

# PPIC San Joaquin Valley Surface Water Availability

April 2020

## Notes and data caveats

This shapefile includes service areas of irrigation districts (ID) and other entities that are members of the groundwater sustainability agencies (GSAs) in 12 San Joaquin Valley groundwater basins. The dataset summarizes land uses within each of the entities, based on the Department of Water Resources (DWR) 2016 land use data. It also assigns average surface water deliveries for the period 2001-2015 for entities that contain irrigated croplands, and provides estimates of surface water acre-foot per irrigated acre.

**Geographic data sources and notes:** Unless otherwise described below, the sources for the geographic data are:

- (1) DWR's [GSA shapefile](#);
- (2) DWR's [Water Agency Boundaries shapefile](#);
- (3) California Environmental Health Tracking Program's [Water Boundary tool](#).

In the San Joaquin Valley, service areas of many water providers overlap. In general, overlapping regions of different entities were assigned to the system with the smallest area (e.g., where urban providers overlap with service areas of agricultural providers, the area is assigned to urban provider; where small agricultural districts overlap with a larger regional authority, the area is assigned to the smaller district). Any additional notes on geographic data and caveats are provided by basin below.

**Surface water delivery sources and notes:** The average surface water delivery data come from a variety of sources, described below in detail by basin. Data is in water years (October 1 to September 30). In general, we assume that areas within GSAs that are administered by counties rely on groundwater only, except in a few areas served by surface water providers (e.g., mutual water companies). We do not account for riparian water diversions that sometimes exist in these areas. Most areas in the 0-1 acre-foot/acre range of surface water availability purchase and receive occasional floodwater, but do not have regular contracts for surface water access in all years. Where possible, we also include surface water purchased by districts through water transfers in their surface water supply, along with their deliveries from their own water rights and contracts. We do not report surface water deliveries to urban water providers. We also exclude the small amounts of cropland that lie within urban water provider boundaries (valleywide, 57,925 acres).

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## Notes and data caveats by groundwater basin

### 5-022.02 Modesto

There is one GSA within Modesto basin. We use DWR water agency boundaries to split it into member units, and digitize [the GSA map](#) to create updated boundaries for Oakdale ID and Modesto ID.

We use Stanislaus River diversions provided by the San Joaquin County Water Resources office, and Tuolumne River water diversions provided by the Turlock ID.

A portion of Oakdale ID is located in Eastern San Joaquin Basin. We calculated shares of district area in each basin, and applied average surface water deliveries proportionally, based on acreage.

### 5-022.03 Turlock

There are 2 GSAs in Turlock basin. We use DWR water agency boundaries to split it into member units, and digitize the GSA maps to create updated boundaries.

We use Tuolumne River water diversions provided by Turlock ID.

### 5-022.04 Merced

There are three GSAs in Merced basin: Merced Irrigation-Urban GSA, Merced Subbasin GSA, and Turner Island Water District (WD). To split Merced Subbasin GSA into member units, [we digitize the GSA map](#), since areas of mutual water companies in Merced basin were not available in the DWR water agency boundary dataset.

The main source of surface water in Merced basin is the Merced River. The Merced River is first diverted for use by Merced ID, and some portion is then also delivered to other districts in the basin by Merced ID. To calculate average surface water deliveries for Merced ID, we use the [2013 Agricultural Water Management Plan](#) (AWMP) for 2000-2008, and the [2015 AWMP](#) for 2010-2015. Since the value for 2009 was not available, and it was a below-normal water year for the Merced River, we assume the volume delivered was the same as in 2003. In the average delivery calculation for Merced ID we include: surface water deliveries to agriculture and canal seepage and evaporation, but we exclude transfers to other districts within the basin.

The Turner Island WD diverts tail water from San Luis Canal Company, and we use the [district's LAFCO boundary modification request](#) to collect that data. Detailed surface water data was not available for other districts in the basin. We assume that mutual water companies and water districts within Merced Subbasin GSA do not receive surface water, except Stevinson WD and Merquin County Water District (CWD). Stevinson WD has a contract with Merced ID for 26,400 af, and of that amount Stevinson delivers 14,211 af to Merquin CWD (this amount used to be 18,211 af prior to [2010 when Merquin CWD implemented conservation measures](#) that lowered delivery requirements from Stevinson). We assume that Merquin and Stevinson are receiving their full contractual amounts every year, except in critically dry years of 2014, and 2015, when Merced ID did not divert any water from the Merced River.

