MOJAVE BASIN AREA WATERMASTER

CONSUMPTIVE WATER USE STUDY

AND

PRODUCTION SAFE YIELD UPDATE

2017-18 WATER YEAR

May 1, 2019

Prepared by

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May 1, 2019

Tom McCarthy, Executive Officer
Mojave Basin Area Watermaster
13846 Conference Center Drive
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Dear Mr. McCarthy,

This letter transmits the report titled "Consumptive Water User Study and Production Safe Yield Update, 2017-18 Water Year." The report provides a detailed evaluation of the consumptive use of water in each of the five subareas and establishes the Production Safe Yield for determining adjustments to Free Production Allowance.

The report was completed pursuant to the Courts request at the hearing of July 6, 2018. Status reports were given to the Court regarding the progress on completion on October 12, 2018 and January 31, 2019.

The following individuals provided information, analysis and support in preparation of this document. Their efforts were essential to the report's timely preparation and completion.

Valerie Wiegenstein, Watermaster Services Manager
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Very truly yours,

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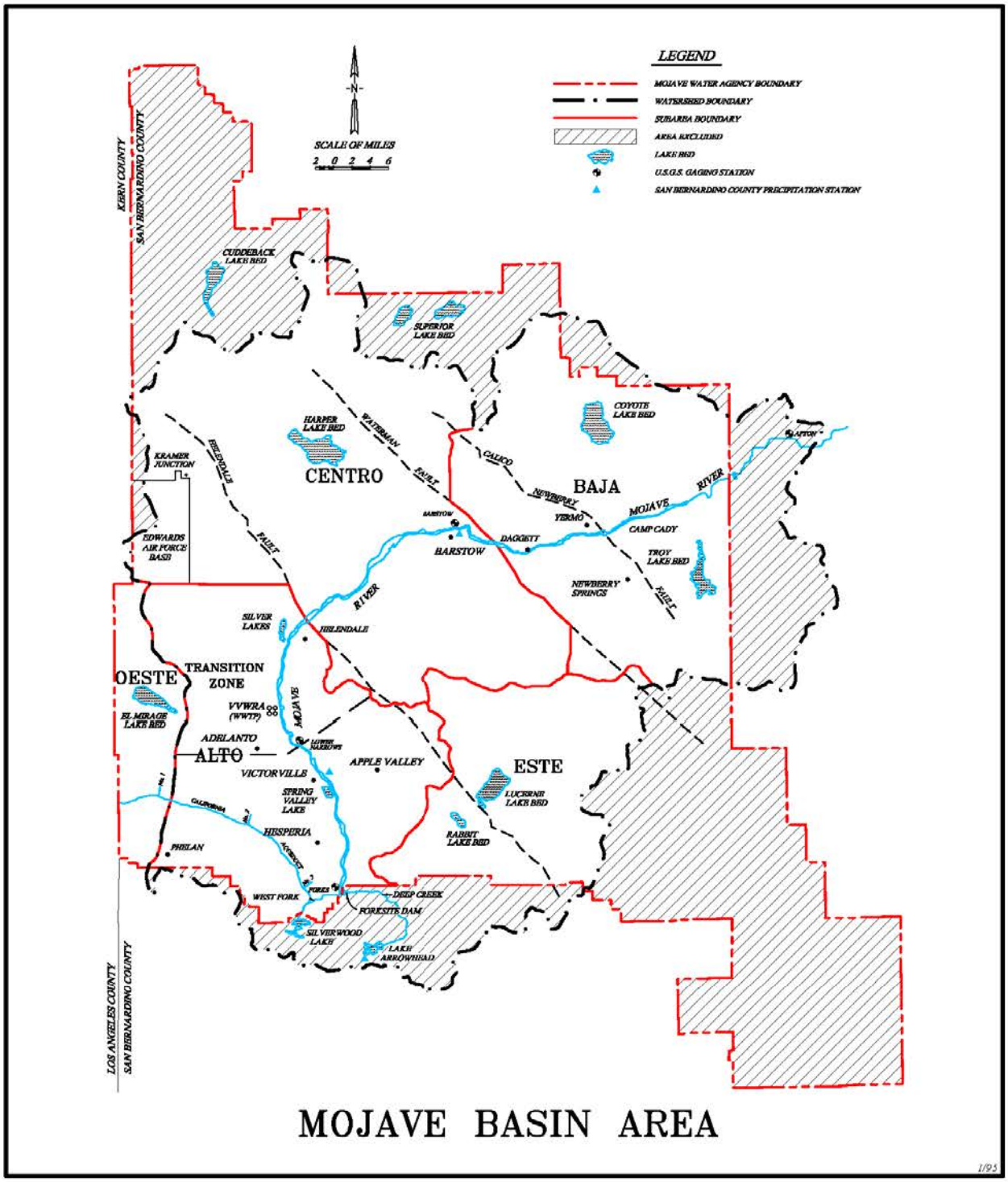
Table of Contents

Appendices

Attachments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MOJAVE WATER AGENCY BOUNDARY
WATERSHED BOUNDARY
SUBAREA BOUNDARY
AREA EXCLUDED
LAKE BED
U.S.G.S. GAGING STATION
SAN BERNARDINO COUNTY PRECIPITATION STATION
SCALE OF MILES
2 0 2 4 6
KERN COUNTY
SAN BERNARDINO COUNTY
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
CUDDEBACK LAKE BED
SUPERIOR LAKE BED
COYOTE LAKE BED
HARPER LAKE BED
CENTRO
BAJA
WATERMAN FAULT
CALICO FAULT
NEWBERRY FAULT
HELENDALE FAULT
KRAMER JUNCTION
EDWARDS AIR FORCE BASE
MOJAVE RIVER
YERMO
CAMP CADY
DAGGETT
BARSTOW
TROY LAKE BED
NEWBERRY SPRINGS
SILVER LAKES
HELENDALE
OESTE
TRANSITION ZONE
EL MIRAGE LAKE BED
VVWRA (WWTP)
ADELANTO
ALTO
VICTORVILLE
APPLE VALLEY
ESTE
LUCERNE LAKE BED
RABBIT LAKE BED
SPRING VALLEY LAKE
HESPERIA
PHELAN
WEST FORK
DEEP CREEK
FORESTA DAM
SILVERWOOD LAKE
LAKE ARROWHEAD
MOJAVE BASIN AREA
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Consumptive Water Use Study and Production Safe Yield Update

Background and Extent of Investigation

The Judgment After Trial, January 1996 (Judgment) requires that Watermaster annually review conditions in the five Subareas of the Mojave Basin Area (MBA) for the purpose of establishing Free Production Allowance (FPA) for the next water year (water year commences October 1 of each year). Watermaster staff and engineer compile water production information for each party to the Judgment, evaluate land uses, sequential water uses and make estimates of consumptive use. In addition, elements of water supply, obligations under the Judgment and water levels in various wells throughout the Basin Area are evaluated.

The Judgment required that Production Safe Yield (PSY) be re-evaluated after 5 years to account for land use changes and possible changes in water supply conditions. In February 2000, Albert A. Webb Associates (Webb) prepared a report and update of the consumptive uses and estimates of the PSY for the 5 subareas established in the Judgement. The report presented herein is an update to the estimates by Webb.

The PSY calculation is defined in the Judgment and generally includes the 60-year average water supply (1931-1990) based on the published records of the USGS at West Fork, Mojave River and Deep Creek Mojave River, gaging stations (Appendix D). It is assumed that the water supply that occurred during the 60-year hydrologic base period will repeat in the future. The calculation assumes that the cultural conditions (pumping, patterns of water use, land uses, riparian water demands) for a given year are consistent throughout the 60-year hydrologic period.

The current investigation is primarily focused on changes in use by producers, changes in consumptive use, and return flow. In general water supply assumptions, for long term supply, made by Webb and established at trial are mostly unchanged. Specific changes to the elements of water supply use and disposal as reported by Webb and as estimated by Watermaster Engineer are shown on Table 1 (and shown in final form as Table 5-1 of the Watermaster Annual Report, included herein as Attachment 1).

Details of water supply and the estimated consumptive use for each producer in each subarea are discussed in more detail under various sections of this report. An evaluation of the long-term changes in groundwater gradients at subarea boundary locations is provided in the section on subsurface flow.

TABLE 1

Production Safe Yield Update
Based on Long-Term Average Natural Water Supply and Outflow, and Imports, Consumptive Use, and Production for 2018

(all amounts in acre-feet)

WATER SUPPLY	Este	Oeste	Alto	Centro	Baja	Basin Totals
Surface Water Inflow	1,700	1,500	~~69,100~~ 68,500 [1]	~~34,700~~ 33,600 [2]	~~14,400~~ 17,358 [3]	~~72,700~~ 72,652 [4]
Subsurface Inflow	0	0	1,000	2,000	~~1,200~~ 1,581 [5]	0 [6]
Deep Percolation of Precipitation[1]	0	0	3,500	0	100	3,600
Imports	~~2,630~~ 2,000	0	~~1,620~~ 2,234	~~0~~ 2,262 [8]	0	~~4,250~~ 6,496
TOTAL	**3,700**	**1,500**	**75,234**	**37,862**	**19,039**	**82,748**

CONSUMPTIVE USE AND OUTFLOW	Este	Oeste	Alto	Centro	Baja	Basin Totals
Surface Water Outflow	0	0	~~34,700~~ 33,600 [2]	~~14,000~~ 16,406 [8]	~~8,200~~ 5,372 [9]	~~8,200~~ 5,372
Subsurface Outflow	~~825~~ 200	~~350~~ 800	2,000	~~1,200~~ 1,581 [5]	0	0
Consumptive use						
Agriculture[10]	~~3,900~~ 2,327	~~2,300~~ 1,208	~~7,900~~ 1,311	~~13,000~~ 8,895	~~20,800~~ 17,664	~~47,900~~ 31,405
Urban[10,11]	~~2,200~~ 1,500	~~1,300~~ 1,724	~~40,700~~ 40,603	~~8,500~~ 7,557	~~7,900~~ 6,338	~~60,600~~ 57,722
Phreatophytes[13]	0	0	11,000	3,000	2,000	16,000 [12]
TOTAL	**4,027**	**3,732**	**88,514**	**37,439**	**31,374**	**110,499**
Surplus / (Deficit)	~~(2,595)~~ (327)	~~(2,450)~~ (2,232)	~~(20,905)~~ (13,280)	~~(3,000)~~ 423	~~(23,200)~~ (12,335)	~~(52,150)~~ (27,751)
Total Estimated Production[14]	~~9,751~~ 5,055	~~6,502~~ 3,944	~~90,767~~ 77,686	~~36,375~~ 20,665	~~43,879~~ 24,524	~~187,274~~ 131,874
PRODUCTION SAFE YIELD[15]	~~**7,156**~~ **4,728**	~~**4,052**~~ **1,712**	~~**69,862**~~ **64,406**	~~**33,375**~~ **21,088**	~~**20,679**~~ **12,189**	~~**135,124**~~ **104,123**

See Attachment 1 for final Production Safe Yield table with footnotes.

Water Supply

As indicated on Table 1, water supply includes gaged and ungaged inflow, subsurface flow, deep percolation of precipitation, and certain imports. Return flow is also an element of supply and is included as water production less consumptive use.

Surface Water Inflow, Gaged and Ungaged

Surface water inflow to the Basin Area is the measured flow of the Mojave River at the Forks and is the sum of the reported discharge of Deep Creek and West Fork Mojave River as recorded by the USGS stream gages (Appendix D). Surface water inflow to Este and Oeste is estimated based on information developed before trial and by Webb. Surface inflow to Este and Oeste is ungaged. Surface water supply to Oeste is from the Sheep Creek watershed. Surface water supply to Centro is estimated at the Helendale fault from the USGS gaging station records at Lower Narrows and adjustments for consumptive uses in the Transition Zone and contributions from discharges by Victor Valley Wastewater Treatment Plant (VVWRA). Surface water supply to Baja is estimated from USGS gaging station records at Barstow and adjustments for losses between the Barstow gage and Waterman fault.

Ungaged inflow to Alto is estimated from Webb and from the Judgment. Webb estimated ungaged inflow to Alto to be 3,500 acre-feet; the estimate in the Judgment is 3,000 acre-feet. For this report, ungaged inflow to Alto is estimated to be 3,000 acre-feet. USGS (Stamos 2001) estimated ungaged inflow to Alto for the 60-year period (1931-1990) and for the 69 years 1931-1968) to be about 2,400 acre-feet. The ungaged inflow to Alto is subject to further evaluation but we believe 3,000 acre-feet is more representative than the estimate by Webb and may overstate the actual amount.

Subsurface Inflow

Subsurface inflow to the Basin Area is estimated based on long term average water levels at subarea boundaries. Estimates of subsurface flow as indicated in the Judgment (Exhibit G), are considered to be representative of the current subsurface flows except for the Centro to Baja subarea. USGS modeling (Stamos 2001) estimated the total subsurface inflow to Baja including subsurface flow from Centro to be 1,581 acre-feet. Additional investigations in 2006 and 2019 by Watermaster Engineer (Subsurface Flows between Subareas, Appendix A) substantiated the estimates in Exhibit G of the Judgment. Subsurface inflow to Alto from Este (200 acre-feet) and from Oeste (800 acre-feet) is assumed to be unchanged from the estimates made for the Judgment. The subsurface flow from Alto to Centro is assumed to be 2,000 acre-feet, unchanged from the Judgment.

The basic methodology to estimate subsurface flow is to calculate a groundwater gradient at the subarea boundaries. Generally, the hydraulic properties of the soil medium are unchanged over time and the saturated thickness of the water bearing material is also relatively unchanged. Therefore, if the water levels measured in the same wells over different time periods do not change, the estimated subsurface flow will also not change.

Deep Percolation of Precipitation

As reported by USGS and by California Department of Water Resources (DWR) precipitation falling on the desert floor is 100% consumed by native vegetation or soil evaporation and therefore does not contribute to a subarea's water supply. DWR assumed that all precipitation less than 8 inches would be consumed and therefore estimates the deep percolation of precipitation only for areas exceeding 8 inches of average annual rainfall (DWR, Bulletin 84, 1967). DWR estimated the deep percolation of precipitation to be 3,500 acre-feet per year. Unless there are significant changes in land use in the upper watershed area where average annual precipitation exceeding 8 inches occurs, we will continue to include 3,500 acre-feet per year as part of supply. However, further study would be required to refine this value. In general precipitation throughout the Basin Area is less than 8 inches, averaging 6 to 4 inches or less in most areas. With the exception of the amount reported by DWR, there is very little supply from precipitation falling on the desert floor. Long term average annual precipitation is reported in the Watermaster Annual Report (WMAR) for Lake Arrowhead (upper Alto watershed), Victorville and Barstow (Annual Report, Figures 3-1 and 3-2). Average precipitation at Victorville is 5.42 inches and 4.54 inches at Barstow.

Total Estimated Production

Total water production is compiled annually for each producer and is the basis for estimating consumptive use of production. The total estimated production in the Mojave Basin Area for the 2017-18 water year was 131,874 acre-feet. This is down from 187,300 acre-feet of total production in the 1996-97 water year. Verified water production by individual producers is reported in the WMAR on Appendix B. During 2017-18, water production within the 5 subareas, excluding minimal producers was:

Este	4,101 acre-feet
Oeste	3,706 acre-feet
Alto	74,317 acre-feet
Centro	19,111 acre-feet
Baja	22,296 acre-feet

Minimal producers pumped an estimated 7,077 acre-feet. Consumptive use of minimal producers is included the PSY calculation.

Consumptive Water Use and Outflow

Outflow from each subarea is shown on Table 1. Total outflow from the Basin Area is measured at the USGS gage at Afton about 6 miles downstream from the Mojave Basin Area (MBA) boundary in Baja. Outflow from Alto to Centro is determined by a separate water balance calculation for the Transition Zone (TZ), (Definition of Transition Zone, see Judgment page 13). The water balance for the TZ is described in the WMAR on pages 23 and 24, and includes Figures 3-6 through 3-9. Figure 3-10 of the WMAR shows the result of this water balance analysis since 1991 (see Attachment 4).

The methodology for determining consumptive use and the total amount by type of use and by Subarea is included in Appendix B. Detailed evaluation of the consumptive water use for each producer is listed in Appendix C.

Water Supply Surplus/Deficit

The difference between the elements of water supply (inflow), outflow and consumptive results in either a surplus, or a deficit. The surplus/deficit for each subarea is shown on Table 5-1 of the WMAR (Attachment 1).

Production Safe Yield

The production safe yield for water year 2017-18 for all subareas was 104,123 acre-feet compared to 135,124 acre-feet in the 1996-97 water year. PSY is calculated as the difference between total pumping in a subarea and the deficit between total water supply and consumptive use and outflow. The results and recommendation for PSY are shown on Table 5-1 (Attachment 1).

Elements of supply included in PSY include certain imports that have been long term reliable supplies but could be interrupted. Wastewater effluent discharged to the MBA in Alto by Lake Arrowhead Community Services District (LACSD), and wastewater effluent discharged to Este by Big Bear Area Wastewater Reclamation Authority (BBAWRA), is included in the PSY calculation for those subareas. The amounts of discharge are reported in the WMAR page 20. PSY for 2018 is considered representative for future planning. Changes that occur in the annual amount discharged by these entities are evaluated annually and reported in the WMAR.

Results

The results of this investigation including changes to supply and consumptive uses are show below. The updated PSY as indicated on Table 5-1 (Attachment 1) for each subarea is as follows:

Este	4,728 acre-feet
Oeste	1,712 acre-feet
Alto	64,406 acre-feet
Centro	21,088 acre-feet
Baja	12,189 acre-feet

Imported Water Supply

In the 2017-18 water year, the Mojave Water Agency purchased and released 14,998 acre-feet of State Water Project Water into the Mojave River within the Alto Subarea, 165 acre-feet in the Centro Subarea, and 86 acre-feet in Baja. Water imported by MWA, or for certain storage accounts is not included in the PSY calculation, except that water imported for High Desert Power Plant is included to the extent of the consumptive use for HDPP (considered 100% for cooling for power generation).

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APPENDIX A

Evaluation of Subsurface Flows Between Subareas
Mojave Basin Production Safe Yield Update

Evaluation of Subsurface Flows Between Subareas
Mojave Basin Production Safe Yield Update

Introduction

As part of a Production Safe Yield update for the Mojave Basin, an evaluation of the subsurface (groundwater) flows between subareas was performed. An evaluation of subsurface flows was previously performed by Ernest M. Weber as part of the Albert A. Webb Associates (Webb) *Consumptive Use Water Study and Update of Production Safe Yield Calculations for the Mojave Basin Area* in 2000. The purpose of the Webb study was to evaluate, and if applicable, update Table C-1 of the Judgement after Trial (1996) to reflect cultural conditions on the long-term subsurface flow between subareas. The five subareas evaluated in the Webb report relied on 1998 groundwater elevation data obtained from the U.S. Geological Survey (USGS) as well as aquifer hydraulic parameters (transmissivity) developed in a USGS study by Hardt (1971).

