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EXECUTIVE SUMMARY

This report includes Los Angeles Department of Water and Power's (LADWP) proposed Owens Valley Operations Plan for the 2020-21 Runoff Year, an update on Owens Valley conditions, and the current status of LADWP's environmental mitigation projects and other legal obligations under the *Agreement between the County of Inyo and the City of Los Angeles and its Department of Water and Power on a Long-Term Groundwater Management Plan for Owens Valley and Inyo County* (Water Agreement); *the 1991 Environmental Impact Report Water from the Owens Valley to Supply the Second Los Angeles Aqueduct, 1970 to 1990, 1990 Onward, Pursuant to a Long Term Groundwater Management Plan* (1991 EIR); the Laws Type E transfer; the *1997 Memorandum of Understanding between the City of Los Angeles Department of Water and Power, County of Inyo, the California Department of Fish and Game, the California State Lands Commission, the Sierra Club, and the Owens Valley Committee* (1997 MOU), the *August 2004* and *March 2010 Amended Stipulations and Orders in Case No. S1CVCV01-29768.*

The Water Agreement provides that by April 20th each year, LADWP will 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. Additionally, Section 11 of the 2004 Stipulation and Order requires that on or about May 1 of each year LADWP shall complete and release an annual report that is in conformance with Section III.H of the 1997 MOU. This report will describe environmental conditions in the Owens Valley and studies, projects, and activities conducted under the Inyo-Los Angeles Water Agreement and the 1997 MOU.

This report is intended to fulfill these requirements.

1. Owens Valley Operations Plan for Runoff Year 2020-21

Section 1 of this report contains LADWP's Annual Operations Plan for Runoff Year 2020-21. As mentioned above, pursuant to Water Agreement Section V.D:

> *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.)*

The Owens Valley experienced a drier than normal snow season in the winter of 2019-20, following a much wetter than normal snow season. The resulting runoff forecast is calling for 299,600 acre-feet of runoff this year, or 74% of normal. LADWP plans to export approximately 188,400 acre-feet (AF) of water from the Eastern Sierra in the 2020-21 runoff year.

Uses in the Owens Valley on Los Angeles City owned lands are planned to be 93,780 AF, of which 49,600 AF is planned for irrigation. Being a drier than normal year, LADWP is not planning on water spreading in Owens Valley.

LADWP groundwater pumping in the Owens Valley is governed by the ON/OFF provisions of the *1991 Agreement between the County of Inyo and the City of Los Angeles and its Department of Water and Power on a Long Term Groundwater Management Plan for Owens Valley and Inyo County* (Water Agreement). According to the well ON/OFF provisions of the Water Agreement, approximately 187,100 acre-feet of water is available for groundwater pumping from Owens Valley wellfields, but LADWP's planned groundwater pumping ranges from 75,000 acre-feet to 93,000 acre-feet for the 2020-21 runoff year.

2. Conditions in the Owens Valley

The overall Eastern Sierra snowpack in watersheds contributing to the Los Angeles Aqueduct (LAA) was estimated to be 54% of normal as of April 1, 2020. Precipitation on the Owens Valley floor during the 2019-20 runoff year averaged 3.7 inches, which was 63% of the long-term average of 5.8 inches.

The groundwater levels in the Owens Valley rose by an average of 1.3 feet as a result of the wetter than normal runoff condition in 2019-20.

During the 2019-20 runoff year, the Lower Owens River was in full operational status with a minimum average flows of 40 cubic feet per second (cfs) or greater as measured at all gauging stations. The total water use by the Lower Owens River, the Delta, Blackrock Waterfowl Management Area, and other Lower Owens River Project (LORP) uses were approximately 16,500 AF for the year. The releases at the Los Angeles Aqueduct (LAA) Intake were augmented by additional releases at selected LAA spill gates to maintain an average continuous flow of at least 40 cfs in the river channel.

3. LADWP Environmental Mitigation Projects and Other Legal Obligations

Section 3 of this report provides information on all of the Los Angeles Department of Water and Power's (LADWP) Mitigation Projects and other obligations required under the Inyo/Los Angeles Water Agreement (Water Agreement), the 1991 Environmental Impact Report on Water From the Owens Valley to Supply the Second Los Angeles Aqueduct (1991 EIR), the subsequent 1997 Memorandum of Understanding between the City of Los Angeles Department of Water and Power, the County of Inyo, California Department of Fish and Game, the California State Lands Commission, the Sierra Club, and the Owens Valley Committee (1997 MOU) and related documents.

Tables 3.1 and 3.2 provide a quick reference guide to all of these commitments. For reference, status of these projects is classified into the following categories:

1. ***Complete*:** Project has no additional commitments required (no water allotment or other financial or environmental mitigation; no continual monitoring and reporting),

2. ***Ongoing as necessary/required:*** These measures are only applied when necessary (monitoring and reporting for mitigation measures for new projects, construction, etc.),
3. ***Implemented and ongoing:*** Project is fully implemented and is currently meeting goals; however, there may be ongoing water or financial commitments or monitoring and reporting requirements,
4. ***Fully implemented but not meeting goals:*** Project is fully implemented but has not yet met prescribed goals or success criteria, and
5. ***Not fully implemented:*** *Project under development or under construction, but not fully implemented*.

Presently, of the 64 required environmental mitigation projects, LADWP reports:

- 9 are complete,
- 42 are implemented and ongoing,
- 13 are fully implemented but not meeting goals,
- 0 are not fully implemented

Of the 48 other obligations, LADWP reports:

- 18 are complete,
- 6 are ongoing as necessary or required,
- 21 are implemented and ongoing,
- 1 are fully implemented and not meeting goals, and
- 2 are not fully implemented

More detailed information regarding each of these projects and other obligations is provided in Section 3. Additionally, comprehensive monitoring reports are found for the Yellow Billed Cuckoo Habitat Enhancement Plans and the Owens Valley Land Management Plan (OVLMP).

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 (Acre-feet)	MOST PROBABLE VALUE (% of Avg.)	REASONABLE MAXIMUM (% of Avg.)	REASONABLE MINIMUM (% of Avg.)	LONG-TERM MEAN (1966 - 2015) (Acre-feet)
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 (Acre-feet)	MOST PROBABLE VALUE (% of Avg.)	REASONABLE MAXIMUM (% of Avg.)	REASONABLE MINIMUM (% of Avg.)	LONG-TERM MEAN (1966 - 2015) (Acre-feet)
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.

