Factors contributing to cropland patterns and changes in the United States

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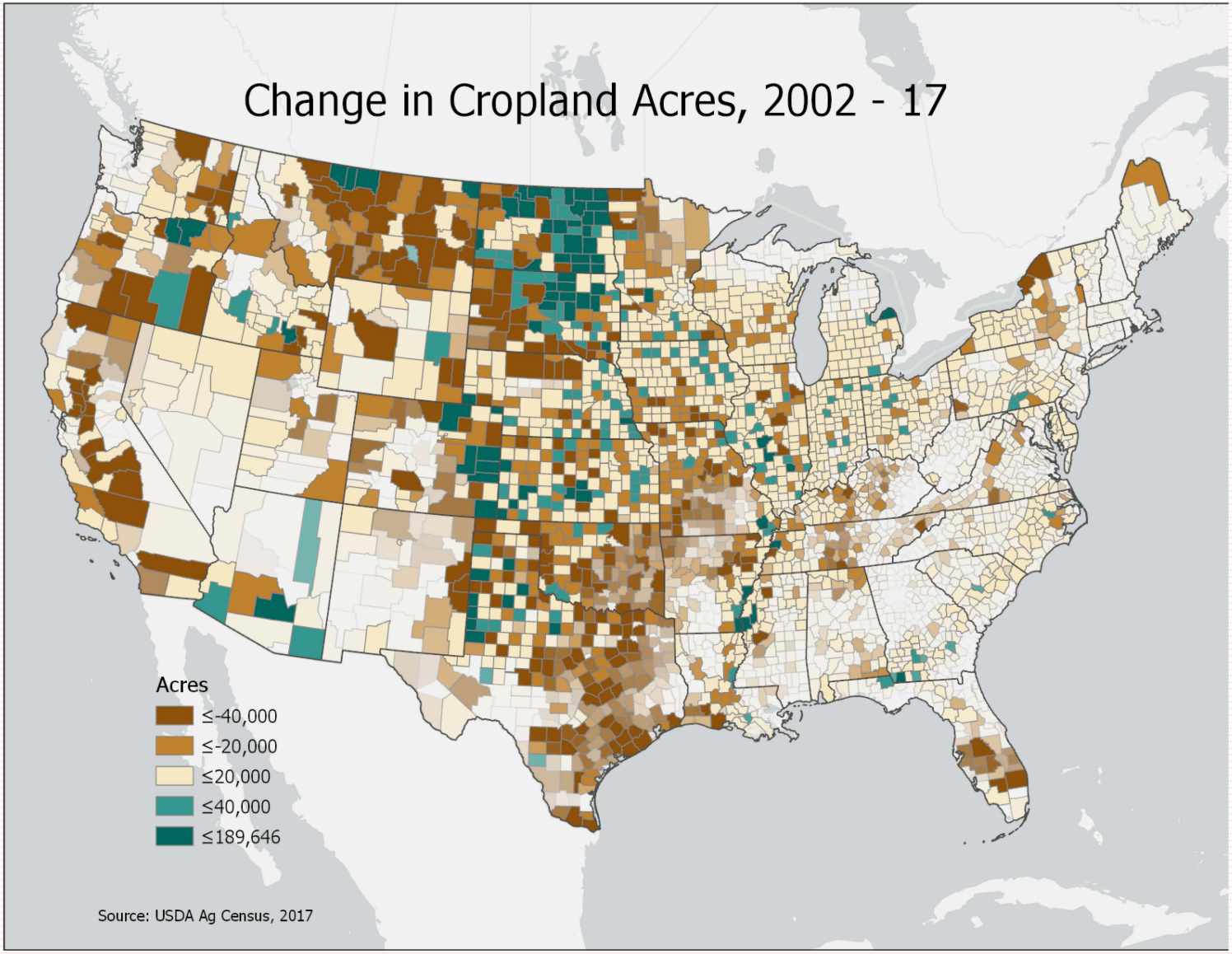
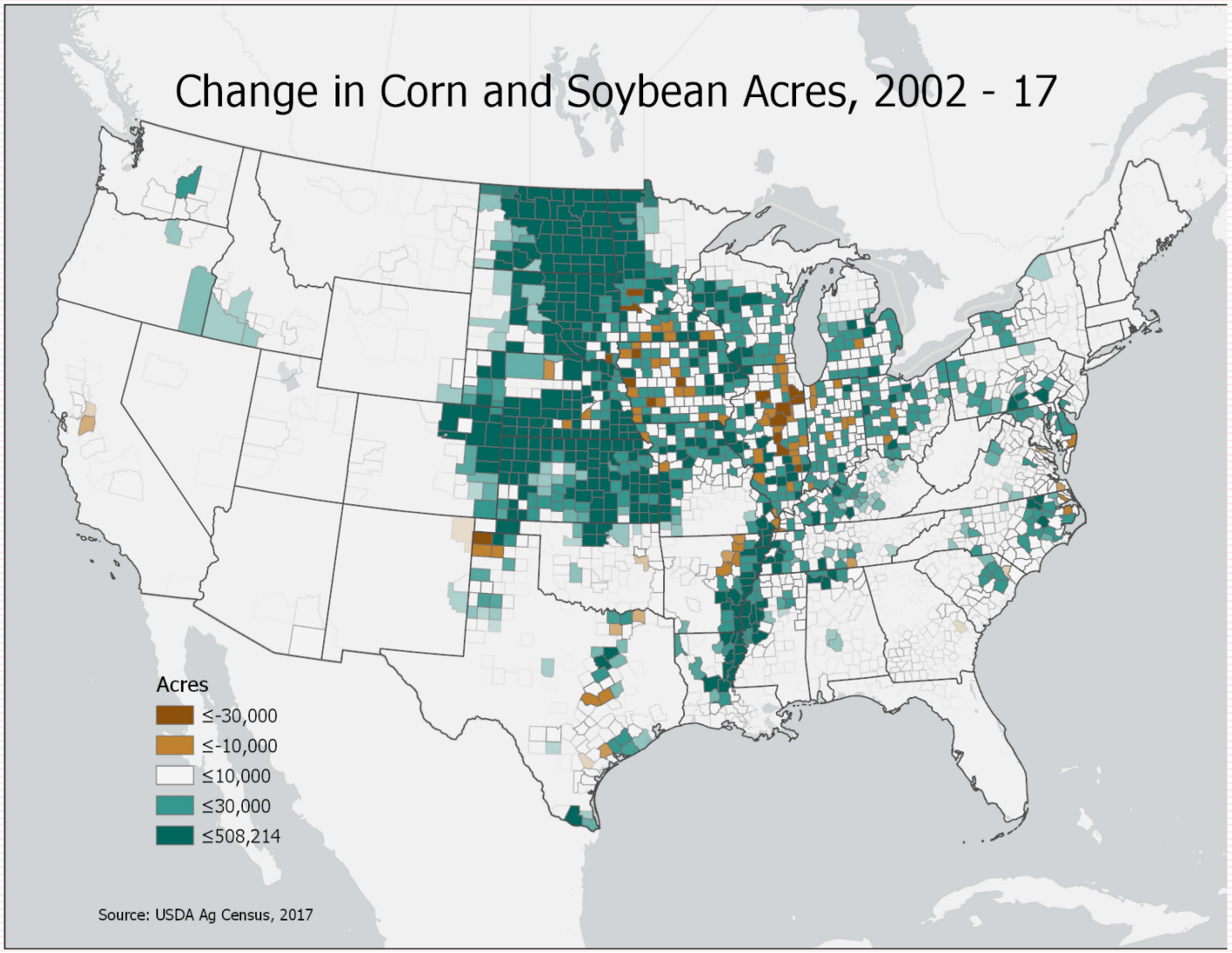
U.S. Cropland Trends: 2002 - 2021