In addition to the subsurface inflow/outflow data in Table C-1 and the analysis by Webb, subsurface flow through the Centro Subarea was analyzed in a 2005 study by California State University Fullerton (CSUF; Napoli and Laton, 2005). The current update incorporates and expands on the findings of this prior study by CSUF and further evaluates potential changes in water levels and flow gradients across the Centro-Baja Subarea boundary through 2016. Additionally, a study by the USGS (Stamos and others, 2001) was reviewed to further evaluate inflow data to the Baja Subarea.

In the prior studies by Webb (2000) and Napoli and Laton (2005), subsurface flows across the subarea boundaries were calculated using a form of Darcy's equation. In this equation, the flow across the boundary in gallons per day Q = TWI; where W is the width of aquifer at the basin boundary in feet; T (transmissivity) is the hydraulic conductivity of the aquifer material times the saturated thickness of the aquifer, expressed in gallons per day per foot of aquifer width; and I is the slope of the groundwater surface (i.e., the gradient). Of these parameters, the hydraulic conductivity and physical configuration of the basin boundary are not expected to change significantly over time. The variables that would be expected to affect short-term changes in groundwater flow across the subarea boundaries are the saturated thickness of the aquifer (which would change with changes in groundwater levels) and changes in the flow gradient. The basic premise of this update is that if groundwater levels and gradients have not changed since the prior studies, the subsurface flow previously estimated from those studies would also not have changed.

The work of Webb relied on 1998 groundwater data developed by the USGS. The current update also incorporates 1998 USGS groundwater data from a regional water table map, as well as subsequent maps for the years up to 2016 (the last published water table map by USGS) and historical water level data (well hydrographs) maintained by Mojave Water Agency. In addition, the USGS water table map for 1996 was reviewed, in addition to groundwater level hydrographs for wells near the subarea boundaries for years prior to 1998. From the preliminary review, we concluded that the conditions between 1996 (Judgement after Trial) and 1998 (update by Webb) were essentially unchanged. For the Centro-Baja subareas, water table maps and gradient calculations developed in the study by Napoli and Laton (CSUF, 2005) were also reviewed. For

our analysis of the Centro-Baja subareas, groundwater data from the USGS were compared to those developed by Napoli and Laton and were also updated using USGS data through 2016.

Subsurface Flow – Este to Alto and Oeste to Alto

In the Judgement after Trial (Table C-1, 1996), inflow to Alto Subarea was estimated at 1,000 acre-ft/yr, with 200 acre-ft/yr from Este subarea and 800 acre-ft/yr from Oeste. The subsurface flow from Este to Alto Subarea was calculated by Webb using average transmissivities across the basin boundary from a USGS study by Hardt (1971) and 1998 water level data from USGS. Webb's estimates of subsurface flow across the boundary ranged from 545 acre-ft/yr, up to 1,385 acre-ft/yr. Using an average transmissivity, the subsurface inflow from Este Subarea was estimated by Webb at 825 acre-ft/yr.

For this current update, the USGS water table maps for the vicinity of the Este-Alto subarea boundary for the years 1998 and 2016 were compared (see Figure 1). The USGS maps show the 2,825 groundwater elevation contour as lying at the boundary of the subareas. It was noted that the position of the 2,825 and 2,900 groundwater elevation contours were little changed between 1998 and 2016 water table maps. The gradient (slope) calculated between the two elevation contours for the years 1998 (0.0026 ft/ft) and 2016 (0.0027 ft/ft) were essentially the same. Based on this comparison, it appears that water levels and gradients across the Este-Alto subarea boundary in 1998 and 2016 are little changed.

The Webb report noted that the boundary between Oeste and Alto Subareas is roughly along Sheep Creek, where a groundwater mound is present. They concluded that no flow occurred across most of this boundary, except in a northern, two-mile segment of the boundary, south of the Alto-Transition Zone boundary. In this area, Webb adjusted the flow to account for the flat slope of the gradient across the boundary. The subsurface flow was estimated at about 350 acre-ft/yr.

Comparison of the 1998 and 2016 groundwater table maps by USGS indicate that the elevation and gradient of the water table at the Oeste-Alto boundary is little changed (see Figure 2). The location of the 2,800 and 2,900 groundwater elevation contours are nearly unchanged, with a groundwater gradient ranging from about 0.0047 to 0.0062 feet per foot between contours. Review of MWA hydrograph maps also show little change in water levels near the subarea boundary since the early 1990s. Webb estimated subsurface inflow from Este and Oeste at 1,175 acre-ft/yr, somewhat higher overall than 1,000 acre-ft/yr listed on Table C-1 of the Judgement after Trial. However, as discussed, the subsurface flows estimated in the Webb update is an average based on a range of possible transmissivities of the aquifer.

Subsurface Flow – Alto to Centro

The boundary of the Alto and Centro subareas is defined by the Helendale Fault. The subsurface flow across the boundary was assumed to be 2,000 acre-ft/yr in Table C-1 of the Judgement after Trial and was accepted by Webb in their study. Groundwater elevations and gradients in the Floodplain Aquifer along the Mojave River were compared in the current update using the 1998 and 2016 USGS water table maps (see Figure 3). In comparing the 1998 and 2016 data, the

location of the 2,400 and 2,500 groundwater elevation contours just up gradient of the Helendale Fault were noted to be little changed. The gradient was also calculated to be 0.0032 ft/ft during the two periods. The hydrogeologic conditions between 1998 and 2016 appear essentially unchanged and the subsurface flow presented in Table C-1 and in Webb's report would then also appear to be unchanged.

Well hydrographs developed by USGS and MWA indicate that water levels in several wells completed within the shallow Floodplain Aquifer are influenced by large storm events and rise rapidly after those events (such as in 2005 and 2010-11). Water levels then slowly decline over the next several years, until the next large storm event. Overall, when peak water levels were compared after storm events, they appeared to be similar. It appeared that water levels recovered after episodic large storm events, with the highest water levels generally consistent over time.

Subsurface Flow – Centro to Baja

The report by Webb accepted the subsurface flows listed in Table C-1 of the Judgement after Trial, which is estimated at 1,200 acre-ft/yr. The net subsurface inflow to Baja was subsequently revised to 1,581 acre-ft/yr, based on groundwater studies by the USGS.

In their study of groundwater flow between the Centro and Baja Subareas, Napoli and Laton (CSUF, 2005) prepared groundwater elevation contour maps and calculated flow gradients for the years 1960, 1993, and 2004. During this period, the flow gradient across the boundary (defined as the Waterman Fault; also referred to on the USGS maps as the Camp Rock-Harper Lake fault) was calculated by CSUF (Napoli and Laton, 2005) to range from 0.0047 ft/ft. (1960) to 0.0052 ft/ft (1993 and 2004), which amounts to only a variation of 0.0005 ft/ft over a 43-year period. Based on their analysis, the CSUF report concluded that groundwater levels had been stable across the Centro Subarea over the period from1990 to 2005. Further, since Centro Subarea had seen no substantial change in water levels "then it can be said that no change in flow across the subarea boundary has occurred" (Napoli and Laton, CSUF, 2005).

It should be noted that the transect used to calculate gradient in the 2005 study by Napoli and Laton is somewhat oblique to groundwater contours and so the groundwater flow gradient calculated by them is somewhat flatter than if the transect were drawn perpendicular to contours (to measure the maximum slope of the water table). In addition, the transect selected by Napoli and Laton crosses the Waterman Fault/subarea boundary, so that the gradient calculated is actually an average value of a somewhat flatter gradient west of the fault/subarea boundary and somewhat steeper gradient east of the fault/boundary.

As part of the current update, additional flow gradients were calculated using USGS water table maps, along the same transect as shown on the Napoli and Laton (2005) report, for the years 1998, 2006, and 2016 (see Figure 4). For those years, the calculated gradients ranged from 0.0045 ft/ft. to 0.0053 ft/ft., essentially the same as calculated by Napoli and Laton.

To be consistent with historical gradient comparisons at other subarea boundaries, USGS water level data were also used to compare 1998 and 2016 gradients within the easternmost Centro

subarea, just west of the Waterman fault/subarea boundary. For those years, the average calculated gradient was nearly identical, at 0.0023 ft/ft in 1998 and 0.0025 ft/ft in 2016.

The position of 2,020 and 2,150 groundwater elevation contours on the USGS maps, which are located just west of the Waterman Fault and Centro-Baja boundary, were compared for the years 1998 and 2016 (see Figure 4). The position of the groundwater level contours shifted only very slightly between the years analyzed, which supports the conclusion by CSUF that water levels within the Centro Subarea have not changed substantially over time. The annual subsurface flow across the subarea boundary appears to be little changed since 1998, as concluded by Napoli and Laton (CSUF, 2005) and the current update.

Conclusions

Although the water table maps by USGS reveal groundwater pumping depressions and areas of local groundwater declines within the Mojave basin, the current analysis found little change in groundwater levels or gradients at the subarea boundaries evaluated. In particular, the current analysis indicates that subsurface flows through the Alto Transition Zone to Centro Subareas, and from the Centro to Baja Subareas remain essentially unchanged from the prior evaluations by Webb in 2000, Stamos and others (USGS, 2001), and CSUF (Napoli and Laton) in 2005. Therefore, it appears that the subsurface component of the subarea obligations called for in the Judgement continue to be met.

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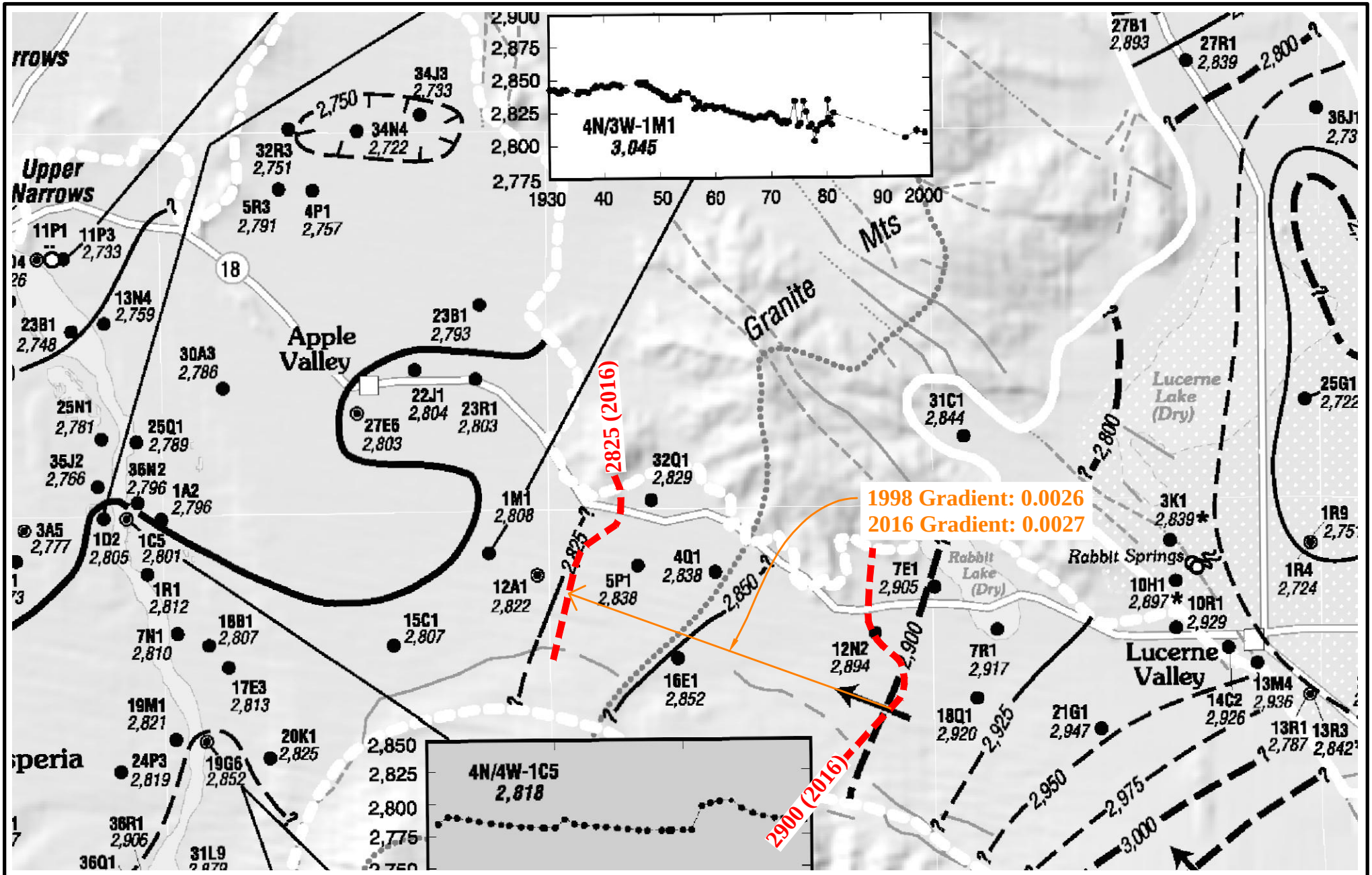

Figure 1
1998-2016 Comparison
Groundwater Levels & Gradients
Alto-Este Boundary

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Base map per USGS 1998 Groundwater Contour Map.

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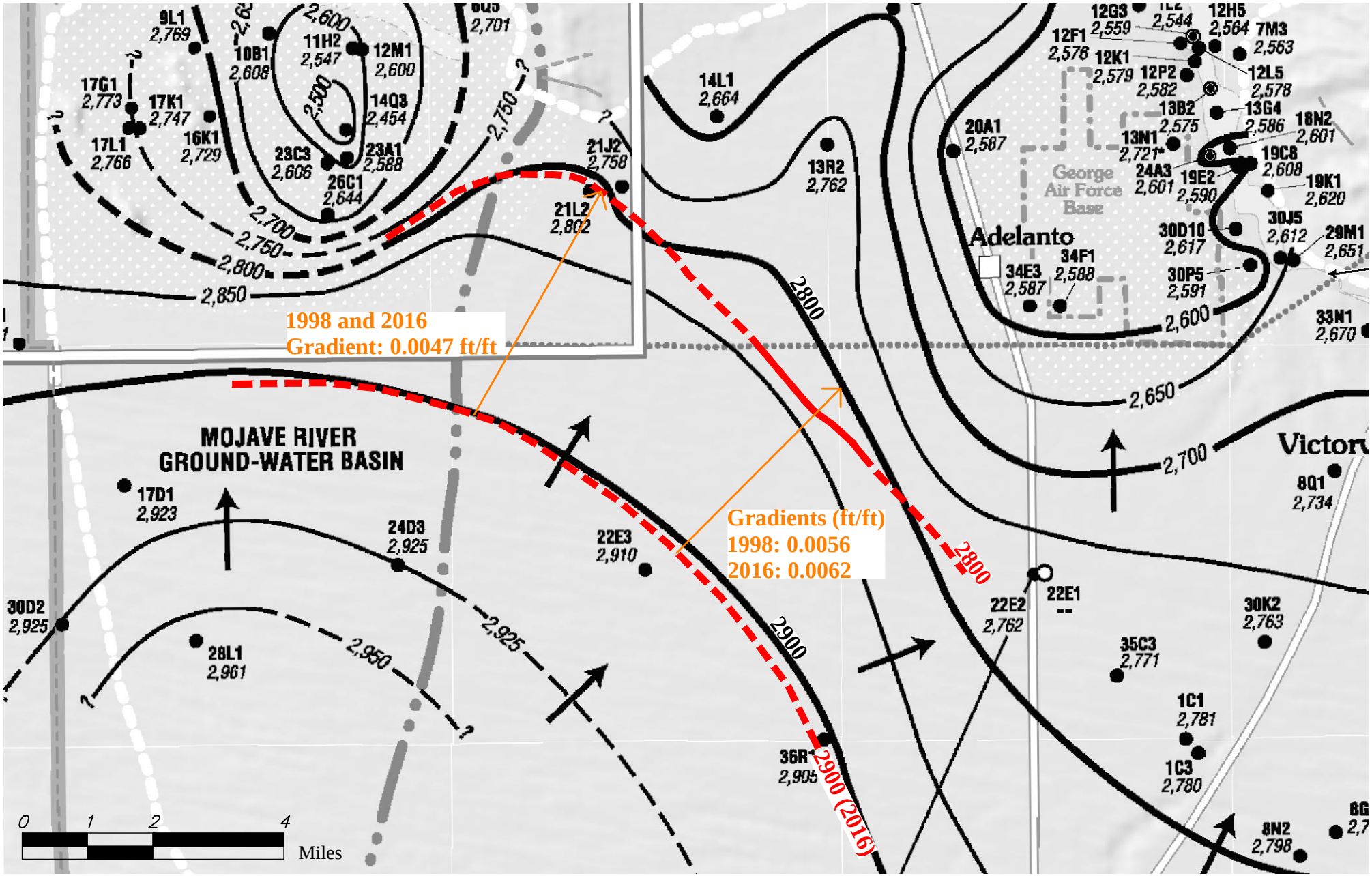
April 2019



2900 2016 Groundwater Contour (ft)

2800 1998 Groundwater Contour (on Base Map)

0.0047 Caculated Gradient and Flow Direction (ft/ft)

Figure 2
1998-2016 Comparison
Groundwater Levels & Gradients
Alto-Oeste Boundary

Wagner Bonsignore
Consulting Civil Engineers, A Corporation

Base map per USGS 1998 Groundwater Contour Map.

