UPLAND RECHARGE IN THE ROGUE BASIN

THE CONCEPT AND AN UPDATE

PROJECT PARTNERS

Southern Oregon University

State of Oregon Water Resources Department

Rogue Basin Partnership

Seven Basins Watershed Council

Hamann, Inc.

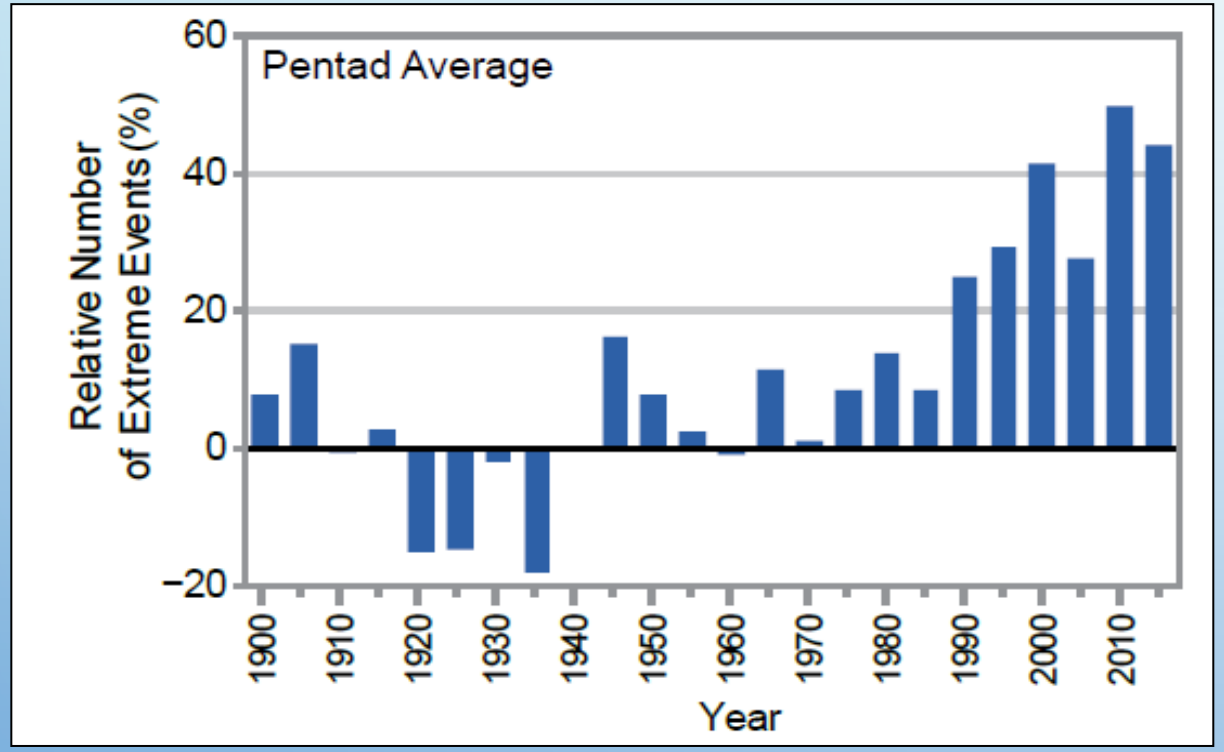
Jackson Soil & Water Conservation District

U.S. Department of the Interior Bureau of Land Management

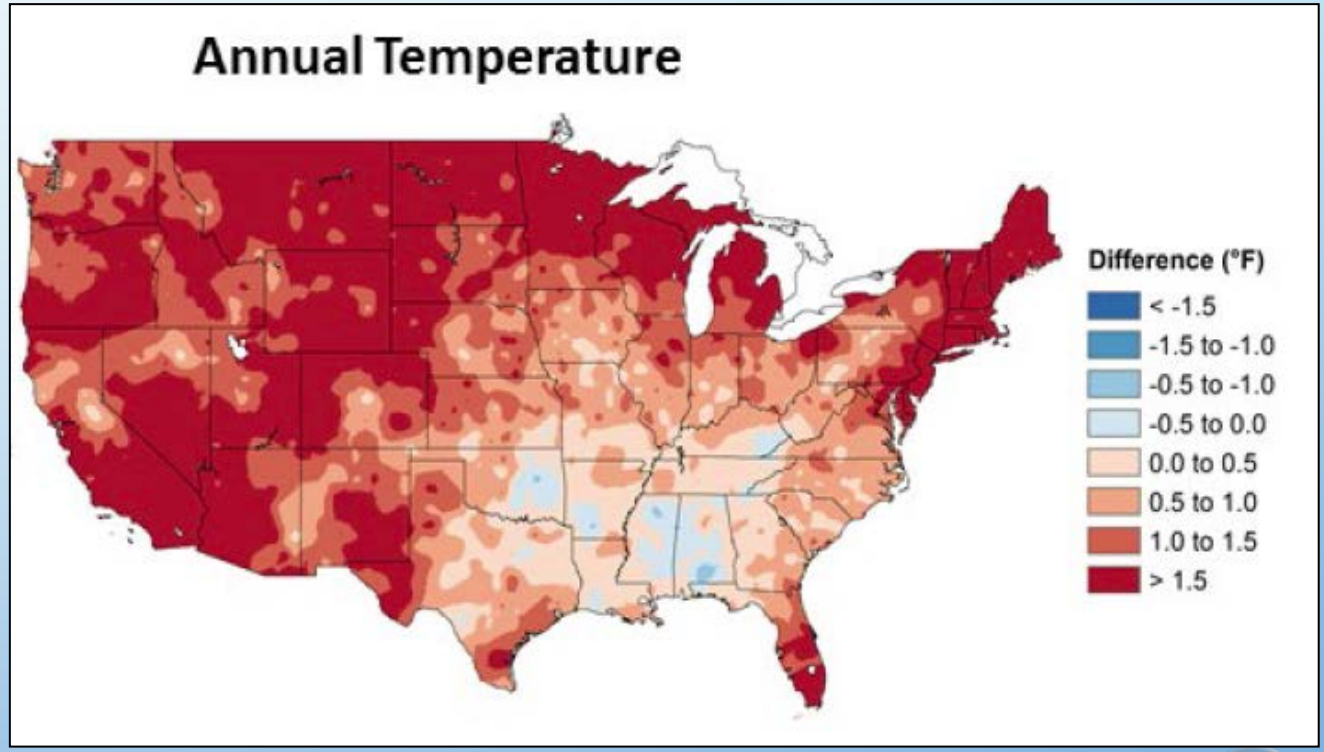
Afternoon Zephyr Farm

Patton Environmental LLC

CLIMATE CHANGES – INCREASED HEAVY PRECIPITATION, SUMMER DROUGHT



2-Day Precipitation Events Exceeding 5-Year Recurrence Interval
(US Global Change Research Program)



