
# Sustainable Groundwater Management Act Workshop

September 2018

# Tulare Irrigation District

Changes in Management & Staff

## General Manager

Aaron Fukuda

## District Engineer

Bill Sario

## Assistant Engineer

Jeremy Barroll

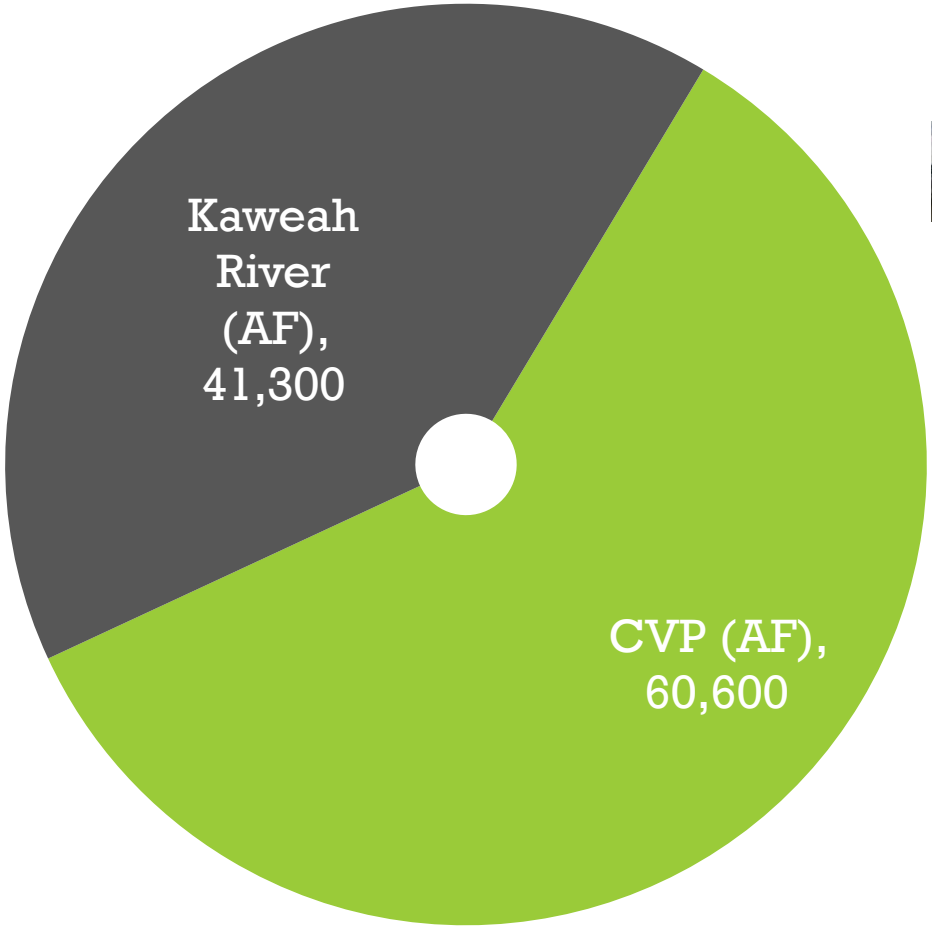
# 2018 Tulare ID Surface Water Run

**101,900 AF**

*Total Surface Water Diverted to the District*

**56,000 AF (54%)**

*Water Delivered to Farm Turnouts*




## 2017 Water Year:

| | |
|---|---|
| Total Surface Water: | 400,000 AF |
| Farm Turnout: | 171,500 AF |
| Groundwater Recharge: | 220,000 AF |

