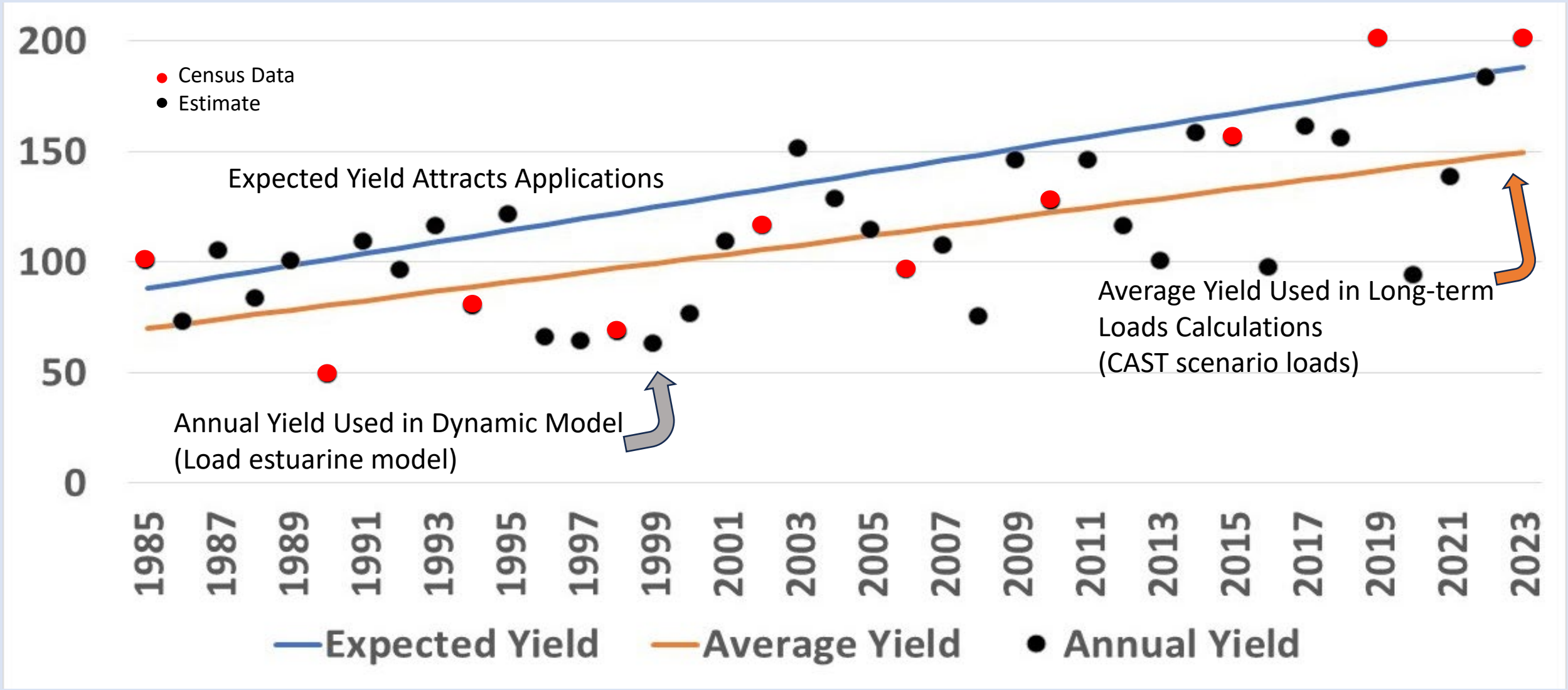
Yields

11/8/2024

*EXAMPLE
DATA ONLY



*EXAMPLE