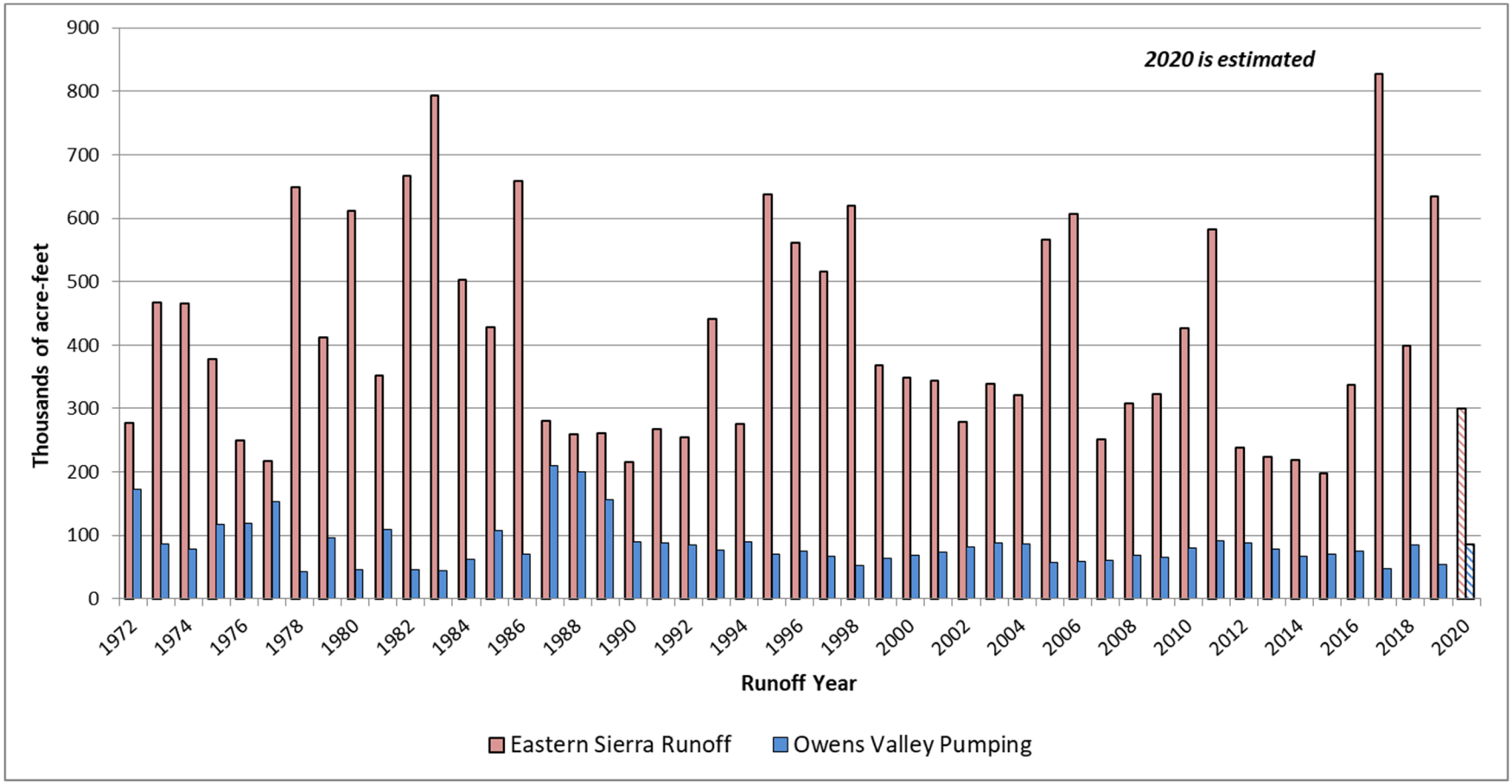


Figure 1.1. Owens River Basin Runoff and Groundwater Pumping

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

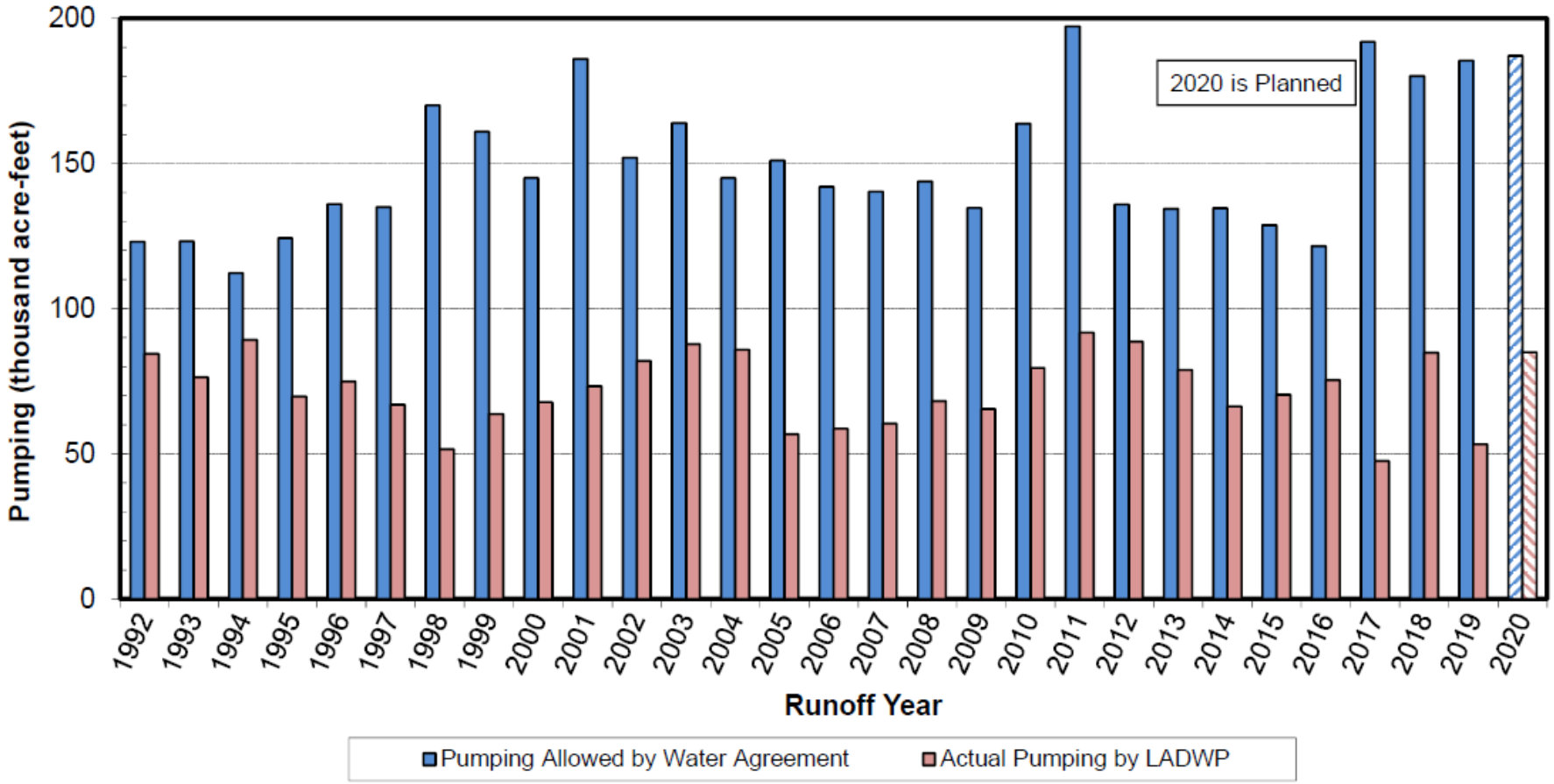


Figure 1.2. Owens Valley Pumping – Provided by Water Agreement and Actual Since Inyo/Los Angeles Water Agreement

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	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
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 in 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.

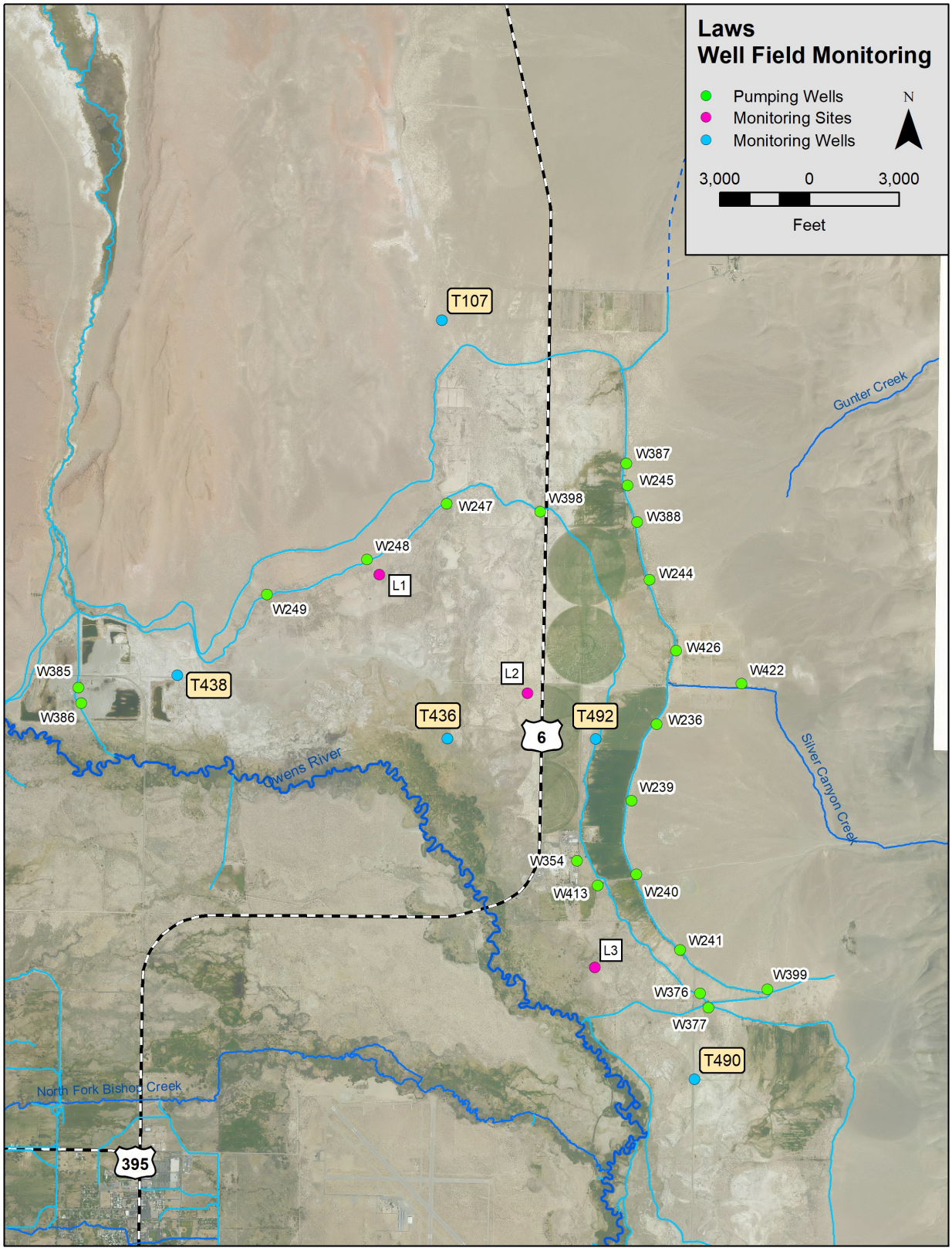
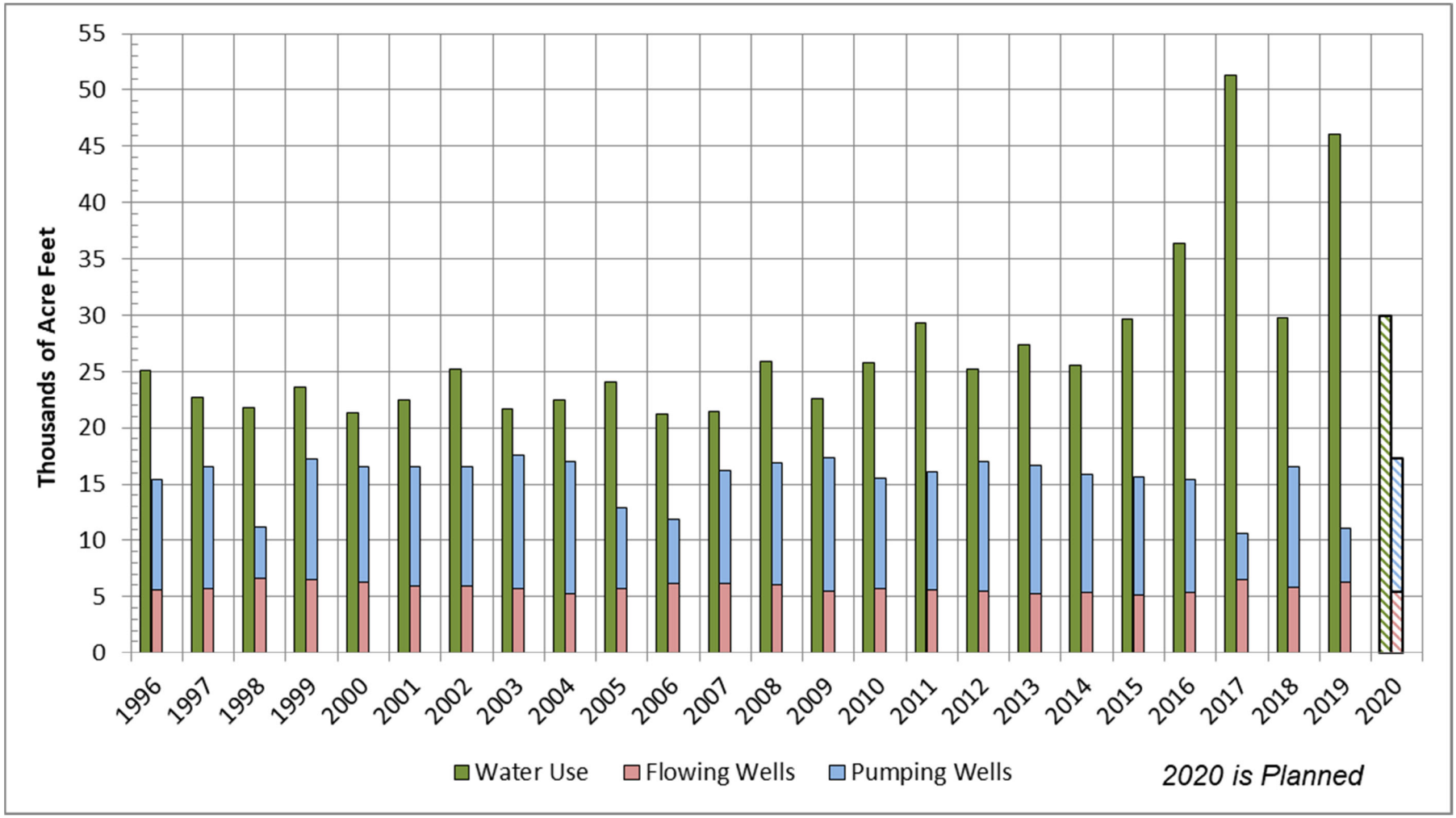


