Defining the Time Scale for Future Phosphorus Scenarios

Matt Johnston

University of Maryland CBPO

Ask

- How many years is **eventually** as it pertains to phosphorus runoff?
  - 1?
  - 10?
  - 25?
  - Some other number?

- Water Quality GIT will make decision by June 12.

- Ag Workgroup can inform this decision.

What is a scenario?

- All practices must be in place to **eventually** meet water quality standards.

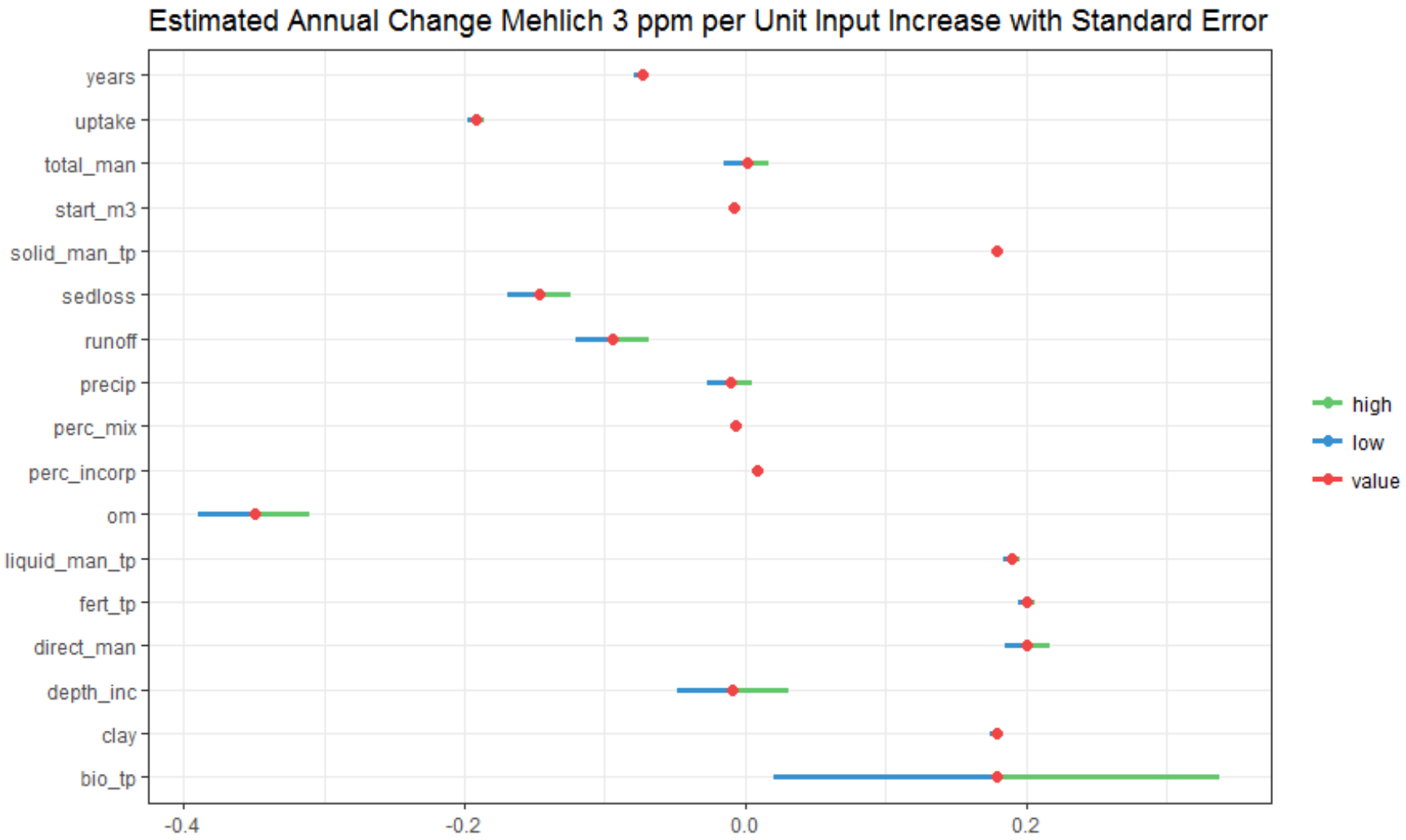
- Scenarios measure long-term loading rates assuming that conditions (animals, application rates, BMPs, etc.) remain the same.

