North American Barley Update

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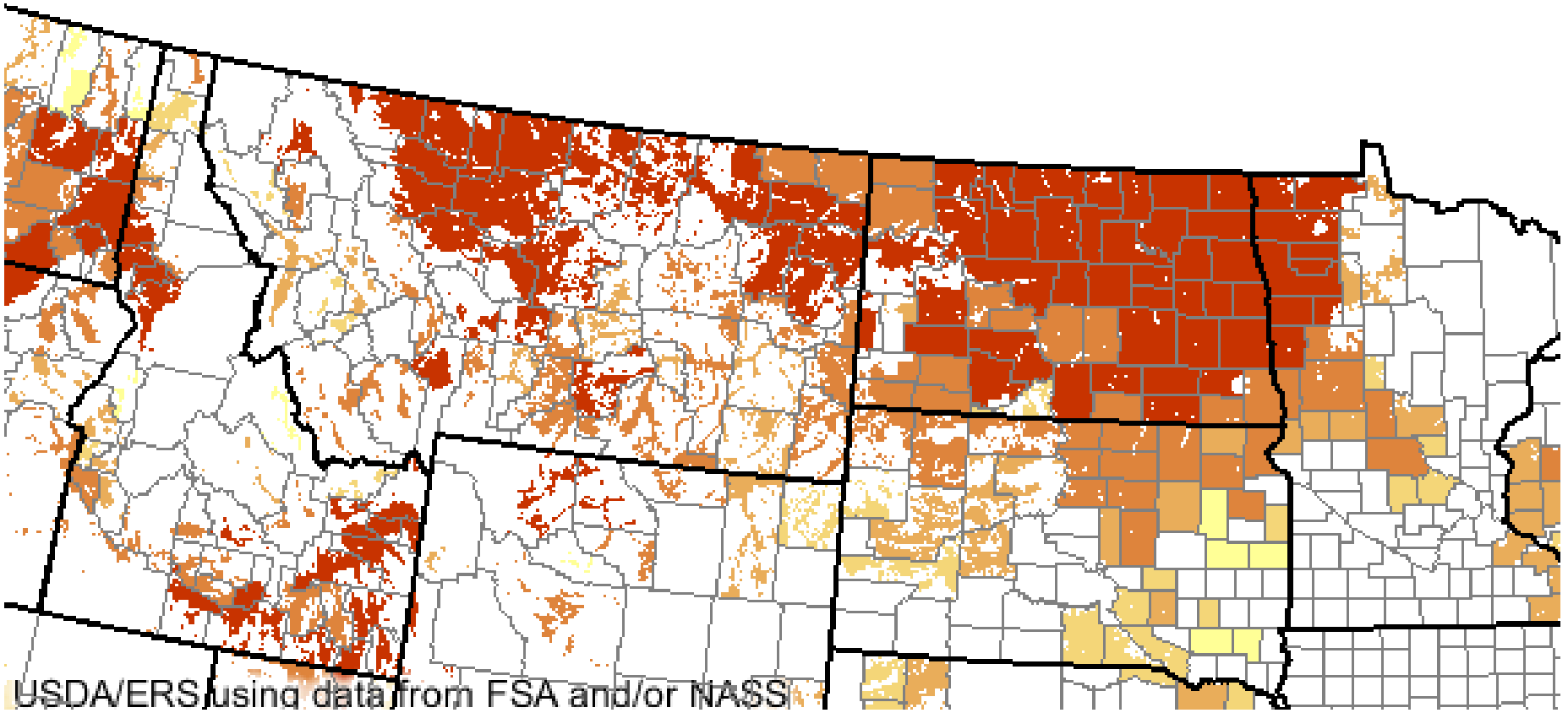
Changing Landscape:
US Barley Acres (1996)



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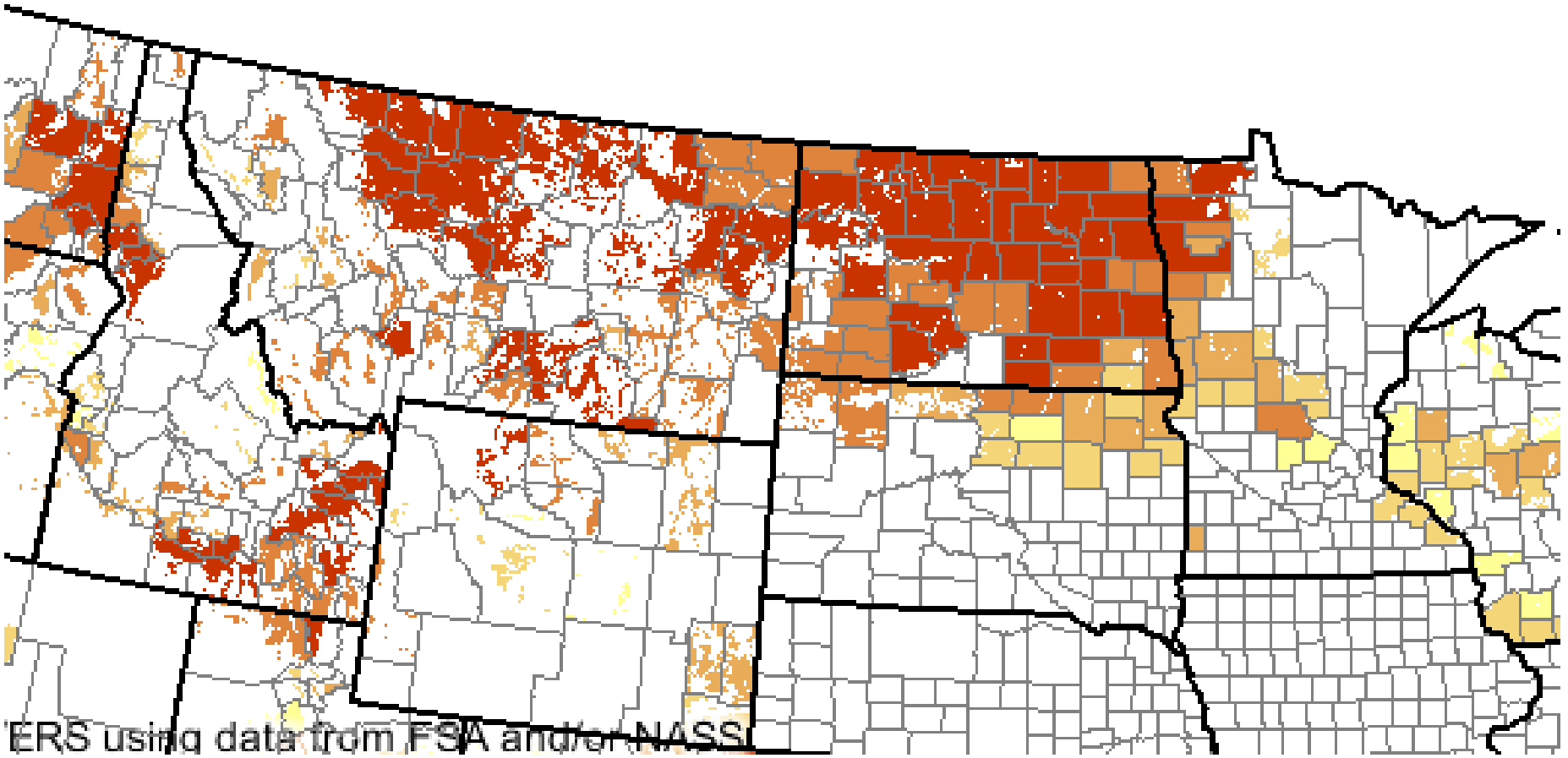
Changing Landscape: US Barley Acres (2002)



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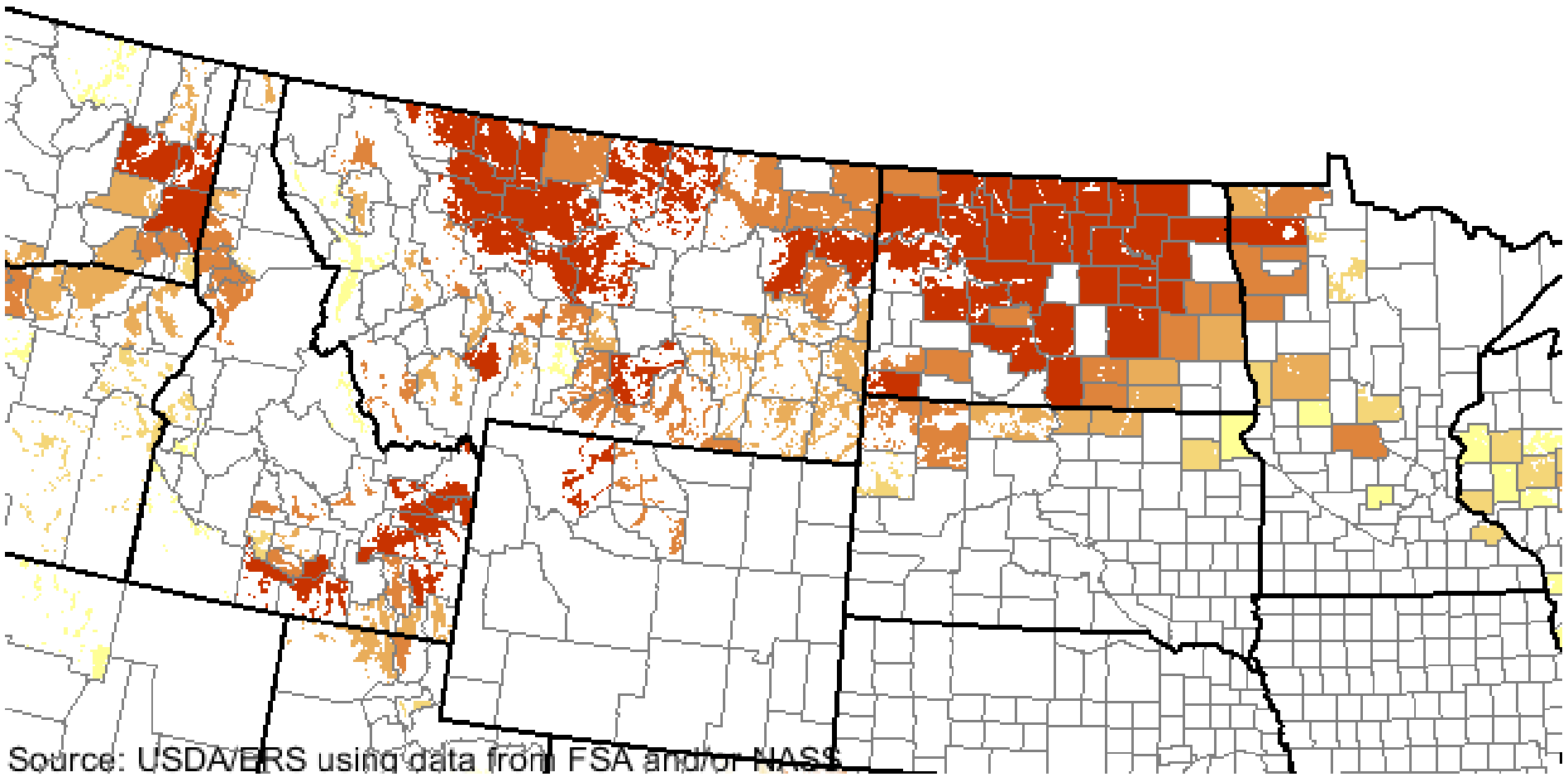
Changing Landscape:
US Barley Acres (2008)



