Ag Water Efficiency Practices
by
San Joaquin Valley CVP Contractors and Farmers

State Water Resources Control Board

July 20, 2011

Mario Santoyo

FRIANT WATER USERS AUTHORITY

Friant Division Service Area and Contractors

Service Area

Merced County
Madera County
Fresno County
Tulare County
Kern County

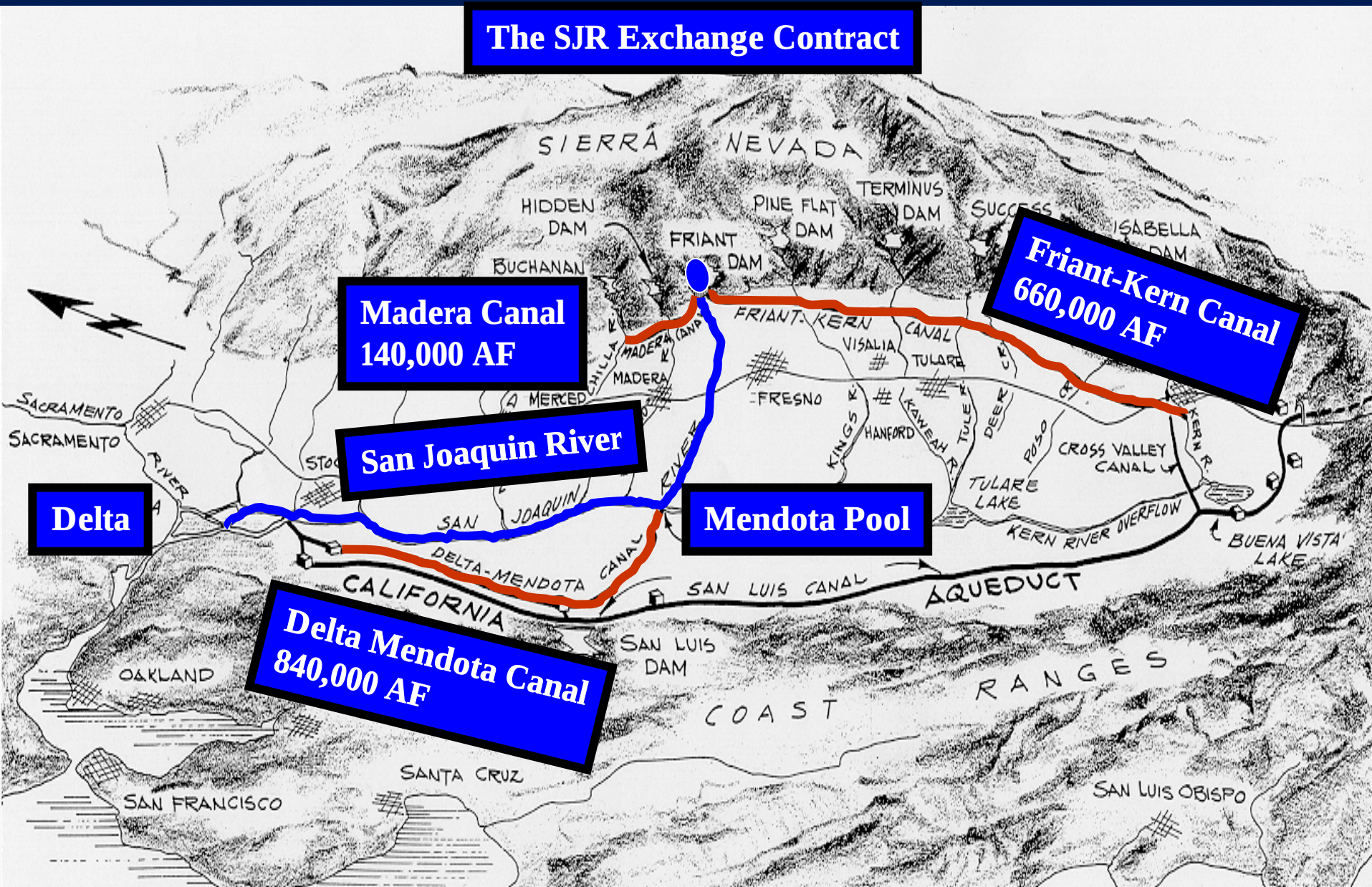
Ag Water Contractors

Alpaugh I.D.
Arvin-Edison W.S.D.
Atwell Island W.D.
Chowchilla W.D.
Delano-Earlimart I.D.
Exeter I.D.
Fresno I.D.
Garfield W.D.
Hills Valley I.D.
International W.D.
Porterville I.D.
Rag Gulch W.D.
Saucelito I.D.
Shafter-Wasco I.D.
Southern San Joaquin M.U.D.
Stone Corral I.D.
Tea Pot Dome W.D.
Terra Bella I.D.
Tulare I.D.
Ivanhoe I.D.
Kern-Tulare W.D.
Lewis Creek W.D.
Lindmore I.D.
Lindsay-Strathmore I.D.
Lower Tule River I.D.
Madera I.D.
Orange Cove I.D.
Pixley I.D.
Kaweah Delta WCD

