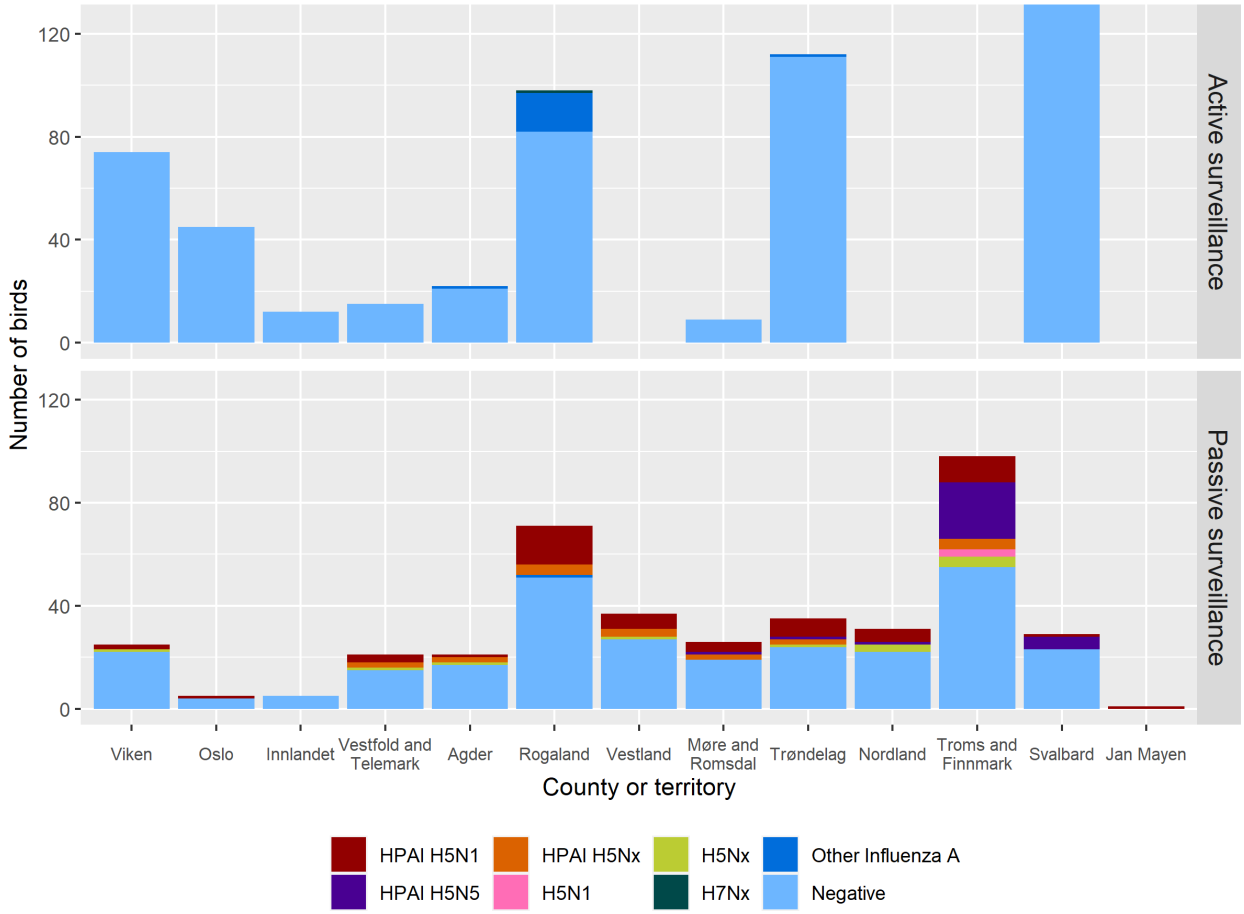


***Figure 1**: The number of wild birds from counties and territories included in the active and passive surveillance programmes for avian influenza in Norway in 2022. The total number of birds sampled by active surveillance from Svalbard were 249, and all samples were negative.*

Among all wild birds sampled in accordance with active or passive surveillance, HPAI H5 subtype virus was detected in samples from 105 birds. All HPAI-positive birds were detected by passive surveillance, and most of these birds were found dead. HPAI cases in 2022 were reported most frequently in northern gannets (*Morus bassanus*) (Table 2). The geographical distribution of HPAI-detections are shown in Figure 2.

Two HPAI outbreaks in commercial poultry appeared in Rogaland county in November and October 2022, respectively.

