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EMPOWERING GROWERS WITH DATA

Columbia Reach Smart Orchard
Chiawana SoilOptix Report-
4/27/2021

Sustainability

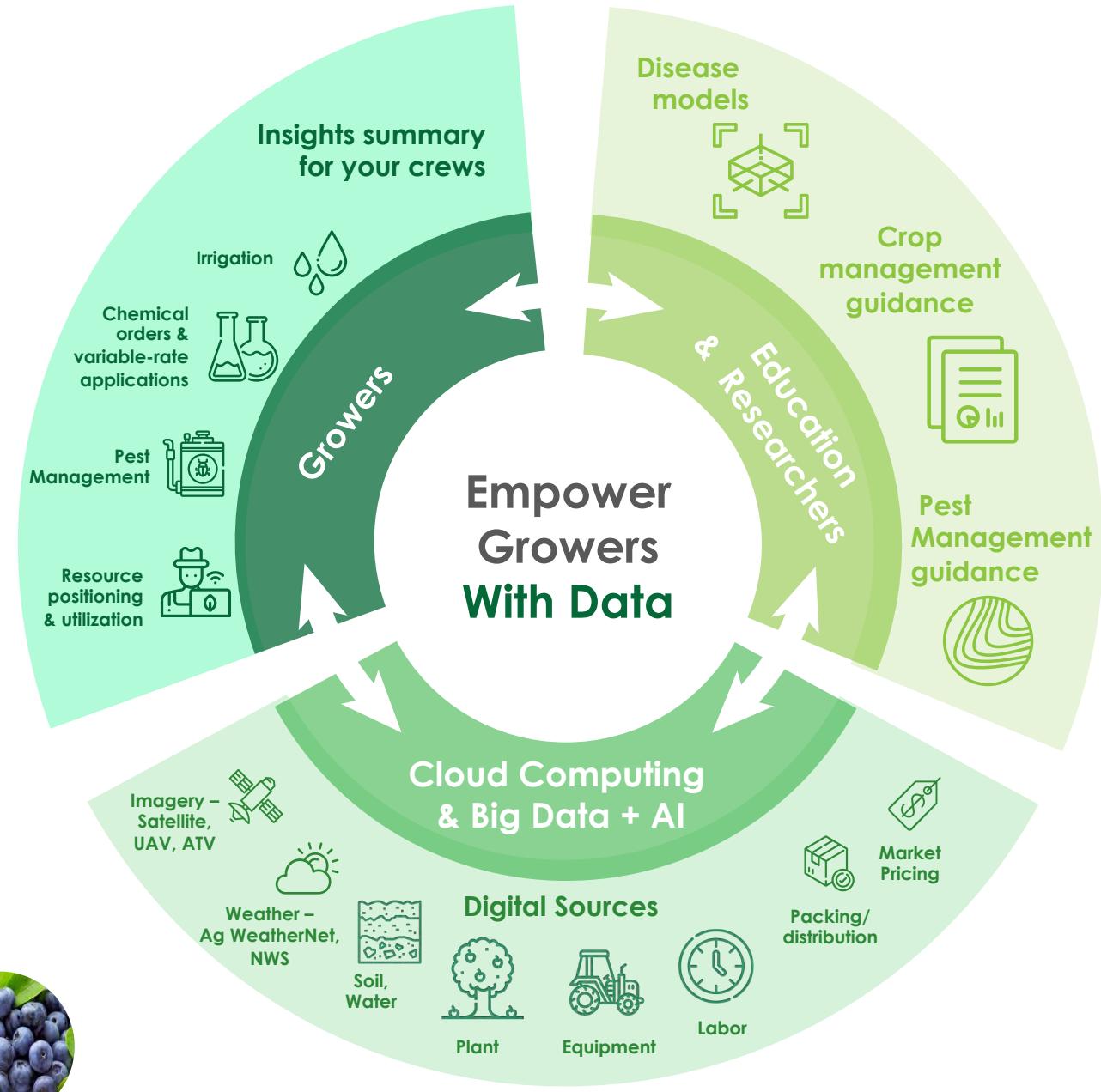
Ag Tech

Data

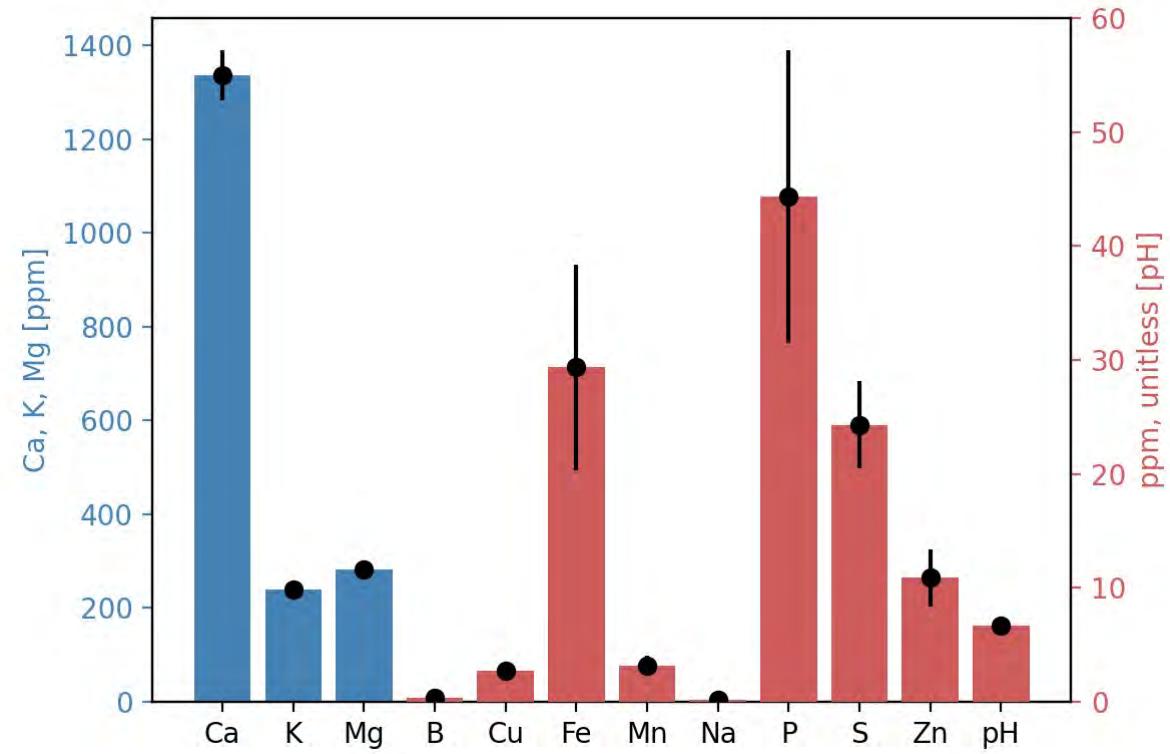
Innovation

What's Inside

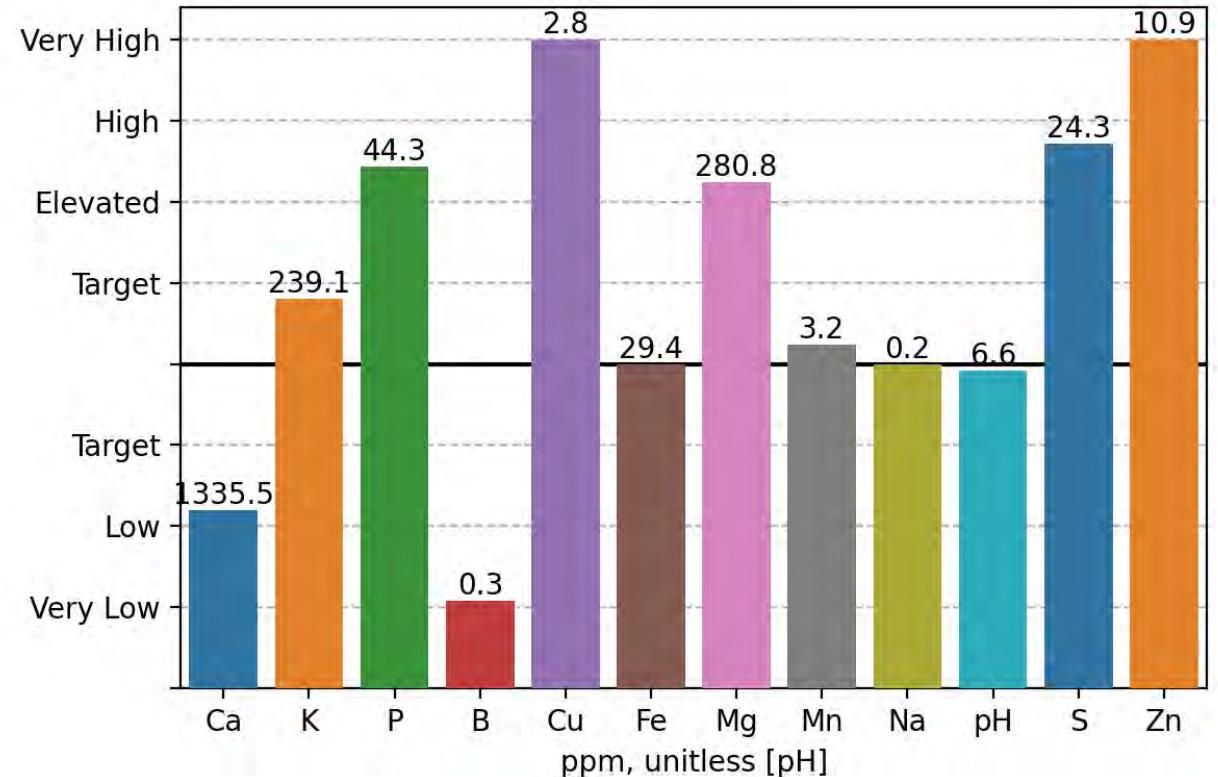
- **Soil Data Summary**
- **Soil Maps**
 - Physical Properties
 - Macronutrients
 - Micronutrients
 - Complex Models
- **Appendix**
 - Soil Nutrient Ratios
 - WSU Optimal Values



Departure From Optimal



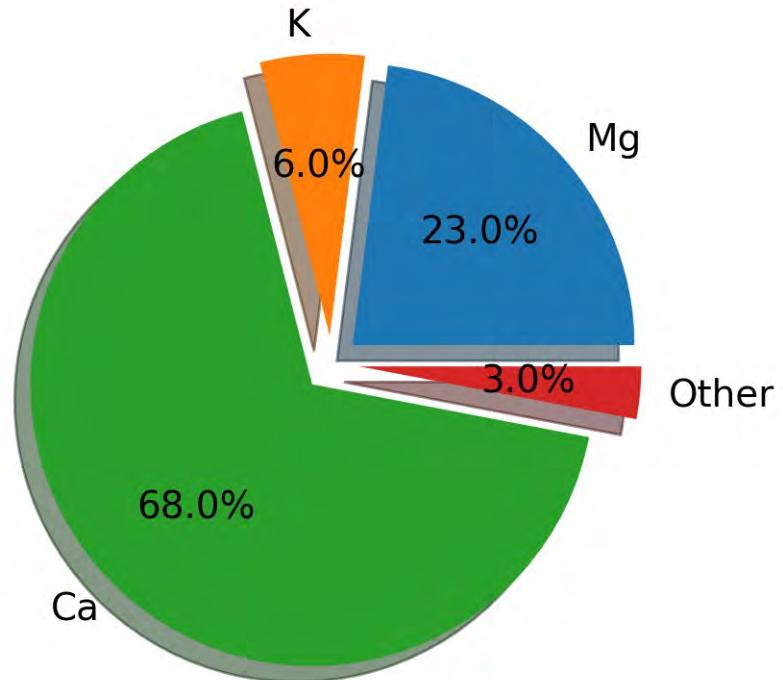
The average value of each micro and macro nutrient. The blue bars are plotted on the left axis and the red bars are plotted on the right axis. The black error bars indicate +/- 1 standard deviation around the mean.



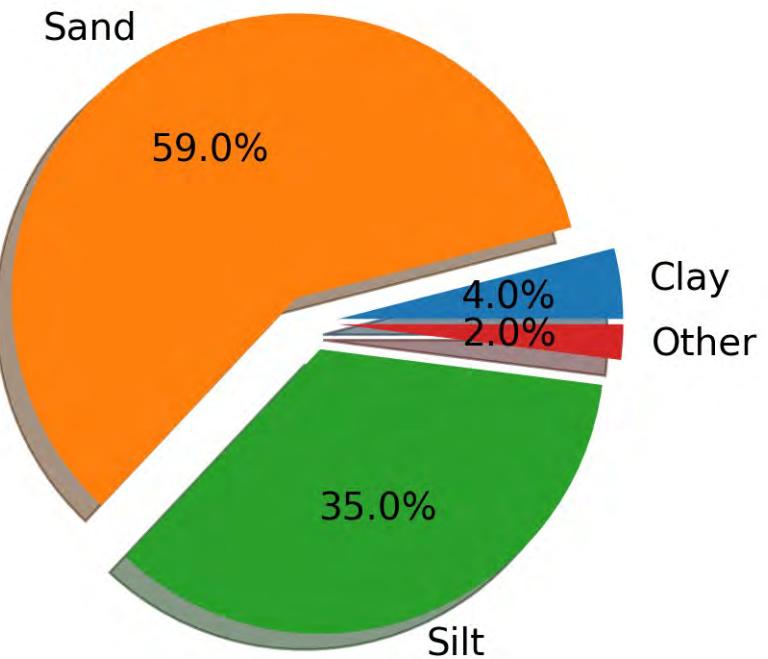
The average value of each nutrient relative to the defined optimal ranges. The black horizontal line indicates 100%. Target ranges are 125% and 75%.

*all variables in the top two bar plots are in ppm, except pH which is unitless.

Soil Properties



Breakdown of base saturation composition percentages as a pie chart.



Breakdown of soil texture composition.



Soil Properties

Physical Properties

Variable	Mean	Min	Max	SD	CV	Units
Sand	59.99	56.08	64.03	1.58	2.63	%
Silt	35.67	29.55	41.6	2.39	6.7	%
Clay	4.34	2.32	6.43	0.82	18.89	%
Loam	40.01	35.97	43.92	1.58	3.95	%
CEC	10.01	8.68	11.39	0.54	5.39	meq/100g
Elevation	899.03	894.2	904.03	1.87	0.21	ft
pH	6.63	5.81	7.49	0.36	5.43	unitless
OM	1.25	0.91	1.57	0.13	10.4	%

Micronutrients

Variable	Mean	Min	Max	SD	CV	Units
B	0.34	0.17	0.47	0.04	11.76	ppm
Cu	2.75	1.52	3.88	0.31	11.27	ppm
Fe	29.35	14.31	53.01	9.04	30.8	ppm
Mn	3.19	1.65	5.85	0.85	26.65	ppm
Na	0.18	0.08	0.25	0.03	16.67	ppm
Zn	10.87	4.06	19.23	2.5	23	ppm

Complex Models

Variable	Mean	Min	Max	SD	CV	Units
Leak	8.08	7.03	9.16	0.42	5.2	unitless
PAWater	43.75	38.71	48.63	1.97	4.5	unitless
SALT	0.77	0.46	1.14	0.11	14.29	mmhos/cm

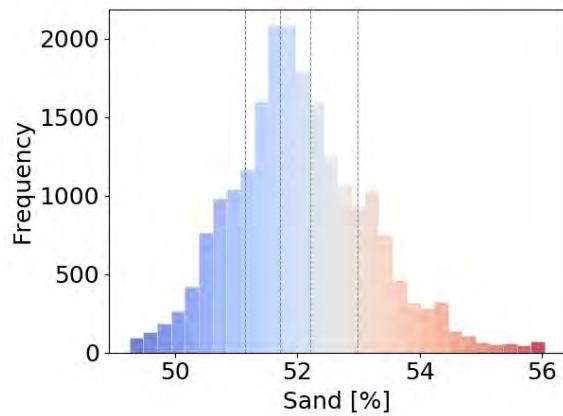
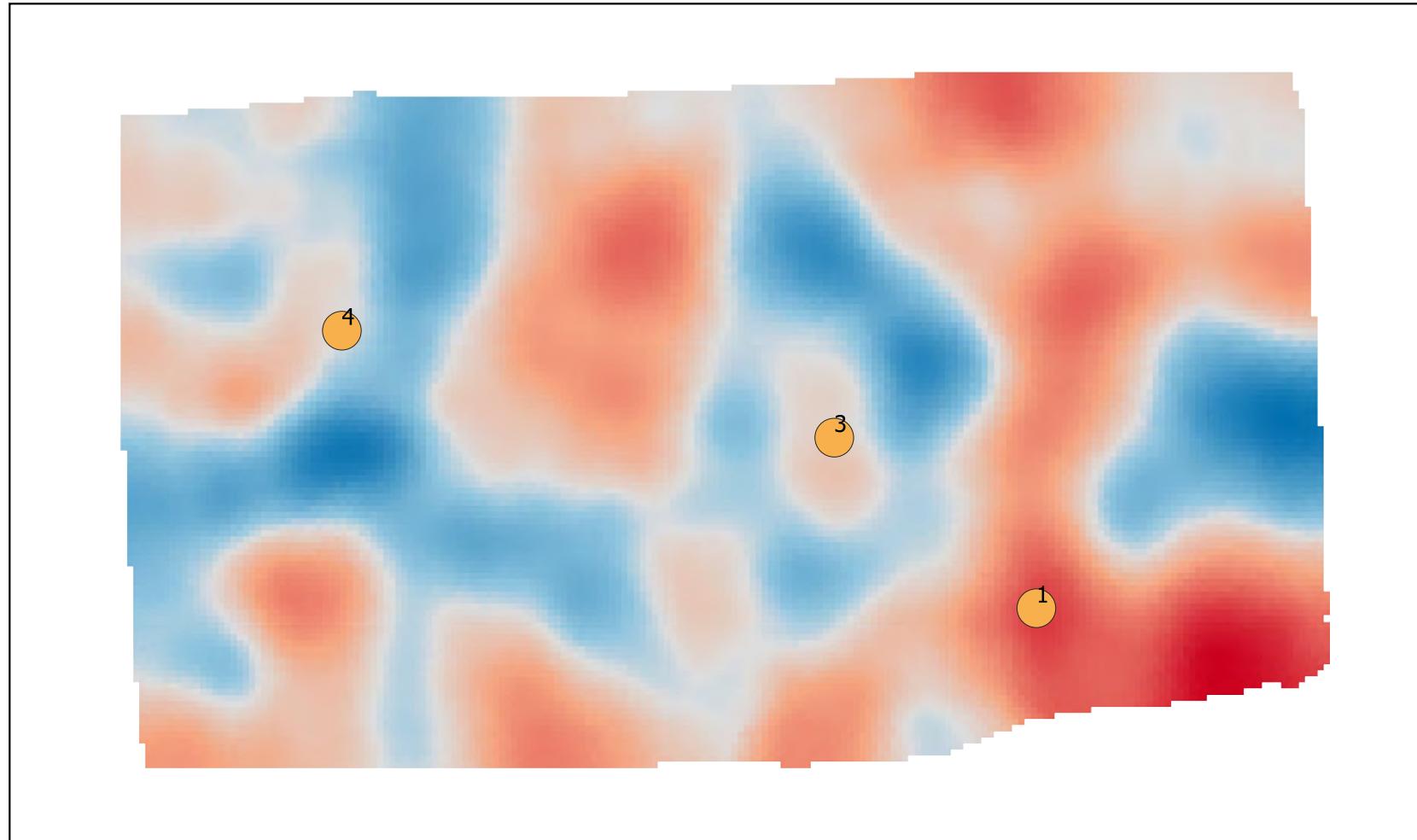
Macro Nutrients

Variable	Mean	Min	Max	SD	CV	Units
NH4N	1.67	0.5	2.9	0.36	21.56	lbs/acre
NO3N	1.26	1.15	1.4	0.04	3.17	lbs/acre
P	44.3	17.2	87.56	12.85	29.01	ppm
K	239.06	193.81	282.62	16.23	6.79	ppm
Ca	1335.46	1203.34	1472.1	53.32	3.99	ppm
S	24.31	14.54	33.05	3.82	15.71	ppm
Mg	280.8	236.57	311.04	12.46	4.44	ppm
Ca_bse	68.07	66.39	69.06	0.49	0.72	%
K_bse	6.24	5.55	6.96	0.26	4.17	%
Mg_bse	23.86	22.03	26.49	0.77	3.23	%



Physical Properties

Variable	Mean	Min	Max	SD	CV	Units
Sand	59.99	56.08	64.03	1.58	2.63	%
Silt	35.67	29.55	41.6	2.39	6.7	%
Clay	4.34	2.32	6.43	0.82	18.89	%
Loam	40.01	35.97	43.92	1.58	3.95	%
CEC	10.01	8.68	11.39	0.54	5.39	meq/100g
Elevation	899.03	894.2	904.03	1.87	0.21	ft
pH	6.63	5.81	7.49	0.36	5.43	unitless
OM	1.25	0.91	1.57	0.13	10.4	%



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	52.05	2

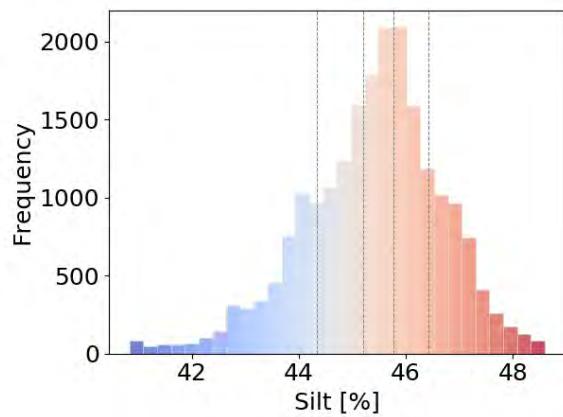
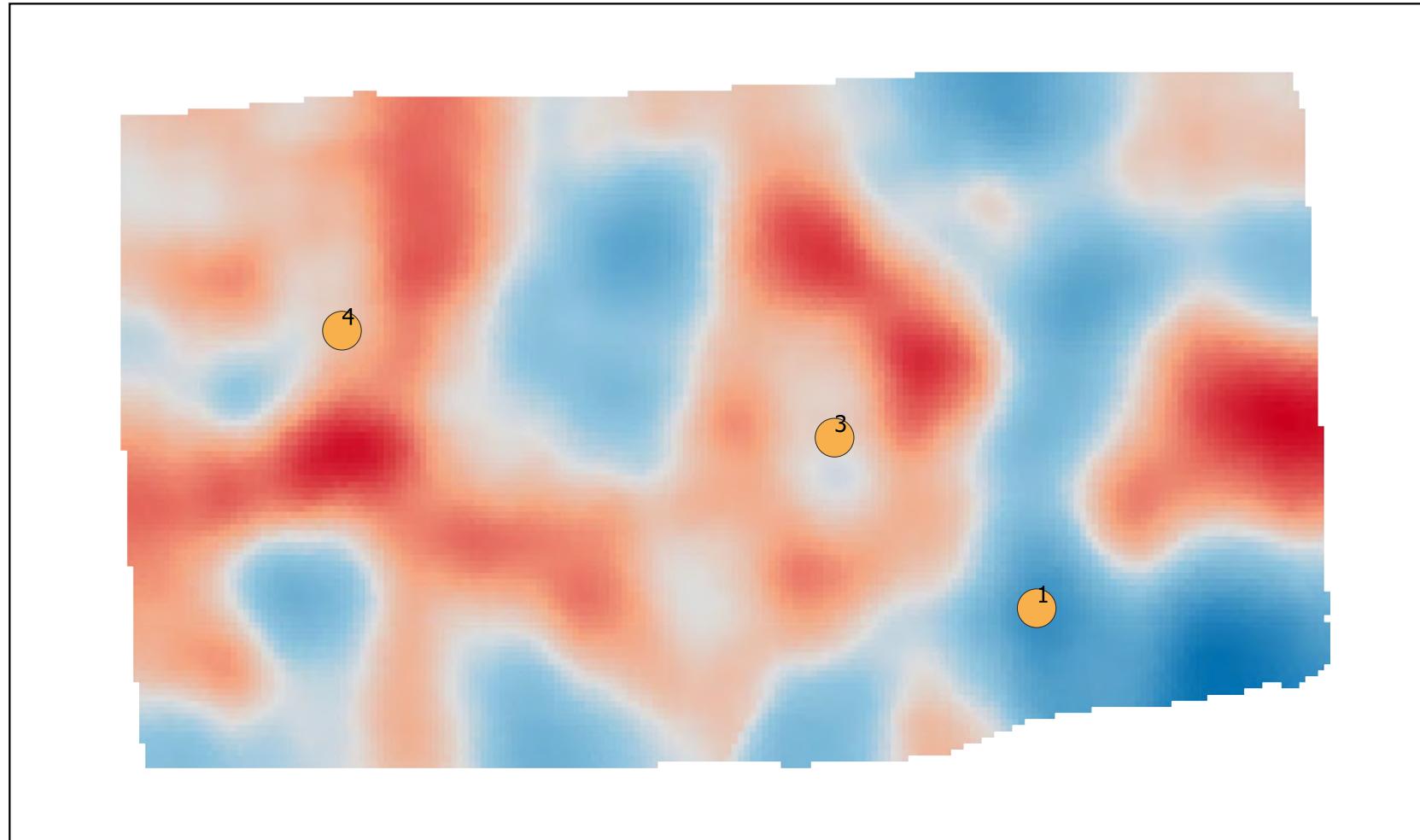
Sand [%]
49.25-51.14
51.14-51.72
51.72-52.21
52.21-52.98
52.98-56.05

