

# HOW SUBSIDENCE THREATENS SUSTAINABILITY

## WHY IS LAND SUBSIDENCE OCCURRING?

Groundwater overdraft occurring near the Friant-Kern Canal has re-initiated a rapid pace of land subsidence on the east side of the San Joaquin Valley. The re-emergence of subsidence threatens the sustainability of the Friant Division through the formation of a capacity constriction on the Friant-Kern Canal at milepost 100, approximately two-thirds of the way down the canal. Primarily, the recent subsidence is driven by groundwater overdraft occurring outside of the Friant Division.

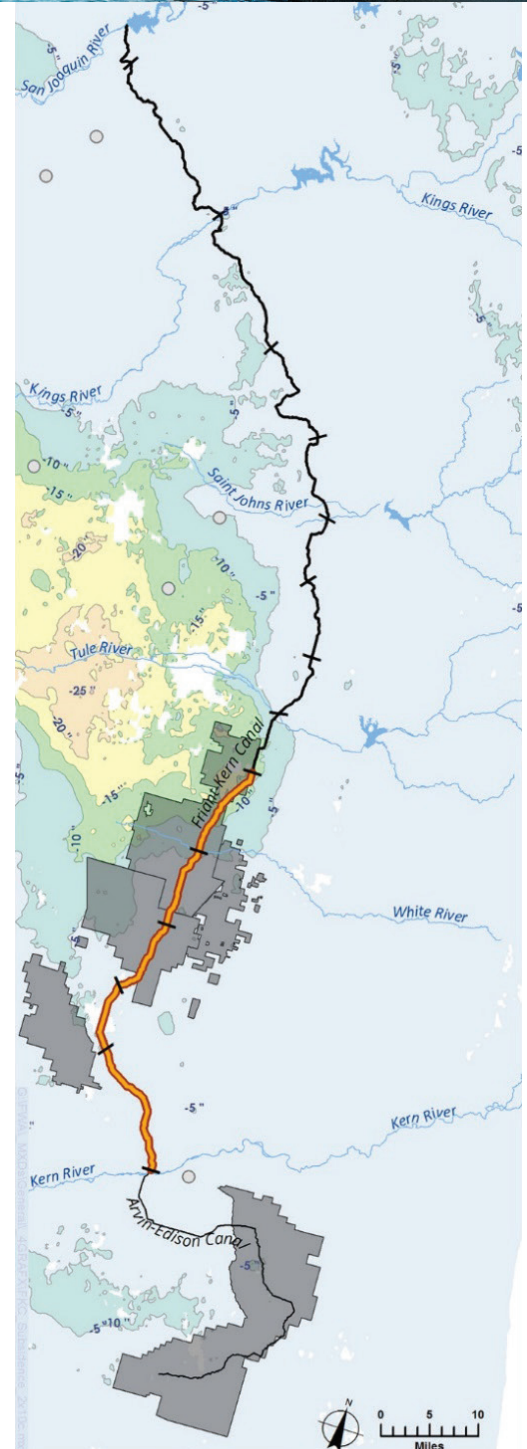
## WHO IS AFFECTED?

The loss of capacity to this 152-mile-long canal will limit exchanges across the region that are likely to become more important with the implementation of SGMA. Currently, groundwater banks are more plentiful beneath the constriction, including those that can be accessed through an intertie with the Cross-Valley Canal. Districts throughout the Friant Division will lose access the groundwater facilities downstream of the constriction, hampering water supply exchanges that will affect the region.

Within the Friant Division, six districts are most acutely impacted by subsidence on the Friant-Kern Canal. Collectively, these districts irrigate more than 330,000 acres in Tulare and Kern counties and have over onethird of the Friant Division Class 2 contract volume. The availability of Class 2 water supplies varies year to year, from zero to 100 percent of contract volumes. This variability serves a foundational role in the Friant Division's conjunctive management design, providing sustainability by allowing groundwater to recharge when surface water is available.

