Management of phosphorus with VR and zone delineation

Wes Anderson, PAg
Senior Fertility Specialist
CropPro Consulting
@fielddirt

Basis for VR phosphate

- Build P in areas that are low, but not in areas that are high.
- Eliminate “yield drag” due to low STP, with perpetual benefits for several years.
- Minimize environmental risk of P runoff

CropPro Consulting

Basis for VR phosphate

- “Strong linear relationships between STP and phosphorus in runoff from eight field-scale microwatershed sites in Alberta were developed” (Little J.L., et al. 2006)

- “Fertilizer P application method and rate was found to have a statistically significant effect on TDP” (Weiseth, 2015).

CropPro Consulting

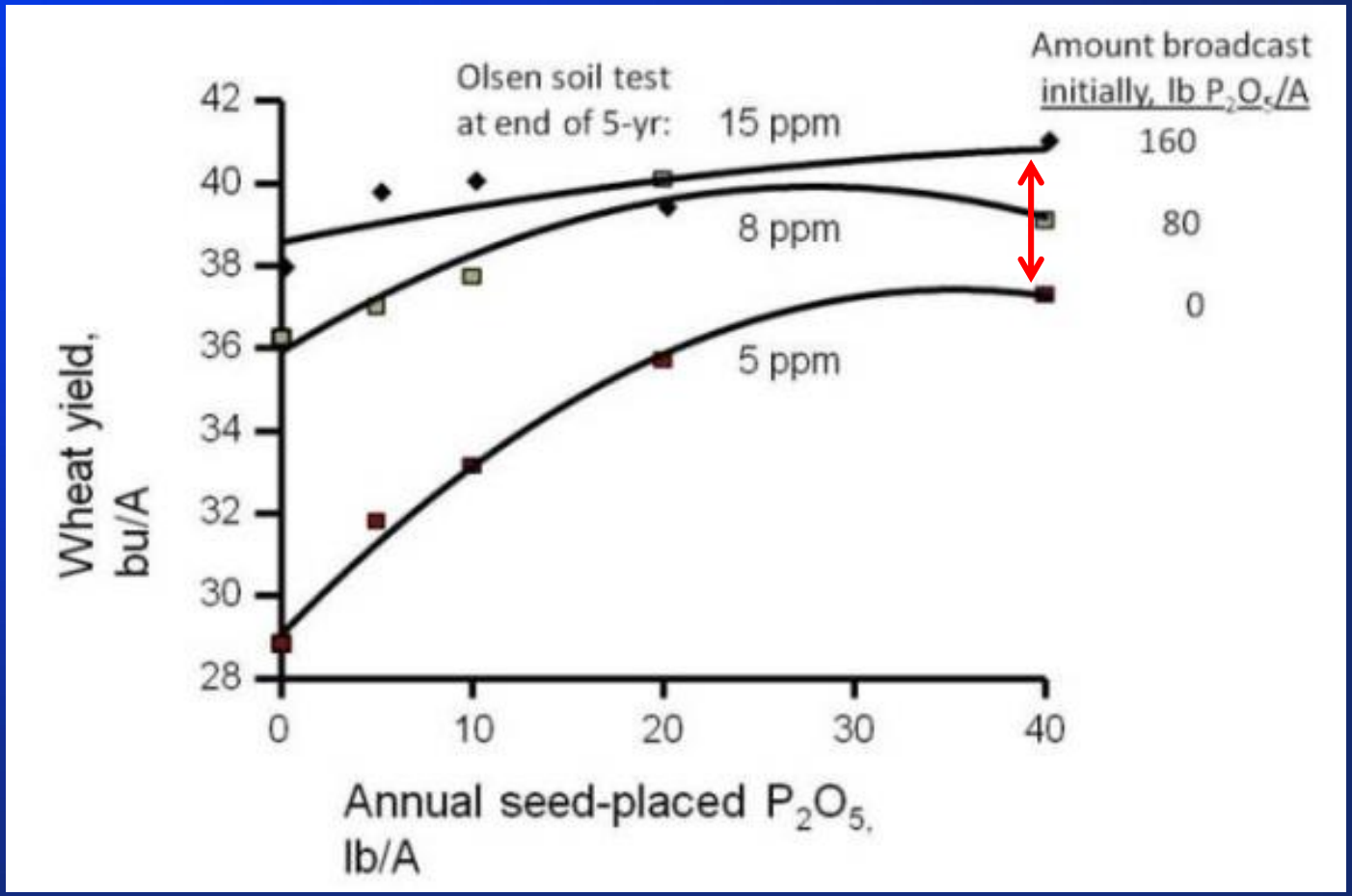
Basis for VR phosphate

- Multiple studies have shown the importance of good soil test P for strong yields (>15 ppm Olson-P) in many crops, ideally 20 for corn and beans?

Basis for VR phosphate

	Olson-P ppm		
Zone	MB Field	SK Field	AB Field
1-2	6	9	17
3-4	7	6	12
5-6	9	6	9
7-8	19	6	11
9-10	35	18	18

CropPro Consulting

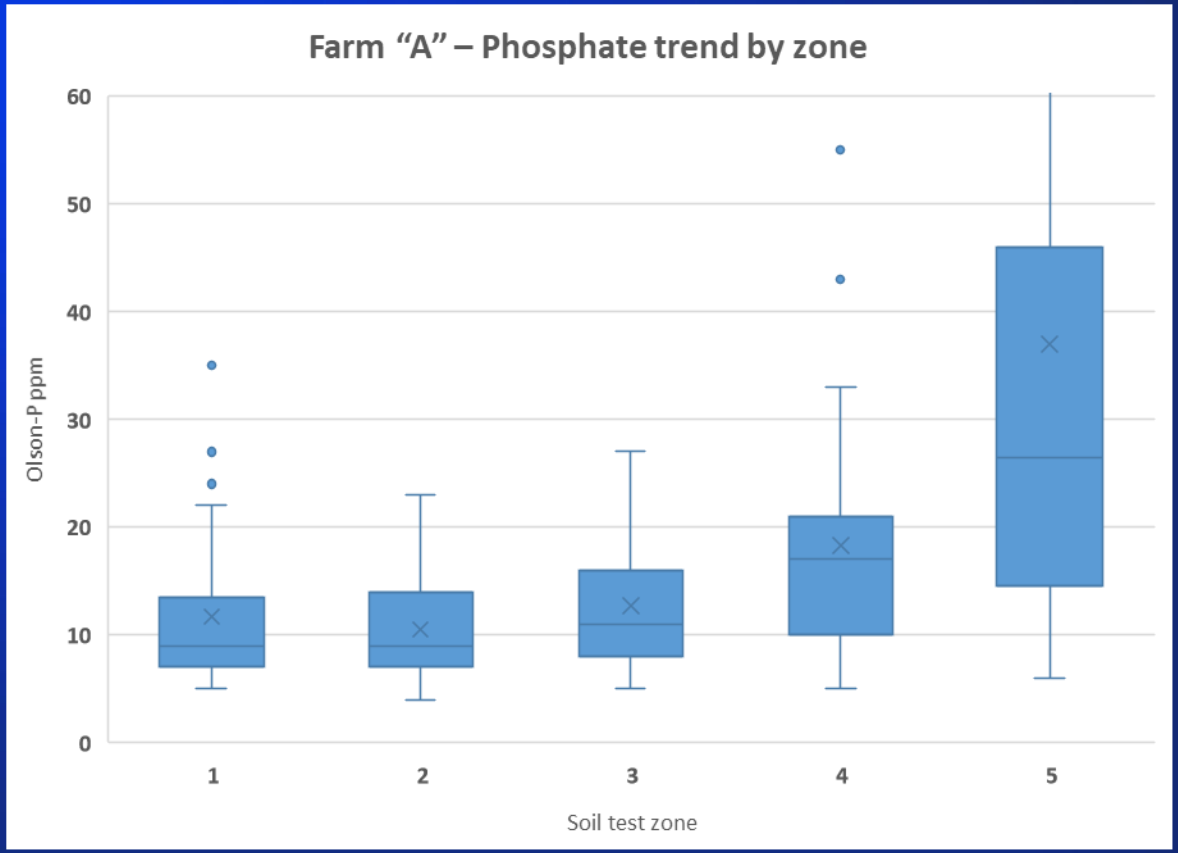


Wager et al, 1986.