ID	Sand
1	55
3	55
4	49

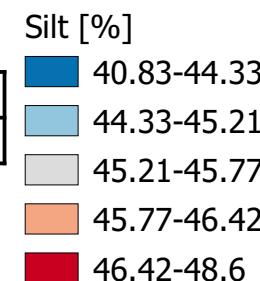


0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	45.38	2

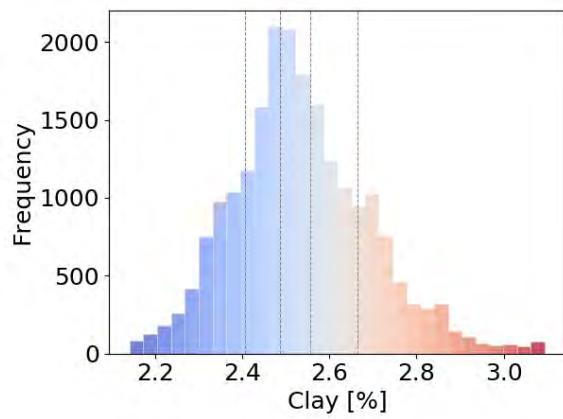
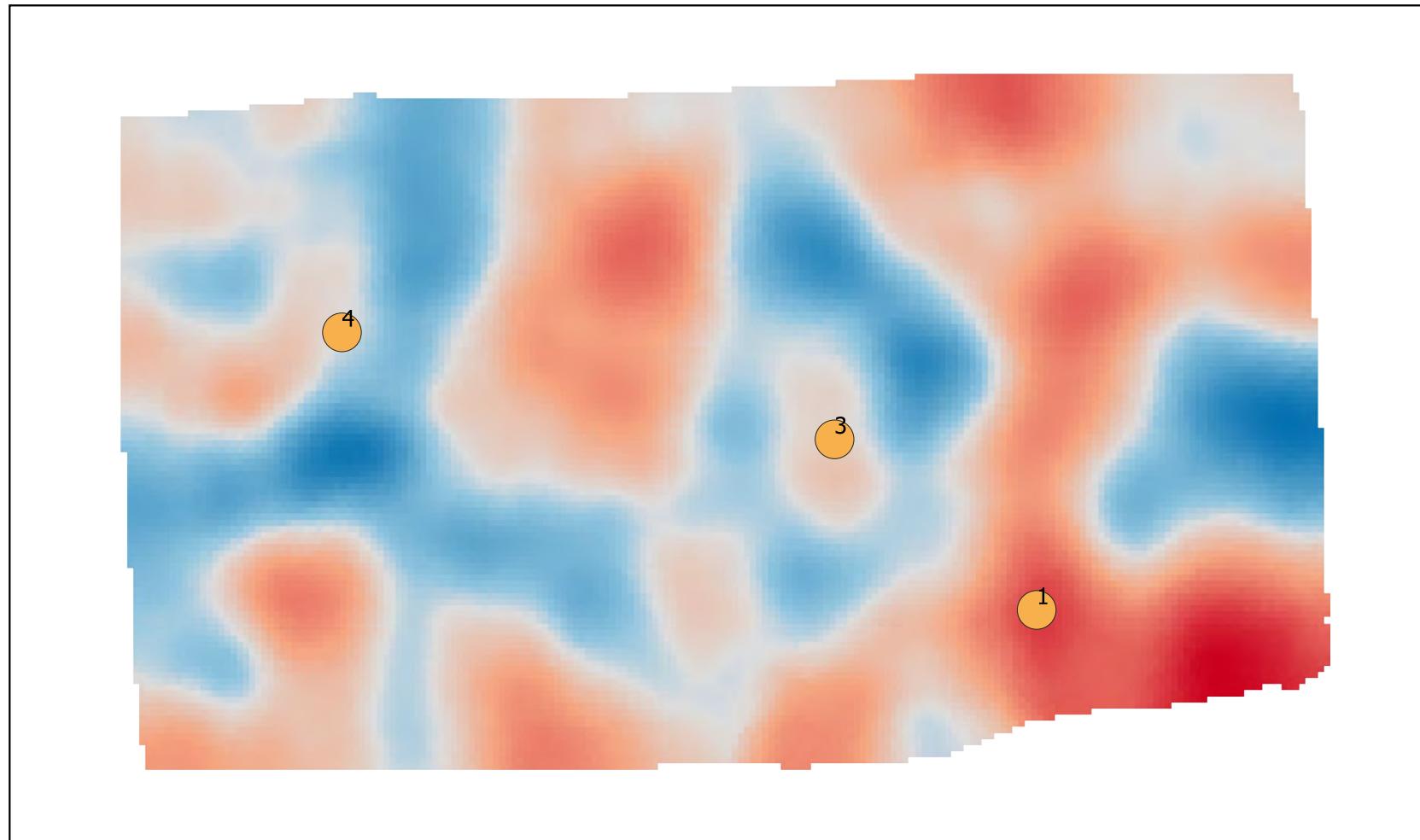


ID	Silt
1	42
3	43
4	48

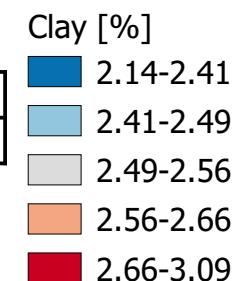


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	2.54	6



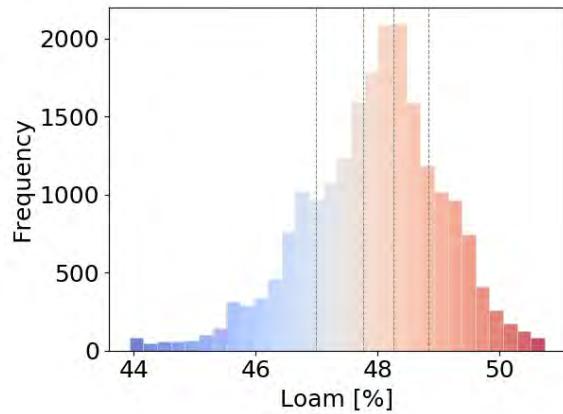
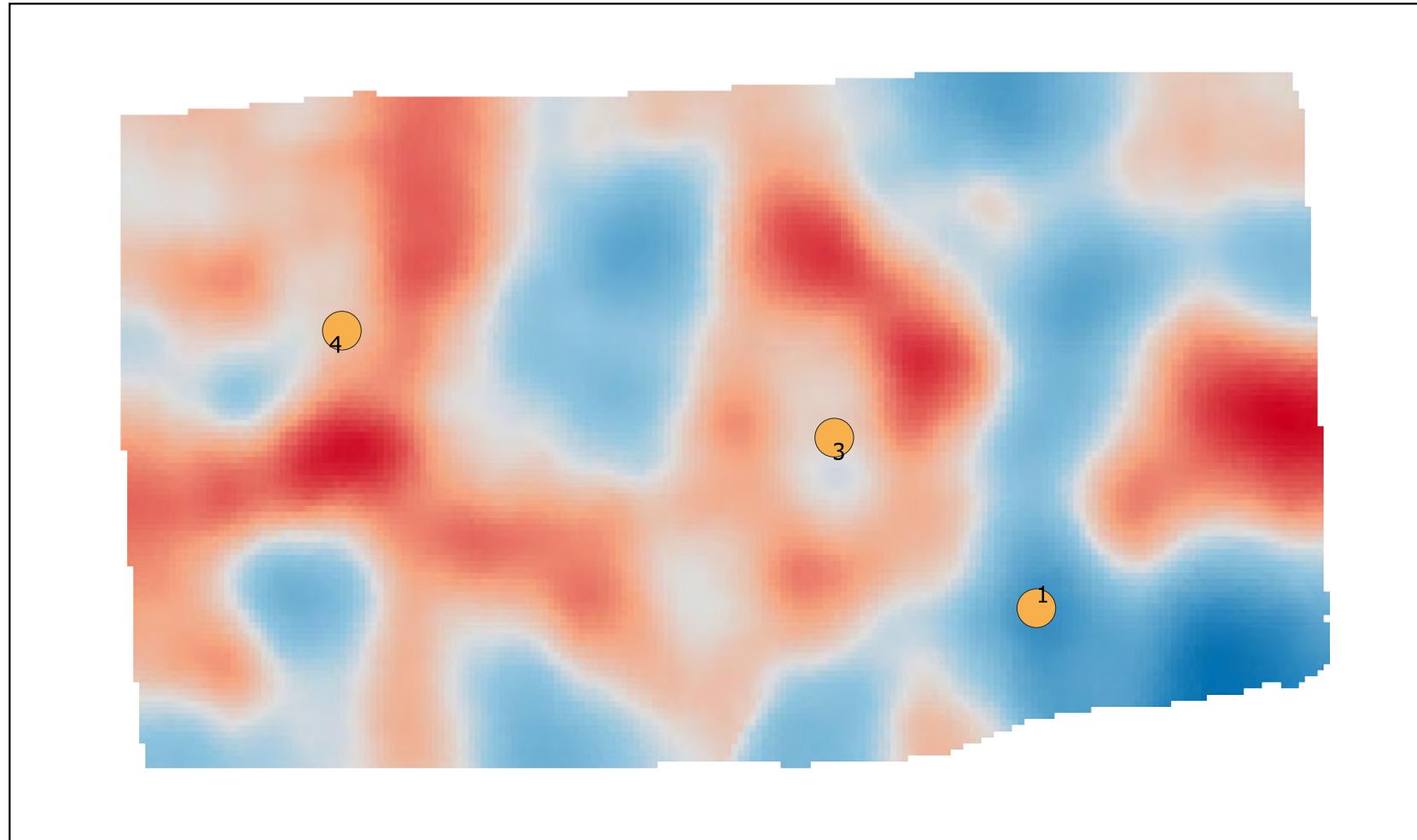
ID	Clay
1	3
3	2
4	3



0 25 50 75 100 m

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Chiawana:Loam



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	47.92	2

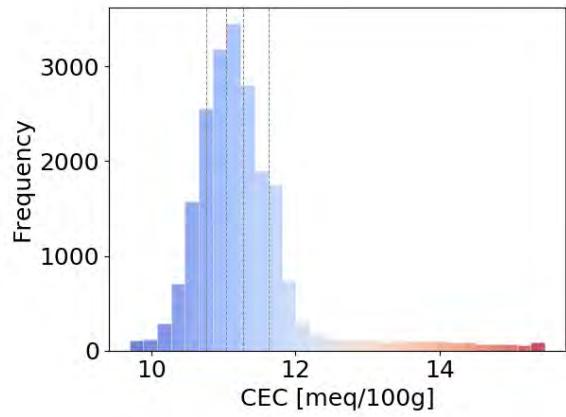
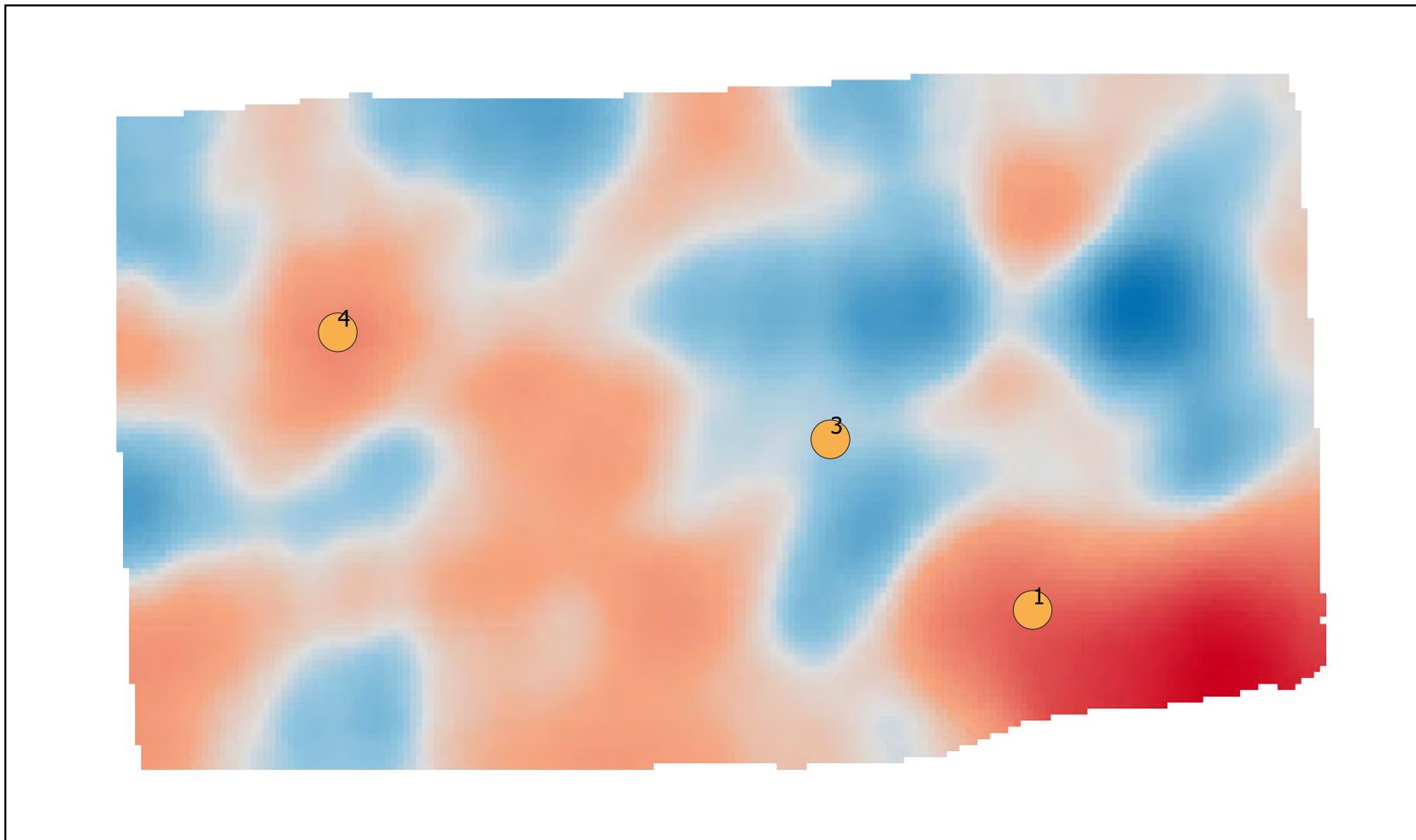
Loam [%]	
43.93-47.0	
47.0-47.77	
47.77-48.26	
48.26-48.83	
48.83-50.74	

ID	Loam
1	NAN
3	NAN
4	NAN



0 25 50 75 100 m

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ID	CEC
1	NAN
3	NAN
4	NAN

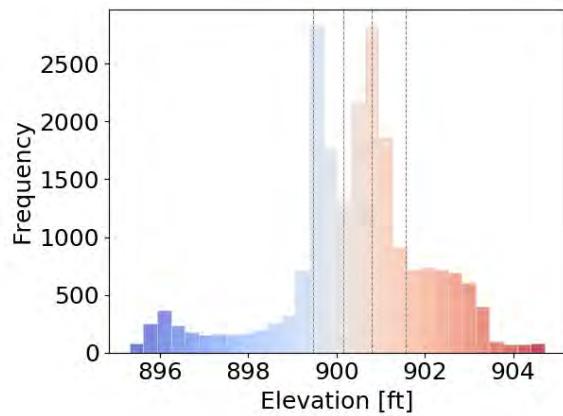
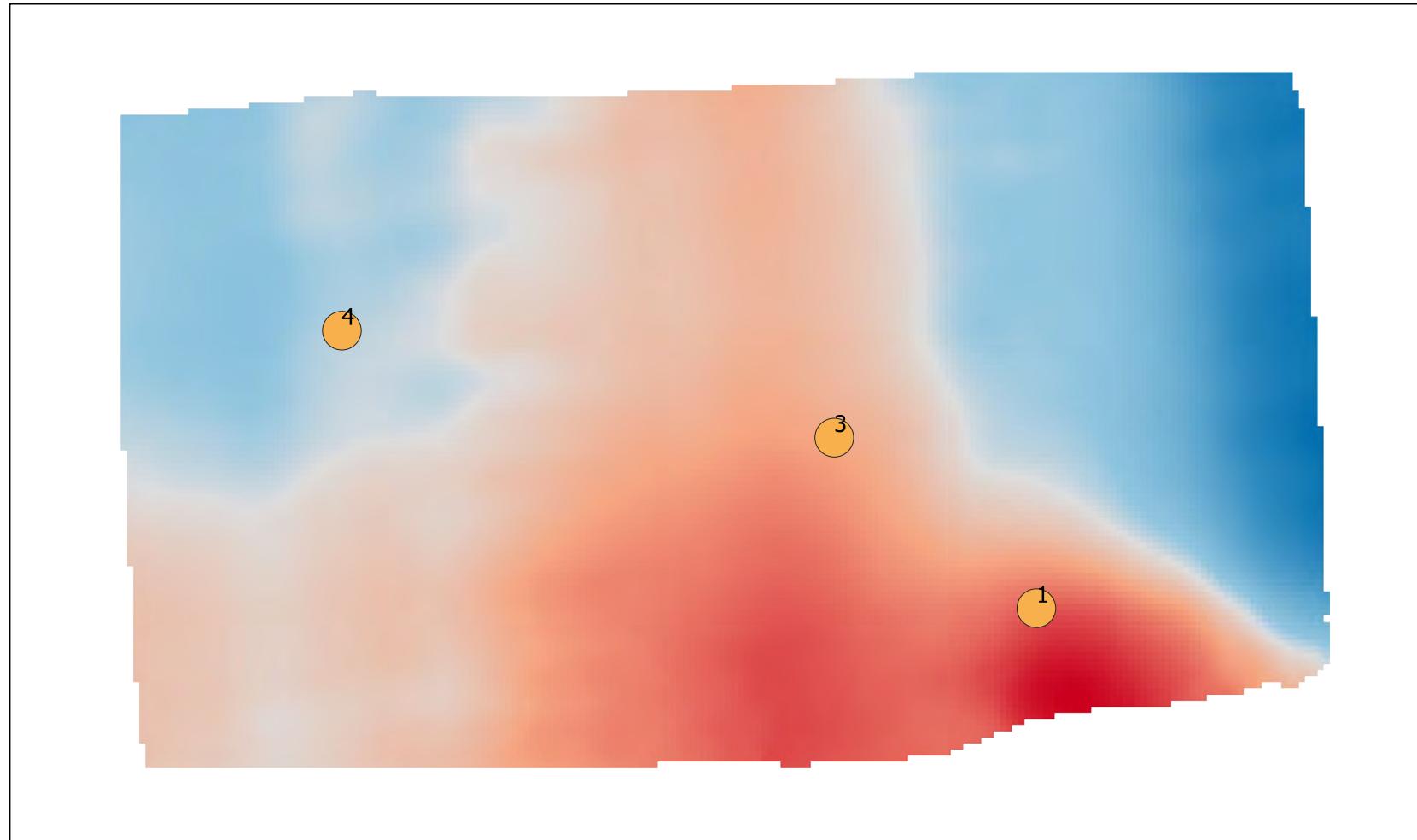
CEC [meq/100g]
9.69-10.77
10.77-11.04
11.04-11.27
11.27-11.63
11.63-15.46



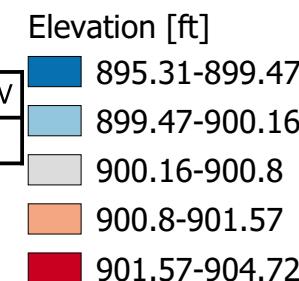
0 25 50 75 100 m

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Chiawana:Elevation



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	900.41	0

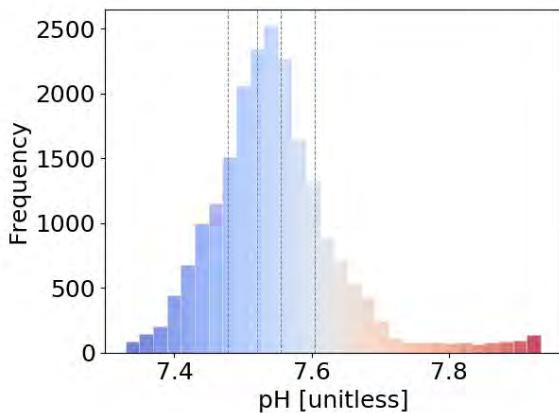
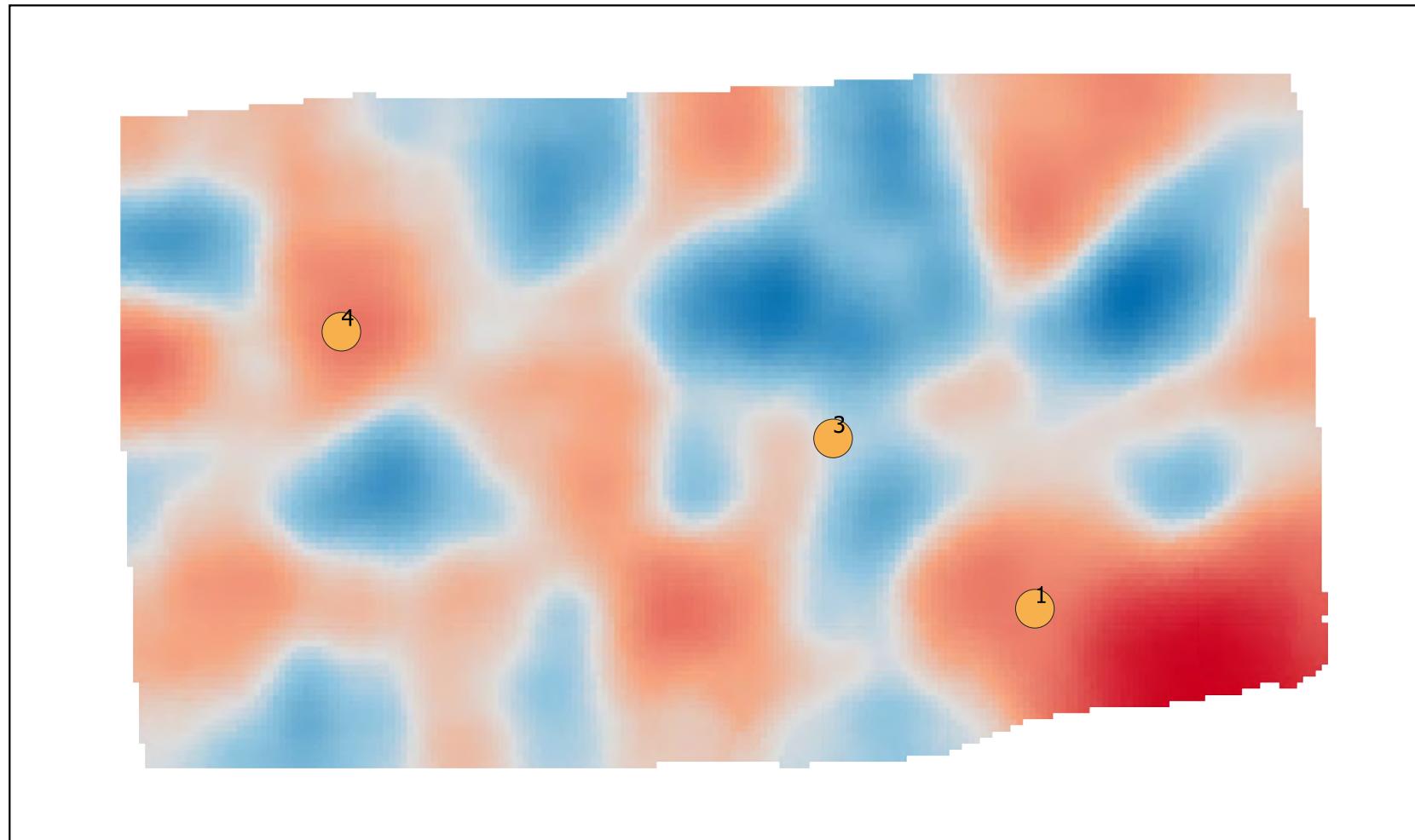


