



Irrigation Management: Engineer's Perspective

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Watering vs Irrigating



Irrigation

A large center pivot irrigation system is shown in operation over a green field. The system consists of a central pivot point with multiple arms extending outwards, each supported by a series of wheels. The arms are connected to a network of pipes that deliver water to the crops. The field is lush and green, and the sky is overcast.

- 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



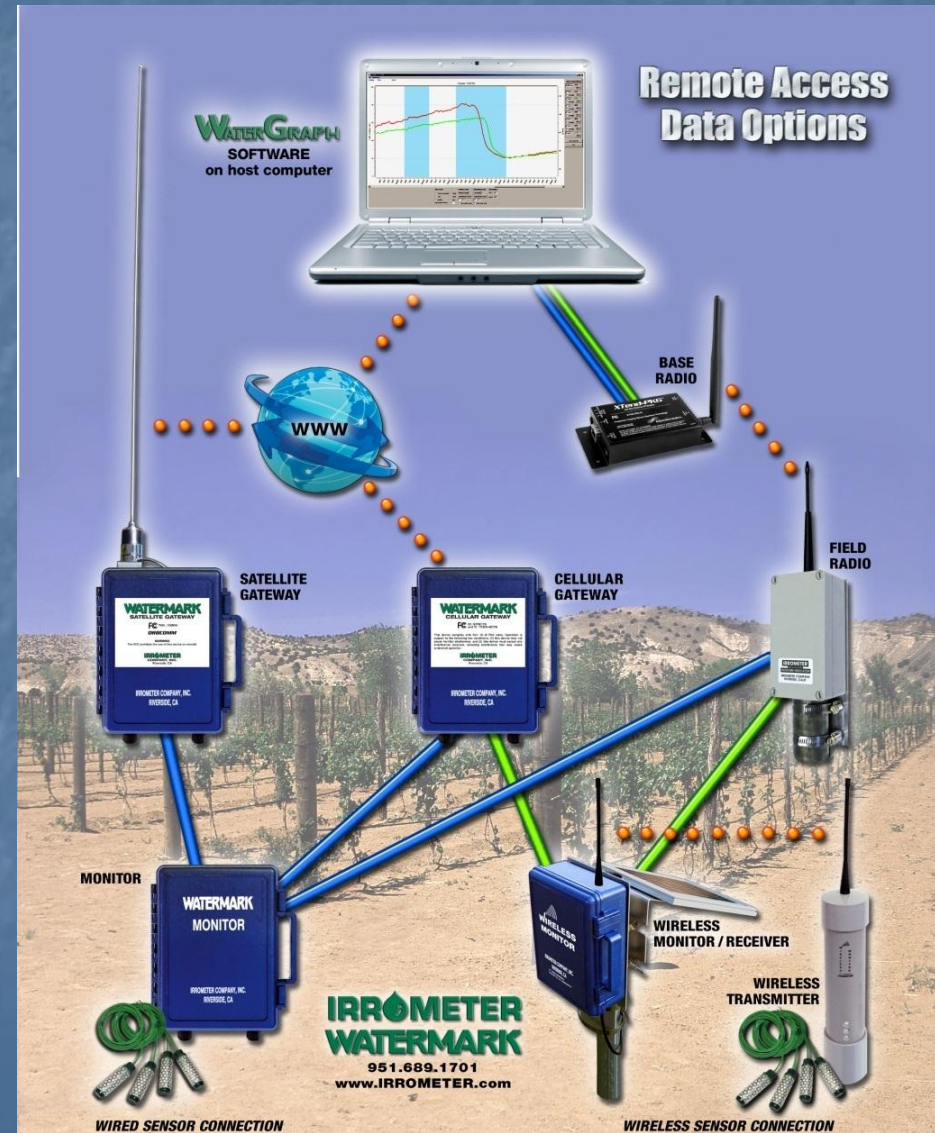
Electronic Sensors for Remote Soil Moisture Monitoring