Figure 1.3. Laws Wellfield

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

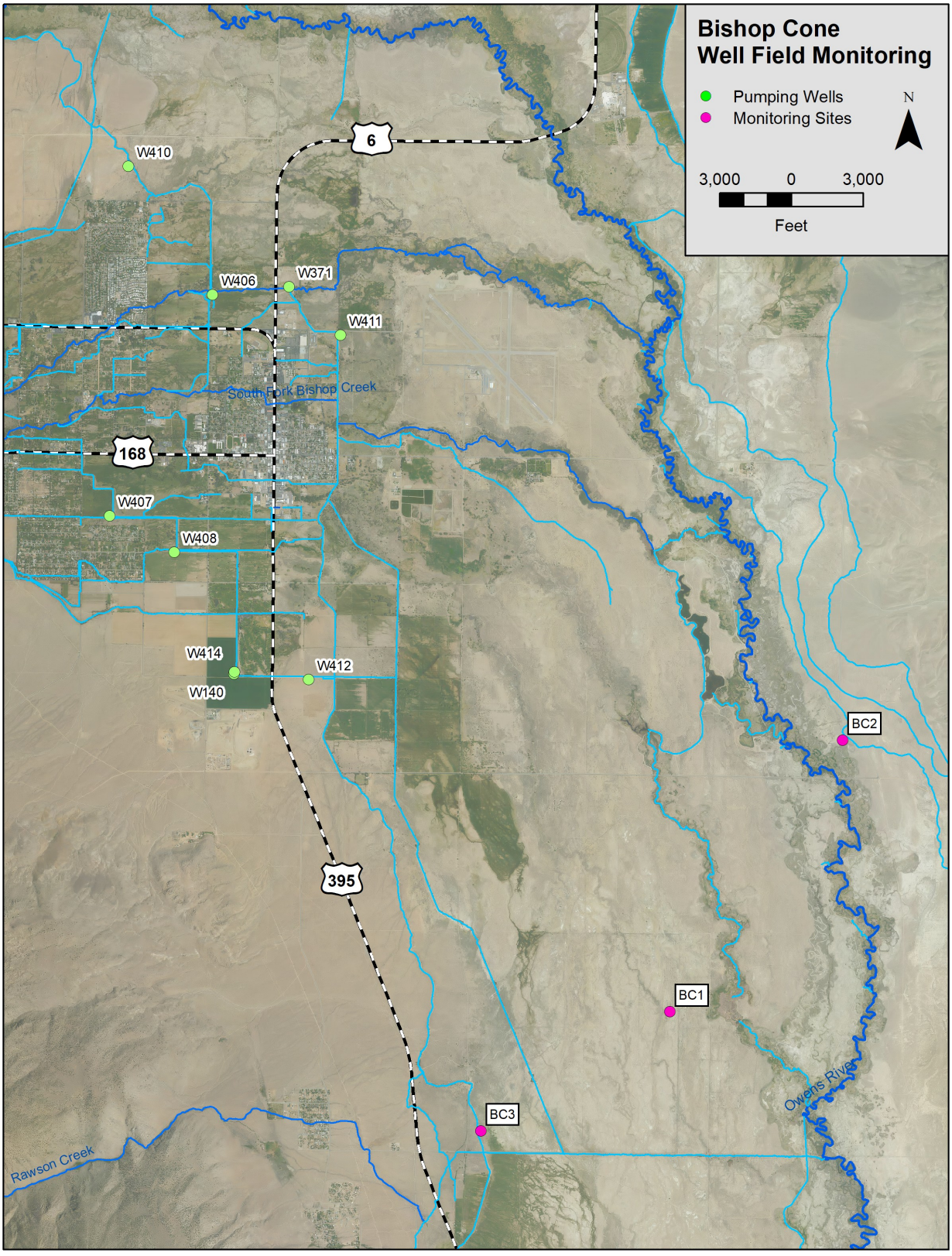


Figure 1.5. Bishop Wellfield

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.

