

CSU Fresno, Center for Irrigation
Technology
McMullin GSA ARI Grant Proposal

Presentation to
McMullin GSA Board of Directors
July 15, 2020

Who We Are

- The Center for Irrigation Technology is an applied research and testing Center allied with the Jordan College of Agriculture at Fresno State
 - Research is mainly focused on water use
 - Testing is conducted on irrigation water application equipment: sprinklers drip, valves, pumps, measurement devices, motors, etc.
- The Agricultural Research Institute is a CSU effort at 5 campuses with ag colleges, funded annually as a line item in CSU's state appropriation
 - Research is conducted on all aspects of agriculture, grants are competitive and based on priorities, water management is a priority

The CIT & McMullin GSA ARI Proposal


- Project proposals were submitted earlier this year
- Projects are ranked based on practical problem-solving and experience of the researcher
- CIT competes with all proposals submitted which total substantially more than the available funds
- The proposal for McMullin GSA ranked among the highest for funding
- All successful ARI proposals have a requirement for matching funds, potentially including cash, or in-kind, such as services, equipment or local costs

THE IMPACT OF ARI


Since its launch in 1999, ARI has transformed agricultural research at the CSU.



\$161
MILLION
IN GRANT FUNDING
FOR AGRICULTURAL
RESEARCH



23%
OF ARI'S BUDGET
GOES TO STUDENT SUPPORT



The McMullin GSA ARI Project Details

- What are the goals?
- What do we propose to do?
- How will it help the GSA?

The McMullin GSA ARI Project Details

- Goals:
 - MAGSA needs a Water Budget to monitor changes in groundwater storage
 - A water budget includes inflow or water supply, and outflow or water use (agricultural/municipal & industrial)
 - This project will help with agricultural water use estimates, which is mostly Groundwater Pumping for Irrigation
 - Groundwater Pumping for Irrigation =
$$\frac{\text{Crop Evapotranspiration} - \text{Effective Rainfall}}{\text{Irrigation Efficiency}}$$
 - The big unknown is crop evapotranspiration, or crop ET = Reference ET (ET_o) x Crop Coefficient (K_c)

The McMullin GSA ARI Project Details

- Goals cont'd:
 - Daily ETo values are available from DWR CIMIS weather stations and Kc values are available for different crops.
 - To calculate seasonal crop ET at MAGSA area, we need a cropping pattern to estimate Kc and need ETo from representative weather stations
 - In the MAGSA-GSP (page 3-128), crop ET was estimated using old DWR Land Use data by County, and average crop ET rates from DWR data
 - These historical estimates are useful for planning purposes but not suitable for actual Water Budget calculations
 - This project proposes to estimate crop water requirements using actual cropping patterns and weather data.

The McMullin GSA ARI Project Details

- What do we propose to do?
 - “The main objective of the project is to help McMullin Area GSA estimate ETc accurately in the GSA service area, which is the most critical component of water accounting in this agricultural region.”
 - “The main task of the project is to build an easy-to-use cloud-based toolkit for McMullin Area GSA as a water demand management tool to assist with groundwater sustainability goals and to serve farmers fairly and effectively.”
- The project will develop Irrigation Scheduling separately for individual fields and aggregated for the MAGSA area
- Irrigation scheduling will be prepared for daily soil water balance and averaged for weekly, monthly, and seasonal water requirements
- Daily Soil Water Balance: $\text{Soil Water}_{\text{Today}} = \text{Soil Water}_{\text{Yesterday}} + \text{Irrigation} + \text{Rain} - (\text{Crop ET} + \text{Runoff} + \text{Deep Percolation})$
- This irrigation scheduling represents the crop water requirements of healthy, well-watered plants.

