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Ian L. Ward

Barley Crop Report 2017

2016 Recap

- Poor to average conditions in malting barley regions of Europe, especially France
- Good conditions and yields in USA
- Wet conditions in Canada giving an average crop with some concerns, although yields permitted some exports to made to China
- Australia bumper crop served domestic and Asian markets
- Rapid transition to better quality 2016 material
- Benign Energy Markets

2017 Highlights

- Bumper yields in Australia stabilized markets going into Northern Hemisphere growing season
- Difficult conditions in Europe
  - Dry during growing season
  - Wet at harvest
- Dry conditions in North America
  - Good soil moisture at start of season
  - Dried out throughout the season

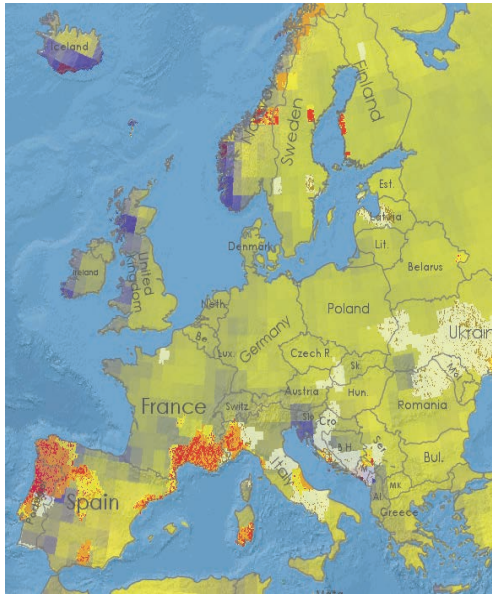
2017 Europe Barley Headlines

- Seeded area down a bit across Europe
- Good start to the growing season across Europe and the UK
- Reasonable barley stocks led to modest early season futures price declines
- Dry growing conditions in Europe
- Good harvest conditions for winter crop
- Wet harvest conditions for Spring crop in Germany UK and Denmark
- Yields better than 2016 across Western Europe, especially in France
- Careful selection required to avoid damaged material in UK & Germany

2017 European Growing Conditions

February

Rainfall

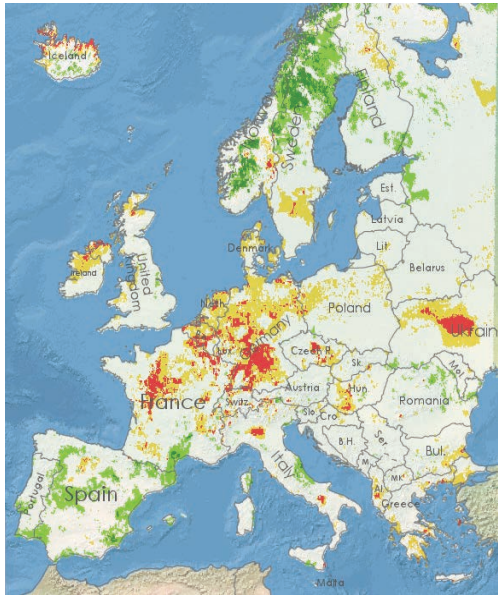


Drier — Wetter

Soil Moisture

Drier — Wetter

Soil Moisture Anomaly

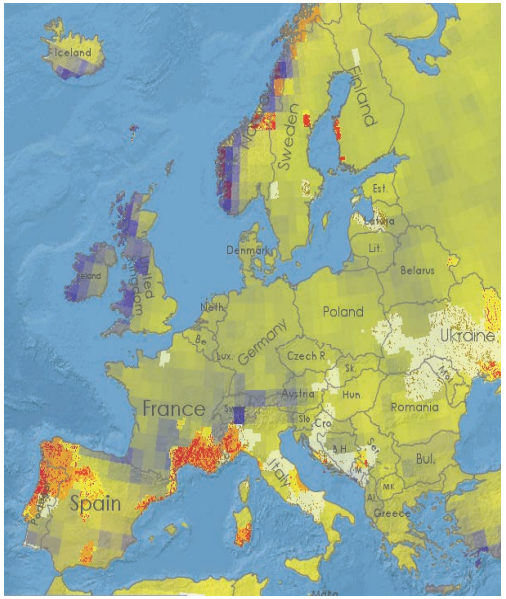


Drier — Wetter

2017 European Growing Conditions

March

Rainfall



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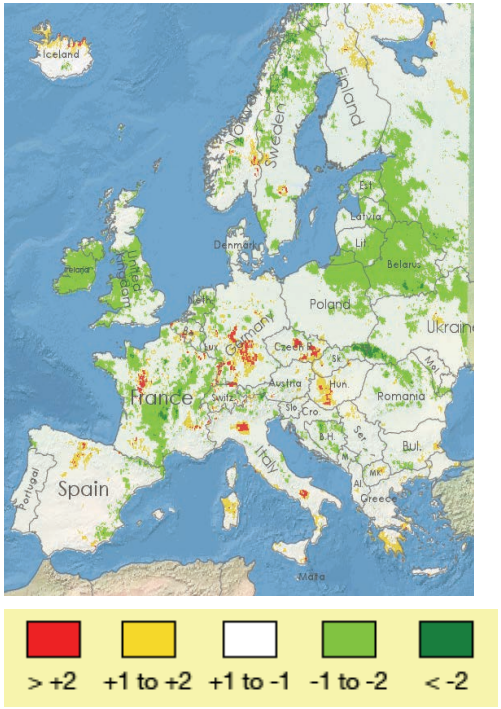
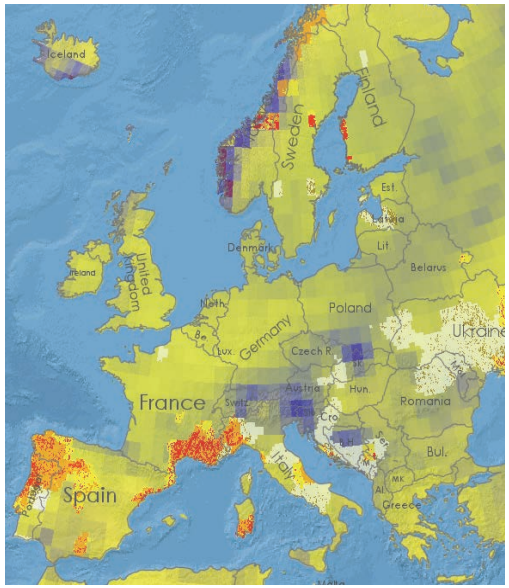


Drier — Wetter

2017 European Growing Conditions

April

Rainfall



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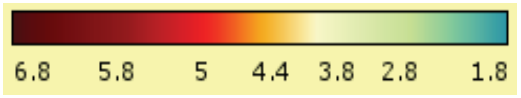

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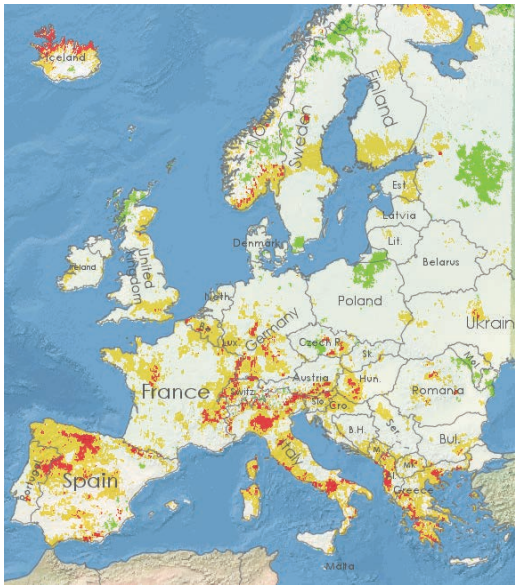

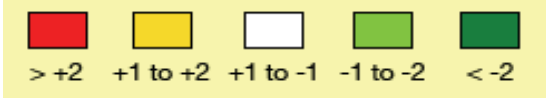

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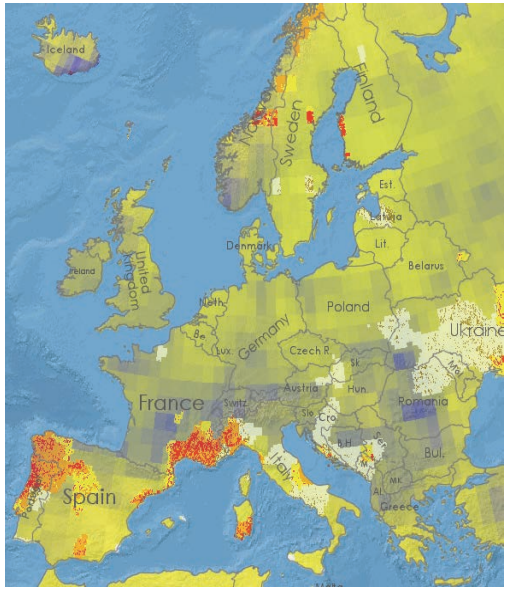
2017 European Growing Conditions

May

Rainfall



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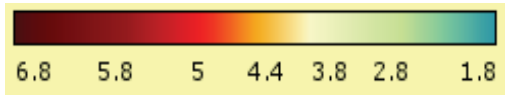

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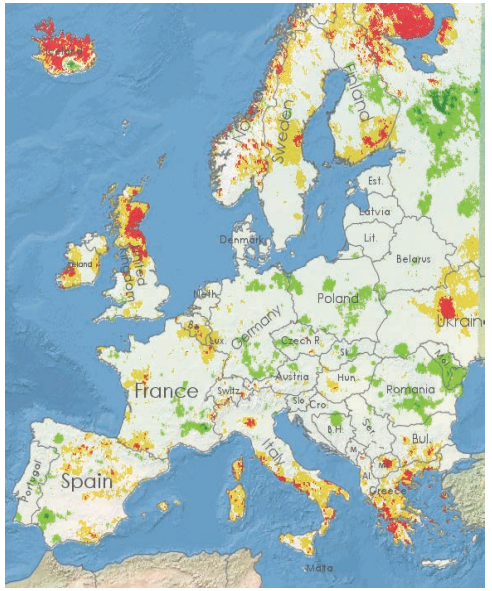

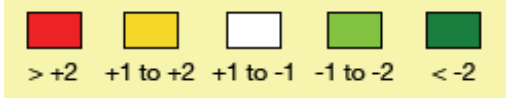

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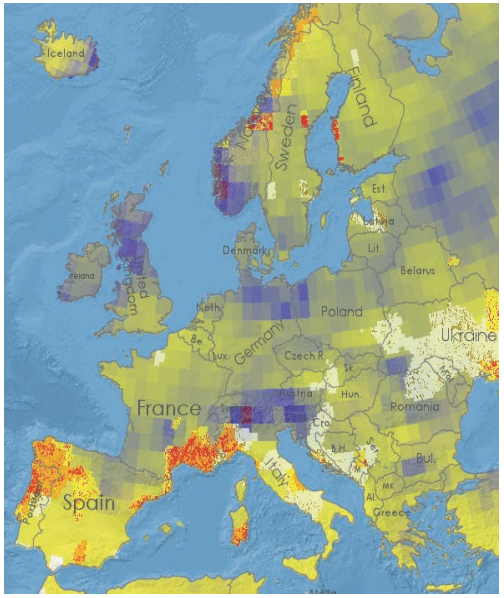
2017 European Growing Conditions

June

Rainfall



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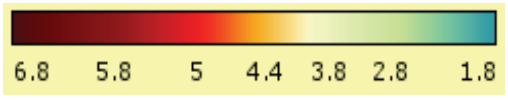