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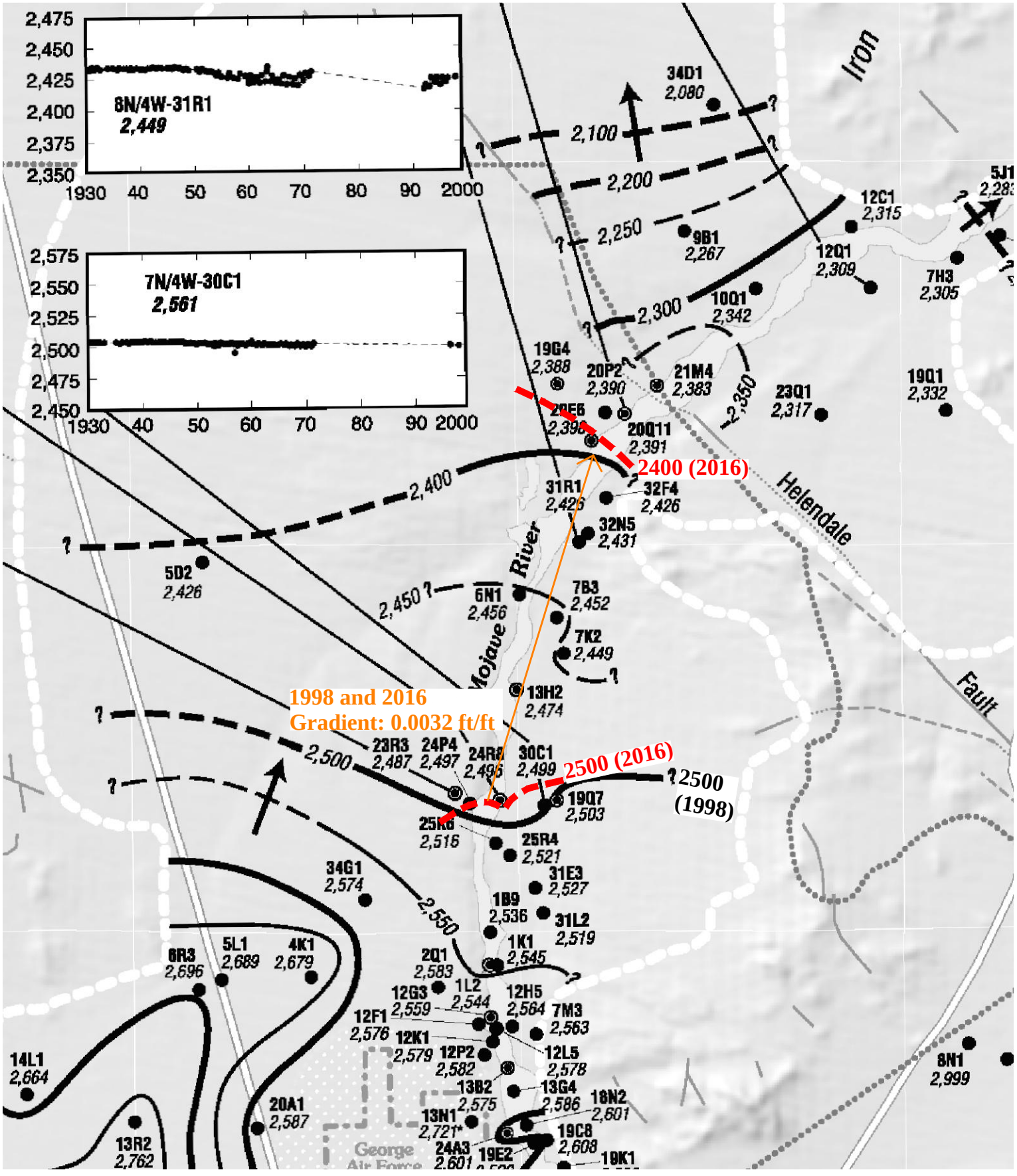
April 2019



2400 2016 Groundwater Contour

280 1998 Groundwater Contour (on Base Map)

0.0032 Caculated Gradient and Flow Direction

Figure 3
1998-2016 Comparison
Groundwater Levels & Gradients
Alto TZ-Centro Boundary

Wagner Bonsignore
Consulting Civil Engineers, A Corporation

Base map per USGS 1998 Groundwater Contour Map.

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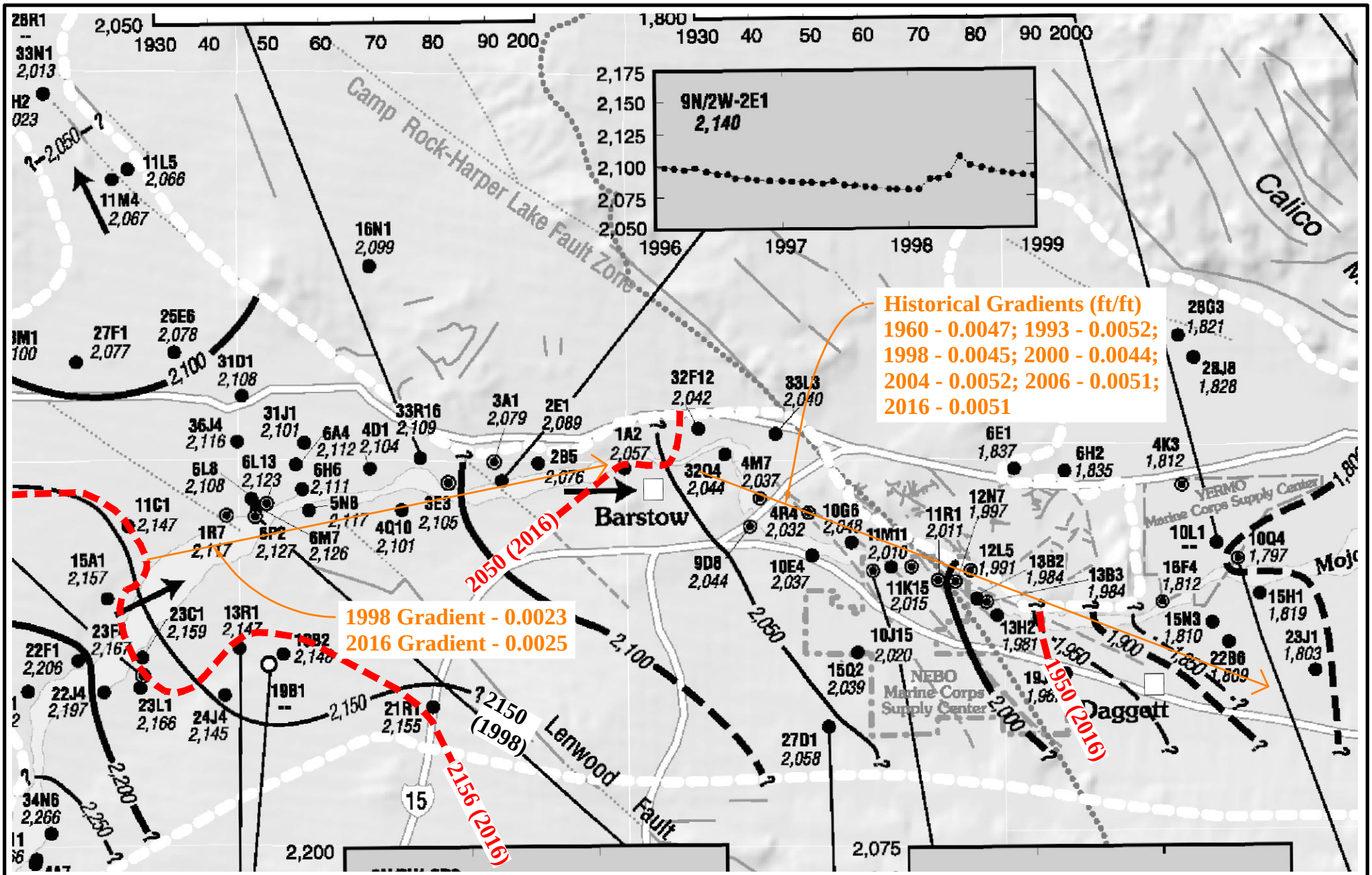
April 2019



2050 2016 Groundwater Contour

2050 1998 Groundwater Contour (on Base Map)

0.0042 Caculated Gradient and Flow Direction

Figure 4
1998-2016 Comparison
Groundwater Levels & Gradients
Centro-Baja Boundary

Wagner Bonsignore
Consulting Civil Engineers, A Corporation

Base map per USGS 1998 Groundwater Contour Map.

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April 2019

APPENDIX B

Consumptive Water Use Analysis for 2017-18

Consumptive Water Use Analysis for 2017-18

Introduction

The purpose of this update to the consumptive water use values for the Mojave Basin Area Watermaster for the 2017-18 water year is to refine estimates of consumptive use and return flow and ultimately re-calculate Production Safe Yield (PSY). The area of study is the five subareas of the Mojave Basin Area as identified in the Judgment After Trial - January 10, 1996. These subareas are Este, Oeste, Alto, Centro, and Baja. Each of these subareas are hydrologically connected, yet, they are climatologically distinct. Consumptive water use for all the water production in the Mojave Basin Area was estimated based on the water use type and location.

Some portion of the water applied to beneficial uses is lost to the water supply system. Consumptive Water Use is the evapotranspiration and the evaporation of water applied to beneficial uses. This is the water permanently removed from the system. The difference between water produced (pumped from the ground) and water consumed is return flow; return flow is considered part of the supply to the extent that it returns to the groundwater body.

The consumptive use crop unit values for irrigated acres is estimated using the Consumptive Use Program Plus (CUP+) from the California Department of Water Resources (DWR). The climate data used for CUP+ is from the California Irrigation Management Information System (CIMIS) for the Victorville and Newberry Springs stations and the crop coefficients for various crop types are from the Food and Agriculture Organization of the United Nations 56 (FAO 56). CUP+ in conjunction with CIMIS data utilized the Penman-Monteith equation to calculate a reference evapotranspiration value along with an applied water use value for each crop type. The consumptive use unit values for each subarea including the Transition Zone can be found on Tables 1 through 6.

Reference evapotranspiration calculated by CIMIS differs from the output of DWR's CUP+. CIMIS uses a modified Penman equation (referred to as the "CIMIS Penman equation"), while CUP+ uses a modified Penman-Monteith equation to calculate reference evapotranspiration. In addition, in order to complete the monthly climatological record, missing daily climate values were manually computed as the average of the previous day and the following day. On occasions when there was missing climatological data for many consecutive days, climate data was filled with data from the nearest CIMIS station.

For agriculture, a land use study using CUP+ applied water values and aerial photography were used to determine how much water should have been used if a crop is 100% efficient and is being irrigated to obtain optimal yield and coverage. For much of the Mojave Basin Area, crops are under-irrigated and this can be seen by the quality of the crop where there may be poor coverage (dead spots) or a crop may be fallowed during certain parts of the year. This is especially true for the Baja subarea where many crops may be grown for only one quarter or where orchards may appear under-irrigated to the point where many trees may have died. For this report, the assumptions made for orchards are that the trees are mature, that the coverage of trees is optimal, and that the size and quality of the fruit (or nut) is high. If any of these conditions are not met, the orchard is most likely being under-irrigated, and therefore, does not contribute to any return flow.

TABLE 1
MOJAVE BASIN AREA WATERMASTER
ESTIMATED UNIT CROP DEMAND BASED ON DWR'S CUP+ PROGRAM
WATER YEAR 2017-18
ALTO SUBAREA

	ET_O[(1)] (ft)												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Reference Evapotranspiration	0.39	0.26	0.21	0.21	0.27	0.36	0.58	0.65	0.84	0.85	0.83	0.65	6.10
	ET_{AW}[(1)] (ft)												
Crop	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Alfalfa	0.39	0.26	0.06	0.16	0.26	0.32	0.58	0.65	0.84	0.83	0.83	0.65	5.83
Grass	0.31	0.21	0.15	0.13	0.21	0.26	0.47	0.52	0.67	0.66	0.67	0.52	4.78
Other Orchard	0.16	--	--	--	--	0.20	0.46	0.62	0.93	0.96	0.96	0.69	4.98
Pasture	0.37	0.24	0.11	0.15	0.24	0.30	0.56	0.62	0.80	0.78	0.79	0.62	5.58
Row Crops	--	--	--	--	--	0.25	0.47	0.54	0.74	0.74	0.63	--	3.37

[(1)] Evapotranspiration of Applied Water (ET_{AW}) results found using DWR's CUP+ Program Version 6.9 based on daily climate data measured at the Victorville CIMIS Station, soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and crop development data from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily Reference Evapotranspiration (ETO) using the Penman-Montieth equation.

TABLE 2
MOJAVE BASIN AREA WATERMASTER
ESTIMATED UNIT CROP DEMAND BASED ON DWR'S CUP+ PROGRAM
WATER YEAR 2017-18
TRANSITION ZONE

	ET_O[(1)] (ft)												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Reference Evapotranspiration	0.39	0.26	0.21	0.21	0.27	0.36	0.58	0.65	0.84	0.85	0.83	0.65	6.10
	ET_{AW}[(1)] (ft)												
Crop	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Alfalfa	0.39	0.26	0.17	0.16	0.26	0.32	0.58	0.65	0.84	0.83	0.83	0.65	5.94
Grass	0.31	0.21	0.12	0.13	0.20	0.25	0.47	0.52	0.67	0.66	0.67	0.52	4.73
Pasture	0.37	0.24	0.06	0.15	0.24	0.30	0.56	0.62	0.80	0.79	0.79	0.62	5.54

[(1)] Evapotranspiration of Applied Water (ET_{AW}) results found using DWR's CUP+ Program Version 6.9 based on daily climate data measured at the Victorville CIMIS Station, soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and crop development data from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily Reference Evapotranspiration (ETO) using the Penman-Montieth equation.

TABLE 3
MOJAVE BASIN AREA WATERMASTER
ESTIMATED UNIT CROP DEMAND BASED ON DWR'S CUP+ PROGRAM
WATER YEAR 2017-18
BAJA SUBAREA

	ET_O[(1)] (ft)												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Reference Evapotranspiration	0.57	0.38	0.30	0.27	0.38	0.49	0.78	0.87	1.05	1.01	1.03	0.81	7.94
	ET_{AW}[(1)] (ft)												
Crop	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Alfalfa	0.57	0.38	0.12	0.27	0.38	0.44	0.78	0.85	1.05	0.93	1.02	0.81	7.60
Grain	--	0.13	0.01	0.23	0.42	0.49	0.73	0.29	--	--	0.00	0.00	2.30
Grass	0.46	0.31	0.23	0.22	0.30	0.34	0.62	0.68	0.84	0.73	0.82	0.65	6.20
Other Orchard	0.16	--	--	--	--	0.26	0.62	0.81	1.16	1.08	1.18	0.92	6.19
Pasture	0.54	0.36	0.17	0.26	0.36	0.41	0.74	0.81	0.99	0.92	0.97	0.77	7.30
Pistachios	0.39	--	--	--	--	--	0.23	0.64	1.19	1.11	1.21	0.83	5.60
Row Crops	--	--	--	--	--	0.34	0.62	0.71	0.92	0.84	0.89	--	4.32
Sudan Grass	0.64	--	--	--	--	--	0.40	0.85	0.83	0.64	1.06	0.94	5.36
Sorghum	0.46	0.03	--	--	--	--	0.16	0.29	0.81	0.97	1.07	0.84	4.63
Teff Grass	0.54	0.36	0.17	0.26	0.36	0.41	0.74	0.81	0.99	0.92	0.97	0.77	7.30

[(1)] Crop Evapotranspiration (ET_C), and Evapotranspiration of Applied Water (ET_{AW}) results found using DWR's CUP+ Program Version 6.9 based on daily climate data measured at the Newberry Springs II CIMIS Station, soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and crop development data from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily Reference Evapotranspiration (ETO) using the Penman-Montieth equation.

[(2)] Teff grass irrigated like pasture. Source: http://www.extension.uidaho.edu/forage/Proceedings/2009%20proceedings/Teff.pdf

TABLE 4
MOJAVE BASIN AREA WATERMASTER
ESTIMATED UNIT CROP DEMAND BASED ON DWR'S CUP+ PROGRAM
WATER YEAR 2017-18
CENTRO SUBAREA

	ET_O[(1)] (ft)												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Reference Evapotranspiration	0.57	0.38	0.30	0.27	0.38	0.49	0.78	0.87	1.05	1.01	1.03	0.81	7.94
	ET_{AW}[(1)] (ft)												
Crop	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Alfalfa	0.57	0.38	0.09	0.27	0.38	0.44	0.78	0.85	1.05	0.93	1.02	0.81	7.57
Grain	--	0.13	0.03	0.23	0.41	0.49	0.73	0.25	--	--	0.00	0.00	2.27
Grass	0.46	0.31	0.23	0.22	0.30	0.34	0.62	0.68	0.84	0.73	0.82	0.65	6.20
Jujube	--	--	--	--	--	--	--	0.41	0.84	1.16	1.30	0.73	4.44
Pasture	0.54	0.36	0.15	0.26	0.36	0.41	0.74	0.81	1.00	0.92	0.97	0.77	7.29
Pistachios	0.38	--	--	--	--	--	0.23	0.64	1.19	1.16	1.21	0.83	5.64
Row Crops	--	--	--	--	--	0.34	0.62	0.71	0.92	0.84	0.80	--	4.23
Sorghum	0.45	--	--	--	--	--	0.16	0.28	0.81	0.97	1.07	0.84	4.58
Sudan Grass	0.66	0.09	--	--	--	--	0.40	0.85	0.86	0.64	1.06	0.94	5.50

[(1)] Crop Evapotranspiration (ET_C), and Evapotranspiration of Applied Water (ET_{AW}) results found using DWR's CUP+ Program Version 6.9 based on daily climate data measured at the Newberry Springs II CIMIS Station, soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and crop development data from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily Reference Evapotranspiration (ETO) using the Penman-Montieth equation.

TABLE 5
MOJAVE BASIN AREA WATERMASTER
ESTIMATED UNIT CROP DEMAND BASED ON DWR'S CUP+ PROGRAM
WATER YEAR 2017-18
ESTE SUBAREA

	ET_O[(1)] (ft)												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Reference Evapotranspiration	0.39	0.26	0.21	0.21	0.27	0.36	0.58	0.65	0.84	0.85	0.83	0.65	6.10
	ET_{AW}[(1)] (ft)												
Crop	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Alfalfa	0.39	0.26	0.05	0.16	0.26	0.32	0.58	0.65	0.84	0.83	0.83	0.65	5.82
Grain	--	0.09	0.07	0.13	0.28	0.36	0.55	0.22	--	--	0.00	0.00	1.70
Grass	0.31	0.21	0.12	0.13	0.20	0.25	0.47	0.52	0.67	0.66	0.67	0.52	4.73
Jujube	--	--	--	--	--	--	--	0.32	0.67	1.03	1.06	0.55	3.63
Other Orchard	--	--	--	--	--	0.20	0.46	0.62	0.93	0.96	0.96	0.74	4.87
Pasture	0.37	0.24	0.06	0.15	0.24	0.30	0.56	0.62	0.80	0.79	0.79	0.62	5.54
Pistachios	0.27	0.05	--	--	--	--	0.20	0.49	0.96	0.99	0.99	0.67	4.62
Row Crops	--	--	--	--	--	0.25	0.47	0.54	0.74	0.74	0.63	--	3.37
Teff Grass	0.37	0.24	0.06	0.15	0.24	0.30	0.56	0.62	0.80	0.79	0.79	0.62	5.54

[(1)] Evapotranspiration of Applied Water (ET_{AW}) results found using DWR's CUP+ Program Version 6.9 based on daily climate data measured at the Victorville CIMIS Station, soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and crop development data from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily Reference Evapotranspiration (ETO) using the Penman-Montieth equation.

