


# Irrigation Management Strategies



Drew M. Gholson  
Delta Research and Extension Center  
Nation Center for Alluvial Aquifer Research  
[drew.gholson@msstate.edu](mailto:drew.gholson@msstate.edu)  
office:662-390-8505, cell: 979-255-7018

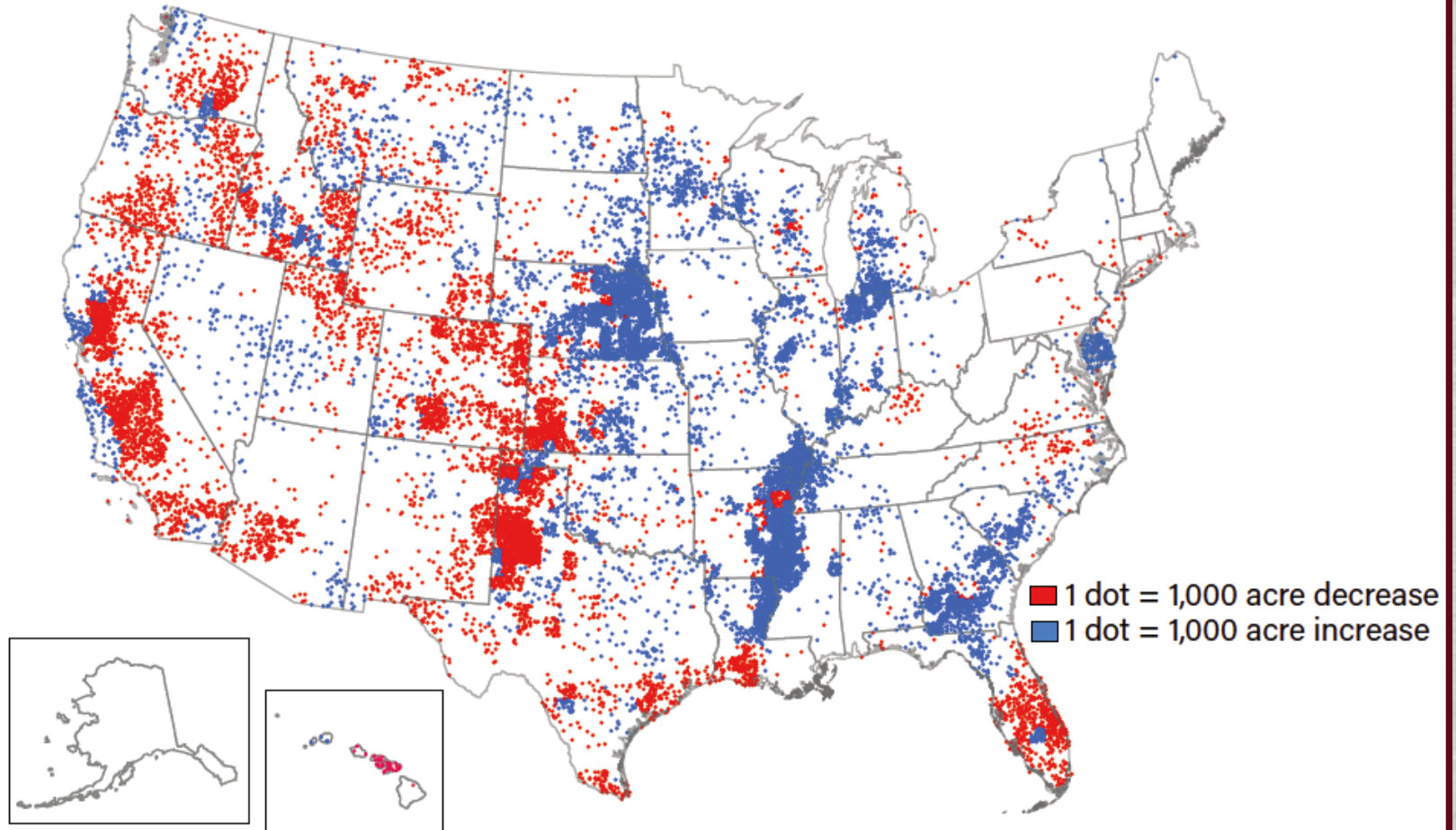


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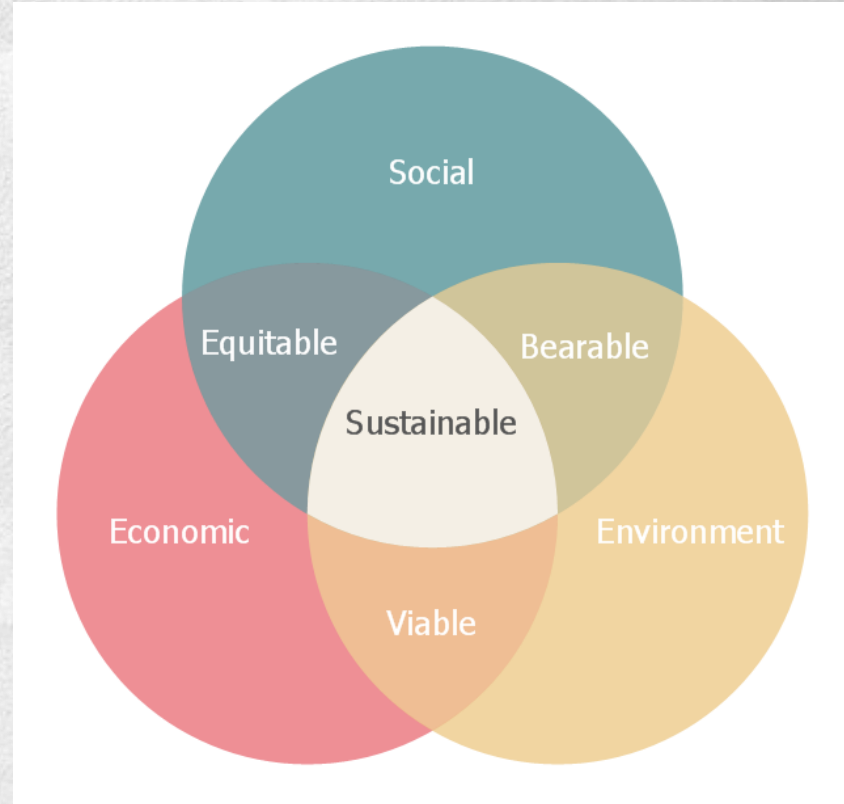
# Spatial distribution of changes in irrigated acreage, 1997–2017

Net increase = 2,955,779 acres



**Source:** USDA, Economic Research Service using data from USDA, National Agricultural Statistics Service, *1997 and 2017 Censuses of Agriculture*.

# Sustainable Agriculture



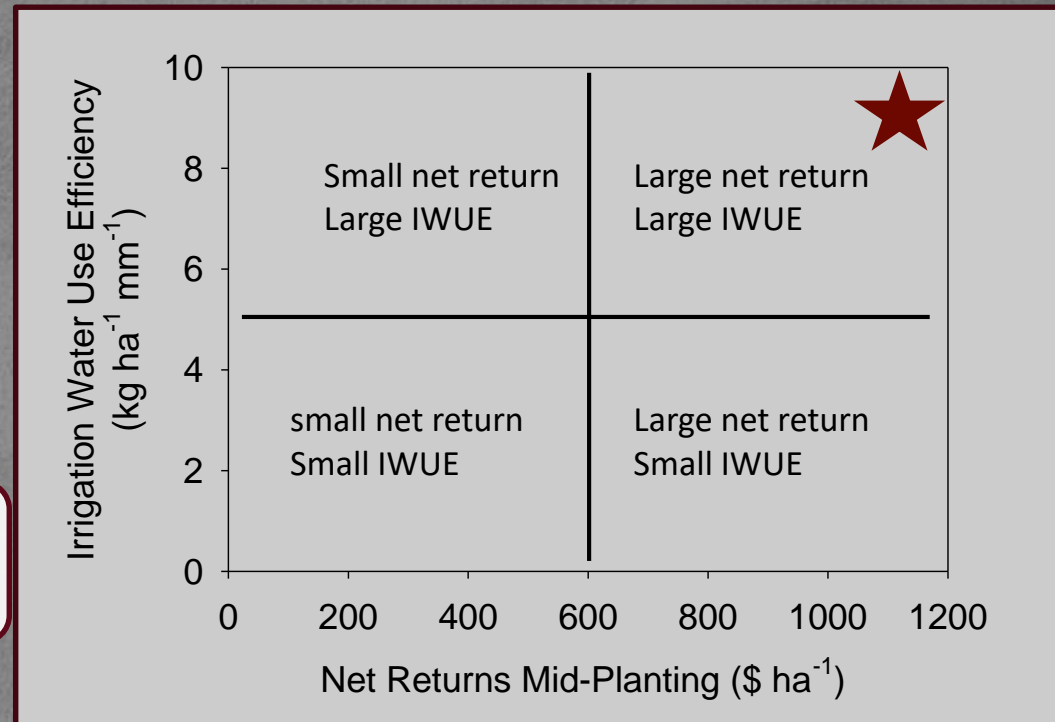
- Economically Viable: If its not profitable, its not sustainable
- Socially Supportive: The quality of life of farmers, farm families and farm communities
- Ecologically Sound: We must preserve the resource base that sustains us all