Small portions of Merced ID and Stevinson WD are located in Turlock basin. We calculated shares of district area in each basin, and applied average surface water deliveries proportionally, based on acreage.

### 5-022.05 Chowchilla

There are 4 GSAs in Chowchilla basin. We split them into member units based on DWR's water agency boundary dataset.

To calculate average surface water deliveries, we use [Appendix 2.f from Chowchilla basin GSP](#). Chowchilla WD and Sierra Mutual Water Company (MWC) have access to surface water. Most of Sierra Vista MWC overlaps with the boundaries of Merced County GSA, and a small portion overlaps with Madera County GSA. We assign all of Sierra Vista MWC diversions to Merced County GSA. We calculate surface water deliveries by subtracting surface water outflows from surface water inflows, based on data in appendix 2.f.

## 5-022.06 Madera

There are 7 GSAs in Madera basin. We split them into member units based on DWR's water agency boundary dataset.

To calculate average surface water deliveries, we use [Appendix 2.f from Madera basin GSP](#). Madera ID, Madera WD, Gravelly Ford WD, and Root Creek WD all have access to surface water. We calculate surface water deliveries by subtracting surface water outflows from surface water inflows to each district, based on the Appendix 2.f data.

## 5-022.07 Delta-Mendota

Delta-Mendota basin includes 23 GSAs. We split each GSA into its member units, but treat San Joaquin River Exchange Contractors Water Authority as a single entity (member districts include: Central California ID, San Luis Canal Company, Firebaugh Canal WD, Columbia Canal Company). Likewise, we do not split Grasslands GSA into member units (Grasslands WD and several other adjacent wildlife management areas).

For surface water deliveries in Delta-Mendota, we use [delivery data from Central Valley Project Operations](#), for districts receiving Central Valley Project (CVP) water. Only Oak Flat district receives State Water Project (SWP) water, and we use SWP diversions spreadsheet obtained from the Department of Water Resources to calculate its diversions. In addition to CVP water, West Stanislaus ID and Patterson ID also receive diversions from the San Joaquin River. We use data reported in [San Joaquin River diversion data assimilation, drainage estimation and installation of diversion monitoring stations](#) for the 1999-2001 diversions of these districts, and supplement the data with [EWRIMS reports](#) from 2009-2017. The data was not available for 2003-2008 for either district, so we assign average values in those years based on water year type (2003: below normal, 2004: dry, 2005: wet, 2006: wet, 2007: critical, 2008: critical).

## 5-022.08 Kings

Kings basin includes 7 GSAs. We use DWR's water agency boundary dataset to split them into member units.

For surface water deliveries, we use tables available in the [McMullin GSA groundwater sustainability plan](#) (Attachment 1: Historical Kings River Diversions, and Attachment 2: Kings Basin GSA Surface Water Data). For CVP deliveries to water districts from 2011-2015, we use [delivery data from Central Valley Project Operations](#). We assign both Consolidated Irrigation District diversions and Lone Tree Channel diversions to Consolidated ID.

In North Fork Kings GSA, there are a number of mutual water companies with non-appurtenant stock. This means their service areas evolve based on the location of water users who hold the stock. Since precise maps of these areas do not exist, we assign their surface water deliveries to areas of North Fork GSA as follows: We add Riverdale ID and Burrel Ditch Company to the Murphy Slough Association area. We also assume that Upper San Jose Company delivers water to Kings County's area within the GSA, Liberty Irrigation Company delivers water to Liberty WD, and Crescent Canal Company delivers water to the western part of the Fresno County within North Fork Kings GSA.

## 5-022.09 Westside

Two GSAs exist in Westside basin: Westlands Water District and Fresno County, which covers small areas on the basin edges. We assume that areas covered by Fresno County do not have access to surface water. The source for surface water deliveries to Westlands Water District is [table 2-9 in the Westlands GSP](#), column "Imported Surface water (af)," which includes both regular Westlands CVP contract deliveries and water purchased from elsewhere by the district and district farmers.