- 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

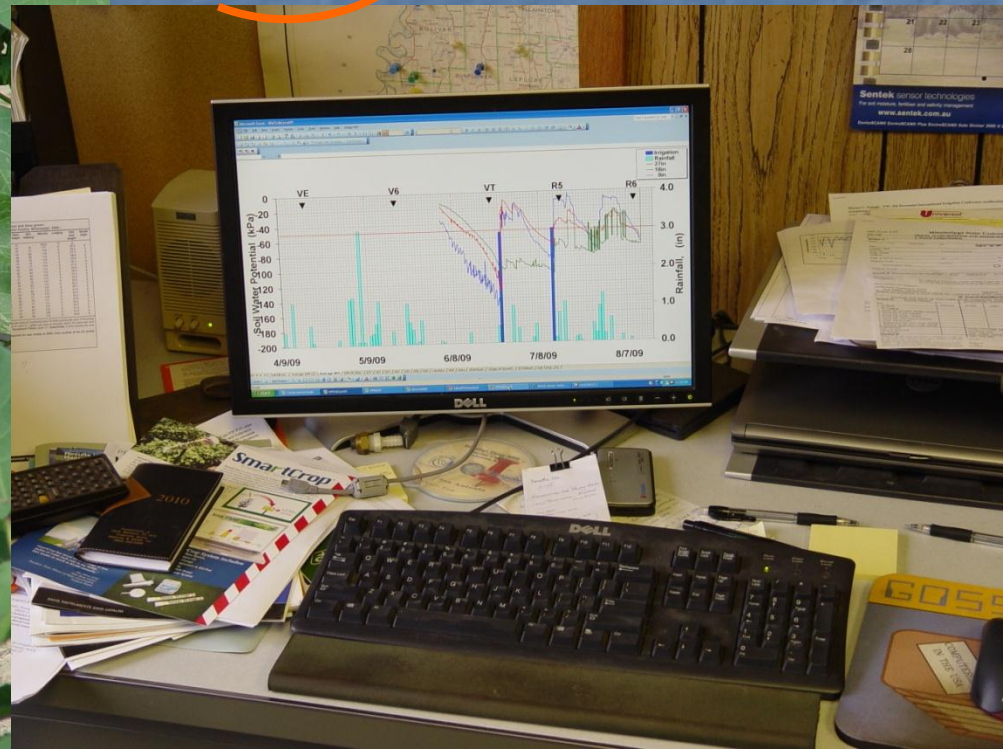


Decagon Em50G Cellular Modem



ECH₂O EC-5





Irrrometer 950T



Watermark Sensors



