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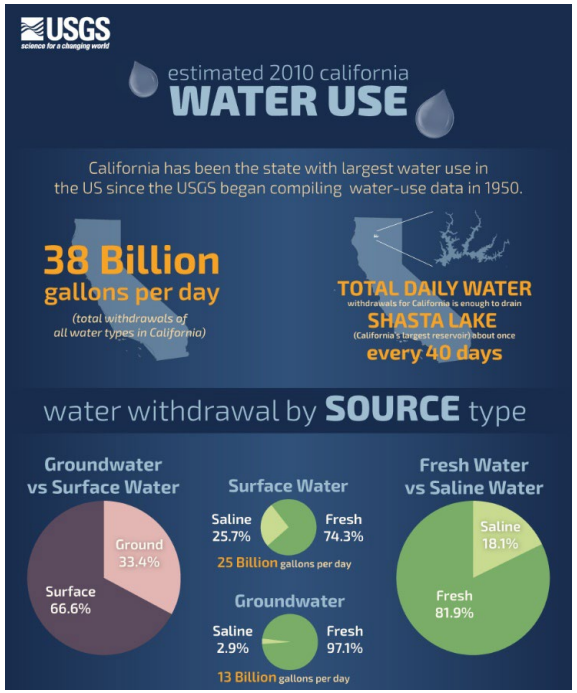
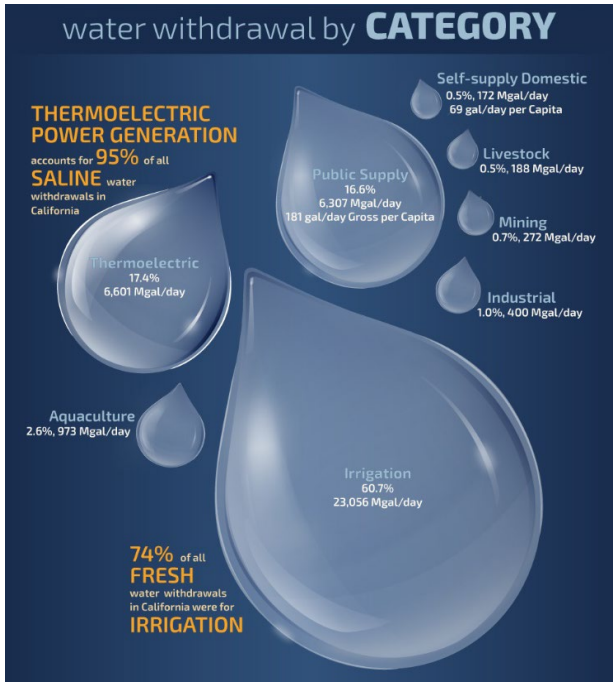
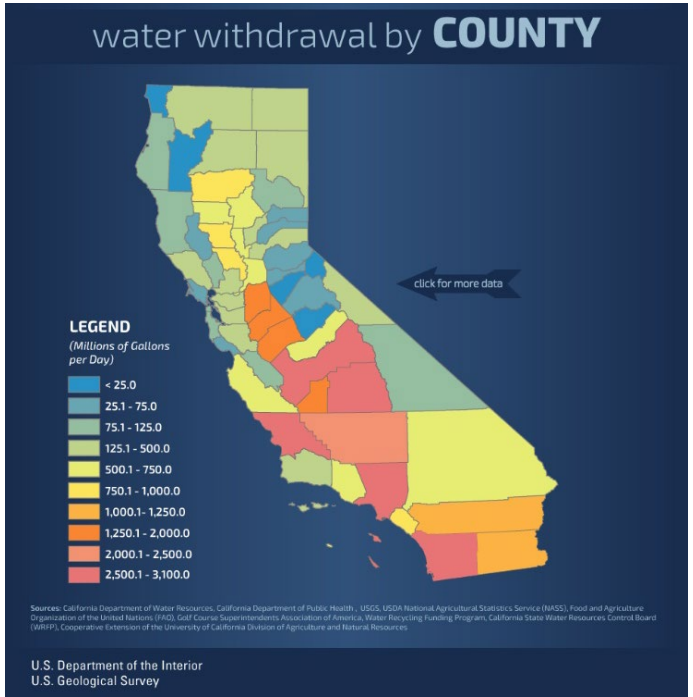
Water Conservation on |Cynodon dactylon (L.)| Fairways