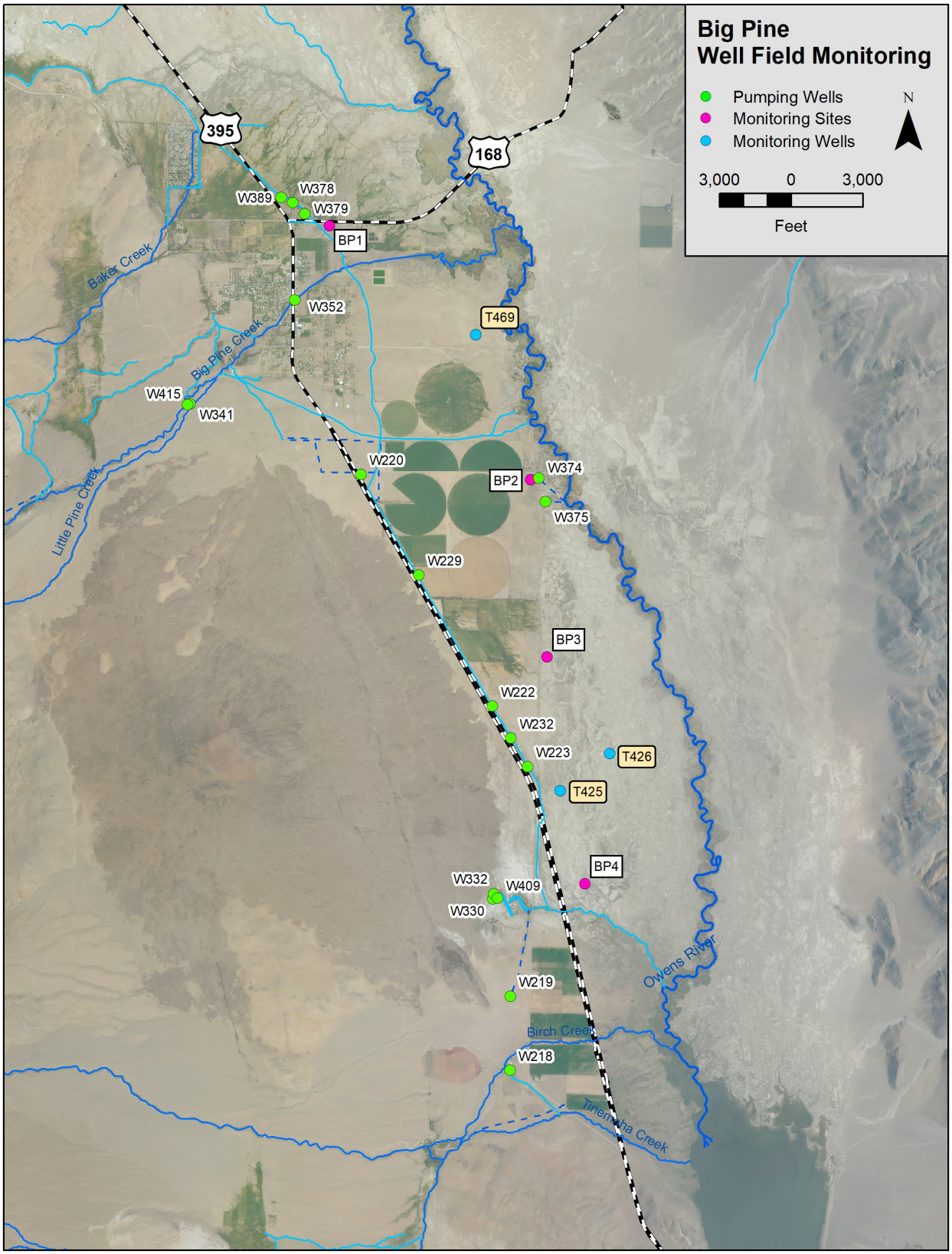


Figure 1.6. Big Pine Wellfield

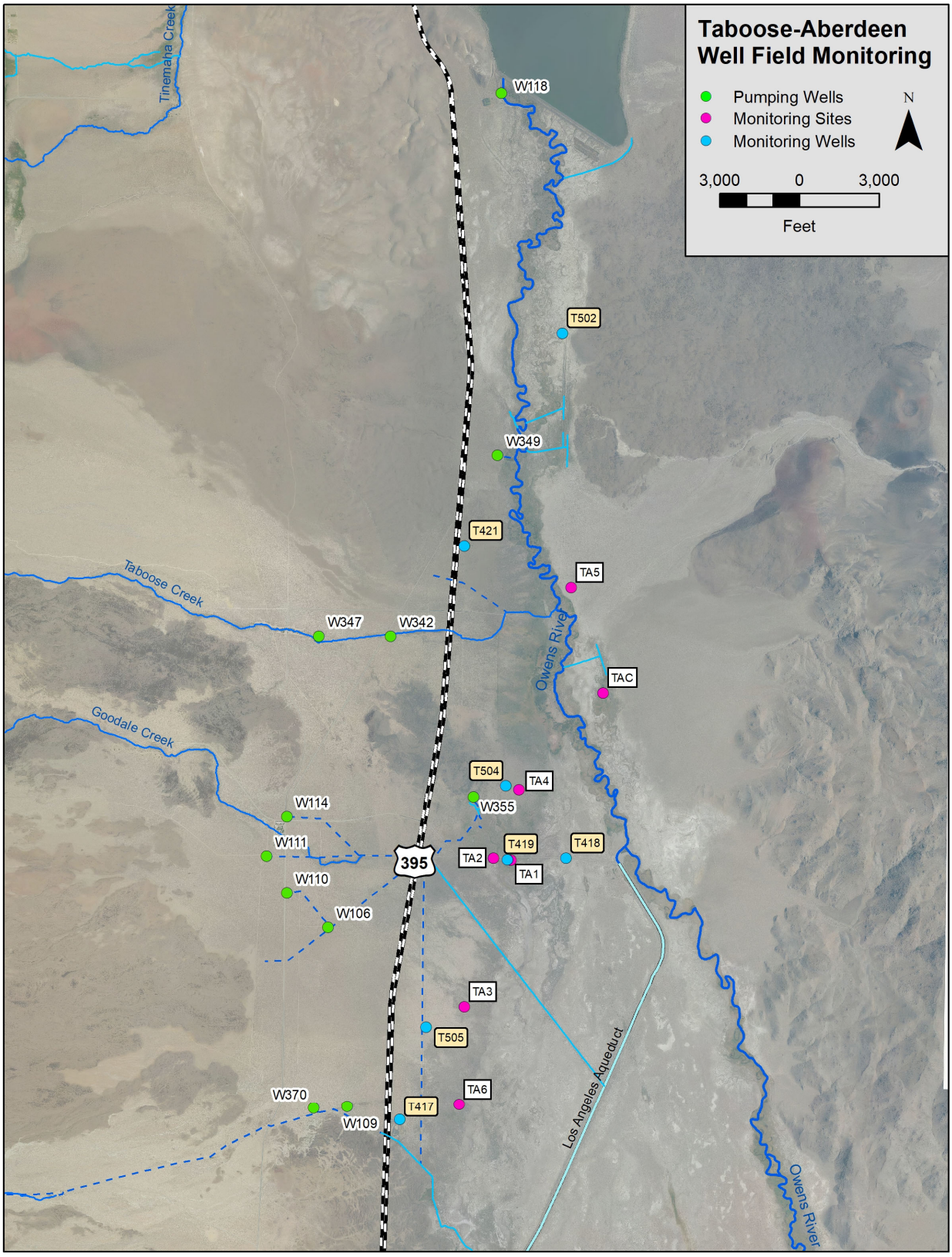


Figure 1.7. Taboose-Aberdeen Wellfield

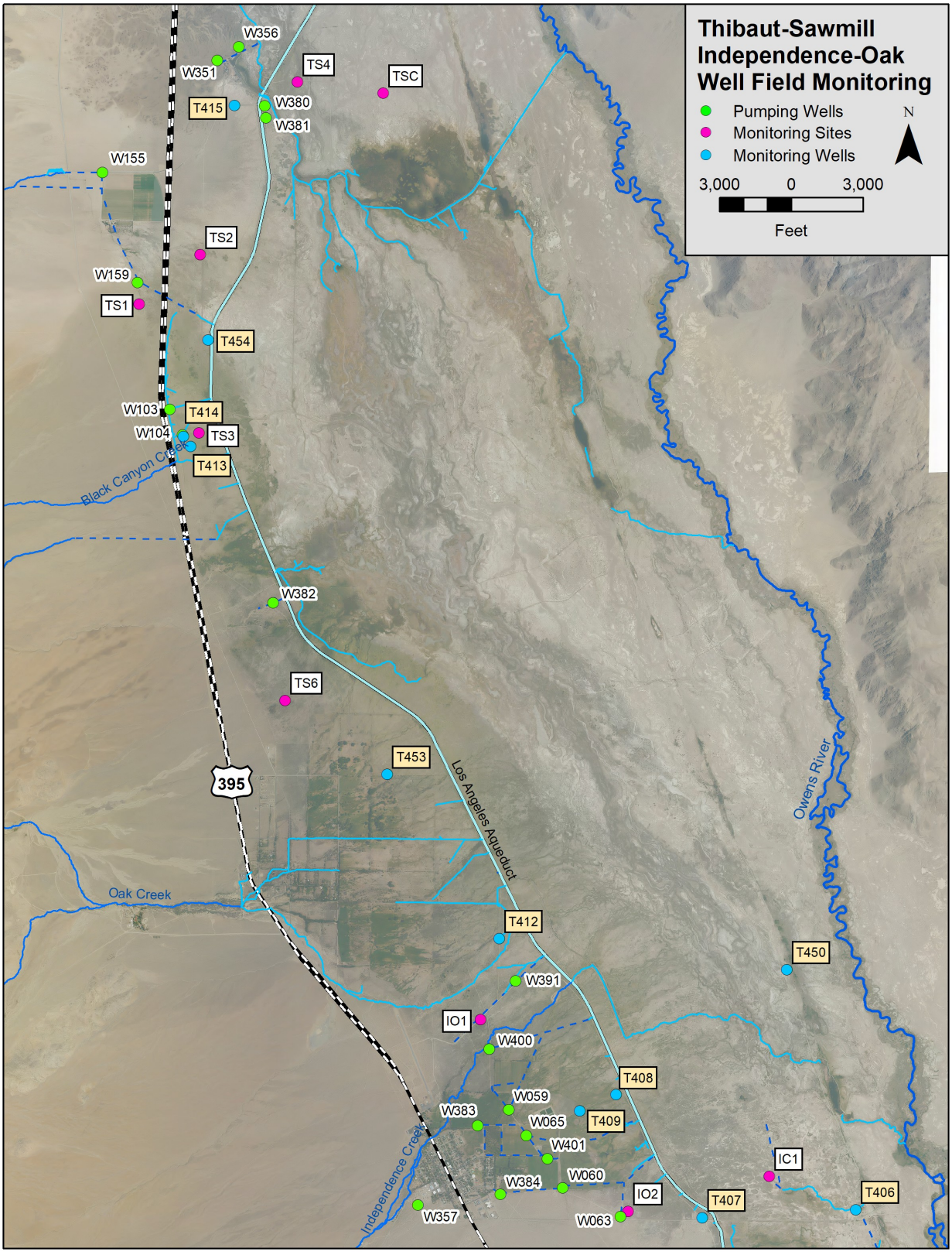


Figure 1.8. Thibaut-Sawmill and Independence-Oak Wellfields

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.

