Hemet-San Jacinto Watermaster

6 Monitoring, Data Compilation, and Evaluation

The Monitoring Programs of the Hemet/San Jacinto Groundwater Management Area (Management Area) collects, compiles, and analyzes groundwater-related data for the Hemet-San Jacinto Watermaster (Watermaster). These programs are funded by the Watermaster and provide the information necessary for a comprehensive view of the Management Area.

Eastern Municipal Water District's (EMWD's) Groundwater Management and Facilities Planning Department serves as the Monitoring Program Administrator. EMWD, Lake Hemet Municipal Water District (LHMWD), the Cities of Hemet and San Jacinto, and the Soboba Tribe provide data on their wells and assist in communicating with the private well owners in their respective jurisdictions.

Data management and reporting are critical activities that occur in concurrence of data collection. Collected data are compiled and entered into EMWD's Regional Water Resources Database on a monthly basis.

This chapter summarizes the monitoring activities and the results of the analyses of the monitoring data. It also provides other pertinent information regarding activities in the Management Area such as well permits issued, rainfall, conjunctive use/groundwater recharge, recycled water, groundwater storage, and surface water flows.

6.1 Groundwater Monitoring

The Groundwater Monitoring Programs of the Management Plan collects, compiles, and analyzes groundwater data, provides the information necessary for a comprehensive view of the Management Area and contain the following major elements:

- Groundwater Level Monitoring;
- Groundwater Quality Monitoring;
- Groundwater Extraction Monitoring; and
- Inactive Well Capping/Sealing.

A map of all the wells participating in the Groundwater Monitoring Programs can be found in Chapter 9, Figure 9-3.

6.1.a Groundwater Level Monitoring

Static groundwater level measurements are collected twice a year; in the spring following winter rains, and in the fall following the dry season; on as many wells as possible. The spring measurements are generally collected in March to April, and fall measurements are generally taken in October to November. The set of available wells varies from year to year due to different reasons such as changes in access agreements, physical well access, and usage of

the well. Wells are required to be turned off for at least 24 hours prior to taking a static water level measurement. In some cases, wells may be in use during the semi-annual collection of water levels making the gathering of static water level measurements infeasible at that location.

During 2018, 191 wells were measured in the spring effort, and 172 were measured in fall, for a total of 363 measurements. Table 6-1 shows the number of wells measured in each groundwater management zone, and the minimum and maximum depth-to-water measurements. The number of measurements taken in each groundwater management zone for years 2009-2018 is shown in Chapter 8, Table 8-1. The minimum and maximum measurements for years 2009 through 2018 can be found in Chapter 8, Table 8-2. A map showing the change in groundwater elevation from Spring 2017 to Spring 2018 can be found in Chapter 9, Figure 9-6. A map showing the change in groundwater elevation from Fall 2017 to Fall 2018 can be found in Chapter 9, Figure 9-7.

Table 6-1: 2018 Groundwater Level Monitoring Program in the Management Area

Management Zone	Number of Wells Measured Spring	Number of Wells Measured Fall	Minimum Depth to Water (ft)	Maximum Depth to Water (ft)
Canyon	25	23	8.3	277
S.J. Upper Pressure	87	76	29.2	594.6
Hemet North (partial)	24	23	158.7	265.8
Hemet South	55	50	17.5	369.4
Totals	191	172	8.3	594.6

6.1.b Groundwater Quality Monitoring

During 2018, annual water quality samples were collected at 115 wells in the Management Area. EMWD collected the samples on available private domestic, or agricultural wells, in addition to wells owned by EMWD. LHMWD and the Cities of Hemet and San Jacinto collected the samples on their drinking water wells and forwarded them to EMWD for analysis and compilation. The number of wells sampled for years 2009 through 2018 can be found in Chapter 8, Table 8-3.

Of the 115 private and municipal wells sampled in 2018, 86 had an existing operable pump while 29 required having a pump set in the well in order to obtain a sample. Sampling a non-operable well without pumping equipment requires the use of a sampling rig to set a temporary pump and is more time consuming. The Standard Operating Procedures as outlined in the Groundwater Monitoring Program were followed for all sampling. Typical constituents tested in the annual water quality sampling effort are listed in Table 6-2.

Generally, the best quality groundwater occurs along the San Jacinto River in the Canyon and San Jacinto Upper Pressure groundwater management zones, where significant municipal extraction occurs. It should be noted that groundwater quality and the character of groundwater are determined by a number of factors including: mineral content of sediments;

recharge and drainage patterns; historic land use practices; and casing screen intervals and depths of wells sampled.