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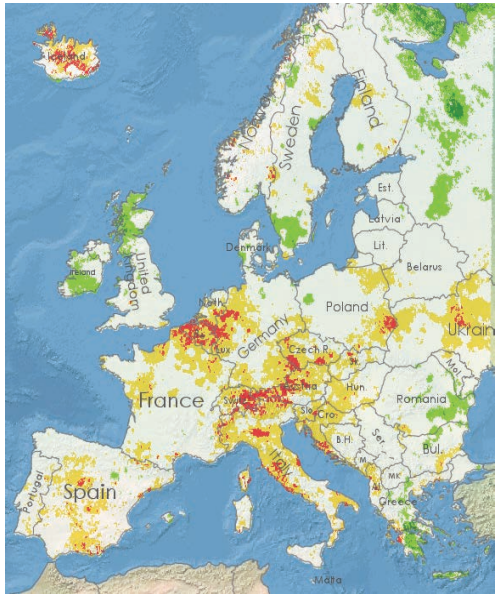

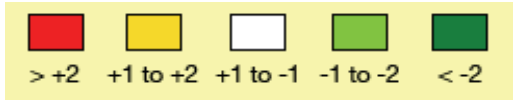

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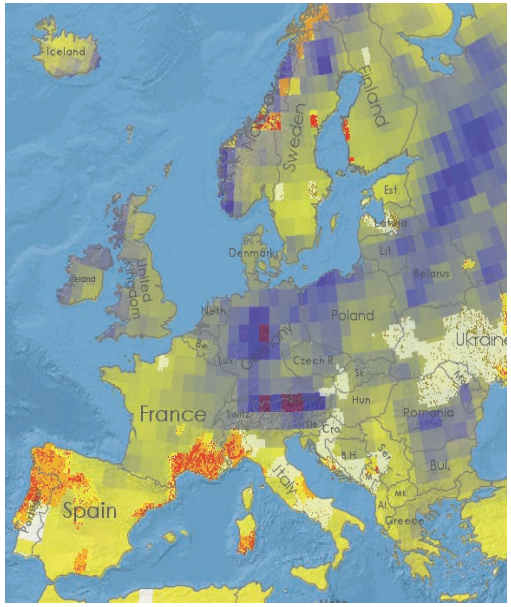
2017 European Growing Conditions

July

Rainfall



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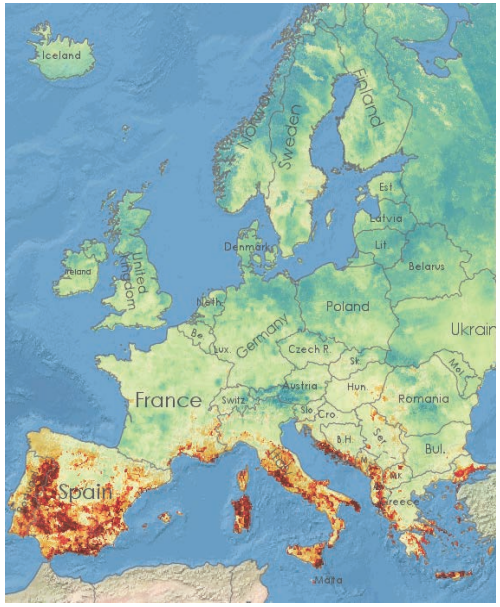

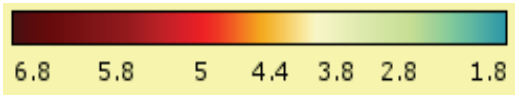

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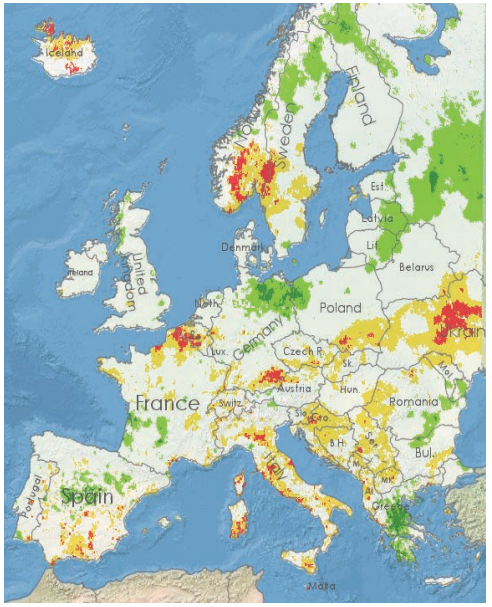
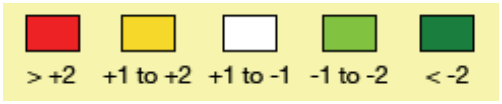


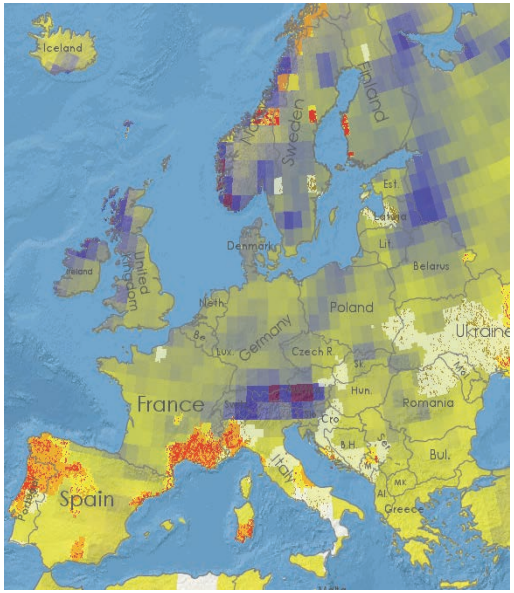


Drier — Wetter

2017 European Growing Conditions

August

Rainfall



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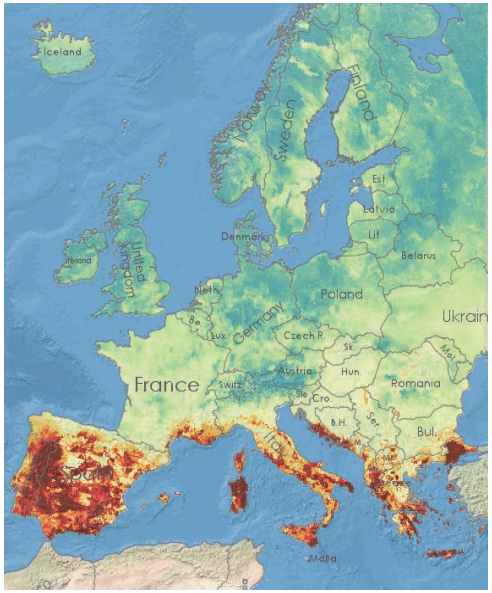

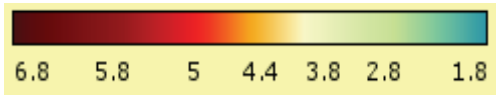

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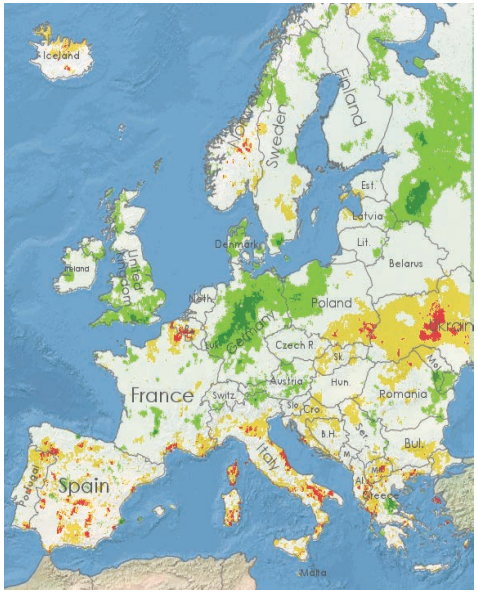

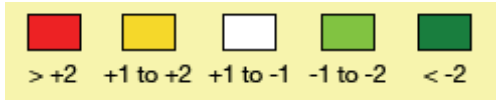

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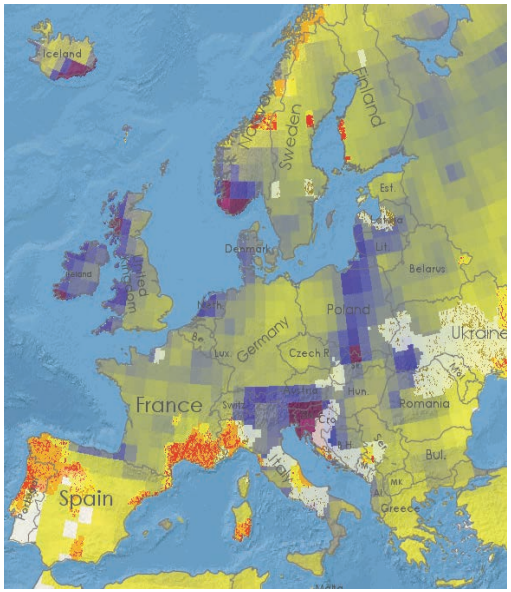
2017 European Growing Conditions

September

Rainfall



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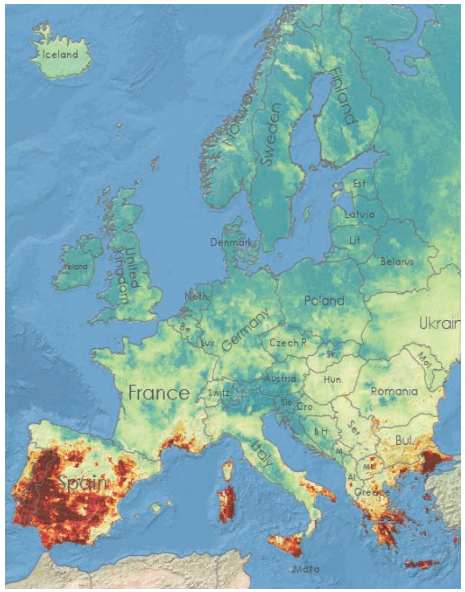

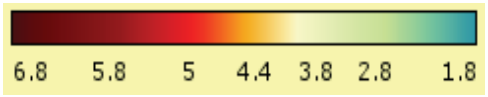

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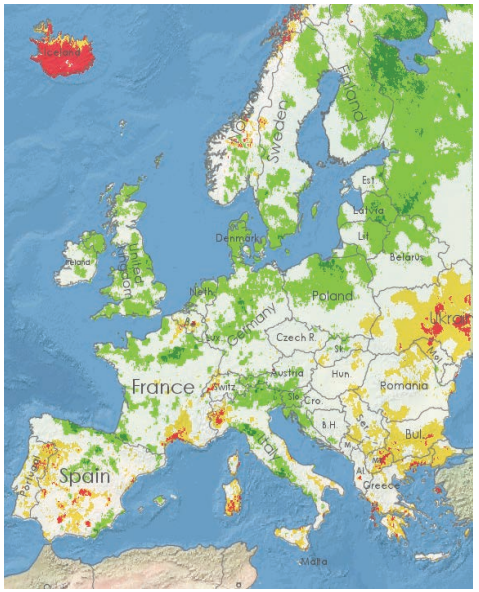
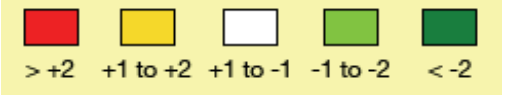




Drier Wetter

European Harvest 2017

	Winter			Spring			Total		
	Acreage	Yield	Production	Acreage	Yield	Production	Acreage	Yield	Production
France	1,476	6.49	9,573	440	6.06	2,665	1,916	6.39	12,238
Germany	1,229	7.36	9.046	340	5.41	1,840	1,569	6.94	10,886
UK	421	7.04	2,963	750	5.89	4,417	1,171	6.30	7,300
Denmark	125	6.43	804	541	5.81	3.143	666	5.93	3,947
Poland	137	4.29	892	786	3.47	2,727	994	3.64	3,619
Cz Republic	97	5.70	553	231	4.08	1,127	328	5.12	1,680
Total EU-28	5,316	5.91	31,406	6,827	3.97	27,080	12,143	4.82	58,486

Area x 1000 Ha, Production x 1000 MT Source Eurostat
Danish Spring Production and yields are Estimates
Dataset from Eurostat source and do not necessarily calculate out directly

