



# Land Subsidence and the Friant-Kern Canal

Alice Peters Auditorium

October 2, 2018

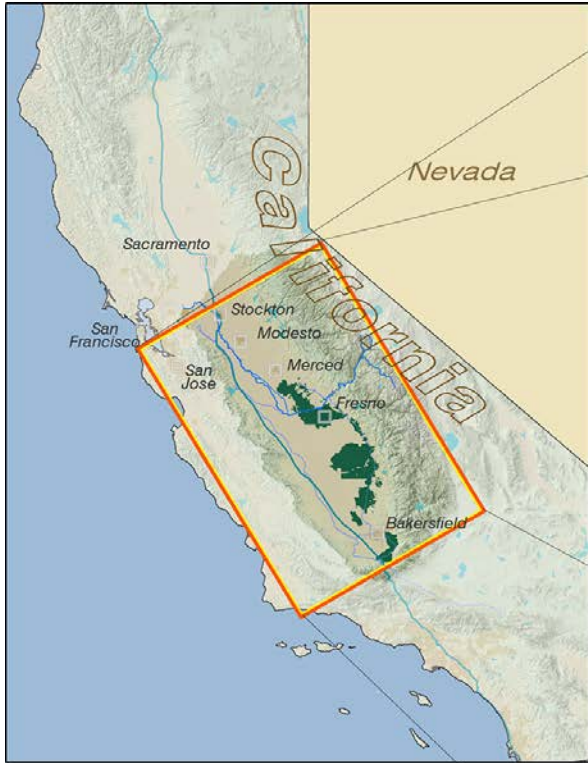
**Douglas DeFlicht**





## Agenda

- **Who is Friant Water Authority**
- **San Joaquin Valley Water Imbalance**
- **Subsidence Problem Statement**
- **Project Alternative**



THE FRIANT DIVISION includes over one million acres of irrigated agriculture among five of the United States' most productive agricultural counties.

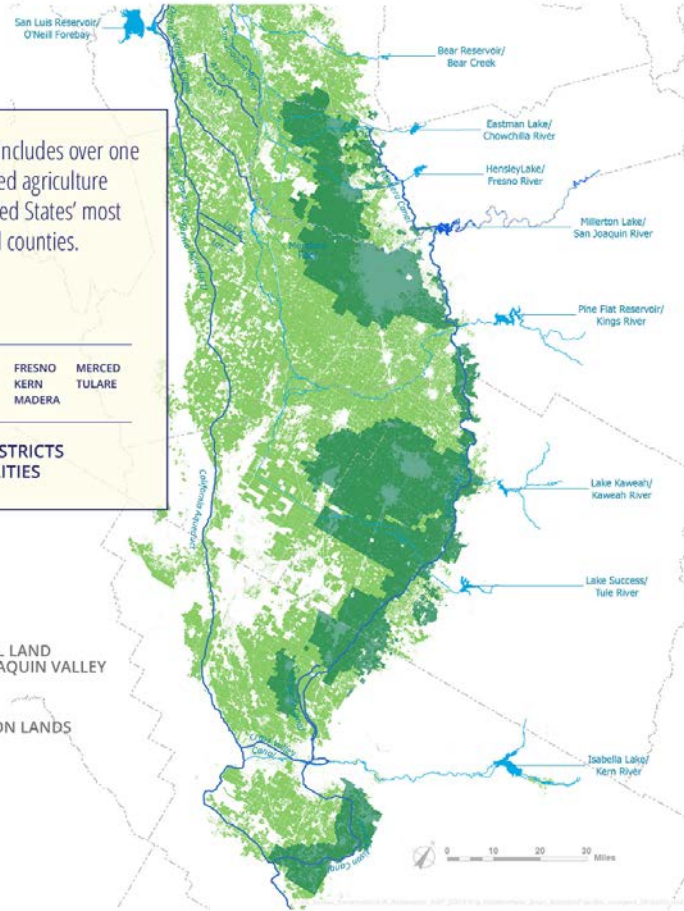
**1M+** ACRES

**5** COUNTIES  
 FRESNO    MERCED  
 KERN      TULARE  
 MADERA

**34** AGENCIES, DISTRICTS & MUNICIPALITIES

 AGRICULTURAL LAND IN THE SAN JOAQUIN VALLEY

 FRIANT DIVISION LANDS



Served from the Friant-Kern Canal

Madera Canal

## Friant Division Contract Volume (Ac-Ft)

Irrigated

District

Class 1

Class 2

Total

Acres

1	Arvin-Edison WSD	40,000	311,675	351,675	132,657
2	Fresno (City of)	60,000	-	60,000	-
3	Hills Valley ID	1,250	-	1,250	4,330
4	Kaweah Delta WCD	1,200	7,400	8,600	340,369
5	Kern-Tulare WD	-	5,000	5,000	20,963
6	Lindmore ID	33,000	22,000	55,000	27,324
7	Lindsay-Strathmore ID	27,500	-	27,500	15,507
8	Orange Cove ID	39,200	-	39,200	29,000
9	Porterville ID	15,000	30,000	45,000	16,987
10	Saucelito ID	21,500	32,800	54,300	19,721
11	Terra Bella ID	29,000	-	29,000	13,881
12	Tulare ID	30,000	141,000	171,000	67,261
13	Fresno ID	-	75,000	75,000	247,562
14	Madera ID	85,000	186,000	271,000	86,533
15	Chowchilla WD	55,000	160,000	215,000	252,364
subtotal		437,650	970,875	1,408,525	1,274,459

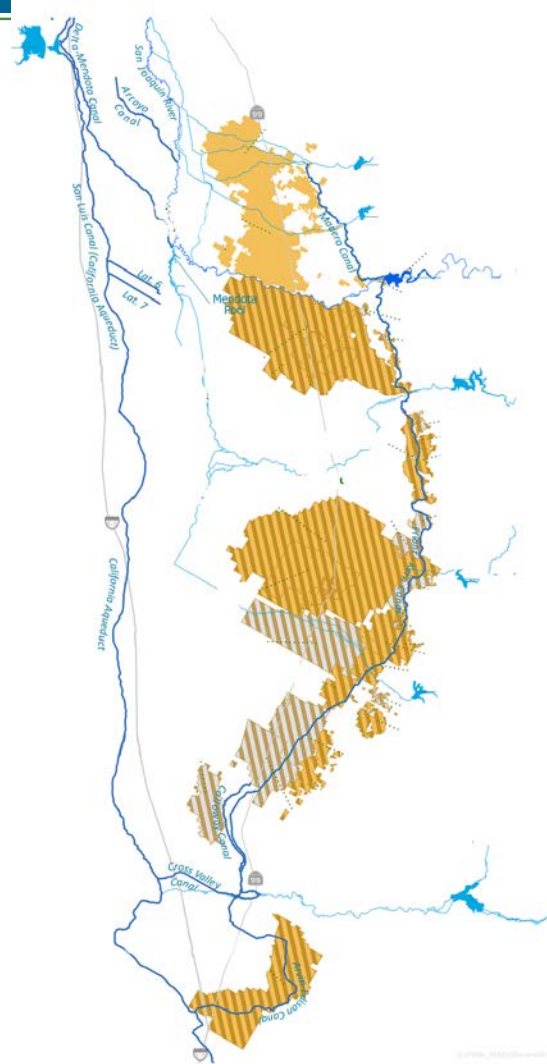
*Percent of Friant Division*

55%

69%

64%

77%



District	
1	Lower Tule River ID
2	Delano-Earlimart ID
3	Southern San Joaquin MUD
4	Shafter-Wasco ID
5	Exeter ID
6	Gravelly Ford WD
7	Stone Corral ID
8	Tea Pot Dome WD
9	Ivanhoe ID
10	Garfield WD
11	Lindsay (city)
12	Orange Cove (city)
13	International WD
14	Lewis Creek WD
15	Tri-Valley WD
16	Madera County
17	Fresno County

