

Occurrence of a conflictive species as assessed by modeling and evaluated by use of multi-source citizen science data

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Denmark was considered without an established population of free-ranging wild boar. Today, sporadic observations of wild boar challenge that view. Due to its reservoir role for economic devastating swine diseases, wild boar represents a potential threat for Denmark's position as a large pig- and pork-exporting country. This study assessed the prospects of wild boar invasion in Denmark. Multi-source citizen science data of wild boar observations were integrated into a multi-modelling approach linking habitat suitability models with agent-based, spatially-explicit simulations. We tested whether the currently observed presence of wild boar is due to natural immigration across the Danish-German border, or whether it is more likely that wild boar escaped fenced premises. Five observational data sources served as evaluation data: 1) questionnaire sent to all 1,625 registered owners of Danish farm land, located in the 60 parishes closest to the border, 2) online questionnaire, 3) mobile web-based GPS application, 4) reports in media or by governmental agencies, and 5) geo-referenced locations of fenced wild boar populations. Data covering 2008 to 2013 included 195 observations of wild boar, including 16 observations of breeding sows. The data from the Danish Nature Agency and the mailed questionnaires confirmed each other regarding the location of wild observations, while data from the Danish Veterinary and Food Administration, the media and the electronic questionnaires documented individual scattered observations in the rest of Jutland. Most observations were obtained in the region bordering Germany. It is uncertain whether the relatively few observations represent an established population. Model outcomes suggested that the origin of about half of the area with sporadic observations of wild boar could be attributed to spatial expansions from a local Danish population near the border. However, the other half, located distant to the border were likely a result of animals escaping fenced premises inside the country. The approach serves as a template to assess the status of an invading species and improve the knowledge base for risk assessment and management decision.