

**OWENS VALLEY OPERATIONS PLAN FOR RUNOFF YEAR
2020-21**

1.0 Owens Valley Operations Plan for Runoff Year 2020-21

This year's annual operations plan and pumping program is consistent with the management strategy of the Water Agreement between the County of Inyo (County) and the City of Los Angeles (City) dated October 18, 1991. As stated in the Water Agreement:

The overall goal of managing the water resources within Inyo County is to avoid certain described decreases and changes in vegetation and to cause no significant effect on the environment which cannot be acceptably mitigated while providing a reliable supply of water for export to Los Angeles and for use in Inyo County.

The overall goal of the Water Agreement: environmental protections and a reliable water supply are the basis of the Los Angeles Department of Water and Power's (LADWP) operations plans. Groundwater pumping in the Owens Valley is managed in conformance with the provisions of the Water Agreement. The Water Agreement provides:

By April 20th of each year, the Department shall prepare and submit to the Inyo County Technical Group a proposed operations plan and pumping program for the twelve (12) month period beginning on April 1st. (In the event of two consecutive dry years when actual and forecasted Owens Valley runoff for the April to September period is below normal and averages less than 75 percent of normal, the Department shall prepare a proposed plan for the six (6) month period beginning on April 1st and October 1st, and submit such plans by April 20th and October 20th.)

1.1. Eastern Sierra Runoff Forecast

The Runoff Forecast for Eastern Sierra, which includes the Owens River Basin and Mono Basin runoffs for the 2020-21 runoff year (Table 1.1) is based on snow surveys of key Eastern Sierra watersheds in Inyo and Mono counties. The Eastern Sierra Runoff Forecast is used for planning aqueduct operations as it is a primary indicator of water supply. The April 1 forecast of the Owens Valley Basin runoff during the 2020-21 runoff year is 299,600 acre-feet, or about 74% of the 50-year (1966-2015) average annual runoff value of 406,000 acre-feet. The runoff forecast is somewhat higher than might be expected from a 54% of normal April 1 snowpack because during the first week of April the Eastern Sierra experienced significant precipitation and snowfall events that were incorporated into the April 1 forecast.

The forecast runoff for the period of April 1, 2020 through September 30, 2020, is 206,000 acre-feet for the Owens River Basin, which is 69% of the 50-year average. The 50-year average Owens Valley runoff between April 1 and September 30, based on 1966-2015 data is 298,151 acre-feet.

Figure 1.1 summarizes Owens River Basin runoff and groundwater pumping by LADWP since the 1972 runoff year. This figure demonstrates this year's forecasted runoff and planned pumping compared to the past runoff in the Owens Valley Basin.

Table 1.1. Eastern Sierra Runoff Forecast for 2020-21 Runoff Year

**2020 EASTERN SIERRA
RUNOFF FORECAST**
April 1, 2020

APRIL THROUGH SEPTEMBER RUNOFF

	MOST PROBABLE VALUE		REASONABLE MAXIMUM	REASONABLE MINIMUM	LONG-TERM MEAN (1966 - 2015)
	<u>(Acre-feet)</u>	<u>(% of Avg.)</u>	<u>(% of Avg.)</u>	<u>(% of Avg.)</u>	<u>(Acre-feet)</u>
MONO BASIN:	68,900	68%	81%	56%	100,782
OWENS RIVER BASIN:	206,000	69%	82%	56%	298,151

APRIL THROUGH MARCH RUNOFF

	MOST PROBABLE VALUE		REASONABLE MAXIMUM	REASONABLE MINIMUM	LONG-TERM MEAN (1966 - 2015)
	<u>(Acre-feet)</u>	<u>(% of Avg.)</u>	<u>(% of Avg.)</u>	<u>(% of Avg.)</u>	<u>(Acre-feet)</u>
MONO BASIN:	85,000	71%	85%	58%	119,103
OWENS RIVER BASIN:	299,600	74%	87%	61%	405,696

NOTE - Owens River Basin includes Long, Round and Owens Valleys (not incl Laws Area)

MOST PROBABLE - That runoff which is expected if median precipitation occurs after the forecast date.

REASONABLE MAXIMUM - That runoff which is expected to occur if precipitation subsequent to the forecast is equal to the amount which is exceeded on the average once in 10 years.

REASONABLE MINIMUM - That runoff which is expected to occur if precipitation subsequent to the forecast is equal to the amount which is exceeded on the average 9 out of 10 years.

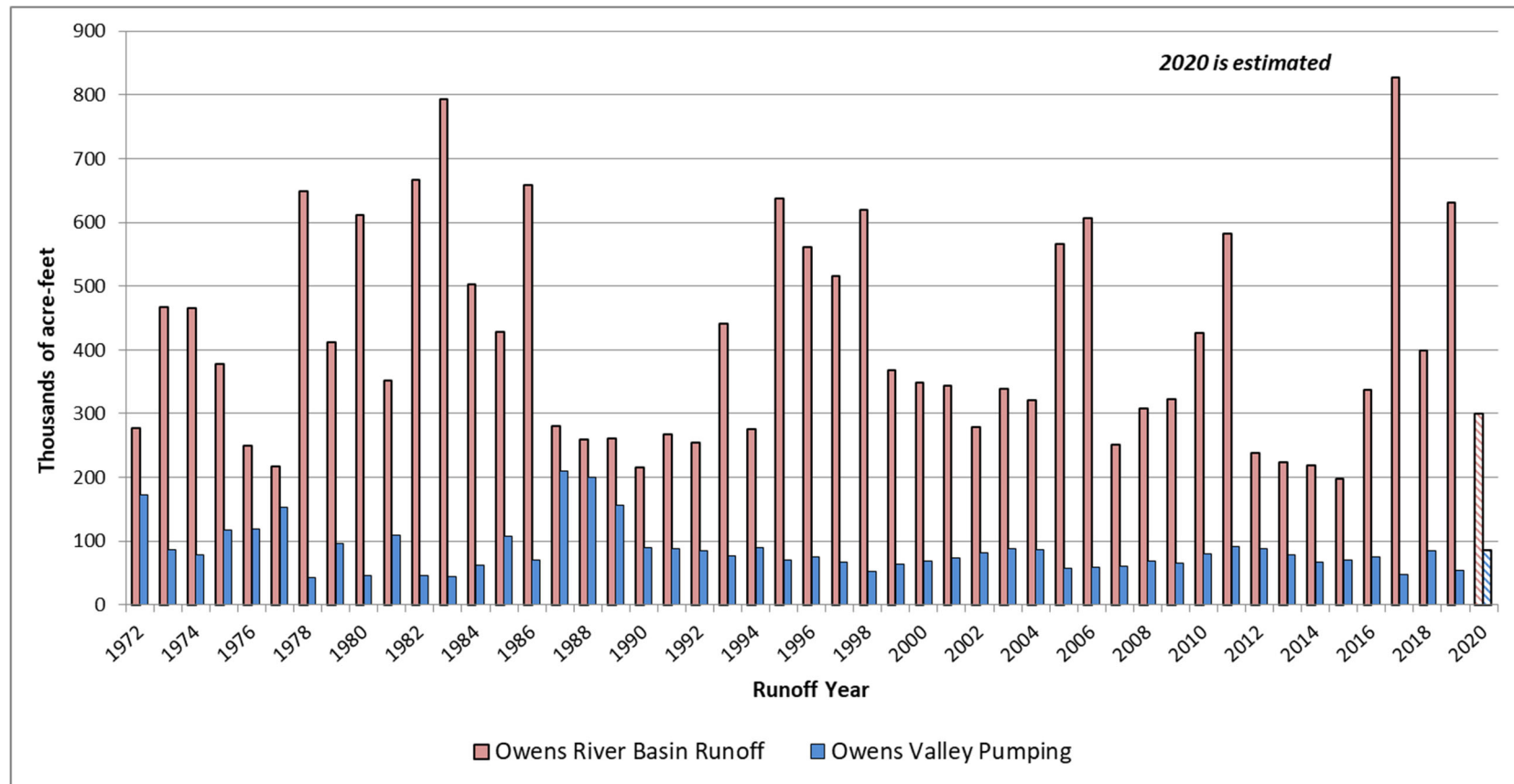


Figure 1.1. Owens River Basin Runoff and Groundwater Pumping

1.2. Owens Valley Groundwater Production

LADWP has prepared its 2020 Annual Owens Valley Operations Plan based on the goals and principles of the Water Agreement. The 2020 Annual Owens Valley Operations Plan is designed to avoid adverse impacts to the environment while providing a reliable supply of water for in-valley uses and export to Los Angeles for municipal use. Given the below normal runoff forecast, LADWP is not considering water spreading except for operational needs.

Under the terms of the Water Agreement, the allowable amount of groundwater pumping from each Owens Valley wellfield is based on the ON/OFF status of monitoring sites located within each wellfield and the capacity of the wells linked to those sites (see Water Agreement Sections V.B and V.C). Table 1.2 lists the ON/OFF status of the monitoring sites within the Owens Valley as of April 2020. Based on Table 1.2, 14 sites are in ON status and 8 sites are in OFF status. The Water Agreement or Technical Group has designated certain town supply wells, irrigation supply wells, fish hatchery supply wells, enhancement/mitigation (E/M) project supply wells, and other wells determined to not significantly impact areas with groundwater dependent vegetation as exempt from the ON/OFF provisions of the Water Agreement. These exempt wells may be pumped for their intended purpose.

Table 1.3 provides a breakdown of the available annual pumping capacity and planned groundwater pumping for the 2020-21 runoff year by wellfield. Table 1.3 also shows the monitoring sites in ON status as of April 2020, the wells associated with the ON status monitoring sites, and the exempt wells in each wellfield. Accordingly, approximately 187,000 acre-feet of water is available for groundwater pumping from Owens Valley wellfields under the terms of the Water Agreement during the 2020-21 runoff year. LADWP plans to pump between 75,000 acre-feet and 93,000 acre-feet of groundwater during the 2020-21 runoff year, which is between 40 percent and 50 percent of the amount allowed under the terms of Water Agreement. The planned range of groundwater pumping during the 2020-21 runoff year will provide LADWP with the needed operational flexibility to supply water for in-valley uses and export to the City of Los Angeles.

Working independently and with the Inyo/Los Angeles Technical Group, LADWP will monitor Owens Valley runoff and environmental conditions to assess if further changes to the planned pumping are needed. LADWP's 2020-21 groundwater management approach is more conservative than the environmentally conservative pumping plans advocated by the Standing Committee during the dry years of the early 1990s.

Figure 1.2 compares the amount of Owens Valley groundwater pumping provided by the provisions of Water Agreement and the actual groundwater pumping by LADWP for each runoff year since 1992 (available pumping was not calculated prior to 1992). LADWP's planned pumping for the 2020-21 runoff year is consistent with its past conservative pumping plans. LADWP is committed to conducting its operations in a conservative, responsible, and environmentally sustainable manner.

In addition to complying with the ON/OFF provisions and the environmental protection goals of the Water Agreement, LADWP's 2020-21 pumping program complies with the groundwater mining provisions of the Green Book. Table 1.4 shows the latest update of the mining calculations based on the procedures described in Section IV.C of the Green Book. As shown in this table, none of the wellfields in the Owens Valley will be in deficit by the end of the first half of the 2020-21 runoff year.

Table 1.5 is a list of Owens Valley wells exempted under the Water Agreement or by approval of the Technical Group from linkage to the ON/OFF provisions of the Water Agreement. This table includes a list of wells by well number, general location of the exempt well, and the reason the well is exempt. This table was revised and approved by the Technical Group at their May 6, 2016 meeting.

Table 1.6 details planned groundwater pumping for the 2020-21 runoff year on a month-to-month basis for each wellfield. Pumping for town water systems, fish hatcheries, and enhancement/mitigation (E/M) projects is included in the pumping distribution. Owens Valley groundwater production for the 2020-21 runoff year is consistent with the provisions of the Water Agreement. While Table 1.6 provides the planned monthly pumping volumes from each wellfield, the actual pumping amounts could vary due to the uncertainty inherent in runoff conditions, operational needs, and safety concerns of the Los Angeles Aqueduct system, which could result in changes in the operation of surface and ground water facilities throughout Eastern Sierra. Any pumping tests will be in addition to the planned pumping for 2020-21. Planned pumping may also be increased to provide freeze protection for the Los Angeles Aqueduct (LAA).