***Table 2**: Species distribution of HPAIV-positive wild birds in Norway in 2022.*

Species (Eng.)	Species (Nor.)	Species (Lat.)	HPAI H5N1	HPAI H5N5	HPAI H5Nx
Barnacle Goose	Hvitkinngås	*Branta leucopsis*	1		
Canada Goose	Kanadagås	*Branta canadensis*	1		
Common Gull	Fiskemåke	*Larus canus*		3	
Common Raven	Ravn	*Corvus corax*		1	
Eagle, species unknown	Ørn, art ukjent	*Accipitridae*	1		
Eurasian Eagle-Owl	Hubro	*Bubo bubo*			1
Eurasian Goshawk	Hønsehauk	*Accipiter gentilis*	1		
European Herring Gull	Gråmåke	*Larus argentatus*		3	
Feral pigeon	Bydue	*Columba livia domestica*	1		
Glaucous gull	Polarmåke	*Larus hyperboreus*		2	
Goose, species unknown	Gås, art ukjent	*Anatidae*	1		
Great Black-backed Gull	Svartbak	*Larus marinus*	10	4	1
Great Skua	Storjo	*Stercorarius skua*	2	4	
Hooded Crow	Kråke	*Corvus corone cornix*		1	
Gull, species unknown	Måke, art ukjent	*Laridae*	2		
Lesser Black-backed gull	Sildemåke	*Larus fuscus*	1		
Mute Swan	Knoppsvane	*Cygnus olor*	1		
Northern Fulmar	Havhest	*Fulmarus glacialis*	1		
Northern Gannet	Havsule	*Morus bassanus*	25	1	15
White-tailed Eagle	Havørn	*Haliaeetus albicilla*	8	11	2
Total			**56**	**30**	**19**

***Figure 2**: Geographical distribution of HPAI virus detections in wild birds in Norway in 2022. Colour marks municipalities with one or more detections of HPAI-positive wild birds: HPAI H5N1 (red), HPAI H5N5 (purple) and HPAI H5Nx (yellow). If more than one HPAI subtype was detected in a municipality in 2022, the colour representing the most recent detected subtype at the end of the year is shown.*

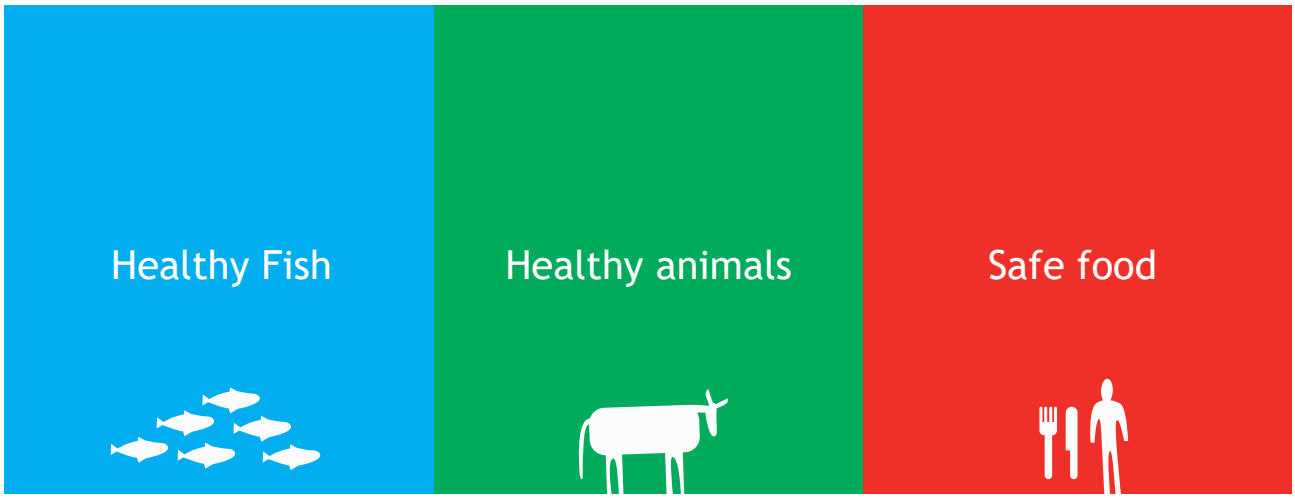
Among wild birds sampled by active surveillance, influenza A virus was detected in 21.9% (14/64) of common teals (*Anas crecca*), 3.6% (2/56) mallards (*Anas platyrhynchos*), 4.3% (1/23) Eurasian wigeons (*Mareca penelope*) and 11.1% (1/9) European herring gulls (*Larus argentatus*)(Table 3). All influenza A-positive samples were further analysed for the presence of subtype H5 or, if negative, for H7. None of the 18 influenza A-positive samples were H5 positive, while one was H7 positive and further confirmed as LPAI H7Nx. None of the samples collected by active surveillance were HPAI virus positive.

Table 3: *Number of birds sampled in the active surveillance programme for avian influenza in Norway in 2022.*

