Agricultural Change: Climate and Development

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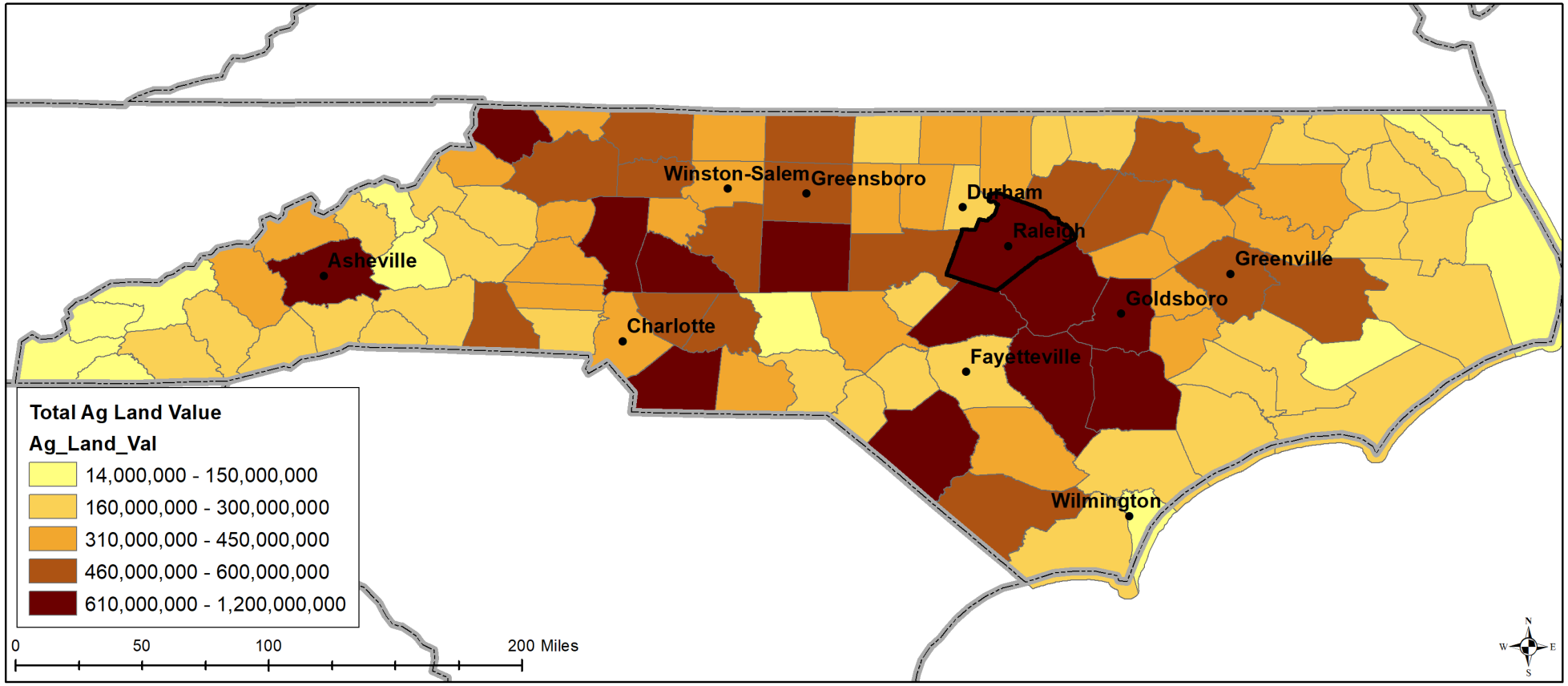
NC State University

Keeping the Farm Workshop

March 11, 2020

North Carolina Ag Land Values

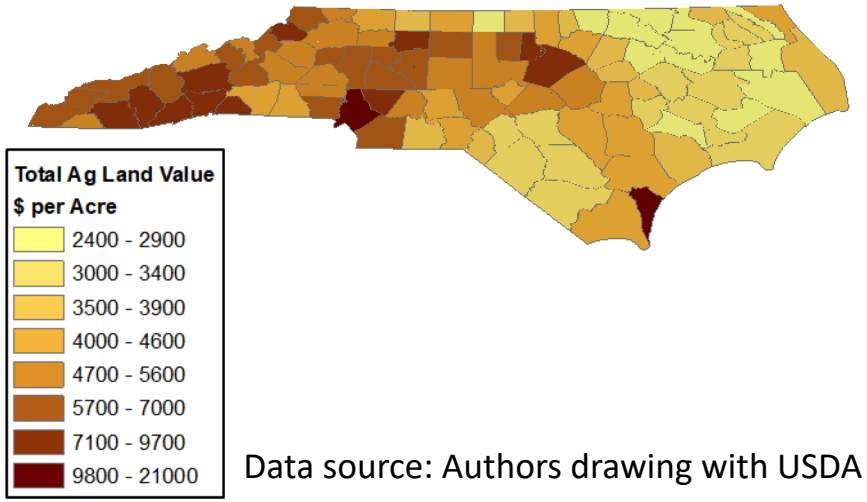


Hedonic Price Analysis

- 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

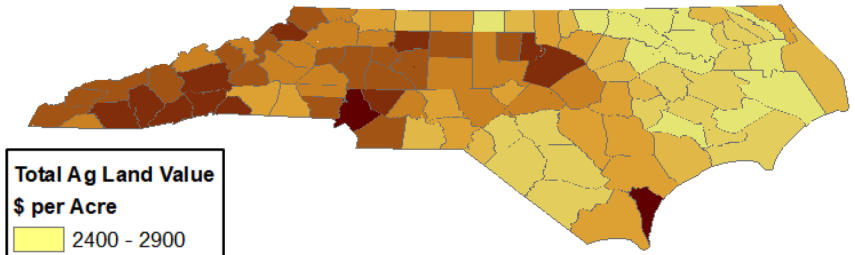
Land Value



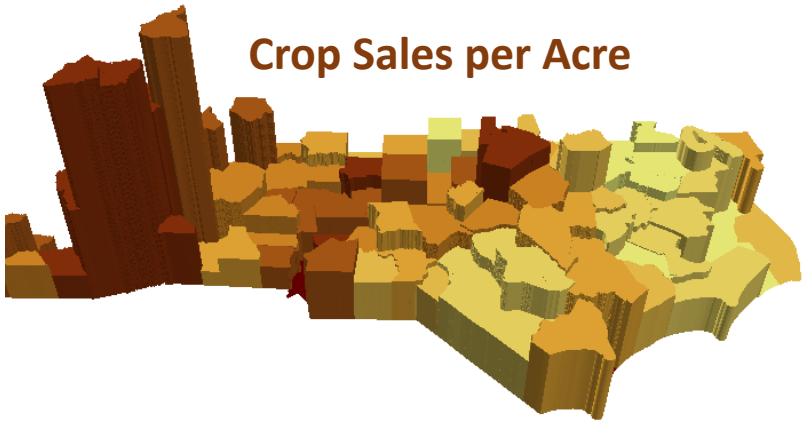
Data source: Authors drawing with USDA Ag Census Quick Stats