European 3 Year Comparison

	Acreage			Yield			Production		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
France	1,829	1,918	1,916	7.09	5.44	6.39	12,393	10,435	12,238
Germany	1,621	1,605	1,569	7.17	6.69	6.94	11,701	10,730	10,886
UK	1,101	1,122	1,171	6.70	5.93	6.30	7,368	6,655	7,380
Denmark	631	707	666	6.10	5.59	5.93	3,633	3,949	3,947
Poland	839	915	994	3.53	3.76	3.64	3,285	3,442	3,619
Cz Rep.	365	326	328	5.44	5.66	5.12	1,995	1,845	1,680
EU 28	12,212	12,335	12,143	4.90	4.87	4.82	60,290	60,064	58,486

Area x 1000 Ha, Production x 1000 MT Source Eurostat
Dataset for prior years updated as of Nov 2017

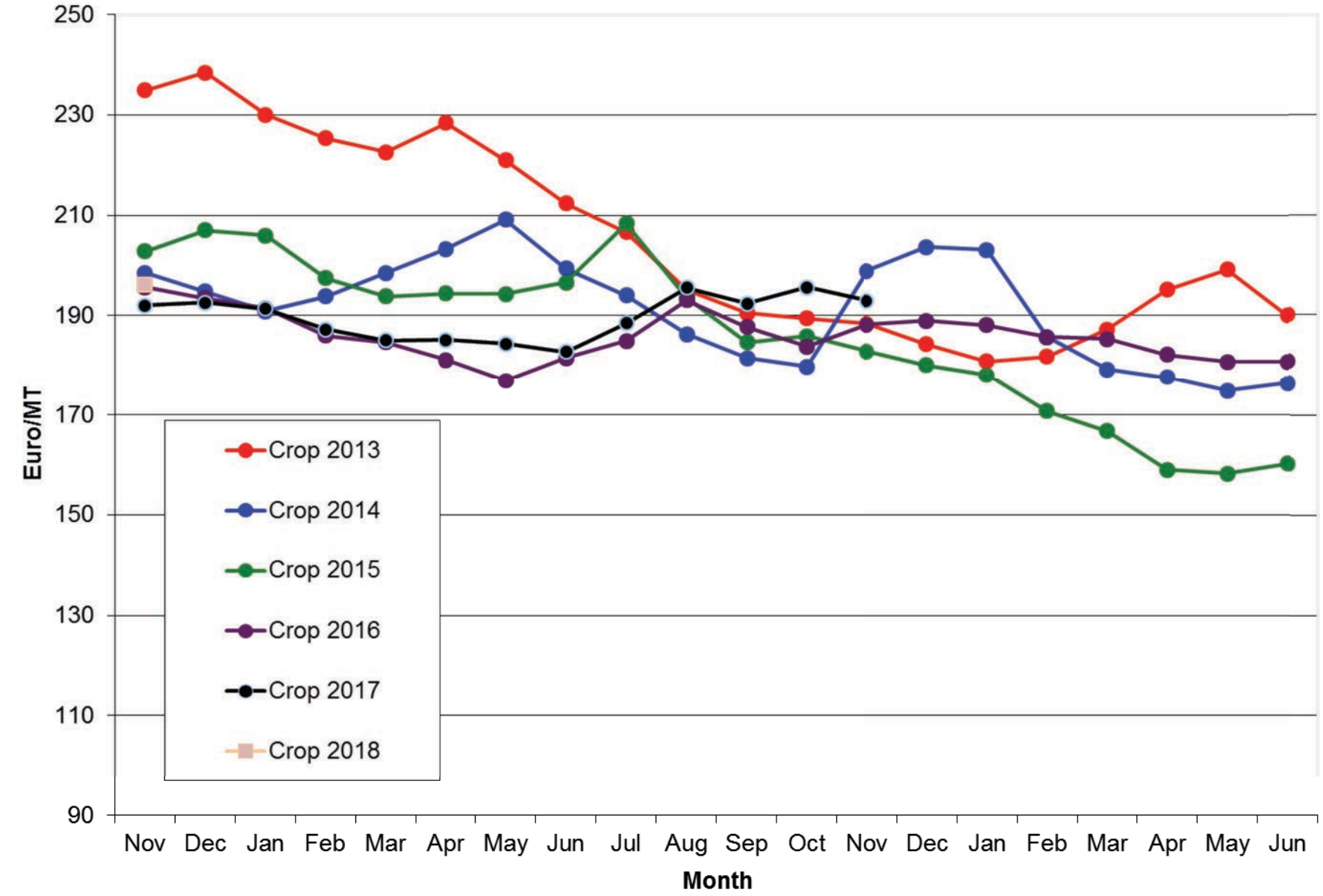
EU Malting S/D Balance

		Demand	Supply	Balance 2017	Balance 2016	Balance 2015
Benelux	Winter	450	0	-400	-472	-619
	Spring	900	100	-800	-583	-648
France	Winter	850	2,600	+1,750	+838	+1,003
	Spring	900	1,600	+700	+492	+780
Germany	Winter	250	75	-150	-162	-280
	Spring	1,950	1,100	-850	-523	-522
UK	Winter	300	300	-	-94	+138
	Spring	1,650	1,950	+300	+842	+183
Denmark	Winter	-	-			
	Spring	350	1,300	+950	+1,786	+863
Total EU	Winter	2,380	3,355	+975	+136	+250
	Spring	8,740	8,560	-180	2,502	+817

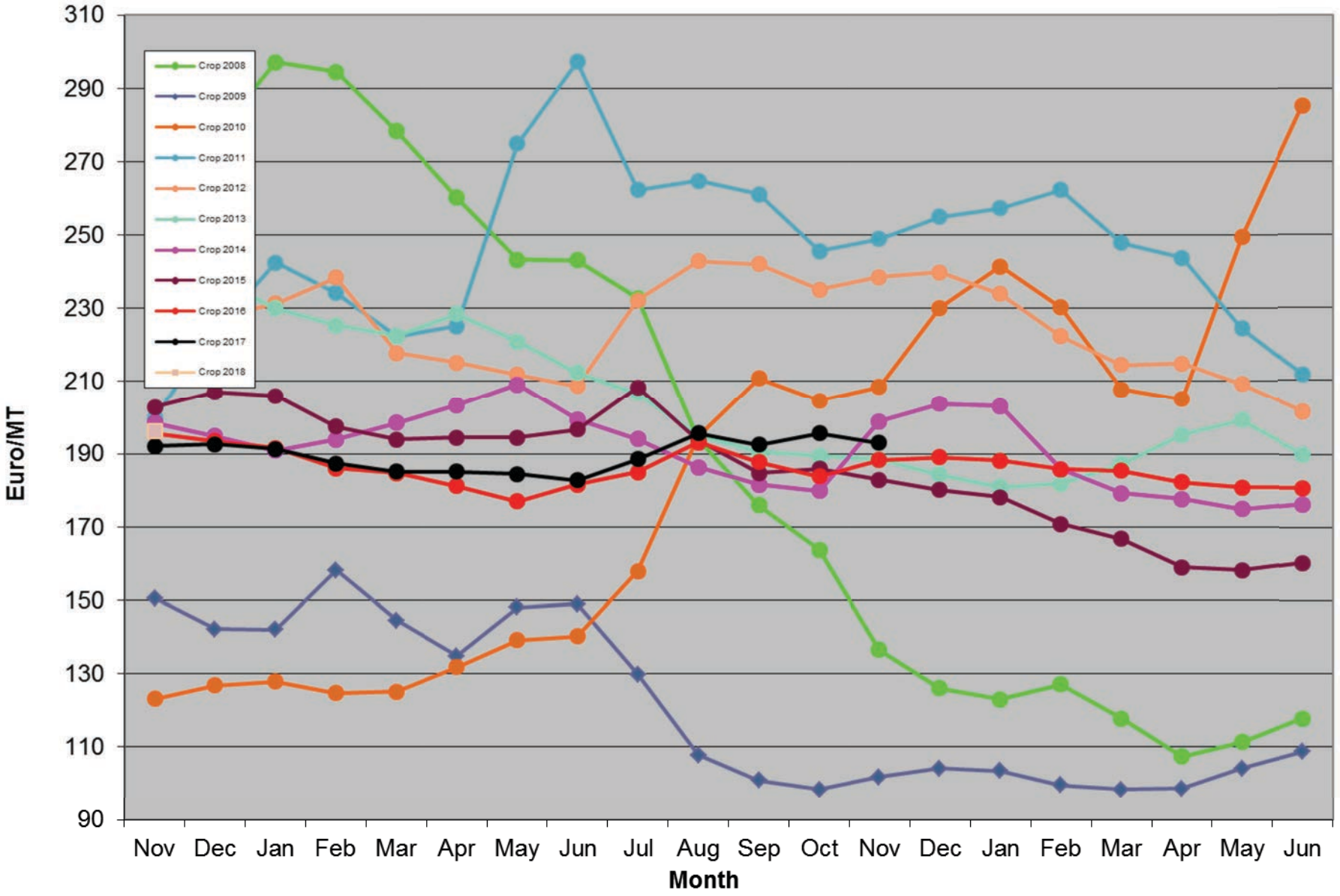
Volume x 1000 MT Source: Gauger

Note Table simplified for clarity removing Carry in and Carry out stocks which affect Supply balance therefore columns do not exactly compute.

Evolution of Barley Pricing 2013-17



Broader context of barley prices



Malt premium spread widening

2017 European Quality

- France produced a better crop than 2016
  - protein in many areas >11.5%, sizing 90%+
- Germany some pre-sprout damage and will have to be selected carefully, concerns about germination in some regions
  - protein 10.3%, sizing 93%
- English spring crop is variable good sizing but higher protein
  - proteins 10.3% (9.3% in 2016) sizing 92%
- Maris Otter has produced a high quality plentiful crop
  - 9.2% protein, sizing 87% (bolder corn than 2016)
- Denmark average crop volume of good quality
  - protein 11% , sizing > 93%
- Scotland typically challenged by the weather produced good crop with good characteristics for distillers
  - protein 9.25%, sizing 96%

US Barley Headlines

- Carry in stocks remain sufficient due to 2015 and 2016 harvests
- Planting down 19% over 2016
- Harvested acreage down 24% Production down 29%
- Seeding conditions – behind average
- Dry growing season affecting crops in ND and MT
- Yields lower than 2016 but better than 2015 72.6 Bushels per acre

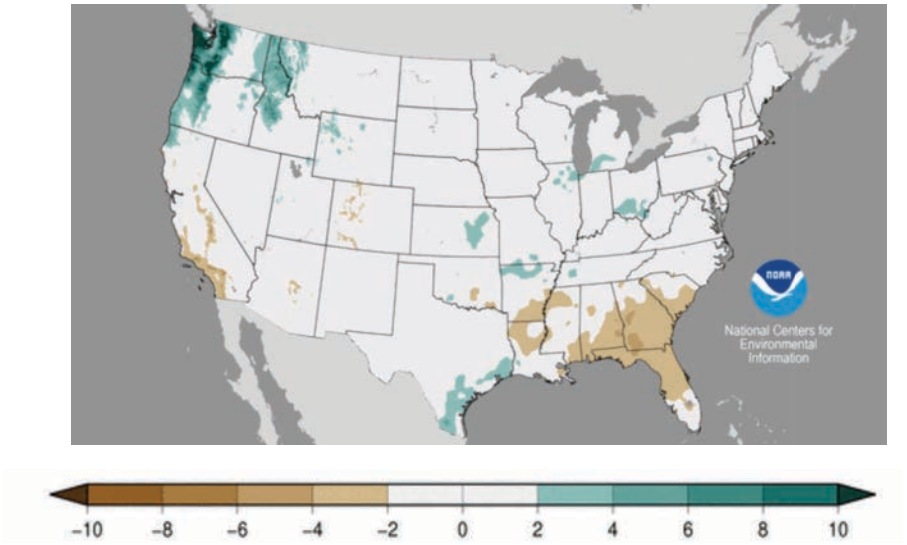
2017 US Growing Conditions

March

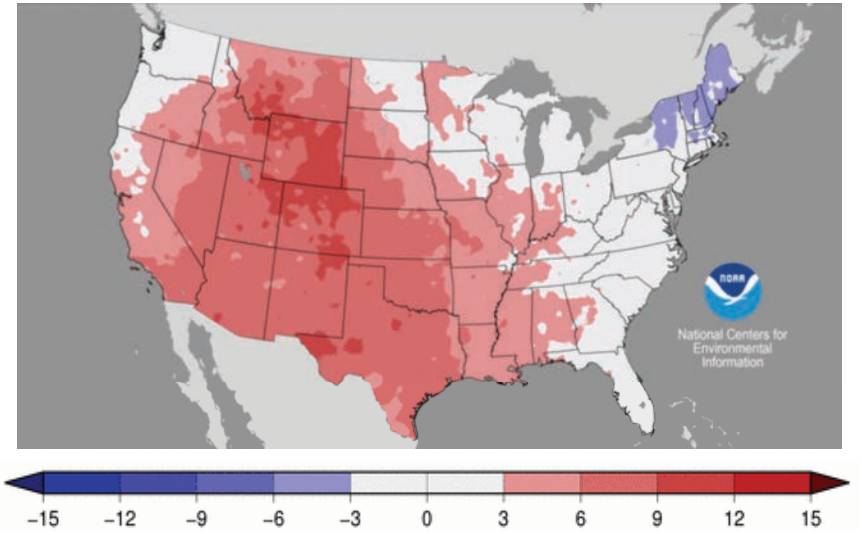
Excessive moisture in Idaho and Washington delayed planting