Table 6-2: Constituents Tested in a Typical Groundwater Quality Sample

Type	Constituent:
Cations	Calcium (Ca)
	Magnesium (Mg)
	Potassium (K)
	Silica (SiO_3)
	Sodium (Na)
Anions	Chloride (Cl)
	Fluoride (F)
	Sulfate (SO_4)
Nitrogens	Nitrate (NO_3)
	Nitrate as Nitrogen (NO_3-N)
	Nitrite as Nitrogen (NO_2-N)
	NOX
Misc.	Hardness
	Total Alkalinity as $CaCO_3$
	Total Dissolved Solids (TDS)

Table 6-3 shows the number of wells sampled, and the extreme values for Total Dissolved Solids (TDS) and Nitrate as Nitrogen (NO_3-N) in mg/L for each management zone for 2018. TDS has a secondary Maximum Contaminant Level (MCL) concentration of 1,000 mg/L, while NO_3-N has a primary MCL concentration of 10 mg/L.

The well with the highest TDS is in the northwestern portion of the San Jacinto Upper Pressure groundwater management zone and is Lauda Beebower Disc Blade (04S/02W-02R01S). This well reported the highest value of TDS (7,410 mg/L) in 2018. This well, Lauda Beebower Disc Blade, reported a TDS value of 5,100 mg/L in 2016. The well with the highest NO_3-N is McMillan Lake 03 (North New) (05S/01E-20K03R) located in the Hemet South groundwater management zone. The McMillan Lake 03 (North New) well reported a NO_3-N value of 39.0 mg/L in 2018 which increased from the reported value of 33.0 mg/L in 2017. Many wells with high TDS and NO_3-N values are located in the southern portions of the Canyon, San Jacinto Upper Pressure, and Hemet South groundwater management zones, and are all located in major citrus producing areas. It can be assumed that the high salts and nitrates are the result of agricultural practices.

Table 6-3: 2018 Groundwater Quality Monitoring in the Management Area

Management Zone	No. of Wells	TDS (mg/L)		NO_3-N (mg/L)	
		High	Low	High	Low
Canyon	15	1,350	218	10.7	< 0.4
S.J. Upper Pressure	49	7,410	168	35.6	< 0.4
Hemet North (partial)	26	1,100	332	10.3	< 0.4
Hemet South	25	1,290	190	39	< 0.4

A map showing TDS concentrations at individual wells in the Management Area for 2018 is found in Chapter 9, Figure 9-8. A map showing NO_3-N concentrations at individual wells in the Management Area for 2018 is found in Chapter 9, Figure 9-9. The analytical results (TDS and Nitrate as Nitrogen) of the wells sampled for years 2009 through 2018 can be found in Chapter 8, Table 8-4.

6.1.c Groundwater Extraction Monitoring

Groundwater extraction on 152 wells in the Management Area was monitored during 2018. Meters are read monthly for 113 well sites, 73 meters are read by EMWD and 40 meters are reported to EMWD. Also, estimates of extraction by non-metered wells at 39 well sites are generated monthly. Estimates are based on various factors including acreage, crop type, weather, and in the case of dairies, number of livestock.

Groundwater extraction in the Management Area during 2018 totaled 40,006 acre feet (AF). Of that 40,006 AF of extraction, 25,786 AF (64%) was by municipalities, 12,777 AF (32%) was by private producers, and 1,443 AF (4%) was by the Soboba Band of Luiseño Indians (including 80 AF delivered by EMWD). The majority of groundwater extraction occurred in the San Jacinto Upper Pressure Management Zone as shown in Table 6-4. The results of groundwater extraction for years 2009 through 2018 can be found in Chapter 8, Tables 8-5 and 8-6.

