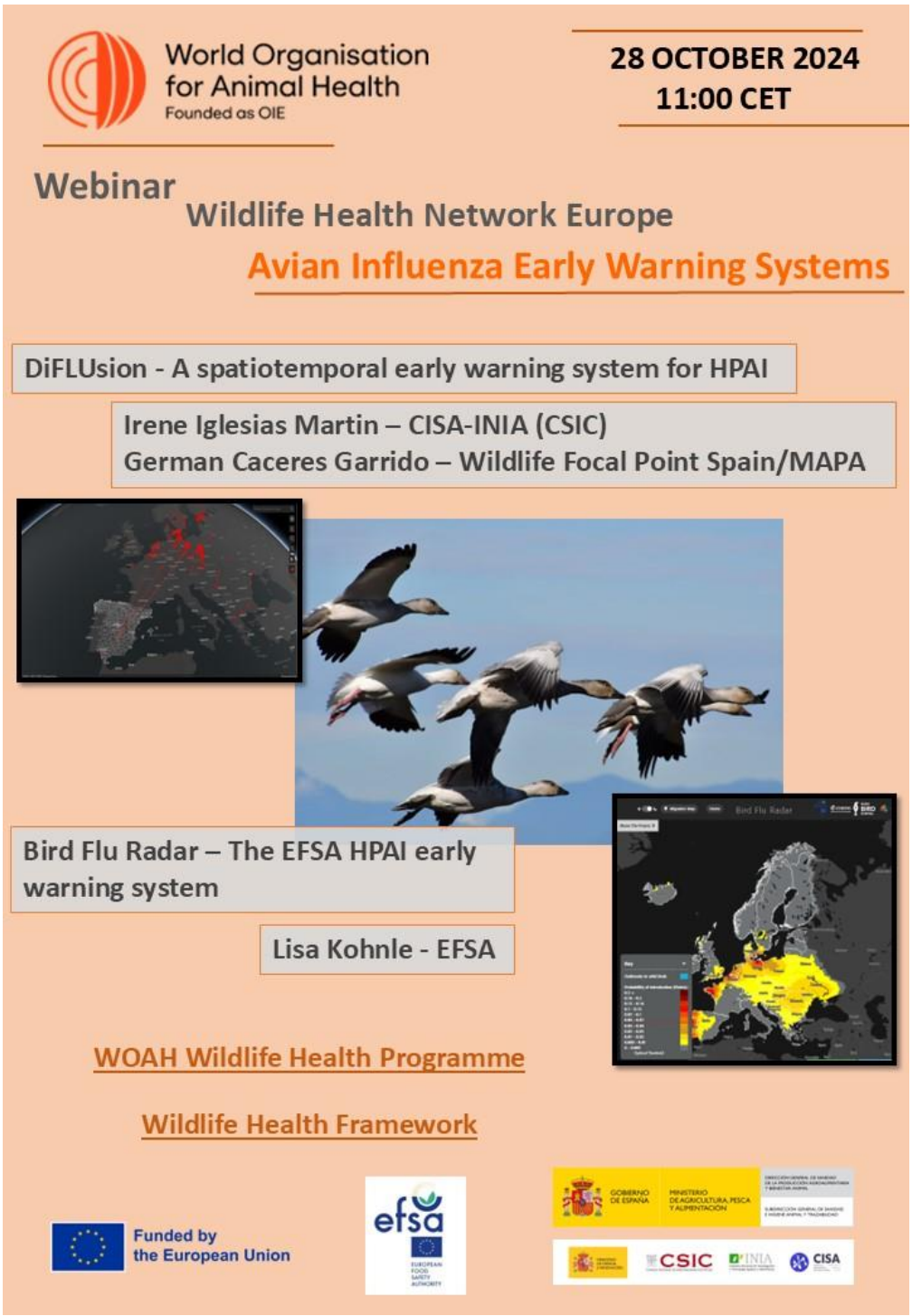
Report

3rd Webinar

Wildlife Health Network – Europe

28 October 2024 11:00 – 13:00 CET Online



Summary

The 3rd Webinar for the Wildlife Health Network in Europe was held online the 28 of October 2024 at 11:00 CET. The meeting had a total of 35 participants, including 3 guest speakers, 23 National Focal Points for Wildlife (Europe and Central Asia) and country representatives, 2 guest participants, 2 English-Russian interpreters, and 6 WOAH staff members. The webinar was recorded and shared in the Wildlife Health Network share point.