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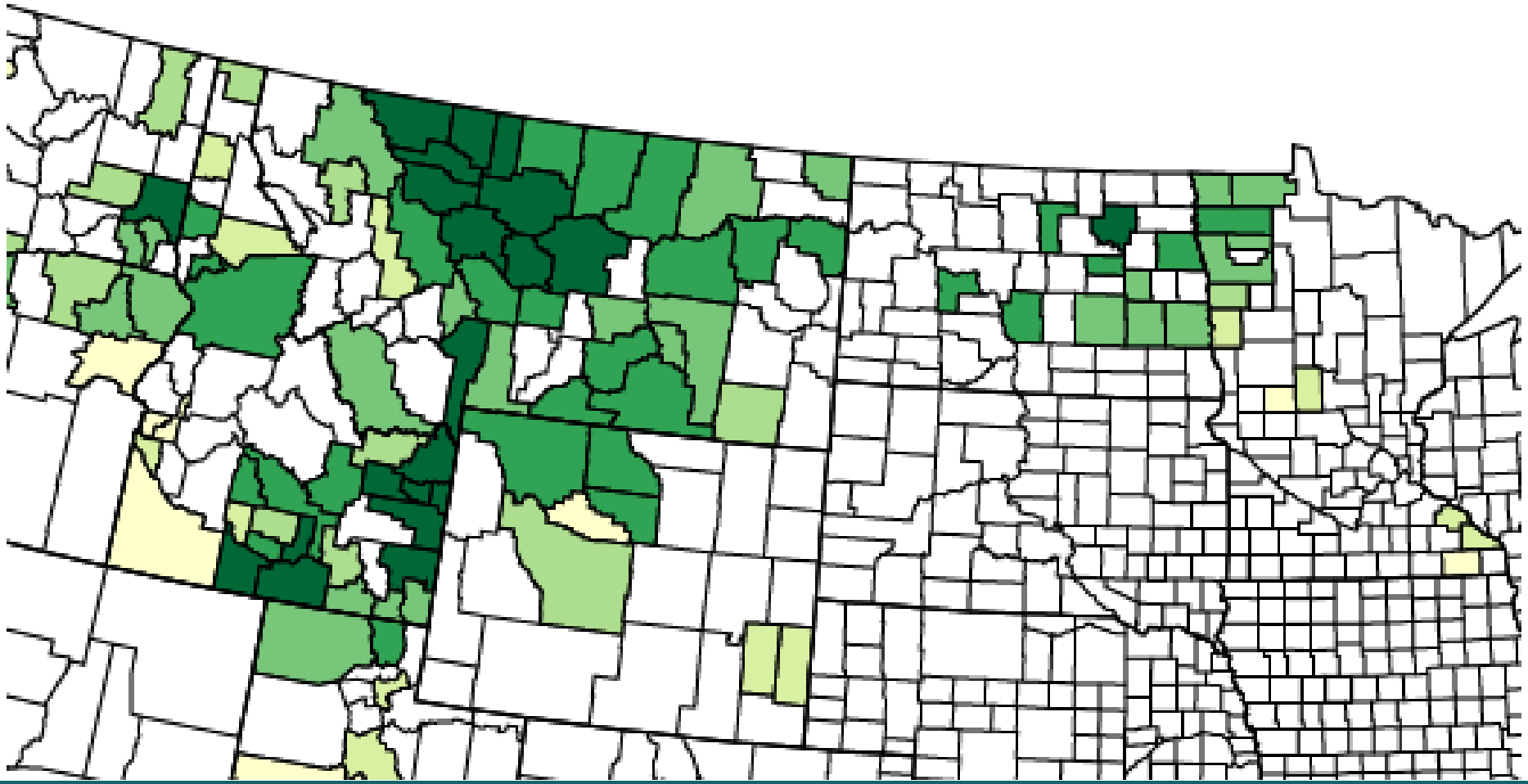
Changing Landscape:
US Barley Acres (2013)



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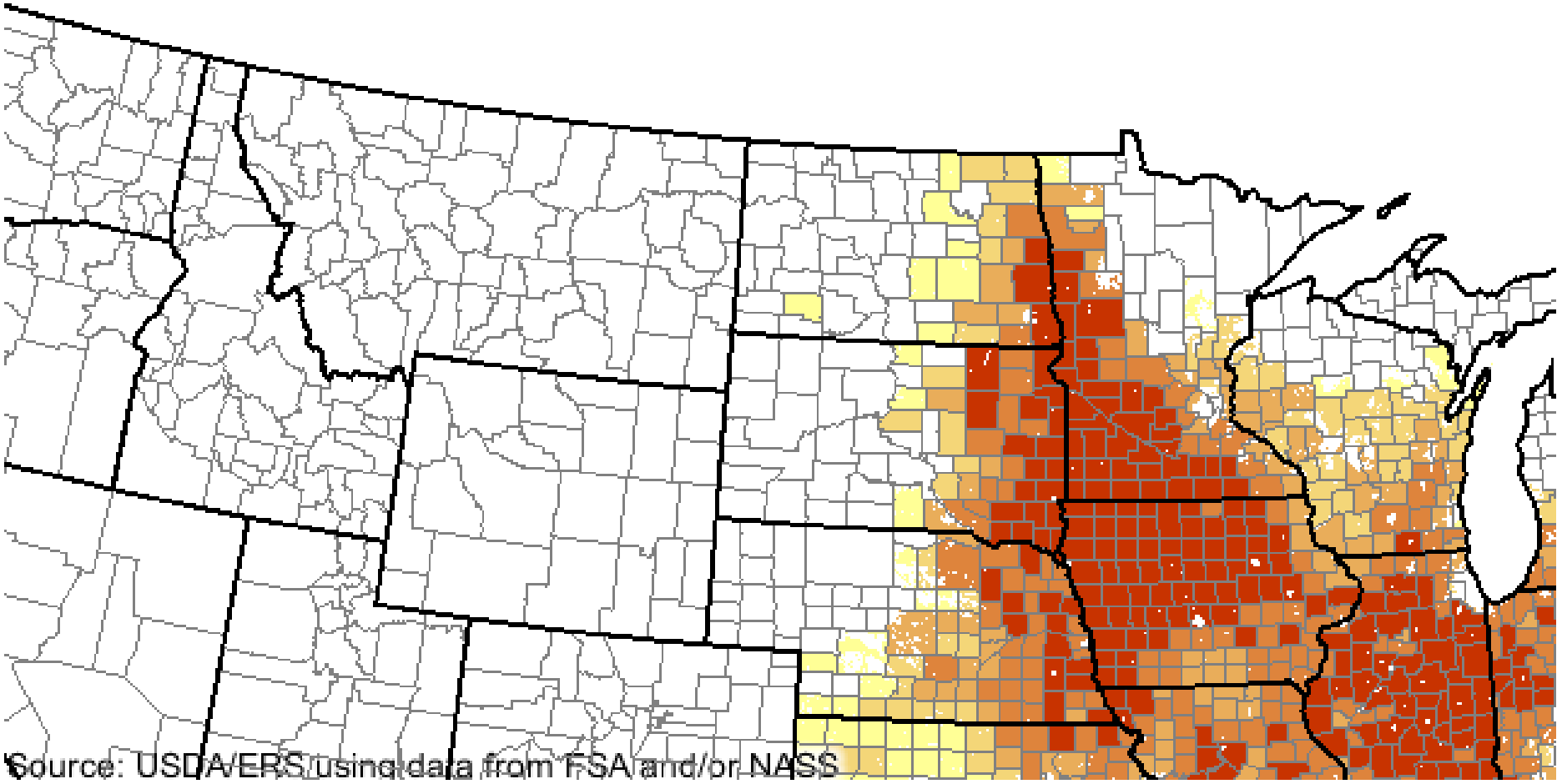
Changing Landscape:
US Soybean Acres (1996)



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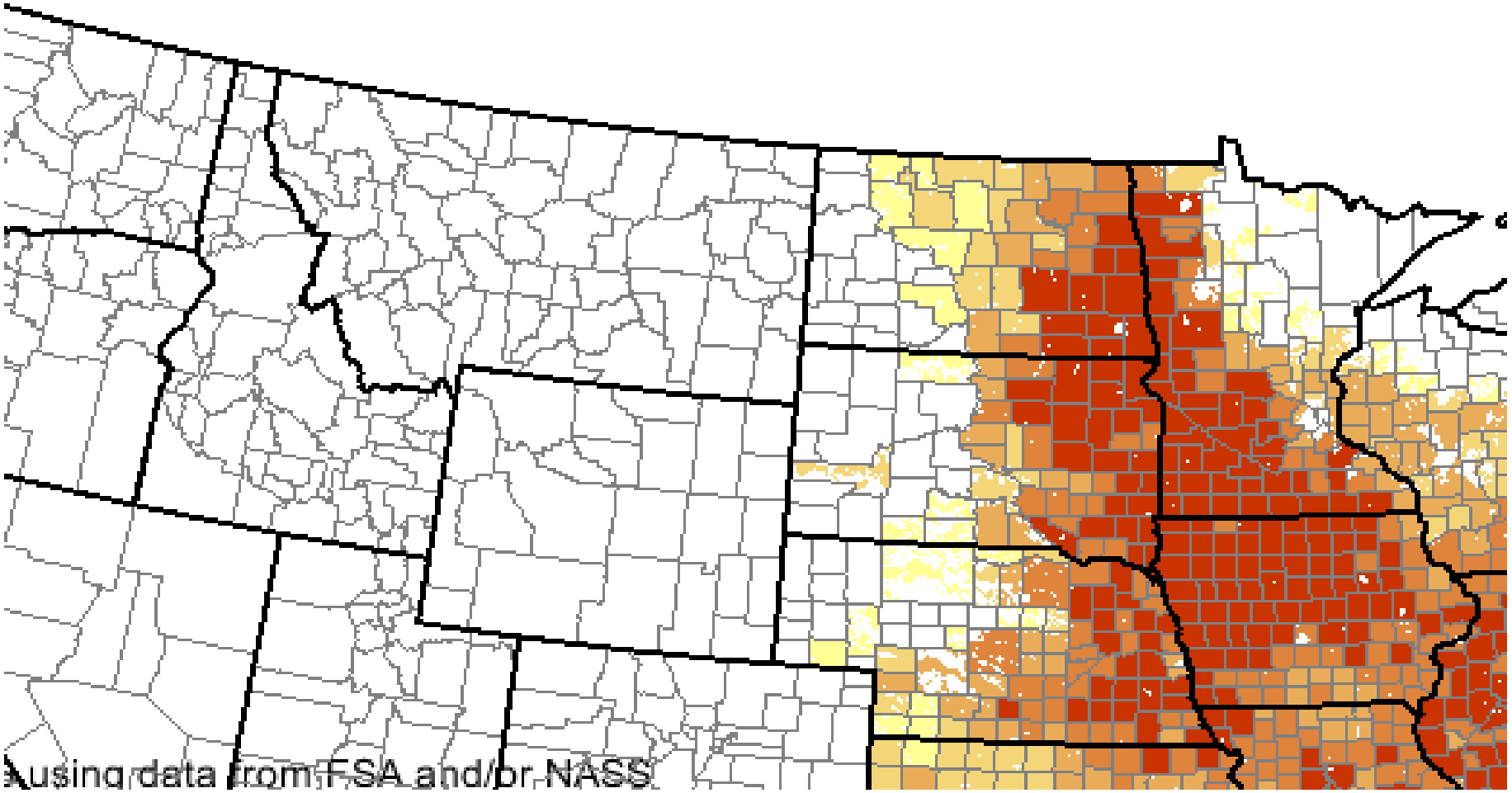
Changing Landscape:
US Soybean Acres (2002)



