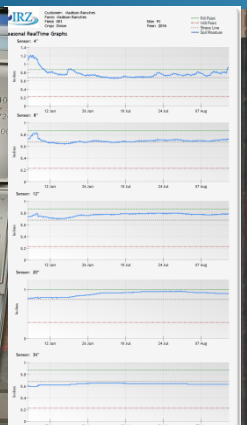
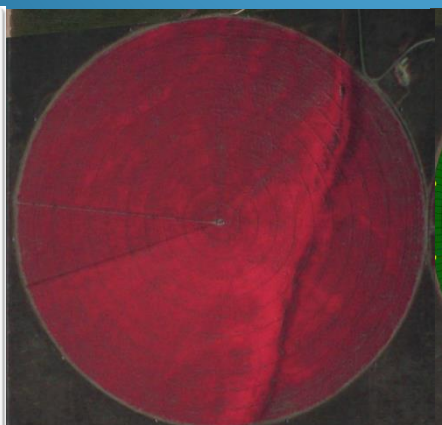
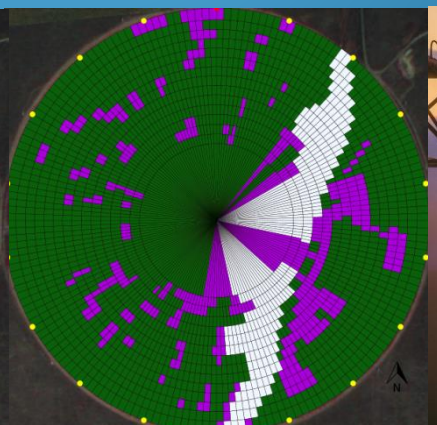
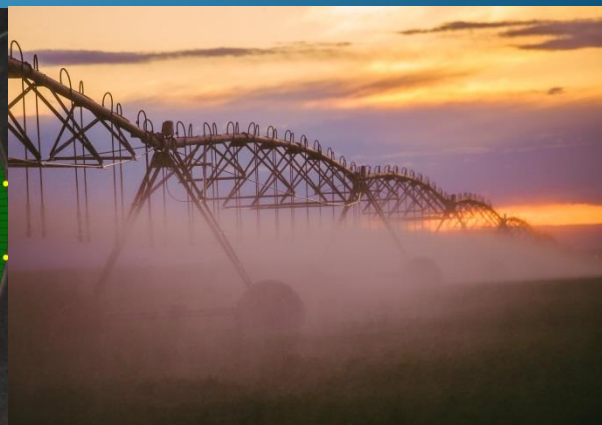
Modern Irrigation Efficiencies

What has driven farmers to be more efficient Irrigators?

- Ground water right curtailment.
- No additional withdrawals from the Columbia River.
- Conserved water rights allowed for new development.
- Operational cost/Economics.
- Expanded crop rotations.
- Consumer demand.

Low pressure drop tube sprinklers

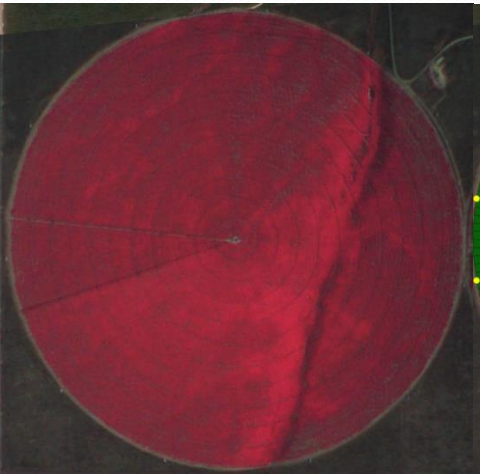
- Center pivot is the most common irrigation method in the basin. Has gone from 11.2 gpm pre acre overhead impact sprinklers requiring over 70 psi to low hanging nozzles requiring only 15 psi at the end of the pivot.
- These newer sprinklers also fight the wind better and hit the ground softer and sooner. Allowing for more of the pumped water to get into the ground.

