

Monitoring U.S. Land-Use Change:

Recent results, advances and opportunities

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September 29th, 2016

Background & Context

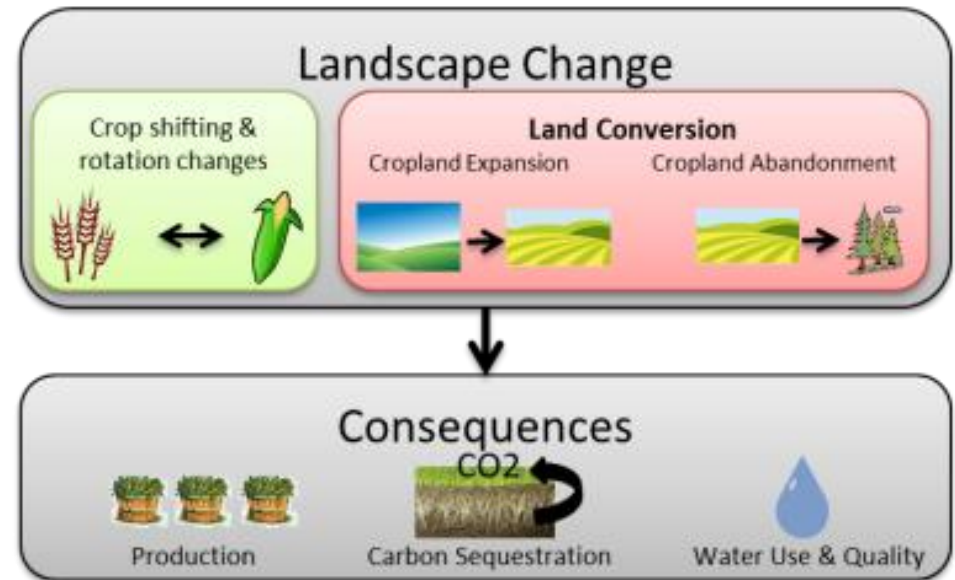
- No Deforestation → No native habitat loss



- Int'l initiatives → equivalent domestic opportunities
- Large-scale, automated monitoring can be a valuable tool for supporting sustainability across supply chains

Cropland conversions across the United States

- Where? What crops?
- What land sources?
- What impacts?



- New Era of U.S. Agriculture
 - High levels of land conversion detected regionally
 - Cropland dynamics **yet to be comprehensively assessed at national level**
- We fill that data gap → Insights to federal policies (Farm Bill, RFS)
 - Opportunities for supply chain sustainability and certification

Overview of Monitoring Approach

- Satellite time coverage:
 - USDA – 2008-2012
 - MRLC – 1992-2011
 - USGS – back to 1970s
- Spatial-temporal processing
 - Include all crops and rotations
 - Track *net* and *gross* changes
- First nationwide assessment to be:
 - Field-level and crop-specific
 - Consistent with all available data from USDA



USDA Cropland Data Layer (CDL)



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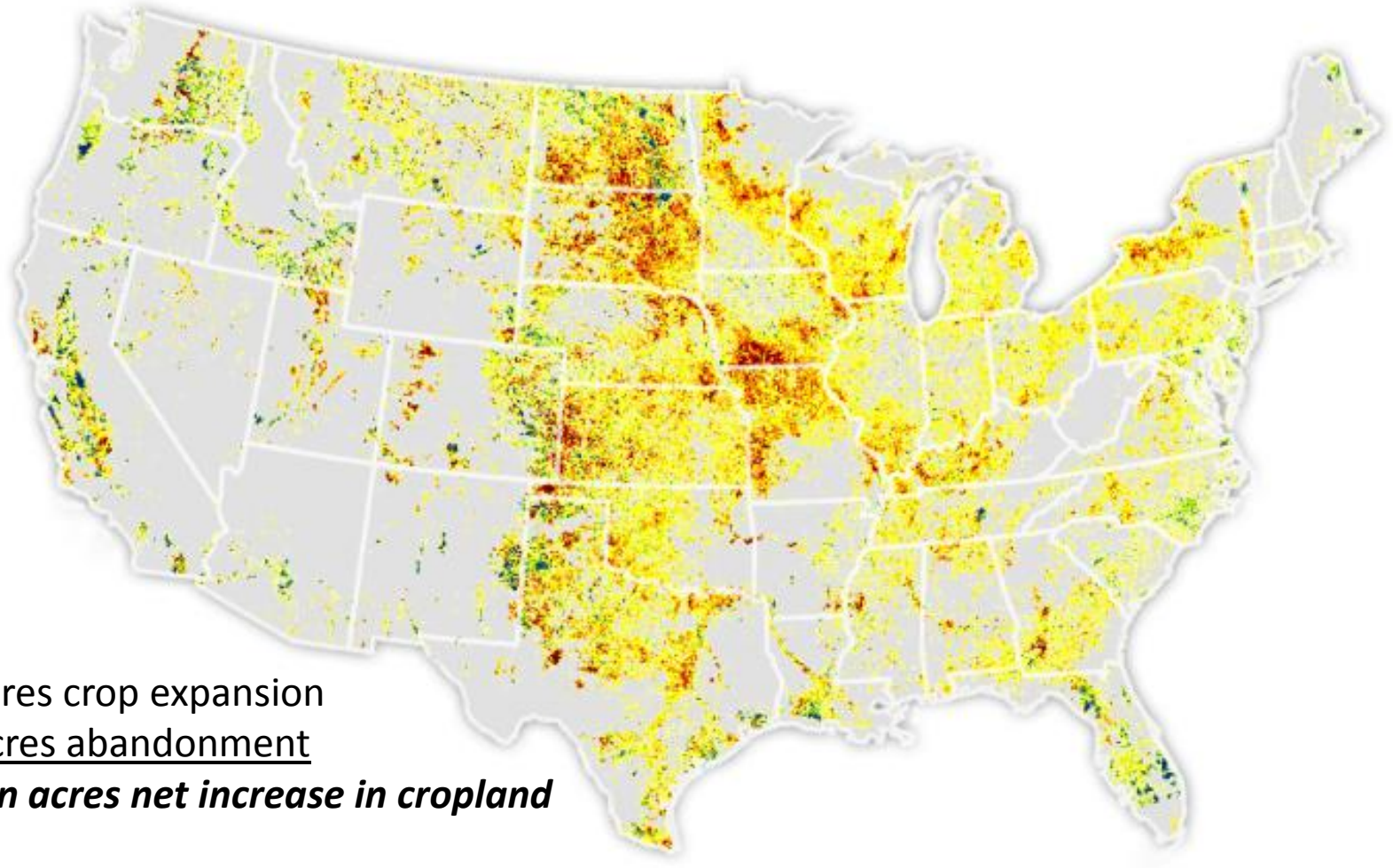
MRLC National
Landcover Database