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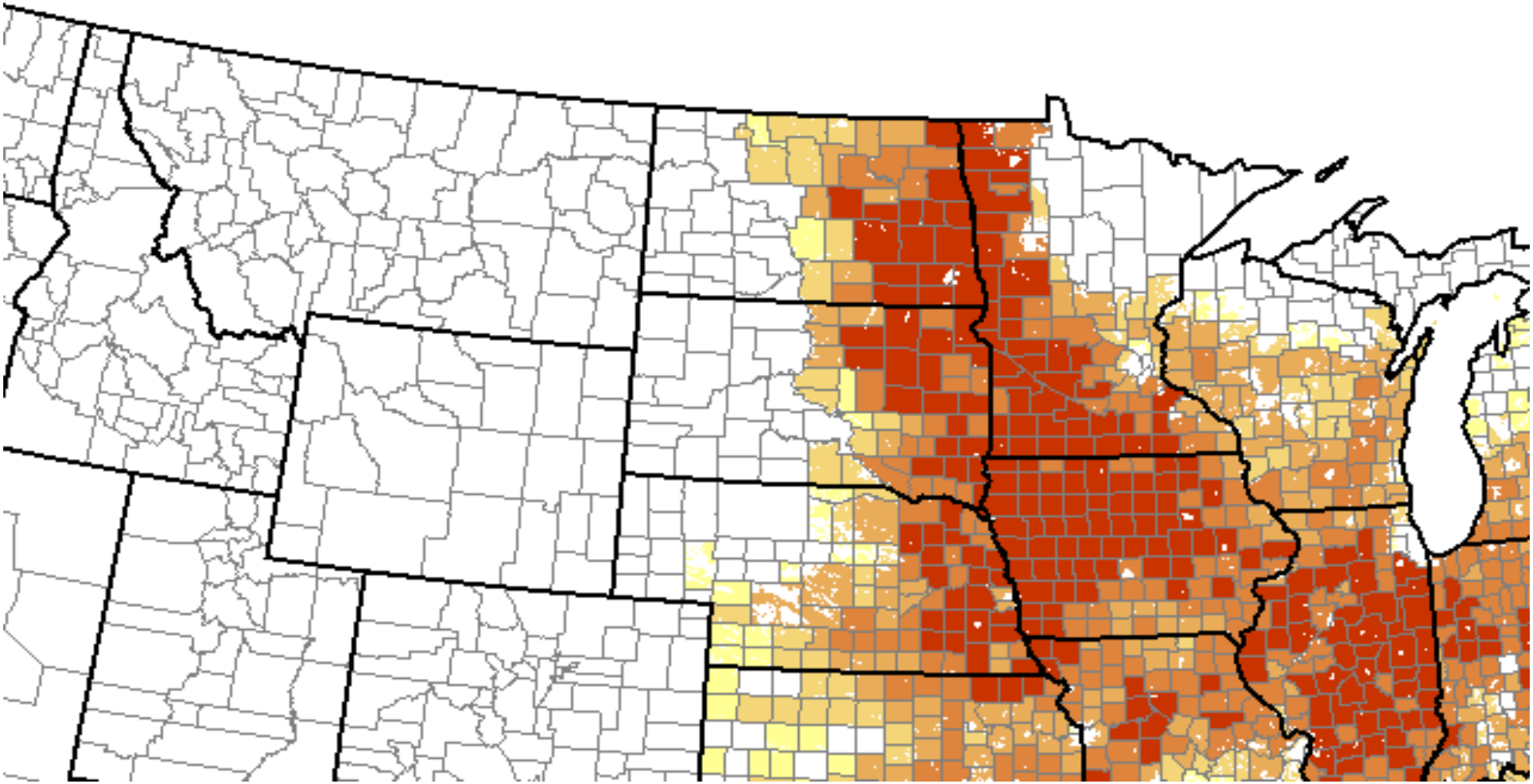
Changing Landscape:
US Soybean Acres (2007)



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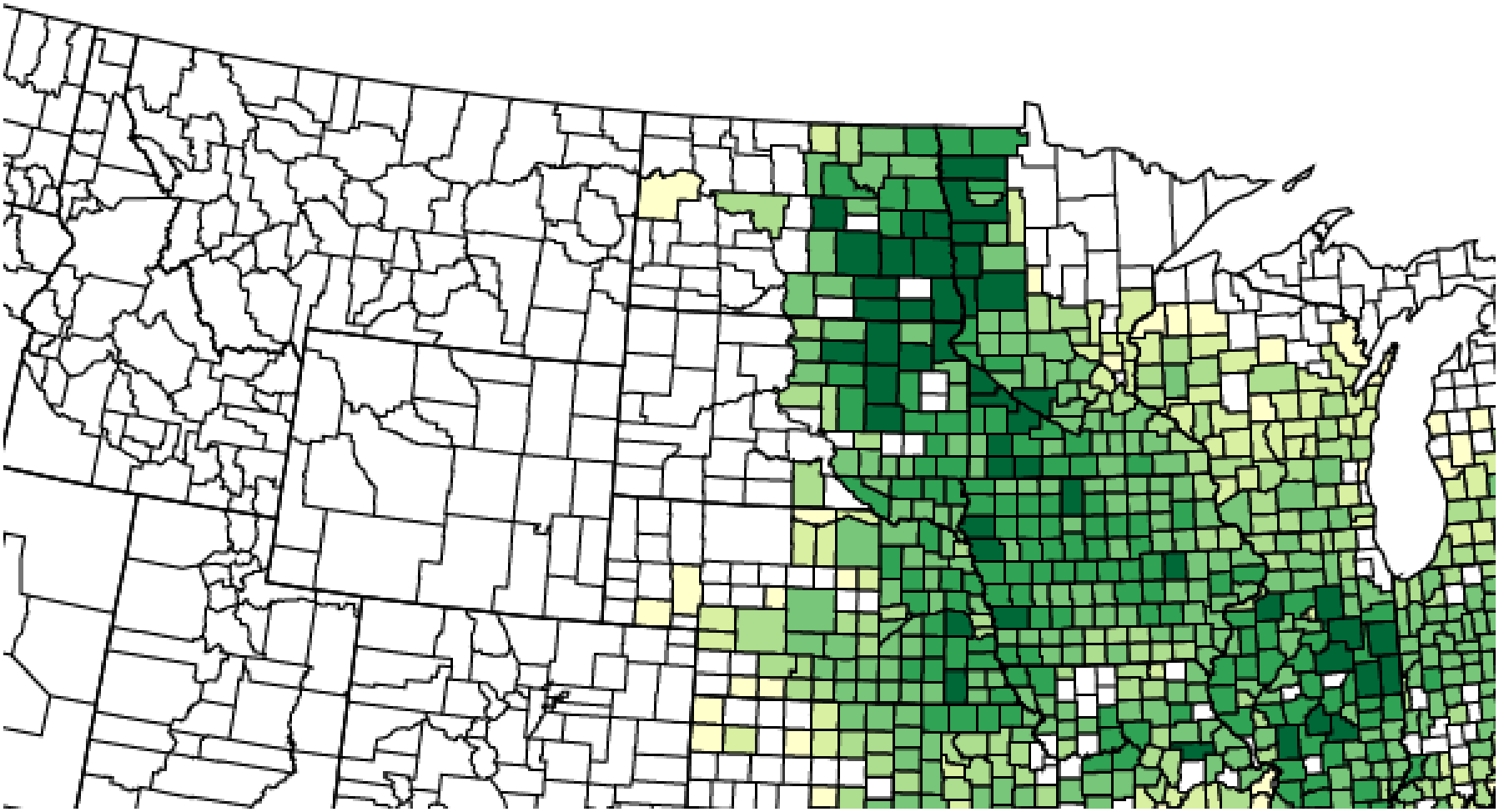
Changing Landscape: US Soybean Acres (2013)



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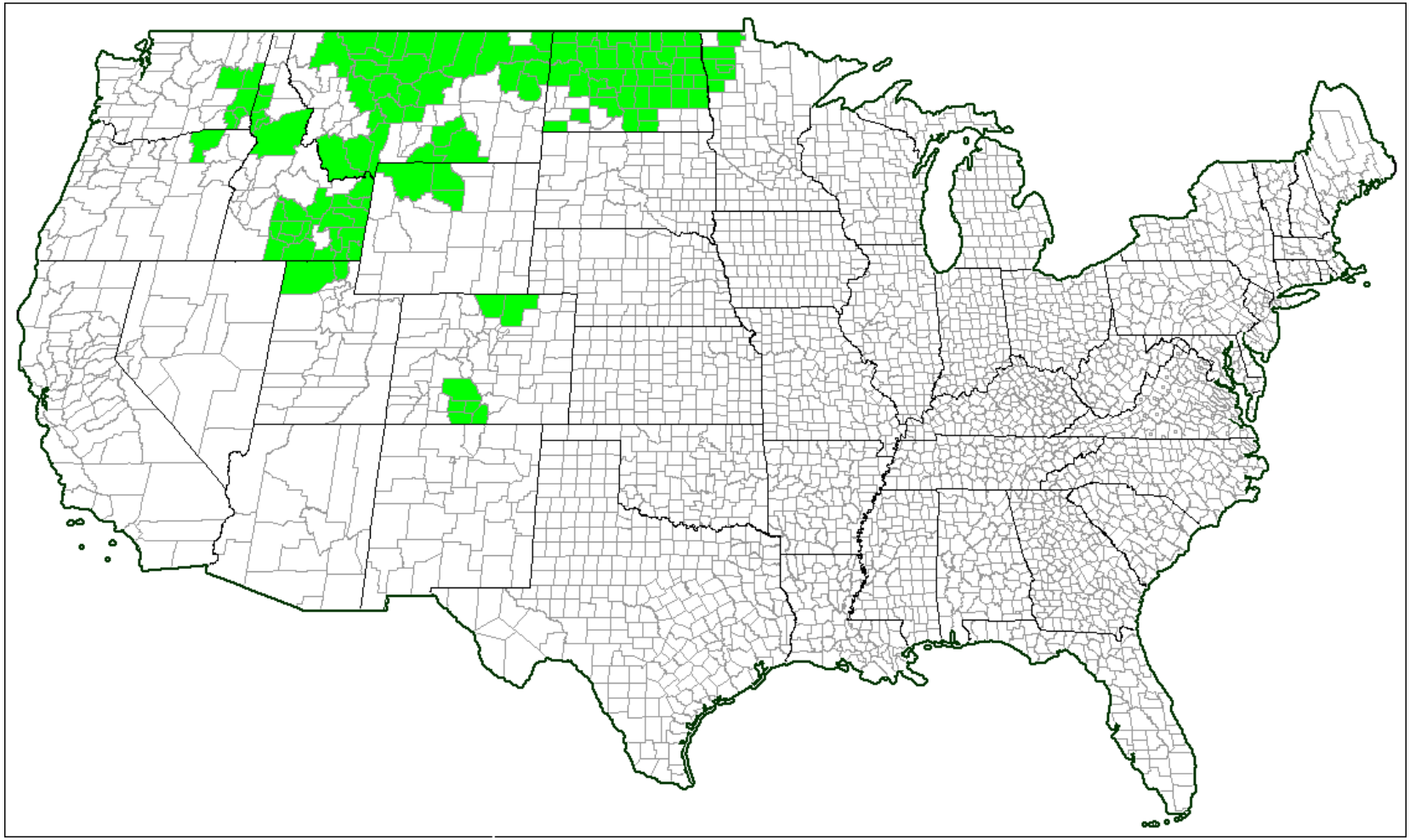
United States Malting Barley Production Regions