The following is a discussion of the planned pumping program by wellfield. Figures 1.3, and 1.5, followed by figures 1.6 through 1.10 show locations of LADWP's Owens Valley pumping wells by wellfield. These figures show the location of production wells, selected monitoring wells, and vegetation monitoring sites in each area.

Groundwater Level Forecasts

LADWP uses regression models to forecast the approximate changes in depth to water in the shallow aquifer. Groundwater pumping for the 2020-21 runoff year will be contingent on environmental conditions, runoff conditions, and water needs assessed during the year. Given a dry year and resulting lower recharge to the Owens Valley groundwater aquifers, LADWP forecasts declining groundwater levels during 2020-21 runoff year.

The range of planned LADWP groundwater pumping by wellfield is included in Table 1.3. Based on the planned groundwater pumping in each wellfields during the 2020-21 runoff year, the forecast depth to water changes between April 1, 2020, and April 1, 2021, in each Owens Valley wellfields utilizing selected monitoring wells are as follows:

- Average groundwater levels in the Laws Wellfield are forecasted to drop between 4.60 feet and 5.4 feet.
- Average groundwater levels in the Big Pine Wellfield are forecasted to drop between 1.0 feet and 1.3 feet.
- Average groundwater levels in the Taboose-Aberdeen Wellfield are forecasted to drop between 2.8 feet and 3.3 feet.
- Average groundwater levels in the Thibaut-Sawmill Wellfield are forecasted to drop between 0.2 foot and 1.9 feet.
- Average groundwater levels in the Independence-Oak Wellfield are forecasted to drop between 0.5 feet and 2.0 feet.
- Average groundwater levels in the Symmes-Shepherd Wellfield are forecasted to rise approximately 0.6 feet.
- Average groundwater levels in the Bairs-Georges Wellfield are forecasted to vary between a drop between 1.8 feet and 2.3 feet.

Overall, the average groundwater levels in the Owens Valley are forecasted to drop between 1.5 feet and 2.2 feet between April 2020 and April 2021.

Table 1.2. Soil/Vegetation Water Balance Calculations for April 2020 According to Section III of the Green Book

Site	October 2019 Soil AWC	50% Annual Precipitation	Projected Soil AWC	Oct. 2019 Vegetation Water Requirement	Oct. 2019 Required Soil AWC For Turn-On	October 1, 2019 On/Off Status	April 2020 Soil AWC	April 2020 Required Soil AWC For Turn-On	April 2020 On/Off
LW 1	126.3	7.9	134.2	12.2	NA	ON	115.5	NA	ON
LW 2	45.9	7.9	53.8	8.7	NA	ON	48.3	NA	ON
LW 3	54	7.9	61.9	23.4	NA	ON	47.5	NA	ON
BP 1	46.5	7.9	54.4	22.7	NA	ON	29.2	NA	ON
BP 2	2.2	NA	NA	27.4	28.4	OFF	3.3	28.4	OFF (7/98)
BP 3	72.5	7.6	80.1	15.1	NA	ON	70.6	NA	ON
BP 4	52.8	8.2	61.0	13.0	NA	ON	60.5	NA	ON
TA 3	11.1	NA	NA	20.8	28.4	OFF	14.0	28.4	OFF (10/17)
TA 4	18.9	7.3	26.2	15.6	NA	ON	25.9	NA	ON
TA 5	20.9	8.2	29.1	8.3	NA	ON	22.9	NA	ON
TA 6	22.9	7.3	30.2	21.4	NA	ON	41.3	NA	ON
TS 1	9.7	NA	NA	27.3	28.9	OFF	12.4	28.9	OFF (7/17)
TS 2	12	7.3	19.3	13.6	NA	ON	17.6	NA	ON
TS 3	18.2	7.3	25.5	14.7	NA	ON	23.3	NA	ON
TS 4	39.3	7.3	46.6	35.1	NA	ON	51.9	NA	ON
IO 1	19.9	NA	NA	58.5	42.2	OFF	28.5	42.2	OFF (10/98)
IO 2	3.5	6.5	10.0	4.4	NA	ON	3.2	NA	ON
SS 1	6.9	NA	NA	8.0	34.0	OFF	14.8	34.0	OFF (7/17)
SS 2	3.1	NA	NA	2.6	25.6	OFF	4.1	25.6	OFF (7/11)
SS 3	21.2	NA	NA	23.1	33.8	OFF	32.5	33.8	OFF (10/11)
SS 4	3.8	NA	NA	9.6	15.9	OFF	7.4	15.9	OFF (7/05)
BG 2	33.6	6.6	40.2	18.6	NA	ON	35.1	NA	ON

Table 1.3. Annual Pumping Capacity According to Monitoring Sites with ON Status and Planned Pumping for 2020-21 Runoff Year

Wellfield	Monitoring	Associated Production Wells	Available Capacity (AF/year)	Planned Pumping (AF)
Laws	L1	398, 247, 248, 249	12,236	
	L2	236, 239, 243, 244	7,240	
	L3	240, 241, 399, 376, 377	9,195	
	L5*	245, 387, 388	8,980	
	Exempt	236, 354, 422, 413	2,100	
	Wellfield Pumpage		39,751	7,580-10,460
Bishop**	All wells	140, 371, 406, 407, 408, 410, 411, 412	19,400	
	Wellfield Pumpage		19,400	11,040-12,685
Big Pine	BP1	378, 379, 389, 352	10,593	
	BP3	222, 223, 232	4,851	
	BP4	331	7,530	
	Exempt	218, 219, 330, 332, 341, 352, 375, 415	25,750	
	Wellfield Pumpage		48,724	21,000-23,695
Taboose Aberdeen	TA4	342, 347	19,838	
	TA5	349	12,130	
	TA6	109, 370	5,502	
	Exempt	118, 355	2,620	
	Wellfield Pumpage		40,090	16,920-19,500
Thibaut Sawmill	TS2	155	796	
	TS3	103, 104, 382	2,968	
	TS4	380, 381	4,561	
	Exempt	351, 356	8,000	
	Wellfield Pumpage		16,325	8,000-11,160
Indep. - Oak	IO2	63	2,100	
	Exempt	59, 60, 61, 65, 357, 383EM, 384EM, 401	15,710	
	Wellfield Pumpage		17,810	6,420-10,740
Symmes Shepherd	Exempt	402EM	1,200	
	Wellfield Pumpage		1,200	960
Bairs Georges	BG2	76, 343, 348, 403	2,820	
	Exempt	343	500	
	Wellfield Pumpage		2,820	2,100-2,820
Lone Pine	Exempt	344, 346, 425	980	
	Wellfield Pumpage		980	980
Total Owens Valley			187,100	75,000-93,000

* Monitoring site has yet to be located.

** Pumping is subject to the Hillside Decree

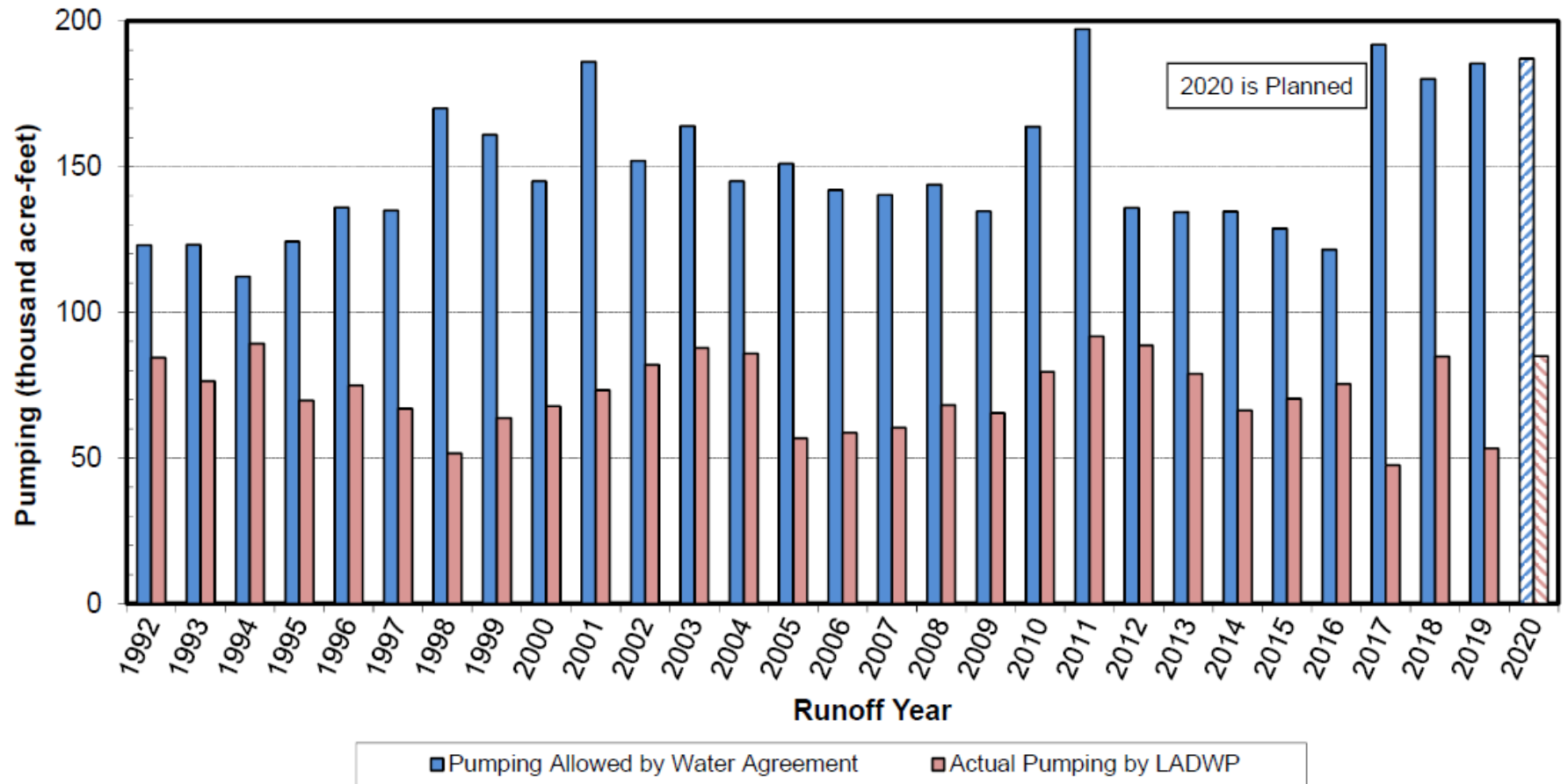


Figure 1.2. Owens Valley Pumping – Provided by Water Agreement and Actual Since Inyo/Los Angeles Water Agreement

Table 1.4. Summary of Recharge and Pumping for Water Year 2000 - 2019 and Estimated Pumping Limit for Apr-Sep 2020 in Acre-Feet