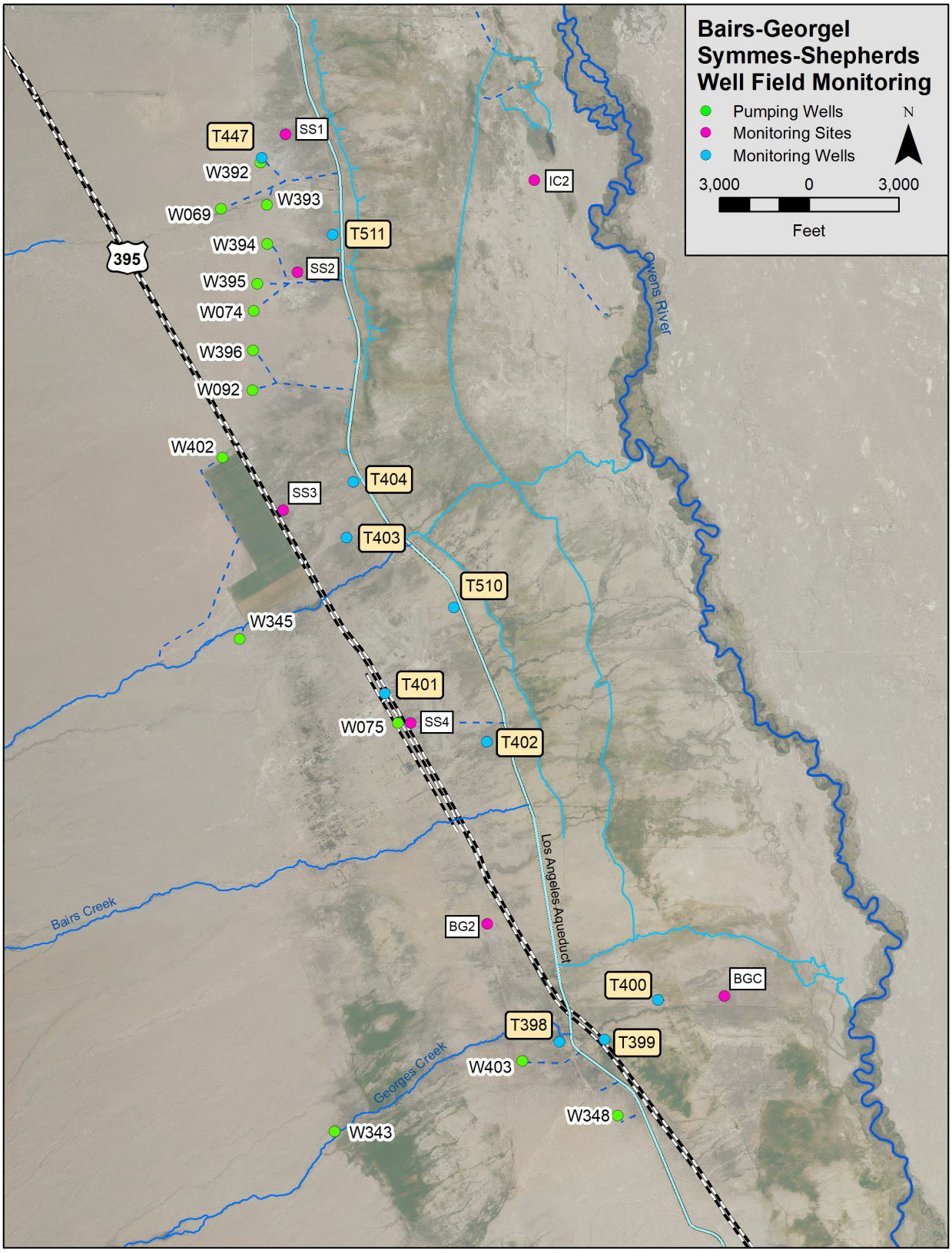


Figure 1.9. Symmes-Sheperds and Bairs-Georges Wellfields

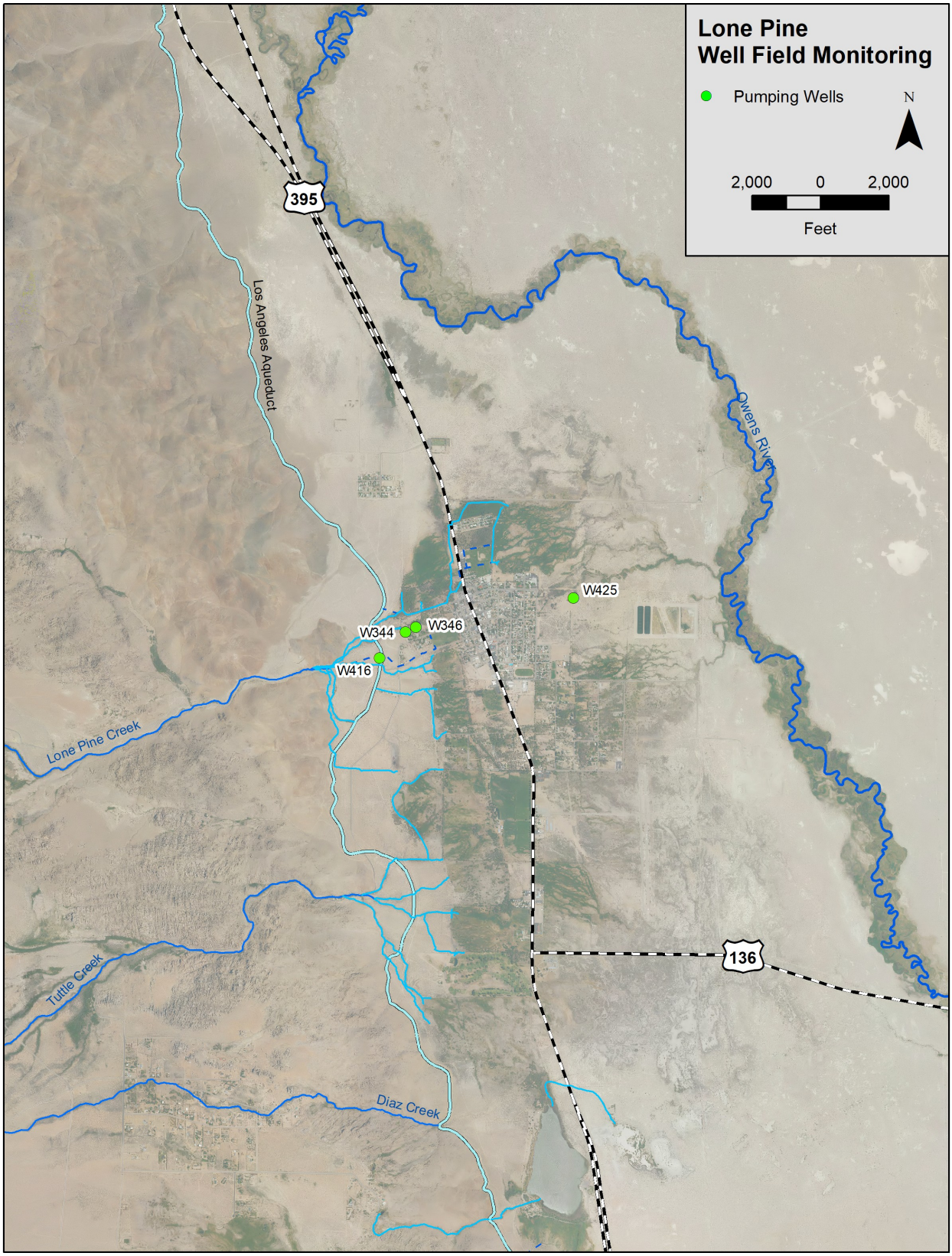


Figure 1.10. Lone Pine Wellfield

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 a continuous flow of at least 40 cfs 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***