**subtotal**  
*Percent of Friant Division*

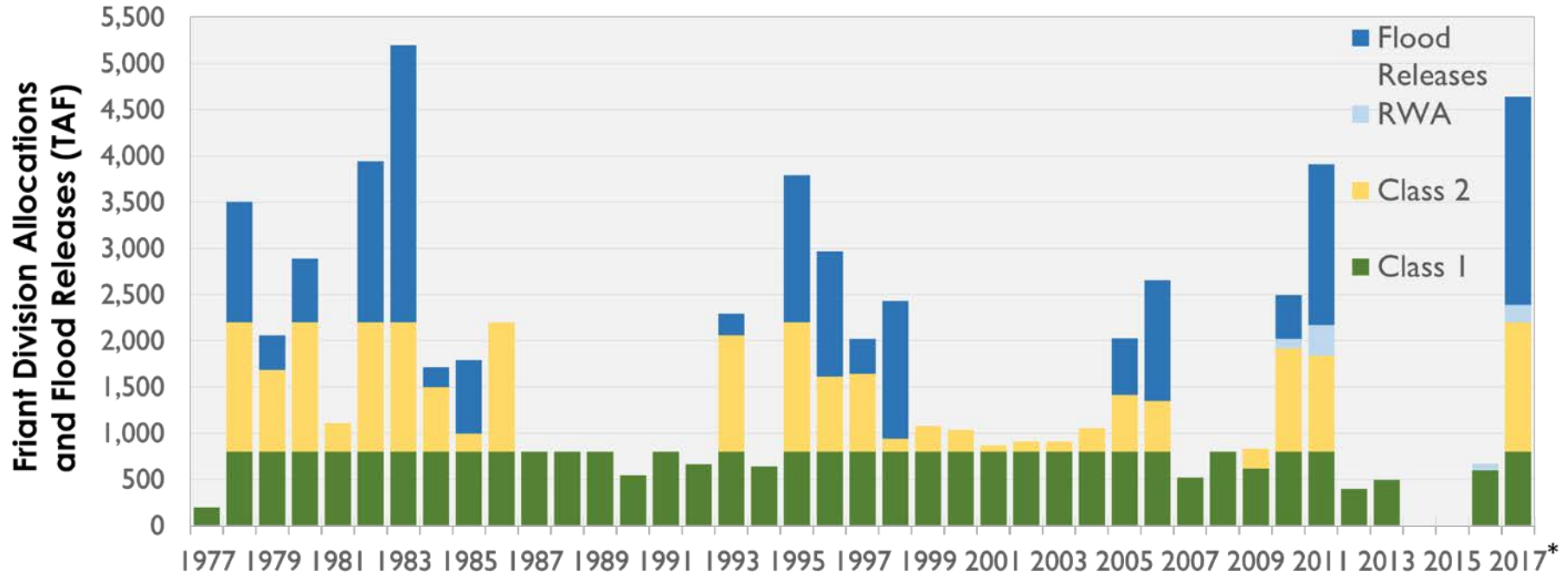
Friant Division Contract Volume (Ac-Ft)		
Class 1	Class 2	Total
61,200	238,000	299,200
108,800	74,500	183,300
97,000	45,000	142,000
50,000	39,600	89,600
11,100	19,000	30,100
-	14,000	14,000
10,000	-	10,000
7,200	-	7,200
6,500	500	7,000
3,500	-	3,500
2,500	-	2,500
1,400	-	1,400
1,200	-	1,200
1,200	-	1,200
400	-	400
200	-	200
150	-	150
<b>362,350</b>	<b>430,600</b>	<b>792,950</b>
45%	31%	36%

Irrigated Acres
102,987
56,463
61,432
38,919
15,112
8,394
6,878
3,553
11,095
1,809
-
-
736
1,289
5,724
-
-
<b>384,168</b>
23%



