



# Irrigation Management: Engineer's Perspective

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# Watering vs Irrigating



# Irrigation



- Available water in the soil
- Critical soil moisture deficits
- Crop water use
- Effective rainfall
- Effective irrigation

# Commercially available wireless soil moisture systems

- Irrigation Initiation Demonstration, MS



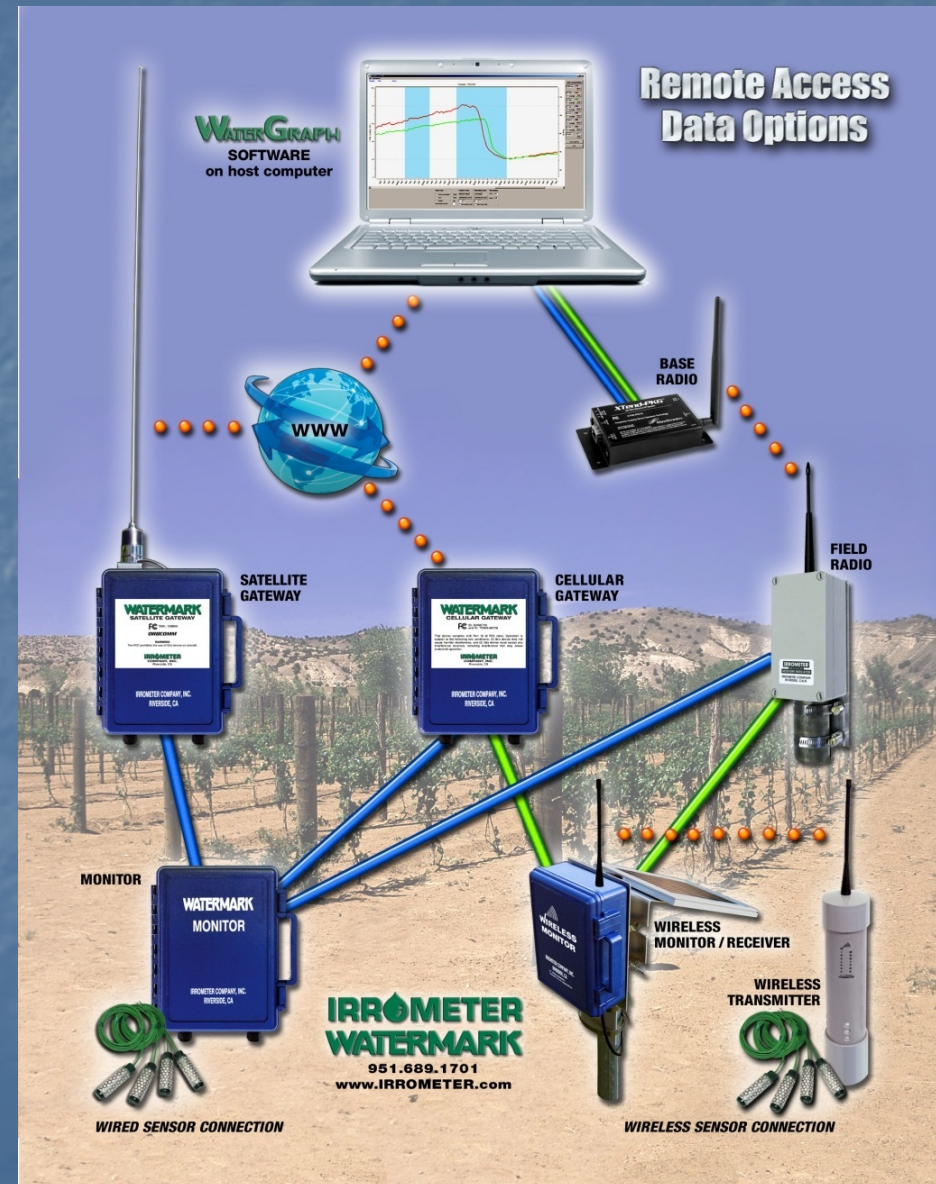
# Electronic Sensors for Remote Soil Moisture Monitoring

