

Section III: Description of Quantity of Water Uses

Water year 2011-2012 is chosen as the representative year for this plan (Table 22), because SWP allocation in 2012 was 65% (which is close to long term expected SWP reliability). For planning purposes, data starts in November 2011 and ends October 2012 (to include a full year of historic data). This “water year” will be the basis to reference the water supplies and water uses that define the water budget in the sections that follow.

Table 22. Representative Year	
	Description
Representative year(s) based upon	2011-2012
First month of representative year	November
Last month of representative year	October 2012

A. Agriculture Water Use

BWSD relies on surface water (Table 23) for irrigation supplies of the many crops grown in the District.

Table 23. Annual Agricultural Water Use (AF)						
Source	Rep. Year 2012					
		2013	2014	2015		
Agricultural Water Supplier Delivered						
Surface Water	130,381	139,723	112,824	115,387		
Groundwater	0	0	0			
Other (define)	0	0	0			
Subtotal	130,381	139,723	112,824			
Other Water Supplies Used						
Surface Water	0	0	0			
Groundwater	0	0	0			
Other (define)	0	0	0			
Subtotal	0	0	0			
Total	130,381	139,723	112,824			

The primary crops grown within the BWSO service area are trees (mostly almonds and pistachios), citrus and carrots. The evolution of irrigation and changing economic conditions has brought many crop changes to the District. Lands historically used for row crop production, mainly cotton, have been converted to permanent plantings (almonds, pistachios and citrus). As lands are converted, pressurized irrigation systems such as drip and micro sprinkler replace flood and sprinkler irrigation as the predominant method of irrigation. Similarly, the on-farm irrigation water efficiencies improve as the irrigation system conversions materialize.

Table 24. Agricultural Crop Water Needs for 2012

Crop	Area (acres)	Crop Evapotranspiration ETC (in) (Representative Year 2012)												Total Crop ETC (in)
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Almonds	21,385		2.39	3.22	4.08	6.60	6.45	6.51	6.55	3.95	1.93			41.67
Pistachios	12,060				1.73	2.72	6.28	8.42	7.68	5.33	2.36			34.53
Citrus	3,860	2.11	3.08	4.76	4.75	5.60	5.86	5.79	5.27	3.76	2.54	1.56	1.05	46.12
Carrots	1,980	1.98	2.65	4.30	5.78	1.81				1.21	0.82	1.59	1.18	21.32
Persimmons	20				3.70	6.93	7.24	7.37	6.75	4.61	1.93			38.54
Totals	39,305													
Salinity of Irrigation Water EC _w =		0.5	dS/m = mmhos/cm											
Crop	Area (acres)	Total Crop ETC (ac-ft/ac)	Threshold Salinity EC _e (mmhos/cm)	Leaching Fraction LF	Leaching Reqmnt LR (ac-ft/ac)	Effective Precip'n Pe (ac-ft/ac)	Total Crop Water Needs (ac-ft/ac)	Total Crop Water Needs (ac-ft)						
Almonds	21,385	3.47	1.5	0.07	0.25	0.25	3.47	74,295						
Pistachios	12,060	2.88	2.5	0.04	0.12	0.25	2.75	33,174						
Citrus	3,860	3.84	1.3	0.08	0.32	0.25	3.92	15,122						
Carrots	1,980	1.78	1.0	0.11	0.20	0.25	1.73	3,421						
Persimmons	20	3.21	1.5	0.07	0.23	0.25	3.19	64						
Totals	39,305						Totals:	126,077						
Assumptions:														
Representative crop for other row crops: Cotton														
Pomegranates are comparable to citrus (3)														
Persimmons are comparable to apples														
Carrots are considered small vegetables														
Figs are considered miscellaneous deciduous or subtropical trees (1)														
Crop ET and reference ET obtained from (1), Zone 15 for Dry Year 1999. Kc values were derived and applied to reference ET to obtain crop ET for year 2012														
All crops are assumed surface irrigated. Needs to be adjusted for sprinkler, drip/micro, and subsurface drip irrigation as needed (1)														
Leaching requirement developed from (4) to maintain 100% yield potential														
Reference Evapotranspiration and Rainfall data collected by CIMIS #146 Belridge.														
All rainfall during the crop growing season is considered effective except for first and last months where 50% is considered effective.														
Crop response to soil salinity:														
Almond: Sensitive (S) (2)														
Apple: Sensitive (S) (2)														
Carrot: Sensitive (S) (2)														
Citrus - Lemon: Sensitive (S) (2)														
Citrus - Orange: Sensitive (S) (2)														
Fig: Moderately Tolerant (MT) (2)														
Pistachio: Moderately Sensitive to Moderately Tolerant (MS-MT) (2)														
Pomegranate: Moderately Sensitive (MS) (2); Moderately Tolerant (MT) (4,6)														
Threshold salinity EC _e and reference (r): Almond: 1.0 (2) to 1.5 (6) mmhos/cm; Apple: 1.5 mmhos/cm (Assumed); Carrot: 1.0 mmhos/cm (5); Grape: 1.5 mmhos/cm (6); Pistachio: 1.5 mmhos/cm (Assumed); Pomegranate: 2.7 mmhos/cm (Assumed); Figs: 2.7 mmhos/cm (Assumed); Citrus-Lemon: 1.0 (2) to 1.5 (5) mmhos/cm; Citrus-Orange: 1.1 (2) to 1.3 (5) mmhos/cm.														
EC _e threshold: average root zone salinity at which yield starts to decline (i.e., electrical conductivity of the saturation extract of the soil) mmhos/cm = dS/m														
References:														
1. Irrigation Training and Research Center (ITRC), California Polytechnic State University, 2003. California Crop and Soil Evapotranspiration, Report 03-001.														
2. Agricultural and Natural Resources (ANR), University of California. Irrigation Water Salinity and Crop Production, Publication 8066.														
3. Division of Agricultural Sciences, University of California, 1980. Growing Pomegranates in California, Leaflet 2480.														
4. Food and Agriculture Organization (FAO), Irrigation and Drainage Paper No. 29. Water Quality for Agriculture.														
5. Maas, E.V. and S.R. Grattan. 1999. Crop Yields as Affected by Salinity, p.55-108. In R.W. Skaggs and J. van Schilfhaarde (ed.) Agricultural Drainage. Agronomy Monograph 38. ASA, CSSA, SSSA. Madison, WI.														
6. Food and Agriculture Organization (FAO), Irrigation and Drainage Paper No. 56. Crop Evapotranspiration.														