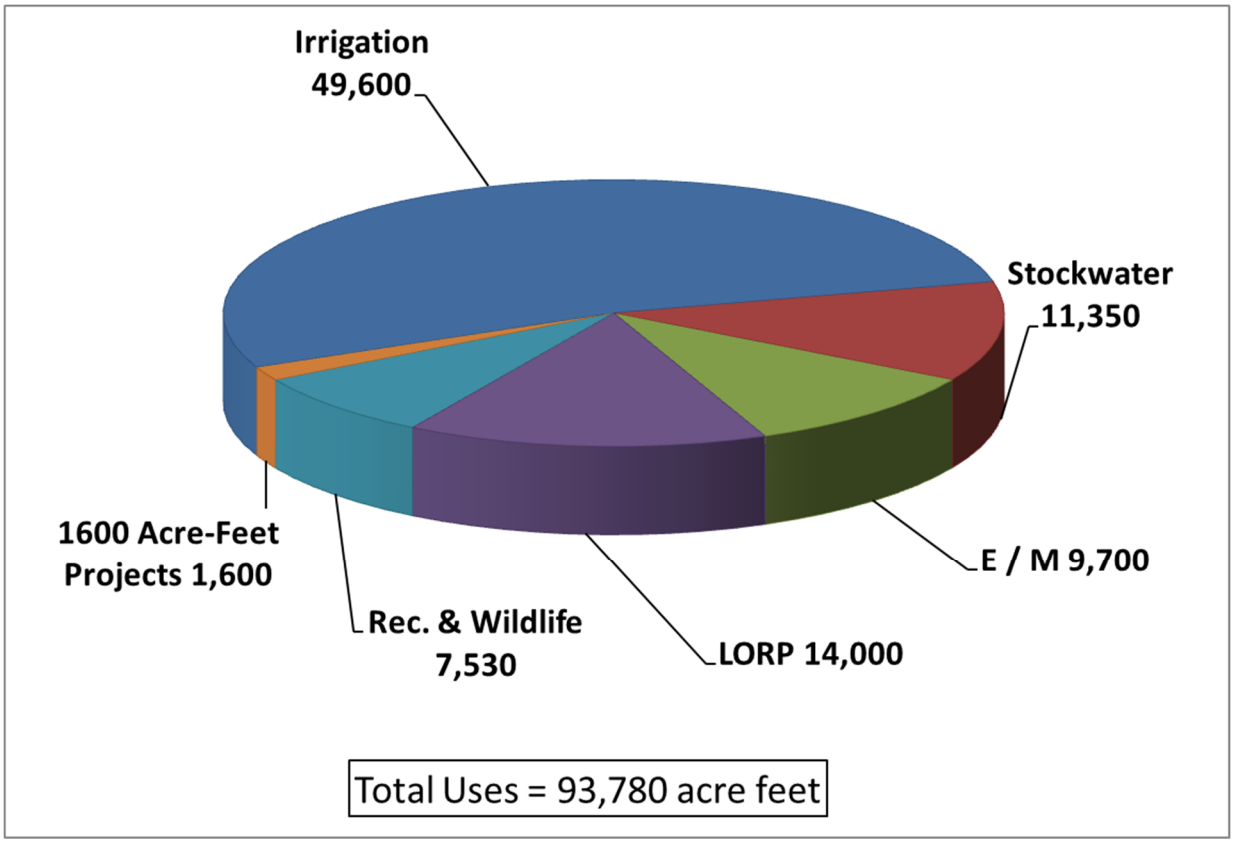


Figure 1.11. Distribution of Planned Owens Valley Water Use on City Owned Lands for 2020-21 Runoff Year

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	155%	*53,198*	*49,376*	*3,822*	11,035	(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 75,000-92,000 acre-feet

(3) surface water was available

1.4. Aqueduct Operations

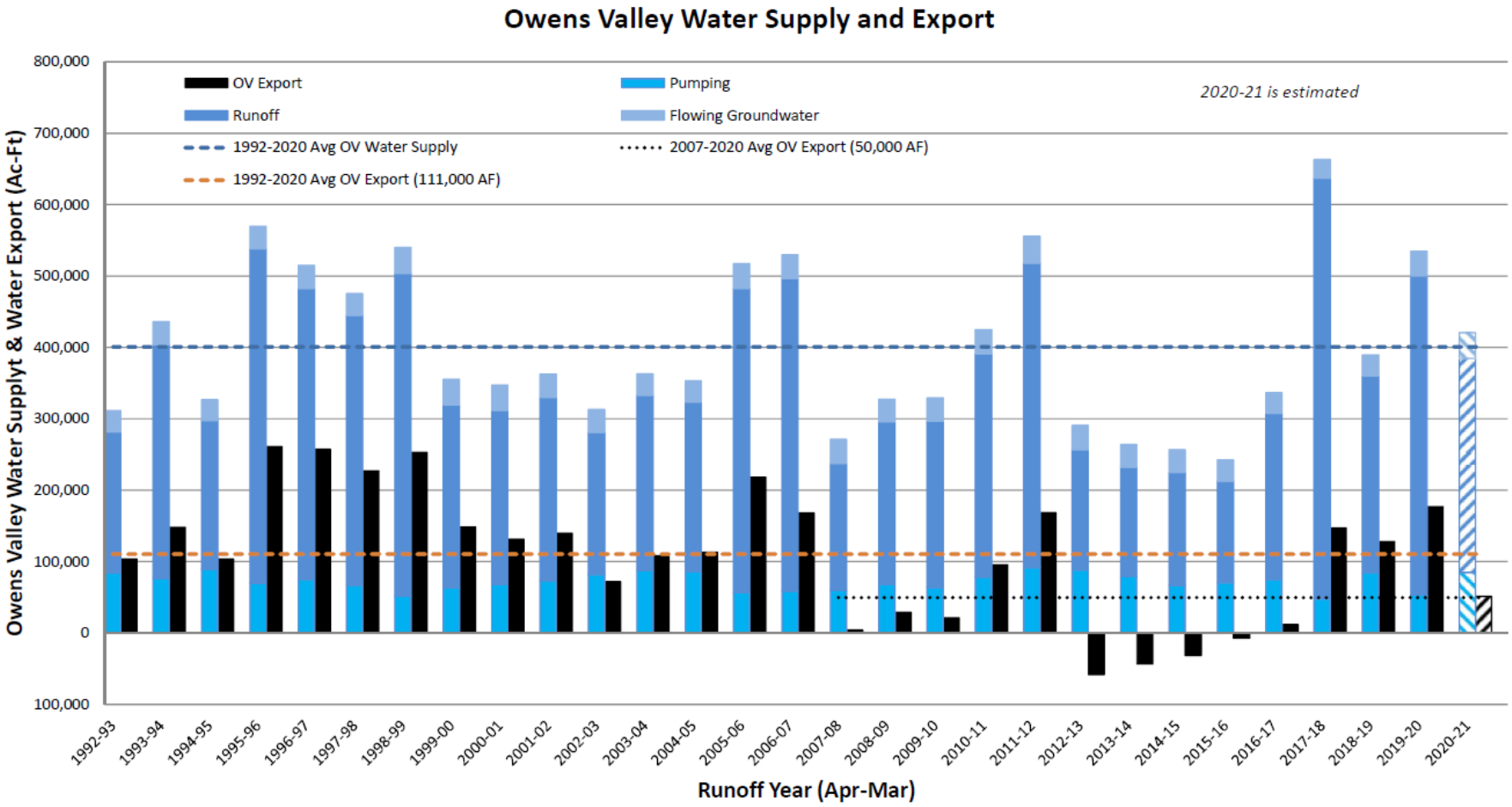
Table 1.9 shows planned LAA reservoir storage levels and monthly deliveries to Los Angeles. Based on this plan, approximately 188,400 feet will be exported from Eastern Sierra to the City during the 2020-21 runoff year. Of this amount, approximately 51,400 acre-feet will come from the Owens Valley water 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 in1971, 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, 177,000 acre-feet was exported from the Owens Valley water supply to Los Angeles, which amounted to 33% 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 1st 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.

