AMT Office Hours

5/9/2025

Today’s Outline:

- Time check
- Crop Yields
- Ag Land Use mapping
- Inorganic fertilizer
- Animal Systems Excess

Time check

5 more meetings (including today)

- End date of **September 12th**

~ Five topics currently under review

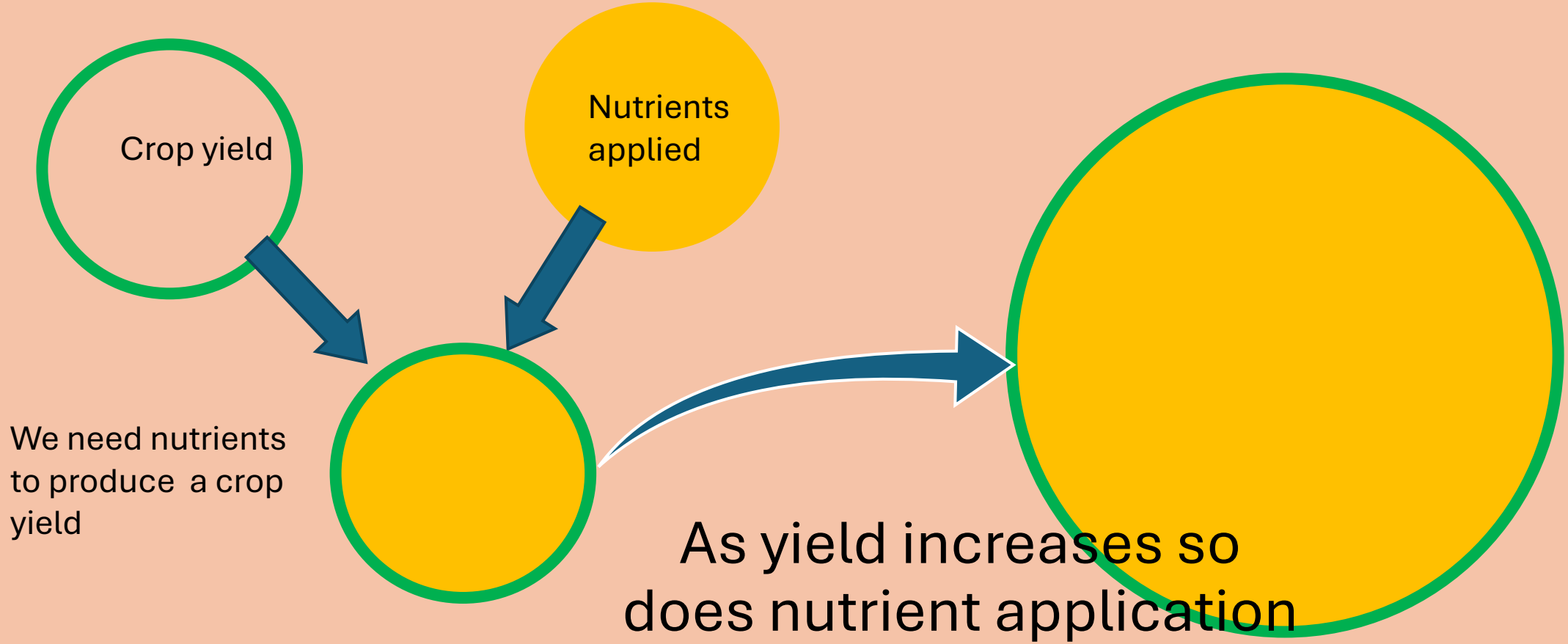
- Crop Yield Trend
- Inorganic Fertilizer
- Ag Land Use Mapping
- Broiler manure update
- Ag BMP processing excess