Water Year	OWENS VALLEY Runoff Percent	LAWS		BISHOP		BIG PINE		TABOOSE-THIBAUT		IND-SYM-BAIRS		LONE PINE		OWENS VALLEY	
		Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping
2001	77%	12,259	2,295	38,772	10,176	22,695	26,785	27,960	17,247	33,469	8,685	13,520	1,942	148,674	67,130
2002	63%	11,184	3,480	35,514	10,839	19,715	26,885	22,495	25,288	28,820	10,599	12,103	1,345	129,831	78,436
2003	75%	11,454	5,786	38,486	11,407	21,883	25,885	26,166	27,387	32,455	14,294	13,088	1,179	143,532	85,938
2004	71%	11,138	7,412	37,149	11,777	21,126	26,149	25,044	25,159	29,771	15,750	11,357	1,119	135,586	87,366
2005	120%	18,389	3,841	47,471	7,093	32,686	19,423	40,500	18,674	46,441	18,585	17,191	1,128	202,678	68,744
2006	138%	35,336	3,013	54,337	5,667	39,650	20,686	47,757	15,707	53,873	9,944	19,956	1,119	250,911	56,136
2007	64%	10,947	7,840	34,470	10,516	19,757	20,525	25,855	14,578	27,624	10,674	10,454	1,100	129,108	65,233
2008	68%	10,855	7,939	35,850	10,228	20,432	20,243	28,619	18,542	27,759	9,219	11,563	858	135,078	67,029
2009	73%	11,049	6,233	37,416	12,123	21,555	22,891	29,385	14,751	29,359	9,603	12,147	775	140,912	66,376
2010	93%	11,154	6,333	41,987	10,509	26,566	22,514	35,541	20,239	36,863	13,031	14,252	626	166,362	73,252
2011	134%	17,375	7,188	52,182	9,889	35,539	27,089	47,562	21,933	50,619	14,527	19,057	998	222,333	81,624
2012	72%	11,058	9,514	37,315	11,134	21,297	27,220	28,369	26,156	28,905	16,570	11,538	1,048	138,482	91,642
2013	62%	10,644	6,642	34,811	11,536	19,408	26,115	24,795	25,225	24,749	17,907	10,364	721	124,771	88,146
2014	50%	10,393	6,287	31,325	10,849	16,871	22,560	21,241	15,778	20,508	11,347	8,960	946	109,297	67,767
2015	43%	10,103	5,824	30,667	10,521	15,380	19,939	18,671	15,563	18,695	11,873	7,995	925	101,512	64,645
2016	63%	10,392	6,038	34,844	10,842	19,551	22,797	25,634	20,642	25,354	18,899	10,306	984	126,082	80,202
2017	175%	42,397	2,000	67,147	4,399	56,732	22,106	71,201	12,959	66,226	9,316	24,745	915	328,449	51,695
2018	93%	14,556	8,646	41,124	9,588	26,299	23,163	34,601	18,896	35,593	12,118	13,811	973	165,983	73,384
2019	130%	34,481	7,127	53,924	5,670	40,241	21,374	47,747	17,000	49,033	10,064	18,307	973	243,733	62,208
2020 (a)	78%	11,361	2,685	38,062	1,005	40,241	9,356	28,142	8,608	30,541	1,729	12,072	142	160,419	23,525
(b) TOTAL		316,526	116,123	822,852	185,768	537,627	453,705	657,286	380,332	696,657	244,734	272,786	19,816	3,303,734	1,400,478
Estimated Apr-Sep 2020 Pumping Limit			200,403		637,084		83,922		276,954		451,922		252,970		1,903,256

(a) Estimated Recharge for the 2020 Water Year; Approximate Pumping for First Half of Water year 2020 (Oct-Mar).

(b) Estimated 20 Year Total for Recharge; actual 19.5 Year Total for Pumping.

Table 1.5. LADWP Groundwater Pumping Wells Exempt from ON/OFF Provisions of Water Agreement**Revised: May 6, 2016**

Well Number	Wellfield	Duration	Reason
354	Laws	Annual	Sole Source-Town Supply
413 ⁽¹⁾	Laws	Annual	Same as above
422 ⁽²⁾	Laws	Annual	Sole Source-Irrigation; no impact on groundwater dependent vegetation
236 ⁽²⁾	Laws	Irrigation Season	Sole Source-Irrigation
413 E/M ⁽¹⁾	Laws	Irrigation Season	Sole Source – Irrigation for Laws Museum irrigation project
415 ⁽³⁾	Big Pine	Annual	Sole Source-Town Supply
341	Big Pine	Annual	Same as above
352	Big Pine	Annual	Same as above
375 E/M	Big Pine	Annual	Make-up water for Big Pine Regreening Project up to 150 acre-feet per year
330 ⁽⁴⁾	Big Pine	Annual	Sole Source-Fish Hatchery
332 ⁽⁴⁾	Big Pine	Annual	Same as above
409 ⁽⁴⁾	Big Pine	Annual	Same as above
218	Big Pine	Annual	No impact on groundwater dependent vegetation
219	Big Pine	Annual	Same as above
118	Taboose-Aberdeen	Annual	Same as above
355	Taboose-Aberdeen	Annual	Sole Source- supply 1,600 acre project
351	Thibaut-Sawmill	Annual	Sole Source – Fish Hatchery
356	Thibaut-Sawmill	Annual	Same as above
401	Independence-Oak	Annual	No Impact on groundwater dependent vegetation
59	Independence-Oak	Annual	Same as above
60	Independence-Oak	Annual	Same as above
65	Independence-Oak	Annual	Same as above
383 E/M	Independence-Oak	Annual	Same as above
384 E/M ⁽¹⁾	Independence-Oak	Annual	Same as above
61	Independence-Oak	Irrigation season	Sole Source-Irrigation; no impact on groundwater dependent vegetation
423 E/M	Independence-Oak	Irrigation Season	Same as above
357	Independence-Oak	Annual	Sole Source – Town Supply
384 ⁽¹⁾	Independence-Oak	Annual	Same as above
402 E/M	Symmes-Shepherd	Irrigation season	Sole Source-Irrigation; no impact on groundwater dependent vegetation
343 ⁽⁵⁾	Bairs-Georges	Annual	Sole Source-irrigation and stock water
425 E/M	Lone Pine	Irrigation Season	Sole Source-Irrigation; no impact on groundwater dependent vegetation
344	Lone Pine	Annual	Sole Source – Town Supply
346	Lone Pine	Annual	Same as above

1. Wells 413 in Laws and 384 in Independence are dual purpose wells to supply water for Enhancement/Mitigation (E/M) supply and backup for town domestic supply.
2. Well 422 designated as primary and Well 236 designated as backup irrigation supply.
3. Currently not in operation.
4. Wells 330, 332, and 409 may only be pumped two at a time, unless pumped for testing or emergencies.
5. Well 343 is exempt in below normal runoff years to supplement flow in Georges Creek for irrigation and stock water supply

Table 1.6. Planned Owens Valley Pumping for the 2020-21 Runoff Year (acre-feet)

Month	Laws	Bishop	Big Pine	Taboose-Aberdeen	Thibaut-Sawmill	Indep.-Oak	Symmes-Shepherd	Bairs-Georges	Lone Pine	TOTAL
April	980	1,440-1,620	1,750-1,960	1,410-1,625	667-930	880-1,040	160	175-235	120	7,582-8,670
May	980	1,620	1,750-1,960	1,410-1,625	667-930	880-1,040	160	175-235	120	7,762-8,670
June	980	1,620	1,750-1,960	1,410-1,625	667-930	880-1,040	160	175-235	140	7,782-8,690
July	980	1,620	1,750-1,960	1,410-1,625	667-930	880-1,040	160	175-235	140	7,782-8,690
August	980	1,620	1,750-1,960	1,410-1,625	667-930	880-1,040	160	175-235	140	7,782-8,690
September	980	1,620	1,750-1,960	1,410-1,625	667-930	880-1,040	160	175-235	140	7,782-8,690
October	210-690	250-565	1,750-2,135	1,410-1,625	666-930	190-750	0	175-235	40	4,691-6,970
November	210-690	250-560	1,750-1,960	1,410-1,625	667-930	190-750	0	175-235	40	4,692-6,790
December	430-690	250-460	1,750-1,960	1,410-1,625	666-930	190-750	0	175-235	25	4,896-6,675
January	430-910	250-460	1,750-1,960	1,410-1,625	666-930	190-750	0	175-235	25	4,896-6,895
February	210-910	250-460	1,750-1,960	1,410-1,625	666-930	190-750	0	175-235	25	4,676-6,895
March	210-690	250-460	1,750-1,960	1,410-1,625	667-930	190-750	0	175-235	25	4,677-6,675
TOTAL	7,580-10,460	11,040-12,685	21,000-23,695	16,920-19,500	8,000-11,160	6,420-10,740	960	2,100-2,820	980	75,000-93,000

1.2.1. Laws Wellfield (Figure 1.3)

Monitoring sites L1, L2, and L3 are in ON status. Production wells controlled by these monitoring sites have available production capacities of 12,236, 7,240, and 9,195 acre-feet respectively. Wells linked to monitoring site L5 have a capacity of 8,980 acre-feet. Exempt wells within the Laws Wellfield have a capacity of 2,100 acre-feet. The total available pumping capacity in the Laws Wellfield is 39,751 acre-feet. Well 236, associated with monitoring site L2, is used as a backup along with Well 422 as an exempt well irrigation water supply.

LADWP's planned groundwater pumping in the Laws Wellfield for the 2020-21 runoff year ranges between 7,580 acre-feet and 10,460 acre-feet, contingent on runoff and operation conditions, water needs, and environmental conditions. Groundwater pumping is planned to supply water for Owens Valley demands including the town water system, E/M projects, and irrigated lands and for export to the City of Los Angeles.

LADWP, in cooperation with Inyo County Water Department conducted a two-month pumping test of modified well W385 between December of 2019 and February of 2020. Wells W385 and W386 associated with monitoring site L4 were modified in 2014 by sealing the screened zone within the shallow aquifer. The modification resulted in a reduction of pumping capacity in W385 from 10.2 cfs to 2.8 cfs and in W386 from 6.1 cfs to 2.8 cfs based on initial 24-hour pumping test. The goal of the pumping test was to document the effect of well modification and to allow comparison with a similar pumping test conducted in 1993-94 based on the effect on nearby shallow groundwater levels both on the north and south of Owens River. Data collected from the pumping test will also be used update and recalibrate the Bishop-Laws Wellfield groundwater flow model. The model can then be used to simulate longer-term operation of W385 and W386 wells.

During the two-month pumping test of W385, groundwater levels were monitored at 29 locations. To ensure that nearby groundwater dependent resources would not be affected by the pumping test, six wells were designated as trigger wells and trigger levels were assigned to each well by staff from LADWP, ICWD, and CDFW. During the test groundwater levels in none of the trigger wells reached the preset trigger levels. A total 463 acre-feet of water was pumped by W385 during the pumping test. LADWP will release the same amount of water to Five Bridges Area during this runoff year from Bishop Creek Canal. Staffs from LADWP and ICWD are preparing a joint report that describes the pumping test and will present the data collected during the test.

Based on the results of the two-month pumping test at W385, LADWP is planning to conduct a similar pumping test of W386 in the winter of 2020-21 runoff year. LADWP will prepare and submit a testing plan to Inyo County/Los Angeles Technical Group for consideration. The testing plan for W386 should include a similar monitoring plan to that of W385 pumping test.