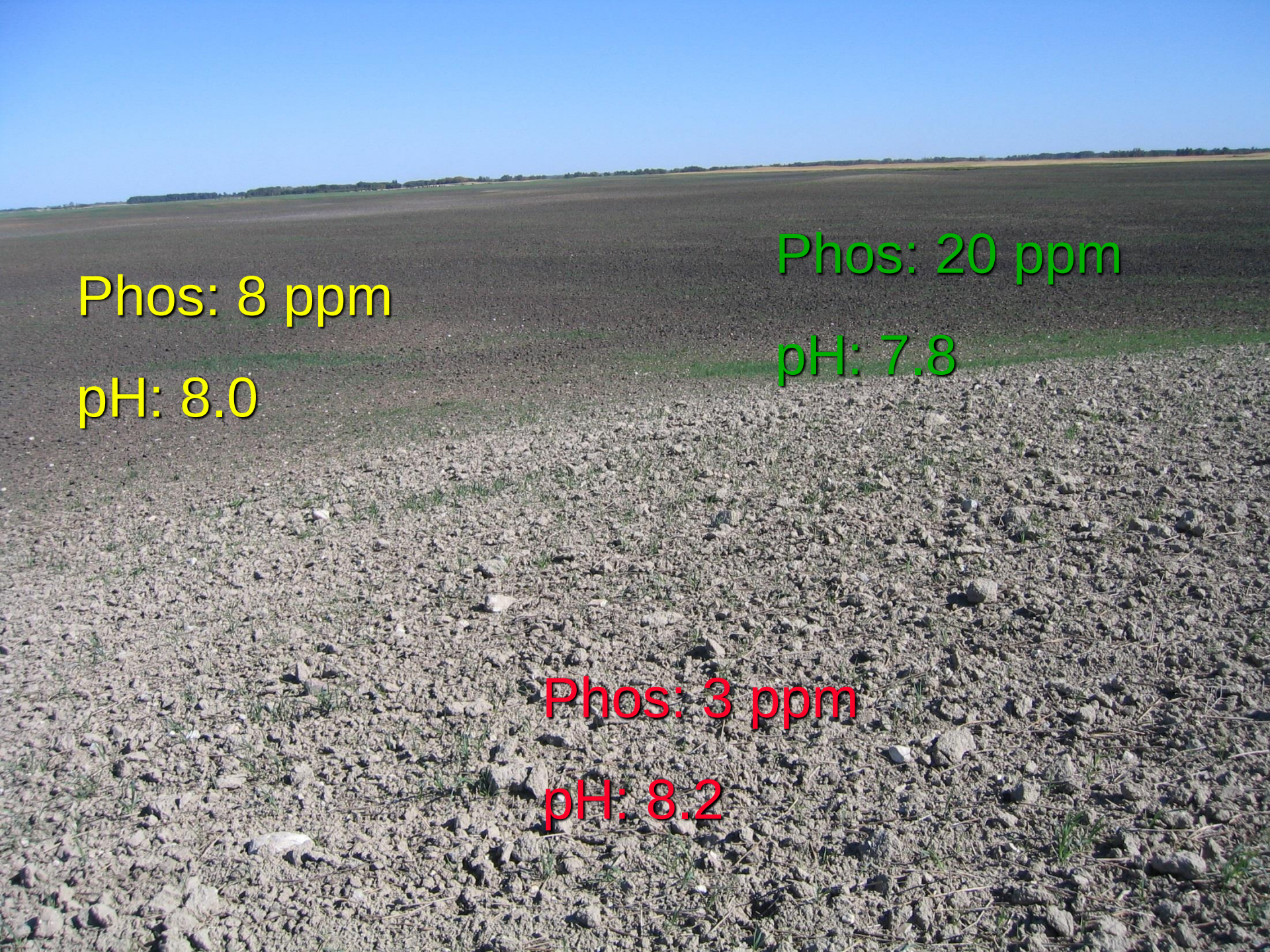
Field	Crop	Grain yield (bu/ac)	
		P	No P
1 (200 lb/ac of 11-52-0) applied in 4 strips	Wheat 2013	43.6	41.2
	Canola 2014	54.6	51.9
2 (150 lb/ac of 11-52-0) applied in 2 strips	Canola	No data	
	Fababean	59.5	52.0
3 (300 lb/ac of 11-52-0) applied in 1 strips	Canola 2013	46.6	42.0
	Barley 2014	91.2	83.9
	Canola 2015	65.9	59.9