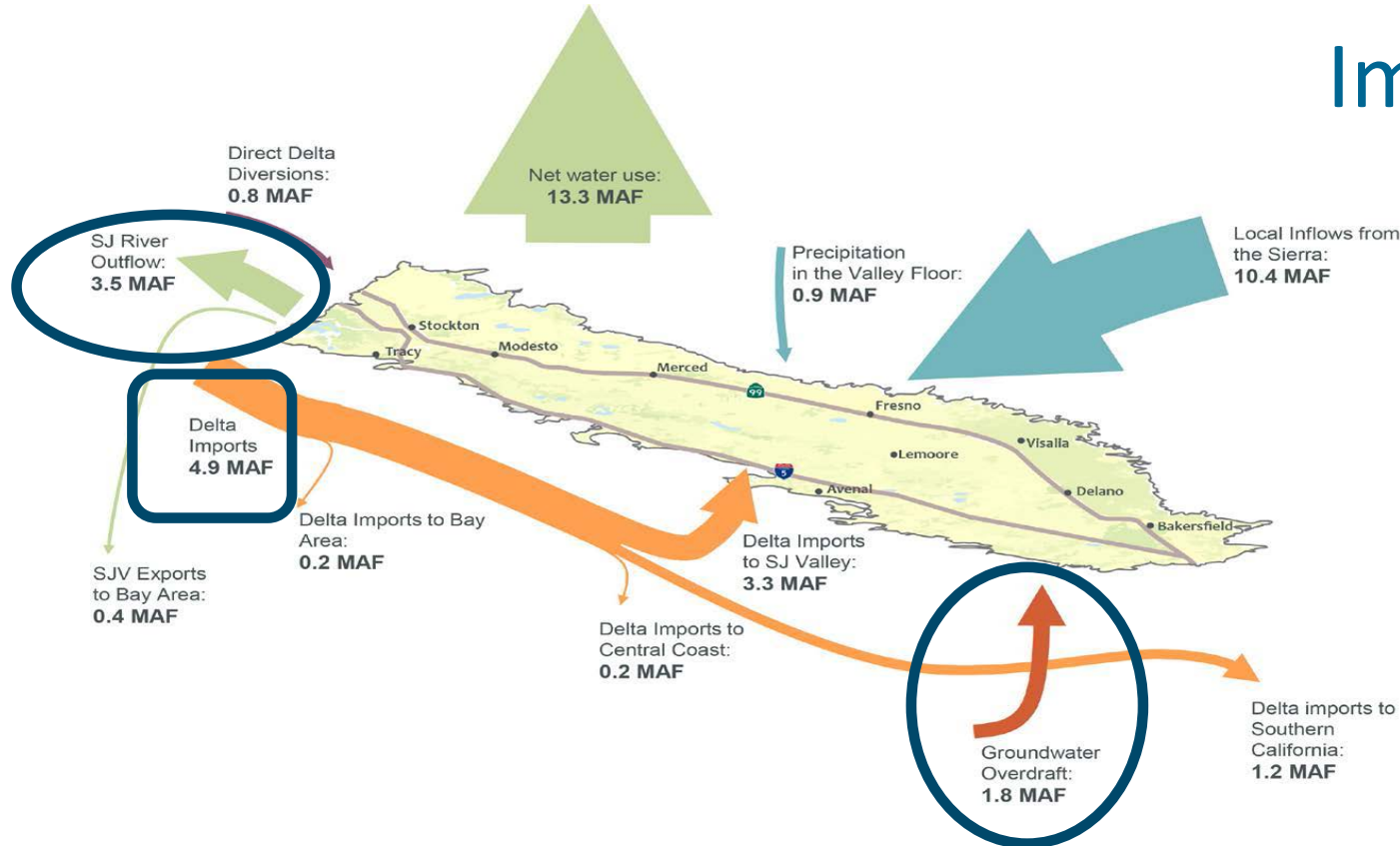
# FRIANT DELIVERIES

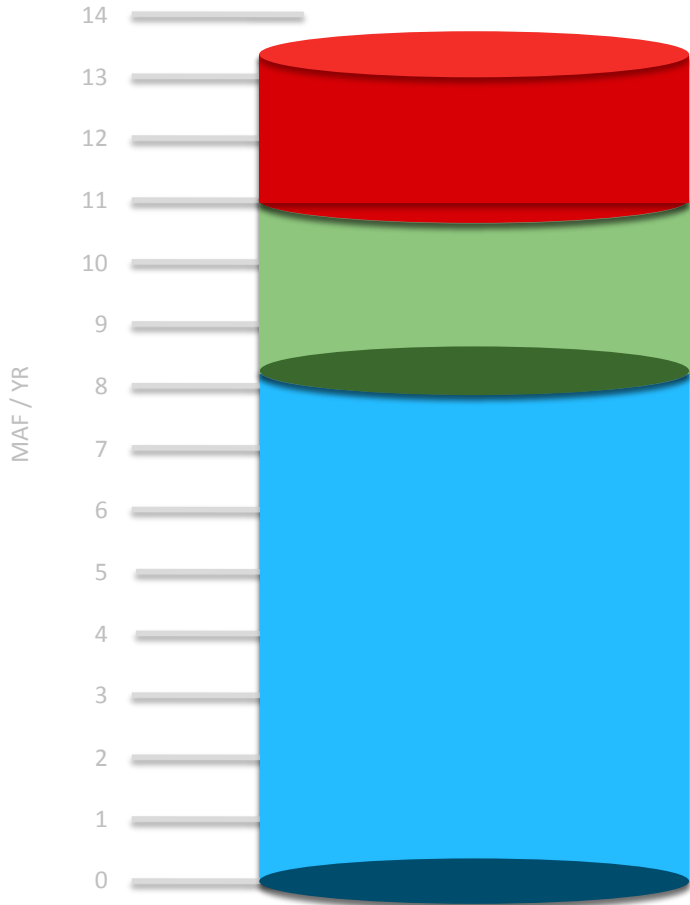
## Long-term average 1.2 MAF/YR





# SJV Water Supply Imbalance





Existing San Joaquin Valley Water Need  
13.3 Million Acre-Feet (MAF) per Year

**PROJECTED GROUNDWATER  
OVERDRAFT | 2.3 MAF/YR**

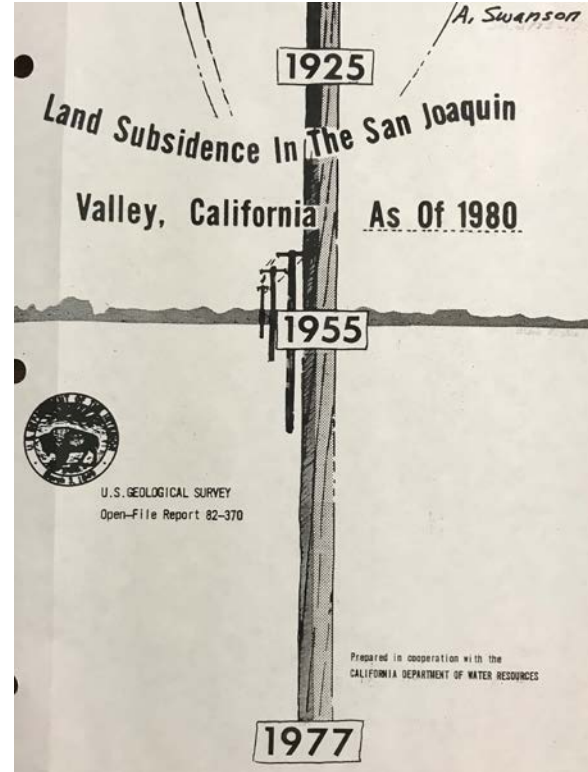
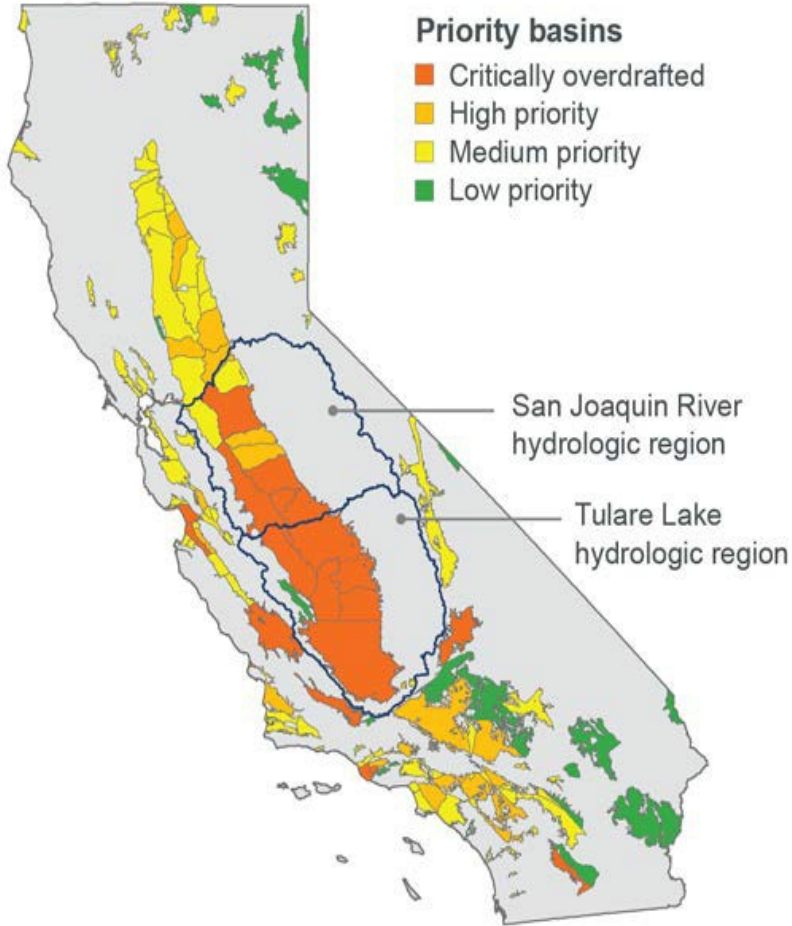
Delta Supplies | 2.8 MAF/YR

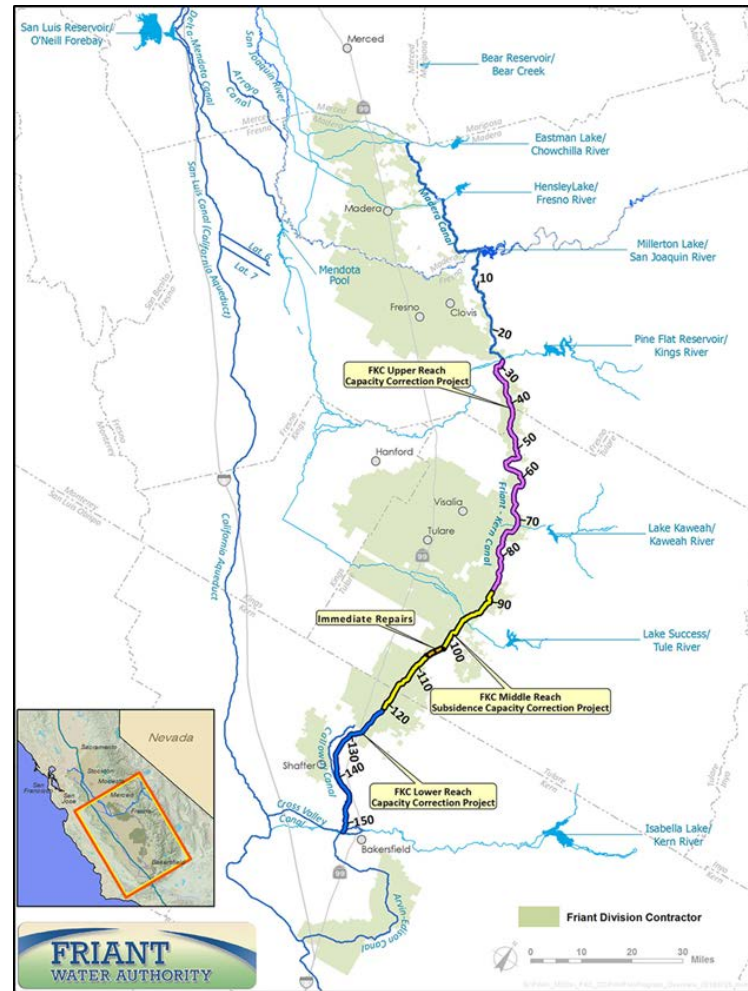
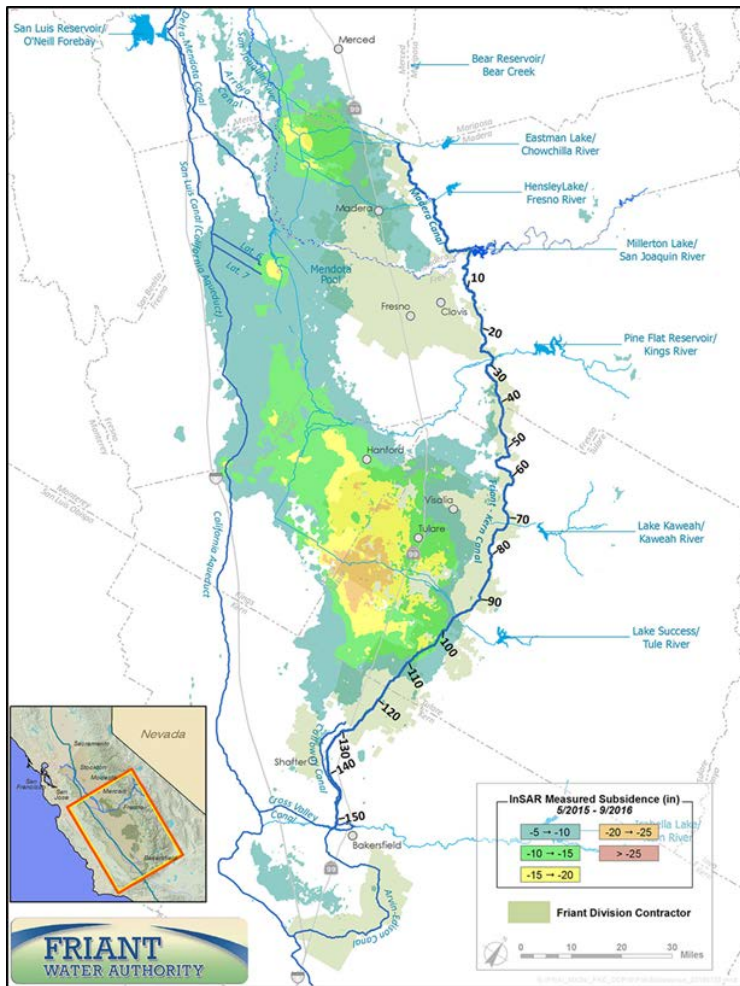
Local Supplies | 8.2 MAF/YR





