2. OWENS VALLEY OPERATIONS PLAN FOR RUNOFF YEAR 2009-10

2. ANNUAL OWENS VALLEY OPERATIONS PLAN FOR RUNOFF YEAR 2009-10

This year's pumping program is consistent with the management strategy of the Water Agreement between the County of Inyo and the City of Los Angeles 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.*"

This year will be the third year that Owens Valley operations will be under the provisions of the IMP as well as the Water Agreement. The IMP, an agreement between Inyo County and LADWP, is a more conservative pumping management approach than pumping under the provisions of the Water Agreement alone. The IMP provides a simple methodology for preparing the Owens Valley annual pumping programs for runoff years 2007-08, 2008-09, and 2009-10. Pumping in the Owens Valley will be managed with the goal of maintaining or raising average groundwater levels in each well field as compared to the average measured water levels in early April 2007, subject to well field specific criteria described in Section 8.b of the IMP.

2.1 Owens Valley Runoff Forecast

The April 1, 2009 LADWP forecast runoff for the Owens Valley is based on the actual survey of snow gauging stations located along the Eastern Sierra Mountain front. The long-term average Owens Valley runoff is 415,725 acre-feet, based on 1956-2005 actual data. For the period of April 1, 2009 through March 31, 2010, the forecast Owens Valley runoff is 294,100 acre-feet, or 71% of long-term average (Table 1). This includes runoff from streams in Long Valley, Round Valley, and the Owens Valley. Figure 1 shows Owens Valley runoff since the 1971 runoff year.

Table 1. Owens Valley Runoff Forecast for 2009-10 Runoff Year

2009 RUNOFF FORECAST
April 1, 2009

APRIL THROUGH SEPTEMBER RUNOFF

	MOST PROBABLE VALUE (Acre-feet)	MOST PROBABLE VALUE (% of Avg.)	REASONABLE MAXIMUM (% of Avg.)	REASONABLE MINIMUM (% of Avg.)	LONG-TERM MEAN (1956 - 2005) (Acre-feet)
MONO BASIN:	**91,300**	**88%**	100%	76%	103,890
OWENS VALLEY:	**206,900**	**68%**	81%	55%	304,059

APRIL THROUGH MARCH RUNOFF

	MOST PROBABLE VALUE (Acre-feet)	MOST PROBABLE VALUE (% of Avg.)	REASONABLE MAXIMUM (% of Avg.)	REASONABLE MINIMUM (% of Avg.)	LONG-TERM MEAN (1956 - 2005) (Acre-feet)
MONO BASIN:	**107,900**	**88%**	101%	75%	122,383
OWENS VALLEY:	**294,100**	**71%**	84%	59%	415,725

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.

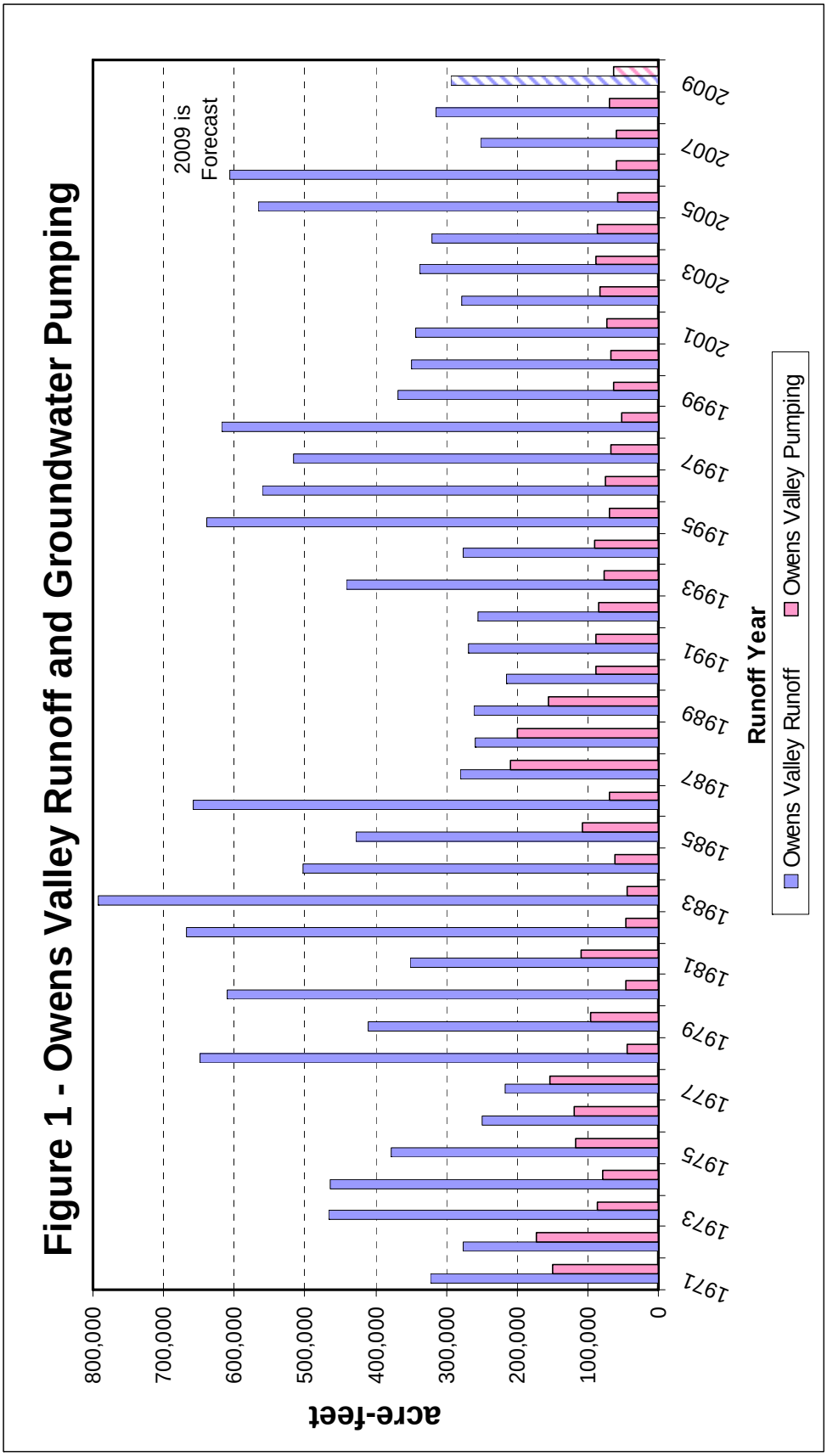


Figure 1 - Owens Valley Runoff and Groundwater Pumping
2009 is Forecast
acre-feet
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
Runoff Year
Owens Valley Runoff
Owens Valley Pumping

2.2 Owens Valley Groundwater Production

LADWP has prepared its 2009-10 Annual Owens Valley Operations Plan based on the goals and principles of the Water Agreement and in compliance with the provisions of IMP. The 2009-10 Annual Operations Plan focuses on meeting in-valley uses and strives to maintain average well field groundwater levels commensurate with those measured in April 2007.

The amount of groundwater pumping allowed under the Water Agreement from each well field in the Owens Valley is determined based on the ON/OFF status of monitoring sites located throughout the Owens Valley (Section V of Water Agreement). Table 2 lists the ON/OFF status of all monitoring sites in the Owens Valley as of April 2009. According to the ON/OFF provisions, Table 3 shows that as of April 2009, approximately 135,000 acre-feet of water is available for groundwater pumping from Owens Valley well fields. The 135,000 acre-feet of water is available for pumping from wells linked to monitoring sites with ON status and from exempt wells. Wells are considered to be exempt when their pumping has no impact on groundwater dependent vegetation or when they are used to supply town water systems, fish hatcheries, and specific Enhancement/Mitigation projects. Table 3 lists a breakdown of available pumping capacity and planned annual groundwater pumping by wellfield. Figure 2 shows comparison between the amount of groundwater pumping allowed under the provisions of Water Agreement and the actual groundwater pumping from the Owens Valley for each runoff year since 1992.

As shown in Table 3, LADWP's planned pumping in Owens Valley for 2009-10 runoff year is limited to 63,450 acre-feet under the provisions IMP. This is approximately 47% of the pumping allowed under the ON/OFF provisions of the Water Agreement. Figure 1 also shows actual groundwater pumping from wellfields in Owens Valley from the 1971 runoff year to the planned pumping for the 2009-10 runoff year.

Consistent with the goals of the Water Agreement, pumping in all areas is within the allowable limits dictated by ON/OFF status and the groundwater mining provisions of the Green Book. Table 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 2009-10 runoff year.

As stated earlier, ICWD and LADWP entered into the IMP agreement for managing groundwater in Owens Valley during 2007-08 through 2009-10 runoff years. Groundwater pumping in the Owens Valley will be managed with the goal of maintaining or raising average groundwater levels in each wellfield compared to the average measured groundwater levels in early April 2007. A number of representative monitoring wells in each wellfield are utilized to calculate the average groundwater levels in corresponding wellfields. Table 5 lists the agreed-upon monitoring wells in each wellfield utilized for calculating average wellfield groundwater levels, measured groundwater levels in April 2007, 2008, and 2009 as well as forecast water levels for April 2010 based on: 1) the measured April 2009 water levels; 2) the 2009-10 Owens Valley runoff; and 3) the proposed wellfield pumping volumes. Measured April 2009 water levels for Owens Valley remained generally stable despite very low runoff

conditions and pumping of the exempt wells presented in Exhibit B of the IMP (Table 6). Similarly, for April 2010, water levels are expected to remain relatively stable despite below normal runoff conditions being forecast.

Table 7 details planned pumping for the 2009-10 runoff year on a month-to-month basis for each wellfield. Pumping for town water systems, fish hatcheries, and enhancement/mitigation (E/M) projects are included in that distribution. While this table provides the planned pumping amounts from each wellfield on a monthly basis, the actual pumping may differ depending on the equipment conditions.

Planned pumping may be increased to provide freeze protection for the Los Angeles Aqueduct during winter months.

The planned monthly distribution of groundwater pumping from each wellfield for the 2009-10 runoff year is similar to previous years and is shown in Table 7. The total Owens Valley groundwater pumping for 2009-10 runoff year is consistent with the provisions of the Water Agreement and the IMP. Pumping tests such as the Reinhackle Spring Operational Test in the Bairs-Georges Wellfield, the initial operation of production wells W415 in Big Pine, and W416 in the Lone Pine Wellfield, if agreed to by ICWD and LADWP, will be in addition to the above planned pumping total.

The following is a discussion of the planned pumping program by wellfield. Figures 3, 4, and 6 through 10 locate LADWP's Owens Valley pumping wells by wellfield. These figures show the location of production wells, monitoring wells, and vegetation monitoring sites in each area.