We need to be sure that we are on a good path forward

Crop Yields

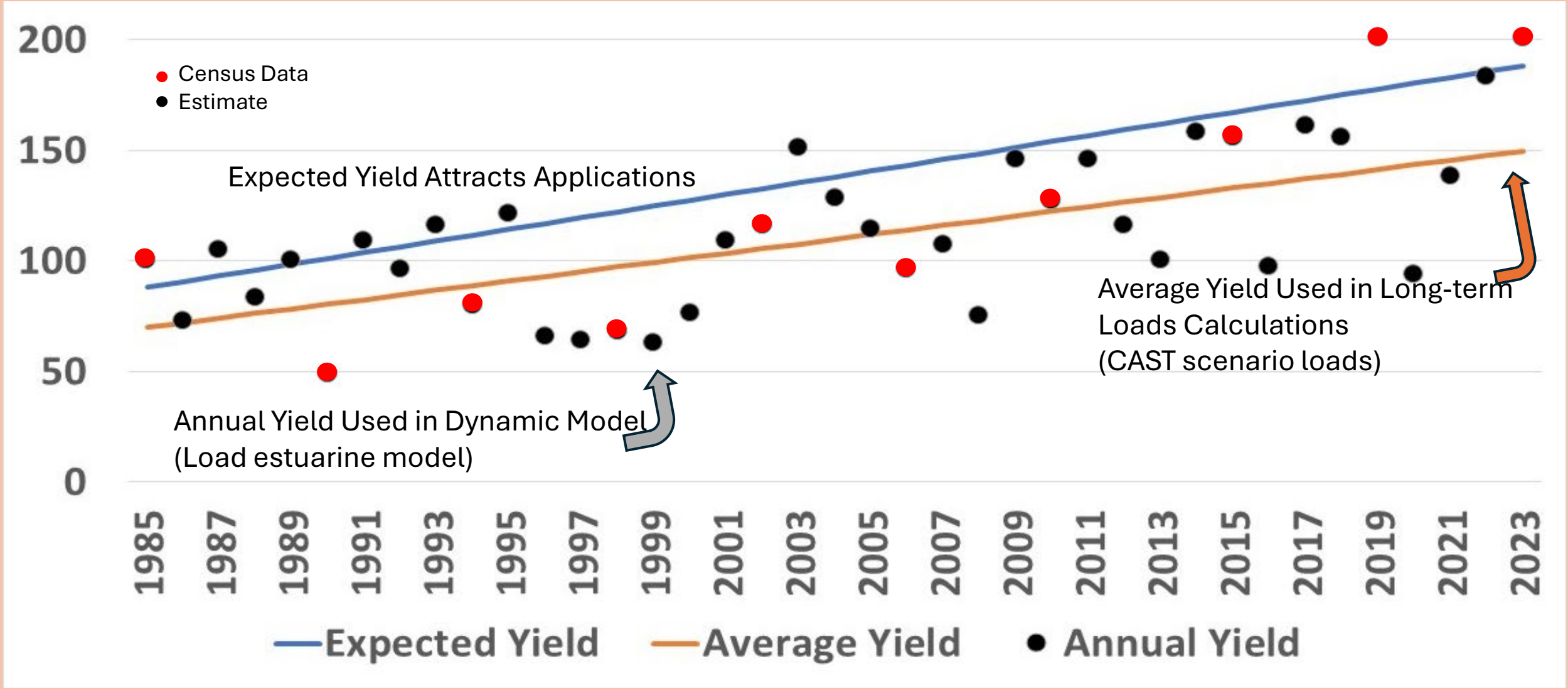
Why crop yields matter

- Yields and nutrient applications are tied together



Models can be used to estimate the yield that attracts nutrient application, isolate the effects of management by accounting for weather

*EXAMPLE DATA ONLY



A quick note on yields

Phase 6

- Uptake AND application use the same yield

Phase 7

- Uptake uses average yield
- Application uses expected yield

Rationale

- A farmer will apply nutrients based on their, sometimes optimistic, yield expectation.
- Nutrient uptake will occur not based on expectation but on an average yield condition.

