



The Plowprint Report: 2018

Plow-up decreases overall, while South Dakota's grasslands are converted at an accelerating rate.



2017 RESULTS

The Good News:

On average, over 800,000 fewer acres were converted to cropland across the Great Plains in 2017.

The Bad News:

1.7 million acres of grassland were lost across the entire Great Plains.

While plow-up decreased across the Great Plains in 2017, it increased within the Northern Great Plains region of South Dakota by 58,000 acres.

Temperate grasslands are being lost worldwide and North American grasslands are no exception. The leading cause of this loss is the conversion of grasslands¹ to cropland. 2018 is a pivotal year to take action on the loss of grasslands in the U.S. because the Farm Bill, a key piece of legislation that impacts grassland conservation, needs to be reauthorized by September 30, 2018. We have an opportunity to use federal programs and funds to better support grasslands conservation. Doing so will protect drinking water for an estimated 44 million people, maintain carbon in the soil, prevent erosion and conserve wildlife habitat.

In the Great Plains, only about half of the grasslands remain, and 87% of those are on poor and marginal quality soils. Growing crops on marginal soils leads to increased erosion and can require greater use of fertilizers and other inputs to make those lands productive. Because of these higher inputs, it's more likely that nutrients will be lost from fields through erosion or leaching, requiring some downstream communities to pay thousands of dollars daily to clean impaired drinking water.

The purpose of the Plowprint analysis is to identify remaining intact habitat across the Great Plains. We do this by tracking cumulative loss of grassland to cropland over time². WWF is estimating cumulative loss of grasslands because the conversion of intact grasslands represents a significant ecological loss that cannot easily be recovered. WWF is dedicated to eliminating grassland loss in the Northern Great Plains by 2030 to ensure a vibrant future for the human and wildlife communities across the region.

On the Cover: Plow-up in northeastern Montana. © Chris Boyer / Kestrel Aerial / WWF-US

¹Grasslands refer to grasslands, shrubland, and wetland cover under the National Landcover Dataset. ²To track grassland loss, WWF monitors cumulative conversion of grassland to cropland from 2008 in the U.S. and 2009 in Canada through the most recent year of data, which is 2017. WWF uses the USDA National Agricultural Statistics Service Cropland Data Layer in the U.S. and the Agriculture and Agri-Food Canada Annual Crop Inventory in Canada. For this analysis, cropland is defined as any annually planted agricultural commodity or fallow agricultural land.

2018 Report Overview

The geographic focus of this report is two-fold: the Great Plains (excluding Mexico), as defined by the Commission for Environmental Cooperation (CEC); and the Northern Great Plains (NGP), as defined by WWF. The report focuses on this region and subregion because they contain the majority of the remaining intact grasslands on the continent.

Estimated new acres converted by geography

Geography	Converted: 2017	Converted: 2016
NGP	540,800	709,980
CEC	1,720,630	2,554,990

REGIONAL TRENDS

2017 saw a decrease in acres converted from grassland to cropland, with over 800,000 fewer acres converted this year across the Great Plains. However, over 1.7 million acres of grassland across the Great Plains, as compared to over 2.5 million acres in 2016, were still lost. Overall, approximately 53% of the Great Plains is still intact. Of note, the NGP lost about 170,000 fewer acres of grassland in 2017, as compared to 2016. 69% of the NGP remains intact.

In addition to tracking conversion of grassland to cropland, WWF also tracks cropland that reverts back to grassland either through restoration or abandonment. In 2017, WWF calculated a substantial increase in perennial cover (see graphic, pg. 3) across all geographies, but especially in the NGP, where WWF estimated a 1.2 million acre increase. At the scale of the Great Plains, WWF calculated an increase of over 3 million acres of this cover in 2017. This is in comparison to just a 370,000 acre increase in the Great Plains in 2016.