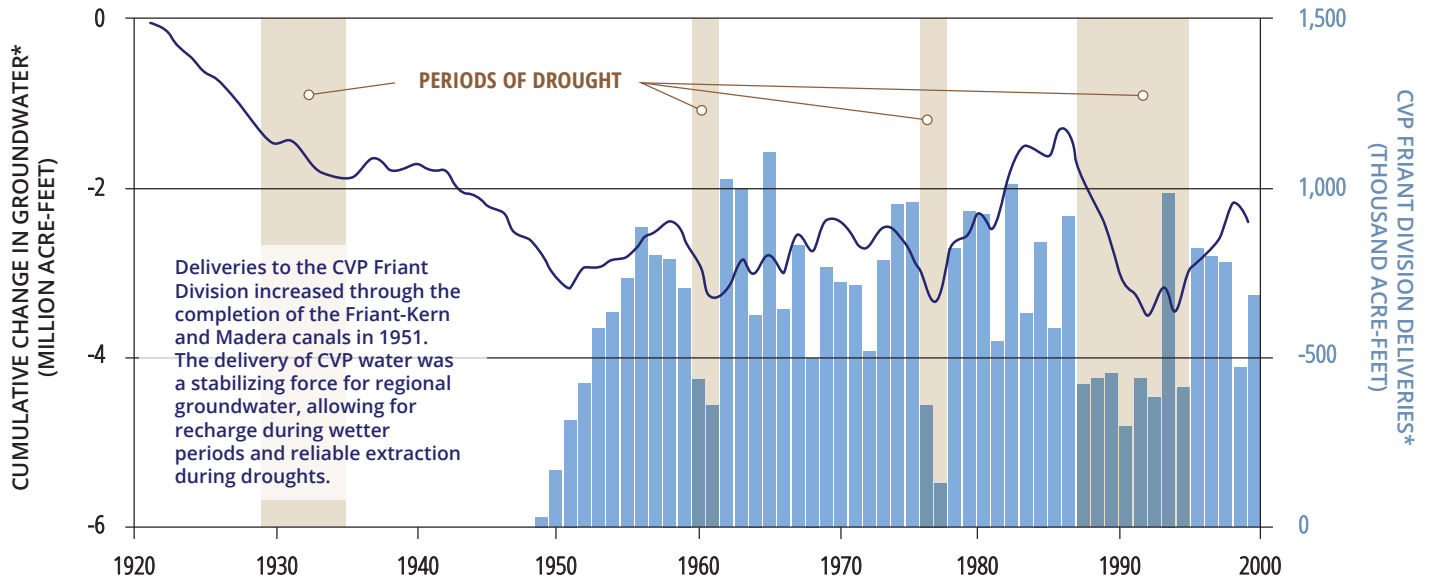
Ironically – or rather, tragically – the most pronounced effect of subsidence will be a limitation in surface water deliveries that were designed to recharge groundwater. The Class 2 supplies are the most likely to be reduced because of their relatively lower priority in the canal. Friant Water Authority (FWA) estimates that the current constriction will reduce long-term deliveries of Class 2 by around 100,000 acre-feet per year. These reductions are most likely to occur in years with high inflows to Millerton Lake: for example, FWA estimates that an additional 300,000 acre-feet could have been delivered in 2017, but for the recent subsidence.

The Friant-Kern Canal (black line) delivers surface water from the San Joaquin River to Friant Contractors across 152 miles of the San Joaquin Valley. Subsidence at milepost 100 (red line) will restrict deliveries to six Friant Contractors (grey areas) and reduce groundwater and surface water exchanges between the multiple basins that cross the 152-mile-long canal.



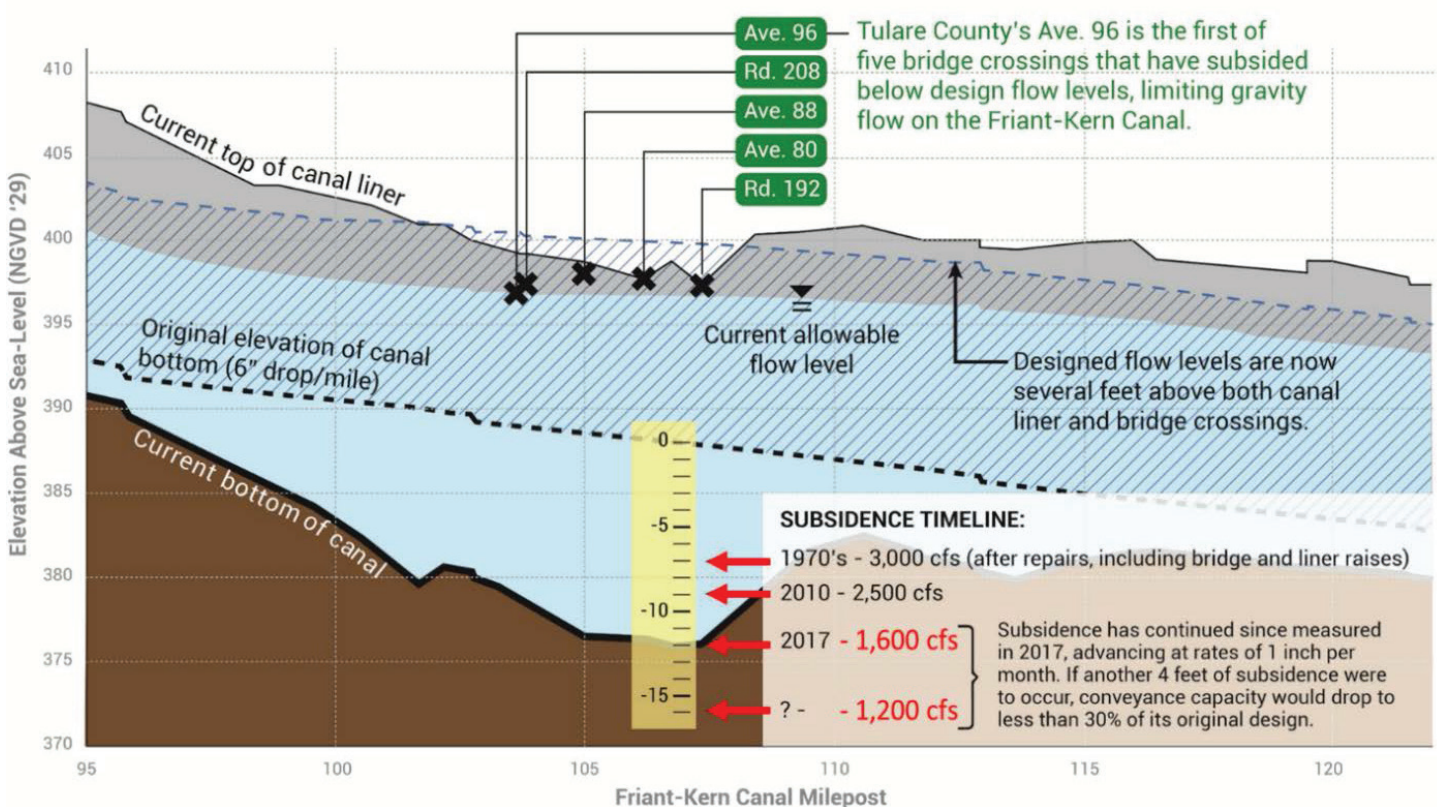
This reduction in surface water deliveries threatens the sustainability of up to 50,000 acres of Friant land. If implementation of the California Sustainable Groundwater Management Act (SGMA) requires that these lands to be pulled out of production, then subsidence currently threatens 15 percent of otherwise sustainable Friant lands below the constriction.

