

Madera County Water and Natural Resources

MAWA IrriWatch

December 16, 2020

Via Zoom



MAWA Presentation
December 16, 2020

Presentation Outline

- Explain the difference between
 - IrriWatch as the GSA measurement system
 - IrriWatch as an irrigation management tool for farmers
- Steps to Enroll
- Misconceptions
- Questions

Q&A/Discussion Following Each Topic
Questions Welcome Any Time

Presentation Outline - Optional for those who may have missed November meeting

- Surface Energy Balance Algorithm for Land (SEBAL)
- SEBAL validation
- Root zone water balances

**Q&A/Discussion Following Each Topic
Questions Welcome Any Time**

IrriWatch Training Schedule

- November 6, 2020 – SEBAL and root zone water budget
- December 16, 2020 – Enrollment workshop with MAWA
- January 20, 2021 – IrriWatch set up and use
 - Explain the data portal, including how to register, log in, define parcels, assemble farm units and set allocations.
 - Explain how to read and interpret available data
 - Describe how IrriWatch determines the irrigation status of a field
 - Describe how to view ET_{aw} versus allocation
- Mid/late summer 2021 – IrriWatch feedback and comparison to field measurements
 - Listen to feedback
 - Respond to questions
 - Discuss comparisons with field measurements.
 - Discuss relationships between AW, ET and ET_{aw} for selected fields

IrriWatch as the GSA Measurement System



IrriWatch Tracks ET for GSA

- SGMA requires groundwater basin to be sustainable (water inflows = water outflows over 50 years of average hydrology)
- Currently water outflows are greater than water inflows
- Solution
 - Increase inflows—Recharge program
 - Decrease outflows (ET), *IrriWatch tracks ET*
 - Sustainable Ag Land Conservation (SALC) program
 - Demand Management

IrriWatch ET Calculations

- **Surface Energy Balance Algorithm for Land (SEBAL)**
- **Daily calculation based on data**
 - Remotely sensed
 - Ground-based
- **Calculated for each approximately 33 foot by 33 foot square area of the field**
- **Crop information not needed**
- **Irrigation method information not needed**

GSA ET Tracking Program (Under Development)

- GSA staff review IrriWatch reports on
 - ET
 - ET of applied water
- Late July/early August GSA alerts growers that are on pace to exceed allocation.
- At end of season GSA sends ET report to all growers