&

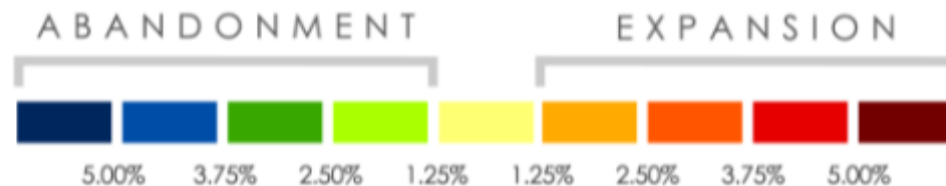


USGS Land Cover
Trends Dataset

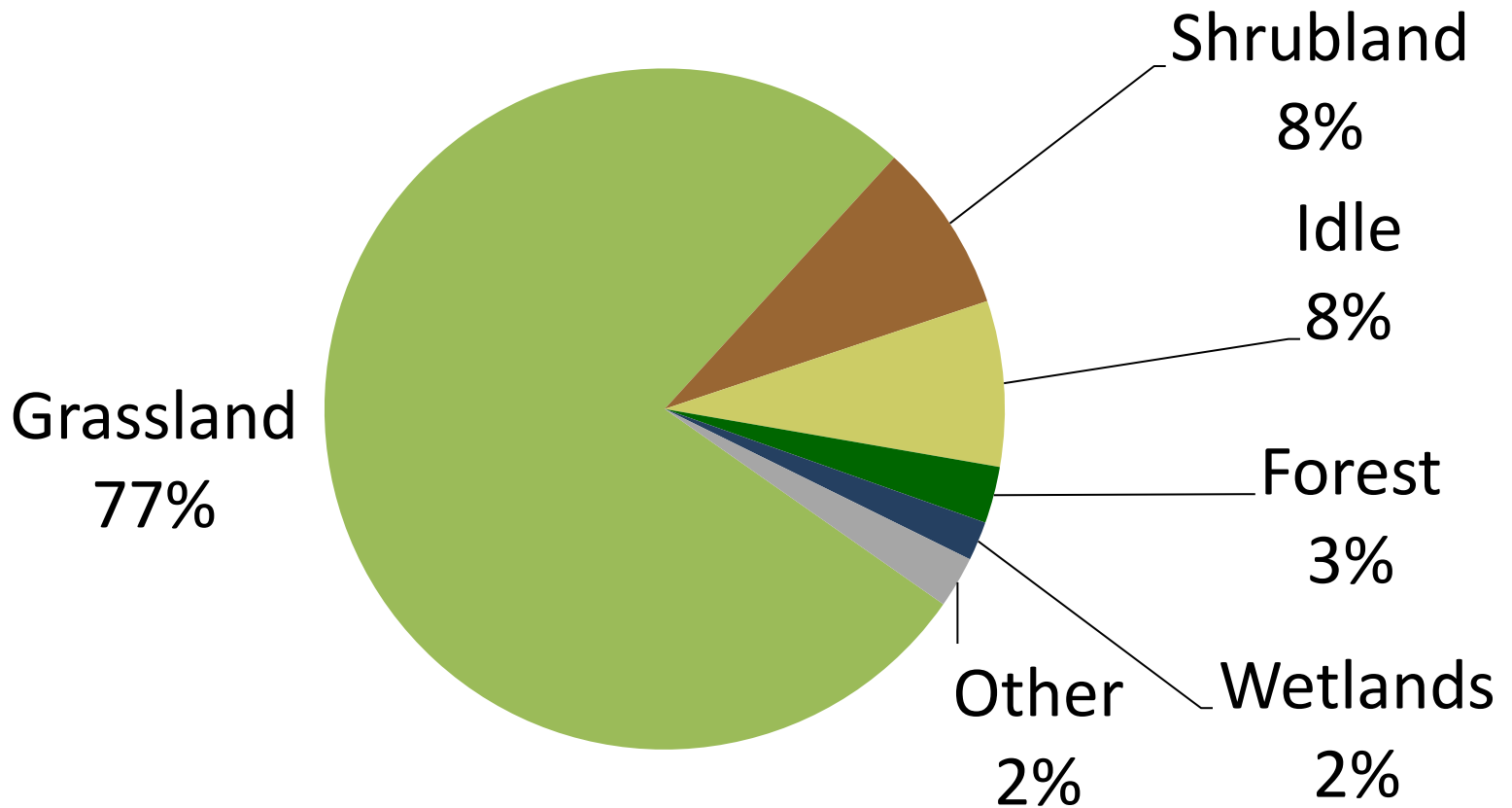
7 million acres of land converted to crop production 2008-2012



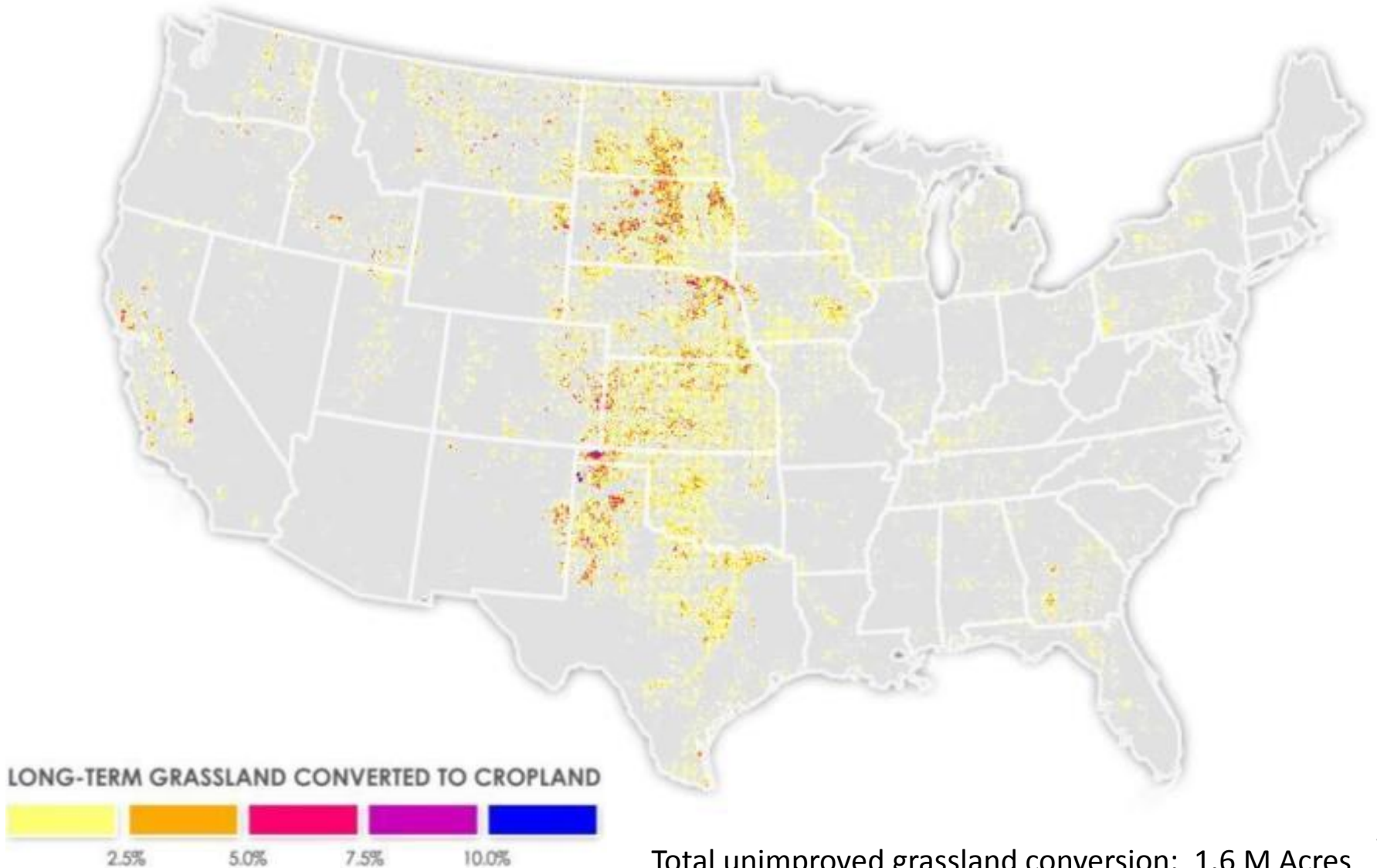
7.3 M acres crop expansion
- 4.3 M acres abandonment
3.0 million acres net increase in cropland