M&I Contractors

City of Fresno
City of Orange Cove
City of Lindsay
Fresno Co. WWD #18
Madera County

The Friant Division and The Delta Connection



Water Management Plans History

1982

- Reclamation Reform Act requires federal contractors to prepare and submit water management, conservation and efficiency plans with timetables and definite goals.

1992

- Central Valley Project Improvement Act (CVPIA) requires Bureau of Reclamation to generate criteria for evaluating CVP contractor plans for meeting Reclamation Reform Act goals. Law also requires preparation of water management plans and triennial review of conservation criteria.

1993

- Reclamation generates “Criteria for Evaluating Water Conservation Plans.”

2008

- Most current version of Mid-Pacific Region Conservation and Efficiency Criteria issued by Reclamation and is was the fifth such revision.

2011

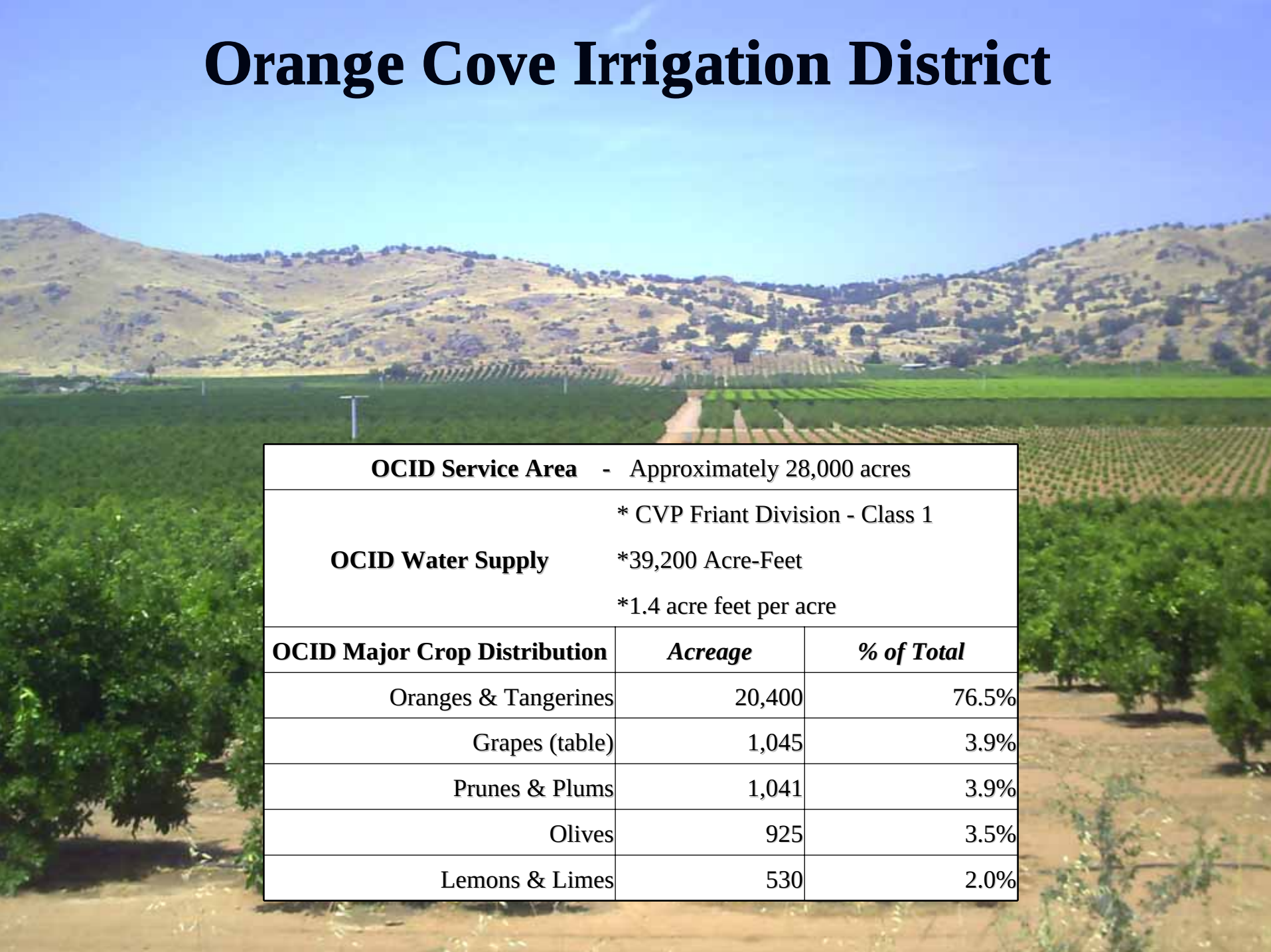
- Reclamation begins latest Conservation and Efficiency Criteria, now undergoing public comment.