California Drought

- Southern California is in chronic drought conditions
  - On average California uses 38 billion gallons per day
    - Of this we use about 66.6% of it through surface water and about 33.4%
    - Most of the water are used in Central and Southern California Areas.







Golf Courses Struggle to Obtain Water

- Golf Courses in particular have difficult times with obtaining water
  - Water restrictions
  - Poor water quality: Reclaimed water
  - Lowering of the water table
  - Increased price of water

- A Questions I want to leave with you
  - How can we remedy this problem?

Ways Golf Courses Reduce Water

- Remove the amount of irrigated areas
  - Reducing the amount of water on areas that do not see play on the golf course.
- Use of Water Efficient turfgrasses
  - Examples of more drought tolerant turfgrass species are Bermudagrass, Zoysia, Kikuyu, and St. Augustine.

Ways Golf Courses Reduce Water Continued

- Deficit Irrigation
  - Reducing the amount of water below optimum levels, but still achieving a desired look and play.
  - Only replacing enough water for the turfgrass to grow and survive, to a point where club member would like the playing conditions and appearance of the turfgrass.
- More Efficient Irrigation and Golf Course Design
  - Example is explained by Larry Stole from PACE Turf.
    - He suggests using a 16 inch sand base at the front of a golf course green, and an 8 inch sand base at the back of the green to provide even volumetric water content throughout the green.

Soil Moisture Sensors (SMS)