Table 25. Agricultural Crop Data for 2012								
Crop	Total Acreage	Irrigation Method	Planting Month	Harvest Month	ET crop (AF/Ac)	Cultural Practices (AF/Ac)	Leaching Requirement (AF/Ac)	Total Crop Water Needs (AF)
Almonds	21,385	Micro/Drip	NA	Aug-Sept	3.47	0	0.25	79,561
Pistachios	12,060	Micro/Drip	NA	Sept-Oct	2.88	0	0.12	36,144
Citrus*	3,860	Drip	NA	Oct-Jan	3.84	0	0.32	16,073
Carrots	1,980	Sprinkler	Jan-Feb	June-July	1.78	0	0.20	3,909
Persimmons	20	Drip	NA	Nov	3.21	0	0.23	69
Total	39,305							135,756
<p>Notes: This table does not account for effective precipitation and constitutes the difference with Table 24. Effective Precipitation is an input in Table 46 (Table 46). NA = Not Applicable * There are some younger plantings (1,000 ac) in the district; the rest are mature trees. Actual usage on citrus during the plan year was 7,206 AF</p>								

Table 25-13. Agricultural Crop Data for 2013								
Crop	Total Acreage	Irrigation Method	Planting Month	Harvest Month	ET crop (AF/Ac)	Cultural Practices (AF/Ac)	Leaching Requirement (AF/Ac)	Total Crop Water Needs (AF)
Almonds	21,385	Micro/Drip	NA	Aug-Sept	3.53	0	0.25	80,972
Pistachios	12,060	Micro/Drip	NA	Sept-Oct	3.00	0	0.13	37,716
Citrus	3,860	Drip	NA	Oct-Jan	3.95	0	0.33	16,505
Carrots	1,525	Sprinkler	Jan-Feb	June-July	1.85	0	0.21	3,135
Persimmons	5	Drip	NA	Nov	3.31	0	0.24	18
Total	38,835				129,855	0	8,491	138,346