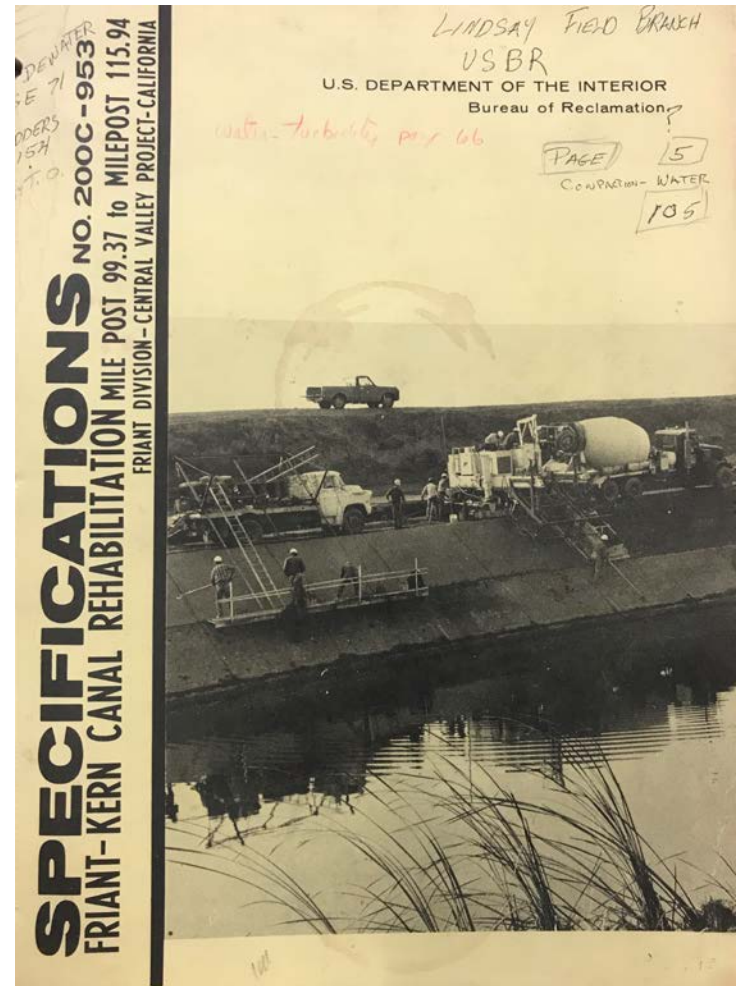
# Friant Division Lands





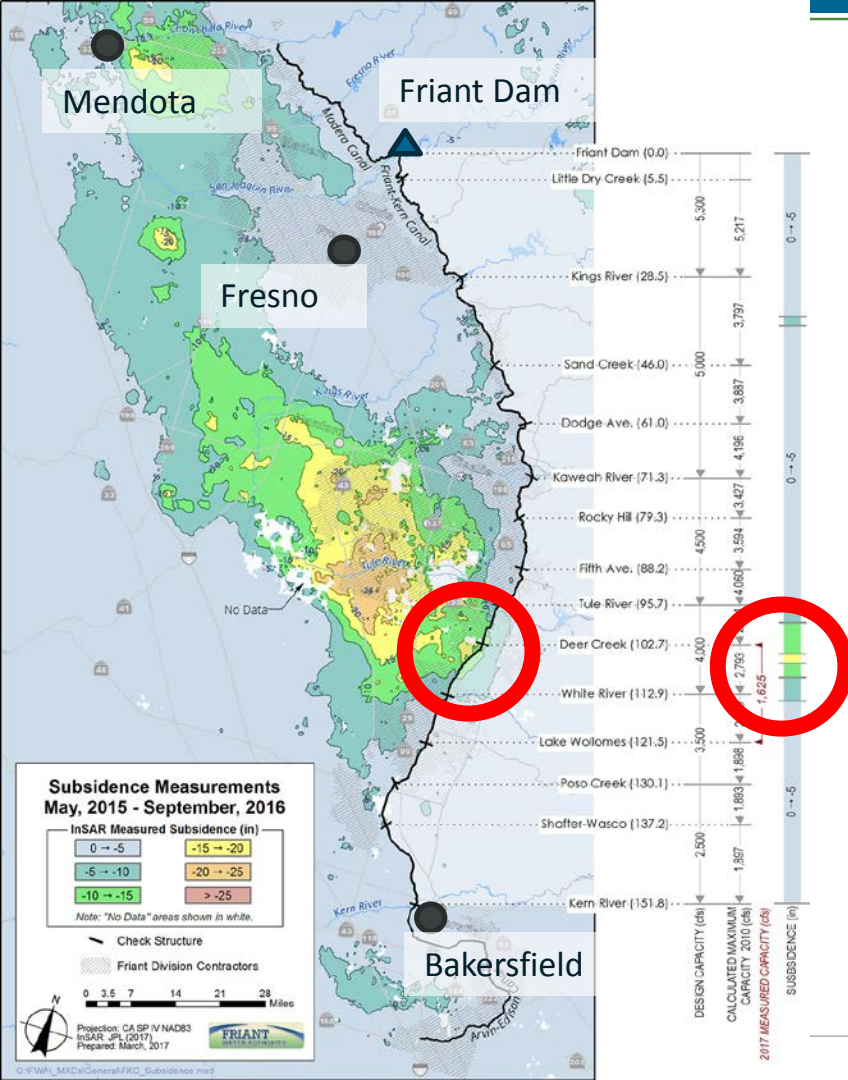
# Friant-Kern Canal Historic Subsidence

- Mile Post 99.37 to 115.94 (of 152 length)
- Friant Districts downstream (~330,000 acres)  
Saucelito Irrigation District (ID), Delano-Earlimart ID, Kern Tulare Water District, South San Joaquin Municipal Utility District, Shafter-Wasco ID, and Arvin-Edison Water Storage District
- Liner Rehabilitation up to 5 feet
- Raised 4 bridges
- Estimated Repair costs ~\$ 4.1 M in 1979