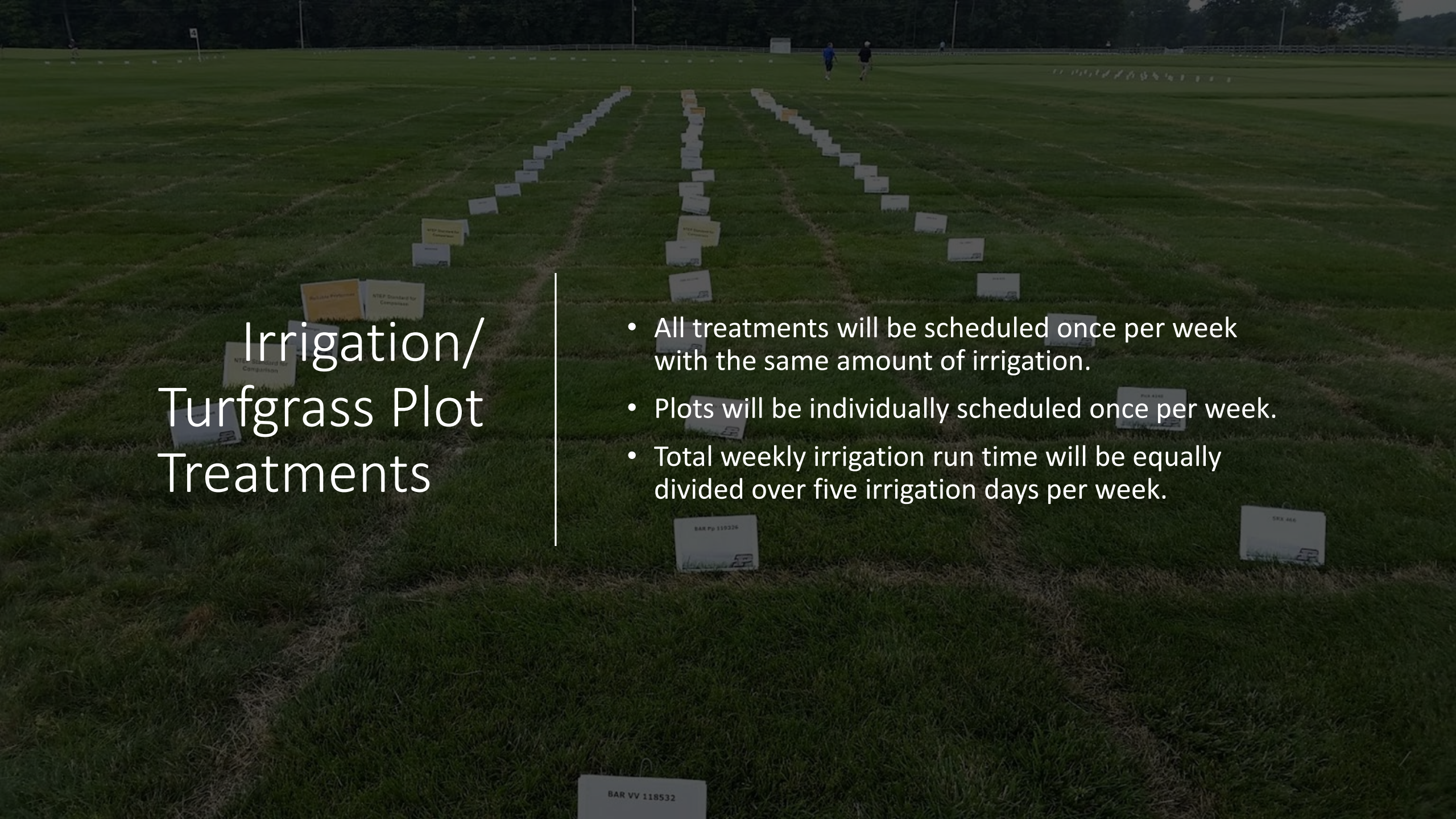
- Time-domain reflectometer (TDR)
  - Sends a signal between the probes and measures the time between pulses to determine soil moisture levels.
- Frequency Domain Reflectometry (FDR) Capacitance technology
  - Probes create an electromagnetic signal that radiates in a “sphere of influence.”
  - In this case the meter will measure the difference between the output wave, and the return wave frequency to determine soil moisture.

Description of Proposed Research

- 3 Main Objectives
  1. Analyze the performance of SMS systems to apply less irrigation and result in water saving by bypassing irrigation events when soil moisture is adequate
  2. Evaluate SMS capability to maintain bermudagrass quality.
  3. Compare SMS performances against standard irrigation scheduling.

Installation

- Soil moisture sensors will be installed based on manufacturer’s instruction and with their assistance.
- There will be two or more wetting and drying cycles after sensors installation to monitor and ensure proper sensor response before final setting of control points on sensors.