Montana somewhat less affected

Precipitation Anomaly

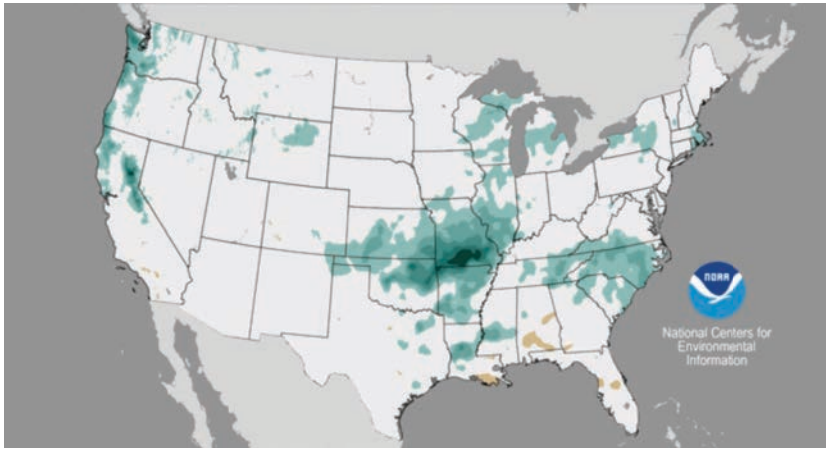


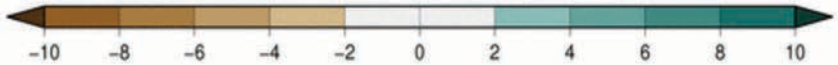
Temperature Anomaly



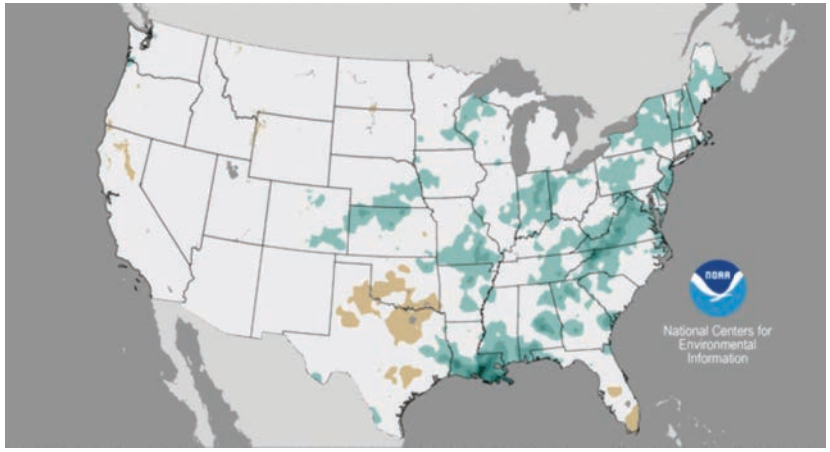
2017 US Growing Conditions

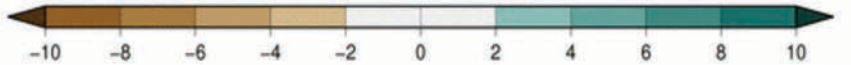
April Precipitation Anomaly





May Precipitation Anomaly





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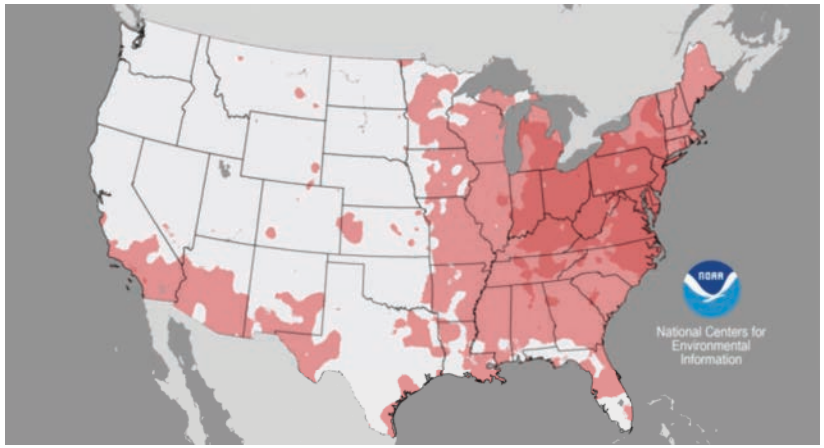

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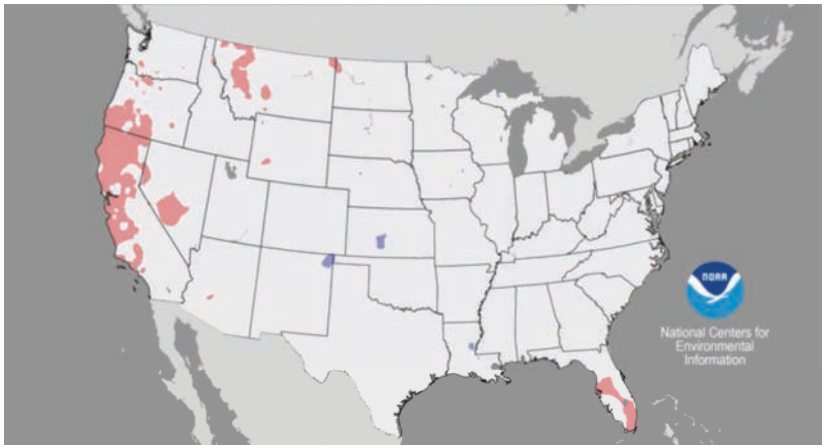
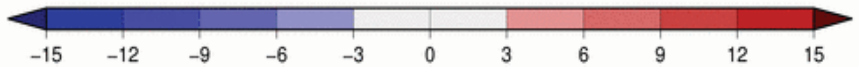
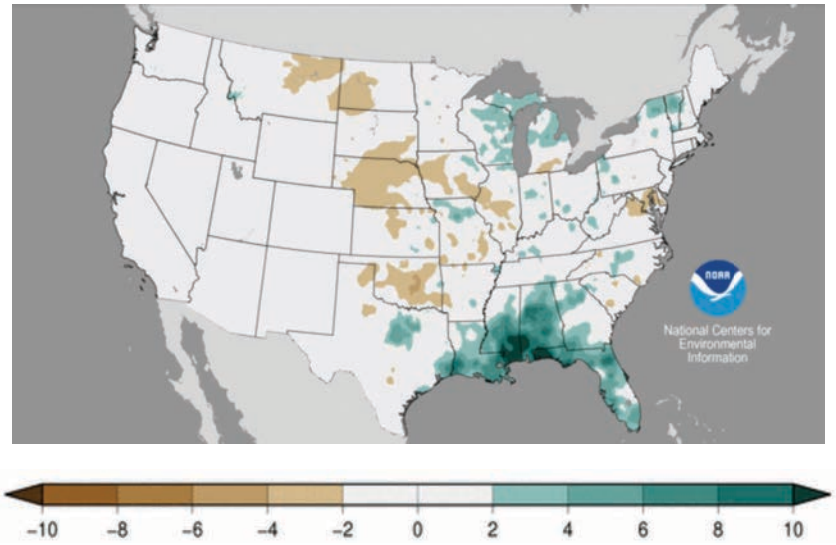


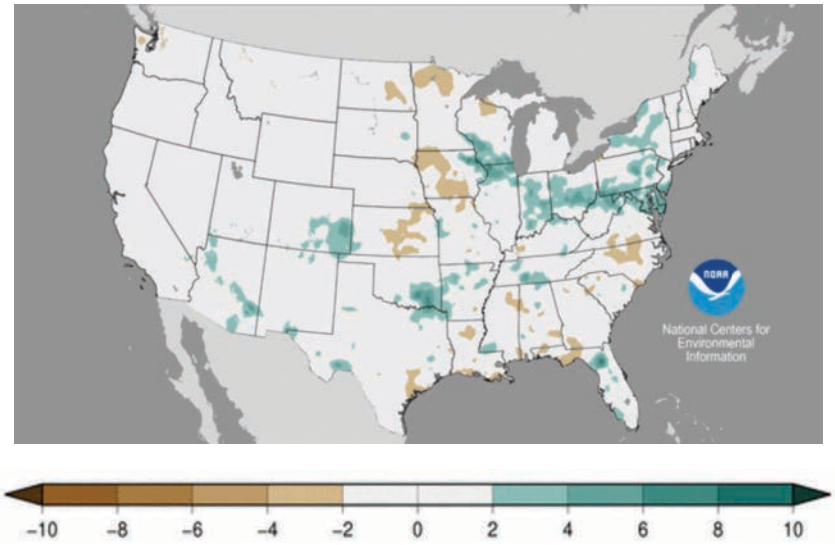


2017 US Growing Conditions

June Precipitation Anomaly



July Precipitation Anomaly



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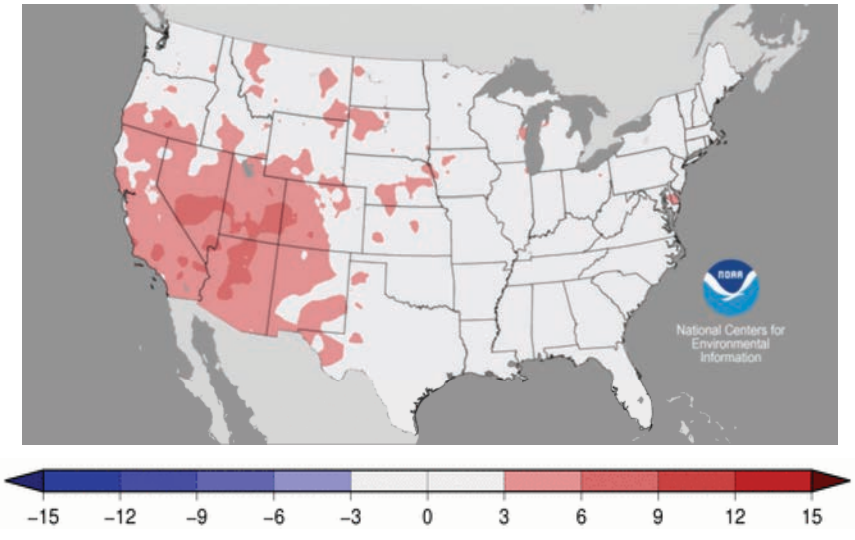