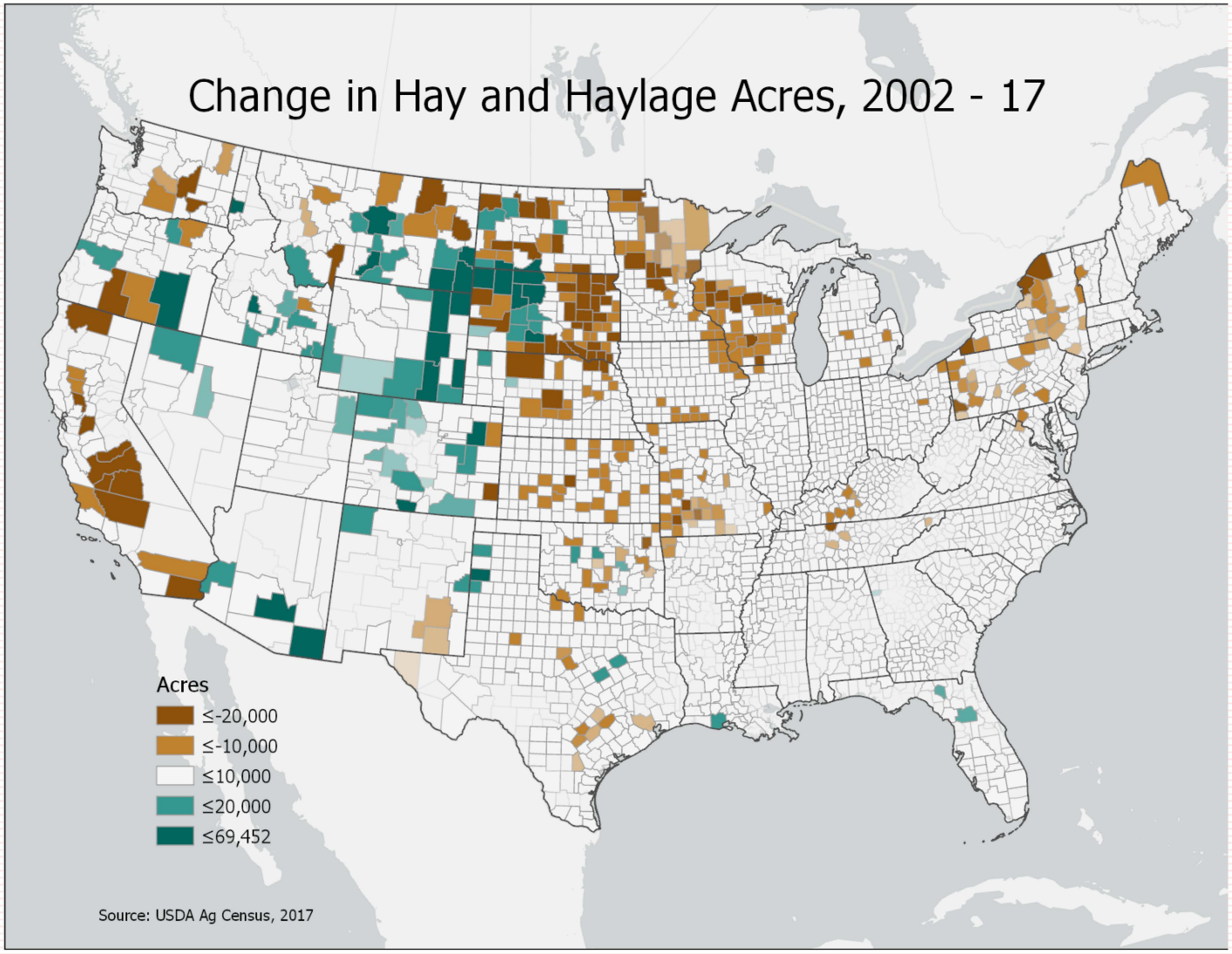
Million Acres

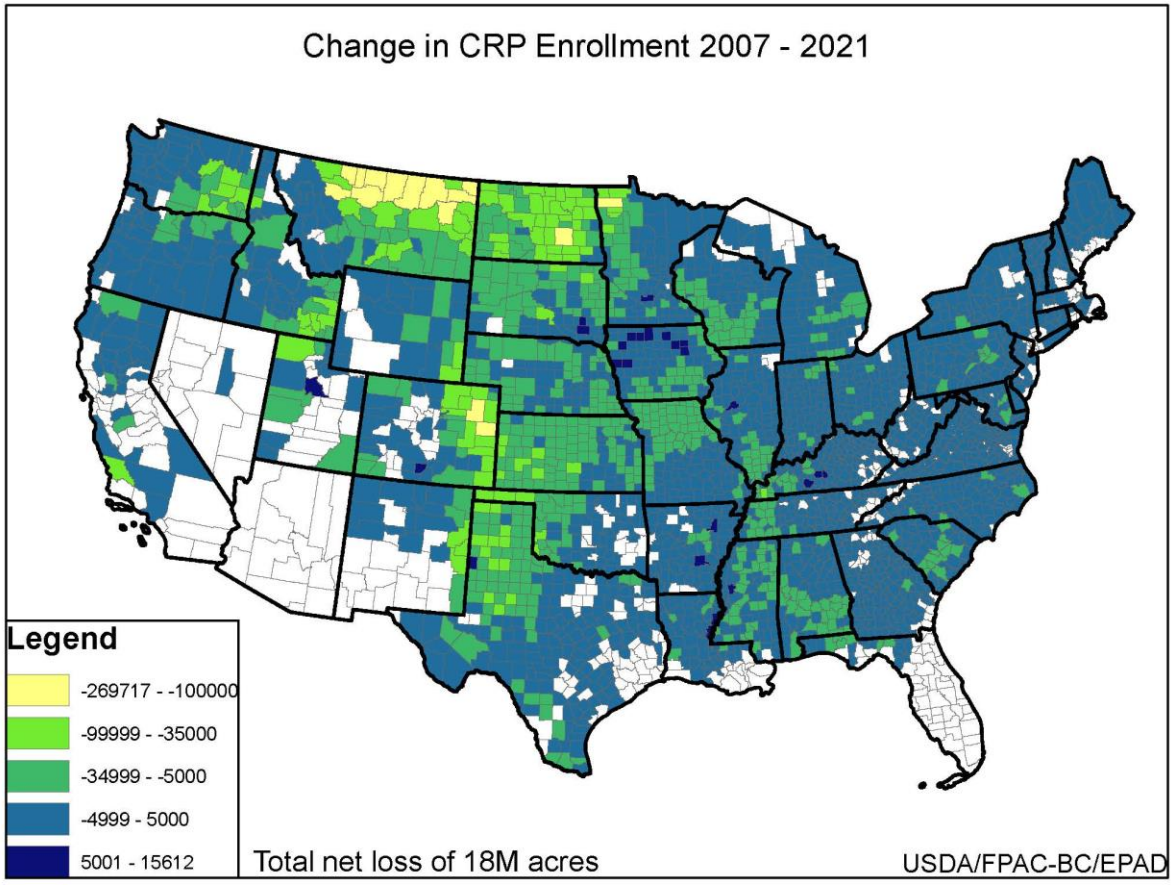
	2002	2007	2012	2017	2021
Total Cropland	327.3	320.4	324.3	318.3	317.2
Corn	78.9	93.5	97.3	90.2	93.4
Soybeans	74	64.7	77.2	90.2	87.2
Wheat	60.3	60.5	55.3	46.1	46.7
Hay	63.9	61.0	54.7	52.8	50.7
CRP enrolled	33.9	36.8	29.5	23.4	18.2

