

Impact of Precipitation on Wheat Production in Idaho:
A Survey of Three Decades of
Crop Progress and Condition Reports

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Background

- Wheat is a major crop in Idaho and PNW
- Precipitation, especially in April – June, has strong relationship with wheat yields (Schillinger and Papendick 2008)
- Climate now
 - Cool, wet winters and warm, dry summers (Kok et al. 2009; Dalton et al. 2013)
- Future climate projections
 - Expect decrease in summer precipitation (Dalton et al. 2013)

Goals

- Compile data from NASS Crop Progress and Condition Reports
- Look for trends in these reports and determine whether they are correlated to wheat production and precipitation data

- Weekly reports April-October
- 1986 – 2013
- Spring and winter wheat
- Condition
 - % of fields with different yield potentials
- Progress
 - % of fields that have reached a given growth stage



Land Cover Categories
(by decreasing acreage)

AGRICULTURE*

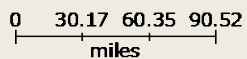
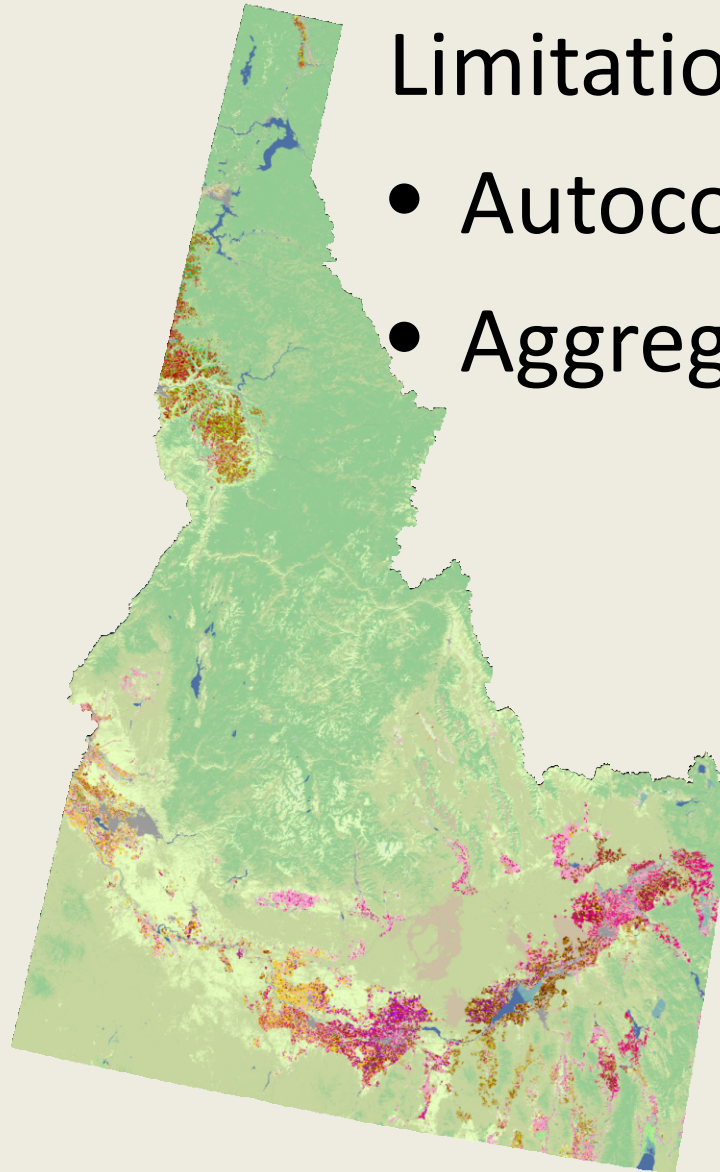
-  Grass/Pasture
-  Alfalfa
-  Winter Wheat
-  Barley
-  Spring Wheat
-  Fallow/Idle Cropland
-  Corn
-  Potatoes
-  Other Hay/Non Alfalfa
-  Sugarbeets
-  Dry Beans
-  Peas
-  Canola
-  Oats
-  Lentils
-  Safflower

NON-AGRICULTURE**

-  Shrubland
-  Evergreen Forest
-  Barren
-  Developed/Open Space
-  Open Water
-  Deciduous Forest

Limitations:

- Autocorrelation
- Aggregation

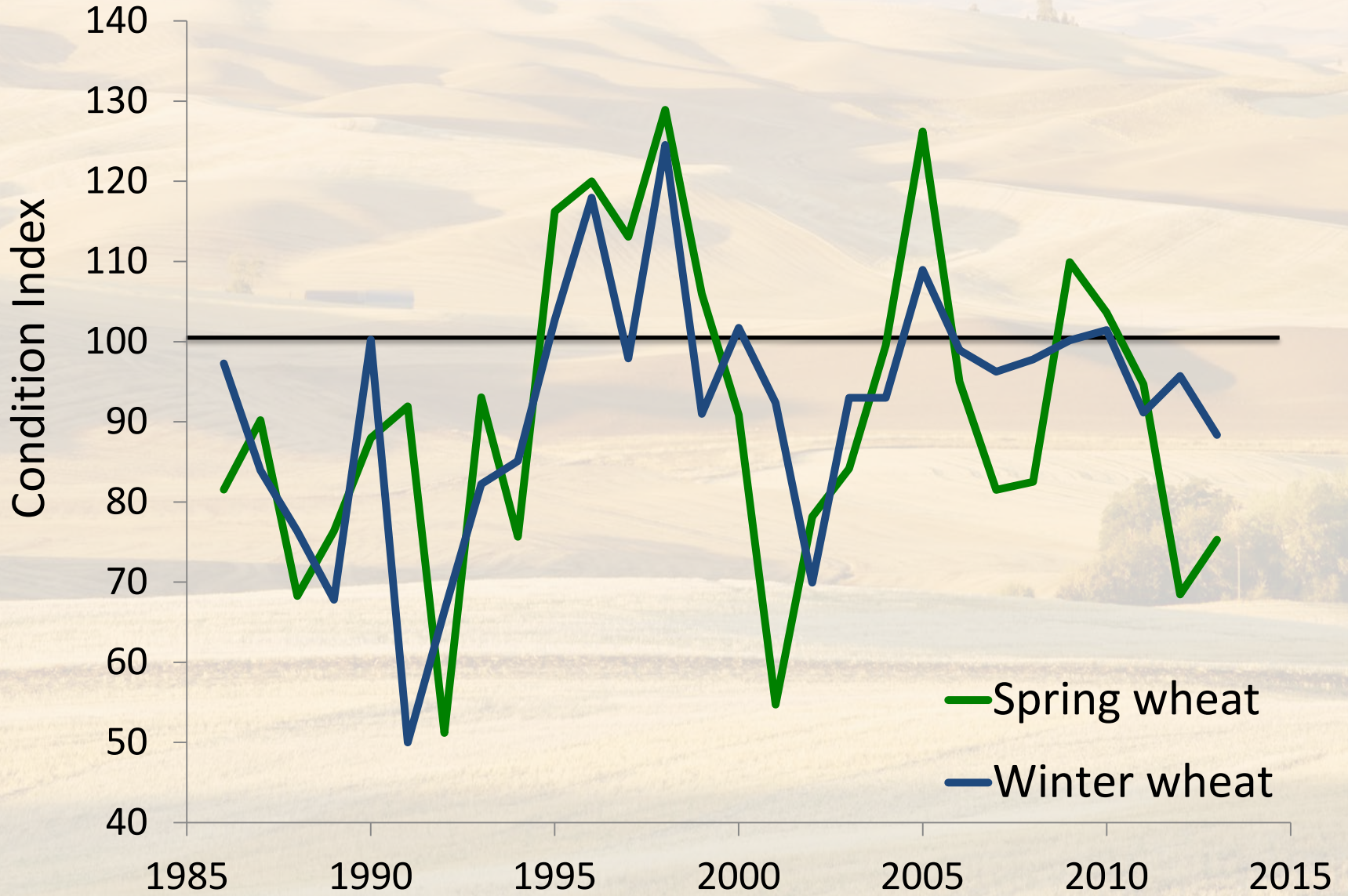


Condition Index

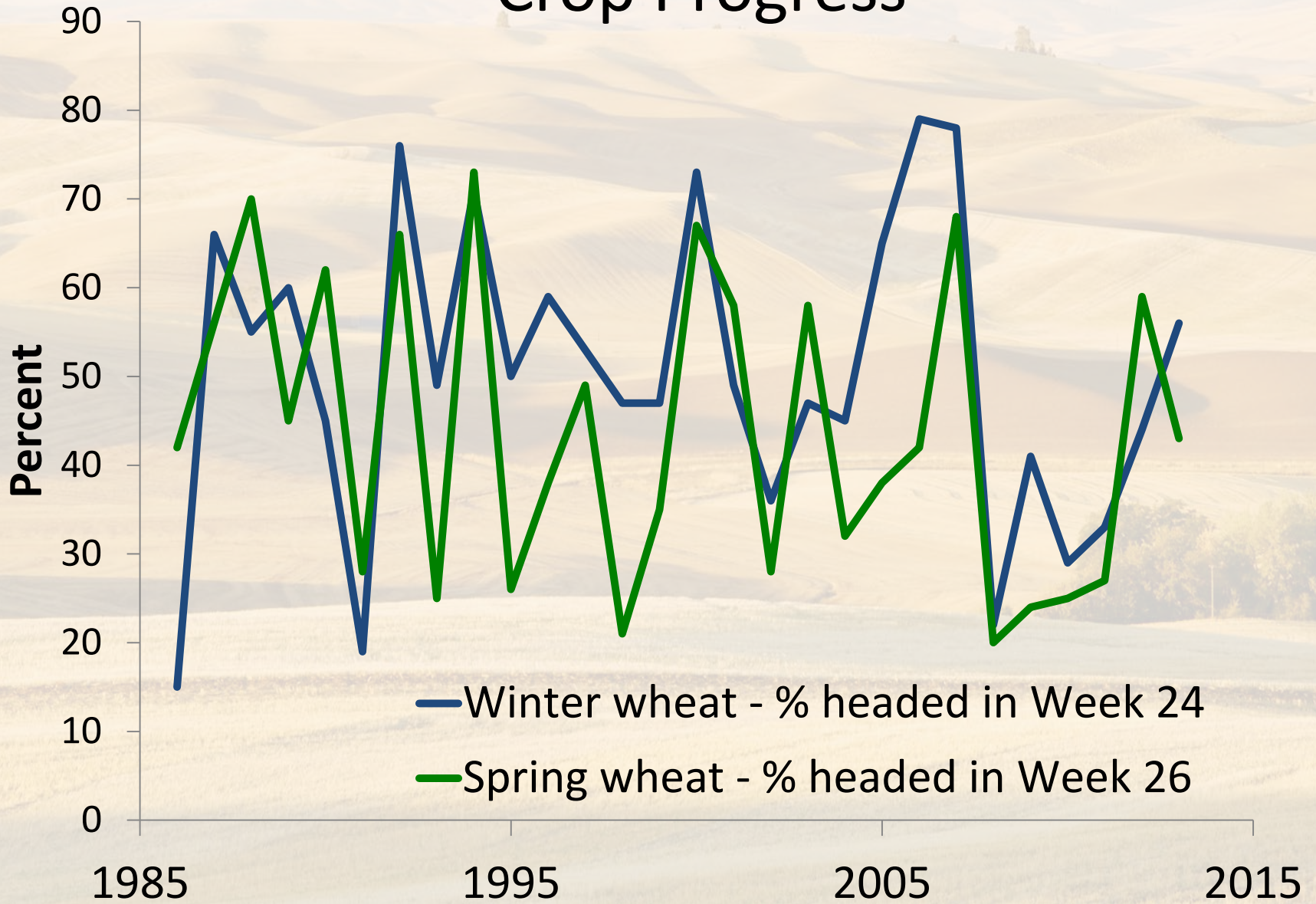
	Condition	%		Score		Subtotal
Above normal yields	→ Excellent	12	×	2	=	24
Normal yields	→ Good	72	×	1	=	72
Possible yield loss	→ Fair	14	×	0	=	0
Heavy yield loss	→ Poor	2	×	-1	=	-2
Extreme yield loss	→ Very Poor	0	×	-2	=	0
Index:						94

- Calculated weekly index
- Yearly average

Crop Condition



Crop Progress



Analysis

- Compared crop progress and condition to other metrics
 - Yield (Bu/Acre)
 - Acreage production lost (acres planted – harvested)
 - Yield insurance loss ratio (total indemnities/total premium)
 - Season precipitation (September-June)
 - Late spring precipitation (April-June)
- Spearman's Rank-Order Correlation Test

The condition index is a representative metric.

Spearman's Rank-order Correlation Test

	Condition Index	
	Winter wheat	Spring wheat
Yield (BU/ACRE)	0.531, p=0.004	0.538, p=0.003
Acreage production lost	-0.515, p=0.005	-0.328, p=0.088
Yield insurance loss ratio	-0.681, p<0.001	-0.635, p<0.001

The condition index is strongly related to both season and spring precipitation.

Spearman's Rank-order Correlation Test