- Resistance-type
  - Irrrometer "WaterMark"
- Capacitance-type
  - Decagon Ech2o
  - Aquaspy probe
  - Sentek Enviroscan
  - Earthtec / Adcon EasyAg



# Wireless Communications

- Radio
  - Spread Spectrum
  - Licensed
  - Mesh
- Internet
  - WiFi, WiMAX, or other
- Cellular
  - GSM (T-Mobile, AT&T)
  - CDMA (Verison, Sprint)
- Satellite



# Decagon Em50G Cellular Modem



ECH<sub>2</sub>O EC-5







# Irrrometer 950T



# Watermark Sensors



**950R receiver**



**Raingage**



**Solar Panel**



**900M-CG  
cellular gateway**



2011



Init 1



Init 3

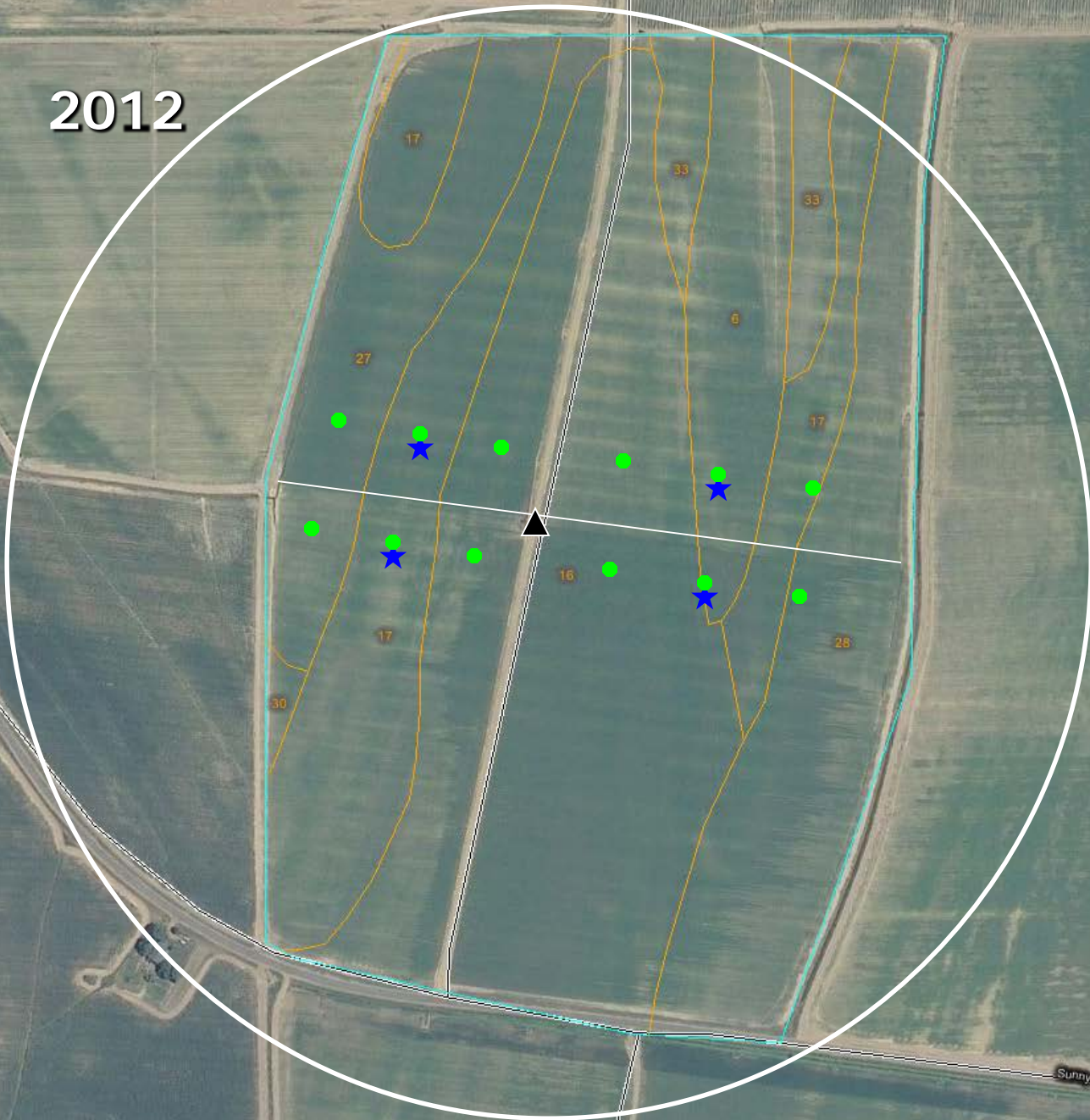


Init 2

0 300ft



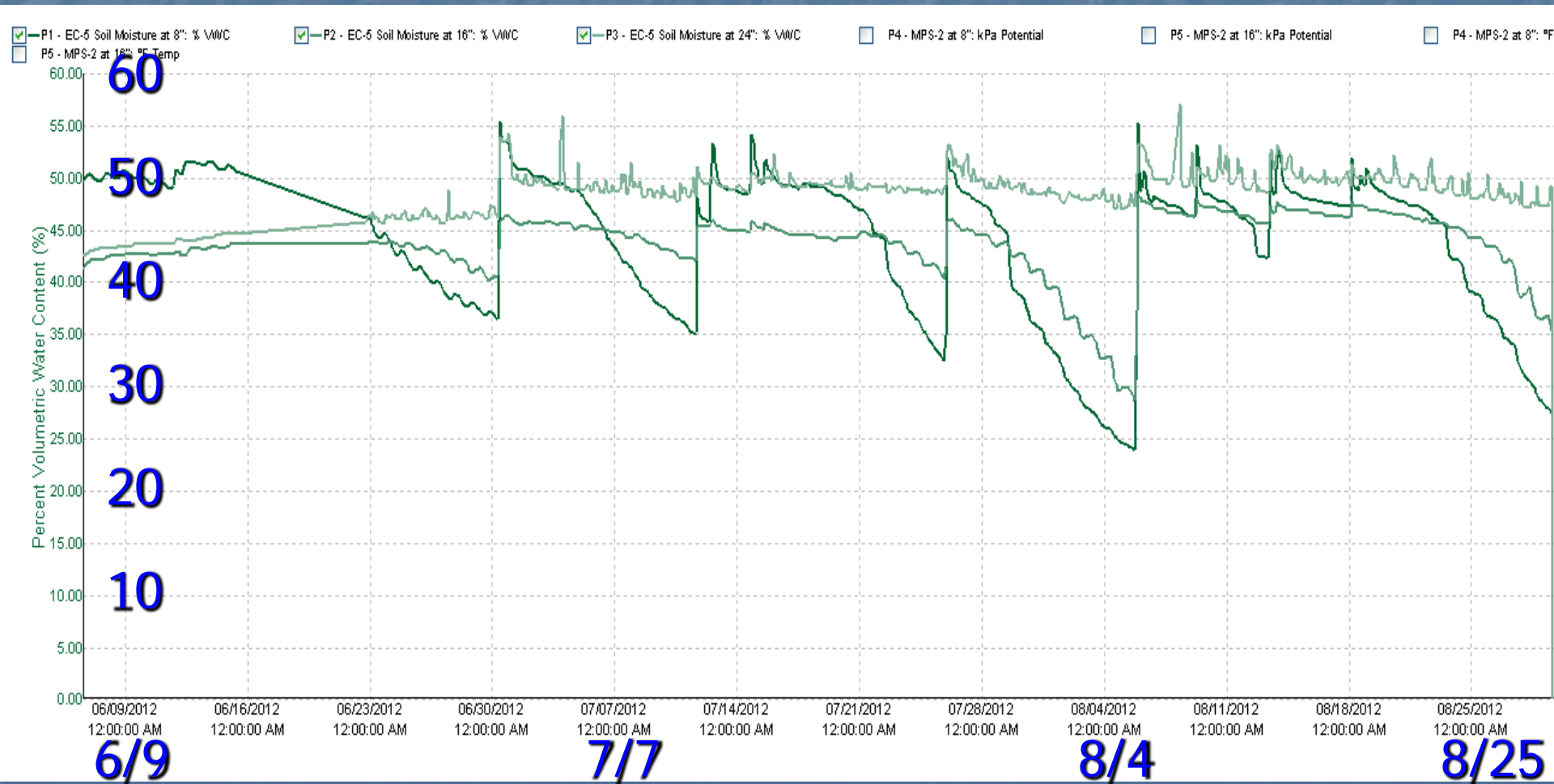
2012



Sunny Side Rd

Pleasantview Plantation Rd

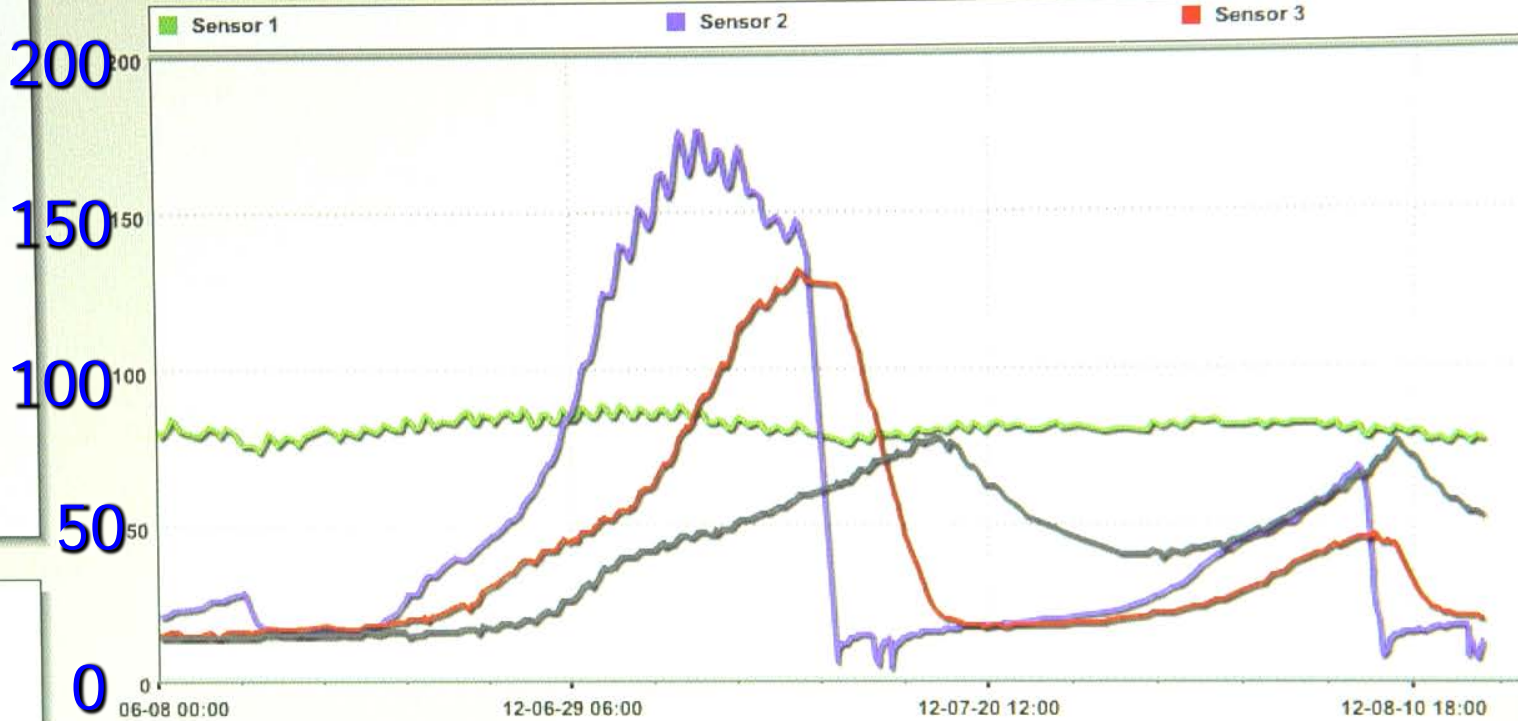
# Decagon EC-5 sensor VWC%



# IRROMETER

Range: 3 Months | From: 31 | Aug | 2012 | MinY: 0 | MaxY: 200 | Y2: 100 | Markers: Off