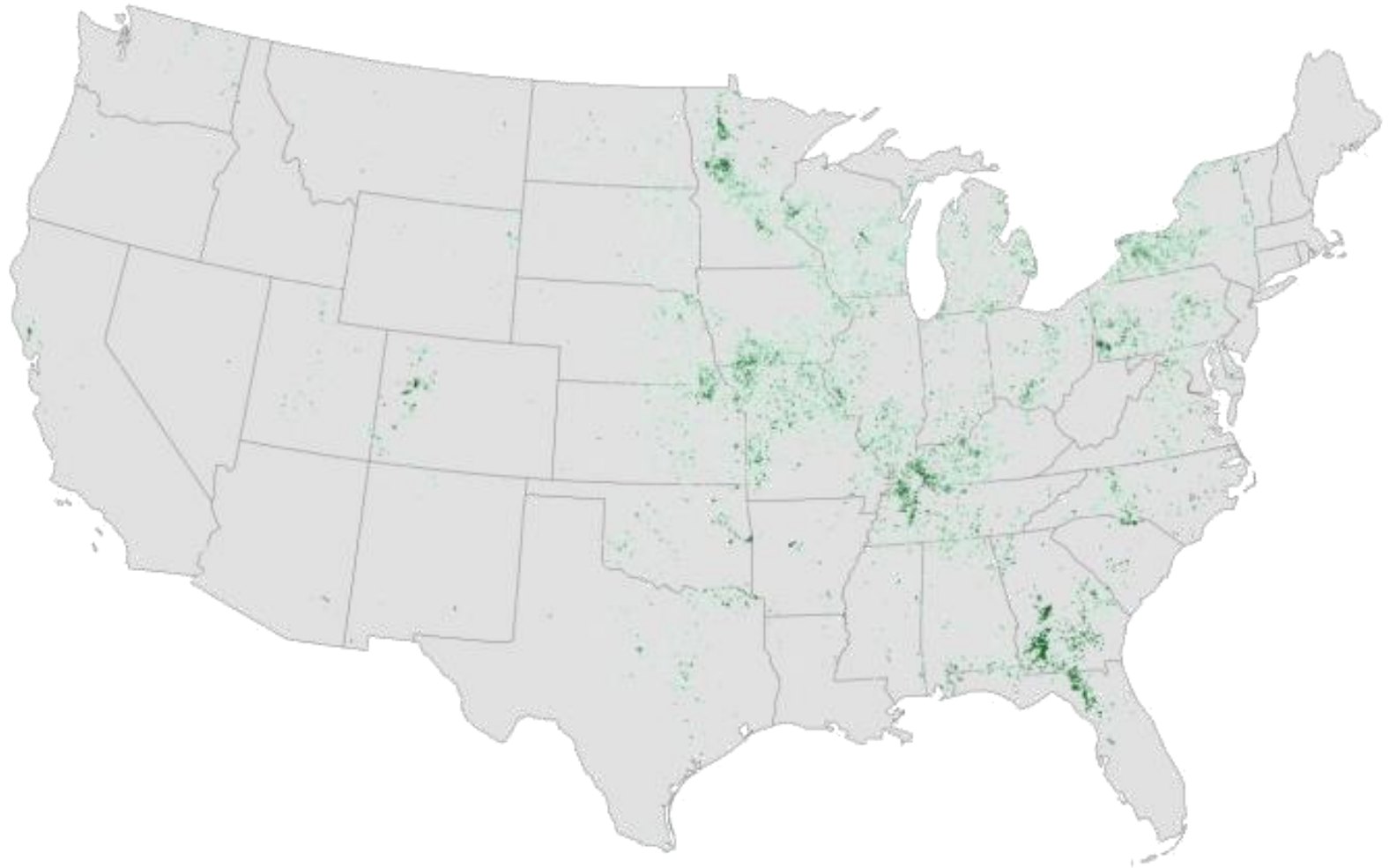
Grasslands were the primary source of new croplands 2008-2012