# Sustainable Production

3. Soil sensors

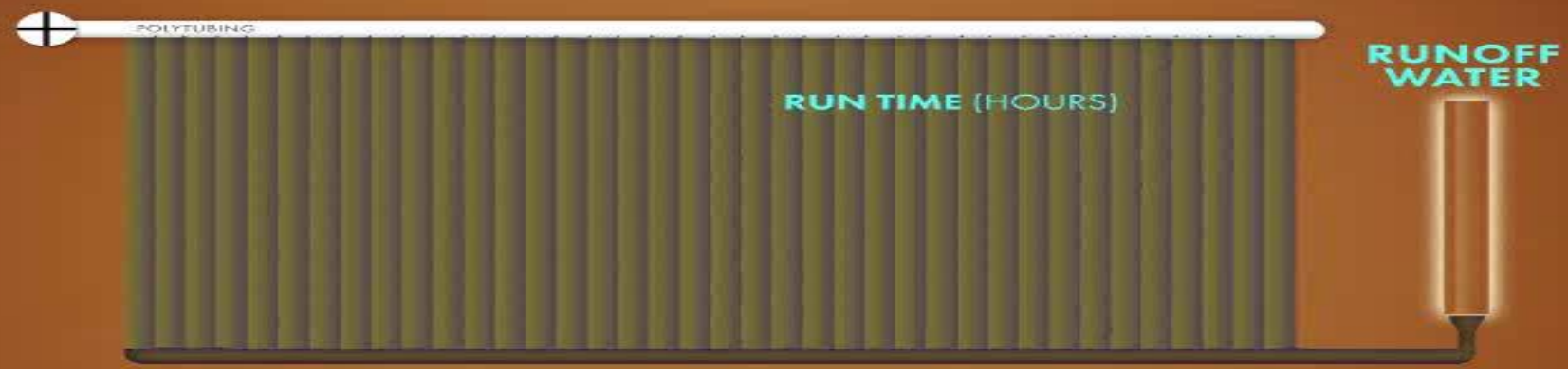
2. Surge irrigation

1. Computerized hole selection





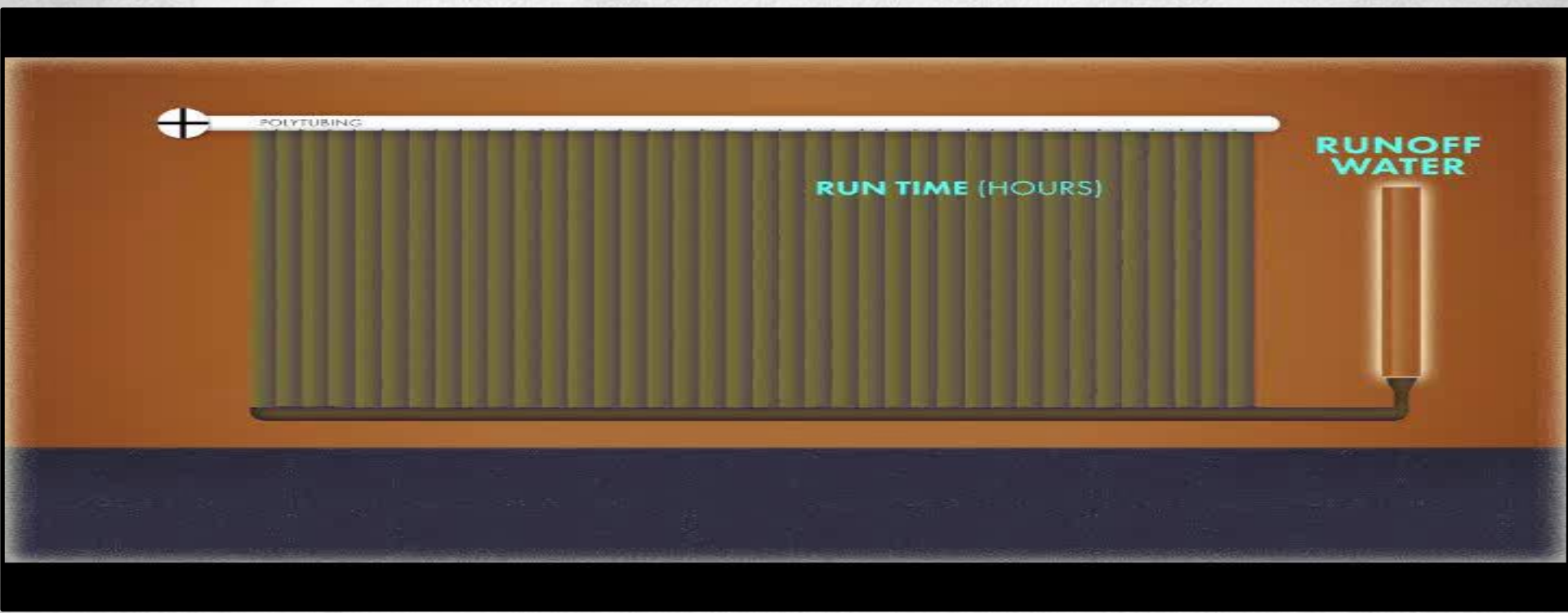
# Irrigation Application Efficiency



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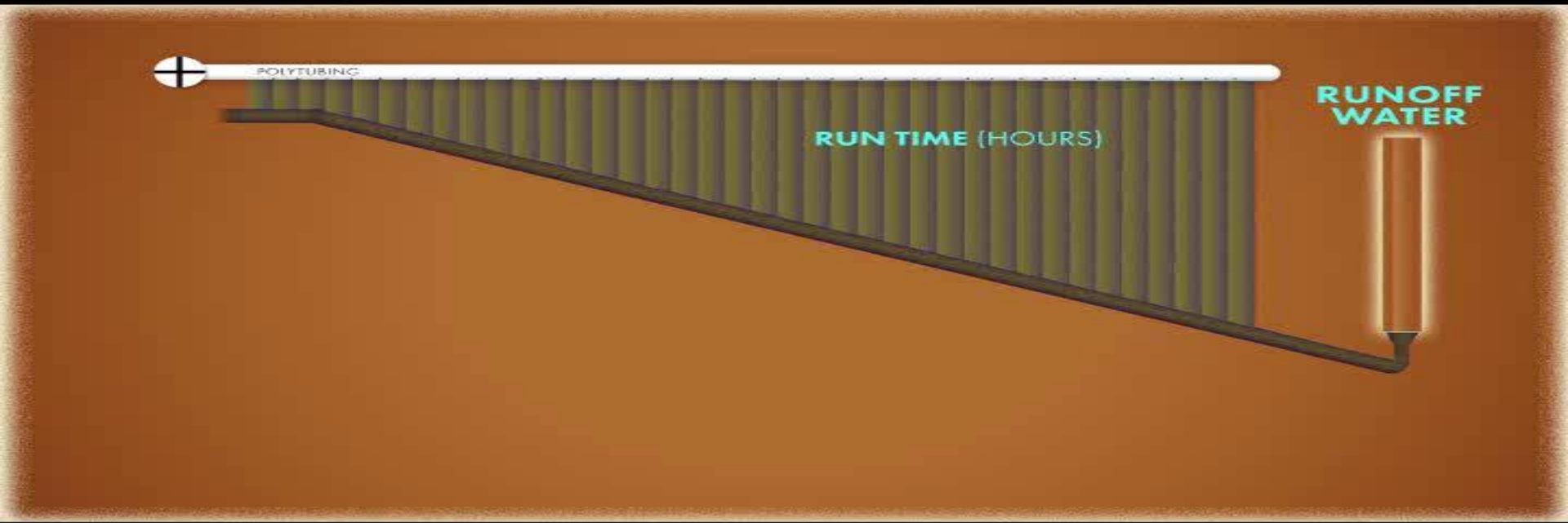
# Irrigation Application Efficiency



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# Irrigation Application Efficiency



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# Irrigation Application Efficiency