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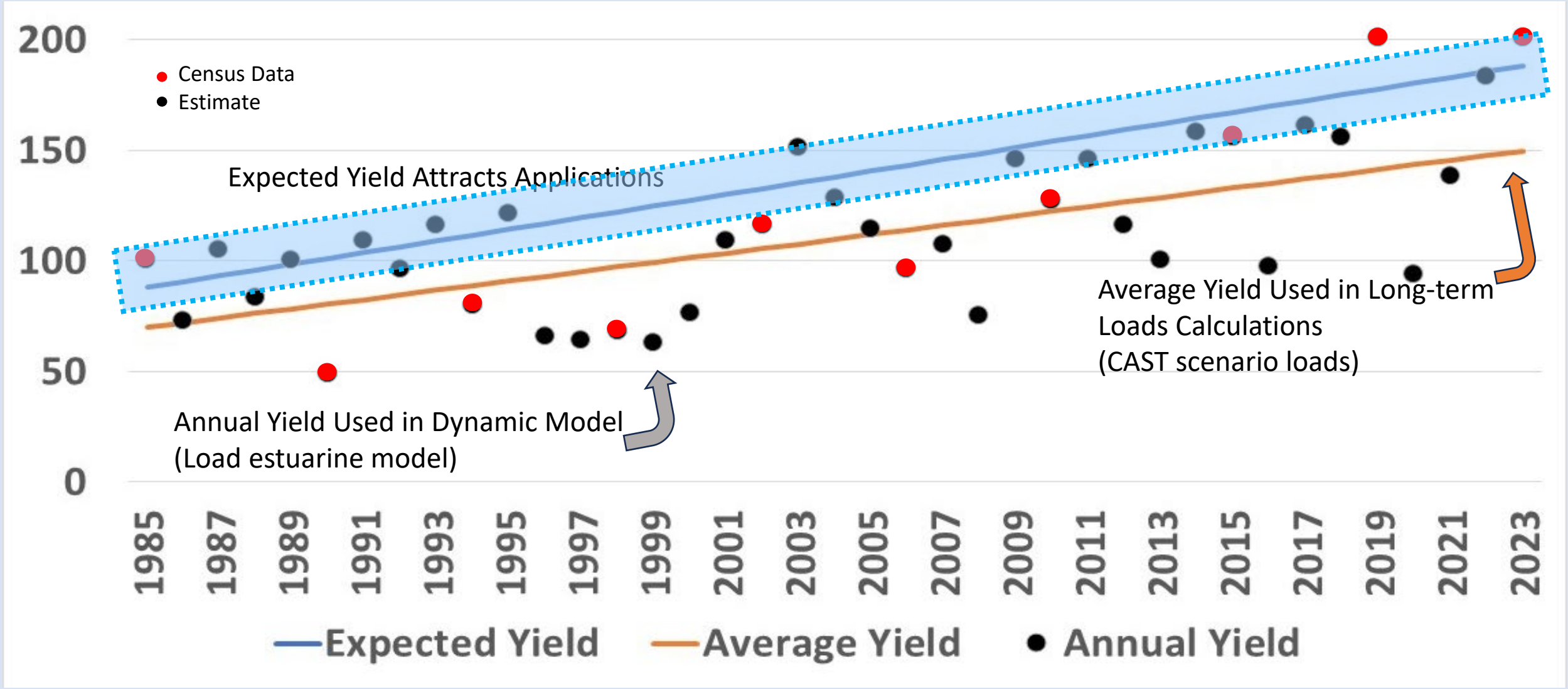