	Condition Index	
	Winter wheat	Spring wheat
Season precipitation (Sept-June)	0.435, p=0.021	0.670, p<0.001
Spring precipitation (April-June)	0.414, p=0.029	0.700, p<0.001

Crop progress

Spearman's Rank-order Correlation Test

	Progress - % headed	
	Winter wheat (mid-June)	Spring wheat (end of June)
Season precipitation (Sept-June)	-0.312, p=0.106	-0.444, p=0.010
Spring precipitation (April-June)	-0.358, p=0.061	-0.529, p=0.002
Condition Index	-0.002, p=0.992	-0.615, p<0.001
Yield (BU/ACRE)	-0.056, p=0.778	-0.400, p=0.021
Acreage production lost	-0.098, p=0.621	0.210, p=0.241
Yield insurance loss ratio	0.181, p=0.387	0.494, p=0.012

Conclusions

- Wheat condition is impacted by variations in precipitation
 - Strongest relationship found in spring wheat
- Changes in precipitation with climate change could impact wheat production
 - Need to implement water management techniques
 - Signals need for more winter crops that are economically viable

Acknowledgments

- Kate Painter
- Vince Matthews and Dave Huggins
- John Abatzoglou (UI) and Dave Paul (USDA RMA)
- Bill Price and Chris McIntosh
- Chelsea Walsh

Literature cited

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