## Surge Results

Reduces surface runoff losses

Decreases deep percolation losses

Improves infiltration sealing soils

Application efficiency 25% higher than conventional



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EXTENSION SERVICE



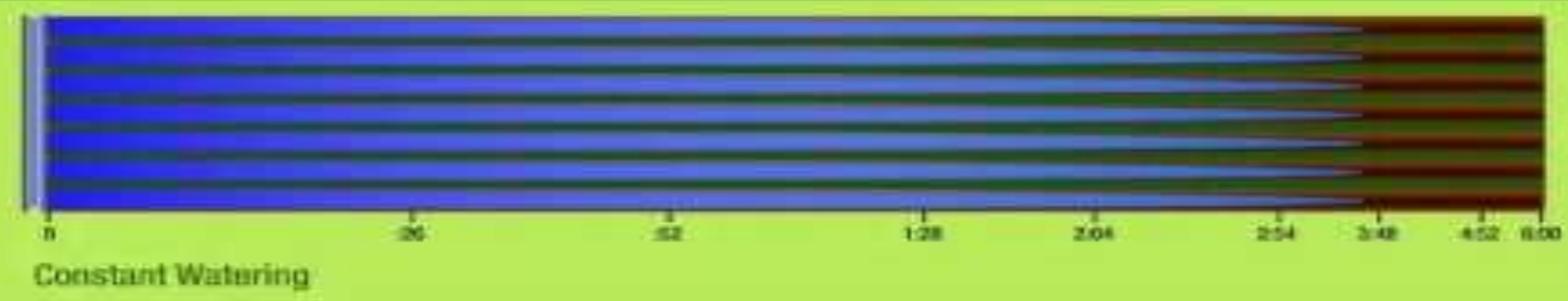
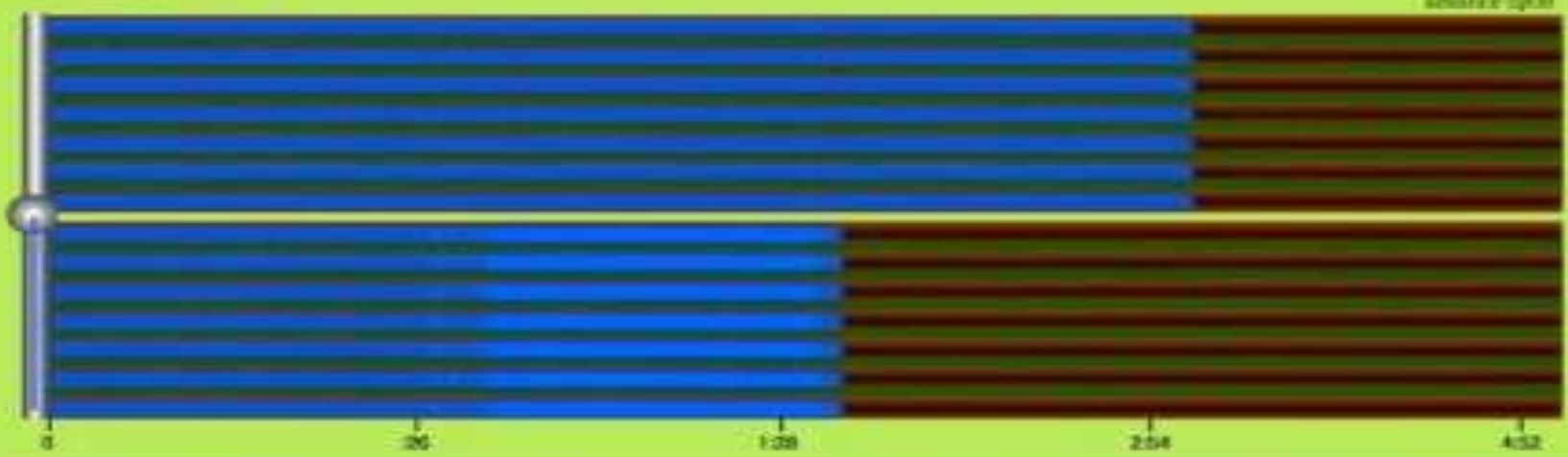
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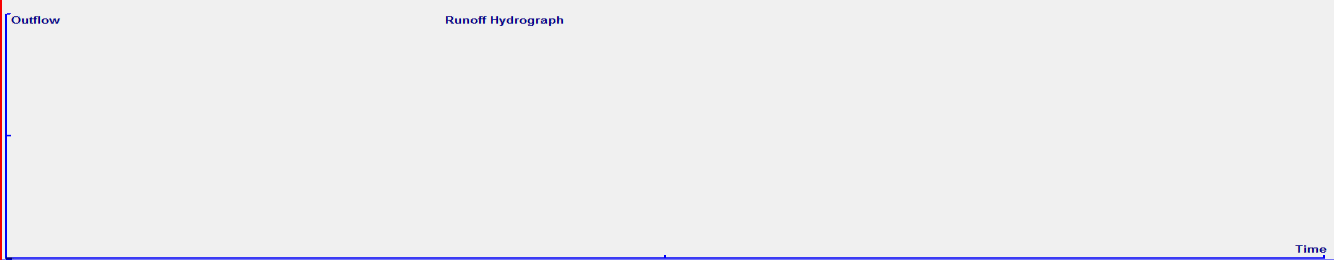
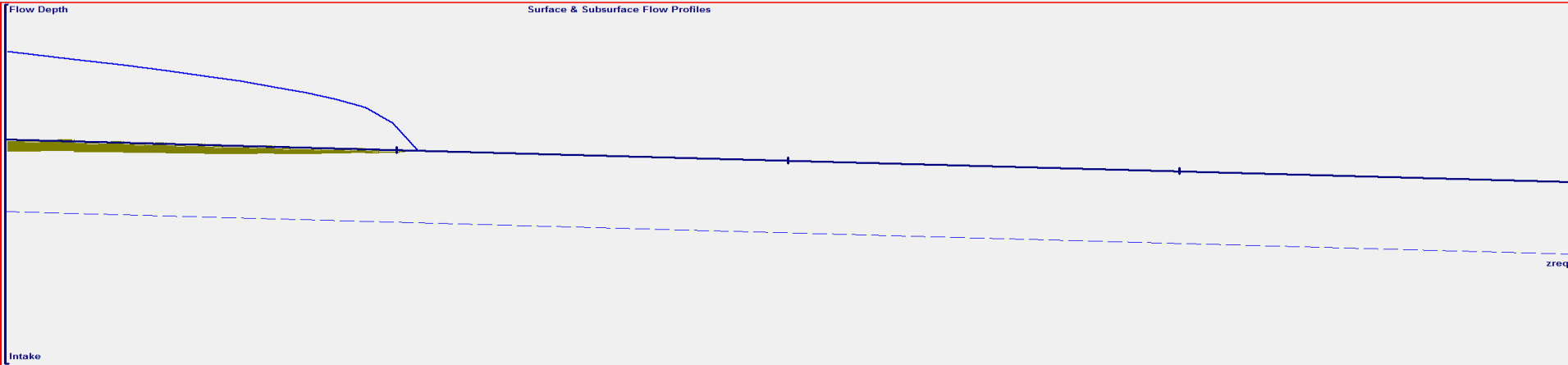






## SURFACE

USDA-NRCS Surface Irrigation Evaluation, Design, and Simulation Program



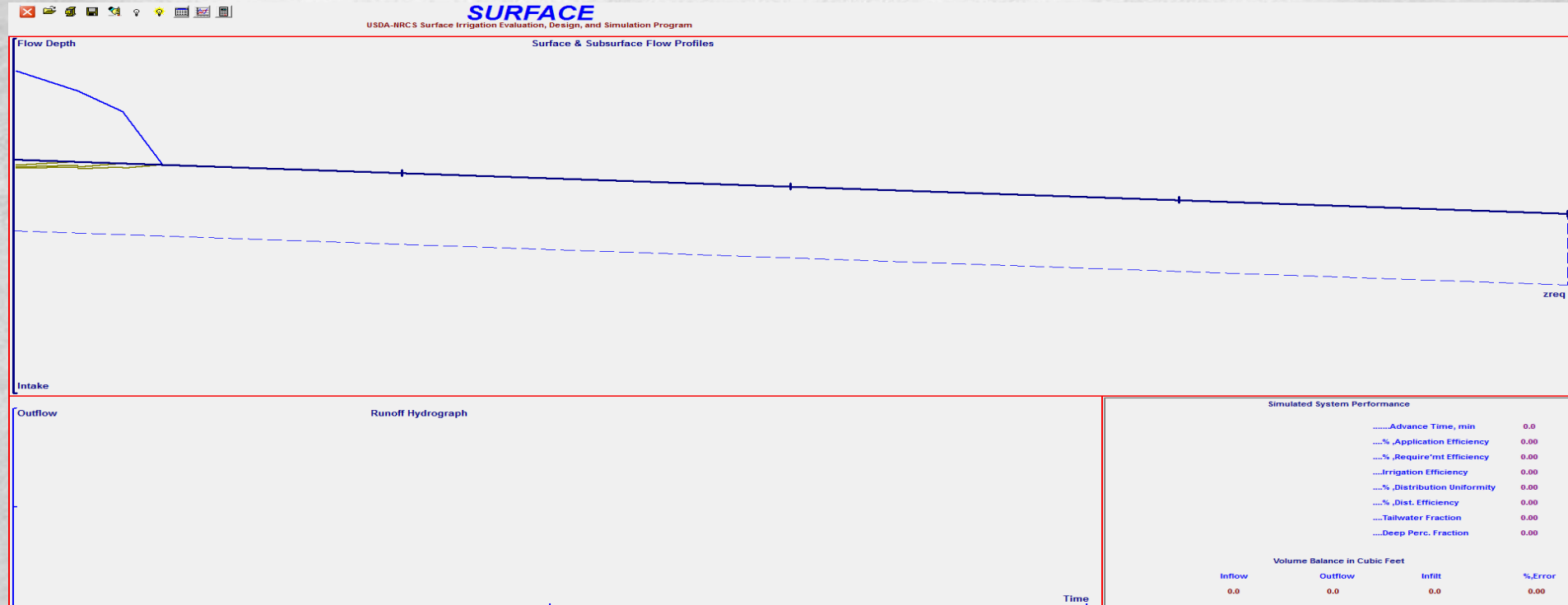
Simulated System Performance

.....Advance Time, min	0.0
....% ,Application Efficiency	0.00
....% ,Require'mt Efficiency	0.00
....Irrigation Efficiency	0.00
....% ,Distribution Uniformity	0.00
....% ,Dist. Efficiency	0.00
....Tailwater Fraction	0.00
....Deep Perc. Fraction	0.00