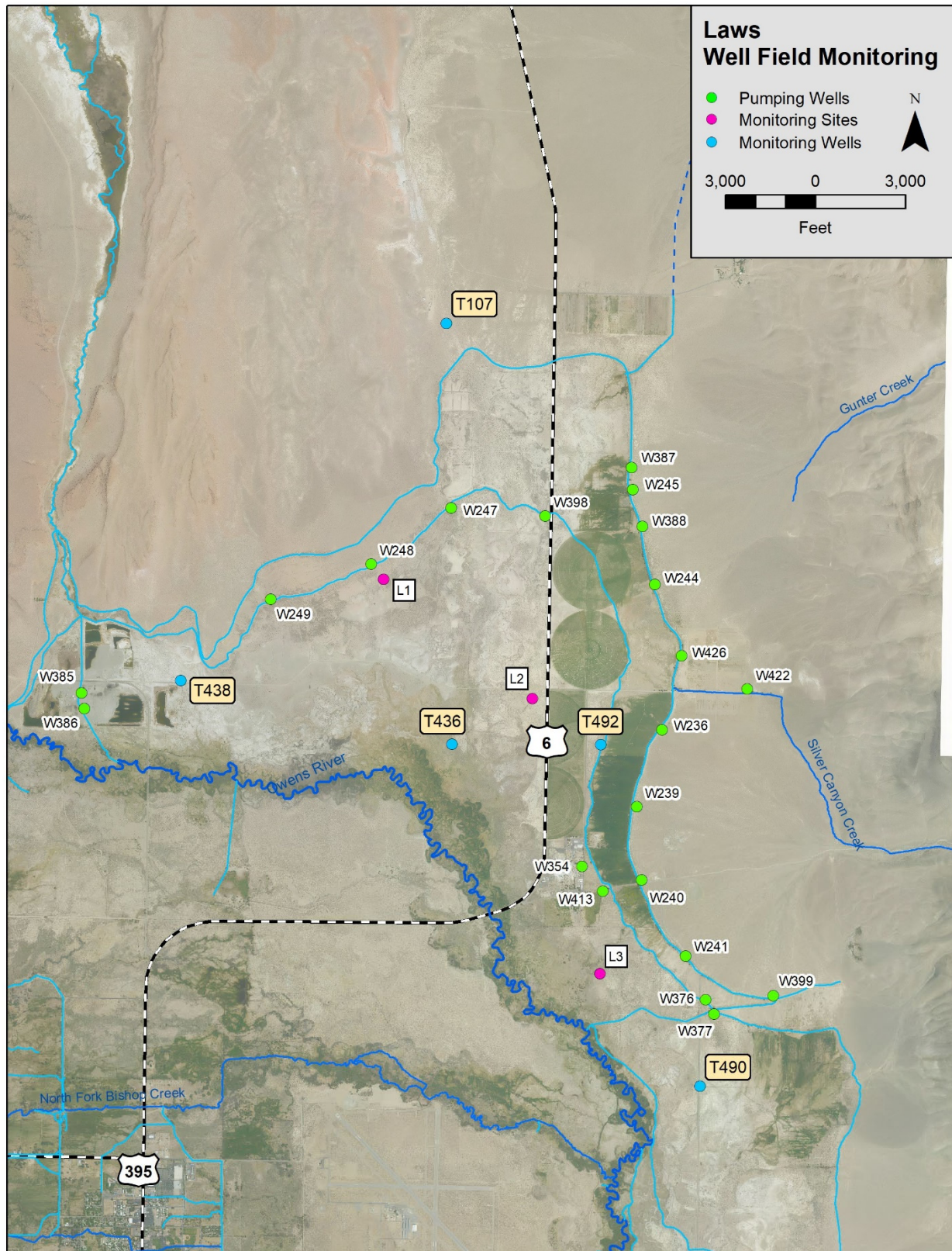
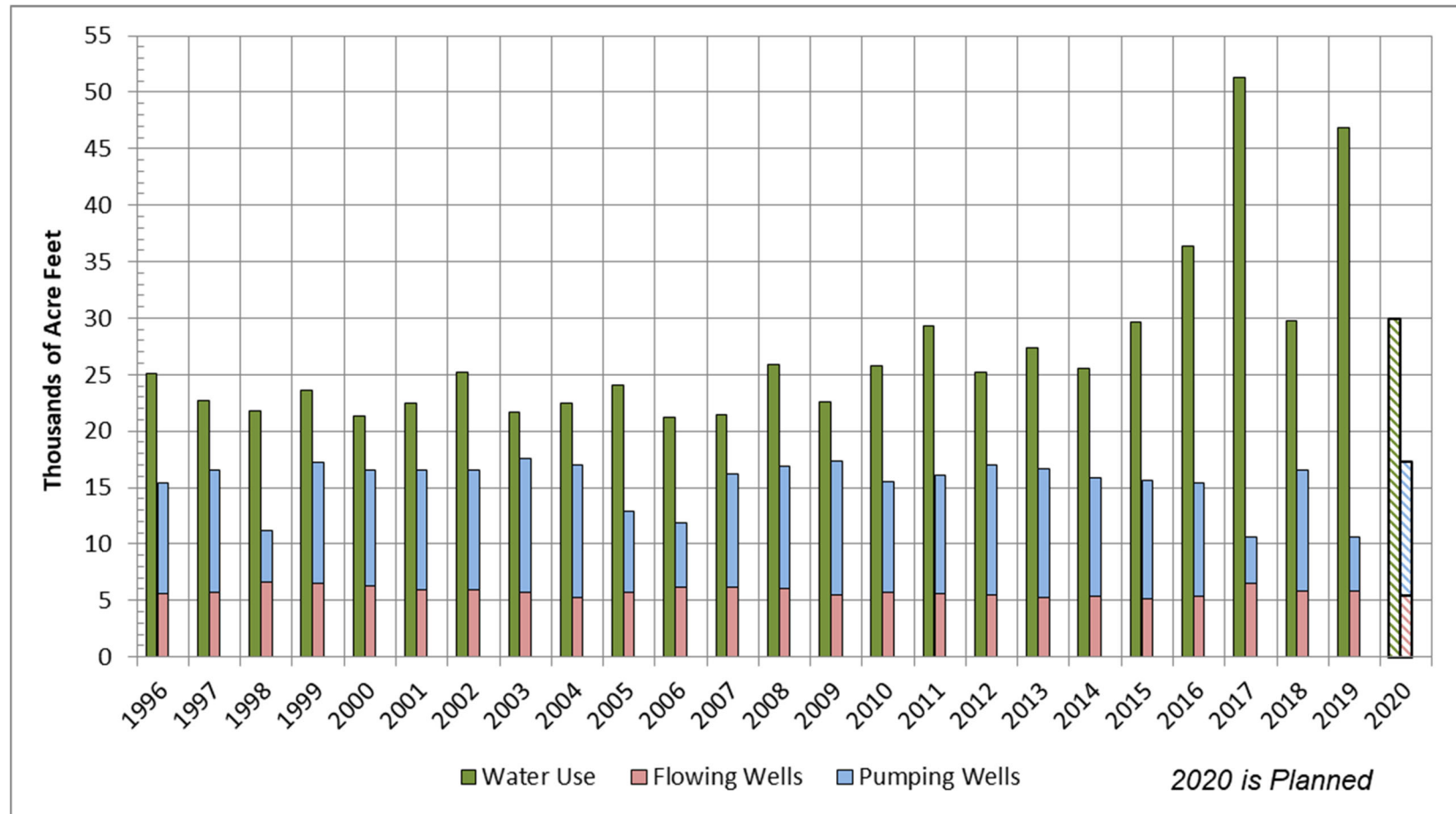


Figure 1.3. Laws Wellfield

1.2.2. Bishop Wellfield (Figure 1.5)

Figure 1.4 illustrates water use on City Lands on Bishop Cone in comparison with groundwater extractions (flowing and pumping wells) for runoff years, 1996 to present.

Pumping in the Bishop Wellfield is governed by the provisions of the Hillside Decree and the Water Agreement, which limit LADWP's annual groundwater extractions (pumping and flowing wells) from the Bishop Cone to an amount commensurate with the total amount of water used on City lands on the Bishop Cone (including conveyance and other losses). Beginning with the 2015-16 Runoff Year the audit water account methods were modified to analyze each areas inflows and outflows to calculate total water use. Under the modified audit protocols, recent total water used on City lands within the Bishop Cone area has been approximately 38,000 acre-feet per year. The total water used during the 2020-21 Runoff Year will be approximately 30,000 acre-feet. The current total available groundwater extraction capacity in the Bishop Wellfield is approximately 19,400 acre-feet. The planned groundwater pumping from the Bishop Wellfield ranges between 11,040 acre-feet and 12,685 acre-feet for the 2020-21 runoff year, contingent on runoff condition, water needs, and environmental conditions.



*According to the Hillside Decree, total groundwater extraction cannot be more than water use on City-owned land on the Bishop Cone.

Figure 1.4. Groundwater Extraction (Flowing & Pumping) and Water Use on City of Los Angeles Land in Bishop Cone

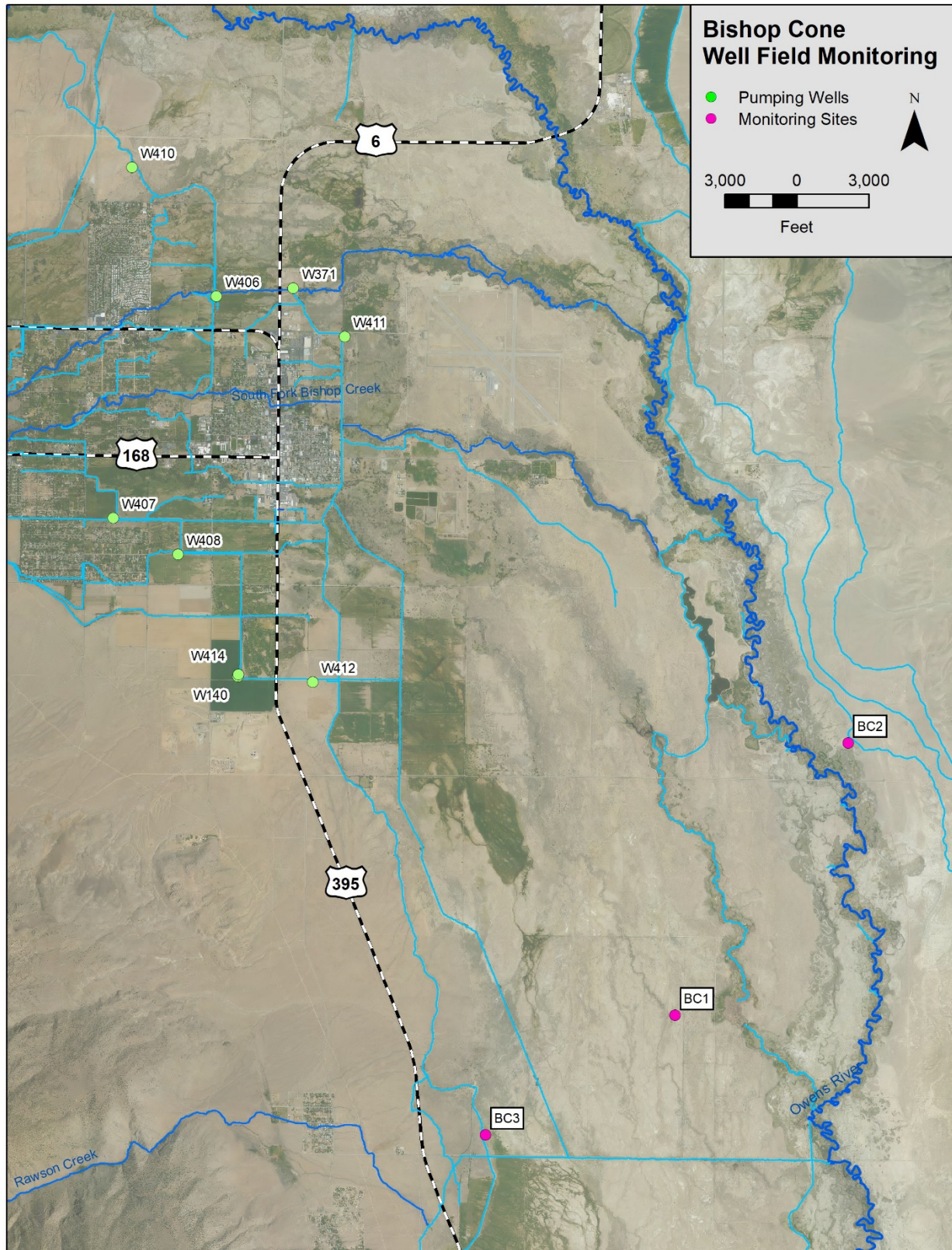


Figure 1.5. Bishop Wellfield

1.2.3. Big Pine Wellfield (Figure 1.6)

Monitoring sites BP1, BP3, and BP4 are in ON status. Production wells controlled by monitoring site BP1 have 10,593 acre-feet pumping capacity, production wells controlled by monitoring site BP3 have 4,851 acre-feet pumping capacity, and production Well 331, controlled by monitoring site BP4, has 7,530 acre-feet pumping capacity. Exempt wells including Well 218, Well 219, town supply wells, and Fish Springs Fish Hatchery wells in the Big Pine Wellfield have a combined 25,750 acre-feet pumping capacity. The total available pumping capacity in the Big Pine Wellfield is 48,724 acre-feet. The total planned pumping in the Big Pine Wellfield for 2020-21 runoff year ranges between 21,000 acre-feet and 23,695 acre-feet, contingent on runoff conditions, water needs, and environmental conditions.

Well W341, located in west Big Pine is currently the primary well supplying the town water system. LADWP installed Well W415 in 2002 to replace Well W341 as the primary town water system source and to provide water to the town ditch system. Following the installation of five new monitoring wells in the vicinity of west Big Pine in 2017 and the completion all permitting requirements, LADWP has transferred town water system supply to Well W415 and plans to decommission Well W341 once enough data has been collected to determine Well W415 has sufficient pumping capacity to serve the towns' water supply demand.

1.2.4. Taboose-Aberdeen Wellfield (Figure 1.7)

Monitoring sites TA4, TA5, and TA6 in Taboose-Aberdeen Wellfield are in ON status. Production wells controlled by monitoring site TA4 have 19,838 acre-feet pumping capacity, production well W349, controlled by monitoring site TA5 has 12,130 acre-feet pumping capacity, production wells associated with monitoring site TA6 have 5,502 acre-feet pumping capacity, and exempt wells W118 and W355 have an available pumping capacity of 2,620 acre-feet. The total available groundwater pumping capacity in the Taboose-Aberdeen Wellfield is 40,090 acre-feet. The planned groundwater pumping in the Taboose-Aberdeen Wellfield for 2020-21 runoff year ranges between 16,920 acre-feet and 19,500 acre-feet, contingent on runoff conditions, water needs, and environmental conditions.