ID	Elevation
1	NAN
3	NAN
4	NAN

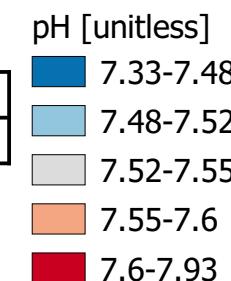


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	7.55	1

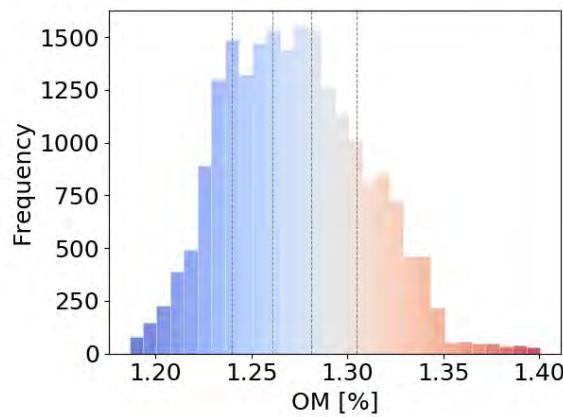
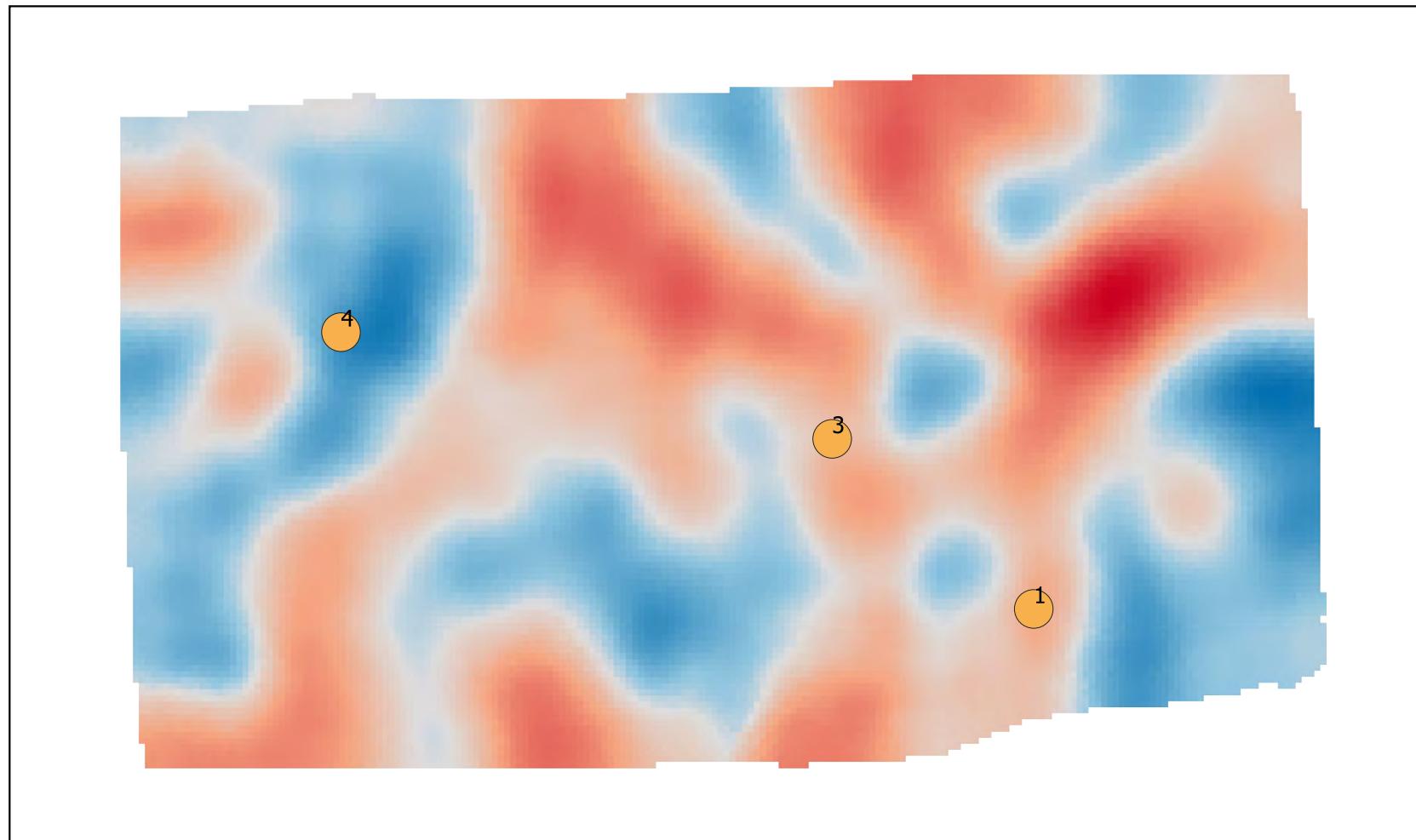


ID	pH
1	7.7
3	7.5
4	7.7

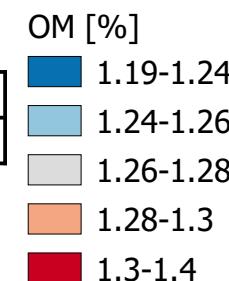


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	1.27	2



ID	OM
1	1.3
3	1.3
4	1.2



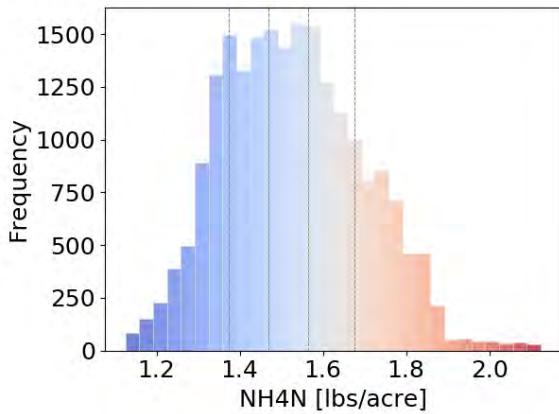
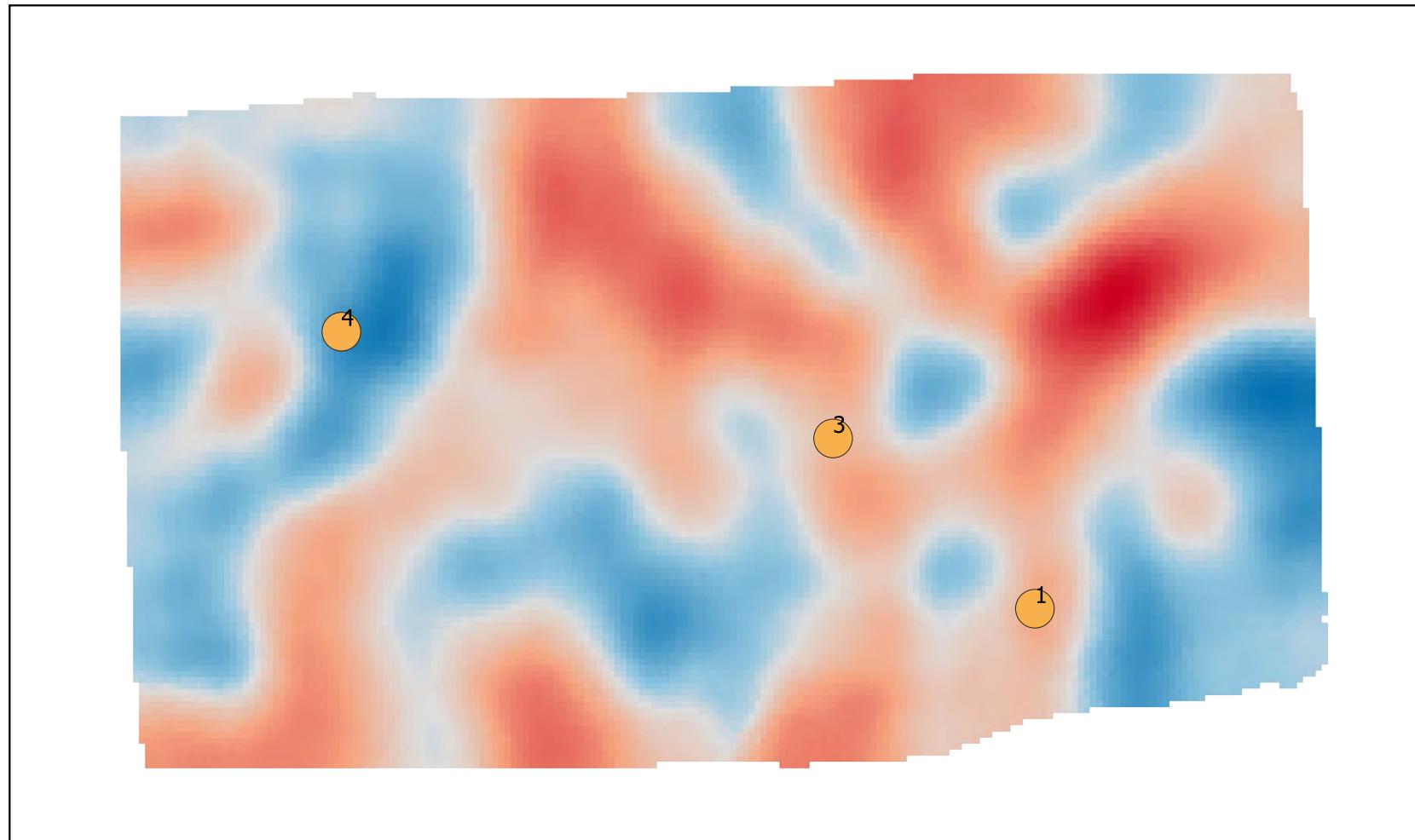
0 25 50 75 100 m

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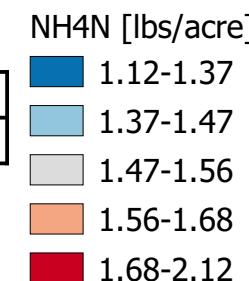


Macronutrients

Variable	Mean	Min	Max	SD	CV	Units
NH4N	1.67	0.5	2.9	0.36	21.56	lbs/acre
NO3N	1.26	1.15	1.4	0.04	3.17	lbs/acre
P	44.3	17.2	87.56	12.85	29.01	ppm
K	239.06	193.81	282.62	16.23	6.79	ppm
Ca	1335.46	1203.34	1472.1	53.32	3.99	ppm
S	24.31	14.54	33.05	3.82	15.71	ppm
Mg	280.8	236.57	311.04	12.46	4.44	ppm
Ca_bse	68.07	66.39	69.06	0.49	0.72	%
K_bse	6.24	5.55	6.96	0.26	4.17	%
Mg_bse	23.86	22.03	26.49	0.77	3.23	%



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	1.53	11

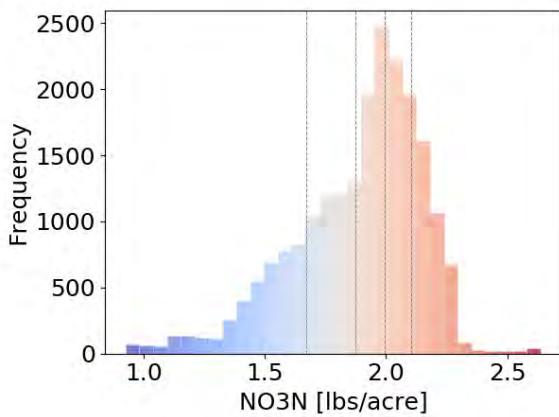
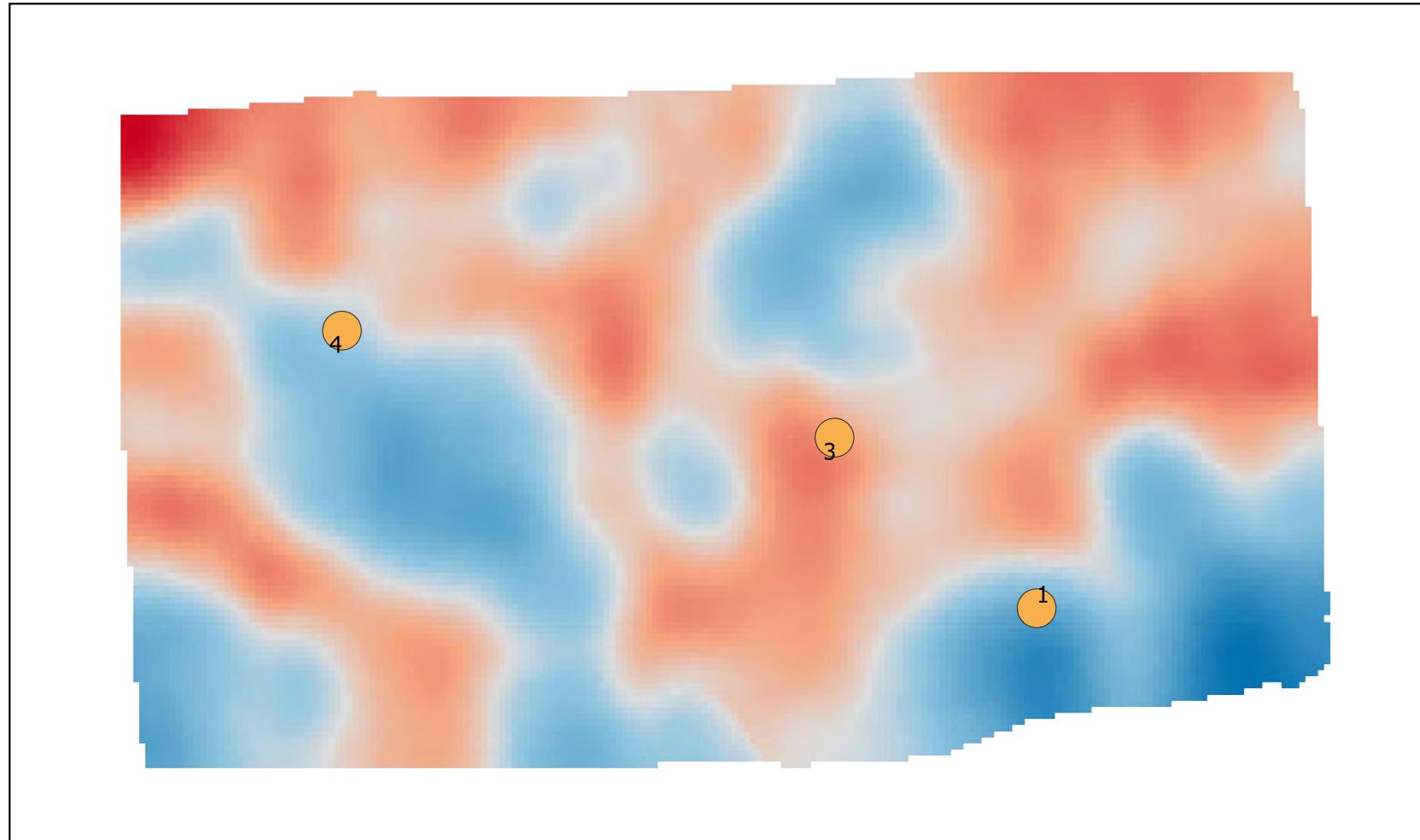


ID	NH4N
1	1.7
3	1.6
4	1.2

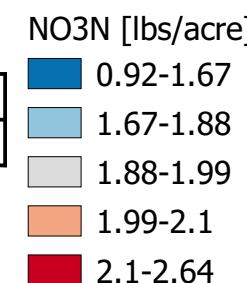


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	1.88	14

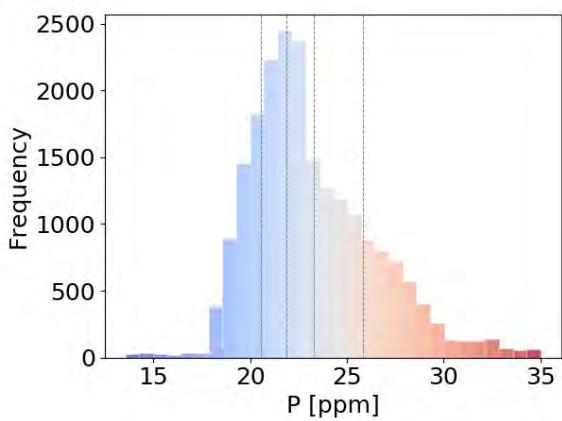
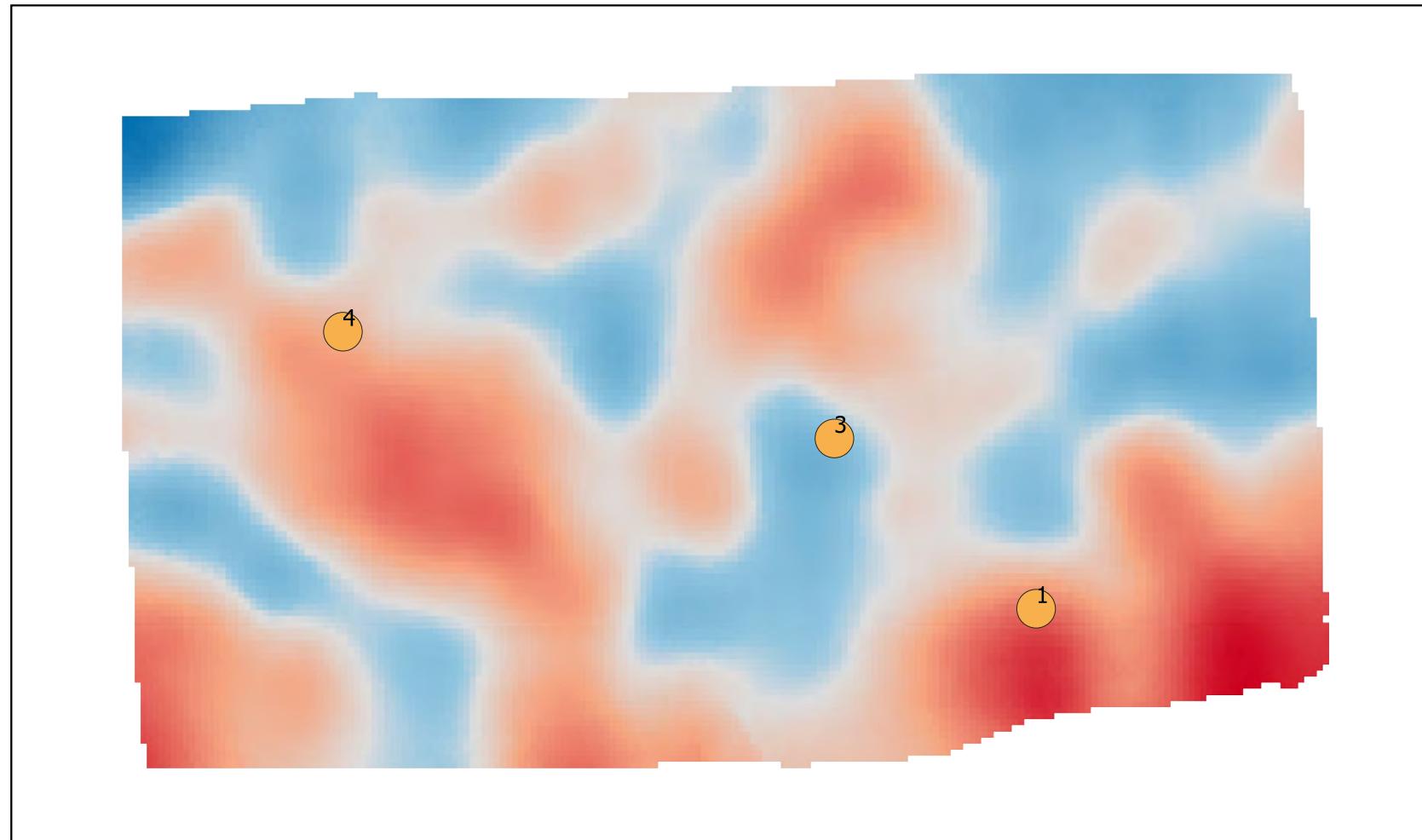


ID	NO3N
1	1.3
3	2.1
4	1.9



0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	23.17	13

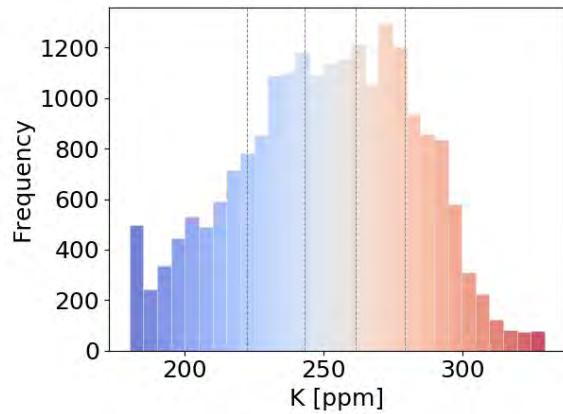
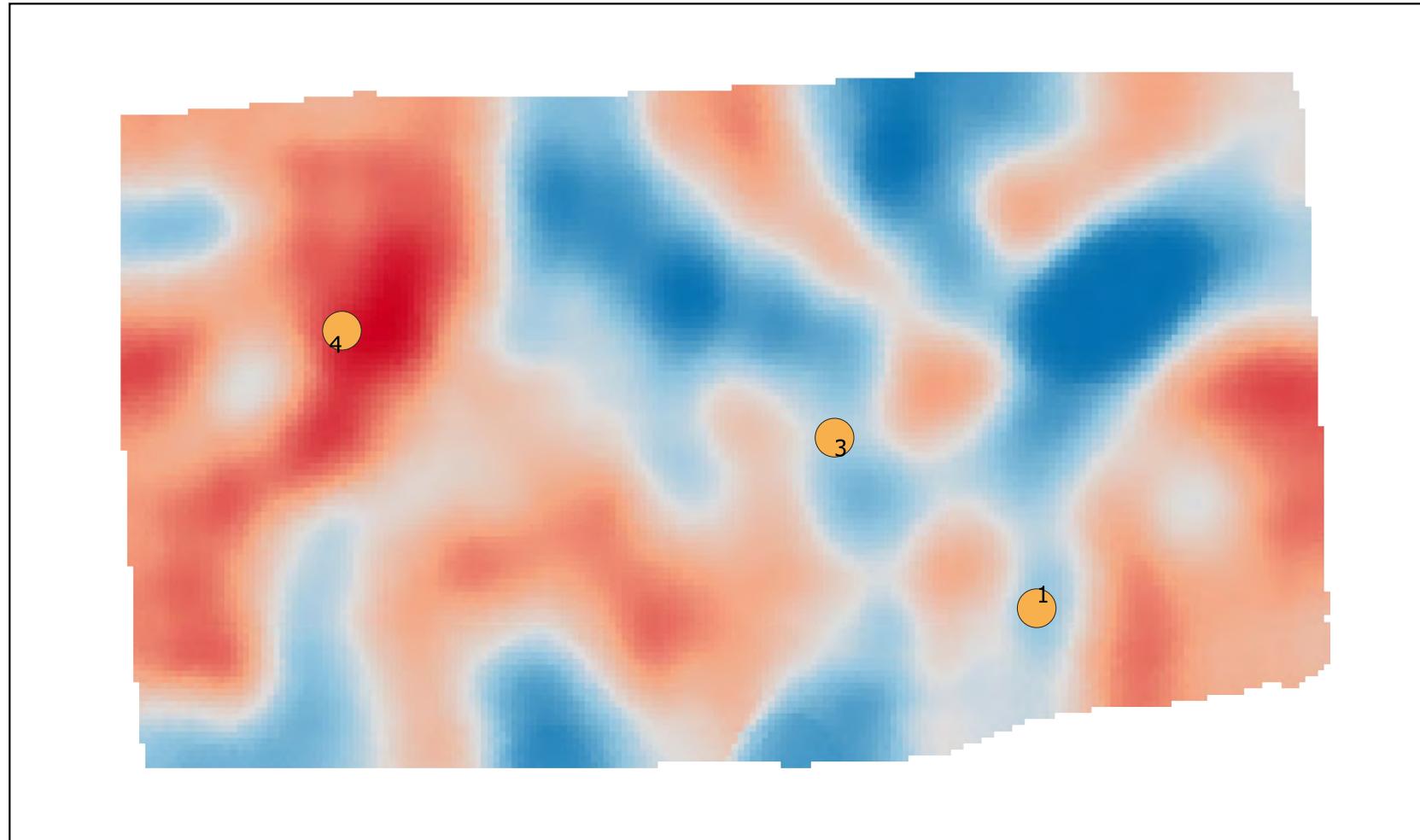
P [ppm]	
13.56-20.53	
20.53-21.86	
21.86-23.28	
23.28-25.81	
25.81-35.01	