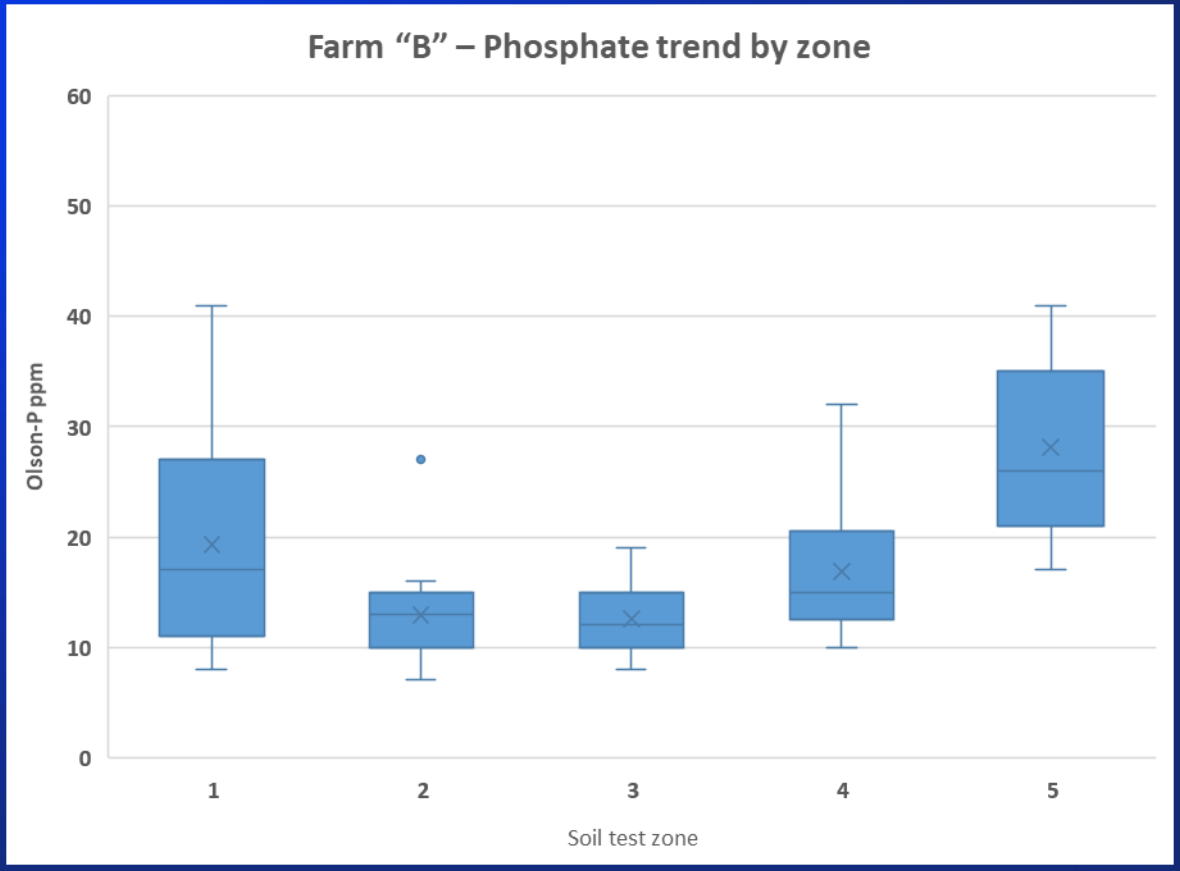
Stu Brandt, NARF VR Project

CropPro Consulting



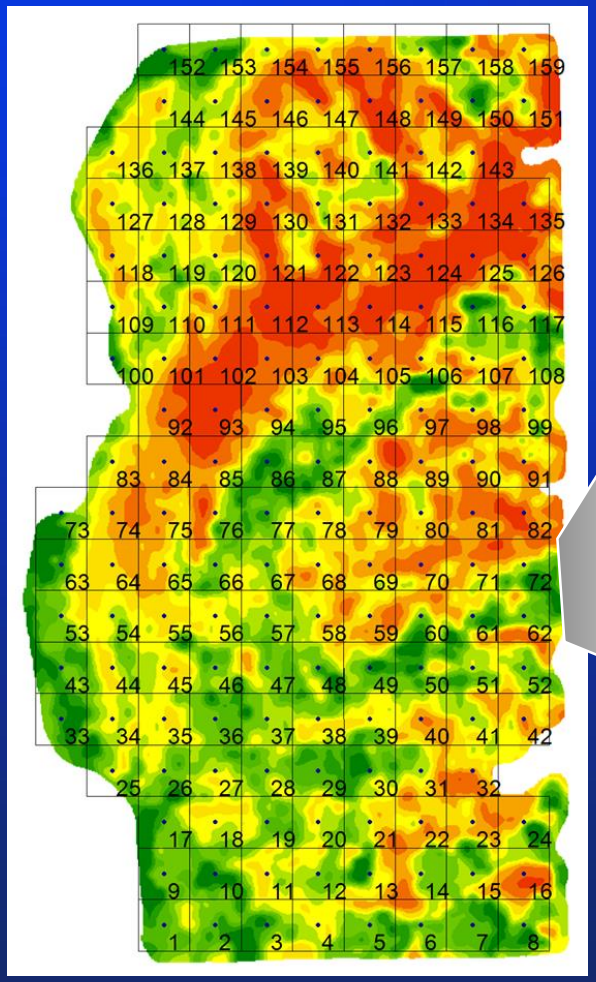
CropPro Consulting


Phos: 8 ppm
pH: 8.0
Phos: 20 ppm
pH: 7.8
Phos: 3 ppm
pH: 8.2

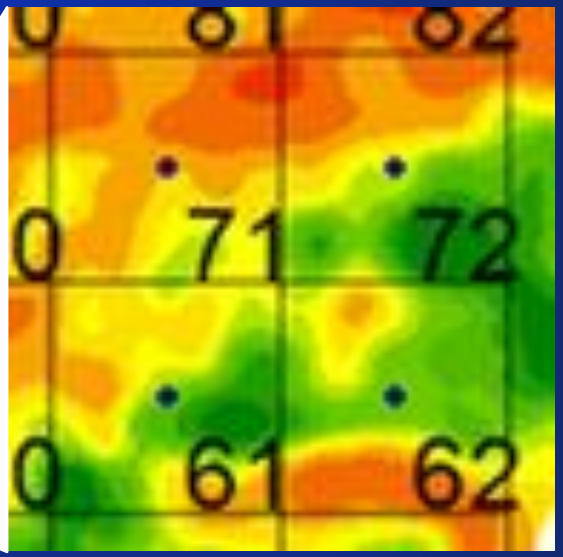