1.2.5. Thibaut-Sawmill Wellfield (Figure 1.8)

Monitoring sites TS2, TS3, and TS4 in Thibaut-Sawmill Wellfield are in ON status. Production well W155 controlled by vegetation monitoring site TS2 has a pumping capacity of 796 acre-feet. Production wells W103, W104, and W382 controlled by vegetation monitoring site TS3 have 2,968 acre-feet of available pumping capacity, and production wells W380 and W381, controlled by vegetation monitoring site TS4 have 4,561 acre-feet pumping capacity. Exempt Blackrock Fish Hatchery supply wells W351 and W356 are limited to pump 8,000 acre-feet per year combined based on the resolution of a dispute between Inyo County and LADWP regarding the conditions of the vegetation parcel BLK94. The total available pumping capacity in the Thibaut Sawmill Wellfield for the 2020-21 runoff year is 16,325 acre-feet. Total planned pumping in the Thibaut Sawmill Wellfield for the 2020-21 runoff year ranges between 8,000 acre-feet

and 11,160 acre-feet subject to hatchery demands, runoff conditions, water supply needs, and environmental conditions.

1.2.6. Independence-Oak Wellfield (Figure 1.8)

Monitoring site IO2 in the Independence-Oak Wellfield is in ON status. The pumping capacity of Well W063 associated with the monitoring site IO2 is 2,100 acre-feet per year. Exempt wells in the Independence-Oak Wellfield have a combined capacity of 15,710 acre-feet. The total available pumping capacity from the Independence-Oak Wellfield is 17,810 acre-feet. The planned groundwater pumping in the Independence-Oak Wellfield for the 2020-21 runoff year ranges between 6,420 acre-feet and 10,740 acre-feet, subject to runoff conditions and irrigation, town water system, and E/M projects water demand.

Production wells W061 in Independence Wellfield is associated with the vegetation monitoring site IO3 but is exempt from ON/OFF provisions of the Green Book during the irrigation season as the sole source for an alfalfa field. Well W061 has become inoperable recently and LADWP is planning to replace well W061 in the next few months.