The webinar highlighted advancements in predicting and mitigating highly pathogenic avian influenza (HPAI) through two monitoring tools, DiFLUsion and the Bird Flu Radar. Irene Iglesias Martín, delivered a prerecorded presentation detailing the description of the model applied for DiFLUsion tool and the global HPAI situation. She emphasized the virus's geographical distribution, host species, evolving dynamics, seasonal shifts, and impacts on conservation, including mammalian spillover events. The need for long-term surveillance of avian influenza across wild birds, mammals, poultry, and humans, adhering to a One Health approach, was underlined. Additionally, gaps in understanding the influenza virus dynamics in wild birds were highlighted. Germán Cáceres Garrido presented on HPAI's epidemiological trends in the EU and Spain (2021–2024). He detailed DiFLUsion's integration into Spain's HPAI risk-based surveillance and prevention framework. DiFLUsion, operational since 2021, is a real-time spatiotemporal early alert system aimed at risk-monitoring and preventing, through data-driven models, HPAI introduction in Spain through migratory birds. It integrates wild birds outbreak data from WOAH's reporting system (WAHIS), wild bird migratory patterns, and climatic conditions, to provide weekly risk alerts, visualized on maps, to guide surveillance and risk communication as well as decision-making on confinement and biosecurity decisions.

Lisa Kohnle presented the Bird Flu Radar, a spatiotemporal early warning tool integrated into EFSA's HPAI surveillance system, operational since 2023. The tool provides weekly risk assessments for HPAI introduction and establishment in wild bird populations in Europe. Utilizing data from a consortium of ornithological organizations, it incorporates abundance and movement patterns of 12 wild bird species, representing 89% of ring recovery data in Europe. HPAI outbreak information is sourced from the EU Animal Disease Information System (ADIS), with risk modelling performed for each 50x50 km grid cell in Europe on a weekly basis. The Bird Flu Radar offers a publicly available online interface, updated with new predictions every Monday, and is available at https://app.bto.org/hpai. Interested users may sign up for weekly alert emails based on their country or region of interest.

The system integrates data from citizen science contributions, environmental and climatic variables. Currently, a poultry risk assessment prototype for broader application is under development, and already available to stakeholders in France and Italy.

While effective, both tools face challenges, including the availability of important input data, limitations of the model performance outside the European region, challenges incorporating biosecurity and vaccination impacts, limited data updates on wild bird dynamics, and gaps in understanding HPAI transmission in different wild bird species. These tools, along with collaborative efforts, aim to strengthen global HPAI prevention and response.

Background

In 2020, The World Organisation for Animal Health (WOAH) has developed the Wildlife Health Programme to expand its work in wildlife health and invest itself in promoting the growth of surveillance systems for wildlife health at regional, national and international levels, and advocate WOAH Members to re-evaluate the importance and visibility given to wildlife health in their countries. Through the Wildlife Health Framework the WOAH aims to reinforce One Health strategies in order to respond to a global need to better manage risks from emerging diseases at the human-animal-ecosystem interface, whilst protecting wildlife. The framework recognises that animal health, balanced ecosystems, and biodiversity contribute to achieving One Health, and pursues two main objectives: the promotion of the risk management of disease emergence at the human-animal-ecosystems interface and the protection of wildlife health. In order to reach this goals, WOAH has developed a **Wildlife Health Network** to build knowledge and awareness amongst national veterinary services about their role in better protecting wildlife health and strengthen WOAH Members' capacity for early detection of pathogens in wildlife, wildlife surveillance and management systems, information management, risk assessment, and implementation of mitigation measures. This approach will support the creation of an enabling environment and foster sustainable partnerships between veterinary services, wildlife management authorities and other relevant partners in public health, wildlife conservation and scientific academic bodies. In this context, the **WOAH Sub-Regional Representation in Brussels** organized a series of webinars to increase knowledge in different Wildlife Health and One Health topics, improve the interaction and create new connections between the members of the network, the National Focal Points of Wildlife in Europe (comprising 53 countries) and different wildlife health stakeholders, and strengthen the collaboration and connection between the members of the network.

Programme

28 October 2024 - online		
11:00	Opening remarks	*Valeria C. Colombo* WOAH SRR Brussels
11:10 – 12:00	DiFLUsion - A spatiotemporal early warning system for HPAI	**Irene Iglesias Martin** Scientific researcher – Animal Health Research Center CISA-INIA (CSIC) **German Cáceres Garrido** Wildlife Focal Point Spain/ Ministry of Agriculture, Fisheries and Food (MAPA)
12:00 – 13:00	Bird Flu Radar – The EFSA HPAI early warning system	**Lisa Kohnle** European Food Safety Authority (EFSA)

Participants present

	Country / Institution	
1	CZECH REPUBLIC	
2	CZECH REPUBLIC	
3	FINLAND	
4	FRANCE	
5	ICELAND	
6	ICELAND	
7	KAZAKHSTAN	
8	LATVIA	
9	MOLDOVA	
10	NORTH MACEDONIA (REP. OF)	
11	PORTUGAL	
12	ROMANIA	
13	SAN MARINO	
14	SERBIA	
15	SERBIA	

16	SLOVENIA	
17	SWEDEN	
18	SWEDEN	
19	THE NETHERLANDS	
20	THE NETHERLANDS	
21	TÜRKIYE (REP. OF)	
22	UNITED KINGDOM	
23	UNITED KINGDOM	
24	Guest speaker - EFSA	
25	Guest speaker - MAPA	
26	DEECA Australia	
27	EFSA	
28	Interpreter 1	
29	Interpreter 2	
30	WOAH	
31	WOAH	
32	WOAH	
33	WOAH	
34	WOAH	
35	WOAH	

