AMT Yield Progress

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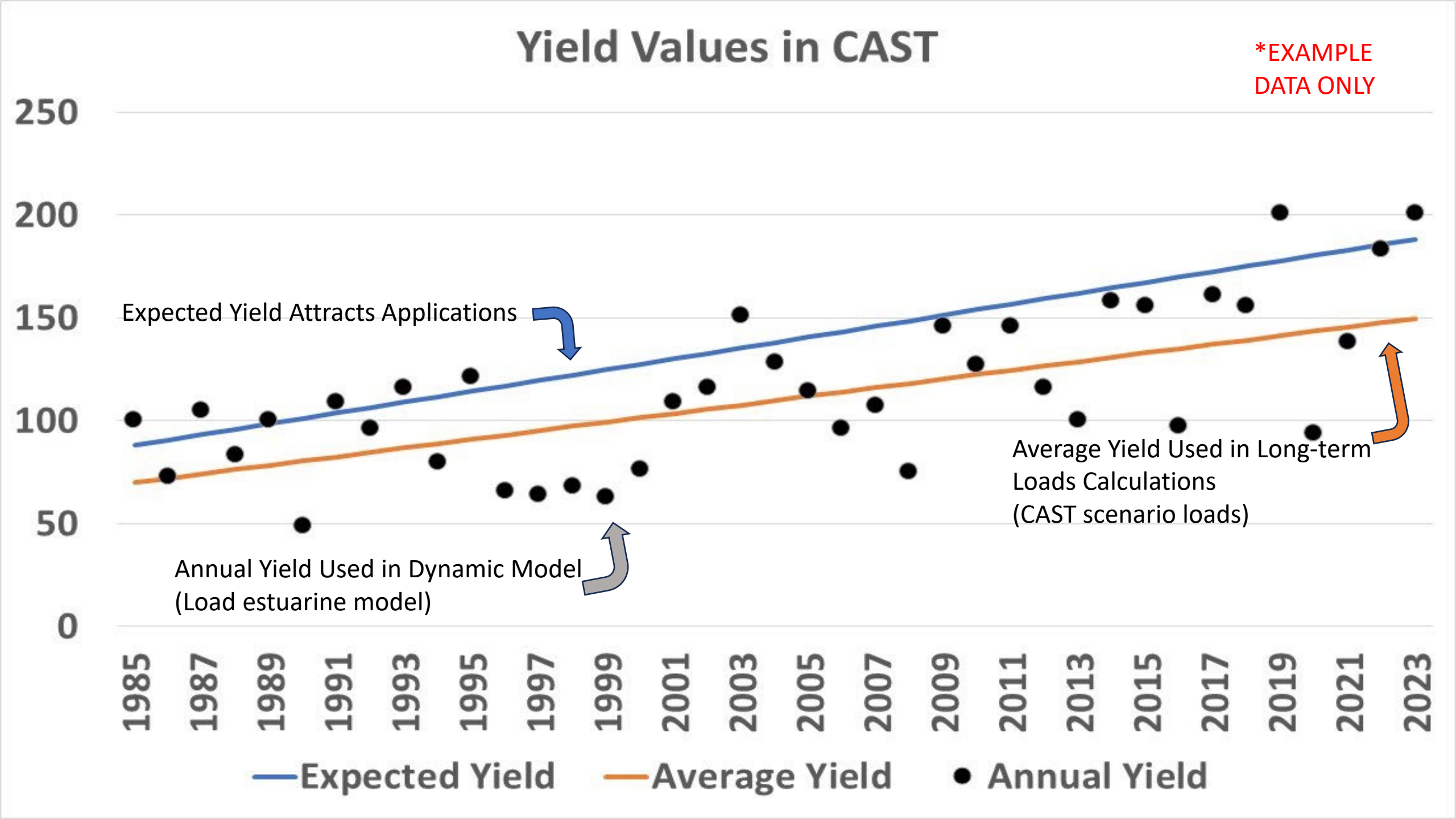
9.23

August Recap

Best method of simulating nutrient applications

Requires us to know:

- Yield trends over time
- How a farmer views yields in relation to nutrient applications


Yield Values in CAST
*EXAMPLE DATA ONLY
250
200
150
100
50
0
Expected Yield Attracts Applications
Annual Yield Used in Dynamic Model
(Load estuarine model)
Average Yield Used in Long-term Loads Calculations
(CAST scenario loads)
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
2019
2021
2023
Expected Yield
Average Yield
Annual Yield

What Yield data are used in CAST?

Annual Surveys

- corn for grain
- soybeans for beans
- barley for grain
- alfalfa hay
- corn for silage or greenchop
- wheat for grain
- oats for grain