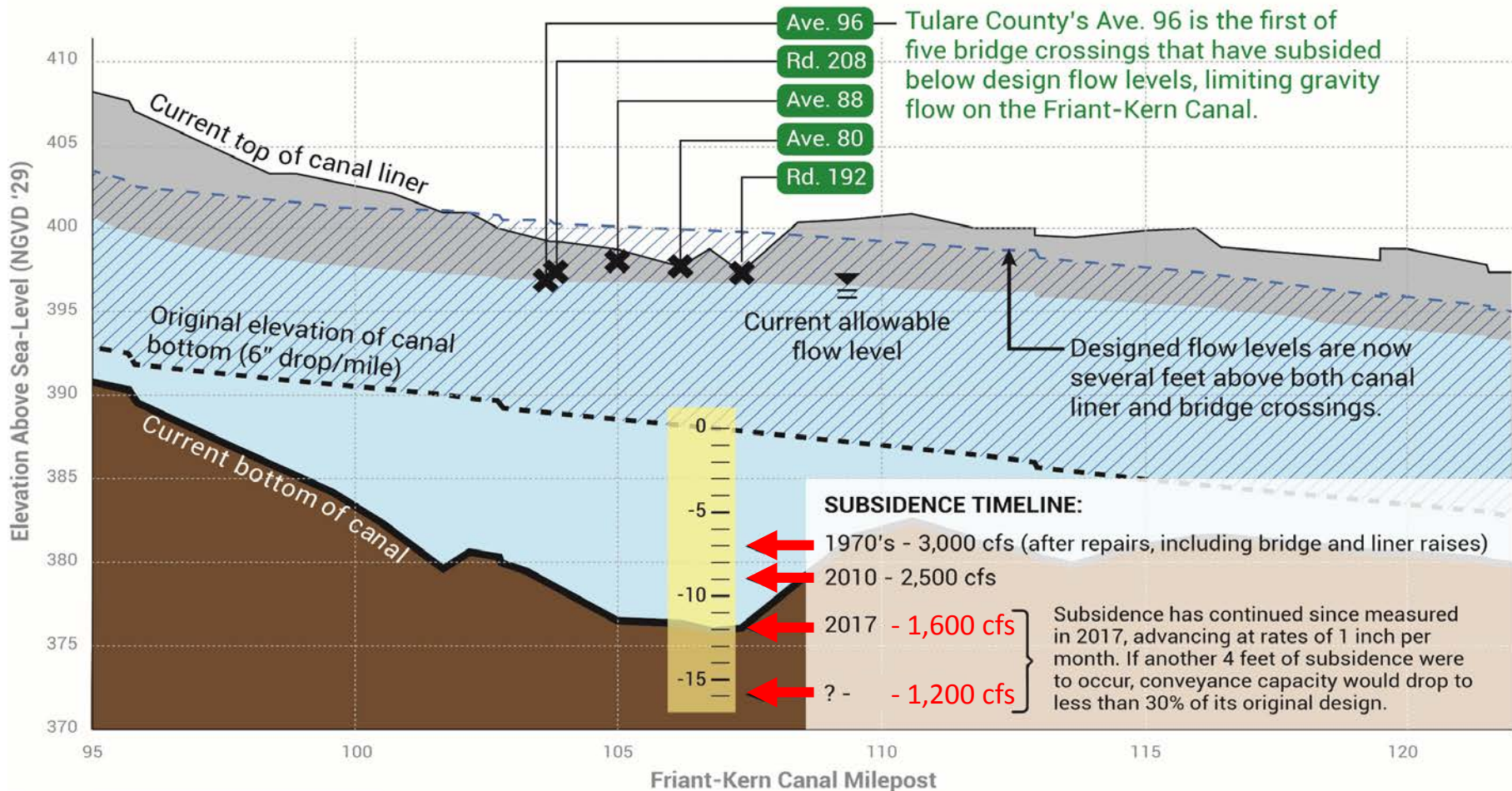


# Friant-Kern Canal Current Subsidence and Conveyance Capacity

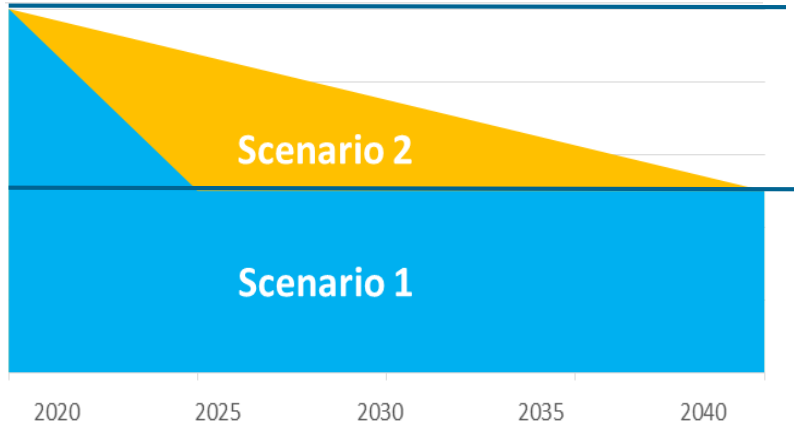
- Around mile post 95 (of 152 length)
- Designed capacity of 4,000 cfs in affected reach
- Estimated capacity in April 2017  
1,600 cfs (60% below design capacity)
- Friant Districts downstream (~330,000 acres)  
Saucelito Irrigation District (ID), Delano-Earlimart ID, Kern Tulare Water District, South San Joaquin Municipal Utility District, Shafter-Wasco ID, and Arvin-Edison Water Storage District
- 300,000 acre-foot reduction in 2017 deliveries
- Long-term Class 2 deliveries expected to be half of historical, with present canal condition
- Unlikely delivery of Section 215 Water in future, without repair



