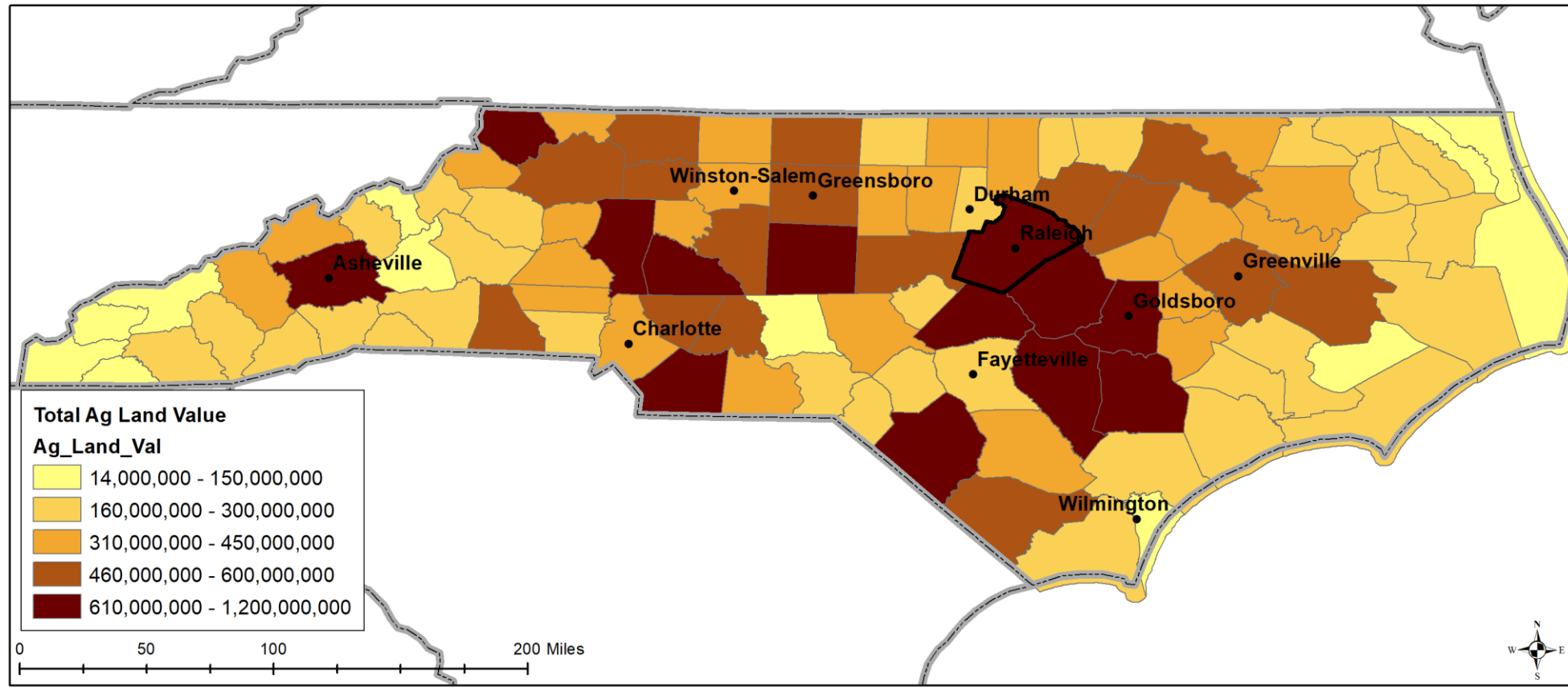


Agricultural Change: Climate and Development

Dr. Eric Edwards
Dept. of Ag and Resource Economics
NC State University

Keeping the Farm Workshop
March 11, 2020

North Carolina Ag Land Values

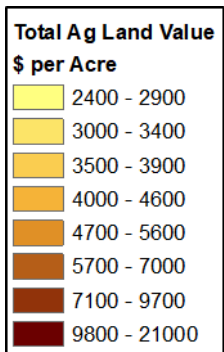
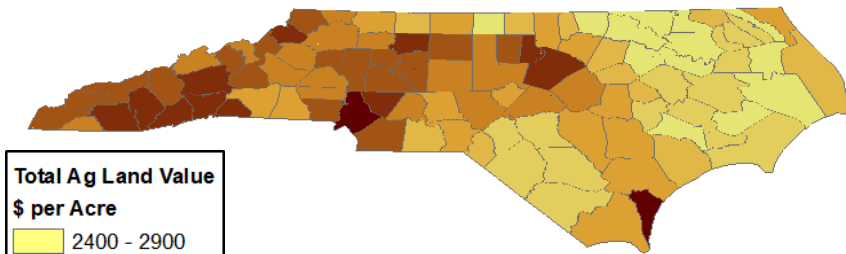


Hedonic Price Analysis

- Estimation of value by breaking item into constituent parts
 - E.g. buying a house, what is the value of a view? An extra bedroom?
- Agricultural land is simpler in many ways
 - What is the value of crops that come off the land
 - How valuable when converted out of agriculture?
 - When will conversion occur?
- Climate affects these values and their timing

Climate and Land Values

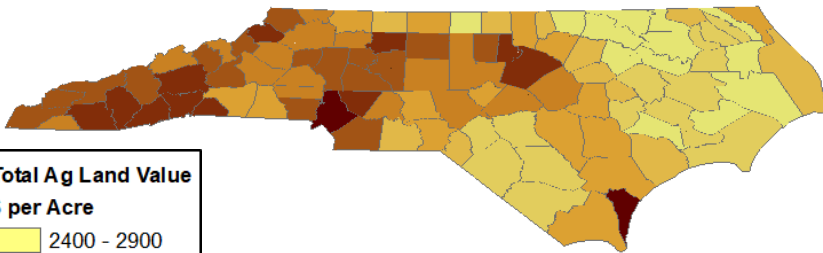
Land Value



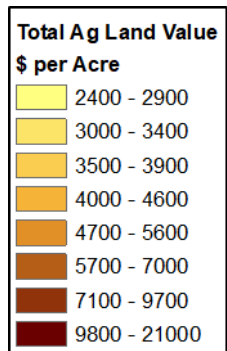
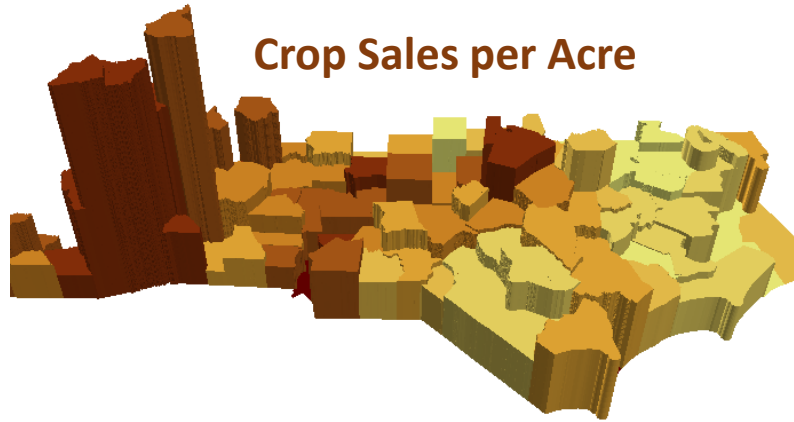
Data source: Authors drawing with USDA Ag Census Quick Stats