Ag census

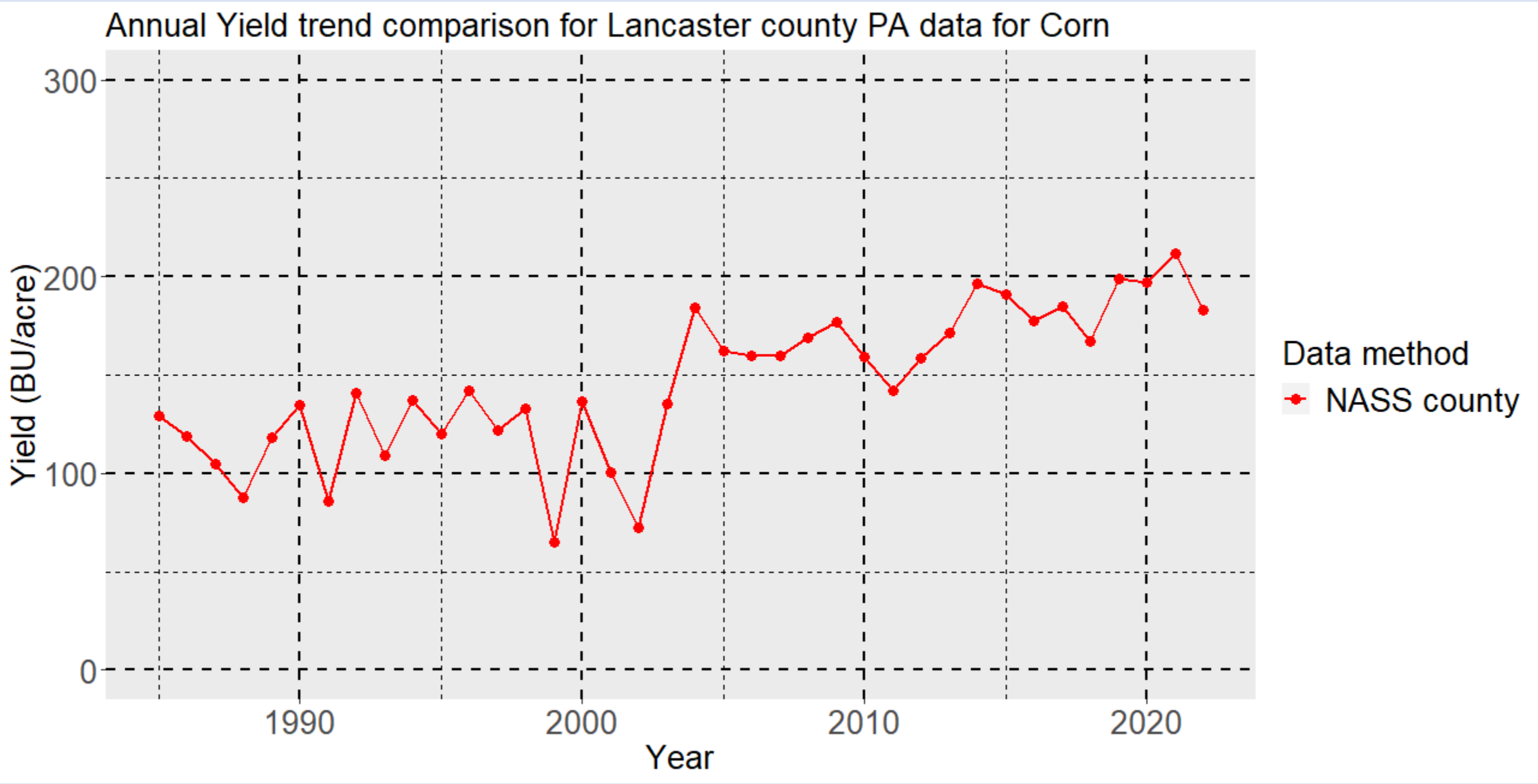
- alfalfa hay
- barley for grain
- buckwheat
- corn for grain
- corn for silage or greenchop
- oats for grain
- rye for grain
- sorghum for grain
- sorghum for silage or greenchop
- soybeans for beans
- wheat for grain

NOTE* annual survey coverage is based on crop data available to all states

Lets look at a specific example:

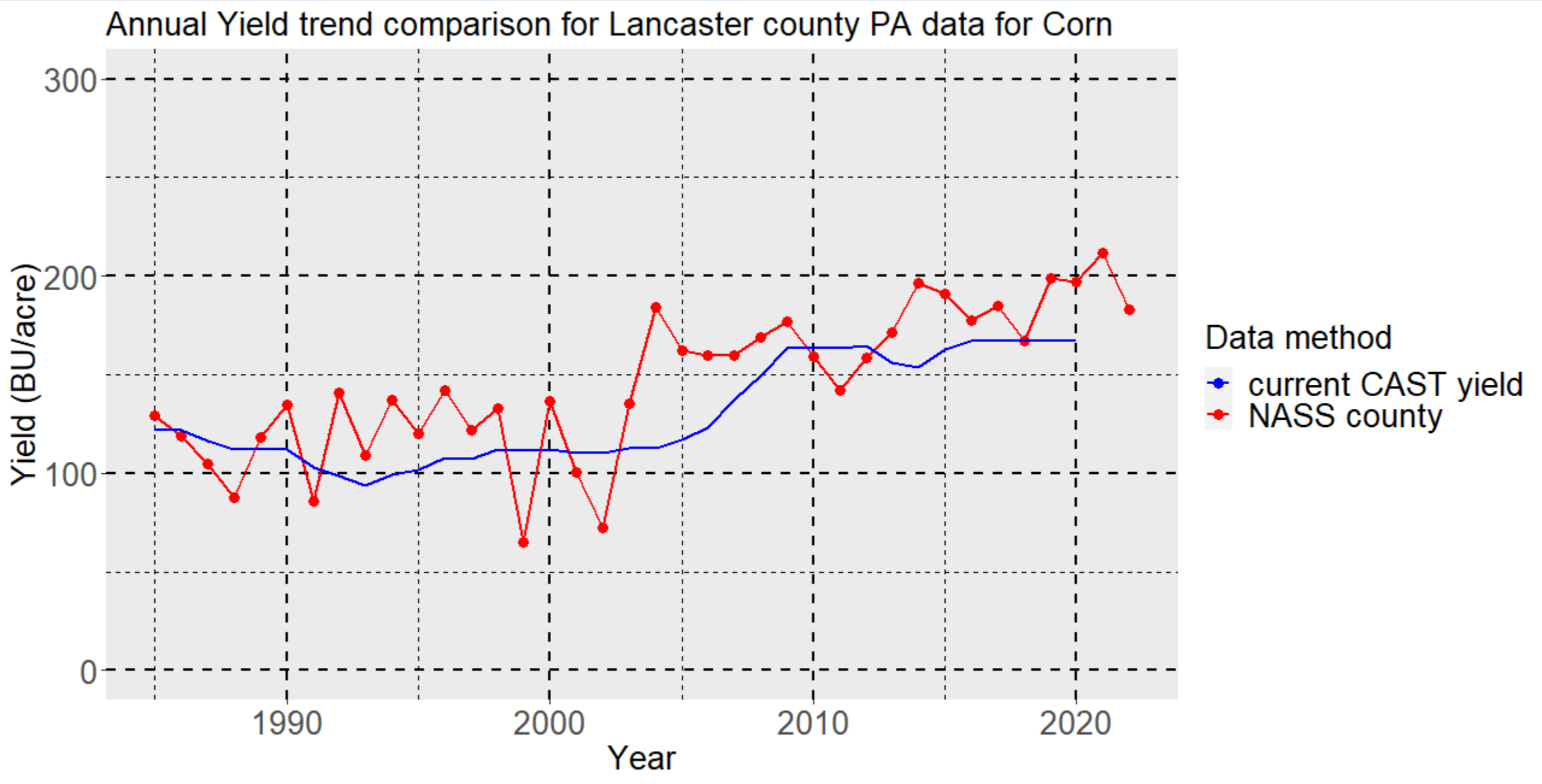
Lancaster, PA

Corn for grain


Annual Yield trend comparison for Lancaster county PA data for Corn
300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
NASS county

August group ideas to improve model yields

1. NASS annual survey averages – Five year trailing average
2. Nutrient management – Best three of five
3. Industry yield rate comparison
    1. 2% increase over time (60% increase over 30 years)
    2. Annual decline over time (2% decrease annually from 2021)


Annual Yield trend comparison for Lancaster county PA data for Corn
300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
current CAST yield
NASS county

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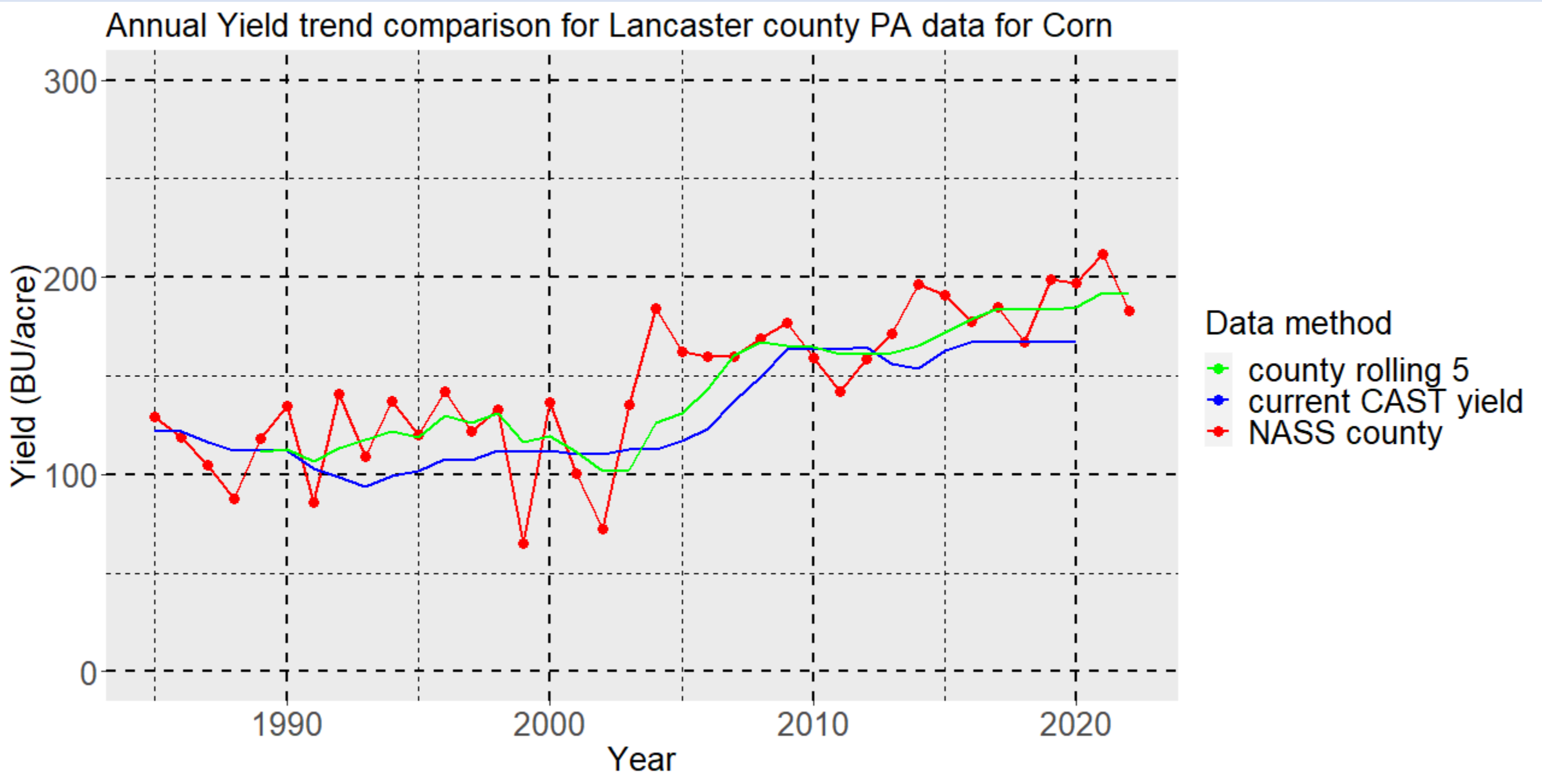
Annual Yield trend comparison for Lancaster county PA data for Corn
300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
county rolling 5
current CAST yield
NASS county