NGP TRENDS

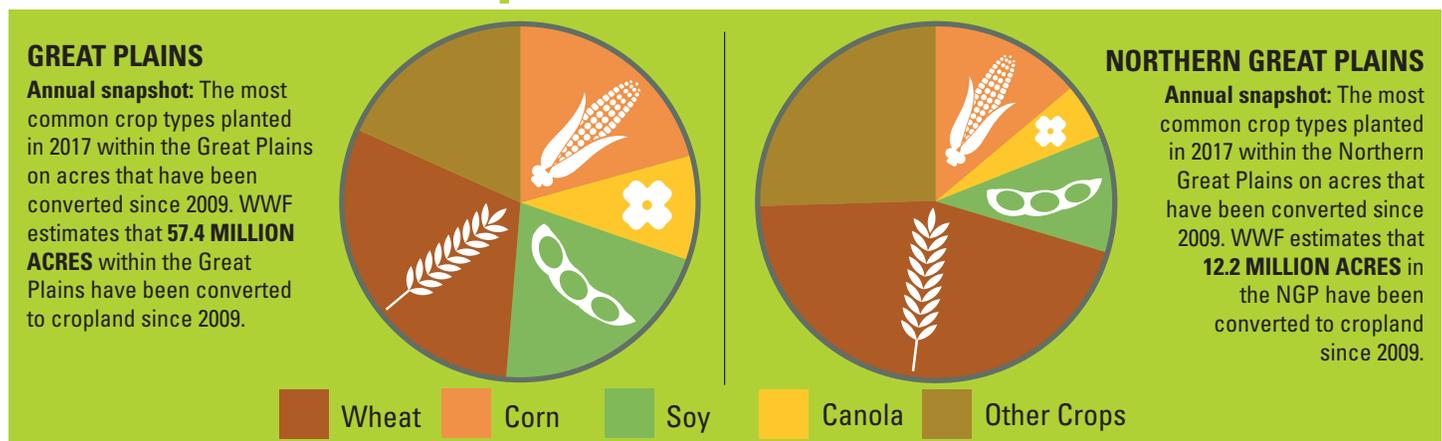
Conversion of grassland to cropland was lower everywhere in the NGP in 2017, except in South Dakota. The NGP portion of Montana (i.e., eastern Montana) saw almost 60,000 fewer acres converted in 2017, as compared to 2016, and the NGP portion of Saskatchewan saw almost 119,000 fewer acres converted in 2017. Meanwhile, the NGP portion of South Dakota saw an increase in conversion by about 58,000 acres compared with 2016. The cause of South Dakota's increase in conversion merits further investigation and is beyond the scope of the Plowprint analysis.

Perennial cover increased everywhere in the NGP except in South Dakota, with the highest increases in Montana (384,000 acres) and Saskatchewan (584,000). Perennial cover decreased in South Dakota by almost 9,000 acres, as compared to 2016.

CROP BREAKDOWN

Of the conversion to cropland that has occurred since 2009 in the Great Plains, wheat (30%), corn (21%), soy (21%) and canola (9%) are the most common crops grown on these lands in 2017. This represents slight increases in corn, soy and canola acreage as compared to 2016. In the NGP, by contrast, wheat (45%), corn (14%) and soy (11%) are the primary crops grown in 2017 on acres that have been converted to cropland since 2009. Wheat continues to be much more prevalent in the NGP than in the Great Plains, while corn and soy are less common in the NGP than in the Great Plains³. Choice of crops planted vary depending on price and growing conditions.

Most Common Crops on Acres Converted Since 2009



³The remaining 19% of the cropland in the Great Plains and 30% in the Northern Great Plains are planted to other crops. Other crops include: millet, sugarbeets, safflower, mustard, rye, potatoes, triticale, buckwheat, vetch, camelina, speltz, grapes, turnips, radishes, onions, aquaculture and other fruits, vegetables, herbs, and small grains.

THE 2018 FARM BILL: Policy & Conservation



The 2018 Farm Bill is a critical moment to reduce incentives to convert grasslands, improve conservation program support of grasslands, and prevent further decreases in Farm Bill conservation funding.