Table 2 - Soil / Vegetation Water Balance Calculations for April 2009 According to Section III of Green Book

Site	Oct 2008 Soil AWC (cm)	50% Annual Precip. (cm)	Proj. soil AWC (cm)	Oct. 2008 Veg. Water Req./ Water Req. for Well Turn-On (cm)	Oct 2008 Status	April 2009 soil AWC (cm)	April 2009 Status	Soil AWC Req. for Well Turn On (cm)
L1	13.9	7.9	21.8	18.0 / NA	ON	14.0	ON	NA
L2	37.5	7.9	45.4	11.0 / NA	ON	37.1	ON	NA
L3	9.0	7.9	16.9	18.5 / NA	OFF	16.6	OFF	18.5, OFF 10-08
BP1	11.5	NA	11.5	14.4 / 22.9H	OFF	12.0	OFF	22.9H, OFF 10-97
BP2	2.3	NA	2.3	26.0 / 28.4	OFF	5.5	OFF	28.4, OFF 7-98
BP3	21.5	7.6	29.1	11.9 / NA	ON	21.9	ON	NA
BP4	57.0	8.2	65.2	8.4 / NA	ON	60.2	ON	NA
TA3	5.1	NA	5.1	35.7 / 25.9	OFF	7.5	OFF	25.9, OFF 7-98
TA4	15.2	NA	15.2	18.3 / 23.2	OFF	19.7	OFF	23.2, OFF 10-98
TA5	20.6	8.2	28.8	6.3 / NA	ON	23.9	ON	NA
TA6	9.0	NA	9.0	23.3 / 26.8H	OFF	12.3	OFF	26.8H, OFF 7-96
TS1	2.0	NA	2.0	2.5 / 20.4H	OFF	3.6	OFF	20.4H, OFF 10-96
TS2	6.7	NA	6.7	15.9 / 19.5	OFF	9.6	OFF	19.5, OFF 7-98
TS3	27.3	7.3	34.6	14.6 / NA	ON	41.2	ON	NA
TS4	26.3	NA	26.3	53.4 / 47.9	OFF	40.6	OFF	47.9, OFF 10-03
IO1	20.6	NA	20.6	83.4 / 42.2	OFF	26.5	OFF	42.2, OFF 10-98
IO2	3.7	NA	3.7	12.6 / 14.8	OFF	4.0	OFF	14.8, OFF 7-05
SS1	25.9	NA	25.9	35.2 / 9.3	OFF	37.0	OFF	39.3, OFF 7-05
SS2	3.0	NA	3.0	17.6 / 13.4	OFF	4.5	OFF	13.4, OFF 7-03
SS3	22.6	NA	22.6	39.4 / 37.7	OFF	35.2	OFF	37.7, OFF 10-03
SS4	4.5	NA	4.5	15.6 / 15.9	OFF	3.7	OFF	15.9, OFF 7-05
BG2	28.6	6.5	35.1	18.0 / NA	ON	31.9	ON	NA

H - These values of soil water required for well turn-on were derived using calculations based on percent cover that were routinely performed in the past. The values have not been updated to conform to the Greenbook equations in section III.D.2, p. 57-59.

Table 3 - Available Pumping Capacity According to Monitoring Sites with ON Status and Planned Pumping for Runoff Year 2009-10

Wellfield	Monitoring Site	Associated Production Wells	Available Capacity (AF)	Planned Pumping (AF)
Laws	L1	247, 248, 249, 398	12,670	
	L2	236**, 239, 243, 244	10,492	
	L5*	245, 387, 388	9,412	
	Exempt	236**, 354, 365, 413	3,337	
	Wellfield Pumpage		**35,911**	**7,900**
Bishop	All wells	140, 371, 406, 407, 408, 410, 411, 412	12,000	
	Wellfield Pumpage		**12,000**	**11,000**
Big Pine	BP3	222, 223, 231, 232	4,851	
	BP4	331	7,530	
	Exempt	218, 219, 330, 332, 341, 352, 415	25,486	
	Wellfield Pumpage		**37,867**	**21,000**
Taboose Aberdeen	TA5	349	10,570	
	Exempt	118, 349	1,810	
	Wellfield Pumpage		**12,380**	**550**
Thibaut Sawmill	TS3	103, 104, 382EM	2,968	
	Exempt	351, 356	12,800	
	Wellfield Pumpage		**15,768**	**12,800**
Indep. - Oak				
	Exempt	59, 60, 61, 65, 357, 383EM, 384EM, 401	13,973	
	Wellfield Pumpage		**13,973**	**7,400**
Symmes Shepherd	Exempt	402EM	1,350	
	Wellfield Pumpage		**1,350**	**1,200**
Bairs Georges	BG2	76, 343, 348, 403	4,054	
	Exempt	343	500	
	Wellfield Pumpage		**4,054**	**400**
Lone Pine	Exempt	344, 346, 390	1,231	
	Other	416	335	
	Wellfield Pumpage		**1,566**	**1,200**
	Owens Valley Total		**134,869**	**63,450**

* Monitoring site has yet to be located.
** Well W236 is used partially for irrigation water augmentation.

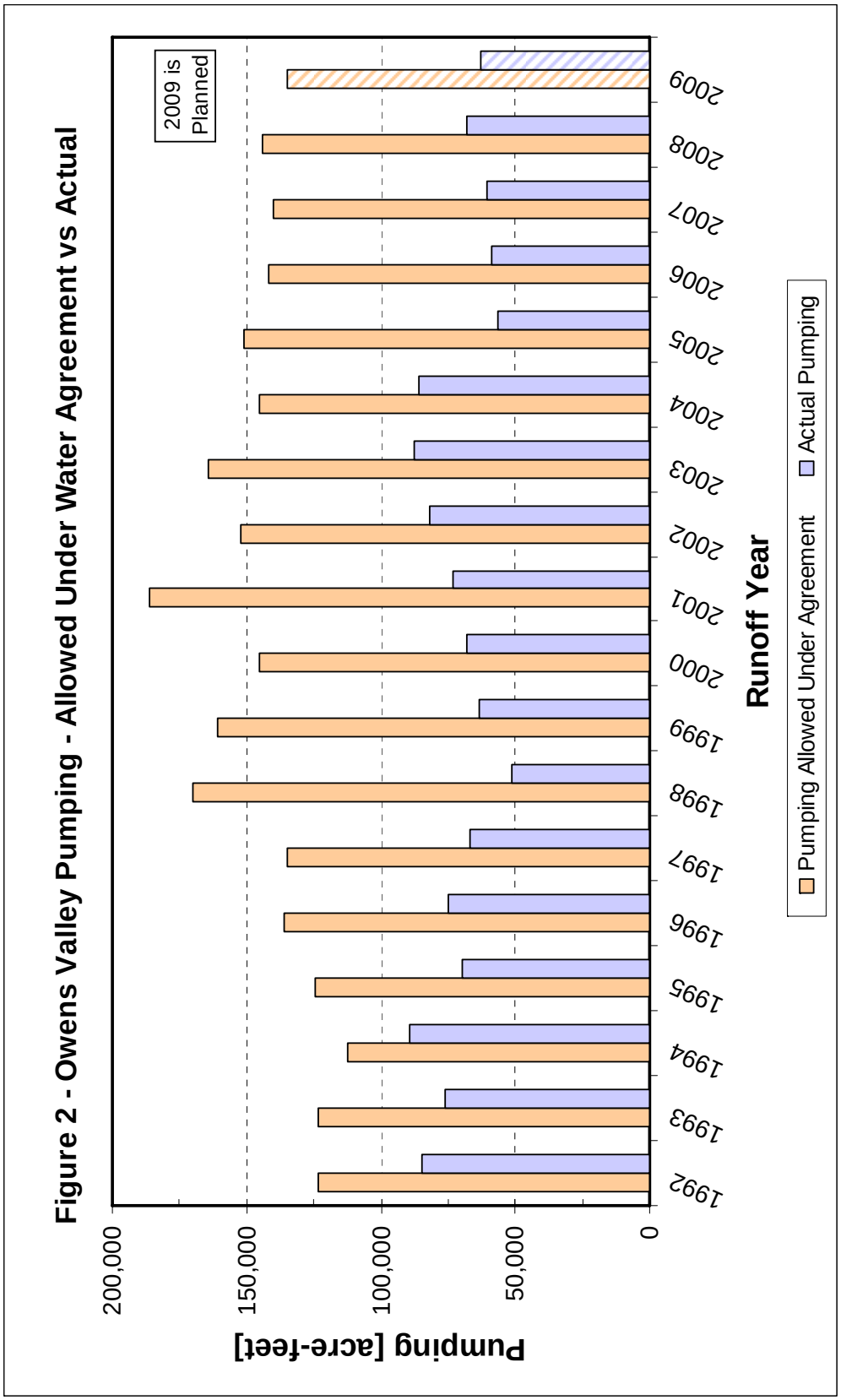


Figure 2 - Owens Valley Pumping - Allowed Under Water Agreement vs Actual
2009 is Planned
Pumping [acre-feet]
200,000
150,000
100,000
50,000
0
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
Runoff Year
Pumping Allowed Under Agreement
Actual Pumping

Table 4 - Summary of Recharge and Pumping for Water Year 1990 - 2008 and Estimated Pumping Limit for Apr-Sep 2009 in acre-feet

Water	OWENS VALLEY	LAWS		BISHOP		BIG PINE		TABOOSE-THIBAUT		IND-SYM-BAIRS		LONE PINE		OWENS VALLEY	
Year	Runoff Percent	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping	Recharge	Pumping
1990	55%	11,580	27,988	34,198	11,432	17,604	29,666	19,777	33,480	23,406	20,124	9,989	1,658	116,554	124,348
1991	59%	11,132	13,691	34,868	11,519	18,729	21,168	21,087	29,136	25,846	10,390	10,408	1,303	122,070	87,207
1992	57%	10,859	8,907	34,688	11,326	18,392	24,345	20,518	23,761	25,195	14,154	10,420	1,626	120,072	84,119
1993	99%	19,778	7,541	44,445	8,404	27,580	22,627	35,068	19,424	40,061	11,689	15,509	1,519	182,441	71,204
1994	60%	12,026	21,206	35,793	10,193	19,430	24,962	21,977	23,557	28,106	14,878	11,554	1,281	128,885	96,077
1995	137%	28,115	7,053	55,397	4,799	38,758	21,970	46,375	17,121	55,103	12,631	22,296	1,037	246,044	64,611
1996	123%	12,588	11,535	50,754	9,153	33,228	24,331	42,097	19,906	51,113	12,382	19,757	1,106	209,537	78,413
1997	125%	15,237	8,349	49,949	9,606	33,474	24,002	42,837	21,774	52,100	9,461	19,962	1,128	213,559	74,320
1998	139%	28,195	470	55,309	7,159	40,065	23,729	46,845	16,496	55,605	7,946	20,341	1,365	246,361	57,165
1999	95%	18,546	1,697	42,388	8,672	28,013	21,832	32,426	16,700	41,090	8,424	15,481	2,141	177,944	59,466
2000	80%	11,102	3,974	39,539	10,804	23,213	20,212	27,567	23,143	37,015	8,497	14,344	1,036	152,780	67,666
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	10,279	12,103	1,345	129,831	78,116
2003	75%	11,454	5,786	38,486	11,407	21,883	25,885	26,166	27,387	32,455	14,281	13,088	1,179	143,532	85,925
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	2,892	54,337	5,667	39,650	20,685	47,757	15,707	53,873	9,944	19,980	1,119	250,935	56,014
2007	64%	10,947	7,840	34,470	10,516	19,757	20,525	25,804	14,578	27,624	10,673	10,454	1,100	129,057	65,232
2008	68%	10,947	7,840	34,470	10,516	19,757	20,525	25,804	14,578	27,624	10,673	10,454	1,100	129,057	65,232
2009 (a)	67%	10,855	130	35,850	2,463	20,432	10,868	28,613	6,587	27,759	1,050	11,584	177	135,094	21,275
(b) TOTAL		311,668	153,927	833,847	183,521	516,190	456,574	626,719	409,703	742,475	230,496	289,792	25,409	3,320,691	1,459,630
Estimated Apr-Sep 2009 Pumping Limit			157,741		650,326		59,616		217,016		511,979		264,383		1,861,061

(a) Estimated Recharge for the 2009 Water Year; Approximate Pumping for First Half of Water year 2009 (Oct-Mar).