Source: *USDA, National Agricultural Statistics Service, Crop Production and Agricultural Prices; and USDA, World Agricultural Outlook Board, World Agricultural Supply and Demand Estimates*


Change in Cropland Acres, 2002 - 17
Acres
≤-40,000
≤-20,000
≤20,000
≤40,000
≤189,646
Source: USDA Ag Census, 2017


Change in Corn and Soybean Acres, 2002 - 17
Acres
≤-30,000
≤-10,000
≤10,000
≤30,000
≤508,214
Source: USDA Ag Census, 2017


Change in Hay and Haylage Acres, 2002 - 17
Acres
≤-20,000
≤-10,000
≤10,000
≤20,000
≤69,452
Source: USDA Ag Census, 2017

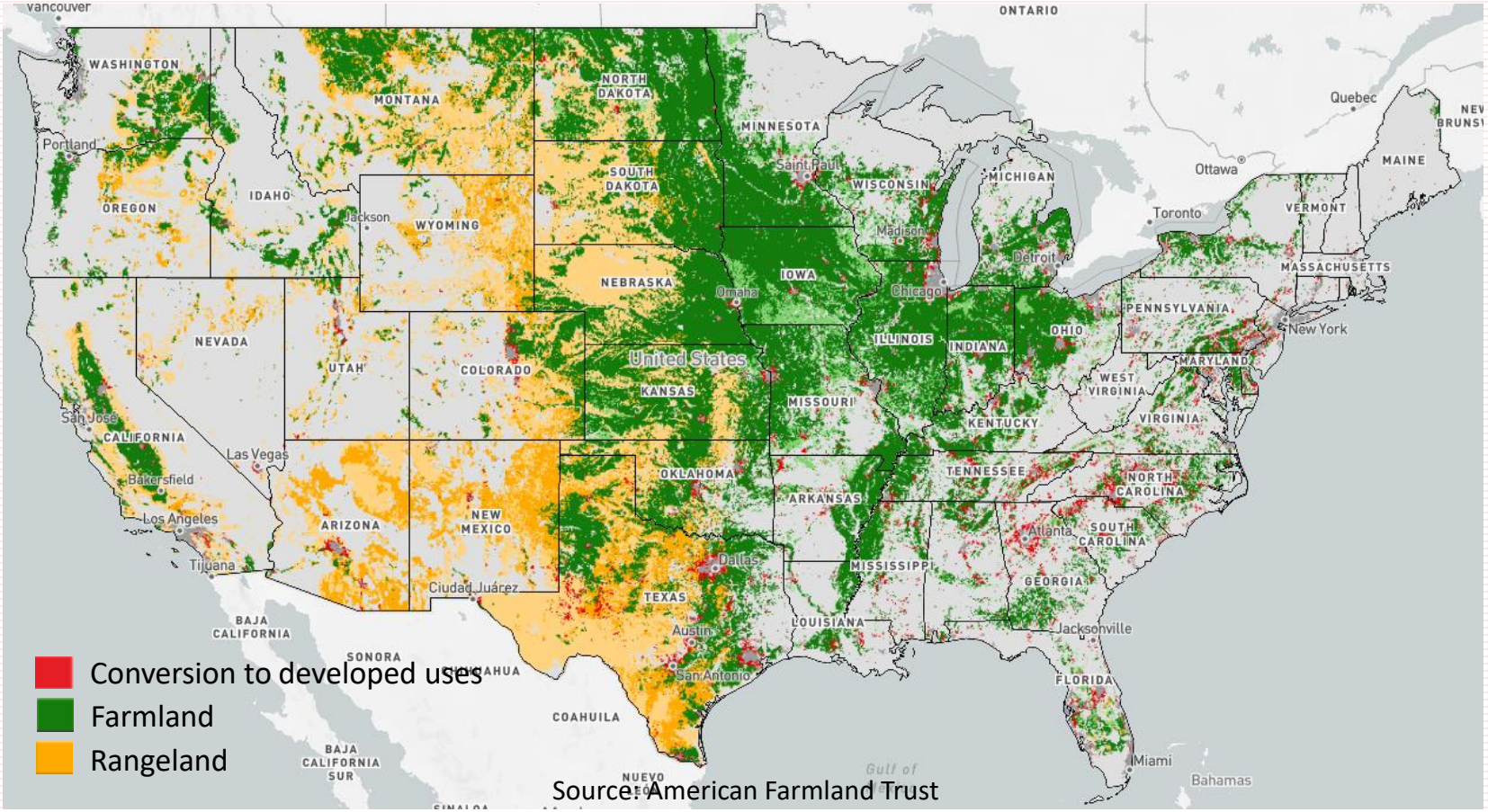


Farm Bill CRP Acreage Caps (million Acres)

2008	39.2
2009	39.2
2010	32
2011	32
2012	32
2013	32
2014	27.5
2015	26
2016	25
2017	24
2018	24
2019	24
2020	23.5
2021	23.5
2022	23.5
2023	25

