

Landscape and spatial patterns of avian influenza virus in Danish wild birds, 2006-2020

Lene Kjær¹, Charlotte Hjulsager², Lars Larsen³, Anette Boklund⁴, Tariq Halasa³, Michael Ward⁵, and Carsten Kirkeby⁴

¹University of Copenhagen Faculty of Health Sciences

²Statens Serum Institut

³University of Copenhagen

⁴University of Copenhagen Faculty of Health and Medical Sciences

⁵University of Sydney

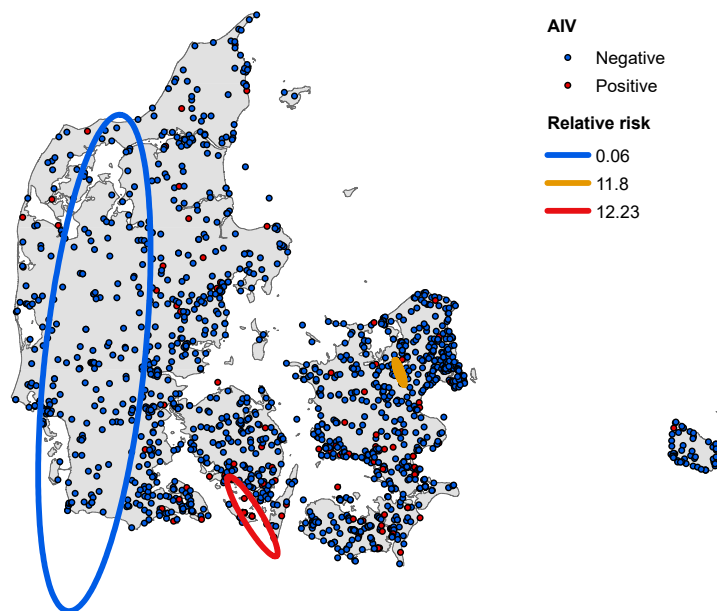
November 19, 2020

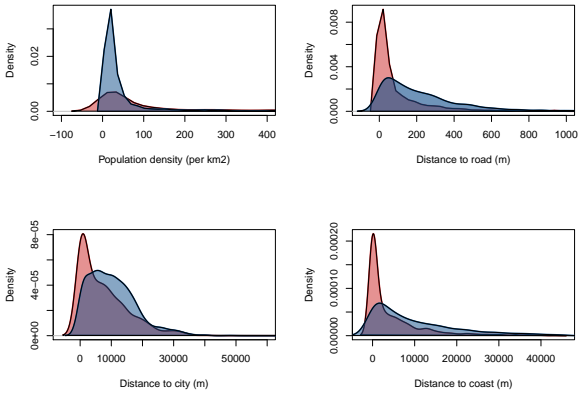
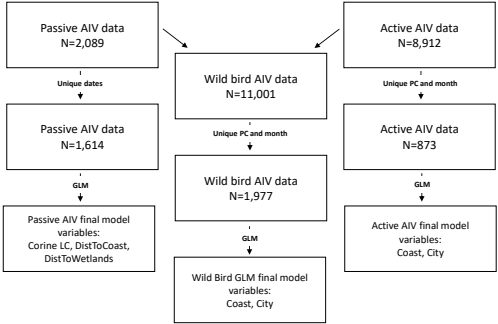
Abstract