ID	P
1	32
3	22
4	20

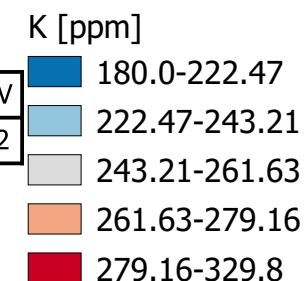


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	250.77	12

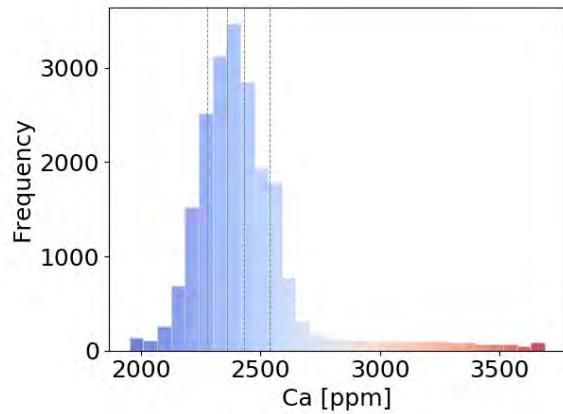
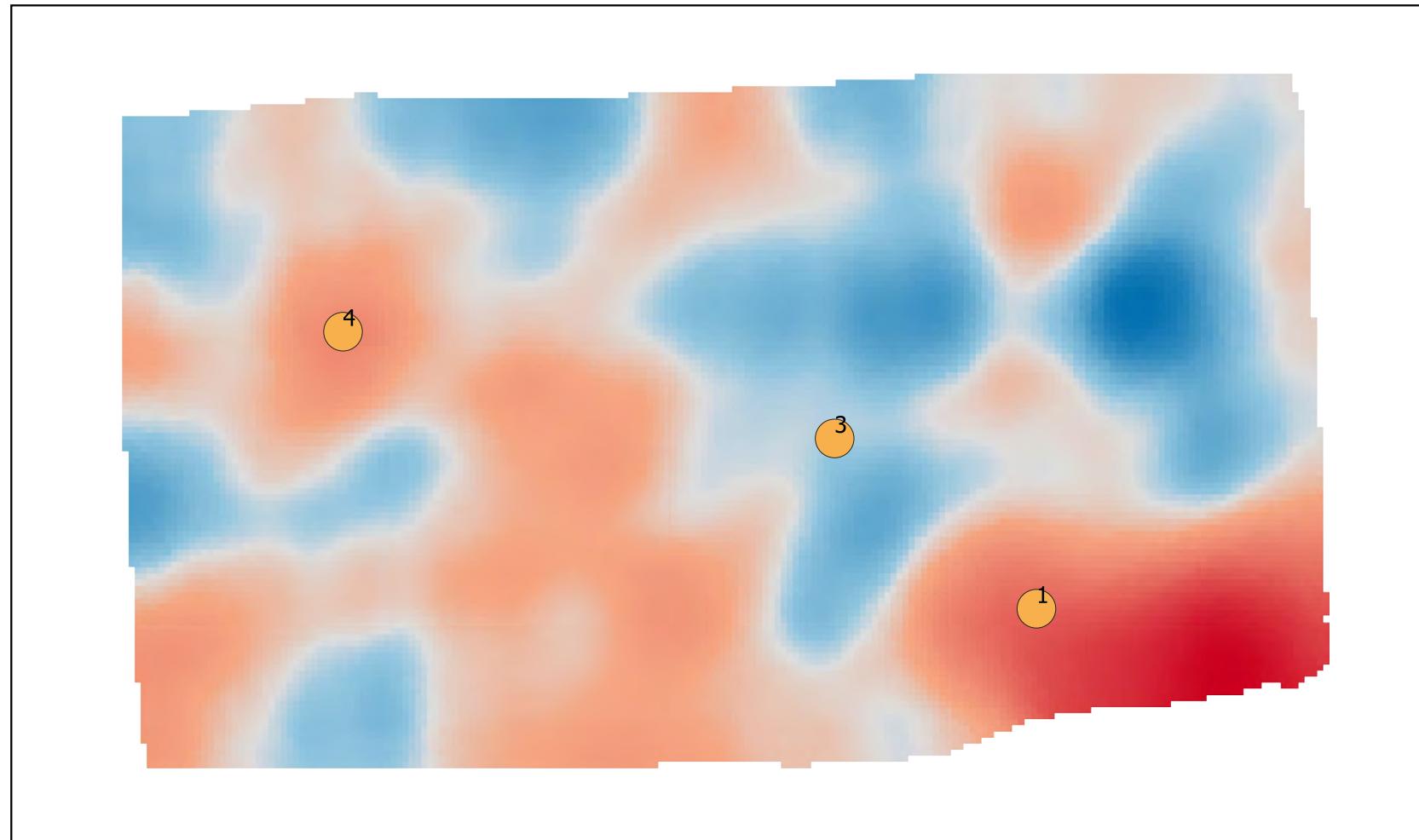


ID	K
1	234
3	210
4	327

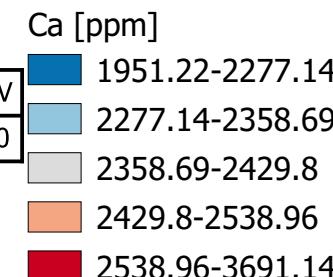


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	2438.7	10

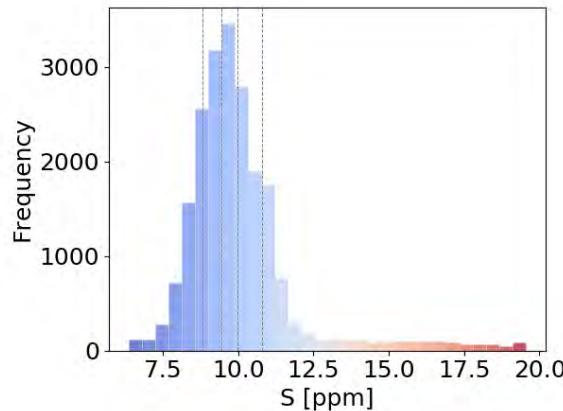
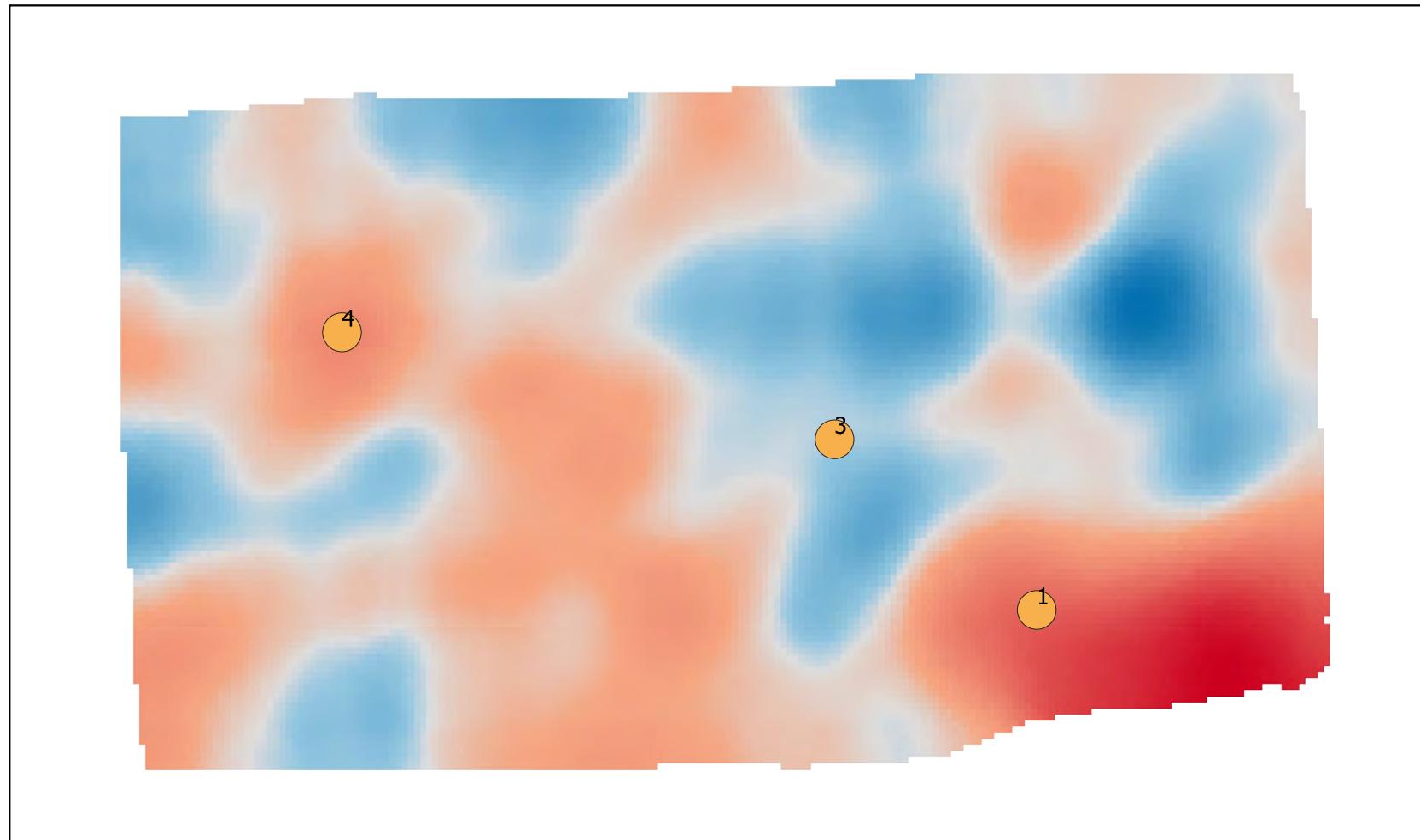


ID	Ca
1	2560.0
3	2040.0
4	3500.0

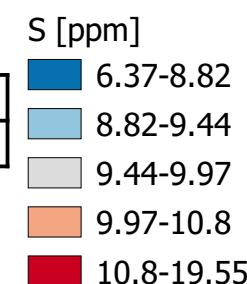


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	10.04	18

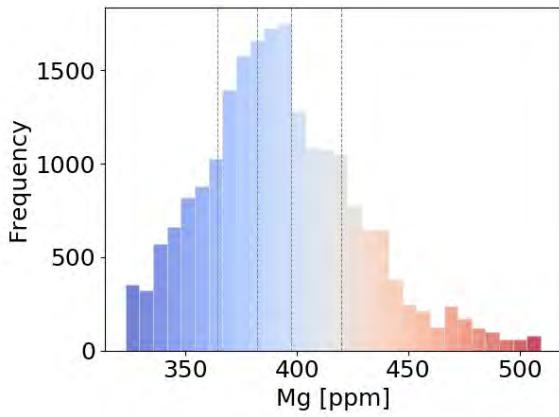
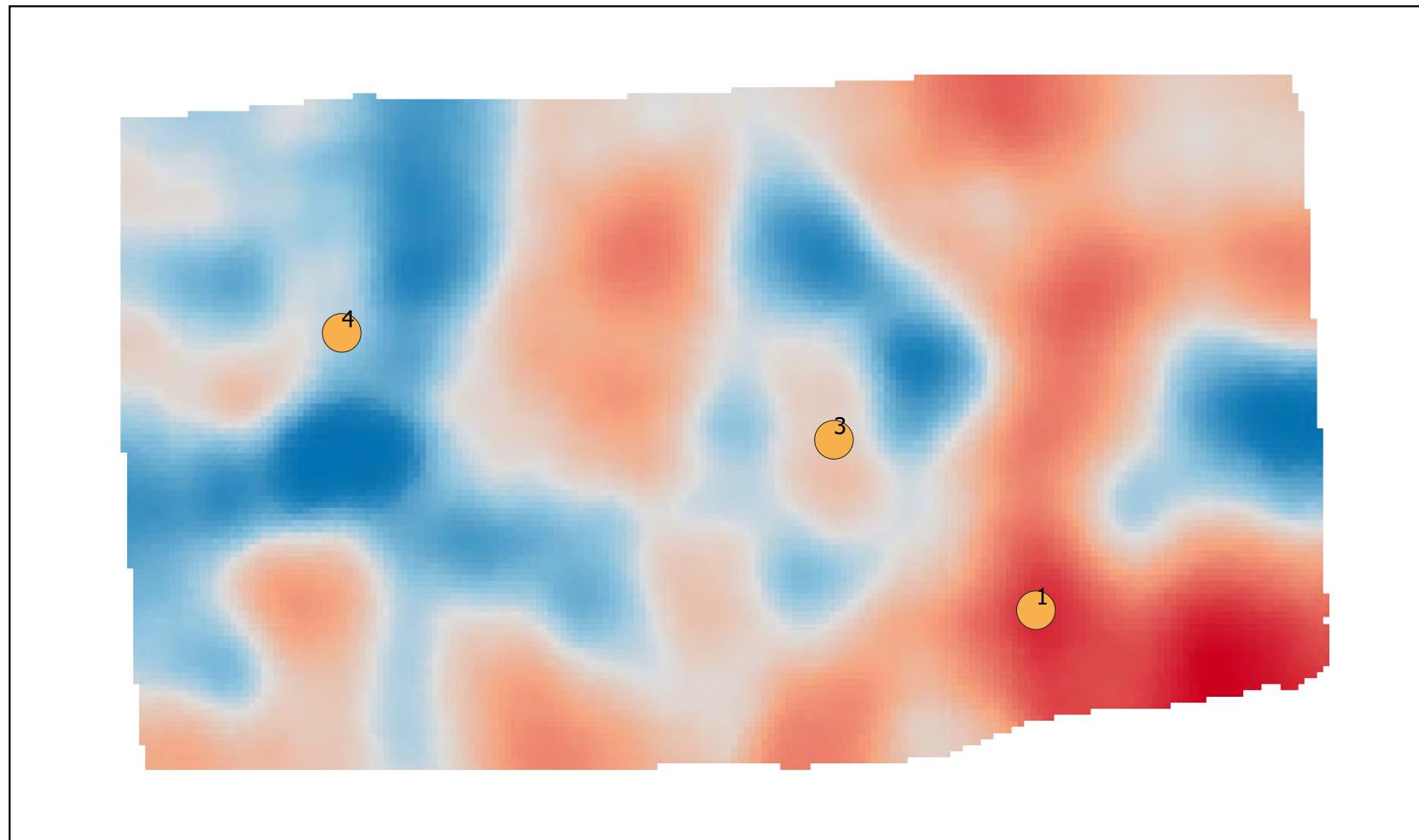


ID	S
1	13.18
3	8.21
4	14.68

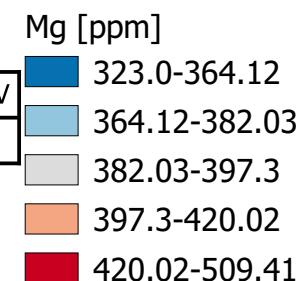


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	392.81	8



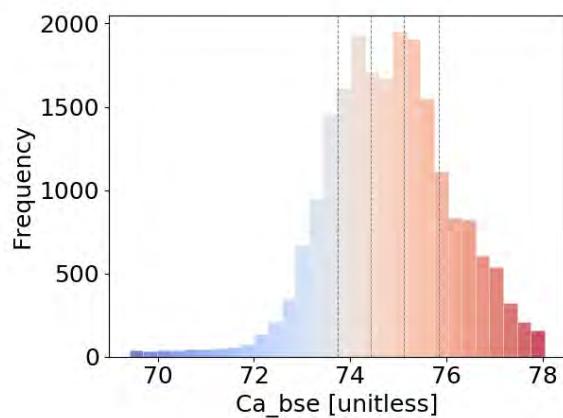
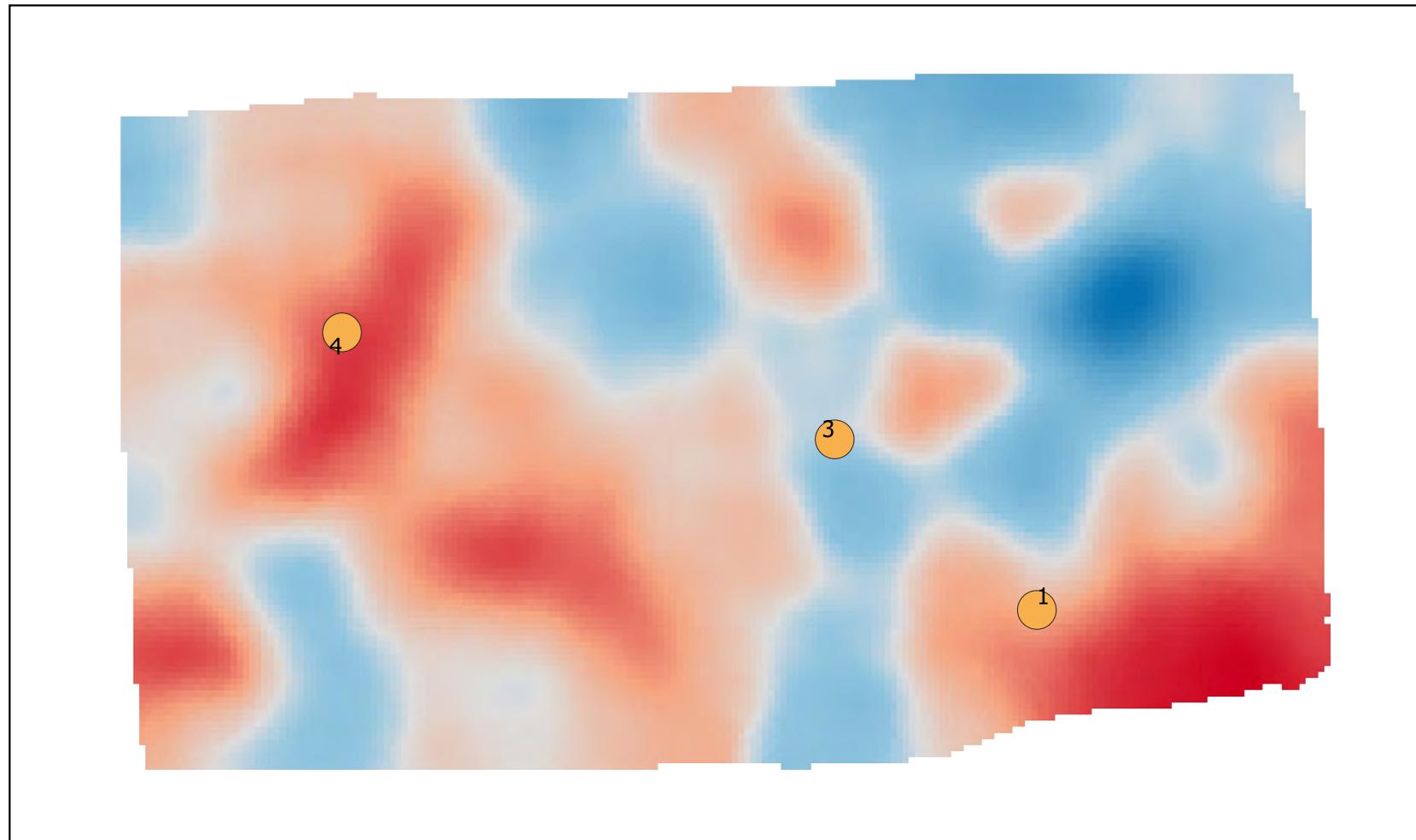
ID	Mg
1	492.0
3	420.0
4	348.0



0 25 50 75 100 m

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Chiawana:Ca_bse



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	74.78	1

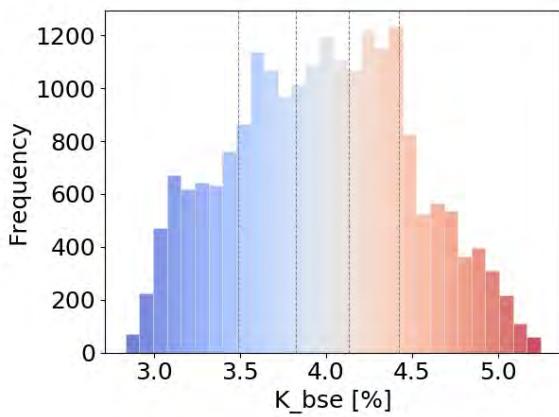
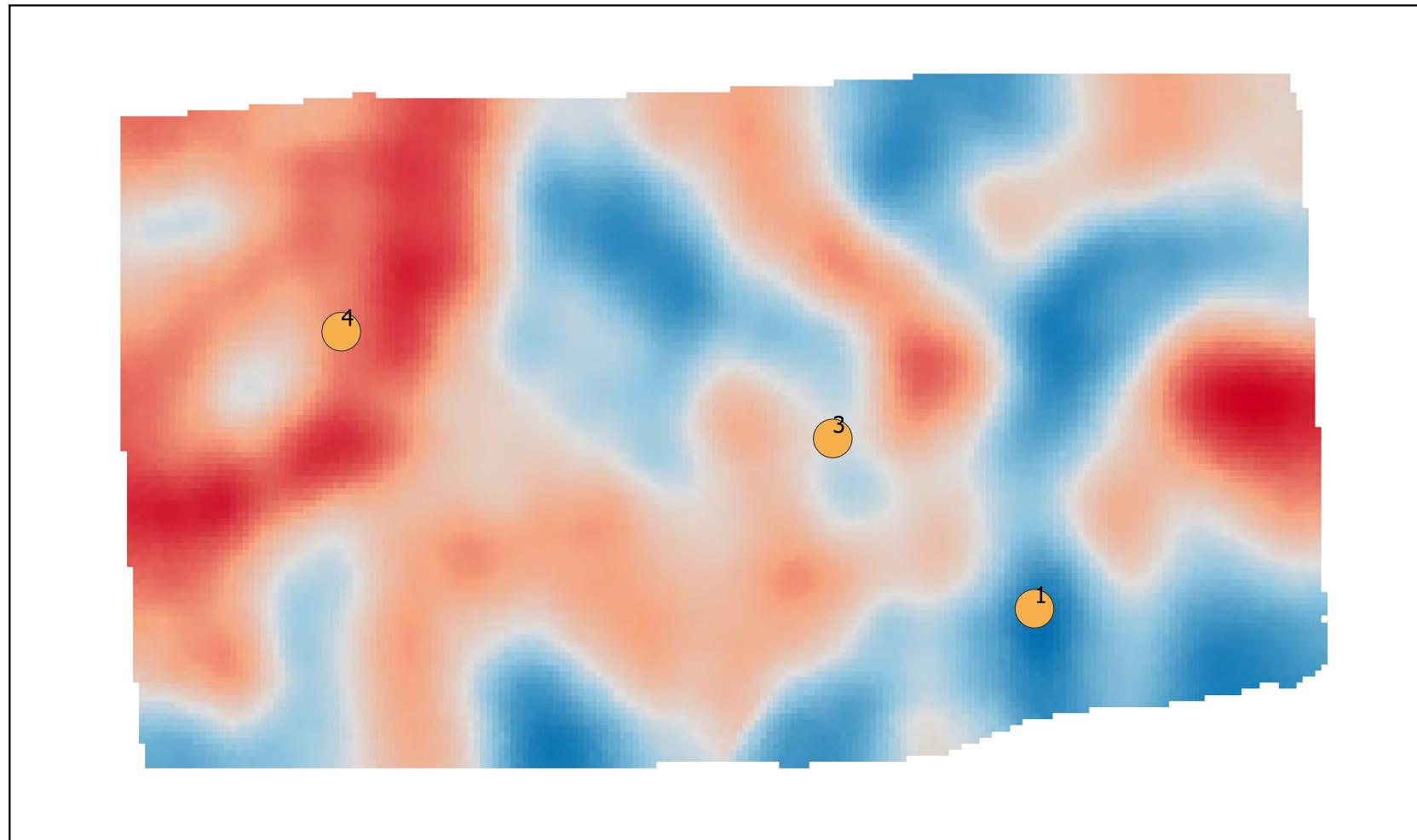
Ca_bse [unitless]
69.41-73.74
73.74-74.44
74.44-75.11
75.11-75.84
75.84-78.05

ID	Ca_bse
1	NAN
3	NAN
4	NAN



0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	3.97	13

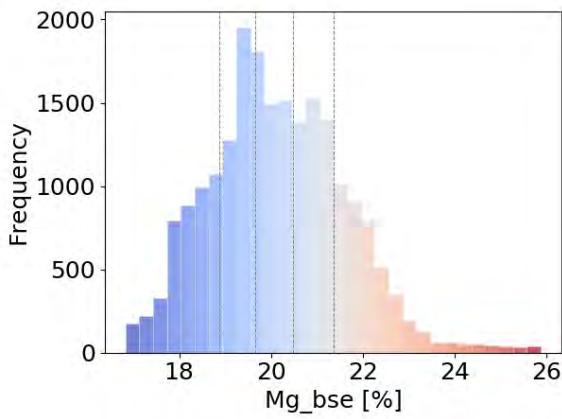
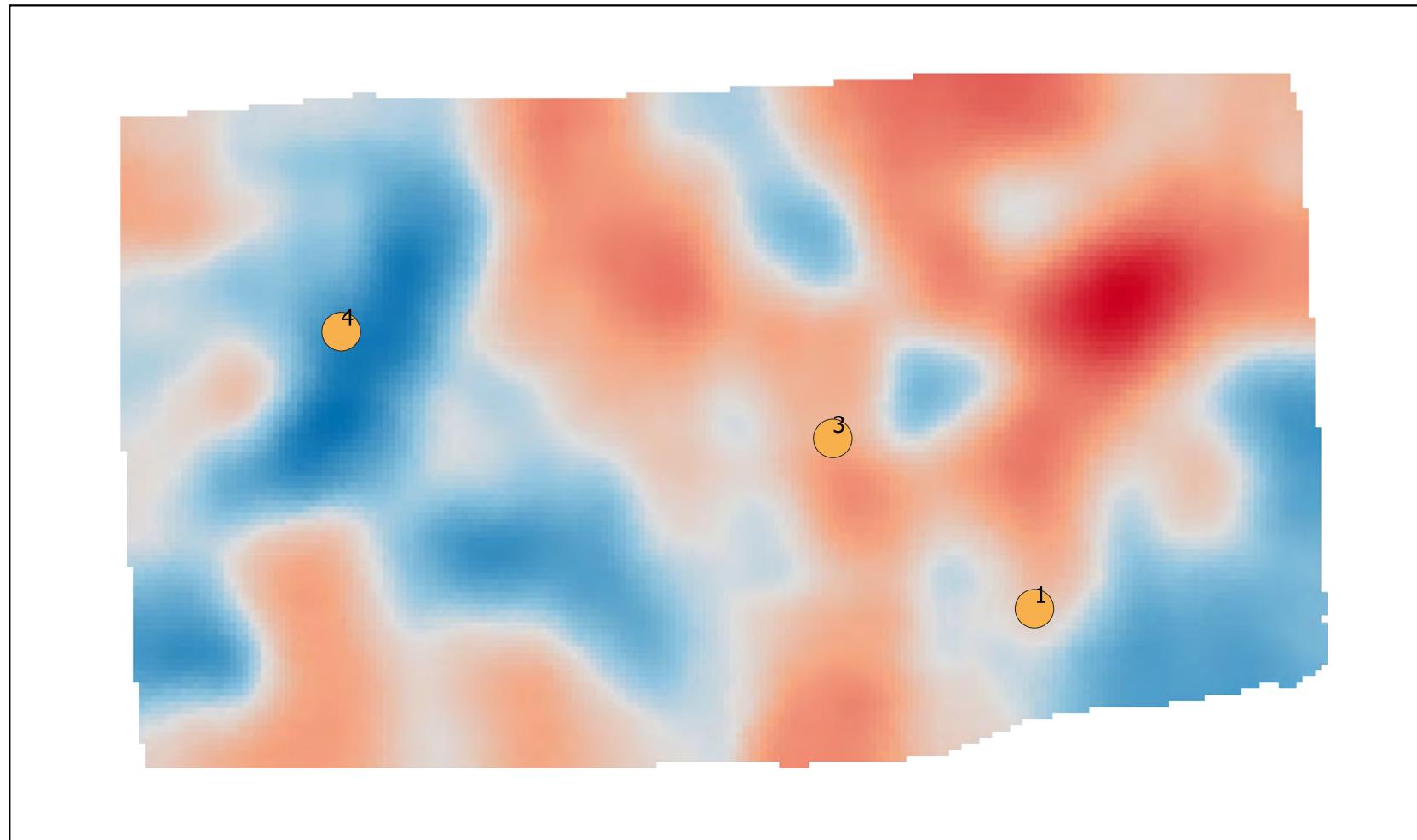
K_bse [%]
2.83-3.49
3.49-3.82
3.82-4.13
4.13-4.42
4.42-5.25