## WATER DELIVERIES TO THE FRIANT DIVISION KEPT REGIONAL GROUNDWATER STABLE THROUGH MULTIPLE CYCLES OF DROUGHT



\*Conditions represented for eleven Friant Division contractors with early participation in the CVP, and collectively representing about half of the Friant Division (55-percent of Class 1 and 46-percent of Class 2 contracts). Information for the combination of conditions at: Delano-Earlimart Irrigation District (ID), Ivanhoe ID, Lindmore ID, Lower Tule ID, Porterville ID, Saucelito ID, Shafter Wasco ID, South San Joaquin Municipal Utility District, Stone Corral ID, and Tulare ID.

## FRIANT-KERN CANAL: COMPARISON OF CURRENT CONDITIONS TO ORIGINAL CONSTRUCTION





## WHAT DOES THE PROBLEM LOOK LIKE?

Approximately 90 miles downstream from Friant Dam, the Friant Division's access point to surface water from the San Joaquin River, the Friant-Kern Canal has subsided twelve feet below its original design elevation – including three feet of subsidence experienced within the past three years, alone. As a result, by April 2017 subsidence had reduced conveyance capacity to 40 percent of its original capacity (from 4,000 to 1,650 cubicfeet per second; cfs).

Unfortunately, the high rates of subsidence have continued along the canal. In 2017, subsidence was continuing at a rate of one inch every month. This may seem trivial, but minor changes in land elevation can have large impacts to the Friant-Kern Canal's capacity because of its "gravity" design. The canal has never used pumps to move water downstream, but instead was designed with a continual slope of 6 inches per mile. This slight grade was just enough to move 4,000 cfs of water when it was designed and built. If current rates of subsidence are sustained, the canal will be reduced to 30 percent of its original capacity within three years (1,200 cfs). This would make the delivery of Class 2 supplies below the constriction nearly impossible. As one third of the Class 2 contracts exist below the constriction, this would threaten the sustainability of one third of the conjunctive management capability of the Friant Division as a whole.

In the subsidence areas, this has the effect of reducing canal flows so that water in the canal stays safely below the abutments of several large county bridges (see figure below). The solution, therefore, is complicated by the expense of any construction involving the bridges and the difficulty of predicting future land subsidence.

Maintaining the Friant-Kern Canal is the primary mission and highest priority of FWA. This issue will be discussed at upcoming FWA Board of Directors meetings until the Board implements a solution. These meetings are announced on our website, [www.friantwater.org](http://www.friantwater.org), and the public is welcome. Separately, FWA will also engage with stakeholders throughout the related planning, design, and construction efforts.



## **FRIANT WATER AUTHORITY**

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Download a PDF of this handout, here: <http://bit.ly/FKC-Impacts>



**FRIANTWATER.ORG**

FWA is a joint-powers authority formed in 2004 by a majority of the water agencies receiving water from the Friant Division of the Central Valley Project. Its primary purposes are to operate and maintain the Friant-Kern Canal and to serve the information and representation needs of its member agencies.