[(2)] Teff grass irrigated like pasture. Source: http://www.extension.uidaho.edu/forage/Proceedings/2009%20proceedings/Teff.pdf

TABLE 6
MOJAVE BASIN AREA WATERMASTER
ESTIMATED UNIT CROP DEMAND BASED ON DWR'S CUP+ PROGRAM
WATER YEAR 2017-18
OESTE SUBAREA

	ET_O[(1)] (ft)												
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Reference Evapotranspiration	0.39	0.26	0.21	0.21	0.27	0.36	0.58	0.65	0.84	0.85	0.83	0.65	6.10
	ET_{AW}[(1)] (ft)												
Crop	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
Alfalfa	0.39	0.26	0.15	0.16	0.26	0.32	0.58	0.65	0.84	0.83	0.83	0.65	5.92
Grain	--	0.09	0.07	0.13	0.28	0.36	0.55	0.22	--	--	0.00	0.00	1.70
Grass	0.31	0.21	0.12	0.13	0.20	0.25	0.47	0.52	0.67	0.66	0.67	0.52	4.73

[(1)] Evapotranspiration of Applied Water (ET_{AW}) results found using DWR's CUP+ Program Version 6.9 based on daily climate data measured at the Victorville CIMIS Station, soil properties found using USDA Natural Resources Conservation Service Web Soil Survey program, and crop development data from FAO Irrigation and Drainage Paper No. 56 (Allen, R.K., L.S. Pereira, D. Raes, and M. Smith, 1998). Daily weather data from CIMIS was used by CUP+ to compute daily Reference Evapotranspiration (ETO) using the Penman-Montieth equation.

Land Use Categories

Each type of production is associated with a land use type. There are 10 different land use types categorized by the Mojave Basin Area Watermaster. These include agricultural, dairy, municipal, domestic, golf course, industrial, parks, recreational lakes, and aquaculture. Land use categories also include subcategories. The land use types can be found on Table 7 below.

TABLE 7
MOJAVE BASIN AREA WATERMASTER
LAND USE CATEGORIES

WATER USE	WATER SUB 1	WATER SUB 2
Agriculture	Alfalfa	Apricots
Aquaculture	Commercial	Apples
Dairy	Domestic	Barley
Domestic	Grain	Cattle
Golf Course	Livestock	Dairy
Industrial	Mobile Home Park	Domestic
Municipal	Municipal	Horses
No Use	Orchard	Peaches
Parks	Pasture	Pistachios
Recreational Lakes	Recreational Lake	Pomegranates
	Row Crops	Poultry
	Sod	Ostriches
	Sorghum	Recreational Lakes
	Sudan Grass	Sudan Grass
		Jujubes

Consumptive Use of Irrigated Acreage

Aerial photography is used in conjunction with Watermaster field visit photographs and producer interviews to determine what kind of crop is being grown. Using Geographic Information Systems (GIS) and yearly aerial photography, the total acreage being irrigated is determined. This is done for crops, golf courses, and parks. In some instances, a producer may plant different crops on the same land at different times of the year. The consumptive use is estimated for both crops. Table 8 shows the total crop type by subarea.

TABLE 8
MOJAVE BASIN AREA WATERMASTER
2017-18 ESTIMATES OF NET IRRIGATED ACREAGE BY CROP TYPE
(ALL AMOUNTS IN ACRES)

Subarea	Alfalfa	Grain	Sudan Grass	Sorghum	Orchard	Pasture	Row Crops	Sod	Teff Grass
Alto	155	0	0	0	0	118	1	51	0
Baja	2,550	916	232	0	694	21	2	0	260
Centro	1,032	209	61	307	48	34	1	0	0
Este	290	37	0	0	156	34	25	0	60
Oeste	149	147	0	0	0	0	0	0	0
Totals	**4,176**	**1,309**	**293**	**307**	**898**	**207**	**29**	**51**	**320**

The total consumptive use of a crop is determined by multiplying the consumptive use of applied water by the total number of irrigated acres. This gives the potential consumptive use in acre-feet. Subtracting the potential consumptive use from the total production for a particular crop yields the consumptive use and the return flow for that specific producer. If the potential consumptive use is higher than the total production, it is assumed that the crop is being under-irrigated and that 100% of the production was consumed.

Consumptive Use of Municipal Production

Consumptive use of municipal production is determined by separating indoor use from outdoor use. For the purposes of this study, indoor domestic use is assumed to be 100% return flow and outdoor use is considered to be 100% consumed. High rates of evaporation in the desert, conservation, restrictions on outdoor uses, changes in landscaping to desert landscapes, ordinances preventing over irrigation, and improved leak detection all support the assumption of 100% outdoor consumptive use. Indoor consumptive use is difficult to measure, and whether water is discharged to sewer or septic, it is assumed to be returned to the system. Municipal leaks in distribution systems are assumed to not contribute to return flow. Leaks are assumed to be repaired timely and thus do not contribute to return flow.

To determine indoor use, the Victor Valley Wastewater Reclamation Authority's (VVWRA) 2009 Flow Projection Analysis was used to estimate gallons per capita per day (gpcd). For a single-family residence (SFR), the sewer generation rate is 57 gpcd and for a multi-family residence (MFR), the sewer generation rate is 46.7 gpcd. Total indoor use is determined by population from census data. Resident population estimates for individual municipalities was determined by using census data and Beacon Economics Growth Forecast (2015). SFR and MFR population numbers were determined by extrapolating total single-family homes versus total multi-family homes. It is assumed that the average occupancy of a SFR is the same as the average occupancy of a MFR. Sewered and septic parcels are determined using GIS data from VVWRA and individual municipalities. Population numbers for the sewered parcels were obtained by extrapolating the

area of sewered parcels with population data from the 2010 census. It is also assumed that all new construction (assumed as population growth) is sewered.

The municipal production is broken down into different categories including SFR, MFR, commercial, industrial, irrigation, other, and system losses. Since the municipal producers do not report this information to the Watermaster, the values were extrapolated using the 2015 Urban Water Management Plans for each municipality, where these values were reported to the State.

The average consumptive use for municipal producers varies by subarea. In the Upper Alto region, the average 2018 municipal consumptive use was 51%. In the Transition Zone, the average 2018 municipal consumptive use was 36%. In the Centro subarea, the average 2018 municipal consumptive use was 25%. In the Baja subarea, the average 2018 municipal consumptive use was 95%. In the Este subarea, the average 2018 municipal consumptive use was 51%. In Oeste, the average municipal consumptive use was 32%.

Commercial water use values were calculated by taking the total commercial area and multiplying by a factor for gallons per square foot per day (gal/sf/day). The commercial square footage for each City was obtained from the VVWRA flow projection model and the "future" values were estimated using the average population growth from Beacon Economics (2015).

Consumptive use for domestic production uses the average indoor production estimates for each subarea. It is assumed that the production for single family residences with a well is comparable to single family residences on municipal water. This is done for each subarea including the Transition Zone separate from the Upper Alto region.

Dairy production is assumed to be 100% consumptively used. The water used for dairy operations is either consumed by the cows or evaporated after a wash down of the dairy facilities.

Consumptive use for golf courses is estimated in the same manner as other crops. Grass, sod, and park have the same consumptive use factor as golf courses.

Industrial production is assumed to be 100% consumptively use.

Consumptive use for recreational lakes is calculated at 100% of verified production. This is due to lake consumptive use only being evaporation off the top of the lake. Aquaculture consumptive use is considered the same as a recreational lake.

In the Judgment, a Minimal Producer is defined as a producer who used less than 10 acre-feet during the 1986-90 base period. Minimal producer total production is assumed to be the same as reported by Albert A. Webb Associates in February 2000. The consumptive use for minimal producers is treated the same as domestic use and is calculated based on the average indoor use for single family residences. The only exception is for the Baja subarea where minimal producer population was used to estimate consumptive use. Baja minimal producer consumptive use was calculated differently because many of the minimal producers have private lakes and small orchards and therefore, use water differently than minimal producers in the other subareas. Minimal producer production and consumptive use are listed below on Table 9.

TABLE 9
MOJAVE BASIN AREA WATERMASTER
MINIMAL PRODUCER CONSUMPTIVE USE BY SUBAREA
(ALL AMOUNTS IN ACRE-FEET)

Subarea	Estimated Total Production	Consumptive Use
Este	954	489
Oeste	238	75
Alto	2,104	1,075
Centro	1,553	396
Baja	2,228	1,996

Total consumptive use by subarea was broken down into land use categories which can be found on Table 10. The consumptive use by category is the sum of the land use types from Table 7.

TABLE 10
MOJAVE BASIN AREA WATERMASTER
CONSUMPTIVE USE BY CATEGORY FOR EACH SUBAREA
(ALL AMOUNTS IN ACRE-FEET)

Use Type	Este	Oeste	Alto	Centro	Baja
Agricultural	2,327	674	1,311	8,679	17,547
Dairy	0	534	0	216	117
Municipal	223	1,633	28,383	2,775	330
Domestic	534	79	1,197	416	3,155
Golf Course	0	0	3,775	17	0
Industrial	703	12	3,735	4,276	995
Parks	36	0	316	0	11
Recreational Lakes	4	0	3,037	73	1,837
Aquaculture	0	0	160	0	10
Agricultural Subtotal	2,327	1,208	1,311	8,895	17,664
Urban Subtotal	1,500	1,724	40,603	7,557	6,338
Total	**3,827**	**2,932**	**41,914**	**16,452**	**24,002**

Notes
1. Consumptive use categories are summed from Appendix C.
2. CDFW North Narrows Park in Alto has 41 acres of "Pasture" in the wetlands behind the park that is not part of the phreatophyte consumptive use. The "pasture" is categorized under recreational lakes in Appendix C. This usage has been moved to the "Agriculture" category for this table.
3. Due to rounding, the sums of the individual items may not be equal to the totals.

Differences Between Webb and 2017-18 Consumptive Use Reports

Albert A. Webb and Associates (Webb) produced a consumptive water use report in 2000 for the Watermaster. The Webb report incorporated the cultural conditions that existed during the 1996-1997 Water Year.

Municipal Consumptive Use

In the Webb report, the municipal consumptive use was estimated at 50% of total production. The 2018 report calculated consumptive use using VVWRA flow projections coupled with producer and population data to estimate total consumptive use. In the Upper Alto region, the average 2018 municipal consumptive use was 51%. In the Transition Zone, the average 2018 municipal consumptive use was 36%. In the Centro subarea, the average 2018 municipal consumptive use was 25%. In the Baja subarea, the average 2018 municipal consumptive use was 95%. In the Este subarea, the average 2018 municipal consumptive use was 51%. In Oeste, the average municipal consumptive use was 32%.

Agricultural Consumptive Use

If the total production was higher than 65% of total production, the Webb report defaulted to 65% consumptive use. In the 2018 report, if the potential consumptive use is over 100% of total production, then the crop is considered to be under-irrigated and will therefore have no return flow.

Minimal Producers

In the Webb report, minimal producer consumptive use is defaulted to 50% of total production. In the 2018 report, minimal producer consumptive use is determined by using the average municipal consumptive use by subarea. In the case of Baja, minimal producer population numbers were used to estimate the consumptive use for Baja minimal producers.

Production Safe Yield

Production Safe Yield (PSY) is defined in the Judgment as "*The highest average Annual Amount of water that can be produced from a Subarea: (1) over a sequence of years that is representative of long-term average annual natural water supply to the Subarea net of long-term average annual natural outflow from the Subarea, (2) under given patterns of Production, applied water, return flows and Consumptive Use, and (3) without resulting in a long-term net reduction of groundwater in storage in the Subarea.*" In the Webb report, the total PSY for the Mojave Basin Area was estimated to be 135,124 acre-feet. In the 2018 report, the total PSY of all the basins is estimated to be 104,123 acre-feet.

One aspect of the PSY is the return flow from production. For the Mojave Basin Area, return flow is counted as part of the supply. The main difference between the water balance conditions from the Webb and 2018 reports is that the total amount of return flow decreased. Figures 1 and 2 display the main differences in the water balance conditions for the Baja and Alto subareas from the Webb and 2018 reports.

FIGURE 1
COMPARISON OF PRODUCTION SAFE YIELD ELEMENTS
WEBB STUDY AND 2018 STUDY
BAJA SUBAREA

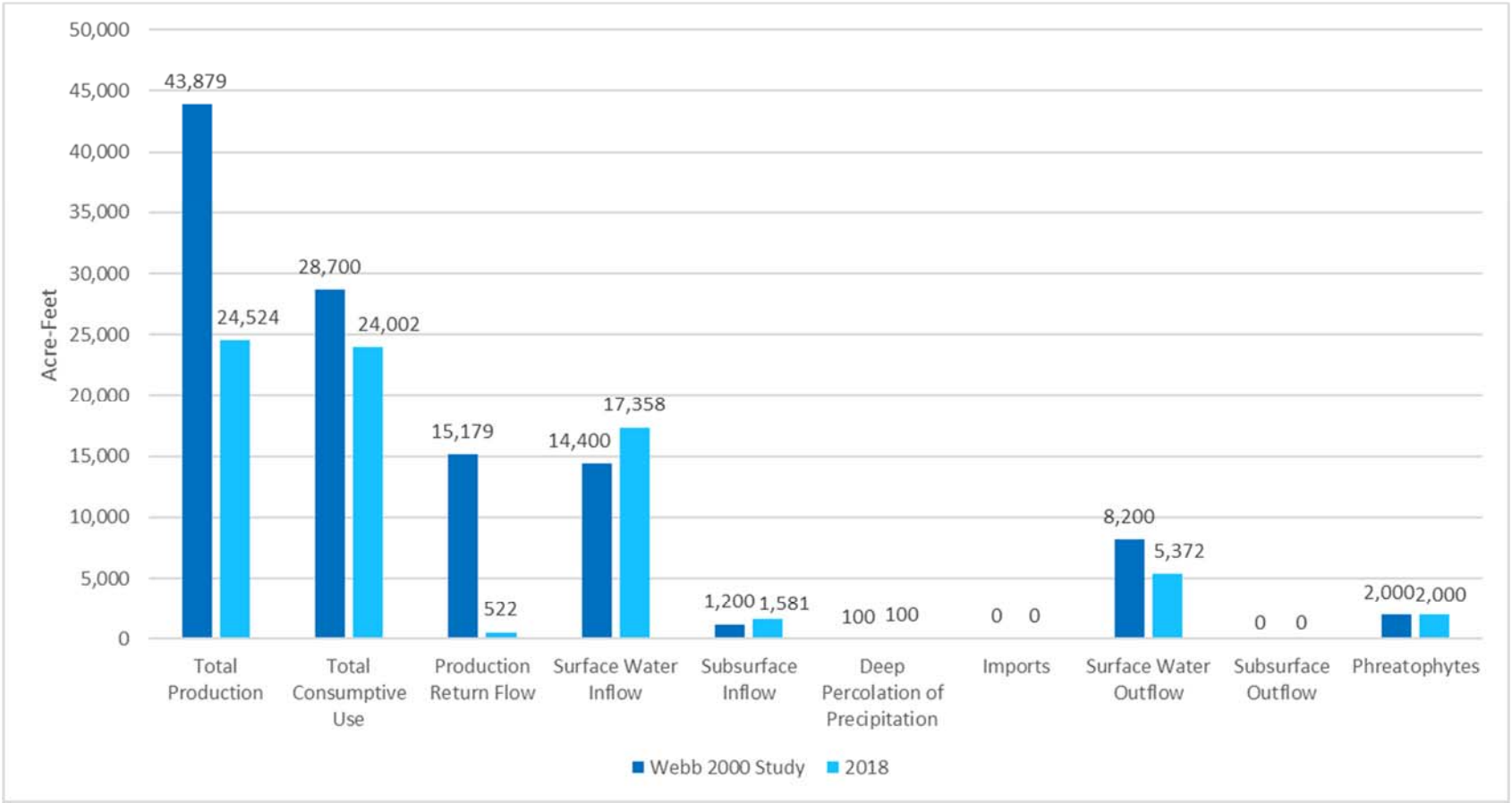
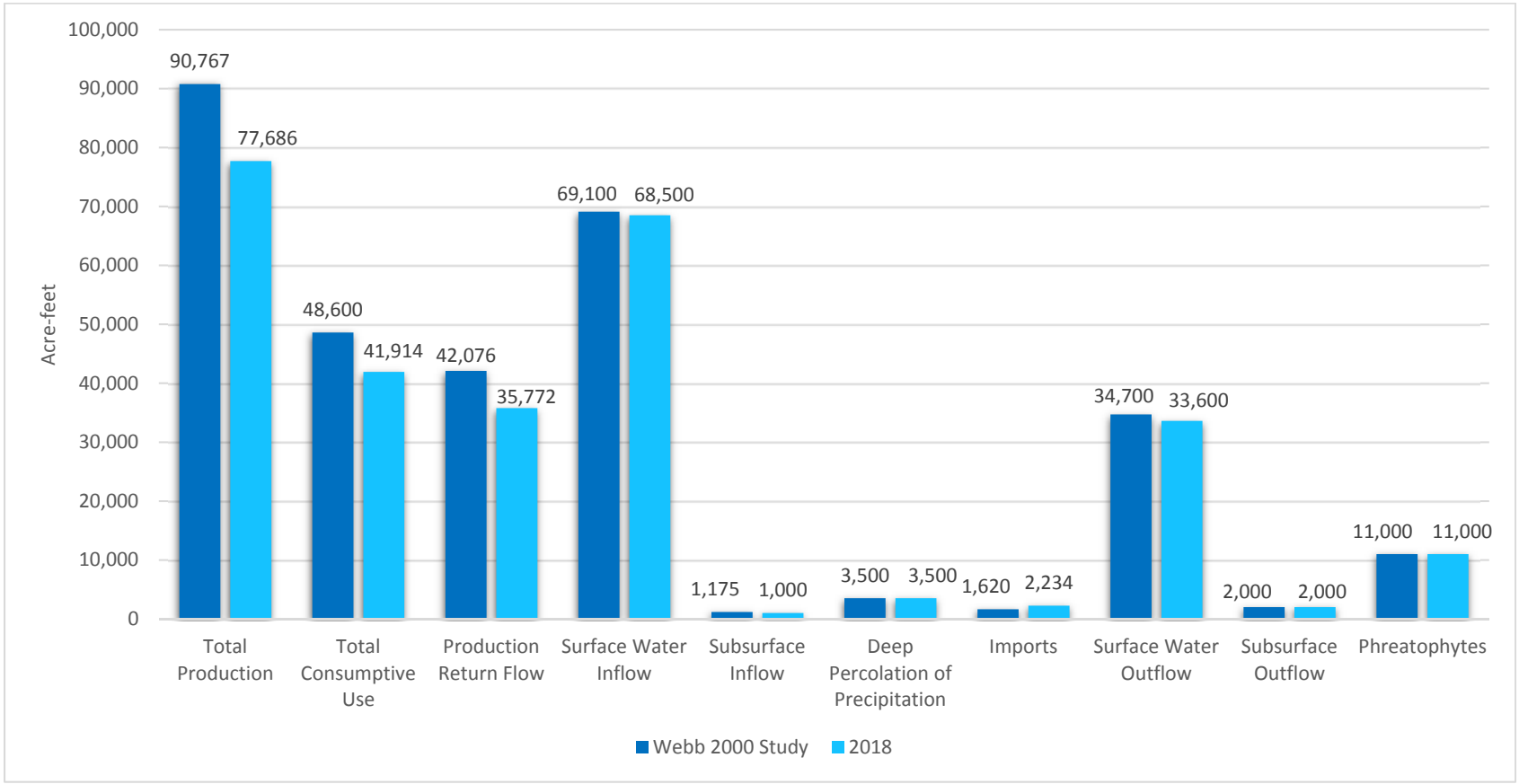