Presentations and Discussions

- Presentation **Opening remarks**: Valeria C. Colombo introduced the objectives of the webinar, the background of the guest speakers and some WOAH updates related to the Wildlife Health Programme.
- Presentation **DiFLUsion - A spaciotemporal early warning system for HPAI**:

  The first speaker, ***Irene Iglesias Martin*** (iglesias@inia.csic.es), due to personal reasons was not able to be present in the webinar. However, she delivered her presentation by a recorded video where she included:

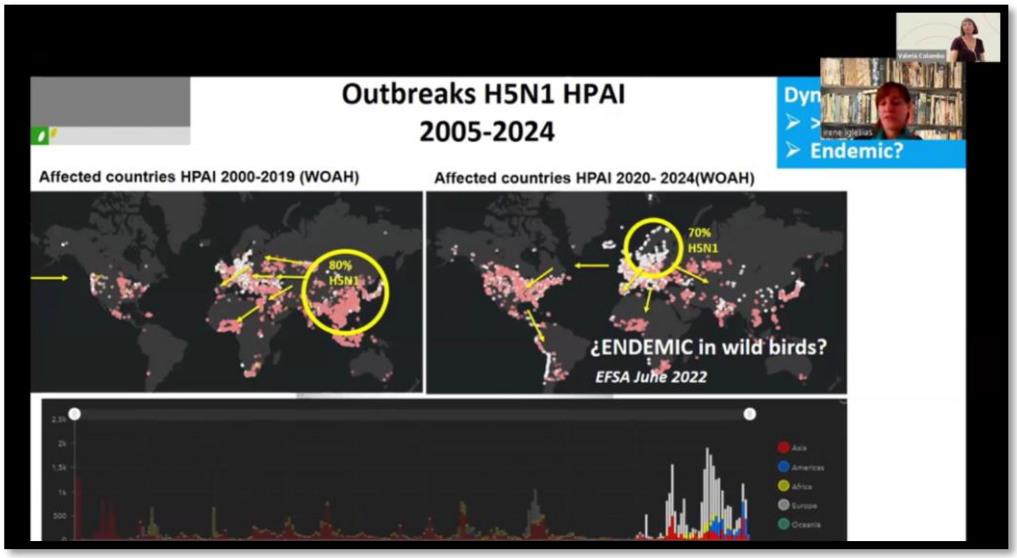
  The global situation regarding H5N1 highly pathogenic avian influenza (HPAI) outbreaks including factors such as geographical distribution, host species affected, emerging trends in virus dynamics, newly identified locations, shifts in seasonality patterns, and impacts on wild bird conservation. Spillover events affecting mammals were also noted. Irene emphasized the need for long-term surveillance to monitor the evolution and dynamics of avian influenza across wild birds, mammals, poultry, and humans, under a One Health approach. The lack of detailed information on the dynamics of influenza in wild bird populations was identified as a significant gap, emphasizing the need for improved data collection and analysis in this area.

DiFLUsion, launched in 2021, is a real-time early alert system designed to monitor and prevent the introduction of avian influenza into Spain. Its primary objective is to track avian influenza outbreaks in northern Europe, monitor wild bird movements, and mitigate the risk of the virus entering Spain through their migration. The system operates in collaboration with the Ministry of Agriculture, providing weekly risk alerts to support decision-making. It utilizes data from the World Organisation for Animal Health (WOAH) on influenza outbreaks, migratory data of over 100 bird species ringed and tracked (recovery data) and phenological data on movements by the Spanish Ornithological Society. Temperature data from the Spanish Meteorological Agency at real time is used to estimate the survival time of the virus under various conditions.