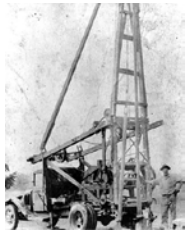
**45,900 AF (45%)**

*Water Delivered for Groundwater Recharge*

# Tulare Irrigation District Groundwater Chapters

**Late 1800's**

Plentiful Underground Supplies, Surface Water Developing but Unstable



**1920's**

**Running Short**

1st Way Out: Deeper Wells

**1940's**

**Groundwater Supplies Unstable**

2nd Way Out: Surface Water Projects such as CVP, Terminus Dam, SWP

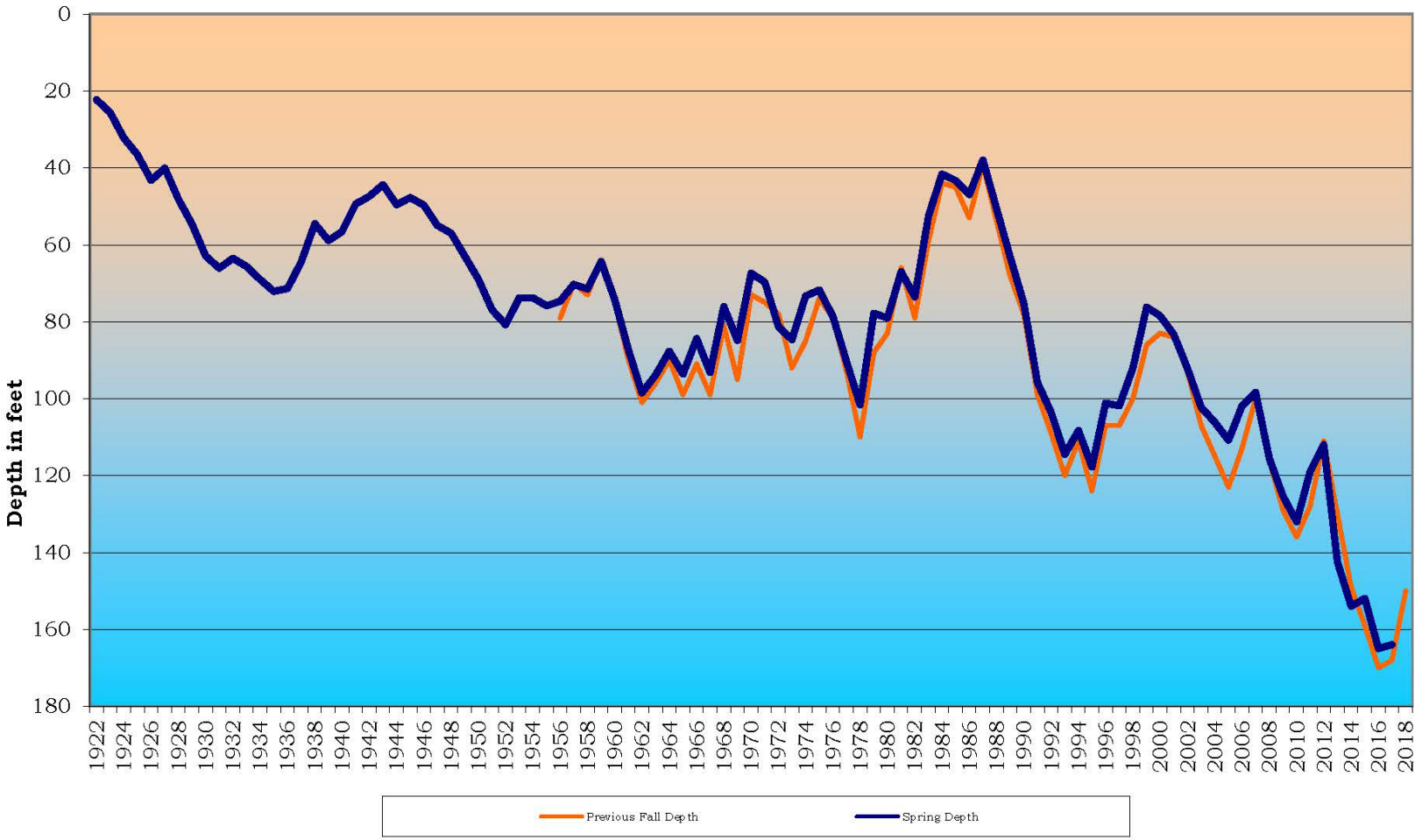
**1990's**

**CVP/SWP Supplies Eroding & Pumping Accelerates**

3rd Way Out: Capitalize on Wet-Year Surface Water Resources (Groundwater Recharge)