Table 6-4: 2018 Groundwater Extraction Monitoring in the Management Area

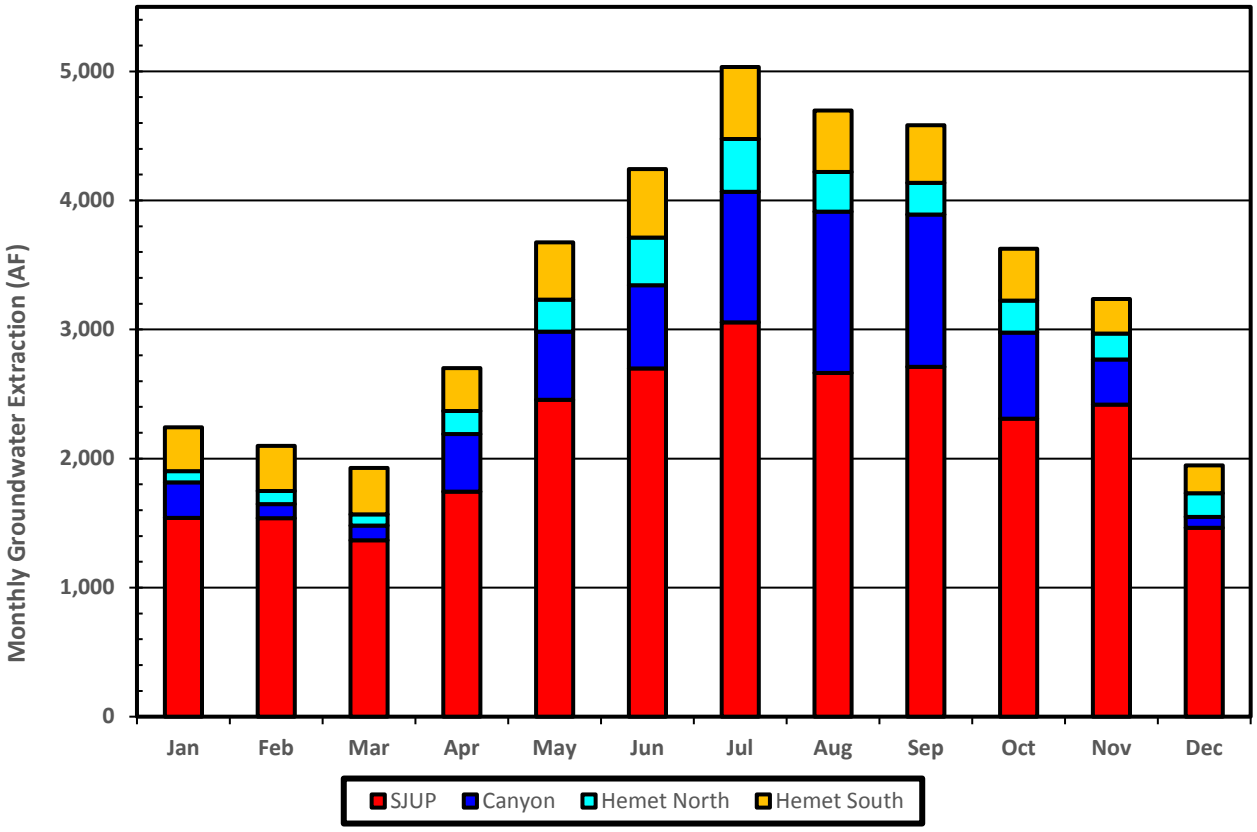
Management Zone	No. of Wells Metered	No. of Wells Estimated	Total Number of Wells	Groundwater Extraction Metered (AF)	Groundwater Extraction Estimated (AF)	Total Groundwater Extraction (AF)
Canyon	19	7	26	5,658	1,005	6,663
S.J. Upper Pressure	50	15	65	24,348	1,612	25,960
Hemet North (partial)	21	5	26	1,907	755	2,662
Hemet South	23	12	35	2,993	1,728	4,721
Total	113	39	152	34,906	5,100	40,006

As expected, extraction rates were highest during the summer months with sixty-five percent (65%) of the year's extraction occurring during the six-month time period from May through October. Monthly groundwater extraction by groundwater management zone is shown in Figure 6-1.

California Water Code Sections 4999 et seq., with few exceptions, requires persons who extract groundwater from wells located in Riverside, San Bernardino, Los Angeles, and Ventura Counties in excess of 25 acre feet in any year to file an Annual Notice of Groundwater Extraction (Annual Notice). Failure to file an Annual Notice may be deemed non-use of water and may lead to a loss of water rights. If a well owner does not file an Annual Notice for five consecutive years, the well will be considered inactive and Annual Notices will no longer mailed to the well owner. Non-use of water over an extended period may lead to the loss of water rights.

Starting with the Annual Notices filed in 2006 recording 2005 groundwater extraction, the State Water Resources Control Board transferred, under the auspices of Water Code Section 5009, authority for the Annual Notices of Groundwater Extraction to certain local water agencies. On June 23, 2006, the State designated EMWD as the agency to assume this function within its service area. As a consequence, EMWD gathers, checks, records, and disseminates water extraction information, and assists the water producers in seeing that their water use is accurately documented. This transfer to local control improved the accuracy of the data and, in EMWD's service area, resulted in an elimination of the annual fees previously paid by the well owners to the State.

Figure 6-1: 2018 Monthly Groundwater Extraction in the Management Area



In 2018, Annual Notices for calendar year 2017 were filed on 135 existing wells within the Management Area. There were no First Annual Notices filed for wells that have not previously participated in the program. EMWD processed a combined total of 135 Annual Notices resulting in a savings of $6,750 to the participants (private and municipal) as opposed to filing with the State directly. Any well owner wishing to reactivate an inactive well recordation must notify EMWD in writing. Table 6-5 presents the results of the 2017 San Jacinto Watershed Groundwater Recordation Program including the participants and associated extraction.