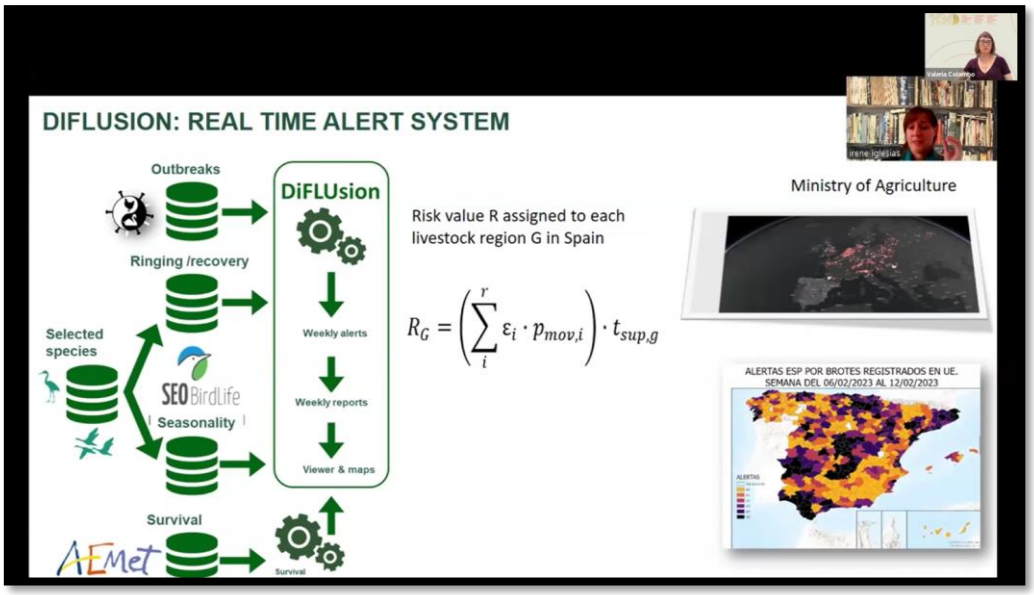
The tool represents a collaborative and data-driven approach to monitoring avian influenza risks and supporting proactive measures against potential outbreaks. The data is integrated into a mathematical model to assign an influenza risk of entry value to each livestock region in Spain. The alerts are displayed on a map that includes information on outbreaks, environment type (urban vs. rural), and other relevant characteristics. This system provides critical information that can be used to alert veterinary services and farmers, guide decisions on poultry confinement, and target active surveillance activities effectively.

DiFLUsion is also integrated into another analytical tool, ProtectIA, which estimates the risk of HPAI introduction into poultry in Spain. Through wild bird migration and domestic bird trade. ProtectIA incorporates both intrinsic data from poultry farms—such as biosecurity measures, national and international trade movements, farm density, and census data—and extrinsic data, including DiFLUsion results , proximity to wetlands, historical outbreak occurrences in the area, temperature, among other factors.

As part of future developments, a consortium was established in 2022 under the ILINK project, comprising Canada, the United States, Spain, Sweden, and the United Kingdom. This consortium aims to adapt and transfer the DiFLUsion and ProtectIA tools to other geographical areas, broadening their applicability.


Outbreaks H5N1 HPAI
2005-2024
Affected countries HPAI 2000-2019 (WOAH)
Affected countries HPAI 2020- 2024(WOAH)
80% H5N1
70% H5N1
¿ENDEMIC in wild birds?
EFSA June 2022
Endemic?


Exploring HPAI and Risk Factors: DashFLUboard
America
Europe
Dashboard Helps Analyze and Predict Spread of Bird Flu


DIFLUSION: REAL TIME ALERT SYSTEM
Outbreaks
Ringing /recovery
Selected species
Seasonality
Survival
DiFLUsion
Weekly alerts
Weekly reports
Viewer & maps
Risk value R assigned to each livestock region G in Spain
$R_G = \left(\sum_i^r \varepsilon_i \cdot p_{mov,i} \right) \cdot t_{sup,g}$
Ministry of Agriculture
ALERTAS ESP POR BROTES REGISTRADOS EN UE.
SEMANA DEL 06/02/2023 AL 12/02/2023

- ***German Cáceres Garrido*** (sganimal@mapa.es) presented the epidemiological evolution of HPAI in the EU and Spain from 2021 to 2024, emphasizing its classification under EU regulations as category A, which entails specific risk management measures. These measures include preventing the introduction and spread of the virus through vaccination of wild bird endangered species in zoos in Spain (inactivated H5N2 vaccine), and implementing biosecurity protocols. Risk-based surveillance strategies were highlighted, comprising active surveillance to certify disease freedom based on WOAH principles and passive surveillance for early HPAI detection. Additionally, the application of contingency plans ensures efficient responses to disease introduction in captive bird populations.

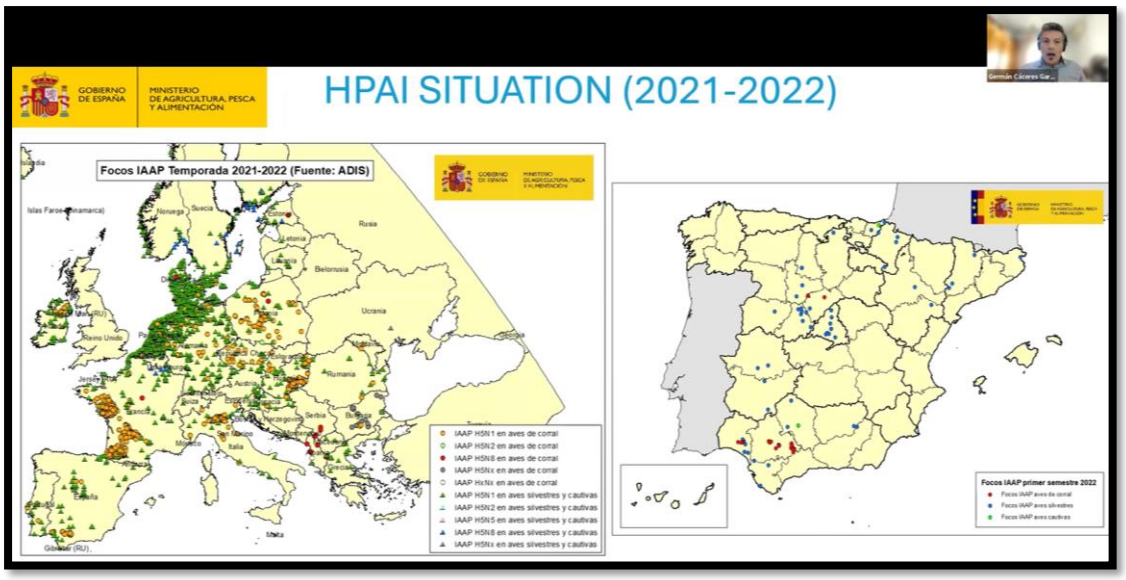
  DiFLUsion implementation in Spain: As part of the HPAI risk-based surveillance and prevention activities implemented by the Ministry of Agriculture, Fisheries and Food in Spain, German explained how the DiFLUsion tool is used in this framework:

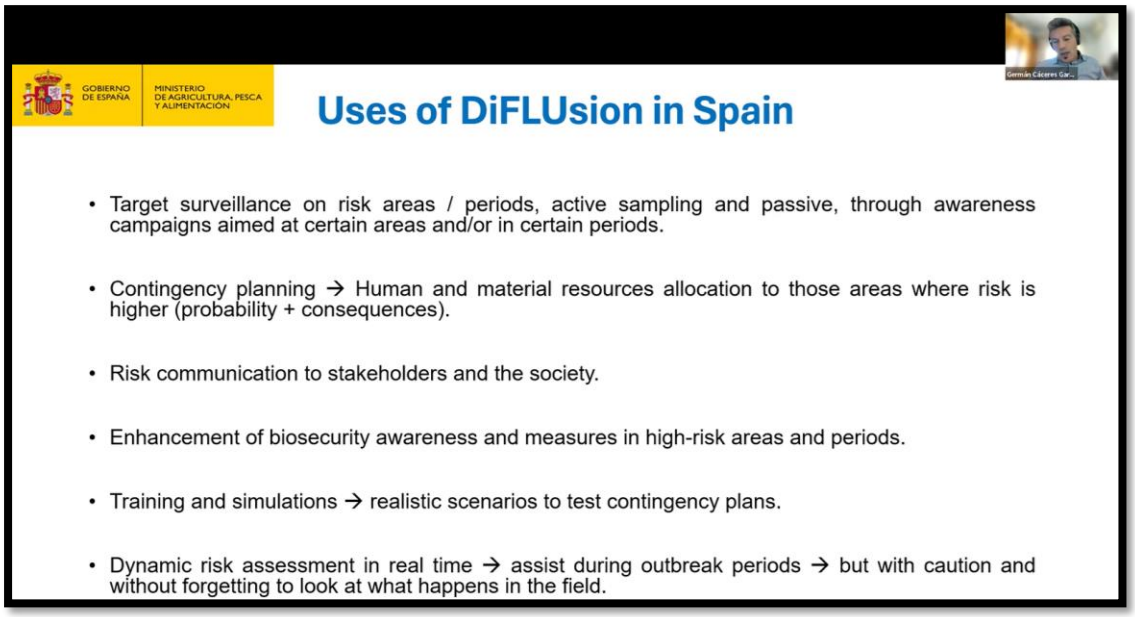
  - Targeting risk-based surveillance activities: Identifying high-risk HPAI animal health units to focus monitoring activities.
  - Planning risk-communication and awareness campaigns: Determining priority areas and timeframes to communicate stakeholders and inform society on measures to prevent HPAI.
  - Coordinating contingency plans: Allocating resources efficiently to high-risk HPAI areas to ensure preparedness.
  - Reinforcing biosecurity measures: Implementing enhanced protocols in regions identified as high-risk.