950R receiver



Raingage



Solar Panel



**900M-CG
cellular gateway**



2011

★
Init 1

★
Init 3

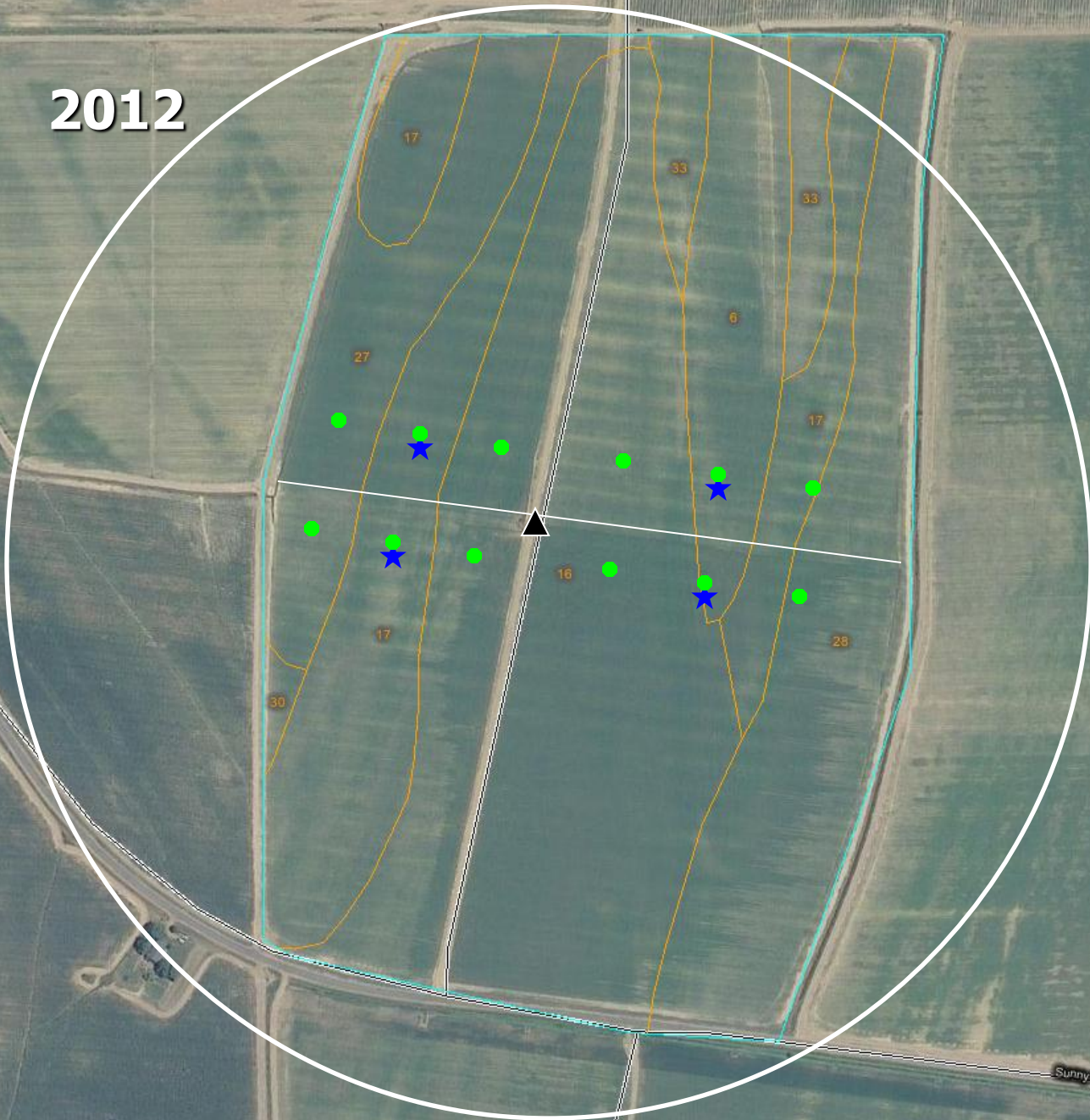
★
Init 2

0 300ft

↑
N