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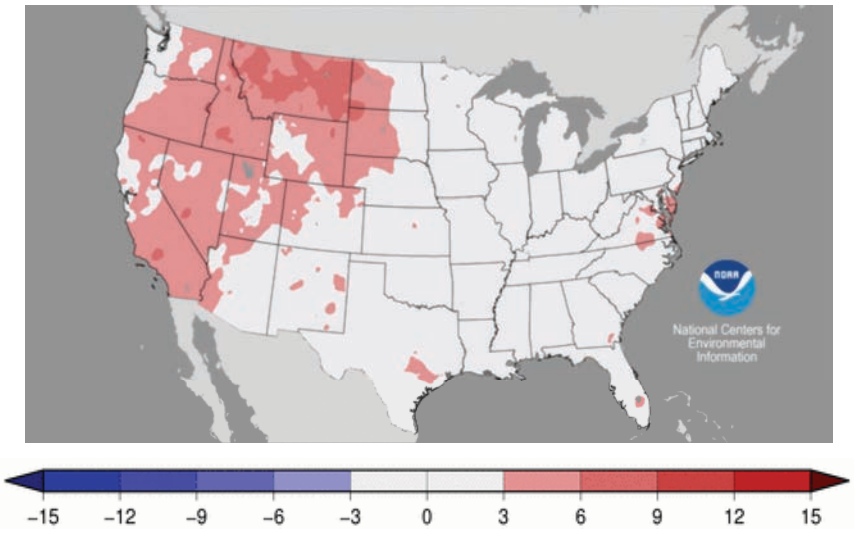


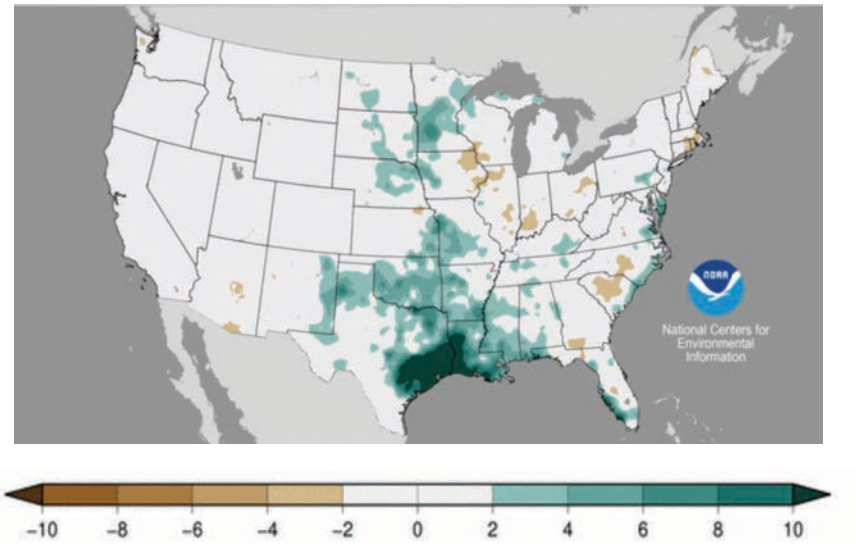
2017 US Growing Conditions

August

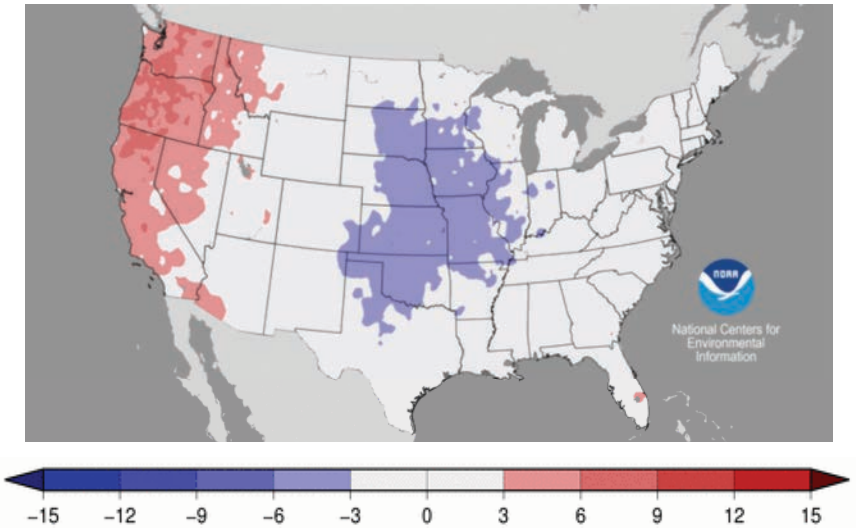
- Barley harvest progressed rapidly due to the dry conditions
- Poor crop volumes across the U.S.
- North Dakota and Montana particularly hit by dryness
- Minnesota has the best Midwest crop.
- Good quality crop in Idaho and Washington on irrigated acreage.

- Rain and snow during Autumn restoring soil moistures for the 2018 crop

Precipitation Anomaly



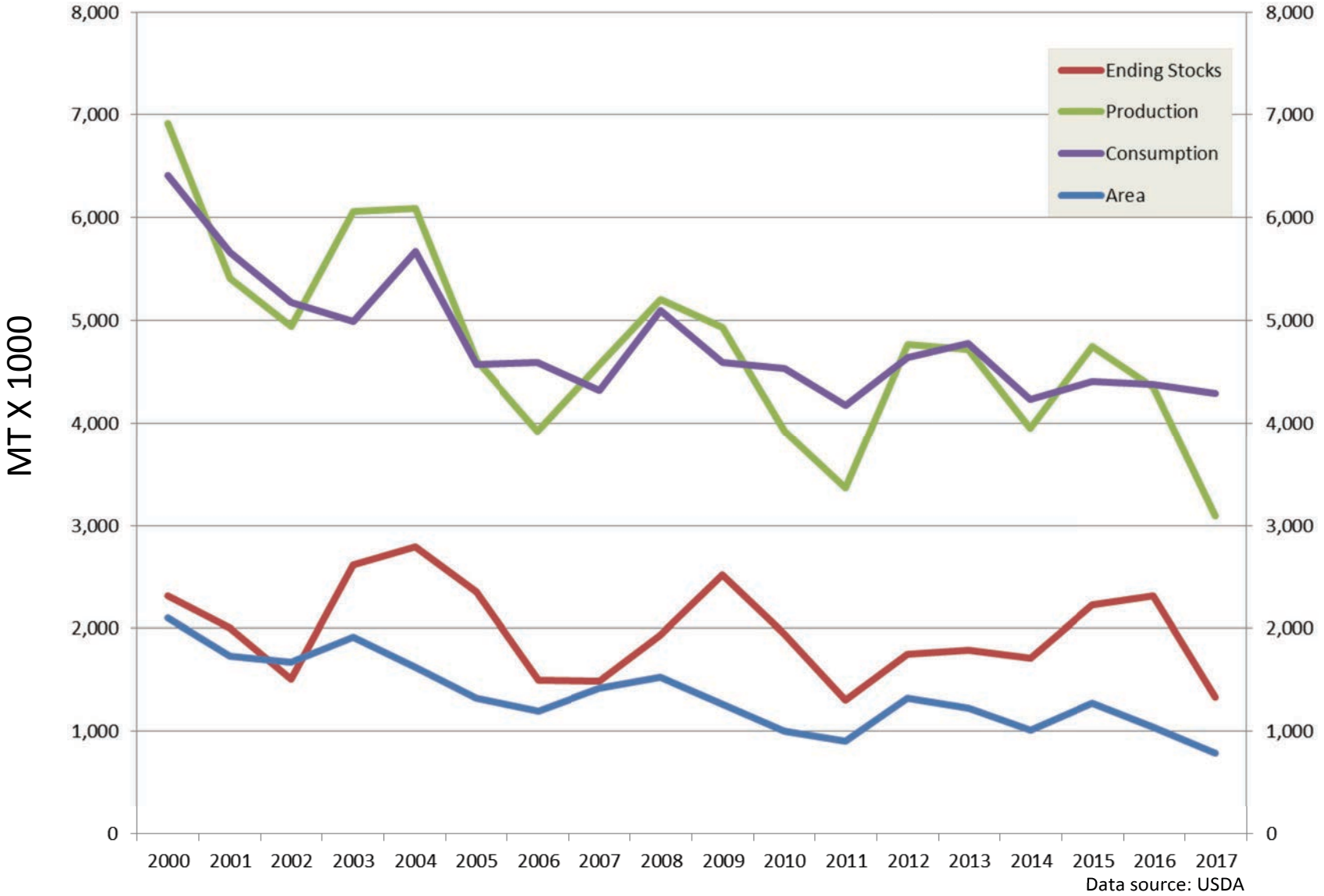
Temperature Anomaly



US Barley Production

	Seeded			Harvested			Production			
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2017
Minnesota	135	95	80	120	66	76	9,240	5,214	5,168	113
N Dakota	1,120	740	520	1,050	640	395	67,200	42,880	24,885	542
Montana	990	990	770	860	780	565	44,720	46,800	28,815	627
Idaho	610	600	530	580	580	510	56,260	62,060	48,450	1,055
Colorado	65	80	70	63	75	68	8,190	9,675	8,976	195
Wyoming	100	95	82	86	82	63	8,170	7,161	4,505	140
Washington	115	110	95	105	93	85	5,040	7,161	4,505	98
California	80	85	70	29	60	28	1,595	4,125	1,400	30
Oregon	49	45	47	37	32	38	1,924	2,144	2,356	51
Other	359	219	217	210	144	134	15,848	11,608	10,942	238
Total	3,623	3,059	2,481	3,158	2,565	1,954	218,187	199,914	141,923	3,090
									Area x 1000 acres Production x 1000 Bushels Source USDA As of Sept 29th 2017	MT x 1000

US Barley Crop Disposition



Data source: USDA

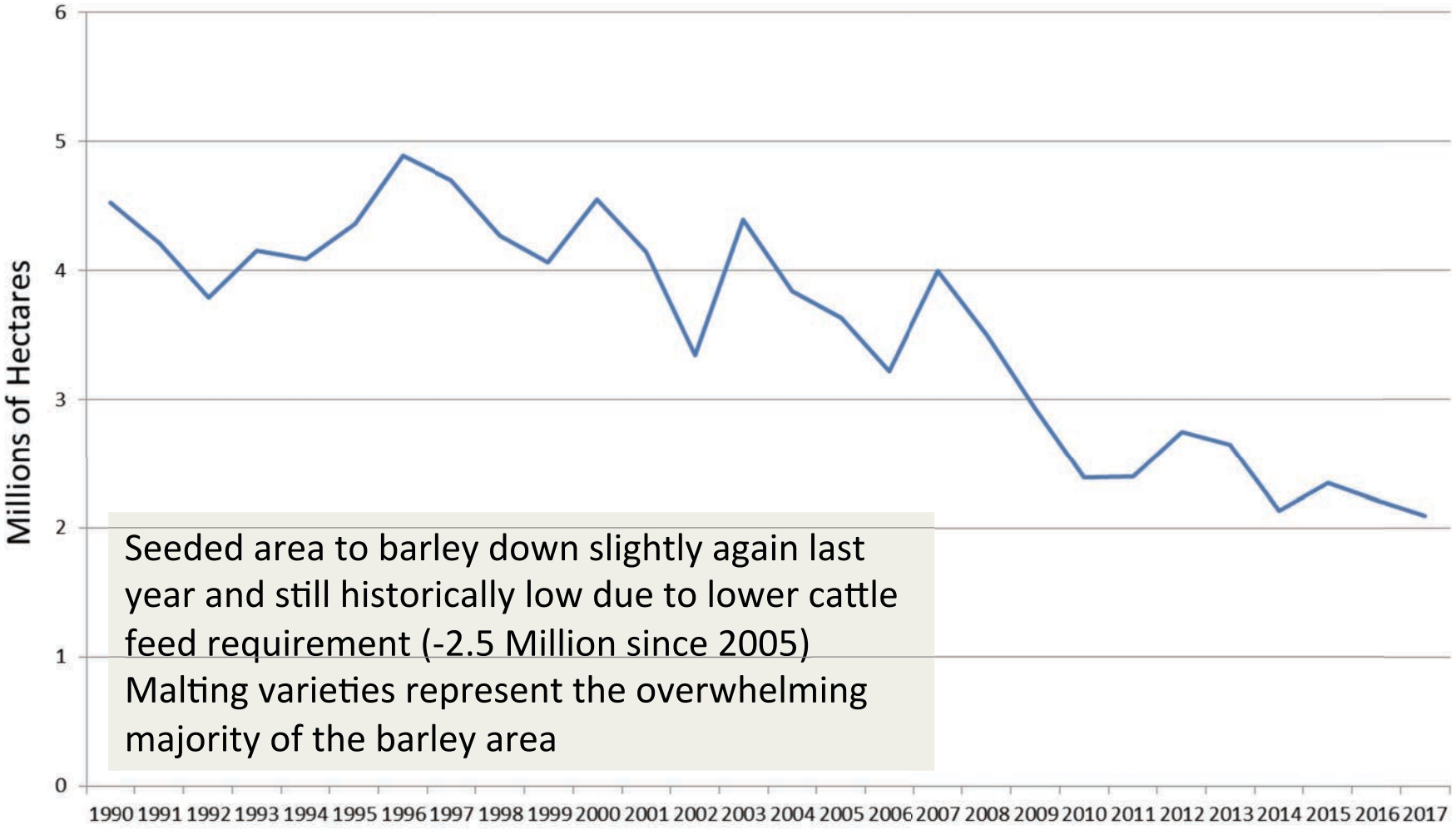
2017 US Crop Assessment

- Smallest barley crop in the U.S. recorded on USDA searchable database
- What was harvested in generally very good for malting
- Sizing slightly lower than 2016 in some samples
- Western 2 row proteins trending lower than 2016
- Similar Total Protein in Midwest 2 row and 6 row than old crop
- Very low evidence of DON
- Barley bright with no staining