Volume Balance in Cubic Feet

Inflow	Outflow	Infit	%Error
0.0	0.0	0.0	0.00



# Common Irrigation Scheduling Methods

Feel & Appearance



Calendar

**June 2020**

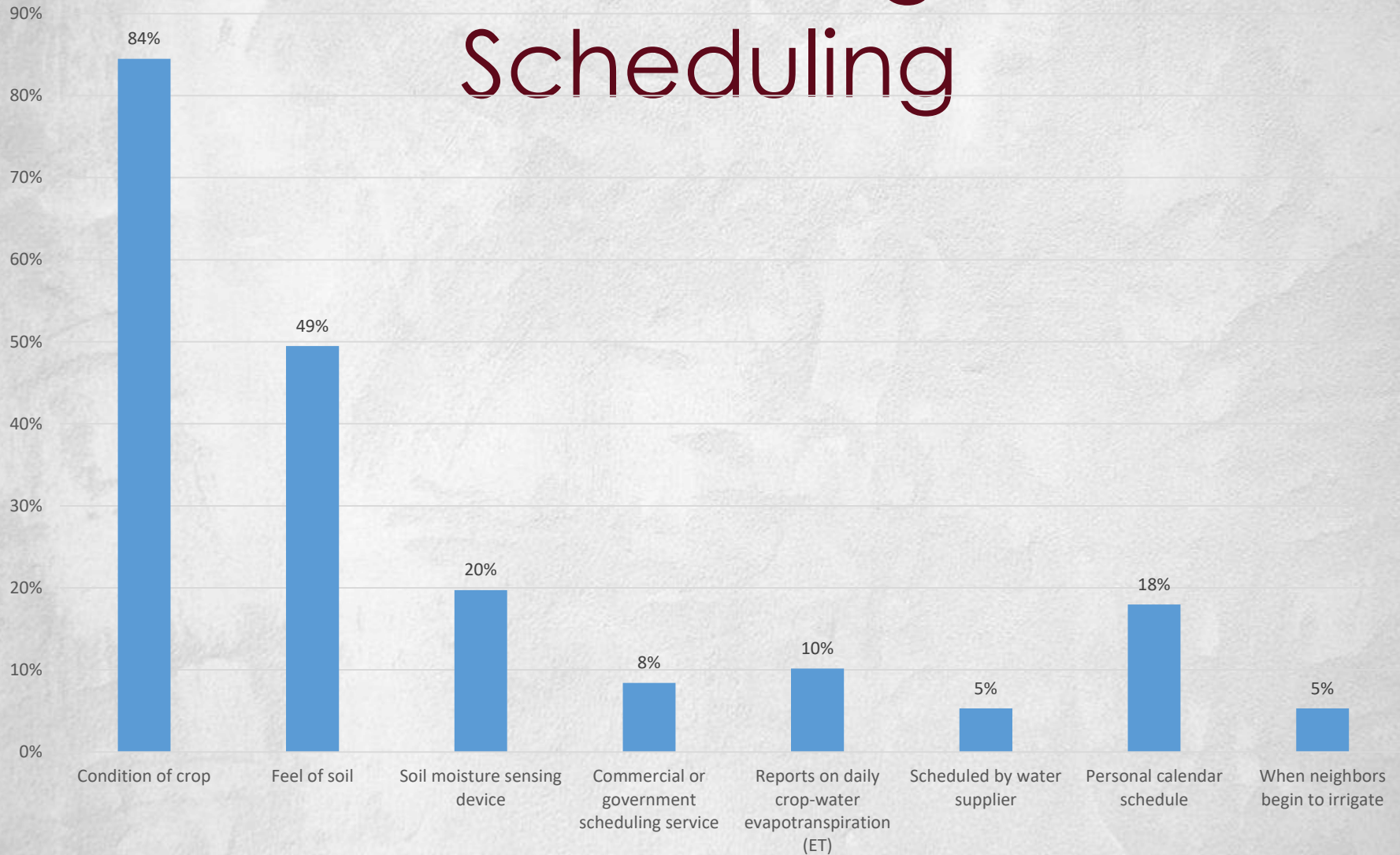
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

www.calendaroptions.com

The Neighbor

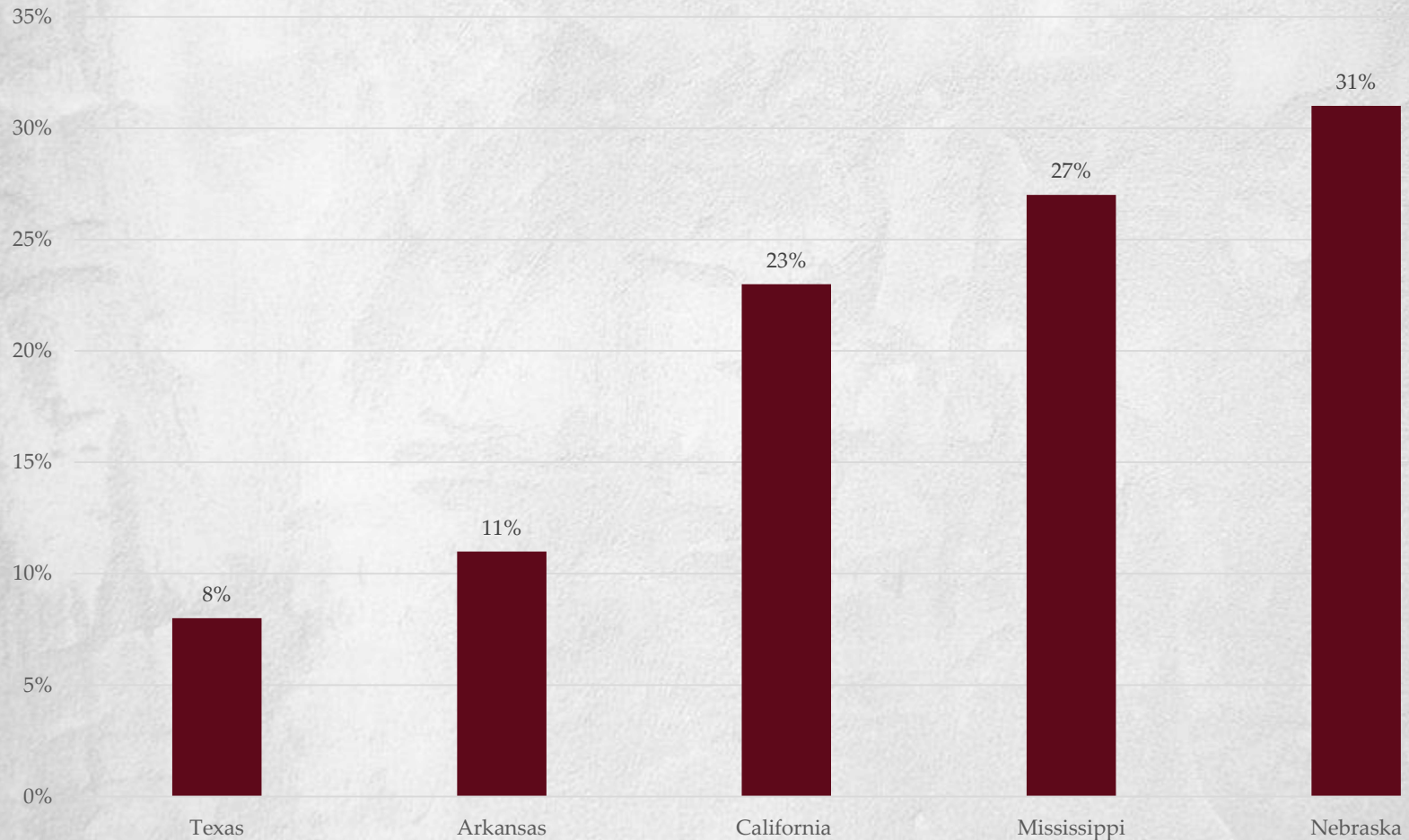


# Methods of Irrigation Scheduling



# National use of SMS

SMS by state



# Irrigation Scheduling

- Understanding soil moisture sensors
- Interpreting soil moisture sensor data
- Making irrigation decision off of soil moisture sensors