Climate and Land Values

Land Value



Crop Sales per Acre



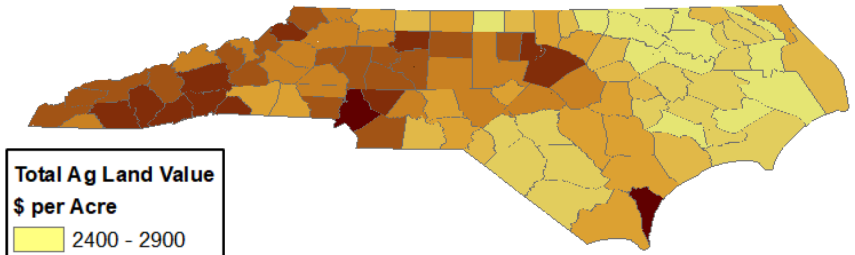
Total Ag Land Value
$ per Acre

- 2400 - 2900
- 3000 - 3400
- 3500 - 3900
- 4000 - 4600
- 4700 - 5600
- 5700 - 7000
- 7100 - 9700
- 9800 - 21000

Data source: Authors drawing with USDA Ag Census Quick Stats

Climate and Land Values

Land Value



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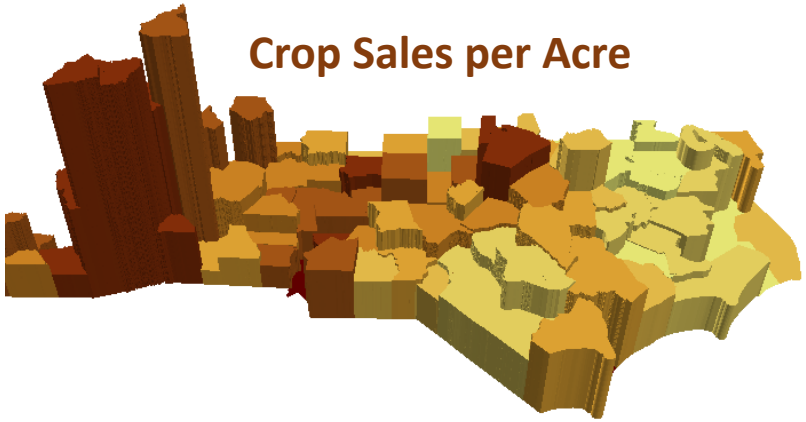
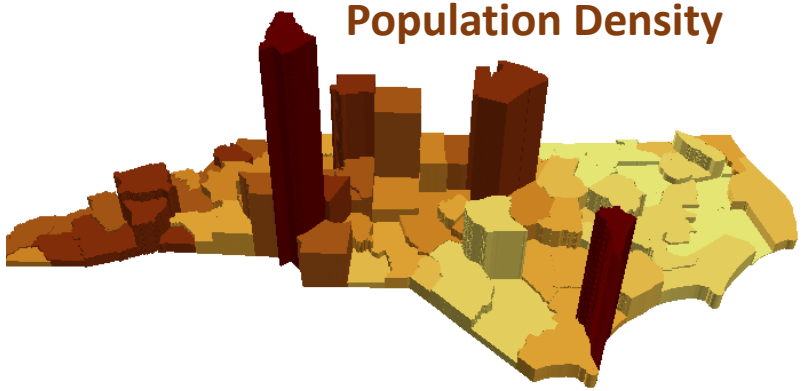


Population Density



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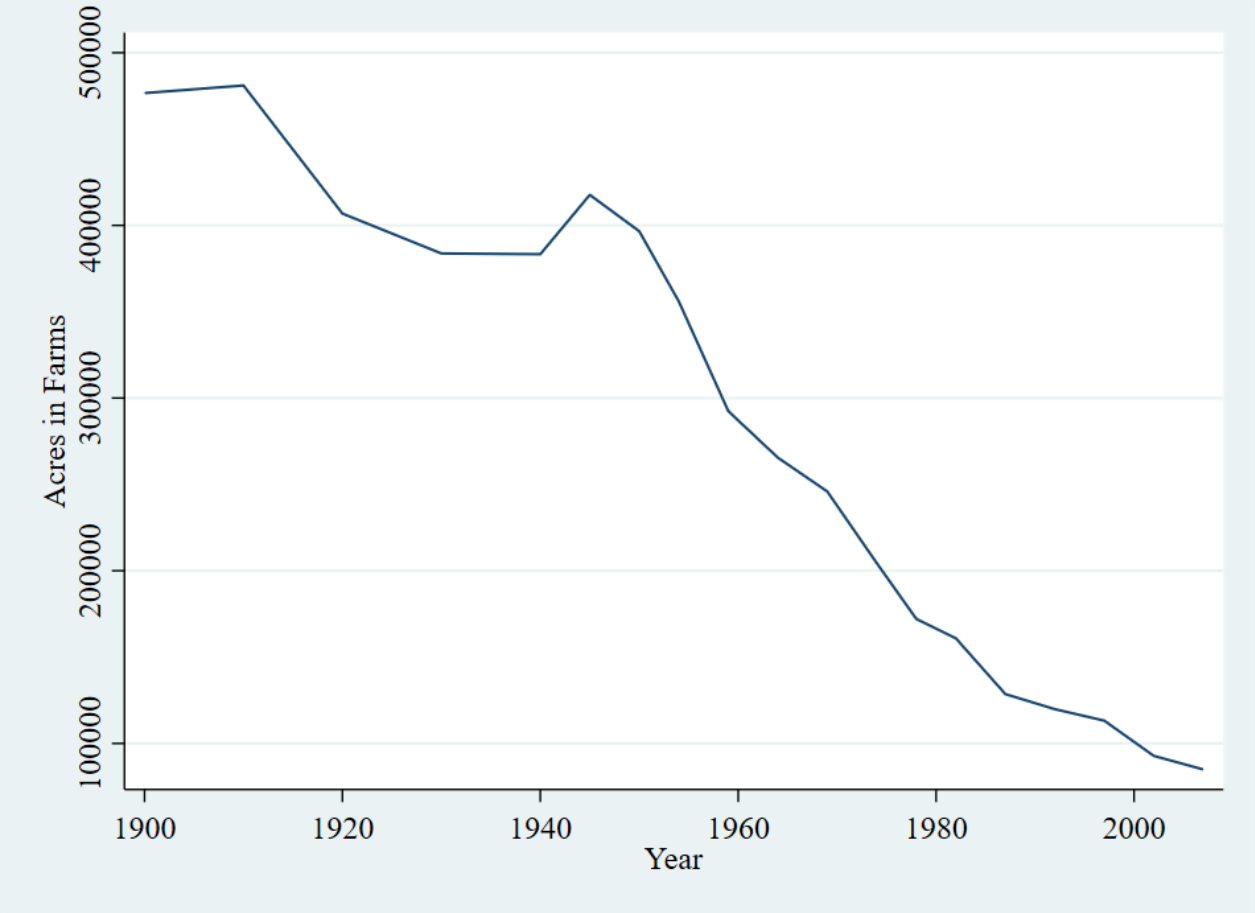
Crop Choices in Wake County, NC