**2014**

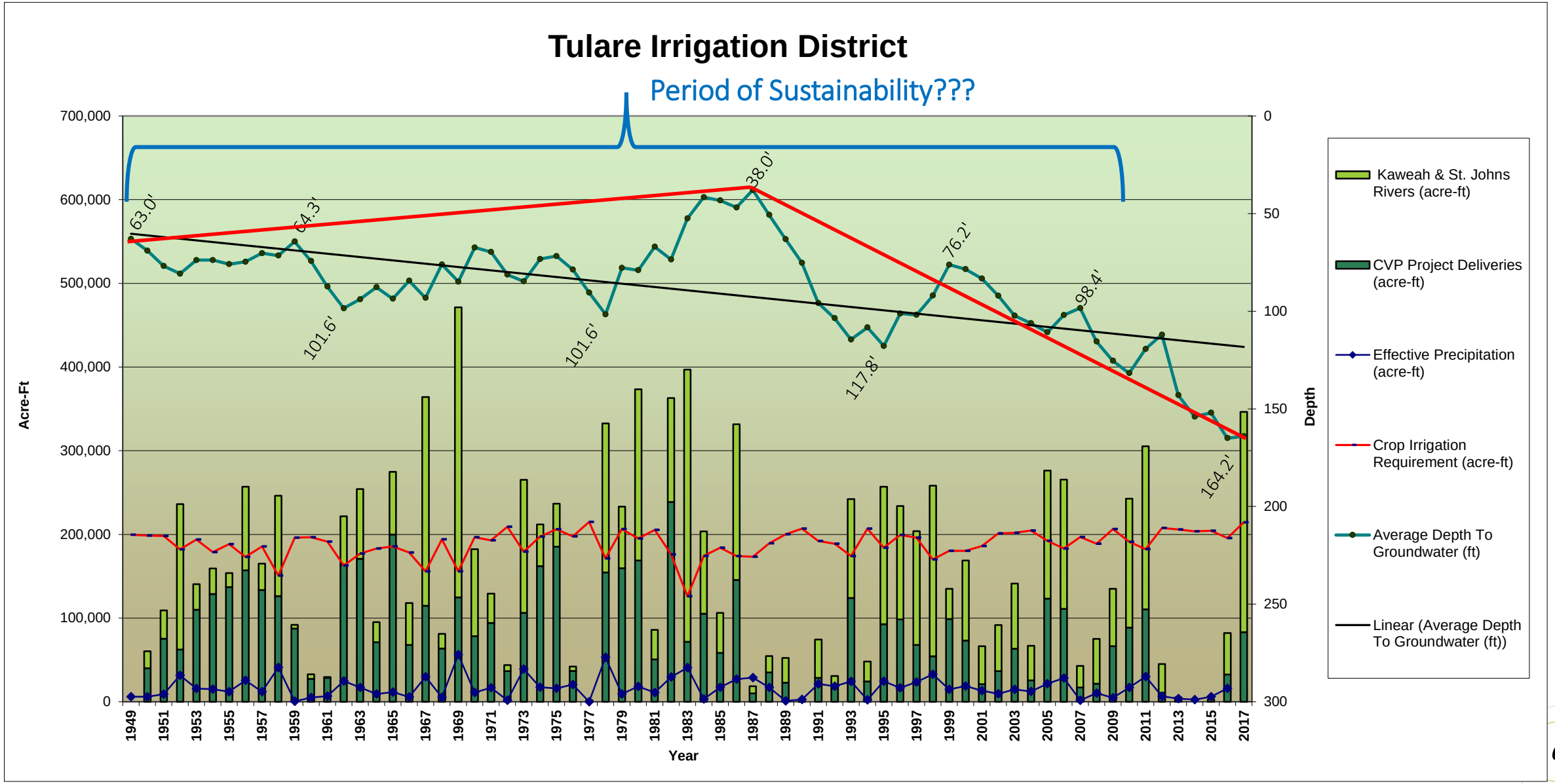
**Sustainable Groundwater Management Act**




