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Grassland to Cropland Conversion in the Northern Plains

The Role of Crop Insurance, Commodity, and Disaster Programs

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What Is the Issue?

Native grasslands in the Northern Plains, particularly those located in the Prairie Pothole Region (PPR), are used as breeding habitat by migratory birds. The PPR includes parts of Iowa, Minnesota, North Dakota, South Dakota, and Montana. Grasslands in the PPR account for about 50 percent of North American duck production. There is growing concern that the conversion of grassland to crop production is damaging this habitat. Once lost, native grasslands are difficult to re-establish.

Environmental organizations and others have argued that some Federal farm programs are encouraging grassland to cropland conversion. While many farm commodity programs are now decoupled from farmers' crop production decisions, several USDA programs continue to depend on current production, including crop insurance, marketing loans, and disaster assistance. Farmers can expand their eligibility to receive benefits from these programs by converting grassland to cropland.

To address these concerns, the Food, Conservation, and Energy Act of 2008 included the Sodsaver provision. If implemented, Sodsaver would deny crop insurance for the first 5 years of production on native sod (native grassland) converted to crop production. Sodsaver is limited to the Prairie Pothole States (Iowa, Minnesota, Montana, North Dakota, and South Dakota) and would be implemented on a State-by-State basis but only at the request of that State's governor. As of June 2011, none of the governors has requested Sodsaver implementation. The manager's statement accompanying the 2008 Farm Act also directed USDA to conduct a study of the role of farm programs in grassland to cropland conversion.

We focus on three questions: (1) How fast are grasslands being converted to cropland in the United States, especially in the Northern Plains? (2) Can a policy like Sodsaver, if implemented, significantly slow grassland to cropland conversion? (3) More broadly, what has been the role of crop insurance and other farm programs in grassland to cropland conversion?

While concern about grassland conversion is often focused on "native" grassland, available data do not identify grasslands as "native" or "non-native." Native grasslands are most likely to be categorized as part of rangeland. This study considers a wide range of grassland categories including rangeland, pasture, hay, and Conservation Reserve Program (CRP) lands with grass cover.

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What Were the Study Findings?

During 1997-2007, grassland-cropland conversion varied by grassland type and region. Compared with other regions, producers in the Northern Plains were more likely to convert grassland to cropland or retain land in crops rather than returning it to grass. In the Northern Plains, about 1 percent of 1997 rangeland had been converted to crop production by 2007 (roughly 770,000 acres), while only 100,000 acres were converted from cropland to rangeland. The Northern Plains accounted for 57 percent of rangeland to cropland conversion between 1997 and 2007. In the United States, there was a net shift between 1997 and 2007 of roughly 10 million acres from cultivated cropland (about 3 percent of 1997 cropland) to hay or pasture. In the Northern Plains, the net shift of cropland to hay and pasture was effectively zero. The gross shift of roughly 3.5 million acres moving from cropland to hay or pasture was exactly offset by acreage moving from hay or pasture to cultivated crops. Through the CRP, however, producers in the Northern Plains moved some land from cultivated crops to grass. Between 1997 and 2007 they enrolled 3.6 million acres of cropland in the CRP, while 1.9 million acres were returned to crop production and 1.7 million acres previously in the CRP became hay, pasture, or range.

The Sodsaver provision of the 2008 Farm Act, if implemented, is likely to have only a modest effect on land use at the grassland-cropland margin. In seven North and South Dakota counties where evidence suggests that grassland to cropland conversion has been relatively high, Sodsaver would reduce expected crop revenue by up to 5 percent, reduce expected net return by up to 14 percent, and increase the variability of crop production (in terms of annual standard deviation of crop revenue) by up to 13 percent. Land use change depends on how responsive land allocation is to changes in crop revenue, net return, and variability. Using elasticities estimated for this study, we find that crop insurance could have been responsible for shifting up to 0.9 percent of rangeland to cropland in the seven counties we considered. This is an estimate of net change in equilibrium acreage and is not directly comparable to gross rangeland conversion. These counties are located in an area where an annual average rate of rangeland to cropland conversion of 0.6 percent of grassland acreage was observed between 1985 and 2003—indicating total conversion of about 6 percent over a period of 10 years. In comparison, the 0.9-percent change in estimated equilibrium acreage that would result from the withdrawal of crop insurance would be modest and indicates that crop insurance is only one of a number of factors (e.g., market conditions, technology, and other programs) that are driving land use choices.

In a study area that includes 77 North Dakota and South Dakota counties, we use an econometric model to estimate that crop insurance, marketing loans, and disaster payments increased land in cultivated crops by 686,000 acres (the average effect between 1998 and 2007)—roughly 2.9 percent of cultivated cropland acreage. (This is an estimate of the net change in equilibrium acreage. The estimated effect varies over time with economic and policy conditions. The 2.9-percent change is the average estimated effect between 1998 and 2007.) The largest overall effect was from disaster assistance (1.2 percent rise in cultivated cropland; 292,000 acres), followed by crop insurance (1 percent; 235,000 acres) and marketing loan benefits (0.7 percent; 161,000 acres). We estimate that roughly 60 percent of the increase in crop acreage came from hay or pasture (403,000 acres) while the remaining acreage came from range (181,000 acres) and CRP (102,000 acres). The estimated rangeland reduction of 181,000 acres was 1.1 percent of rangeland acreage in the 77 counties considered in this study. In the absence of these programs, farmers could adjust to larger grassland acreages by reducing the rate of grassland to cropland conversion, increasing cropland to grassland conversion, or both. The study period, 1998-2007, largely predates the recent rise in commodity prices, beginning with increased corn prices in 2007. Higher crop prices may be encouraging farmers to expand cropland acreage, prompting them to convert grassland to cropland or retain land in crop production that might have otherwise been returned to grass.

How Was the Study Conducted?

The study has three major components. First, we document trends in grassland to cropland changes using data from USDA's Natural Resources Conservation Service (NRCS) 2007 National Resources Inventory (NRI). A simulation analysis is used to gauge the potential of a Sodsaver-type program to reduce crop insurance indemnities and other payments to crops grown on converted grassland in seven counties, thereby reducing incentives for grassland conversion. Finally, an econometric (statistical) model is developed to help understand the role of farm program payments in the movement of land among cropland, hay and pasture, rangeland, and CRP in 77 counties from 1997 to 2007, while controlling for changes in market prices, crop yields, and other nonpolicy factors that may have also influenced land use decisions.