Climate and Land Values

Land Value



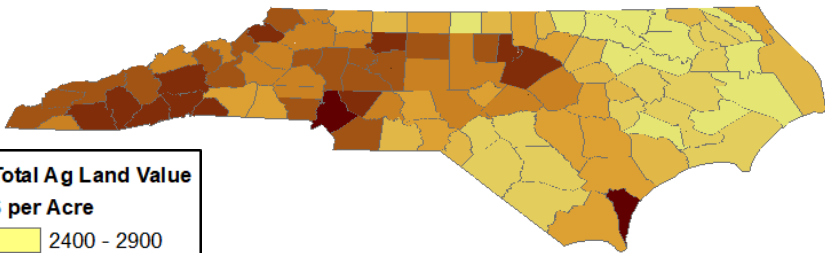
Crop Sales per Acre



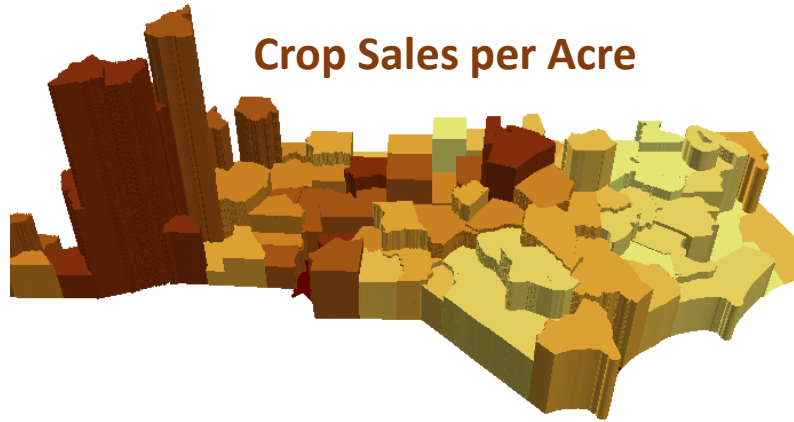
Data source: Authors drawing with USDA Ag Census Quick Stats

Climate and Land Values

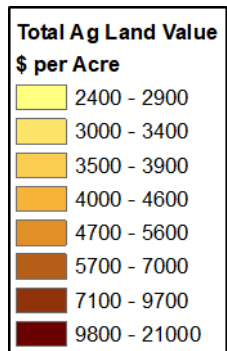
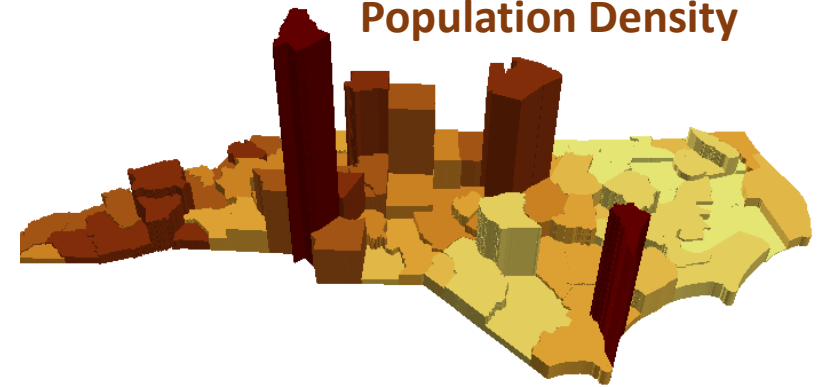
Land Value