18’ Increase

# 1922 – 2017 historical depth to groundwater

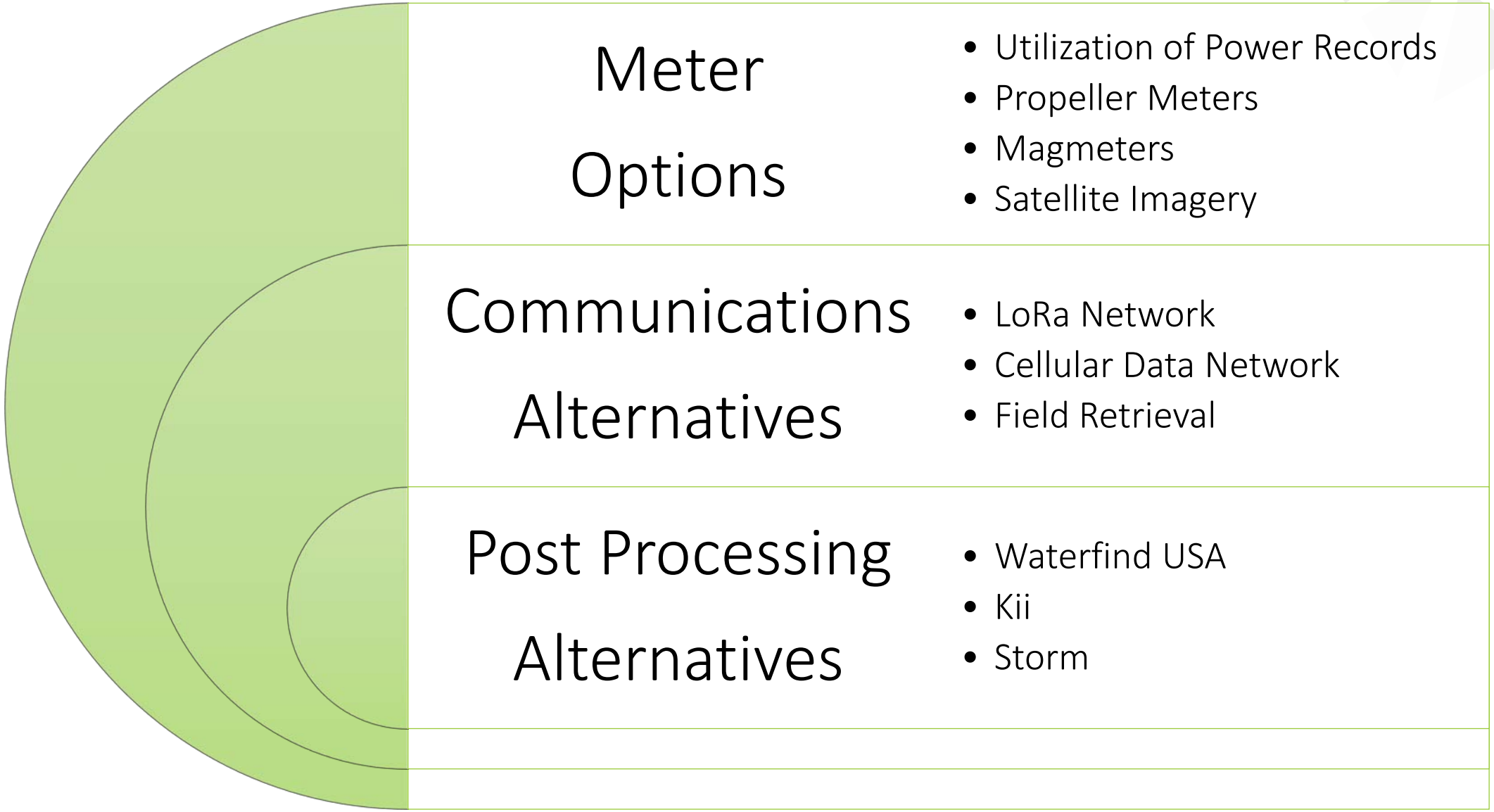
# Historical Depth to Groundwater In Tulare ID



# Groundwater Metering Context

- Sustainable Groundwater Management Act (SGMA) §10725.8 Measurement Devices and Reporting
  - May require the use of a water-measuring device
  - All costs of water-measuring device borne by owner/operator
  - May require annual statements from owner/operator
  - May use any other reasonable method for measurement
- Pumping data used for:
  - Annual reporting (aggregated)
  - Tracking of Pumping Allocations
  - Penalties in the event of exceedance of pumping allocations
  - Water budgets
- Other MKGSA members currently measure at the extraction point and at the use
- Tulare Irrigation District must identify a water-measurement method
  - Coordinates with other MKGSA members
  - Coordinates with other Kaweah Sub-Basin members