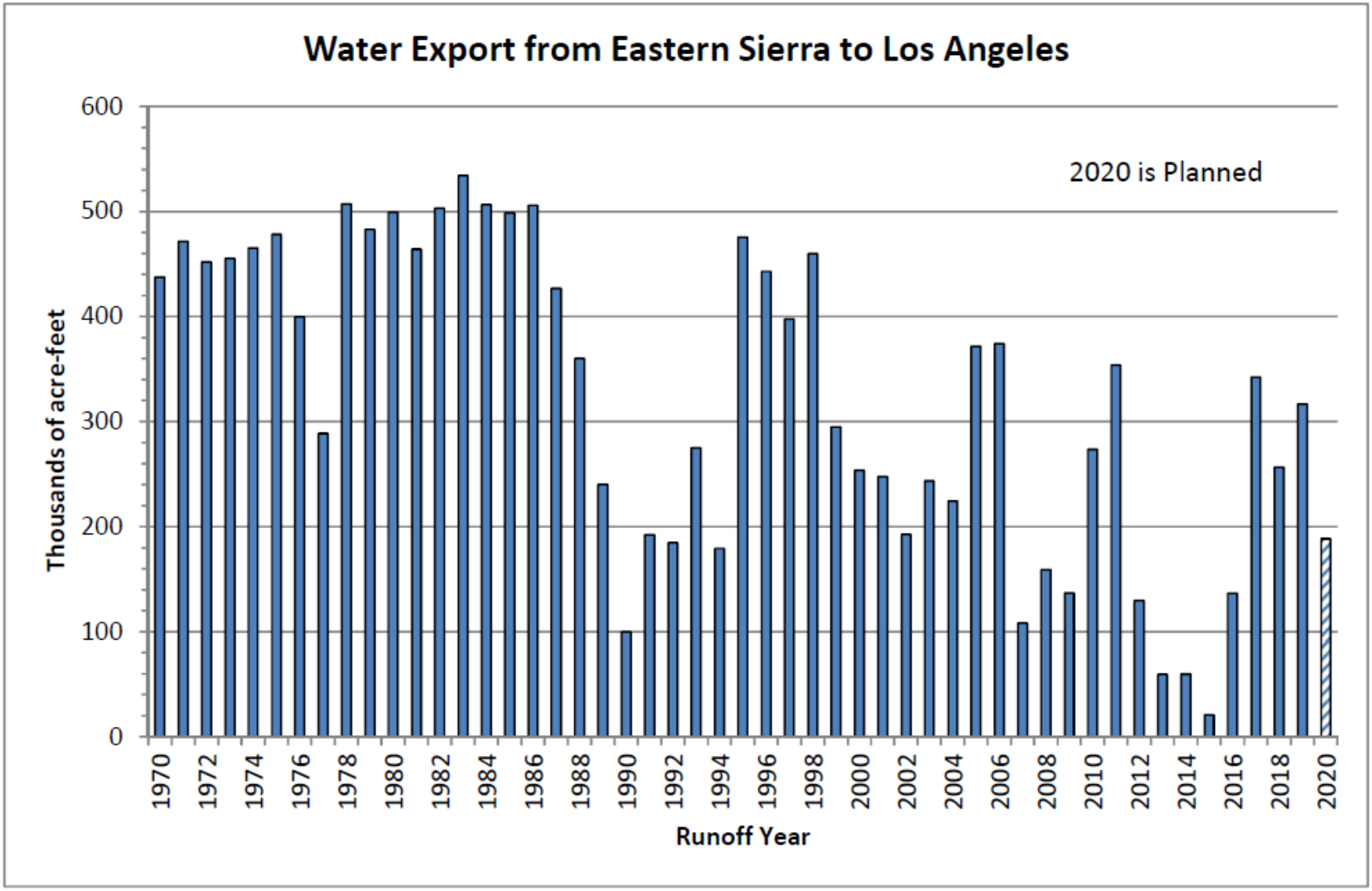


Figure 1.13. Water Export from Eastern Sierra to Los Angeles

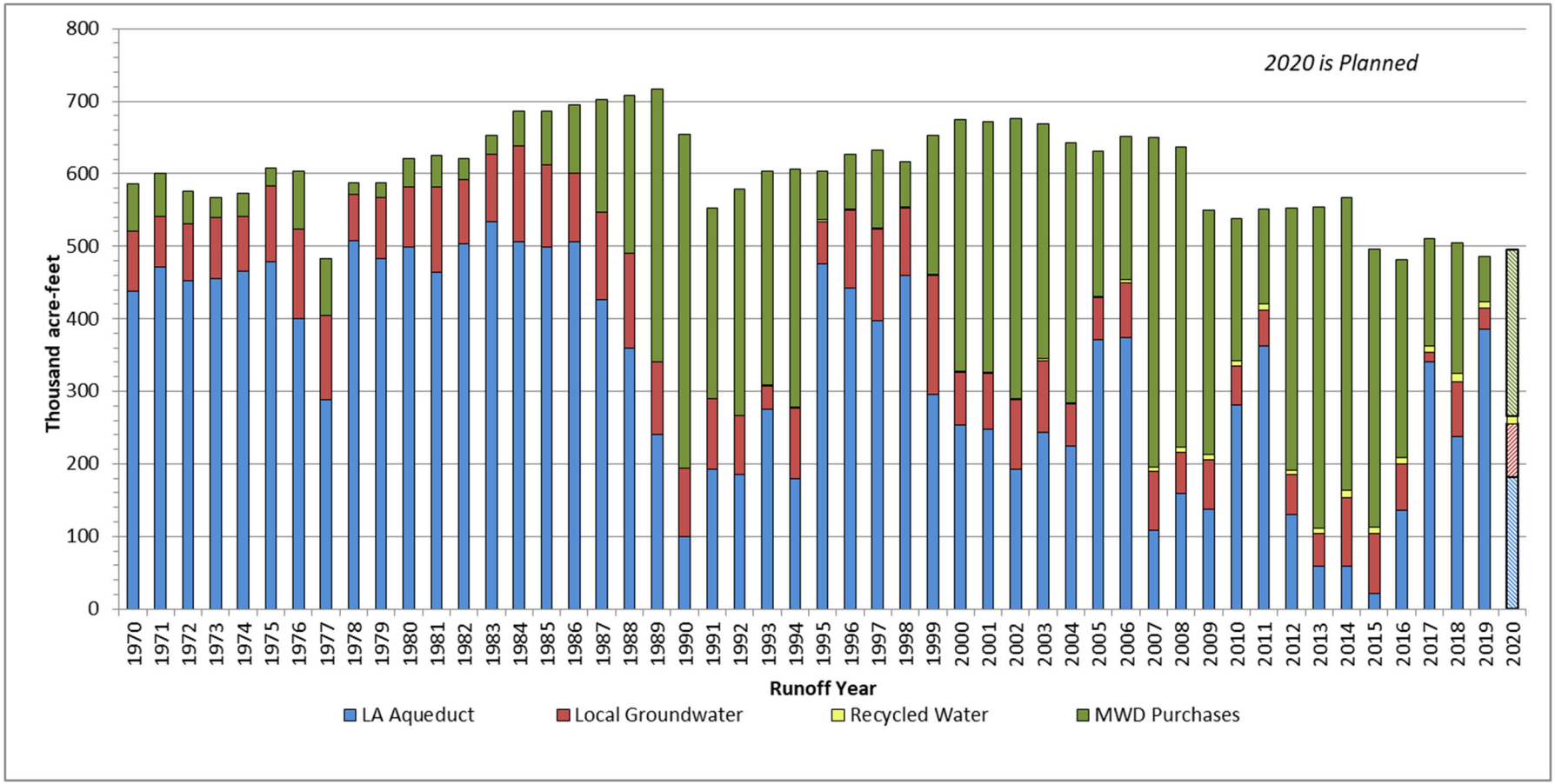


Figure 1.14. Sources of Water for the City of Los Angeles

CONDITIONS IN THE OWENS VALLEY

2.0 CONDITIONS IN THE OWENS VALLEY

As of April 1, 2020, the Eastern Sierra overall snowpack was measured to be 54% of normal (Tables 2.2). Owens Valley runoff during the 2020-21 runoff year is forecast to be 299,600 acre-feet or approximately 74% of normal (Section 1, Table 1.1). Owens Valley floor precipitation during the 2019-20 runoff year was about 63% of average (Table 2.3). Overall, vegetation cover in the Owens Valley is comparable to mid-1980s baseline conditions. A graphical summary of Owens Valley conditions is provided in Figure 2.1. Groundwater levels are generally stable in most areas of the valley, based on depth to water in selected monitoring wells in each of LADWP's nine wellfields, as shown in Figures 2.2 through Figure 2.10.

2.1. Well ON/OFF Status

The Water Agreement includes the vegetation protection provisions of linking pumping wells to specific monitoring sites. If the available soil moisture measured at a vegetation monitoring site is not sufficient to meet the estimated demands of the vegetation associated with that monitoring site, the wells linked to that site are designated as being in the OFF status and may not be operated. The wells linked to a monitoring site may be operated if the available soil water is determined to be sufficient to have met the estimated water requirements of the vegetation at the time that the associated wells were designated as being in the OFF status. The Green Book includes the complete well ON/OFF procedures. Table 2.1 provides a listing of Owens Valley monitoring site ON/OFF status as of April 2019, the monitoring wells associated with each monitoring site, and the linked pumping wells.

Some pumping wells are designated as being exempt from linkage to vegetation sites and the ON/OFF provisions of the Water Agreement because these wells are in areas that cannot cause significant adverse impacts to the vegetation or because these wells have been determined by Inyo County and the Los Angeles Department of Water and Power (LADWP) to be a necessary source of water. A list of exempt wells and the reasons for exemption are included in Section 1, Table 1.5.