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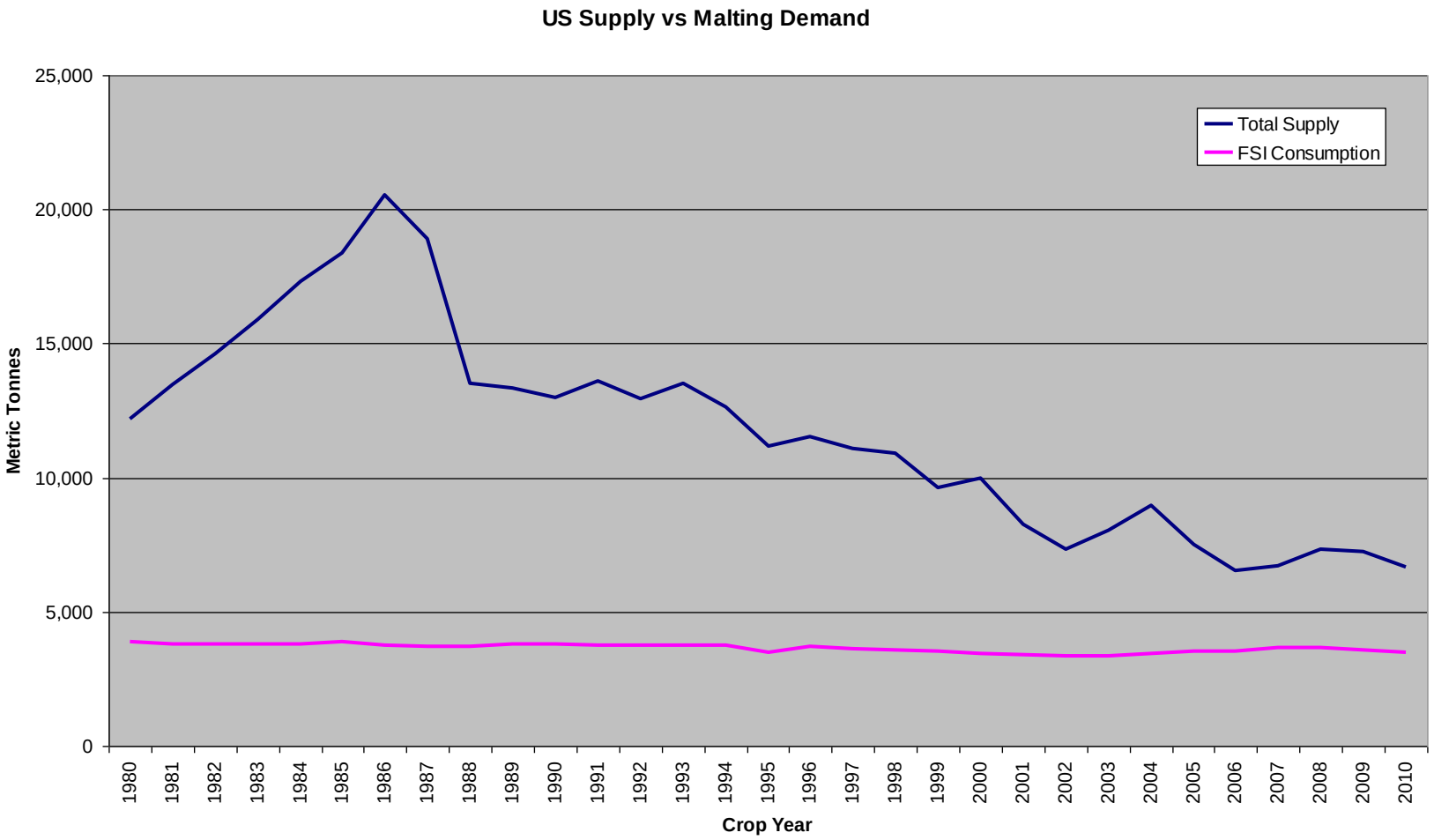
Increase in the Implied Selection Ratio



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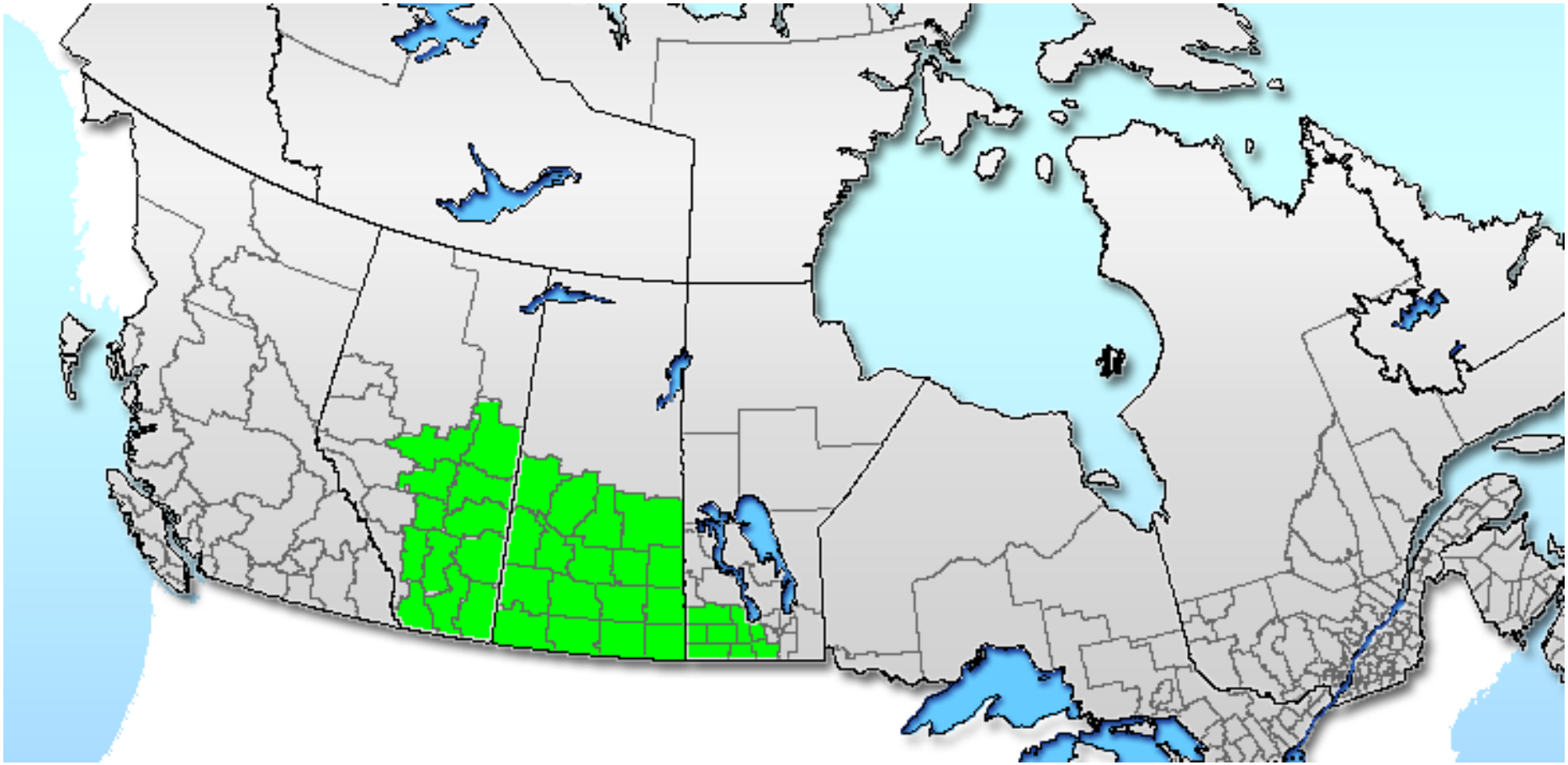
Canada Barley Growing Regions



