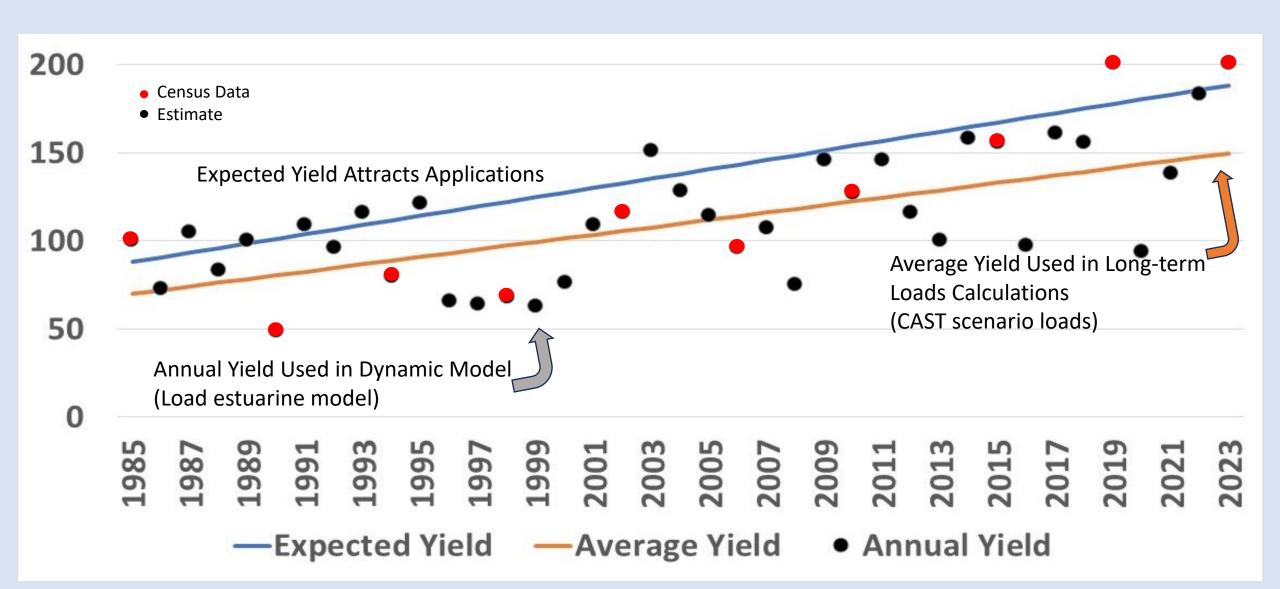
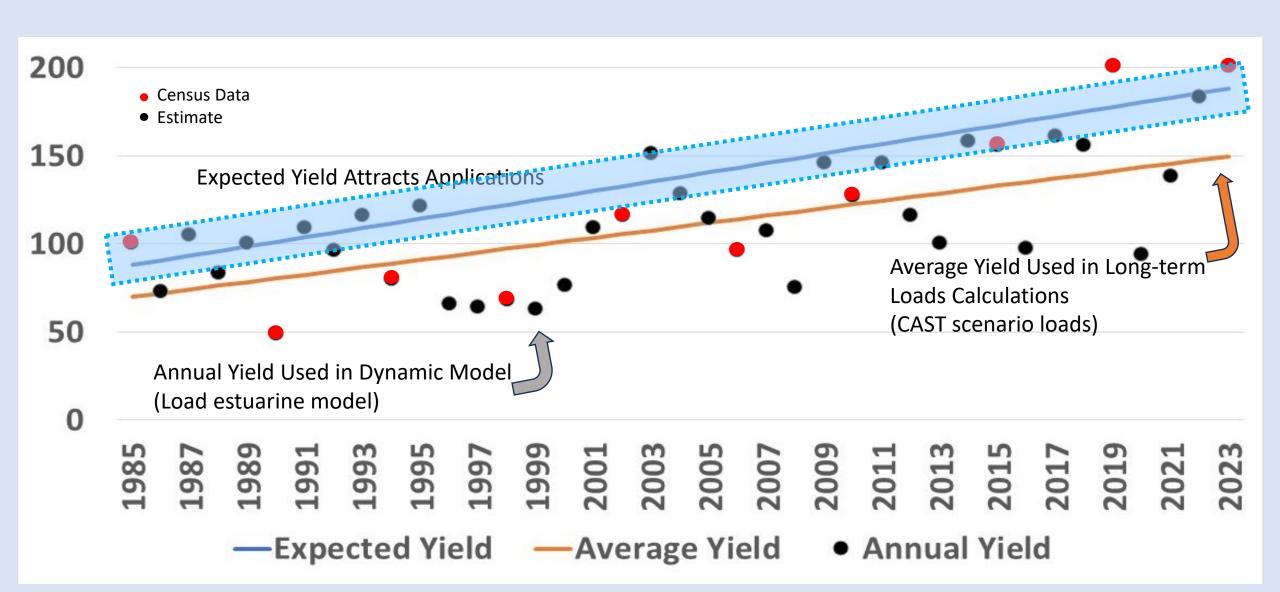
Yields