# Preliminary Metering Options



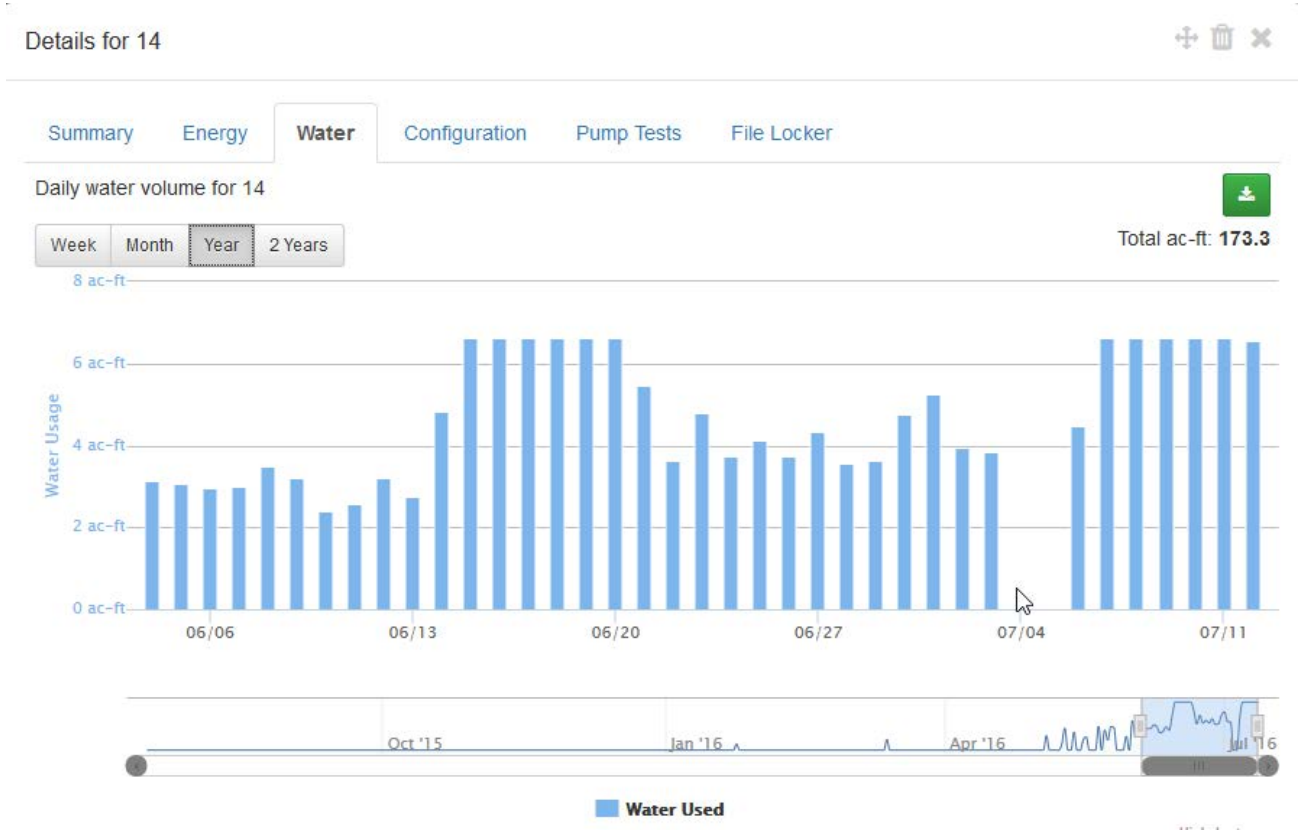
# District Groundwater Well Survey

- July 2017 – Intern conducted a visual survey of groundwater wells
  - Survey from public roads
  - No groundwater well measurements were taken
  - Approximately 60 groundwater wells had existing meters

| | 6” | 8” | 10” | 12” | Unknown | Total |
|---|---|---|---|---|---|---|
| Groundwater Well Discharge Sizing | 92 | 292 | 204 | 12 | 177 | 777 |

# Utilization of Energy Records

- Utilizing energy bills and pump characteristics you can estimate groundwater pumping
- Subject to accurately knowing pumping depth and pump efficiency
- Accuracy Range:  7-10% +/-
- Implementation through District efforts or vendor (PowWow Energy)
- Cost Estimate
  - Development:  $160,000 to $250,000
  - Annual:  $330,000+



# Propeller Meters

- Velocity of water rotates propeller that turns shaft that creates pulse
- Totalizer/registers indicate flow and volume
  - Can be outfitted with elec. output signals
- Wear and tear lead to mechanical failures
  - Requires robust maintenance program
- Accuracy:  +/- 2%
  - Straight pipe requirement upstream and downstream
  - Straightening vanes can improve accuracy
- Implementation
  - Landowner Installation
  - District Installation
- Maintenance Program is critical
- Cost Estimate
  - Development Costs:  $4.36 million
  - Annual Costs:  $250,000

# Magmeters

- Water moves through a magnetic field creating a voltage that is proportional to the velocity of the water
  - Voltage is converted to flow and volume
  - Transmitter converts signal for output
- Must be installed with straight pipe requirements upstream and downstream
- Accuracy:  +/- 1% or less
- Flanged or Insertion Alternatives
- Cost Estimate
  - Development Costs:  $3.32 million
  - Annual Costs:  $150,000