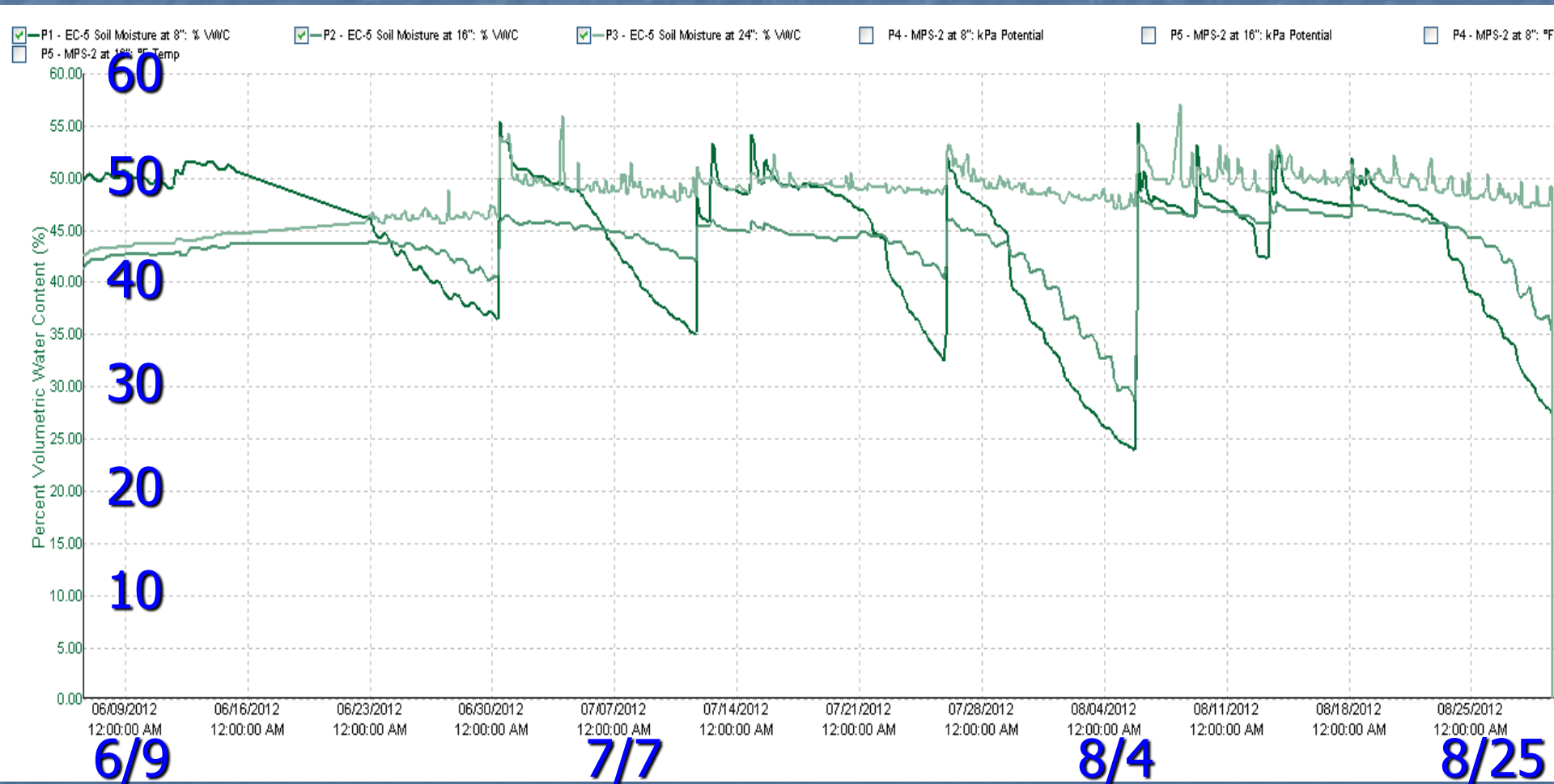
2012



Sunny Side Rd

Pleasant View Plantation Rd

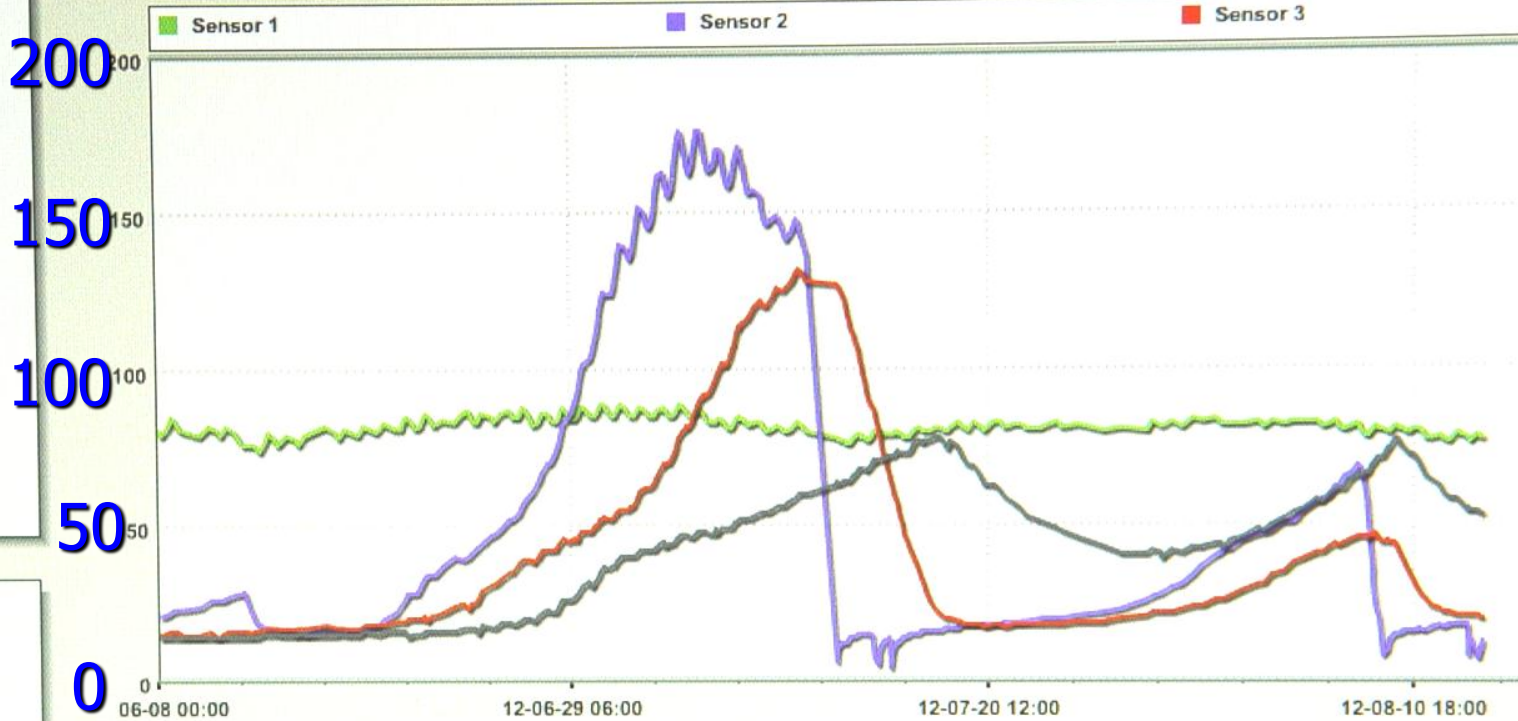
Decagon EC-5 sensor VWC%



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