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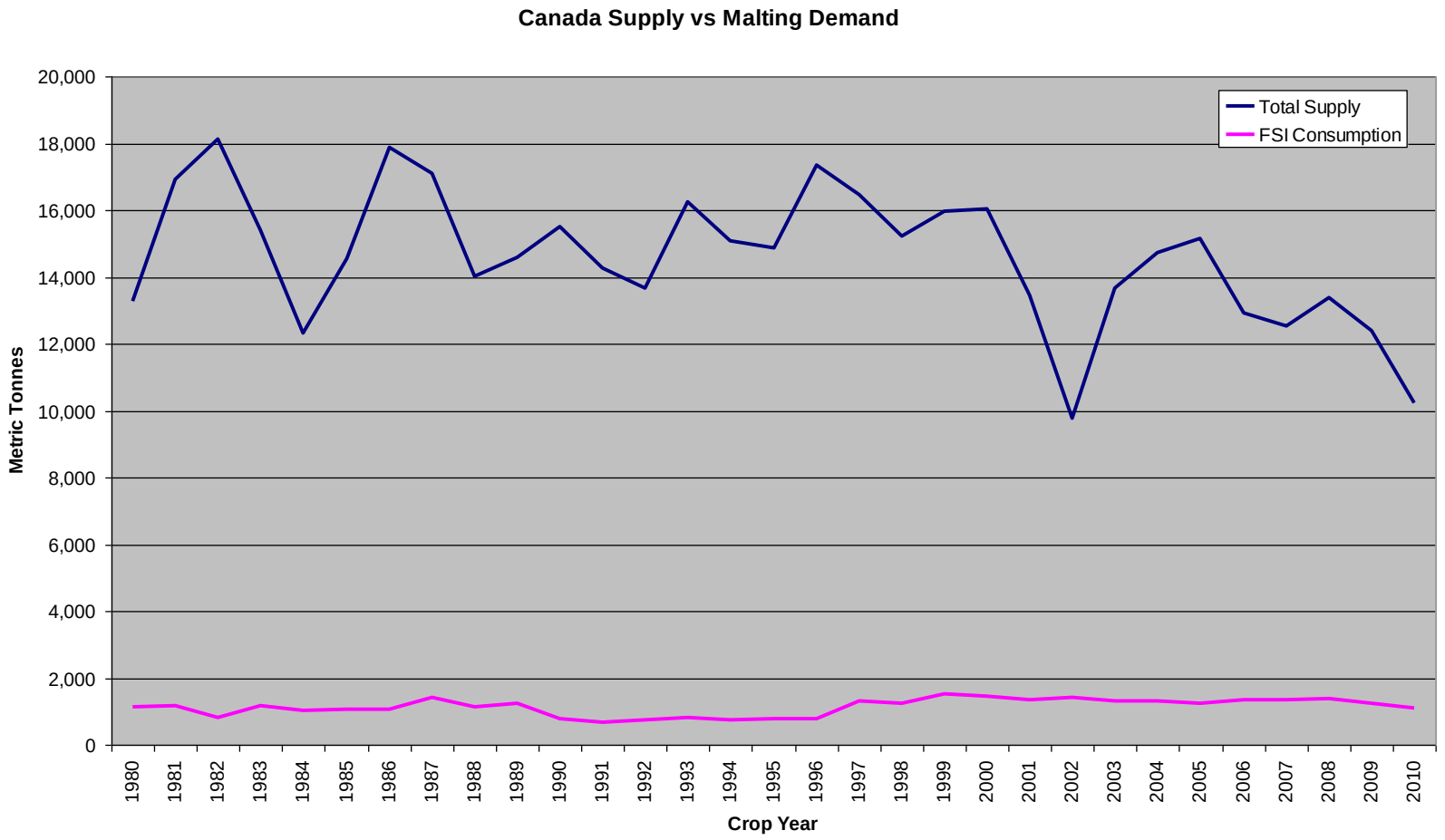
Increase in the Implied Selection Ratio



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US Barley S&D (pre-2014 crop)

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
Beginning Stocks (1000 MT)	1,932	2,515	1,945	1,306	1,750
Area Harvested (1000 HA)	1,260	998	906	1,313	1,214
Yield (MT/HA)	3.93	3.93	3.74	3.65	3.86
Production (1000 MT)	4,949	3,925	3,392	4,796	4,683
MY Imports (1000 MT)	361	207	354	507	408
Total Supply (1000 MT)	7,242	6,647	5,691	6,609	6,841
FSI Consumption (1000 MT)	3,564	3,452	3,374	3,375	3,374
Domestic FSI Selection %	49%	52%	59%	51%	49%
MY Exports (1000 MT)	123	165	193	193	311
Feed Consumption (1000 MT)	1,040	1,085	818	1,291	1,370
Total Demand (1000 MT)	4,727	4,702	4,385	4,859	5,055
Ending Stocks (1000 MT)	2,515	1,945	1,306	1,750	1,786
Ending Stocks to Use %	53%	41%	30%	36%	35%

Source: USDA

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Canada Barley S&D (pre-2014 crop)

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014
Beginning Stocks (1000 MT)	2,964	2,502	1,502	1,195	983
Area Harvested (1000 HA)	2,922	2,394	2,402	2,751	2,650
Yield (MT/HA)	3.26	3.19	3.29	2.91	3.87
Production (1000 MT)	9,528	7,627	7,892	8,012	10,250
MY Imports (1000 MT)	36	44	16	19	9
Total Supply (1000 MT)	12,528	10,173	9,410	9,226	11,242
FSI Consumption (1000 MT)	1,193	1,150	1,209	1,140	1,180
Domestic FSI Selection %	10%	11%	13%	12%	10%
MY Exports (1000 MT)	1,309	1,207	1,299	1,434	1,559
Feed Consumption (1000 MT)	7,524	6,314	5,707	5,669	6,579
Total Demand (1000 MT)	10,026	8,671	8,215	8,243	9,318
Ending Stocks (1000 MT)	2,502	1,502	1,195	983	1,924
Ending Stocks to Use %	25%	17%	15%	12%	21%

Source: USDA & MENA estimates

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Some numbers behind the numbers (2012 crop baseline)

Spring Malting Barley (2012)

Country	Area ('000 ha)	Yield (MT/ha)	Gross production (MT)	Selection rate (%)	Malting quality
USA (MN/ND/MT/WY/CO/ID/WA)	1,126	3.61	4,062,505	69%	2,801,966
Canada	2,576	2.88	7,422,515	22%	1,612,953
Mexico	328	3.15	1,033,200	84%	869,438
Total	4,029	3.11	12,518,220	42%	5,284,357

Spring Malting Barley (2012)

Country	Malting quality	Capacity	Carry-in	Import	Export	Carry-out	As days
USA (MN/ND/MT/WY/CO/ID/WA)	2,801,966	2,581,000	708,775	507,000	105,000	1,331,741	188
Canada	1,612,953	1,000,000	251,476	30,000	800,000	94,428	34
Mexico	869,438	652,000	124,485	50,000	-	391,923	219
Total	5,284,357	4,233,000	1,084,736	587,000	905,000	1,818,092	157

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Repeat for 2013

Spring Malting Barley (2013)					
Country	Area ('000 ha)	Yield (MT/ha)	Gross production (MT)	Selection rate (%)	Malting quality
USA (MN/ND/MT/WY/CO/ID/WA)	1,039	3.61	3,749,780	68%	2,564,452
Canada	2,477	3.91	9,676,103	28%	2,733,645
Mexico	215	2.56	550,400	84%	463,162
Total	3,730	3.75	13,976,283	41%	5,761,259

Spring Malting Barley (2013)								
Country	Malting quality	Capacity	Carry-in	Import	Export	Attrition	Carry-out	As days
USA (MN/ND/MT/WY/CO/ID/WA)	2,564,452	2,581,000	1,331,741	408,000	105,000		1,618,194	229
Canada	2,733,645	1,000,000	94,428	30,000	758,000	600,000	500,073	183
Mexico	463,162	652,000	391,923	100,000	-		303,084	170
Total	5,761,259	4,233,000	1,818,092	538,000	863,000	500,000	2,521,351	217

It all starts with a recipe…

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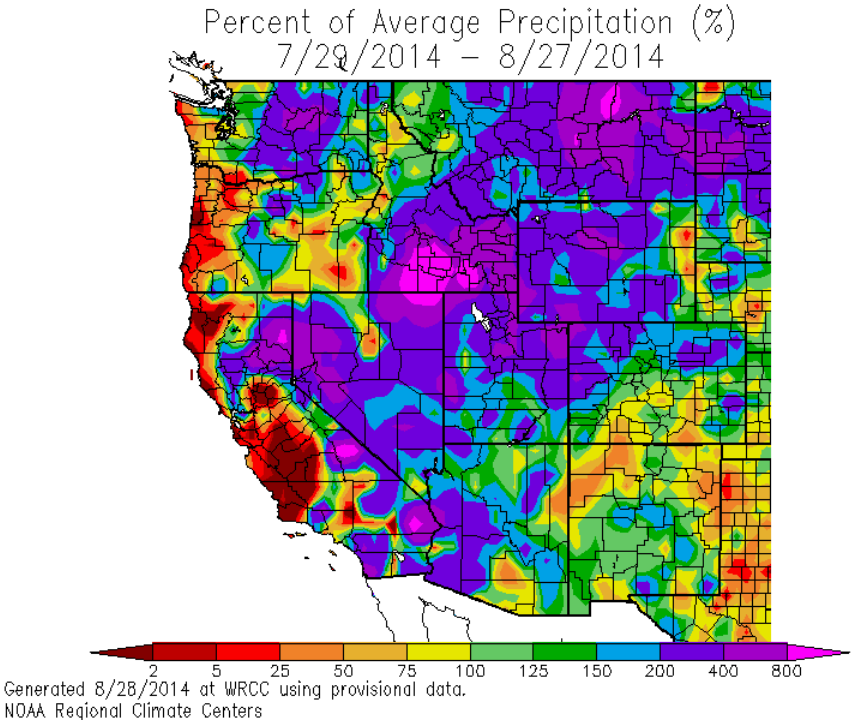
Recipe for Ideal Malting Barley Crop

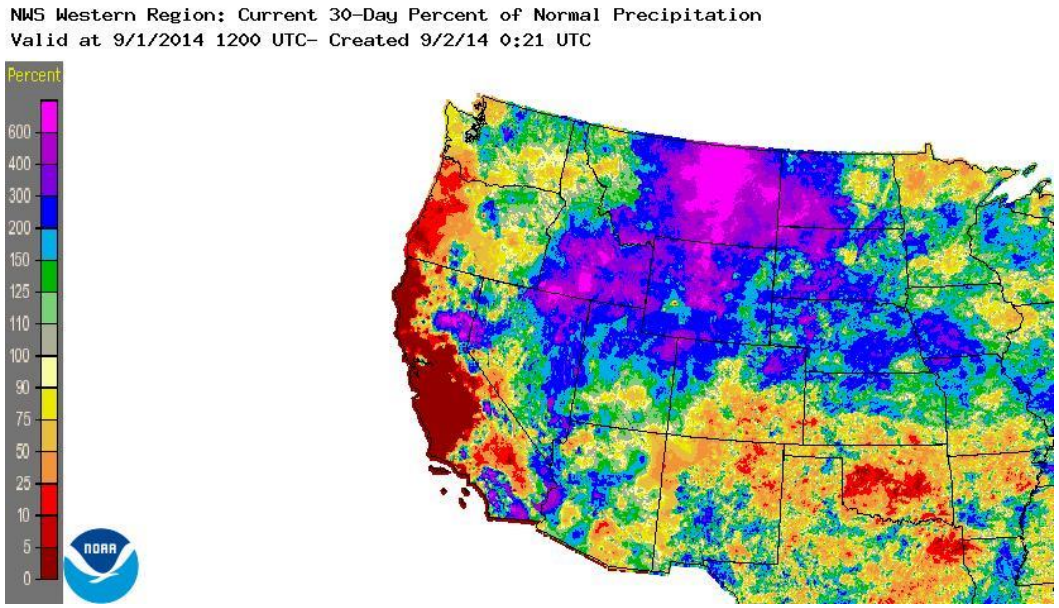
- **Start with ample and diversified planting area**
  - Planted area down 11% in US
  - Down 14% in Canada
  - Major malt production regions intact
- **Stagger your start times**
  - North Dakota and Canadian planted in very tight window given delayed spring
  - Idaho and Montana planting on schedule
- **Provide sufficient (but not excessive) moisture and warmth**
  - Some disease pressure due to excess wet/humid conditions during key growth stages
  - Yield prospects looked promising throughout most growing areas (but not to the extent of 2013 crop)
- **Complete harvest before any degradation of the crop's quality (CRITICAL STEP)**
  - **Widespread failure to achieve**