# Friant-Kern Canal: Comparison of Current Conditions to Original Construction



# Preparing for Future Subsidence



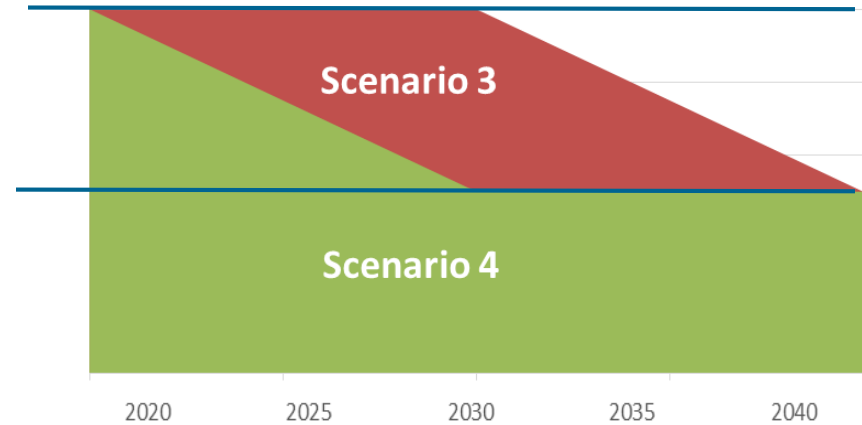
## Hydrology Assumptions

- 50 years average

Current



SGMA

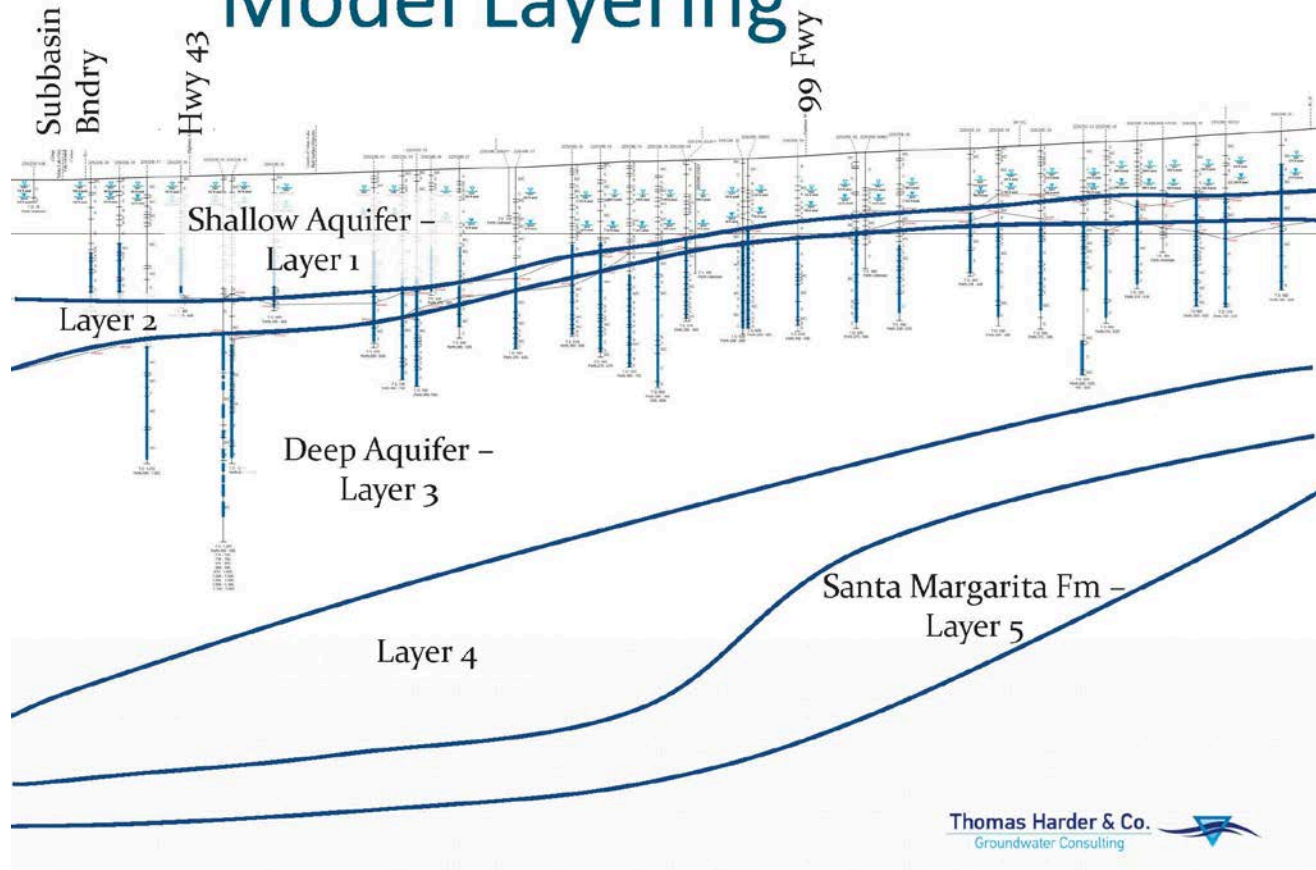


## Hydrology Assumptions

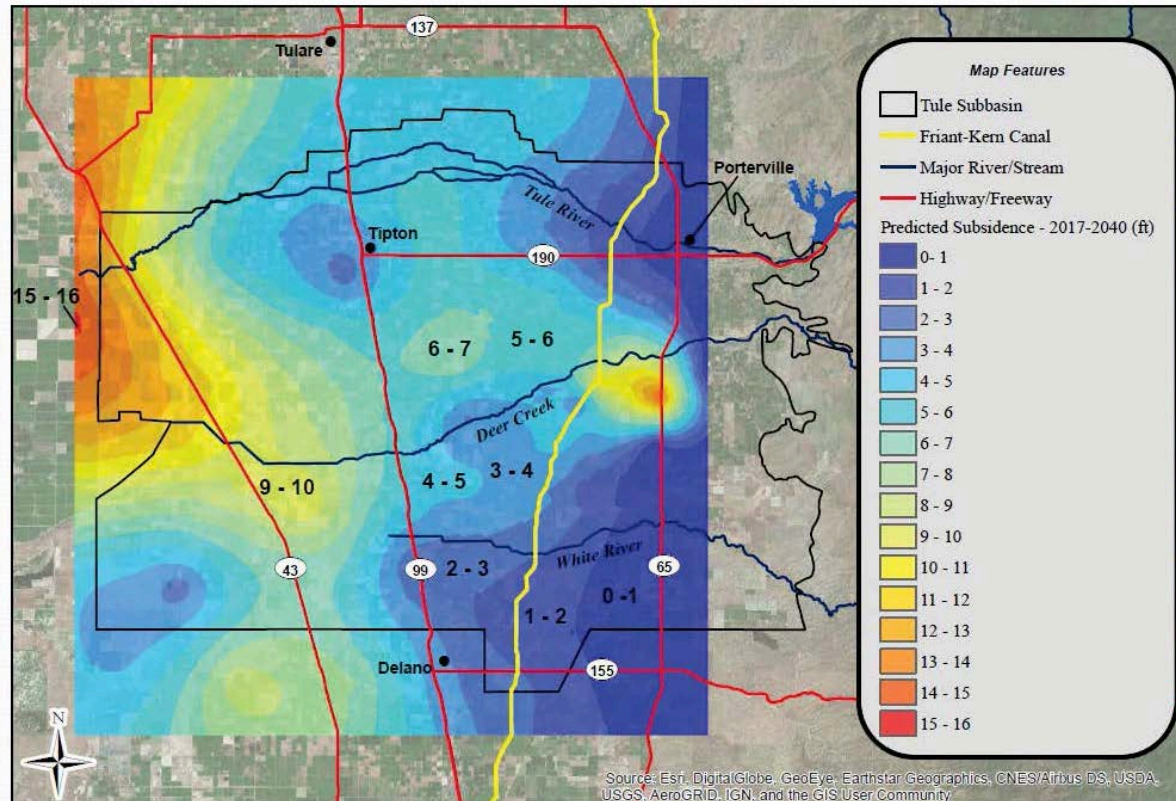
- 18 years dry
- 12 years wet
- 20 years average