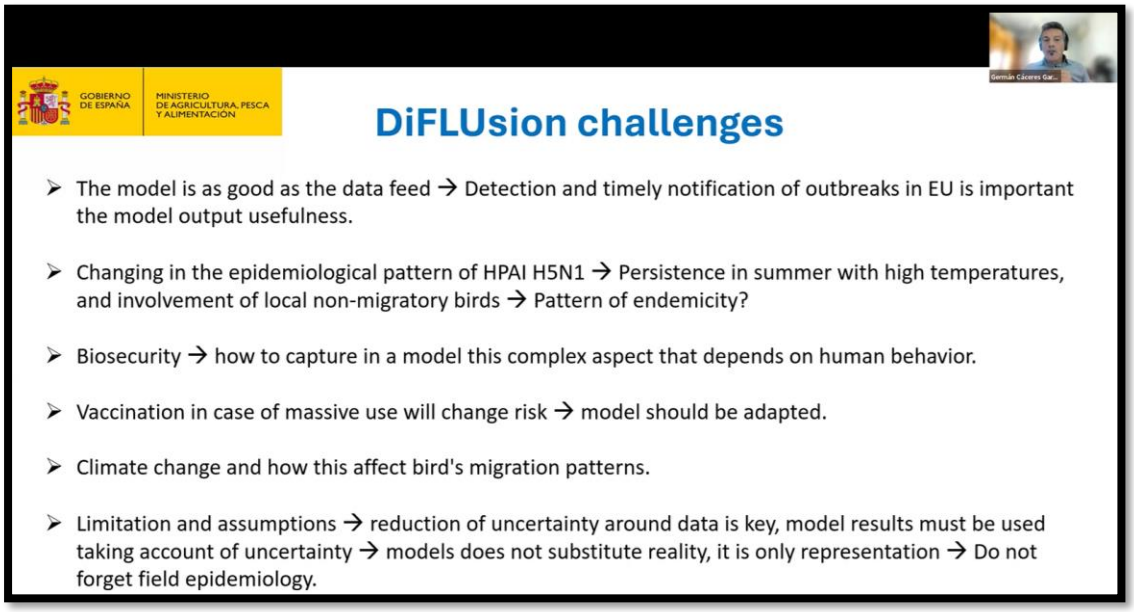
  Some variables can limit the efficiency of the tool as follows:

  - Real time outbreaks notification: timely communication and notification of HPAI wild bird cases is crucial for the performance of the risk alert estimation;
  - Changes in HPAI dynamics: some HPAI strains are showing patterns of persistence during summer at higher temperatures than expected. In addition, the virus is infecting wild non-migratory birds, potentially changing the virus epidemiological status as endemic in some areas. These changes could affect the prediction efficiency of the model;
  - Biosecurity measures: It is challenging to assess how this variable influences the risk of HPAI transmission due to the difficulty of incorporating it into the model, as biosecurity is assessed though time-point questionnaire but is affected by day-to-day human behavior.

- Vaccination: If widespread vaccination programs are implemented in the EU, this will impact the risk of HPAI transmission and should be incorporated into the model.
- Climate change: changes in climate and the potential influence in wild birds' behavior, including migration patterns, might affect HPAI dynamics;
- Data uncertainty: the reduction of data uncertainty is crucial to reduce the gaps between a real scenario and the predictions made by the model.







- Presentation **Bird Flu Radar – The EFSA HPAI early warning system**:

Lisa Kohnle (lisa.kohnle@efsa.europa.eu) presented the Bird Flu Radar tool, integrated into EFSA's early warning system for highly pathogenic avian influenza (HPAI), operational since 2023. The tool evolved from the Migration Mapping Tool (https://app.bto.org/mmt), aiming to provide weekly spatio-temporal risk assessments of HPAI introduction and establishment in wild birds. It uses citizen and ring-recovery data to model wild bird abundance and movement, encompassing 12 wild bird species representing 89% of the ring-recovery records available in Europe, in combination with HPAI outbreak data from the EU Animal Disease Information System (ADIS), which are modelled by a consortium including Sovon (Dutch Centre for Field Ornithology), the European Union for Bird Ringing (Euring), Euro Bird Portal (EBP), the European Bird Census Council (EBCC), the British Trust for Ornithology (BTO), the Catalan Ornithological Institute (ICO) and EpiMundi.

The wild bird abundance modelling includes data collected by citizens through Euro Bird Portal during 6 years. The model is an AdaSTEM model that estimates the probability of occurrence and relative abundance of a certain wild bird species on a weekly basis in a grid of 30x30 km^2 cells. The model incorporates environmental, climatic, and land-use variables.

On the other hand, wild bird movements are modelled based on bird movements categorized into long-distance (over 200 km, between-month migration and during cold season) and short-distance

(less than 200 km, local movements within seasons) migrations. The model is a Bayesian spatial model fitted in INLA (integrated nested Laplace approximation).

The probability of HPAI introduction in wild birds estimated by the model comprises the probability of entry of the virus during a particular week in an area of 50x50 km, together with the probability of the transmission of the virus to at least one other bird in that area (establishment). Different ecological variables and epidemiological parameters are included in the model, like the probability of an infected bird survival while migrating and the probability of shedding HPAI virus upon arrival on a certain location, among others.

Stakeholders can access the publicly available online tool and subscribe for weekly alerts via email at https://app.bto.org/hpai. Users can find prediction values per week (historical data and up to one week in advance), previous outbreak locations, values of sensitivity and specificity, and the modelled data can be downloaded.