The Farm Bill is one of the most influential pieces of legislation for grasslands in the United States. It is the largest source of funding for private land conservation, sets policies for public grasslands managed by the US Forest Service, sets US farm and food policies and programs, and supports essential public research.

Farm Bill conservation programs help support maintaining grasslands, improving natural resources on private working lands, and better leveraging public and private funding for conservation of private lands. These investments help conserve grasslands, improve water quality, maintain carbon in the soil, and minimize soil erosion.

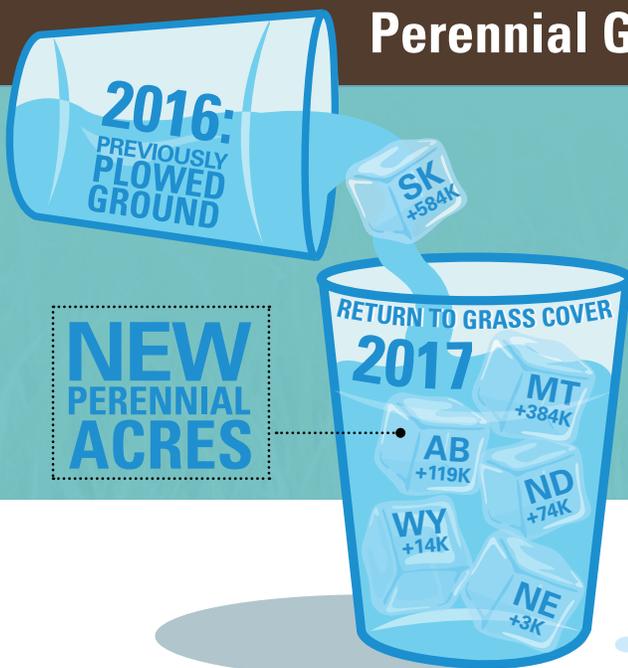
Some farm support programs incentivize converting grasslands by reducing the risk of converting grasslands into marginal cropland. This must change.

Congress renews and revises the Farm Bill every five years. The current Farm Bill expires September 30, 2018, and Congress is working on a new Farm Bill.

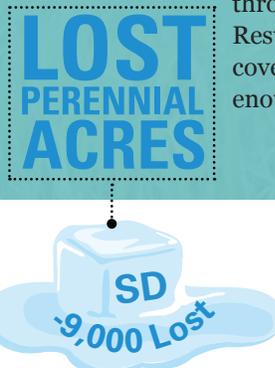
Conservation opportunities in 2018 Farm Bill

- Strengthen and expand the Sodsaver policy that disincentivizes conversion of native sod to cropland
- Maintain enrollment of 8-10 million acres annually in Conservation Stewardship Program contracts that support comprehensive on-farm conservation planning and practices
- Maintain baseline funding for the conservation title, preventing further cuts to conservation funding that supports grassland conservation and natural resource management
- Maintain minimum conservation requirements for federal subsidies for crop insurance reforms
- Increase the acres allocated to and enrolled in the Conservation Reserve Program Grasslands

Perennial Grass Cover: Gains & Loss



In 2017, perennial grass cover increased in the NGP portion of Saskatchewan, Alberta, Montana, Wyoming, North Dakota, and Nebraska, but *decreased* by 9,000 acres in South Dakota. Conversion of grassland to cropland, although damaging to native ecosystems, is not necessarily permanent, and cropland can rotate back into perennial grass cover through restoration or abandonment. Restoration and rotations into perennial cover, while important, are not always enough to conserve biological diversity.



