A probabilistic crop-footprint approach to characterize potential pesticide use sites for endangered species assessments at the national scale

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Introduction

Background
An important component of endangered species assessments (ESAs) is the definition of crop footprints that represent potential sites for pesticide applications based on prescribed points on the pesticide label. Despite many previous crop footprints being based on generalized land use, such as the National Agriculture Statistics Service (NASS) Crop Count Data (CCD), extracted and classified by states or counties, with no information concerning individual crop footprints or historic yields being generated and readily available, especially for remote or rural sites. This methodology also assumes that the probability of planting a pixel to an NLCD class, given that the pixel is incorrectly identified as soybean.

Datasets
The following datasets were used to develop the potential pesticide use footprint: NASS Crop Count Data (CCD), the Crop Rotation Data Layer (CRDL) from the National Agricultural Statistics Service (NASS) (2009–2012), and the National Land Cover Dataset (NLCD) for the contiguous U.S. (2001, 2006, and 2011), which is derived from the 2001 NLCD. This dataset provides information on 17 land cover classes, including wetlands, grasslands, and cultivated crops. The CRDL dataset provides information on the crop rotation for each county in the contiguous U.S. for the years 1992–2012. This dataset is used in this study to develop the potential pesticide use footprint at the field level and yearly land cover data is utilized in the CDL. The USDA Crop Reporting Service (CRS) provides the weekly report of the crop acreages, which is used to test the proposed methodology. The National Space-Based passive imaging system of the Minerals Management Service (MMS) provides a much larger range of data, including additional crop footprints and a more comprehensive coverage of the United States.

Methodology

Probability Crop Footprint Acreage Comparison

The likely number of crop footprints representing potential pesticide use sites for endangered species assessments at the national scale

Study Area
The continental United States was evaluated to test the proposed approach. The population was used as the example target for crop footprints, which reflects the actual potential for pesticide use sites for endangered species assessments. This crop footprint development methodology is referred to as the 5-C crop footprint methodology.

Objective
A probabilistic methodology that physically varied, high resolution, georeferenced, classified data on multi-year, multi-year land cover data is utilized. There is an increase in the number of counties that can be assessed for using probabilistic footprints. Varying yearly data can help understand and account for crop rotations and changes in land cover over time. The crop footprint methodology represents the same amount of acreage as historical reports by county. The probabilistic crop footprint reduces the environmental impact of spatial pixels without removing them from the analysis. Approaches that use probabilistic crop footprints to represent the likelihood of pesticide use sites for endangered species assessments at the national scale

Results and Discussion

Probabilistic Crop Footprint Approach

The probability of mapping a pixel to an NLCD class, given that the pixel is incorrectly identified as soybean.}

Abstract:
A methodology for developing probabilistic crop use site footprints to estimate the likelihood of pesticide use sites at the national scale and to account for uncertainty in the approach was assessed. The probabilistic unit of the approach consists of annual crop rotations and the occurrence of species重现 land and field observations. This approach and the resulting uncertainty reports by county were validated by the USDA Crop Reporting Service (CRS). The probabilistic crop footprint methodology was compared to the CDL, which is a highly accurate and reliable estimate of the proportion of endangered species and their potential pesticide use sites. This statistical approach was also used in decision analysis and land cover data are utilized in the CDL. The USDA Crop Reporting Service (CRS) provides the weekly report of the crop acreages, which is used to test the proposed methodology. The National Space-Based passive imaging system of the Minerals Management Service (MMS) provides a much larger range of data, including additional crop footprints and a more comprehensive coverage of the United States.