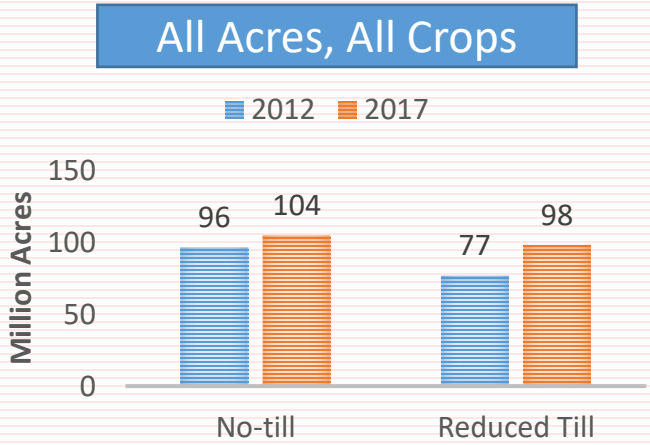
Conversion of Agricultural Land to Developed Uses (2001-2016)

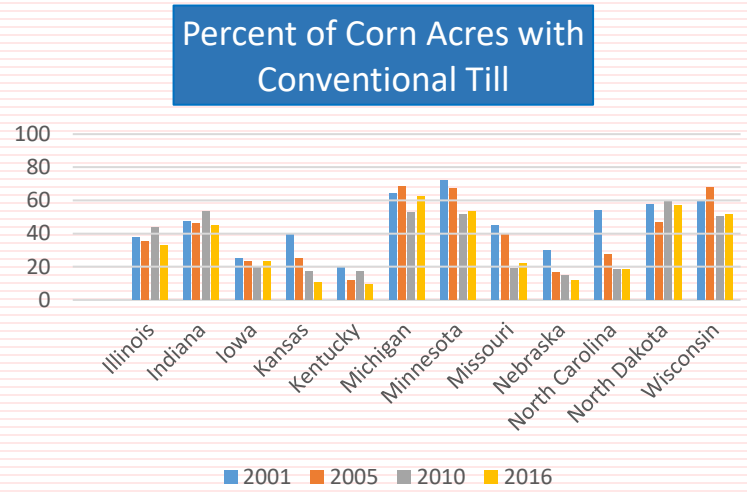
10.9 Mil acres



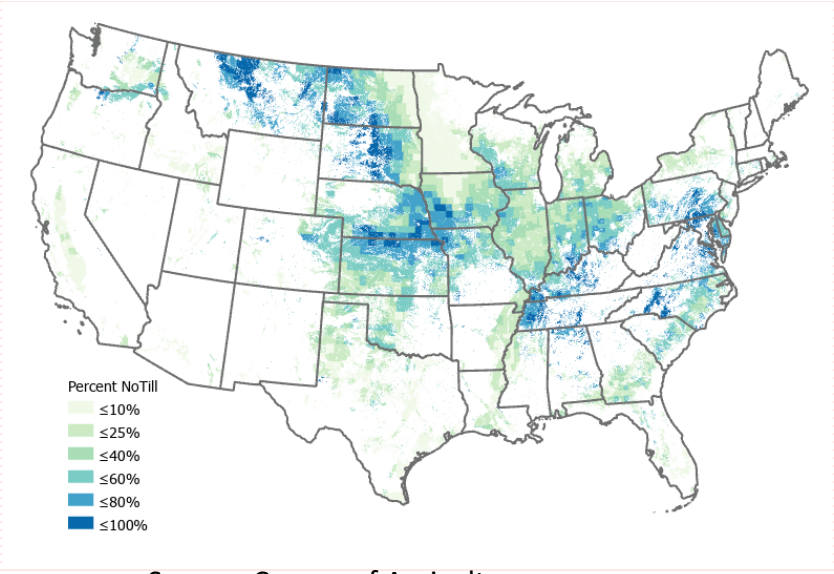
Source: American Farmland Trust

Conservation Practices: Tillage

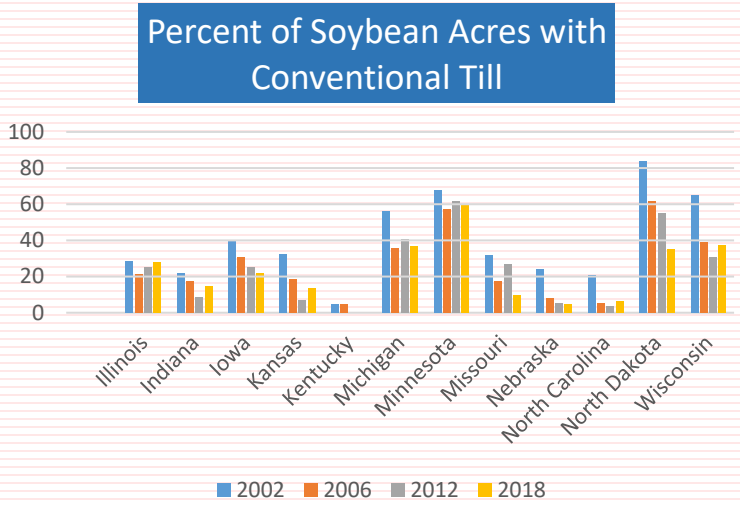




Percent of Reported Tillage in No Till, 2017

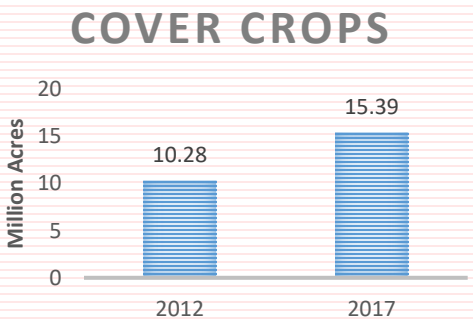


Source: Census of Agriculture