Reiterating how Phase 6 and 7 yields look

Phase 6

Yield per acre

Application

Uptake

Phase 7

Yield per acre Application

Yield per acre Uptake

Expected application

Uptake

One more iteration

Phase 6

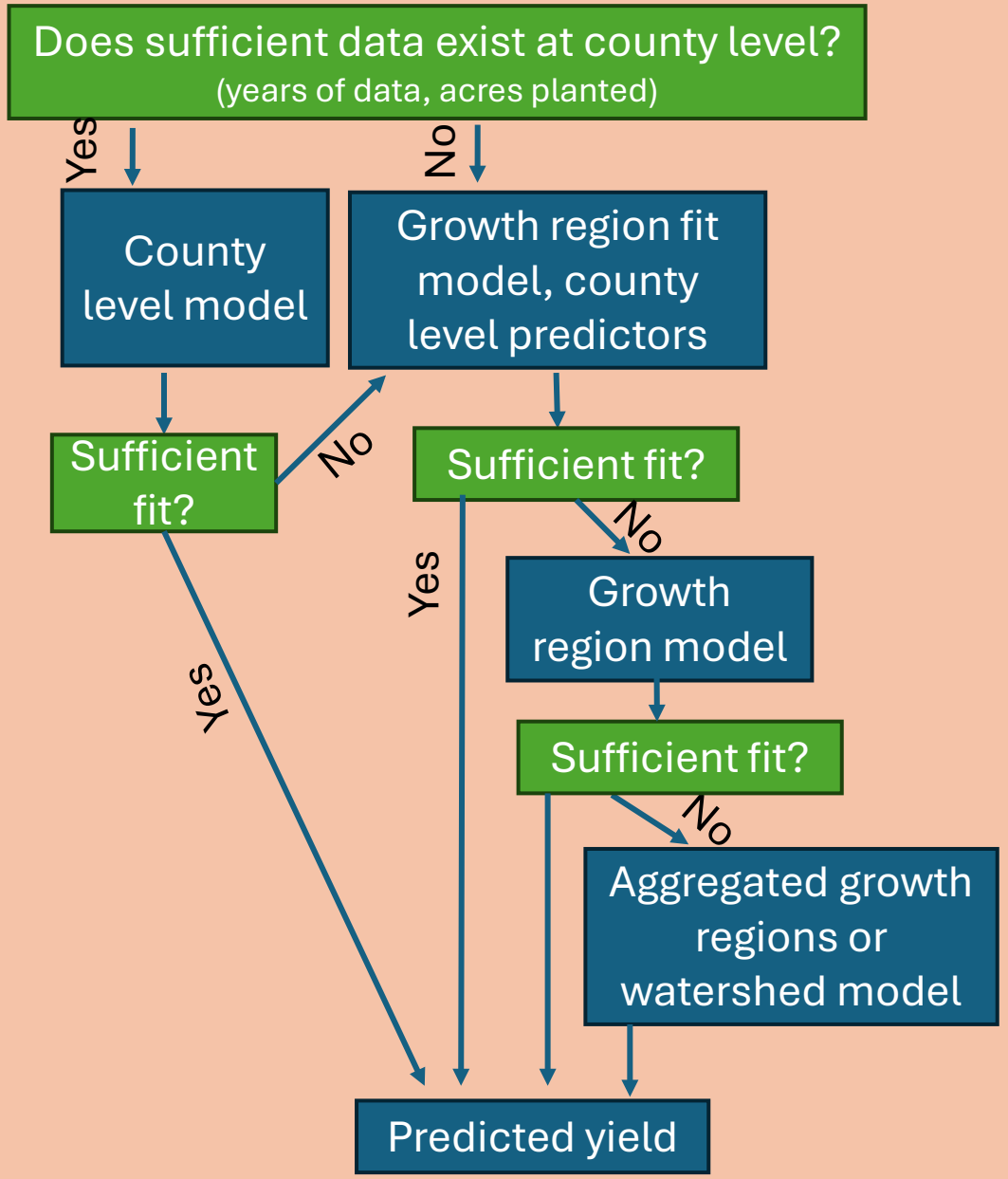
- One Yield
  - Application
  - Uptake

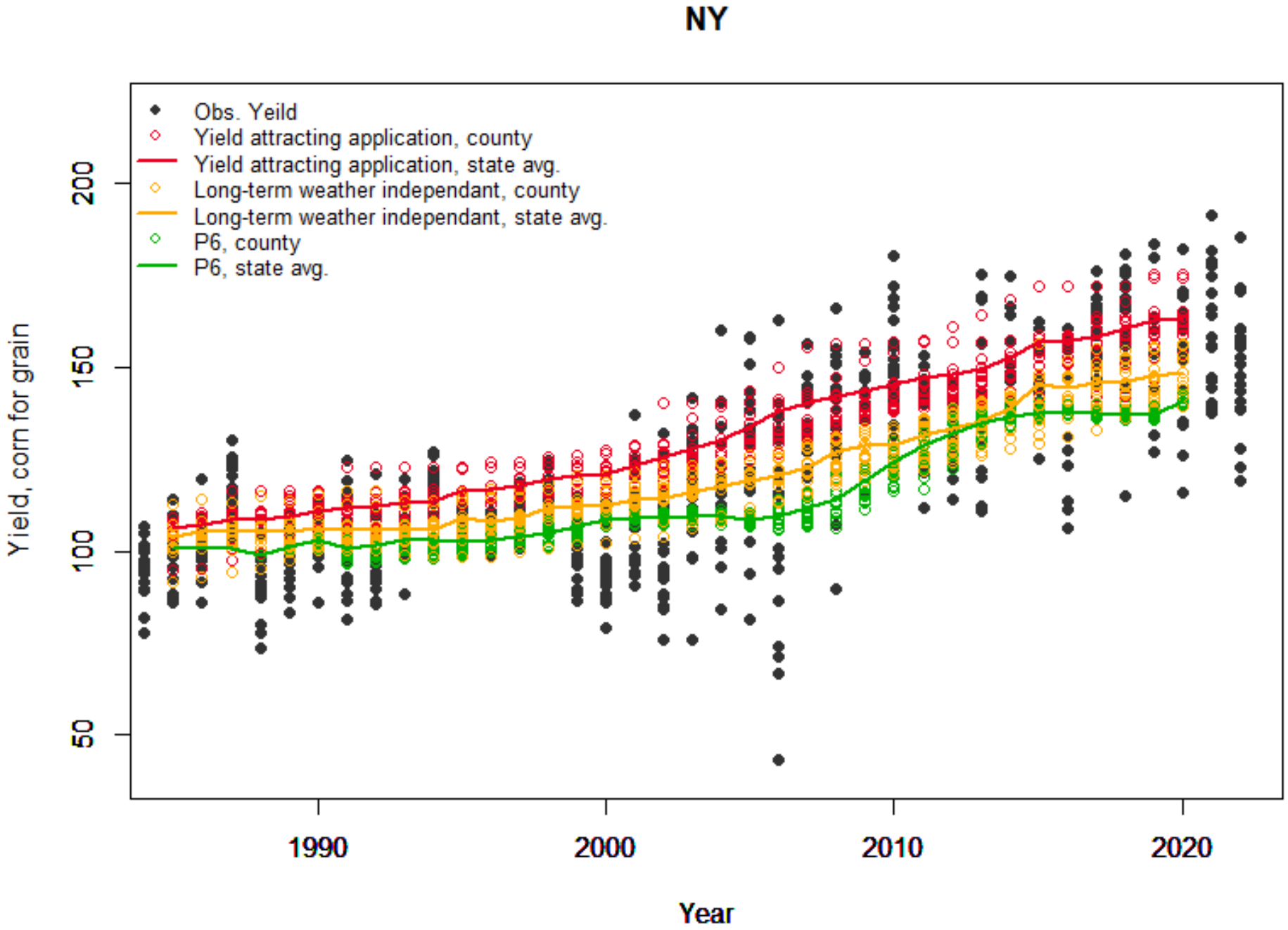