# Developed Irrigation Instruments/Devices

Tensiometer



Watermark Sensor



Soil Capacitance Probe



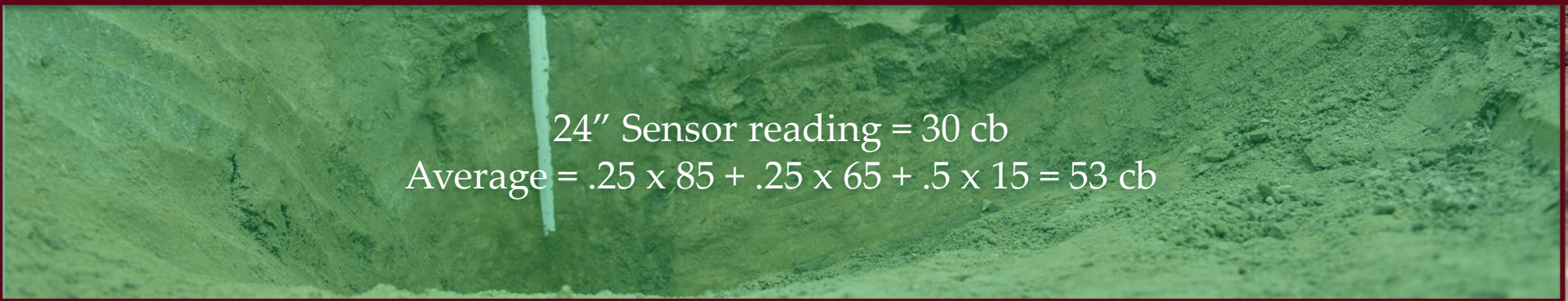
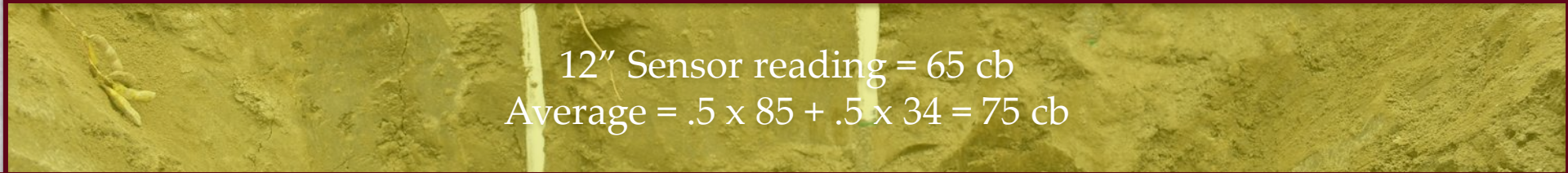


# Answering questions

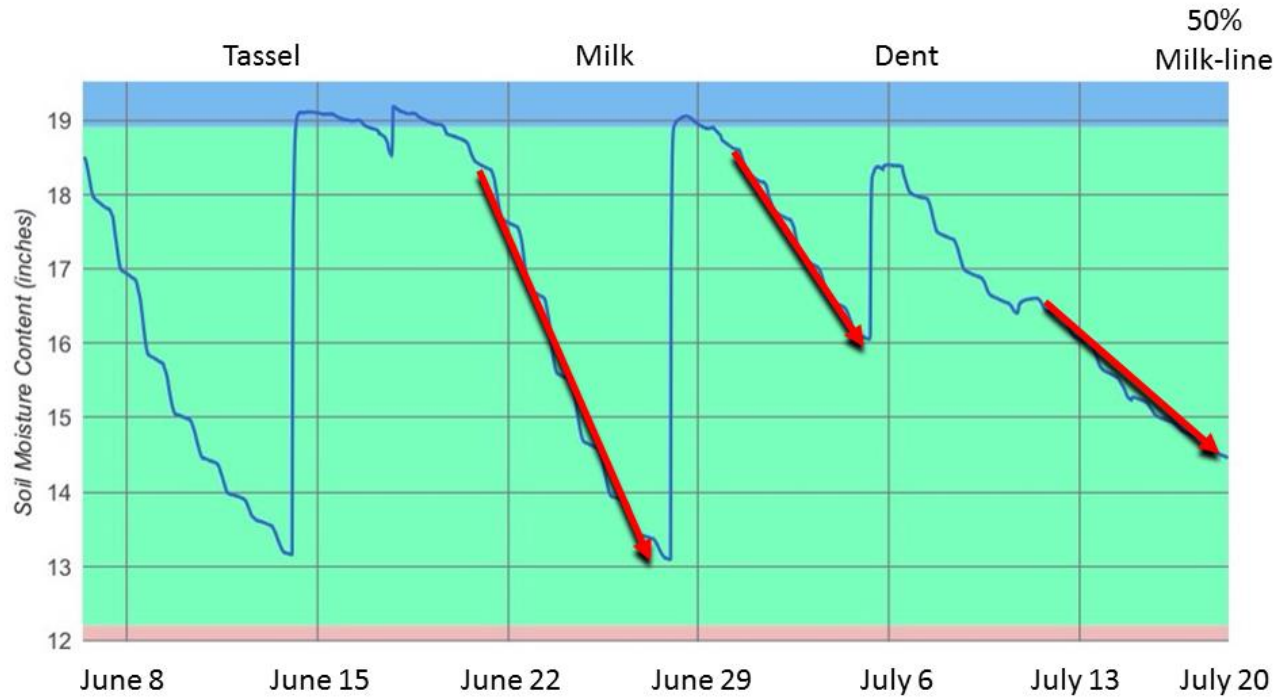
- When do I initiate/start irrigating?
  - Why is this so hard?
- When do I start after a rain?
- How much of that rain actually went in the soil profile?
- How much moisture am I using on a cloudy day? Humid? Clear? Low humidity?
- How much does soil type play a factor in irrigation decisions?
- Can I use one trigger point for any given soil type?
- Are my cover crops actually helping?
  - Compaction
  - Water holding capacity
- When can I terminate irrigation?