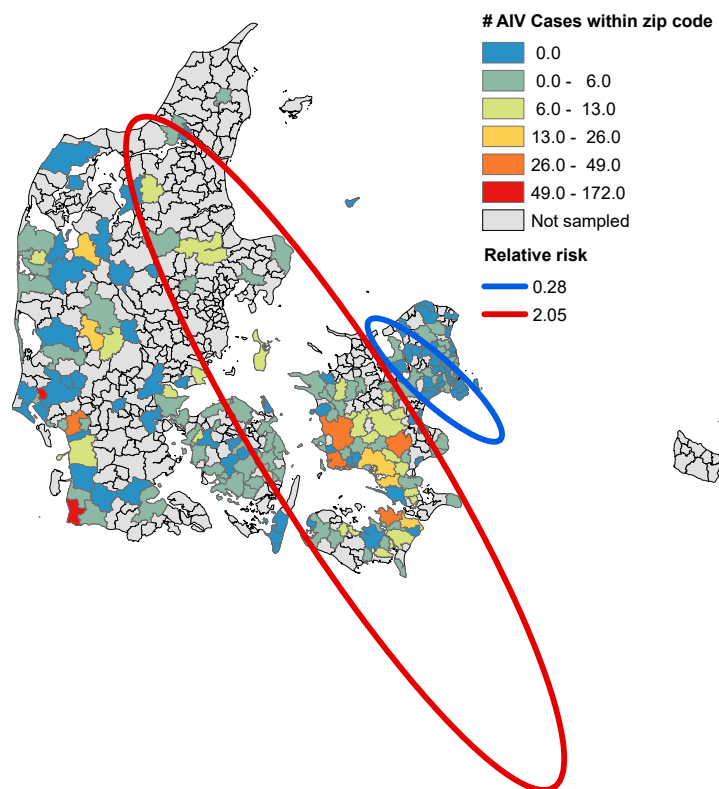
Avian influenza (AI) is a contagious disease of birds with zoonotic potential. AI virus (AIV) can infect most bird species, but clinical signs and mortality vary. Assessing the distribution and factors affecting AI incidence can direct targeted surveillance to areas at risk of disease outbreaks, or help identify disease hotspots or areas with inadequate surveillance. Using virus surveillance data from passive and active AIV wild bird surveillance, 2006-2020, we investigated the association between a range of landscape factors and game bird release and the presence of AIV. Furthermore, we assessed potential bias in the passive AIV surveillance data submitted by the public, via factors related to public accessibility. Lastly, we tested the AIV data for possible hot and cold spots within Denmark. The passive surveillance data was biased regarding accessibility to areas (distance to roads, cities and coast) compared to random locations within Denmark. We found significant effects of variables related to coast, wetlands and cities for the passive and active AIV surveillance data ($P < 0.01$), but found no significant effect of game bird release. We used these variables to predict the risk of AIV presence throughout Denmark, and found high-risk areas concentrated along the coast and fjords. For both passive and active surveillance data, low-risk clusters were mainly seen in Jutland and northern Zealand, whereas high-risk clusters were found in Jutland, Zealand, Funen and the southern Isles such as Lolland and Falster. Our results suggest that landscape affects AIV presence, as coastal areas and wetlands attract waterfowl and migrating birds and therefore might increase the potential for AIV transmission. These findings have enabled us to create risk maps of AIV incidence in wild birds and pinpoint high-risk clusters within Denmark. This will aid targeted surveillance efforts within Denmark and potentially aid in planning the location of future poultry farms.