CropPro Consulting

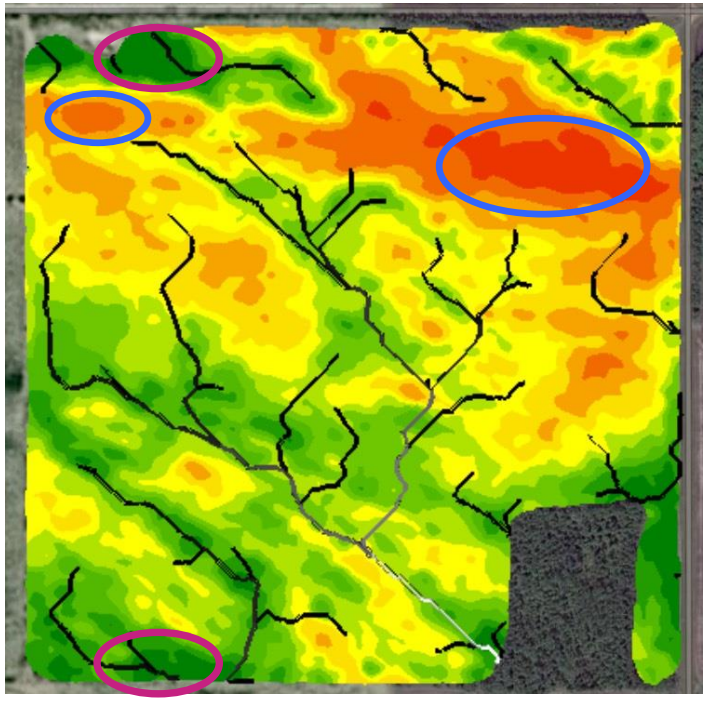
Methods of zone delineation



2 ac grids

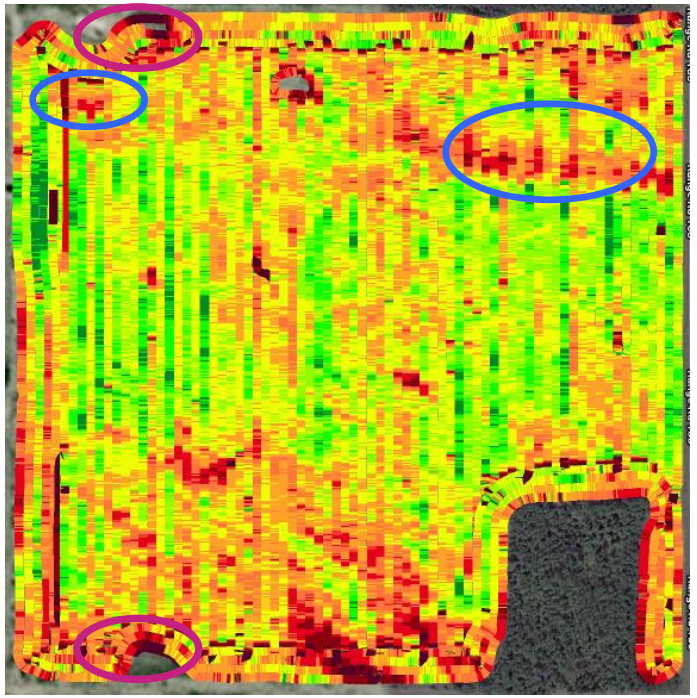


CropPro Consulting

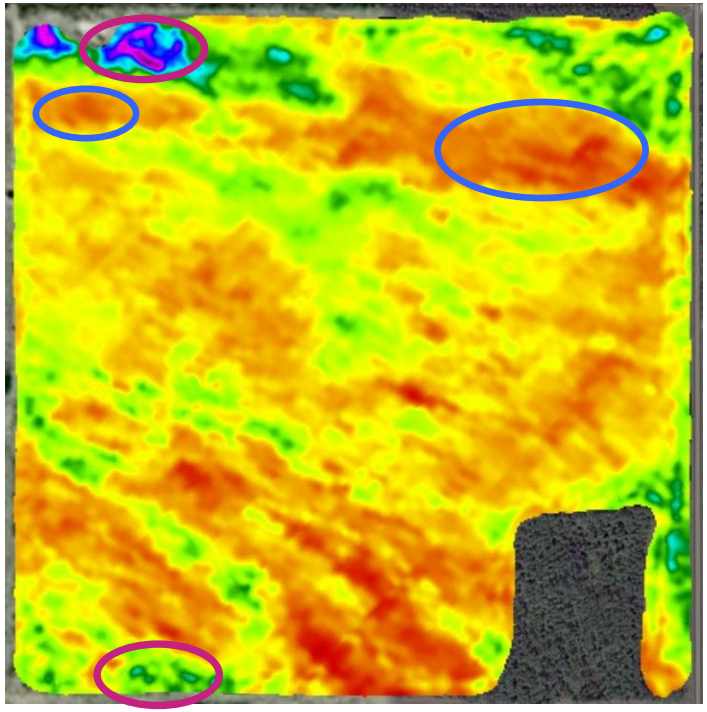


SWAT MAP

Knolls

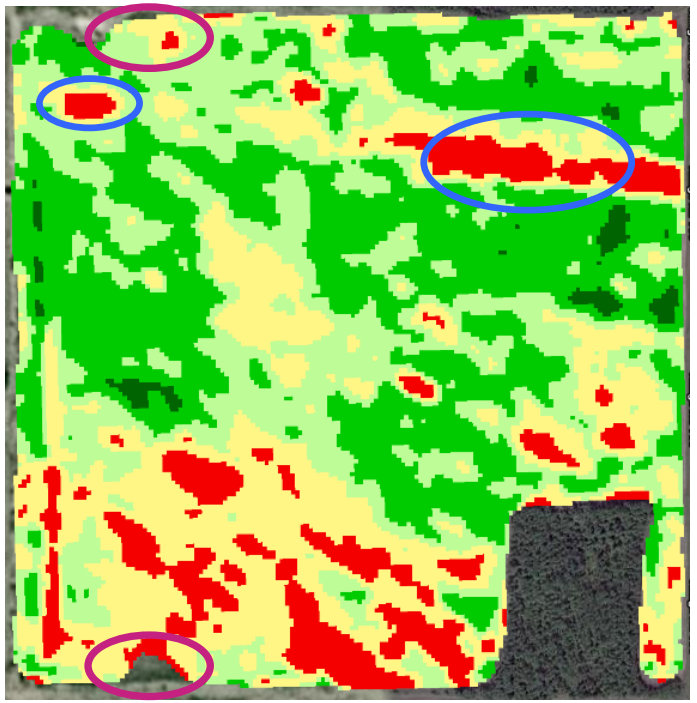


‘18 Wheat Yield



EC

Depressions



21/07/18 NDVI

Methods of zone delineation

- Grid – lots of data, but bad/unnatural resolution. Currently too expensive at high resolution.
- Yield and/or NDVI – can't delineate different soils or landscape positions (fertilizer responsiveness), also many temporal factors affect data.
- EC – usually not good enough on its own.
- Topography – can't delineate saline vs. non-saline depression, sand vs. clay.

CropPro Consulting

Soil, water, & topography (SWAT)