The tool can be limited by the following factors:

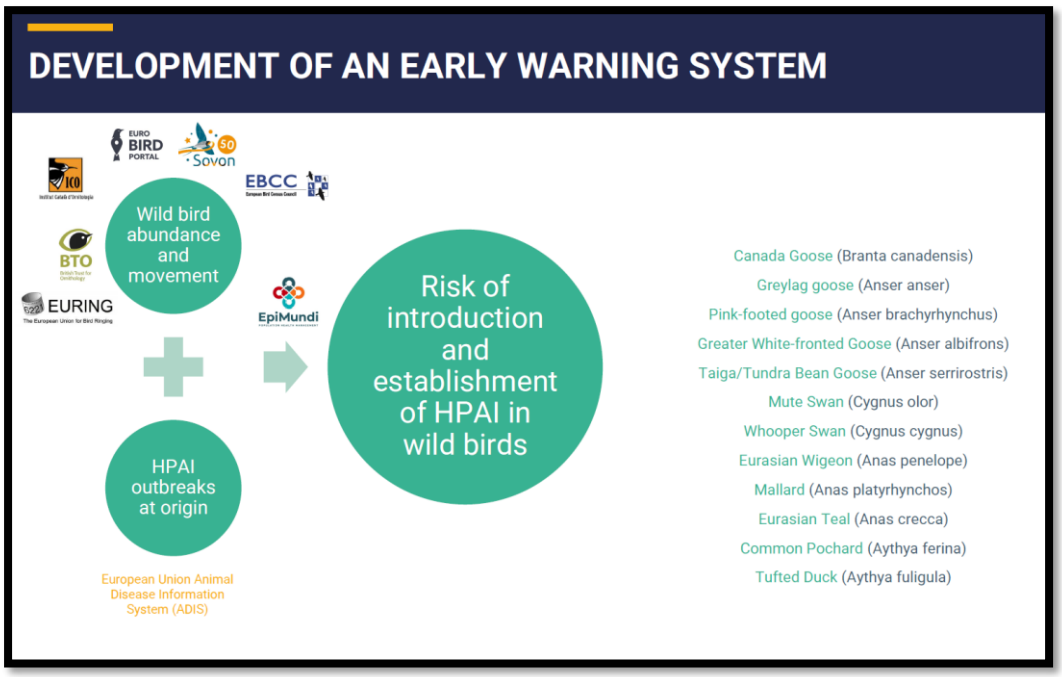
- Heterogeneity in model performance: The performance of the model varies according to the geographical area, potentially linked to the quality and availability of input data from countries at the European border. There is a lack of data on wild bird movements and outbreaks from countries outside the European region, affecting mostly the performance of the model in Eastern Europe;
- Parameters constant over time: While HPAI outbreak data updates in real time (weekly), wild bird abundance and movement data remains constant over years;
- Estimates: The model provides relative risk estimates, allowing for comparisons between locations and periods; however, these estimations are not absolute;
- HPAI transmission dynamics: The model currently assumes equal HPAI transmission across wild bird species due to a lack of data, though species-specific differences are possible. More detailed data on HPAI dynamics across different wild bird species is needed;
- Additional risk factors: Further data on other potential risk factors, like wild bird behaviour, age, and how biosecurity measures in poultry farms are reflected in HPAI transmission are needed. It is necessary to better understand how to collect and quantify this data to enhance the models.

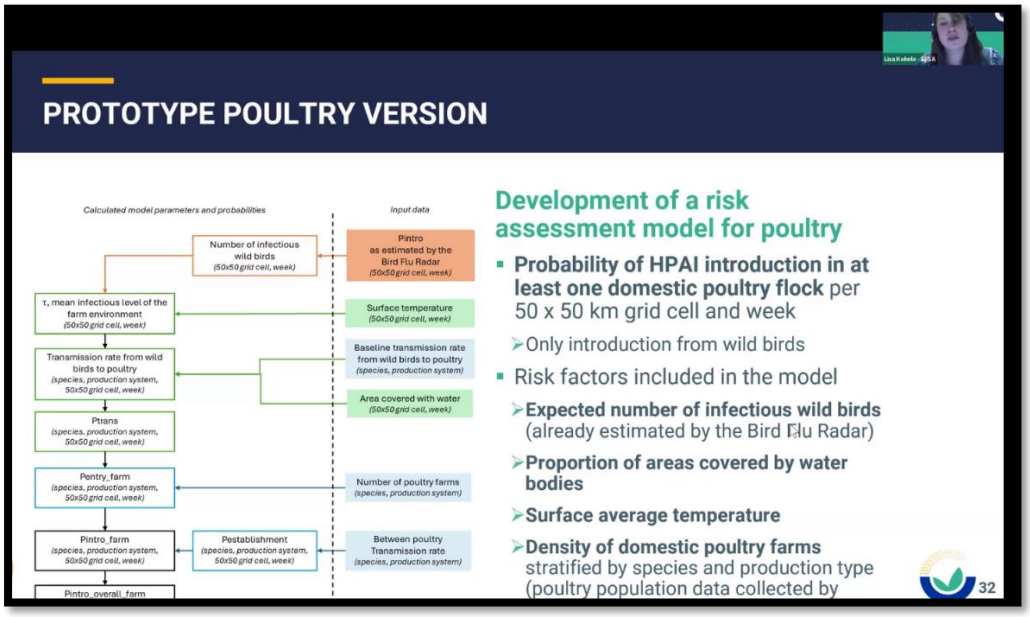
Future developments of the Bird Flu Radar include:

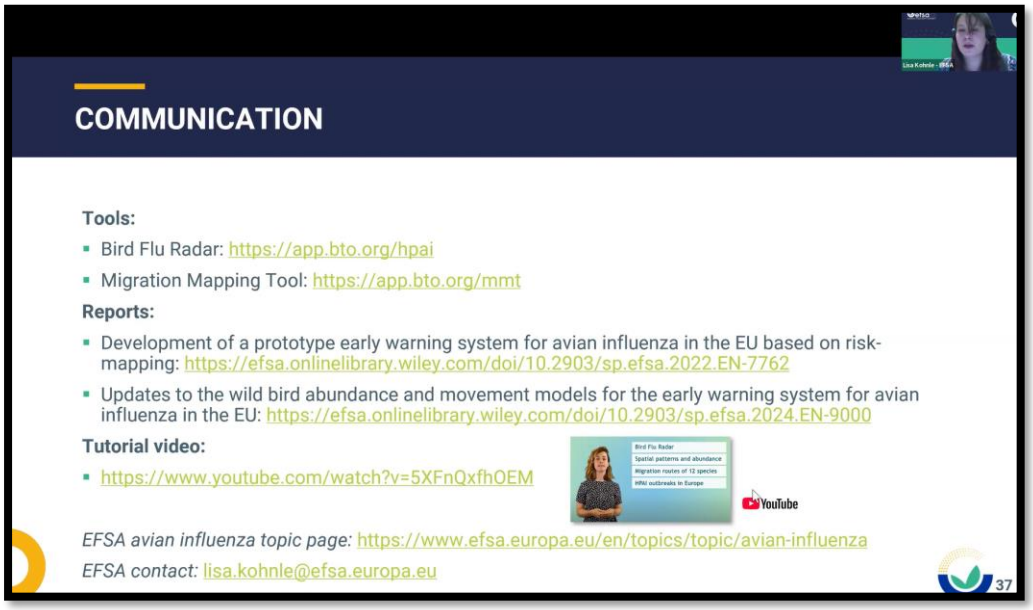
- HPAI poultry risk assessment: Currently a prototype tool for HPAI poultry risk assessment is under development and has been launched in October 2024 for Italy and France, with

potential to be extended to other countries. This model aims to estimate the probability of HPAI introduction by wild birds in at least one domestic poultry flock in a 50x50 km area per week, based on poultry population data collected by EFSA and weather data that influence virus survival in the environment;

- Inclusion of improved wild bird abundance and movement data for the initial 12 wild bird species, and modelling of the same data for another 13 selected wild bird species;
- Model validation: How the addition of the improved data and new wild bird species, and the modification of other variables, impact the output of the model still needs to be better understood;
- Climatic data: Inclusion of environmental climatic data in wild bird abundance and movement models, as well as the integration of these models into one single complex model is under process;
- Real-time movements: There is ongoing exploratory work to use tracking data estimating wild bird movements in real time;
- Data improvement: There are ongoing efforts to enhance the collection and generation of input data to improve the tool's performance and expand its application to additional geographic areas. This includes obtaining data from regions outside of Europe.







- **Hightlights** of the webinar:

For both HPAI risk-assessment tools the following variables were highlighted:

- The importance of timely and accurate data on HPAI outbreaks, wild bird movements, and ecological conditions like the dynamics of HPAI in wild bird species. Data quality and availability are particularly limited in certain regions, especially outside Europe. Uncertainty in data collection leads to discrepancies between predictions and real-world scenarios;

- Challenges in incorporating variables in the model like biosecurity measures, vaccination programs, and changes in virus dynamics (e.g., summer persistence or non-migratory bird infections) hinder prediction accuracy;
- Both highlighted the influence of climate change on wild bird behaviour, migration patterns, and HPAI dynamics, which are not fully integrated into current tools;
- Both models aim to support HPAI risk management through active surveillance, resource allocation, and stakeholder awareness.

Conclusions

This webinar was the third online meeting organized for the National Wildlife Focal Points of Europe and Central Asia to update their knowledge on two HPAI risk-assessment tools available in the region, DiFLUsion and Bird Flu Radar. Both tools were described, explained and showed in detail to give the resources needed to the focal points to access them for the prediction of HPAI introduction through wild birds' movements. The limitations and future improvements of both tools were mentioned. It was highlighted the importance of long-term monitoring of HPAI outbreaks and wild birds' movements to better understand the disease dynamics and evolution to improve the models performance. In addition, the speakers agreed in the relevance of timely and accurate data reporting. This is particularly significant given that, in many instances, it is the focal points themselves who bear the responsibility for reporting this type of data. Finally, the expansion of the tools to estimate the risk of introduction of HPAI in poultry by wild bird movements and poultry trade were mentioned. The webinar was also attended by colleagues from the European Food Safety Authority (EFSA) and the Department of Energy, Environment and Climate Action (DEECA) Australia. This webinar series is aligned with the objectives and activities of the WOAH Wildlife Health Programme.