Harvest Issues: Idaho first…

- Crop gets 10 to 15% of harvested without issue
- Excessive rains enter the area August 5/6
- Repeat moisture systems impact balance of crop over next 30 days



…then Montana and North Dakota



- Crop gets 50% harvested without much issue
- Excessive rains enter the area August 21/22
- Repeat moisture systems impact balance of crop over next 20 days

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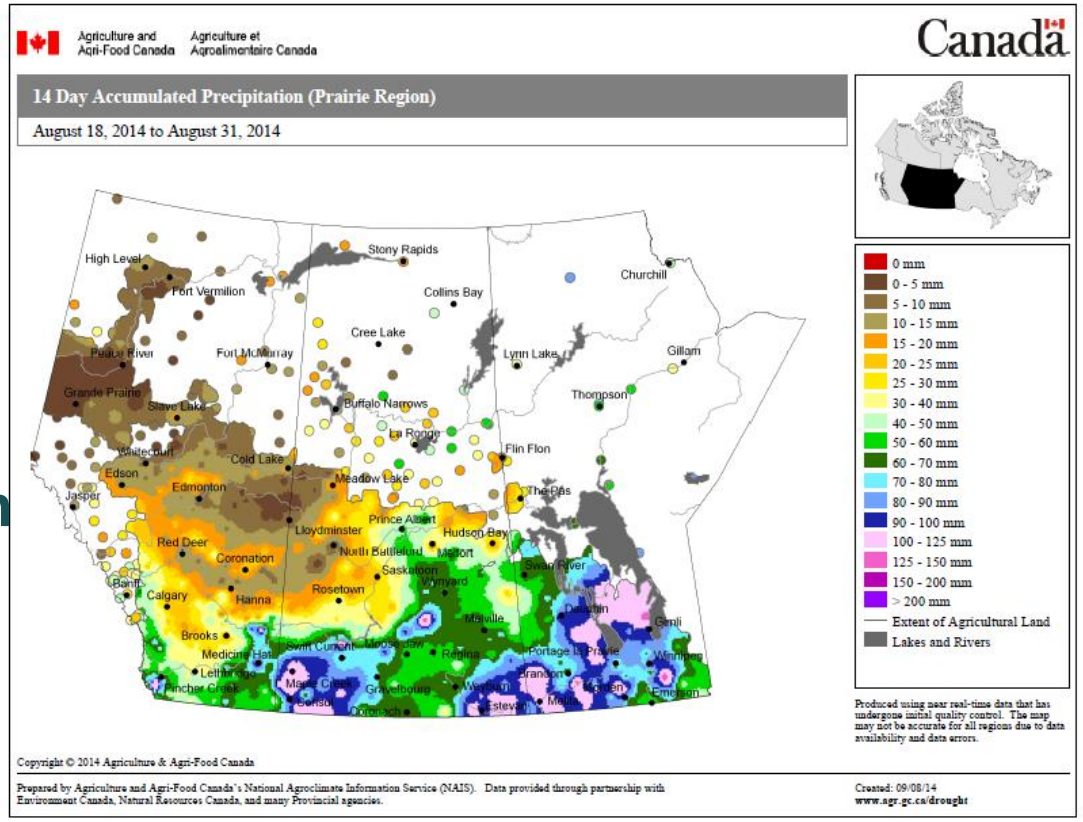
…and carries into Canada too

- Crop only 10 to 15% harvested
- Balance fairly close to maturity given tight planting window
- Same system over MT and ND, impacts much of Southern and Eastern Prairies over a 20 day period
- Limited drying weather keeps crop damp



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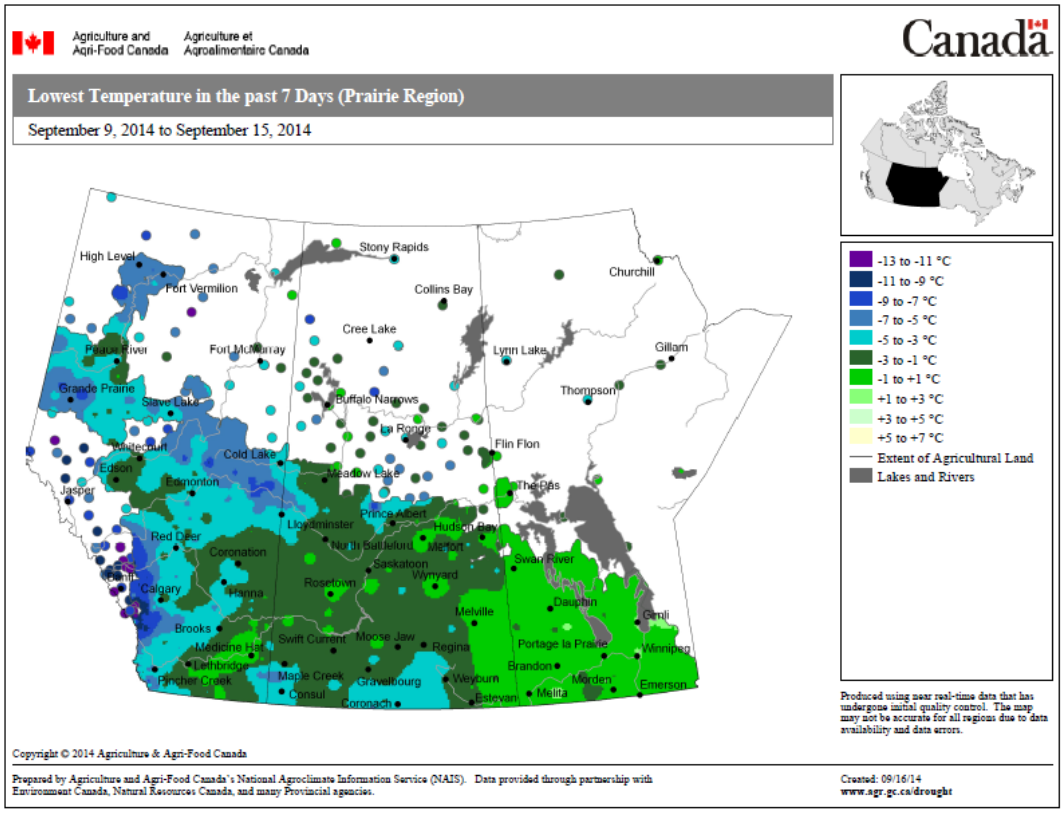
Add a dash of a killing frost…



- **Detrimental freezing temps in the overnight hours impact the crop over a 72 hour period (~Sept 11)**
- **Anything still green enough to escape impacts of rain systems, potentially exposed**

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…and pinch of snow in Southern Alberta for good measure

source: producer.com

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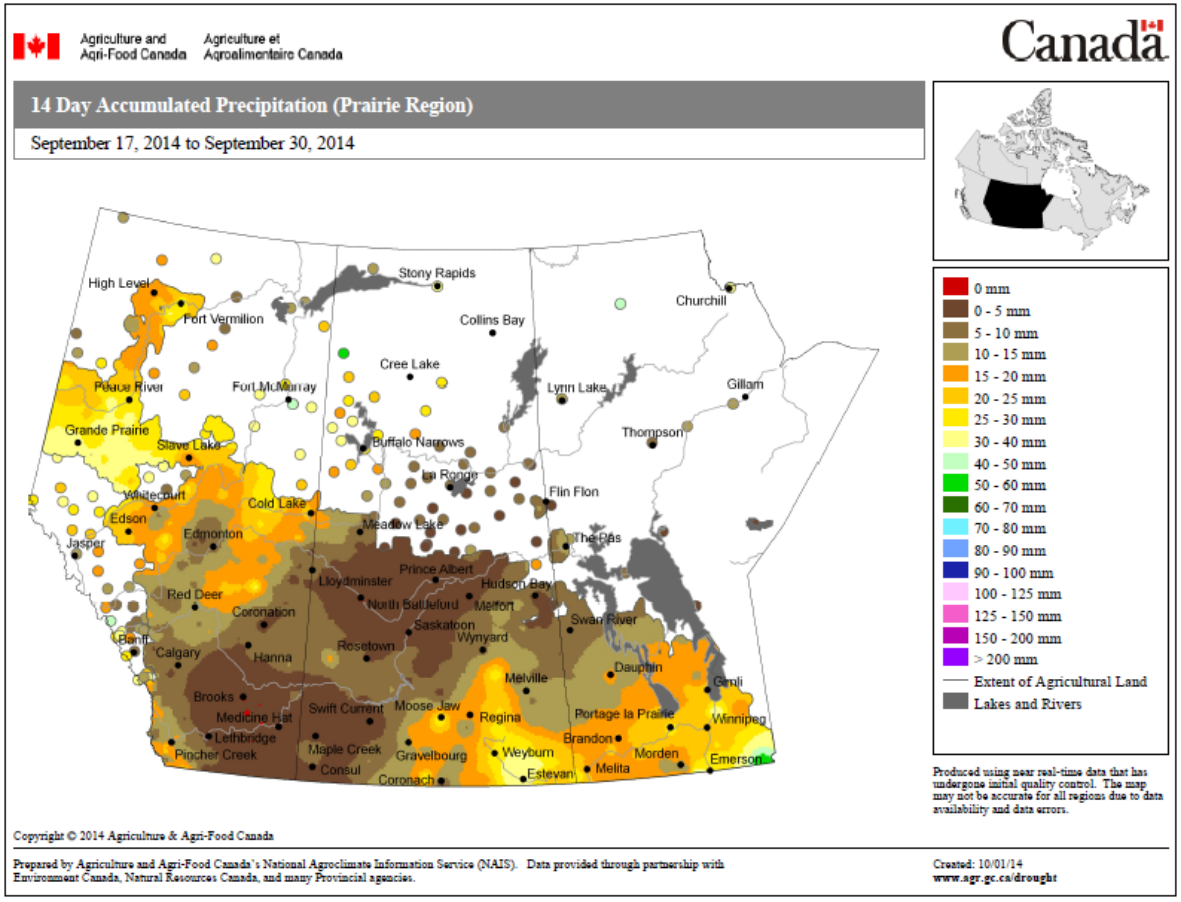
Mix well and harvest for 14 days

- Beneficial high pressure system finally enters the prairies in last half September
- Harvest advances rapidly, but gets stalled by weather after 10 days
- Barley crop estimated at 90+% complete
- Anecdotal evidence that growers focusing on higher value crops during this harvest window (assume their barley is already degraded to feed?)