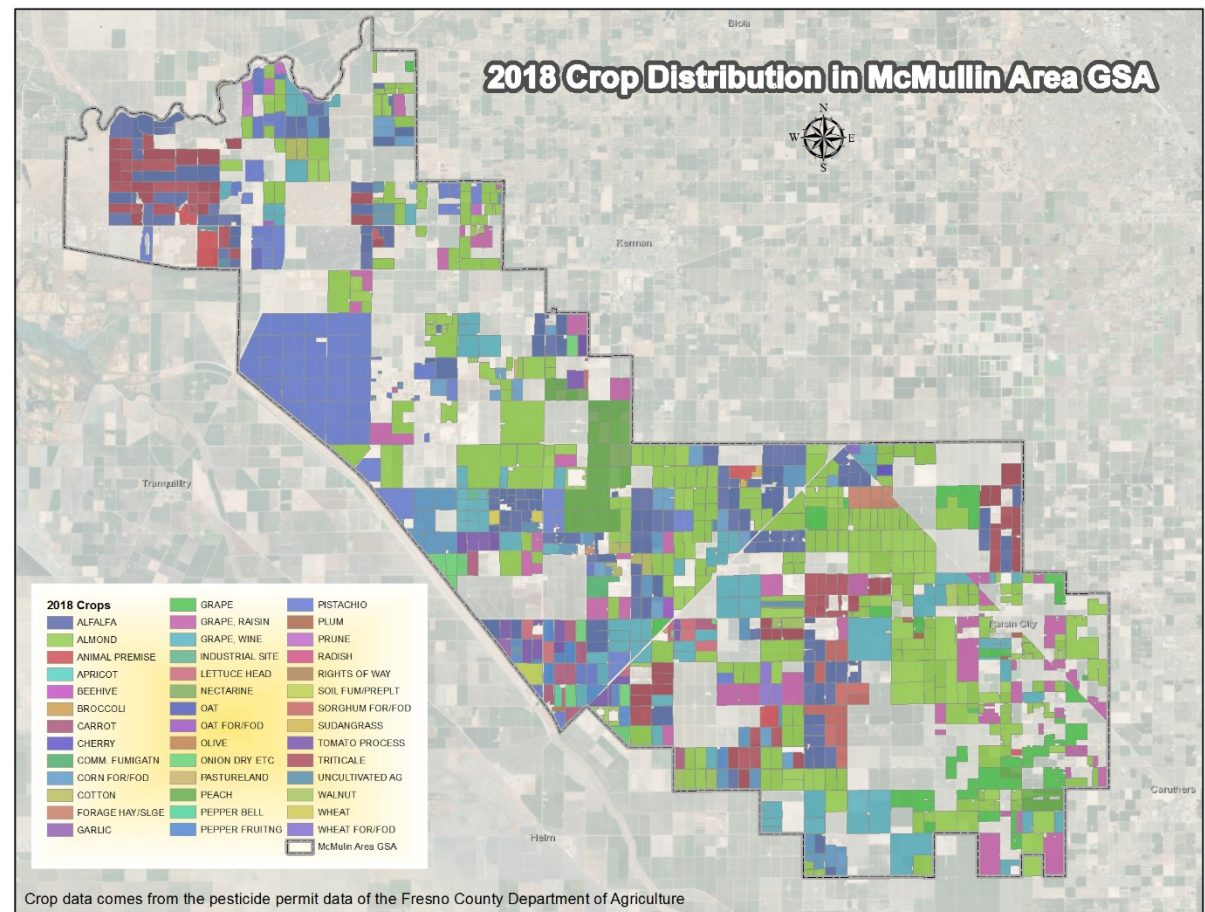
The McMullin GSA ARI Project Details

- What tools do we develop to meet the goals?
 1. A weather database for reference evapotranspiration (ET_o) and other related weather variables such as rainfall; data will be taken from California Irrigation Management Information System (CIMIS) weather stations and ET_o will be calculated using other available local weather stations;
 2. Crop database for crop coefficients (K_c) and other required crop data such as rooting depth and irrigation management parameters; this database will be built using published and local data;
 3. Soil database for crop-water relations, such as depth, field capacity and wilting point using the United States Department of Agriculture (USDA) soil databases;
 4. Field database for field boundaries and cropping patterns using annual County Agricultural Commissioners' pesticide permitting reporting program and field survey; supplemented by the USDA-NASS Cropland Data Layer, when appropriate;
 5. Crop evapotranspiration (ET_c) database, estimated for individual fields and GSA service area using ET_o and K_c, $ET_c = ET_o \times K_c$; and
 6. Irrigation scheduling databases, separately for individual fields and aggregated for the McMullin Area GSA service area.

The McMullin GSA ARI Project Details

- How will results be summarized?

We prepare spreadsheets which show components of crop ET at each farm aggregated for the MAGSA service area



Matching Funds Ask

- ARI projects require 1:1 matching funds (25% cash, 75% in-kind)
- Original total year 1 ARI budget request was \$64,203.
- \$16,630 cash was authorized by McMullin
- \$47,573 of in-kind match required

In-Kind Match Can be:

- Payroll costs count for time spent overseeing the project
- Equipment used in office and field
- Services for data management
- Travel, rentals, any other expense that supports the project objectives

McMullin GSA ARI Project

- Questions?
- Discussion
 - Others supporting the proposal – IFF, FID-NKGSA, Farm Bureau



Thank You!

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