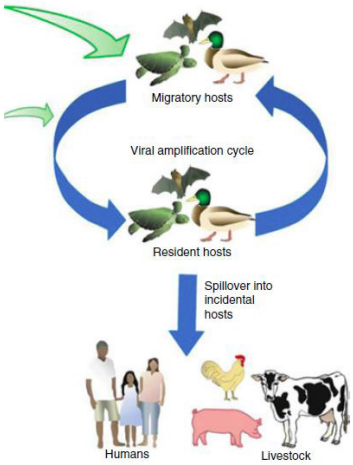
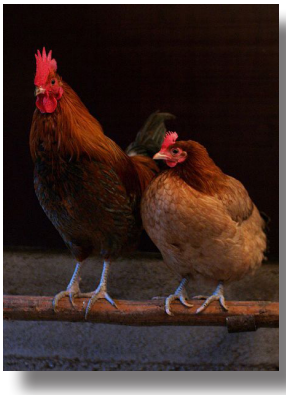
USGS
science for a changing world

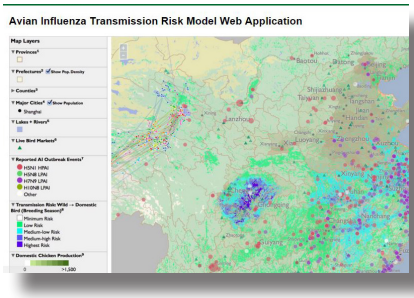
Patuxent Wildlife Research Center

Modeling Avian Influenza Risk for Poultry in the US



Interface risk diagram





Interface risk for China

The Challenge: The highly pathogenic avian influenza (HPAI) outbreak of 2014-2015 has been the most costly animal health event in U.S. history, both from the standpoint of lost birds due to infection or depopulation, and from disruption to the poultry market due to international embargos of U.S. poultry products. Over the past 10 months more than 50 million birds have been lost and $3.3 billion in economic losses incurred. Wildlife and HPAI viruses have the potential to occupy shared spaces in the environment, particularly air and water, and understanding the interaction between the two is crucial for predicting and managing outbreaks.

The Science: This work is in partnership with The Center for Epidemiology and Animal Health (CEAH) within USDA Animal and Plant Health Inspection Service (APHIS). CEAH has developed models that evaluate within-flock and between-flock spread of HPAI in commercial and backyard poultry in the U.S. Meanwhile, the USGS Patuxent Wildlife Research Center (PWRC) has developed spatial risk models for avian influenza focusing on the combined interface of transmission risk between wild migratory birds, domestic birds, and environmental risk factors. Together, the data from CEAH and USGS is being incorporated into disease transmission risk models to identify factors that place domestic animals and humans at risk for exposure and infection. PWRC has also converted 2012 Agricultural Census data for poultry to GIS county-level shapefiles for the 3,007 counties across the U.S. and is working towards developing gridded distribution models from these data.

The Future: Fortunately, the current HPAI strains circulating in wild birds and poultry have not caused disease in humans, but that may not be the case in the future. Application of these models will help predict areas, seasons, and conditions of highest risk for transmission of HPAI, providing important management information directed at preventing transmission. A website will be constructed to provide a data platform that allows users to interactively investigate avian influenza outbreak risk to the animals they manage (both wild and domestic) customized to their specific conditions. This work is also the beginning of a long-term cooperative effort between USDA and DOI that would allow for more effective response and preparedness to emerging issues that arise at the wildlife-agriculture-human interface.

Contact: Diann Prosser at (301) 497-5914, or dprosser@usgs.gov