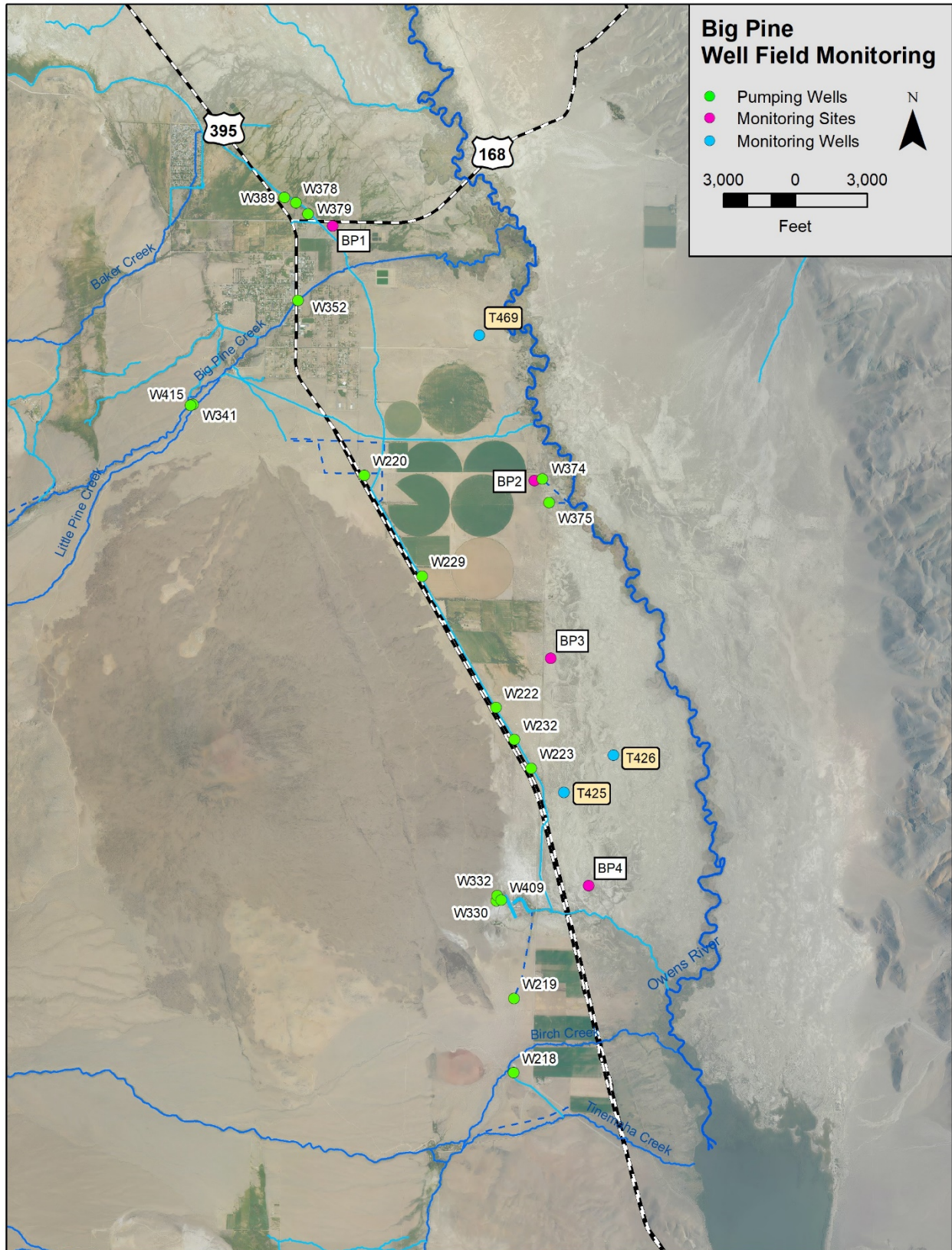


Figure 1.6. Big Pine Wellfield

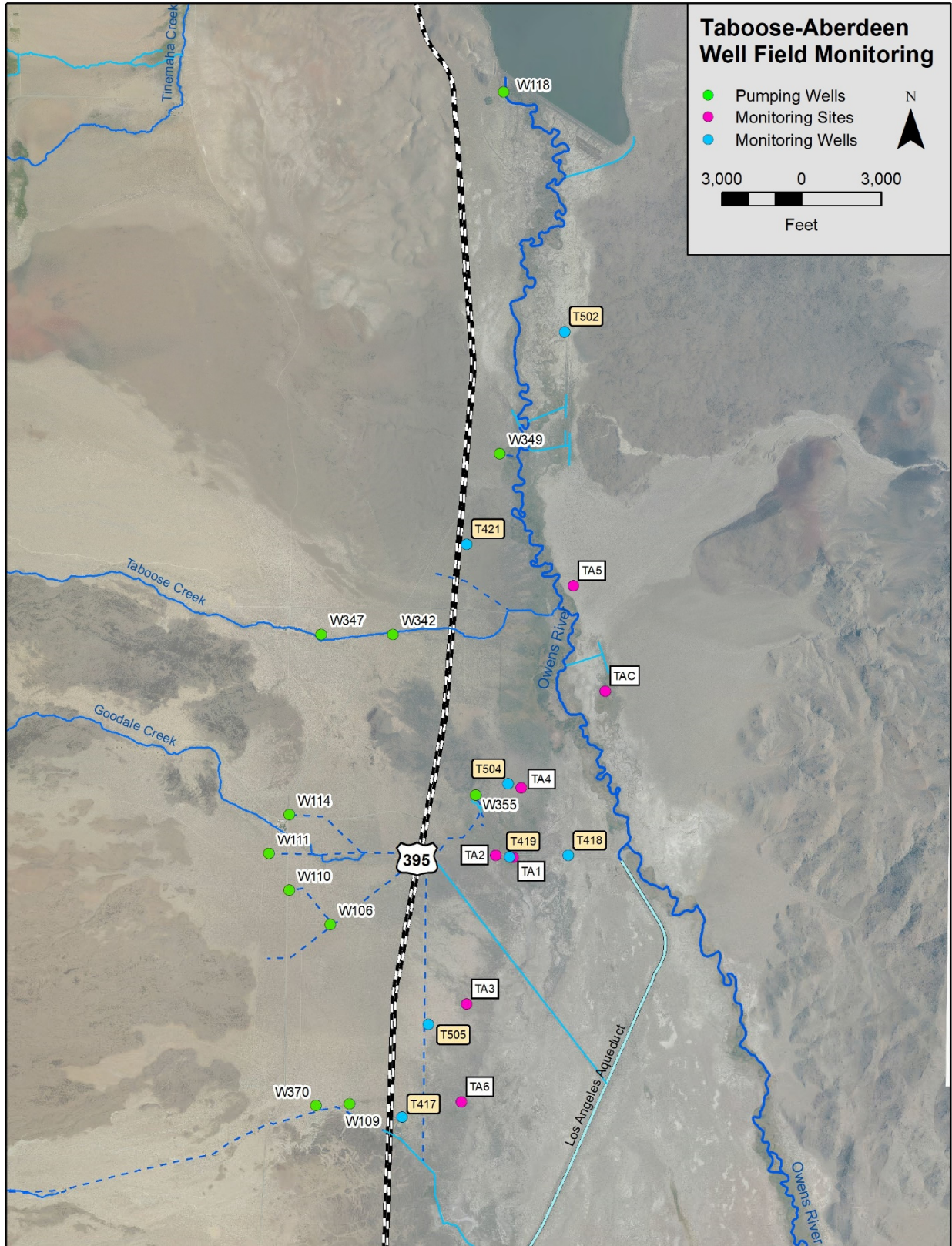


Figure 1.7. Taboose-Aberdeen Wellfield

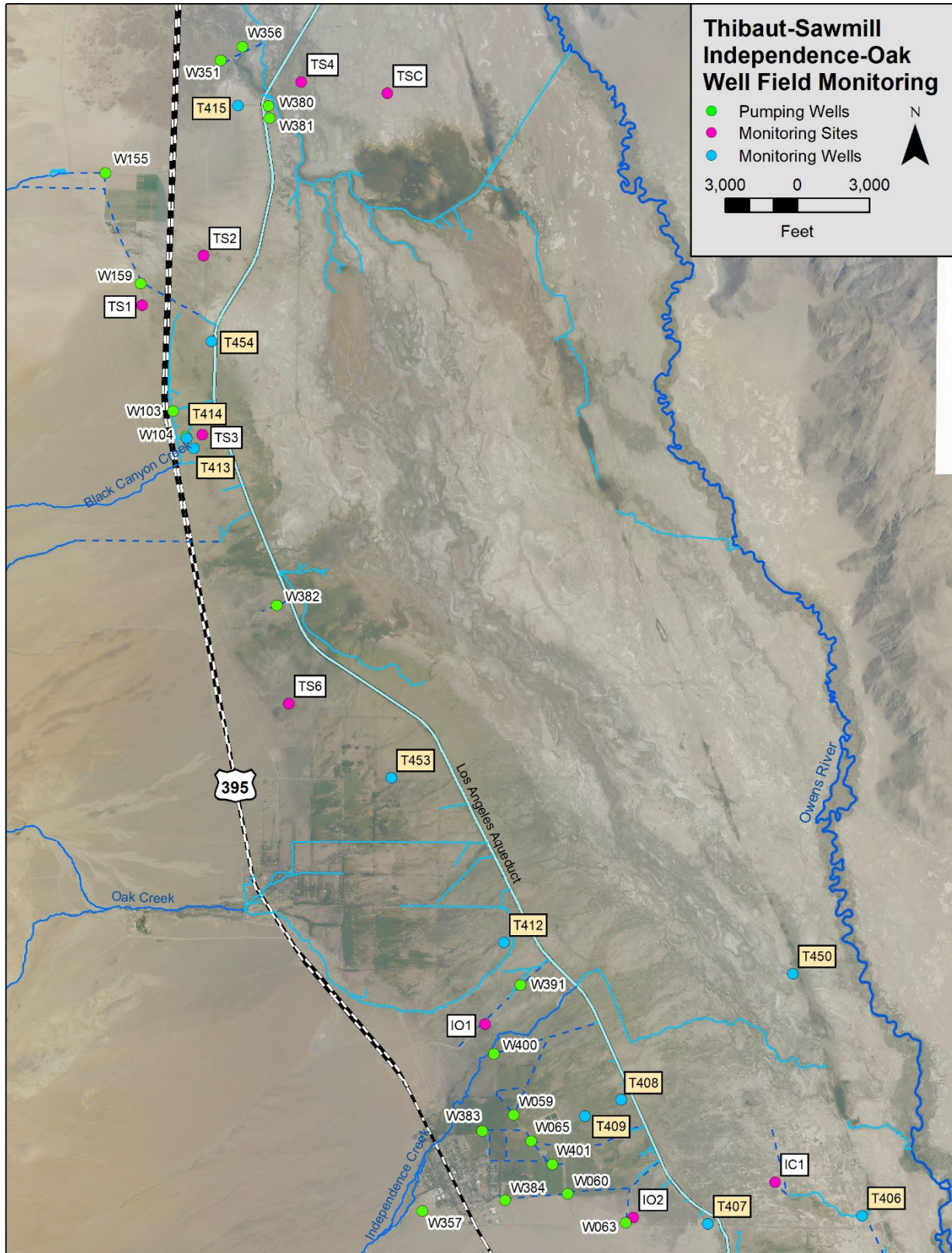


Figure 1.8. Thibaut-Sawmill and Independence-Oak Wellfields

1.2.7. Symmes-Shepherd Wellfield (Figure 1.9)

None of the vegetation monitoring sites in the Symmes-Shepherd Wellfield is in ON status. Exempt Well 402 has a capacity of about 1,200 acre-feet. Total available pumping capacity in the Symmes-Shepherd Wellfield for the 2020-21 runoff year is approximately 1,200 acre-feet. The planned pumping in the Symmes-Shepherd Wellfield for the 2020-21 runoff year is approximately 960 acre-feet contingent on runoff conditions, E/M project water needs, and environmental conditions. LADWP has had difficulty operating well W402 in recent years, specifically during the peak of summer, when water demand for irrigation is the highest. As a result, LADWP is planning to replace W402 to meet water demand by the lessee for irrigation, subject to approval by the Technical Group and the permit by Inyo County Environmental Health Department.

1.2.8. Bairs-Georges Wellfield (Figure 1.9)

Vegetation monitoring site BG2 is in ON status. The wells controlled by this monitoring site have a combined 2,880 acre-feet pumping capacity. Well W343 is exempt for pumping approximately 500 acre-feet (based upon a six month exemption period in dry years). The current total available pumping capacity in the Bairs Georges Wellfield for the 2020-21 runoff year is approximately 2,880 acre-feet. Planned groundwater pumping in the Bairs Georges Wellfield for the 2020-21 runoff year ranges between 2,100 and 2,820 acre-feet, contingent on runoff conditions, water needs, and environmental conditions. In this wellfield, LADWP is evaluating a replacement for well W076 which has been out operation in recent years. Based on the geology of the area and the lack of productivity on the deeper aquifer, LADWP plans to replace well W076 with a similar characteristic well and approximately the same pumping capacity, subject to the completion of the evaluation.

1.2.9. Lone Pine Wellfield (Figure 1.10)

Lone Pine exempt wells are town supply wells W344 and W346, and E/M project supply Well W425. These three wells have an annual available pumping capacity of approximately 980 acre-feet.

The planned groundwater pumping from the Lone Pine Wellfield during the 2020-21 runoff year is approximately 980 acre-feet, contingent on runoff conditions, water supply needs, and environmental conditions.

Well W416 is a production well in the Lone Pine Wellfield, drilled in 2002. An operational pumping test was conducted on Well W416 during the 2009 runoff year. This well was modified in 2014 to seal the screen portion of the well within the shallow aquifer. LADWP is planning to equip and conduct the initial operation of this well. If initial operation is performed during 2020-21 runoff year, it will be in addition to the currently planned pumping from Lone Pine Wellfield. LADWP has requested the Technical Group to designate a vegetation monitoring site for this well.

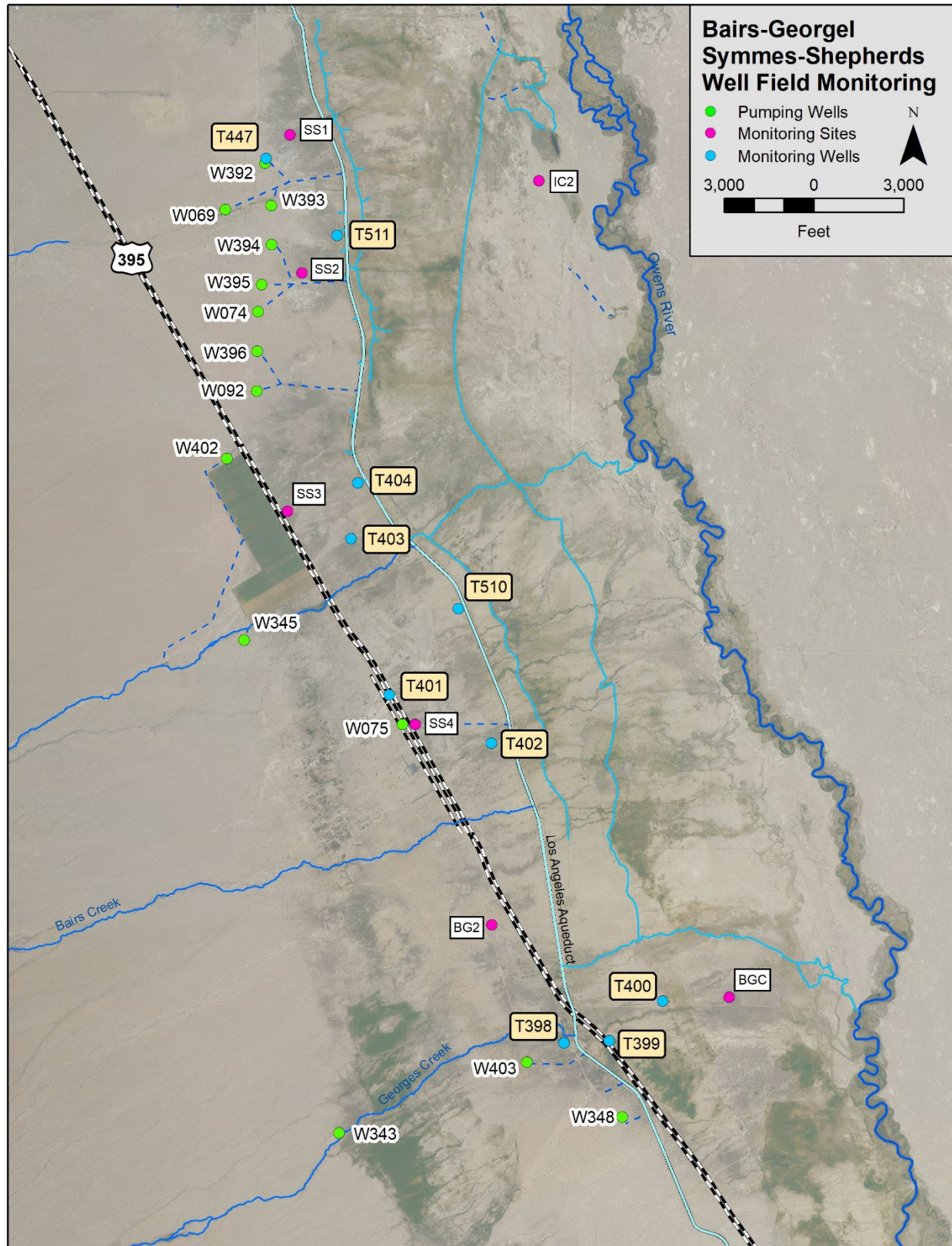


Figure 1.9. Symmes-Sheperds and Bairs-Georges Wellfields

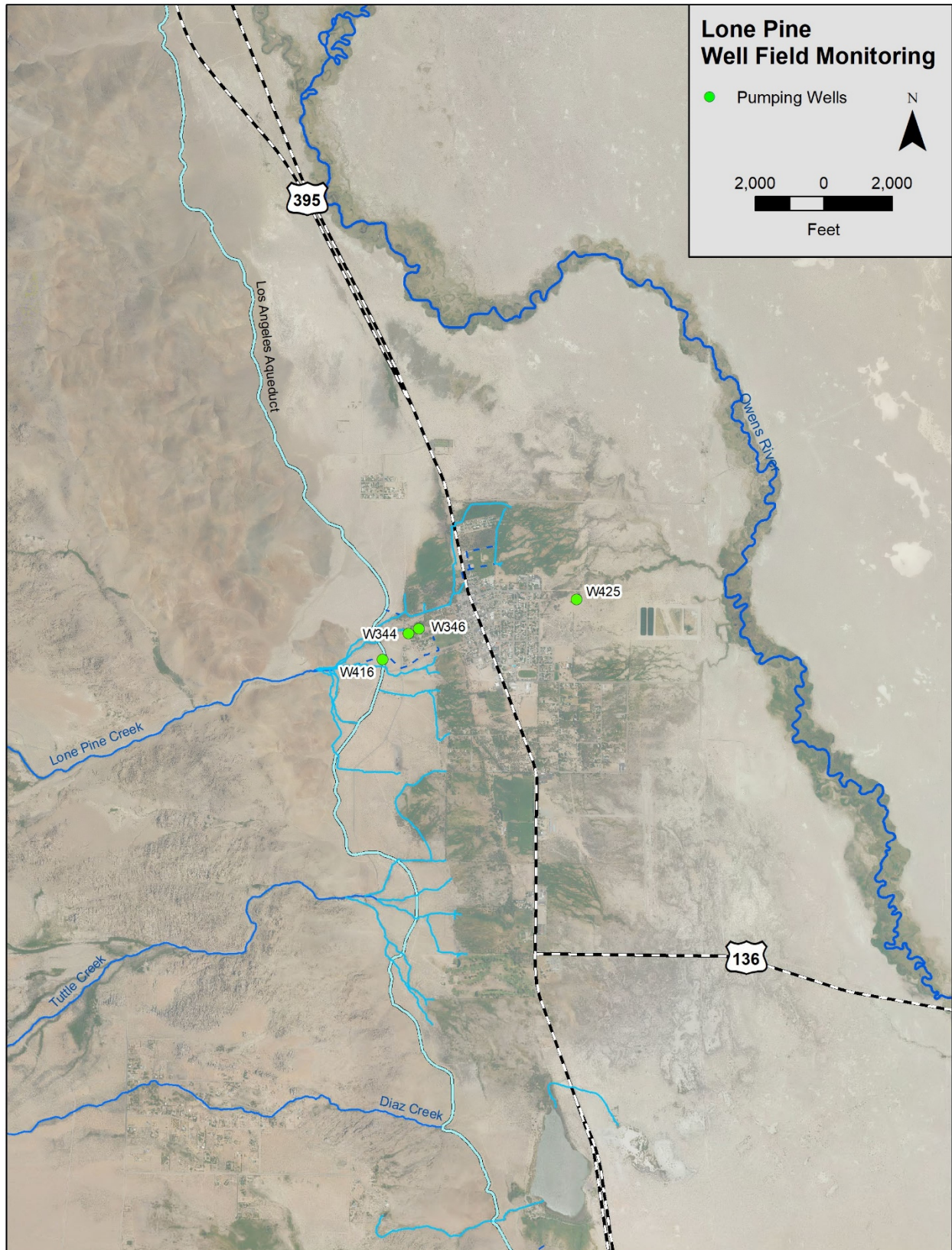


Figure 1.10. Lone Pine Wellfield

1.3. Owens Valley Uses (Including Enhancement/Mitigation Projects)

Table 1.7 shows the historic (1981-82) uses and the planned monthly uses on Los Angeles City owned lands within the Owens Valley for 2020-21. The in valley uses shown on Table 1.7 consist of irrigation, stockwater, recreation and wildlife projects, E/M projects supply, Lower Owens River Project (LORP) usage, and 1600 Acre-feet Projects. As shown in Table 1.7 and Figure 1.11, LADWP plans to provide approximately 93,780 acre-feet for in valley uses on City-owned lands this runoff year.