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Then evaluate your results…
United States Barley Supply and Demand

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015 (forecast)
Beginning Stocks (1000 MT)	1,932	2,515	1,945	1,306	1,750	1,786
Area Harvested (1000 HA)	1,260	998	906	1,313	1,214	1,066
Yield (MT/HA)	3.93	3.93	3.74	3.65	3.86	3.83
Production (1000 MT)	4,949	3,925	3,392	4,796	4,683	4,080
MY Imports (1000 MT)	361	207	354	507	408	544
Total Supply (1000 MT)	7,242	6,647	5,691	6,609	6,841	6,410
FSI Consumption (1000 MT)	3,564	3,452	3,374	3,375	3,374	3,353
Domestic FSI Selection %	49%	52%	59%	51%	49%	52%
MY Exports (1000 MT)	123	165	193	193	313	218
Feed Consumption (1000 MT)	1,040	1,085	818	1,291	1,368	1,089
Total Demand (1000 MT)	4,727	4,702	4,385	4,859	5,055	4,660
Ending Stocks (1000 MT)	2,515	1,945	1,306	1,750	1,786	1,750
Ending Stocks to Use %	53%	41%	30%	36%	35%	38%

Source: USDA

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Canada Barley Supply and Demand

	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015 (Forecast)
Beginning Stocks (1000 MT)	2,964	2,502	1,502	1,195	983	1,758
Area Harvested (1000 HA)	2,922	2,394	2,402	2,751	2,650	2,200
Yield (MT/HA)	3.26	3.19	3.29	2.91	3.87	3.18
Production (1000 MT)	9,528	7,627	7,892	8,012	10,250	6,996
MY Imports (1000 MT)	36	44	16	19	25	50
Total Supply (1000 MT)	12,528	10,173	9,410	9,226	11,258	8,804
FSI Consumption (1000 MT)	1,193	1,150	1,209	1,140	1,200	1,200
Domestic FSI Selection %	10%	11%	13%	12%	11%	14%
MY Exports (1000 MT)	1,309	1,207	1,299	1,434	1,600	800
Feed Consumption (1000 MT)	7,524	6,314	5,707	5,669	6,700	5,600
Total Demand (1000 MT)	10,026	8,671	8,215	8,243	9,500	7,600
Ending Stocks (1000 MT)	2,502	1,502	1,195	983	1,758	1,204
Ending Stocks to Use %	25%	17%	15%	12%	19%	16%

Source: USDA & MENA estimates

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2014 Crop Quality

- Good plumps and moderate proteins
- Came off the field wet in Canada
- Variable signs of weathering and disease
  - Grey cast and higher than normal DON levels
- Chitting evident
  - Some samples showing immediate impact on germination
  - Others are a ticking time bomb

Then scrutinize your results…

2014	Planted Area		2014 Harvested Area		Abandonment & Green Feed	Yield		Production	
	Acres ('000)	Hectares ('000)	Acres ('000)	Hectares ('000)	%	Bu/Ac	MT/ha	Bushels ('000)	MT ('000)
North Dakota	620	251	540	219	12.9%	69	3.71	37,260	811
Minnesota	75	30	60	24	20.0%	52	2.80	3,120	68
Montana	920	372	775	314	15.8%	59	3.17	45,725	996
Colorado	57	23	54	22	5.3%	126	6.78	6,804	148
Idaho	560	227	515	209	8.0%	95	5.11	48,925	1,065
Washington	115	47	105	43	8.7%	60	3.23	6,300	137
Wyoming	80	32	63	26	21.3%	107	5.75	6,741	147
Total US	2,427	983	2,112	855	13.0%	72.8	3.92	154,875	3,372
vs 2013	-15%		-18%		33%	5%			-14%

2014	Planted Area		2014 Harvested Area		Abandonment & Green Feed	Yield		Production	
	Acres ('000)	Hectares ('000)	Acres ('000)	Hectares ('000)	%	Bu/Ac	MT/ha	Bushels ('000)	MT ('000)
Manitoba	325	132	290	117	10.7%	65	3.50	18,873	411
Saskatchewan	1,950	789	1,740	704	10.8%	56	3.00	97,004	2,112
Alberta	3,300	1,336	2,869	1,161	13.1%	67	3.60	191,969	4,180
Total Canada	5,575	2,256	4,899	1,982	12.1%	62.9	3.38	307,846	6,703
vs 2013		-15%		-20%	82%		-13%		-31%

2014	Planted Area		2014 Harvested Area		Abandonment & Green Feed	Yield		Production	
	Acres ('000)	Hectares ('000)	Acres ('000)	Hectares ('000)	%	Bu/Ac	MT/ha	Bushels ('000)	MT ('000)
Total Mexico	n/a	n/a	531	215	n/a	48	2.56	25,279	550

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Restate your hypothesis… (Traditional Selection Rates)

Gross Barley Production	Percentage Malting Types	Gross Malting Production	Selection Rate	2014 Malting	Tra
MT ('000)	%	MT ('000)	%	MT ('000)	
811	91.2%	707	80%	565	North Dakota
68	94.8%	54	80%	43	Minnesota
996	66.7%	788	80%	631	Montana
148	92.7%	145	90%	130	Colorado
1,065	80.0%	927	90%	834	Idaho
137	24.0%	36	75%	27	Washington
147	70.0%	130	85%	111	Wyoming
3,372	75.6%	2,787	84%	2,342	Total US
-14%		-13%		-13%	

Gross Barley Production	Percentage Malting Types	Gross Malting Production	Selection Rate	2014 Malting	
MT ('000)	%	MT ('000)	%	MT ('000)	
411	64.7%	266	40%	106	Manitoba
2,112	84.3%	1,780	40%	712	Saskatchewan
4,180	38.1%	1,592	40%	637	Alberta
6,703	55.8%	3,639	40%	1,455	Total Canada
-31%		-33%		-47%	

Gross Barley Production	Percentage Malting Types	Gross Malting Production	Selection Rate	2014 Malting	
MT ('000)	%	MT ('000)	%	MT ('000)	
550	99.0%	545	85%	463	Total Mexico

2014 crop production	4,260
2015 annual demands	4,233
surplus/(deficit)	27

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Substitute reality… (Expected Selection Rates)

Gross Barley Production	Percentage Malting Types	Gross Malting Production	Selection Rate	2014 Malting		Delta from Traditional
MT ('000)	%	MT ('000)	%	MT ('000)		
811	91.2%	707	75%	530	North Dakota	-5%
68	94.8%	54	75%	41	Minnesota	-5%
996	66.7%	788	60%	473	Montana	-20%
148	92.7%	145	95%	138	Colorado	5%
1,065	80.0%	927	40%	371	Idaho	-50%
137	24.0%	36	85%	31	Washington	10%
147	70.0%	130	90%	117	Wyoming	5%
3,372	75.6%	2,787	61%	1,700	Total US	-22%
-14%		-13%		-37%		

Gross Barley Production	Percentage Malting Types	Gross Malting Production	Selection Rate	2014 Malting		
MT ('000)	%	MT ('000)	%	MT ('000)		
411	64.7%	266	30%	80	Manitoba	-10%
2,112	84.3%	1,780	30%	534	Saskatchewan	-10%
4,180	38.1%	1,592	30%	478	Alberta	-10%
6,703	55.8%	3,639	30%	1,092	Total Canada	-10%
-31%		-33%		-60%		

Gross Barley Production	Percentage Malting Types	Gross Malting Production	Selection Rate	2014 Malting		
MT ('000)	%	MT ('000)	%	MT ('000)		
550	99.0%	545	85%	463	Total Mexico	0%

2014 crop production	3,255
2015 annual demands	4,233
surplus/(deficit)	(978)

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…and understand the concerns

Spring Malting Barley (2014)					
Country	Area ('000 ha)	Yield (MT/ha)	Gross production (MT)	Selection rate (%)	Malting quality
USA (MN/ND/MT/WY/CO/ID/WA)	855	3.92	3,349,842	49%	1,653,793
Canada	1,982	3.38	6,709,097	16%	1,092,683
Mexico	215	2.56	550,400	84%	463,162
Total	3,052	3.48	10,609,339	30%	3,209,638

Country	Malting quality	Capacity	Carry-in	Import	Export	Carry-out	As days
USA (MN/ND/MT/WY/CO/ID/WA)	1,653,793	2,581,000	1,618,194	250,000	105,000	835,986	118
Canada	1,092,683	1,000,000	500,073	30,000	500,000	122,757	45
Mexico	463,162	652,000	303,084	100,000	-	214,246	120
Total	3,209,638	4,233,000	2,421,351	380,000	605,000	1,172,989	101

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How will the deficiency from 2014 crop be covered:

- **2013 crop**
  - In tight hands (and not immortal)
- **2015 crop**
  - Buys you a month or two of calendar 2015
- **Imports from outside North America**
  - Makes sense where can be used in the blend
- **Making the most of this year's crop**
  - Will likely come with some challenges for all

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There is always next year, so…

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Wisconsin Grown Ingredients

WI Barley: Sustainability in our backyard?

- **Objectives**
  - Create local source of barley and wheat for Malteurop plants in Milwaukee and Winona
    - Reduced transportation to malt plants
    - Geographic diversity of barley production
  - Add niche in rotation for WI growers
    - Double crop opportunity
      - Provide additional agricultural production from same land base
    - Pave way for introduction of suitable winter barley
      - Minimize soil erosion over winter (wind and water)
      - Eliminate Spring fieldwork that may disturb animals/ecology.
      - Provide grower with diversity in their fieldwork
        - Winter wheat is already in grower rotations

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WI Barley: Areas of Consideration

- **Irrigated area of 'Central Sands'**
  - 175,000 acres (70,850HA)
  - Specialty crop growers with highly diverse rotation (potatoes, peas, beans, sweet corn, cucumbers)
  - But no active small grains
- **Winter wheat area of WI**
  - 345,000 acres planted in 2011 (140,000HA)
  - Valuable in adding diversification to fieldwork

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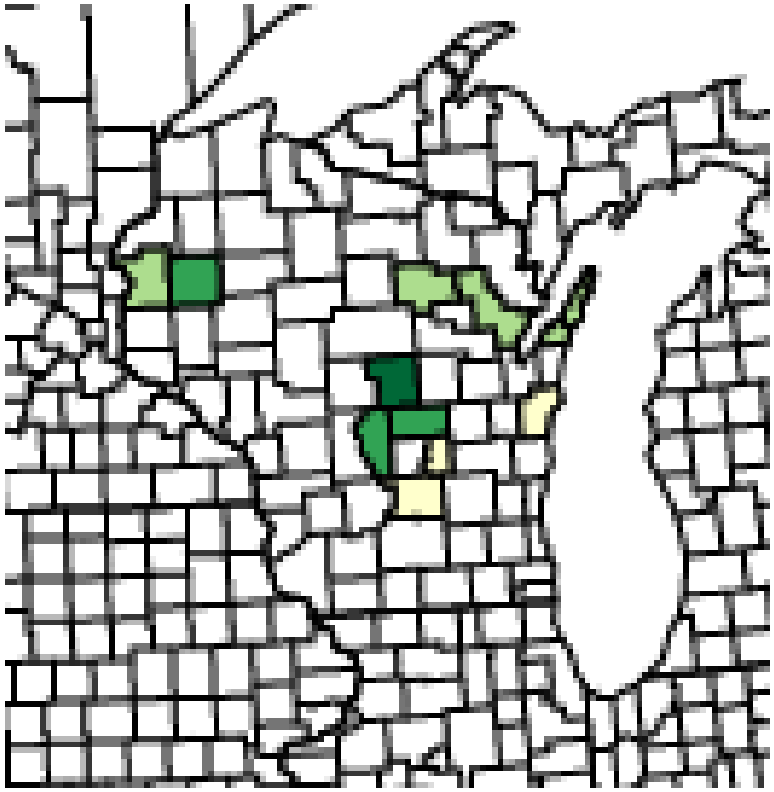
Snap Beans (2007)