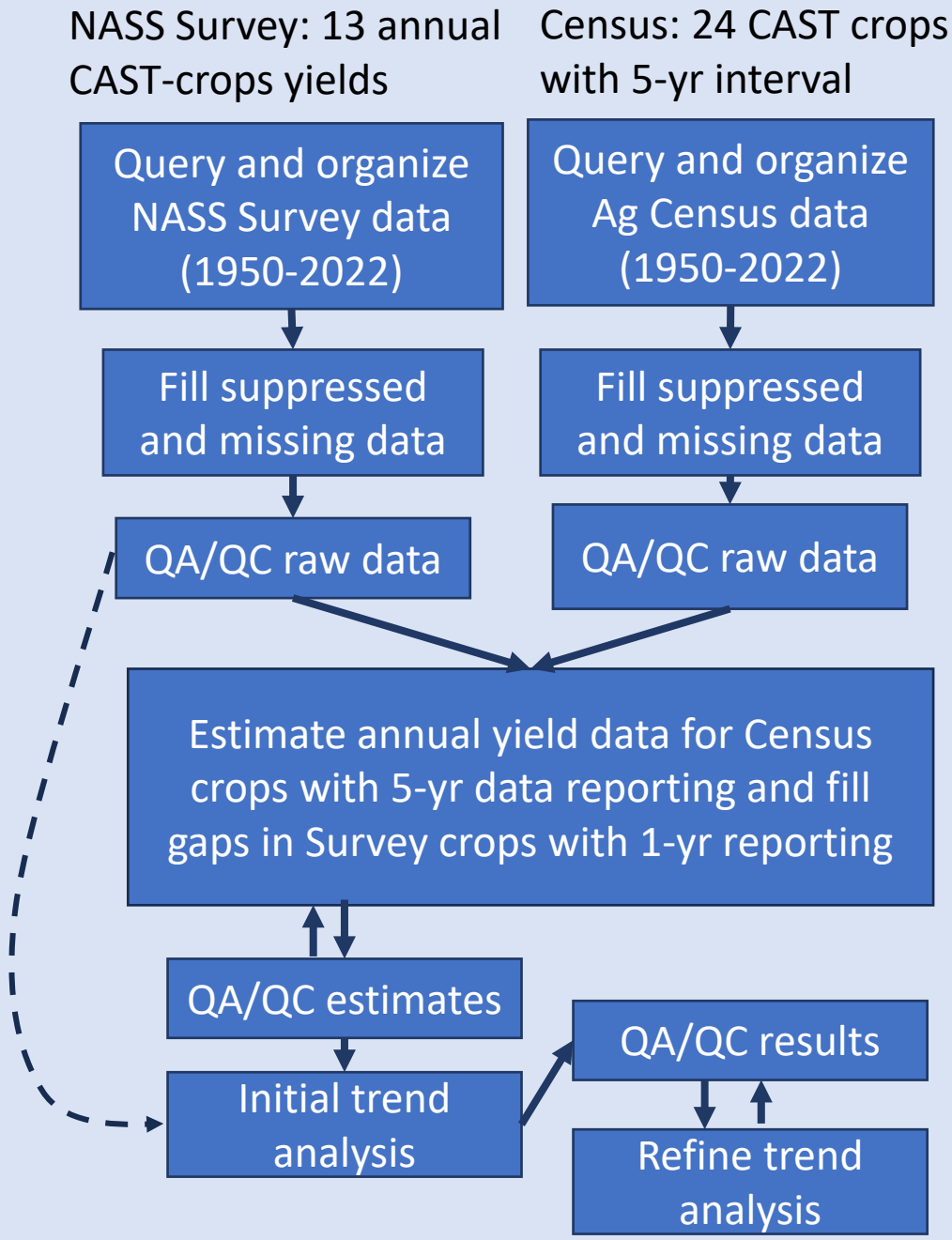
Iterative and collaborative process:

Planned path for investigation

Goals:

- Estimate farmer yield expectations at the county level which drive the application of nutrients.
- Estimate various yield trends to support several potential scenarios.

Approach: Use trend analysis of long-term annual crop yields.



Statistical modeling method for estimating annual yields

multivariate linear models, bootstrapped (LOO) BIC and conceptual model selection

$$Yield_{\text{crop i, growth region j}} \sim f(\text{time, weather, climate, Survey crop yields, economics})$$

Predictor list built with Work Group input

Weather and climate:

- Precip. – growing season
- Precip. – winter
- Wet day frequency – growing season
- Avg temp. - growing season
- Avg temp. – annual
- Growing degree day
- Heat stress – 5 consecutive days with max temp. > 86F
- Drought – 40 days Apr.-Jul. with < 2 in rainfall

Survey crop yields:

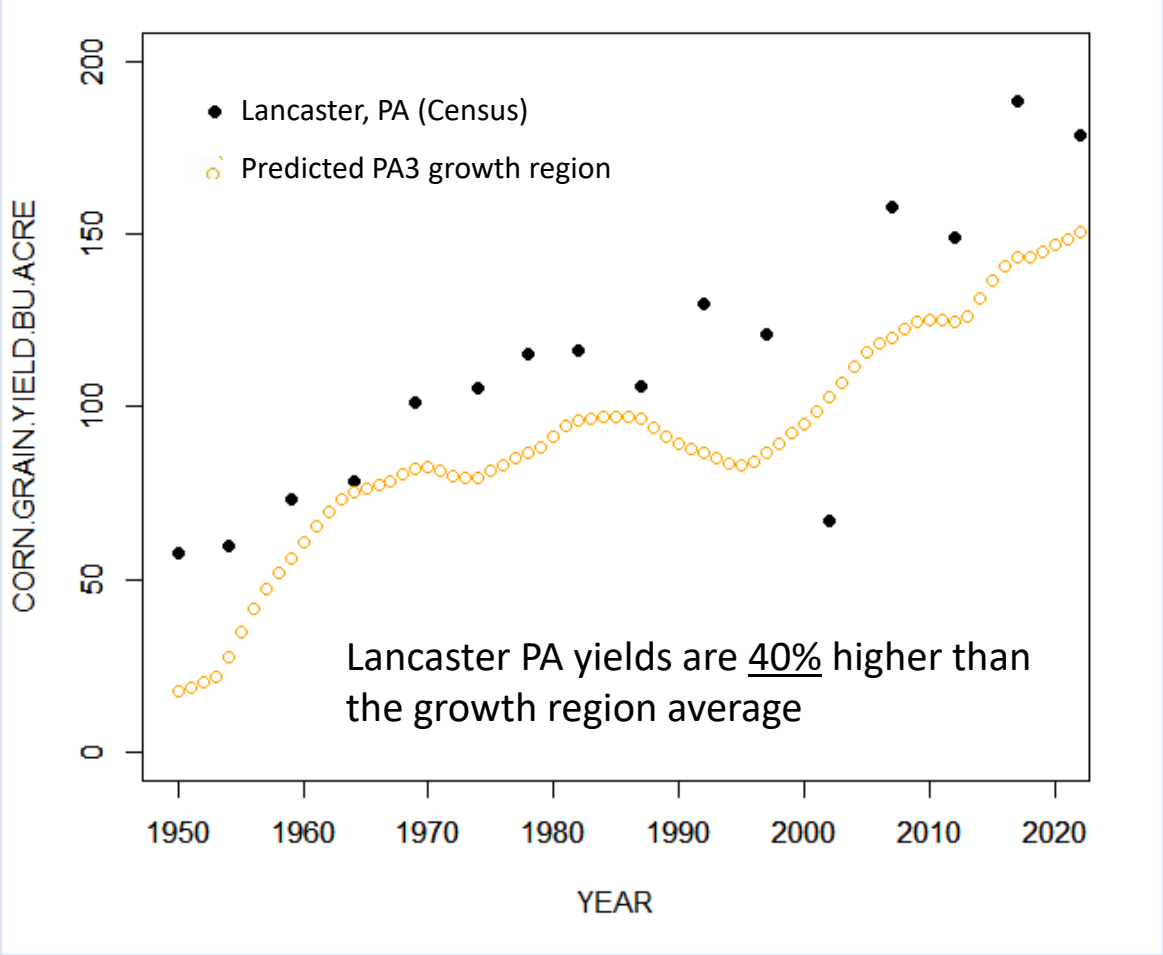
- Corn-grain
- Corn-silage
- Barley
- Alfalfa
- Oats
- Wheat
- Soy

Survey price data:

- Corn
- Sorghum
- Hay
- Wheat
- Oil/gas

Continued improvements

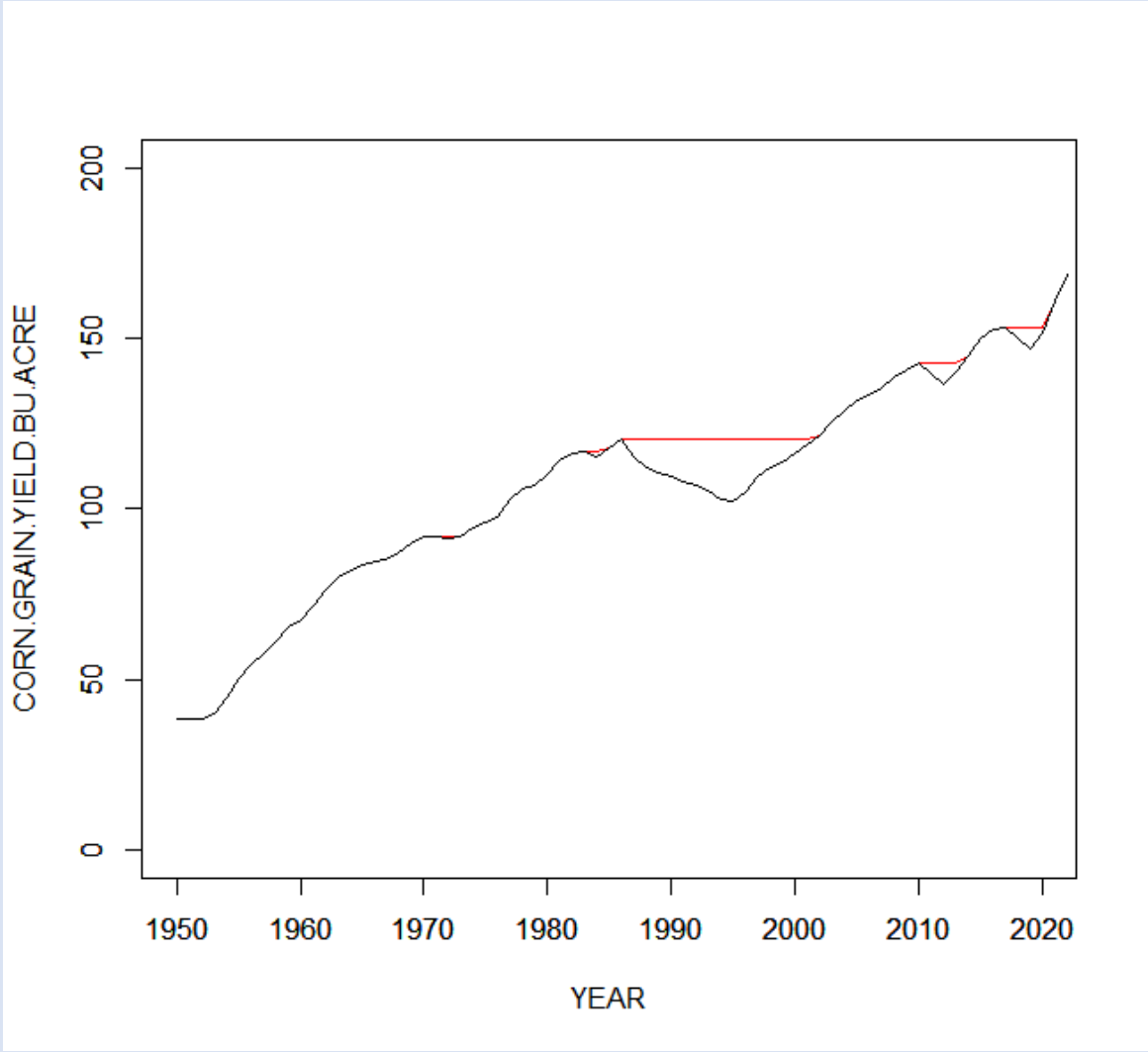
- Initially… Aggregating to the growth region was done to improve data quality over the largest number of counties and crops where data at the individual county can be unreliable.
- HOWEVER, this has resulted in predicted yields which are (much) too low for counties which have high yields relative to their growth region.
- Because counties with high relative yields are also likely to have more acres this issue skews the watershed wide demand for N application down as well.