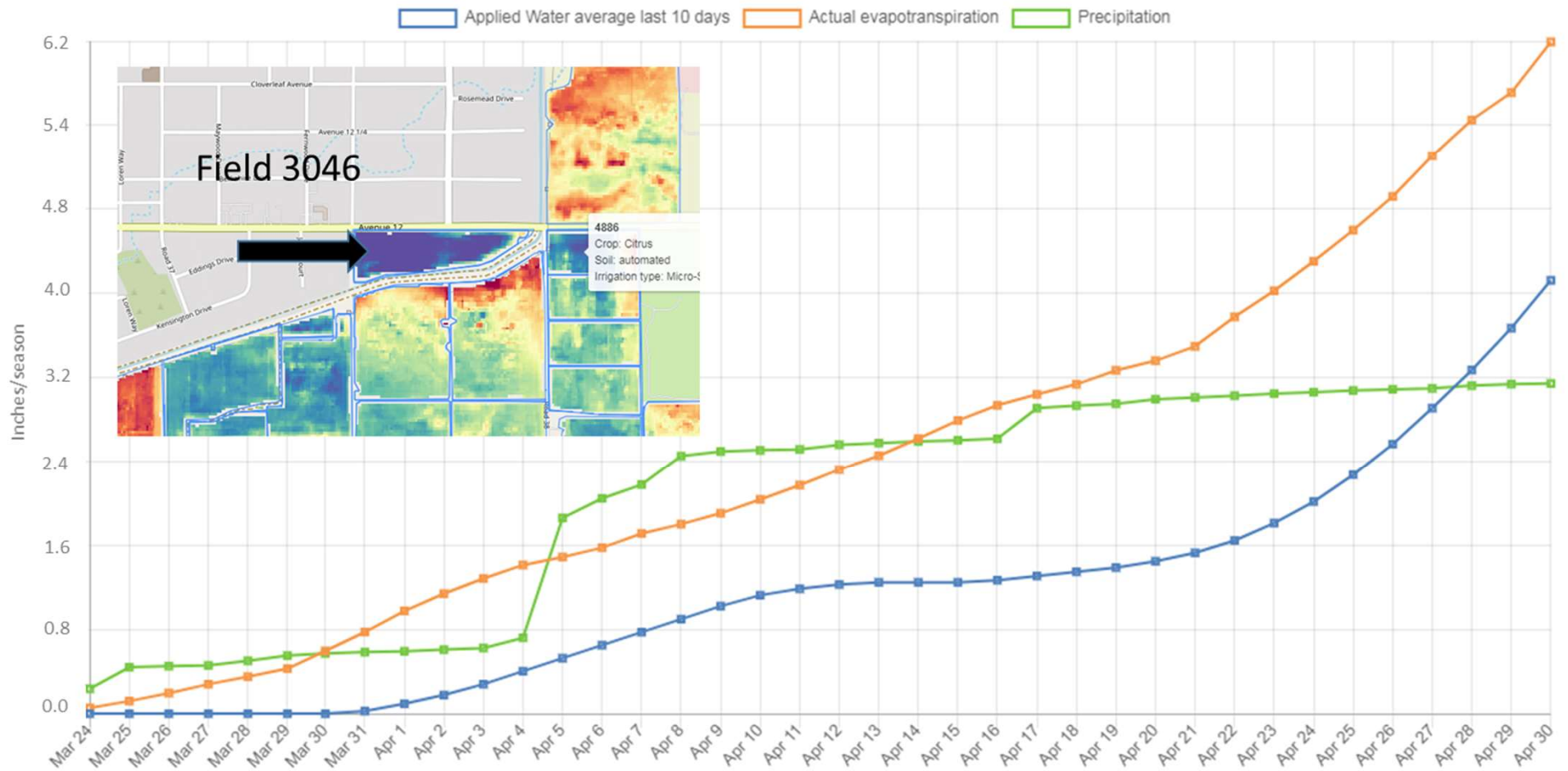
Accumulated Applied & Consumed Water

Graphs - 3046



Graphs

Table data



IrriWatch as an Irrigation Management Tool for Farmers



IrriWatch Tracks ET and Provides Irrigation Scheduling Support for Farmers

- Uniform ET equals good production
- Information on ET supports irrigation scheduling
- Additional parameters in IrriWatch support irrigation scheduling and management
- Accurate crop and irrigation type information improves accuracy of irrigation scheduling and management support
- Allows farmer to assemble farm units