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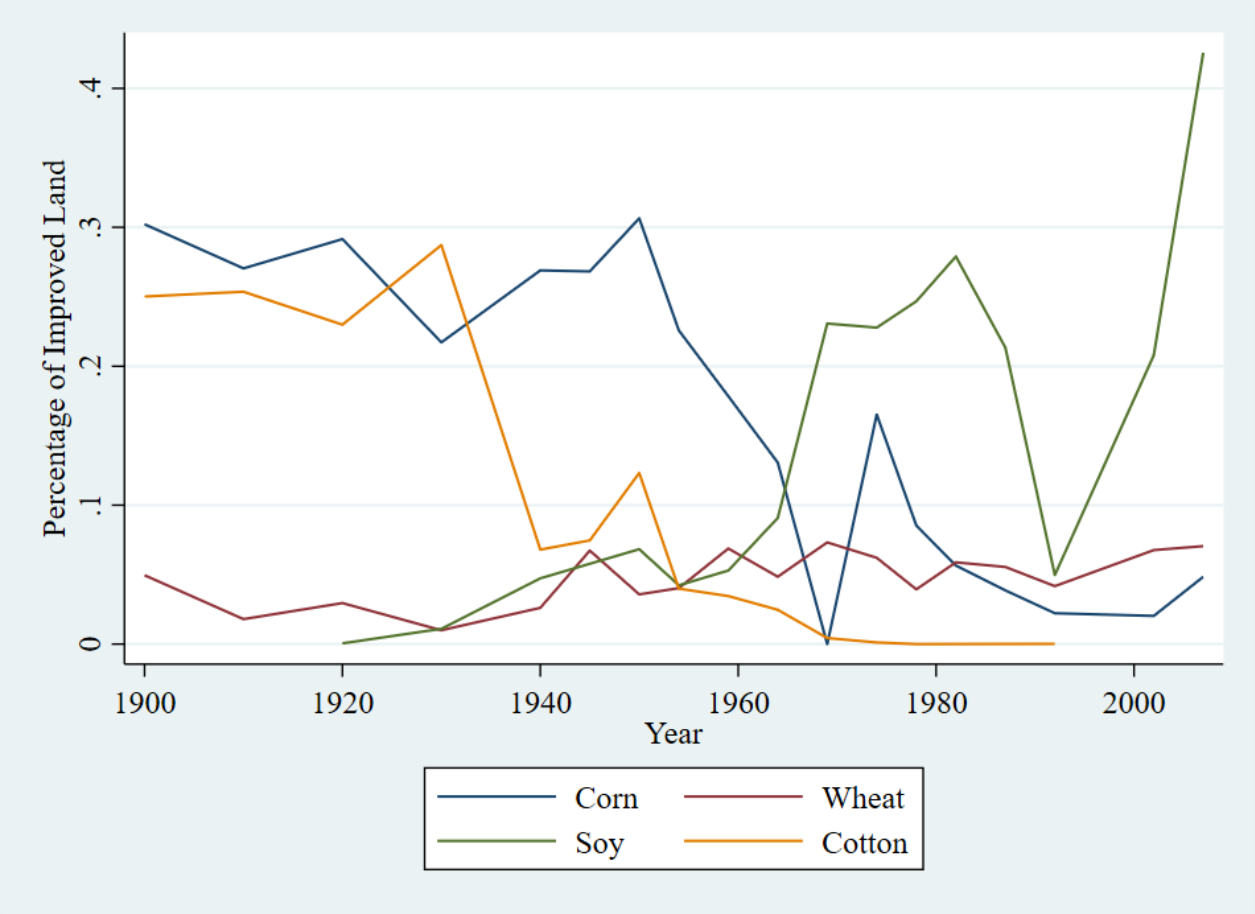
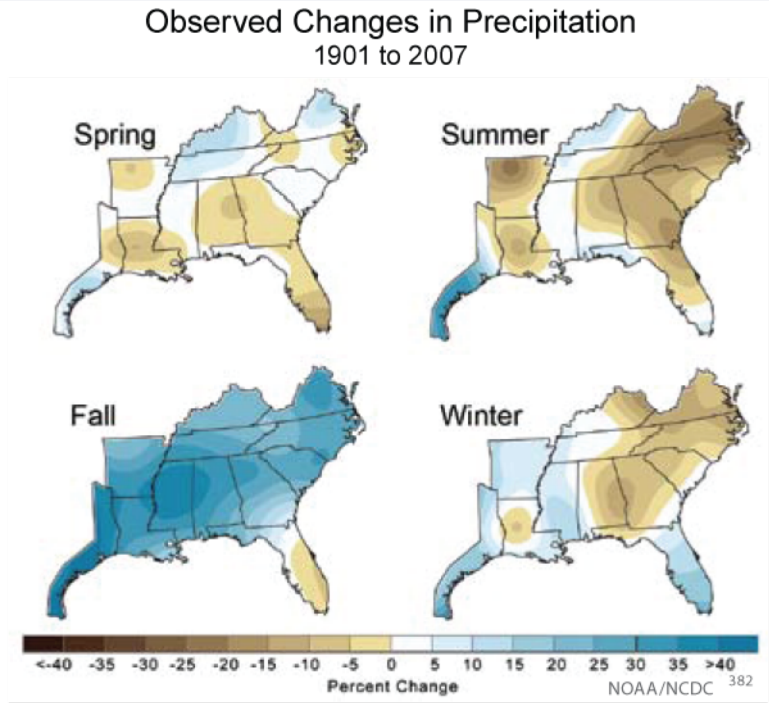