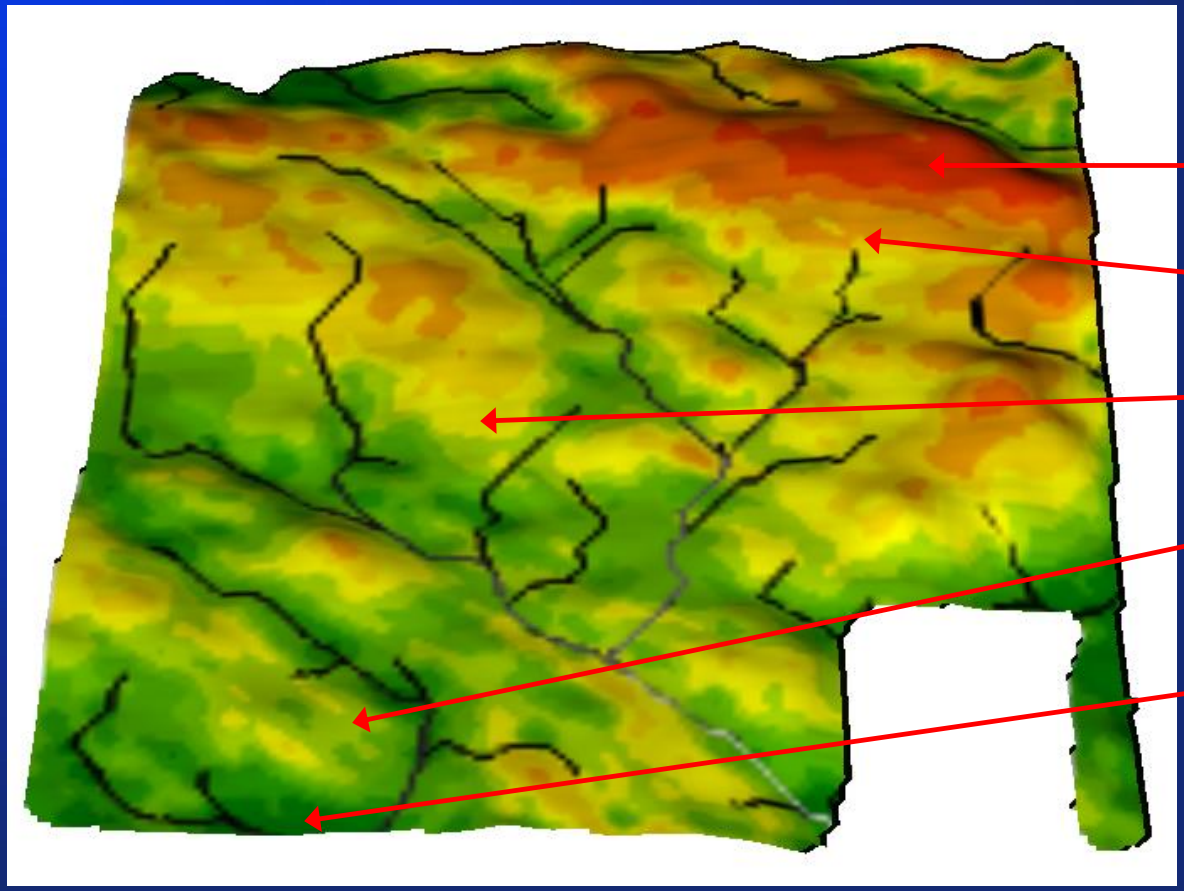
Our goal is to cost effectively map & measure the long-term effects of:

- soil erosion
- water deposition
- parent material differences
- harvest nutrient removal

…to end up with a useful tool that considers both yield potential and nutrient responsiveness.

CropPro Consulting

Soil, water, & topography (SWAT)



CropPro Consulting

VR Phos example

Zone	2016	2018
1-2	7	30
3-4	4	33
5-6	5	20
7-8	12	22
9-10	32	15

Olson-P values (ppm), 0-8”

0-200 lbs/ac (avg 189) P_2O_5 applied in 2017, banded.

Approx. +8 bu canola, + 2 bu soybeans.

CropPro Consulting

VR Phos example

Zone	2017	2018
1-2	4	46
3-4	6	27
5-6	6	42
7-8	13	21
9-10	18	39

Olson-P values (ppm), 0-8”

20-180 lbs/ac (avg 149) P_2O_5 applied in 2017 broadcast & incorporated.

CropPro Consulting

Summary

- Strong evidence we can build soil P with a payback in ~3 years using SWAT, with perpetual value assuming maintenance.
- Should band/incorporate to reduce soluble P movement in water.
- Minimize tillage erosion to reduce particulate P and further degradation of knolls.
- Mine high soil P, especially in direct runoff source areas whenever possible.
- Landscape reclamation instead of VR Phos?

CropPro Consulting

Wes Anderson, PAg
Senior Fertility Specialist
CropPro Consulting
wes@croprecords.com
www.croppro.ca
@fielddirt
306.209.8056