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

Table 5 – Measured Depth-to-Water in April of 2007, 2008, and 2009 and Forecast for April 2010 in Selected Monitoring Wells

Wellfield (Planned Pumping)	**Monitoring Well**	**April 2007 Measured DTW (ft)**	**April 2008 Measured DTW (ft)**	**April 2009 Measured DTW (ft)**	**April 2010 Forecasted DTW (ft)**	**April 2010 DTW change from April 2007**
Laws	T436	-5.3	-7.1	-8.8	-10.3	-5.1
	T490	-10.2	-12.6	-13.8	-15.0	-4.8
	T492	-23.1	-26.8	-29.1	-34.3	-11.2
(7,900 AF)	***Average***	***-12.9***	***-15.5***	***-17.2***	***-19.9***	***-7.0***
Big Pine	T425	-14.9	-14.9	-15.2	-16.5	-1.6
	T426	-11.7	-11.9	-12.1	-12.8	-1.0
(21,000 AF)	***Average***	***-13.3***	***-13.4***	***-13.7***	***-14.6***	***-1.3***
Taboose-Aberdeen	T418	-9.1	-8.3	-8.7	-8.3	0.8
	T419	-6.3	-5.1	-6.2	-5.2	1.1
	T421	-33.1	-32.5	-33.4	-33.4	-0.4
	T502	-8.0	-7.5	-8.8	-9.6	-1.6
(550 AF)	***Average***	***-14.1***	***-13.3***	***-14.3***	***-14.1***	***0.0***
Thibaut-Sawmill	T413	-10.4	-11.9	-12.2	-13.4	-3.0
	T415	-19.0	-18.4	-21.7	-21.4	-2.3
(12,800 AF)	***Average***	***-14.7***	***-15.1***	***-17.0***	***-17.4***	***-2.7***
Independence - Oak	T407	-9.9	-9.8	-9.5	-10.0	0.0
	T408	-2.9	-2.8	-2.9	-3.2	-0.4
	T409	-3.3	-3.1	-2.7	-5.2	-2.0
(7,400 AF)	***Average***	***-5.4***	***-5.2***	***-5.0***	***-6.1***	***-0.8***
Symmes-Shepherd	T401	-22.0	-20.6	*	*	*
	T403	-7.0	-6.3	-6.2	-5.9	1.0
	T404	-5.4	-5.4	-5.4	-5.1	0.3
	T447	-35.7	-34.6	-33.8	-33.6	2.1
(1,200 AF)	***Average***	***-16.0***	***-15.4***	***-15.1***	***-14.9***	***1.2***
Bairs-George	T398	-2.7	-3.8	-3.3	-3.7	-1.0
	T400	-4.4	-4.6	-4.9	-4.8	-0.5
(400 AF)	***Average***	***-3.5***	***-4.2***	***-4.1***	***-4.3***	***-0.8***

* Well T401 was abondoned as part of CALTRANS road widening in December 2008

Table 6 – Exempt Wells in Owens Valley

Exhibit B

(revision 7/2007)

List of Exempt Owens Valley Wells for this Agreement

WELL NUMBER	WELL FIELD	REASON
354[1]	Laws	Town Supply
413[2]	Laws	Town Supply and Laws Museum E/M Project Irrigation Well
236	Laws	Irrigation Water (to supplement irrigation water supply from Well 365 when necessary)
247	Laws	Supply McNally Pasture enhancement/mitigation Project
376	Laws	Irrigation Supply for re-vegetation project
377	Laws	Supply Laws/Poleta Pasture enhancement/mitigation Project
399	Laws	Irrigation Supply for re-vegetation project
341[1]	Big Pine	Town Supply
352[2]	Big Pine	Town Supply
415[2 3]	Big Pine	Town Supply
357[1]	Independence-Oak	Town Supply
384[2]	Independence-Oak	Town Supply
344[1]	Lone Pine	Town Supply
346[2]	Lone Pine	Town Supply
330	Big Pine	Fish Spring Hatchery
332	Big Pine	Fish Spring Hatchery
349	Taboose-Aberdeen	Water to supply a pond which is a mitigation project
351	Thibaut-Sawmill	Blackrock Fish Hatchery
356	Thibaut-Sawmill	Blackrock Fish Hatchery
401	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
59	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
60	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
65	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
383E/M	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
384E/M	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
61	Independence-Oak	Water for irrigation in Independence-Oak Wellfield
365	Laws	Water for irrigation in Laws Wellfield
245	Laws	Water for irrigation in Laws Wellfield
387	Laws	Water for irrigation in Laws Wellfield
388	Laws	Water for irrigation in Laws Wellfield
402E/M	Symmes-Shepherd	Water for E/M Project in Symmes-Shepherd Wellfield
390E/M	Lone Pine	Water for E/M Project in Lone Pine Wellfield
343	Bairs-Georges	Irrigation Water in Bairs-Georges Wellfield in Below Average Runoff Years

Note 1: Primary town supply well

Note 2: Backup town supply well

Note 3: Usage for the Big Pine Ditch system to be consistent with evaluation and approval of such use by the Technical Group

Note: This is Exhibit B, "List of Exempt Owens Valley Wells for this Agreement," an attachment to the 3/07 Standing Committee-approved Interim Management Plan (IMP).

Table 7 - Planned Monthly Wellfield Pumping for 2009-10 Runoff Year in acre-feet

Month	Laws	Bishop	Big Pine	Taboose-Aberdeen	Thibaut-Sawmill	Indep.-Oak	Symmes-Shepherd	Bairs-George	Lone Pine	TOTAL
April	1,000	1,500	1,700	15	1,060	1,000	200	0	180	6,655
May	1,200	1,500	1,800	18	1,060	1,050	200	0	180	7,008
June	1,200	1,500	1,800	368	1,080	1,050	200	0	190	7,388
July	1,200	1,500	1,800	18	1,080	1,050	200	150	190	7,188
August	1,200	1,500	1,800	20	1,080	1,050	200	150	190	7,190
September	1,200	1,500	1,800	18	1,080	1,050	200	100	180	7,128
October	200	400	1,800	18	1,060	200	0	0	15	3,693
November	200	300	1,700	15	1,060	200	0	0	15	3,490
December	200	300	1,700	15	1,060	200	0	0	15	3,490
January	100	300	1,700	15	1,060	200	0	0	15	3,390
February	100	300	1,700	15	1,060	200	0	0	15	3,390
March	100	400	1,700	15	1,060	150	0	0	15	3,440
Total	**7,900**	**11,000**	**21,000**	**550**	**12,800**	**7,400**	**1,200**	**400**	**1,200**	**63,450**

Laws Wellfield (Figure 3)

Monitoring sites L1 and L2 are in ON status. Production wells controlled by these monitoring sites have an available production capacity of 32,357 acre-feet. Wells linked to monitoring site L5 have a capacity of 9,412 acre-feet. Green Book designated exempt wells within the Laws Wellfield have a capacity of 3,337 acre-feet. Therefore, the total available pumping capacity in the Laws Wellfield is 35,911 acre-feet.
Well W365 has had a reduction in production capacity. Well W236, associated with monitoring site L2 is sometimes used along with W365 as exempt wells to provide irrigation water. LADWP is evaluating W365 to determine the cause of reduced production capacity.

According to the terms of the IMP, monitoring wells T436, T490, and T492 are used to calculated the average groundwater level in the Laws Wellfield. Even though vegetation monitoring sites L1 and L2 are in ON status, none of the wells associated with these monitoring sites will be pumped in the 2009-10 runoff year because of the depth-to-water criteria of the IMP. The pumping minimum in the Laws Wellfield is 7,900 acre-feet this year to supply the town water system, all E/M projects, and irrigated lands in this wellfield. IMP exempted wells (Table 6) will be utilized to provide water for these uses. Therefore, the required groundwater pumping from the Laws Wellfield is 7,900 acre-feet for the 2009-10 runoff year. With this amount of groundwater pumping and a 71% of normal Owens Valley runoff, the April 2010 average groundwater level in the Laws Wellfield, based on the key monitoring wells is forecast to be 7.0 feet below the April 2007 level as shown in Table 5.

Bishop Wellfield (Figure 4)

Pumping in the Bishop Wellfield is governed by the provisions of the Hillside Decree, and exempt from the management provisions of the IMP. The provisions of the Hillside Decree limit LADWP's annual groundwater extractions (pumping and flowing wells) from the Bishop Cone to the total amount of water used on City-owned lands on the Bishop Cone (including conveyance losses) in each runoff year. Currently, the accounted-for total uses on City-owned land within the Bishop Cone area is approximately 25,000 acre-feet per year. The current total available pumping capacity in the Bishop Wellfield is approximately 12,000 acre-feet. The planned groundwater pumping from the Bishop Wellfield is 11,000 acre-feet for the 2009-10 runoff year.

Figure 5 shows water use on the City-owned land in comparison to the groundwater extractions (flowing and pumping wells) on Bishop Cone for runoff years 1996 to present. The current annual accounted for water use on the City-owned land (approximately 25,000 acre-feet) and the groundwater extraction capacity (approximately 15,000 acre-feet) leaves an additional 10,000 acre-feet of allowed pumping remaining on the Bishop Cone.

The above calculated water use does not include the amount of conveyance losses on Bishop Cone which is a credited use. When an evaluation of conveyance losses within Bishop Cone is completed, it will be included in future Bishop Cone audits.