06-08 00:00 | 12-06-29 06:00 | 12-07-20 12:00 | 12-08-10 18:00

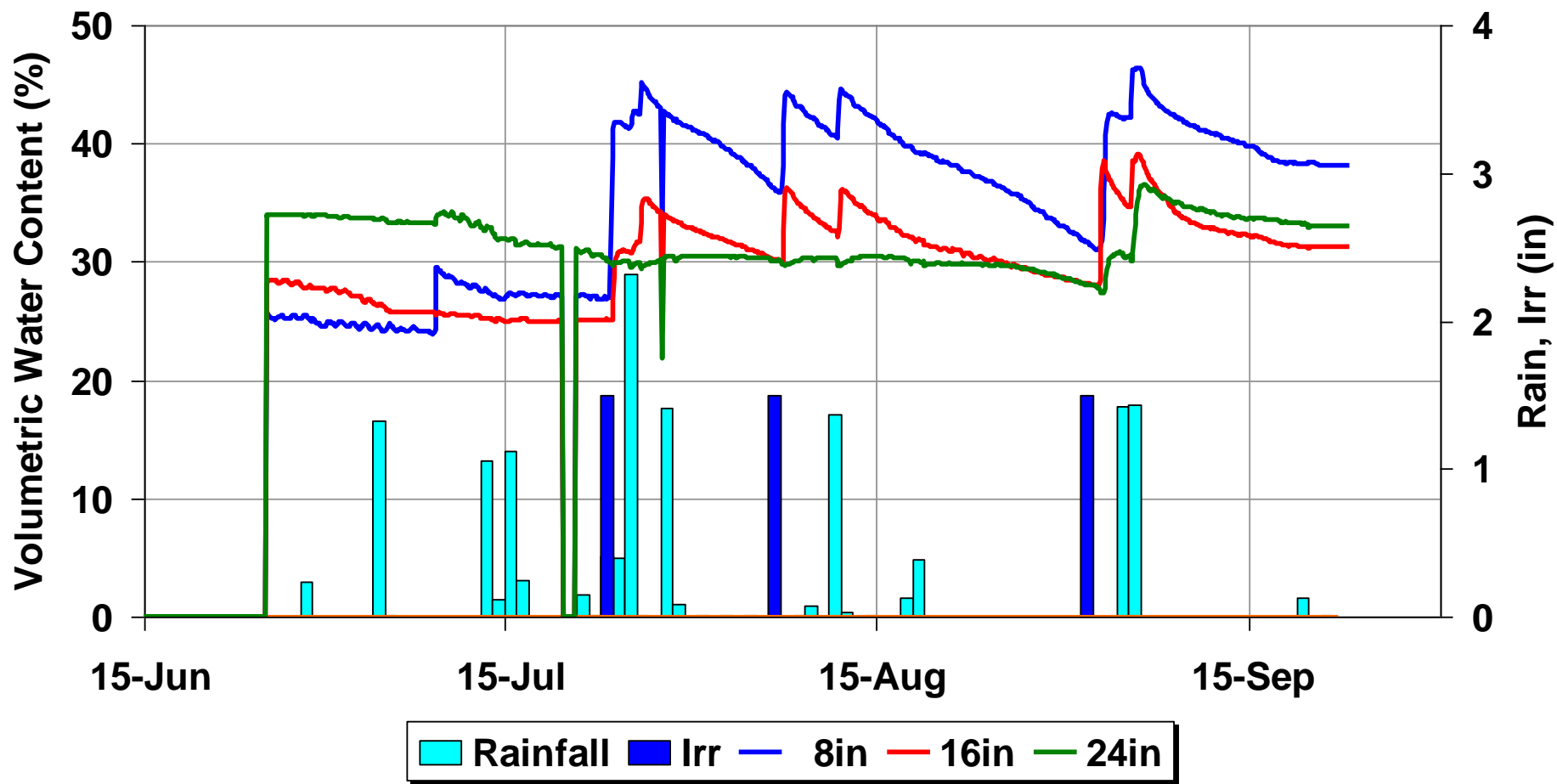
6/8 | **6/29** | **7/20** | **8/10**

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 18:07	78	9	21	54			

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

Site 3



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.