So how is P Runoff Determined?

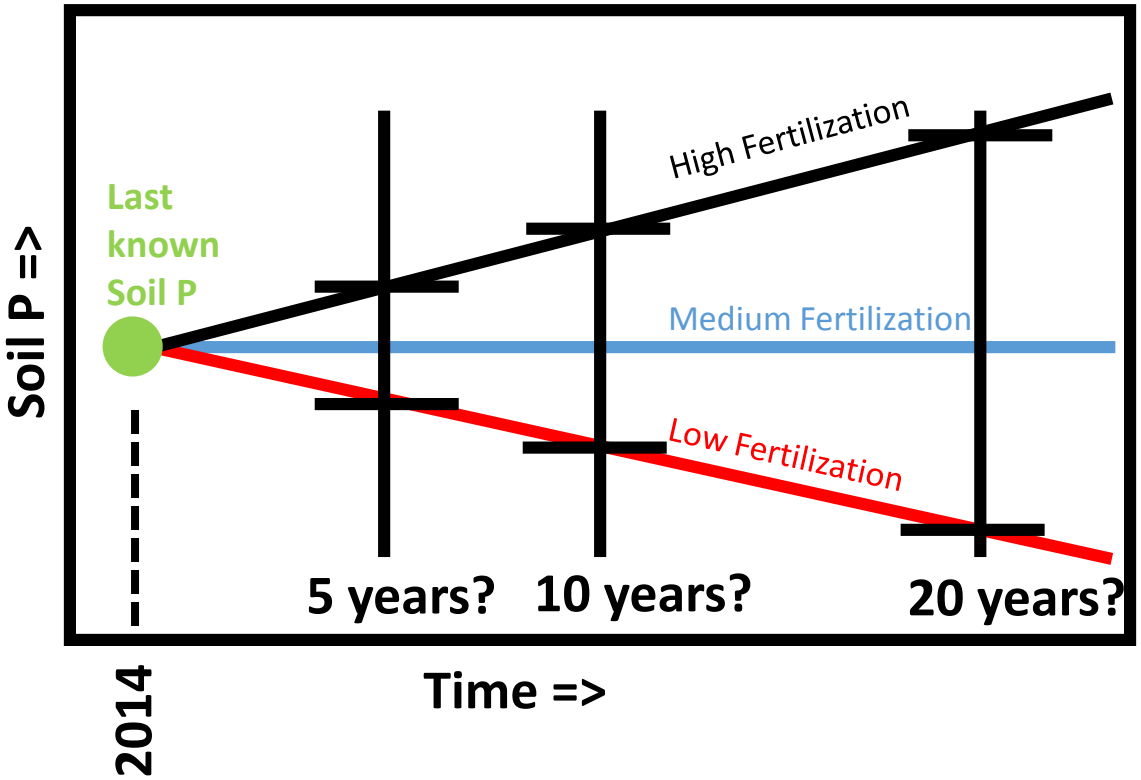
- A change in any one of four variables is multiplied by a "sensitivity."
- That sensitivity work was completed by Modeling Workgroup for Beta 2.
- Webinar provided to Ag Workgroup in March, 2016.
- Beta 2 documentation published online in April, 2016.
- Sensitivity work showed P runoff was sensitive to soil P.
- **Soil P is significantly sensitive to the number of years APLE is run.**

Input	Input Unit	Change in EOSS P loss (lbs)
Soil P	**ppm**	**0.015**
Sediment Washoff	ton/ac	0.168
Runoff	Inches	0.057
Water Extractable P (WEP)	lbs/acre	0.018