27% of converted grasslands were long-term (20+ yr) unimproved grasslands

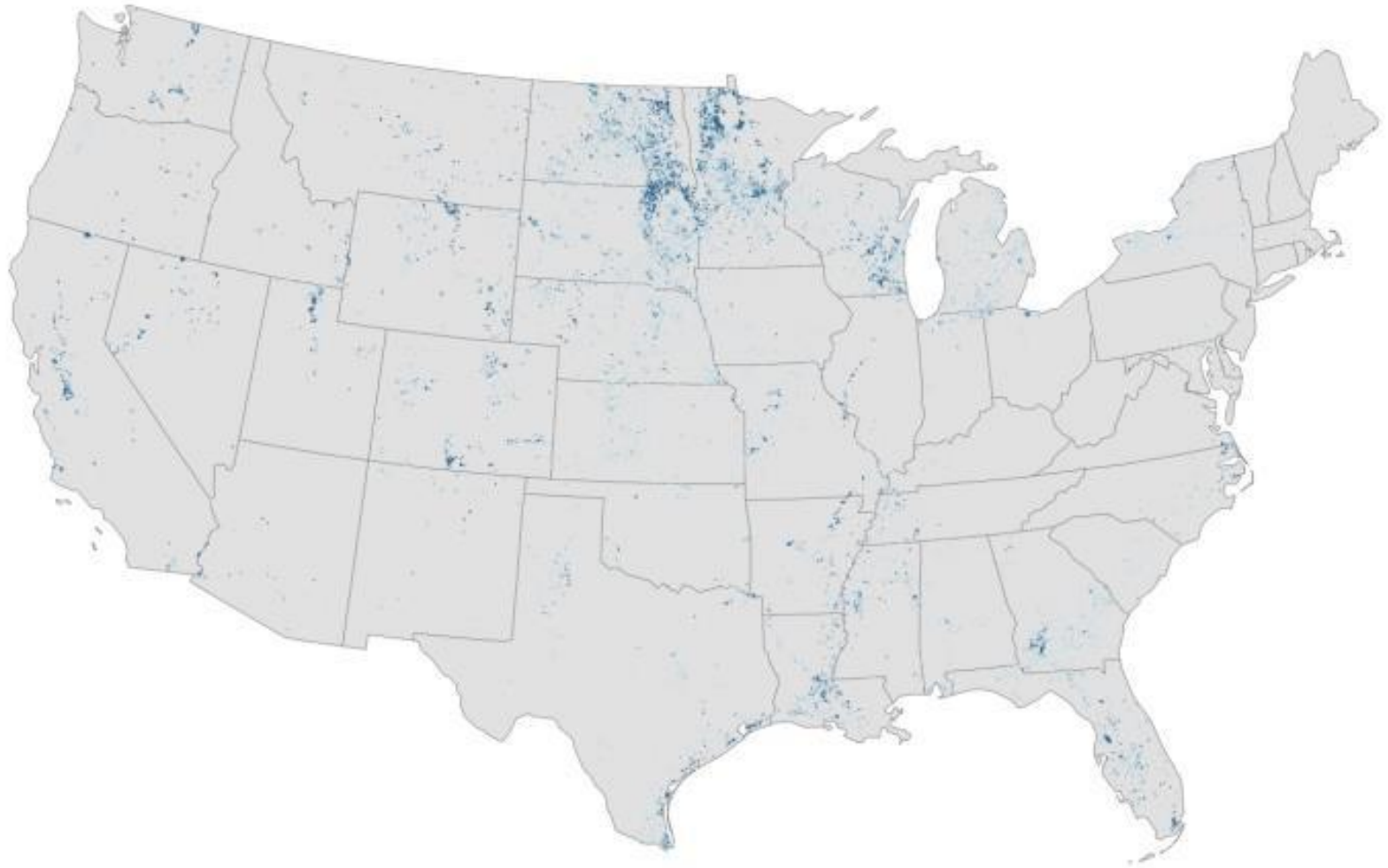


Conversion of forests was greatest in Georgia and the Eastern half of the U.S.



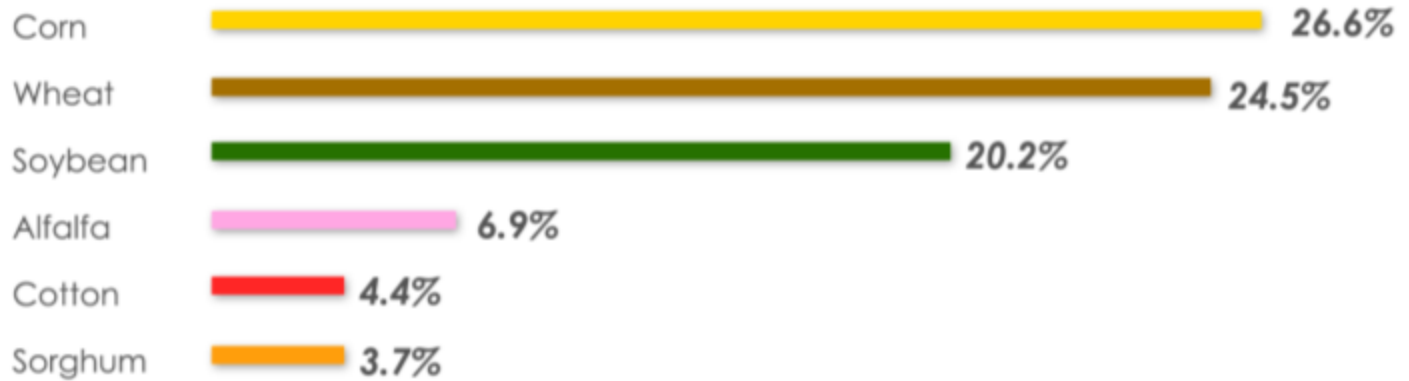
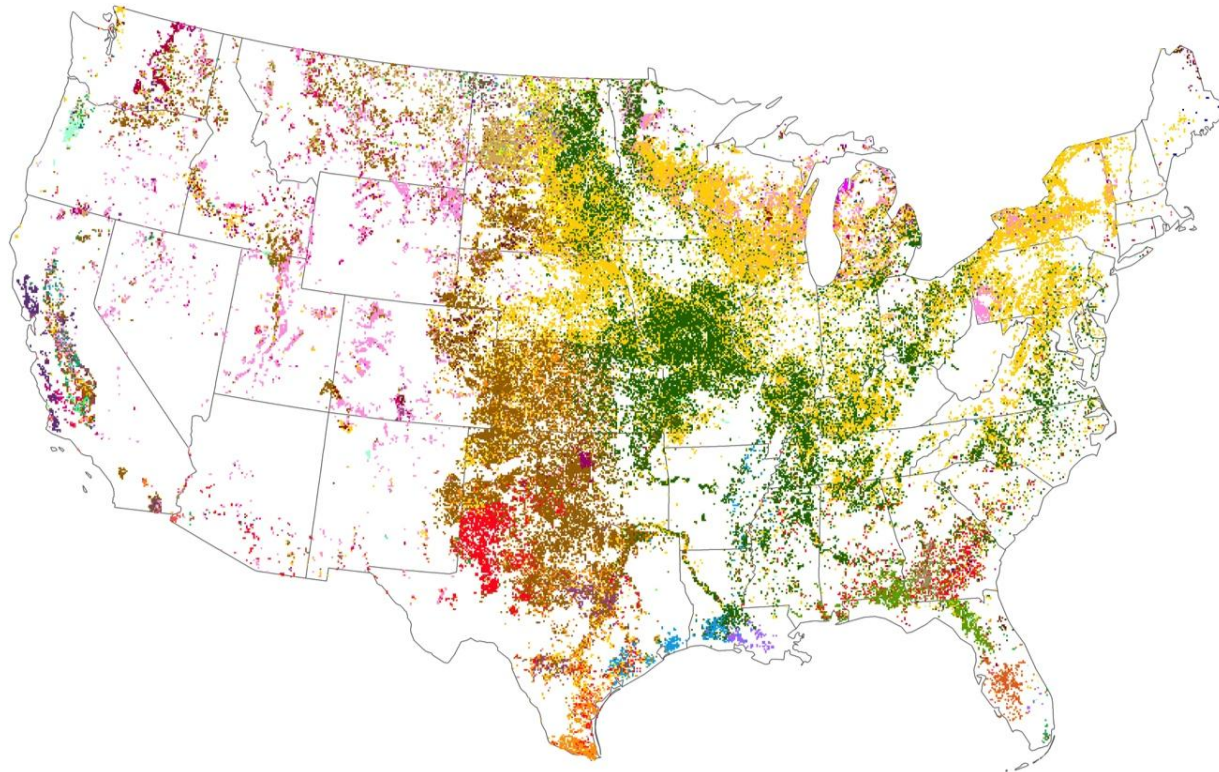
Total forest-to-cropland conversion: 198,000 acres