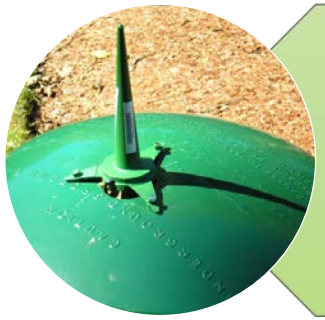

# Satellite Imagery

- KDWCD ET Study
  - Crop ET determined by remote (satellite imagery)
  - Using Crop Consumptive Use Fraction (CCUF) they could model the pumping extractions
  - Aggregated accuracy at approximately 7%
- Cal Poly ITRC
  - Using same approach to determine ET
  - Use the Crop ET to establish a consumptive allocation
    - Not vetted or approved by DWR
- Costs Estimate
  - Development Costs:  $60,000 - $100,000
  - Annual Costs:  $10,000 - $40,000

# Data Acquisition


## Field Acquisition

- District Staff field collects data from 800 wells
- Data can be physically field recorded or downloaded
- Fairly time intensive operation by a dedicated staff



## LoRa Network

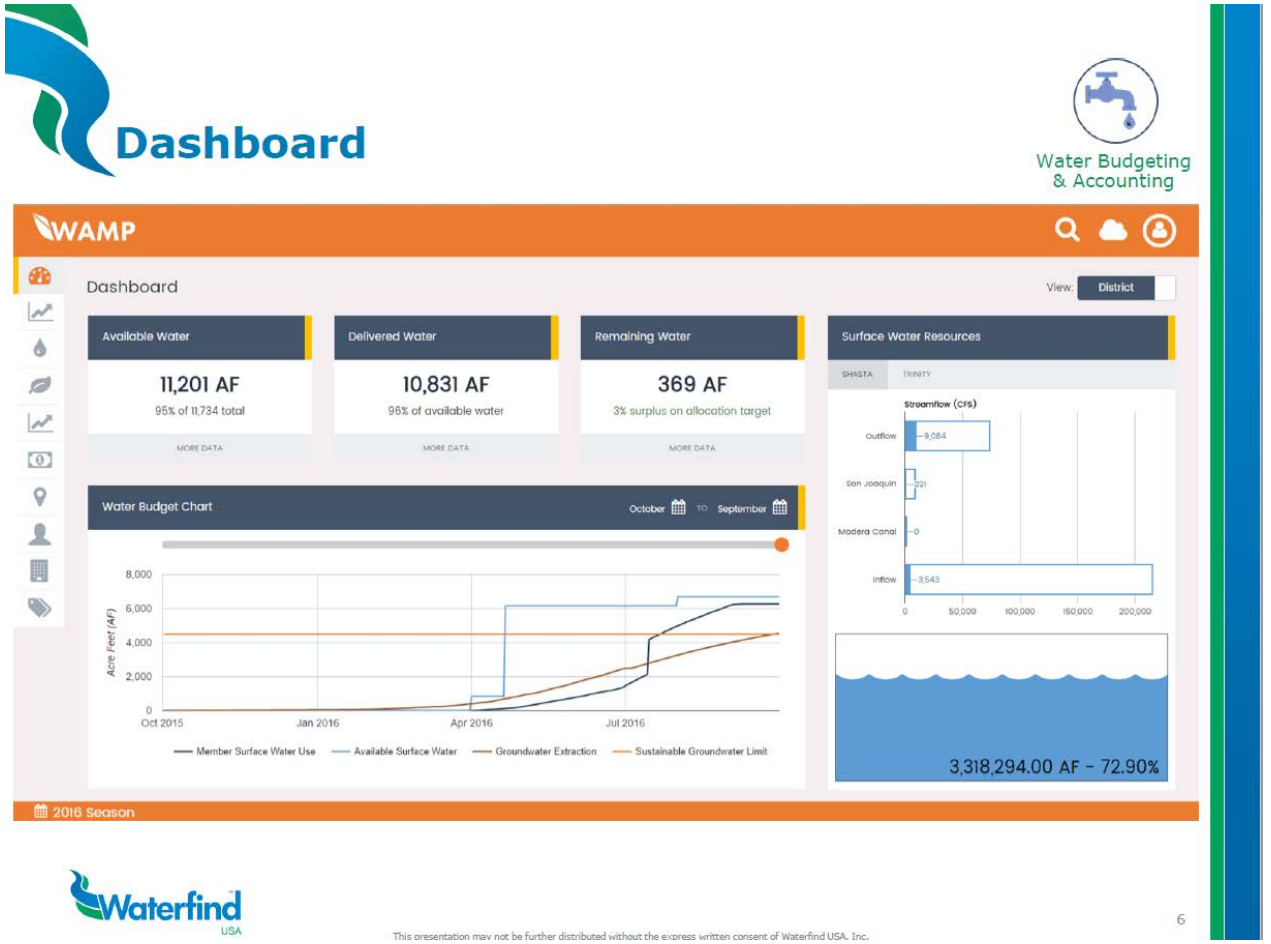
- Long range, low power, cost effective wireless network
- Central Valley Senet network
- Battery powered (7-10) Years