ID	K_bse
1	NAN
3	NAN
4	NAN

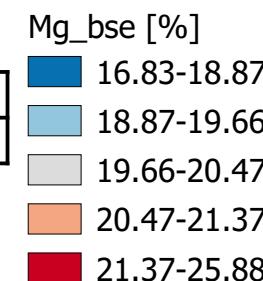


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	20.15	7



ID	Mg_bse
1	NAN
3	NAN
4	NAN



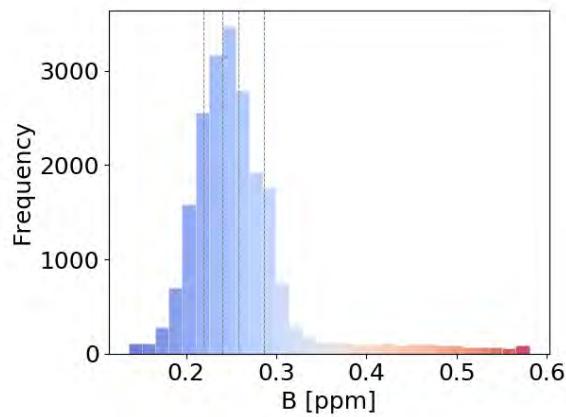
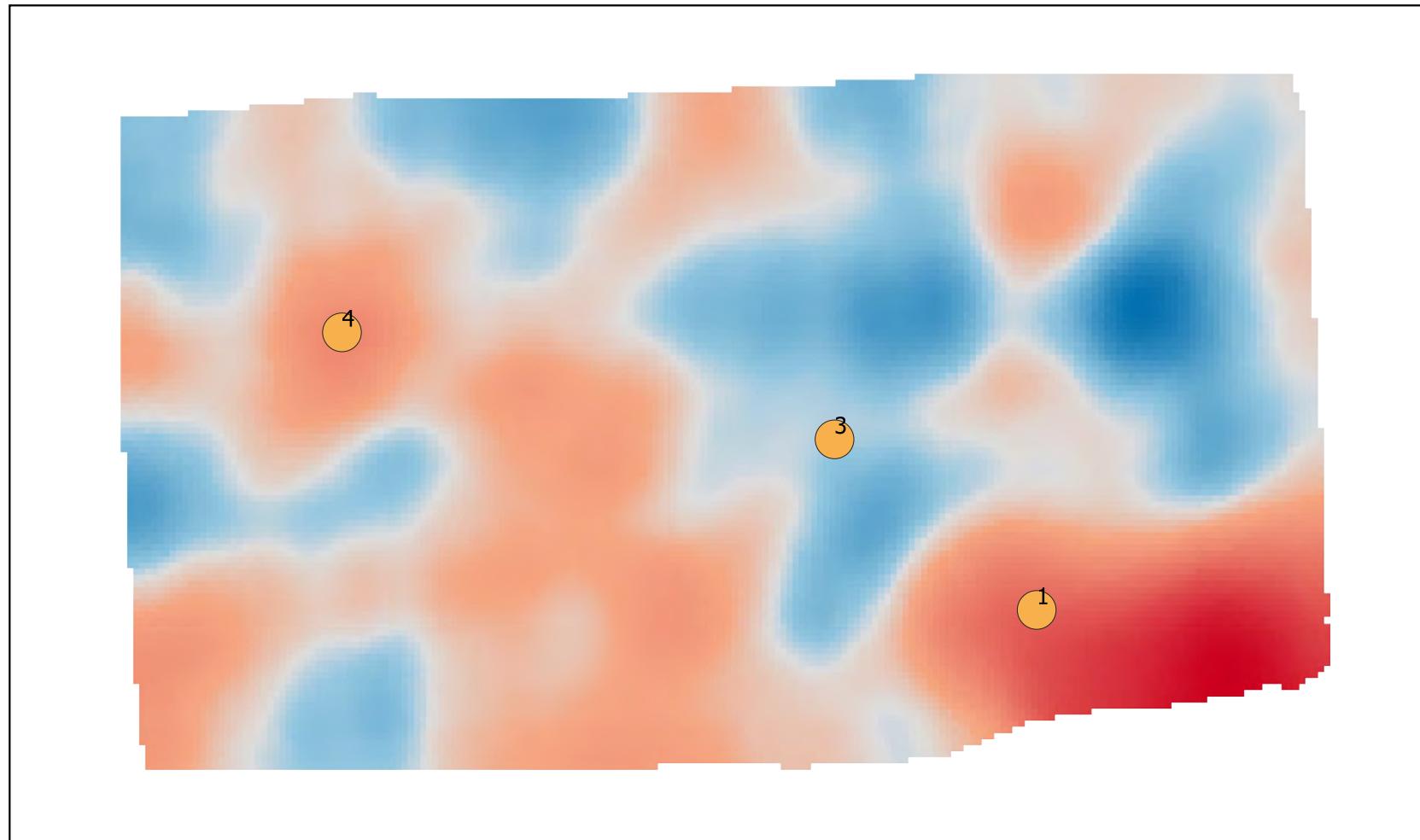
0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.

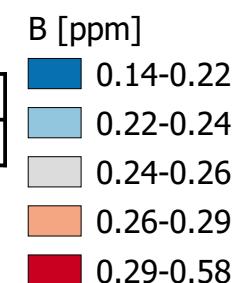


Micronutrients

Variable	Mean	Min	Max	SD	CV	Units
B	0.34	0.17	0.47	0.04	11.76	ppm
Cu	2.75	1.52	3.88	0.31	11.27	ppm
Fe	29.35	14.31	53.01	9.04	30.8	ppm
Mn	3.19	1.65	5.85	0.85	26.65	ppm
Na	0.18	0.08	0.25	0.03	16.67	ppm
Zn	10.87	4.06	19.23	2.5	23	ppm



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	0.26	24

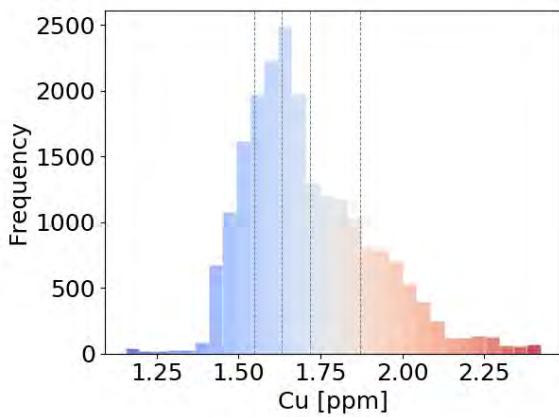
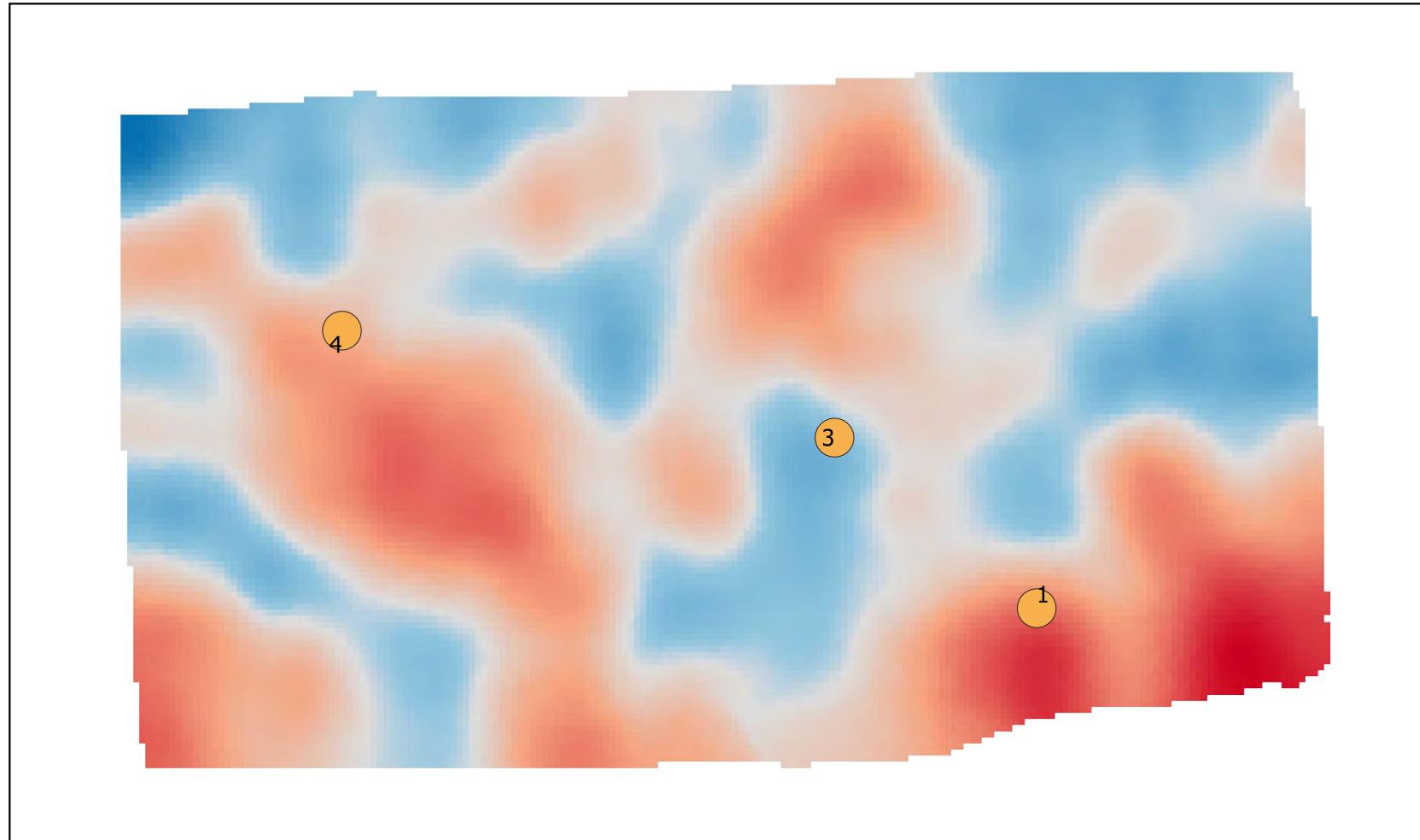


ID	B
1	0.35
3	0.19
4	0.44

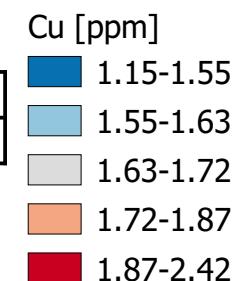


0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	1.71	11

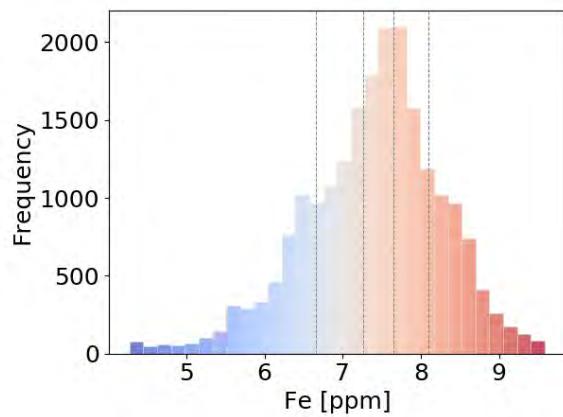
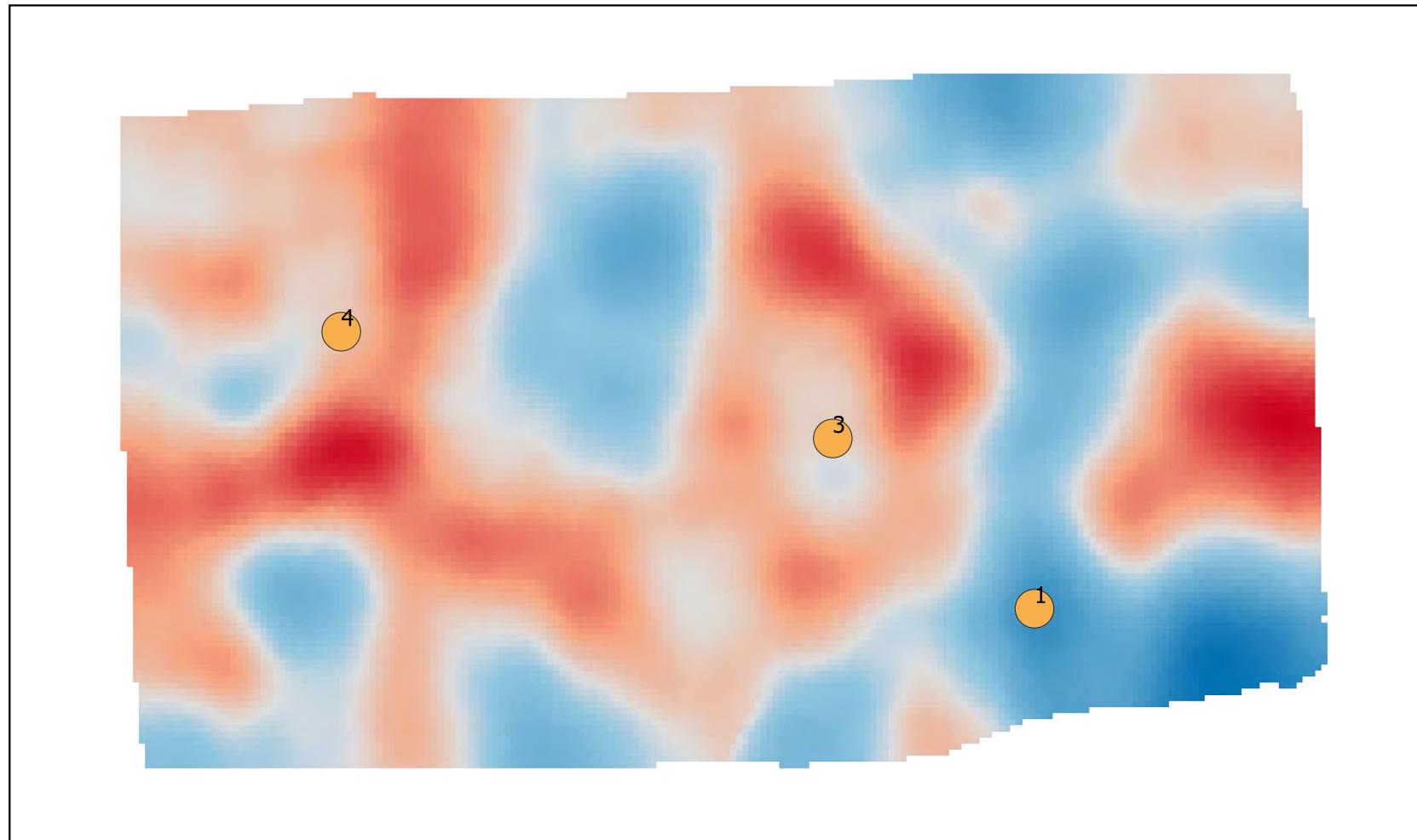


ID	Cu
1	2.2
3	1.6
4	1.6

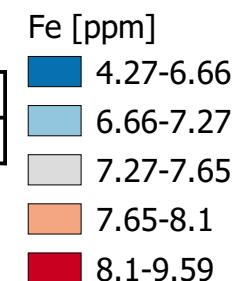


0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	7.39	11

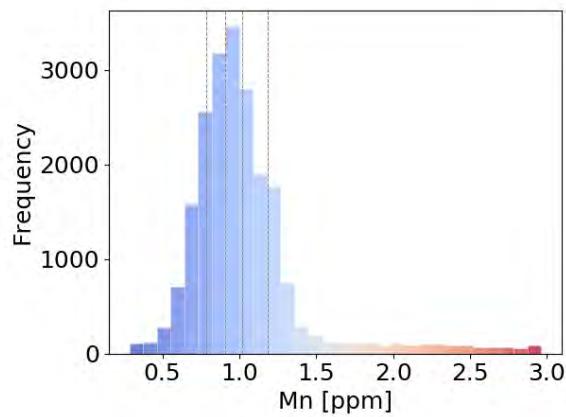
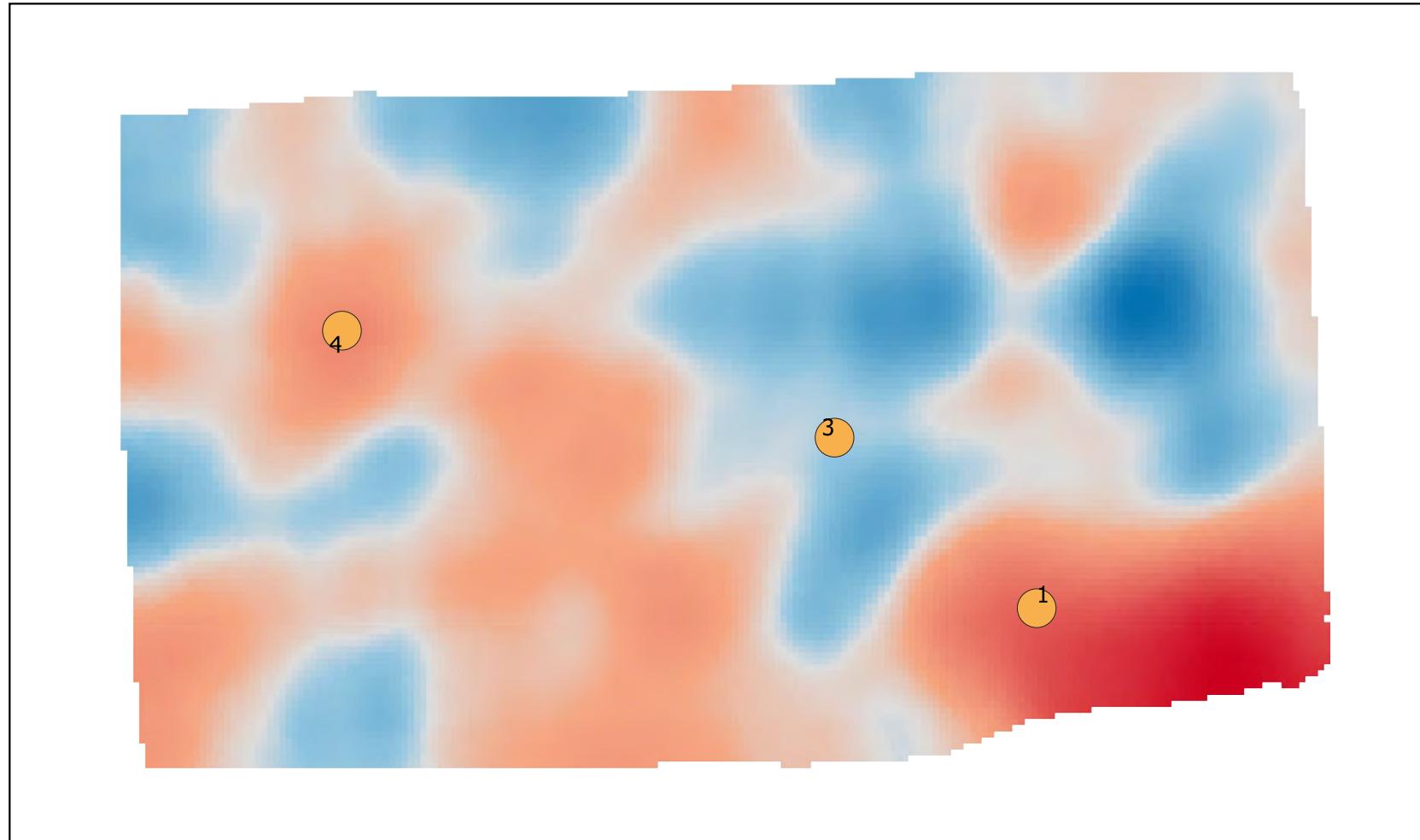


ID	Fe
1	5
3	7
4	8



0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	1.03	37

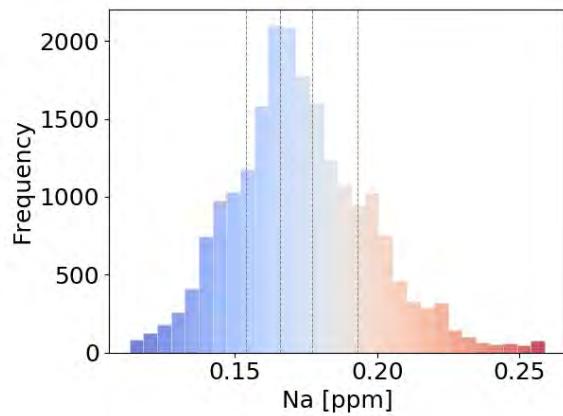
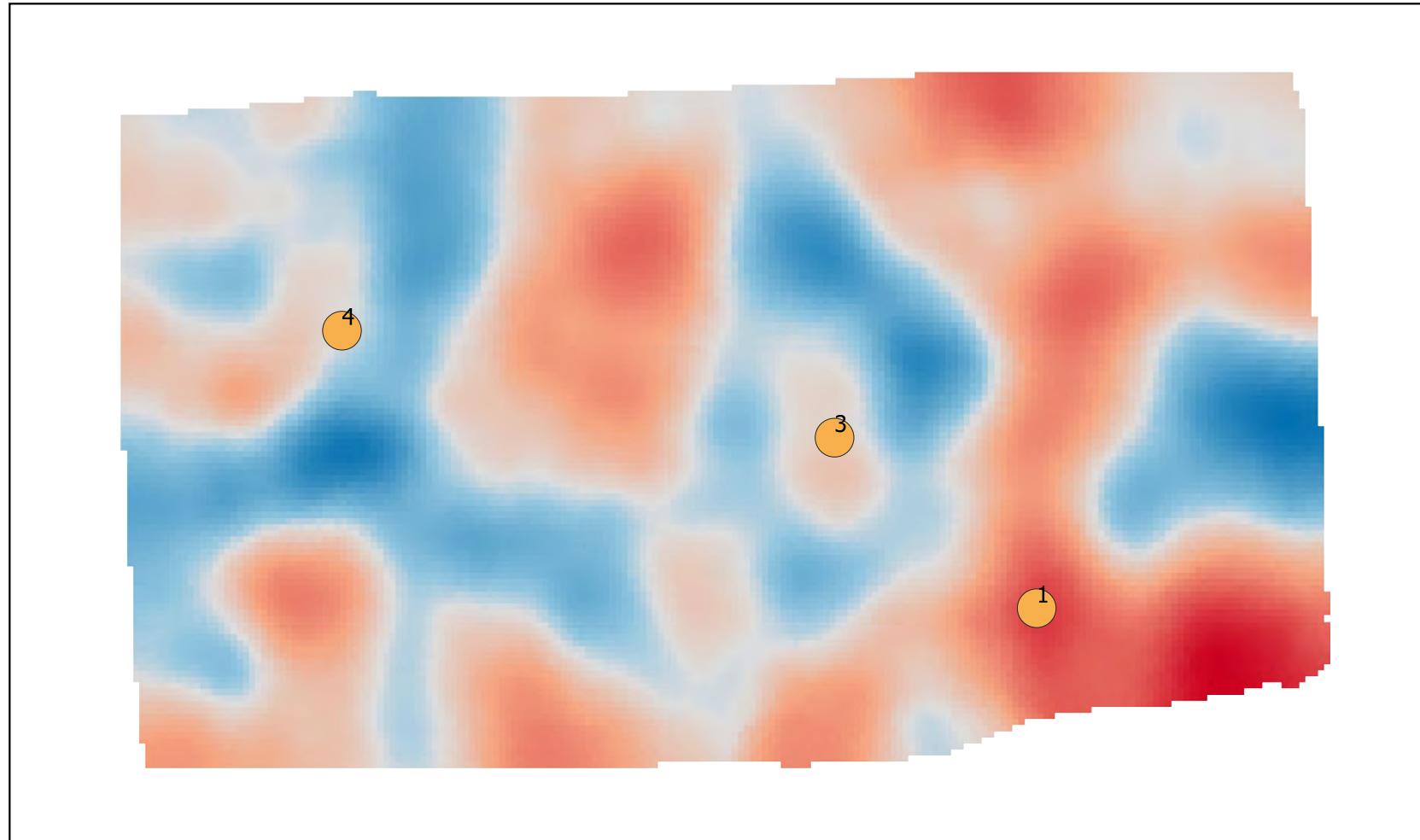
Mn [ppm]
0.28-0.78
0.78-0.91
0.91-1.02
1.02-1.19
1.19-2.96