Water Supply Distribution Improvements

Typical Examples

- Orange Cove Irrigation District (Pipe)
- Delano-Earlimart Irrigation District (Pipe)
- Tulare Irrigation District (Open Channel)

Orange Cove Irrigation District



OCID Service Area - Approximately 28,000 acres		
OCID Water Supply	* CVP Friant Division - Class 1 *39,200 Acre-Feet *1.4 acre feet per acre	
OCID Major Crop Distribution	***Acreage***	***% of Total***
Oranges & Tangerines	20,400	76.5%
Grapes (table)	1,045	3.9%
Prunes & Plums	1,041	3.9%
Olives	925	3.5%
Lemons & Limes	530	2.0%

Orange Cove Irrigation District - Complete Delivery System Rehabilitation

What?

*** Infrastructure**

- 105 miles of PVC Pipeline - Closed / Pressurized System
- 850 Propeller Type Flow Meters (+/- 2% accuracy)
- 45 High Efficiency Pumps (incl. Staged and Variable Frequency Drives at each Turnout)
- Fully SCADA Enabled / On Demand System
- 4 Time-of-Use Reservoirs (off peak period (night) pumping / peak period gravity delivery)

When? *** Started 1992 - Completed 1995**

Why?

*** Water Conservation - 15% Conveyance Loss Reduction (Canal Turnout to Field)**

**15%* *Pre-project Conveyance Loss*

**0%* *Post-project Conveyance Loss*

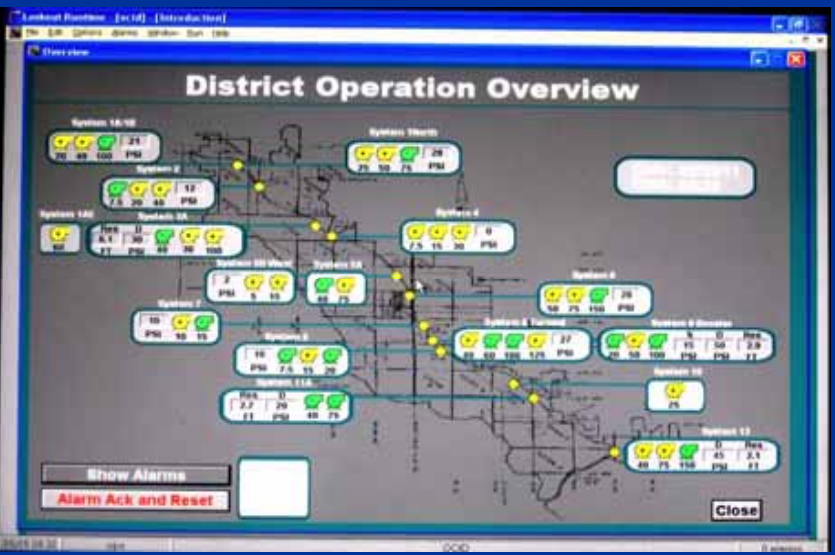
*** Energy Conservation - 40% Annual Energy Consumption Reduction**

*Pre-project Electrical Power Consumption - 4.7 Million Kilowatt Hours

*Post-project Electrical Power Consumption - 2.8 Million Kilowatt Hours

How Much? * $22 Million (25 Year Bonds - 2017 Payoff)

VFD Controller



Human-Machine SCADA Interface

SCADA Receiver Antenna

DELANO – EARLIMART IRRIGATION DISTRICT

DEID Service Area - Approximately 56,500 acres	
DEID Water Supply	* CVP Friant Division *108,800 Acre Feet Class 1 *74,500 Acre Feet Class 2
DEID Permanent Crop Distribution	***% of Total***
Grapes	54%
Almonds	17%
Other Tree Fruit and Nut Crops	14%
Total	86%

DEID Distribution System

- Fully pipelined, 172 miles of Rubber Gasket Reinforced Concrete Pipe.
- Closed system.
- 466 active turnouts (2009); fully metered.
- Installations of pressure-compensating float systems for constant flow regulation.

