Programmable Irrigation & Fertigation

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OpenFarm

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Collaborators: PowWow Energy, WHCC, and UCSB

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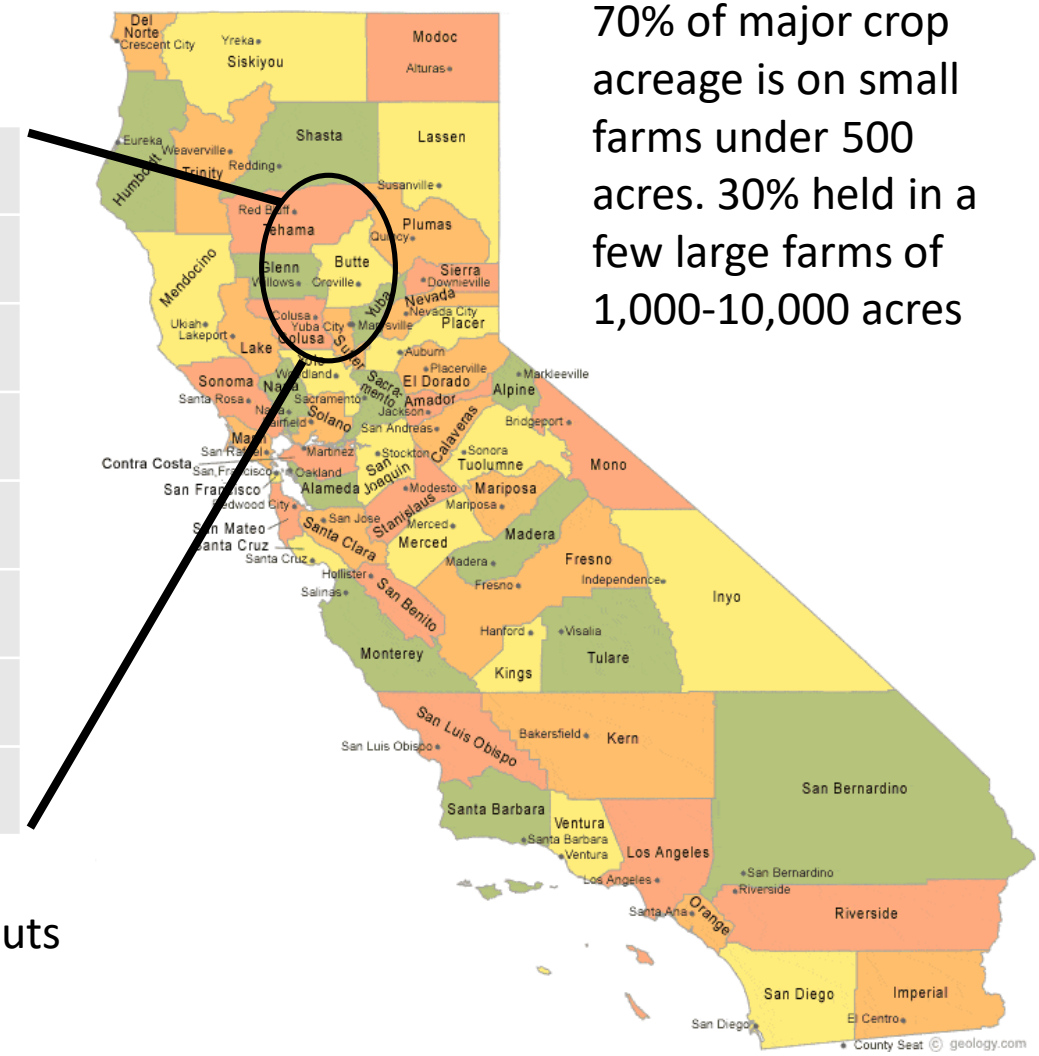
Co-PI for DAC: Terry Brase (WHCC)
Co-PI for M&V: Dr. Geyer (UCSB)

Market is fragmented (ex: Chico region)