Climate Change, Past



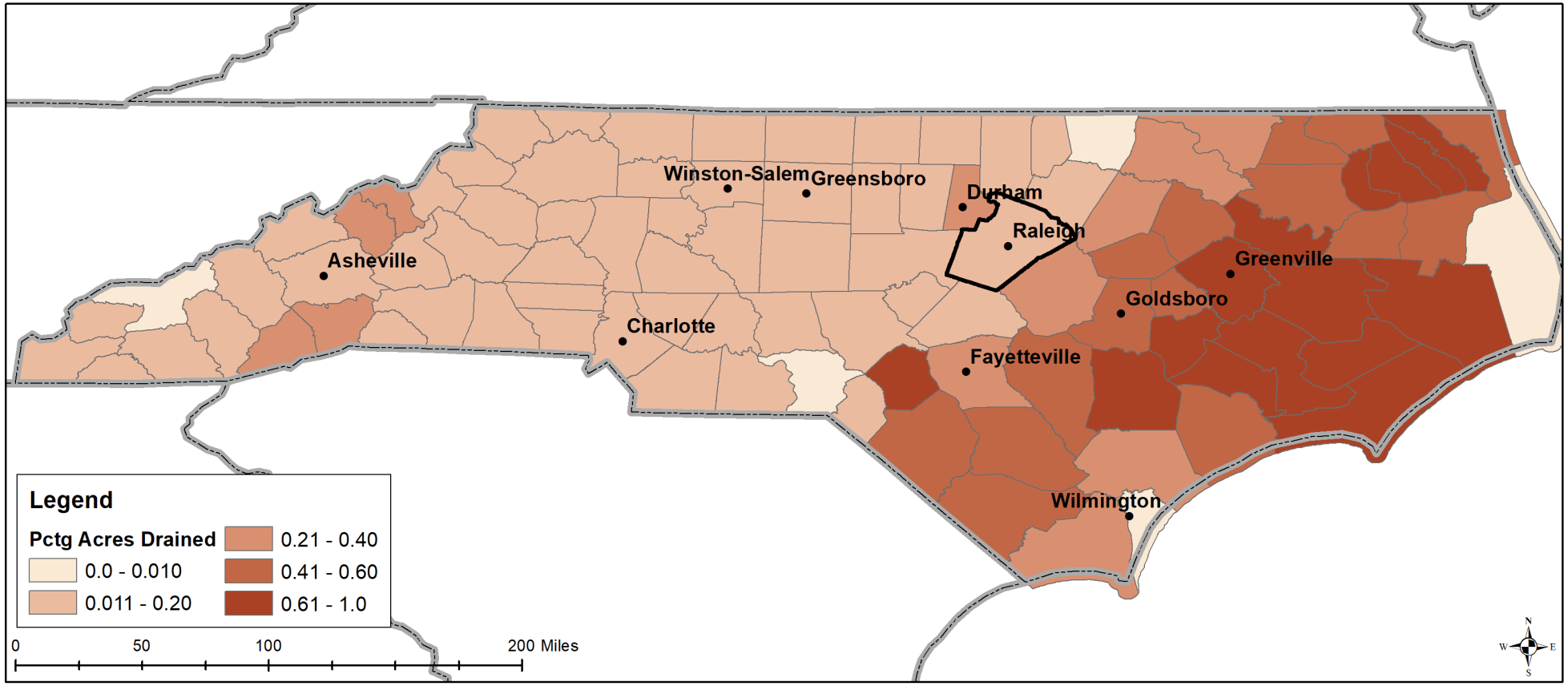
- Large climate shifts since 1900
- Precipitation in Southeast has increased by about 30%
- Parts of NC, however, have seen 30% decreases in summertime precipitation