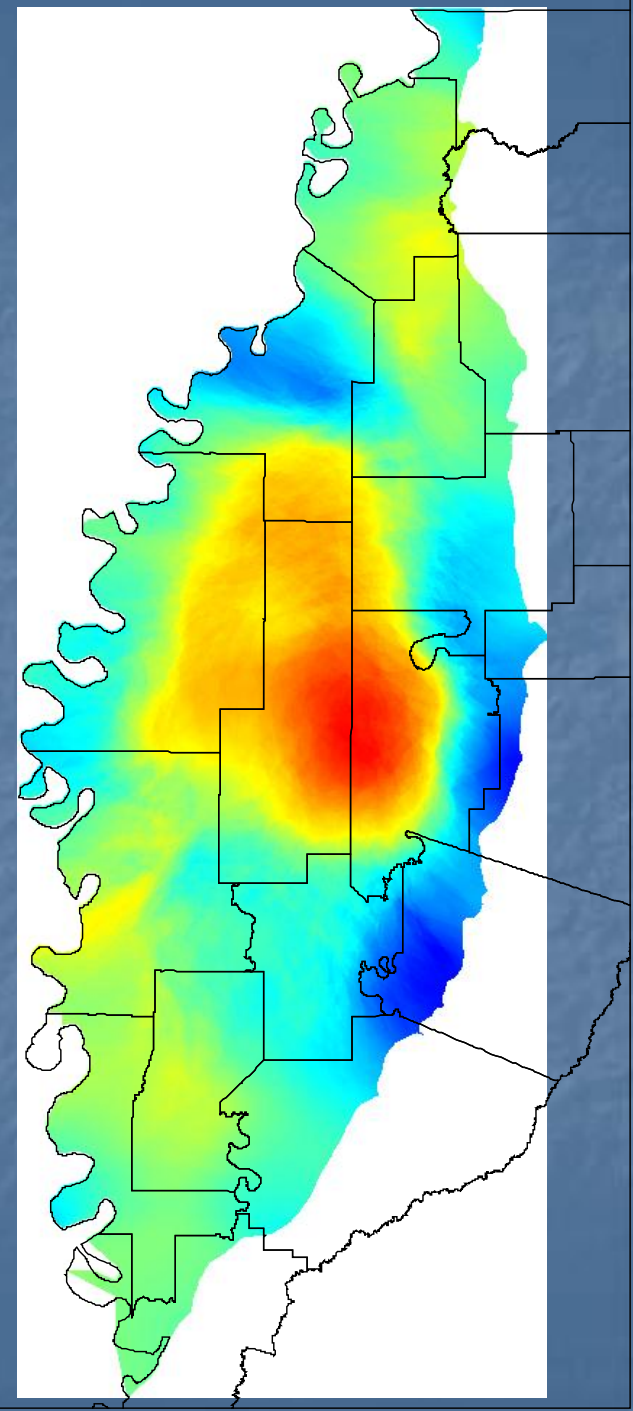
Water use must change.

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.