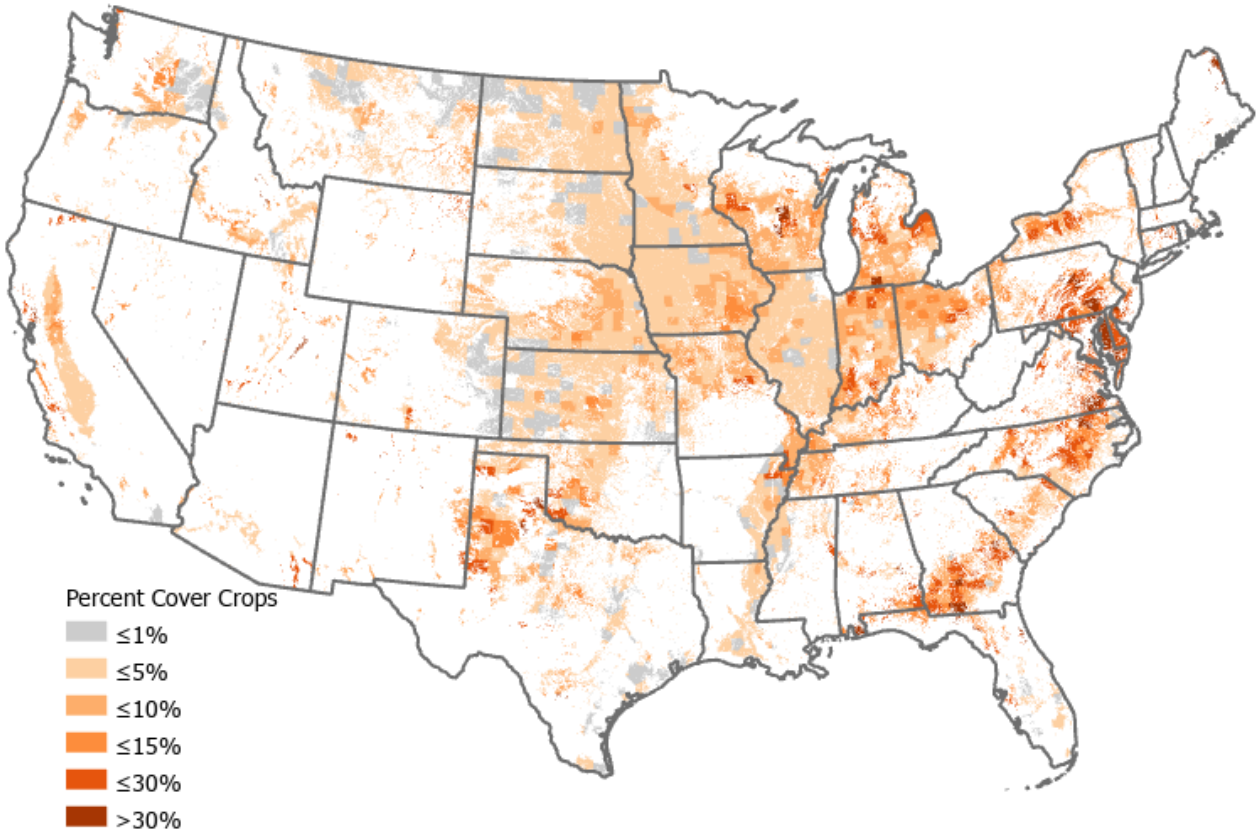
Source: ARMS

Conservation Practices: Cover Crops



Percent Cover Crops, 2017

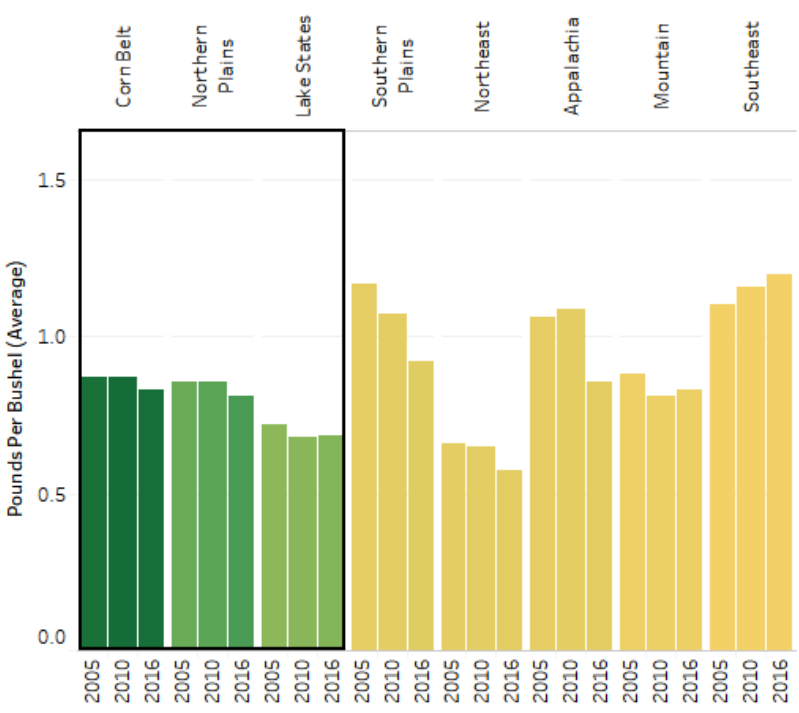
Percent of harvested cropland in 2017 (excl. alfalfa)



Source: Census of Agriculture

Conservation Practices: Nitrogen Management Indicators (Corn)

a) Nitrogen Pounds Per Bushel by USDA Region



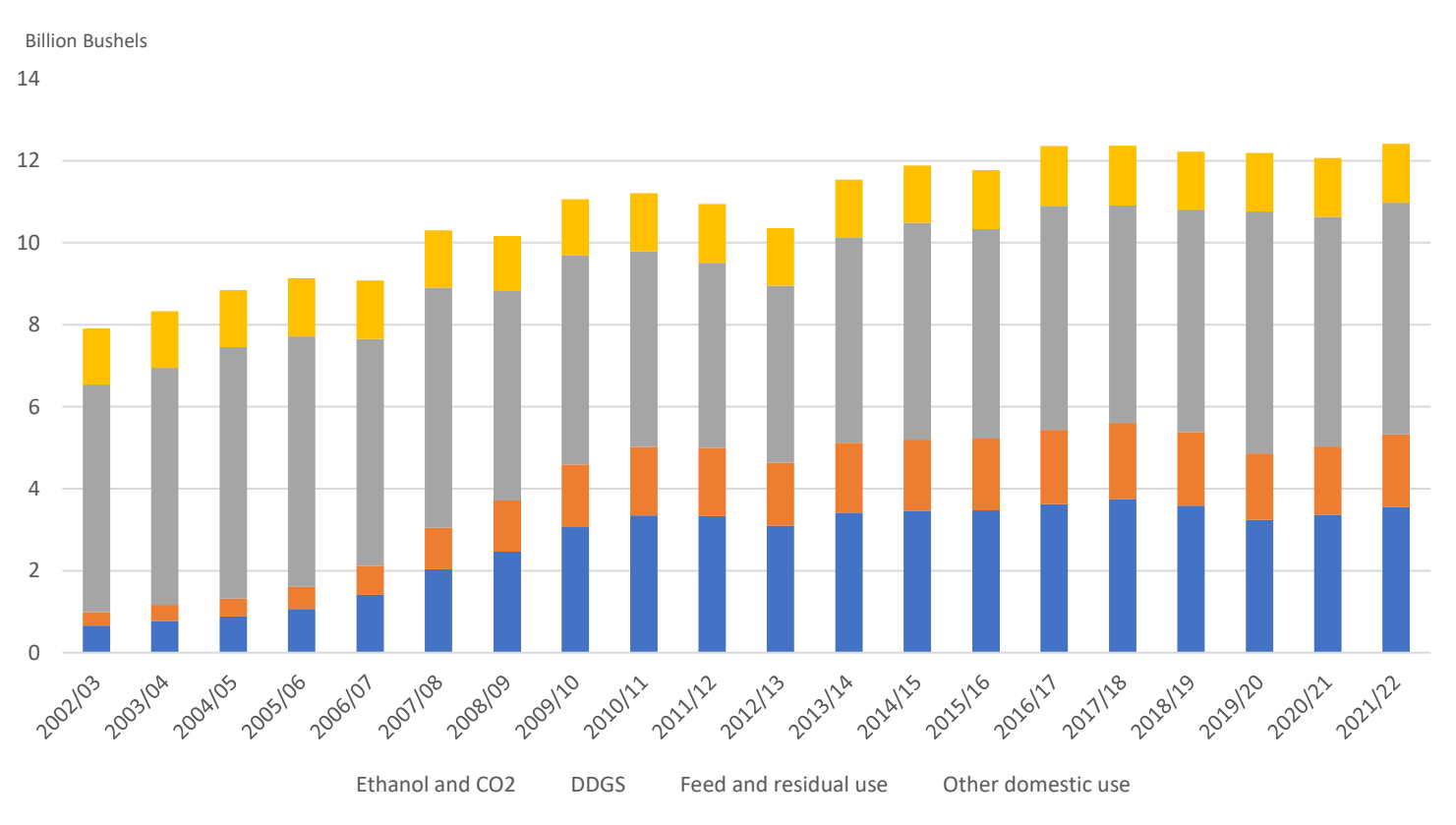
b) Nitrogen Inhibitor Use for Corn (% of planted acres)