Phase 7

- Two Yields
  - Expected application
  - Uptake

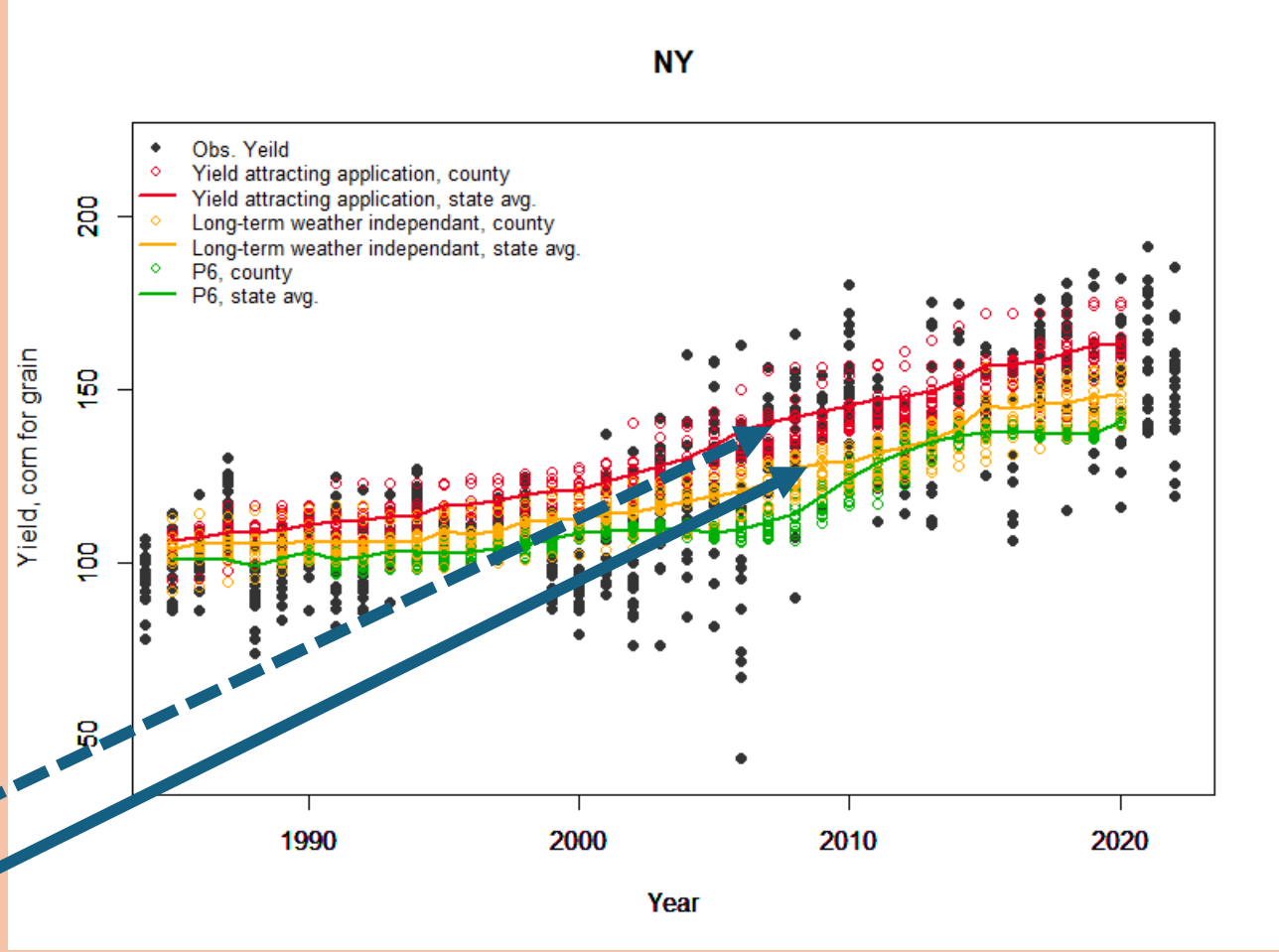
Modeling crop yields, proposed P7 approach

- A county level model is preferred, but there are a total of four models generated to predict yields based on available data and fit.




NY
Obs. Yeild
Yield attracting application, county