THE 2018 FARM BILL: Community Conservation

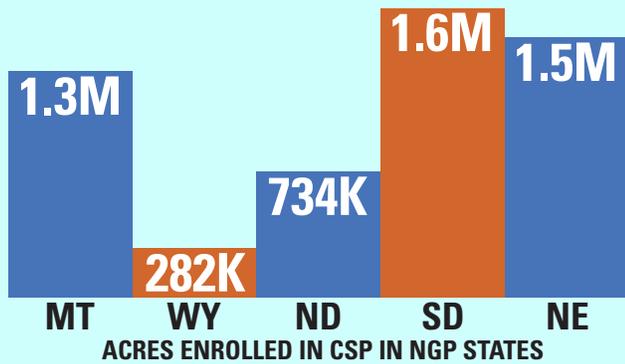
In recent years, the Great Plains of the US and Canada have lost a greater proportion of intact grassland than the Brazilian Amazon has lost rainforest, making this year's Farm Bill more important than ever to grasslands and the wildlife that call them home. Grasslands have also been converted for purposes other than cropland, such as energy development and urban expansion.

Farm Bill conservation programs administered by the US Department of Agriculture support land and natural

resource management. They help keep grasslands intact by providing technical and financial assistance for landowners. These popular programs include: Agricultural Conservation Easement Program, Conservation Innovation Grants, Conservation Stewardship Program, Conservation Reserve Program, Environmental Quality Incentives Program, and the Regional Conservation Partnership Program.

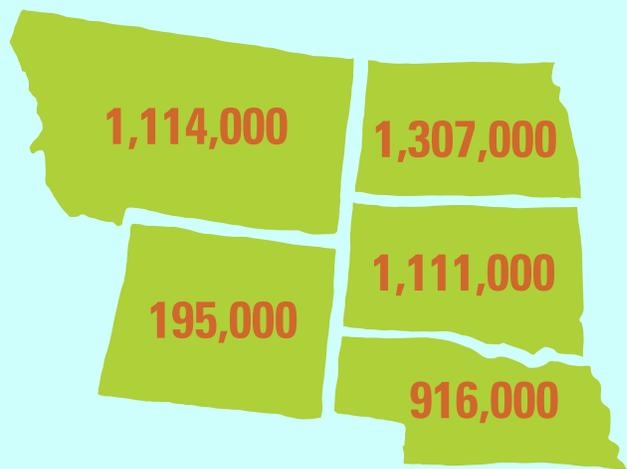
Key Farm Bill Programs Supporting Grassland Conservation in the NGP

These important Farm Bill programs, and policies like Sodsaver, are critically important to protecting the over 127 million acres of intact grasslands remaining in the NGP. The graphs below indicate the demand for and high enrollment in these programs in NGP states.



Conservation Stewardship Program (CSP) (2016 Data*)

The largest voluntary conservation program in the US, CSP supports whole farm conservation planning and management through financial and technical assistance. With the 2016 enrollment, the total acreage of lands enrolled in CSP exceeds 126,000 square miles, an area larger than Iowa and Illinois combined. The NGP states shown here represent 31% of lands enrolled in CSP nationally.



Conservation Reserve Program (CRP) (2018 Data*)

CRP is a voluntary conservation program that provides financial incentives to keep environmentally sensitive land out of crop production. The total acreage of lands enrolled in CRP is 22.6 million acres. In the map to the right, the number of acres for each NGP state is shown in orange, which represents 21% of all CRP acres nationally.



Environmental Quality Incentives Program (EQIP) (2017 Data*)

EQIP is a voluntary conservation program that provides technical assistance and financial cost-share to agricultural producers to plan and implement conservation improvements on their farm or ranch. Demand for EQIP is much higher than the program has funding to support: in 2016, about 25% of the nearly 10,000 qualifying projects submitted in the NGP were funded.

*These numbers represent the most recently available data for each program (CSP, CRP, and EQIP).