Table 6-5: 2017 Groundwater Extraction Recordation Notices Filed in the Management Area

Management Zone	Annual Notices	First Notices	Private Well Owners	Groundwater Extraction Reported (AF)	Municipal Well Owners	Groundwater Extraction Reported (AF)
Canyon	20	0	9	118	11	4,883
SJ Upper Pressure	68	0	43	5,253	25	17,617
Hemet North (partial)	19	0	19	277	0	0
Hemet South	28	0	17	1,148	11	3,499
Totals	135	0	88	6,796	47	25,999

Chapter 8, Table 8-7 demonstrates an increase in the number of Annual Notices filed following EMWD assuming responsibility for the program. In addition, Chapter 8, Table 8-8 presents the amount of groundwater extraction recorded per management zone during 2006 through 2017 in acre feet.

The amount of groundwater extracted per the Annual Notices does not account for the full volume of water believed to have been extracted from the basin due to the fact that some well owners do not file Annual Notices, or file inaccurate amounts on the Annual Notices. Discrepancies in the amounts groundwater extraction reported occur if well owners document extractions on their annual notices that vary from the production meters read by EMWD.

6.1.d Inactive Well Capping/Sealing Program

Inactive, unused wells are a potential source of groundwater contamination. Open casings are especially vulnerable to contamination from surface flows or vandalism - such as the dumping of oil or other waste products. Large open casings, 16 to 18 inches in diameter, also present a hazard to small children and animals. It is not known how many open casings or unused wells exist within the Management Area.

As part of this monitoring program, an inactive well or open casing will be capped/sealed at no charge to the well owner in an effort to protect the public and groundwater supplies. This is done by welding a bolted or locking cap onto the well casing. These wells may still be used for water level and, in some cases, water quality monitoring. Priority is given to those wells that are potentially dangerous open holes (16-18" casings) or those located in areas where flooding resulting from precipitation might carry manure, fertilizers, or other contaminants into the well.

During 2018, no inactive agricultural wells were capped/sealed as shown in Table 6-6. Chapter 8, Table 8-9 shows the number of wells, by groundwater management zone, which have been capped/sealed to date in the Management Area. The table includes a listing of 43 wells capped/sealed by EMWD since the 2004 implementation of the Hemet/San Jacinto Inactive Well Capping/Sealing Program. Chapter 9, Figure 9-10 presents the locations of these wells.

Table 6-6: 2018 Inactive Wells Capped/Sealed in the Management Area

Management Zone	Number of Wells
Canyon	0
S.J. Upper Pressure	0
Hemet North (partial)	0
Hemet South	0
Totals	0

6.2 Imported Water Monitoring

Within the EMWD system, treated water from the Metropolitan Water District of Southern California (MWD) can reach the Management Area via the Homeland bypass and the Simpson Pump Station, which results in blends of imported water and groundwater from wells west of the Management Area due to the complexity of EMWD's distribution system. State Project Water (SPW) enters the system at the Mills Filtration Plant (MWD turnout EM-12). Colorado River Water (CRW) can enter the system through either the Perris Water Filtration Plant (EM-4) or from Lake Skinner via the Auld Road pumping plant (EM-17).

Untreated water (raw water) from MWD can reach the Management Area through two distinct systems. One system can bring untreated SPW into the Management Area at the Warren Road Pump Station (EM-14), and is maintained for the purpose of groundwater recharge in the San Jacinto area and raw water feed to EMWD's Hemet Water Filtration Plant. This line also serves some agricultural customers within both EMWD's and LHMWD's service areas. The second system can bring untreated CRW into the Management Area at the Brownlands Pumping Plant (EM-1), and is maintained for the purpose of groundwater augmentation for the dairies along the Ramona Expressway as part of the North San Jacinto Water Supply Initiative.

All imported water from MWD into the EMWD system, including EM-1, EM-4, EM-12, EM-14, and EM-17, that flows into the Management Area is metered and monitored.

6.2.a Hemet Water Filtration Plant

The Hemet Water Filtration Plant (HWFP) has to be operated at a constant rate. Therefore, treated HWFP water may leave the Management Area. Watermaster requires the amount of treated water leaving the Management Area to be less than the total amount produced by the HWFP. During 2018, the HWFP treated 4,326 AF of water of which 2,472 AF was exported outside of the Management Area.