Cutaway  
View

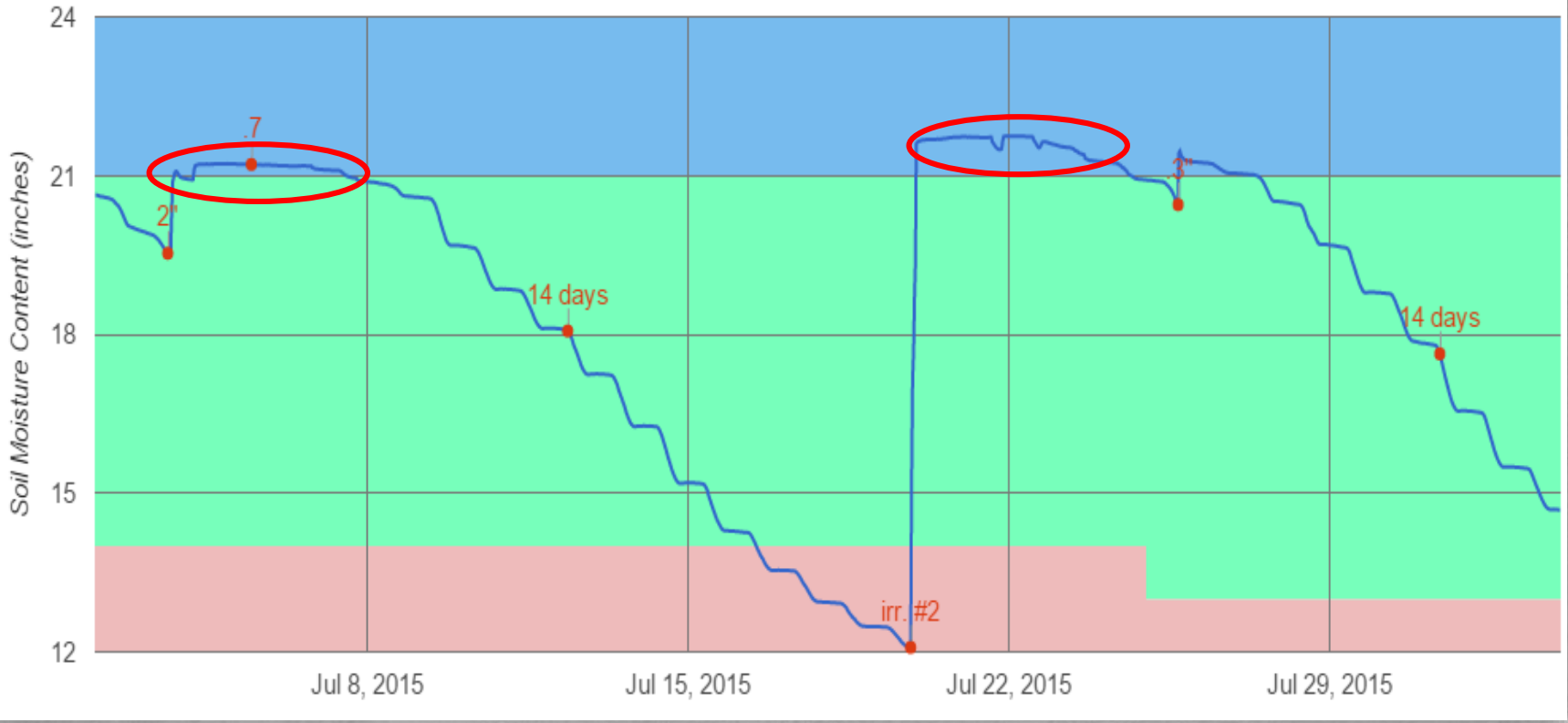


# Moisture Use Relative to Corn Growth Stage



Slide from Dr. Erick Larson, MSU Corn Specialist

# Sum of Sensors

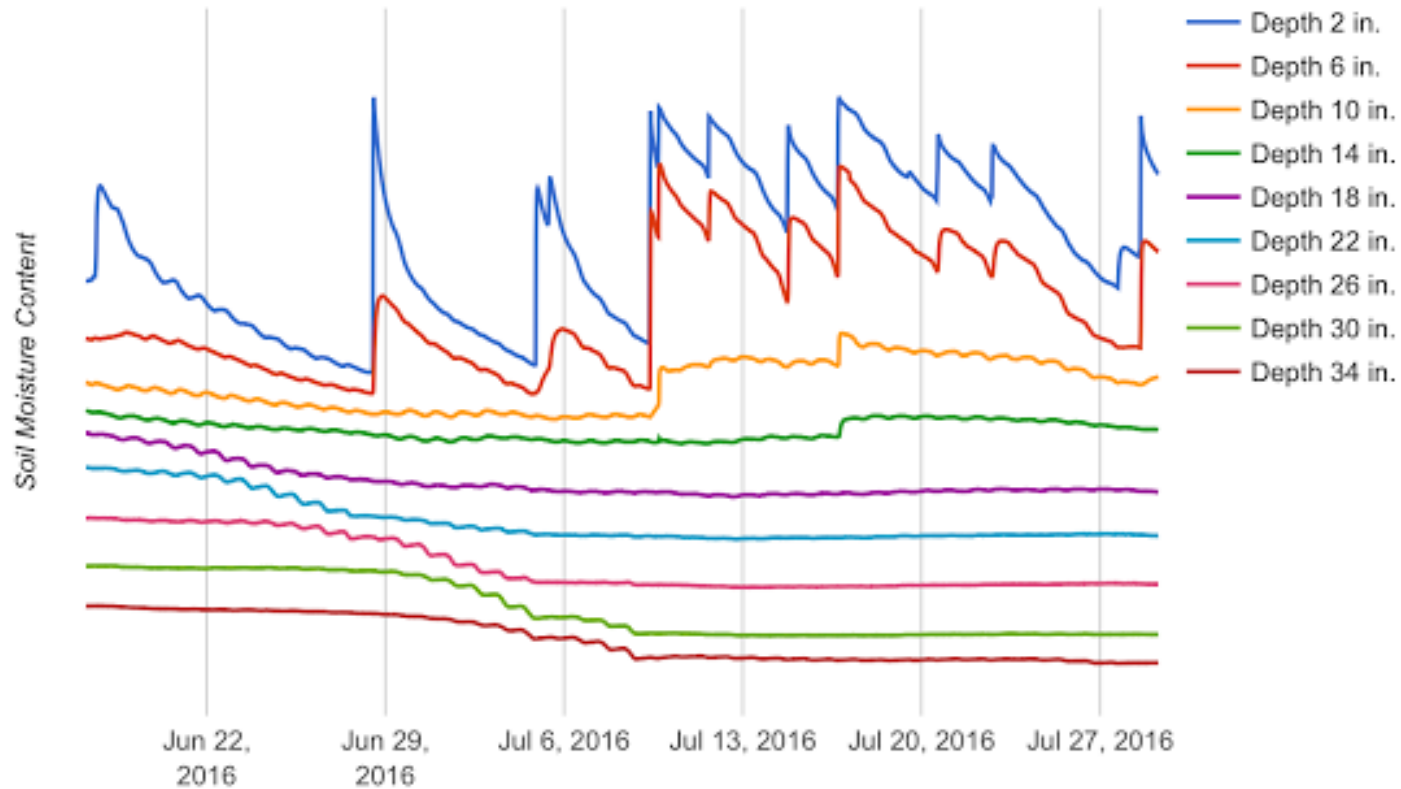


Saturation: How much does this cost you every year?

Is it a cumulative effect?