- Cotton Inc
- Cotton 950
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- Rain



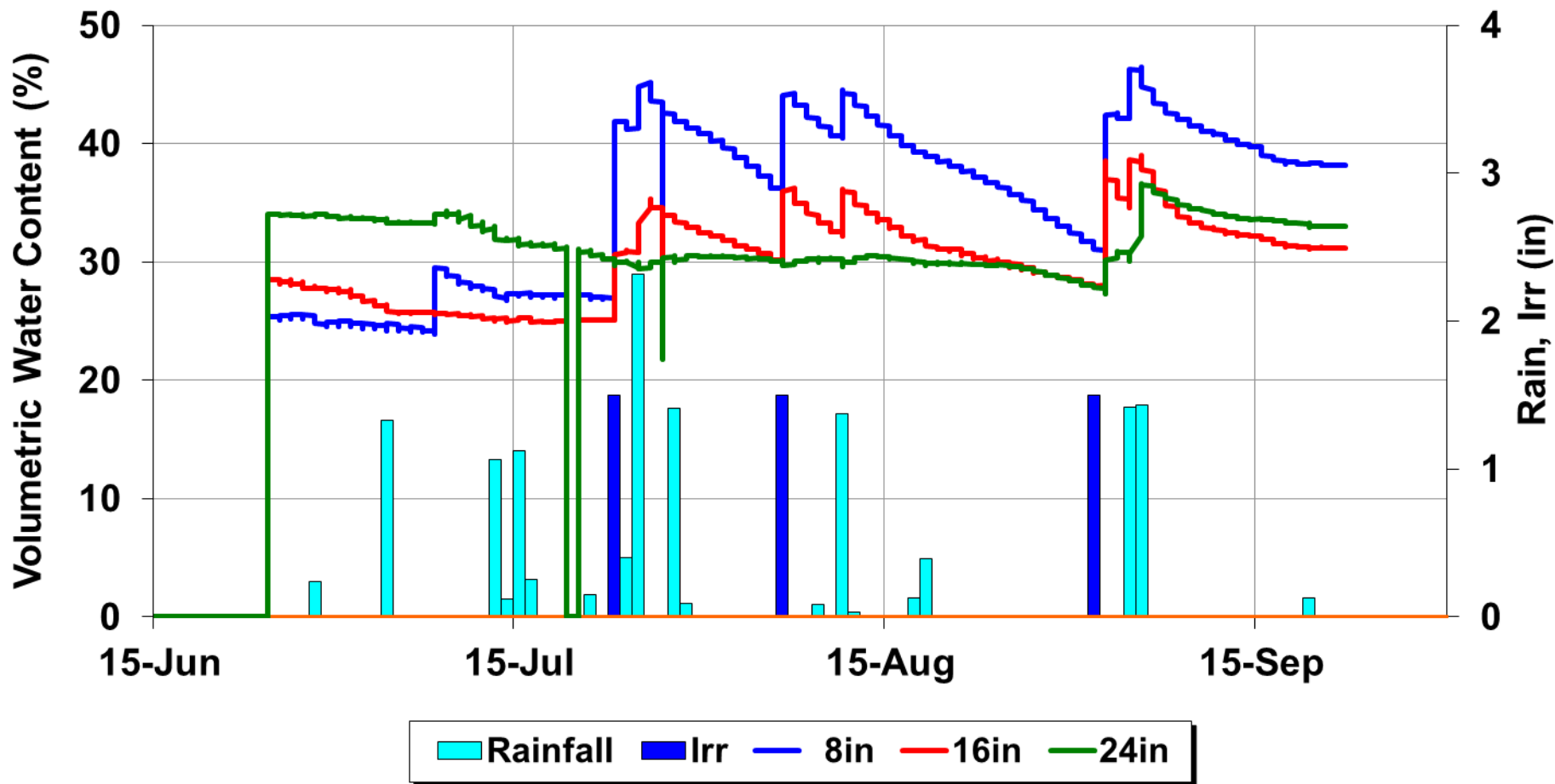
- [Manage Devices](#)
- [Manage Users](#)
- [Graph Defaults](#)
- [Interpreting the Data](#)
- [Log me out!](#)