Species (Eng.)	Species (Nor.)	Species (Lat.)	No. sampled	Inf. A positive	H5 positive	H7 positive	LPAI H7Nx
Barnacle Goose	Hvitkinngås	*Branta leucopsis*	103				
Bird (species unknown)	Fugl, art ukjent	*Aves*	4				
Black-headed gull	Hettemåke	*Larus ridibundus*	28				
Black-legged Kittiwake	Krykkje	*Rissa tridactyla*	55				
Canada Goose	Kanadagås	*Branta canadensis*	10				
Common Eider	Ærfugl	*Somateria mollissima*	50				
Common Goldeneye	Kvinand	*Bucephala clangula*	5				
Common Gull	Fiskemåke	*Larus canus*	20				
Common Teal	Krikkand	*Anas crecca*	64	14		1	1
Eurasian Wigeon	Brunnakke	*Mareca penelope*	23	1			
European Herring Gull	Gråmåke	*Larus argentatus*	9	1			
Goosander	Laksand	*Mergus merganser*	1				
Great Black-backed Gull	Svartbak	*Larus marinus*	2				
Greylag Goose	Grågås	*Anser anser*	42				
Lesser Black-backed gull	Sildemåke	*Larus fuscus*	13				
Mallard	Stokkand	*Anas platyrhynchos*	56	2			
Mute Swan	Knoppsvane	*Cygnus olor*	1				
Parasitic Jaeger	Tyvjo	*Stercorarius parasiticus*	20				
Pink-footed Goose	Kortnebbgås	*Anser brachyrhynchus*	69				
Red-breasted Merganser	Siland	*Mergus serrator*	3				
Snow Bunting	Snøspurv	*Plectrophenax nivalis*	1				
Thick-billed Murre	Polarlomvi	*Uria lomvia*	26				
White-tailed Eagle	Havørn	*Haliaeetus albicilla*	31				
Total			**636**	**18**		**1**	**1**

References

1. Webster RG, Bean WJ, Gorman OT, Chambers TM, Kawaoka Y. Evolution and ecology of influenza A viruses. Microbiol Rev 1992; 56: 152-79. https://doi.org/10.1128/mr.56.1.152-179.1992
2. Olsen B, Munster VJ, Wallensten A, Waldenström J, Osterhaus ADME, Fouchier RAM. Global patterns of influenza A virus in wild birds. Science 2006; 312(5772): 384-8. https://doi.org/10.1126/science.1122438
3. The global consortium for H5N8 and related influenza viruses. Role for migratory wild birds in the global spread of avian influenza H5N8. Science 2016; 354(6309): 213-17. https://doi.org/10.1126/science.aaf8852
4. Madslien K, Moldal T, Gjerset B, Gudmundsson SH, Follestad A, Whittard E, Tronerud OH, Dean KR, Åkerstedt J, Jørgensen HJ, das Neves CG, Rømo G. First detection of highly pathogenic avian influenza virus in Norway. BMC Veterinary Research 2021; 17(218). https://doi.org/10.1186/s12917-021-02928-4
5. Gjevre AG, Handeland K, Jansen PA, Lyngstad TM, Ytrehus B. Risiko for smitte med høypatogen aviær influensa (HPAI) H5N1 fra ville fugler til fjørfe i Norge. Veterinærinstituttets rapportserie 1-2006. Oslo: National Veterinary Institute; 2006. https://www.vetinst.no/rapporter-og-publikasjoner/rapporter/2006/rapport-risiko-for-smitte-med-hypatogen-avir-influensa-hpai-h5n1-fra-ville-fugler-til-fjrfe-i-norge
6. Granstad S, Rømo G, Falk M, Reiersen A, Ytrehus B, Åkerstedt J. Risikovurdering – Høyrisikoområder for introduksjon av høypatogen fugleinfluensa (HPAI) til fjørfe i Norge. National Veterinary Institute; 2022. https://www.vetinst.no/dyr/vilt/fugleinfluensa-i-norge/_/attachment/download/c02a92a1-44bd-46c3-a32f-3918a225ed57:93c6de1e0452892e90337899aec92ee7ebbf24f0/20221219_Risikovurdering_h%C3%B8yrisikoomr%C3%A5der_HPAI_Norge%20(1).pdf
7. EFSA (European Food Safety Authority), ECDC (European Centre for Disease Prevention and Control), EURL (European Union Reference Laboratory for Avian Influenza), Brown I, Kuiken T, Mulatti P, Smietanka K, Staubach C, Stroud D, Therkildsen OR, Willeberg P, Baldinelli F, Verdonck F and Adlhoch C, 2017. Scientific report: Avian influenza overview September – November 2017. EFSA Journal 2017; 15(12), e05141. https://doi.org/10.2903/j.efsa.2017.5141
8. Spackman E, Senne DA, Myers TJ, Bulaga LL, Garber LP, Perdue ML, Lohman K, Daum LT, Suarez DL. Development of a real-time reverse transcriptase PCR assay for type A influenza virus and the avian H5 and H7 hemagglutinin subtypes. J Clin Microbiol 2002; 40(9): 3256-60. https://doi.org/10.1128/jcm.40.9.3256-3260.2002
9. James J, Seekings AH, Skinner P, Purchase K, Mahmood S, Brown IH, Hansen RDE, Banyard AC, Reid SM. Rapid and sensitive detection of high pathogenicity Eurasian clade 2.3.4.4b avian influenza viruses in wild birds and poultry. J Virol Methods 2022; 301:114454. https://doi.org/10.1016/j.jviromet.2022.114454
10. Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe). Diagnostic protocols for the detection, identification and typing of AI. https://www.izsvenezie.com/reference-laboratories/avian-influenza-newcastle-disease/diagnostic-protocols/



Scientifically ambitious, forward-looking and collaborative- for one health!

Veterinærinstituttet
Norwegian Veterinary Institute

Ås Trondheim Sandnes Bergen Harstad Tromsø

postmottak@vetinst.no
www.vetinst.no