Observed Changes in Annual Temperature: 1901 - 2016
(US Global Change Research Program)

Project Goal: Determine feasibility of reducing runoff and increasing infiltration over time through soil amendments on Oak Savannah/Range and Forest Lands

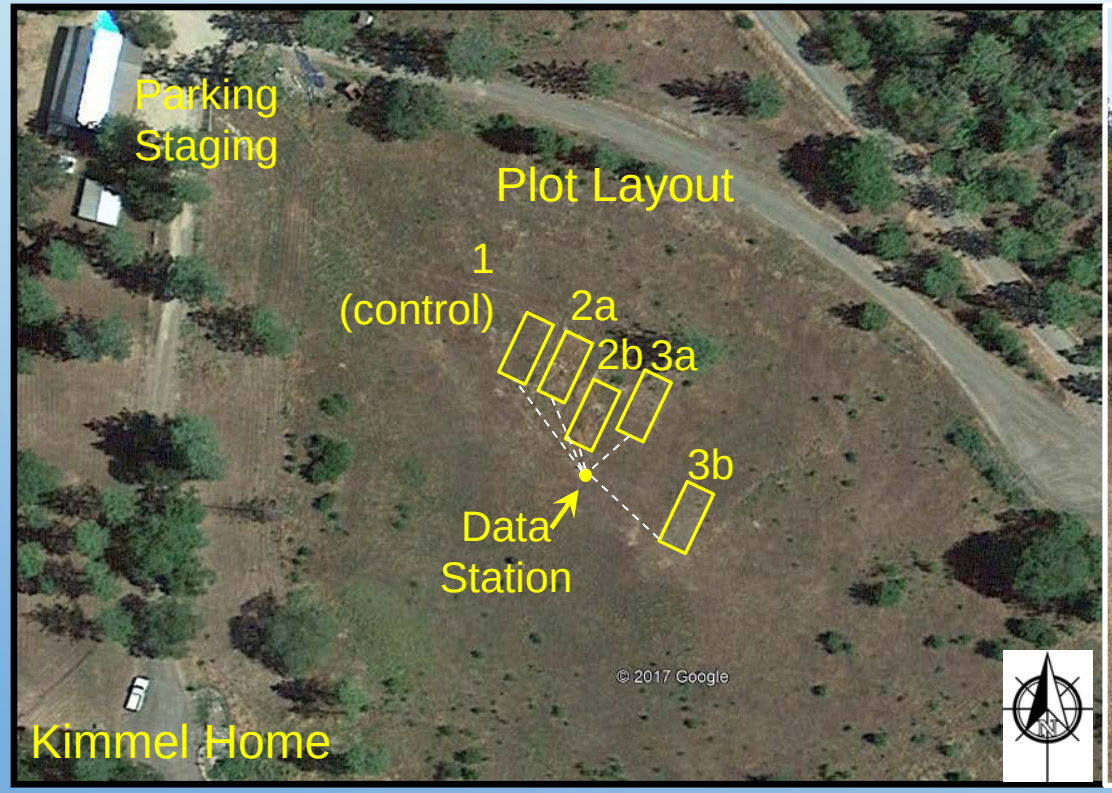
Overarching Goals:

- Is this feasible at large scale?
- Is it sustainable?
- Could forest management strategies on federal land potentially be changed to better accommodate water retention while not increasing fuel loading?

PROJECT PLAN

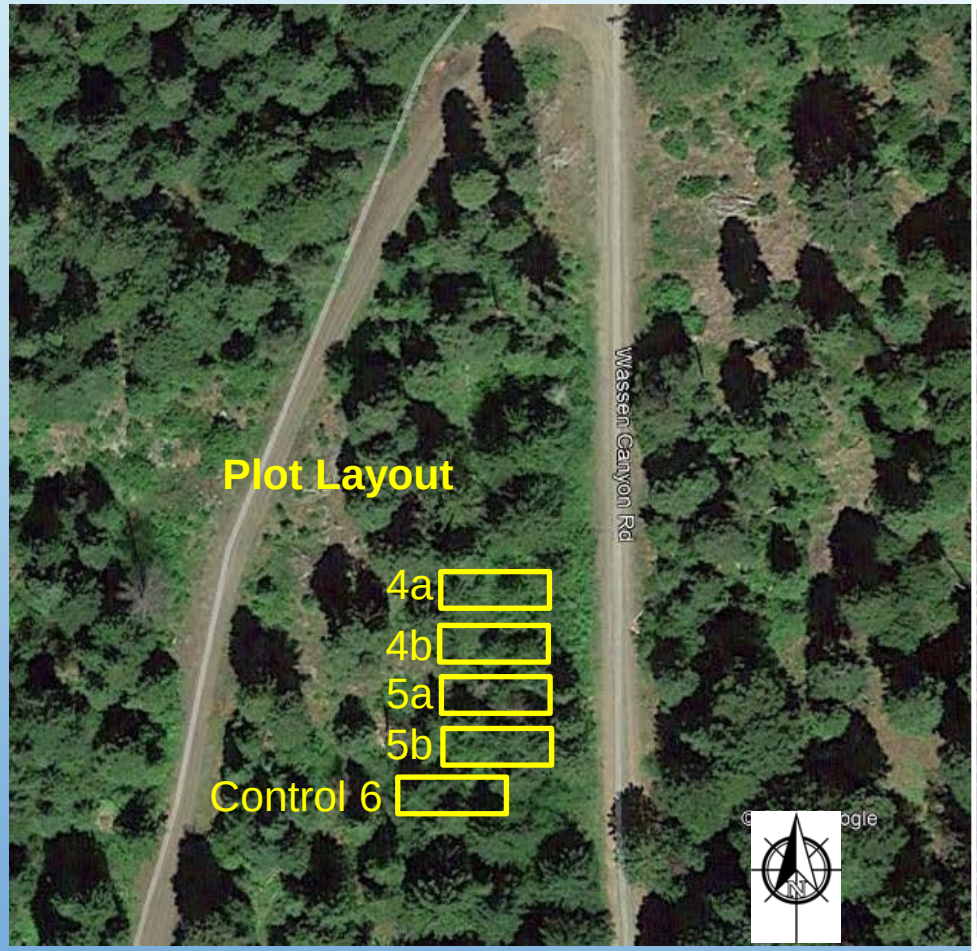
- Select two common S. Oregon land types (Oak Savannah/Range & Forest)
- **Develop Experiment involving Control Plot and 2 Variable Plot Pairs per site**
- Create amendment plan for each plot:
  - Chemical variables: COMPOST, WOOD, BIOCHAR, NUTRIENT, MYCORRHIZAE, SEED
  - Mechanical variables: WINDROW, MIXED IN, SCATTER
- **Collect data (1yr+): Soil Moisture & Temperature Probes, Chemical and Soil Moisture Lab Tests, Photo Monitoring, Weather gauges, Game camera**
- Analyze data to evaluate soil moisture changes and retention