Adaptation to Climate: Water Management

Drainage

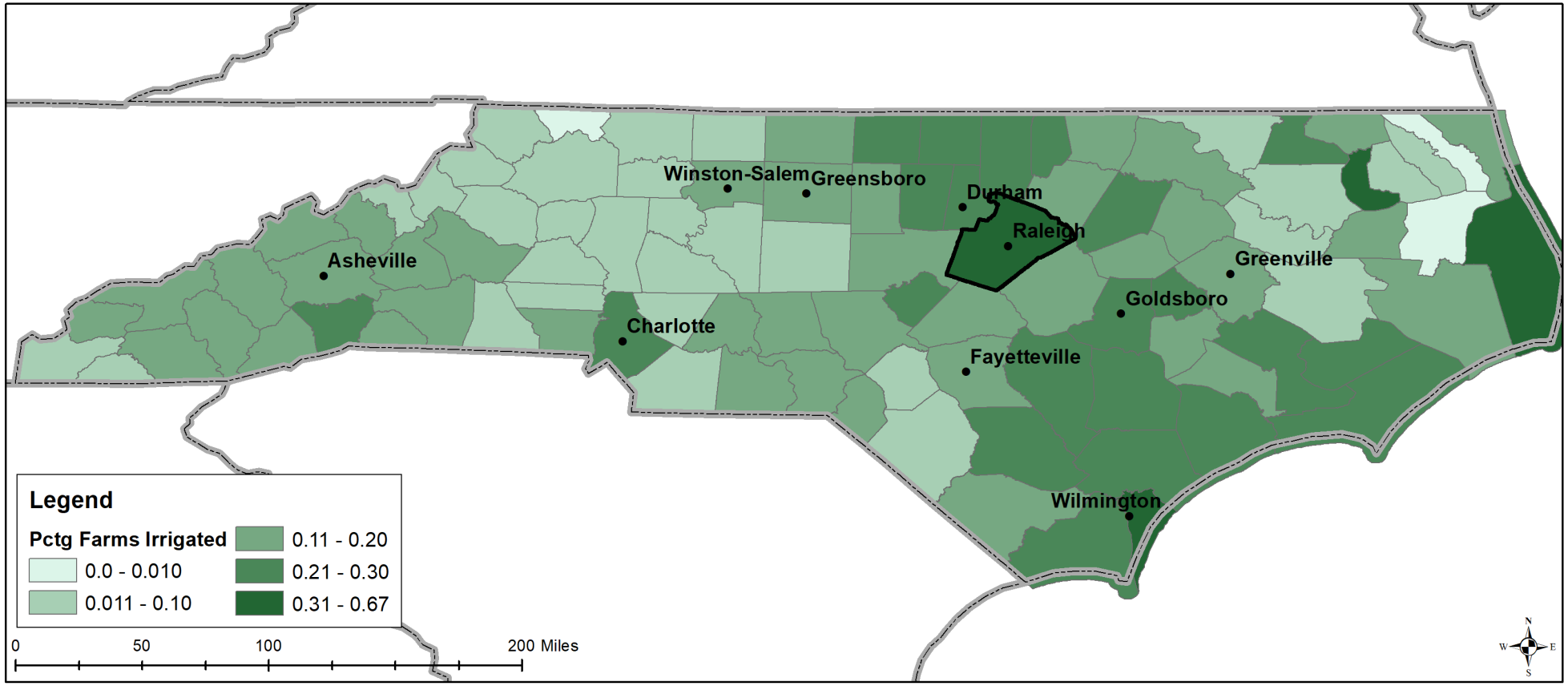
Irrigation

Percentage of Crop Acres Drained



Data source: USDA Ag Census Quick Stats

Percentage of Farms with Irrigation



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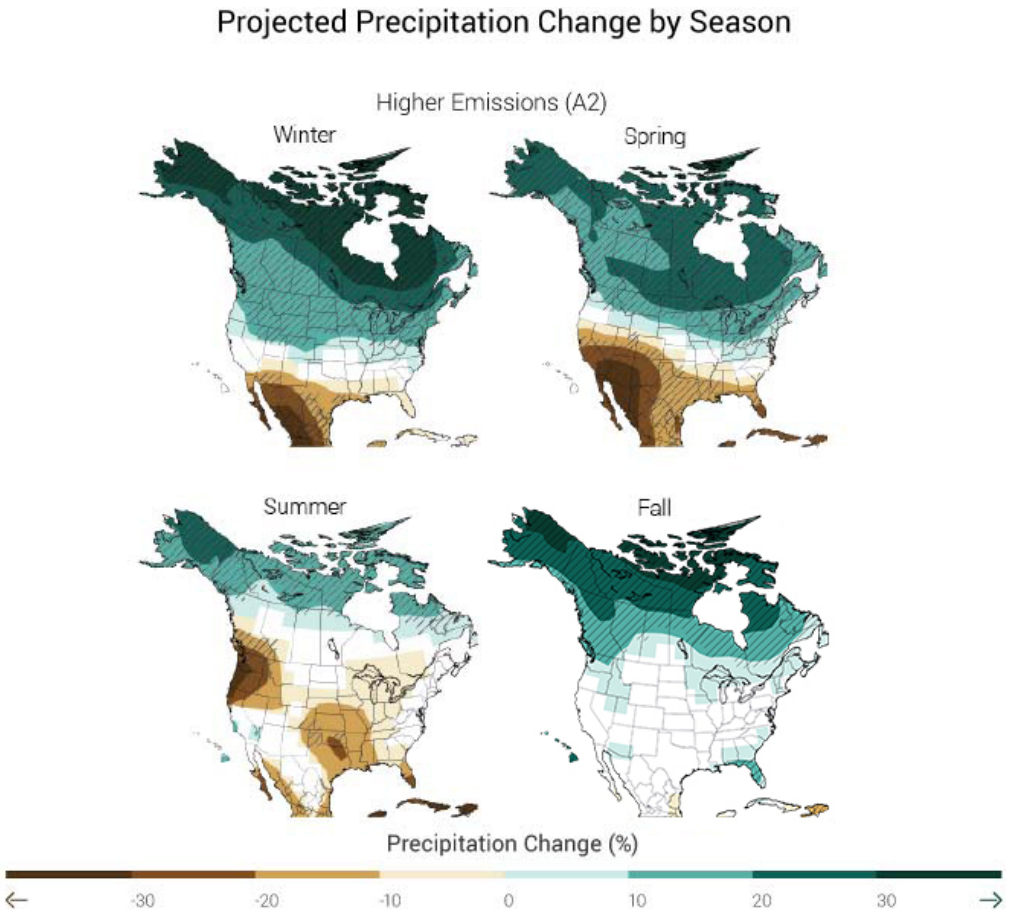
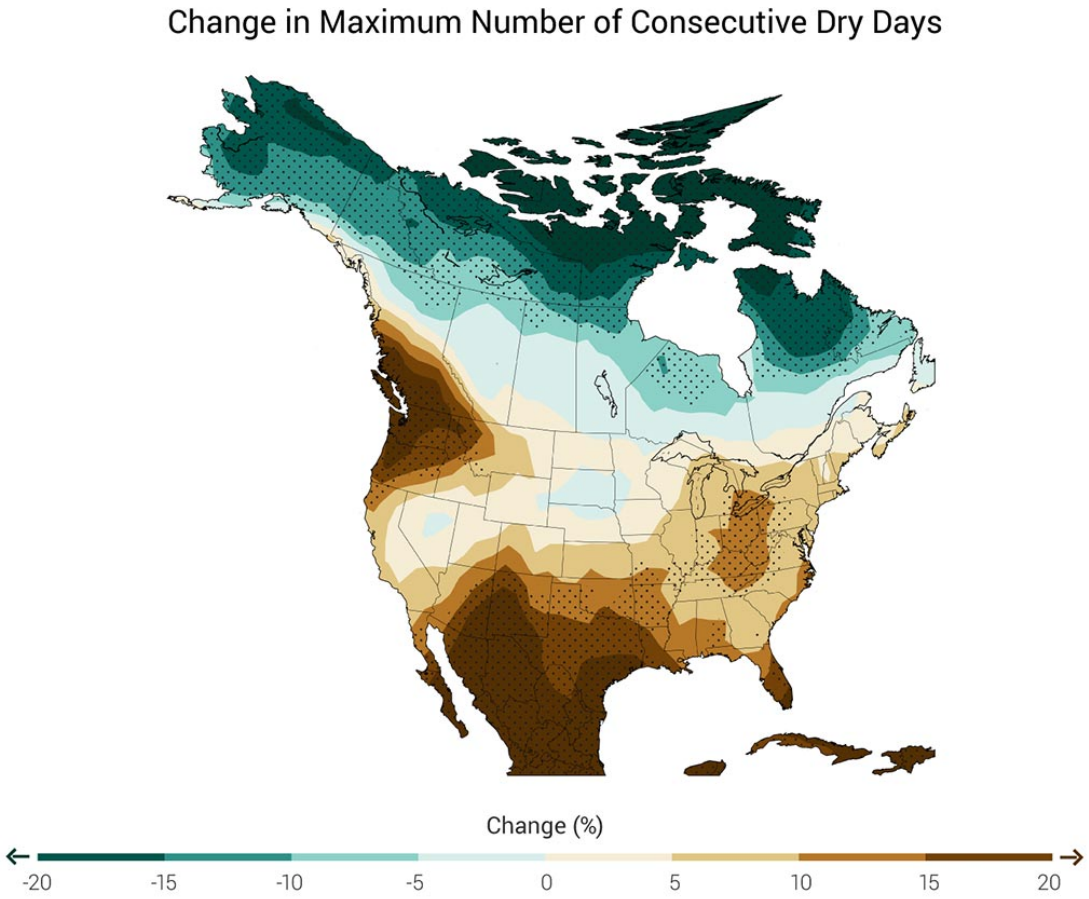
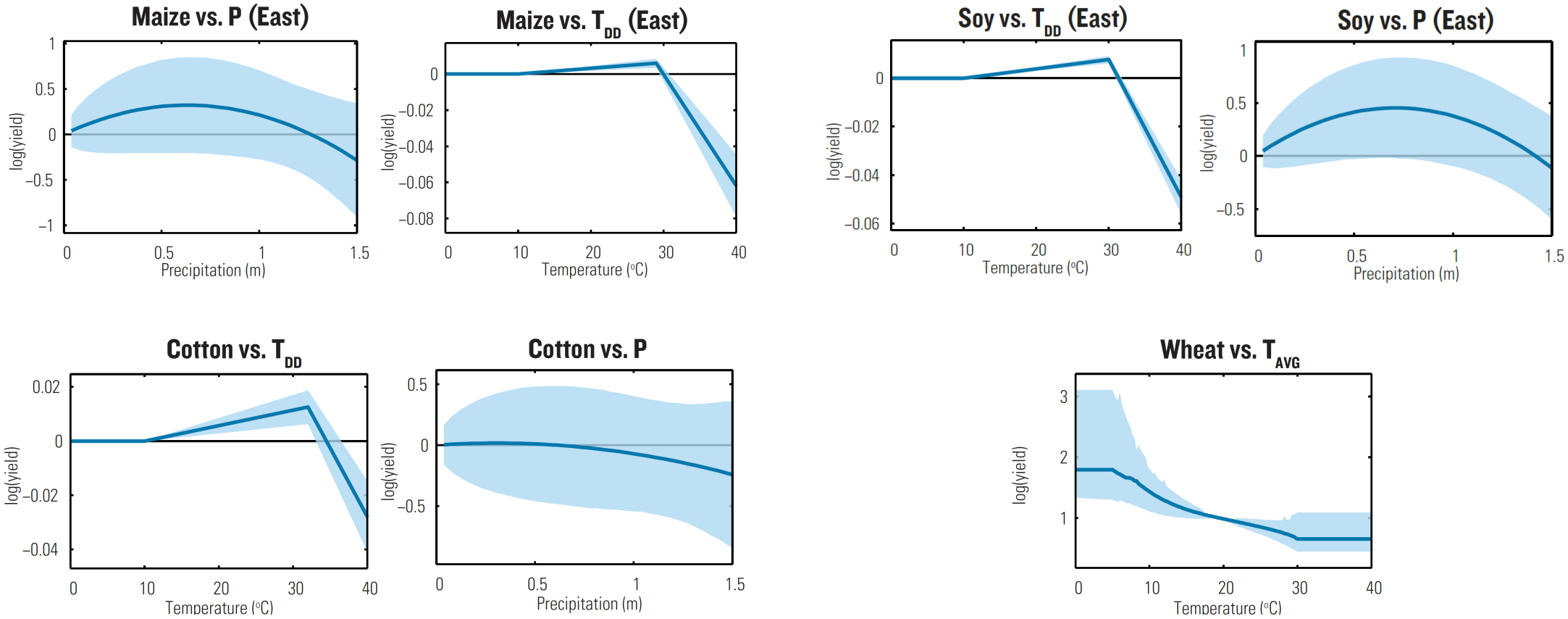
Climate Change, Present and Future