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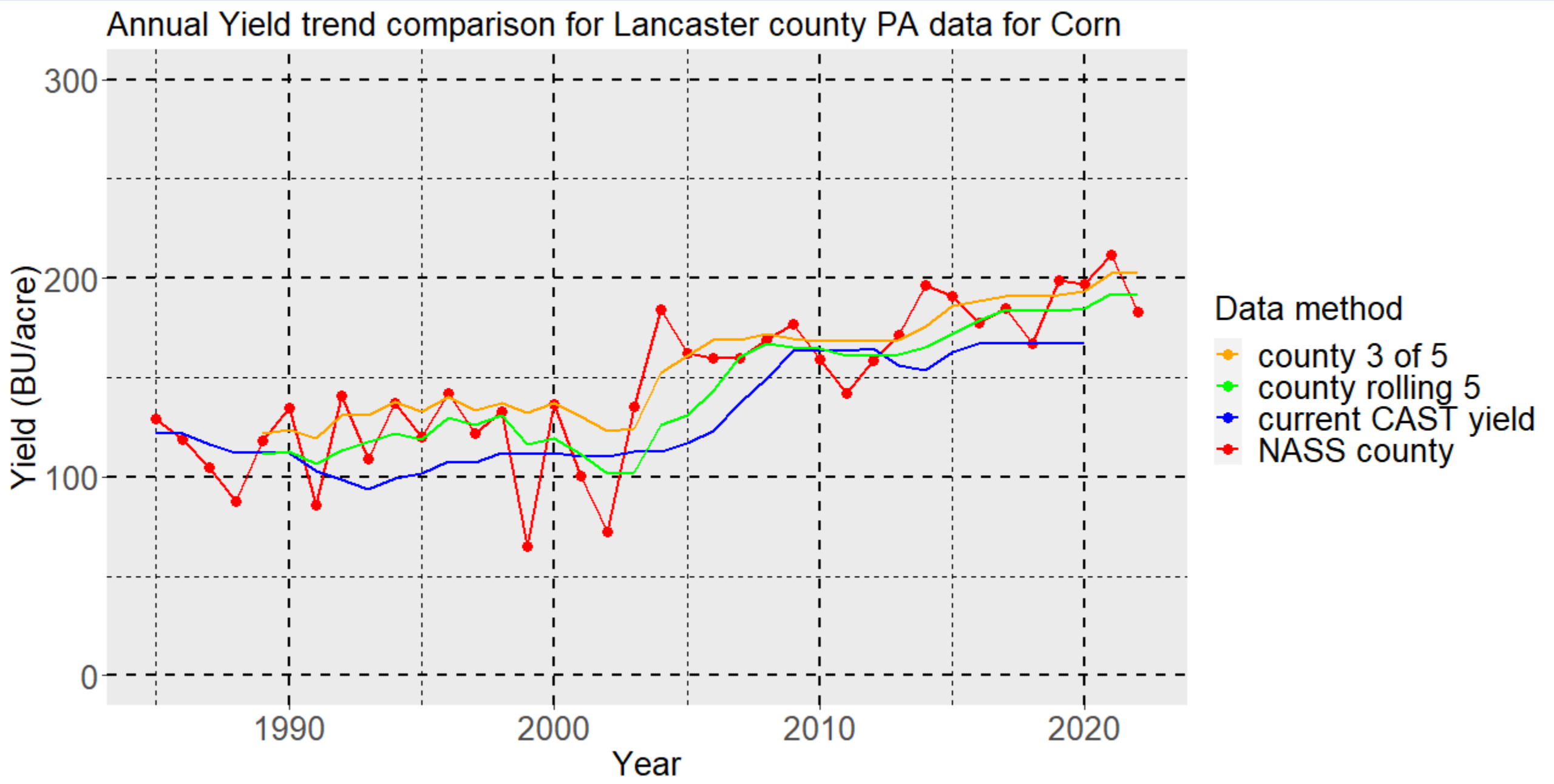
Annual Yield trend comparison for Lancaster county PA data for Corn
300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
county 3 of 5
county rolling 5
current CAST yield
NASS county