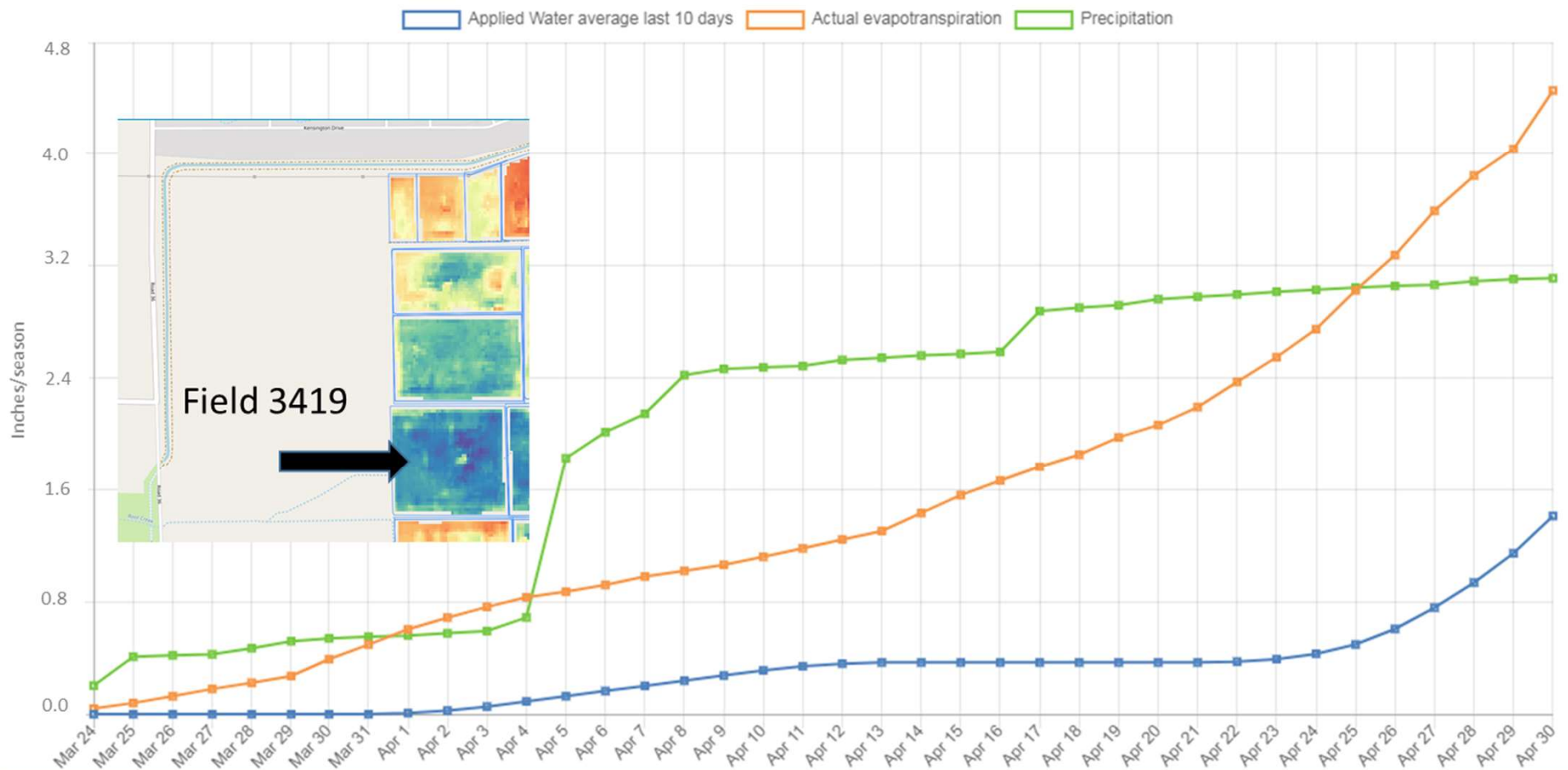
Accumulated Applied & Consumed Water

Graphs - 3419



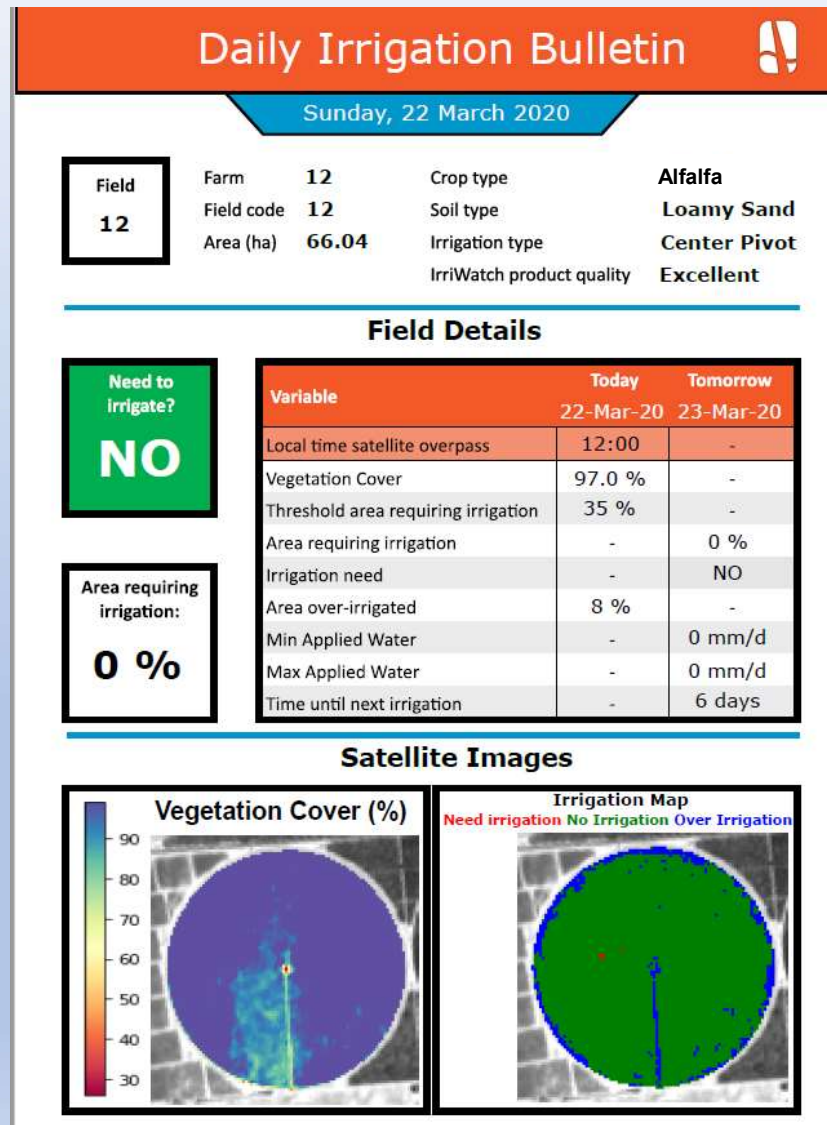
Graphs

Table data



Registered growers get data on cell phone

Agencies have access to all fields on IrriWatch and receive 10 day summary emails



Steps to Enroll

- Email to Etmeasurement@maderacounty.com
 - Your Email address
 - Your APNs
 - Optionally provide
 - Crops
 - irrigation method
- OR
- Submit form on maderacountywater.com

Steps After Enrolling

- **IrriWatch will send you an email with a link and instructions on signing up for IrriWatch**
- **You can sign up for IrriWatch and validate fields, crops, soils and irrigation methods**
- **IrriWatch data becomes available in January 2021**
- **January 20, 2021 – IrriWatch set up and use training**

Misconceptions



Misconceptions

- “If I enroll in Irriwatch, I’ll get an allocation. Therefore, I shouldn’t enroll.”
- **Fact: Farmers that do not enroll in IrriWatch will also get an allocation.**
- “My cell phone never works out where I farm, so the satellite technology won’t be accurate.”
- **Fact: Satellite measurements do not need local cell phone service.**
- “I use drip irrigation, but won’t be rewarded for my irrigation efficiency.”
- **Fact: Drip irrigation does NOT reduce ET.**
- “I grow a specialty crop that doesn’t use a standard ET and won’t be measured accurately.”
- **Fact: Research over the last 25 years has shown SEBAL ET calculations to be sufficiently accurate for all crops.**

ET Terms

- Reference ET - ET of grass (CIMIS used in IrriWatch), calculated from weather station measurements of:
 - Temperature
 - Net radiation
 - Wind
 - Relative humidity
- Actual ET - calculated by SEBAL
- ET of precipitation (ET_p) is ET from water supplied by precipitation