6.2.b Imported Water Recharge

The "Physical Solution" as defined in the Stipulated Judgment and Complaint (Judgment), Case Number RIC 1207274, entered with the Superior Court of the State of California for the County of Riverside, identifies groundwater recharge as the preferred method of accomplishing Soboba Settlement Agreement requirements. The Integrated Recharge and Recovery Program (IRRP) is defined as the system that receives untreated SPW from Lake Silverwood and Lake Perris through the existing EMWD Warren Road Pump Station (EM-14) and consists of 35 acres of basins or ponds for recharging SPW; three extraction wells; three monitoring wells; modification to two existing pump stations; and pipelines within, and adjacent to, the San

Jacinto River. In addition, the Grant Avenue Ponds consist of 52 acres of basins or ponds; an additional pump station; and pipelines within, and adjacent to, the San Jacinto River, that are part of the system used for recharging SPW.

During 2018, a total of 4,783 AF SPW was recharged at the IRRP and Grant Avenue Ponds (shown in Table 6-7). Total historical groundwater extraction, imported water usage, recycled water usage, and rainfall is displayed in Chapter 9, Figure 9-11 and total historical imported water recharge is displayed in Chapter 9, Figure 9-12.

Table 6-7: 2018 Raw Water Recharge in the Management Area

Facility	Imported Raw Water Recharge (AF)
IRRP Ponds	3,584
Grant Ave. Ponds	1,199
Totals	4,783

6.2.c North San Jacinto Water Supply Initiative

EMWD constructed a system to provide untreated CRW purchased from MWD to six dairy property owners in the Management Area via the Brownlands Pump Station (EM-1). In turn, the property owners have agreed to reduce their groundwater extraction by substituting the imported raw water for groundwater extraction.

During 2018, the North San Jacinto Water Supply Initiative serving 322 AF of untreated CRW to the dairies, with 175 AF of that amount served to six dairies within the Management Area.

6.3 Recycled Water Monitoring

Most of the recycled water used in the Management Area comes from the San Jacinto Valley Regional Water Reclamation Facility (SJV RWRF); however, the area also receives recycled water from the Winchester Ponds (Temecula Valley RWRF) and, occasionally, from the Perris Valley RWRF (PV RWRF).

6.3.a Recycled Water Usage

During 2018 recycled water usage in the Management Area totaled 13,163 AF, as shown in Table 6-8. A majority of the recycled water usage in the Management Area occurred in the San Jacinto Upper Pressure groundwater management zone. Historical recycled water usage for each groundwater management zone for 2009 through 2018 can be found in Chapter 8, Table 8-10.

Table 6-8: 2018 Recycled Water Usage in the Management Area

Management Zone	Recycled Water Use (AF)
Canyon	0
S.J. Upper Pressure	6,390
Hemet North (partial)	4,128
Hemet South	2,645
Totals	13,163

6.3.b Recycled Water In-lieu Program

This project supplies recycled water from the SJV RWRF for agricultural irrigation in-lieu of pumping groundwater. The agreement can deliver up to 8,540 AFY of recycled water to Rancho Casa Loma and the Scott Brothers Dairy. During 2018, 3,499 AF and 798 AF of recycled water was delivered to Rancho Casa Loma and Scott Brothers Dairy respectively, for a total of 4,297 AF of recycled water, including 2,689 AF in-lieu of groundwater as shown in Table 6-9.

Table 6-9: 2018 Recycled Water In-lieu Usage in the Management Area

Agency	2018 Total Recycled Water Deliveries (AF)	2018 Recycled Water Deliveries Subsidized by Watermaster (AF)
Scott Brothers Dairy	798	458
Rancho Casa Loma	3,499	2,231
Totals	4,297	2,689

6.3.c Recycled Water Incidental Recharge

Incidental recharge of recycled water occurs at the SJV RWRF, Alessandro Storage Ponds, and the MWD San Jacinto Reservoir. Incidental recharge amounts for each facility during 2018 is presented in Table 6-10. Historical data from 2009 through 2018 for ponds in the Management Area are shown in Chapter 8, Table 8-11. The SJV RWRD, Alessandro Ponds, and MWD San Jacinto Reservoir are located in the San Jacinto Upper Pressure groundwater management zone. Alessandro Ponds were empty from May through December 2018 due to a storage reconfiguration and water was not stored until the second week of December 2018 for MWD San Jacinto Reservoir.