KIMMEL SITE
OAK SAVANNAH/RANGE



Source: Modified from Google Earth 2017 aerial.

WASSON SITE
FOREST LAND



CRITERIA FOR AMENDMENT SELECTION:

- Locally sourced, inexpensive, easy to apply
- Amendments selected based on research showing benefits to soil moisture, improved organic matter
- Limited variables while still trying number of options
- Applicable to type of land (Oak Savannah or Forest)

Plot 2A (below)

Compost Windrows, Biochar, Fertilizer, Microbes, Grass Seed

Plot 2B (above)

Same, no Mycorrhizal

October 21, 2016

Plot 3A (above)
Chain-flailed Wood (top dressed)
Grass seed-native and commercial
October 21, 2016

Plot 3B (below)
Chain-flailed wood, incorporated 3-4 inches, seed

Plot 4A (below)

Doug Fir Bark (top dressed), Biochar, Mycorrhizal

Plot 4B (above)

Same, no mycorrhizal

October 21, 2016

Plot 5A (above)
Local limbs/logs – 25% coverage
October 21, 2015

Plot 5B (below)
Same – 75% coverage

EQUIPMENT LAYOUT


TRUPER


ECHO EC-5


10/14/2015


3B-6
10/12/2015

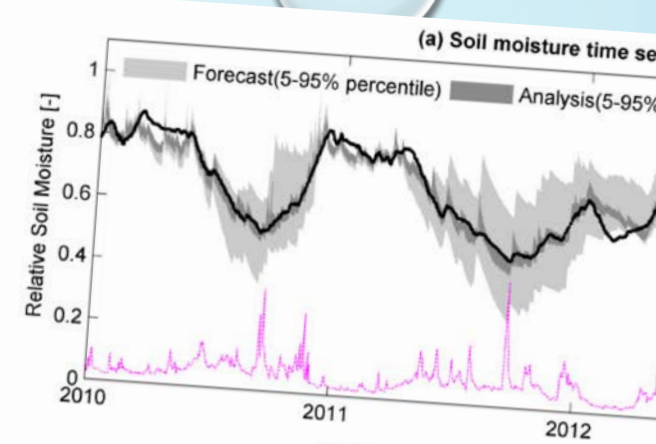
SOIL MOISTURE DATA

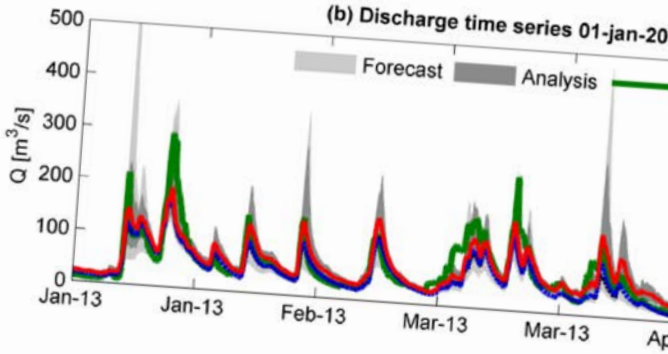
Final Moisture Content %(wb)							
19	18	17	16	15	14	13	12	11
Moisture Loss (kg/tonne)								
136	146	157	167	176	186	195	205	213
125	134	145	155	165	174	184	193	202
				153	163	172	182	191
					151	161	170	180
					140	149	159	169
					128	138	148	157
					116	126	136	146
					105	115	125	135
					93	103	114	124
					81	92	102	112
					70	80	91	101
					58	69	80	90
					47	57	68	79
					35	46	57	67
					23	35	45	56
					12	23	34	45