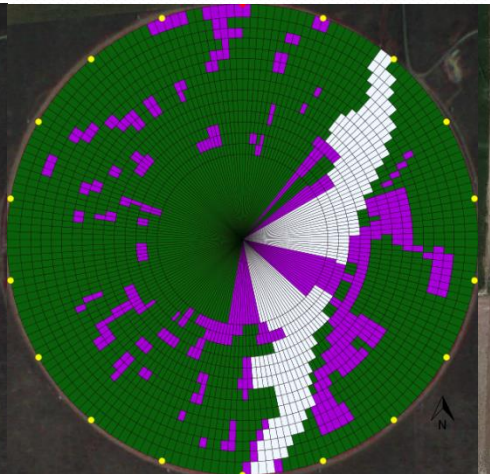
Center Pivot Drag hoses

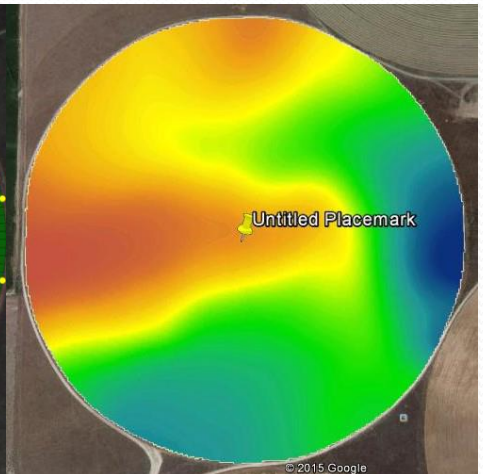
- Center pivots can be retrofitted to push water through small drag hoses. These hoses drag over the top of the crop or on the ground
- This eliminates much of the loss from wind or evaporation.
- Not a good choice for every crop. In onions for example, the drag hoses would spread diseases from one plant to another.

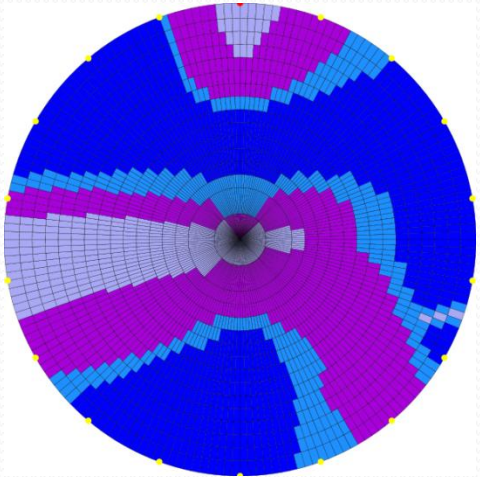
Variable Rate Irrigation

- Allows producers to write prescriptions for very small zones within a field.
- Helps to ensure that every acre of production is maximized by helping to control over watering or under watering.