Figure 3

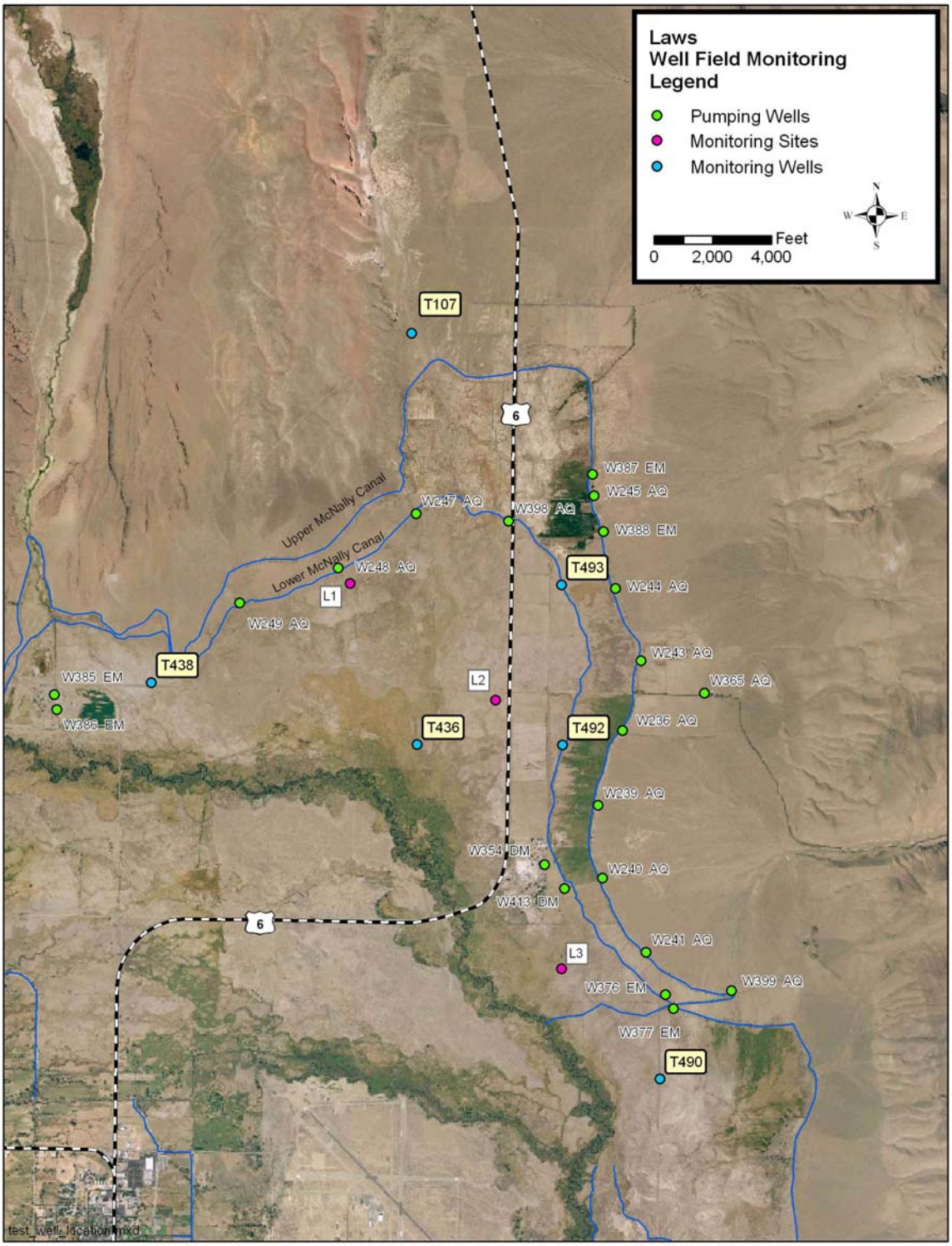
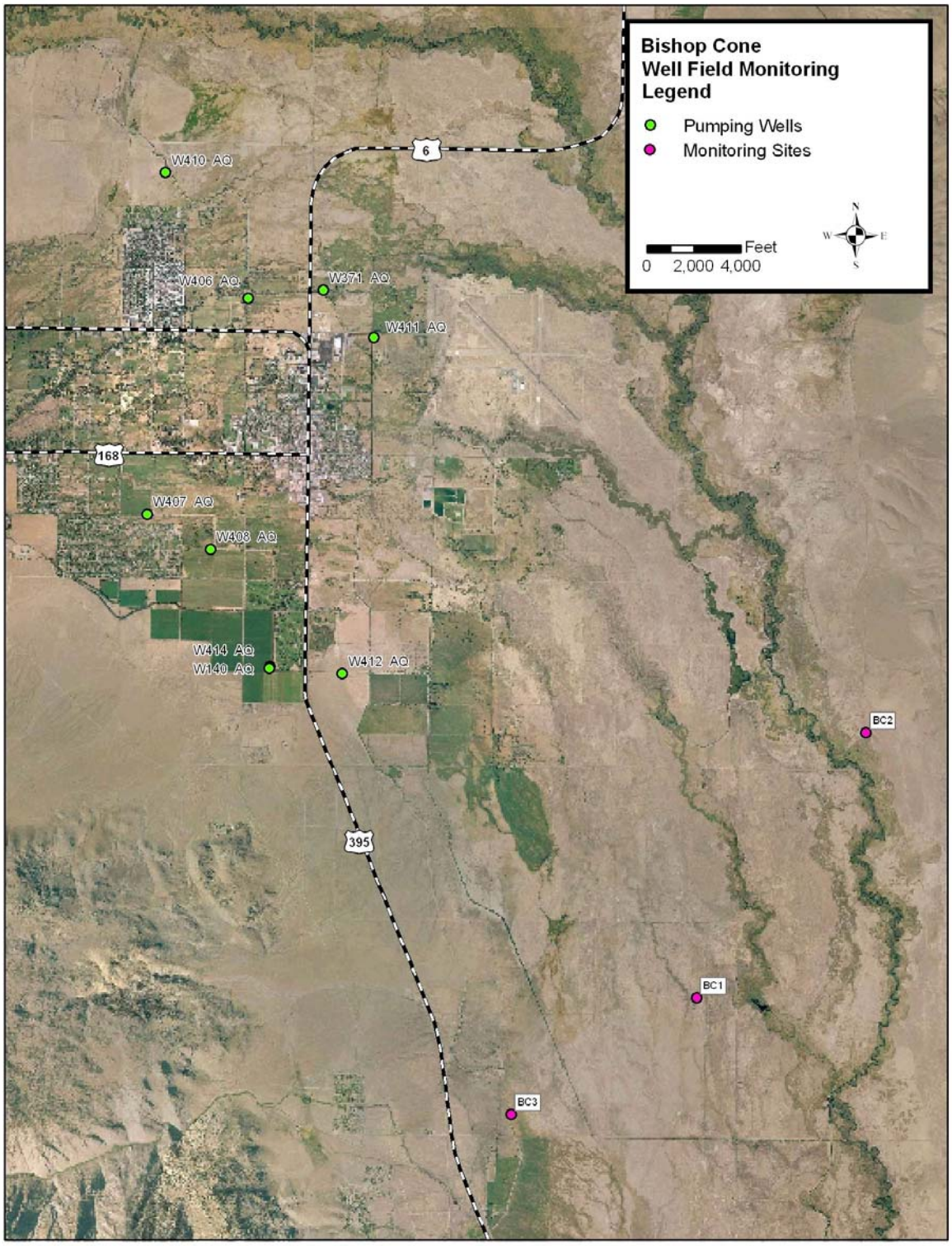
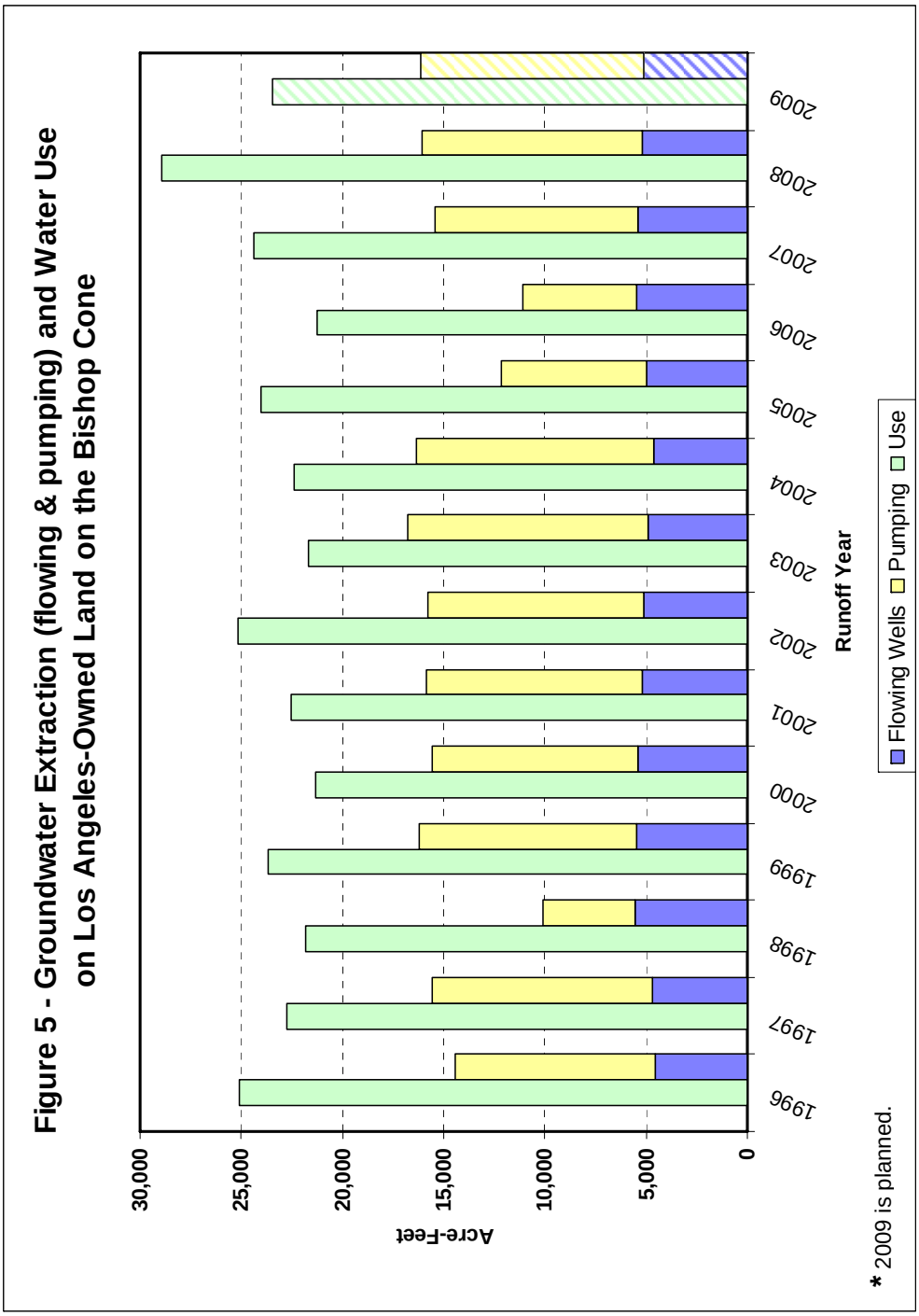

Laws
Well Field Monitoring
Legend
Pumping Wells
Monitoring Sites
Monitoring Wells
Feet
0 2,000 4,000
N
W
E
S
T107
6
W387 EM
W245 AQ
W247 AQ
W398 AQ
W388 EM
Upper McNally Canal
Lower McNally Canal
W248 AQ
L1
T493
W244 AQ
W249 AQ
W243 AQ
T438
W385 EM
W365 AQ
L2
W386 EM
T436
T492
W236 AQ
W239 AQ
W354 DM
W240 AQ
W413 DM
6
W241 AQ
L3
W399 AQ
W376 EM
W377 EM
T490
test_well_location.mxd

Figure 4


Bishop Cone
Well Field Monitoring
Legend
Pumping Wells
Monitoring Sites
Feet
0 2,000 4,000
N
W
E
S
6
168
395
W410 AQ
W406 AQ
W371 AQ
W411 AQ
W407 AQ
W408 AQ
W414 AQ
W140 AQ
W412 AQ
BC2
BC1
BC3