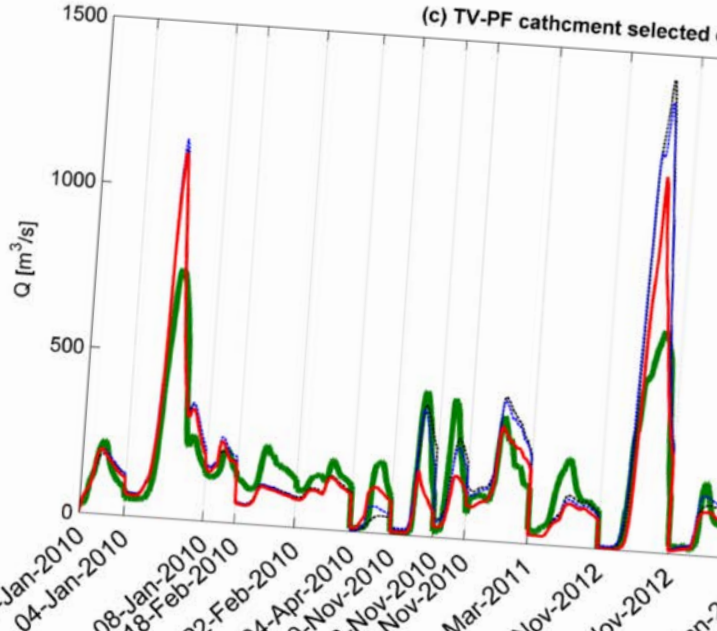
eading No	Time	Type	Duration	Units	Seque
12	8/8/2014 8:46	Soil	11.88	ppm	Final
13	8/8/2014 8:49	Soil	11.25	ppm	Final
14	8/8/2014 9:10	Soil	11.35	ppm	Final
15	8/8/2014 9:15	Soil	11.26	ppm	Final
16	8/8/2014 9:16	Soil	11.3	ppm	Fina
17	8/8/2014 9:18	Soil	11.33	ppm	Fina
18	8/8/2014 9:18	Soil	11.36	ppm	Fina
19	8/8/2014 9:19	Soil	11.18	ppm	Fin
20	8/8/2014 9:21	Soil	10.3	ppm	Fir
21	8/8/2014 9:25	Soil	11.3	ppm	Fir
22	8/8/2014 9:29	Soil	11.17	ppm	Fi
23	8/8/2014 9:32	Soil	11.31	ppm	F
24	8/8/2014 9:35	Soil	11.34	ppm	F
25	8/8/2014 9:39	Soil	11.17	ppm	
26	8/8/2014 9:41	Soil	11.31	ppm	
	8/8/2014 9:42	Soil	12.44	ppm	
			12.11	ppm	