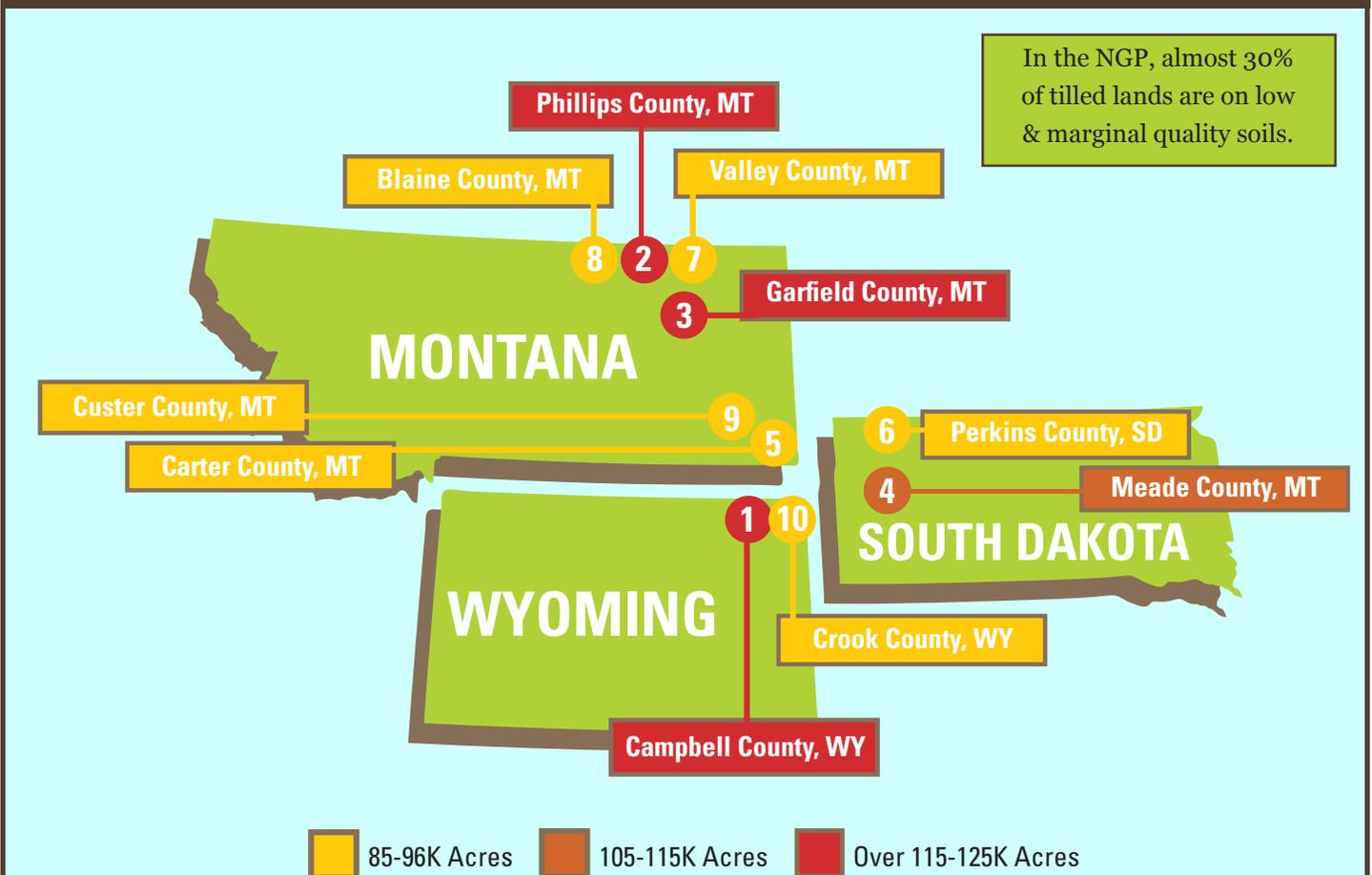
Conserving Marginal Soils

Soil quality greatly enhances where a farmer can successfully grow crops; however, new seed technology also enables growing crops in areas with shorter growing seasons and drier climates than in the past. WWF has developed a model that estimates the quality of soils for growing crops based on a variety of environmental factors, including climatic variables and the way water moves through the soil⁴. These factors help us predict where soil is of high enough quality to support crops, and where crops should not be grown due to low or marginal quality soils. It is these low and marginal quality soils that are currently largely intact in the Great Plains and provide important ecosystem services and wildlife habitat.

In the Great Plains, approximately 83% of the lands that have been plowed are on high quality soils. However, this means 17%—or over 63 million acres—that have been plowed are on low and marginal quality soils.