Crop Sales per Acre

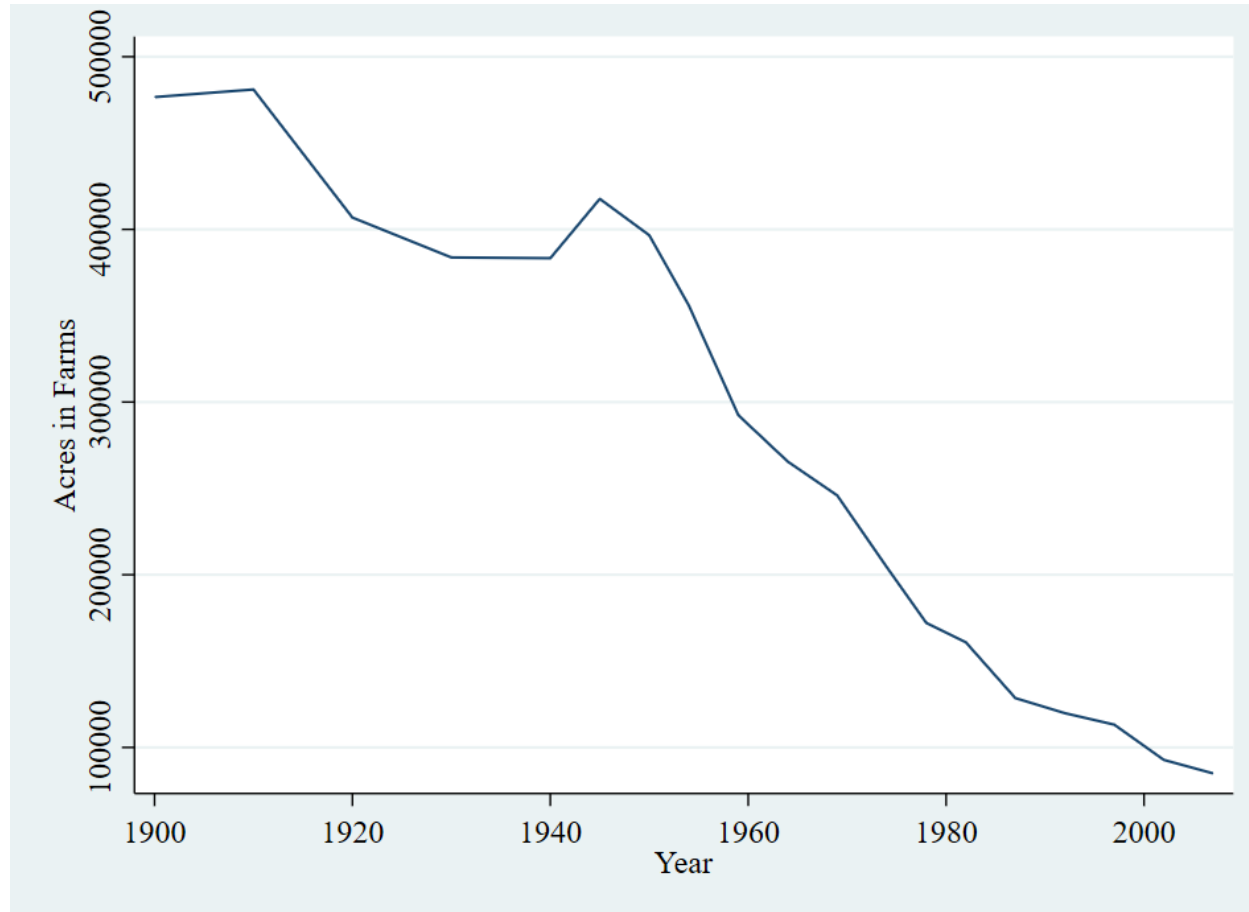


Population Density

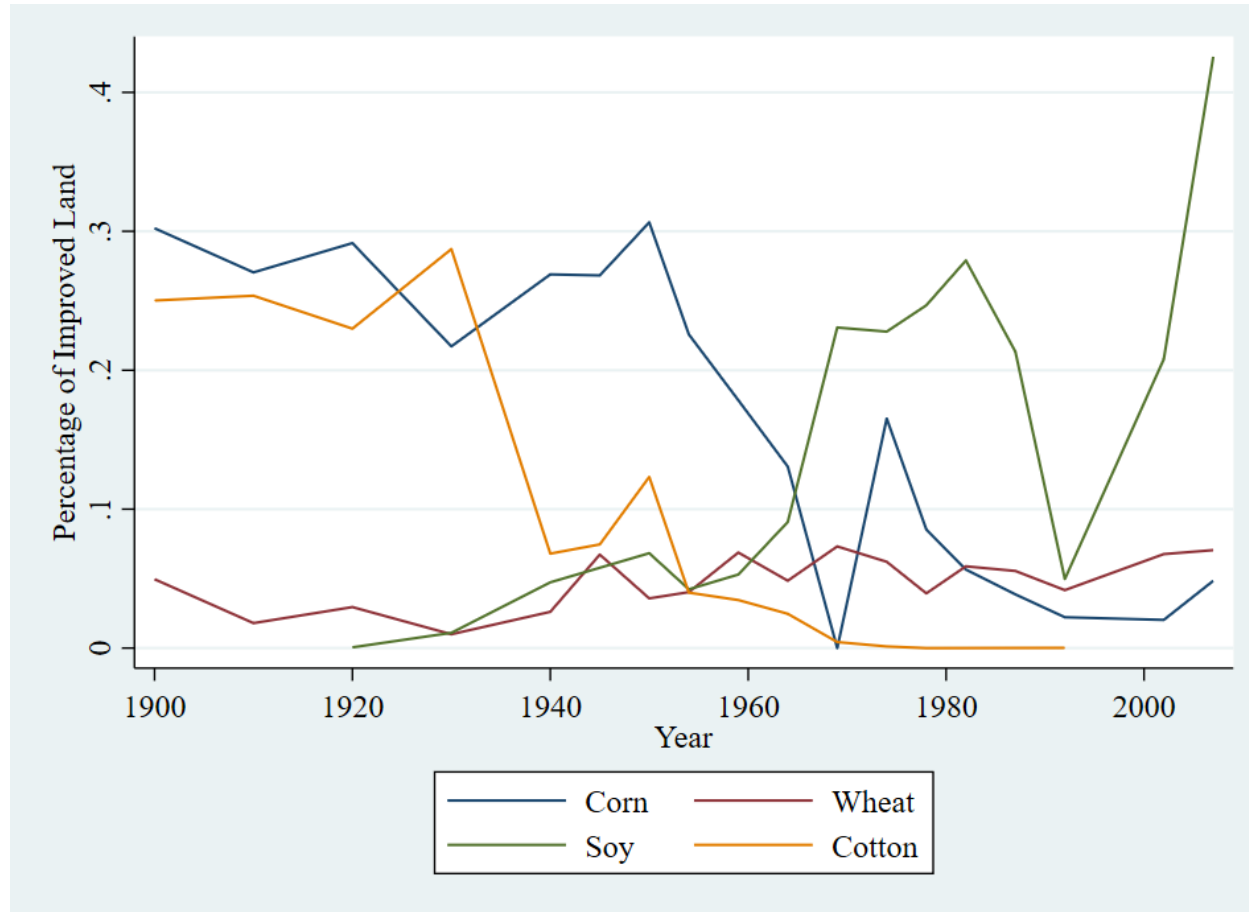


Data source: Authors drawing with USDA Ag Census Quick Stats

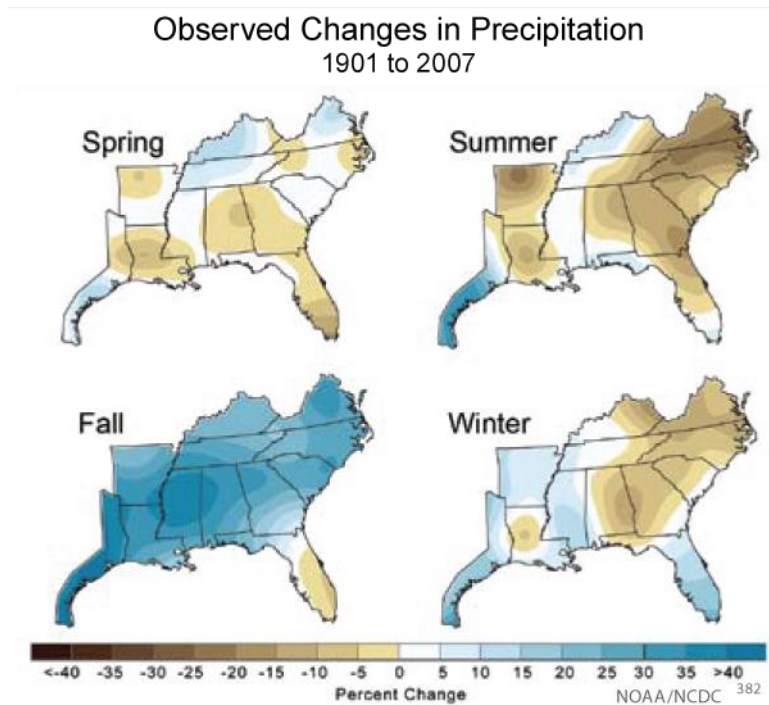
Crop Choices in Wake County, NC



Crop Choices in Wake County, NC



Climate Change, Past



- Large climate shifts since 1900
- Precipitation in Southeast has increased by about 30%
- Parts of NC, however, have seen 30% decreases in summertime precipitation