FIGURE 2
COMPARISON OF PRODUCTION SAFE YIELD ELEMENTS
WEBB STUDY AND 2018 STUDY
ALTO SUBAREA



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APPENDIX C

Consumptive Water Use for Individual Producers, 2017-18

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Adelanto, City Of	Municipal			960.22	25.15%	960.22	3,818
Ades, John and Devon	Domestic	Grass	0.08	3.07	51.12%	3.07	6
Agcon, Inc.	Industrial	Lake	2.27	293.00	100.00%	293.00	293
	Domestic			0.36	36.50%	0.36	1
American States Water Company	No Use			0.00	0.00%	0.00	0
Apple Valley Foothill County Water District	Municipal			48.56	51.12%	48.56	95
Apple Valley Heights County Water District	Municipal			27.31	26.77%	27.31	102
Apple Valley Unified School District	Parks	Park	9.93	47.47	87.90%	47.47	54
Apple Valley View Mutual Water Company	Municipal			12.27	51.12%	12.27	24
Apple Valley, Town Of	Golf Course	Golf Course	95.09	454.53	98.13%	458.25	467
		Lake	0.61	3.72			
	Parks	Park	24.00	114.72	100.00%	41.00	41
Aqua Capital Management, LP-Agriculture	No Use			0.00	0.00%	0.00	0
Aqua Capital Management, LP-Industrial	No Use			0.00	0.00%	0.00	0
Bass Trust, Newton T.	Domestic	Grass	0.09	1.02	51.12%	1.02	2
Bastianon Revocable Trust	Domestic			0.51	51.12%	0.51	1
Beebe, Robert W. and Dorothy K.	No Use			0.00	0.00%	0.00	0
Beinschroth Family Trust	Agriculture	Alfalfa	11.60	67.63	100.00%	18.00	18
	Domestic	Park	1.91	14.82	100.00%	29.00	29
		Lake	0.54	14.82			
Box, Geary S. and Laura	Domestic	Grass	0.20	2.04	51.12%	2.04	4
Brown, Bobby G. and Valeria R.	Domestic	Grass	0.17	0.36	36.50%	0.36	1
Brown, Jennifer	Domestic	Grass	0.15	2.04	51.12%	2.04	4
Bruneau, Karen	Domestic	Grass	0.15	1.02	51.12%	1.02	2

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Bryant, Ian	No Use			0.00	0.00%	0.00	0
Bunnell, Dick	Domestic			0.73	36.50%	0.73	2
CalMat Company	Industrial			4.00	100.00%	4.00	4
CalPortland Company - Agriculture	No Use			0.00	0.00%	0.00	0
CalPortland Company - Oro Grande Plant	Industrial			763.00	100.00%	763.00	763
CDFW - Mojave Narrows Regional Park	Parks	Grass	5.47	26.15	50.28%	26.15	52
	Recreational Lakes	Lake	36.42	222.16	26.48%	454.85	1,718
		Pasture	41.70	232.69			
CDFW - Mojave River Fish Hatchery	Aquaculture	Lake	2.70	16.47	100.00%	20.00	20
		Grass	1.42	6.79			
		Park	3.55	16.97			
Cemex, Inc.	Industrial	Park	5.92	1,152.00	100.00%	1,152.00	1,152
Cunningham, Jerry	No Use			0.00	0.00%	0.00	0
Dolch, Robert and Judy	Domestic	Grass	0.12	2.04	51.12%	2.04	4
Dora Land, Inc.	No Use			0.00	0.00%	0.00	0
East Desert Land Company, LLC	Agriculture	Alfalfa	142.92	848.94	70.28%	848.94	1,208
Evenson, Edwin H. and Joycelaine C.	Domestic			0.36	36.50%	0.36	1
Federal Bureau of Prisons, Victorville	No Use			0.00	0.00%	0.00	0
Fischer Revocable Living Trust	Domestic			0.51	51.12%	0.51	1
Fisher Trust, Jerome R.	No Use			0.00	0.00%	0.00	0
Fitzwater, R. E.	Domestic	Grass	0.05	0.36	36.50%	0.36	1
Frazier, et al.	No Use			0.00	0.00%	0.00	0
Golden State Water Company	Municipal			175.38	19.82%	175.38	885
Green Acres Estates	Domestic	Grass	0.07	2.56	51.12%	2.56	5

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Gulbranson, Merlin	No Use			0.00	0.00%	0.00	0
Haas, Bryan C. and Hinkle, Mary H.	No Use			0.00	0.00%	0.00	0
Halanna Equities III	Domestic	Grass	0.31	3.07	51.12%	3.07	6
Hamilton Family Trust	Domestic	Other Orchard	0.32	7.67	57.90%	8.68	15
		Grass	0.20	0.96			
		Lake	0.01	0.06			
Helendale Community Services District	Municipal	Pasture	5.07	886.34	71.83%	1,105.43	1,539
		Sod	41.74	197.43			
		Park	4.58	21.66			
Helendale School District	Domestic	Park	1.95	2.19	36.50%	2.19	6
Hesperia - Golf Course, City of	Golf Course	Golf Course	93.70	447.89	79.22%	452.34	571
		Lake	0.73	4.45			
Hesperia Venture I, LLC	Domestic	Lake	16.00	0.51	51.12%	0.51	1
Hesperia Water District	Municipal			5,960.44	42.96%	5,960.44	13,874
	Parks	Lake	10.90	66.49	40.30%	156.78	389
		Park	18.89	90.29			
Hesperia, City of	No Use			0.00	0.00%	0.00	0
Hi-Grade Materials Company	Industrial	Lake	0.08	18.00	100.00%	18.00	18
Holway Jeffrey R and Patricia Gage	No Use			0.00	0.00%	0.00	0
Holway, Jeffrey R	No Use			0.00	0.00%	0.00	0
Hunt, Connie	No Use			0.00	0.00%	0.00	0
Jamboree Housing Corporation	Municipal	Grass	1.72	20.96	51.12%	20.96	41
Jess Ranch Water Company	Municipal			1,259.15	88.24%	1,259.15	1,427
	Golf Course	Golf Course	172.67	825.36	76.84%	864.46	1,125
		Lake	6.41	39.10			
	Aquaculture	Lake	20.00	140.00	100.00%	140.00	140

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Johnson, Carlean	Agriculture	Grass Pasture	1.17 1.37	5.59 7.64	60.17%	13.24	22
Johnson, Ronald	No Use			0.00	0.00%	0.00	0
Johnston, Harriet and Johnston, Lawrence W.	Domestic	Grass	0.37	2.04	51.12%	2.04	4
Kanesaka, Kenji and Yukari	No Use			0.00	0.00%	0.00	0
Kemper Campbell Ranch	Domestic Agriculture	 Lake Pasture	 5.13 51.41	11.25 31.29 286.87	51.12% 100.00%	11.25 121.00	22 121
Laguna Water II, Ltd.	No Use			0.00	0.00%	0.00	0
Lake Arrowhead Community Services District	No Use			0.00	0.00%	0.00	0
Langley, James	No Use			0.00	0.00%	0.00	0
Langley, James - Industrial	No Use			0.00	0.00%	0.00	0
Lawson, Ernest and Barbara	Domestic	Grass	0.05	0.51	51.12%	0.51	1
Lenhert, Ronald and Toni	Domestic	Grass	0.28	4.09	51.12%	4.09	8
LHC Alligator, LLC	No Use			0.00	0.00%	0.00	0
Liberty Utilities (Apple Valley Ranchos Water) Corp.	Municipal			4,002.87	48.37%	4,002.87	8,276
Low, Dean	No Use			0.00	0.00%	0.00	0
Luckey 2010 Revocable Trust	Domestic	Grass	0.15	0.51	51.12%	0.51	1
Mariana Ranchos County Water District	Municipal			110.70	52.71%	110.70	210
McInnis, William S.	Domestic	Park Pasture	0.25 0.07	4.77 0.39	73.77%	5.16	7
McKinney, Paula	No Use			0.00	0.00%	0.00	0
MLH, LLC	Domestic	Grass	0.50	4.09	51.12%	4.09	8
Mojave Water Agency	Municipal			16.00	100.00%	16.00	16

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Navajo Mutual Water Company	Municipal			15.33	51.12%	15.33	30
Nuñez, Luis Segundo	Domestic			0.51	51.12%	0.51	1
Nunn Family Trust	Domestic	Grass	0.02	0.51	51.12%	0.51	1
Oro Grande School District	Municipal			30.00	100.00%	30.00	30
	Parks	Park	10.16	48.06	100.00%	35.00	35
Perry Revocable Living Trust, Thomas and Patricia	Domestic	Grass	0.07	0.51	51.12%	0.51	1
Phelan Piñon Hills Community Services District	Municipal			52.00	32.28%	52.00	161
Pittman, Leroy W.	Domestic			0.36	36.50%	0.36	1
Polich, Donna	No Use			0.00	0.00%	0.00	0
Rancheritos Mutual Water Company	Municipal			55.72	51.12%	55.72	109
Rim Properties, A General Partnership	No Use			0.00	0.00%	0.00	0
Rue Ranch	Domestic	Lake	1.00	1.02	51.12%	1.02	2
San Bernardino County - High Desert Detention Center	Municipal			121.00	100.00%	121.00	121
San Bernardino County Service Area 42	Municipal			24.09	36.50%	24.09	66
San Bernardino County Service Area 64	Municipal			1,541.90	55.05%	1,541.90	2,801
San Bernardino County Service Area 70J	Municipal			668.02	39.18%	668.02	1,705
Sapp, Robert D. and Lee, Teresa J.	Domestic	Grass	0.51	3.58	51.12%	3.58	7
Scray, Michelle A. Trust	Domestic			0.51	51.12%	0.51	1
Service Rock Products Corporation	Industrial			8.00	100.00%	8.00	8
Sheep Creek Water Company	No Use			0.00	0.00%	0.00	0
Silver Lakes Association	Golf Course	Golf Course	197.33	933.35	84.71%	991.15	1,170
		Park	12.22	57.80			
	Recreational Lakes	Lake	6.59	40.20	64.25%	1,624.80	2,529
		Lake	259.77	1,584.60			

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Snowball Development, Inc.	No Use			0.00	0.00%	0.00	0
Spring Valley Lake Association	Recreational Lakes	Lake	195.00	1,189.50	47.33%	1,189.50	2,513
Spring Valley Lake Country Club	Golf Course	Golf Course	130.68	624.65	92.15%	647.83	703
		Lake	3.80	23.18			
Storm, Randall	No Use			0.00	0.00%	0.00	0
Sudmeier, Glenn W.	Domestic			0.51	51.12%	0.51	1
Summit Valley Ranch, LLC	Domestic	Lake	1.15	9.71	51.12%	9.71	19
Thompson Living Trust, James A. and Sula B.	Domestic			0.51	51.12%	0.51	1
Thompson Living Trust, R.L. and R.A.	Agriculture	Pasture	1.98	11.05	100.00%	4.00	4
Thrasher, Gary	Domestic	Grass	1.08	0.73	36.50%	0.73	2
	Agriculture	Pasture	10.64	58.95	100.00%	13.00	13
Thunderbird County Water District	Municipal			43.41	40.57%	43.41	107
Transamerica Fin'l Svc - Spears, Larry B. and Erlinda	No Use			0.00	0.00%	0.00	0
Vanhoops Holdings, LP	No Use			0.00	0.00%	0.00	0
Victor Valley Community College District	Municipal	Grass	28.00	377.90	100.00%	412.00	412
		Lake	5.59	34.10			
Victor Valley Memorial Park	Municipal	Park	7.16	34.22	76.06%	34.22	45
Victorville Water District, ID#1	Municipal			9,108.59	52.27%	9,108.59	17,427
	Industrial			1,497.00	100.00%	1,497.00	1,497
	Golf Course	Golf Course	75.47	360.75	90.19%	360.75	400
	Parks	Park	2.00	9.56	95.60%	9.56	10
Victorville Water District, ID#2	Municipal			2,577.29	52.27%	2,577.29	4,931
Vogler, Albert H.	Domestic	Row Crops	0.84	0.51	51.12%	0.51	1
Wagner Living Trust	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Alto Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Wakula Family Trust	Domestic			0.36	36.50%	0.36	1
Ward, Ken and Barbara	Agriculture	Pasture	6.12	34.15	100.00%	16.00	16
West, Howard and Suzy	No Use			0.00	0.00%	0.00	0
West, Jimmie E.	Domestic	Grass	0.25	0.36	36.50%	0.36	1
Western Rivers Conservancy	Domestic			0.36	36.50%	0.36	1
Western Water Company	No Use			0.00	0.00%	0.00	0
Westland Industries, Inc.	Domestic	Lake	0.01	14.31	51.12%	14.31	28
Wiener, Melvin and Mariam S.	No Use			0.00	0.00%	0.00	0
Wood, Michael and Denise	Agriculture	Sod Grass	9.15 0.12	43.28 0.57	99.65%	43.85	44
Wyatt Family Trust	No Use			0.00	0.00%	0.00	0
Minimal Producers	Domestic			1,075.48	51.12%	1,075.48	2,104
Summary for the Alto Subarea						**41,913.74**	**77,686.00**

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Baja Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
35250 Yermo, LLC	Domestic	Lake Grass	0.02 0.11	13.28	94.86%	13.28	14
Ahn, Chun Soo and Wha Ja	Domestic			0.95	95.00%	0.95	1
Ake, Charles J. and Marjorie M.	No Use			0.00	0.00%	0.00	0
Archibek, Eric	No Use			0.00	0.00%	0.00	0
Arguelles, Alfredo	Agriculture Domestic	Grain	62.77	144.37 0.95	57.75% 95.00%	144.37 0.95	250 1
Atchison, Topeka, Santa Fe Railway Company	Industrial			57.00	100.00%	57.00	57
Bailey 2007 Living Revocable Trust, Sheré R.	No Use			0.00	0.00%	0.00	0
Barber, James B.	Domestic	Grass Lake	0.35 0.80	38.88 6.35	100.00%	41.00	41
Baron, Susan and Palmer, Curtis	No Use			0.00	0.00%	0.00	0
Bender Trust, Dolores M.	No Use			0.00	0.00%	0.00	0
Borgogno Revocable Living Trust	Agriculture	Alfalfa	220.00	1,672.00	100.00%	761.00	761
Borja, Leonil T. and Tital L.	No Use			0.00	0.00%	0.00	0
Bredelis, Ronald C. and Jean	Domestic	Grass Lake	0.02 0.78	25.60 6.19	100.00%	27.00	27
Brown, Ronald A.	Agriculture	Alfalfa	84.37	641.21	100.00%	174.00	174
Bubier, Diane Gail	Recreational Lakes	Lake	1.49	11.83	98.59%	11.83	12
Budget Finance Company	No Use			0.00	0.00%	0.00	0
Bush, Kevin	No Use			0.00	0.00%	0.00	0
Calico Junction	No Use			0.00	0.00%	0.00	0
Calico Lakes Homeowners Association	Recreational Lakes Domestic	Lake Grass	24.56 4.19	195.01 71.12	100.00% 94.83%	168.00 71.12	168 75

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Baja Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
California Department Of Transportation	Domestic			15.17	94.81%	15.17	16
CalMat Company	No Use			0.00	0.00%	0.00	0
Camanga, Tony and Marietta	Domestic			0.95	95.00%	0.95	1
Campbell, M. A. and Dianne	No Use			0.00	0.00%	0.00	0
Carlton, Susan	Domestic			0.95	95.00%	0.95	1
CDFW - Camp Cady	Agriculture	Grain	49.56	113.99	100.00%	66.00	66
	Aquaculture	Lake	1.11	8.81	100.00%	7.00	7
	Domestic	Pasture	0.53	5.69	94.83%	5.69	6
CF Properties, LLC	Agriculture	Grain	121.00	278.30	100.00%	211.00	211
Cheyenne Lake, Inc.	Recreational Lakes	Lake	15.36	121.96	100.00%	104.00	104
	Domestic	Park	11.56	88.19	94.83%	88.19	93
Clark, Arthur	No Use			0.00	0.00%	0.00	0
Conner, William H.	No Use			0.00	0.00%	0.00	0
Corbridge, Linda S.	Domestic			0.95	95.00%	0.95	1
	Agriculture	Pistachios	16.65	93.24	100.00%	8.00	8
Cross, Francis and Beverly	No Use			0.00	0.00%	0.00	0
Crystal Lakes Property Owners Association	Recreational Lakes	Lake	46.22	366.99	100.00%	326.00	326
	Domestic	Grass	4.52	97.67	94.83%	97.67	103
Daggett Community Services District	Municipal			191.76	88.78%	191.76	216
Daggett Ranch, LLC	Domestic	Lake	0.37	35.08	94.81%	35.08	37
		Grass	0.74	4.59			
De Jong Family Trust	Agriculture	Alfalfa	352.00	2,675.20	100.00%	1,763.00	1,763
		Grain	152.00	349.60			
		Pistachios	1.47	8.23			
	Domestic			6.64	94.86%	6.64	7