2017 Canadian Barley Headlines

- Seeded Acreage down again in 2017
- Good seeding conditions– Seeding completed early
- Drying conditions throughout the growing season in the Southern Prairies
- Good harvest conditions
- Barley is generally of excellent quality

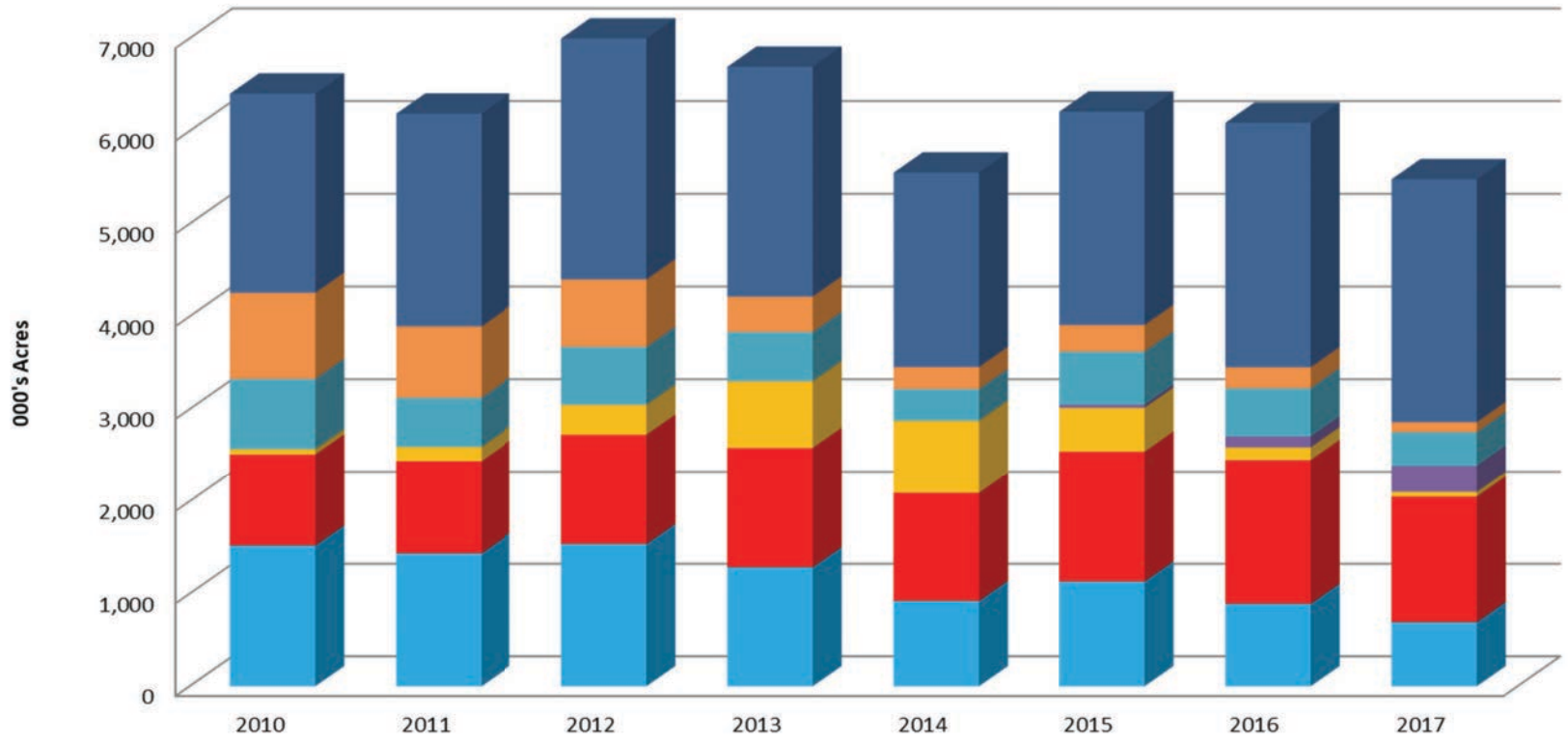
Canada Seeded Acreage



Seeded area to barley down slightly again last year and still historically low due to lower cattle feed requirement (-2.5 Million since 2005)

Malting varieties represent the overwhelming majority of the barley area

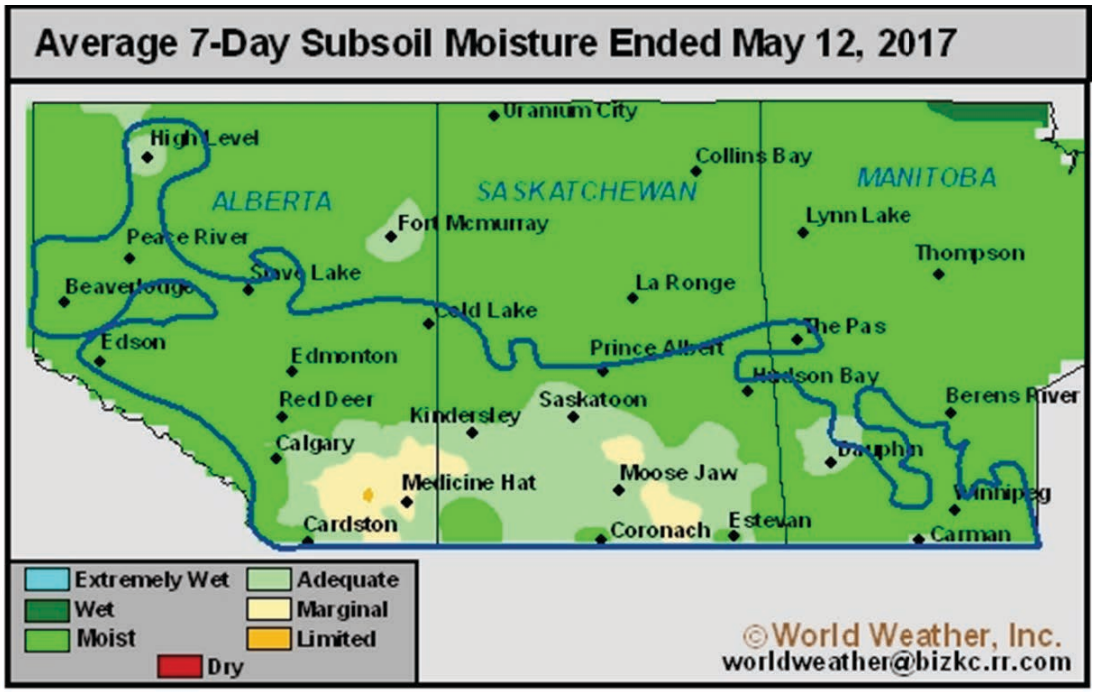
Western Canada Varieties Seeded



	2010	2011	2012	2013	2014	2015	2016	2017
Feed	2,148	2,296	2,604	2,480	2,098	2,301	2,639	2,621
Other 6 Row	928	769	727	381	238	286	224	107
Other 2 Row	760	533	626	532	343	573	522	365
Synergy	0	0	0	0	0	34	118	285
Meredith	59	154	323	721	783	475	139	52
CDC Copeland	987	1,000	1,185	1,293	1,168	1,406	1,557	1,357
AC Metcalfe	1,523	1,439	1,539	1,288	924	1,134	893	695
Harrington	0	0	0	0	0	0	0	0

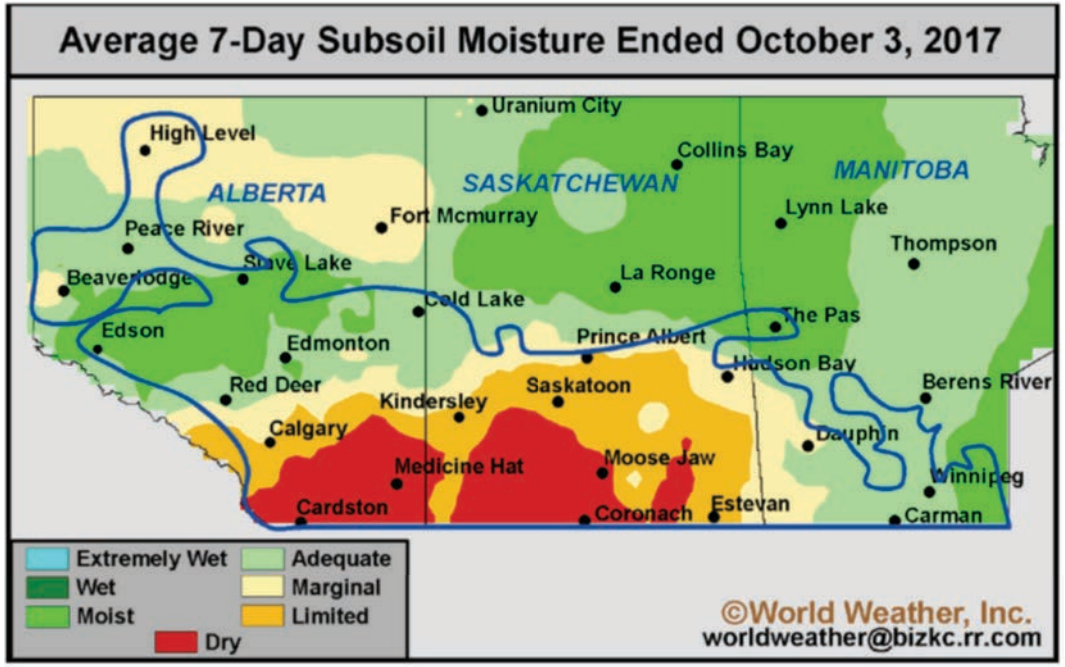
Canadian Prairie Sowing Conditions

Good seeding conditions
Excessive field moisture in some areas cause delays
Overall completed ahead of Average
Moisture conditions ideal for even germination



Canadian Crop Development

- Dry growing conditions in the south of Alberta and Saskatchewan affected yields and to a lesser extent quality
- Perfect harvest conditions
  - Lower moisture
  - No pre-sprout damage