# Model Layering

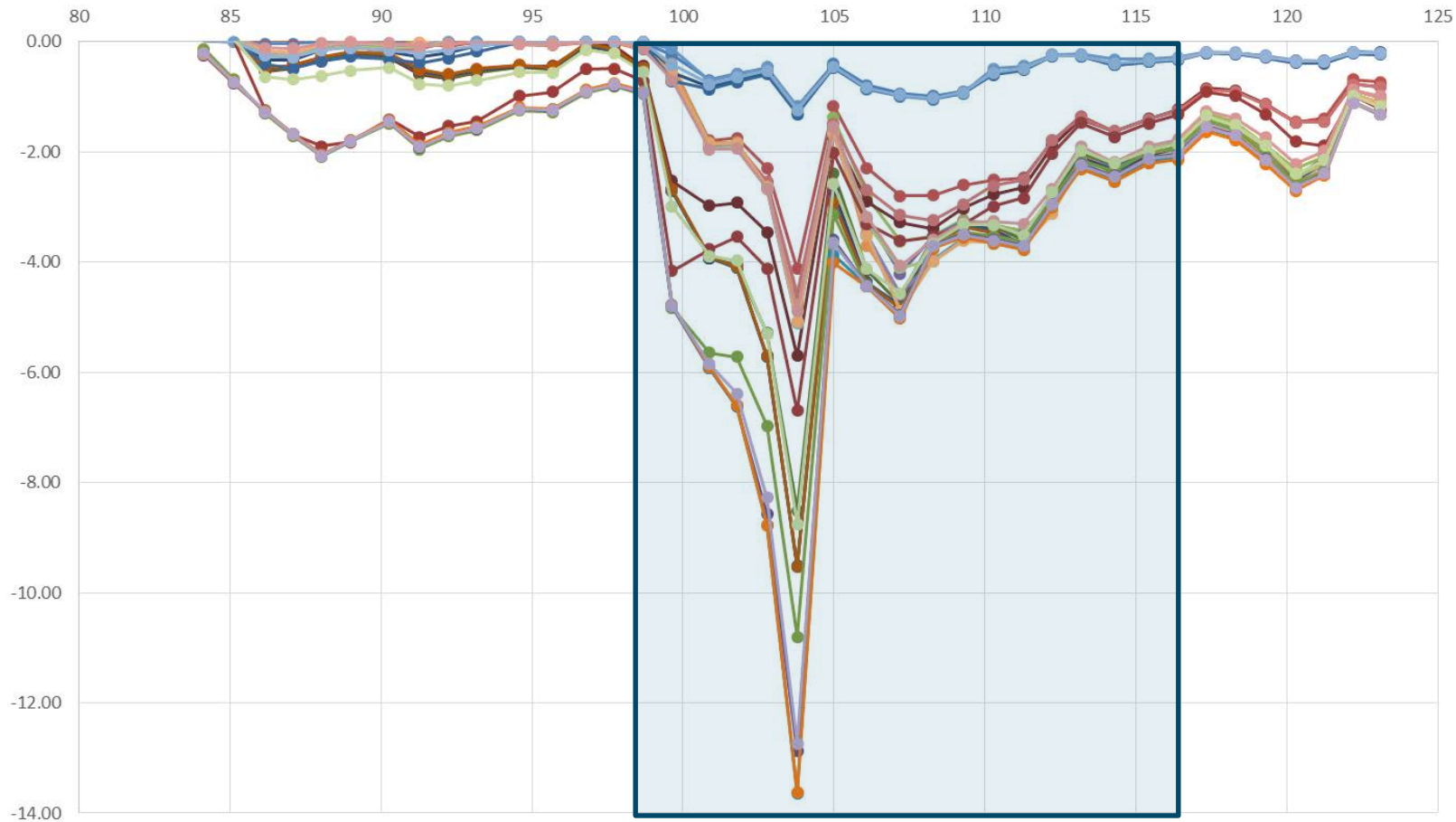


# Model-Projected Land Subsidence Scenario 4

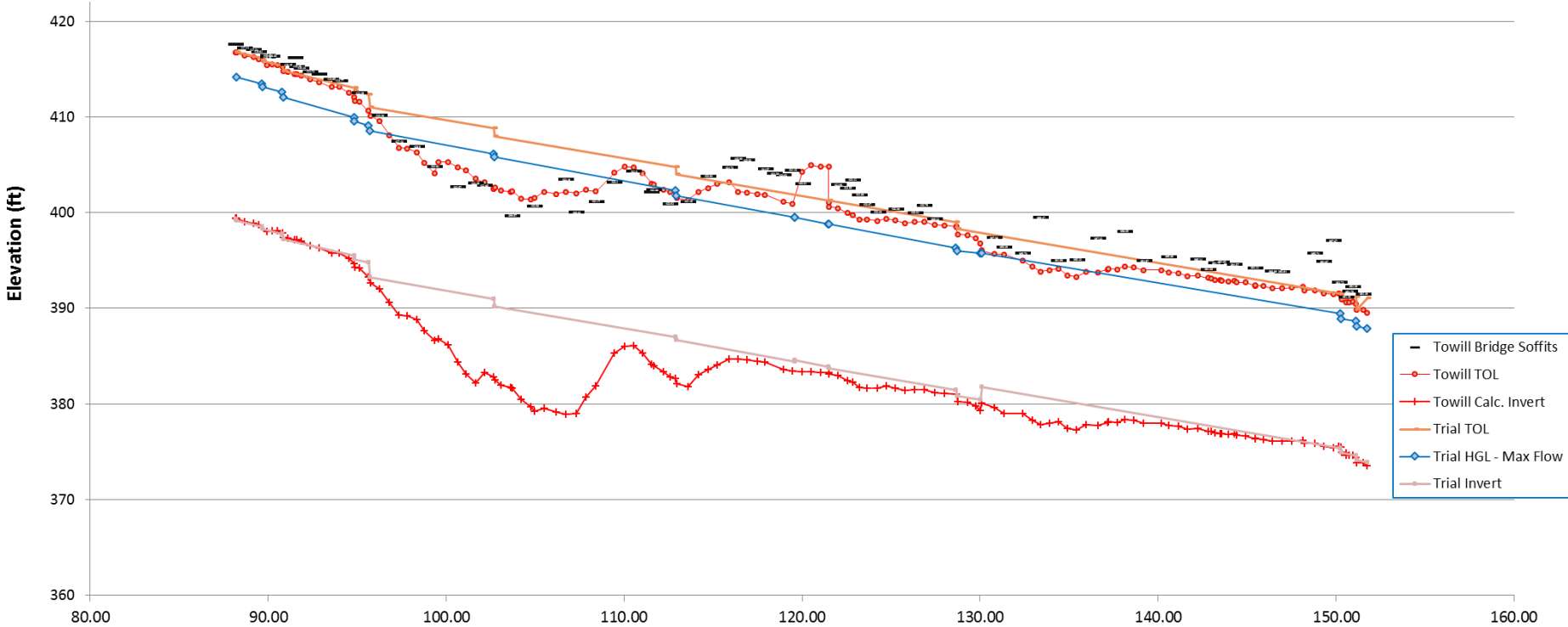




# Simulated Additional Subsidence Along the FKC



# Restoring the Hydraulic Grade Line of the Friant-Kern Canal

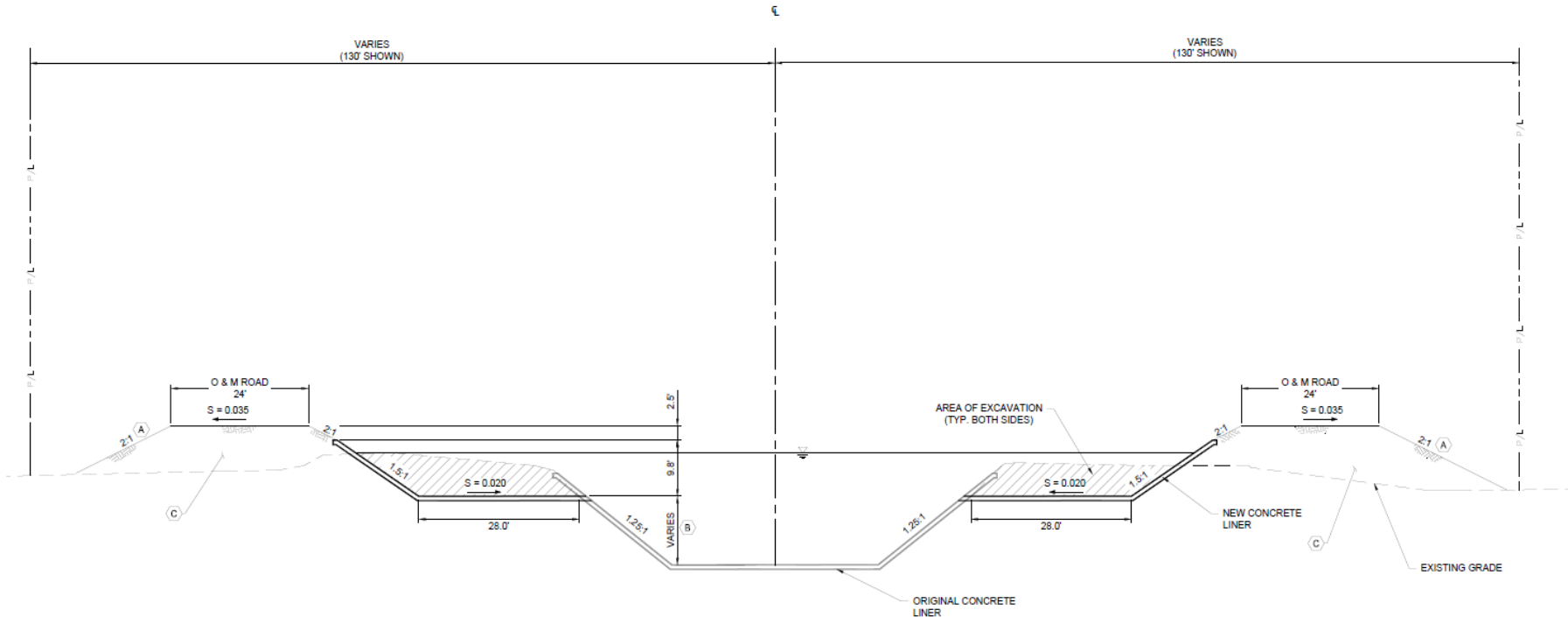


# Project Alternatives -Friant-Kern Canal

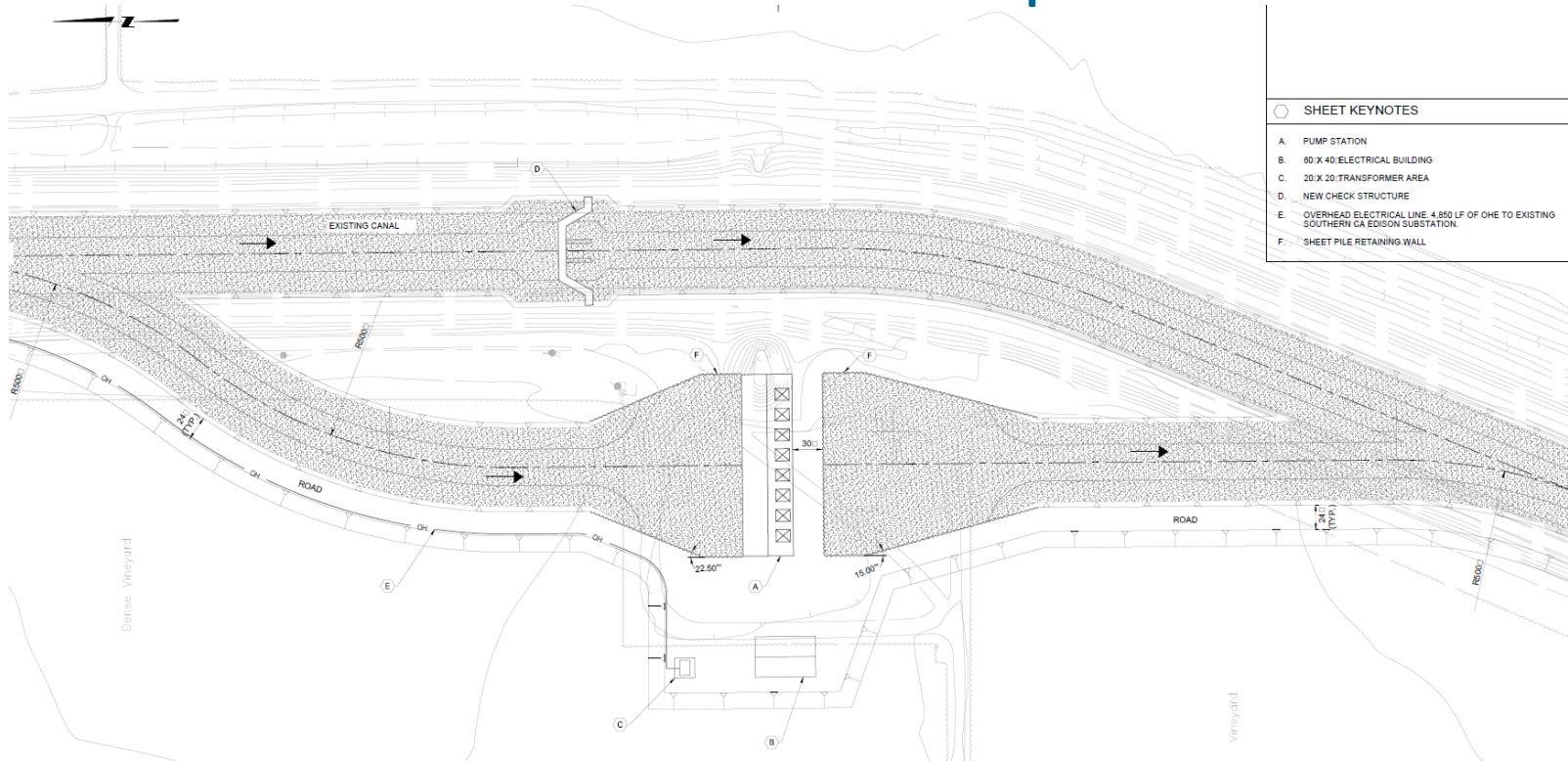
Initial Alternative	Pumping Plant	Widen and Raise Portions of Existing Canal	New Canal	Modify Turnouts	Modified or New Bridges
Enlarge Canal		X		X	X
Pump Station at MP 109	X	X		X	X
Pump to Woollomes	X	X	X	X	X
Bypass – Tule to White River		X	X		X
Bypass – Tule to Woollomes		X	X		X
Parallel Bypass – Tule to Woollomes		X	X		X



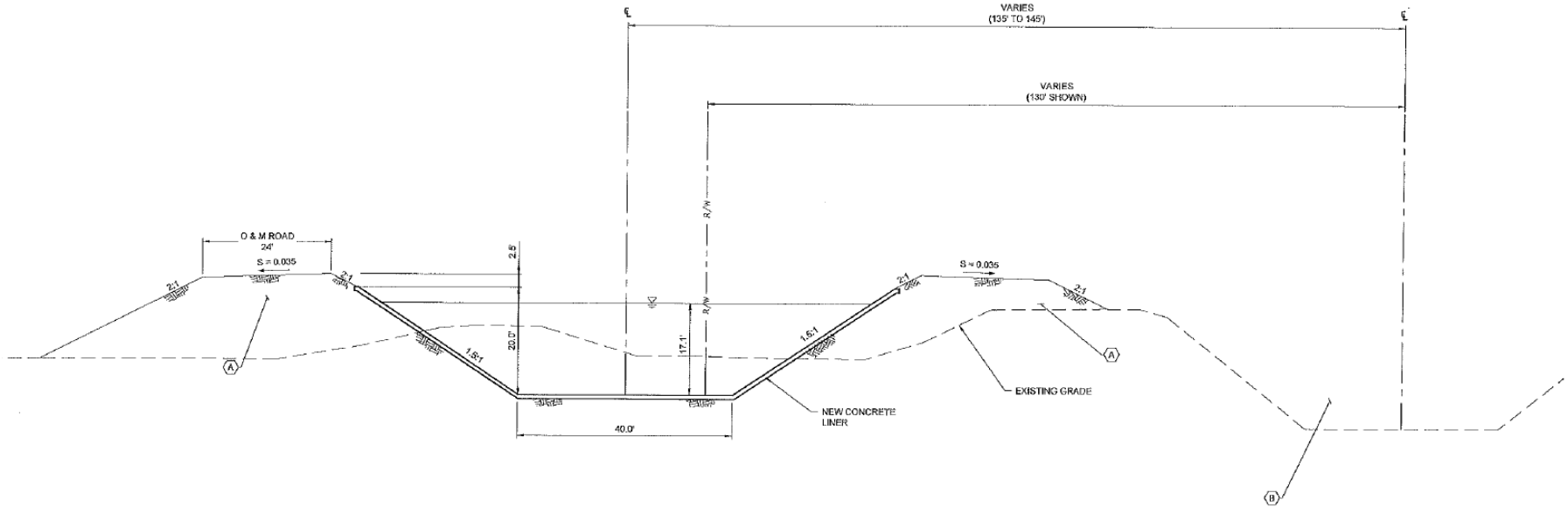