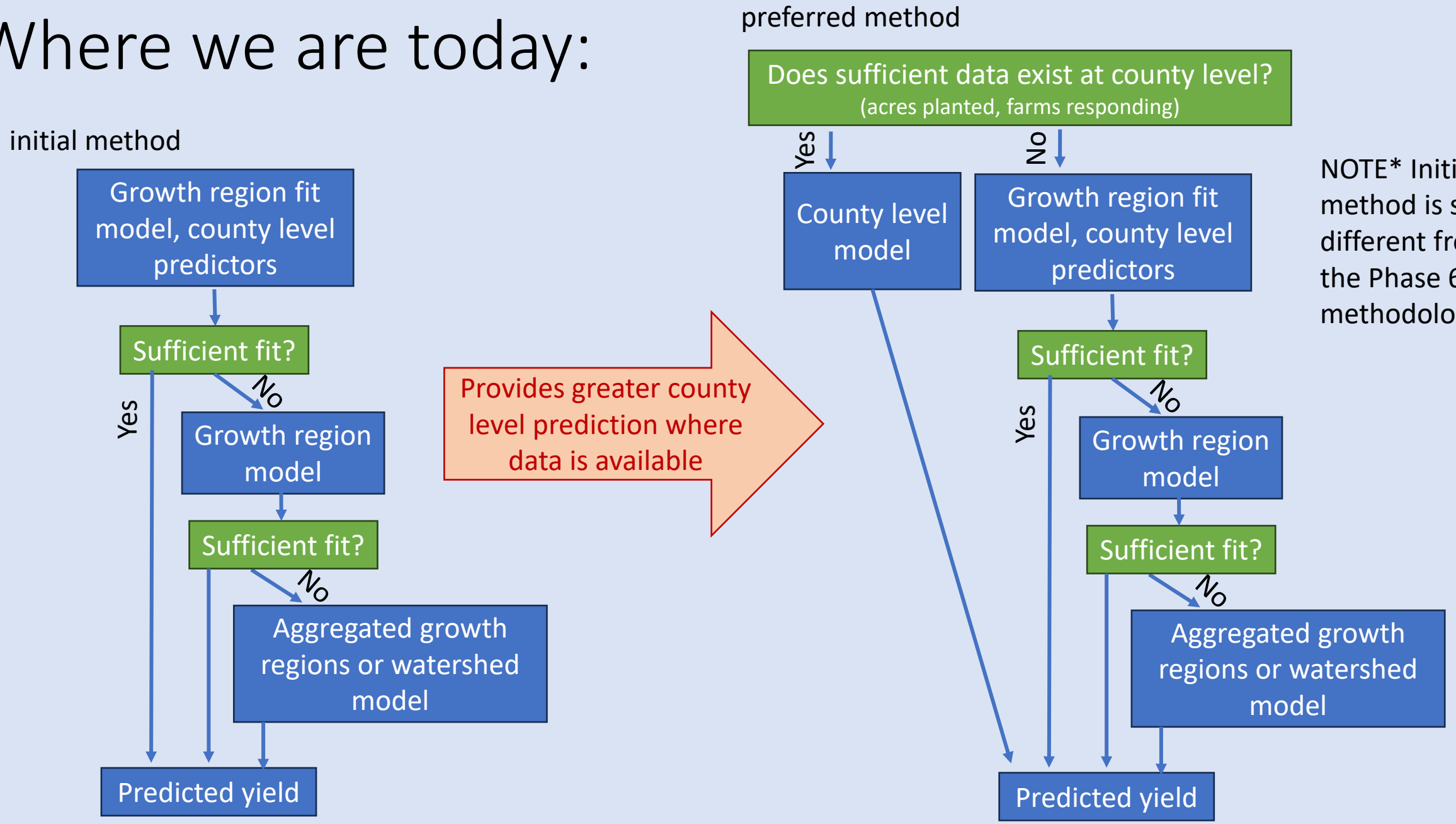
Expected yields must not go down (for some crops)

Based on Work Group input…

- The expected yield for large crops (e.g., Corn, Wheat) with historically positive trends does not likely decrease
  - This has not been applied in the results shown, but will be applied to select crops based on watershed trend in next revision



Where we are today:



Last Month (October):

- Requests were made for data comparing county/regional vs only regional modeling methods
- Provided via email to voting members
- Try again in November

Decision:

Proposed decisions:

Should this new statistical framework be used to determine long term crop yield trends?