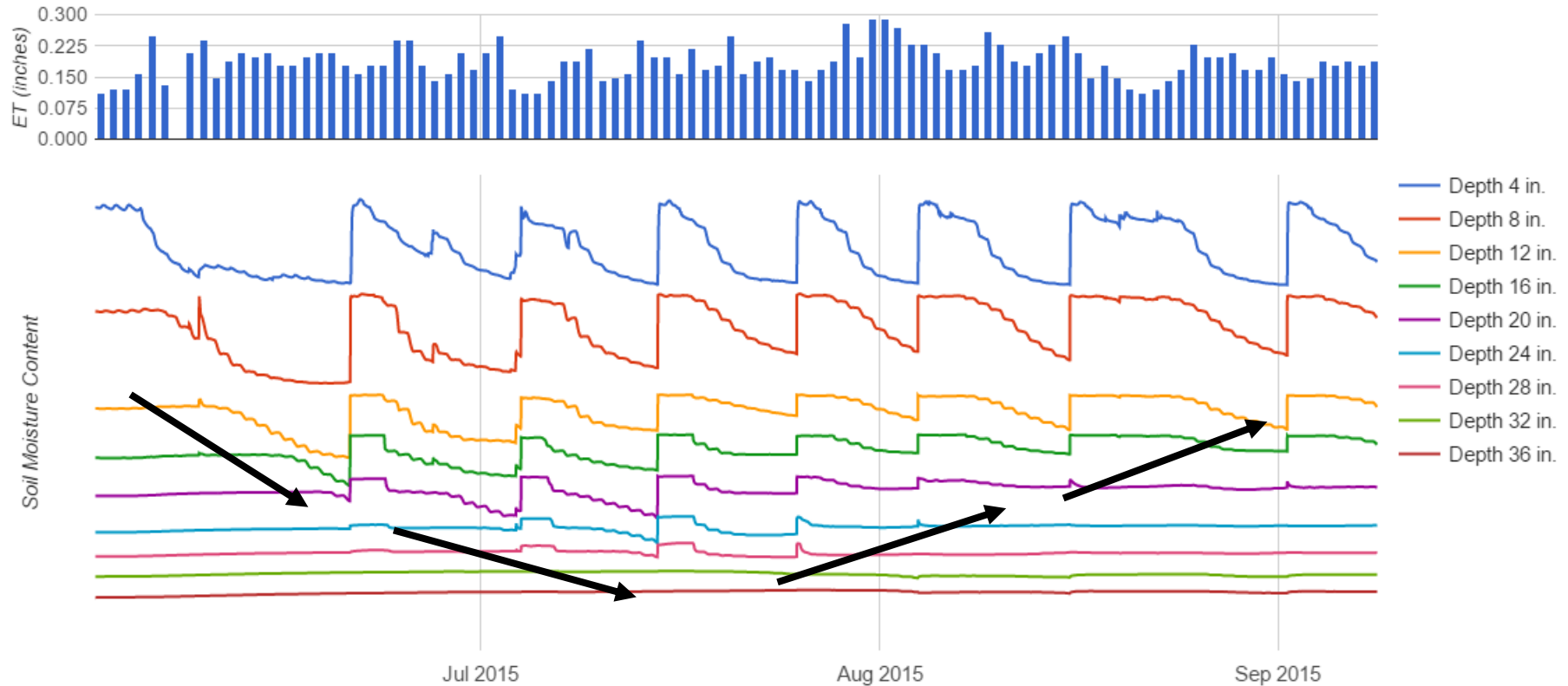
# Compaction

## Individual Sensors

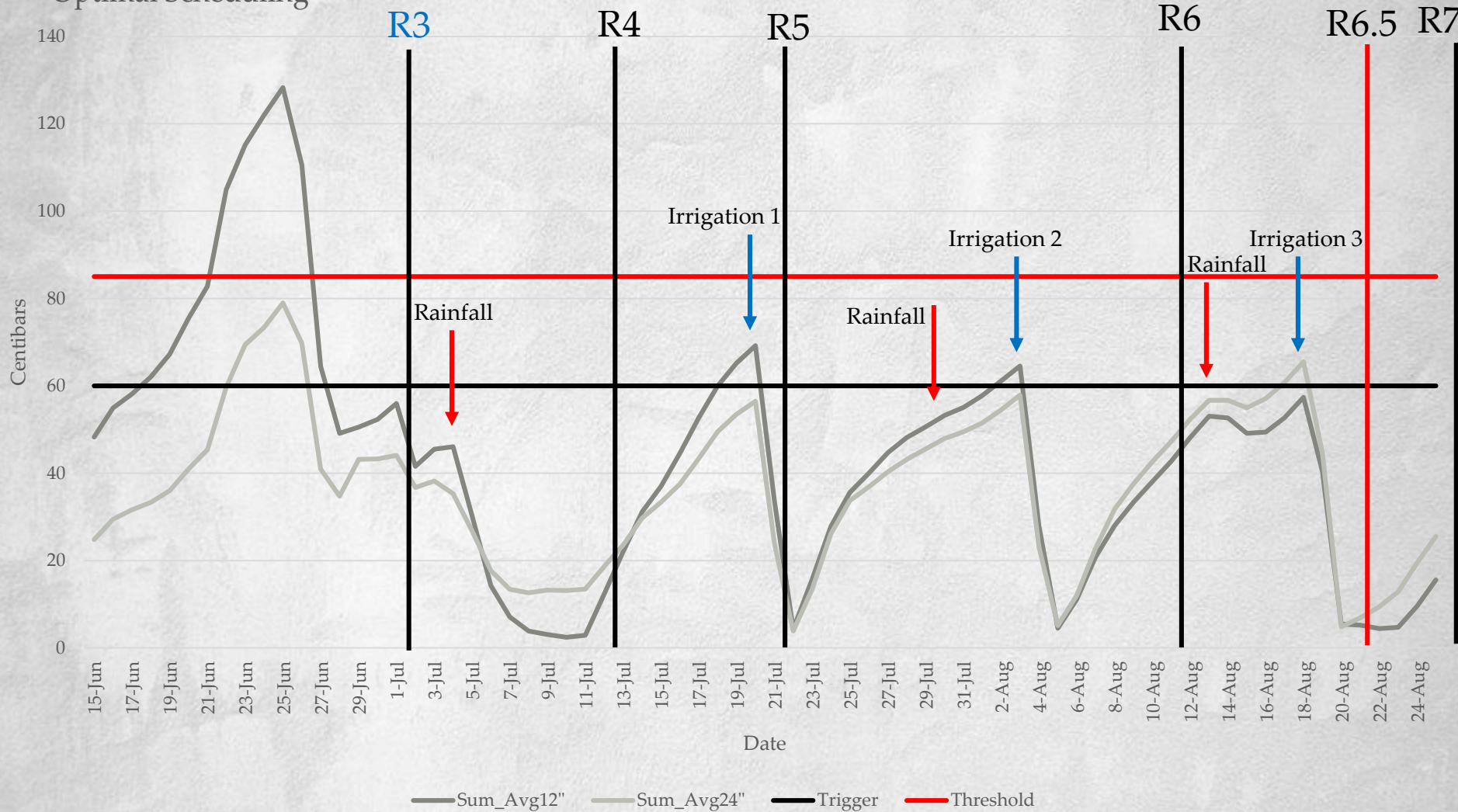


# Set Points/Refill Points Should NOT Remain the Same

## Discrete Sensors

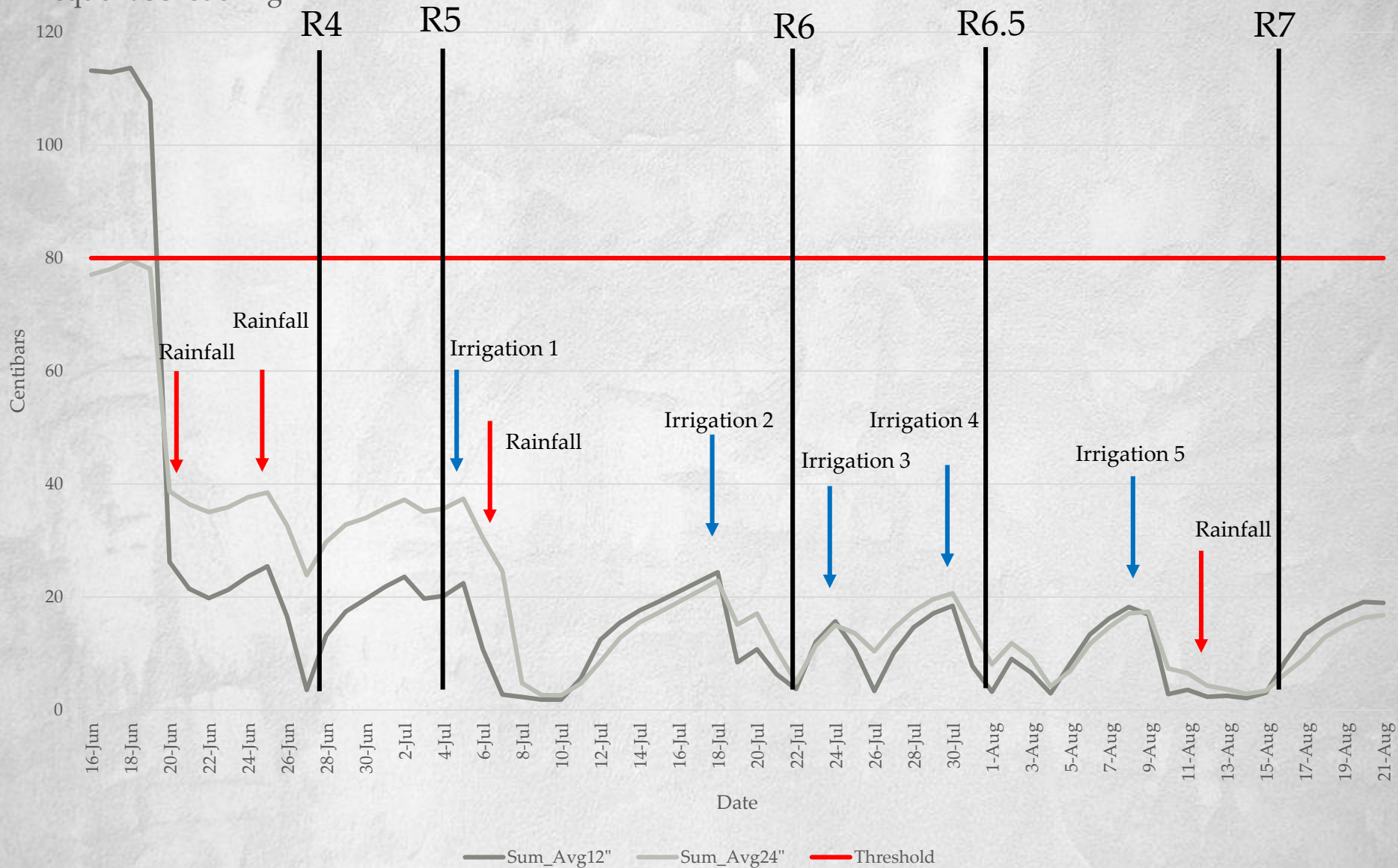


# Optimal Scheduling



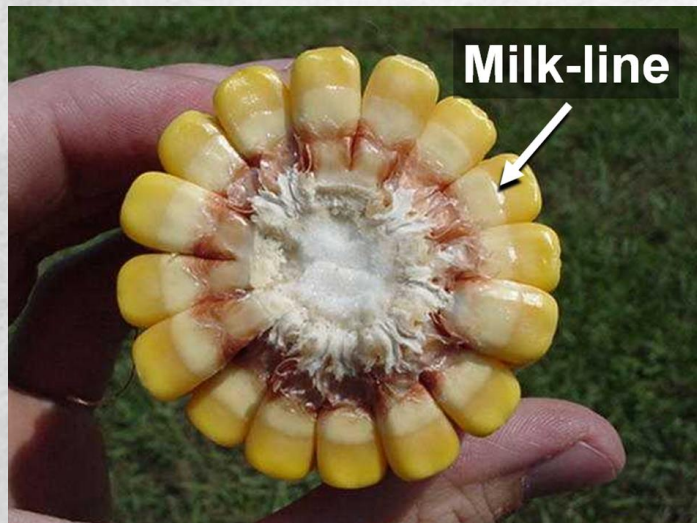


# Frequent Scheduling



At the dent stage, corn has reached 75% of its weight.  
Stopping irrigation at the dent stage can cause yields to suffer as much as 15-20%

Once the milk line appears and begins its move through kernel, there are only 21-24 days until maturity