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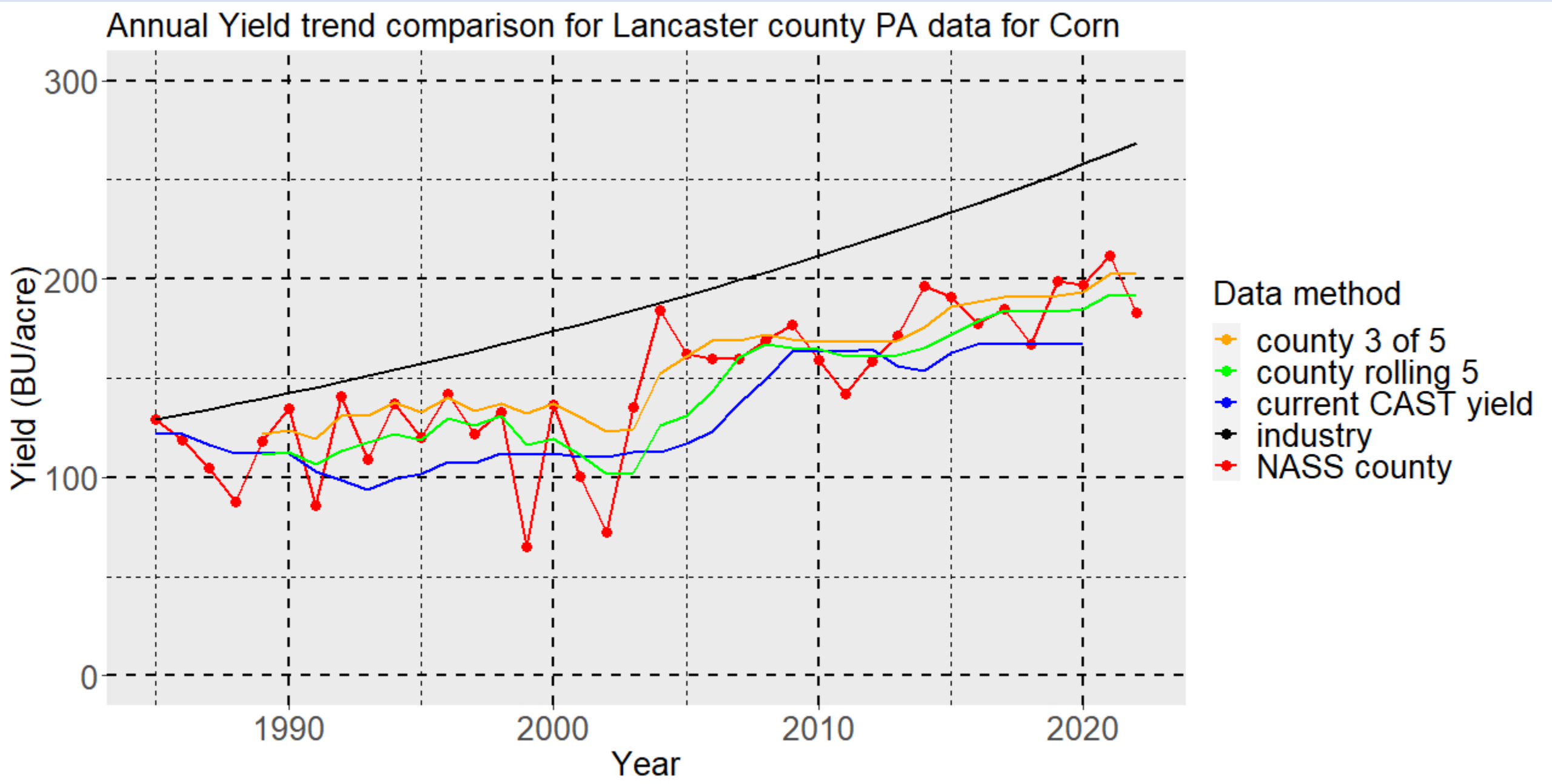
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300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
county 3 of 5
county rolling 5
current CAST yield
industry
NASS county