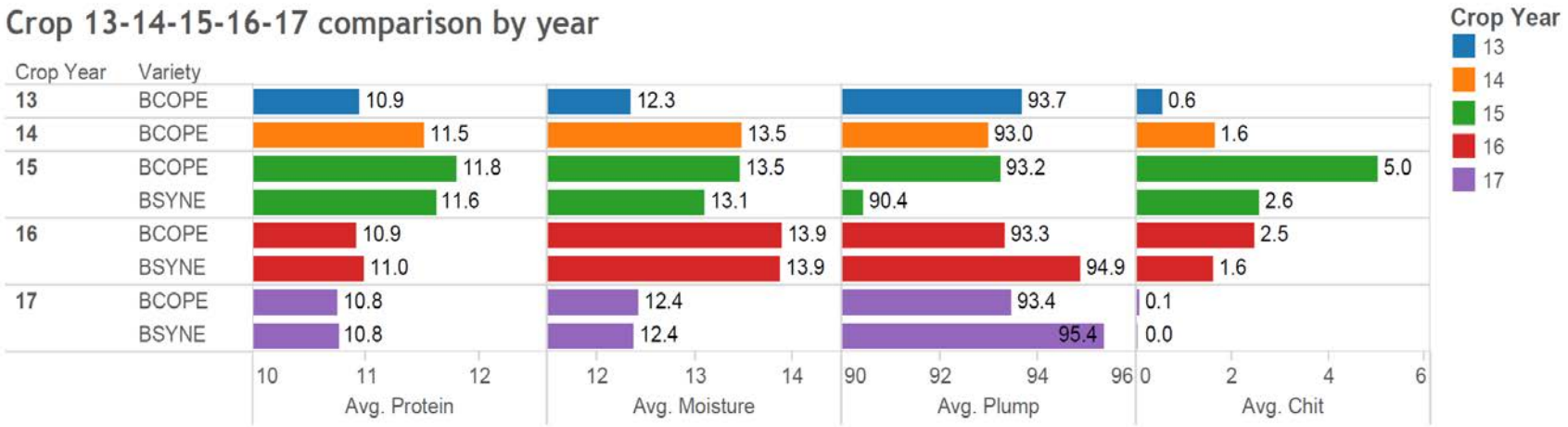
Canadian Barley Production

Canadian barley areas and production 2015,2016 and 2017									
	Seeded			Harvested			Production		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
Alberta	1,356	1,295	1,153	1,161	1,052	1,017	4,289	4,398	3,794
Manitoba	162	146	107	148	138	105	566	540	407
Saskatchewan	971	1,001	941	898	898	870	2,863	3,374	2,673
Total Canada	2,641	2,586	2,335	2,354	2,223	2,120	8,226	8,784	7,305
Area x 1000 Ha Production x 1000MT Source Statcan									

Yields down across the prairies, in Manitoba similar to 2016
Total harvest expectation down to 7.3 Million MT

2017 Canadian Crop Assessment

- No pre-sprout damage!
- Protein down a touch from 2016 crop. Ave <11%
- Surprisingly, plump levels similar to 2016
- Lower FAN and Soluble Protein
- Lower Wort Color due to lower TP & FAN
- Excellent modification
- Lower enzymatic activity
- Higher Extract

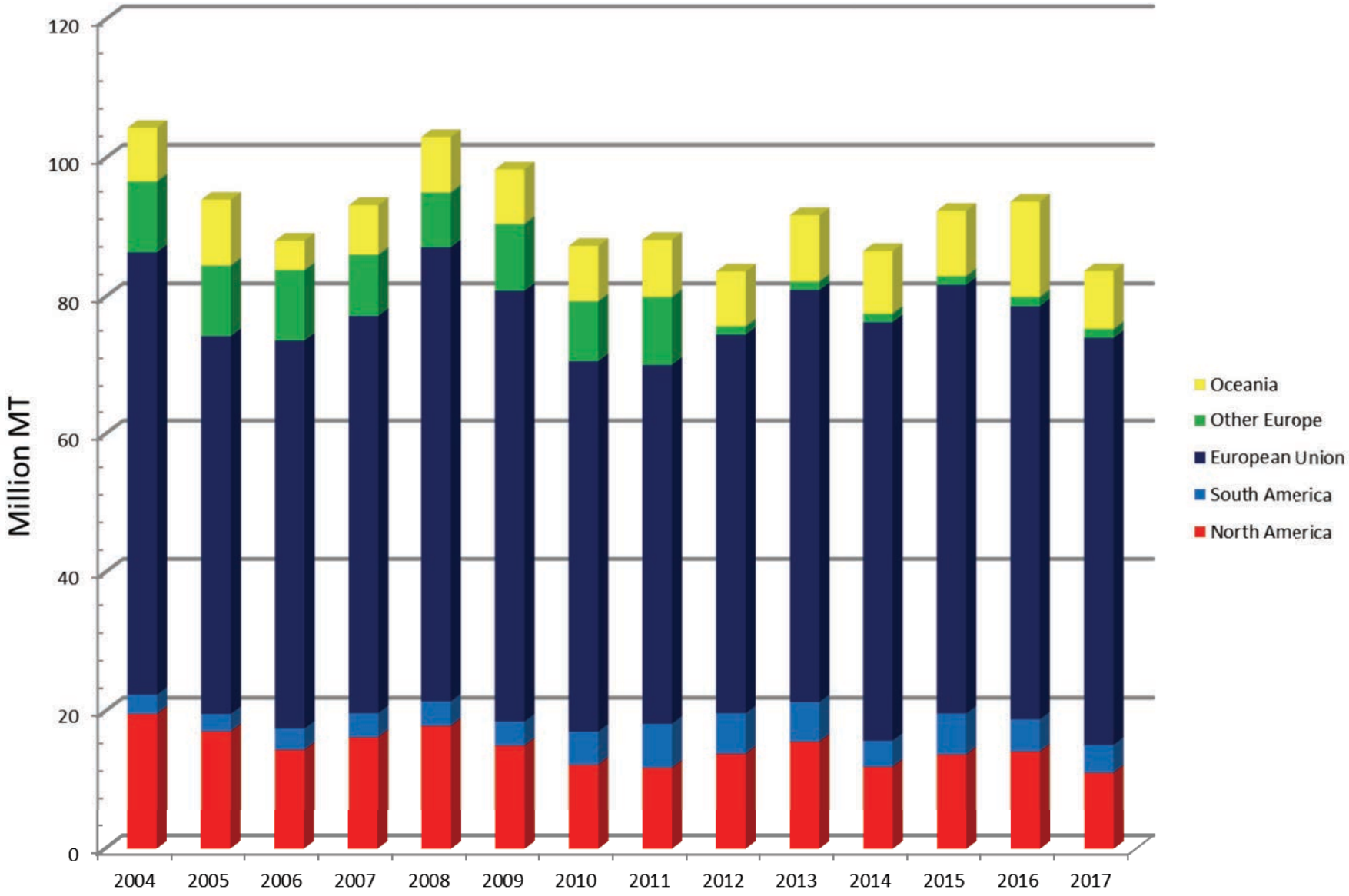


Global Barley Production 2017

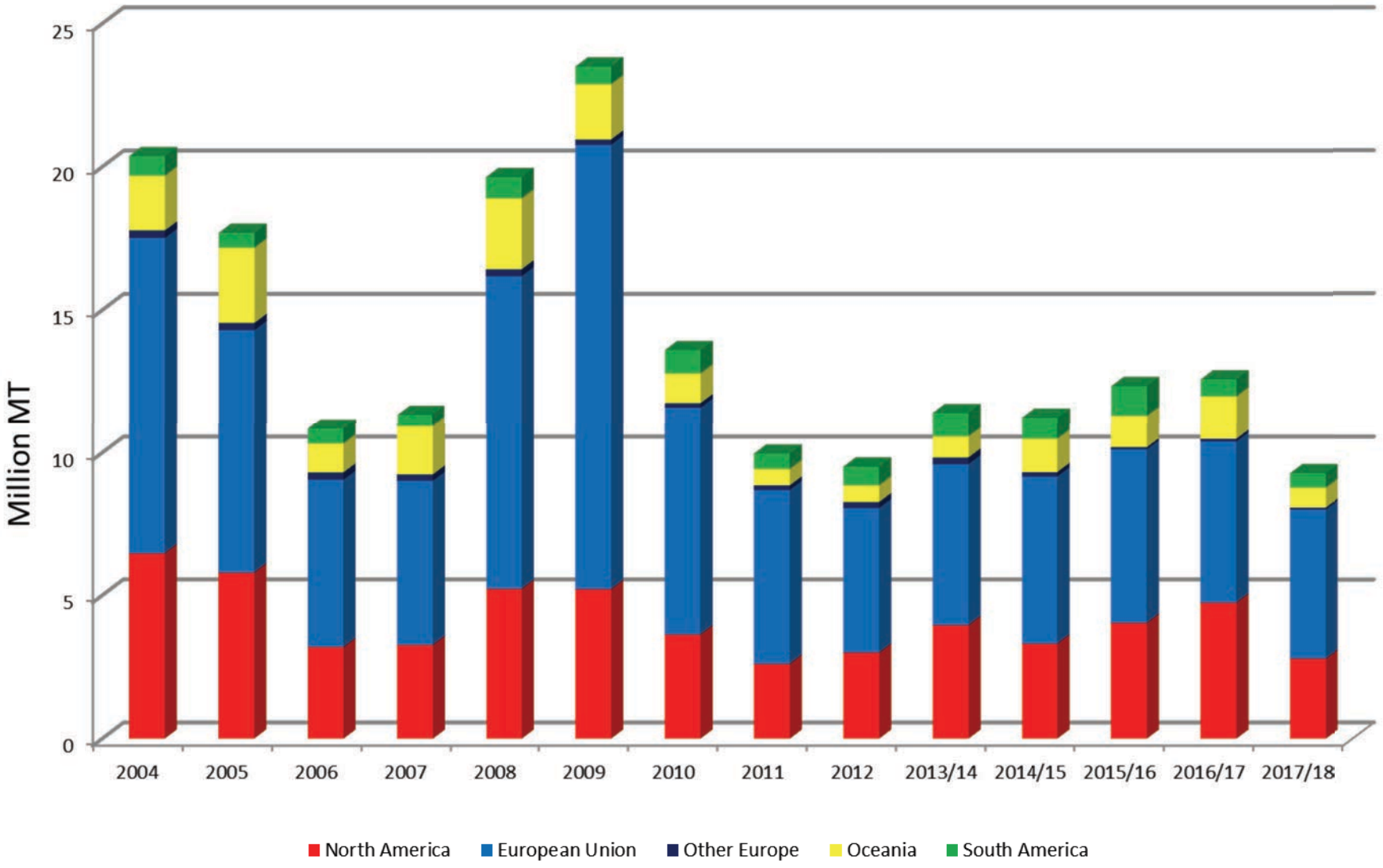
World Barley Production X 1000 MT	2015/2016	2016/2017	2017/2018 Prj. Nov
USA	4,750	4,353	3,090
Australia	8,993	13,414	8,000
Canada	8,226	8,800	7,250
EU	62,095	59,855	58,963
Russia	17,083	17,547	20,500
Ukraine	8,751	9,900	8,700
WORLD TOTAL	149,640	147,151	141,660