Wetland conversion was concentrated in Minnesota and the Dakotas

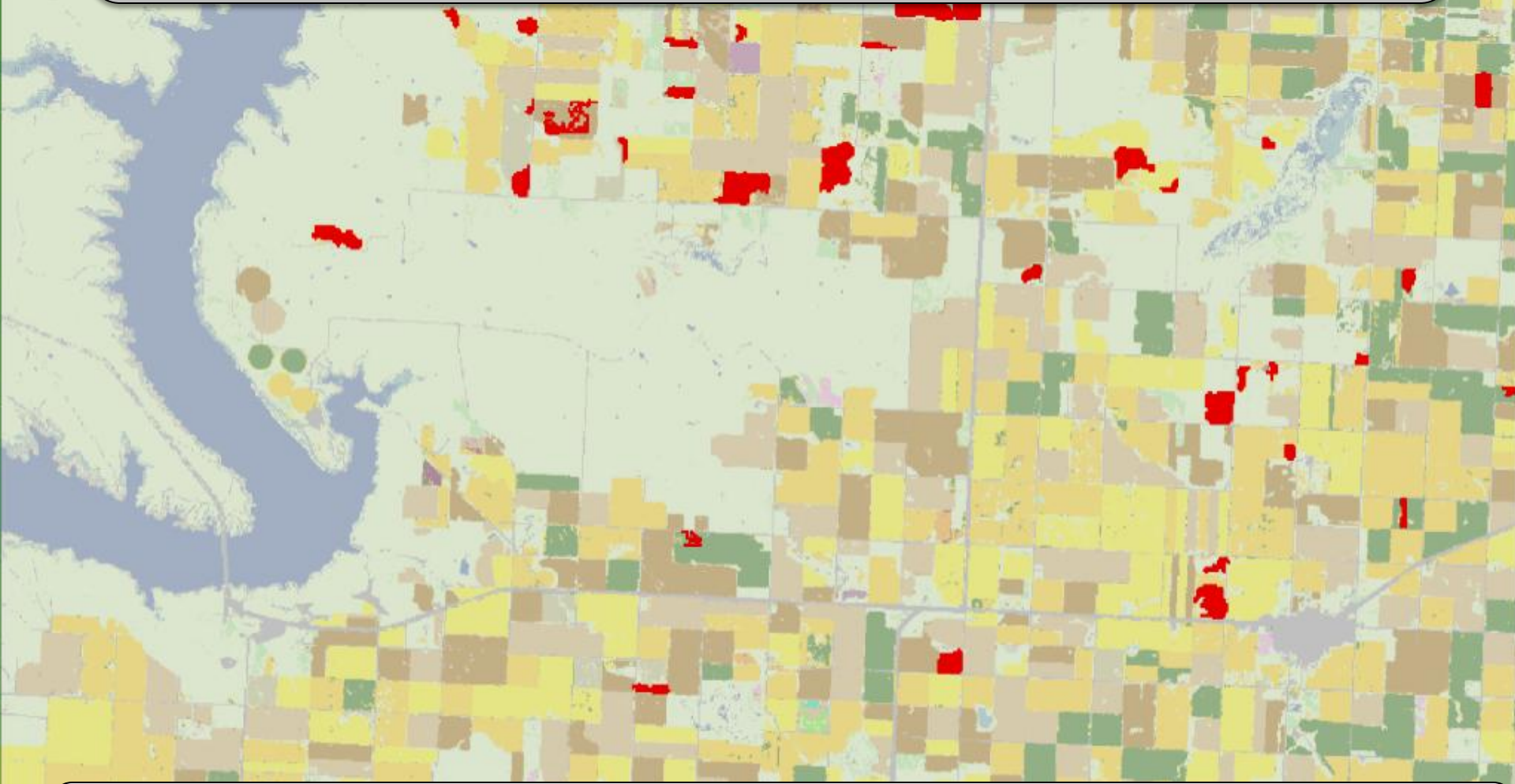


Total wetland-to-cropland conversion: 136,000 acres

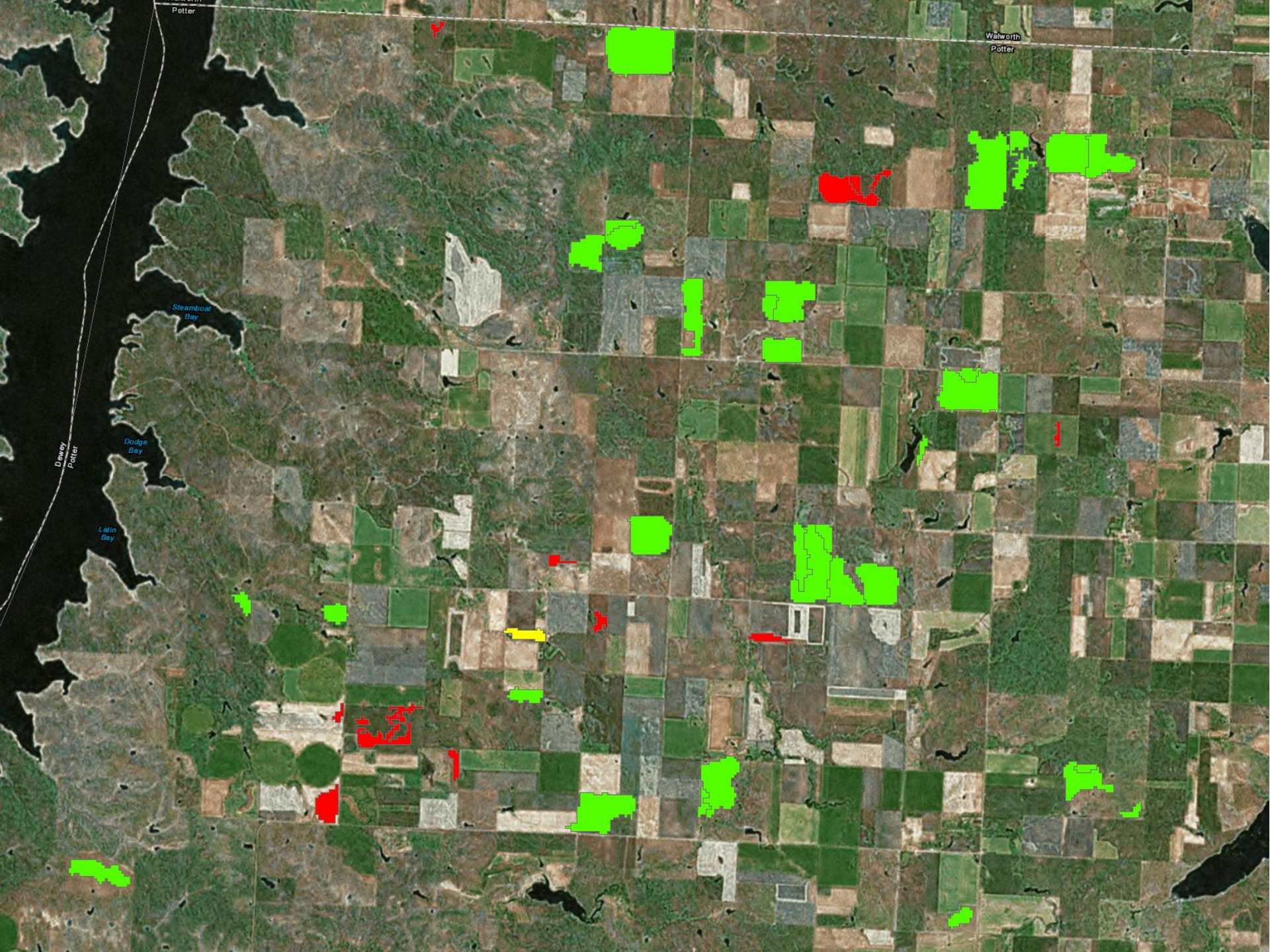
“Break-out” crops vary by region



Map of 2012 land use for Potter County, SD



Red fields = new crop expansion

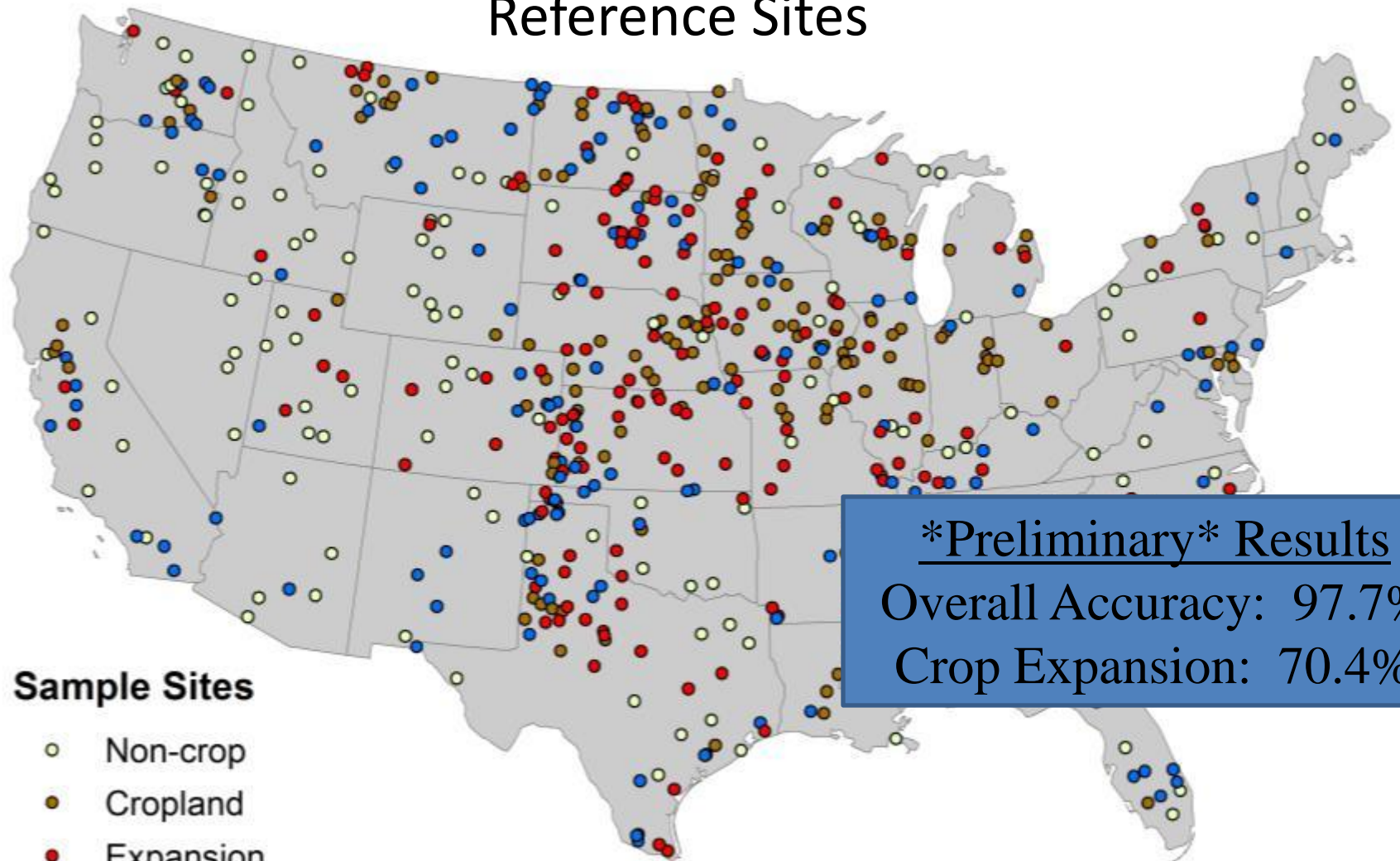


Results consistent with other estimates

Data Source	Time Period	Net Cropland Expansion (million acres / year)	Definition of Cropland
USDA Census of Agriculture	2007-2012	1.56	Harvested + Failed + Fallow
National Resources Inventory (NRI)	2007 – 2012	0.86	Cultivated
Lark et. al. (this study)	2008 - 2012	0.75	Cultivated
NASS Acreage Surveys	2008 - 2012	0.65	Principle Crop Planted Area – non-alfalfa hay