State	2005	2010
All States	8%	12%
Illinois	28%	28%
Indiana	13*%	44*%
Iowa	---	13*%
Kentucky	6*%	---
Michigan	6*%	---
Minnesota	5*%	8*%
Missouri	3*%	12*%
Nebraska	---	6*%
New York	6*%	---
Ohio	7*%	4%
Pennsylvania	11*%	---
Wisconsin	12*%	---

***= Statistically unreliable due to low sample size**

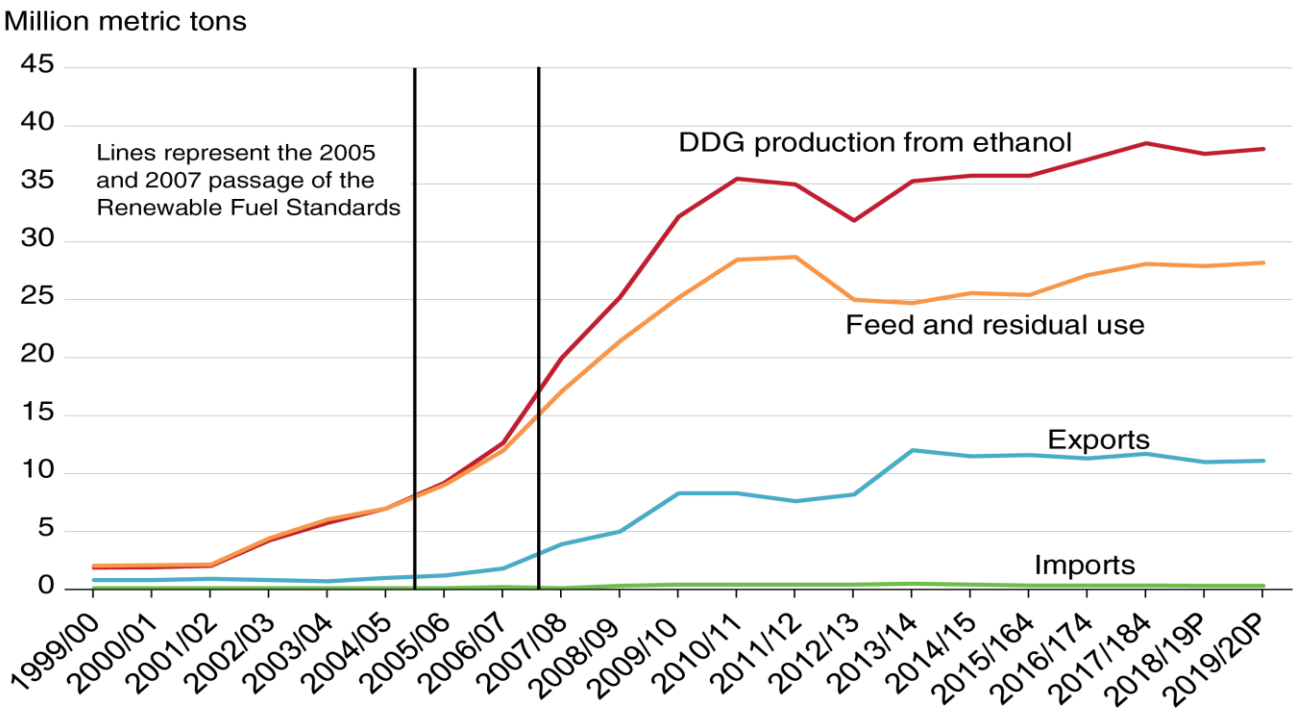
Source: (USDA ARMS)