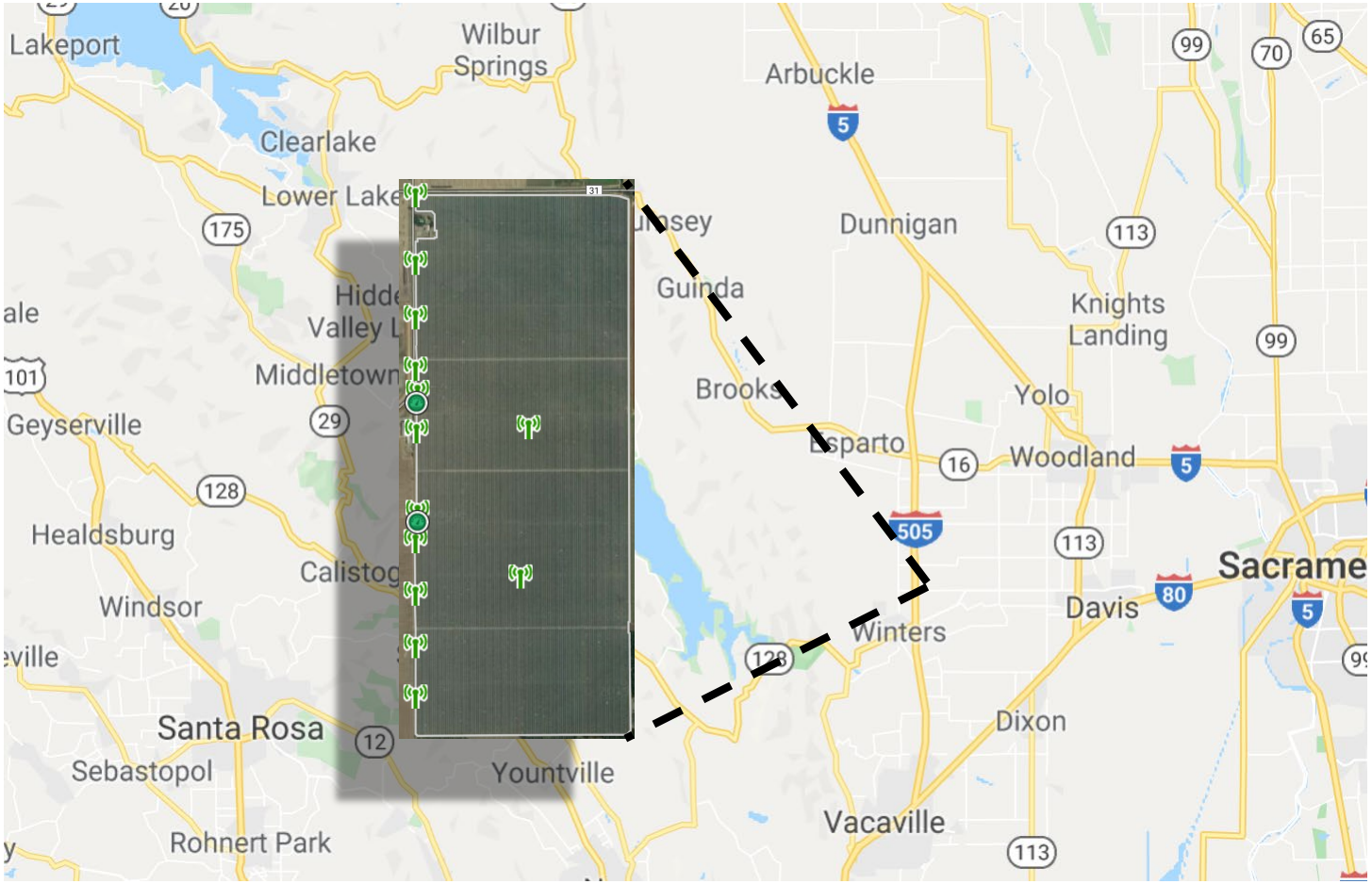
County	Top-3 Crop Acres
Butte	198,675
Colusa	215,691
Glenn	168,811
Sutter	136,937
Tehama	50,226
Yuba	63,695
Grand Total	834,035



70% of major crop acreage is on small farms under 500 acres. 30% held in a few large farms of 1,000-10,000 acres

Top 3 crops: Rice, Almonds, and Walnuts

Example: 15,000 acre farm experimenting with automated 388-acre almond orchard



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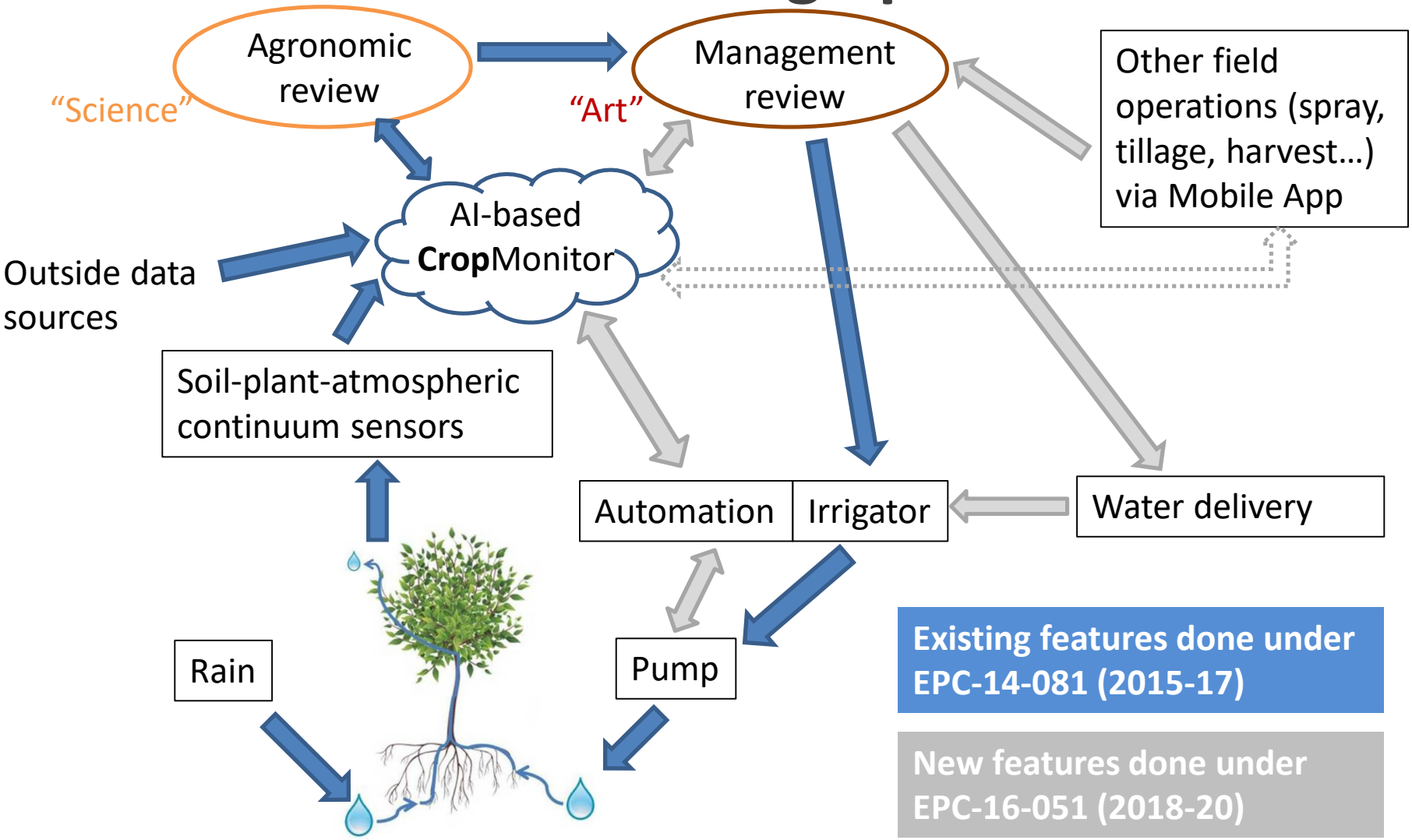
Where does programmable irrigation fit within the farming operation?