- ET of applied water (ET_{aw}) is ET from water supplied by irrigation
- Actual ET equals $ET_p + ET_{aw}$



Questions



Enrollment Questions

- What is the minimum information needed to enroll?
- Answer: Email and APNs
- What are the benefits of providing additional (crop and irrigation type) information?
- Answer: More accurate irrigation scheduling and crop production information
- How will the additional information be used?
- Answer: IrriWatch uses the additional information to estimate when and how much to irrigate. Crop information will also be used to estimate depth of root zone, crop height for aerodynamics and dry matter production. The Madera County GSA does not need the additional information.

Enrollment Questions

- When will IrriWatch start measuring ET?
- Answer: January 1, 2021
- What happens if I do not enroll in IrriWatch?
- Answer: You will not be able to track the evapotranspiration of applied water from your irrigated area and you will not receive IrriWatch estimates of many parameters related to irrigation scheduling and crop production. You will not have access to the additional information that IrriWatch provides to help you monitor your irrigation management and planning.
- Can I add or remove parcels after I enroll?
- Answer: Yes.
- What if one APN has more than one field?
- Answer: It will be divided into individual fields.

Enrollment Questions

- What if a field has more than one APN?
- Answer: Fields in multiple APNs can be grouped as a farm unit.
- Can I create my own fields in IrriWatch?
- Answer: Yes, by printing a screen shot of what is signed up, drawing the fields on the printed picture, scanning it and emailing it to support@irriwatch.com also provided in the registration email.
- Can I enroll land that is not irrigated (not paying a GSA fee but may want to plant in the future)?
- Answer: Yes.