Calibration Check performed 1-27-2015

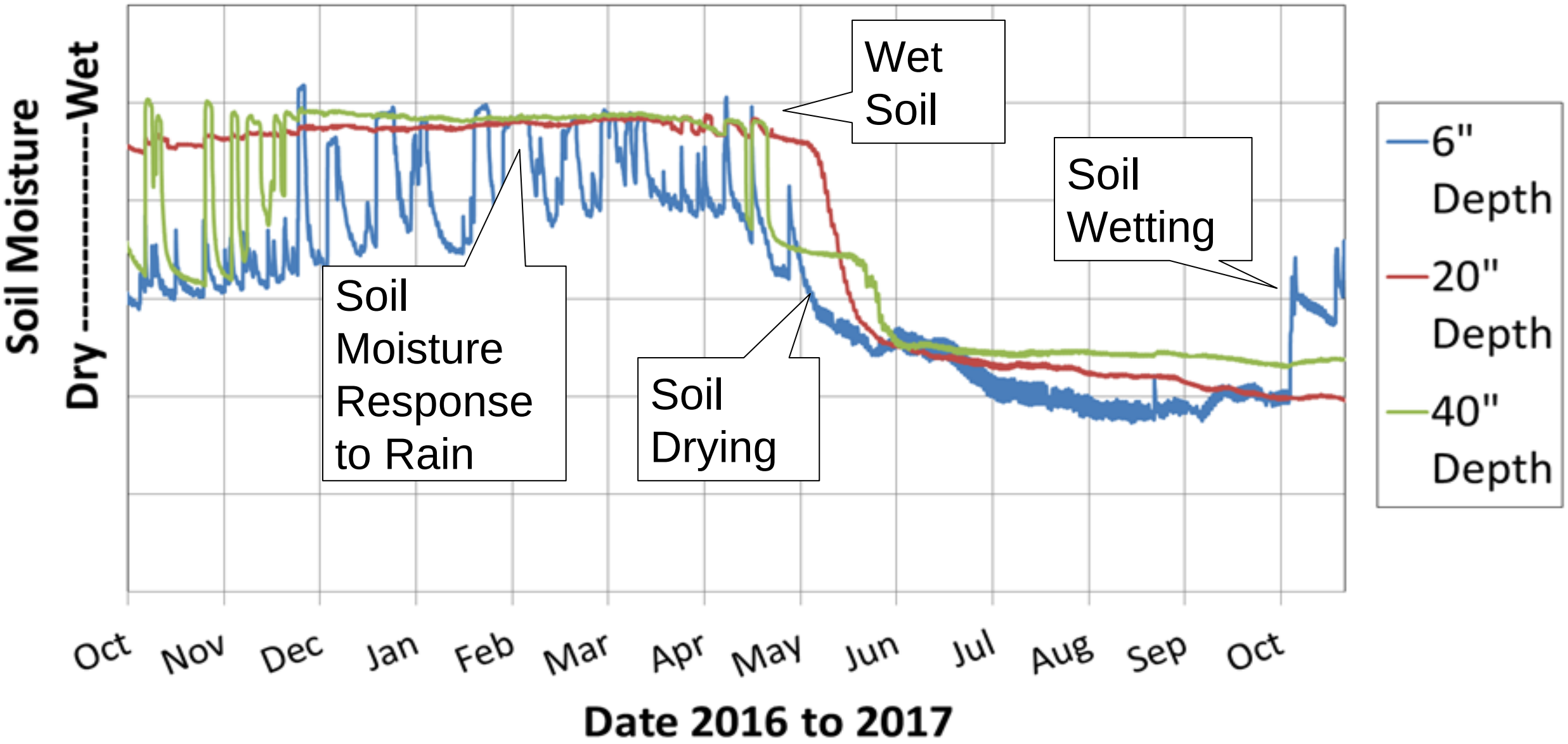
File #	DateTime	Mn
154	1/27/20	



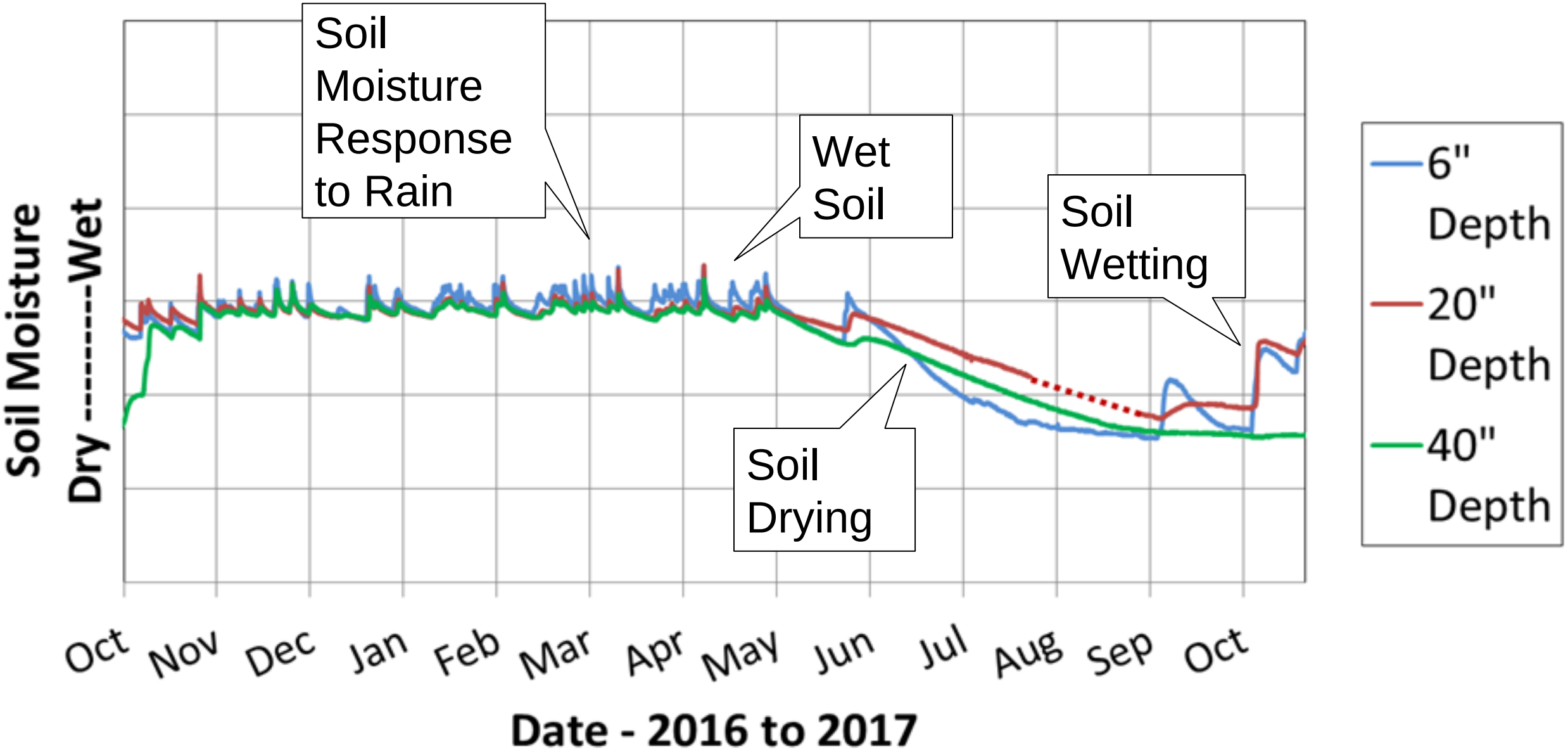




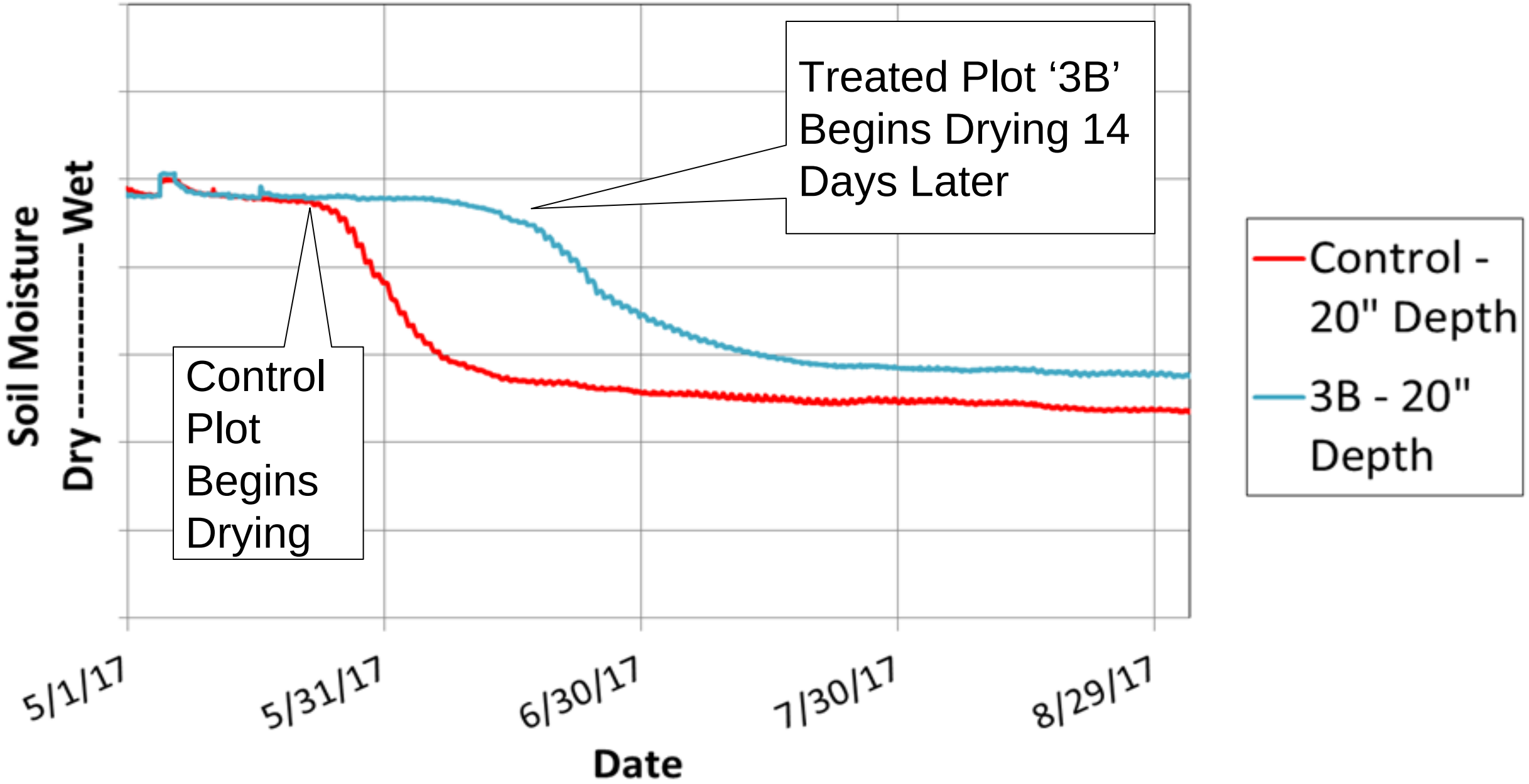
Kimmel Site - Full Year Soil Moisture Values of Control Plot