Adaptation to Climate: Water Management

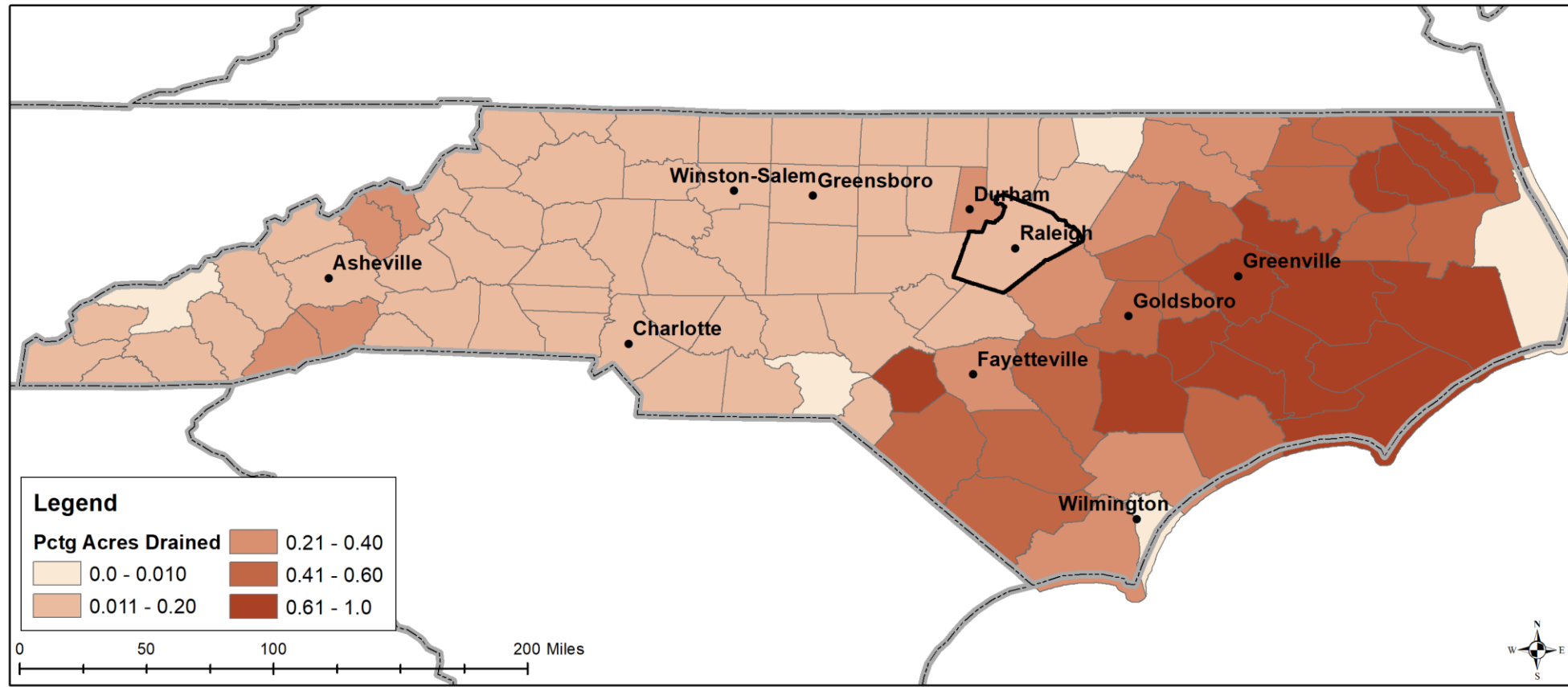
Drainage



Irrigation

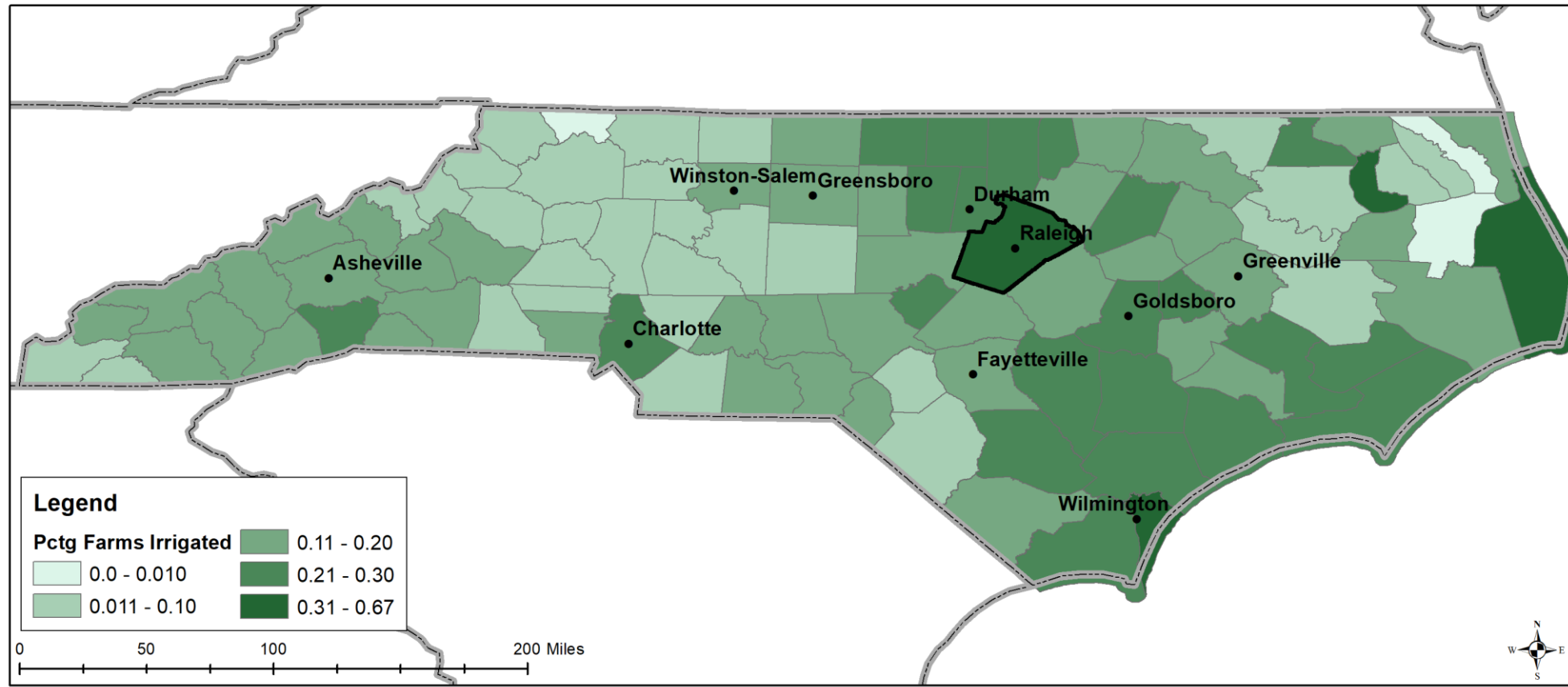


Percentage of Crop Acres Drained



Data source: USDA Ag Census Quick Stats

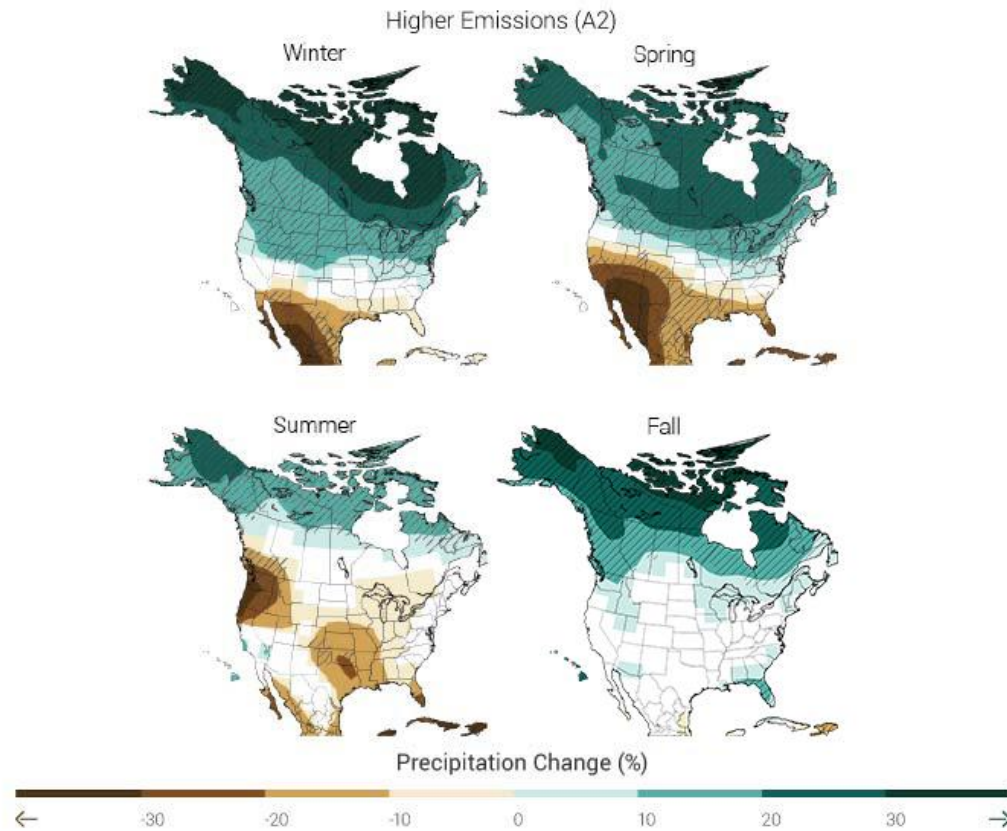
Percentage of Farms with Irrigation



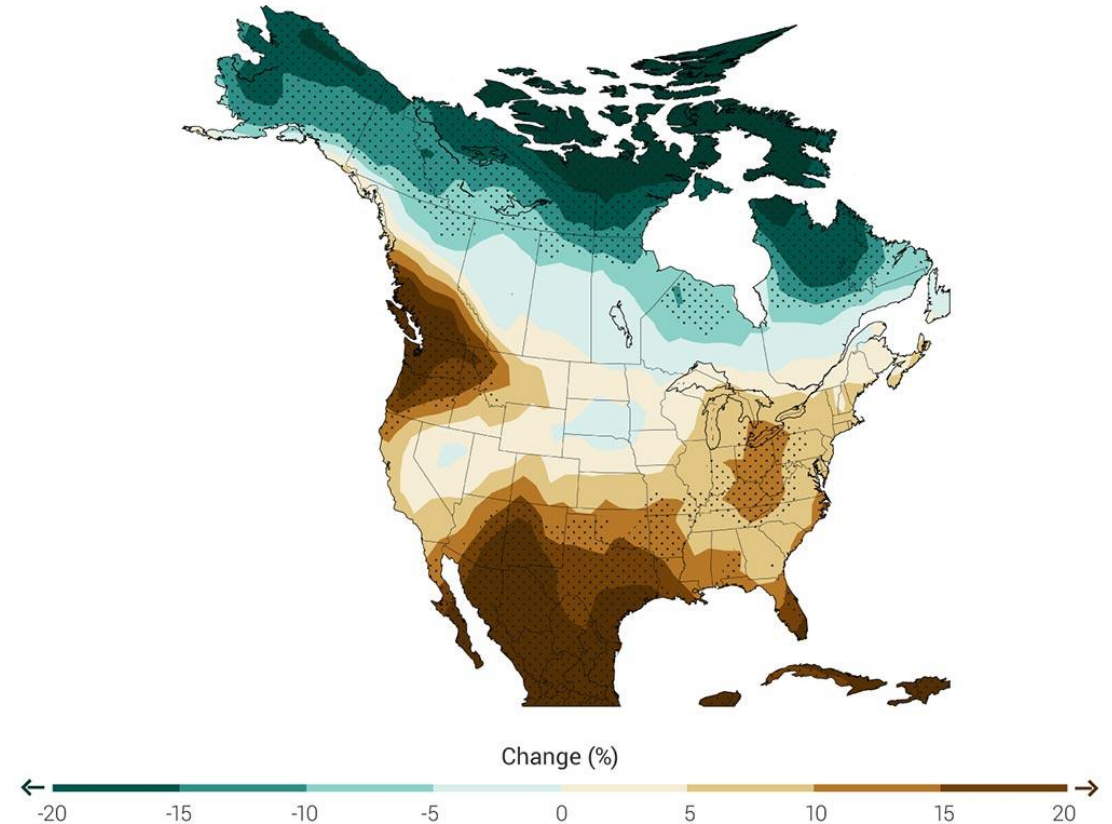