August group ideas to improve model yields

- NASS annual survey averages – Five year trailing average
- Nutrient management – Best three of five
- Industry yield rate comparison
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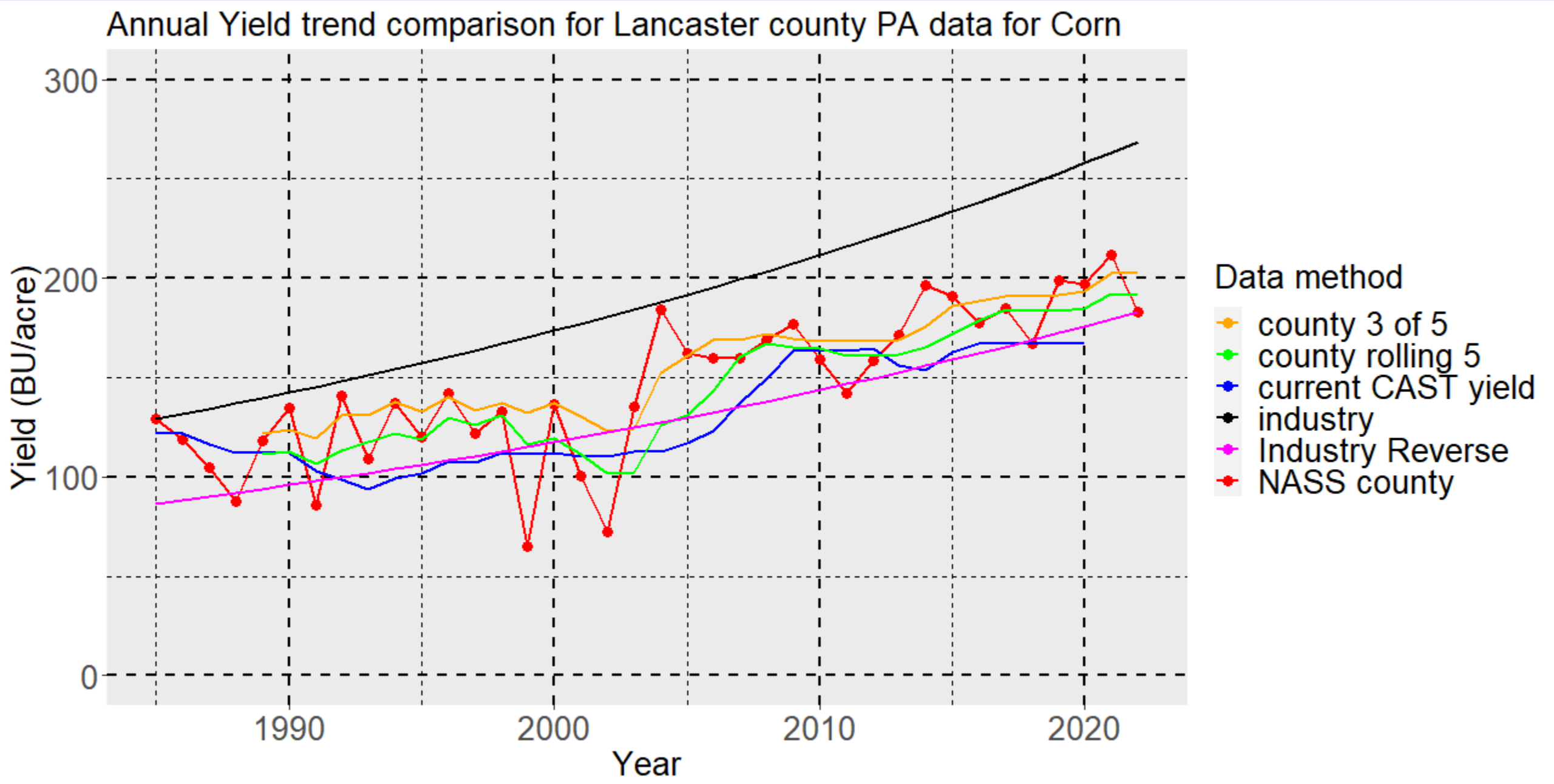
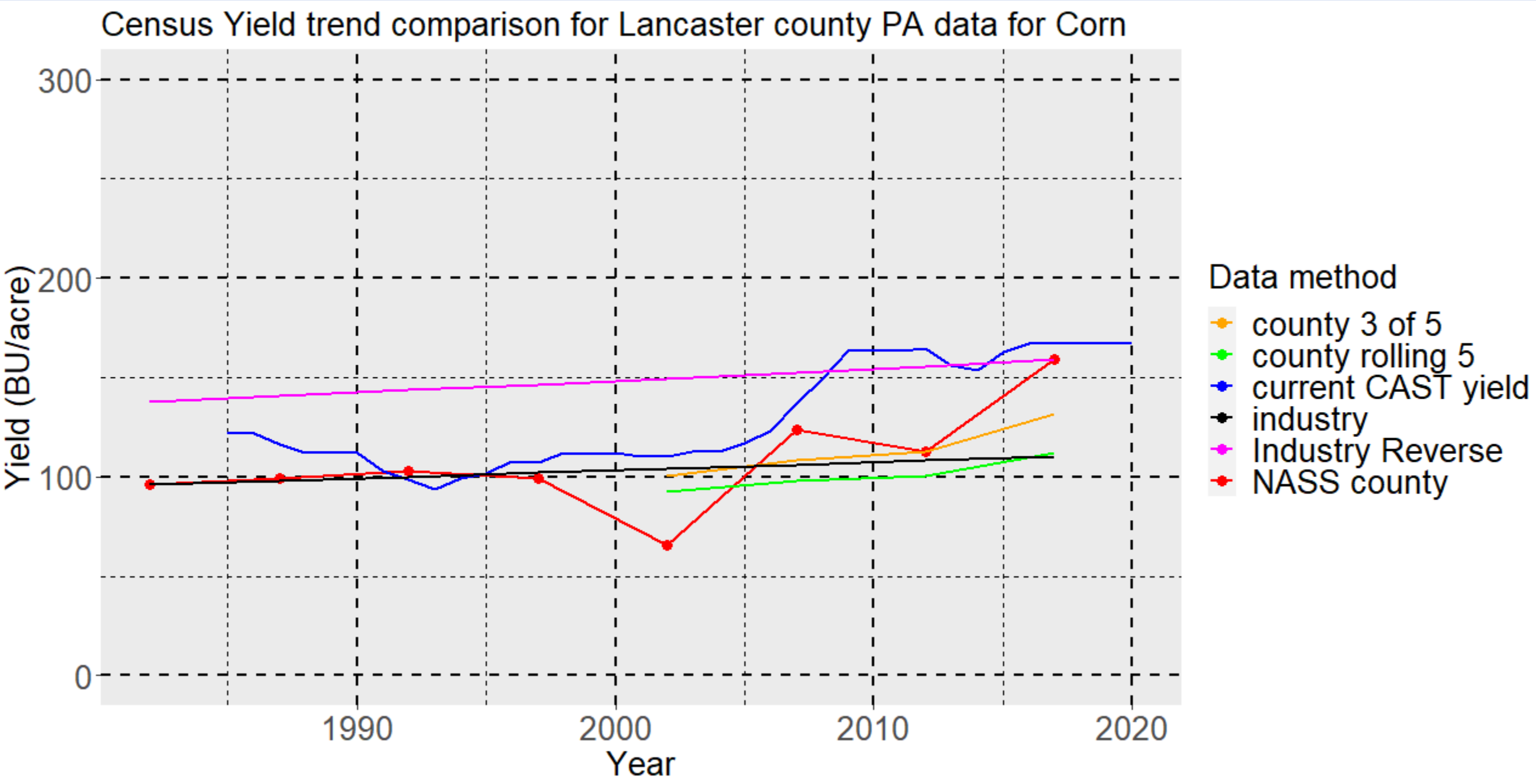
  - **Annual decline over time (2% decrease annually from 2021)**