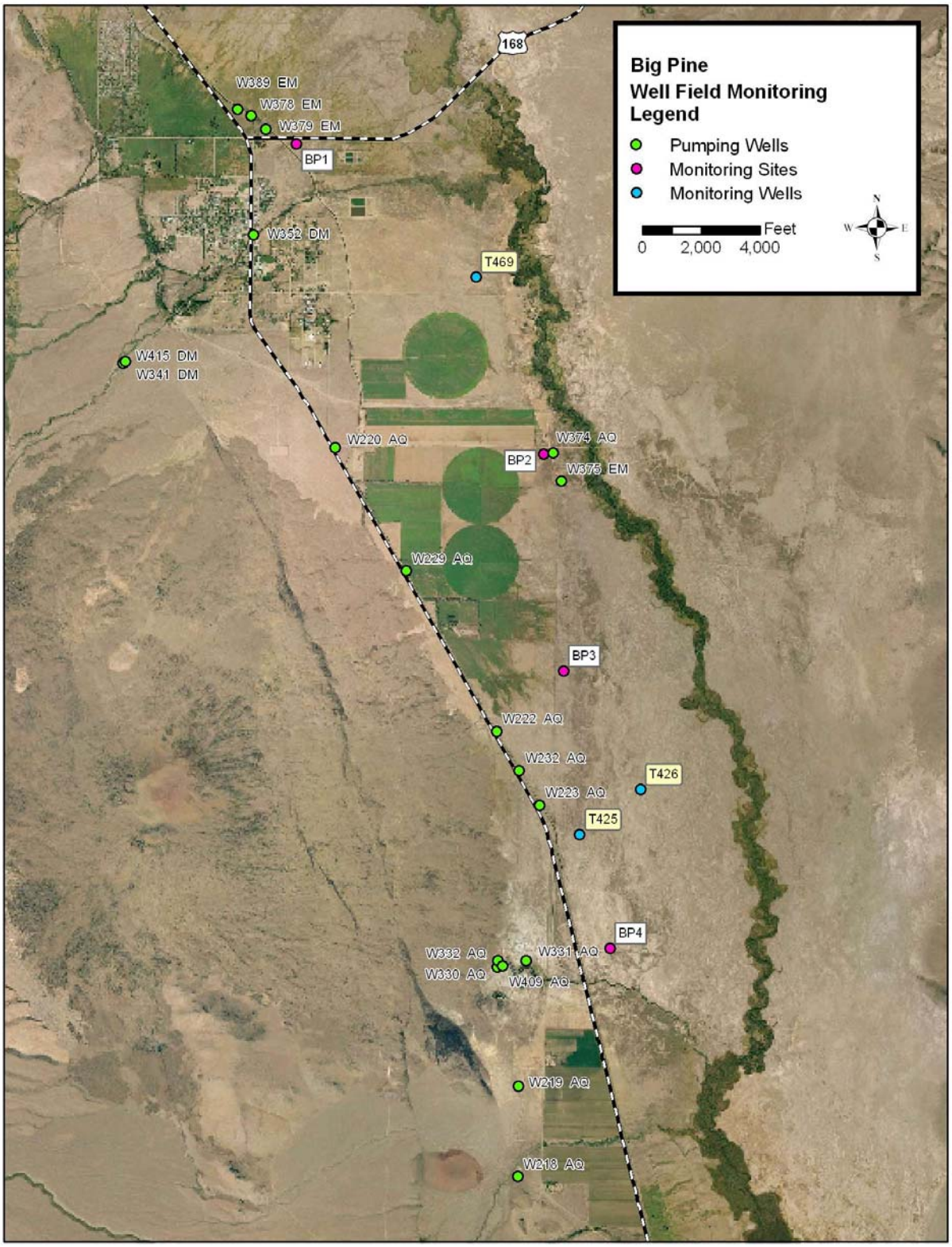
According to the Hillside Decree, total groundwater extraction can not be more than water use on City-owned land on the Bishop Cone.

Big Pine Wellfield (Figure 6)

Monitoring sites BP3 and BP4 are in ON status. Production wells controlled by BP3 have an available production capacity of 4,851 acre-feet. Production well W331, controlled by monitoring site BP4, has a production capacity of 7,530 acre-feet. Green Book designated exempt wells W218, W219, town supply wells, and the Fish Spring Fish Hatchery wells in the Big Pine Wellfield have a combined capacity of 25,486 acre-feet. Therefore, the total available capacity in the Big Pine Wellfield is 37,867 acre-feet.

According to the IMP, monitoring wells T425 and T426 are used to calculate the average groundwater level in Big Pine Wellfield. Even though monitoring sites BP3 and BP4 are in ON status, none of the wells associated with these monitoring sites will be pumped in the 2009-10 runoff year because of the depth-to-water criteria of the IMP. The required pumping from the Big Pine Wellfield includes supplying Fish Spring Fish Hatchery and the town water system on a year-round basis. IMP exempted wells (Table 6) will be utilized to provide water for these uses. The required groundwater pumping from the Big Pine Wellfield is 21,000 acre-feet in the 2009-10 runoff year. With 21,000 acre-feet of pumping and a 71% forecast Owens Valley runoff, the April 2010 average groundwater level in the Big Pine Wellfield based on the key monitoring wells is forecast to be 1.3 feet below April 2007 measured levels as shown in Table 5.

Figure 6


Big Pine
Well Field Monitoring
Legend
Pumping Wells
Monitoring Sites
Monitoring Wells
Feet
0 2,000 4,000
N
W
E
S
168
W389 EM
W378 EM
W379 EM
BP1
W352 DM
T469
W415 DM
W341 DM
W220 AQ
W374 AQ
BP2
W375 EM
W229 AQ
BP3
W222 AQ
W232 AQ
T426
W223 AQ
T425
BP4
W332 AQ
W331 AQ
W330 AQ
W409 AQ
W219 AQ
W218 AQ

Taboose-Aberdeen Wellfield (Figure 7)

Monitoring site TA5 is in ON status. Production well W349 is controlled by this monitoring site and has an available pumping capacity of approximately 10,570 acre-feet. Green Book exempted well W118 in the Taboose-Aberdeen Wellfield has a capacity of 1,810 acre-feet. Therefore, the total available groundwater pumping capacity in the Taboose-Aberdeen Wellfield is 12,380 acre-feet.

According to the IMP, monitoring wells T418, T419, T421, T502 are used to calculate the average groundwater level in the Taboose-Aberdeen Wellfield. Even though monitoring site TA5 is in ON status, production well W349 will not be pumped continuously because of the depth-to-water criteria of the IMP. During the month of June, W349 will pump continuously for approximately 11 days and for the rest of year will be set on a timer to maintain the water level in a pond adjacent to the Owens River. Production well W349 is expected to pump approximately 550 acre-feet during the 2009-10 runoff year. With the 550 acre-feet of pumping from the Taboose-Aberdeen Wellfield and a 71% of normal forecast Owens Valley runoff, the April 2010 average groundwater level in the Taboose-Aberdeen Wellfield, based on the key monitoring wells, is forecast to remain the same as April 2007 measured levels as shown in Table 5.

Thibaut-Sawmill Wellfield (Figure 8)

Monitoring site TS3 is in ON status. Production wells controlled by this monitoring site have an available pumping capacity of 2,968 acre-feet. Green Book exempted wells W351 and W356 supplying Blackrock Fish Hatchery have a capacity of 12,598 acre-feet and 8,110 acre-feet respectively. Typically, 12,800 acre-feet per year is necessary for supplying the Blackrock Fish Hatchery. Therefore, a total pumping capacity of 15,568 acre-feet is available in the Thibaut-Sawmill Wellfield.

According to the IMP, monitoring wells T413 and T415 are used to calculate the average water level in the Thibaut-Sawmill Wellfield. Even though monitoring site TS3 is in ON status, the wells associated with this monitoring site will not be pumped in the 2009-10 runoff year because of the depth-to-water criteria of the IMP. Typically, 12,800 acre-feet per year is necessary for supplying the Blackrock Fish Hatchery. IMP exempted wells (Table 6) will be utilized to provide water for use at the Blackrock Hatchery. The required groundwater pumping from the Thibaut-Sawmill Wellfield is 12,800 acre-feet for the 2009-10 runoff year. With the required pumping of 12,800 acre-feet from the Thibaut-Sawmill Wellfield and a 71% of normal forecast Owens Valley runoff, the average April 2010 groundwater level in the Thibaut-Sawmill Wellfield, based on the key monitoring wells, is forecast to be 2.7 feet below the average measured wellfield groundwater level in April 2007 as shown in Table 5.

Independence-Oak Wellfield (Figure 8)

All vegetation monitoring sites in the Independence-Oak Wellfield remained in OFF status as of April 2009, resulting in no planned pumping from wells linked to these monitoring sites. Total available pumping capacity in the Independence-Oak Wellfield from Green Book designated exempt wells is 13,973 acre-feet. Pumping from this

wellfield will be limited to exempt wells for supplying E/M projects and the town water system.

According to the IMP, monitoring wells T407, T408, and T409 are used to calculate the average groundwater level in the Independence-Oak Wellfield. None of the wells in the Independence-Oak Wellfield will be pumped for Los Angeles Aqueduct (LAA) supply because of the depth-to-water criteria of the IMP. The required pumping in this wellfield is 7,400 acre-feet for supplying the town water system and E/M projects in the wellfield. IMP exempted wells (Table 6) will be utilized to provide water for these uses. The planned groundwater pumping from the Independence-Oak Wellfield is 7,400 acre-feet for the 2009-10 runoff year. With the planned pumping of 7,400 acre-feet from the Independence-Oak Wellfield and a 71% of normal forecast Owens Valley runoff, the average April 2010 groundwater level in the Independence-Oak Wellfield, based on the key monitoring wells, is forecast to be 0.8 feet below to the average measured groundwater level in April 2007 as shown in Table 5.