11/8/2024





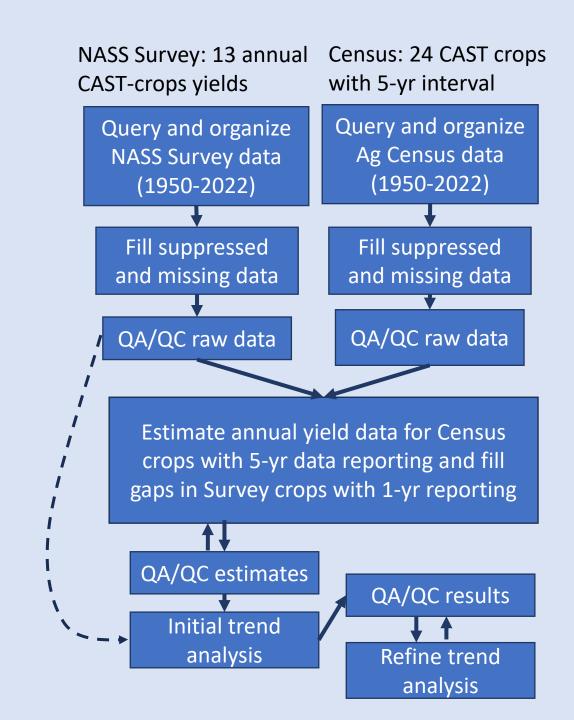
Iterative and collaborative process:

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_{crop i, growth region j} ~ f(time, weather, climate, Survey crop yields, economics)

Predictor list built with Work Group input

		1		1	
١٨/	Dat	nar	วทศ	\sim	limate:
V V	Cat	IICI	anu	C	mate.

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

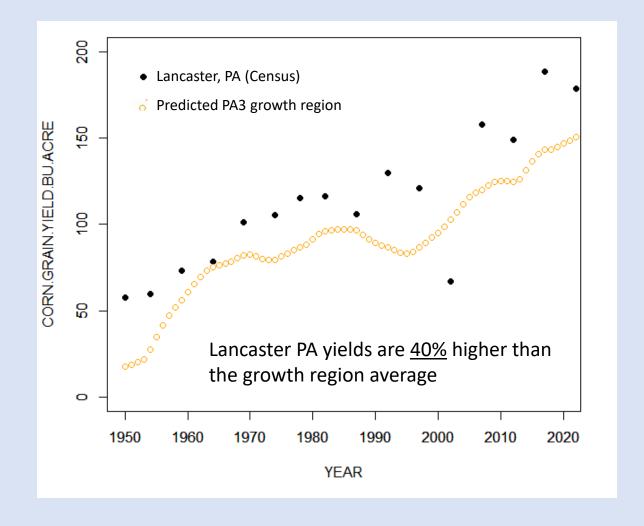
Hay

Wheat

Oil/gas

Continued improvements

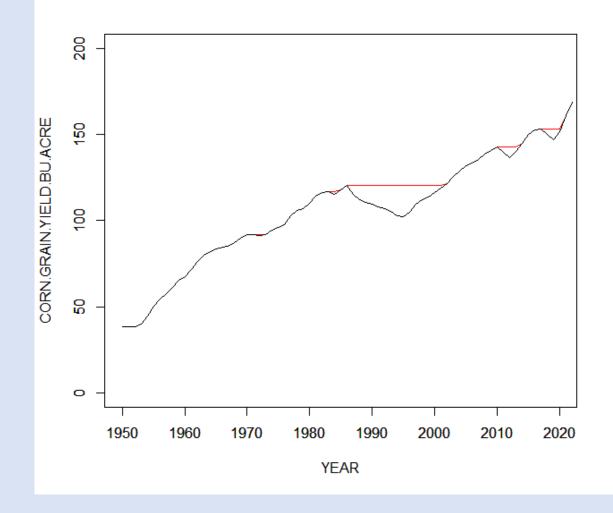
- Initially... Aggregating to the growth region was done to improve data quality over the largest number of counties and crops where data at the individual county can be unreliable.
- HOWEVER, this has resulted in predicted yields which are (much) too low for counties which have high yields relative 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



preferred method Where we are today: Does sufficient data exist at county level? (acres planted, farms responding) initial method 2 NOTE* Initial Growth region fit Growth region fit method is still County level model, county level model, county level different from model predictors predictors the Phase 6 methodology Sufficient fit? Sufficient fit? Provides greater county Yes level prediction where Growth region Growth region data is available model model Sufficient fit? Sufficient fit? Aggregated growth Aggregated growth regions or watershed regions or watershed model model Predicted yield Predicted yield

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?