Annual Yield trend comparison for Lancaster county PA data for Corn
300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
county 3 of 5
county rolling 5
current CAST yield
industry
Industry Reverse
NASS county

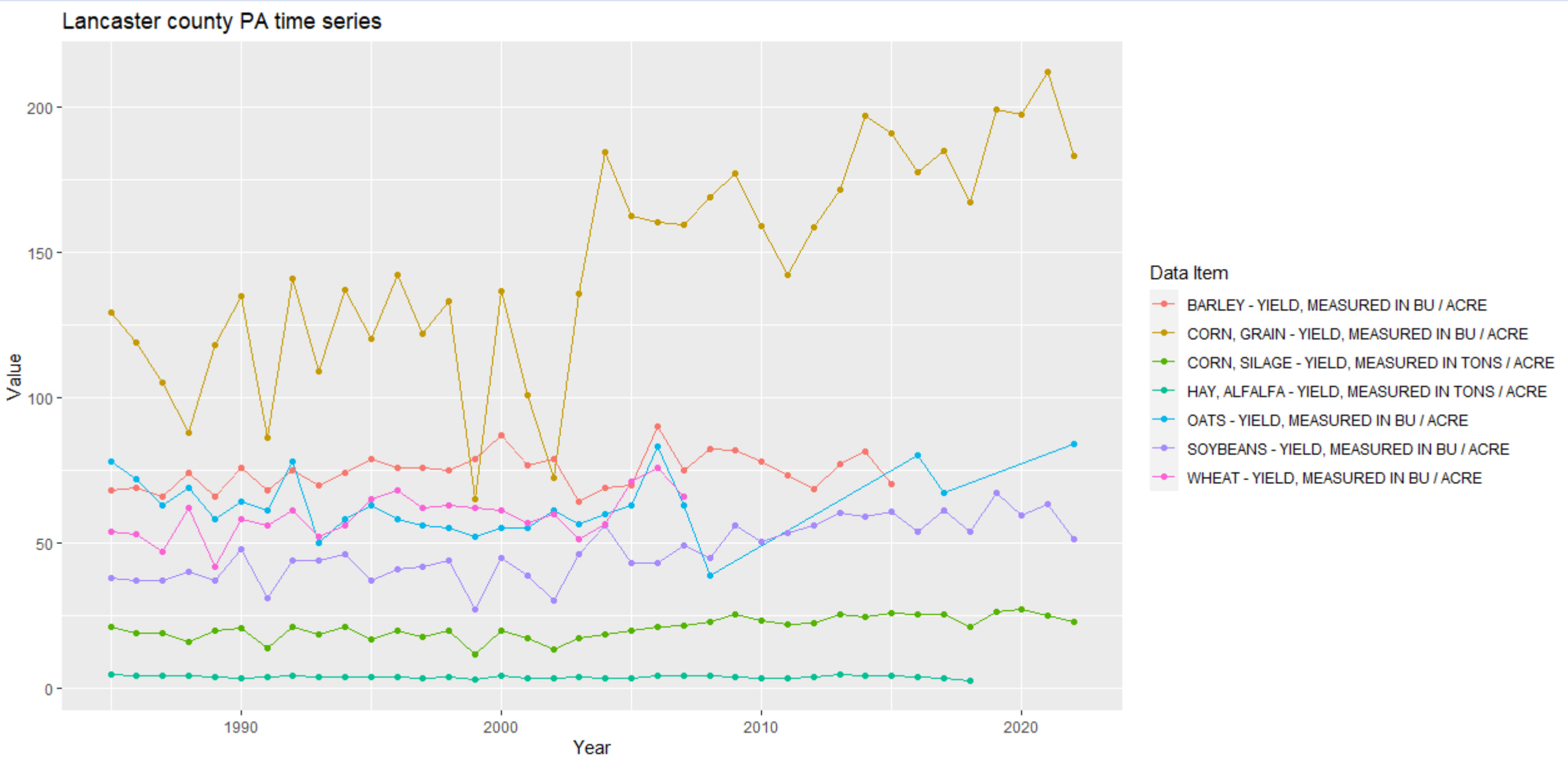
Does this still work with the census?