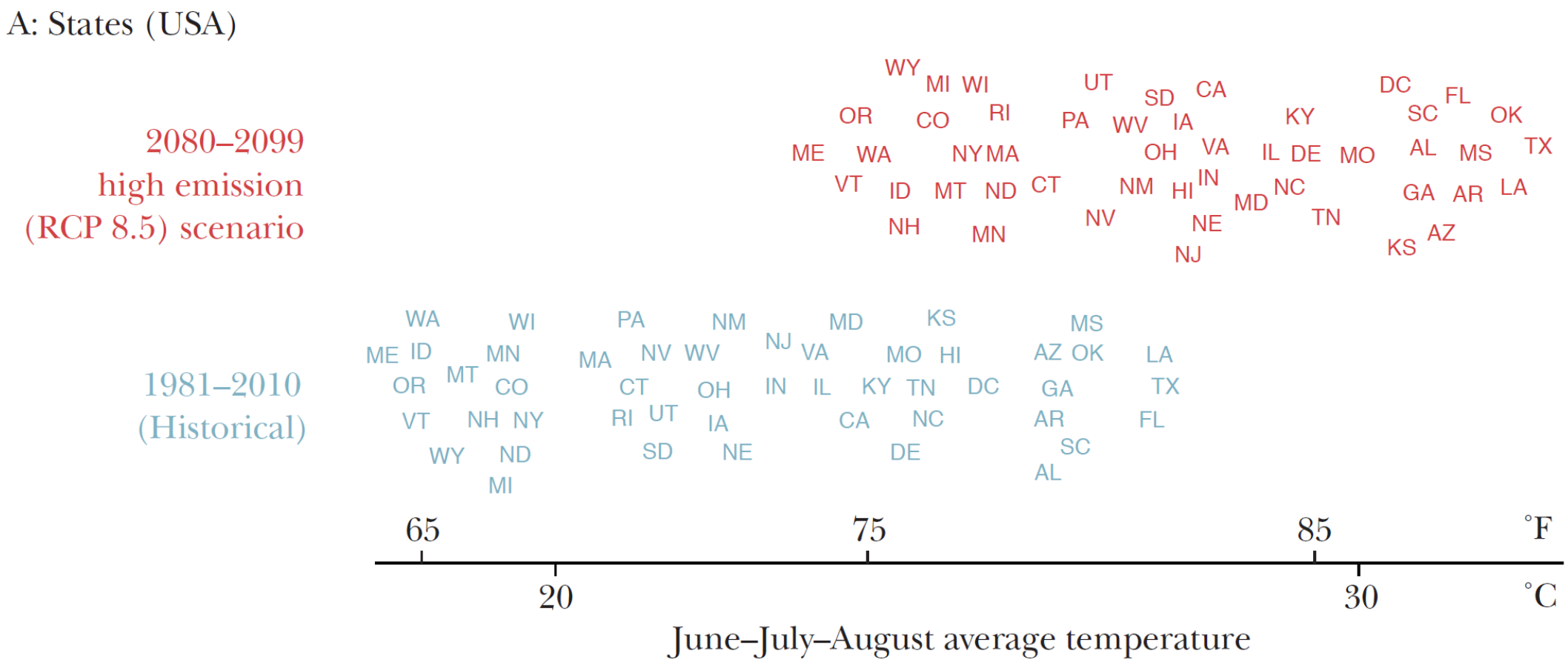
Source: National Climate Assessment with data from NOAA NCDC / CICS-NC