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Baja Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Dennison, Quentin D. - Clegg, Frizell and Joke	No Use			0.00	0.00%	0.00	0
Docimo Living Trust, Allen Lee	Recreational Lakes	Lake	9.56	75.91	100.00%	65.00	65
Donaldson, Jerry and Beverly	Domestic			0.95	95.00%	0.95	1
Dowell, Leonard	No Use			0.00	0.00%	0.00	0
Evert Family Trust	Recreational Lakes	Lake	3.25	25.81	73.73%	25.81	35
	Domestic			0.95	95.00%	0.95	1
Fejfar, Monica Kay	No Use			0.00	0.00%	0.00	0
Fernandez, Arturo	No Use			0.00	0.00%	0.00	0
Ferro, Dennis and Norma	No Use			0.00	0.00%	0.00	0
First CPA LLC	Agriculture			33.00	100.00%	33.00	33
Fundamental Christian Endeavors, Inc.	Domestic			37.93	94.83%	37.93	40
	Parks	Grass	1.70	10.54	21.51%	10.54	49
	Recreational Lakes	Lake	4.72	37.48	100.00%	33.00	33
Gabrych, Eugene	Agriculture	Alfalfa	122.00	927.20	100.00%	823.00	823
		Grain	121.00	278.30			
Garcia, Daniel	Domestic	Pistachios	2.18	1.90	95.00%	1.90	2
Garg, Om P.	Domestic			4.74	94.80%	4.74	5
GenOn Energy, Inc.	Industrial			754.00	100.00%	754.00	754
Gray, George F. and Betty E.	No Use			0.00	0.00%	0.00	0
Hackbarth, Edward E.	Agriculture	Alfalfa	110.00	836.00	100.00%	861.00	861
		Grain	119.00	273.70			
Hanson Aggregates WRP, Inc.	No Use			0.00	0.00%	0.00	0
Hareson, Nicholas and Mary	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
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2017-18 Water Year
Baja Subarea
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Harter, Joe and Sue	Agriculture	Pistachios	138.02	772.91	100.00%	2,578.00	2,578
		Alfalfa	319.42	2,427.59			
		Teff Grass	179.77	1,312.32			
		Grain	76.62	176.23			
	Domestic			3.79	94.75%	3.79	4
Hass, Pauline L.	Domestic			0.95	95.00%	0.95	1
Hawkins, James B.	No Use			0.00	0.00%	0.00	0
Hendley, Rick and Barbara	Domestic			12.33	94.85%	12.33	13
Hiett, Harry L.	Agriculture	Other Orchard	0.44	2.72	100.00%	2.00	2
Hilarides 1998 Revocable Family Trust	Industrial			1.00	100.00%	1.00	1
	Domestic			0.95	95.00%	0.95	1
Ho, Ting-Seng and Ah-Git	No Use			0.00	0.00%	0.00	0
Hollister, Robert H. and Ruth M.	Domestic			1.90	95.00%	1.90	2
Hong, Paul B. and May	No Use			0.00	0.00%	0.00	0
Hood Family Trust	Domestic	Grass	0.01	1.90	95.00%	1.90	2
Horton, John	No Use			0.00	0.00%	0.00	0
Horton's Children's Trust	Domestic	Grass	0.32	7.59	94.88%	7.59	8
	Recreational Lakes	Lake	16.54	131.33	100.00%	115.00	115
Hubbard, Ester and Mizuno, Arlean	Domestic	Row Crops	0.44	2.84	94.67%	2.84	3
Hunt, Ralph M. and Lillian F.	Domestic	Grass	0.06	3.79	100.00%	4.00	4
		Pasture	1.15	8.40			
Hyatt, James and Brenda	Domestic	Lake	2.14	16.12	94.82%	16.12	17
Im, Nicholas Nak-Kyun	Recreational Lakes	Lake	2.63	20.88	77.34%	20.88	27
	Agriculture	Pistachios	46.49	260.34	100.00%	35.00	35
Irvin, Bertrand W.	Domestic	Lake	0.98	13.28	94.86%	13.28	14

Mojave Basin Area Watermaster
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Italmood Inc., et. al.	Agriculture	Pistachios	68.67	384.55	100.00%	17.00	17
	Domestic			2.84	94.67%	2.84	3
Jacks, James F.	Domestic			0.95	95.00%	0.95	1
Jackson, James N. Jr Revocable Living Trust	No Use			0.00	0.00%	0.00	0
Jackson, Ray Revocable Trust No. 45801	No Use			0.00	0.00%	0.00	0
Johnson, James R. and Ellen	Agriculture	Pistachios	9.82	54.99	100.00%	26.00	26
Karimi, Hooshang	No Use			0.00	0.00%	0.00	0
Kasner Family Limited Partnership	Agriculture	Alfalfa	236.00	1,793.60	100.00%	854.00	854
Kasner, Robert	Agriculture	Grain	119.01	273.72	100.00%	2,687.00	2,687
		Alfalfa	395.09	3,002.68			
		Teff Grass	79.93	583.49			
	Domestic			0.95	95.00%	0.95	1
	Industrial			33.00	100.00%	33.00	33
Katcher, August M. and Marceline	Domestic			0.95	95.00%	0.95	1
Kemp, Robert and Rose	No Use			0.00	0.00%	0.00	0
Kim, Joon Ho and Mal Boon Revocable Trust	Agriculture	Alfalfa	117.00	889.20	100.00%	337.00	337
Kim, Seon Ja	Domestic			0.95	95.00%	0.95	1
Koegler, Ronald R. and Carolyn V.	Domestic			13.28	94.86%	13.28	14
Koering, Richard and Koering, Donna	Domestic	Grass	0.04	0.95	95.00%	0.95	1
Koroghlian, Ted and Najwa	Domestic	Lake	0.45	6.64	94.86%	6.64	7
Kosharek, John and Joann	Domestic	Lake	0.40	9.48	94.80%	9.48	10
Lake Jodie Property Owners Association	Recreational Lakes	Lake	28.47	226.05	100.00%	196.00	196
	Domestic	Grass	2.47	102.41	94.82%	102.41	108
		Other Orchard	2.85				
Lake Waikiki	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Lake Wainani Owners Association	Recreational Lakes	Lake	23.27	184.76	100.00%	170.00	170
	Domestic	Grass	2.79	17.30	100.00%	33.00	33
		Pistachios	5.06	28.34			
		Row Crops	0.37	1.60			
Lam, Phillip	Recreational Lakes	Grass	0.10	0.62	73.51%	5.15	7
		Lake	0.57	4.53			
Langley, Michael R. and Sharon	Agriculture	Pistachios	18.95	106.12	100.00%	12.00	12
Lavanh, et al.	Domestic			0.95	95.00%	0.95	1
Lawrence, William W.	Domestic	Grass	0.08	0.95	95.00%	0.95	1
Lee, Vin Jang T.	No Use			0.00	0.00%	0.00	0
Lem, Hoy	No Use			0.00	0.00%	0.00	0
Liang, Yuan - I and Tzu - Mei Chen	No Use			0.00	0.00%	0.00	0
Liberty Utilities (Apple Valley Ranchos Water) Corp.	Municipal			122.60	88.84%	122.60	138
Lin, Kuan Jung and Chung, Der-Bing	No Use			0.00	0.00%	0.00	0
Lo, et al.	Agriculture	Pistachios	12.89	72.18	100.00%	30.00	30
		Row Crops	0.02	0.09			
		Lake	0.13	1.03			
M Bird Construction	No Use			0.00	0.00%	0.00	0
Mahjoubi, Afsar S.	No Use			0.00	0.00%	0.00	0
Maloney, Janice	Domestic			1.90	95.00%	1.90	2
Manning, Sharon S.	Domestic	Row Crops	0.68	39.83	94.83%	39.83	42
		Lake	1.03				
Marcroft, James A. and Joan	Domestic	Grass	0.32	25.60	94.81%	25.60	27
		Lake	0.60				
Marshall, Charles	No Use			0.00	0.00%	0.00	0

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Martin, Michael D. and Arlene D.	Agriculture	Pistachios	14.33	80.25	100.00%	42.00	42
Milbrat, Irving H.	Domestic	Lake	0.30	30.34	94.81%	30.34	32
Miller Living Trust	No Use			0.00	0.00%	0.00	0
Mizrahie, et al.	No Use			0.00	0.00%	0.00	0
Morris Trust, Julia V.	Domestic			0.95	95.00%	0.95	1
Mulligan, Robert and Inez	No Use			0.00	0.00%	0.00	0
Murphy, Jean	Domestic	Lake	0.08	3.79	94.75%	3.79	4
New Springs Limited Partnership	No Use			0.00	0.00%	0.00	0
Newberry Community Services District	Domestic	Park	1.36	10.43	94.82%	10.43	11
Newberry Springs Recreational Lakes Association	No Use			0.00	0.00%	0.00	0
O. F. D. L., Inc.	Recreational Lakes	Lake	16.33	129.66	100.00%	108.00	108
	Domestic	Grass	1.55	55.95	94.83%	55.95	59
P and H Engineering and Development Corporation	No Use			0.00	0.00%	0.00	0
Patino, José	Domestic			0.95	95.00%	0.95	1
Pearce, Craig L.	Domestic	Grass	0.02	12.33	94.85%	12.33	13
Perko, Bert K.	Agriculture	Lake	0.36	2.86			
		Pistachios	49.45	276.92	100.00%	41.00	41
Poland, John R. and Kathleen A.	Domestic	Lake	0.70	12.33	99.62%	12.95	13
		Grass	0.10	0.62			
Porter, Timothy M.	No Use			0.00	0.00%	0.00	0
Pozzato Partners, Limited	Domestic			31.29	94.82%	31.29	33
Price, Donald and Ruth	Domestic			0.95	95.00%	0.95	1
Pruett, Andrea	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
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2017-18 Water Year
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Quakenbush, Samuel R.	Domestic	Pasture	0.03	4.74	94.80%	4.74	5
		Lake	0.57				
Quiros, Fransisco J. and Herrmann, Ronald	Agriculture	Pistachios	25.00	140.00	100.00%	35.00	35
Rice, Henry C. and Diana	No Use			0.00	0.00%	0.00	0
Rizvi, S.R Ali	No Use			0.00	0.00%	0.00	0
Rossi, James L. and Naomi I.	Agriculture	Alfalfa	48.00	364.80	100.00%	321.00	321
S and B Brothers, LLC	Recreational Lakes	Lake	6.49	51.53	99.10%	51.53	52
Sagabean-Barker, Kanoeolokelani L.	Recreational Lakes	Lake	1.68	13.34	100.00%	12.00	12
	Domestic			1.90	95.00%	1.90	2
Samra, Jagtar S.	Domestic	Lake	0.68	8.53	94.78%	8.53	9
San Bernardino Co Barstow - Daggett Airport	Municipal			16.00	100.00%	16.00	16
Service Rock Products Corporation	Industrial			1.00	100.00%	1.00	1
Shaw, Robert M. and Lori A. Slater-Shaw	Domestic	Lake	1.42	11.27	100.00%	11.00	11
		Grass	0.18	1.12			
		Pistachios	0.41	2.30			
Sheng, Jen	Domestic			0.95	95.00%	0.95	1
Sheppard, Thomas and Gloria	Agriculture	Other Orchard	0.41	2.54	36.26%	2.54	7
	Domestic			0.95	95.00%	0.95	1
Short, Charles H. Revocable Trust	No Use			0.00	0.00%	0.00	0
Short, Jerome E.	Domestic	Lake	2.32	16.12	94.82%	16.12	17
Singh, et al.	No Use			0.00	0.00%	0.00	0
Smith, Denise dba Amerequine Beauty, Inc	Agriculture	Pasture	19.00	138.70	100.00%	91.00	91
Smith, Porter and Anita	No Use			0.00	0.00%	0.00	0
Smith, William E. and Patricia A.	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
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2017-18 Water Year
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Southern California Edison Company	No Use			0.00	0.00%	0.00	0
Southern California Gas Company	Industrial			7.00	100.00%	7.00	7
Sperry, Wesley	No Use			0.00	0.00%	0.00	0
St. Antony Coptic Orthodox Monastery	Agriculture	Alfalfa	29.88	227.09	100.00%	44.00	44
		Other Orchard	18.29	113.22			
		Pistachios	7.86	44.02			
	Recreational Lakes	Lake	1.14	9.05	25.86%	9.05	35
	Domestic	Grass	0.10	122.32	94.82%	122.32	129
Starke, George A. and Jayne E.	No Use			0.00	0.00%	0.00	0
Sundown Lakes, Inc.	Recreational Lakes	Park	6.79	42.10	100.00%	168.00	168
		Lake	22.06	175.16			
Sunray Land Company, LLC	Industrial			1.00	100.00%	1.00	1
Szynkowski, Ruth J.	Domestic	Row Crops	0.01	1.90	95.00%	1.90	2
Tapie, Raymond L.	Domestic			0.95	95.00%	0.95	1
Teisan, Jerry	No Use			0.00	0.00%	0.00	0
Thayer, Sharon	Recreational Lakes	Lake	3.94	31.28	100.00%	27.00	27
	Domestic	Other Orchard	0.23	2.84	94.67%	2.84	3
Thomas, Stephen and Lori	Aquaculture	Lake	0.38	3.02	50.29%	3.02	6
Triple H Partnership	Agriculture	Pistachios	27.78	155.57	100.00%	92.00	92
Tsui, Richard	No Use			0.00	0.00%	0.00	0
Turner, Terry	Domestic			0.95	95.00%	0.95	1
Union Pacific Railroad Company	Industrial			66.00	100.00%	66.00	66
Vaca, Andy and Teresita S.	Domestic	Lake	0.88	8.53	94.78%	8.53	9
Van Bastelaar, Alphonse	Agriculture	Pistachios	62.06	347.54	100.00%	94.00	94

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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Van Dam Family Trust, Glen and Jennifer	Agriculture	Pistachios	138.60	776.16	100.00%	3,134.00	3,134
		Grain	94.65	217.70			
		Alfalfa	314.26	2,388.38			
Van Leeuwen, John	Agriculture	Sudan Grass	232.00	1,243.52	100.00%	910.00	910
		Grass	2.81	17.42			
	Dairy			117.00	100.00%	117.00	117
Vander Dussen Trust, Agnes and Edward	Agriculture	Grass	119.00	737.80	100.00%	839.00	839
		Alfalfa	118.00	896.80			
Wang, Steven	No Use			0.00	0.00%	0.00	0
Ward, Raymond	Industrial	Pistachios	24.35	75.00	100.00%	75.00	75
		Lake	0.14				
	Domestic			0.95	95.00%	0.95	1
Weems, Lizzie	Domestic	Pistachios	1.27	7.11	100.00%	10.00	10
		Lake	0.76	6.03			
Weeraisinghe, Maithri N.	Domestic			0.95	95.00%	0.95	1
Western Horizon Associates, Inc.	Agriculture	Alfalfa	84.68	643.57	100.00%	479.00	479
		Grass	27.15	168.33			
Wet Set, Inc.	Recreational Lakes	Lake	13.80	109.57	100.00%	95.00	95
	Domestic	Park	12.82	37.93	94.83%	37.93	40
Witte, E. Daniel and Marcia	Domestic			0.95	95.00%	0.95	1
WLSR, Inc.	Recreational Lakes	Lake	21.36	169.60	100.00%	133.00	133
Worsey, Joseph A. and Revae	No Use			0.00	0.00%	0.00	0
Minimal Producers	Domestic			1,996.29	89.60%	1,996.29	2,228
Summary for the Baja Subarea						**24,002.08**	**24,524.00**

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Centro Subarea
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Apple Valley Heights County Water District	No Use			0.00	0.00%	0.00	0
Aqua Capital Management, LP	No Use			0.00	0.00%	0.00	0
Atchison, Topeka, Santa Fe Railway Company	No Use			0.00	0.00%	0.00	0
Bar-Len Mutual Water Company	Municipal	Grass	1.20	7.39	25.49%	7.39	29
Barstow Community Developers, LLC	Golf Course			17.00	100.00%	17.00	17
Best, Byron L.	No Use			0.00	0.00%	0.00	0
Brommer Family Trust	No Use			0.00	0.00%	0.00	0
Chafa, Larry R. and Delinda C.	Domestic			0.25	25.49%	0.25	1
Choi, Yong Il and Joung Ae	No Use			0.00	0.00%	0.00	0
Chong, Joan	Agriculture	Jujube	10.49	46.58	100.00%	26.00	26
	Domestic	Row Crops	0.47	0.51	25.49%	0.51	2
Christison, Joel	Domestic	Pistachios	29.00	0.25	25.49%	0.25	1
Contratto, Ersula	Domestic	Grass	0.04	0.25	25.49%	0.25	1
Darr, James S.	Industrial			285.00	100.00%	285.00	285
	Municipal	Grass	0.04	20.25	88.03%	20.25	23
De Vries, Neil and Mary Family Trust	Domestic	Grass	0.10	0.25	25.49%	0.25	1
Dorrance, David W. and Tamela L.	No Use			0.00	0.00%	0.00	0
Eygnor, Robert E.	No Use			0.00	0.00%	0.00	0
Federal National Mortgage Association - Fannie Mae	No Use			0.00	0.00%	0.00	0
Frates, D. Cole	No Use			0.00	0.00%	0.00	0
Friend, Joseph and Deborah	Agriculture	Park	1.57	9.73	88.49%	9.73	11
Gabrych, Eugene	No Use			0.00	0.00%	0.00	0
Gaines Family Trust, Jack and Mary	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
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2017-18 Water Year
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Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Golden State Water Company	Municipal			2,741.93	49.12%	2,741.93	5,582
Grill, Nicholas P. and Millie D.	Industrial			66.00	100.00%	66.00	66
	Agriculture	Pasture	3.28	23.91	100.00%	4.00	4
	Domestic			0.25	25.49%	0.25	1
Gutierrez, Jose and Gloria	Agriculture	Grass	0.21	1.30	100.00%	94.00	94
		Pasture	0.86	6.27			
		Row Crops	0.14	0.59			
		Alfalfa	15.08	114.16			
	Domestic			0.25	25.49%	0.25	1
Hanify, Michael D., dba - White Bear Ranch	No Use			0.00	0.00%	0.00	0
Harmsen Family Trust	Agriculture	Alfalfa	71.00	537.47	100.00%	436.00	436
	Dairy			26.00	100.00%	26.00	26
Harper Lake Company VIII	Industrial			1,001.00	100.00%	1,001.00	1,001
	Recreational Lakes	Lake	29.23	232.09	100.00%	73.00	73
		Lake	3.74	29.70			
Helendale Community Services District	No Use			0.00	0.00%	0.00	0
Hensley, Mark P.	Agriculture	Pistachios	8.10	45.68	100.00%	22.00	22
Hi Desert Mutual Water Company	Municipal			5.10	25.49%	5.10	20
High Desert Associates, Inc.	No Use			0.00	0.00%	0.00	0
Hill Family Trust and Hill's Ranch, Inc.	Domestic	Grass	0.48	10.20	25.49%	10.20	40
Howard, et al.	No Use			0.00	0.00%	0.00	0
Huerta, Hector	Agriculture	Alfalfa	124.00	938.68	100.00%	914.00	914
	Dairy			10.00	100.00%	10.00	10
Jones, Joette	No Use			0.00	0.00%	0.00	0
Jordan Family Trust	Domestic	Grass	0.42	1.02	25.49%	1.02	4
Kasner Family Limited Partnership	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
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2017-18 Water Year
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Kim, Jin S. and Hyun H.	No Use			0.00	0.00%	0.00	0
Lee, et al., Sepoong and Woo Poong	Domestic			0.25	25.49%	0.25	1
Leyerly, Geneva	Domestic			1.02	25.49%	1.02	4
McCollum, Charles L.	No Use			0.00	0.00%	0.00	0
Mead Family Trust	Domestic	Grass	0.04	0.25	25.49%	0.25	1
Mojave Solar, LLC	Industrial			1,632.00	100.00%	1,632.00	1,632
Most Family Trust	No Use			0.00	0.00%	0.00	0
Odessa Water District	No Use			0.00	0.00%	0.00	0
Ohai, Reynolds and Dorothy	Domestic			0.25	25.49%	0.25	1
Osterkamp, Gerold	Dairy	Pasture	2.00	125.00	100.00%	125.00	125
		Grass	1.83				
Pacific Gas and Electric Company	Agriculture	Grain	144.00	326.88	100.00%	1,454.00	1,454
		Alfalfa	227.00	1,718.39			
	Industrial			1,270.00	100.00%	1,270.00	1,270
	Domestic			0.51	25.49%	0.51	2
Rios, Mariano V.	Domestic	Grass	0.04	1.53	25.49%	1.53	6
Rivero, Fidel V.	Domestic			0.25	25.49%	0.25	1
Ruisch Trust, Dale W. and Nellie H.	Agriculture	Grain	28.00	63.56	80.25%	479.91	598
		Alfalfa	55.00	416.35			
	Dairy			48.00	100.00%	48.00	48
	Domestic			0.51	25.49%	0.51	2
Ruisch, et al.	Agriculture	Alfalfa	116.85	884.55	100.00%	475.00	475
		Grain	37.21	84.47			
Service Rock Products Corporation	Industrial			18.00	100.00%	18.00	18
Sexton, Rodney A. and Sexton, Derek R.	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Centro Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Soppeland Revocable Trust	Domestic			0.25	25.49%	0.25	1
Synagrow-WWT, Inc. (dba Nursury Products, LLC)	Industrial			4.00	100.00%	4.00	4
Tallakson Family Revocable Trust	Domestic			1.53	25.49%	1.53	6
Valenti, Vito	No Use			0.00	0.00%	0.00	0
Van Dam Revocable Trust, E and S	Agriculture	Grass	0.40	2.48	100.00%	155.00	155
		Pasture	28.13	205.07			
	Dairy			7.00	100.00%	7.00	7
Van Leeuwen, John	Agriculture	Sorghum	307.00	1,406.06	100.00%	1,292.00	1,292
		Grass	0.24	1.49			
Vernola Trust, Pat and Mary Ann	Agriculture	Alfalfa	422.99	3,202.03	100.00%	3,317.00	3,317
		Sudan Grass	60.61	333.36			
Victorville Water District, ID#1	No Use			0.00	0.00%	0.00	0
Werner, Andrew J.	No Use			0.00	0.00%	0.00	0
Western Development and Storage, LLC	No Use			0.00	0.00%	0.00	0
Withey, Connie	Domestic			0.25	25.49%	0.25	1
Minimal Producers	Domestic			395.83	25.49%	395.83	1,553
Summary for the Centro Subarea						**16,451.03**	**20,665.00**