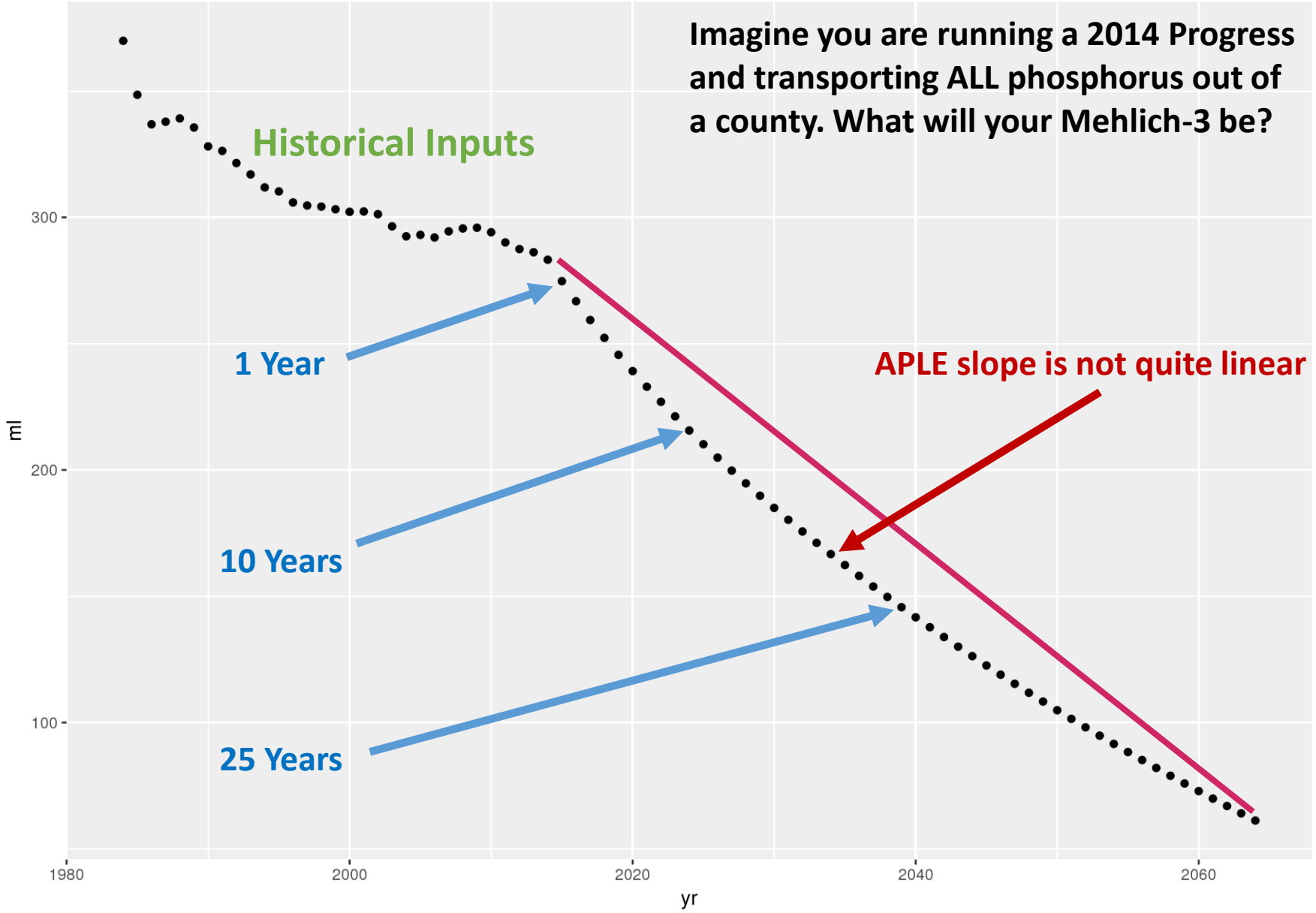
So how is Soil P Determined?



How APLE Responds Over Time to Changes in Inputs (Conceptual)



How APLE Responds Over Time to Changes in Inputs (Actual Run)