Data source: USDA Ag Census Quick Stats

Climate Change, Present and Future

Projected Precipitation Change by Season

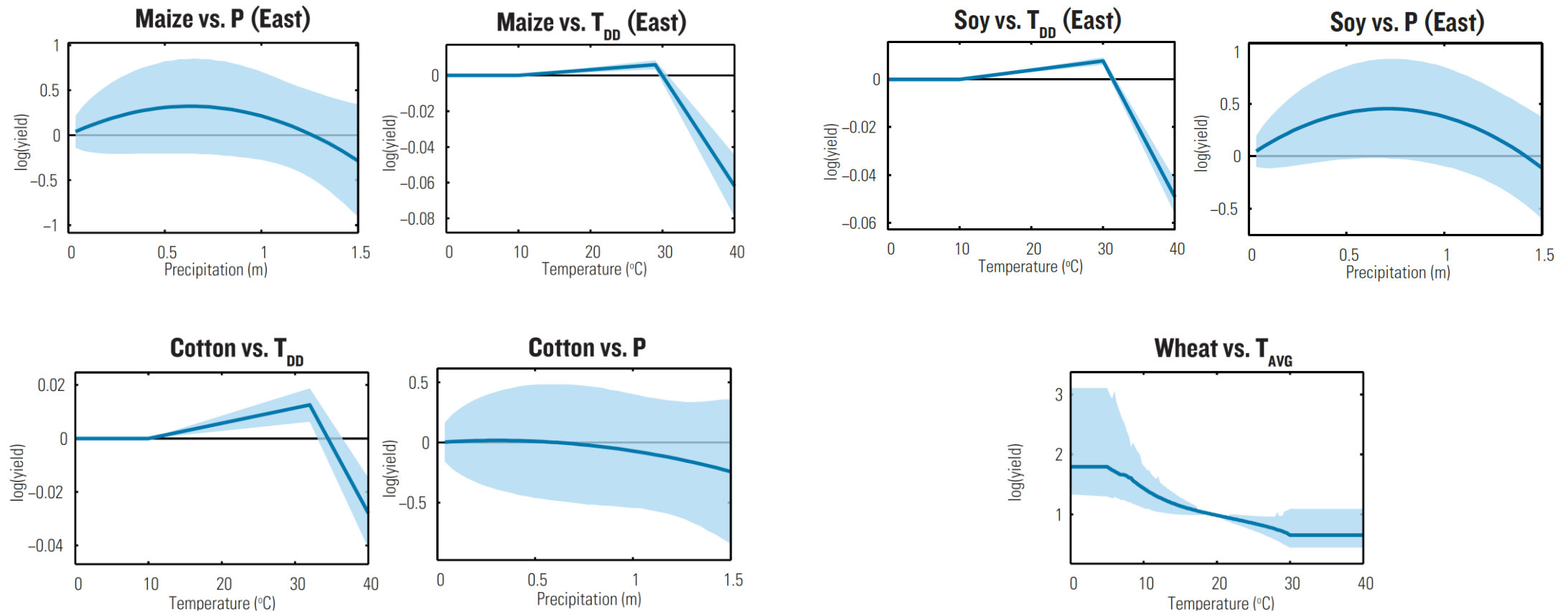


Change in Maximum Number of Consecutive Dry Days



Source: National Climate Assessment with data from NOAA NCDC / CICS-NC

Crops: Big-4 / Climate Relationship



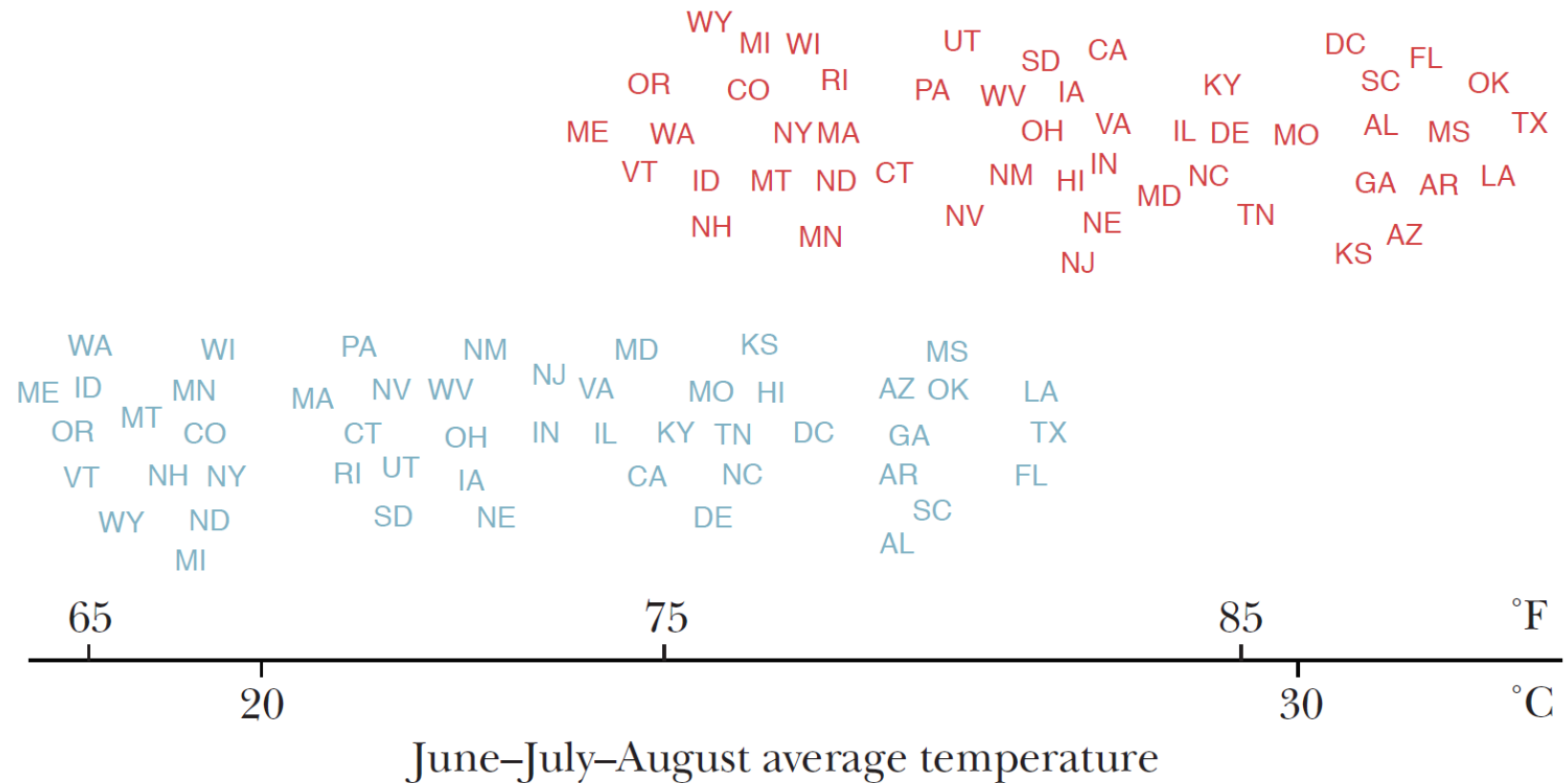
Source: Hsiang, S., Kopp, R., Jina, A., Rising, J., Delgado, M., Mohan, S., Rasmussen, D.J., Muir-Wood, R., Wilson, P., Oppenheimer, M. and Larsen, K., 2017 Estimating economic damage from climate change in the United States. *Science*, 356(6345), pp.1362-1369.

US Temperature Change Projections

A: States (USA)

2080–2099
high emission
(RCP 8.5) scenario

1981–2010
(Historical)