Work done under contract EPC-16-051

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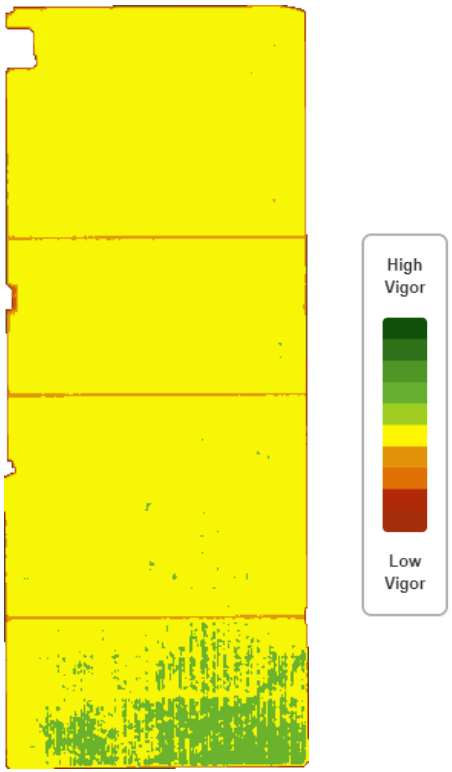
Effect of rainfall on orchard with a slope

Image of flooded field near Davis after rain early in the season (near bloom)