## 5-022.11 Kaweah

Three GSAs exist in Kaweah basin. We split the GSAs into their member units based on DWR's water agency boundary dataset. Kaweah Delta Water Conservation District (WCD) overlays almost the entire basin, and overlaps with multiple irrigation districts and privately owned ditch companies. Ditch companies further overlap with each other. For the purpose of this exercise, we merge all ditch companies into one polygon and call it "Kaweah Ditch Companies," based on a shapefile we received from Kaweah Delta WCD. We further split Kaweah Delta WCD into its member irrigation districts. We consider portions of Kaweah Delta WCD that remain after this process "unincorporated" and without access to surface water. Some small parts of this area may have riparian diversions from Kaweah River. Lakeside Irrigation WD's service area shapefile was not available, therefore all of its Kaweah River diversions are assigned to Kings County WD which overlaps the same area.

For CVP deliveries to water districts we use [delivery data from Central Valley Project Operations](#). Detailed Kaweah River diversions were not available by district. We use total Kaweah River diversions available in [table 11 of the Appendix 2A Kaweah Subbasin, Basing Setting Components](#). We split the river amounts to each GSA proportional to shares of *Irrigation Returns from Kaweah River Sources* for each of the GSAs (as [presented in Table 6-2 of the Greater Kaweah GSP](#)). We further split the GSA amounts to irrigation districts (Ivanhoe Irrigation District, Lindsay Strathmore Irrigation District, Wutchumna Mutual Water Company, Kaweah Ditch Companies, Kings County Water District, St. Johns Water District, Tulare Irrigation District) based on acreage.

## 5-022.12 Tulare Lake

There are 5 GSAs in Tulare Lake basin. We split them into member agencies based on DWR's water agency boundaries dataset.

For surface water deliveries to districts, we use [table D2-3 of the Tulare Lake GSP](#). The deliveries from specific canals are assigned as follows. Blakeley Canal deliveries are assigned to Reclamation District 761. All diversions within Mid Kings GSA are assigned to Kings County WD. Deliveries from Westlake Canal are assigned to Empire Westside ID. All deliveries to Tri County Water Authority are assigned to Angiola WD. Lakelands Canal deliveries are assigned to Corcoran ID, and the remainder of El Rico GSA deliveries is assigned to Tulare Lake Basin Water Storage District (WSD).

Tulare Lake Basin WSD overlaps two GSAs (El Rico, and Southwest Kings). We calculated shares of district area in each GSA, and applied average surface water deliveries proportionally, based on acreage.

## 5-022.13 Tule

There are 6 GSAs in the Tule basin. We split them into member agencies based on DWR's water agency boundaries dataset.

We use [Tule Subbasin Coordination Agreement Attachment 2 Tule Subbasin Setting](#) for CVP deliveries to each irrigation district, and [Groundwater Flow Model of the Tule Subbasin](#) for Tule River deliveries applied to agriculture for each of the GSAs. We assume all of the Tule River deliveries to Eastern Tule GSA are split between Porterville ID and Vandalia WD based on acreage.

## 5-022.14 Kern

There are 11 GSAs in the Kern basin. We split them into member agencies based on DWR water agency boundaries dataset. The overlap between Wheeler Ridge Maricopa WSD and Arvin Edison WSD is assigned to Arvin Edison WSD.

Since we first created this map, Kern County no longer exists as a GSA in the basin. Some parts of its area have been apportioned to other water districts, and other parts are independent management areas within Kern Groundwater Authority GSA. For the purposes of this mapping exercise, we assume that areas that would be covered by Kern County do not receive surface water, and we still keep the area marked as “Kern County.”

We use [Table 1 of Attachment H. Historical and Projected Future Water Budget Development with C2VSimFGKern](#) to assign surface water deliveries to agriculture by water district. Based on our review of GSPs, we found that Table 1 mistakenly switches surface water deliveries for Shafter Wasco ID and Semitropic WSD, which we change in our dataset. For Rosedale Rio Bravo WSD, we also include the amount reported in Table 4 (surface water diversion to groundwater banking and managed aquifer recharge), since the district delivers water to its customers through groundwater recharge.