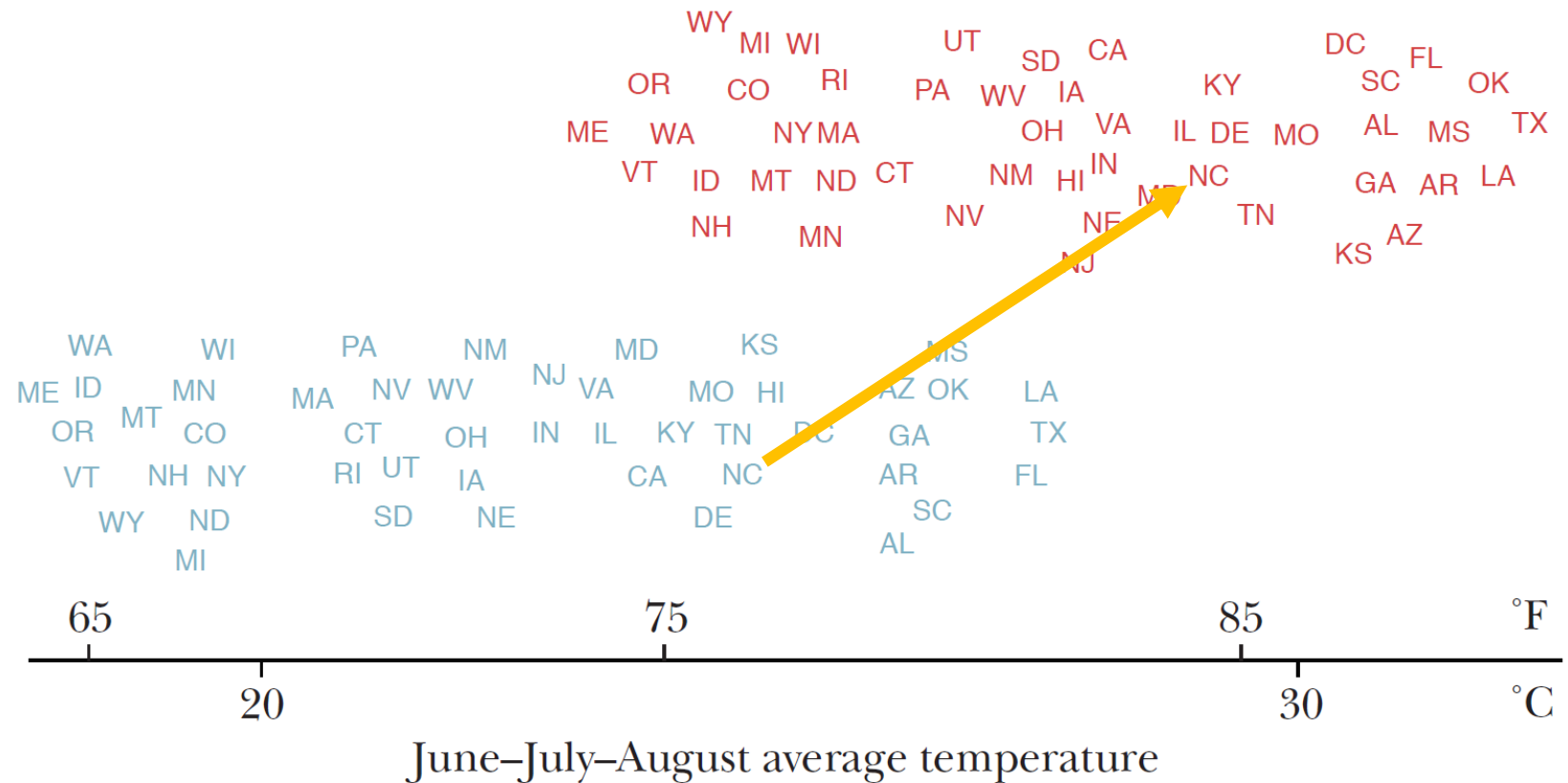


US Temperature Change Projections

A: States (USA)

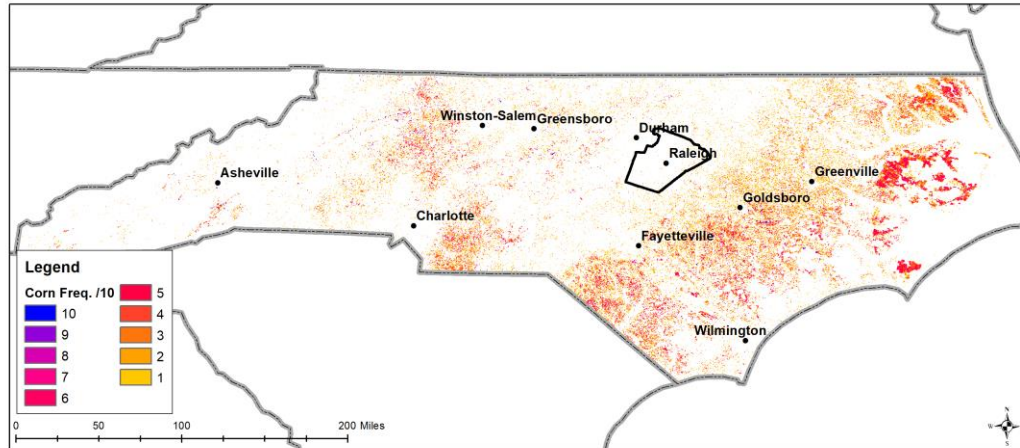
2080–2099
high emission
(RCP 8.5) scenario

1981–2010
(Historical)