6/8                      6/29                      7/20                      8/10

Last Download: 2012-10-26 07:41:34

Date Time	Sensor1	Sensor2	Sensor3	Sensor4	Sensor5	Sensor6	Sensor7
12-08-14 03:22	77	13	20	53			
12-08-14 01:17	77	10	20	53			
12-08-13 21:57	78	7	21	54			
12-08-13 19:07	78	9	21	54			

Site





# Results

- The wireless soil moisture systems worked reasonably well, but do need attention.
- The producer has become more comfortable with the data from both systems.
- The irrigation initiation demonstration indicates that later initiations on this deeper soil may save an irrigation without reducing yield.

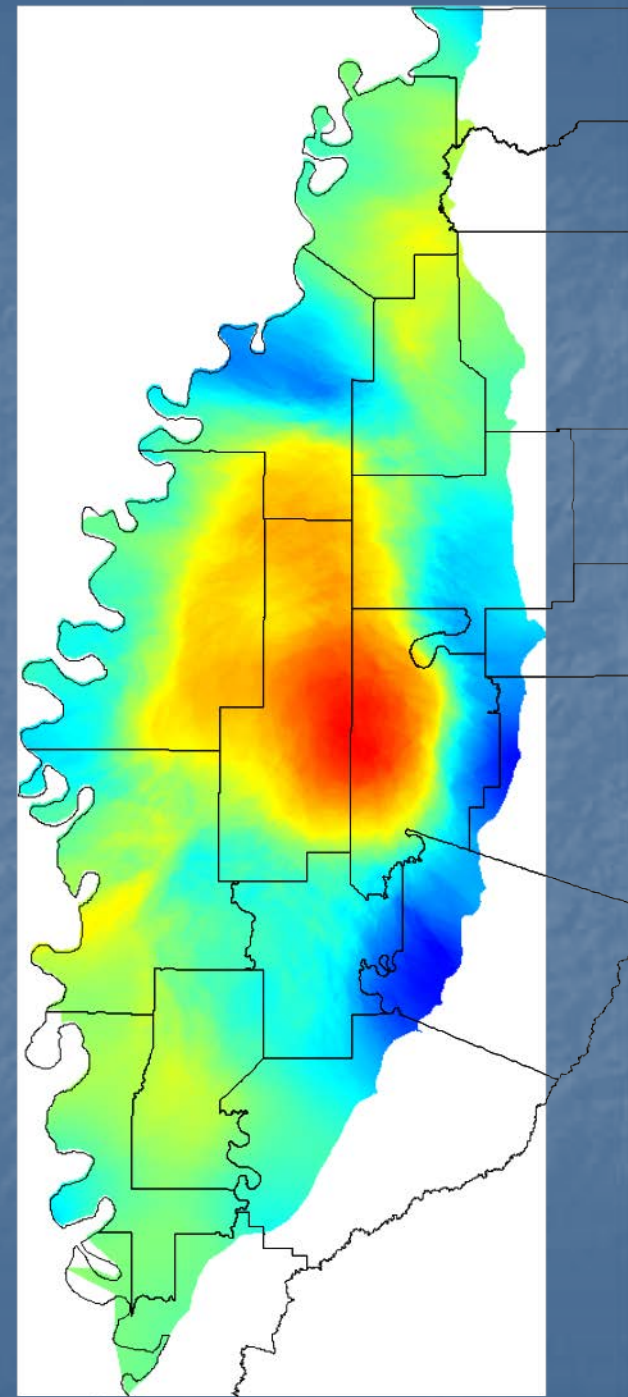
**Water use must change.**

**The alluvial aquifer will not support current irrigated acres and certainly not additional acres.**

**Managing and preserving our water supply protects and maintains our economy and land values.**

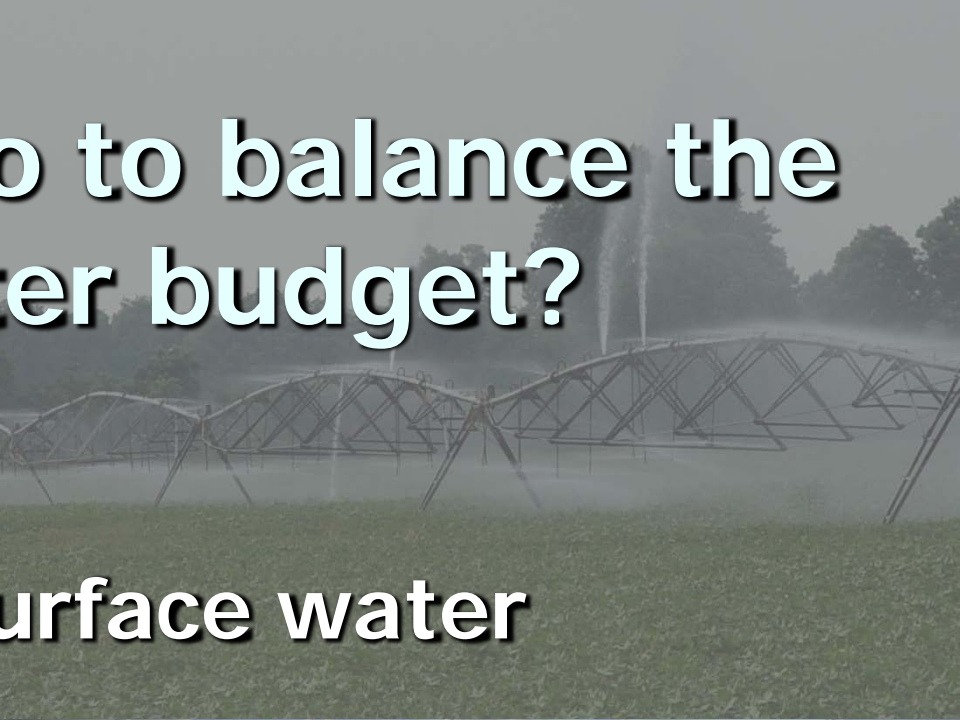
**The question is not if change will occur but how will we change.**

**YMD 2009**



# What can you do to balance the Delta's water budget?

- Use more surface water
- Conservation



# System Selection

**Furrow Irrigation**  
**60% Efficient**



**Sprinkler Irrigation**  
**80% Efficient**



**Drip Irrigation**  
**90% Efficient**



# Irrigation Scheduling

- Economically, maximize crop yields with the least amount of water.
- Timely application of adequate amounts of water to prevent "yield reducing" crop stress.

# Irrigation Conservation

- Reduction in water use of 10 to 20% will go a long way in balancing the Delta's water supply.
- The goal is to have adequate water available for all producers & users in the Delta.



**Questions?  
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