Releases to the LORP from the LAA Intake facility began on December 6, 2006. An average flow of over 40 cubic feet per second (cfs) is now maintained throughout the entire 62 mile stretch of the Lower Owens River, south of the Intake structure. When needed, the releases at the Intake are augmented through additional releases at the Independence, Blackrock, Georges, Locust, and Alabama Spill Gates to maintain required flows in the river channel. Table 1.7 shows projected 2020-21 water use by the LORP on a monthly basis, totaling 14,000 acre-feet. Total LORP uses include the Lower Owens River, Owens Delta, Blackrock Waterfowl Management Area, and project associated losses.

The Water Agreement provides that "... enhancement/mitigation projects shall continue to be supplied by enhancement/mitigation wells as necessary." Due to the monitoring sites controlling some of the production wells supplying E/M projects being in OFF status, the amount of water supplied to E/M projects has often exceeded the amount of water provided by E/M project supply wells. In the past, LADWP chose to supply certain E/M projects from surface water sources. Future E/M allotments may be influenced by the availability of E/M wells and operational demands. Table 1.8 shows the planned water supply to E/M projects and the forecast imbalance between the E/M project water use and the E/M project groundwater supply through the end of the 2020-21 runoff year. E/M project water demands during the 2020-21 runoff year are expected to be approximately 2,700 acre-feet greater than E/M groundwater pumping. The cumulative E/M water supply shortfall at the end of the 2020-21 runoff year will be approximately 205,000 acre-feet.

The Technical Group is currently evaluating the water supply issues associated with the E/M projects and will provide its findings to the Inyo/Los Angeles Standing Committee. It is expected that the Standing Committee will be requested to take appropriate action necessary to ensure water supplied to E/M projects is in conformance with the provisions of the Water Agreement.

Table 1.7. Water Uses on City of Los Angeles Owned Lands in Owens Valley – Actual Use in 1981-82 and Planned Use in 2020-21 Runoff Year (acre-feet)

Use	April		May		June		July		August		September		TOTAL Apr-Sep	
	1981	2020	1981	2020	1981	2020	1981	2020	1981	2020	1981	2020	1981	2020
Irrigation	3,980	6,850	7,958	8,755	10,373	10,855	9,476	9,670	8,295	8,110	6,321	5,260	46,403	49,500
Stockwater	1,141	1,115	1,319	1,145	1,244	1,065	1,245	1,065	1,219	1,045	1,319	945	7,487	6,380
E / M	0	1,440	0	1,280	0	1,640	0	1,640	0	1,340	0	930	0	8,270
LORP	0	350	0	1,300	0	3,000	0	2,900	0	2,600	0	2,400	0	12,550
Rec. & Wildlife	379	530	804	810	1,160	820	1,455	750	1,381	930	1,406	610	6,585	4,450
1600 ACFT Proj.	0	80	0	180	0	80	0	74	0	220	0	230	0	864
Total	5,500	10,365	10,081	13,470	12,777	17,460	12,176	16,099	10,895	14,245	9,046	10,375	60,475	82,014

Use	October		November		December		January		February		March		TOTAL Oct-Mar		TOTAL Apr-Mar	
	1981	2020	1981	2020	1981	2020	1982	2021	1982	2021	1982	2021	81-82	19-20	81-82	2020
Irrigation	263	100	0	0	0	0	0	0	0	0	14	0	277	100	46,680	49,600
Stockwater	1,065	860	1,045	1,000	1,050	860	1,007	825	1,010	685	1,098	740	6,275	4,970	13,762	11,350
E / M	0	490	0	300	0	260	0	290	0	20	0	70	0	1,430	0	9,700
LORP	0	900	0	240	0	200	0	20	0	20	0	70	0	1,450	0	14,000
Rec. & Wildlife	781	1,010	713	640	565	600	478	300	342	200	447	330	3,326	3,080	9,911	7,530
1600 ACFT Proj.	0	190	0	77	0	76	0	142	0	146	0	105	0	736	0	1,600
Total	2,109	3,550	1,758	2,257	1,615	1,996	1,485	1,577	1,352	1,071	1,559	1,315	9,878	11,766	70,353	93,780

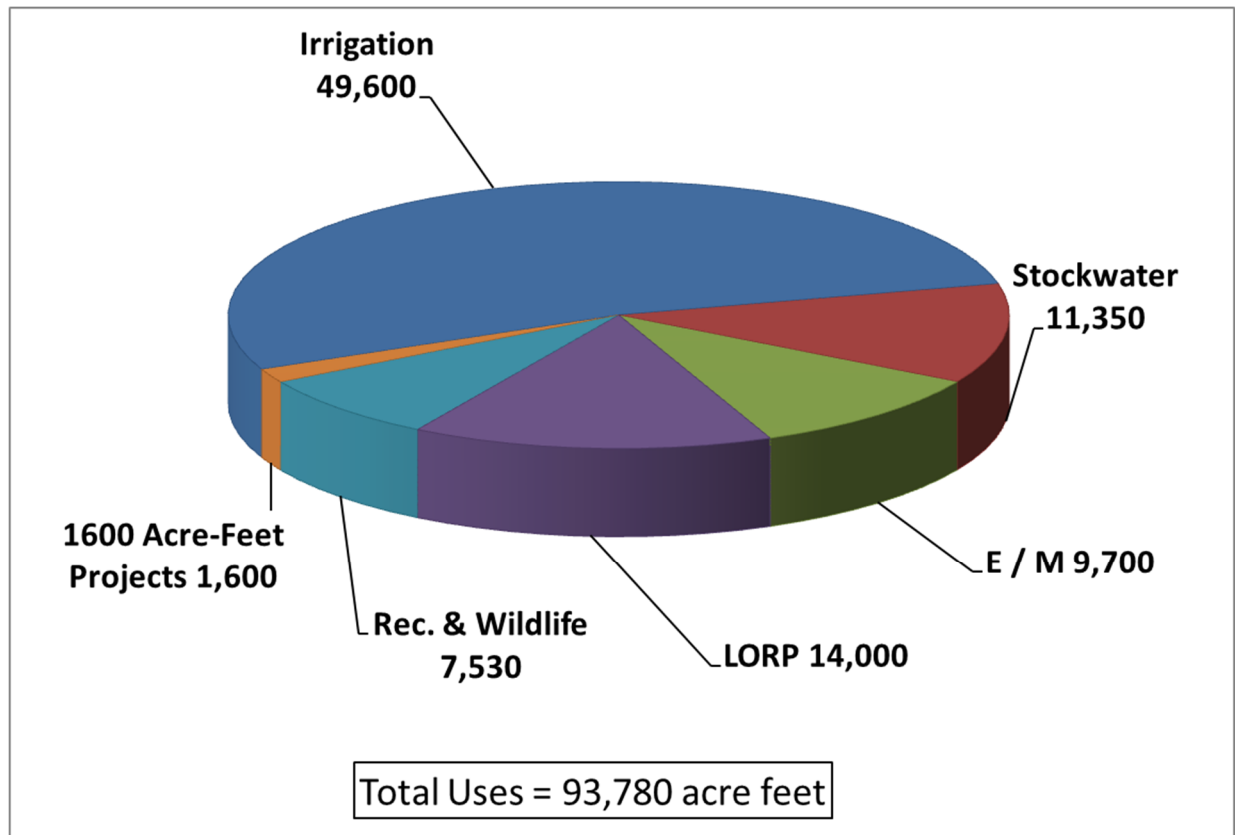


Figure 1.11. Distribution of Planned Owens Valley Water Use on City Owned Lands for 2020-21 Runoff Year

**Table 1.8. Owens Valley Groundwater Pumping and E/M Water Use
(1992-93 through 2020-21 Runoff Year (acre-feet))**

Runoff Year	Owens Valley Runoff (1)	Total Pumping	Non-E/M Pumping	E/M Pumping	E/M Water Uses	E/M Pumping & Use Imbalance	Cumulative E/M Pumping & Use Imbalance
1992-93	62%	84,453	70,688	13,765	18,357	-4,592	-9,319
1993-94	108%	76,329	67,338	8,991	19,310	-10,319	-19,638
1994-95	68%	89,219	78,209	11,010	20,812	-9,802	-29,440
1995-96	156%	69,752	57,180	12,572	22,943	-10,342	-39,782
1996-97	137%	74,904	57,981	16,923	23,949	-7,026	-46,808
1997-98	126%	66,914	52,760	14,154	21,608	-7,346	-54,154
1998-99	151%	51,574	47,353	4,221	19,672	(3)	-54,154
1999-00	90%	63,675	59,342	4,333	24,452	-20,117	-74,271
2000-01	85%	67,795	61,456	6,339	20,782	-14,272	-88,543
2001-02	84%	73,349	70,055	3,294	21,815	-18,521	-107,064
2002-03	68%	81,979	76,059	5,920	21,394	-15,474	-122,538
2003-04	83%	87,732	80,734	6,998	21,116	-14,118	-136,656
2004-05	78%	85,820	78,110	7,710	18,918	-10,617	-147,273
2005-06	138%	56,766	51,695	5,071	20,032	-14,285	-161,558
2006-07	148%	58,621	53,925	4,696	17,357	(3)	-161,558
2007-08	61%	60,338	53,413	6,925	11,565	-4,640	-166,198
2008-09	75%	68,971	61,053	7,918	10,646	-2,728	-168,926
2009-10	79%	64,138	57,946	6,192	10,697	-4,505	-173,431
2010-11	104%	78,248	71,233	7,015	10,407	-3,392	-176,823
2011-12	142%	91,699	84,365	7,334	11,462	-4,128	-180,951
2012-13	58%	88,689	83,034	5,655	9,257	-3,602	-184,553
2013-14	55%	78,809	73,678	5,131	8,222	-3,091	-187,644
2014-15	53%	66,625	60,735	5,890	9,510	-3,620	-191,264
2015-16	48%	70,344	65,220	5,124	8,413	-3,289	-194,553
2016-17	82%	76,000	70,730	5,270	11,500	-6,230	-197,494
2017-18	202%	47,511	44,571	2,940	11,525	(3)	-197,494
2018-19	97%	84,774	77,824	6,950	11,545	-4,595	-202,089
2019-20	154%	53,199	49,578	3,621	11,062	(3)	-202,089
2020-21	74%	(2)		7,000	9,700	-2,700	-204,789

(1) Based on 1966-2015 average. Includes some runoff contribution to the Laws Wellfield from the White Mountains.

(2) Planned pumping range is 75,000-93,000 acre-feet

(3) surface water was available

1.4. Aqueduct Operations

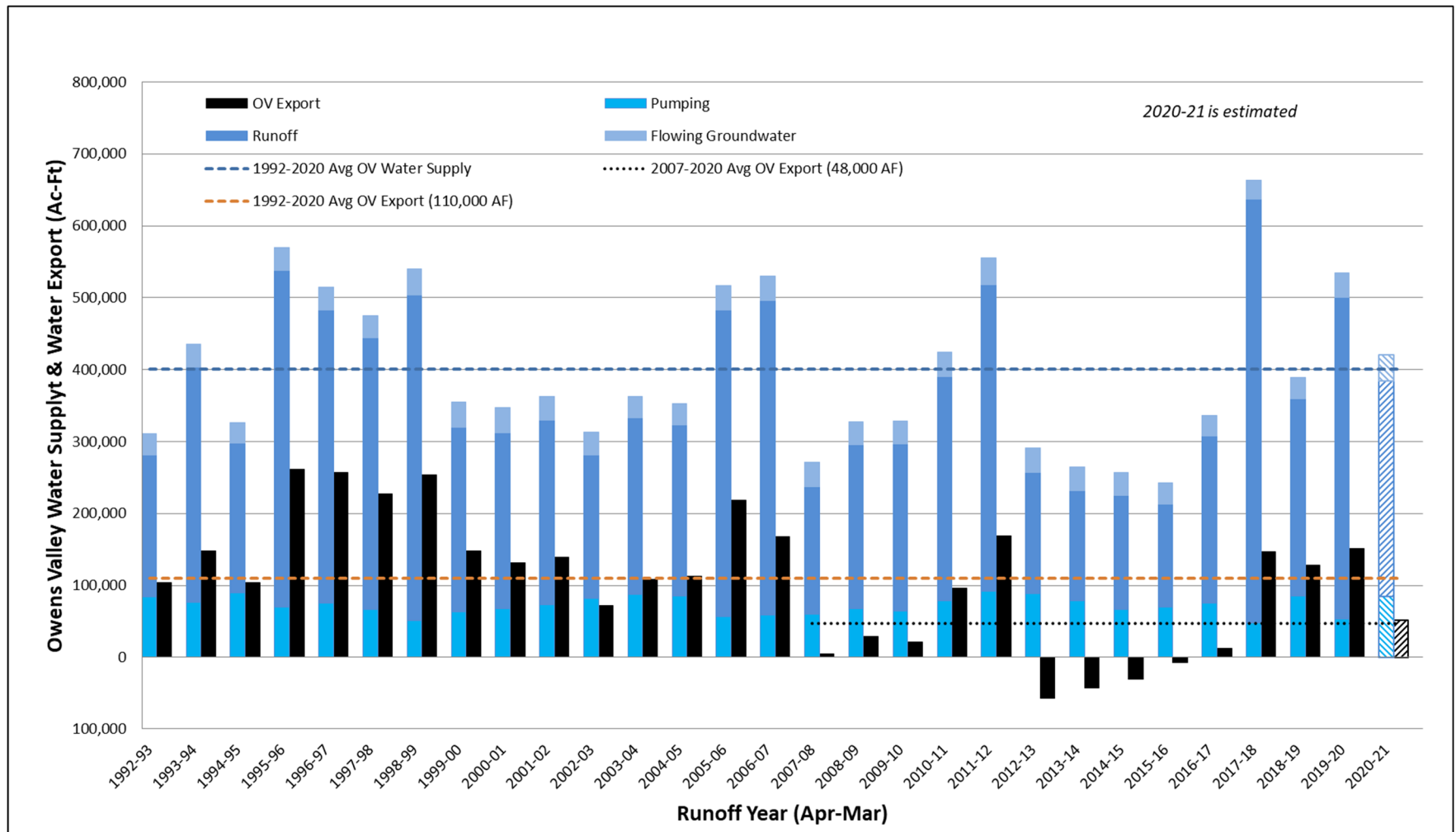
Table 1.9 shows planned LAA reservoir storage levels and monthly deliveries to Los Angeles. Based on this plan, approximately 188,400 feet will be exported from Eastern Sierra to the City during the 2020-21 runoff year. Of this amount, approximately 51,400 acre-feet will come from the Owens Valley water supply. Figure 1.12 shows historical Owens Valley water supply (made up of flowing groundwater, runoff, and pumping) alongside the amount of this water exported to Los Angeles.