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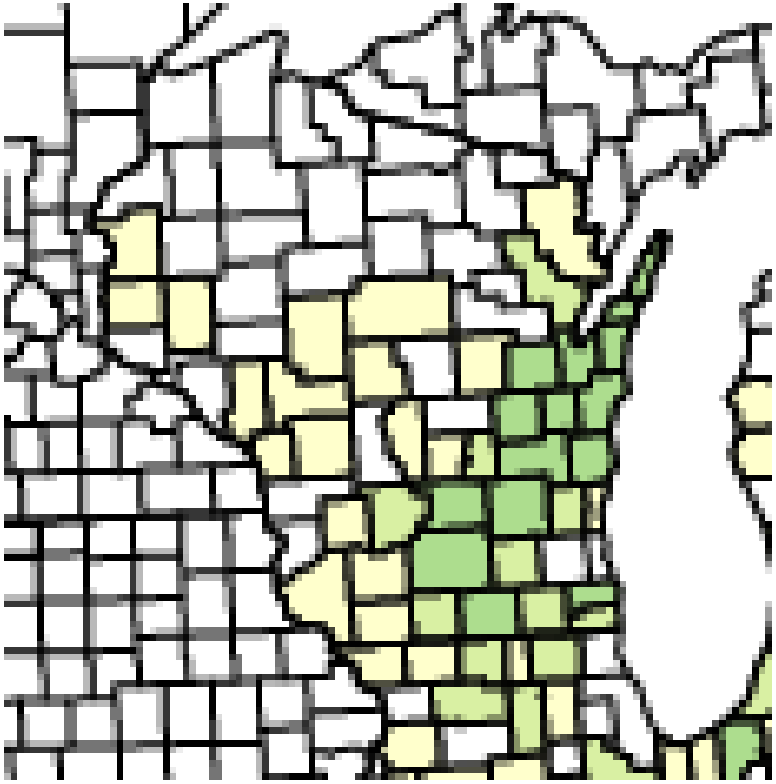
Winter Wheat (2009)



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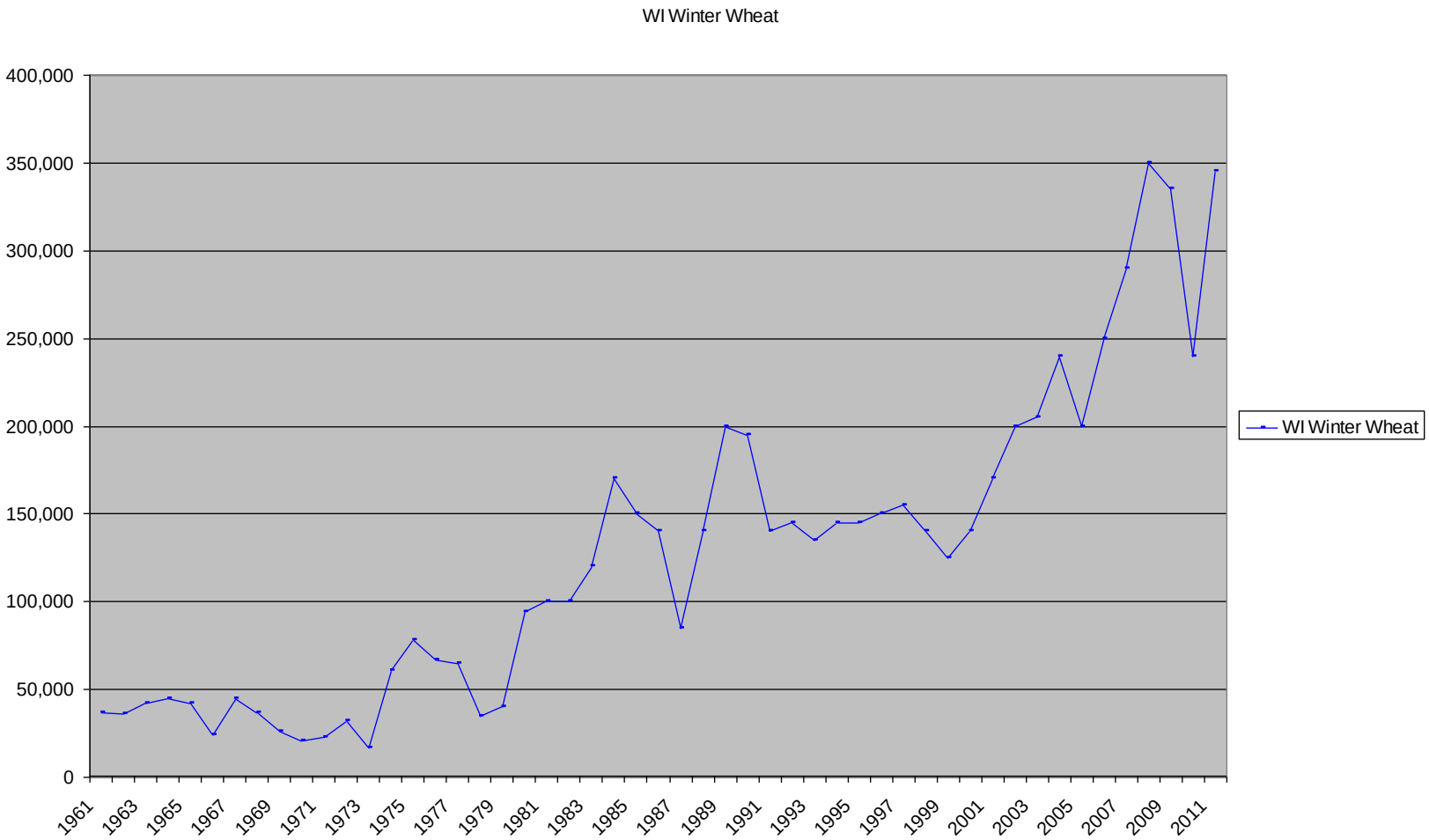
Wisconsin Winter Wheat Acreage 1961 - present



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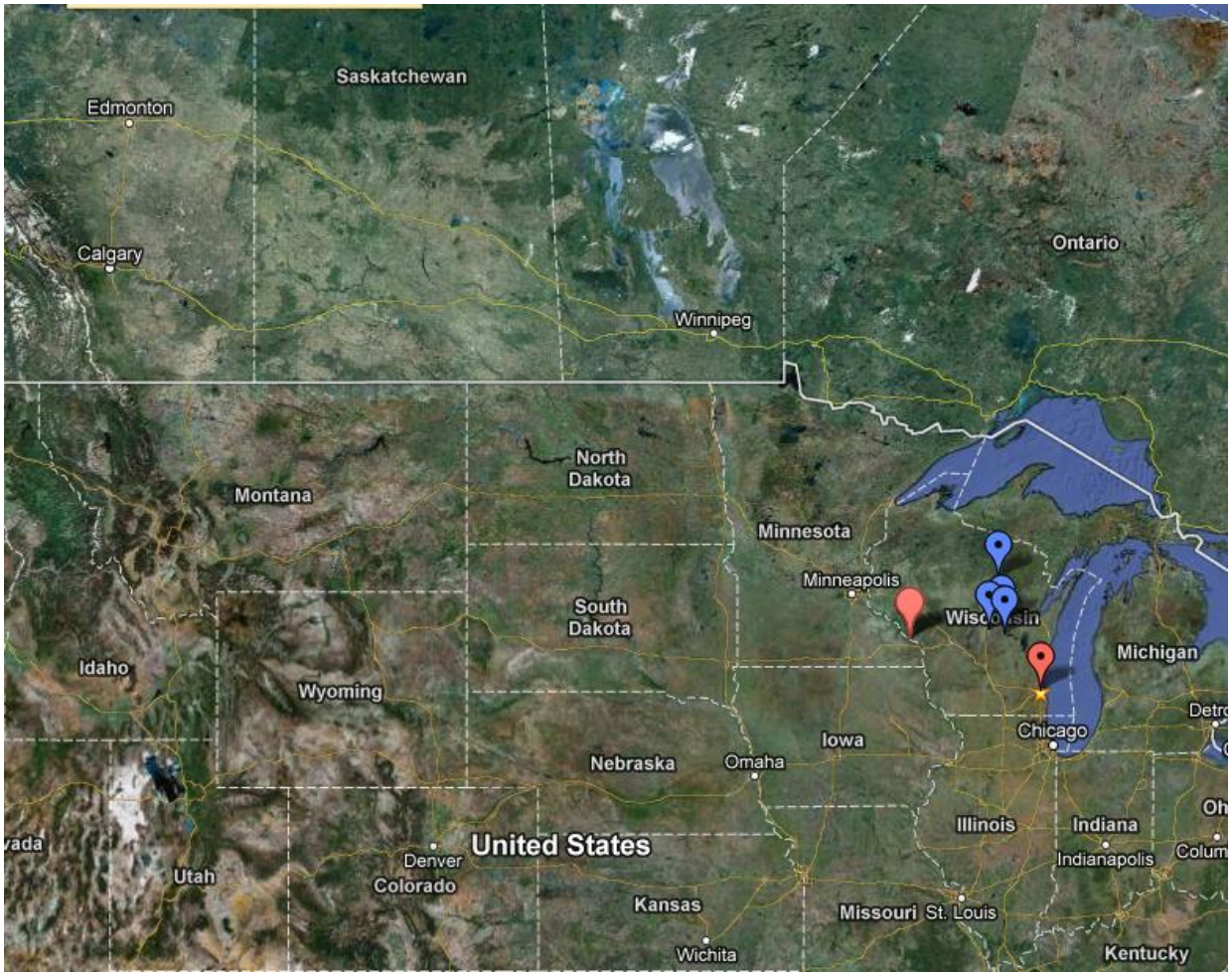
WI Barley Locations



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What we learned and what to change

- **Fungicides work**
  - Low leaf disease
  - Low DON levels
    - 2011 Avg = 0.4ppm
    - 2012 Avg = 0.2
    - 2013 Avg = 0.6
    - 2014 Avg = 0.4*****
- **Rotation is just as critical**

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What we learned and what to change

- **Find the right varieties (barley is not specifically bred for Midwest climate)**
  - NDSU program and European types look best suited on 2R front
  - Lacey strong performer for 6R
  - Test plots pay big dividends

What we learned and what to change

- **Surface staining an issue**
  - WI has higher humidity than western growing areas
  - Steps to combat
    - Early planting = Early harvest (less exposure to heat/humidity)
      - Winter Barley have less staining?
    - Harvest at higher moisture (dry down balance in bin)
- **Lodging can be a challenge**
  - Target shorter straw varieties
  - Watch fertility programs
  - Certain chemicals can mitigate

Thank you

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