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



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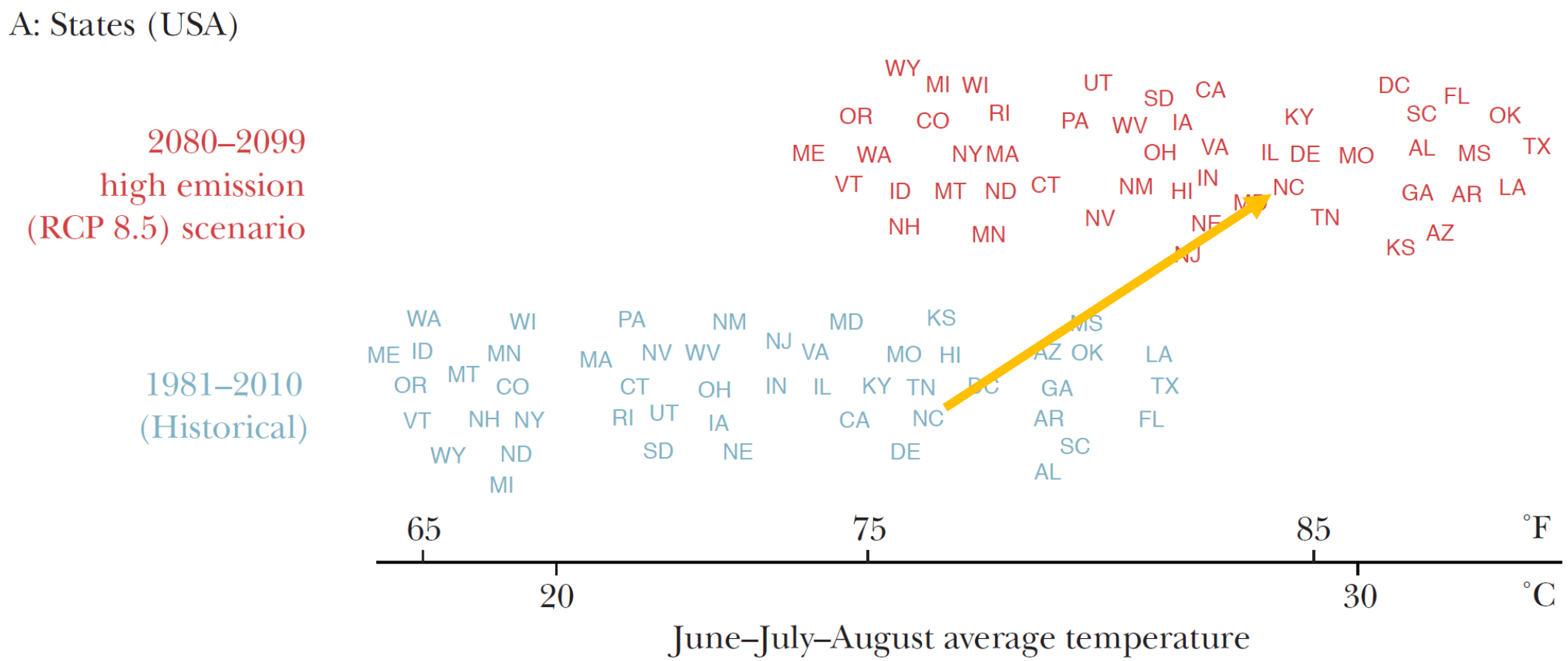

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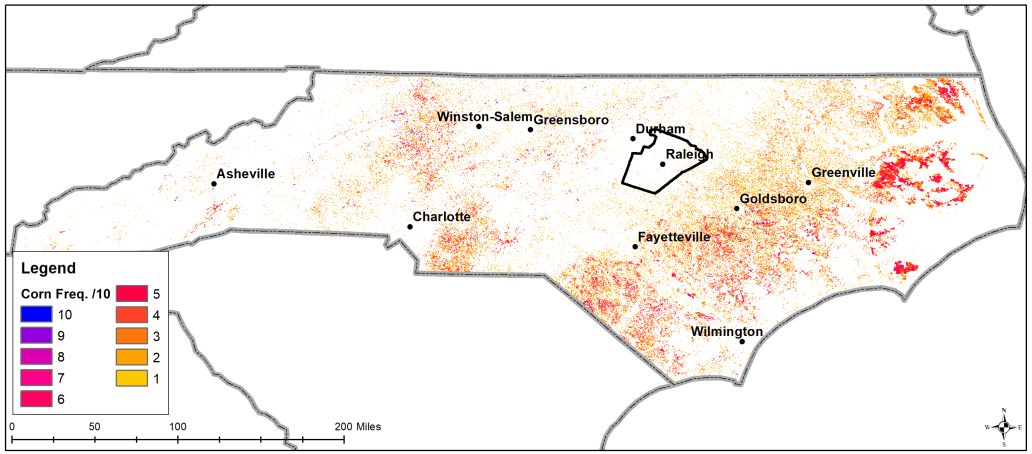
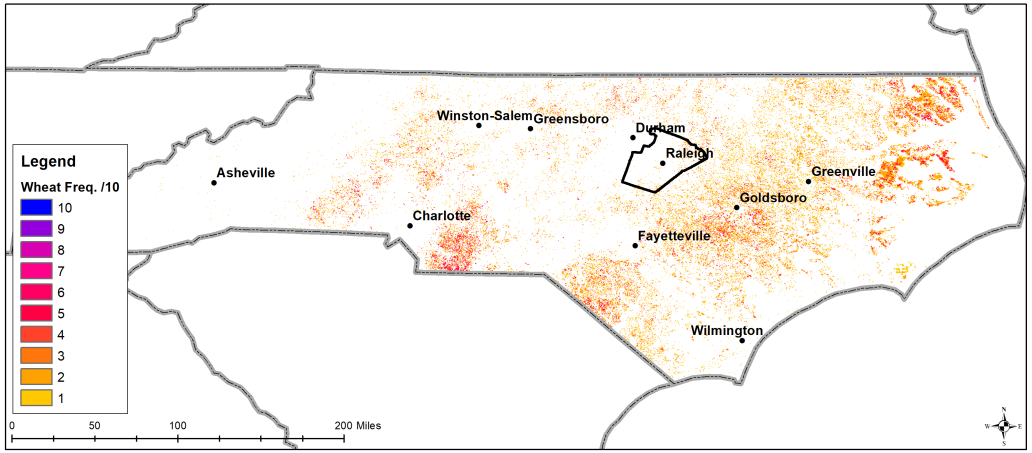
10-year Crop Frequencies