Vigor across field at harvest in 2018 from aerial pictures

Team working on the project near Davis

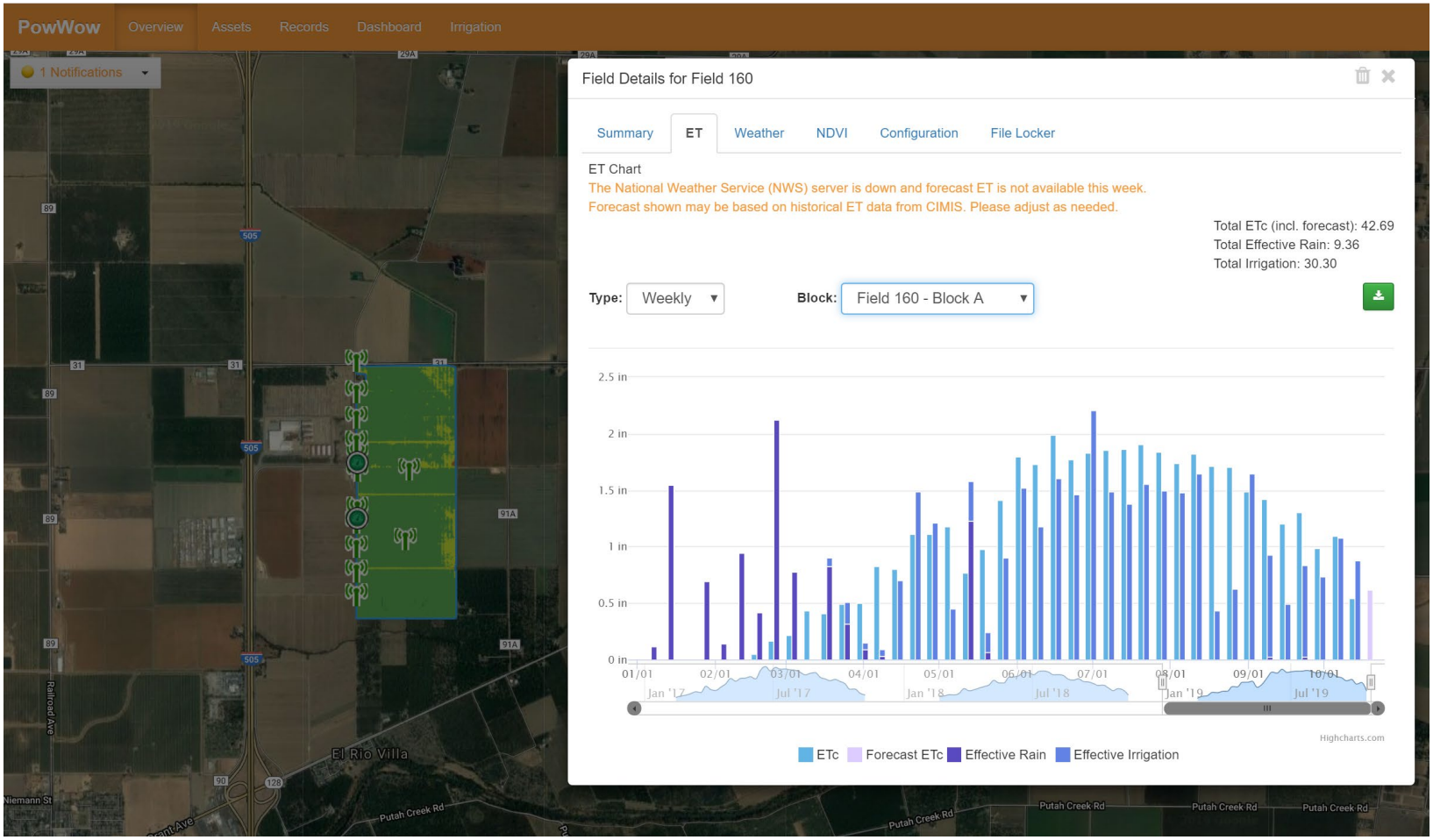
VANN FAMILY ORCHARDS

PowWow

WiseConn

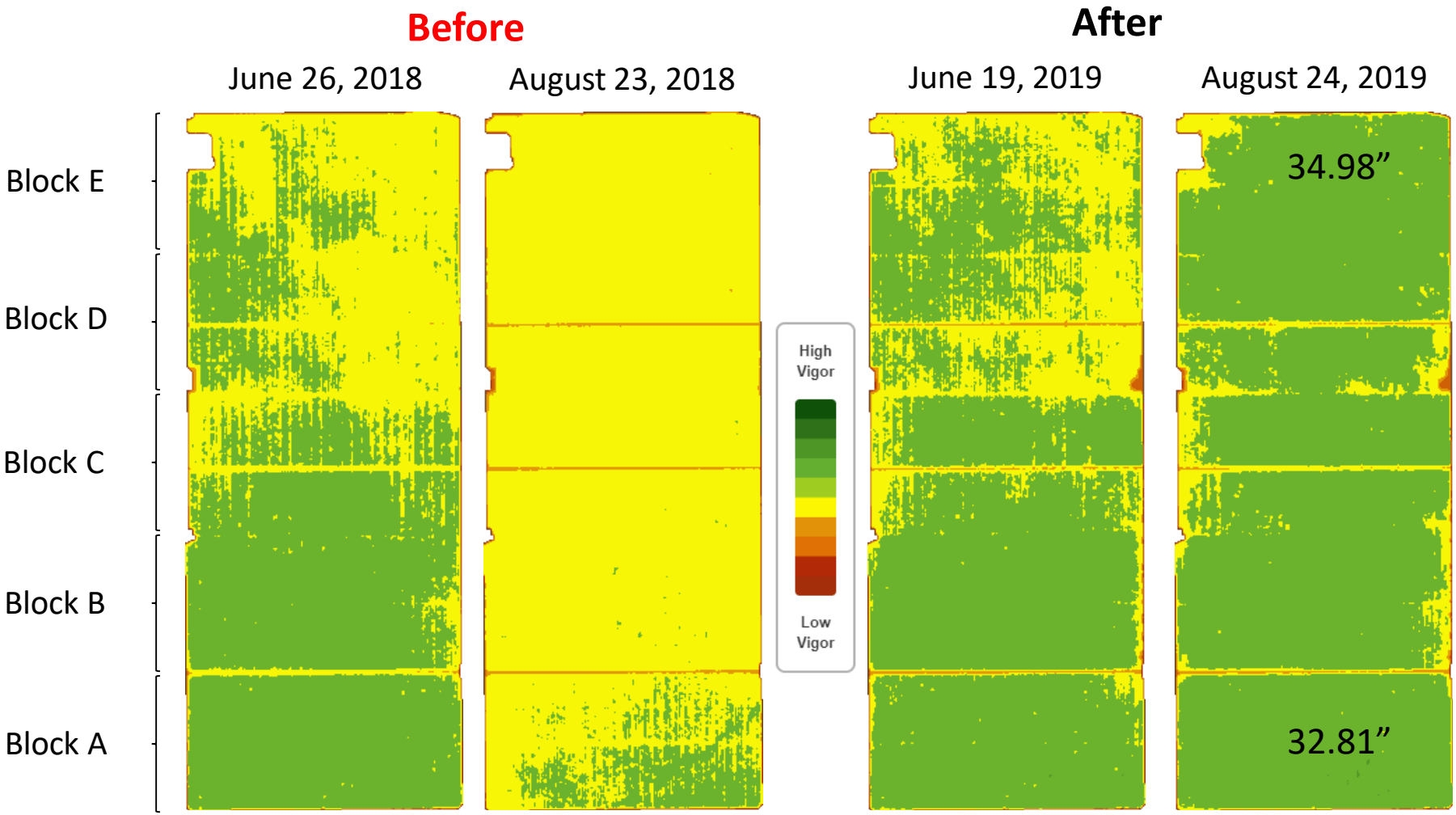
UCSB
UNIVERSITY OF CALIFORNIA
SANTA BARBARA