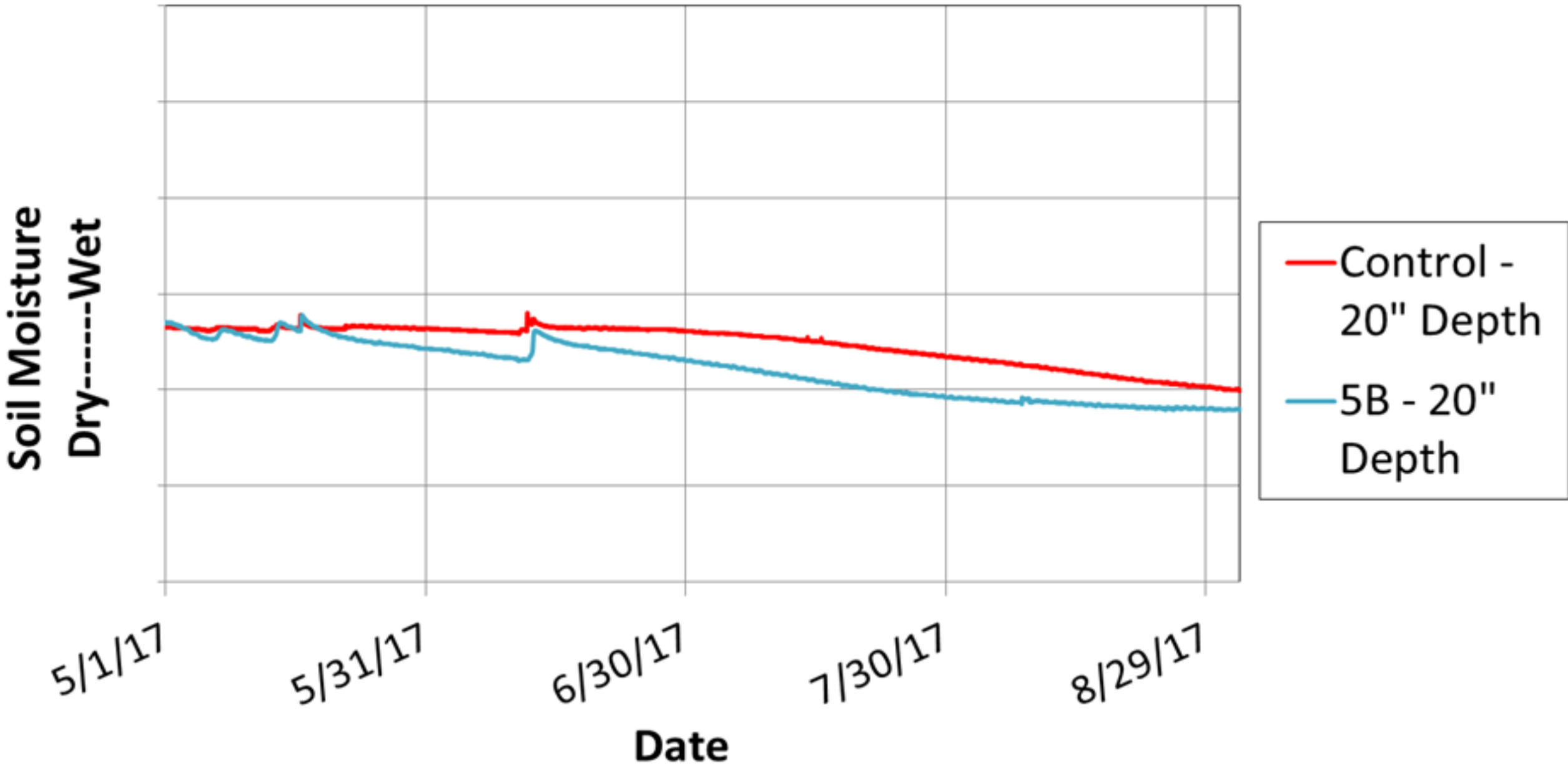
Wasson Site - Full Year Soil Moisture Values of Plot 5A