In the NGP, about 71% of the lands that have been plowed are on high quality soils. This means that almost 30% of NGP plow-up, or 15 million acres, is on low and marginal-quality soils.

Top 10 NGP Counties with Highest Plow-up on Marginal Soils since 2009⁵



1.) Campbell Co., Wyoming, 135,720 Acres, 2.) Phillips Co., Montana, 123,329 Acres, 3.) Garfield Co., Montana, 117,838 Acres, 4.) Meade Co., South Dakota, 108,525 Acres, 5.) Carter Co., Montana, 96,122 Acres, 6.) Perkins Co., South Dakota, 92,878 Acres, 7.) Valley Co., Montana, 90,057 Acres, 8.) Blaine Co., Montana, 87,523 Acres, 9.) Custer Co., Montana, 87,110 Acres, 10.) Crook Co., Wyoming, 85,304 Acres,

⁴Olimb and Robinson, In-review; ⁵WWF reports conversion rates for three county types (focal, buffer, and other), based upon the amount of remaining intact habitat and relative species diversity. This ranking includes only focal counties within the NGP.

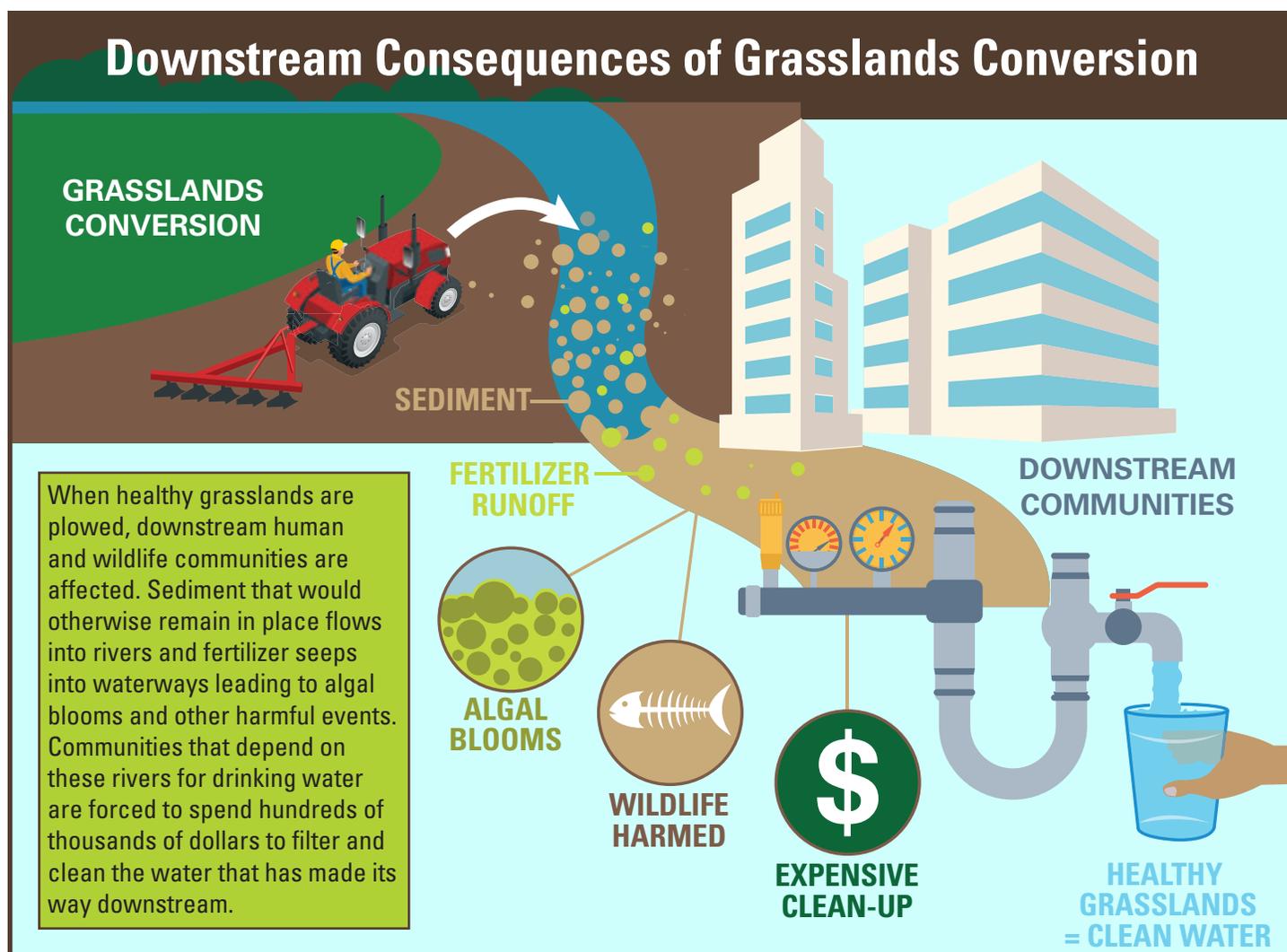
Plow-up's Effect on Drinking Water

Intact grasslands are important for protecting source water areas for downstream communities. However, only recently has WWF begun to understand the financial impact on downstream communities of plowing up grasslands. Two