Screenshot from software dashboard



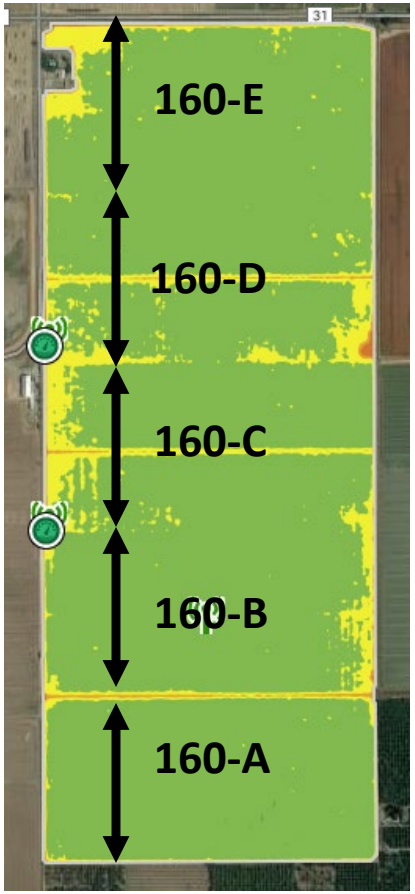
Water savings: Applied water is 21% less than crop ET. Each block is irrigated differently.

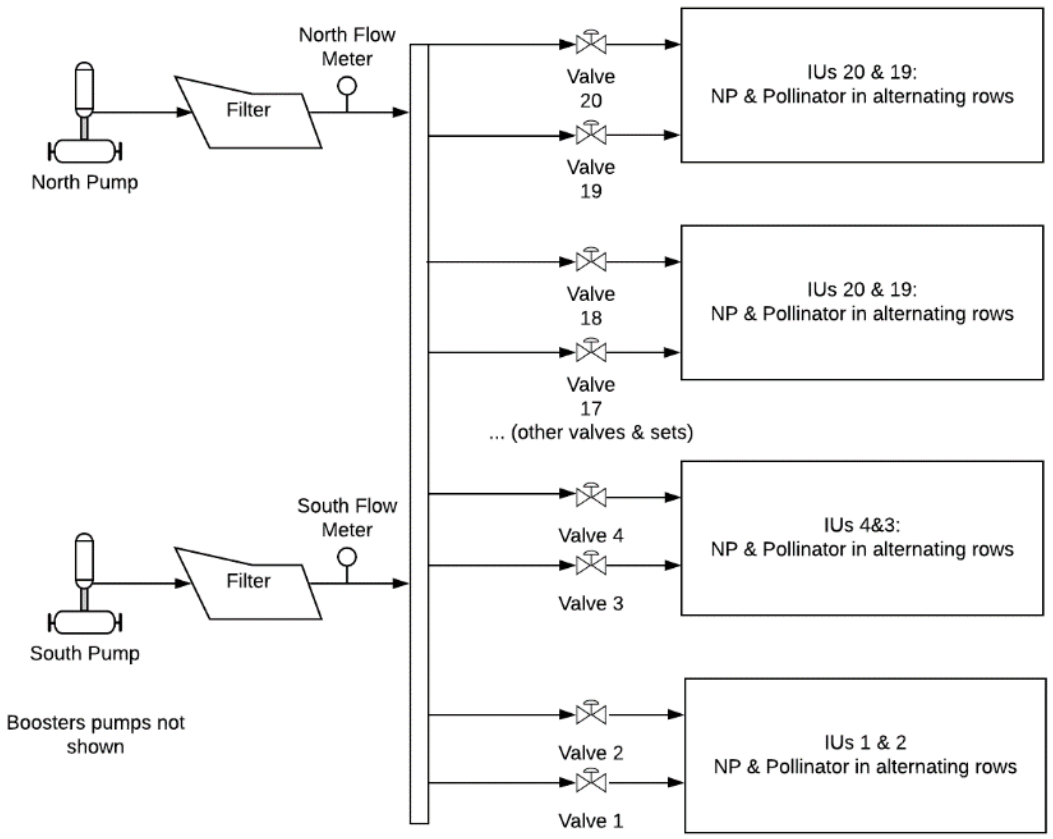
Impact of project on almond orchard



Vigor uniformity dramatically improved. Water applied on Block E is 7% more than on Block A.

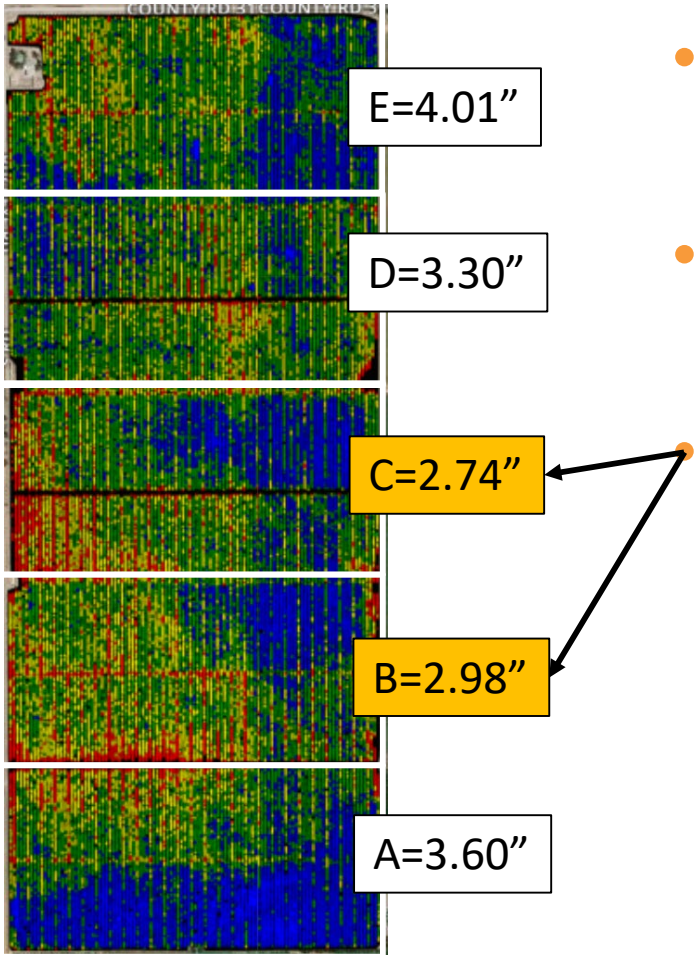
Integration is not easy: 20 irrigation units