Table 6-10: 2018 Recycled Water Incidental Recharge in the Management Area

Facility	Incidental Recharge (AF)
SJV RWRF	189
Alessandro Ponds	30
MWD San Jacinto Reservoir	5

6.4 Surface Water Monitoring

The San Jacinto Valley is drained by the San Jacinto River, which rises in and drains the western slopes of the San Jacinto Mountains. Waterways tributary to the river include the North and South Forks, Strawberry Creek, Indian Creek, Poppet Creek, and Bautista Creek. The San Jacinto River and its tributaries are ephemeral, that is, they flow only when enough precipitation occurs to produce runoff and much of this flow infiltrates to groundwater. When storms are unusually intense and prolonged, the ground saturates and the remaining precipitation runs off into streams. The river recharges the groundwater basin in the area southeast of the City of San Jacinto. The river then flows northwest past the Lakeview Mountains before turning southwest to flow across the Perris Valley toward Lake Elsinore. The San Jacinto River ultimately flows into Lake Elsinore via Railroad Canyon and Canyon Lake. Lake Elsinore, when full, overflows into Temescal Wash, which joins the Santa Ana River near Prado Dam.

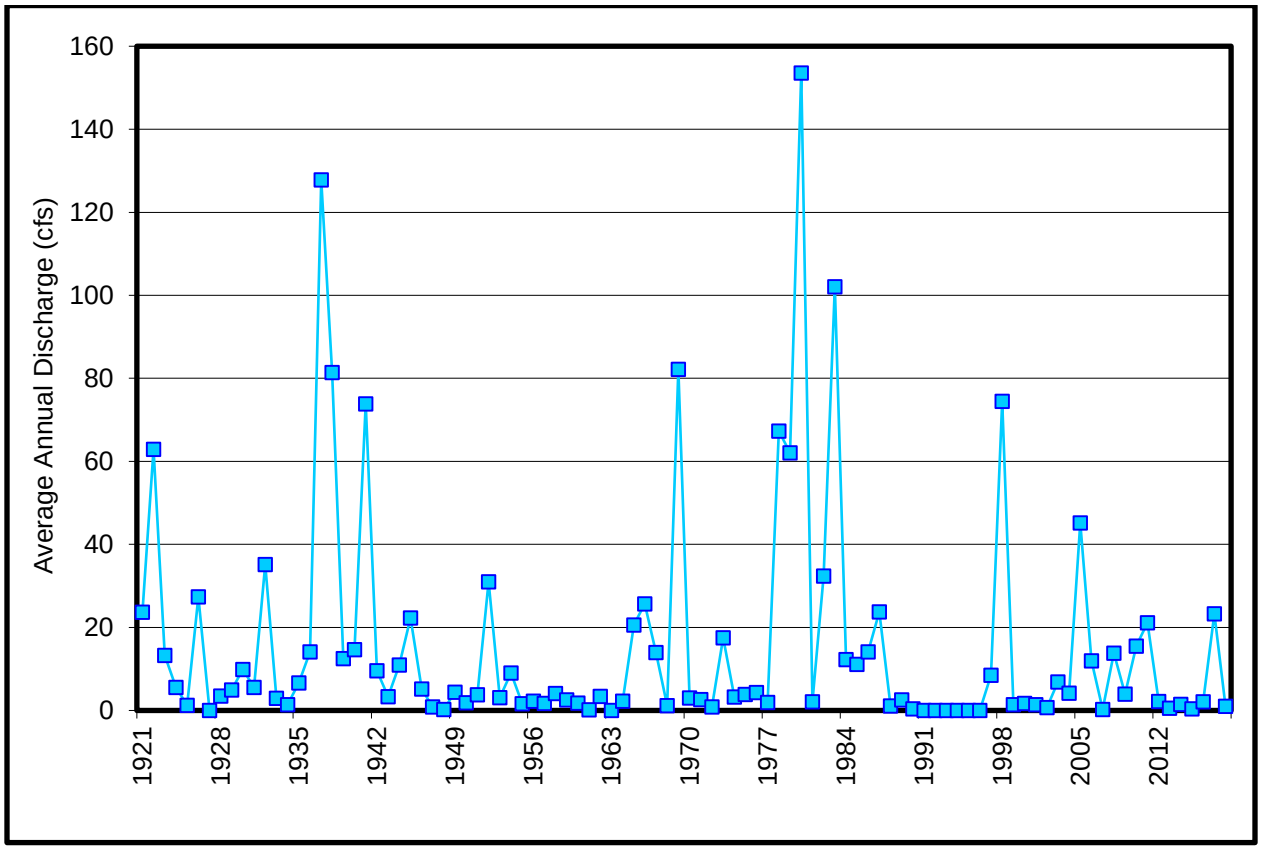
6.4.a River/Stream Flows

The U.S. Geological Survey (USGS) monitors and maintains a real-time gauge on the San Jacinto River at the Cranston Ranger Station and has done so since 1921. This gauge is located at 33°44'17" Latitude and 116°49'59" Longitude (NAD27) at an elevation of 1,920 feet above sea level. The drainage area above the gauge is 142 square miles.