## Cellular Network

- Verizon network with modems for each well
- Monthly data charges (expensive)
- Equipment costs are fairly expensive

# Post-Processing Software

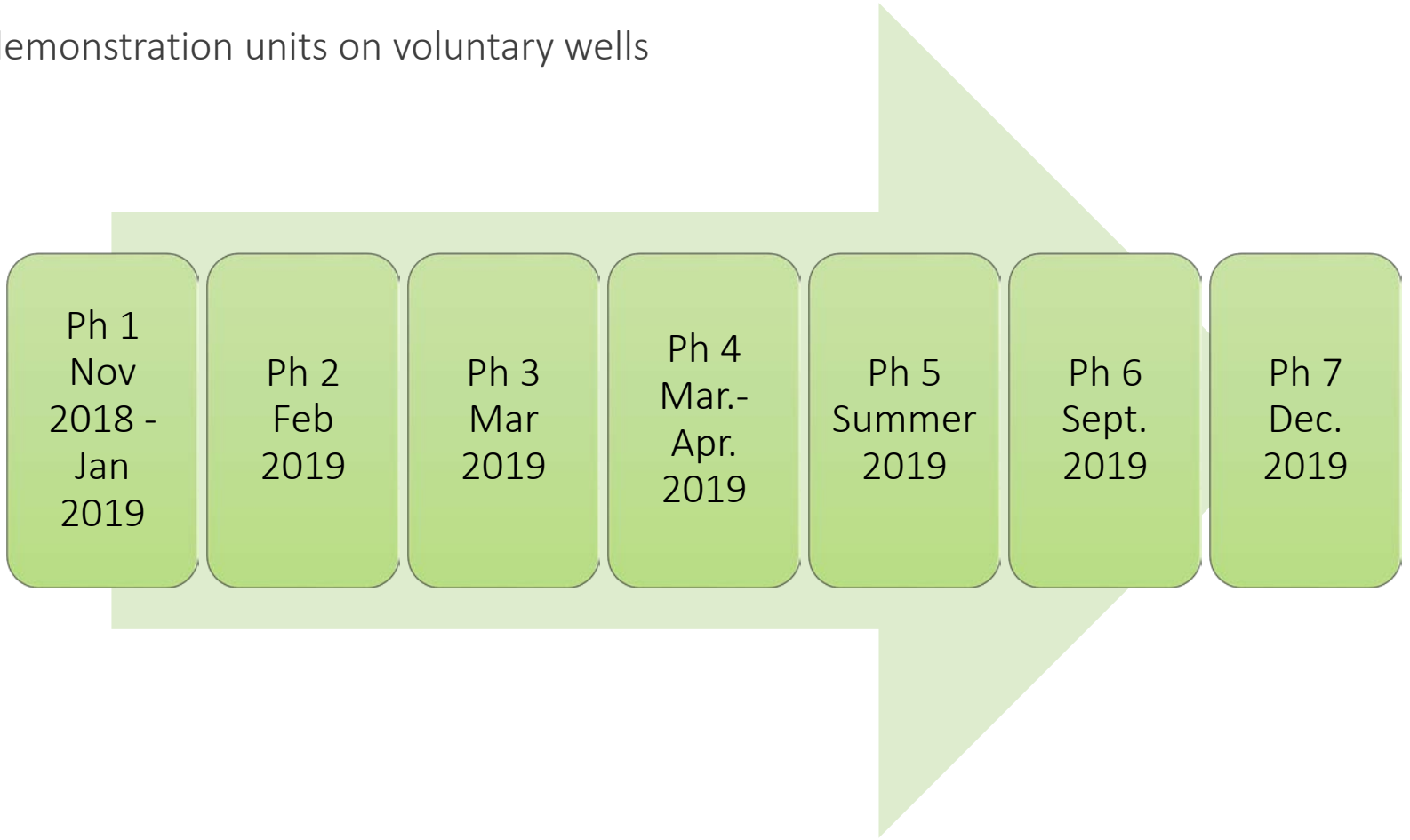
- Once a method is identified for measuring or estimating groundwater pumping how do you maintain and display the information?
- No SGMA specific software developed
- Researched:
  - Waterfind USA
  - Kii
  - STORM