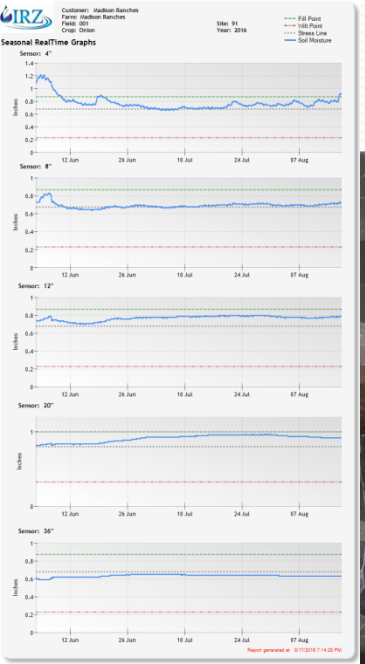


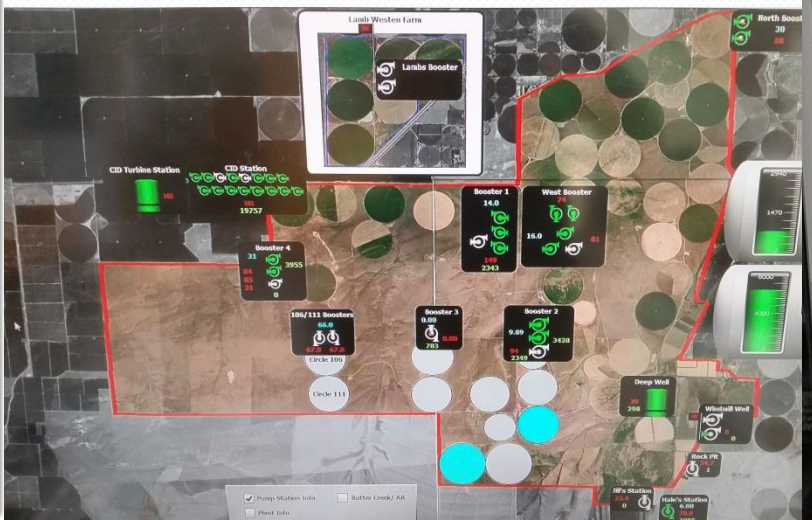
Sub Surface Drip Irrigation

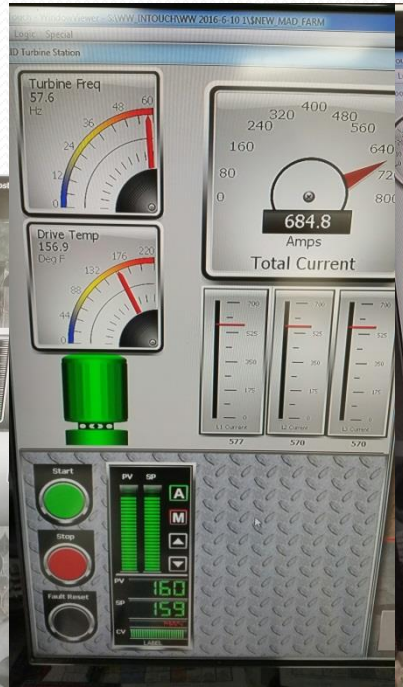
- Uses same volume of water as an overhead irrigated crop, but produces up to 30% more onions.
- Slow adoption due to significant start up cost ($1,200/acre) along with the struggle to find hand labor, and system maintenance.

Better Science and Tec

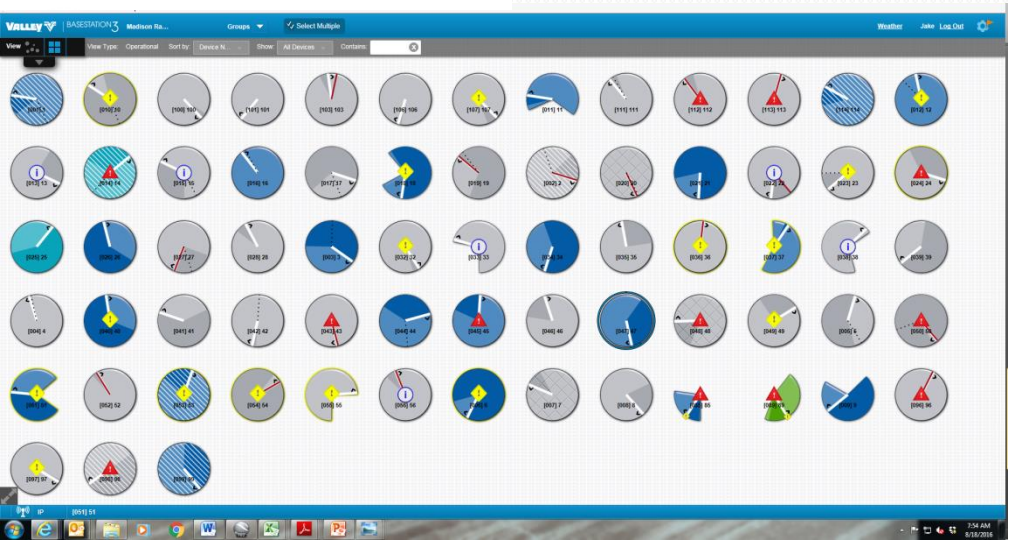
- Weather stations, real time probes, neutron probes.
- Soil samples and tissue samples for prescribed fertility.
- VFD, PLC, pressure transducers, fiber optics, & the internet.







Real time information allows for quicker more accurate decision making.