Overall there are 20 Irrigation Units controlled by individual valves to irrigate by plant variety or soil zone. The opening/closing of valves is staggered to maintain pressure.

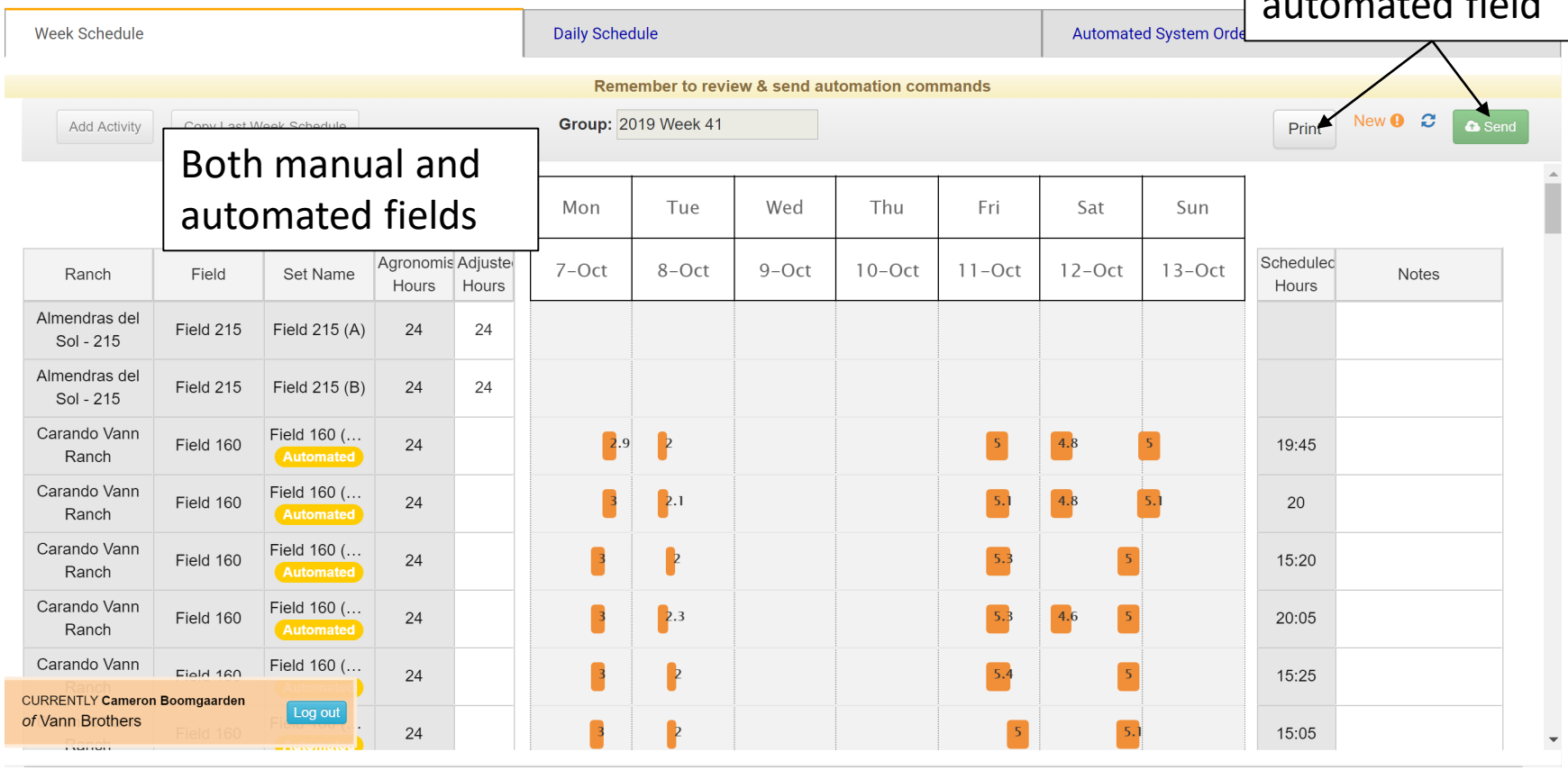
Transition to automation can be difficult