Figure 7

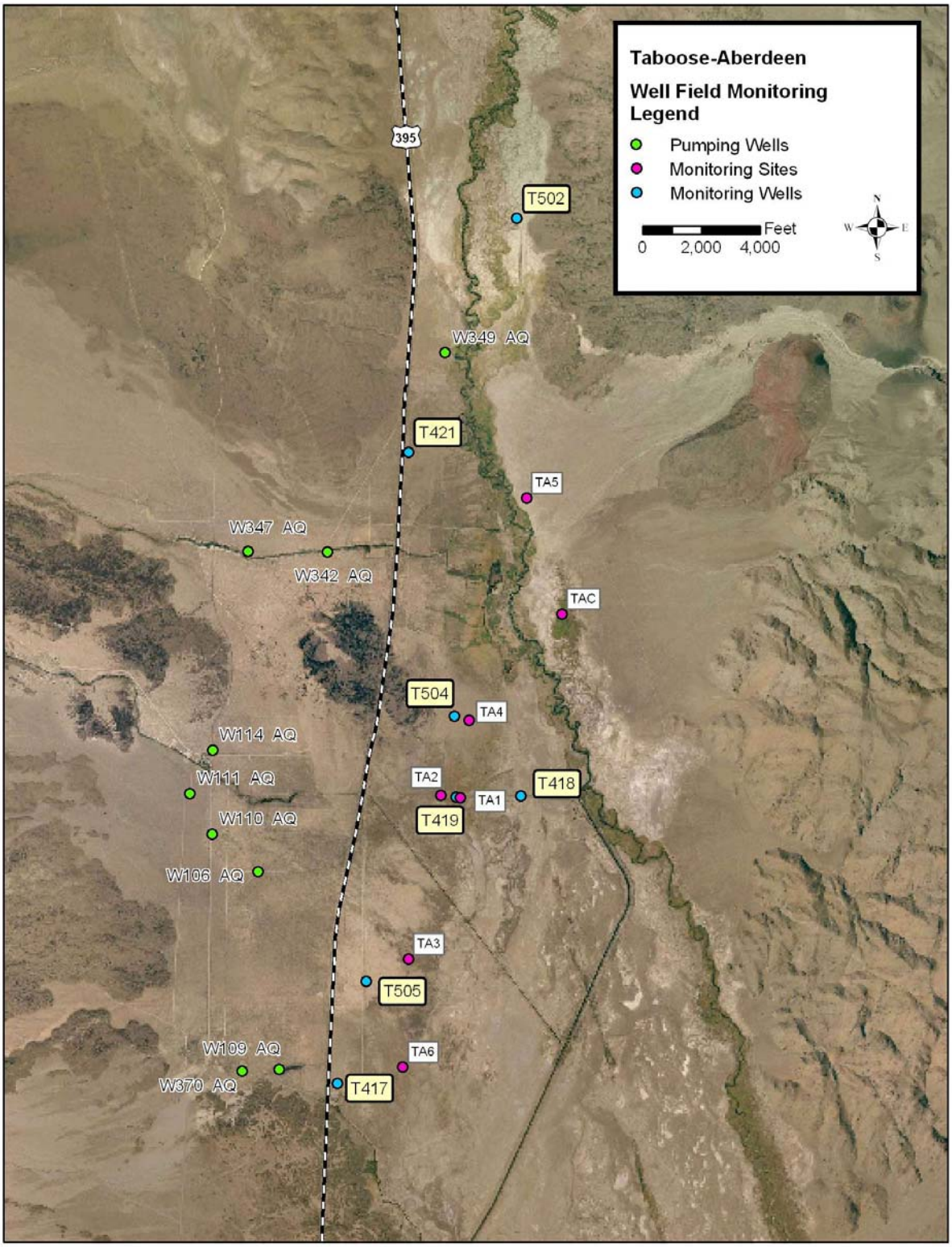
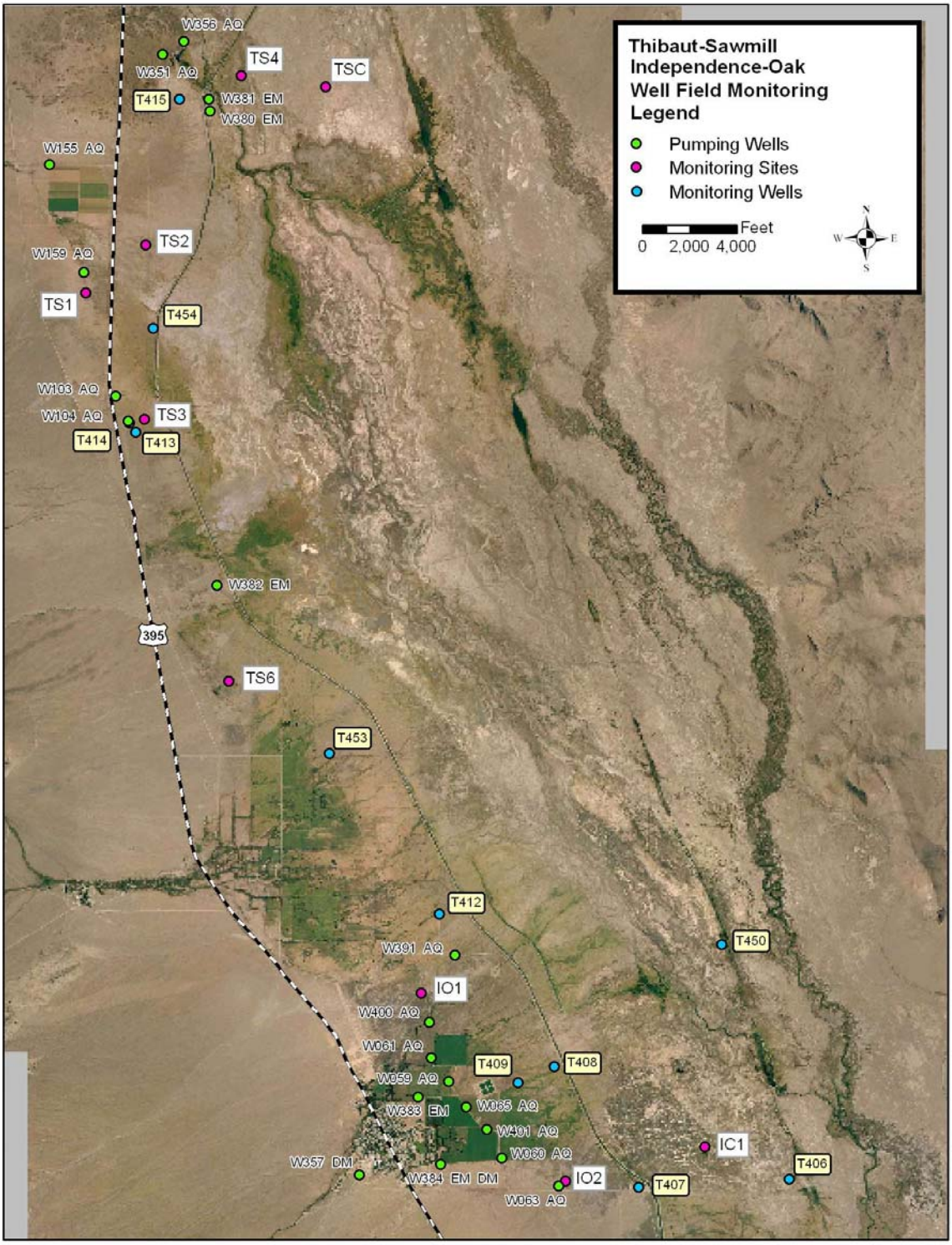

Taboose-Aberdeen
Well Field Monitoring Legend
Pumping Wells
Monitoring Sites
Monitoring Wells
Feet
0 2,000 4,000
N
W
E
S
395
T502
W349 AQ
T421
TA5
W347 AQ
W342 AQ
TAC
T504
TA4
W114 AQ
W111 AQ
TA2
T418
TA1
T419
W110 AQ
W106 AQ
TA3
T505
W109 AQ
TA6
W370 AQ
T417

Figure 8


Thibaut-Sawmill
Independence-Oak
Well Field Monitoring
Legend
Pumping Wells
Monitoring Sites
Monitoring Wells
Feet
0 2,000 4,000
N
W
E
S
W356 AQ
W351 AQ
TS4
TSC
T415
W381 EM
W380 EM
W155 AQ
TS2
W159 AQ
TS1
T454
W103 AQ
W104 AQ
TS3
T414
T413
W382 EM
395
TS6
T453
T412
T450
W391 AQ
IO1
W400 AQ
W061 AQ
T409
T408
W059 AQ
W383 EM
W065 AQ
W401 AQ
IC1
W060 AQ
T406
W357 DM
W384 EM DM
IO2
T407
W063 AQ

Symmes-Shepherd Wellfield (Figure 9)

The average measured wellfield water level in April 2009 was higher than the average April 2007 level. However, all vegetation monitoring sites in the Symmes-Shepherd Wellfield remained in OFF status as of April 2008, resulting in no planned pumping from wells linked to these monitoring sites. Green Book designated exempt well, W402, in the Symmes-Shepherd Wellfield, has an available capacity of 1,350 acre-feet. The required groundwater pumping from the Symmes-Shepherd Wellfield is 1,200 acre-feet for the 2009-10 runoff year.

According to the IMP, monitoring wells T401, T403, T404, and T447 are used to calculate the average water level in the Symmes-Shepherd Wellfield. However, due to a Caltrans road widening project near Manzanar, several monitoring wells including T401 were destroyed. Therefore, to calculate average wellfield water level, only data from monitoring wells T403, T404, and T447 were utilized. IMP exempted production well W402 (Table 6) will be used for supplying an E/M project in this wellfield. Pumping 1,200 acre-feet from the Symmes-Shepherd Wellfield and a 71% of normal forecast Owens Valley runoff, the average April 2010 groundwater level in the Symmes-Shepherd Wellfield, based on the key monitoring wells, is forecast to be 1.2 feet above the average measured wellfield groundwater level in April 2007 as shown in Table 5.

Bairs-Georges Wellfield (Figure 9)

Vegetation monitoring site BG2 remained in ON status as of April 2008. As 2009-10 runoff year is forecast to be a below normal year, LADWP anticipates having to operate well W343 to provide supplemental water for irrigation purposes in this wellfield. The total planned pumping from well W343 is expected to be 400 acre-feet. Operational testing related to Reinhackle Spring may resume if a testing protocol is agreed to by ICWD and LADWP.

According to the IMP, monitoring wells T398 and T400 are used to calculate the average groundwater level in the Bairs-Georges Wellfield. LADWP is not planning to operate any wells in the Bairs-Georges Wellfield during the 2009-10 runoff year for aqueduct supply purposes because of the depth-to-water criteria of the IMP. The IMP exempted well W343 (Table 6) will be utilized to provide supplemental irrigation water during this runoff year. With a planned pumping of 400 acre-feet from the Bairs-Georges Wellfield and a 71% of normal forecast Owens Valley runoff, the average April 2010 groundwater level in the Bairs-Georges Wellfield, based on the key monitoring wells, is forecast to be 0.8 feet below the average measured groundwater level in April 2007 as shown in Table 5.

Lone Pine Wellfield (Figure 10)

LADWP is currently operating three wells in the Lone Pine area including the town supply wells W344 and W346 and well W390 to supply an E/M project east of town. These three wells pump approximately 1,200 acre-feet per year to meet the demand.

As outlined in Section IV.B of the Green Book, LADWP desires to activate pumping well W416, which was drilled in 2002. Green Book guidelines provide for operation of a new well at full capacity for up to six months while monitoring nearby water levels and vegetation. Data collected during the initial operation will then be utilized to develop a long-term operation plan for this production well.

The planned groundwater pumping from the Lone Pine Wellfield is 1,200 acre-feet for the 2009-10 runoff year. Pumping for initial operation phase of W416 will be in addition to the 1,200 acre-feet and implemented once agreement is reached on the testing protocol between ICWD and LADWP. A revised protocol for initial operation of W416 was submitted to ICWD on March 5, 2009 and is awaiting comment/approval.

The E/M well W390 had been producing silt and sand for the last couple of years, to the extent of causing pump failure. A replacement pump with the same capacity failed as well. Subsequently, a small capacity pump with only 0.5 cfs pumping capacity was installed in the well for the 2009-10 irrigation season. LADWP is currently making plans to re-drill this well.