U.S. Domestic Corn Use
2000/01 through 2018/19



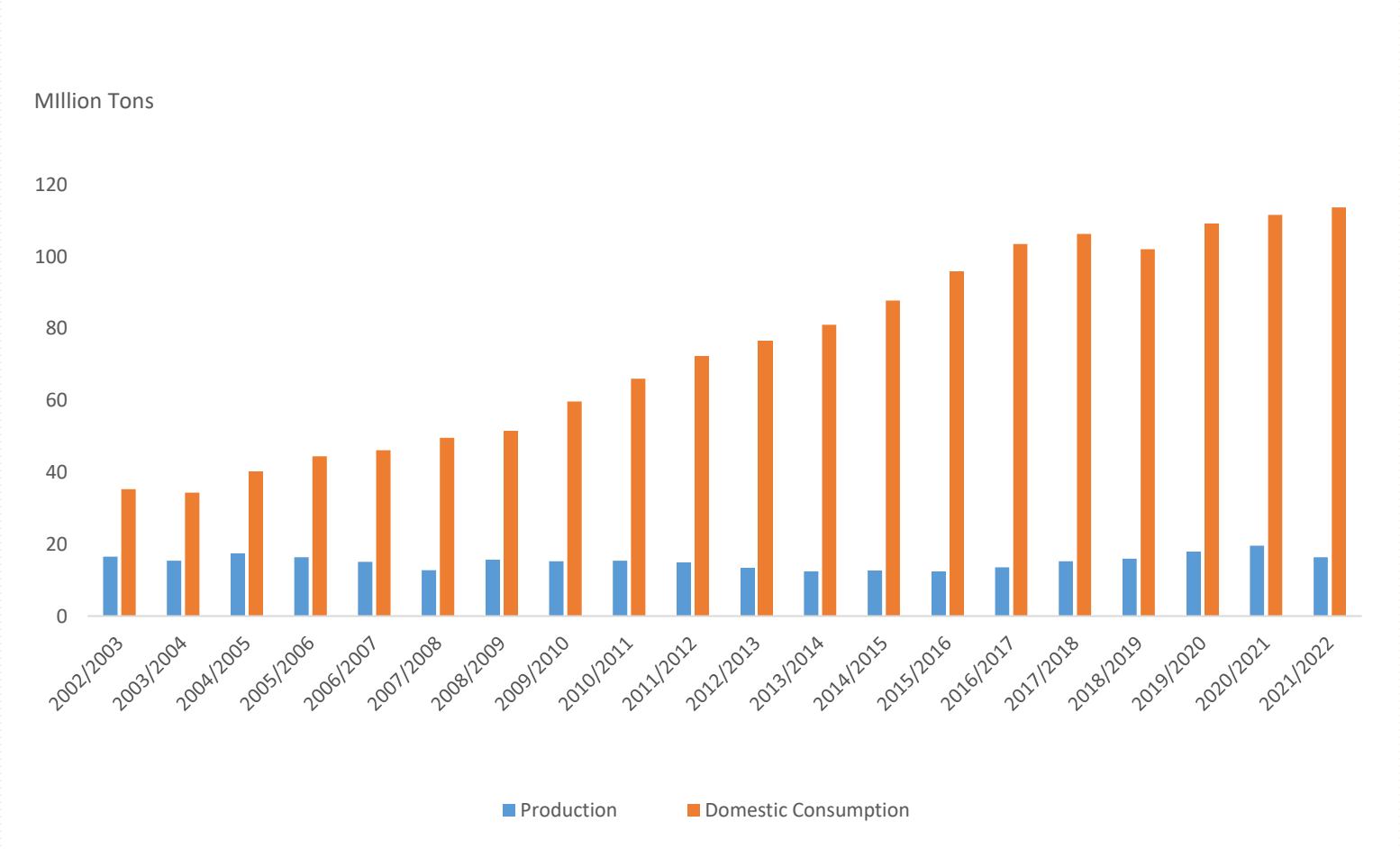
Source: World Agricultural Supply and Demand Estimates

Dried distillers' grains (DDGs) supply and use has risen in concert with ethanol fuel production



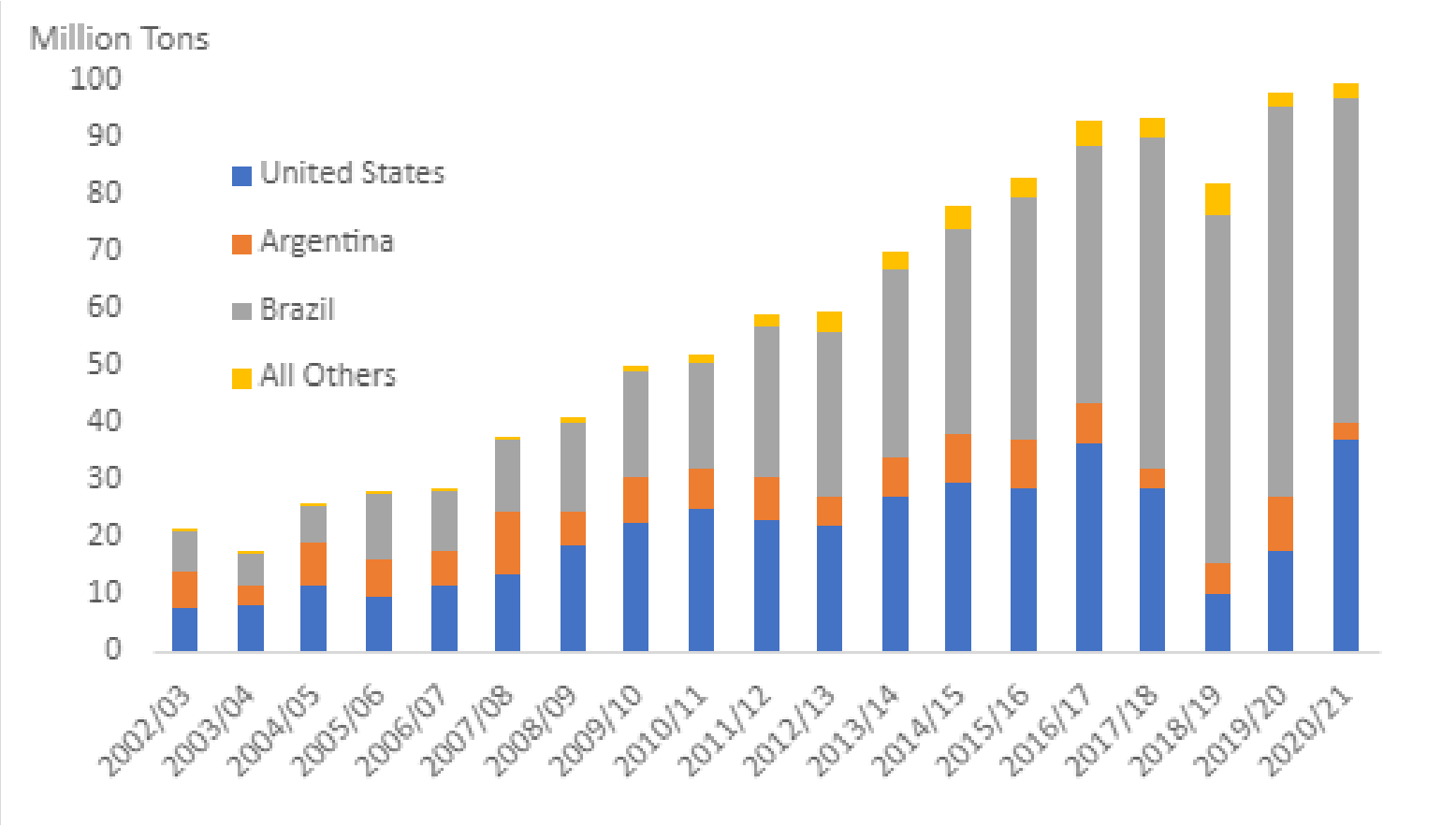
Note: P = projection. 2018/19 and 2019/20 data are projections. DDG = Dried distillers' grains.
Source: USDA, Economic Research Service Bioenergy Statistics data.