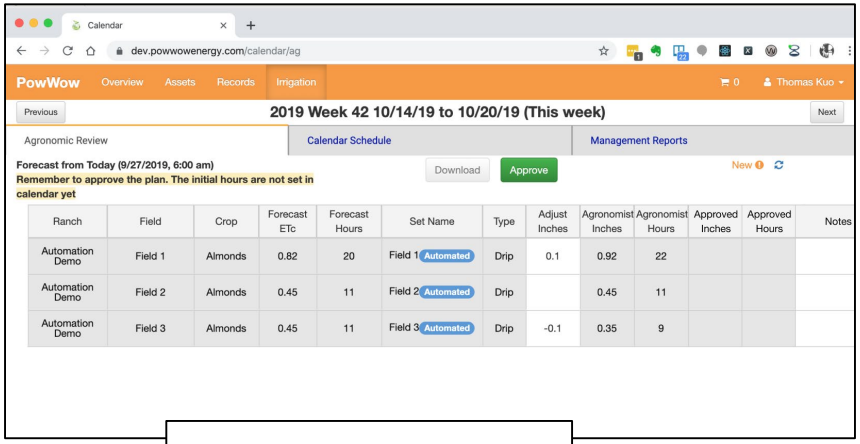
- This image illustrates water stress on 6/14
- …and irrigation totals for 3 weeks prior
- Some blocks were shorted (B & C) while moving from manual to automation (weeks of 5/27-6/10)

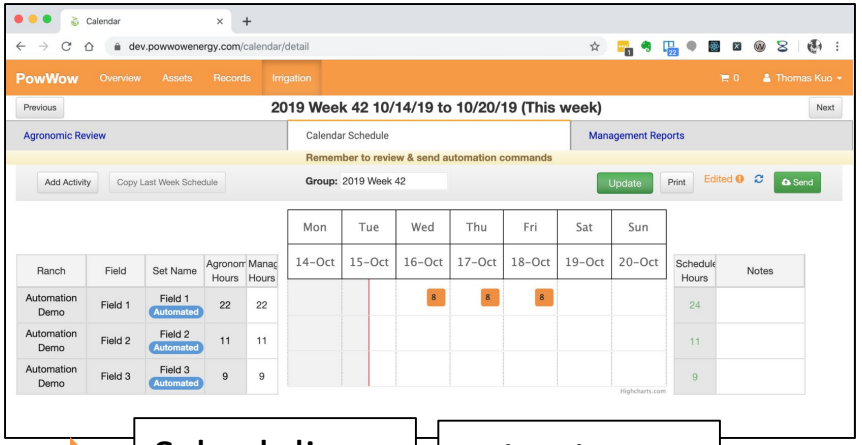
Farming operation will change gradually

Print a work order or load schedule to automated field



CropMonitor's irrigation workflow





Agronomic review feeds into…

Scheduling by manager

Irrigation events…

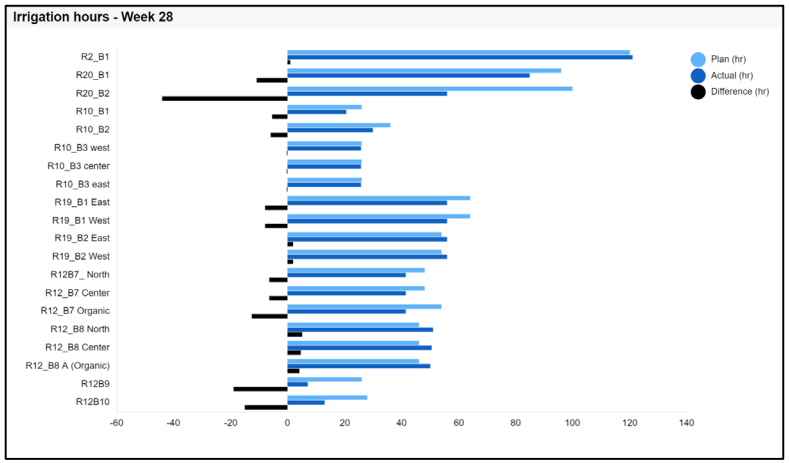
Accuracy report for Agronomist

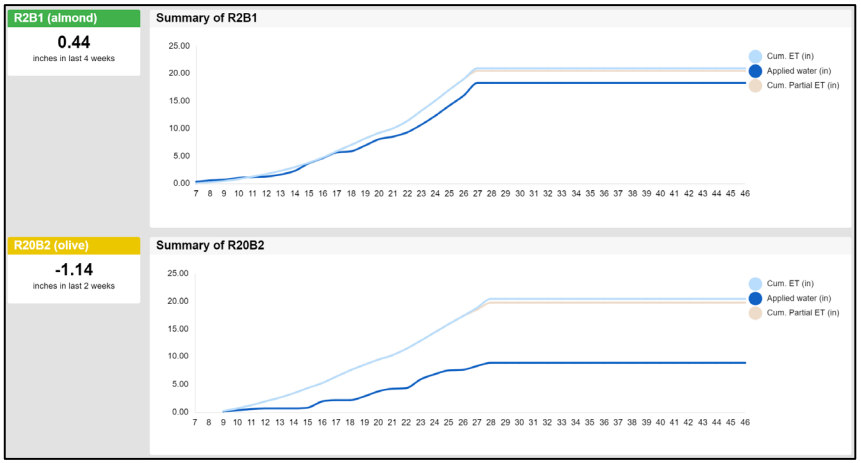
Precision report for management

Precision and accuracy reports

Precision (hours) – are we following the plan?