Measurement Questions

- How frequently are measurements available?
- **Answer: Daily at 6 am.**
- Will IrriWatch identify deficit irrigation practices?
- **Answer: Yes**
- Will IrriWatch provide information on the ET of different parts of a field or just the entire field?
- **Answer: IrriWatch provides ET for 33-foot X 33-foot square areas in each field.**
- What happens if there are clouds or smoke during the growing season?
- **Answer: IrriWatch estimates the values for the cloudy days.**

Measurement Questions

- Are microclimates accounted for in the IrriWatch system?
- Answer: Yes, within-field variabilities of air temperature and air humidity for each approximately 33-foot by 33 foot square area on the surface are accounted for. The land surface temperature at midday for each approximately 33-foot by 33 foot square area is also accounted for.
- How is the precipitation as a part of total ET accounted for?
- Answer: IrriWatch needs precipitation on a daily basis to provide daily water balances. This daily requirement limits the options. We are still evaluating the limited options for this area, but will probably use 24-hour observed precipitation from the NOAA California-Nevada Forecast Center.

Measurement Questions

- How can I compare my meter data to the measurement by IrriWatch?
- **Answer:** We are looking for about 30 volunteers to provide meter data to Davids Engineering to compare to the IrriWatch ET and related assessments of Applied Water. From that analysis we can provide a step by step description of what to do and if you have questions we will review and discuss.
- Will IrriWatch measure the ET of unirrigated land, e.g. rangeland and riparian areas (arundo)?
- **Answer:** Yes.
- Will you be measuring water use on land of other GSPs in the Madera Subbasin?
- **Answer:** No

Allocation Budget Questions

- Will my allocation show up on my IrriWatch account?
- **Answer: Yes.**
- How do I know what my allocation is?
- **Answer: After everyone has had the opportunity to opt in, the Madera County GSA will send a letter to growers providing the allocation.**
- Will I still get an allocation if I do not enroll in IrriWatch?
- **Answer: Yes.**

Allocation Budget Questions

- What happens if IrriWatch shows that I used more than my allocation?
- **Answer: The first year—Nothing—this is a “dry run.”** For future years, it is expected that there will be penalties for exceeding the allocation, similar to the fines for driving faster than the speed limit.
- How are allocations accounted for if there are multiple APNs?
- **Answer: Allocations will be reported as acre-feet per irrigated acre.**

Farm Units Questions

- How will Farm Units be created if I enroll in IrriWatch?
- **Answer: You will be able to assemble your farm units within IrriWatch, limited to fields within the farm unit zones defined.**
- How will Farm Units be created if I do not enroll in IrriWatch?
- **Answer: They will not be created and default boundaries of the Madera Country GIS system will be applied to individual parcels/fields.**

Farm Units Questions

- What if I have two properties that are near each other but across a farm unit boundary?
- **Answer: You can apply for an exemption. Properties within a reasonable distance (five to ten miles) may be granted the exemption depending on local groundwater conditions.**
- Can I change my farm unit after I enroll?
- **Answer: Yes.**

ET from SEBAL versus Applied Water

- ET from SEBAL includes ET from precipitation
- $ET_{SEBAL} = ET_p + ET_{aw}$
- Applied water = $ET_{aw} + \text{runoff} + \text{deep percolation}$
- If $ET_p > \text{runoff} + \text{deep percolation}$, then $ET_{SEBAL} > \text{applied water}$
- If $ET_p < \text{runoff} + \text{deep percolation}$, then $ET_{SEBAL} < \text{applied water}$

ET Does Not Measure Efficiency

- Assuming no
 - Leaching
 - Frost protection
 - Pre-irrigation
 - Other “reasonable” beneficial uses
- Efficiency = ET_{aw} divided by applied water

SEBAL ET: Flood versus Drip

- **SEBAL ET includes**
 - Evaporation from ponded water and wet soil
 - Transpiration from leaves
- **Flood irrigation has more evaporation and infiltration from ponded water and wet soil**
- **Drip irrigation has less evaporation from ponded water and wet soil and less infiltration**
- **No need to adjust for irrigation types**
- **Irrigation types influence irrigation scheduling**

Opportunity to Validate Applied Water Estimates

Describe the opportunity

- Use IrriWatch to estimate and validate irrigation efficiency

What are we asking participating growers to do?

- Enroll as a user of IrriWatch
- Help us identify well locations and field boundaries corresponding to areas served by each well
- Provide applied water estimates collected using a flow meter installed and maintained according to manufacturer specifications
- Meet with staff from Davids Engineering to collect field information (i.e., sprinkler/emitter application rates, number of sprinklers/emitters, etc.)

If interested in learning more about using IrriWatch to estimate irrigation efficiency, contact

- Ryan Fulton, Davids Engineering, Inc.
- Email: ryan@davidsengineering.com