China Soybean Import Dependence



Source: World Agricultural Supply and Demand Estimates

China Soybean Imports by Source

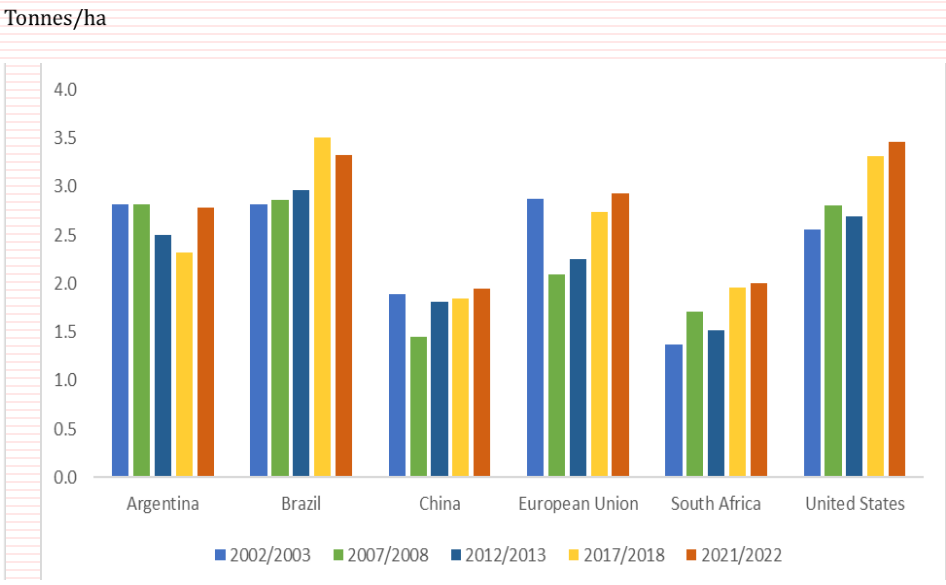


Source: FAS Production, Supply and Distribution system; TDM database

Changes in yield over time for select countries

Corn yield

Soybean yield



Source: FAS Production, Supply and Distribution system

Understanding the drivers of land use change

Babcock (2015): Model predictions of land use change associated with biofuels are inconsistent with what has happened since biofuel production dramatically increased in the mid-2000s.

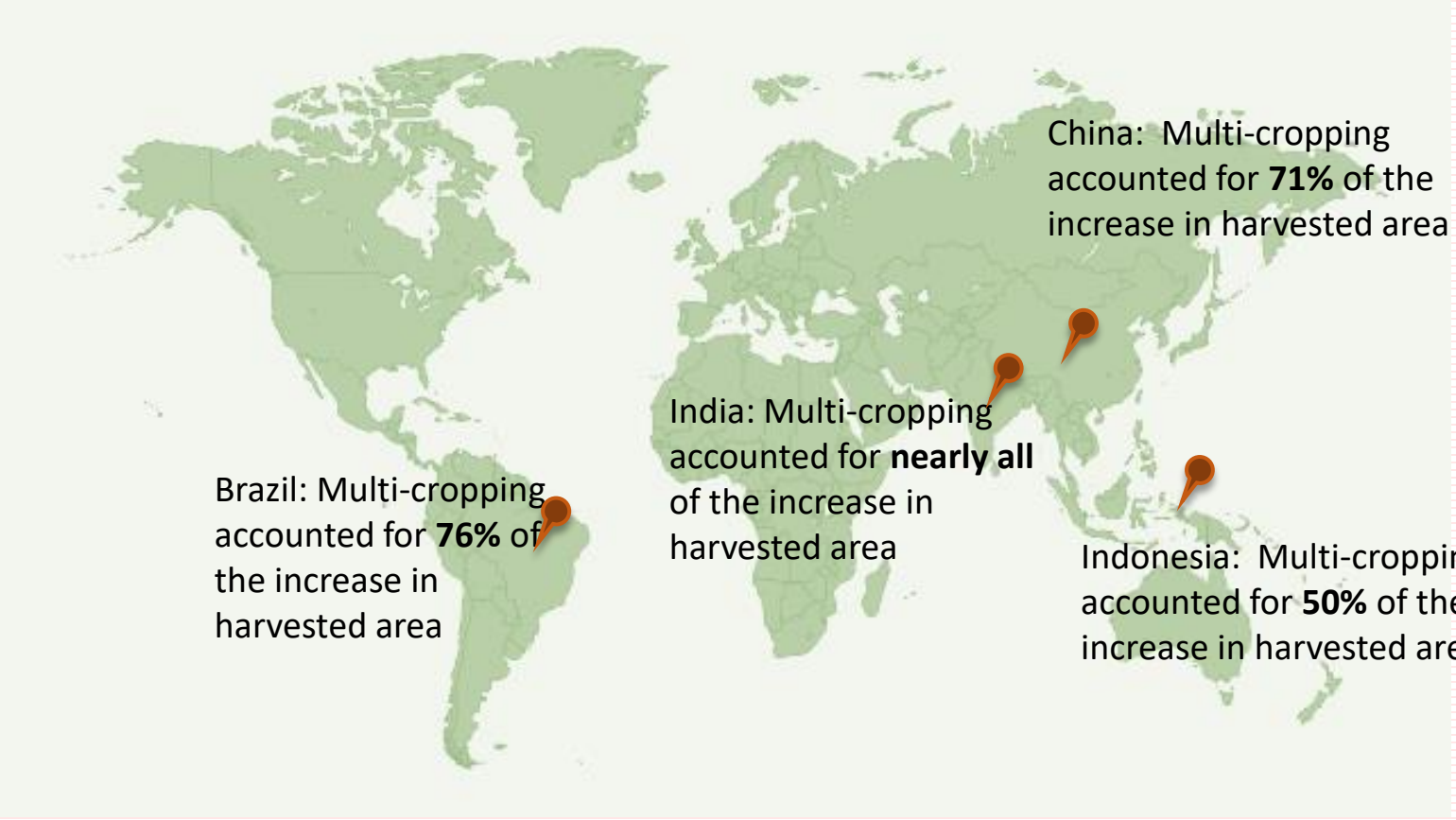
Why:

- Higher prices increase margins and accelerate new technology
- Expansion of multiple cropping
- Reduction in unharvested land

Shrestha et al. (2019): satellite data estimates of land-use change may be disproportionately misclassifying land as agriculture.

Shrestha et al. (2019), Lark et al. (2017), and others: Grassland land converted to cropland misclassification is a known weakness of the CDL.

Babcock's findings on the importance of multi-cropping And intensification in increasing supply



Conclusions

- **A number of factors – some anticipated and some not – influenced crop production and cropland use during the period 2000-2021;**
- **Corn and soybean production shifted north into the Dakotas while hay production shifted west.**
- **Much of the increase in demand for biofuel feedstocks was met domestically without reducing exports.**
- **Farmers decided to intensify management, improve yields, and return land to production to meet increasing demand.**
- **Conservation trends improved for practices that influence GHG emissions.**
- **Policy drivers also influenced land use decisions in the US and globally.**
- **Potential remains to continue to increase yield and intensify production, especially in regions that are well below production potential.**