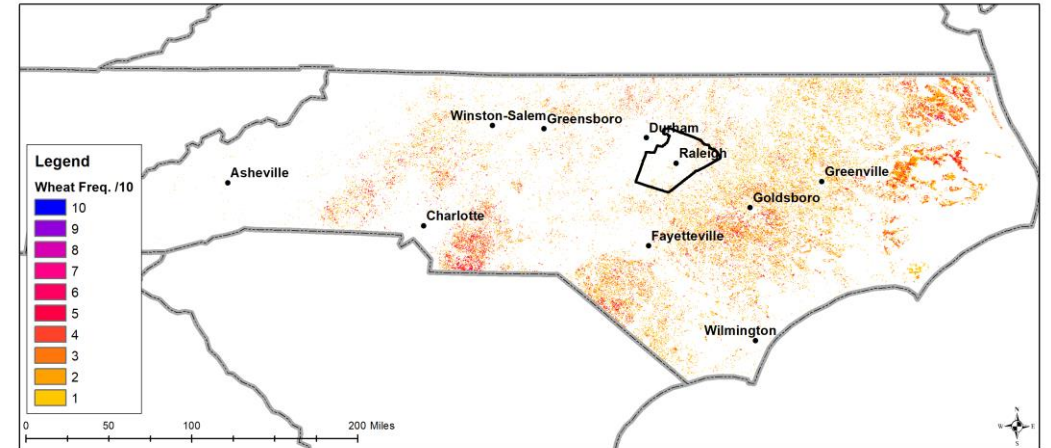


10-year Crop Frequencies

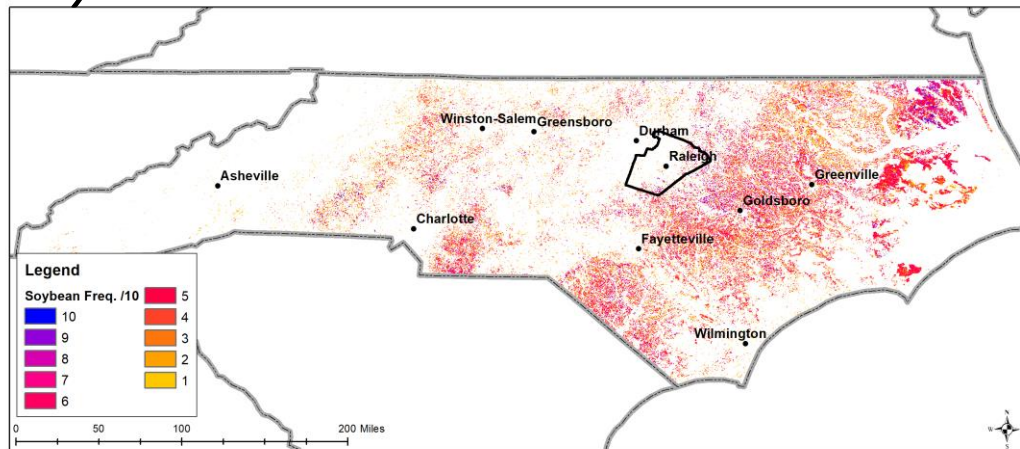
Corn



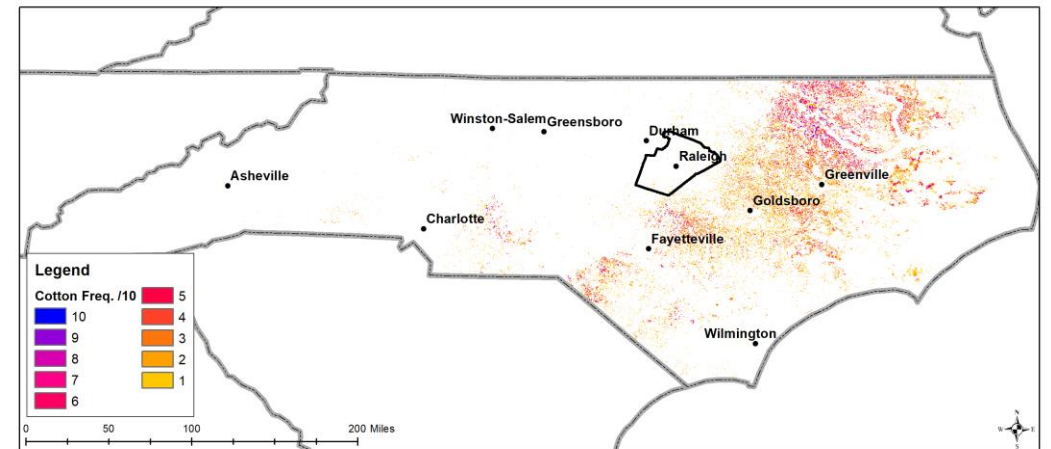
Wheat



Soybeans

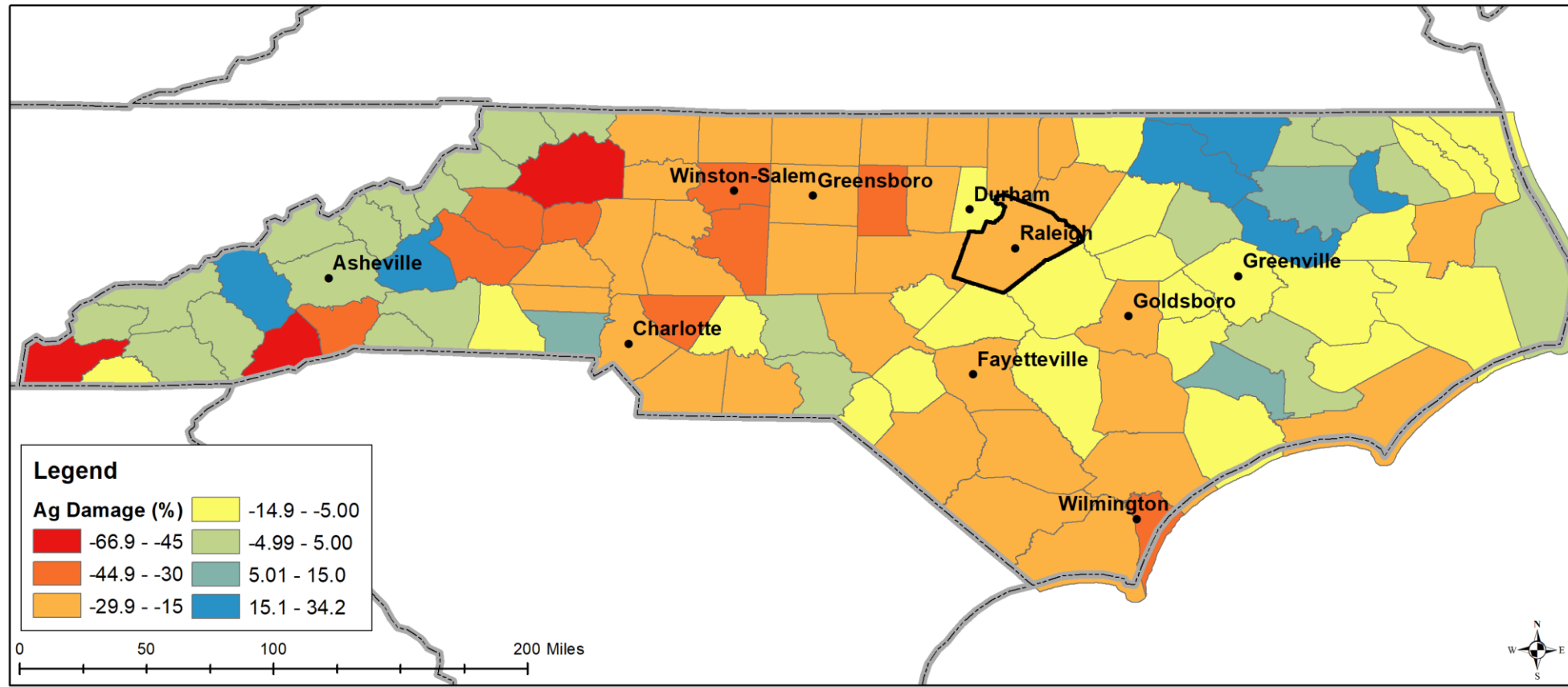


Cotton



Data source: CropScape - Cropland Data Layer. National Agricultural Statistics Service

Big-4 Crop Yield Projections (2080-2099)



Data source: Hsiang et al (2017)

Damage Projections with Current Sales (Big 4)



Caveats

- Only Big-4 Crops
 - What about livestock?
 - What about specialty crops?
 - Sweet potatoes
 - Tree crops
 - Peanuts
- Assumes similar crop choice mix going forward
 - Change crops
 - Water management
 - Irrigation when dry, drainage when wet
 - High-precipitation events

Questions?

follow:

@NCWaterEcon

email:

eric.edwards@ncsu.edu



Eric Edwards
@NCWaterEcon

Water and economics in North Carolina and beyond. Assistant professor in Ag and Resource Economics @NCState @NCExtension @NCStateCALS

Raleigh, NC
ericcedwards.com
Joined February 2018

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Tweets 34 Following 195 Followers 134 Likes 93

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Pinned Tweet

Eric Edwards @NCWaterEcon · Oct 8

I wrote a short article with @SAnneSuther about today's Nobel prize announcement and how the work of William Nordhaus relates to agriculture in North Carolina. Check it out!



Figure 2: 1994 estimate of per acre farm value impact (1982\$) of a 5°F increase in temperature and decrease in precipitation due to changing climate for two different land value weighting schemes. Souder et al. (1994)

Today's Nobel Prize and North Carolina Agriculture

William Nordhaus won the Nobel prize in economics this morning. We discuss the work of Nordhaus in the context of agriculture in North Carolina.

cals.ncsu.edu