Yield attracting application, state avg.
Long-term weather independant, county
Long-term weather independant, state avg.
P6, county
P6, state avg.
Yield, corn for grain
50
100
150
200
1990
2000
2010
2020
Year

Let’s relate these data



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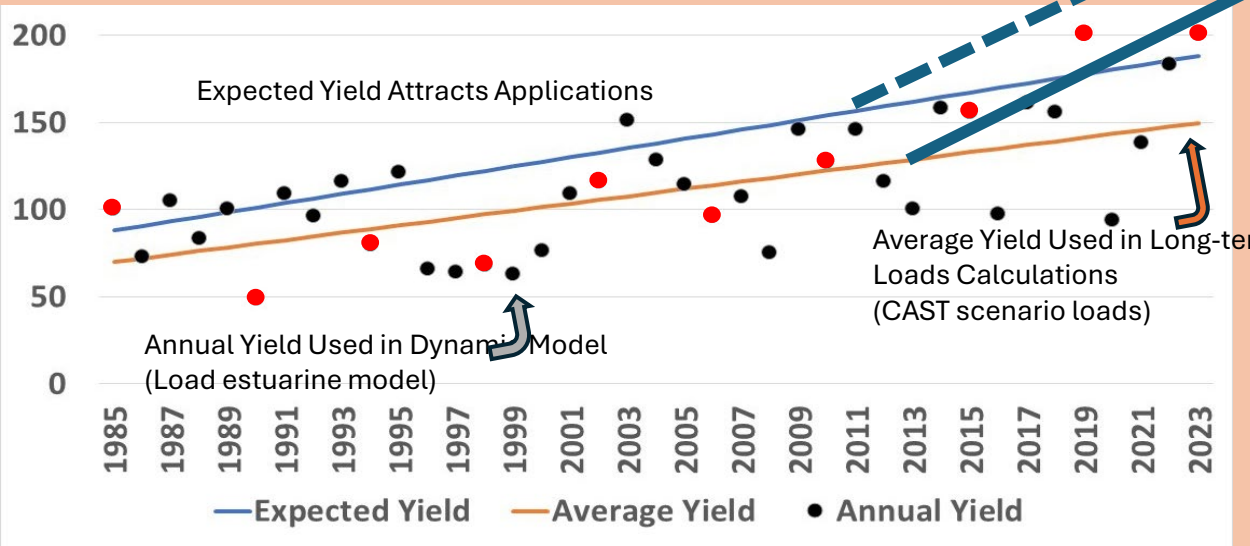