In 2018, this station recorded a total flow of 733.5 AF with a peak flow of 47.8 cfs on March 23, 2018. Figure 6-2 demonstrates the great variability in annual flows in the San Jacinto River (based on the mean-daily data) and emphasizes the uncertainty of sufficient flows for diversion in any given year.

Monitoring of surface flows is an important factor in determining the water balance and in estimating the amount of groundwater recharge being added to storage. Tributaries to the river should also be monitored provided appropriate funding is made available for such monitoring. Surface water diversions were captured by LHMWD, EMWD, and the Soboba Gravel Pit in 2018. Surface water flows were not sufficient to exceed the capacity of the recharge facilities, therefore, surface water flows were captured within the Management Area.

Figure 6-2: Historical Average Annual Flow of the San Jacinto River



6.4.b San Jacinto River Diversions

LHMWD holds pre-1914 rights for the diversion and storage of surface water from the San Jacinto River and its tributaries. Such pre-1914 rights, and the applicable rights and obligations that apply to the nature of pre-1914 rights, are in regard to Lake Hemet, Strawberry Creek, and the North and South Forks of the San Jacinto River. In addition, LHMWD's storage of surface water takes place in the San Jacinto Upper Pressure groundwater management zone at Riverside County Flood Control and Conservation District's Bautista Ponds. During 2018, LHMWD diverted 253 AF of surface water; 0 AF at Lake Hemet, 0 AF at South Fork, 243 AF at North Fork, and 10 AF at Strawberry Creek as shown in Table 6-11. The total volume of water diverted, 253 AF, was utilized for direct use or sale and none of surface diversions were put into storage.

EMWD's diversion and storage of San Jacinto River surface water takes place in the Canyon groundwater management zone at EMWD's Grant Avenue Ponds in the Valle Vista area. EMWD's diverted water is stored in the groundwater aquifer in accordance to License No. 10667, and the Judgment requirements. During 2018, EMWD diverted 279 AF of surface water into storage at the Grant Avenue Ponds. Historical river diversions in the Management Area from 2009 through 2018 can be found in Chapter 8, Table 8-12.

Table 6-11: 2018 San Jacinto River Diversions

Agency	Diversion Points	Acre Feet
LHMWD	Lake Hemet	0
	South Fork	0
	North Fork	243
	Strawberry Creek	10
EMWD	Grant Avenue	279
	Total	532

6.5 Precipitation

Topography generally controls the relative amount of precipitation from one location to the next within the Management Area. The majority of rain falls in the winter months. On the valley floor, 12 to 13 inches are average, but near the peak of Mt. San Jacinto, the average is around 40 inches.

Two sites for measuring precipitation are used for this report; one in San Jacinto and one in Hemet. The San Jacinto station is operated by the California Division of Forestry (CDF) and data are available from 1910 to the present. The CDF data are compiled and provided to EMWD by the Riverside County Flood Control and Conservation District (RCFC). The location of the Hemet measuring station has changed over time. Data from 1911 through 2002 were collected at the LHMWD office. Starting 2003, Hemet rainfall data was collected at the RCFC Station No. 318 located at the Hemet Channel. Starting with 2014, Hemet rainfall data is being collected at the RCFC Station No. 180 located at Ryan Airport and provided to EMWD by RCFC. Annual rainfall in the Hemet/San Jacinto area can be quite variable.

During 2018, the Hemet station recorded 6.45 inches of rain and the San Jacinto station recorded 8.42 inches as shown in Table 6-12. Historical rainfall in the Management Area from 2009 through 2018 can be found in Chapter 8, Table 8-13.

Table 6-12: 2018 Rainfall and Rainfall Extremes in the Management Area

Location	Rainfall (inches)			
	San Jacinto		Hemet	
Historic High	28.63	1961	26.60	1978
Historic Low	4.98	1969	3.64	2002
Long-term Average	12.13		11.29	
Year 2018	8.42		6.45	

6.6 Well Permits

Riverside County Ordinance No. 682.3 regulates the construction, reconstruction, abandonment, and destruction of community water supply wells, individual domestic wells, and agricultural wells. Under the auspices of the Department of Environmental Health, the County is responsible for issuing well drilling permits. A valid permit along with the payment of all applicable fees is required before anyone digs, drills, bores, drives, or reconstructs a well that is, or was, a water well, a cathodic protection well, or a monitoring well. Standards for the construction or reconstruction of wells are the standards recommended in the *California Department of Water Resources Bulletin No. 74-81, Chapter II*, and *Bulletin No. 74-90, as amended by the State*.