Figure 9

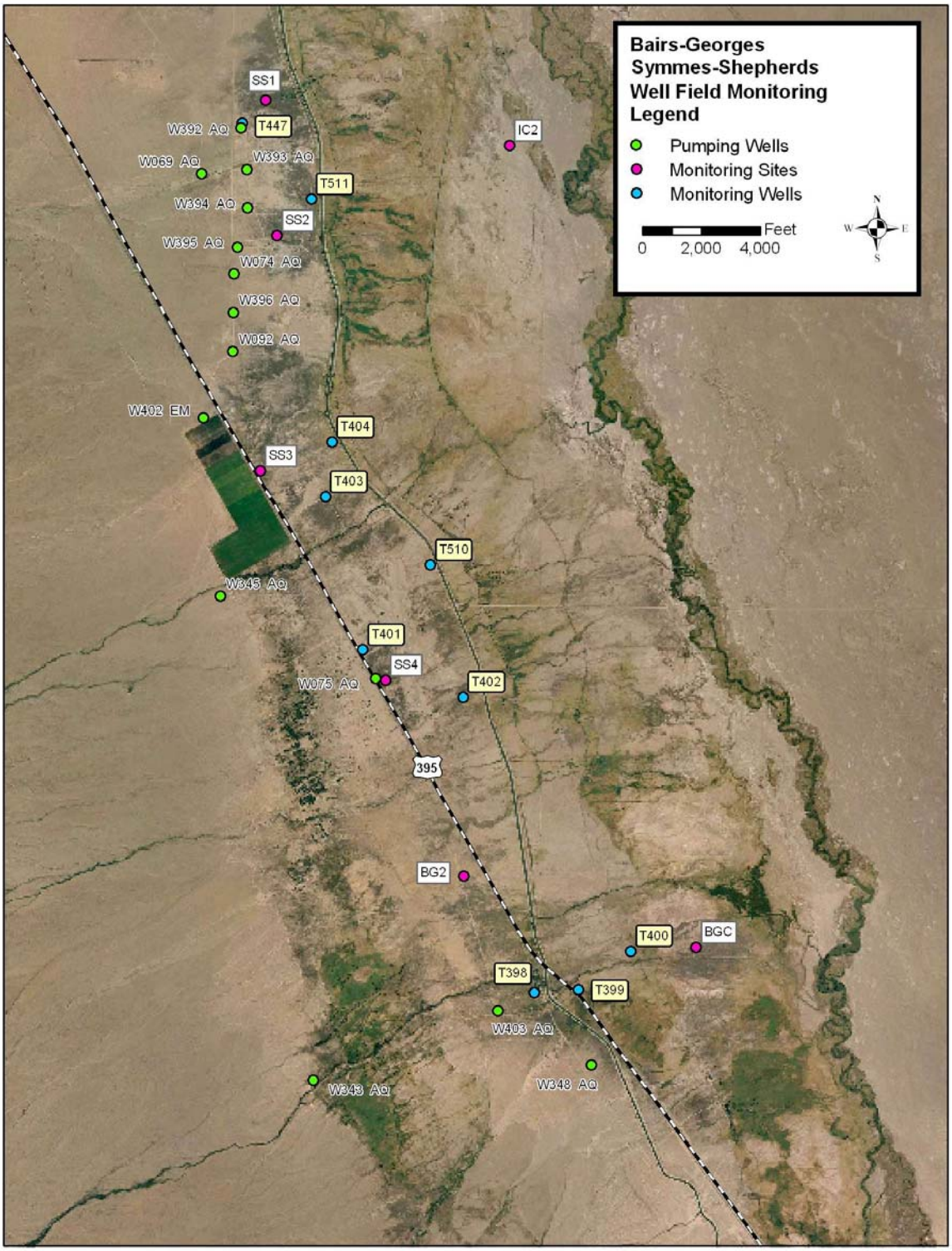
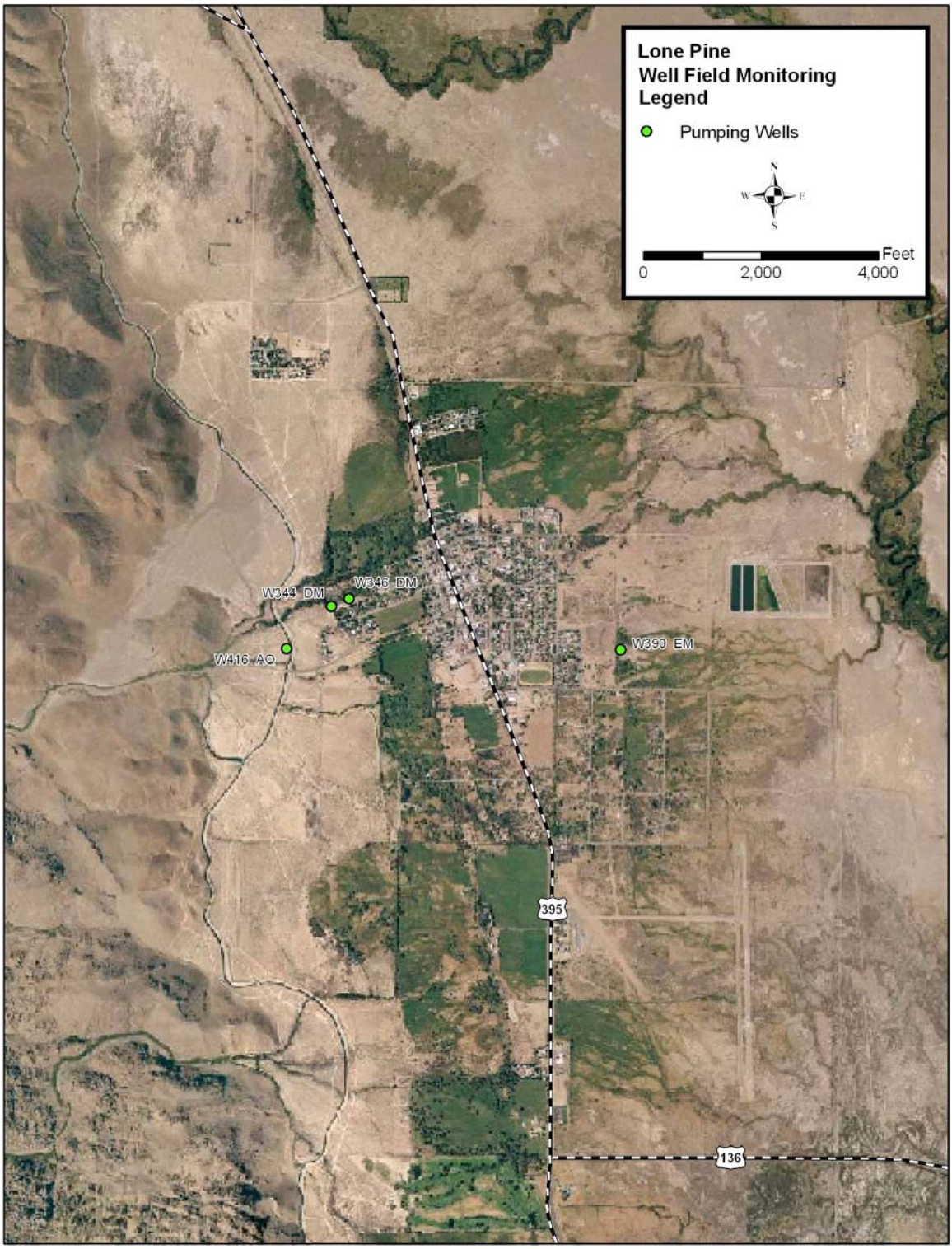

Bairs-Georges
Symmes-Shepherds
Well Field Monitoring
Legend
Pumping Wells
Monitoring Sites
Monitoring Wells
Feet
0 2,000 4,000
N
W
E
S
SS1
W392 AQ
T447
W069 AQ
W393 AQ
T511
W394 AQ
SS2
W395 AQ
W074 AQ
W396 AQ
W092 AQ
IC2
W402 EM
T404
SS3
T403
T510
W345 AQ
T401
SS4
W075 AQ
T402
395
BG2
T400
BGC
T398
T399
W403 AQ
W348 AQ
W343 AQ

Figure 10


Lone Pine
Well Field Monitoring
Legend
Pumping Wells
N
W
E
S
Feet
0
2,000
4,000
W344 DM
W346 DM
W416 AQ
W390 EM
395
136

2.3 Owens Valley Uses (Including Enhancement/Mitigation Projects)

Table 8 shows the historic (1981-82) uses and the planned monthly Owens Valley uses for 2009-10. The in-valley uses shown on Table 8 consist of irrigation, stock water, operations, recreation and wildlife projects, E/M supply (with the LORP project usage shown separately), and Owens Lake. As shown in Table 8 and Figure 11, LADWP plans to provide approximately 197,000 acre-feet for in-valley uses this runoff year.

The water for the McNally Ponds E/M project is supplied via the McNally canals in above normal runoff years when Owens River water is available or well water when the canals are not operated. In most normal or below normal runoff years since 1991 the Standing Committee has approved not operating the McNally Pond project because of lack of E/M supply well capacity. In June 2007 LADWP requested that the list of IMP exempt wells be modified to allow pumping of Wells 248 and 249 in the Laws Wellfield to supply water to the McNally Ponds E/M project. This request was not approved. Due to low runoff the McNally Canals will not be operated in 2009-10, subsequently there is no water available to supply this project.

The Water Agreement provides that "... *enhancement/mitigation projects shall continue to be supplied by enhancement/mitigation wells as necessary*." Due to 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 exceeded the amount of water provided by E/M project supply wells. Table 9 shows the planned water supply to E/M projects and the forecast imbalance between the E/M projects water use and the E/M project supply well pumping by the end of 2008-09 runoff year.

The planned E/M water use is expected to result in a shortfall of E/M pumping totaling approximately 2,750 acre-feet during the 2009-10 runoff year and a cumulative shortfall of approximately 171,400 acre-feet by the end of 2009-10 runoff year. This shortfall will be made up partially by pumping LAA supply wells and/or by providing surface water from the LAA.

Releases to the Lower Owens River Project (LORP) from the intake facility commenced on December 6, 2006. An average flow of over 40 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 LAA intake are augmented through additional releases at the Independence, Blackrock, Georges, Locust, and Alabama spillgates to maintain a continuous flow of approximately 40 cfs in the river channel. Table 8 shows estimated water use by the Lower Owens River on a monthly basis. Consumptive use of approximately 26,000 acre-feet of water by the Lower Owens River, Delta, Off-River Lakes and Ponds, and the Blackrock waterfowl habitat area is expected during the 2009-10 runoff year.

Table 8 - Historic (1981-82) and Projected (2009-10) Water Uses on City Owned in the Owens Valley in acre-feet

Use	April		May		June		July		August		September		TOTAL Apr-Sep	
	1981	2009	1981	2009	1981	2009	1981	2009	1981	2009	1981	2009	1981	2009
Irrigation	3,980	6,300	7,958	9,300	10,373	9,600	9,476	10,000	8,295	8,000	6,321	3,900	**46,403**	**47,100**
Stockwater	1,141	1,000	1,319	1,200	1,244	1,100	1,245	1,100	1,219	1,100	1,319	1,000	**7,487**	**6,500**
E / M	0	1,200	0	1,400	0	1,500	0	1,800	0	2,000	0	1,600	**0**	**9,500**
LORP Project[1]	0	1,000	0	2,400	0	3,100	0	3,300	0	3,700	0	2,600	**0**	**16,100**
Owens Lake	0	8,000	0	9,000	0	10,000	0	10,000	0	0	0	13,700	**0**	**50,700**
Rec. & Wildlife	379	550	804	700	1,160	700	1,455	1,000	1,381	1,600	1,406	1,050	**6,585**	**5,600**
Total	***5,500***	***18,050***	***10,081***	***24,000***	***12,777***	***26,000***	***12,176***	***27,200***	***10,895***	***16,400***	***9,046***	***23,850***	***60,475***	***135,500***

Use	October		November		December		January		February		March		TOTAL Oct-Mar		TOTAL Apr-Mar	
	1981	2009	1981	2009	1981	2009	1982	2010	1982	2010	1982	2010	81-82	09-10	81-82	09-10
Irrigation	263	300	0	0	0	0	0	0	0	0	14	0	**277**	**300**	**46,680**	**47,400**
Stockwater	1,065	900	1,045	800	1,050	800	1,007	800	1,010	700	1,098	900	**6,275**	**4,900**	**13,762**	**11,400**
E / M	0	700	0	100	0	100	0	100	0	100	0	100	**0**	**1,200**	**0**	**10,700**
LORP Project[1]	0	1,600	0	1,100	0	500	0	500	0	700	0	1,500	**0**	**5,900**	**0**	**22,000**
Owens Lake	0	11,500	0	3,000	0	2,000	0	2,000	0	5,600	0	12,200	**0**	**36,300**	**0**	**87,000**
Rec. & Wildlife	781	900	713	900	565	500	478	500	342	500	447	500	**3,326**	**3,800**	**9,911**	**9,400**
Total	***2,109***	***15,900***	***1,758***	***5,900***	***1,615***	***3,900***	***1,485***	***3,900***	***1,352***	***7,600***	***1,559***	***15,200***	***9,878***	***52,400***	***70,353***	***187,900***