Table 25-14. Agricultural Crop Data for 2014								
Crop	Total Acreage	Irrigation Method	Planting Month	Harvest Month	ET crop (AF/Ac)	Cultural Practices (AF/Ac)	Leaching Requirement (AF/Ac)	Total Crop Water Needs (AF)
Almonds	21,260	Micro/Drip	NA	Aug-Sept	3.69	0	0.26	84,086
Pistachios	12,060	Micro/Drip	NA	Sept-Oct	3.09	0	0.13	38,841
Citrus	3,260	Drip	NA	Oct-Jan	4.12	0	0.34	14,534
Carrots	600	Sprinkler	Jan-Feb	June-July	1.92	0	0.21	1,277
Persimmons	5	Drip	NA	Nov	3.45	0	0.25	18
Total	37,185				130,350	0	8,406	138,757

Table 25-15. Agricultural Crop Data for 2015								
Crop	Total Acreage	Irrigation Method	Planting Month	Harvest Month	ET crop (AF/Ac)	Cultural Practices (AF/Ac)	Leaching Requirement (AF/Ac)	Total Crop Water Needs (AF)
Almonds	21,260	Micro/Drip	NA	Aug-Sept				
Pistachios	12,060	Micro/Drip	NA	Sept-Oct				
Citrus	3,260	Drip	NA	Oct-Jan				
Carrots	300	Sprinkler	Jan-Feb	June-July				
Persimmons	5	Drip	NA	Nov				
Total	36,885							

The District encompasses about 97,396 acres. As shown on Table 26, in 2012 surface irrigation water was delivered to 39,305 acres (total acreage). Most of the non-irrigated land (51,268 acres) is not served by District facilities. Other non-irrigated land (9,173 acres) in the District is non-farmable land (oilfields).

Table 26. Irrigated Acres						
	Rep. Year 2012					
		2013	2014	2015		
Total Irrigated Acres	39,305	38,835	37,185	36,885		

For purposes of this report, cropped acreage is the same as irrigated acreage. The amount of irrigated land that is not cropped at any point in time during the year is small. Nearly 99% of the cropped land is planted with permanent crops. The remaining land not planted with permanent crops is devoted, to row crops.

Table 27. Multiple Crop Information						
Cropping System	Rep. Year 2012					
		2013	2014	2015	2016	2017
Single-Cropped Acres	39,305	39,305	39,305	39,305		
Inter-cropping	Negligible	Negligible	Negligible	Negligible		
Double Cropping	Negligible	Negligible	Negligible	Negligible		

B. Environmental Water Use

BWSD does not provide any of its Table A contract water to any environmental uses.

C. Recreational Water Use

BWSD does not provide any water to any recreational uses.

D. Municipal and Industrial Use

Water Users in the Industrial Zone own and operate a distribution system that delivers water through a pumping plant located at the forebay of BWSD Turnout No.5 (Bel 5) on the CA Aqueduct via a pipeline (collectively referred to as the Industrial System) to the Industrial Zone of the District. Water delivered through the Industrial System is used primarily to support petroleum recovery activities in the North and South Belridge Oil Fields located along the western portion of the District. No treatment is required prior to use.

As previously mentioned, 5,578 AF of BWSD's annual Table A amount is under contract for industrial use. However, approximately 1,600 AF is actually delivered annually for use in the Industrial Zone. The remaining balance is normally transferred to other Water Users and used for agricultural purposes within the District (Table 28).

Table 28. Municipal/Industrial Water Uses (AF)						
Municipal/ Industrial Entity	Rep. Year 2012					
		2013	2014	2015		
Municipal Entity						
None	0	0	0	0		
Industrial Entity						
Various Oil Companies	1,600	1,858	1,567	1,575		
Total	1,600	1,858	1,567			

E. Groundwater Recharge Use

There is no active groundwater recharge supported by District supplies within the District.

Table 29. Groundwater Recharge Water Uses (AF)							
Location/ Groundwater Basin	Method of Recharge	Rep. Year 2012					
			2013	2014	2015		
Commitments/Dedicated							
None	Recharge basins	0	0	0	0		
Voluntary/Opportunistic							
Other (non-District projects)	Recharge basins	0	0	0	0		
Pioneer	Recharge basins	0	0	0	0		
Berrenda Mesa	Recharge basins	0	0	0	0		
Total		0	0	0			

F. Transfer and Exchange Use

The District relies on transfers and exchanges to supplement its annual water supply. In recent years, common landowner transfers into the District (as noted in Table 32) account for most of the activity in this section.

G. Other Water Use

BWSD has no other water uses besides those previously described.

Table 30. Other Water Uses (AF)						
Water Use	Rep. Year 2012					
		2013	2014	2015		
None	0	0	0	0		
TOTAL	0	0	0			