ID	Mn
1	2.3
3	1.0
4	1.0

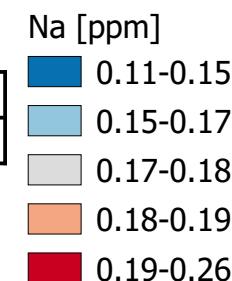


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	0.17	14

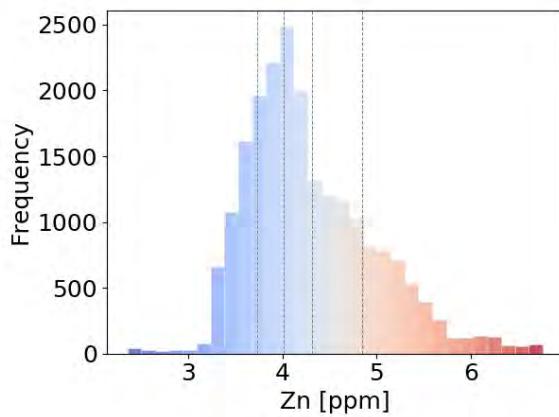
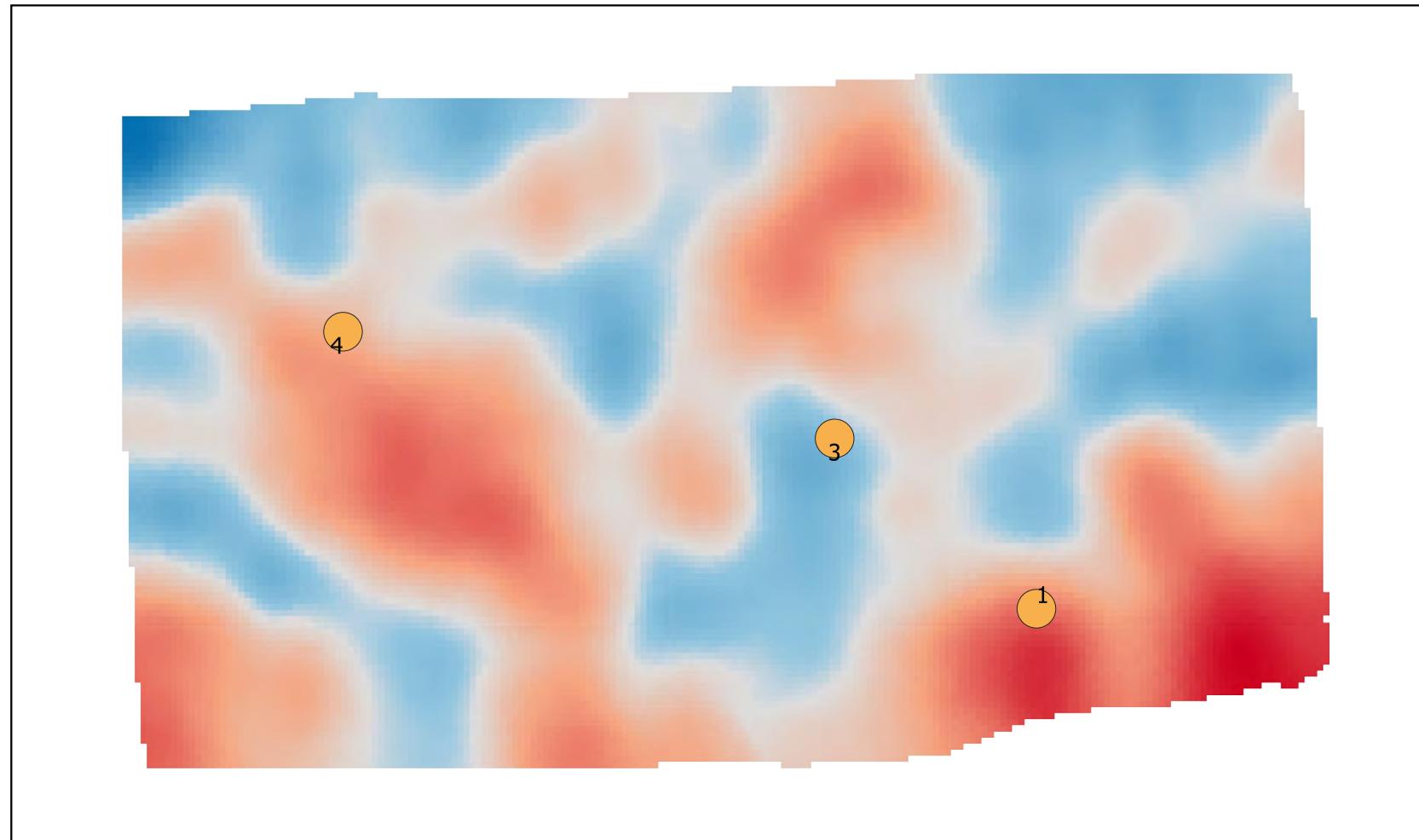


ID	Na
1	55.2
3	39.1
4	39.1

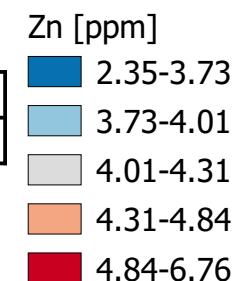


0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	4.29	15



ID	Zn
1	6.1
3	4.0
4	3.7



0 25 50 75 100 m

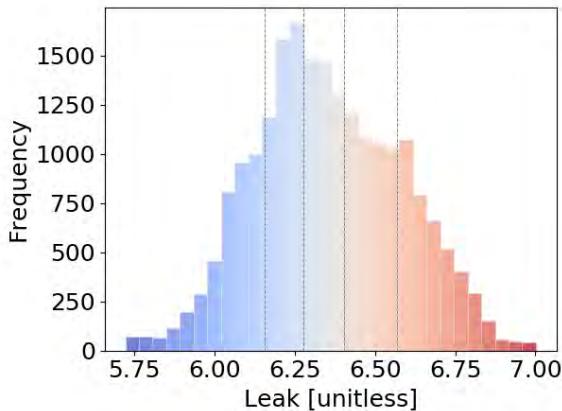
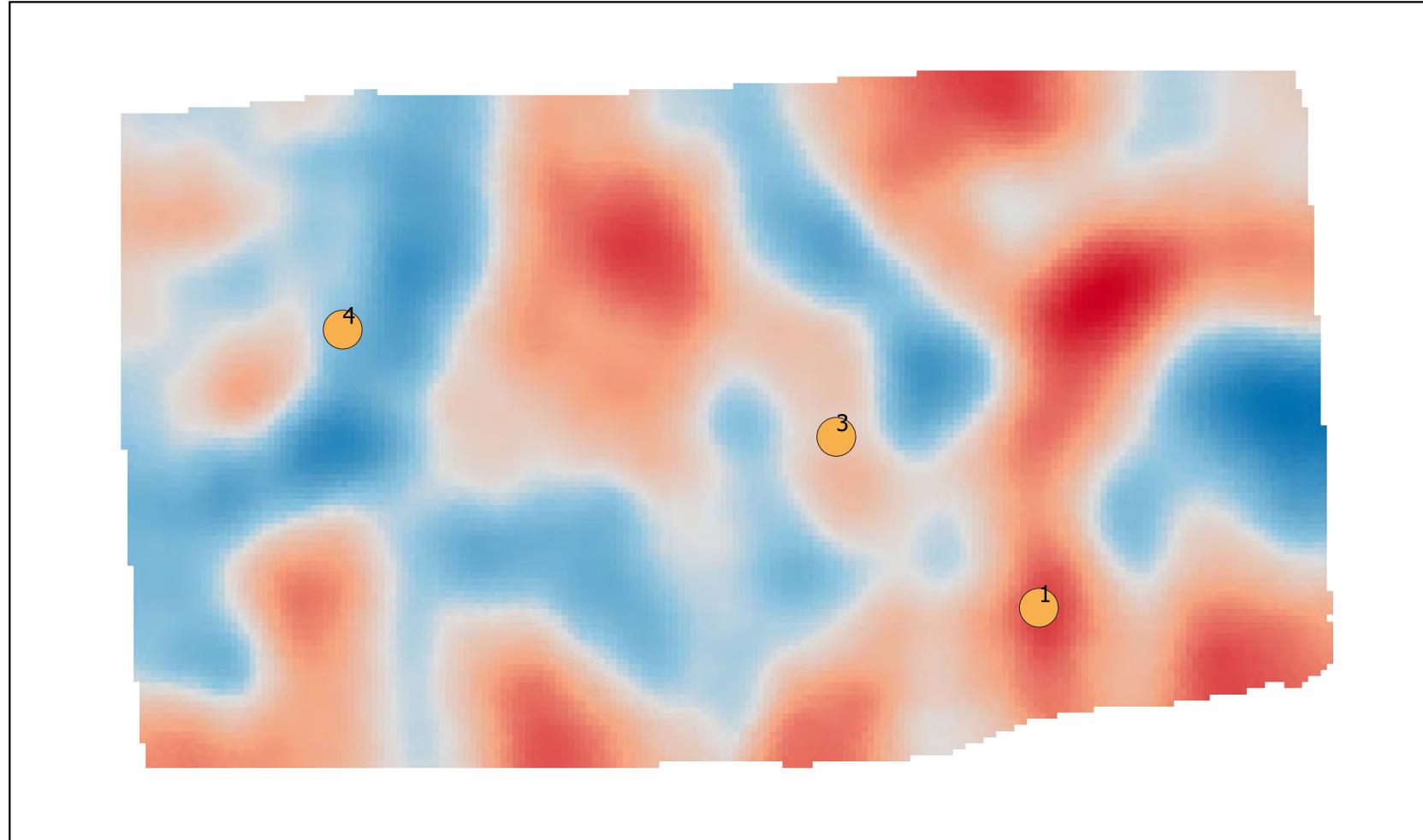
*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.



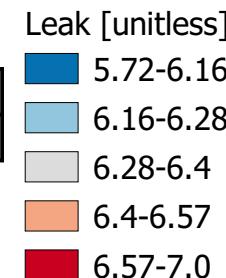
Complex Models

Variable	Mean	Min	Max	SD	CV	Units
Leak	8.08	7.03	9.16	0.42	5.2	unitless
PAWater	43.75	38.71	48.63	1.97	4.5	unitless
SALT	0.77	0.46	1.14	0.11	14.29	mmhos/cm

Chiawana:Leak



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	6.35	3

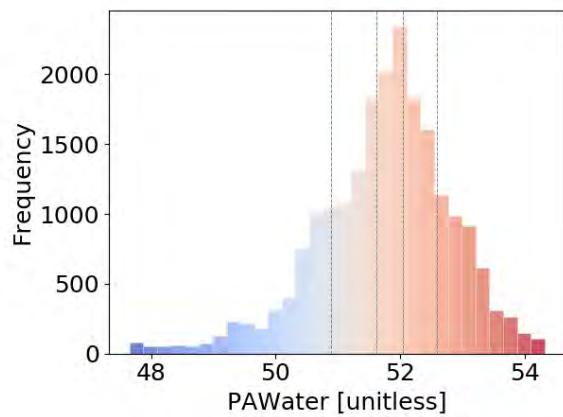
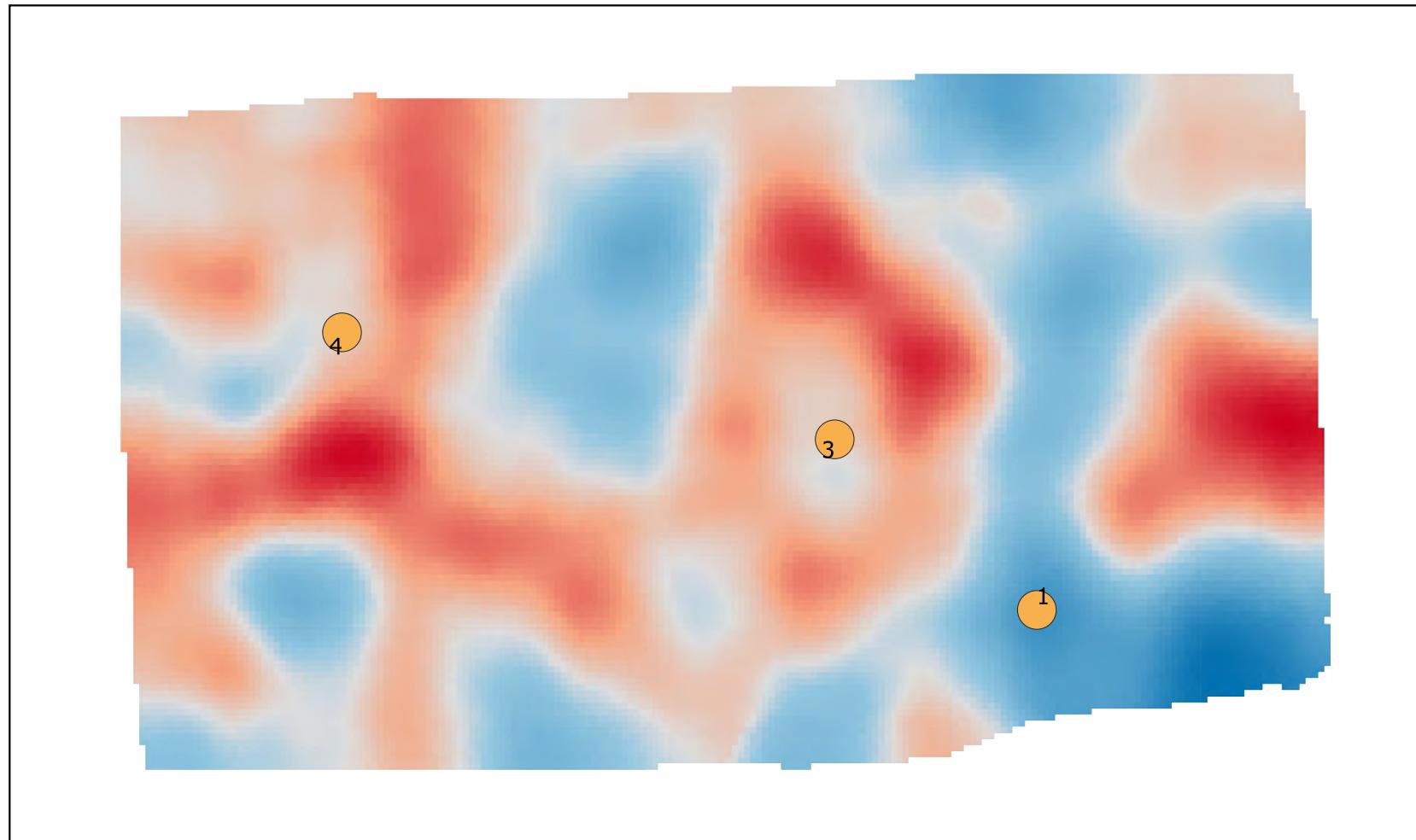


ID	Leak
1	NAN
3	NAN
4	NAN

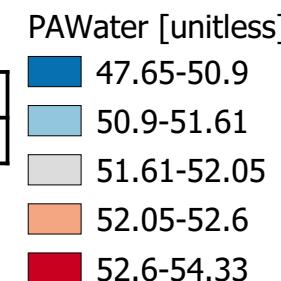


0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.



Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	51.74	2

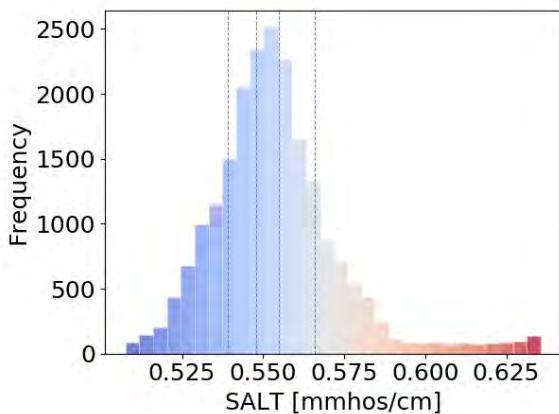
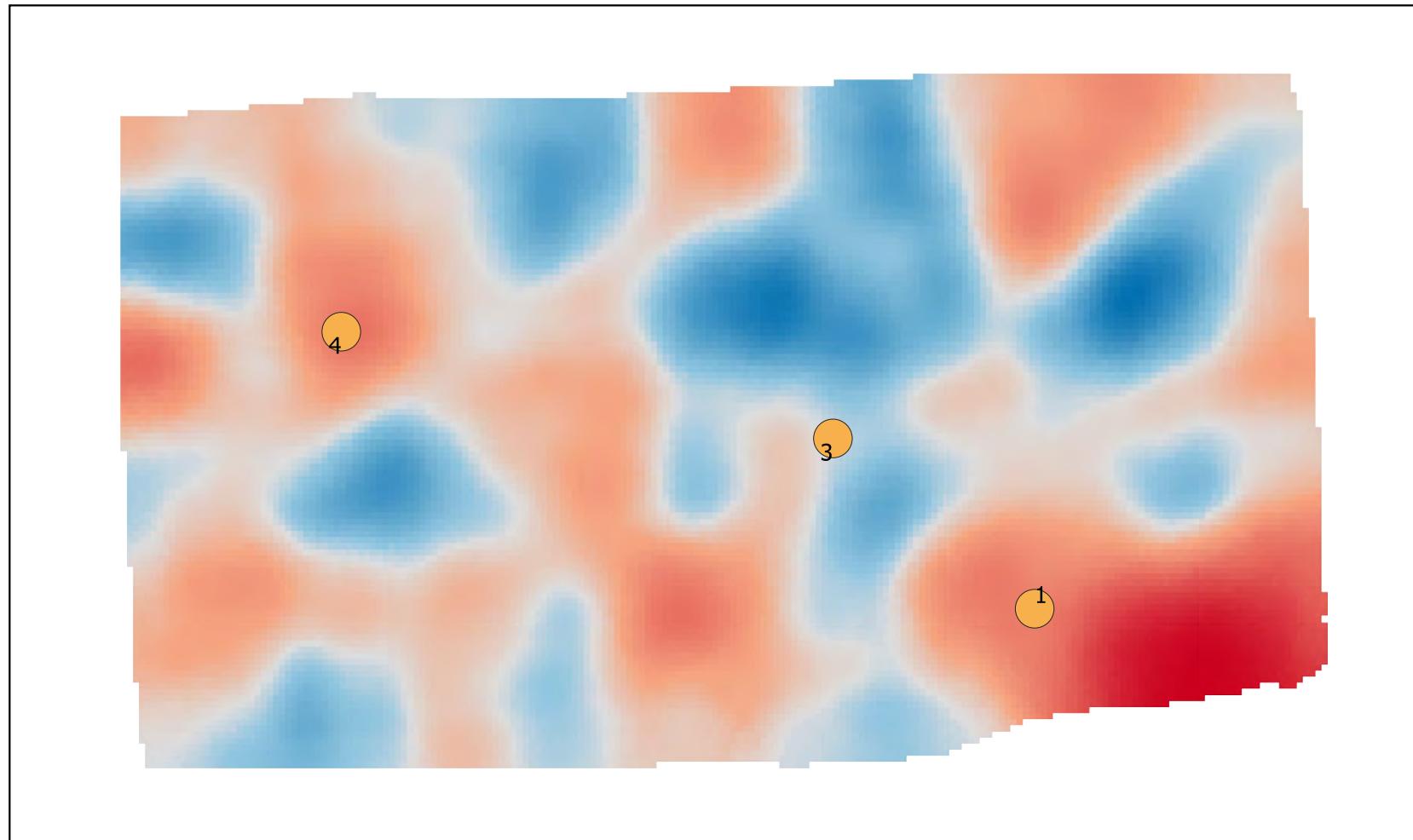


ID	PAWater
1	NAN
3	NAN
4	NAN

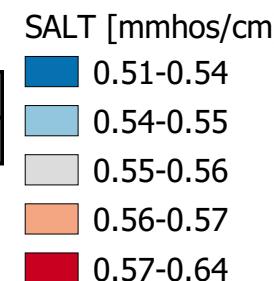


0 25 50 75 100 m

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Client	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	661	Apples	4/27/21	20.85	0.55	3



ID	SALT
1	NAN
3	NAN
4	NAN



0 25 50 75 100 m

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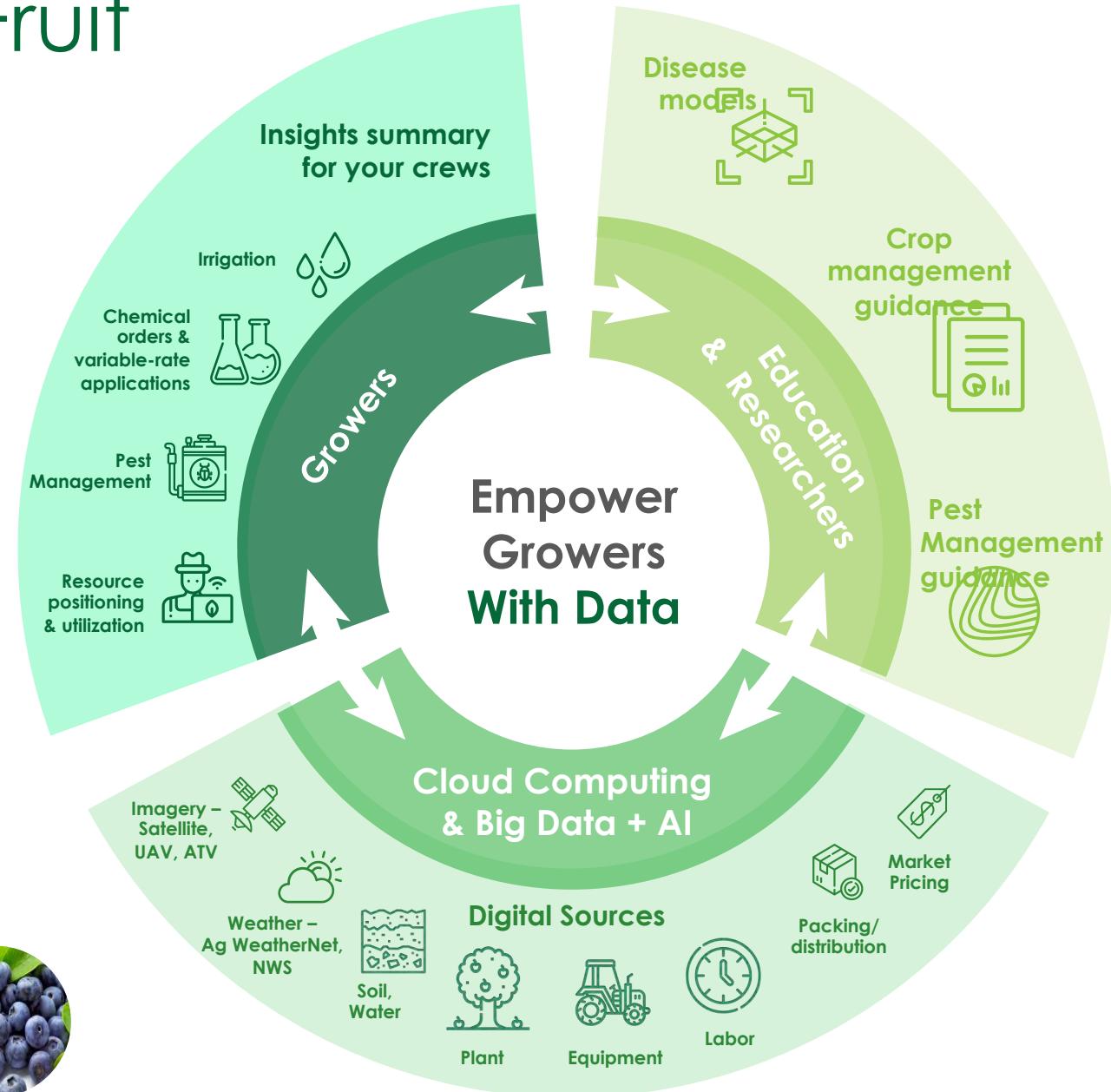