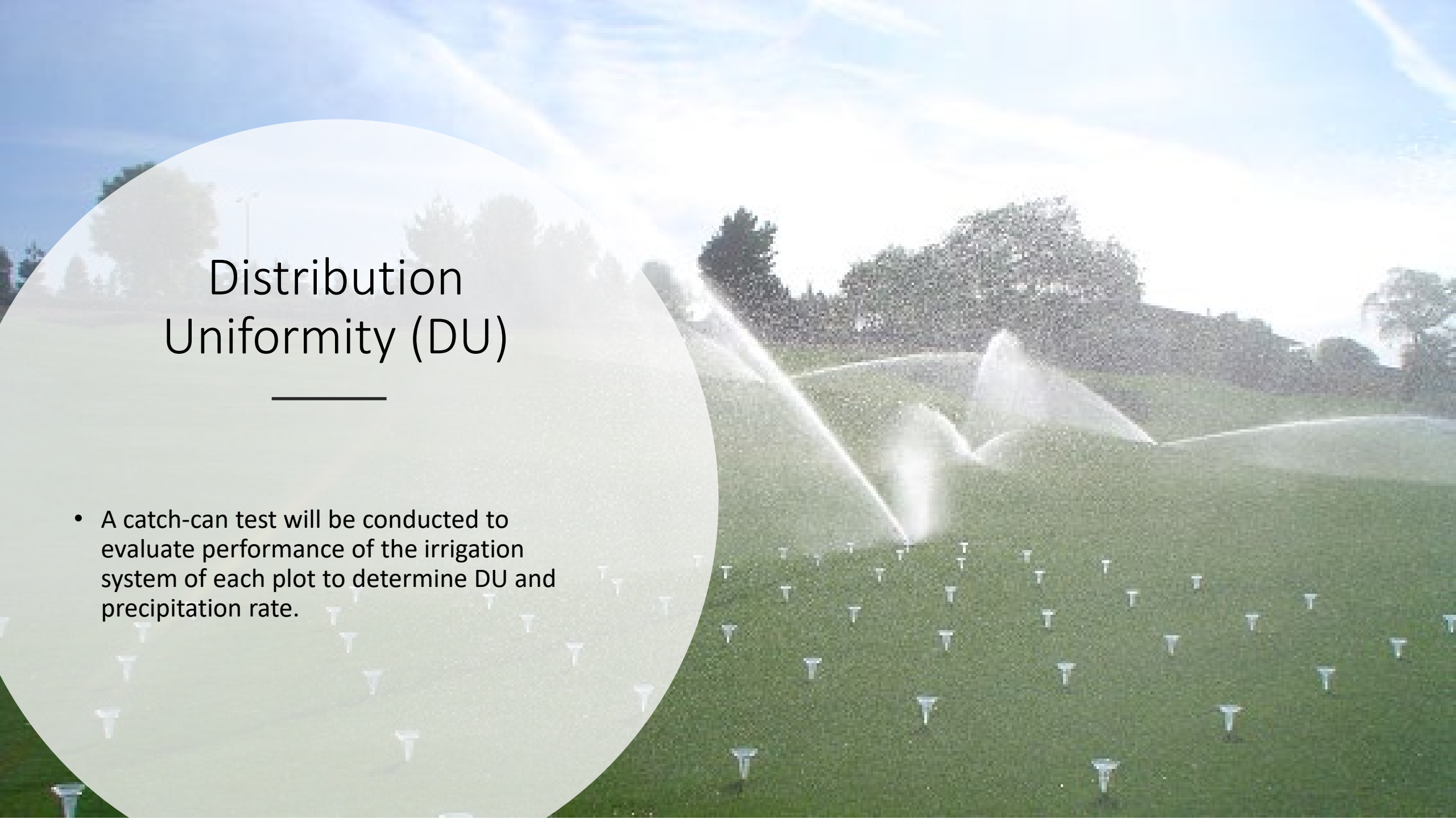


Irrigation/ Turfgrass Plot Treatments

- All treatments will be scheduled once per week with the same amount of irrigation.
- Plots will be individually scheduled once per week.
- Total weekly irrigation run time will be equally divided over five irrigation days per week.

Distribution Uniformity (DU)

- A catch-can test will be conducted to evaluate performance of the irrigation system of each plot to determine DU and precipitation rate.



Maintenance/ Upkeep

- Bermudagrass will be maintained at the heigh of 1/2”
- Mowed twice a week.
- Fertilized using 0.4 lbs N/1000 ft2 per growing month
  - Split the monthly rate into one application every 2 weeks to avoid high and low peaks of shoot growth.

Data Collection

- Data Collection will be conducted from May 1st – October 31st, 2018 and 2019.
- Eto precipitation, and other climatic data will be accessed from CIMIS station #78 based
- Data being collected
  - Runtime
  - Irrigation applied
  - Number of irrigation events that are bypassed or allowed
  - Amount of saved applied irrigation
  - Visual turfgrass quality and color ratings
  - Soil water content (VMC %)
  - Soil salinity (EC)

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Any Questions?