DEID Distribution System (continued)

- 18 pumping plants:
  - 5 re-regulation reservoirs
  - Over 100 individual pumps
  - $1.65 million motor control center replacement project completed in 2008
- SCADA controlled system
  - installed in 1999 at a cost of $4.5 million

TULARE IRRIGATION DISTRICT

Open Channel Distribution System

300 Miles of Unlined Canal

TID Service Area - Approximately 72,000 acres **Irrigated –** Approximately 61,835 acres	
TID Water Supply	* CVP Friant Division * 30,000 Acre Feet Class 1 ·* 141,000 Acre Feet Class 2 ·Local ·50,000 Acre Feet Avg. Kaweah River

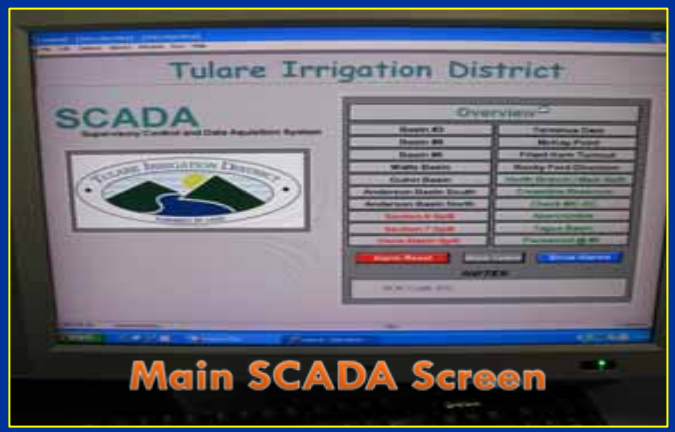
TID Permanent Crop Distribution	***Acres***
Corn	20,936
Alfalfa	16,696
Wheat	11,752
Acres are based on two rounds of crops and some	
crops may be double counted on the same land.	

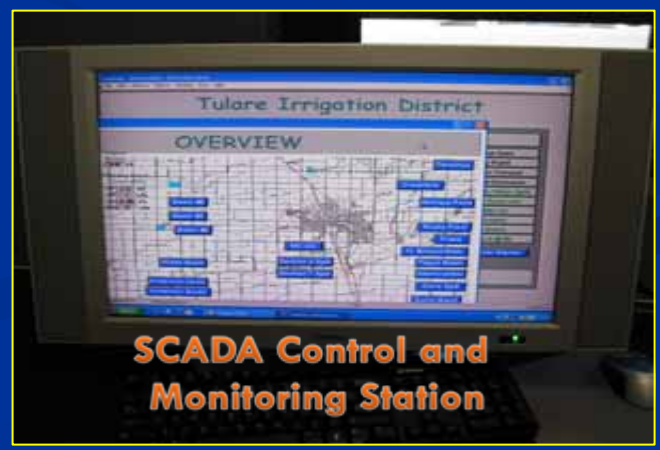
Supervisory Control and Data Acquisition (SCADA) Investments

- Investment of approximately $2 Million in SCADA equipment.
  - Monitoring and canal structure control systems.

Supervisory Control and Data Acquisition (SCADA) Investments

- SCADA Programs:
  - Permit better water management practices.
  - Balance canal systems and maintain constant levels.
  - Reduce the amount of water spilled outside the District, conserving surface water.
  - Increase flexibility in meeting grower demands efficiently.
  - Provide monitoring and warnings that permit quicker responses to operational needs and emergencies.