Prior to the building of the second Los Angeles Aqueduct in 1971, 38% of Owens Valley Water Supply was exported to Los Angeles on an annual basis. The Inyo/LA Water Agreement EIR projected 44% of Owens Valley Water Supply being exported to Los Angeles annually. However, since implementation of the Inyo/LA Water Agreement 27% of the Owens Valley water supply has been exported to Los Angeles.

In the 2019-20 runoff year, 152,000 acre-feet was exported from the Owens Valley water supply to Los Angeles, which amounted to 29% of the overall Owens Valley water supply, with the rest of the water being used locally in the Owens Valley. For runoff year 2020-21, the planned 51,400 acre-feet of export of Owens Valley water amounts to 12% of the total Owens Valley water supply.

Table 1.9. Planned Los Angeles Aqueduct Operations for 2020-21 Runoff Year

Month	Owens Valley-Bouquet Reservoir Storage 1 st of month Storage (acre-feet)	Exports from Eastern Sierra (acre-feet)
April, 2020	187,000	8,000
May	192,000	24,600
June	178,000	23,200
July	163,000	24,000
August	148,000	23,000
September	126,000	17,900
October	108,000	7,700
November	108,000	12,000
December	117,000	15,400
January, 2020	127,000	15,400
February	136,000	11,100
March	144,000	6,100
TOTAL	-43,000	188,400



Note: The blue bar made up of Runoff, Flowing Groundwater, and Pumping is the Owens Valley water supply.

The black bar is the amount of the Owens Valley water supply exported to Los Angeles.

The black bar is below 0 between the 2012-13 runoff years and the 2015-16 runoff years because the Owens Valley uses exceeded the supply and imported water was used to meet the water demands.

Figure 1.12 Owens Valley Supply and Export

1.5. Water Exports to Los Angeles

Figure 1.13 provides a record of water exports from the Eastern Sierra to Los Angeles since 1970. Figure 1.14 shows the LAA contribution to the City water supply relative to other sources and the total annual water supplied to Los Angeles since 1970. LADWP estimates that Los Angeles will require about 494,500 feet of water during the 2020-21 runoff year. It is anticipated that water from the Owens Valley will make up about 11% of the 2020-21 supply for Los Angeles, while the entire Eastern Sierra will make up about 37% of the 2020-21 supply. Water purchases from the Metropolitan Water District of Southern California will provide about 46% of the City's supply, groundwater from Los Angeles area aquifers will provide about 15%, and recycled water will supply about 2% of the City's water needs.

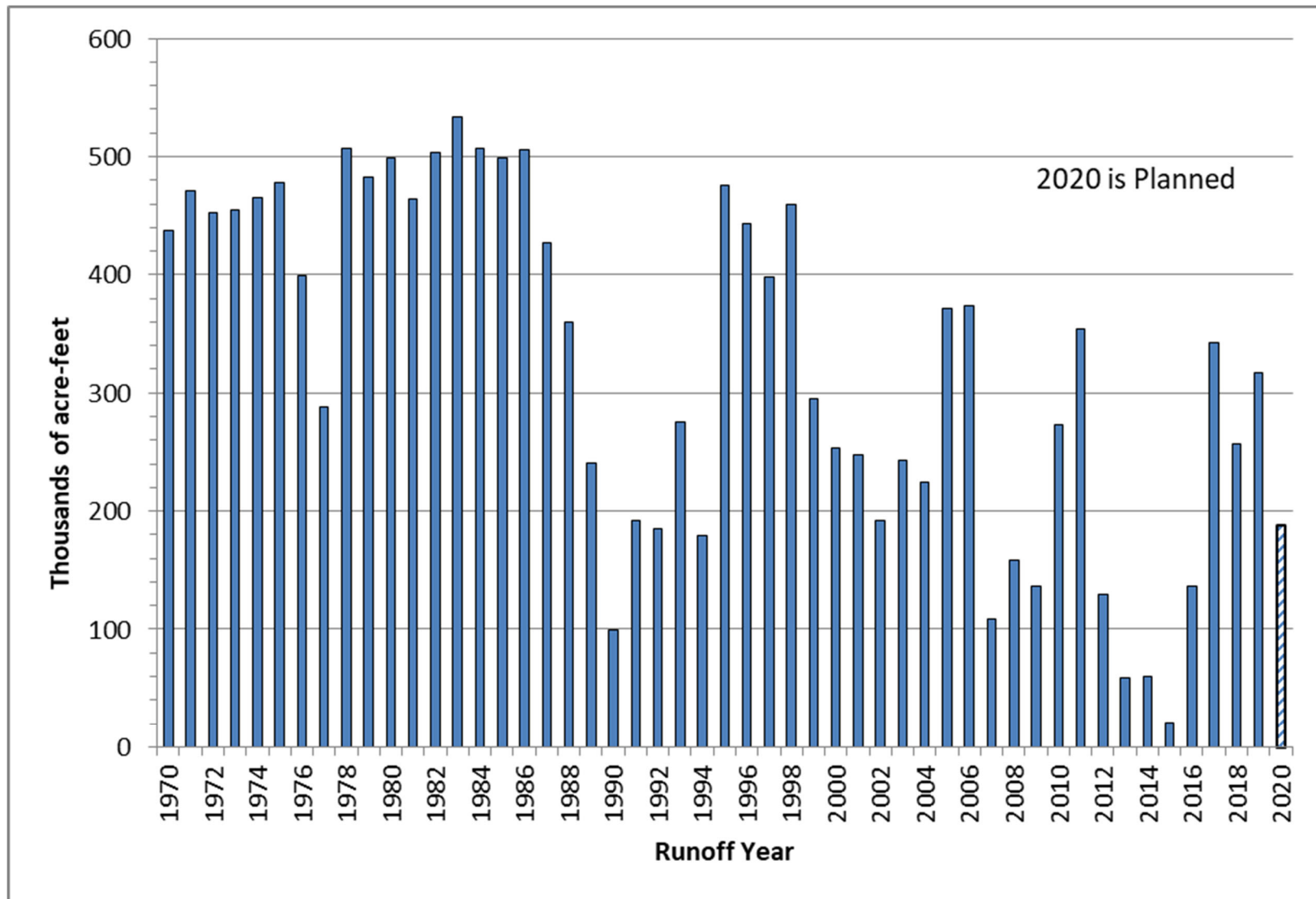


Figure 1.13. Water Export from Eastern Sierra to Los Angeles

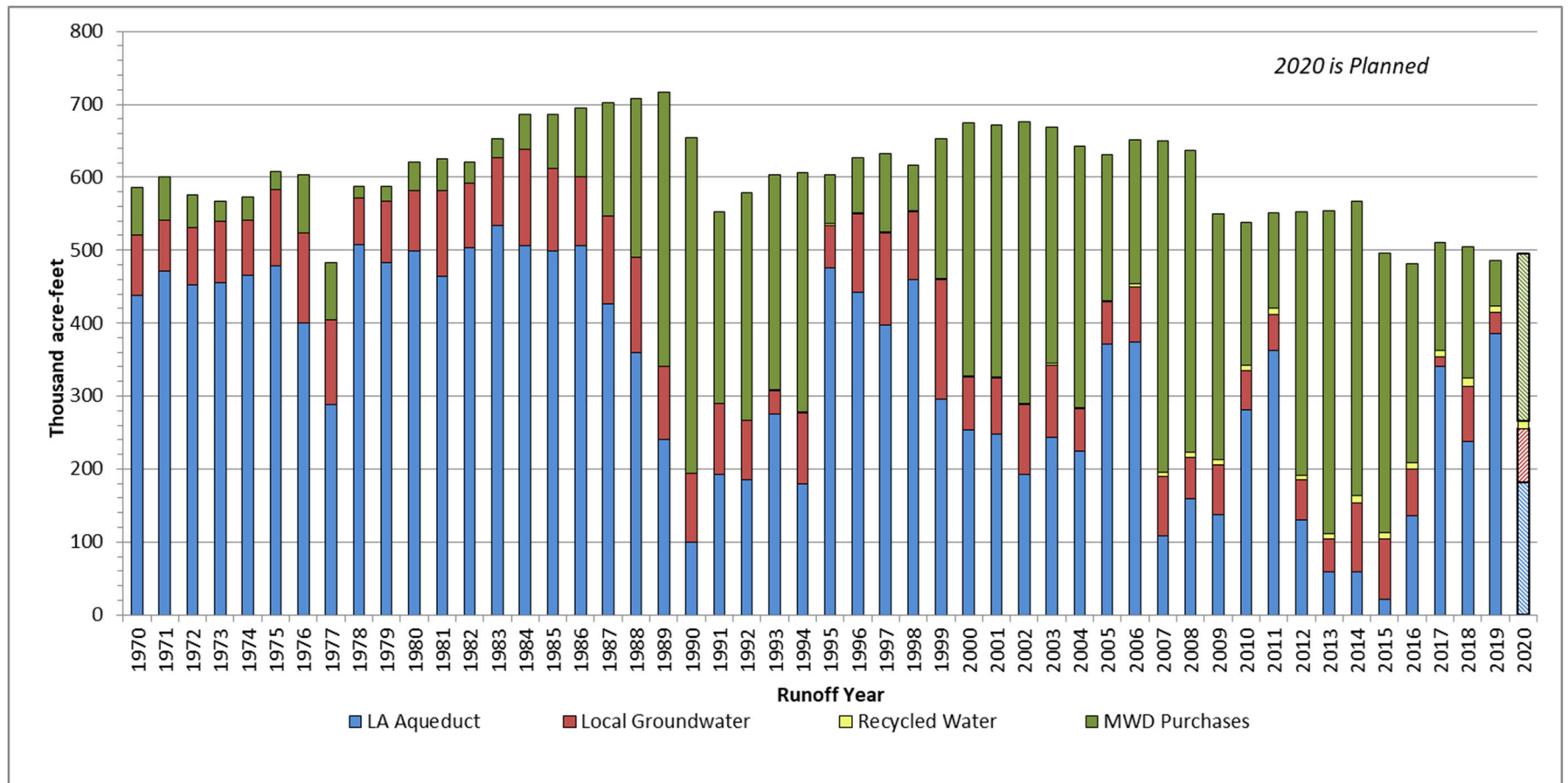


Figure 1.14. Sources of Water for the City of Los Angeles