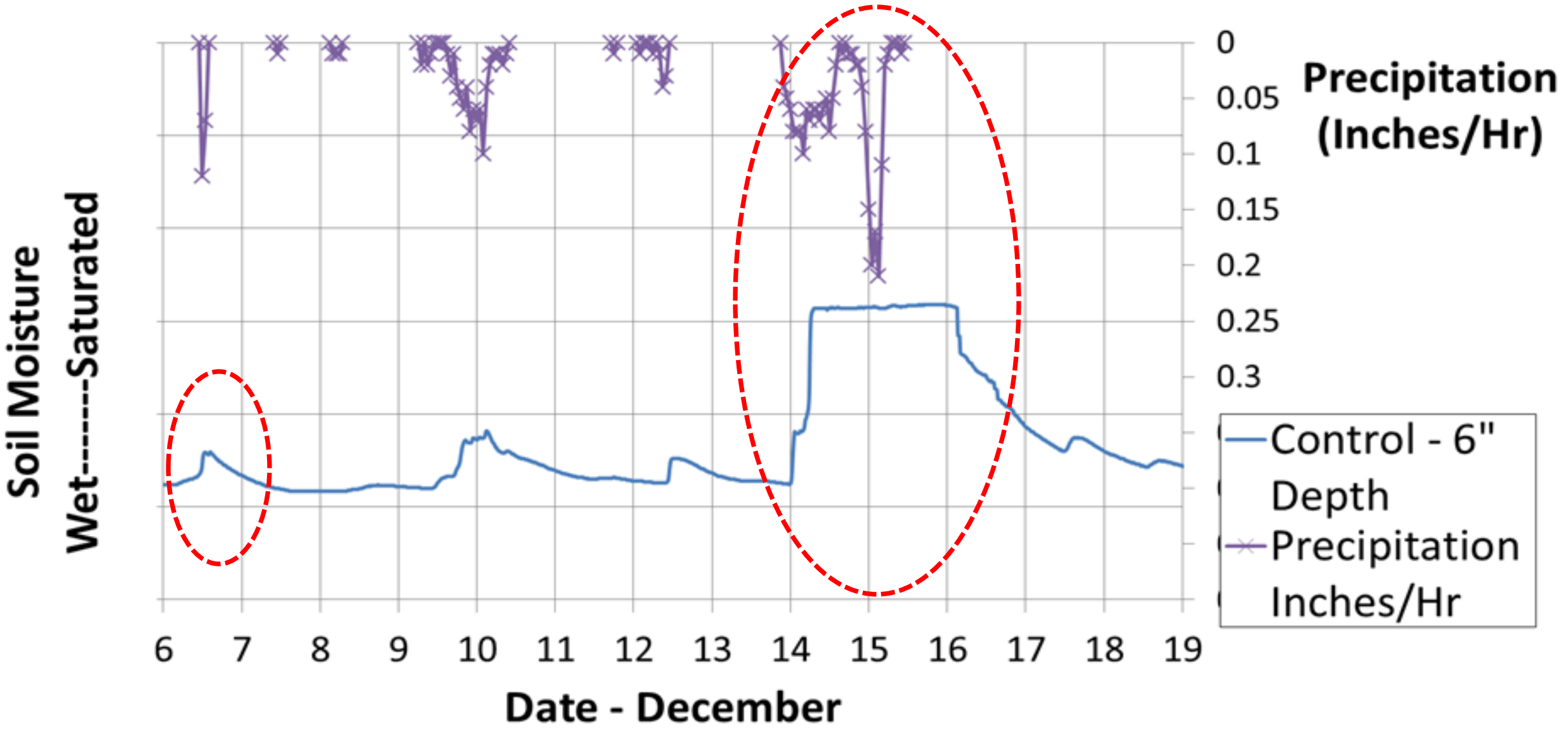
Kimmel Site - Soil Moisture Retention in Plots Control vs 3B



Wasson Site - Soil Moisture Retention in Plots Control vs 5B



Kimmel Site - Control Plot Soil Moisture Response to Precipitation




Dec 14 2016

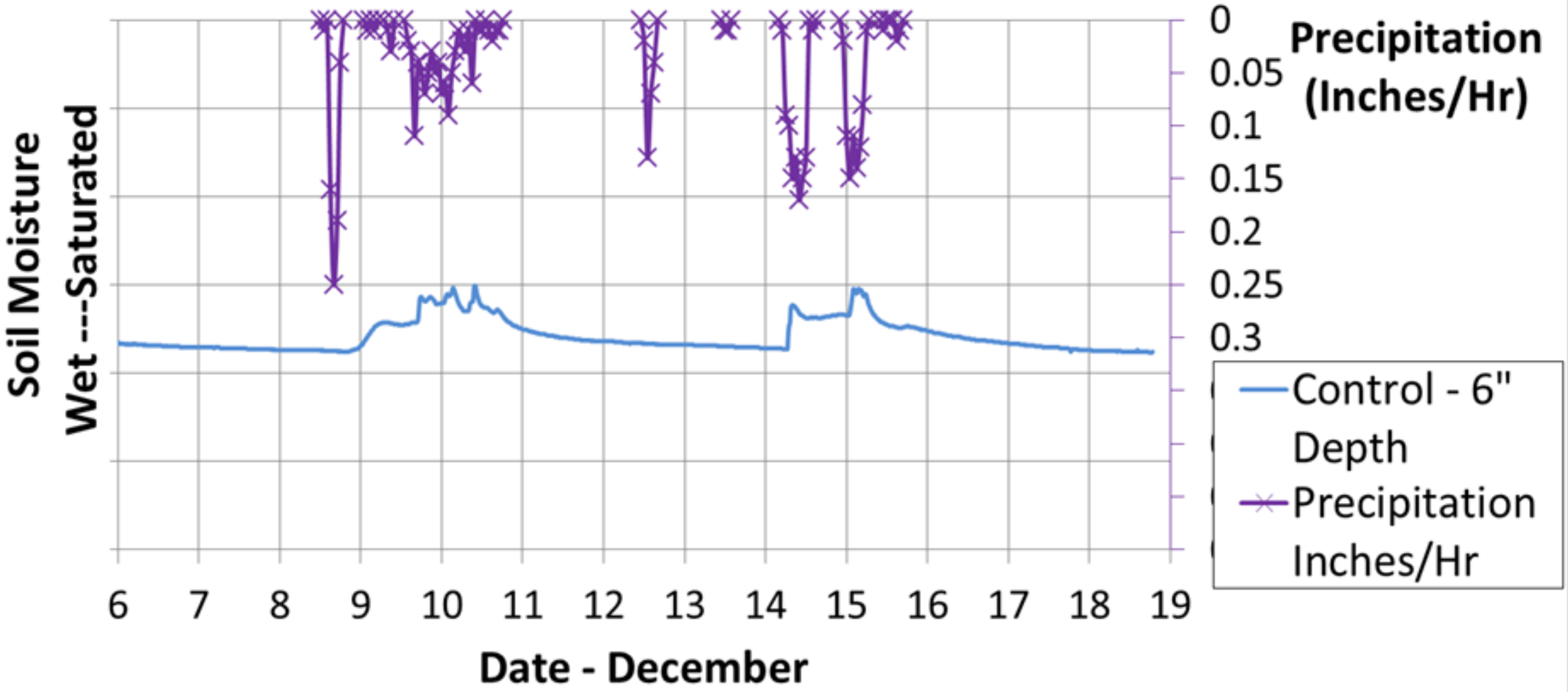
No apparent runoff within Plots 3A and 3B