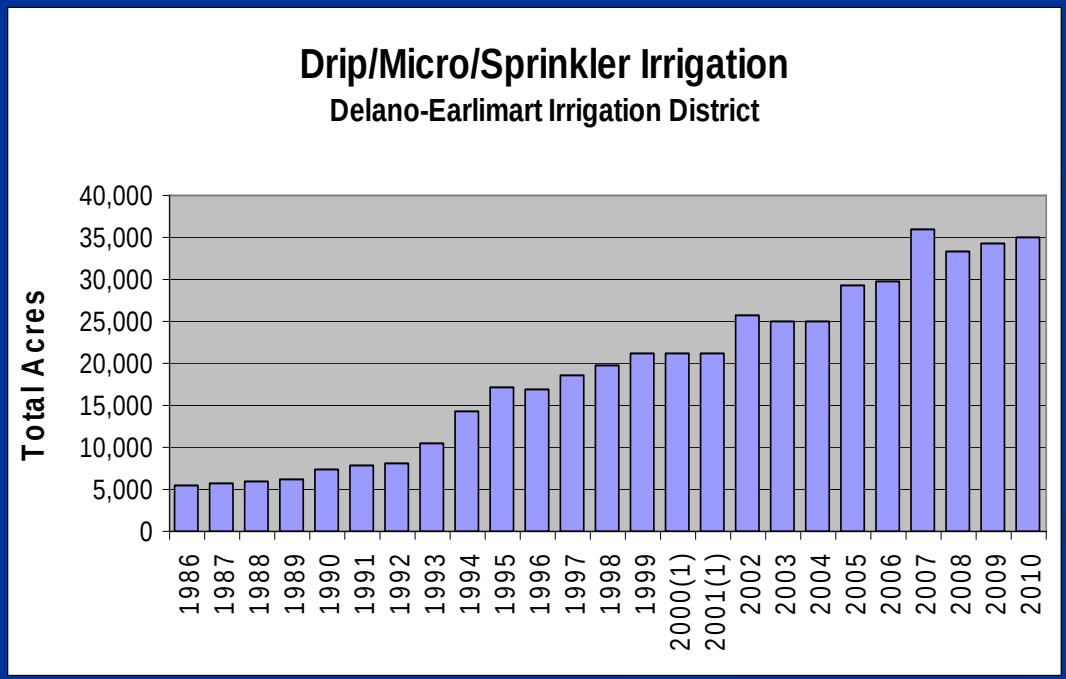
On Farm Efficiency Examples

- Orange Cove Irrigation District
- Delano-Earlimart Irrigation District
- Tulare Irrigation District

Orange Cove I.D.

Irrigation Method	*Acreage by Method*	*% by Method*
Border/Flood	505	2%
Furrow	4,640	18%
Sprinkler	1,099	4%
Drip	19,871	76%
Totals	26,115	100%

Year	Average Grower Cost for Surface Water Deliveries
	$/acre-foot
1950	$ 5.70
1955	$ 4.60
1960	$ 4.60
1965	$ 4.60
1970	$ 4.60
1975	$ 4.60
1980	$ 12.80
1990	$ 49.48
1995	$ 56.00
2000	$ 64.00
2005	$ 70.00
2010	$ 80.00



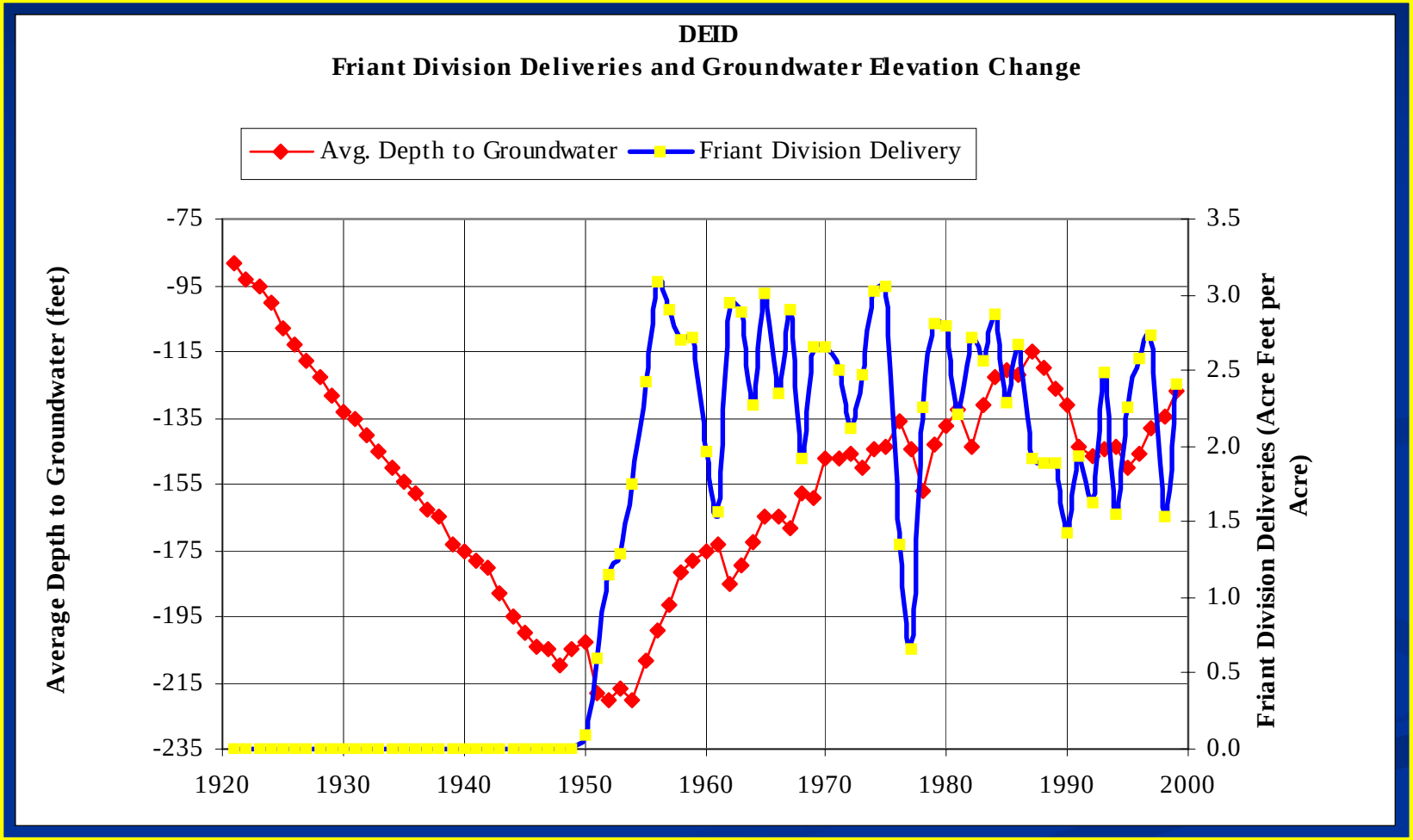
Year	Grower Cost for Surface Water
	$/acre-foot
1951	$ 3.00
1955	$ 3.60
1960	$ 2.00
1965	$ 2.00
1970	$ 2.00
1975	$ 2.00
1980	$ 2.25
1990	$ 13.00
1995	$ 19.75
2000	$ 26.50
2005	$ 33.00
2009	$ 49.50

