Examining inter-regional and intra-seasonal Differences in Wintering Waterfowl Habitat Use Among Pacific and Atlantic Flyways and its Application for Food Security in the U.S.

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Abstract

The Central Valley of California (CVC) and Mid-Atlantic (MA) in the U.S. are critical sites for wintering waterfowl. Mapping waterfowl distributions using weather radar aids in the targeted adaptive management by highlighting important waterfowl habitats. Additionally, mapping broadscale waterfowl distributions improves food security by allowing government agencies and commercial poultry operations to better understand the interface between wild and domestic birds that is related to risk of highly pathogenic avian influenza outbreaks. Improving understanding of predictors of wintering waterfowl distributions at both local and landscape scales will allow facility managers and regulatory agencies to make more informed risk management decisions. We used 9 years (2014–2023) of data from the US NEXRAD network to model winter waterfowl distributions in the CVC and MA as a function of weather, temporal, and environmental characteristics using boosted regression tree modelling. We captured the spatial-temporal variability in effect size of 28 different covariates within two geographic regions which are critical to nationwide waterfowl management and have a high density of commercial poultry. In general, environmental, and geographic predictors had the strongest relative effect on predicting wintering waterfowl distributions in both regions, while effects of land cover composition were more regionally and temporally specific. Increased daily mean temperature was a major predictor of increasing waterfowl distributions in both regions throughout the winter. Increasing waterfowl densities in the CVC are strongly tied to the flooding of the landscape and rice availability, whereas waterfowl in the MA, where water is less limiting, are generally governed by waste grain availability and emergent wetland on the landscape. Waterfowl distributions in the MA increased closer to the Atlantic coast and lakes, while in the CVC they were higher nearer to lakes. Our findings promote understanding of the predictors of winter waterfowl densities in relationship with biosecurity of commercial poultry nationally.

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