The Riverside County Department of Environmental Health maintains a database detailing permits issued for wells drilled or abandoned in the county area. In the Management Area, eleven (11) well permits were issued in 2018 and they are summarized in Table 6-13.

As shown in the table, four (4) permits for domestic wells were issued. This category includes two types of wells:

(1) small individual domestic wells, primarily located in basin interface areas and non-water bearing zones, fractured bedrock areas, or where municipal water service is not available; and
(2) community or municipal domestic wells.

The four (4) permits issued for agricultural wells within the Management Area are in fact individual domestic wells on small agricultural properties. Since these wells are for individual domestic drinking water uses, they are not considered significant to the program because it is anticipated that they will produce less than 25 acre feet per year.

There was one (1) permit issued for a monitoring well within the Management Area.

Table 6-13: 2018 Well Permits Issued in the Management Area

Management Zone	Domestic Wells	Agricultural Wells	Monitoring Wells	Cathodic Protection Wells	Abandoned Wells	Total Permits
Canyon	-	1	-	-	-	1
S.J. Upper Pressure	4	-	-	-	-	4
Hemet North (partial)	-	2	-	-	-	2
Hemet South	-	1	1	2	-	4
Totals	4	4	1	2	-	11

There were two (2) permits issued for cathodic wells within the Management Area. The County makes every effort to observe well destruction, however no wells were abandoned in the Management Area. If that is not possible, they require a concrete ticket and destruction log from the owner.

It should be noted that Table 6-13 shows the number of permits issued, it does not necessarily reflect the actual number of wells drilled or abandoned. However, diligent effort is made by EMWD

to research each well and determine its status. It is possible that some wells may be drilled or abandoned in early 2019 under permits issued in 2018.

6.7 Groundwater Storage Changes

In 2015, the Watermaster, with assistance from the California Department of Water Resources develop a tool that can be used in calculating annual groundwater storage changes in the Management Area. This tool, Groundwater Storage Change Calculator (GSCC), uses information from the 2014 San Jacinto Groundwater Flow Model Update (SJFM-2014) and water level data collected as part of the annual Monitoring Program to estimate groundwater storage changes in the Management Area.

6.7.a Storage Change Calculation Methodology

The SJFM-2014 is a regional groundwater flow model which was calibrated based on hydrogeological data between 1984 and 2012. The SJFM-2014 estimated the cumulative storage reduction in the Management Area to be approximately 310,000 AF at the end of the 2012 simulation period. The Watermaster will use this estimate as the starting groundwater storage levels at the time that the Watermaster started its operation in April 2013.

The GSCC evaluates the groundwater volume for each one of the Groundwater Management Zones (GMZ) within the Management Area. The GSCC divides each GMZ into subsections and calculates storage changes for each subsection. The boundary for each subsection was defined based on the SJFM-2014 December 2012 groundwater elevation contour trends, and Key Wells within each subsection were selected to calculate the storage curve and storage volume for each subsection. The SJFM-2014 model data was used to delineate these subsections based on the location of the calibration wells, hydrogeological similarity, and availability of the monitoring program data within each subsection. The SJFM-2014 water budget estimates were used to obtain monthly changes in storage volume for each subsection between 1984 and 2012,

The GSCC uses storage curves based on historical observed groundwater level data and associated simulated monthly storage value to establish trend-line equations for each Key Well within each subsection. The generic storage curve equation used by the GSCC is:

$$y = mx + b$$

where,

y	storage volume (acre-feet)
m	slope of the storage curve
x	water level data point (feet/MSL)
b	intercept (constant)

A copy of the GSCC User Manual prepared by RMC was included as an appendix in the 2015 Annual Report.

6.7.b Groundwater Storage Change between 2017 and 2018

Using the methodology described above, the groundwater storage in the Management Area was estimated to have been reduced by 29,807 AF since the formation of the Watermaster in 2013, and to have been increased by 149 AF between Spring of 2017 and 2018. A summary of estimated storage changes in the Management Area and within each one of the GMZs is shown in Table 6-14.

Table 6-14: Estimated Groundwater Storage Changes within the Management Area

Management Zone	Time Period	Estimated Storage Changes (AF)
Management Area	January 1984 - December 2012	- 310,458
Management Area	January 1984 – Spring 2018	- 340,265
Management Area	January 2013 – Spring 2018	- 29,807
Total Groundwater Management Zones	Spring 2017 – Spring 2018	149
San Jacinto Upper Pressure	Spring 2017 – Spring 2018	1,846
Hemet North	Spring 2017 – Spring 2018	- 352
Hemet South	Spring 2017 – Spring 2018	21
Canyon	Spring 2017 – Spring 2018	- 1,366