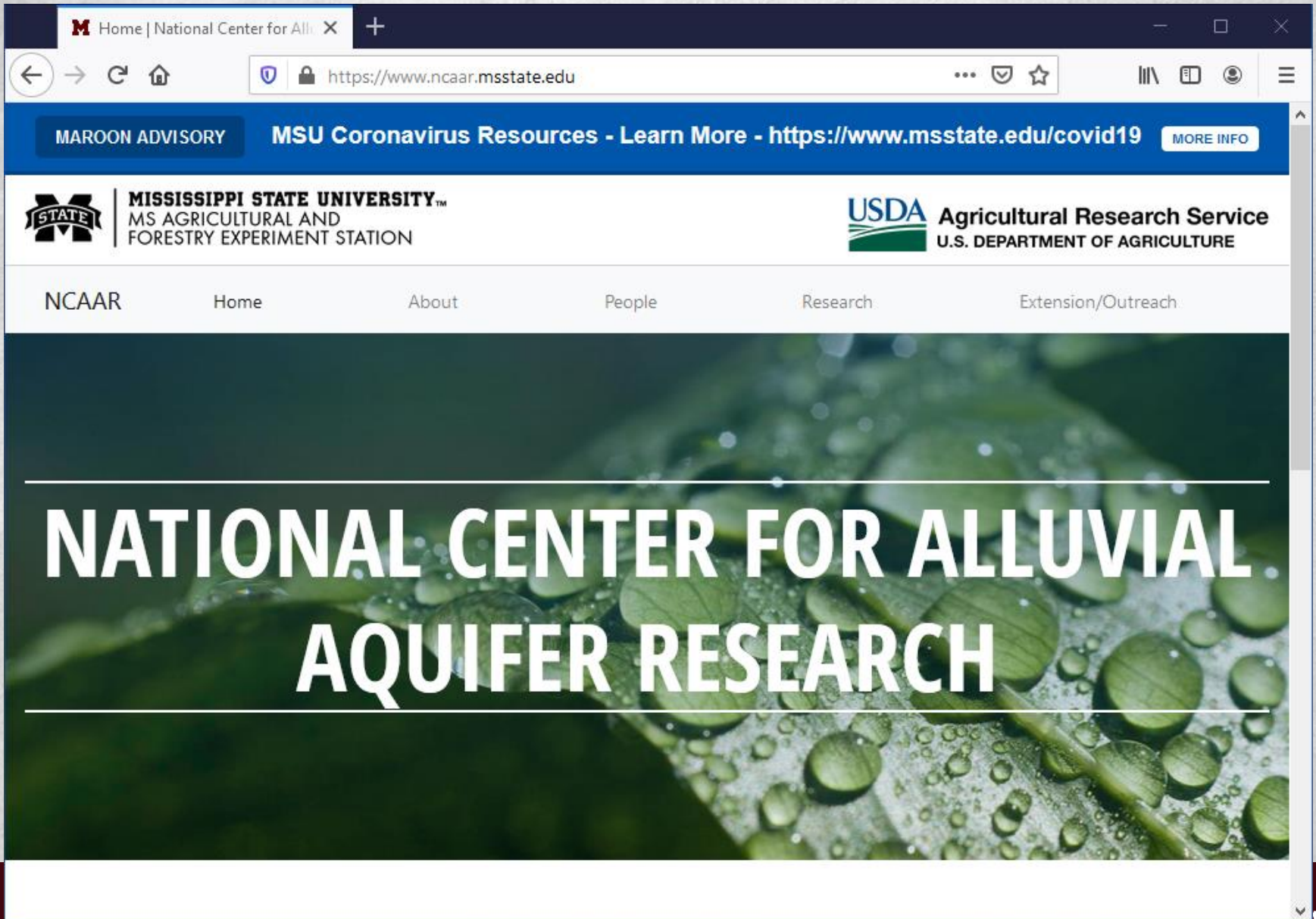
- Picture taken July 13<sup>th</sup>
- Estimated Maturity is July 30<sup>th</sup>.

$(24d - (24d \times 30\% \text{ milk line})) = 16-17 \text{ days to maturity}$



**Milk-line**

$(24d - (24d \times 50\% \text{ milk line})) = 12 \text{ days to maturity}$



MAROON ADVISORY

MSU Coronavirus Resources - Learn More - <https://www.msstate.edu/covid19>

MORE INFO



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Agricultural Research Service  
U.S. DEPARTMENT OF AGRICULTURE

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**Soil Moisture Monitoring Showcase**

[Web Tools](#)

## Soil Moisture Monitoring Showcase



Welcome to the official website of the National Center for Alluvial Aquifer Research (NCAAR) soil moisture monitoring showcase! Please click on one of the buttons below.

[General Information](#)

### Showcase Quick Links

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[Participating Vendors](#)

[Irrrometer Watermark 200SS](#)

[Sentek Drill & Drop](#)

[AquaSpy Vector Probe](#)

[CropX Soil Sensor](#)

### Contact NCAAR

#### General Information

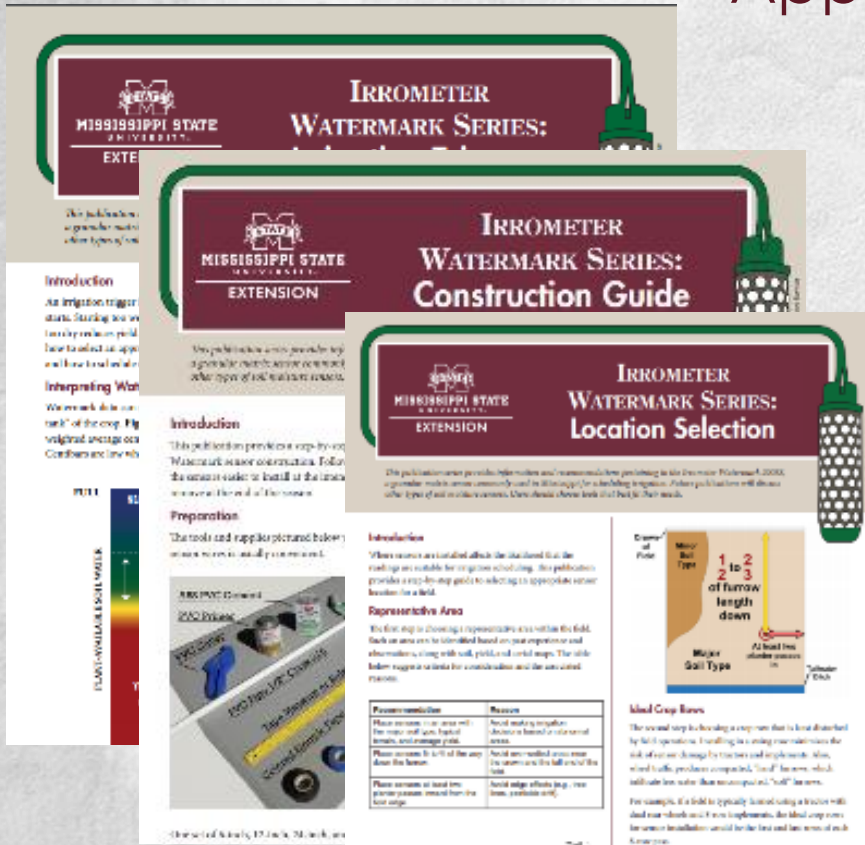
[vfs23@msstate.edu](mailto:vfs23@msstate.edu)

662.390.8510

#### Showcase Demo

*Drew Gholson*

# Watermark Fundamentals & Application



1. Scientific Background
2. Measurement Devices
3. Sensor Construction
4. Sensor Location
5. Sensor Installation
6. Irrigation Triggers

<https://www.ncaar.msstate.edu/outreach>



Calculate

## Results

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<b>Cost</b>	<b>\$/Acre</b>	<b>Total</b>
Pumping	\$8.04	\$1045.20
Labor	\$0.38	\$49.85
Capital	\$1.20	\$156.00
Total Irrigation Event	\$9.62	\$1251.05

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Compare the cost of another irrigation with the expected benefits of additional irrigation; you can expect to profitably irrigate if the next irrigation event will result in the following yield gains:

<b>Commodity</b>	<b>Yield</b>
Corn	1.92 bu/acre
Cotton	9.62 lbs/acre
Soybean	1.07 bu/acre





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### Flow Meter Calculator

Beginning Totalizer Reading  
0

Ending Totalizer Reading  
0

Totalizer Units  
~choose units~

Acres Irrigated  
0

Calculate!

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### Flow Meter Calculator

**You Entered:**  
Beginning Totalizer Reading  
**200 acre-inches**  
Ending Totalizer Reading  
**600 acre-inches**  
Area Irrigated  
**150 acres**

**You Irrigated:**  
Gross Water Volume  
**400 acre-inches**  
**33.333 acre-feet**  
**10861714 gallons**  
Gross Water Depth  
**2.67 inches**

Reuse Inputs    Reset Inputs



# Thank You

Drew M. Gholson  
Delta Research and Extension Center  
National Center for Alluvial Aquifer Research  
[drew.gholson@msstate.edu](mailto:drew.gholson@msstate.edu)  
cell: 979-255-7018  
Twitter: @DMGholson



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