Waterfind USA

# Groundwater Measurement Demonstration Project

- Phase 1 – Identify Demonstration systems for measurement of groundwater extraction
- Phase 2 – Develop and present Groundwater Measurement 2018/19 Demonstration Scope of Work and Budget
- Phase 3 – Acquire demonstration units
- Phase 4 – Install demonstration units on voluntary wells



# The Tulare ID Solutions

## Groundwater Recharge Basins

Martin Basin, Swall Basin, Cordeniz Basin, Okieville Basin

Total = 230 Acres

## On-Farm Recharge

Grower participation in on-farm Recharge: 2017 had 600 Acres and achieved 6,800 AF in 3 months

GRAT Tool and Crop Buy-Out Program

## Surface Water Storage Projects

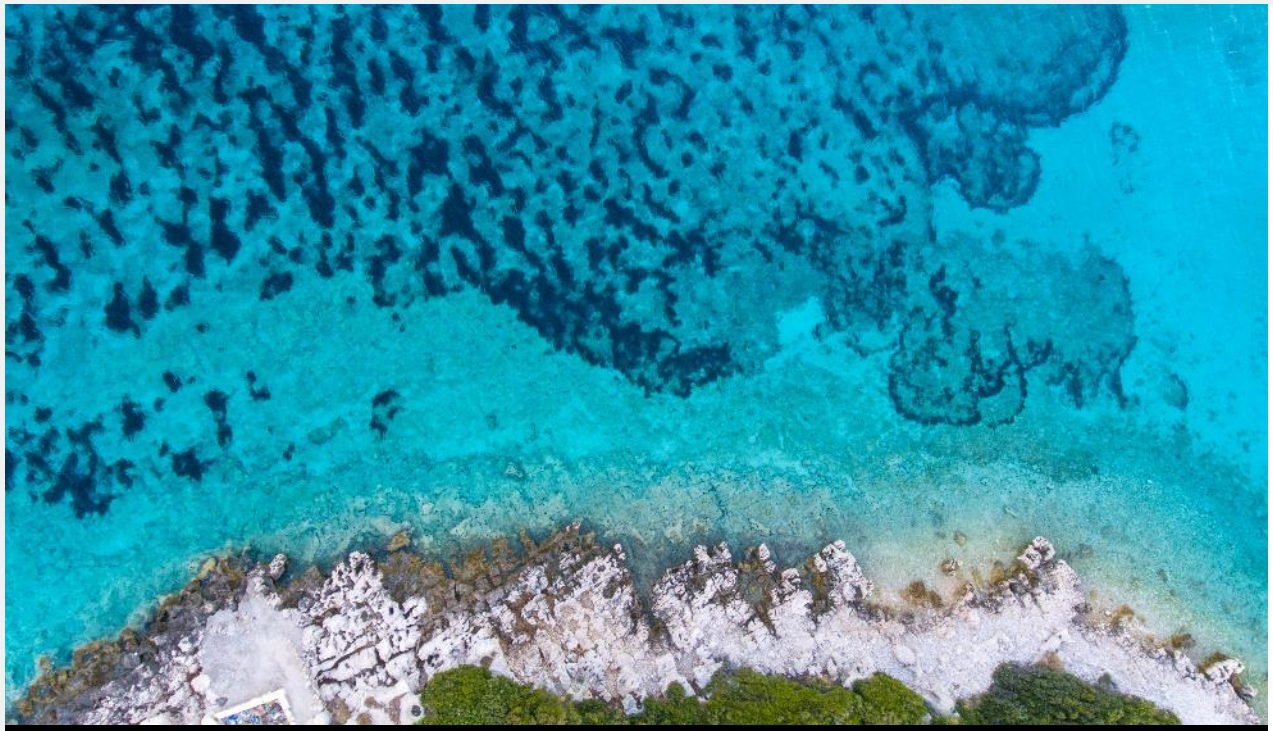
Temperance Flat Reservoir

&

McKay Point Reservoir

## Groundwater Market

Groundwater credit program to allow for the marketing of credits for ability to forgo groundwater pumping



# Thank You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