TID's On-Farm Efficiency Programs

- Farmers use irrigation practices that minimize water usage and save on costs.
- Farmers use NRCS EQIP grants.
- Ag Water Enhancement Program Grants received by TID.
  - Promotes implementation of water efficient practices.
  - Pays about half the cost of farm water efficiency projects.
- SBS Ag's new drip system to irrigate furrow crops such as wheat and corn
  - First-time use of drip for application in furrow crops within TID.
  - NRCS AWEP grant paid 50% of project costs.
  - Anticipated water savings of 30%.
  - First wheat crop yielded a 15% increase in crop production compared to historical practices and adjacent furrow-irrigated fields.
  - Changed field preparation activities and drastically reduced field preparation to one tractor pass.

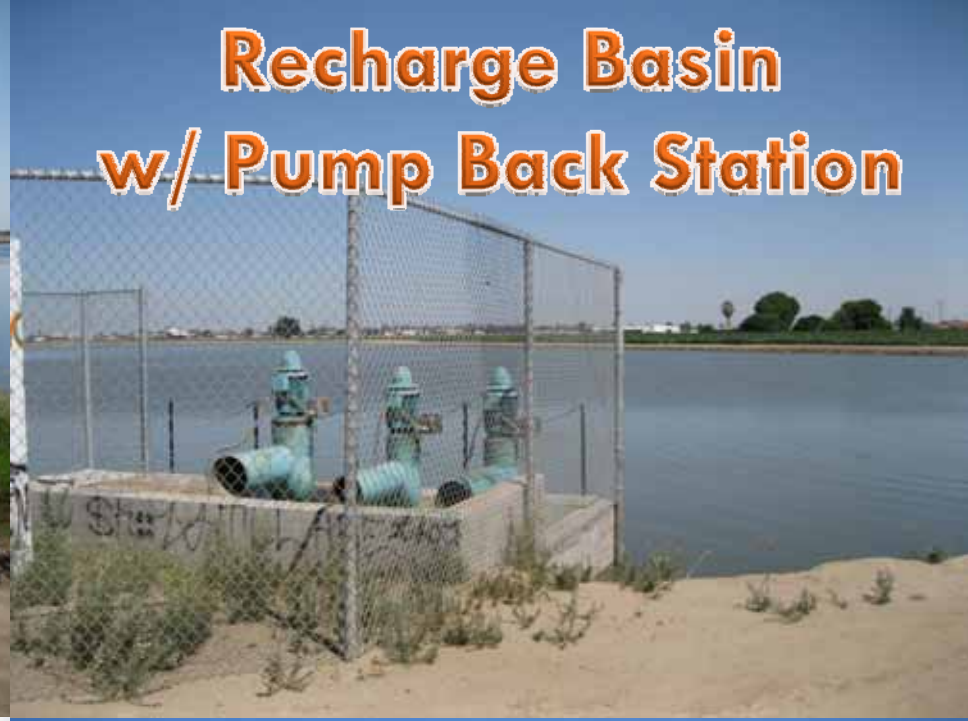
Groundwater and Surface Storage

The Importance of Groundwater Recharge?