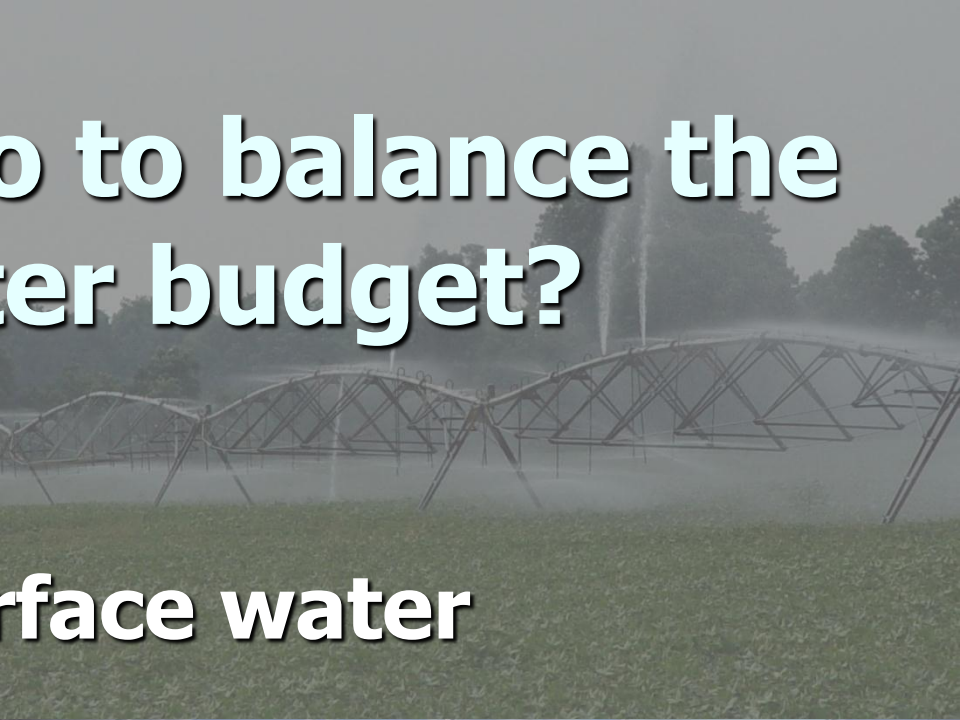
YMD 2009



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

- Use more surface water

- Conservation

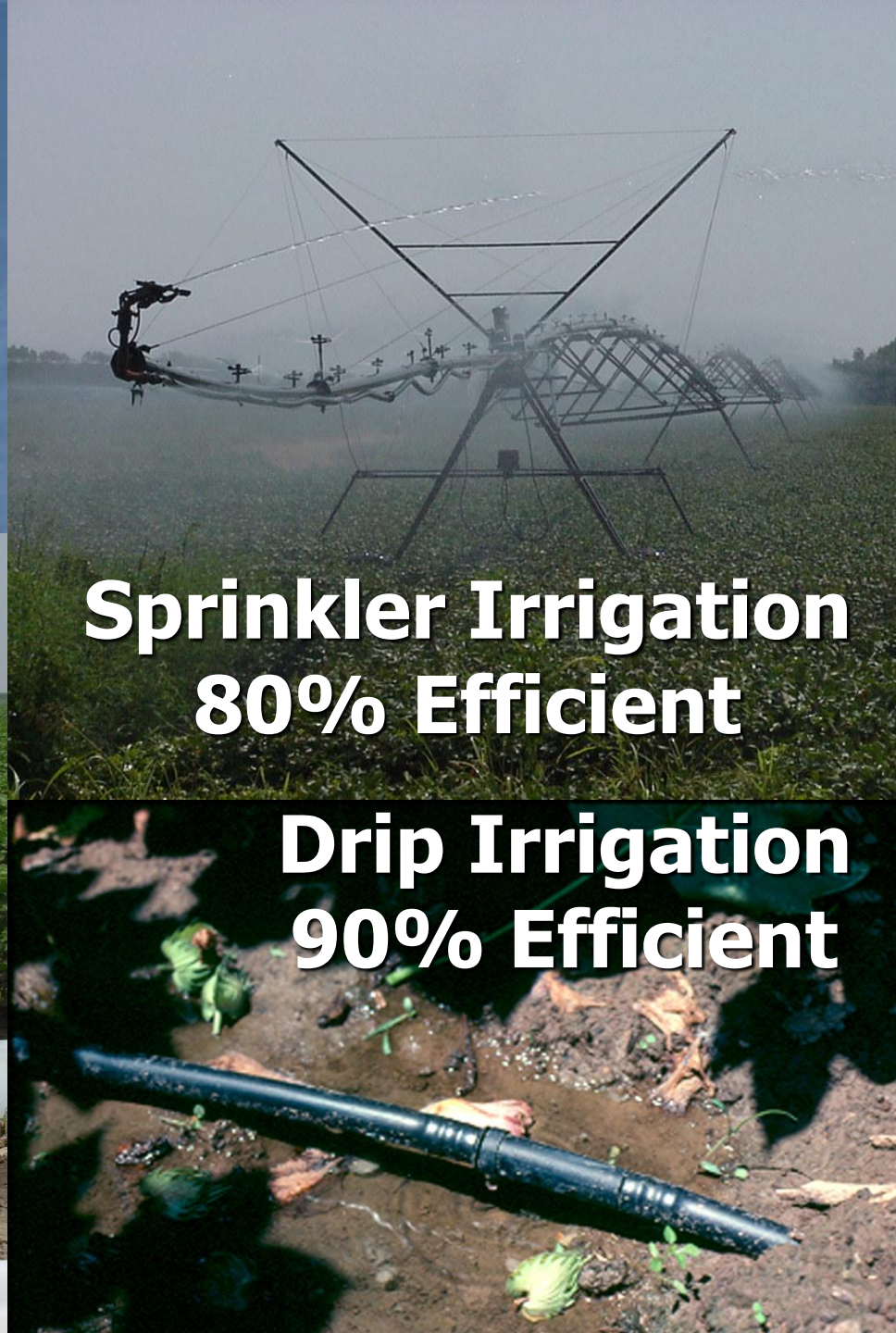


System Selection

**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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