IRZ

Soil Moisture Monitoring Services For

Madison Ranches

RZ -Root Zone **AWHC** -Available Water Holding Capacity **SD** -Soil Deficit Date: 8/15/2016

Field Number	Crop	Soil Deficit In The RZ	Soil Moisture Percent In the RZ (% of AWHC)	Change In Moisture From Last Reading (Inches)	Change In Moisture From Last Reading (Percent)	Soil Deficit In The Top Foot (Inches)	Soil Moisture In Top Foot (% of AWHC)	Forecasted ET For Next 7 Days (Inches)	Inches Of Irrigation Next 7 Days To Get To FC	Inches of Irrigation Next 7 Days (85% Soil Deficit)	Water Applied Last Week In Inches (Irrigation + Rain)
1	Onions	1.4	59%	-0.3	-9%	0.8	53%	1.2	1.4	1.2	1.2
2	Onions	0.7	79%	-0.3	-9%	0.5	72%	1.2	0.7	0.6	0.2
3	Volunteer	2.0	65%	-0.1	-2%	1.0	47%		2.0	1.7	0.1
4	Alfalfa Seed							2.4			Sprayed
5	Winter Wheat	1.8	70%	0.0	0%	1.1	45%		1.8	1.5	1.2
6	Field Corn	0.0	100%	0.1	2%	0.0	100%	2.2	0.0	0.0	2.1
7	Alfalfa Seed	3.2	38%	-0.1	-2%	1.1	31%	2.4	3.2	2.7	0.2
8	Alfalfa Seed	2.4	51%	-0.1	-2%	0.8	50%	2.4	2.4	2.0	0.2
9	Alfalfa	2.0	56%	-0.4	-9%	0.8	47%	0.6	2.0	1.7	0.2
10	Stubble	2.9	46%	0.4	7%	1.0	44%		2.9	2.5	0.4
11	Seed Corn	0.0	100%	0.1	2%	-0.2	112%	2.2	0.0	0.0	1.4
12	Alfalfa	0.2	98%	1.8	33%	-0.3	117%	1.8	0.2	0.2	4.1
13	Volunteer	1.7	62%	0.0	0%	0.8	47%		1.7	1.4	0.1
14	Onions	1.4	60%	0.1	3%	1.0	47%	1.2	1.4	1.2	0.2
15	Winter Wheat	2.1	56%	0.0	0%	0.8	50%		2.1	1.8	0.4
16	Alfalfa	0.5	91%	1.2	21%	0.1	94%	2.4	0.5	0.4	2.5
17	Volunteer	0.8	86%	0.3	5%	0.1	95%		0.8	0.7	1.5
18	Onions	1.3	64%	0.0	0%	0.7	61%	1.2	1.3	1.1	0.0
19	Volunteer	0.9	82%	0.4	8%	0.1	93%		0.9	0.8	1.4
20	Alfalfa Seed	3.2	37%	0.0	0%	1.2	29%	2.4	3.2	2.7	0.1
21	Volunteer	2.4	50%	0.0	0%	0.9	44%		2.4	2.0	1.4
21-2	Seed Corn	0.8	85%	-0.4	-8%	0.2	89%	2.2	0.8	0.7	1.3
22	Alfalfa Seed	3.1	39%	0.1	2%	0.6	57%	2.4	3.1	2.6	1.6
23	Volunteer	2.3	52%	-0.1	-2%	1.0	38%		2.3	2.0	0.1
24	Field Corn	-1.1	120%	1.4	26%	-0.5	131%	2.2	-1.1	-0.9	1.6
25	Field Corn	1.3	76%	0.0	0%	0.3	84%	2.2	1.3	1.1	1.8
26	Alfalfa	2.2	55%	0.5	10%	0.3	80%	2.4	2.2	1.9	1.8
27	Pasture	1.0	71%	0.0	0%	0.5	69%	1.5	1.0	0.9	0.0
27-2	Seed Corn							2.2			Sprayed
28	Alfalfa Seed							2.4			Sprayed
32	Alfalfa Seed	4.0	31%	-0.1	-2%	1.2	33%	2.4	4.0	3.4	0.0
33	Alfalfa Seed	3.1	45%	0.1	2%	0.6	63%	2.4	3.1	2.6	1.3
34	Field Corn	1.7	67%	0.1	2%	0.5	71%	2.2	1.7	1.4	2.4
35	Volunteer	3.8	32%	0.0	0%	1.3	28%		3.8	3.2	0.0
36	Alfalfa Seed	3.2	41%	0.0	0%	1.1	42%	2.4	3.2	2.7	1.6

What Benefits continue to drive irrigation innovation and tec.

- Information Age.
- More accurate data leads to more profitable decision making ability.
- More accurate data leads to the best possible use of a limited resource.
- Without good data, we are operating under our best guess.
- With the current ag economy the difference between a successful farm and a sinking farm is the ability to make real time decisions and adapt to them quickly and effectively.

Questions

Thank you for your time.

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