Formal Nationwide Accuracy Assessment

Reference Sites

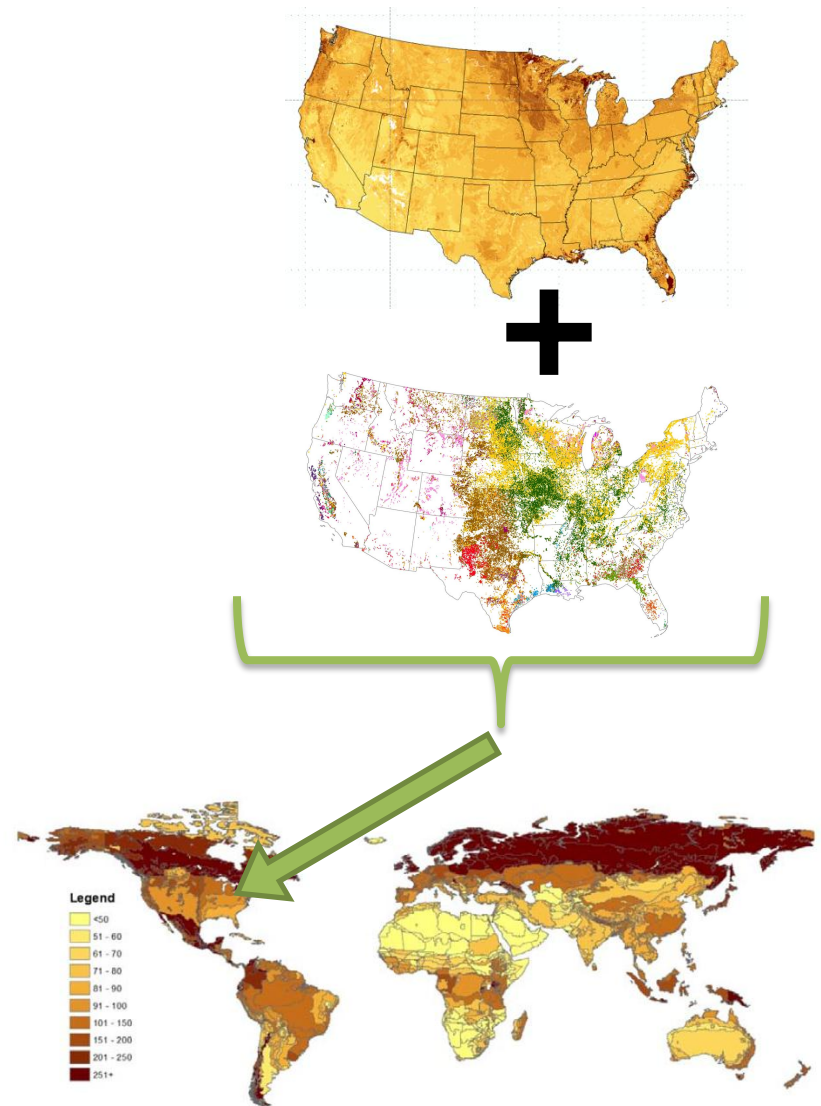


Stratified Random Sample – 600 total locations
Blind, point interpretation of NAIP imagery
Must have images w/in 1-2 yr of study window

ONGOING RESEARCH & OPPORTUNITIES

Carbon Flux Mapping

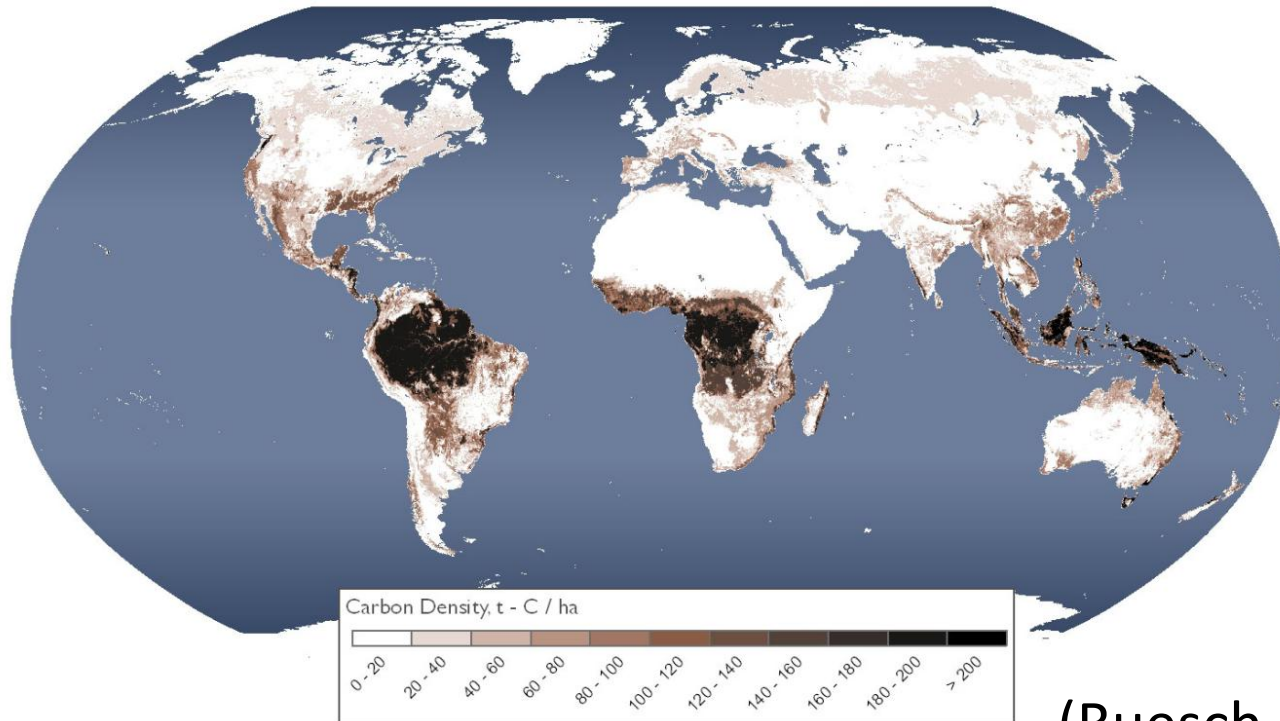
- Calculate spatially-explicit emissions & sequestration for recent U.S. LUC
- Update county & regional emissions factors



