

Cultivated hay and fallow/idle cropland confound analysis of grassland conversion in the Western Corn Belt

The conclusions of a recent study by Wright and Wimberly (1) suggesting that corn/soy cultivation in the Western Corn Belt (WCB) “threatens grasslands” are questionable because of the methods and data used. The study (1) compared National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL) for 2006 with CDL for 2011 (2) and found 530,000 ha of net “grassland conversion” to corn/soy. The study (1) labeled over 3.5 million ha of CDL cropland (alfalfa, other/hay, and fallow/idle) as “grassland” in 2006 and then improperly counted any corn/soy rotation to that land in 2011 as “grassland conversion.” The study also failed to mention that total “grassland” area as defined in the study (1) grew by 1.6 million ha from 2006 to 2011, continuing a 20-y trend of net grassland expansion across the northern plains (3).

Furthermore, per CDL (2), over 1.2 million ha of WCB fallow/idle cropland in 2006 rotated to other uses in 2011 and could easily accommodate 530,000 ha of corn/soy without encroaching on any other “grassland.” Cultivated hay, alfalfa, and fallow/idle cropland are often managed in rotation with row crops (3, 4). Over 2.2 million ha of fallow/idle cropland were available in the “grassland” class in 2006, but only 1.0 million ha remained in 2011 (2). Fallow/idle land reflects prior cultivated use, and its appearance may vary from bare soil to annual cover crops (2, 4). One could expect significant change when comparing pixels classified as fallow/idle fields in 2006 with corn/

soy in 2011. However, it only takes 24% of the 2006 fallow/idle land to account for all 530,000 ha of net “grassland conversion.”

NASS cautions against use of CDL for noncropland analyses because “grassland-related categories have traditionally had very low classification accuracy in the CDL” and instead recommends that the National Land Cover Dataset be used to study non-agricultural land cover (2). The “grassland” area calculated using 2006 CDL data (2) exceeds the total grassland area per 2006 National Land Cover Dataset data (5) by over 480,000 ha. The discrepancy in initial 2006 grassland area is similar in magnitude to the “conversion” estimated by the study from 2006 to 2011 (1) and underscores the large uncertainties involved when using these data for change analysis (3–5).

Reliable change calculations are impossible when comparing inconsistent land-cover data from two time periods. The 2006 starting point used for the study introduced further uncertainty as this was the first year of a new CDL classification system that has continued to evolve and improve ever since. Between 2006 and 2011 the CDL underwent changes in: (i) class types, names, and numbers; (ii) resolution (from 56-m to 30-m); and (iii) input and training data sources (2). Pixel comparisons of disparate datasets generate unquantifiable uncertainty and are discouraged because they result in a change map that manifests differences in methods and input data rather than real change on the ground (5).

Land use change cannot be accurately calculated by using inconsistent data combined into a large aggregate class. Better data and analyses are needed to guide land management improvements for sustainable provision of multiple services to society.

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1 Wright CK, Wimberly MC (2013) Recent land use change in the Western Corn Belt threatens grasslands and wetlands. *Proc Natl Acad Sci USA* 110(10):4134–4139.

2 US Department of Agriculture, National Agriculture Statistics Service (2013) *Cropland data layer metadata*. Available at www.nass.usda.gov/research/Cropland/metadata/meta.htm. Accessed March 20, 2013.

3 Claassen R, Carriazo F, Cooper JC, Hellerstein D, Ueda K (2011) *Grassland to Cropland Conversion in the Northern Plains: The Role of Crop Insurance, Commodity, and Disaster Programs*. Economic Research Report No. ERR-120 (US Department of Agriculture, Washington, DC).

4 Johnson DM (2013) A 2010 map estimate of annually tilled cropland within the conterminous United States. *Agric Syst* 114(C):95–105.

5 Multi-Resolution Characteristics Consortium (2013) National Land Cover Database (NLCD). Available at <http://www.mrlc.gov/index.php>. Accessed March 30, 2013.

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