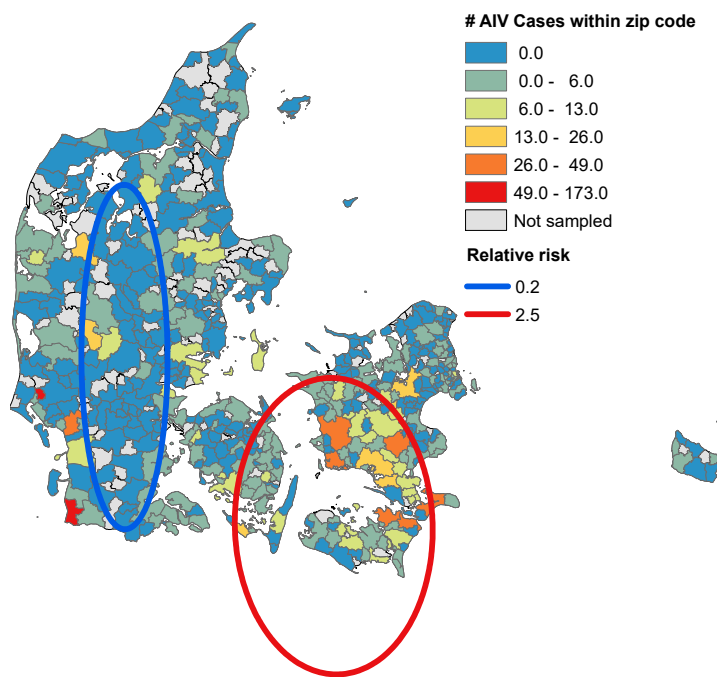
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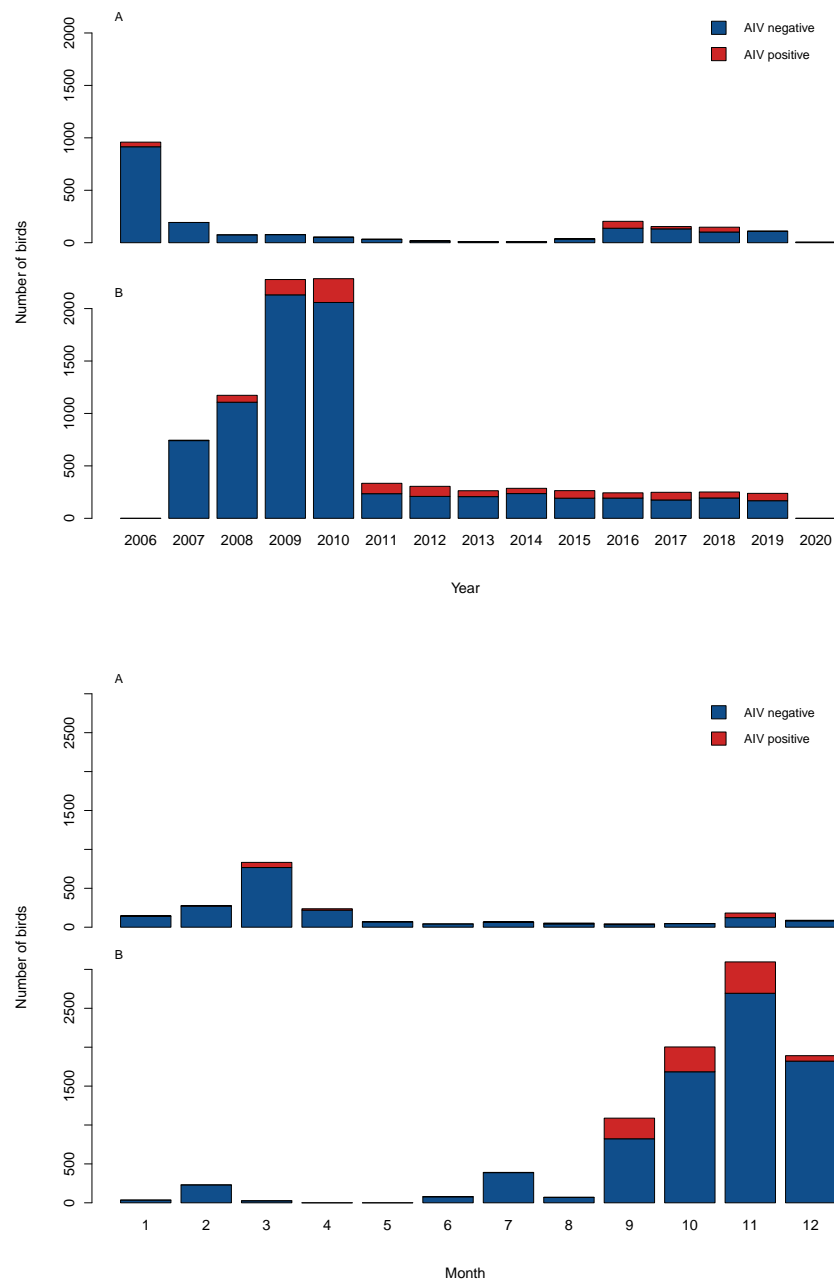
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