A quick refresh of how CAST works:

CAST Structure

Illustrative example

Average Load

+

ΔInputs * Sensitivity

*****

BMPs

*****

Acres

*****

Land to Water

*****

River Delivery

Average nitrogen load to stream for double cropped ag land watershed wide is 40 pounds per acre

Load by land-river segment and land use

CAST Structure

Average Load

+

ΔInputs * Sensitivity

*

BMPs

*

Acres

*

Land to Water

*

River Delivery

Load by land-river segment and land use

Illustrative example

FERTILIZER

Your area applies 115 pounds of fertilizer while the watershed-wide average is 140.

Each additional pound of fertilizer results in 0.2 lbs of runoff

(115-140) * 0.2 = -5 lbs/acre

CAST Structure

Average Load

+

ΔInputs * Sensitivity

*

BMPs

*

Acres

*

Land to Water

*

River Delivery

Load by land-river segment and land use

UPTAKE

Illustrative example

Your area uptakes 110 pounds of fertilizer while the watershed-wide average is 120.

Each additional pound of uptake results in -0.17 lbs of runoff

(110-120) *- 0.17 = 1.7 lbs/acre

CAST Structure

Illustrative example

Average Load

+

ΔInputs * Sensitivity

*

BMPs

*

Acres

*

Land to Water

*

River Delivery

SUM each of the inputs* sensitivities for each input category (e.g. fertilizer, uptake, etc.) with the watershed average load

(-5)+(1.7)+(40) =36.7 lbs

Fertilizer

Uptake

Average Load

Load by land-river segment and land use

CAST Structure

Illustrative example

Average Load

+

ΔInputs * Sensitivity

*****

BMPs

*****

Acres

*****

Land to Water

*****

River Delivery

BMPs are applied which give, in aggregate, a 20% reduction

36.7 * (1-.20) = 29.36 lbs/acre

Load by land-river segment and land use

CAST Structure

Illustrative example

Average Load

+

ΔInputs * Sensitivity

*****

BMPs

*****

Acres

*****

Land to Water

*****

River Delivery

There are 100 acres of double cropped land in this segment

29.36 lbs/acre * 100 acres = 2936 lbs

Load by land-river segment and land use

CAST Structure

Illustrative example

Average Load

+

ΔInputs * Sensitivity

*****

BMPs

*****

Acres

*****

Land to Water

*****

River Delivery

The land here is 50% leaker than average due to high groundwater recharge in the piedmont carbonate

The river system reduces loads by 30%

2936 lbs * 1.5 * (1-.30) = 3082.8 lbs Delivered to the Bay from this land use and segment

Load by land-river segment and land use

Questions?

Inorganic fertilizer

- Compared several raw datasets
- Used a tool – CalCAST
  - Statistical representation of CAST for quick comparisons
- Input fertilizer N data show regional differences
- No clear “winner”
- Still work to be done

Multiple fertilizer data sets exist:

CAST 23

- Annual 1985-present
- AAPFCO and state data
- Nitrogen and Phosphorus

TREND

- Annual 1930-2017
- Composite of multiple datasets
  - Several USGS, Cao et al 2018, USDA ERS
- Nitrogen

Animal systems BMP excess

- Concerns with:
  - Animal Waste Management Systems
  - Animal Mortality Disposal by Composting
  - Riparian Fence – Reduction of Direct Deposition

Thank you for attending office hours!

We will begin our main meeting at 09:00.