Global Carbon Mapping

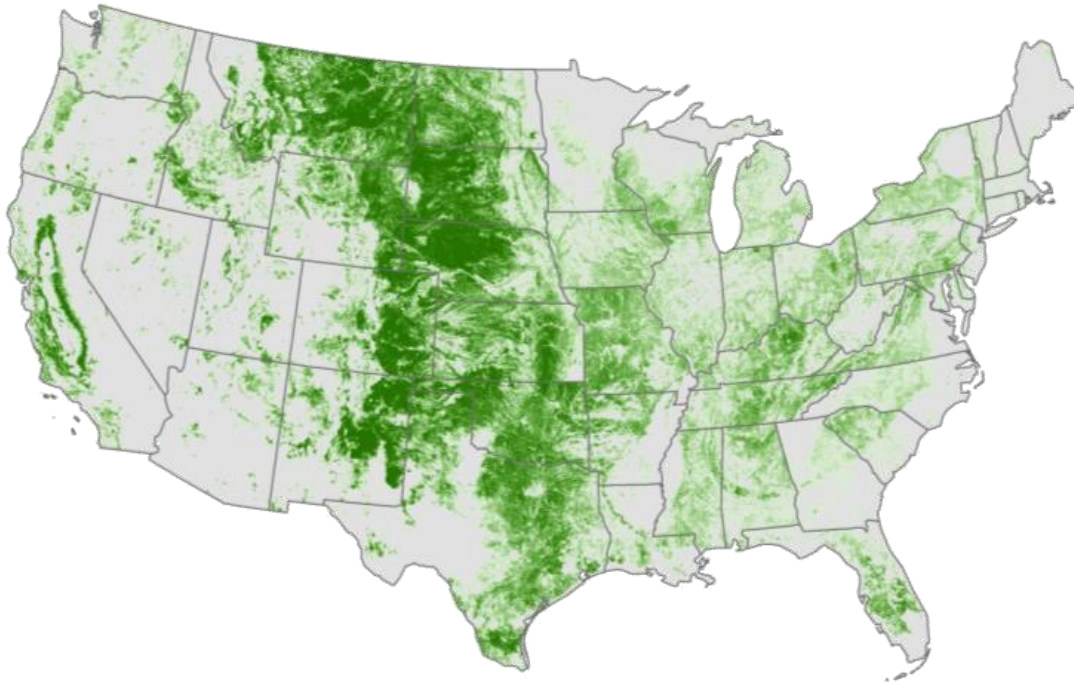
- Update global soil and biomass C map
- Harmonized, globally-consistent database

Global Above- and Below-ground Living
Biomass Carbon Density



(Ruesch & Gibbs 2008)

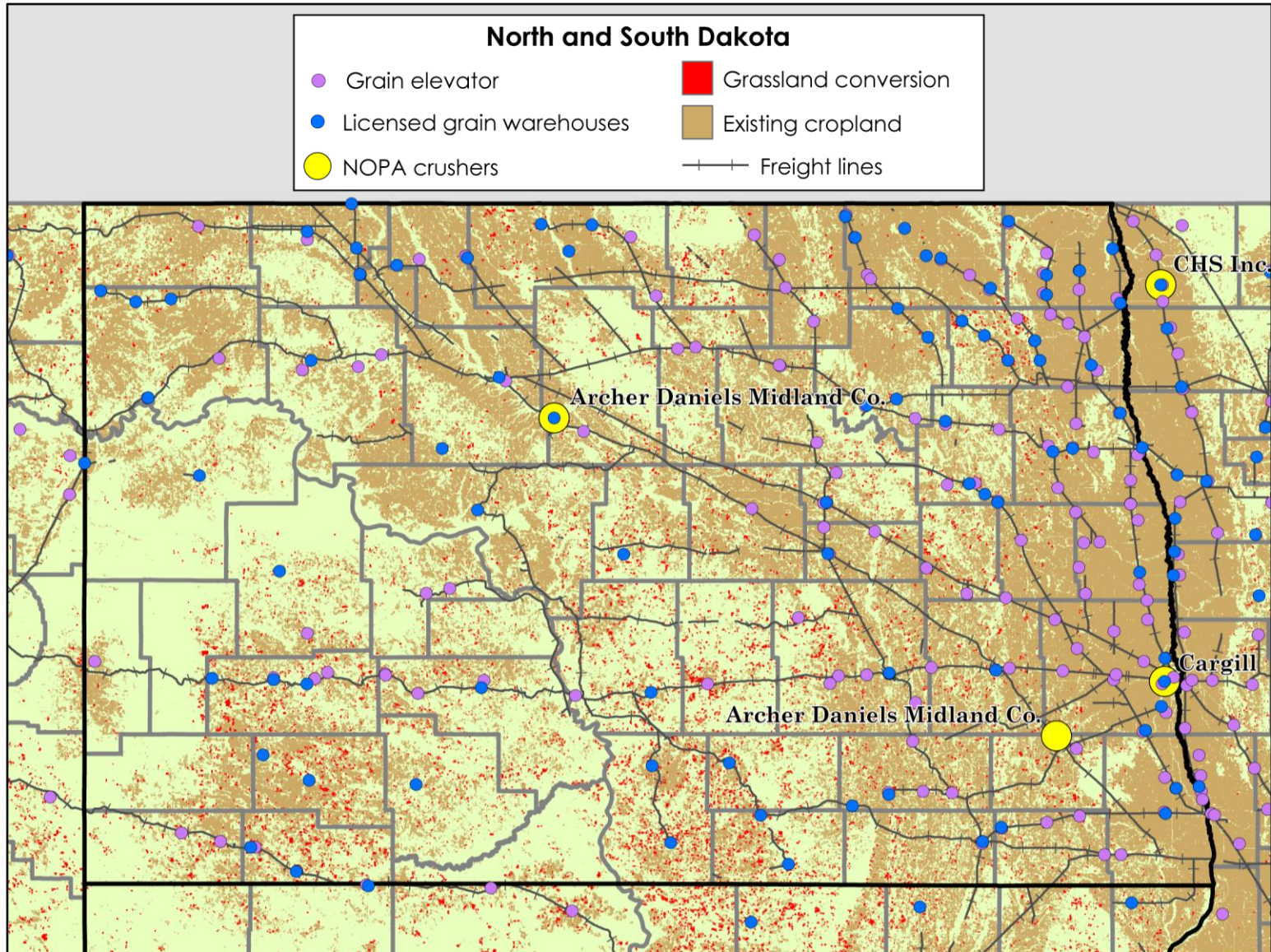
Monitoring U.S. Grasslands & Tracking Annual Conversion



Integrate:

- Native vs Non-native
 - Ownership
 - Protected status
- Conversion (date, crop)

Integration with Supply Chain data



Take-home messages:

- U.S. land conversion is an emerging, widespread issue
 - Implications for GHG emissions, environmental obligations, and sustainability certification
- New methodologies can produce highly-accurate results with high spatial- and crop- specificity
- Substantial opportunity for ensuring sustainability across domestic supply chains
 - Certifications (ISCC), federal policy, and industry-led initiatives

Thank you!

- Funded in part by:
 - Wisconsin Bioenergy Initiative
 - California Air Resources Board
- USDA NASS's Geospatial Research Analysis Section for crop statistic insights and clarifications
- Rudy Omri & Ian Schelly for mapping assistance

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