Ground Water Levels Dropping


150 Acre Recharge Basin


Recharge Basin
w/ Pump Back Station

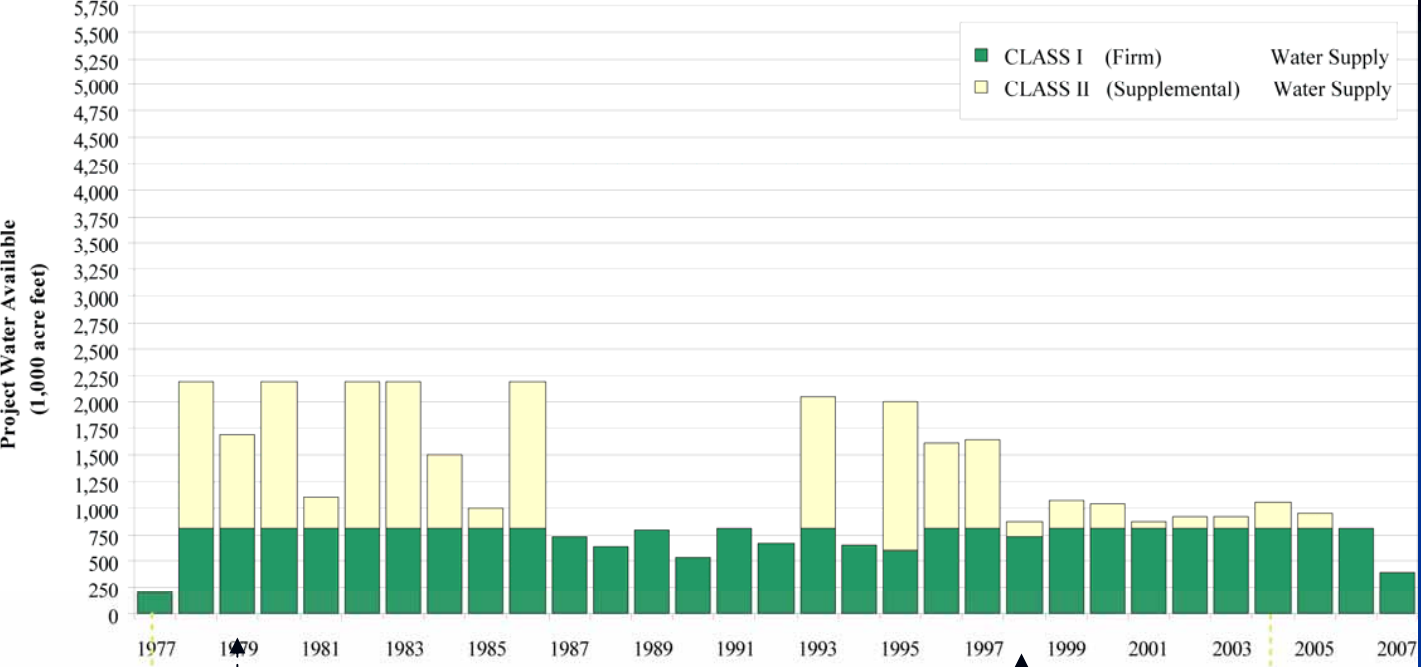

New 150 Acre
Recharge Basin

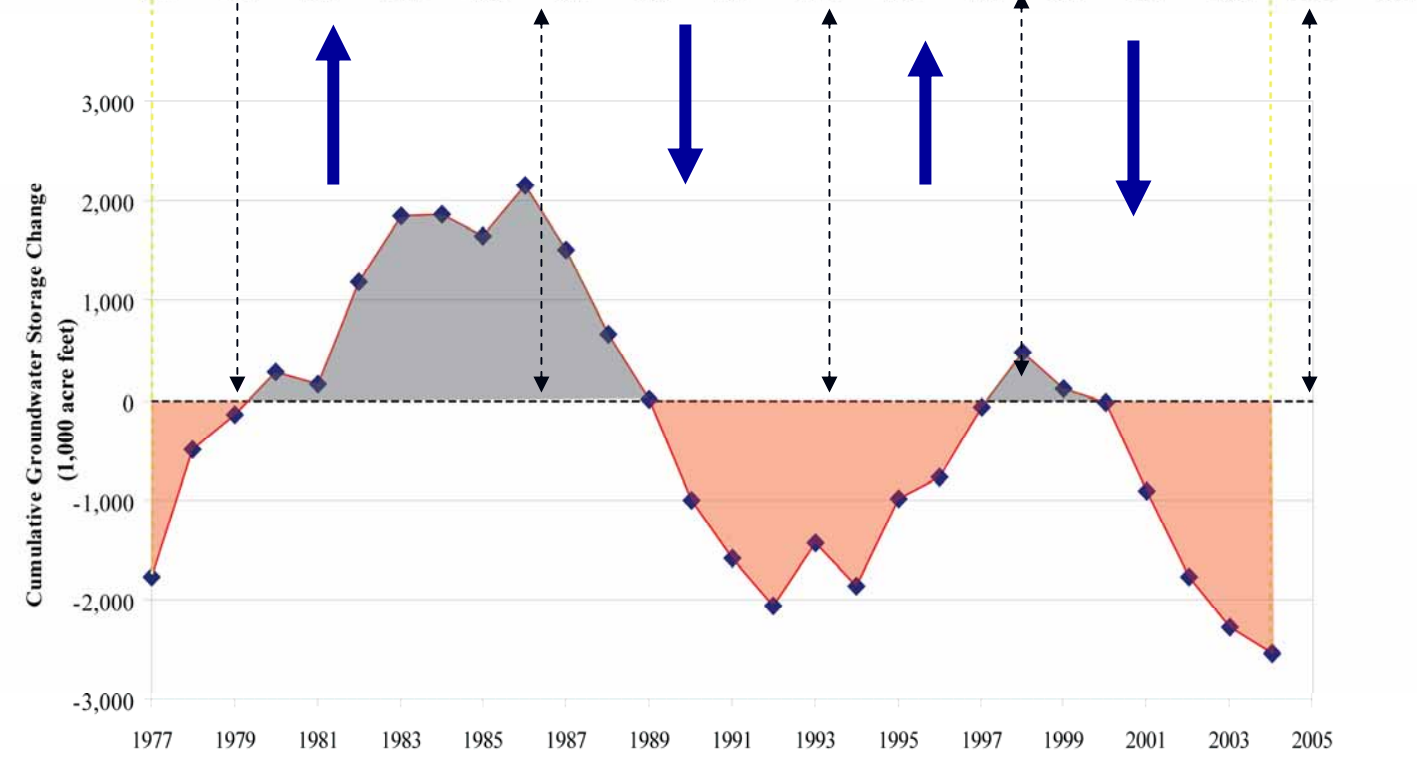

15 Acre Basin

Friant Division

Class 2

Water Supply and Groundwater Storage Relationship