Appendix

Target Values for Tree Fruit

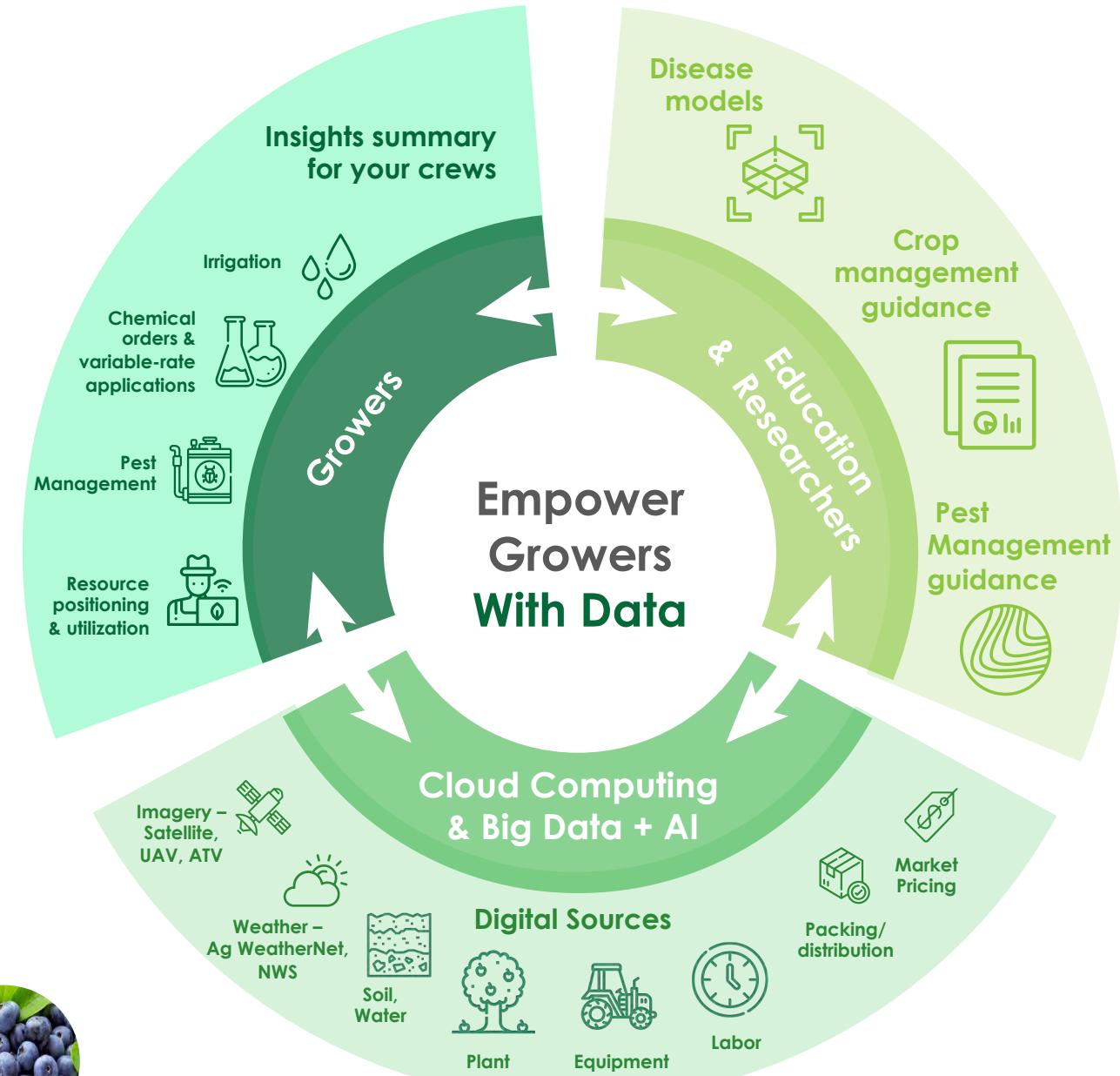
Variable	Unit	Low	Target Value	High
pH	unitless	<5	6-7.5	>8
K	ppm	<120	150-250	>300
Ca	ppm	<3	820-4000	
Mg	ppm	<0.5	60-300	>2.5
Na	ppm		<115	>0.5
B	ppm	<1	1-1.5	>1.5
S	ppm	<4	9-20	>20
Zn	ppm	<0.25	0.6-1	
Cu	ppm	<0.1	0.6-1	>20
Mn	ppm		1-5	>50
Fe	ppm		>4.5	
P	ppm	<10	15-40	>50

* Per Washington State University research

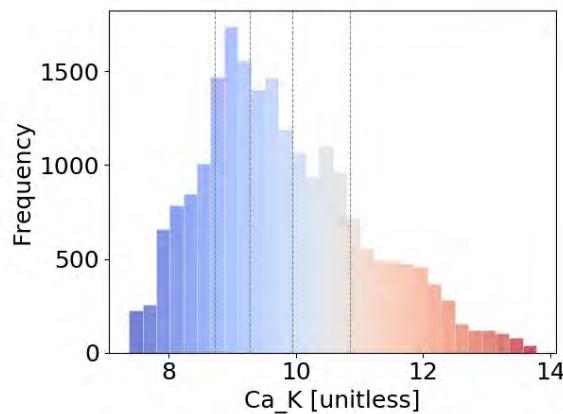
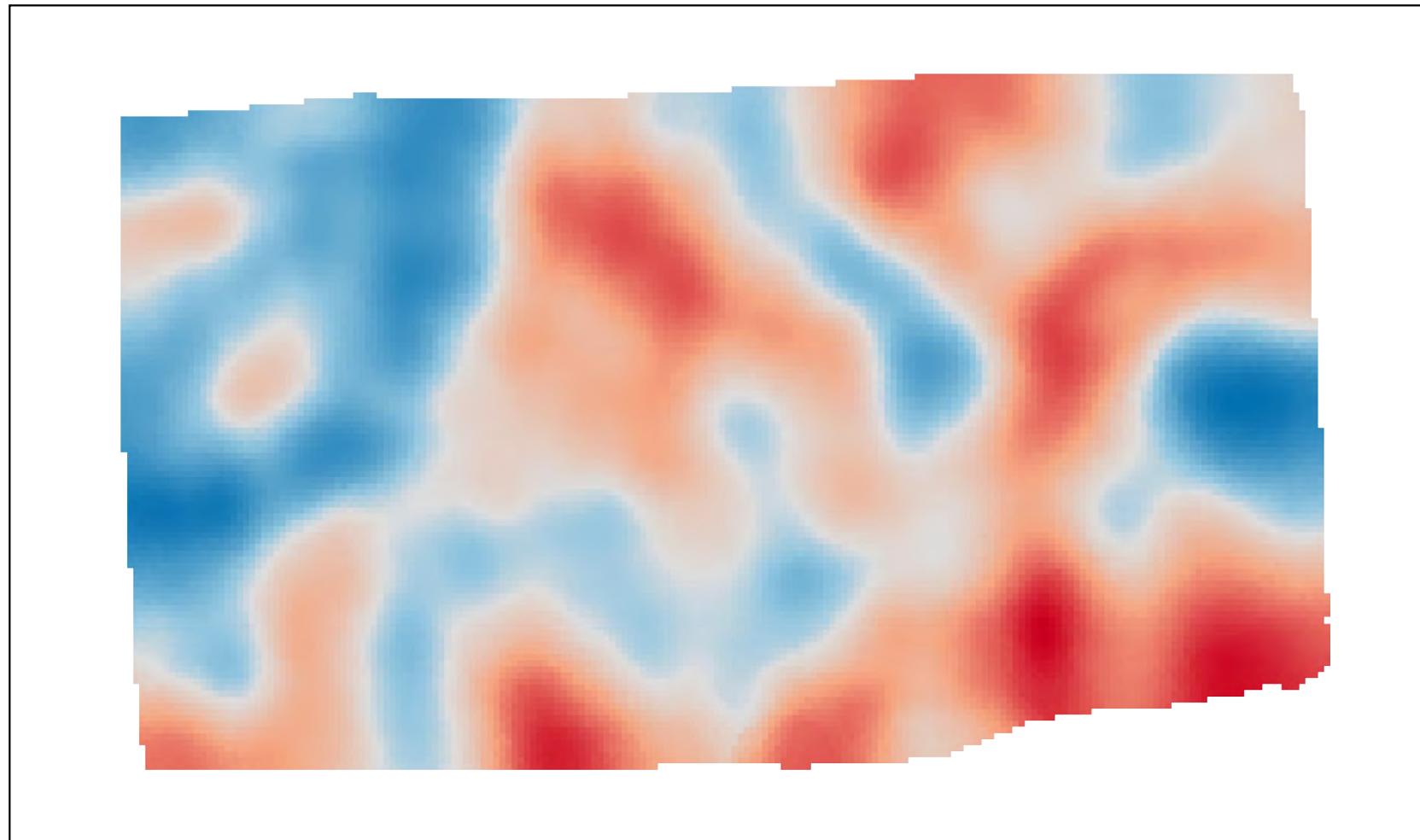


Ratios

- Calcium-Magnesium
- Potassium-Magnesium
- Calcium-Potassium
- Calcium-Phosphorous
- Potassium-Boron
- Potassium-Magnesium
- Manganese-Copper
- Manganese-Zinc
- Phosphorous-Copper
- Phosphorous-Manganese
- Zinc-Copper



Ratio:Ca_K



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	9.8	13

Ca_K [unitless]

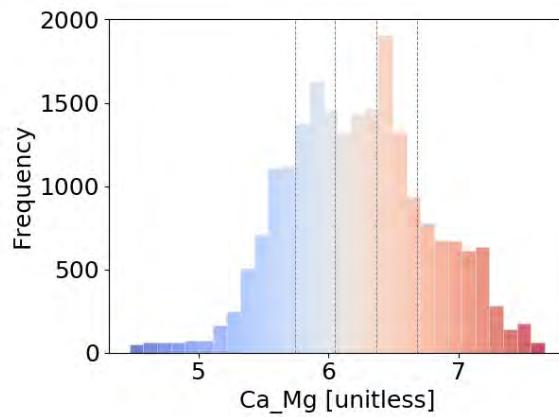
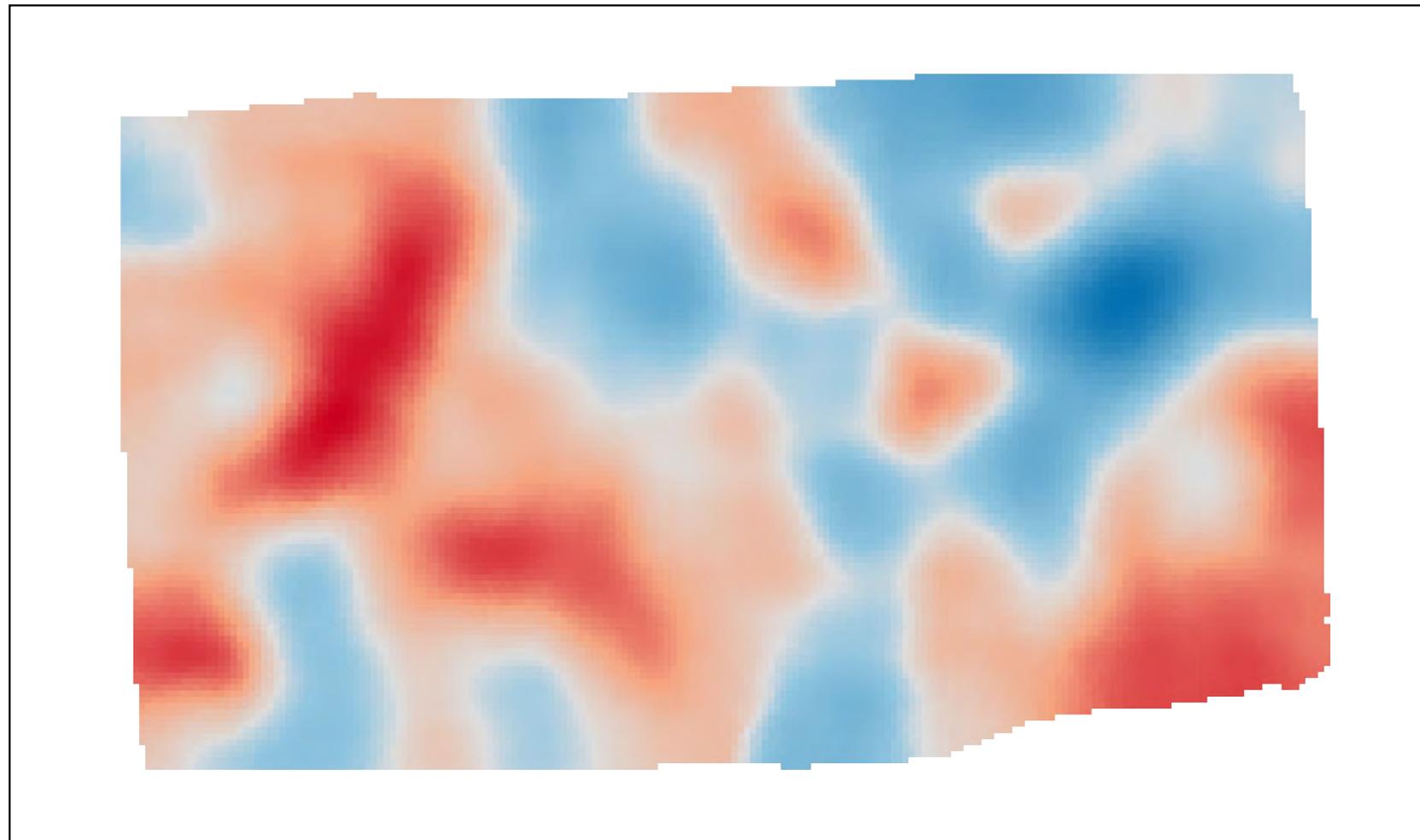
- 7.4-8.7
- 8.7-9.3
- 9.3-9.9
- 9.9-10.9
- 10.9-13.8



0 25 50 75 100 m

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Ratio:Ca_Mg



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	6.22	9

Ca_Mg [unitless]

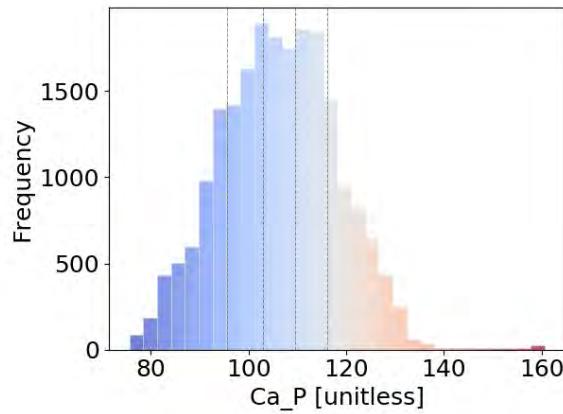
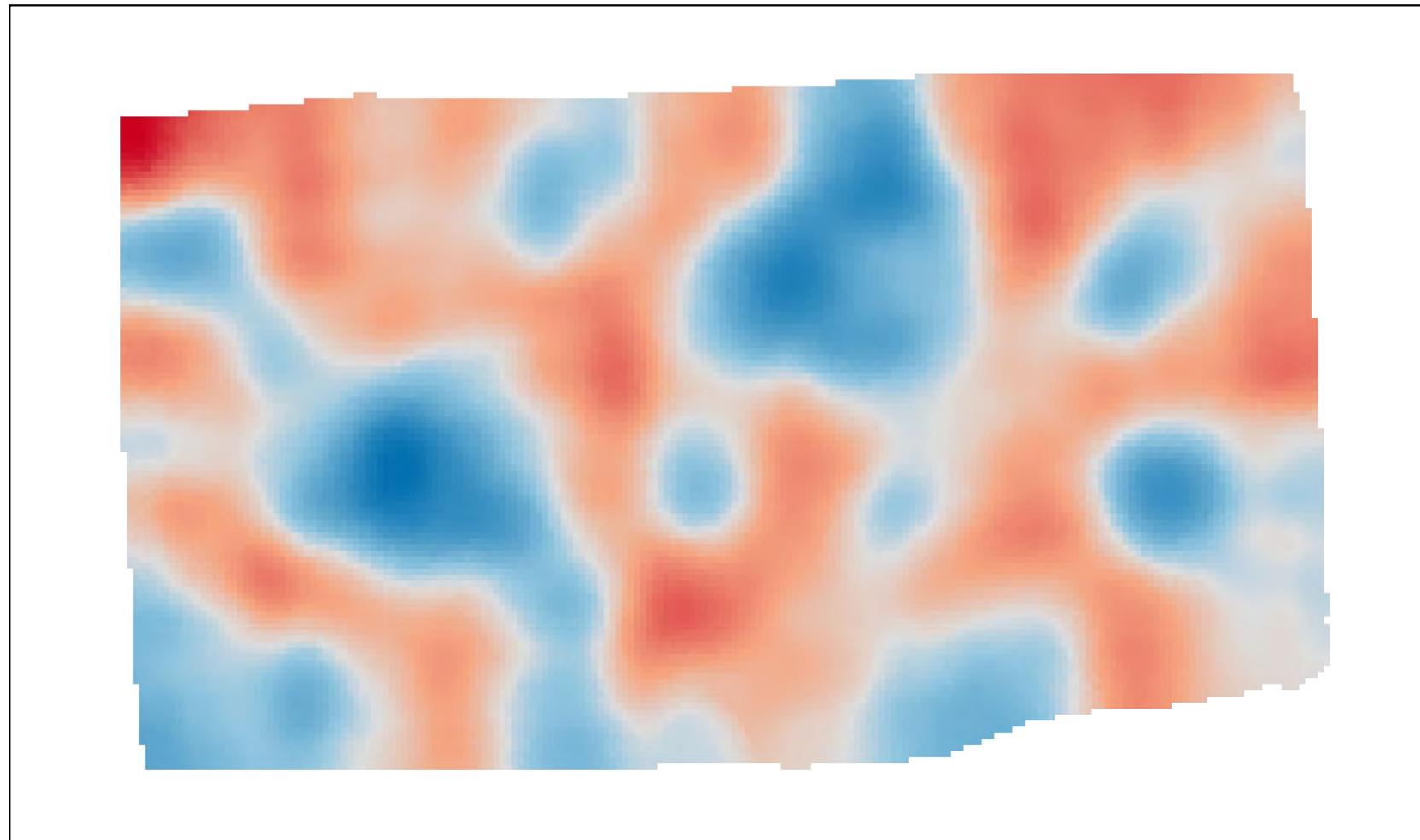
- 4.5-5.7
- 5.7-6.0
- 6.0-6.4
- 6.4-6.7
- 6.7-7.7



0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.

Ratio:Ca_P



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	106.21	11

Ca_P [unitless]

75.7-95.6

95.6-103.0

103.0-109.6

109.6-116.2

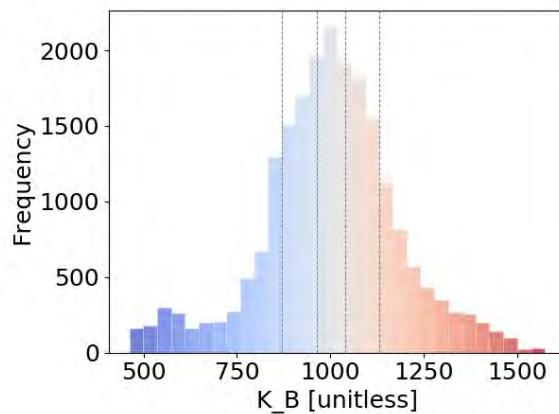
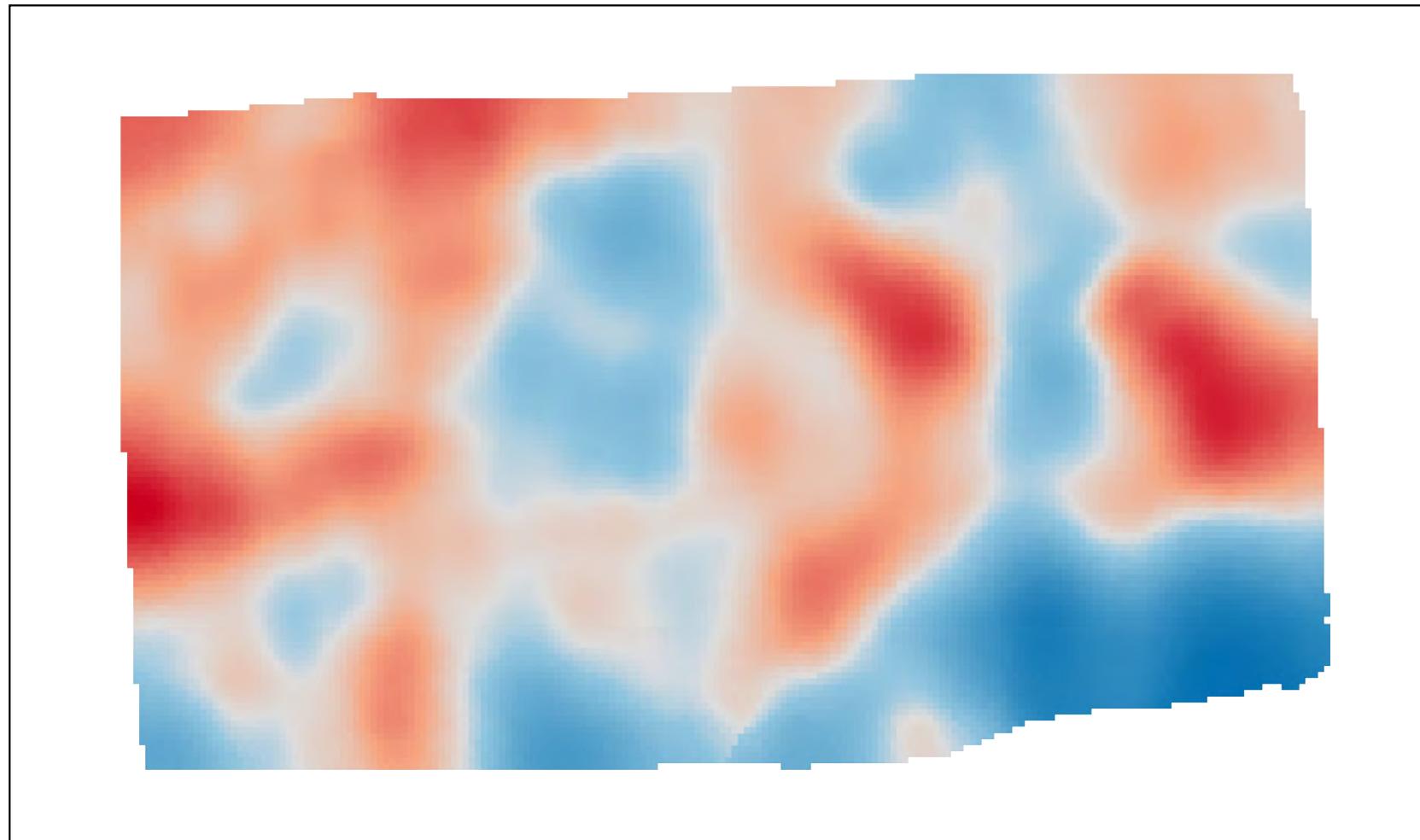
116.2-160.7



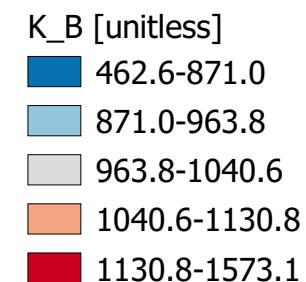
0 25 50 75 100 m

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Ratio:K_B



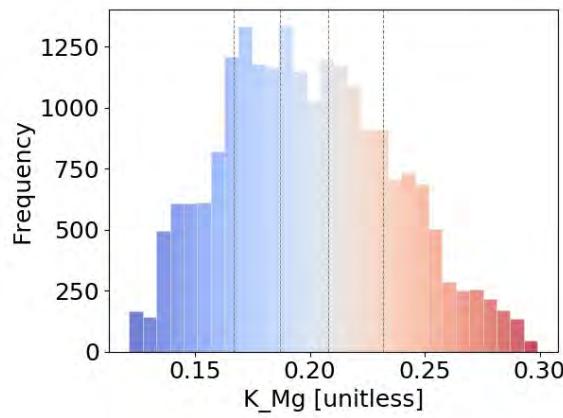
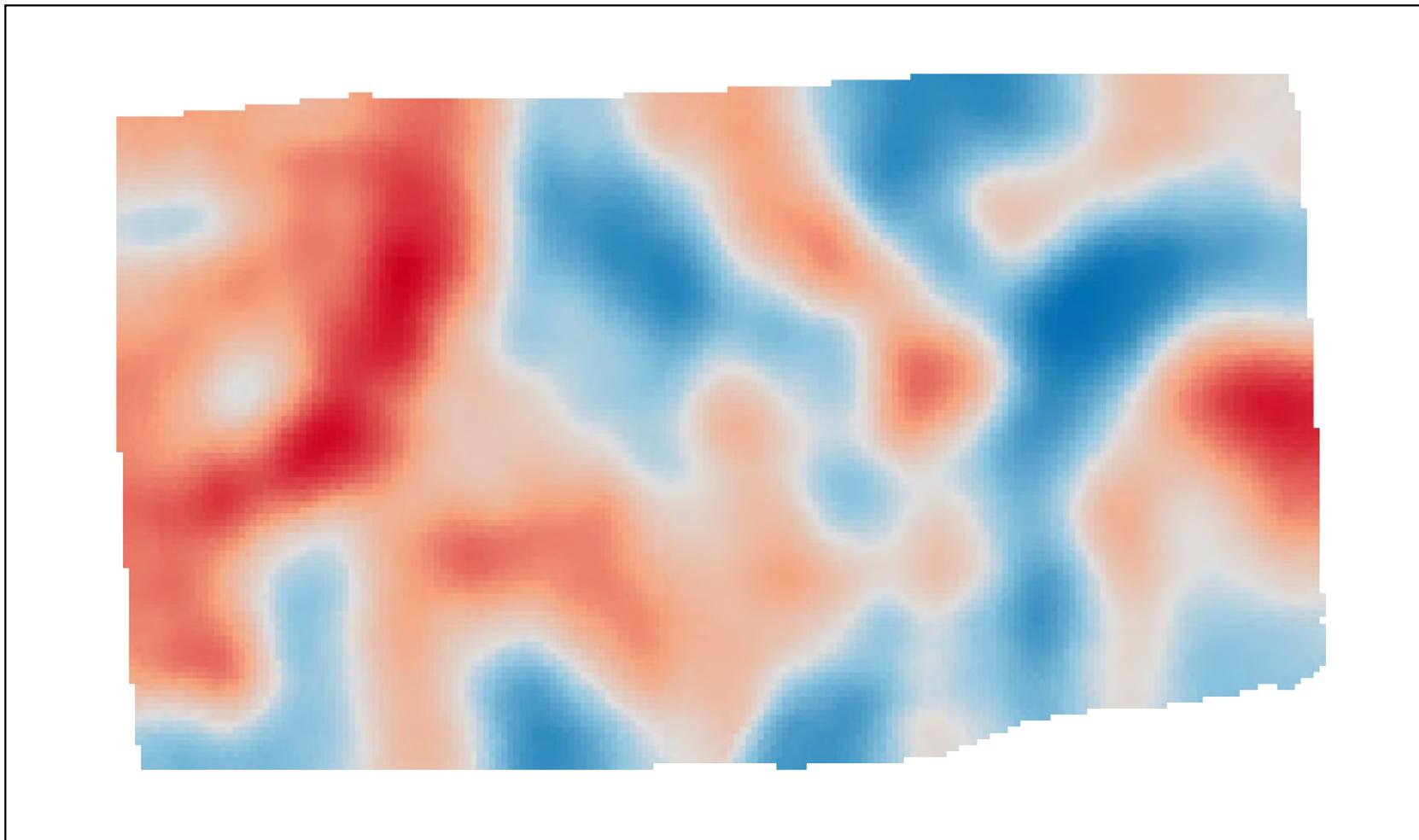
Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	998.47	18



0 25 50 75 100 m

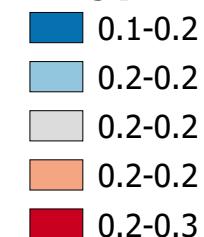
*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.