# Project Alternatives – Friant-Kern Canal Enlargement

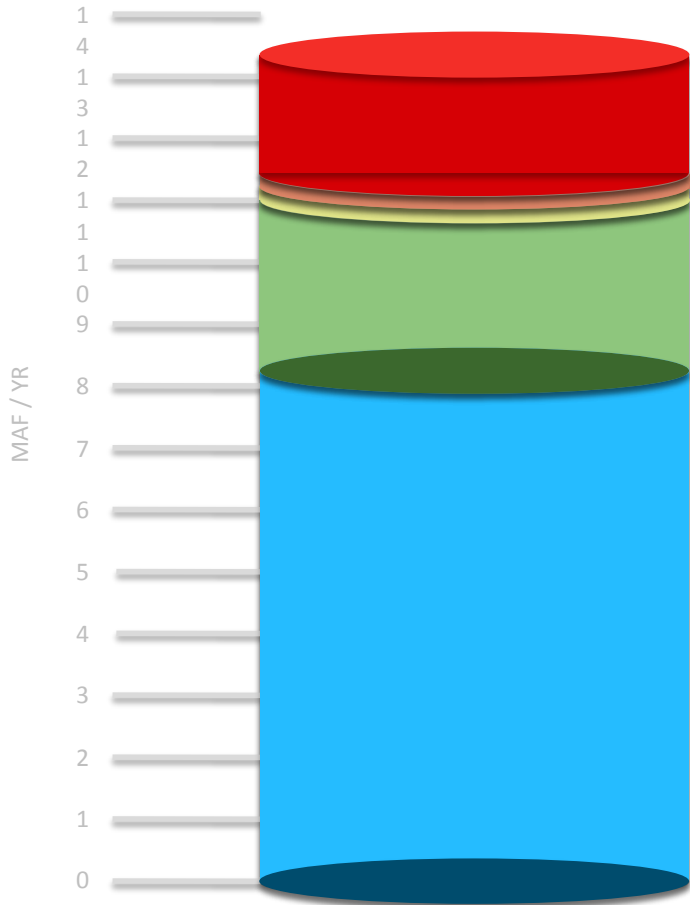


# Project Alternatives – Friant-Kern Canal Pump Station



# Project Alternatives – Friant-Kern Canal Bypass Canal





**Existing San Joaquin Valley Water Need**  
← **13.3 Million Acre-Feet (MAF) per Year**

**SHORTFALL | 1.8 MAF/YR**

**Over 700,000 Acres of**  
**Land Retirement**

New Conveyance | **0.2 MAF/YR**

Temperance Flat Reservoir | **0.2 MAF/YR**

Delta Supplies | **2.8 MAF/YR**

Local Supplies | **8.2 MAF/YR**



**FOR MORE INFORMATION  
VISIT  
[WWW.FRIANTWATER.ORG](http://WWW.FRIANTWATER.ORG)**

**CHIEF OPERATING OFFICER  
DOUGLAS DEFLITCH  
[DDEFLITCH@FRIANTWATER.ORG](mailto:DDEFLITCH@FRIANTWATER.ORG)**