How P Runoff Responds to Time

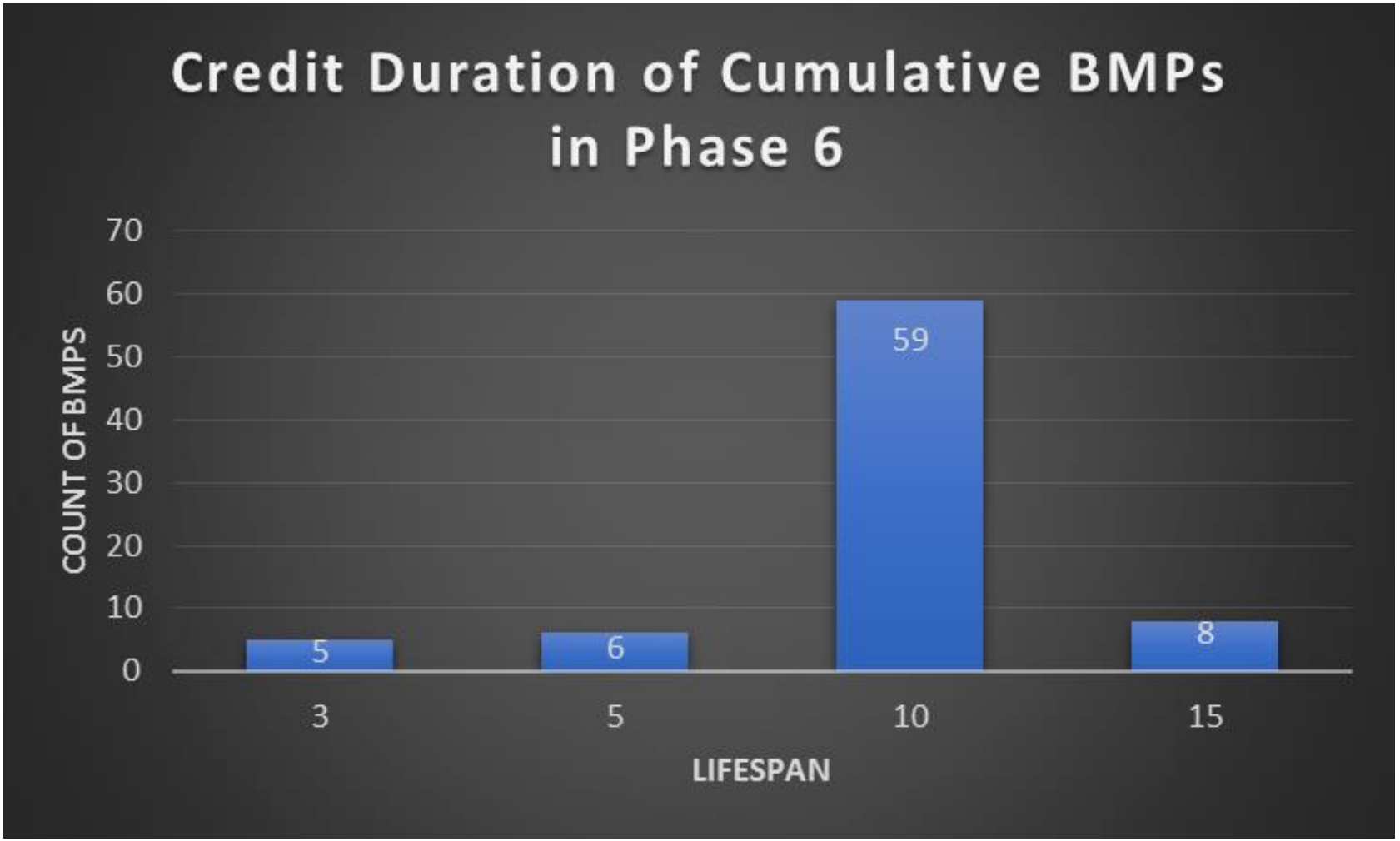
- Assume an annual 4 ppm decrease in soil P in a scenario. Everything else remains constant.
- Remember that average, annual P runoff for crop land uses is 1.87 lbs P/acre.

Input	Input Unit	Change in EOSS P loss (lbs)	Runoff (1 Yr)	Runoff (10 Yrs)	Runoff (25 Yrs)
Soil P	**ppm**	**0.015**	**-0.06**	**-0.6**	**-1.5**
Sediment Washoff	ton/ac	0.168	0	0	0
Runoff	Inches	0.057	0	0	0
Water Extractable P (WEP)	lbs/acre	0.018	0	0	0