December 14, 2017 High Precipitation Event

Water retained along contoured windrows on Plots 2A and 2B

December 14, 2016
High Precipitation Event

Wasson Site - Control Plot Soil Moisture Response to Precipitation

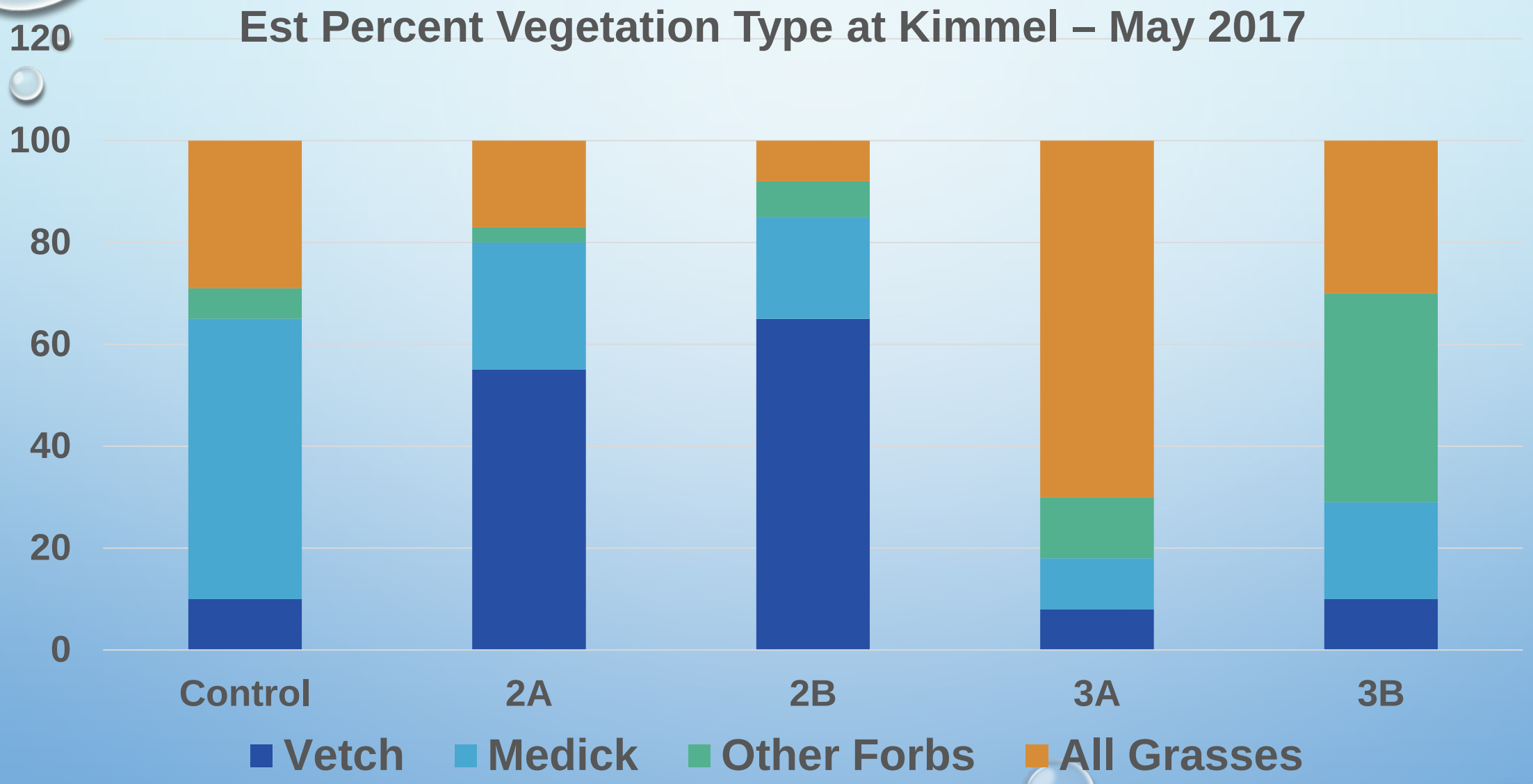


Snow at Wasson
December 12, 2016

OBSERVATIONS AT KIMMEL

OBSERVATIONS AT WASSON

Grass Growth on Windrow Plots 2A and 2B


Est Percent Vegetation Type at Kimmel – May 2017
120
100
80
60
40
20
0
Control
2A
2B
3A
3B
Vetch
Medick
Other Forbs
All Grasses

FINDINGS/OBSERVATIONS

- Runoff appeared detained from storm events by plots at Kimmel (Oak Savannah) site (visual observation). No runoff observed at Wasson (Conifer Forest)
- Soil moisture was retained longer in some treated plots than at control (Plots 3A & 3B Kimmel)
- These observations suggest an increase in infiltration through the soil horizon based on treatment methods
- All preliminary, based on one initial season!

FINDINGS/OBSERVATIONS cont.

- Vegetation growth appears affected by different treatment methods
- Mycorrhizal growth was enhanced at Wasson Plot 5B
- Soil chemistry appears changed in some treated plots (benefits are undetermined)
- Some data gaps due to equipment malfunction
- Soil moisture sensors provide relative vs. absolute soil moisture values

NEXT STEPS/OPTIONS

- Short-Term
  - Continue for another year
  - Expand project to include new plot treatments
- Mid-Term
  - Continue project with more input/output controls
  - Rainfall Simulation
- Long-Term
  - Apply soil treatments at farm/forest scale and monitor results
- Funding opportunities?

Thank you!

Project Contacts:

Sam Whitridge,
Managing Director
Rogue Basin Partnership
info@roguepartners.org

Amy Patton, Hydrogeologist
Patton Environmental, LLC
pattonenv@gmail.com

Soil Test Results