

Supplementary material for "Strong impact of the recent Highly Pathogenic Avian Influenza panzootic on population dynamics of a long-lived bird"

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Abstract

Since 2020, the spread of a new Highly Pathogenic Avian Influenza virus (HPAIV-H5N1) has triggered the most severe wildlife panzootic ever recorded, with suspected population crashes in hundreds of species. Yet, no study has evaluated the demographic mechanisms underlying these declines. We used Integrated Population Models and population forecasts to evaluate the demographic impact of HPAIV-H5N1 on a long-lived species population, the peregrine falcon in the Netherlands. We found drastic declines in adult survival – the key driver of population dynamics in long-lived species – along with a sudden ~25% decline in breeding pairs over consecutive panzootic years. Population projections predict recovery to pre-panzootic levels not before 2030. Our findings illustrate how the new HPAIV panzootic can generate unprecedentedly strong, long-lasting population impacts in long-lived species. This

raises major concerns about the viability of the many species affected by the panzootic and calls for a global-scale conservation response.

Readme

R code and data to reproduce all the analyses presented in the paper. There are five files:

1. Code_HPAI.R - Code to run the model with data from 1993 to 2024 (i.e., including HPAI panzootic outbreaks) + projections until 2034
2. data_hpai.RData - Necessary data to run the model with data from 1993 to 2024 (i.e., including HPAI panzootic outbreaks) + projections until 2034
3. Code_NoHPAI.R - Code to run the model with data from 1993 to 2019 (i.e., excluding HPAI panzootic outbreaks) + projections until 2034
4. data_nohpai.RData - Necessary data to run the model with data from 1993 to 2019 (i.e., excluding HPAI panzootic outbreaks) + projections until 2034
5. Plots_Publish.R – Code to run the plots that appear in the manuscript. The code runs with the .RData files generated by running the analyses (files number 1 and 3).

Instructions: Download all files in the same folder and set it as a working directory. The code is set to find and load the data from the working directory.

Key words

Avian Influenza, Integrated Population Modelling, Wildlife Disease, Demographic Analysis, Demographic Resilience, Long-lived Species, Capture-Mark-Recapture, Wildlife Epizootics, Population Models, Peregrine Falcon