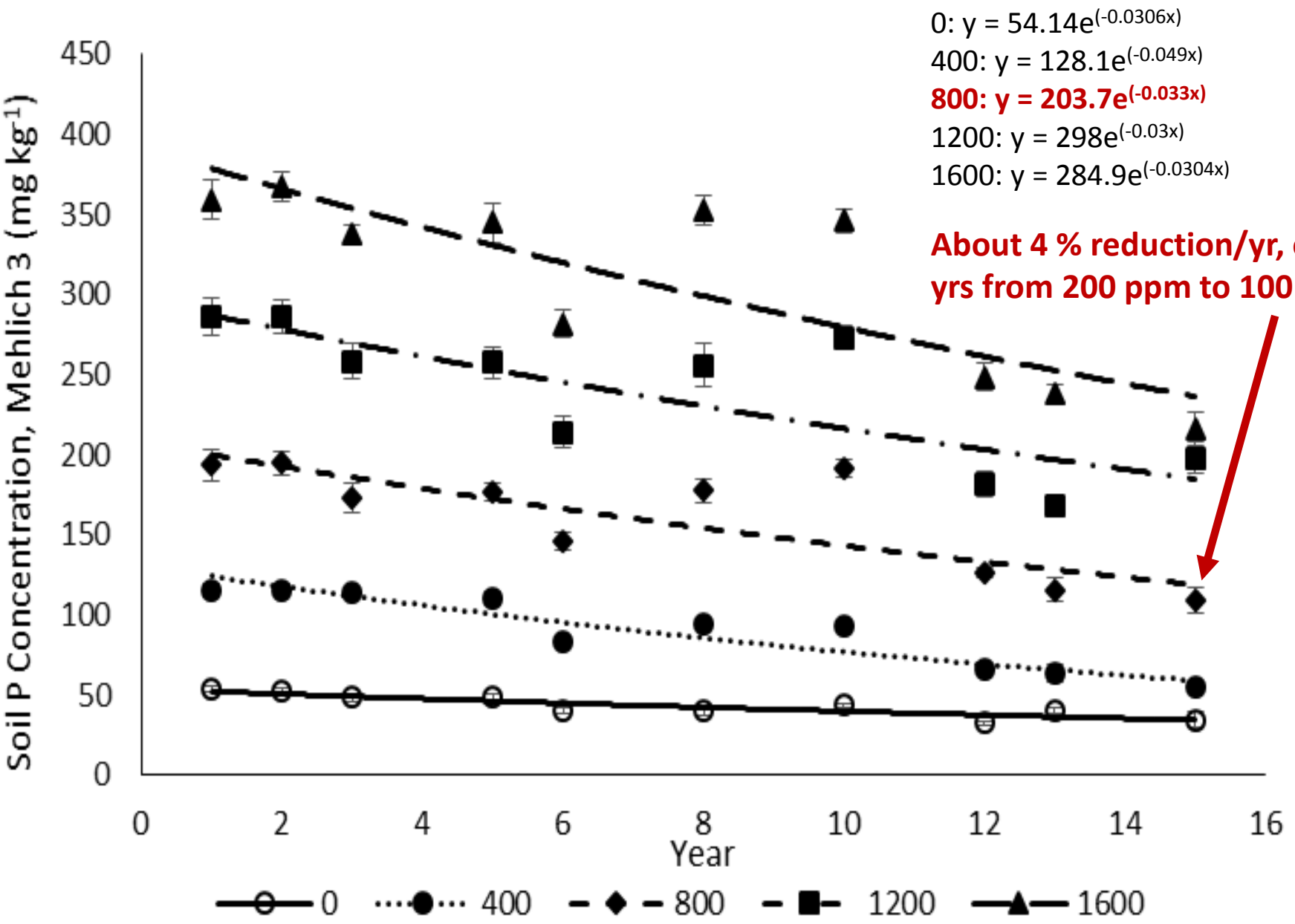
Options for Eventually

- 1 Year
  - Applications could change significantly with very, very minimal change in P soil, and thus P runoff.
  - Wastewater progress is measured in “current year” format.
- 10 Years
  - Most common credit duration for BMPs, including forest buffers. Example, if a state submits an acre of forest buffers in a progress year, it is assumed to receive the full credit for 10 years, as if the trees are fully grown.
  - Similar time period to nitrogen runoff.
- 25 Years
  - Consistent with findings from P drawdown study on Mid-Atlantic Coastal Plain soil.
  - Study estimated P could be drawn down from 200 ppm to 100 ppm Mehlich 3 in 25 years with zero additional inputs.
  - Dr. Vadas demonstrated similar results from APLE, confirming APLE’s ability to replicate the study’s findings.
- Something Else?

Basis for 10 Years?



Basis for 25 Years?



Fiorellino, et al., 2017 https://dl.sciencesocieties.org/publications/aj/abstracts/109/2/455?access=0&view=pdf

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