Ratio:K_Mg



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	0.2	18

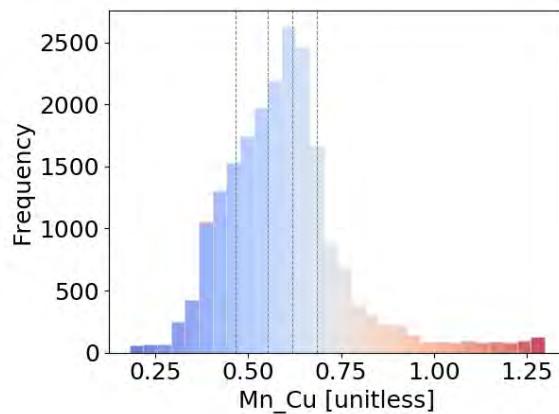
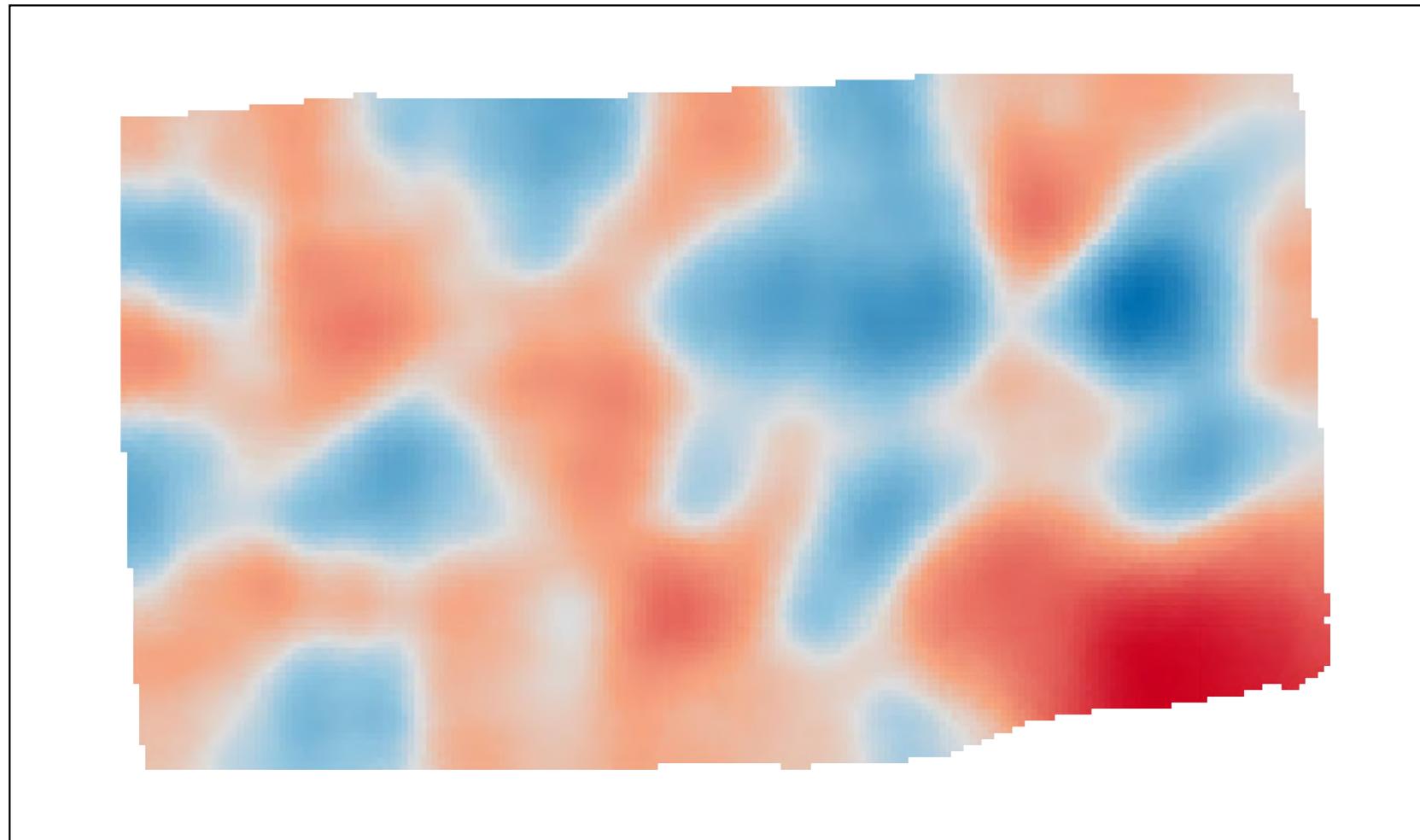
K_Mg [unitless]



0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.

Ratio:Mn_Cu



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	0.6	28

Mn_Cu [unitless]

0.2-0.5

0.5-0.6

0.6-0.6

0.6-0.7

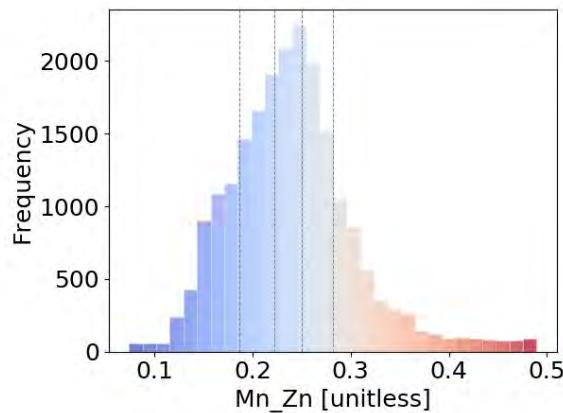
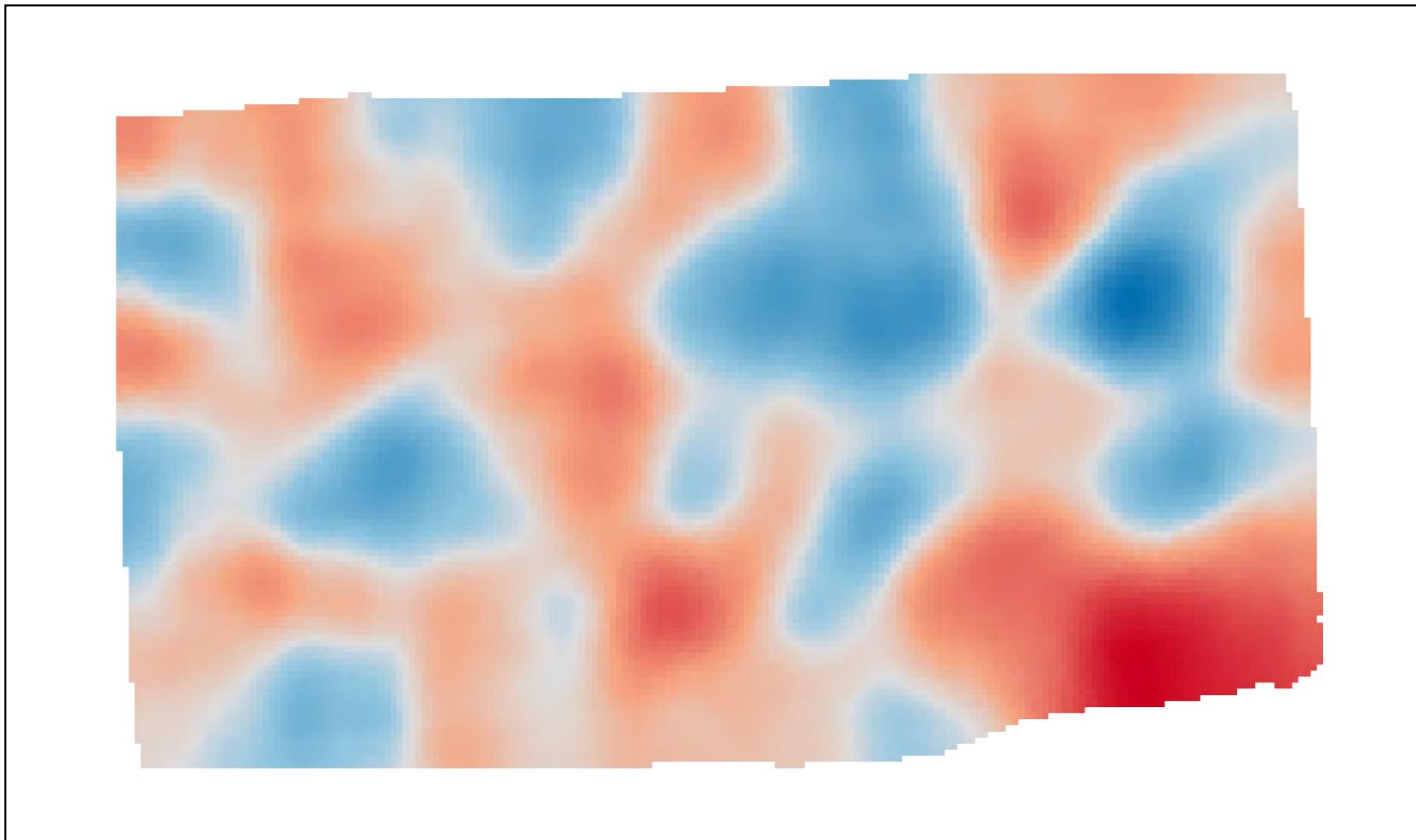
0.7-1.3



0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.

Ratio:Mn_Zn



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	0.24	27

Mn_Zn [unitless]

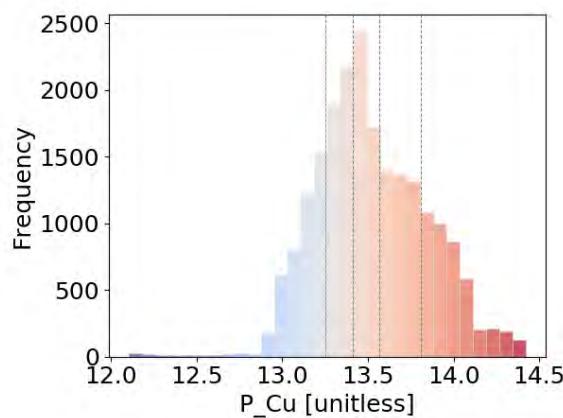
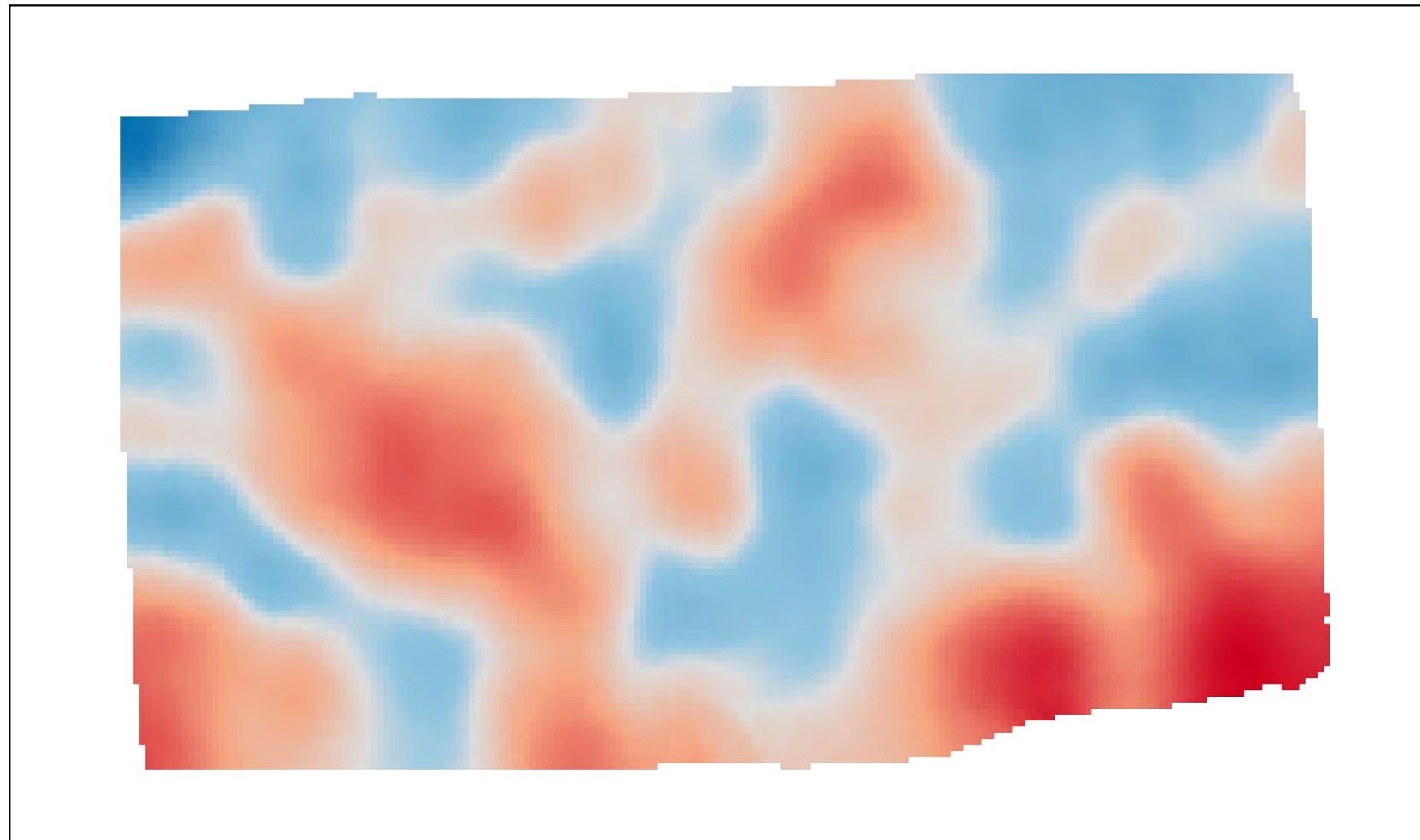
- 0.1-0.2
- 0.2-0.2
- 0.2-0.2
- 0.2-0.3
- 0.3-0.5



0 25 50 75 100 m

*This document is designed to provide you a "snapshot" of your field at a glance. Legend descriptions are not recommendations.

Ratio:P_Cu



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	13.52	2

P_Cu [unitless]

12.1-13.2

13.2-13.4

13.4-13.6

13.6-13.8

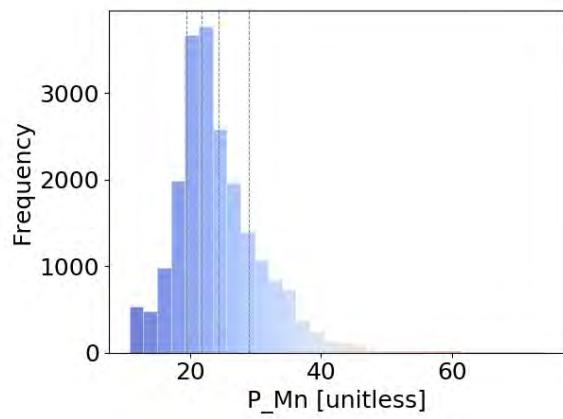
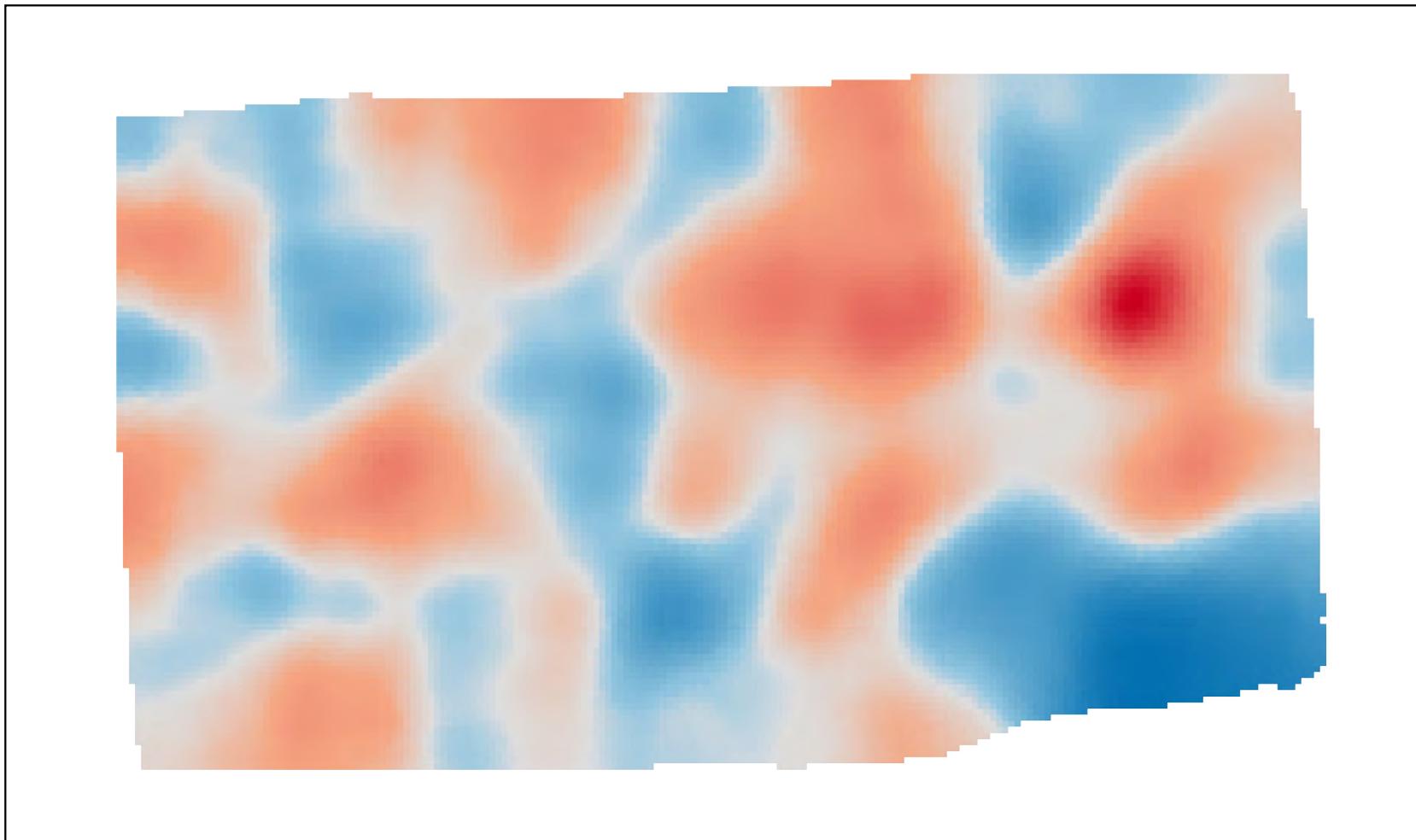
13.8-14.4



0 25 50 75 100 m

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Ratio:P_Mn



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	24.33	28

P_Mn [unitless]

10.8-19.4

19.4-21.8

21.8-24.4

24.4-29.0

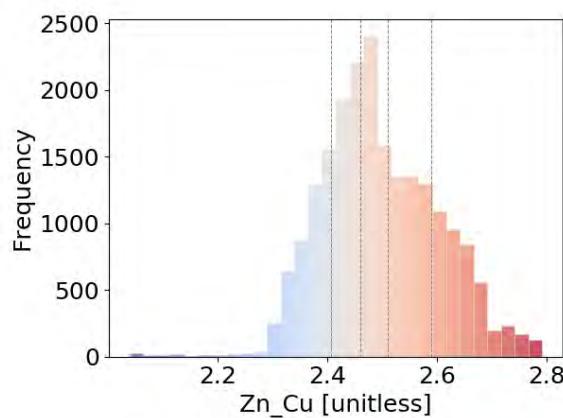
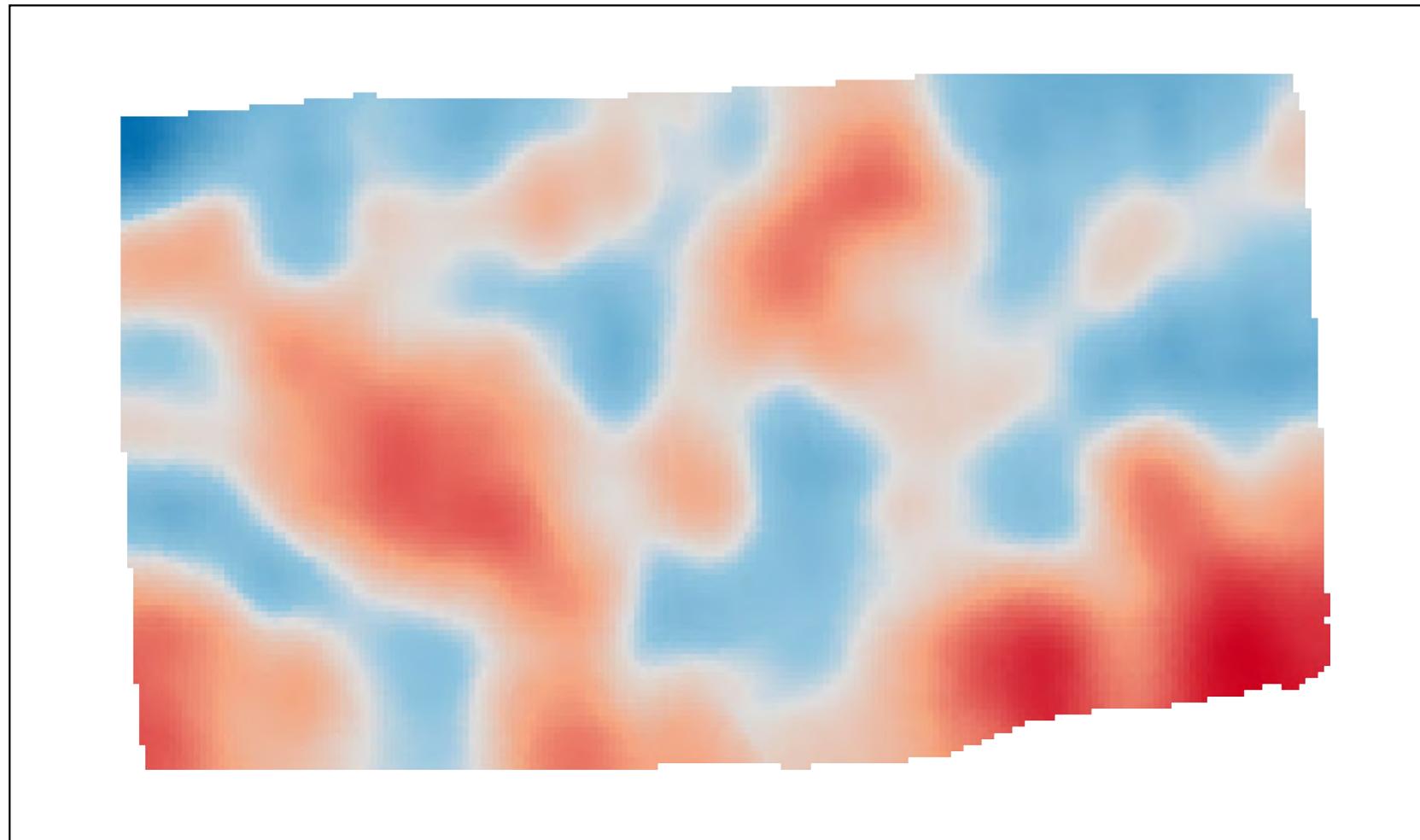
29.0-74.1



0 25 50 75 100 m

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Ratio:Zn_Cu



Client	Orchard	Block	Crop	Scan Date	Acres	Mean	CV
Columbia Reach	Chiawana	661	Apples	4/27/21	20.85	2.49	4

Zn_Cu [unitless]

2.0-2.4

2.4-2.5

2.5-2.5

2.5-2.6

2.6-2.8



0 25 50 75 100 m

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