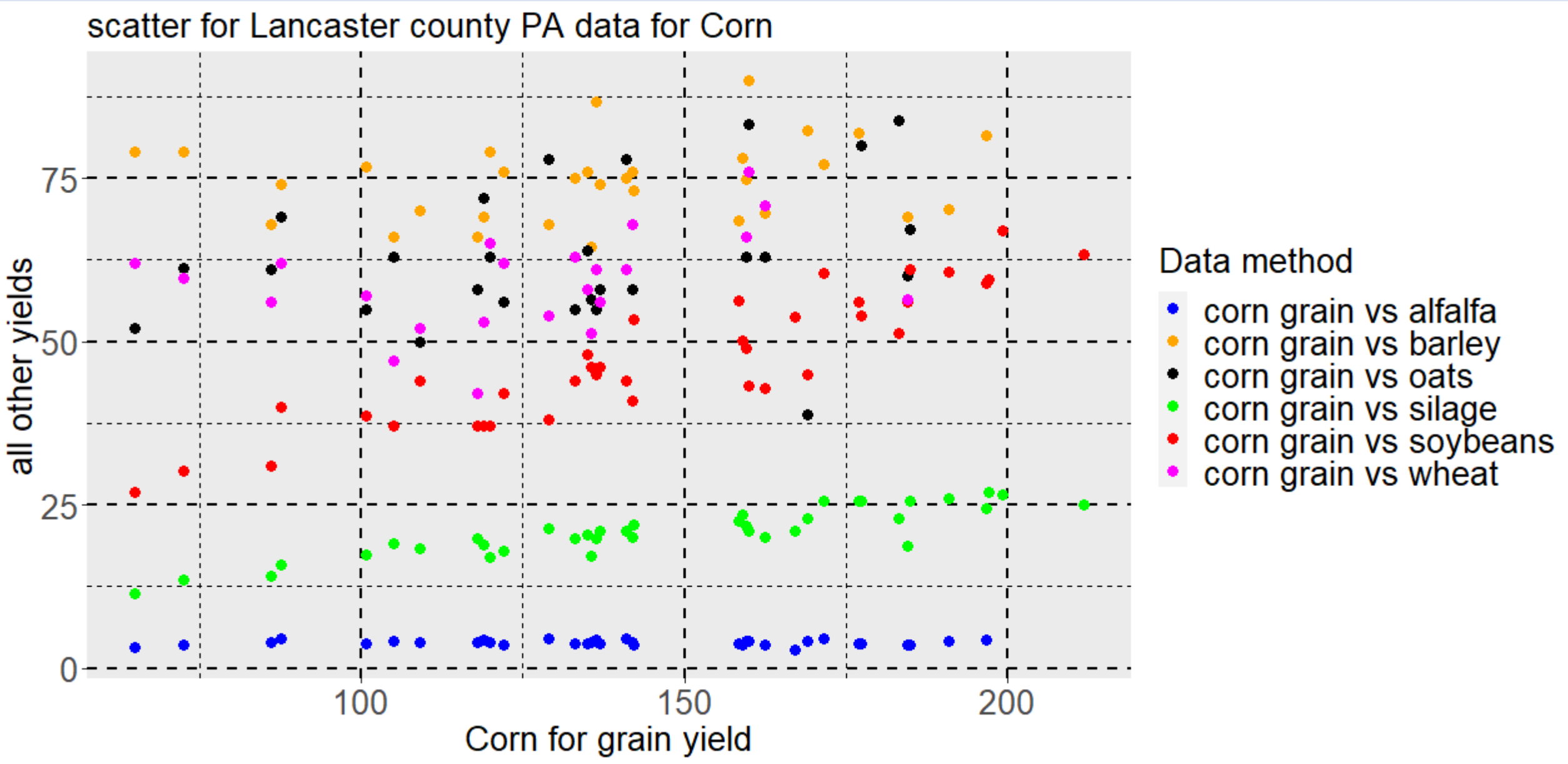
1. NASS Five year census survey averages – Five year trailing average
2. **Nutrient management – Best three of five**
3. Industry yield rate comparison
    1. 2% increase over time (60% increase over 30 years)
    2. Annual decline over time (2% decrease annually from 2021)


Census Yield trend comparison for Lancaster county PA data for Corn
300
200
100
0
Yield (BU/acre)
1990
2000
2010
2020
Year
Data method
county 3 of 5
county rolling 5
current CAST yield
industry
Industry Reverse
NASS county

How can we deal with crops that aren’t in the updated annually?

- Lancaster County Time series
- 7 annually updated crops
- Look for correlations


Lancaster county PA time series
Value
200
150
100
50
0
1990
2000
2010
2020
Year
Data Item
BARLEY - YIELD, MEASURED IN BU / ACRE
CORN, GRAIN - YIELD, MEASURED IN BU / ACRE
CORN, SILAGE - YIELD, MEASURED IN TONS / ACRE
HAY, ALFALFA - YIELD, MEASURED IN TONS / ACRE
OATS - YIELD, MEASURED IN BU / ACRE
SOYBEANS - YIELD, MEASURED IN BU / ACRE
WHEAT - YIELD, MEASURED IN BU / ACRE


scatter for Lancaster county PA data for Corn
all other yields
0
25
50
75
100
150
200
Corn for grain yield
Data method
corn grain vs alfalfa
corn grain vs barley
corn grain vs oats
corn grain vs silage
corn grain vs soybeans
corn grain vs wheat

Correlation table for annually update crops

Correlatic	barley	corn_grai	corn_sila	alfalfa	oats	soybeans	wheat
barley		0.17	0.15	0.01	-0.01	0.08	0.7
corn_grain			0.9	0.03	0.3	0.91	0.31
corn_silage				0.2	0.35	0.87	0.09
alfalfa					0.37	-0.02	-0.07
oats						0.21	0.27
soybeans							0.13
wheat							

Summary

- In Lancaster County, PA for Corn for grain:
  - Both five year rolling average, and fixed 2% decrease since 2021 track annual data.
  - No method works well for data collected every five years.
  - Corn has a large impact on yields across the watershed
    - Corn and soybeans appear to be correlated
- Still need to think about annual variability and crops without annual updates.
- Plays into what crops and land uses we want to have.

Questions?