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Este Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Abdul, Harry and Anita	Industrial			4.00	100.00%	4.00	4
	Domestic			1.54	51.20%	1.54	3
Abshire, David V.	No Use			0.00	0.00%	0.00	0
Ahn, Chun Soo and David	No Use			0.00	0.00%	0.00	0
Ahn Revocable Living Trust	Agriculture	Jujube	31.76	115.29	100.00%	67.00	67
Ahn Revocable Trust	Agriculture	Pistachios	27.00	124.74	100.00%	20.00	20
Anderson, Ross C. and Betty J.	No Use			0.00	0.00%	0.00	0
Avila, Angel and Evalia	Agriculture	Pasture	32.00	177.28	100.00%	118.00	118
Bar H Mutual Water Company	Municipal			14.90	59.59%	14.90	25
Bell, Chuck	Agriculture	Alfalfa	65.00	378.30	100.00%	243.00	243
	Domestic	Grass	0.17	3.58	51.20%	3.58	7
Bracht, William F. and Alexander, Alicia M.	Agriculture	Other Orchard	3.70	18.02	52.08%	27.60	53
		Pasture	1.73	9.58			
Casa Colina Foundation	Domestic	Grass	0.64	5.63	51.20%	5.63	11
	Recreational Lakes	Lake	0.66	4.03	11.18%	4.03	36
Center Water Company	Municipal			12.51	59.59%	12.51	21
Chung, et al.	Agriculture	Jujube	12.53	45.48	100.00%	34.00	34
		Other Orchard	0.11	0.54			
		Park	0.71	3.36			
Club View Partners	No Use			0.00	0.00%	0.00	0
Cross, Sharon I.	Domestic	Grass	0.06	0.51	51.20%	0.51	1
DaCosta, Dean Edward	Domestic			0.51	51.20%	0.51	1
Dahlquist, George R.	No Use			0.00	0.00%	0.00	0
Desert Dawn Mutual Water Company	Municipal			11.92	59.59%	11.92	20

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Este Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Desert Springs Mutual Water Company	Municipal			26.22	59.59%	26.22	44
DJC Corporation	No Use			0.00	0.00%	0.00	0
Gabrych, Eugene	No Use			0.00	0.00%	0.00	0
Gaeta, Miguel and Maria	Domestic			0.51	51.20%	0.51	1
Gaeta, Trinidad	Agriculture	Grain	37.00	62.90	48.02%	62.90	131
	Domestic			0.51	51.20%	0.51	1
Gardena Mission Church, Inc.	No Use			0.00	0.00%	0.00	0
Gayjikian, Samuel and Hazel	Domestic			0.51	51.20%	0.51	1
Golden State Water Company	Municipal			43.81	37.13%	43.81	118
Gordon Acres Water Company	Municipal			10.13	59.59%	10.13	17
Gubler, Hans	Agriculture	Row Crops	3.46	10.00	100.00%	10.00	10
Hal-Dor Ltd.	Agriculture			16.00	100.00%	16.00	16
Harvey, Lisa M.	Domestic	Grass	0.28	0.51	51.20%	0.51	1
Hert, Scott	Agriculture	Alfalfa	36.00	209.52	100.00%	199.00	199
	Domestic			0.51	51.20%	0.51	1
Hi-Grade Materials Company	Industrial	Lake	2.00	168.00	100.00%	168.00	168
Hitchin Lucerne, Inc.	Domestic			5.12	51.20%	5.12	10
Jubilee Mutual Water Company	Municipal			59.59	59.59%	59.59	100
Juniper Riviera County Water District	Municipal			6.67	10.11%	6.67	66
Kim, Ju Sang	Domestic			0.51	51.20%	0.51	1
Lee, Anna K. and Eshban K.	No Use			0.00	0.00%	0.00	0
Lee, Doo Hwan	No Use			0.00	0.00%	0.00	0
Lopez, Baltazar	No Use			0.00	0.00%	0.00	0

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Este Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Lua, Michael T. and Donna S.	No Use			0.00	0.00%	0.00	0
Lucerne Valley Mutual Water Company	Municipal			19.07	59.59%	19.07	32
Lucerne Valley Partners	No Use			0.00	0.00%	0.00	0
Lucerne Vista Mutual Water Company	Municipal			10.73	59.59%	10.73	18
M.B. Landscaping and Nursery, Inc.	Agriculture	Alfalfa	189.35	1,102.02	84.97%	1,102.02	1,297
	Domestic			2.05	51.20%	2.05	4
Mitsubishi Cement Corporation	Industrial	Park	5.09	357.00	100.00%	357.00	357
Monaco Investment Company	No Use			0.00	0.00%	0.00	0
Moss, Lawrence W. and Helen J.	Domestic			16.39	51.20%	16.39	32
Norris Trust, Mary Ann	Domestic			0.51	51.20%	0.51	1
Oasis World Mission	Agriculture	Pistachios	13.90	64.22	100.00%	48.00	48
		Jujube	16.16	58.66			
Omya California, Inc.	Industrial			30.00	100.00%	30.00	30
Pak, Kae Soo and Myong Hui Kang	Agriculture	Jujube	26.56	96.41	100.00%	69.00	69
		Row Crops	0.56	1.89			
Pettigrew, Dan	No Use			0.00	0.00%	0.00	0
Pettigrew, James and Cherlyn	Agriculture	Teff Grass	60.00	332.40	100.00%	138.00	138
	Domestic			0.51	51.20%	0.51	1
Reed, Mike	Domestic	Grass	0.05	0.51	51.20%	0.51	1
Rhee, Andrew N.	Agriculture	Jujube	16.22	58.88	100.00%	41.00	41
Robertson's Ready Mix	Industrial			87.00	100.00%	87.00	87
Royal Way	Agriculture	Lake	0.15	0.92	70.11%	35.06	50
		Other Orchard	2.97	14.46			
		Park	4.16	19.68			

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Este Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
S and E 786 Enterprises, LLC	No Use			0.00	0.00%	0.00	0
Saba, Saba A. and Shirley L.	No Use			0.00	0.00%	0.00	0
San Bernardino County Service Area 29	Parks	Park	7.62	36.04	68.00%	36.04	53
Son's Ranch	Agriculture	Other Orchard	4.31	20.99	38.87%	20.99	54
	Domestic			0.51	51.20%	0.51	1
Specialty Minerals, Inc.	Industrial			57.00	100.00%	57.00	57
Spillman, James R. and Nancy J.	Domestic	Grass	0.37	4.31	86.21%	4.31	5
The Cushenbury Trust, c/o Specialty Minerals, Inc.	No Use			0.00	0.00%	0.00	0
Weiser, et al.	Agriculture	Row Crops	20.60	69.42	46.49%	75.31	162
		Other Orchard	1.21	5.89			
	Domestic			0.51	51.20%	0.51	1
West End Mutual Water Company	Municipal			7.75	59.59%	7.75	13
Wilshire Road Partners	No Use			0.00	0.00%	0.00	0
Minimal Producers	Domestic			488.49	51.20%	488.49	954
Summary for the Este Subarea						**3,827.01**	**5,055.00**

Mojave Basin Area Watermaster
Estimate of Consumptive Use by Producer
2017-18 Water Year
Oeste Subarea
(Unless Otherwise Noted All Amounts Shown Are in Acre-feet)

Producer	Water Use	Irrigation Type	Irrigated Acres	Potential Consumptive Use	Potential Consumptive Use Percentage	Consumptive Use	Verified Production
Aerochem, Inc.	Industrial			10.00	100.00%	10.00	10
Brown, Sue and Doug	No Use			0.00	0.00%	0.00	0
Chamisal Mutual Water Company	Municipal			10.57	35.22%	10.57	30
Dossey, D. A.	No Use			0.00	0.00%	0.00	0
Handrinos, Nicole A.	Domestic			0.32	31.52%	0.32	1
Hettinga Revocable Trust	Agriculture	Alfalfa	149.00	882.08	100.00%	674.00	674
		Grain	147.00	249.90			
	Dairy			534.00	100.00%	534.00	534
Phelan Piñon Hills Community Services District	Municipal			1,622.15	66.24%	1,622.15	2,449
	Industrial			2.00	100.00%	2.00	2
Troeger Family Trust, Richard H.	Domestic	Grass	0.33	3.45	57.53%	3.45	6
Minimal Producers	Domestic			75.01	31.52%	75.01	238
Summary for the Oeste Subarea						**2,931.49**	**3,944.00**

APPENDIX D

Mojave River Discharge at Various Points, 1931-2018

Mojave River Discharge at Various Points, 1931-2018

Water Year	Mojave River at The Forks[2]	Mojave River at Lower Narrows[3]	VVWRA Discharge	Makeup Water Purchases	Lower Narrows + VVWRA + Makeup Water	Mojave River at Barstow[4]	Mojave River at Waterman Fault[5]	Mojave River at Afton, Estimated[6]	Mojave River at Afton, Measured[7]
1930-31	15,431	22,460	0	0	22,460	0	0	1,268	1,268
31-32	99,283	84,190	0	0	84,190	40,305	34,109	18,850	-
32-33	22,429	23,910	0	0	23,910	0	0	1,000	-
33-34	16,114	23,830	0	0	23,830	0	0	1,000	-
34-35	57,544	33,810	0	0	33,810	1,180	0	1,000	-
1935-36	24,098	20,420	0	0	20,420	0	0	1,000	-
36-37	169,120	150,253	0	0	150,253	103,879	100,741	54,070	-
37-38	218,195	188,080	0	0	188,080	138,094	137,466	72,200	-
38-39	40,494	29,680	0	0	29,680	550	0	1,000	-
39-40	31,159	27,480	0	0	27,480	0	0	1,000	-
1940-41	161,108	143,350	0	0	143,350	96,003	94,670	49,900	-
41-42	26,019	25,790	0	0	25,790	101	0	1,000	-
42-43	149,890	127,287	0	0	127,287	90,974	89,820	47,200	-
43-44	86,762	77,650	0	0	77,650	36,254	35,626	18,200	-
44-45	70,747	54,640	0	0	54,640	22,087	21,459	10,800	-
1945-46	54,464	43,210	0	0	43,210	12,577	11,949	6,720	-
46-47	50,277	37,200	0	0	37,200	2,877	2,249	1,000	-
47-48	13,626	26,310	0	0	26,310	0	0	1,000	-
48-49	22,988	22,842	0	0	22,842	0	0	1,000	-
49-50	12,418	21,630	0	0	21,630	0	0	1,000	-
1950-51	2,219	20,819	0	0	20,819	0	0	1,000	-
51-52	102,948	66,793	0	0	66,793	12,548	8,782	2,190	-
52-53	8,817	21,800	0	0	21,800	0	0	990	990
53-54	54,394	31,230	0	0	31,230	0	0	952	952
54-55	17,873	22,520	0	0	22,520	0	0	912	912
1955-56	16,234	21,743	0	0	21,743	0	0	902	902
56-57	22,076	20,559	0	0	20,559	0	0	753	753
57-58	148,917	98,044	0	0	98,044	20,063	16,297	2,784	2,784
58-59	18,351	20,321	0	0	20,321	4	0	597	597
59-60	8,772	19,274	0	0	19,274	0	0	684	684
1960-61	4,483	18,913	0	0	18,913	0	0	668	668
61-62	67,235	26,761	0	0	26,761	735	0	563	563
62-63	5,636	17,026	0	0	17,026	0	0	751	751
63-64	10,902	17,090	0	0	17,090	1	0	539	539
64-65	21,444	16,802	0	0	16,802	6	0	566	566
1965-66	116,246	51,013	0	0	51,013	6,350	1,340	4,781	4,781
66-67	128,072	74,220	0	0	74,220	7,691	7,063	1,466	1,466
67-68	24,618	18,794	0	0	18,794	0	0	358	358
68-69	341,487	291,130	0	0	291,130	146,601	145,346	72,725	72,725
69-70	17,102	23,115	0	0	23,115	0	0	542	542
1970-71	20,445	20,437	0	0	20,437	0	0	360	360
71-72	23,281	22,804	0	0	22,804	44	0	598	598
72-73	64,375	34,714	0	0	34,714	151	0	311	311
73-74	27,180	17,746	0	0	17,746	0	0	435	435
74-75	16,842	16,619	0	0	16,619	0	0	160	160

1975-76	23,686	20,182	0	0	20,182	1	0	297	297
76-77	11,714	28,210	0	0	28,210	2	0	897	897
77-78	362,630	209,124	0	0	209,124	50,463	45,013	46,749	46,749
78-79	112,217	72,340	0	0	72,340	5,560	4,932	1,200	1,200
79-80	307,155	229,630	0	0	229,630	137,654	136,399	66,700	66,700
1980-81	16,082	23,147	0	0	23,147	0	0	1,381	1,381
81-82	57,781	35,350	0	0	35,350	1	0	1,052	1,052
82-83	262,174	189,150	0	0	189,150	92,995	91,113	13,312	13,312
83-84	29,323	27,020	0	0	27,020	42	0	1,820	1,820
84-85	24,560	21,056	0	0	21,056	0	0	684	684
1985-86	45,957	16,964	4,286	0	21,250	0	0	550	550
86-87	10,799	14,468	4,601	0	19,069	0	0	561	561
87-88	17,363	16,133	5,484	0	21,617	8	0	915	915
88-89	10,922	11,487	6,330	0	17,817	0	0	431	431
89-90	7,789	8,918	6,941	0	15,859	0	0	548	548
1990-91[1]	38,580	10,848	7,276	0	18,124	0	0	744	744
91-92[1]	86,060	25,673	7,387	0	33,060	30	0	628	628
92-93[1]	428,700	284,939	7,331	0	292,270	122,800	116,604	66,590	66,590
93-94	31,679	10,913	7,753	0	18,666	0	0	483	483
94-95	201,191	113,279	7,949	0	121,228	11,110	9,855	391	391
1995-96	21,400	11,182	8,475	1,804	21,461	0	0	633	633
96-97	31,712	8,211	8,705	2,253	19,169	0	0	646	646
97-98	170,132	83,517	9,353	2,870	95,740	10,512	8,629	1,287	1,287
98-99	9,320	9,298	8,744	0	18,042	0	0	579	579
99-00	19,298	6,990	9,006	3,440	19,436	0	0	283	283
2000-01	17,433	5,618	9,286	3,306	18,210	0	0	350	350
01-02	2,451	4,550	9,689	5,115	19,354	0	0	239	239
02-03	34,197	6,242	10,281	4,753	21,276	0	0	249	249
03-04	36,922	5,384	11,392	5,950	22,726	0	0	394	394
04-05	355,224	192,590	13,246	4,222	210,058	126,168	121,775	44,638	44,638
2005-06	106,946	27,252	13,542	0	40,794	182	0	186	186
06-07	5,866	4,942	13,067	3,008	21,017	0	0	150	150
07-08	50,384	9,155	13,865	2,859	25,879	10	0	166	166
08-09	30,912	4,360	13,609	3,206	21,175	0	0	112	112
09-10	102,427	19,166	14,525	3,074	36,765	374	0	190	190
2010-11	210,108	126,351	14,825	565	141,741	23,358	20,158	6,402	6,402
11-12	29,733	9,504	14,674	0	24,178	0	0	302	302
12-13	9,429	7,325	14,310	0	21,635	0	0	118	118
13-14	12,104	6,790	12,898	0	19,688	42	0	1,404	1,404
14-15	9,032	5,610	12,926	1,513	20,049	0	0	366	366
2015-16	10,664	4,959	12,940	1,406	19,305	0	0	160	160
16-17	57,434	9,626	13,262	2,447	25,335	0	0	293	293
17-18	16,294	3,787	12,824	2,505	19,116	0	0	197	197
Avg 1931-1990	**65,538**	**51,958**	**461**	**0**	**52,419**	**17,097**	**16,406**	**8,732**	**5,943**
Avg 1931-2018	**68,953**	**46,995**	**3,873**	**617**	**51,484**	**15,004**	**14,334**	**7,410**	**5,372**
% Change (1931-90 to 31-2018)	**5%**	**-10%**	**741%**	**-**	**-2%**	**-12%**	**-13%**	**-15%**	**-10%**

Notes

(1) Discharge Values from USGS Simulation of Ground-Water Flow in the Mojave River Basin, CA (Lower Narrows and Afton, CA values from gaging station).
(2) Discharge of Mojave River at The Forks from the addition of values as reported from USGS stations at West Fork Mojave River Near Hesperia, CA (10261000), and Deep Creek Near Hesperia, CA (10260500).
(3) Discharge of Mojave River at Lower Narrows as reported by USGS station Mojave River at Lower Narrows Near Victorville, CA (10261500).
(4) Discharge of Mojave River at Barstow as reported by USGS station Mojave River at Barstow, CA (10262500).
(5) Discharge of Mojave River at Waterman Fault as predicted by model based on surface water losses to groundwater storage between Barstow and Waterman Fault.
(6) Discharge of Mojave River at Afton, CA from water years 1932 through 1952 by William Hardt and published by USGS in Open - File Report, "Hydrologic Analysis of Mojave River Basin California using Electric Analog Model" dated August 18, 1971. Water Years 1979 and 1980 estimated by Mojave Basin Area Watermaster. All other water year discharge values as reported by USGS station Mojave River at Afton, CA (10263000).
(7) USGS station Mojave River at Afton, CA (10263000). No reported data for 1931-1952. Water Years 1979 and 1980 estimated by Mojave Basin Area Watermaster.