1. LORP OFF-RIVER LAKES & PONDS CONTINUE TO BE PART OF RECREATION AND WILDLIFE USES.

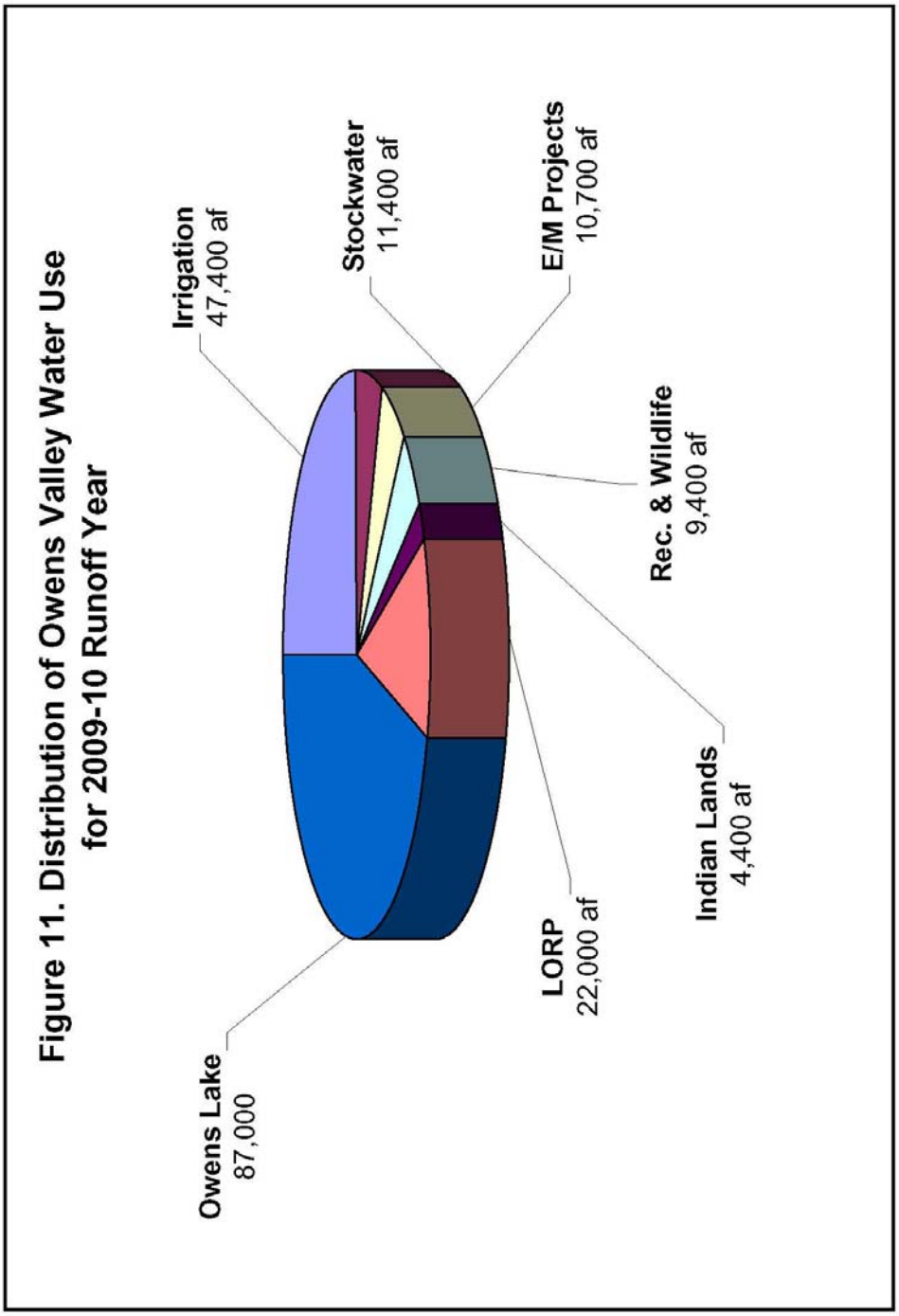


Figure 11. Distribution of Owens Valley Water Use
for 2009-10 Runoff Year
Irrigation
47,400 af
Stockwater
11,400 af
E/M Projects
10,700 af
Rec. & Wildlife
9,400 af
Indian Lands
4,400 af
LORP
22,000 af
Owens Lake
87,000

Table 9 - Owens Valley Groundwater Pumping for E/M Water Use (1984-85 through 2009-10 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
1984-85	120	61,981	61,981	0	0		0
1985-86	103	107,718	107,718	0	109		0
1986-87	158	69,887	69,887	0	12,696	(4)	0
1987-88	68	209,393	179,883	29,510	29,360		0
1988-89	62	200,443	171,012	29,431	30,872		0
1989-90	63	155,903	133,340	22,563	23,330		0
1990-91	52	89,061	70,974	18,087	17,949		0
1991-92	64	87,526	71,736	15,790	20,517	-4,727	-4,727
1992-93	61	84,135	70,370	13,765	18,357	-4,592	-9,319
1993-94	106	76,329	67,338	8,991	19,310	-10,319	-19,638
1994-95	66	89,153	78,143	11,010	20,812	-9,802	-29,440
1995-96	154	69,740	57,168	12,572	22,914	-10,342	-39,782
1996-97	135	74,817	57,894	16,923	23,949	-7,026	-46,808
1997-98	124	66,910	52,756	14,154	21,500	-7,346	-54,154
1998-99	149	51,575	47,354	4,221	19,672	(4)	-54,154
1999-00	89	63,699	59,366	4,333	24,450	-20,117	-74,271
2000-01	84	67,534	61,195	6,339	20,611	-14,272	-88,543
2001-02	83	72,536	69,242	3,294	21,815	-18,521	-107,064
2002-03	67	82,281	76,361	5,920	21,394	-15,474	-122,538
2003-04	81	87,726	80,728	6,998	21,116	-14,118	-136,656
2004-05	77	85,803	78,093	7,710	18,327	-10,617	-147,273
2005-06	136	56,806	51,735	5,071	19,356	-14,285	-161,558
2006-07	145	57,412	52,716	4,696	17,357	(4)	-161,558
2007-08	58	60,338	53,413	6,925	11,312	-4,387	-165,945
2008-09 (2)	86	68,149	60,231	7,918	10,646	-2,728	-168,673
2009-10 (3)	71	63,450	55,550	7,900	10,650	-2,750	-171,423

(1) Based on 1956-2005 average: 415,725 acre-feet
(2) estimated
(3) forecast or planned
(4) surface water was available

2.4 Aqueduct Operations

Table 10 shows planned Los Angeles Aqueduct first-of-month reservoir storage levels and planned monthly Aqueduct deliveries to Los Angeles. Based on this plan, a total of 136,213 acre-feet will be exported from the Eastern Sierra to the City in the 2009-10 runoff year. This is only 38% of the long-term average export of water from the Eastern Sierra to the City between 1970 and present.

2.5 Water Exports to Los Angeles

Figure 12 provides a record of water supply exported from the Eastern Sierra, averaging 363,000 acre-feet per year from 1970 to present. Figure 13 shows the LAA contribution to the City water supply relative to the total supply from 1970 to present. During the 2008-09 runoff year, approximately 25% of the water supply for the City of Los Angeles was provided by exports from the Eastern Sierra (Owens Valley and Mono Basin). Figure 13 also shows the forecast water supply mix for the City for the 2009-10 runoff year. It is estimated that imports from the Eastern Sierra will provide approximately 23% of water supply for the City, groundwater pumping from San Fernando Valley will provide 12%, recycled water 1%, and purchased water from Metropolitan Water District of Southern California will provide the remaining 64% of the City's water supply. This, one of the lowest historic forecasts for water exports to Los Angeles from the Eastern Sierra, is the result of multiple years of lower than normal Owens Valley runoff, reduced groundwater pumping required by the IMP, reduced Mono Basis exports, and increasing water demands in the Owens Valley for the Owens Lake Dust Mitigation Program and the LORP.

Table 10 - Planned Los Angeles Aqueduct Operations for 2009-10 Runoff Year

Month	Owens Valley-Bouquet Reservoir Storage 1st of month Storage (acre-feet)	Aqueduct Delivery to Los Angeles (acre-feet)
April	179,090	5,950
May	182,536	9,223
June	183,514	11,901
July	178,006	15,372
August	163,585	15,372
September	156,174	14,876
October	133,389	10,760
November	123,909	10,413
December	127,535	10,760
January	140,955	10,760
February	158,844	10,066
March	171,000	10,760
TOTAL		***136,213***

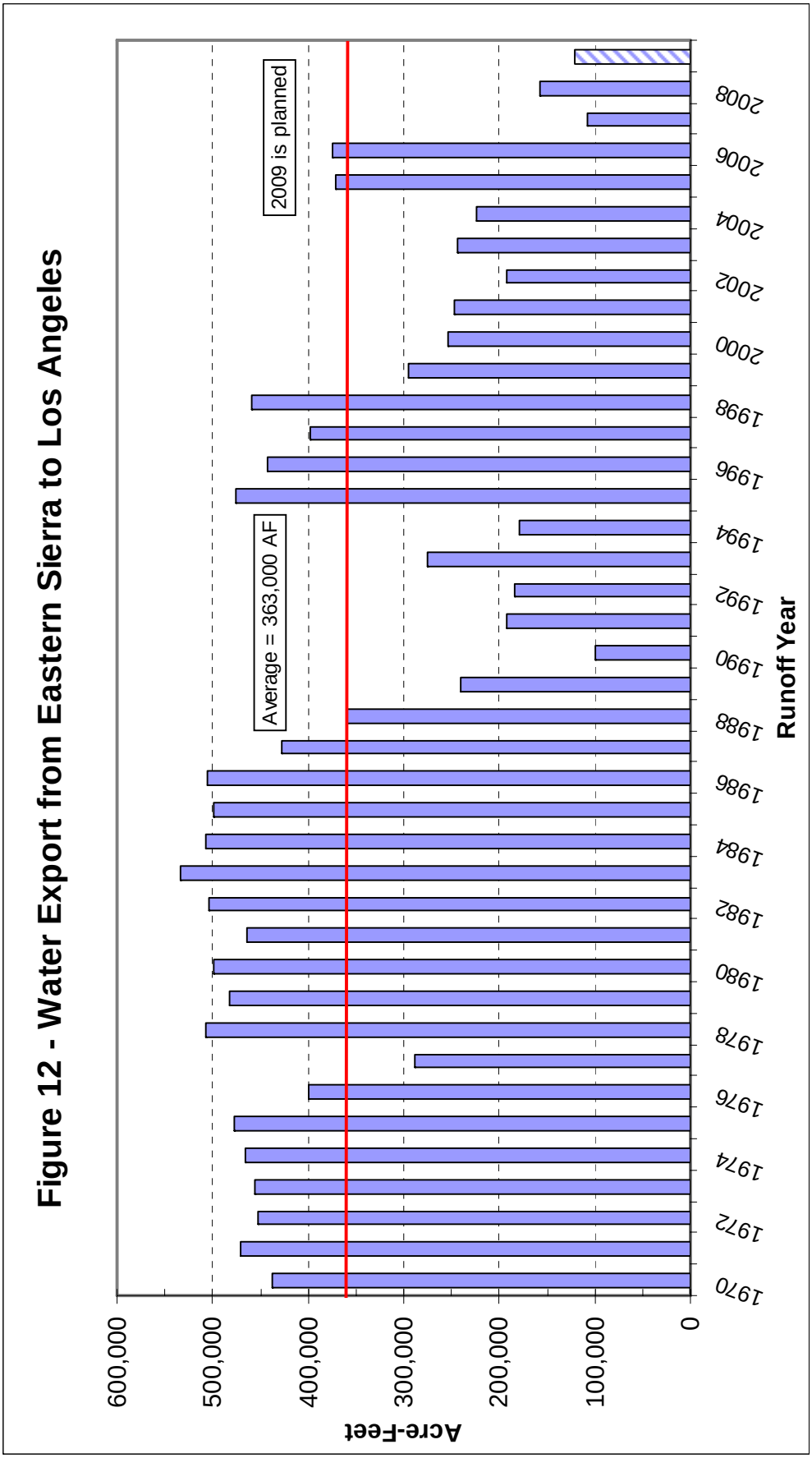


Figure 12 - Water Export from Eastern Sierra to Los Angeles
Average = 363,000 AF
2009 is planned
Acre-Feet
600,000
500,000
400,000
300,000
200,000
100,000
0
Runoff Year
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008

Figure 13 – Sources of Water for the City of Los Angeles