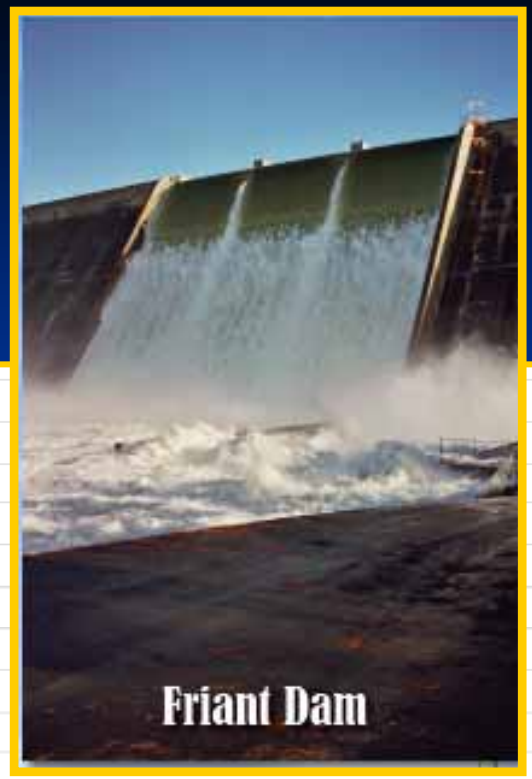




Cumulative Groundwater Storage Change

Friant Division

SJR Flood Releases



*** Based on the past 30 years lost of approximately 14 million AF which is equivalent to approximately 93 years of water supply for the City of Fresno**

Thank You

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