Summary Comparison of Discharge at Various Points on the Mojave River

Water Year Period	Mojave River at Forks[1]	Mojave River at Lower Narrows + VVWRA[2]	Mojave River at Lower Narrows + VVWRA + Makeup Water Purchases[2]	Mojave River at Barstow[3]	Mojave River at Waterman Fault[4]
1931-1990	65,538	52,419	52,419	17,097	16,406
1931-2018	68,953	50,867	51,484	15,004	14,334

Water Year Period	Mojave River at Afton, Estimated [5]	Mojave River at Afton, Measured[6]	Potential Surface Water Recharge in Baja Subarea Based on Estimated Afton Flow[7]	Potential Surface Water Recharge in Baja Subarea Based on Measured Afton Flow[8]
1931-1990	8,732	5,943	7,675	10,464
1931-2018	7,410	5,372	6,924	8,962

Notes

(1) Combined discharge of USGS stations at West Fork Mojave River Near Hesperia, CA (10261000), and Deep Creek Near Hesperia, CA (10260500).
(2) USGS station Mojave River at Lower Narrows Near Victorville, CA (10261500), plus effluent discharges by VVWRA.
(3) USGS station Mojave River at Barstow, CA (10262500).
(4) Discharge of Mojave River at Waterman Fault as predicted by model based on surface water losses to groundwater storage between Barstow and Waterman Fault.
(5) Discharge of Mojave River at Afton, CA from water years 1932 through 1952 by William Hardt and published by USGS in Open - File Report, "Hydrologic Analysis of Mojave River Basin California using Electric Analog Model" dated August 18, 1971. Water Years 1979 and 1980 estimated by Mojave Basin Area Watermaster. All other water year discharge values as reported by USGS station Mojave River at Afton, CA (10263000).
(6) USGS station Mojave River at Afton, CA (10263000). No reported data for 1931-1952. Water Years 1979 and 1980 estimated by Mojave Basin Area Watermaster.
(7) Flow at Waterman Fault less flow at Afton (includes estimated flows for 1932-1952 and 1979-1980; see footnote 5).
(8) Flow at Waterman Fault less flow at Afton (excludes estimated flows for 1932-1952, but includes estimated flows for 1979-1980; see footnote 6).

ATTACHMENT 1

Table 5-1 from Watermaster Annual Report

Production Safe Yield Update
Based on Long-Term Average Natural Water Supply and Outflow,
and Imports, Consumptive Use, and Production for 2018

TABLE 5-1

SUBAREA HYDROLOGICAL INVENTORY BASED ON LONG TERM AVERAGE NATURAL WATER SUPPLY AND OUTFLOW AND 2017-18 IMPORTS AND CONSUMPTIVE USE

(ALL AMOUNTS IN ACRE-FEET)

		Este	Oeste	Alto	Centro	Baja	Basin Totals
WATER SUPPLY							
Surface Water Inflow		1,700	1,500	68,500 [1]	33,600 [2]	17,358 [3]	72,652 [4]
Subsurface Inflow		0	0	1,000	2,000	1,581 [5]	0 [6]
Deep Percolation of Precipitation		0	0	3,500	0	100	3,600
Imports[7]		2,000	0	2,234	2,262	0	6,496
	TOTAL	**3,700**	**1,500**	**75,234**	**37,862**	**19,039**	**82,748**
CONSUMPTIVE USE AND OUTFLOW							
Surface Water Outflow		0	0	33,600 [2]	16,406 [8]	5,372 [9]	5,372
Subsurface Outflow		200	800	2,000	1,581 [5]	0	0
Consumptive use							
Agriculture[10]		2,327	1,208	1,311	8,895	17,664	31,405
Urban[10,11]		1,500	1,724	40,603	7,557	6,338	57,722
Phreatophytes		0	0	11,000	3,000	2,000	16,000 [12]
	TOTAL	**4,027**	**3,732**	**88,514**	**37,439**	**31,374**	**110,499**
Surplus / (Deficit)		(327)	(2,232)	(13,280)	423	(12,335)	(27,751)
Total Estimated Production[13]		5,055	3,944	77,686	20,665	24,524	131,874
PRODUCTION SAFE YIELD[14]		**4,728**	**1,712**	**64,406**	**21,088**	**12,189**	**104,123**

[1] Average discharge of Mojave River at The Forks, 1931-1990 (The Forks is the addition of reported values from USGS stations at West Fork Mojave River Near Hesperia, CA (10261000) and Deep Creek Near Hesperia, CA (10260500). Includes 3,000 af of ungaged inflow (Judgment, 1996).

[2] Estimated based on reported flows at USGS gaging station, Mojave River at Victorville Narrows and 1991-2018 Transition Zone water balance (Watermaster Engineer, 2019).

[3] Estimated from reported flows at USGS gaging station, Mojave River at Barstow. Includes 16,406 af of Mojave River surface flow across the Waterman Fault estimated by "Evaluations of Potential Mojave River Recharge Losses between Barstow and Waterman Fault", Wagner & Bonsignore, 2012 (see Appendix A, Table 6), and 747 af of local surface inflow from Kane Wash and Boom Creek, and 205 af from washes (Wagner, 2011).

[4] Represents the sum of Este (1,700 af), Oeste (1,500 af), Alto (68,500 af) and Baja (747 af from Kane Wash and Boom Creek, 205 af from washes).

[5] Stamos, 2001 (USGS).

[6] Inter subarea subsurface flows do not accrue to the total basin water supply.

[7] Imports for Este are from the Big Bear Area Regional Wastewater Authority; Alto are from Lake Arrowhead Community Services District and pre-purchased groundwater storage for HDPP; Centro are the average make-up water purchases, 1995-2018.

[8] Estimated from reported flows at USGS gaging station, Mojave River at Barstow (see note #2 above).

[9] Based on USGS station Mojave River at Afton, CA (10263000) reported discharge for 1931, 1953-2018. Water Years 1979 and 1980 estimated by Mojave Basin Area Watermaster.

[10] 2018 Consumptive Use Analysis by Watermaster.

[11] Includes consumptive use of "Minimals Pool" (estimated Minimal's production is 7,077 af).

[12] From USGS Water-Resurces Investigation Report 96-4241 "Riparian Vegetation and Its Water Use During 1995 Along the Mojave River, Southern California" 1996.

[13] Water production for 2017-18. Included in the production values are the estimated minimal producer's water use by Subarea.

[14] Imported State Water Project water purchased by MWA is not reflected in the above table.

ATTACHMENT 2

TABLE C-1 of Judgment

Subarea Hydrological Inventory Based On Long-Term Average Natural Water Supply and Outflow And Current Year Imports and Consumptive Use

--SAMPLE CALCULATION--
TABLE C-1 OF JUDGMENT

Mojave Basin Area Adjudication
Subarea Hydrological Inventory Based On
Long-Term Average Natural Water Supply and Outflow
and Current Year Imports and Consumptive Use
(All Amounts in Acre-Feet)

WATER SUPPLY	Este	Oeste	Alto	Centro	Baja	Basin Totals
Surface Water Inflow						
Gaged	0	0	65,000	0	0	65,000
Ungaged	1,700	1,500	3,000	37,300 [1]	14,300 [2]	6,500 [3]
Subsurface Inflow	0	0	1,000	2,000	1,200	0 [4]
Deep Percolation of Precipitation	0	0	3,500	0	100	3,600
Imports						
Lake Arrowhead CSD	0	0	1,500	0	0	1,500
Big Bear ARWWA	2,000	0	0	0	0	2,000
TOTAL	3,700	1,500	74,000	39,300	15,600	78,600
CONSUMPTIVE USE AND OUTFLOW						
Surface Water Outflow						
Gaged	0	0	0	0	8,200	8,200
Ungaged	0	0	37,300 [1]	14,000 [5]	0	0
Subsurface Outflow	200	800	2,000	1,200	0	0
Consumptive Use						
Agriculture	6,800	2,900	16,300	20,300	30,200	76,500
Urban	1,900	1,200	36,300	9,500	9,700	58,600
Phreatophytes	0	0	5,100	900	1,500	7,500 [6]
Exports	0	0	0	0	0	0
TOTAL	8,900	4,900	97,000	45,900	49,600	150,800
Surplus / (Deficit)	(5,200)	(3,400)	(23,000)	(6,600)	(34,000)	(72,200)
Total Estimated Production (Current Year) [7]	15,700	7,600	98,900	46,500	54,300	223,000
PRODUCTION SAFE YIELD (Current Year) [7]	**10,500**	**4,200**	**75,900**	**39,900**	**20,300**	**150,800**

[1] Estimated from reported flows at USGS gaging station, Mojave River at Victorville Narrows.

[2] Includes 14,000 acre-feeet of Mojave River surface flow across the Waterman Fault estimated from reported flows at USGS gaging station, Mojave River at Barstow and 300 acre-feet of local surface inflow from Kane Wash.

[3] Represents the sum of Este (1,700 af), Oeste (1,500 af), Alto (3,000 af) and Baja (300 af from Kane Wash).

[4] Inter subarea subsurface flows do not accrue to the total basin water supply.

[5] Estimated from reported flows at USGS gaging station, Mojave River at Barstow.

[6] Estimated by Bookman-Edmonston.

[7] For purposes of this Table, the current year is 1990.

ATTACHMENT 3

TABLE 1
Subarea Hydrological Inventory Based On
Long-Term Average Natural Water Supply and Outflow
And 1996-97 Imports and Consumptive Use

Consumptive Water Use Study and Update of
Production Safe Yield Calculations for the Mojave Basin Area

Albert A. Webb Associates
February 16, 2000

TABLE 1

MOJAVE BASIN AREA ADJUDICATION
SUBAREA HYDROLOGICAL INVENTORY BASED ON LONG TERM AVERAGE NATURAL WATER SUPPLY AND OUTFLOW AND 1996-97 IMPORTS AND CONSUMPTIVE USE

(ALL AMOUNTS IN ACRE-FEET)

	Este	Oeste	Alto	Centro	Baja	Basin Totals
WATER SUPPLY						
Surface Water Inflow						
Gaged	0	0	65,500	0	0	65,500
Ungaged	1,700	1,500	3,600	34,700 [1]	14,400 [2]	7,200 [3]
Subsurface Inflow	0	0	1,175	2,000	1,200	0 [4]
Deep Percolation of Precipitation	0	0	3,500	0	100	3,600
Imports						
Lake Arrowhead CSD	0	0	1,620	0	0	1,620
Big Bear Area RWA	2,630	0	0	0	0	2,630
TOTAL	**4,330**	**1,500**	**75,395**	**36,700**	**15,700**	**80,550**
CONSUMPTIVE USE AND OUTFLOW						
Surface Water Inflow						
Gaged	0	0	0	0	8,200	8,200
Ungaged	0	0	34,700 [1]	14,000 [5]	0	0
Subsurface Outflow	825	350	2,000	1,200	0	0
Consumptive use						
Agriculture	3,900	2,300	7,900	13,000	20,800	47,900
Urban [6]	2,200	1,300	40,700	8,500	7,900	60,600
Phreatophytes	0	0	11,000	3,000	2,000	16,000 [7]
Exports	0	0	0	0	0	0
TOTAL	**6,925**	**3,950**	**96,300**	**39,700**	**38,900**	**132,700**
Surplus / (Deficit)	(2,595)	(2,450)	(20,905)	(3,000)	(23,200)	(52,150)
Total Estimated Production (Current Year) [8]	9,751	6,502	90,767	36,375	43,879	187,274
PRODUCTION SAFE YIELD (Current Year) [9]	**7,156**	**4,052**	**69,862**	**33,375**	**20,679**	**135,124**

[1] Estimated from reported flows at USGS gaging station, Mojave River at Victorville Narrows.

[2] Includes 14,000 acre-feet of Mojave River surface flow across the Waterman Fault estimated from reported flows at USGS gaging station, Mojave River at Barstow, and 400 acre-feet of local surface inflow from Kane Wash and Boom Creek.

[3] Represents the sum of Este (1,700 ac.ft.), Oeste (1,500 ac.ft.), Alto (3,600 ac.ft.) and Baja (400 ac.ft. from Kane Wash and Boom Creek).

[4] Inter subarea subsurface flows do not accrue to the total basin water supply.

[5] From reported flows at USGS gaging station, Mojave River at Barstow.

[6] Includes consumptive use of "Minimals Pool".

[7] From USGS Water-Resurces Investigation Report 96-4241 "Riparian Vegetation and Its Water Use During 1995 Along the Mojave River, Southern California" 1996.

[8] Based on data in "Fourth Annual Report of the Mojave Basin Area Watermaster, Water Year 1996-97" April 1, 1998. Included in the production values are the estimated minimal producer's water use by Subarea.

[9] For 1996-97 Water Year. Imported State Water Project water purchased by MWA (4,501 acre-feet) is not reflected in the above table.

ATTACHMENT 4

Figure 3-10 from Watermaster Annual Report

Transition Zone Water Balance

Transition Zone Water Balance

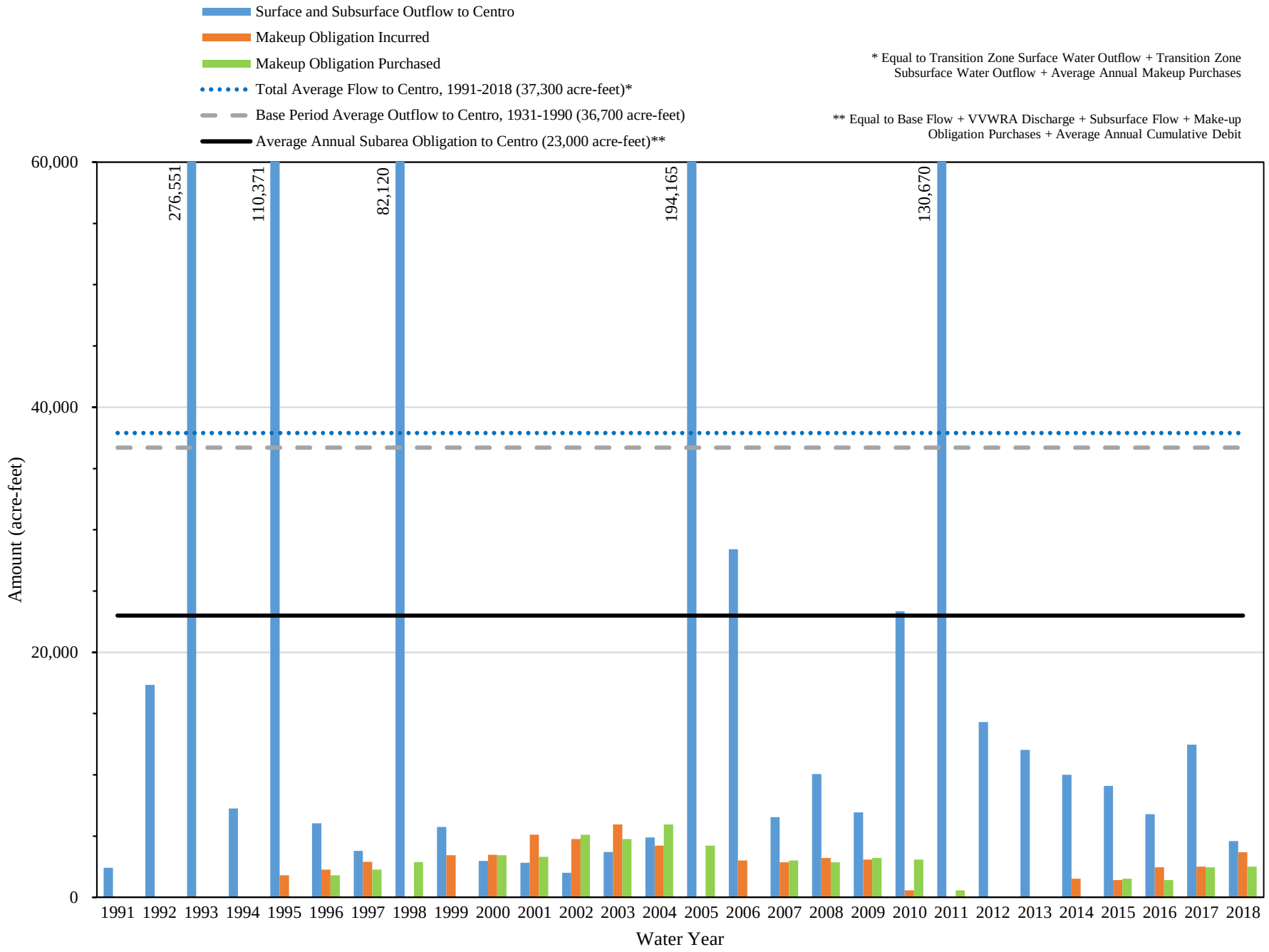

FIGURE 3-10