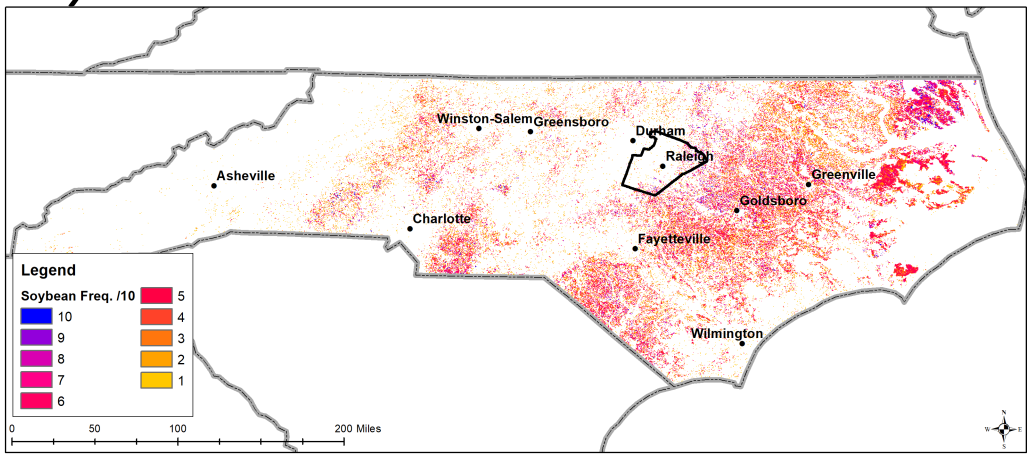
Corn



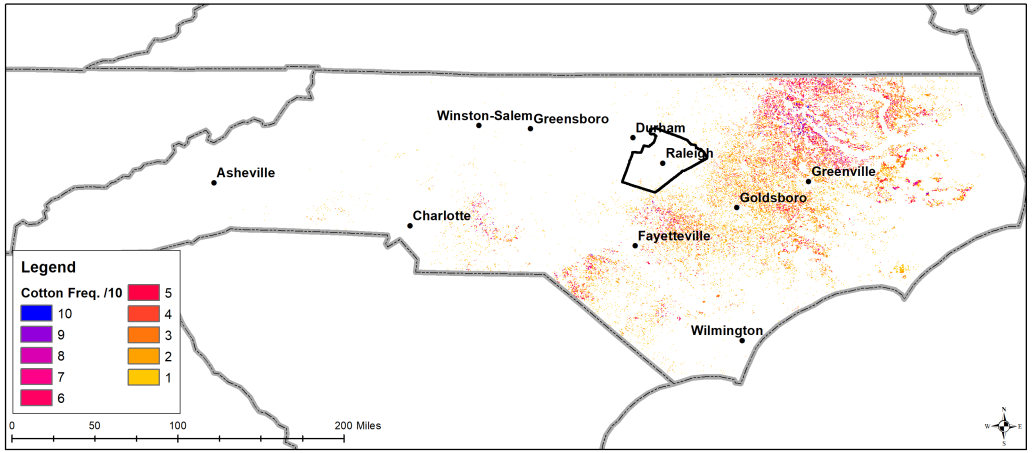
Wheat



Soybeans

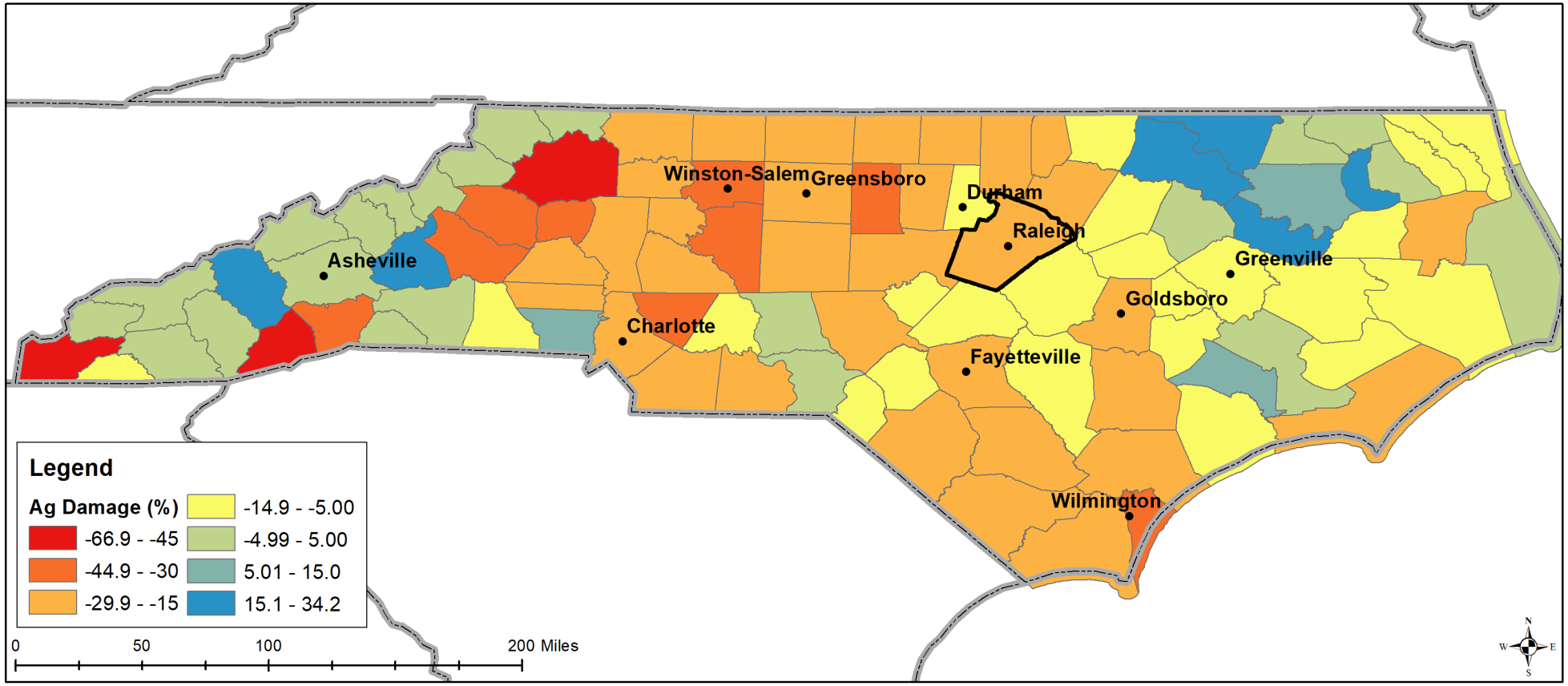


Cotton



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)

Data sources: USDA Ag Census Quick Stats and Hsiang et al (2017)

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?

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