studies released this year indicate that communities are spending hundreds of thousands, if not millions, of dollars to counteract the impact of increased sediment and nutrient loading. One study found that farm fertilizer was the biggest contributor to nitrogen loading in water bodies, representing more than half of the total nitrogen loading⁶. This study also suggested that small communities bear an unfair burden in dealing with the costs of removing nitrogen pollution from their drinking water.

The second study showed that communities located downstream from areas converted to cropland are spending significant amounts of money to combat the problem⁷. For

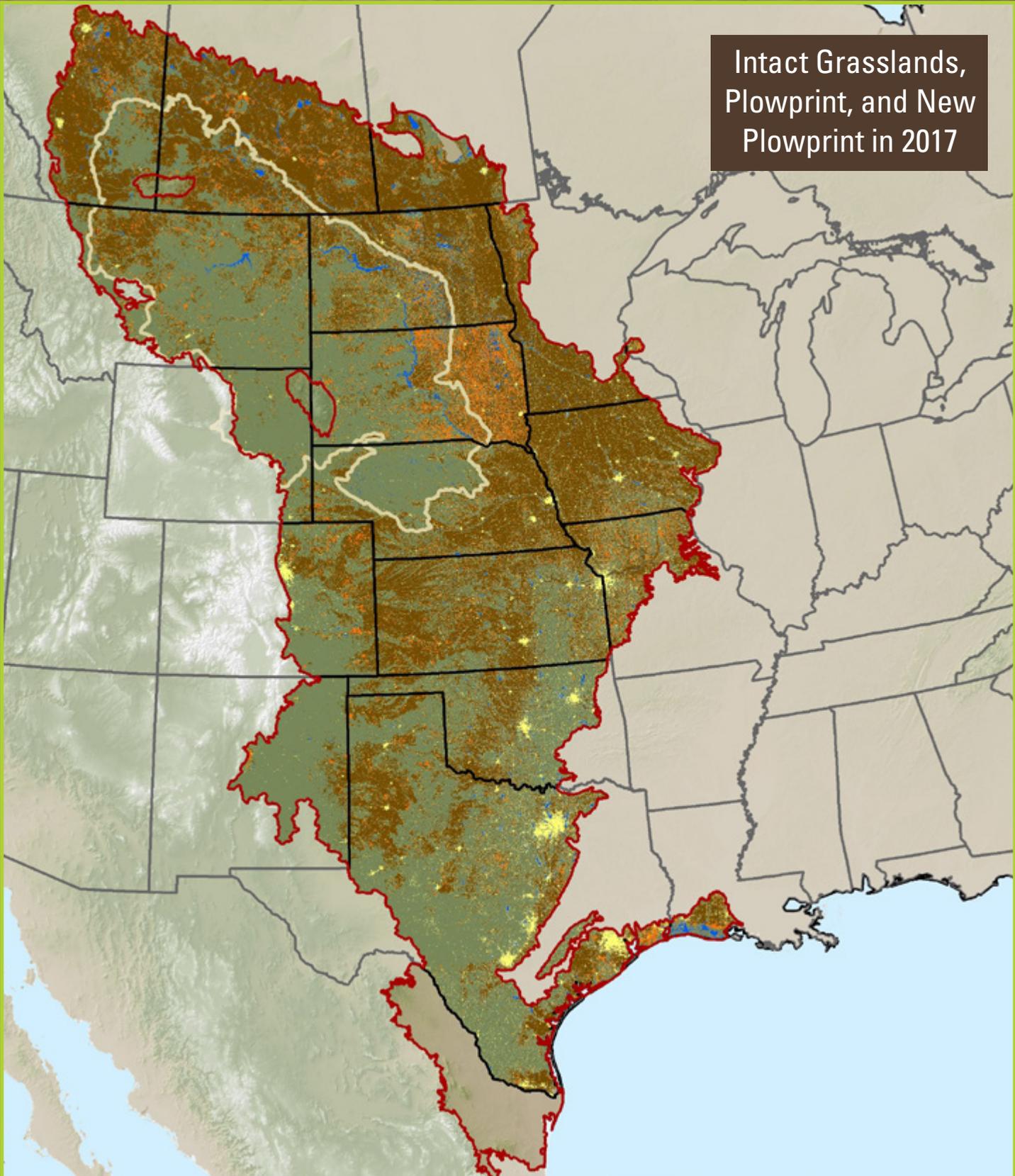
example, Kansas City, Missouri, spends thousands of dollars per day filtering out agricultural chemicals. Meanwhile, Wichita, Kansas, has spent \$350-400 million on its aquifer storage and recovery system, which addresses a number of agricultural pollutants. Des Moines, Iowa, has spent tens of millions of dollars in capital costs for treatment systems, including \$4.1 million in the early 1990s to specifically address nitrates. In fact, operating costs for nitrate removal can average \$8,000 per day.