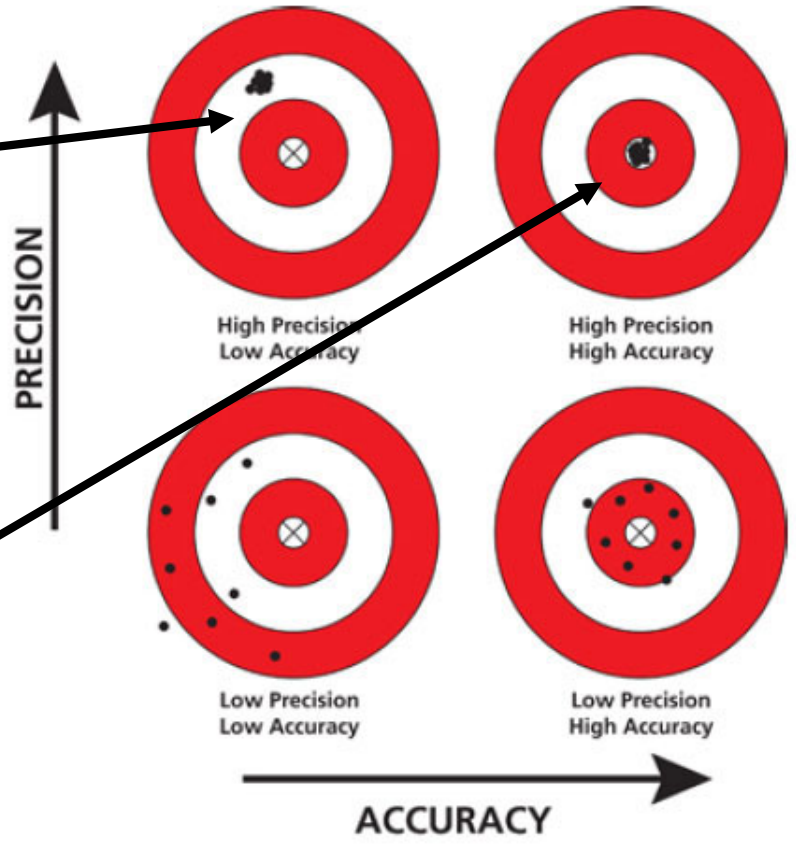
Accuracy (inches) – are we meeting the crops needs?





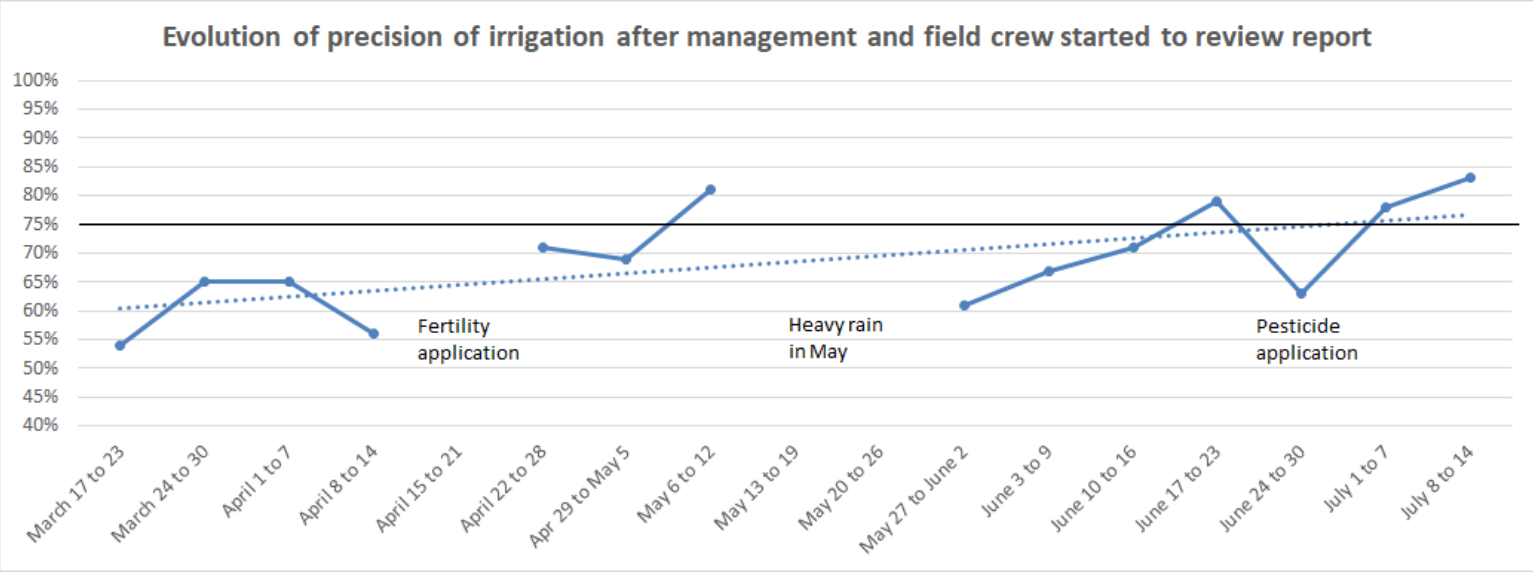
Precision vs Accuracy in irrigation

- **Precision** – A farm must be able to follow a plan (tight cluster)
- **Accuracy** – Feedback from sensors and yield data help accurately tune the plan (bullseye) for the most “crop per drop”



Precision: value for farms large and small

- Precision report is not just for large farms: it triggers important conversations with smaller organizations to improve farming practices and gain efficiency in the future (example below)
- Farms with extensive automation will still benefit from precision reporting: irrigation events are paused/canceled in the field
- **All farms** benefit from greater visibility within the organization



Answers, not just data

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