Source USDA FAS

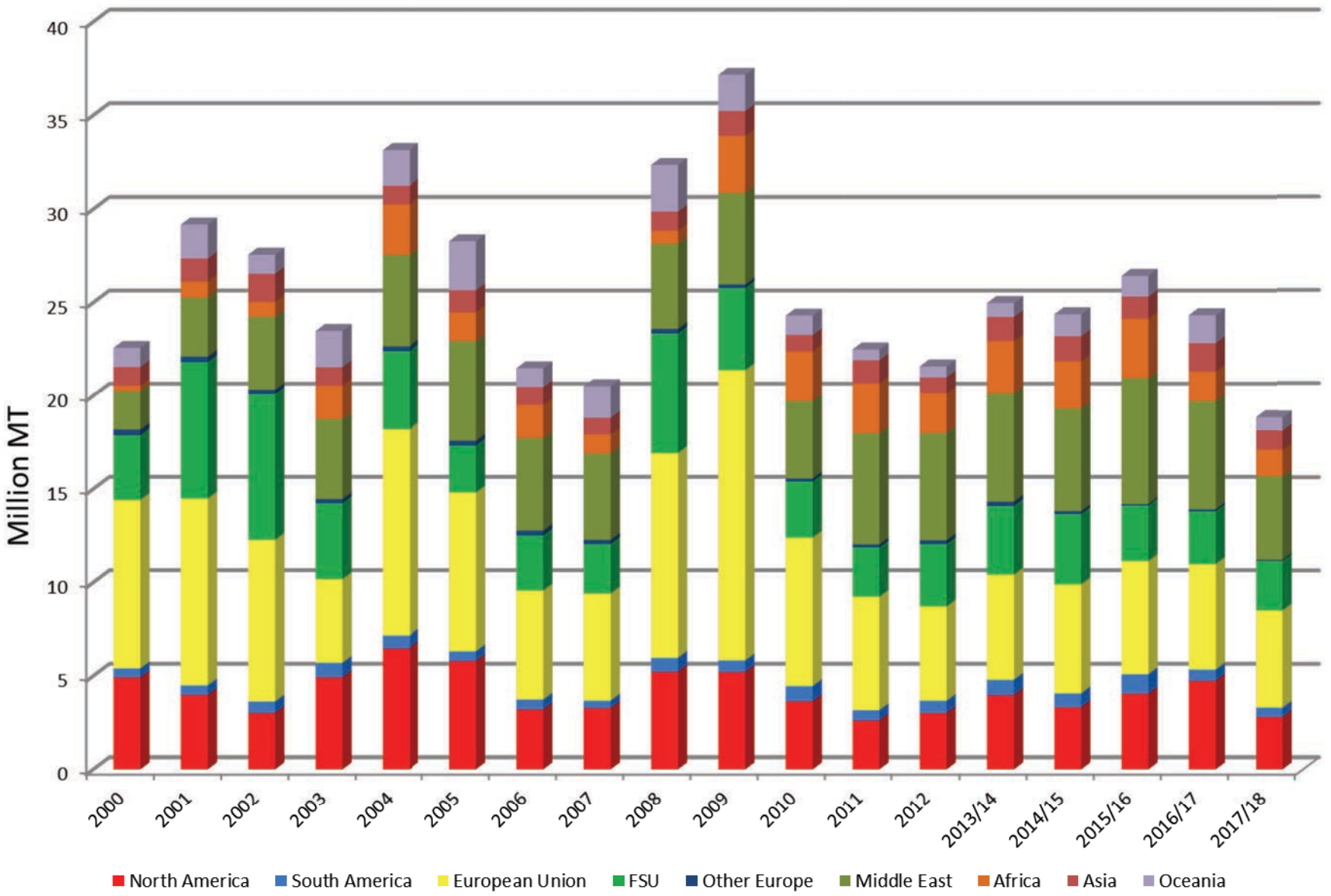
Production in Malting Barley Regions



Malt Barley Regions Carry Out



Global Ending Stocks 2017/18



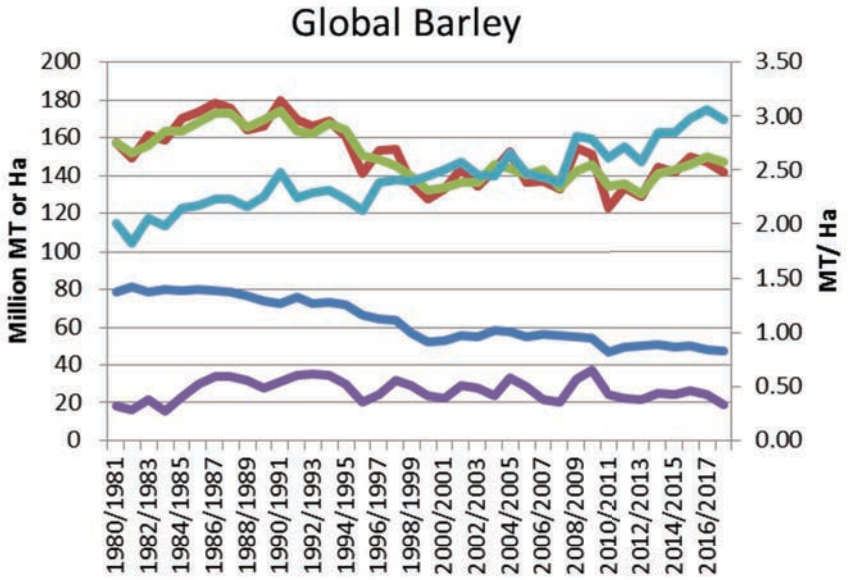
Political Events

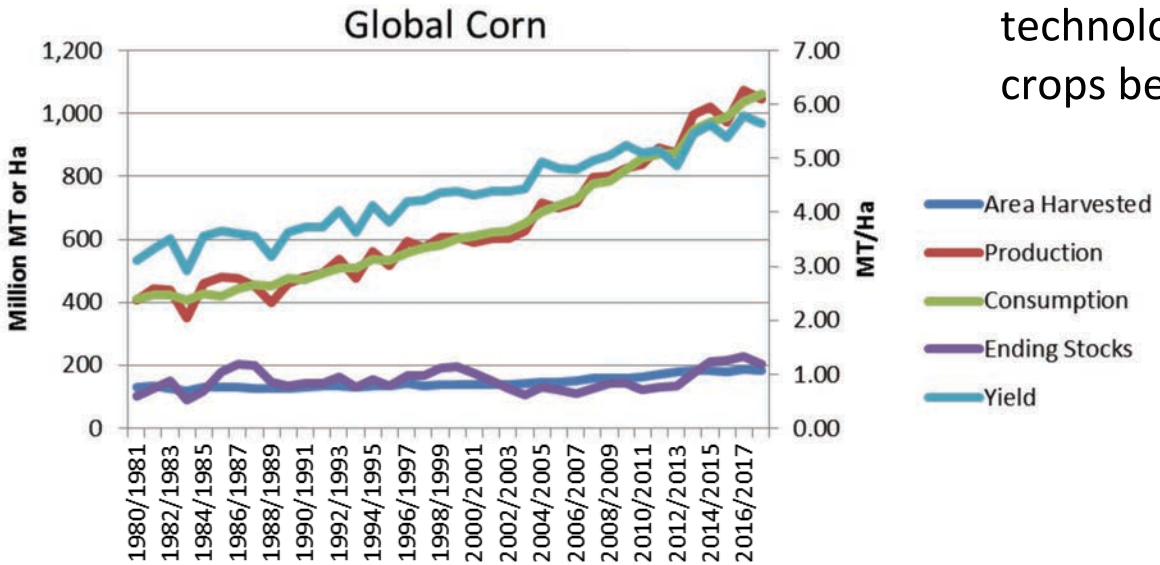
- CETA Canada & E.U.
  - Import tariffs on grain products will become tax free
- TTP Pull out & NAFTA revision
  - Lost opportunities for U.S. farmers exporting ag products
  - Potential consequences for U.S. Canada cross boarder grain trade
- Brexit
  - Driving uncertainty in currency markets especially GBP

Currencies: 5 year chart

Commodities

Farming Trends





- For barley plant breeding and limited use of chemical inputs have driven improvements
- In the last 10 years improvements in application have further driven yields by precision applications
- Corn yields higher naturally steeper rise due to application of gene technology
- Neither wheat nor barley have utilized this technology but at what point do these crops become uneconomic for growers?

Farming Trends - The Nitrate Time Bomb

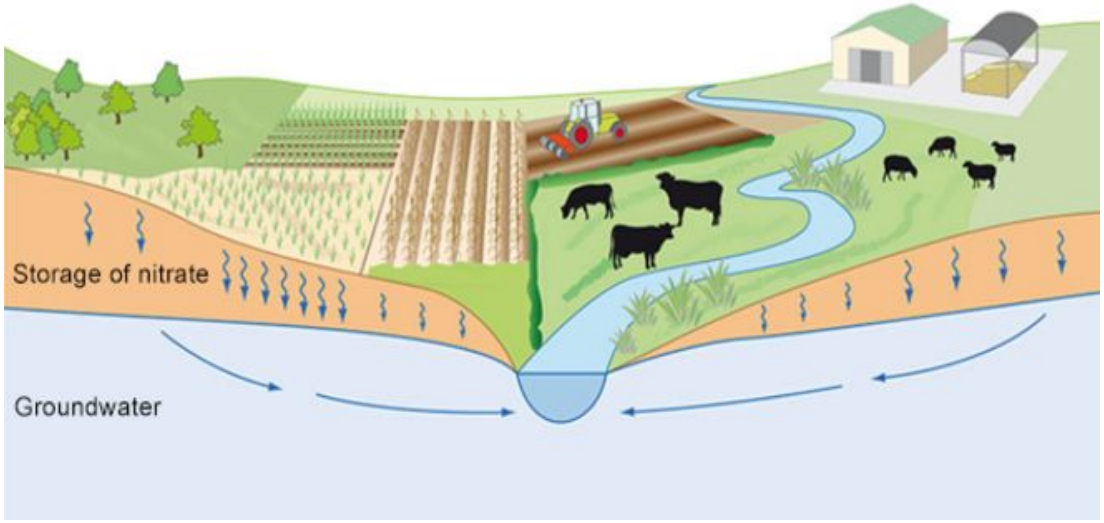
Researchers from BGS and Lancaster University

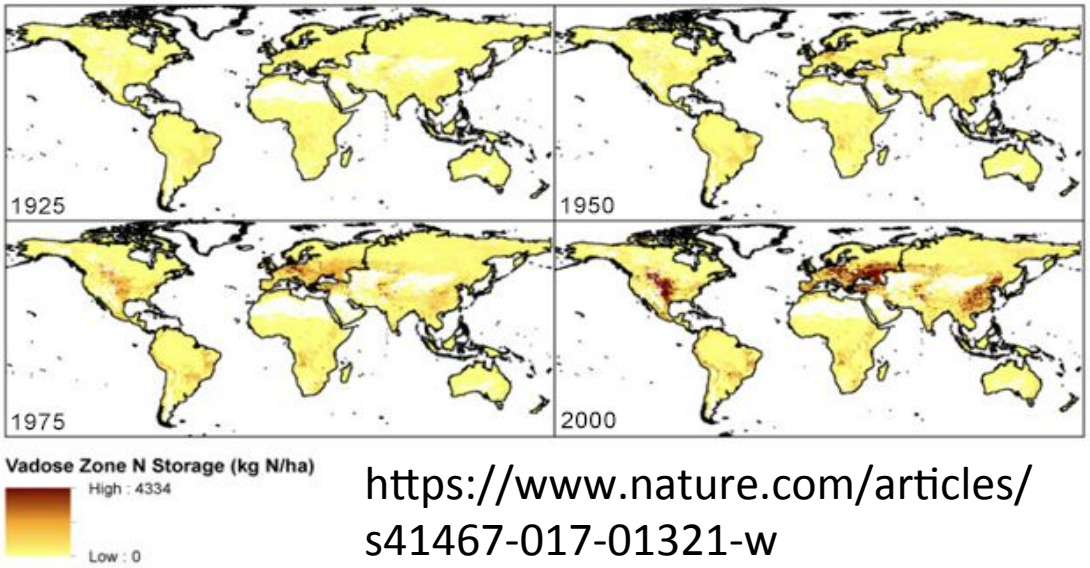
Estimate 180 million MT of nitrate are accumulating in rocks from liberal use of fertilizer

It is predicated that over time this will leach into ground water and find its way into aquifers requiring additional water treatment and cause algal blooms

Malting barley is low nitrogen input crop

Digital farming potential to reduce or eliminate nitrate build up





https://www.nature.com/articles/s41467-017-01321-w

Conclusions & Considerations 2017

- French crop much better than 2016
- UK & German crop mixed
- US Short on volume
- Canadian crop surprisingly good quality
- Energy markets benign
- Barley prices surprisingly stable
- Dollar coming off the gains against major currencies
- Overall malt quality in 2018 expected to be good

- Global supplies of malting barley are very tight
- Solid crops will be needed in 2018 to prevent significant price rises next year
- Political climate affecting trading?

Select Ingredients

With thanks to:
Bob Sutton, Rahr Malting
Steve LePoidevin, Crisp Malting Group
Thomas Weyermann, Weyermann® Malz

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