Keeping grasslands intact rather than plowing up marginal lands for farming is one obvious way to stop this trend. This year, with the reauthorization of the Farm Bill, we have an opportunity to strengthen and ensure funding for important programs that incentivize grassland conservation and good management.



⁶Vedachalam, S., Mandelia, A.J., and Heath, E.A. 2018. Source Water Quality and the Cost of Nitrate Treatment in the Mississippi River Basin, Northeast-Midwest Institute Report, 44 pp., <http://www.nemw.org/> ⁷LimnoTech. 2018. Assessing the Impacts of Land Conversion on Drinking Water in the Northern Great Plains, 34 pp.

Intact Grasslands, Plowprint, and New Plowprint in 2017



□ Northern Great Plains ■ Intact ■ Plowprint ■ New Plowprint ■ Open Water ■ Developed

Map of intact grasslands, Plowprint (lands that have been planted to crops beginning in 2009) and the new addition to the Plowprint in 2017 (lands that were plowed in 2017) in the Great Plains. Because the Plowprint has a spatial resolution of 56 meters, the pixels that were plowed in 2017 are challenging to see at the scale of the Great Plains. Thus, WWF aggregated the smaller pixels into a resolution of 1 kilometer, while maintaining the percentage of the larger cell that was new Plowprint. To display the data, WWF experimented with different thresholds of cropland composition within each 1 km pixel and selected a threshold of 2%. Thus, for each aggregated pixel, 2% of the pixels had to be new Plowprint to qualify. This threshold allowed the pixels to be clearly visible at the Great Plains scale and reflect the hotspots of new conversion.

Photos: Front Cover, Page 1, Back Cover: © Chris Boyer / Kestrel Aerial / WWF-US; Page 3: © WWF-US / Clay Bolt; Map: Back Cover, © WWF-US / Sarah Olimb

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