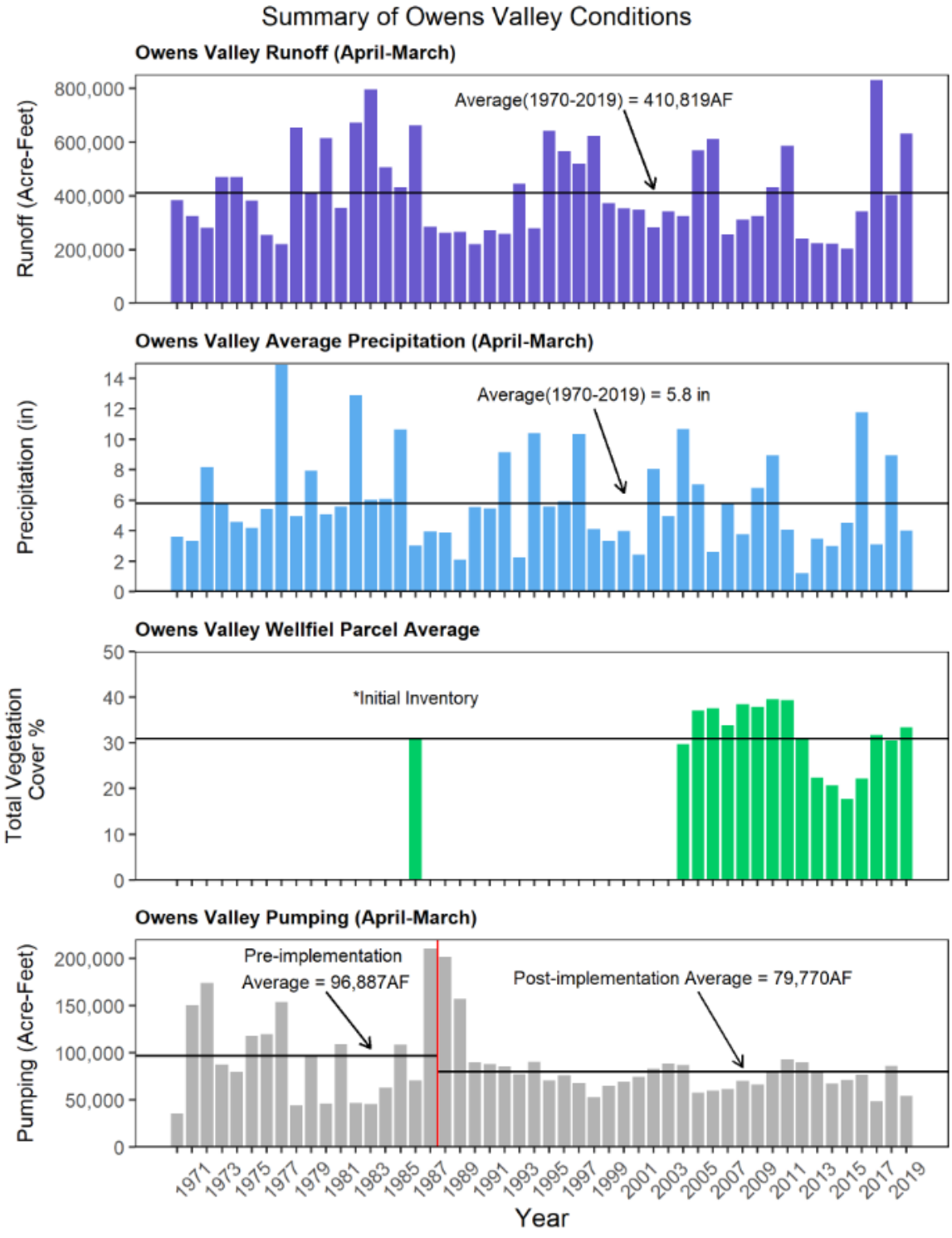


Figure 2.1. Summary of Owens Valley Conditions

Table 2.1. Owens Valley Monitoring Site Status (ON/OFF) as of April 2020

Wellfield	Monitoring Site	Monitoring Well	Pumping Wells	E/M Wells	ON/OFF Status
Laws	L1	795T	247, 248, 249, 398		ON
	L2	USGS 1	236*, 239, 243, 244		ON
	L3		240, 241, 242	376, 377	ON
	L4a, L4b			385, 386	na
	L5**		245	387, 388	na
	Exempt		236*, 354, 422, 413		Exempt
Bishop	All wells		140, 411, 410, 371		na
			406, 407, 408, 412		na
Big Pine	BP1	798T	210, 352	378, 379, 389	ON
	BP2	799T	220, 229, 374		OFF
	BP3	567T	222, 223, 231, 232		ON
	BP4	800T	331		ON
	Exempt		218, 219, 330, 332, 341, 352, 375, 415		Exempt
Taboose-Aberdeen	TA3	505T	106, 110, 111, 114		OFF
	TA4	586T	342, 347		ON
	TA5	801T	349		ON
	TA6	803T	109, 370		ON
	Exempt		118		Exempt
Thibaut-Sawmill	TS1	807T	159		OFF
	TS2	T806	155		ON
	TS3	454T	103, 104	382	ON
	TS4	804T		380, 381	ON
	Exempt		351, 356		Exempt
Independence-Oak	IO1	809T	391, 400		OFF
	IO2	548T	63		ON
	Exempt		59, 60, 61, 65, 401, 357, 384*	383, 384	Exempt
Symmes-Shepherd	SS1	USGS 9G	69, 392, 393		OFF
	SS2	646T	74, 394, 395		OFF
	SS3	561T	92, 396		OFF
	SS4	811T	75, 345		OFF
	Exempt			402	Exempt
Bairs-Georges	BG2	812T	76, 343*, 348, 403		ON
	Exempt		343*		na
Lone Pine	Exempt		344, 346	425	Exempt
	Other		416		na

*dual use

** Monitoring site has not yet been located.

2.2 Groundwater Level Hydrographs

LADWP hydrographers monitor groundwater levels in over 700 monitoring wells throughout the Owens Valley. Groundwater levels are considered when evaluating the overall condition of the basin and are utilized for calibrating groundwater models. Hydrographs are used to observe the changes in groundwater levels over time. Figures 2.2 through 2.10 illustrate hydrographs of selected monitoring wells with available long-term data in Owens Valley wellfields. As shown in Figures 2.2 through 2.10, because of wetter than normal runoff during the 2019-20 runoff year, groundwater levels throughout Owens Valley wellfields rose between April 2019 and April 2020 as listed below:

- In Laws Wellfield, the average groundwater levels (represented by monitoring wells T107, T438, T436, and T490) experienced an average of 2.6 feet rise between April 2019 and April 2020.
- In Bishop Wellfield, the average groundwater levels (represented by monitoring wells T390, T501, T389, and T485) experienced an average of 0.1 feet rise between April 2019 and April 2020.
- In Big Pine Wellfield, the average groundwater levels (represented by monitoring wells T470, T469, T425, and T426) experienced an average of 1.6 feet rise between April 2019 and April 2020.
- In Taboose-Aberdeen Wellfield, the average groundwater levels (represented by monitoring wells T502, T417, T421, and T419) experienced an average of 1.5 feet rise between April 2019 and April 2020.
- In Thibaut-Sawmill Wellfield, the average groundwater levels (represented by monitoring wells T413, T414, T415, and T454) experienced an average of 0.7 feet rise between April 2019 and April 2020.
- In Independence-Oak Wellfield, the average groundwater levels (represented by monitoring wells T406, T412, T408, and T453) experienced an average of 2.2 feet rise between April 2019 and April 2020.
- In Symmes-Shepherd Wellfield, the average groundwater levels (represented by monitoring wells T511, T440, T403, and T453) experienced an average of 0.7 feet rise between April 2019 and April 2020.
- In Bairs-Georges Wellfield, the average groundwater levels (represented by monitoring wells T398, T400, and V087) experienced an average of 0.4 feet rise between April 2019 and April 2020
- In Lone Pine Wellfield, the average groundwater levels (represented by monitoring wells T360, V015N, V172, and V256) experienced an average of 1.9 feet rise between April 2019 and April 2020.

Overall, the average groundwater levels in the Owens Valley rose approximately 1.3 feet between April 2019 and April 2020.

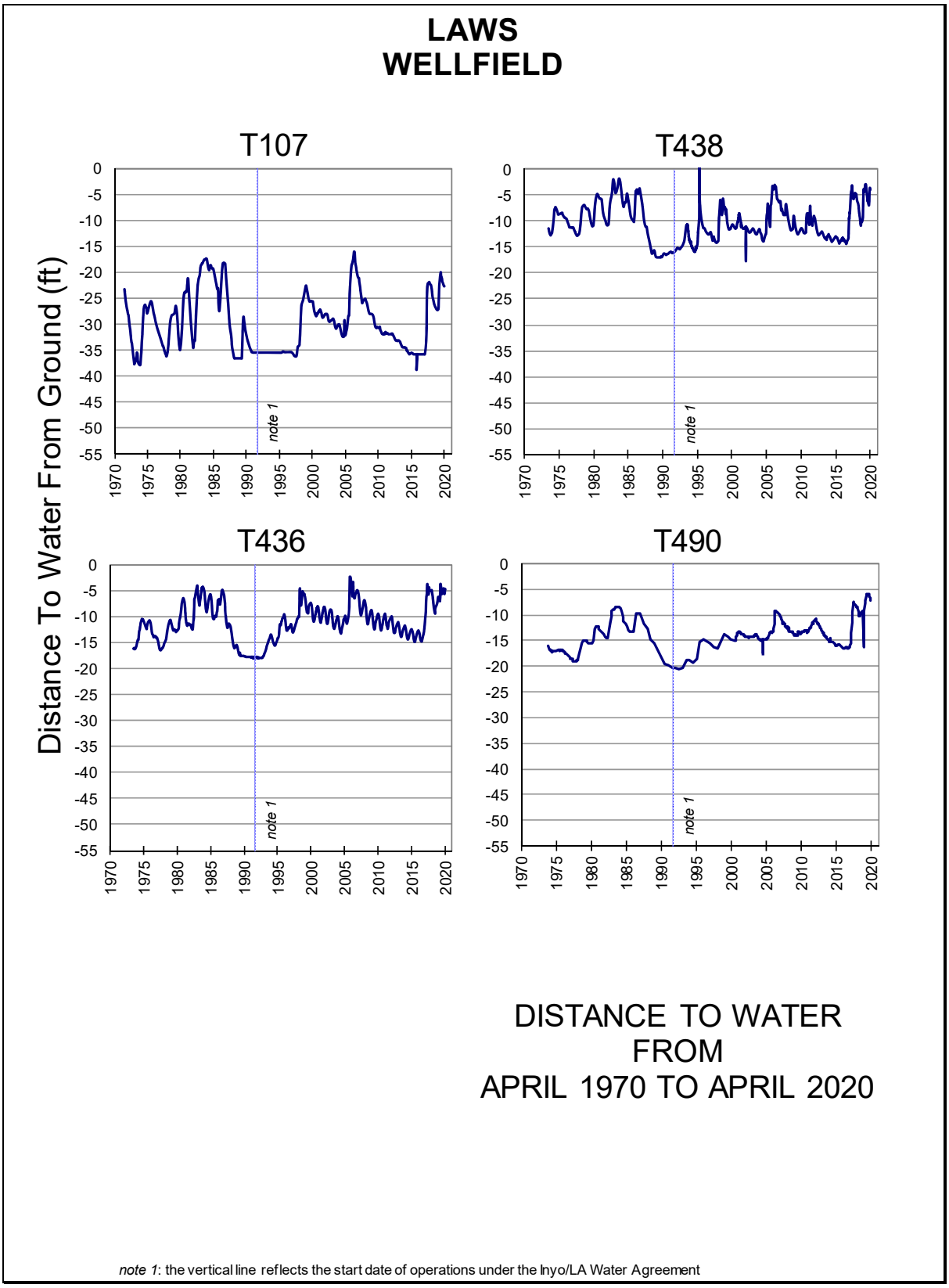


Figure 2.2. Distance to Water Hydrographs for Laws Wellfield

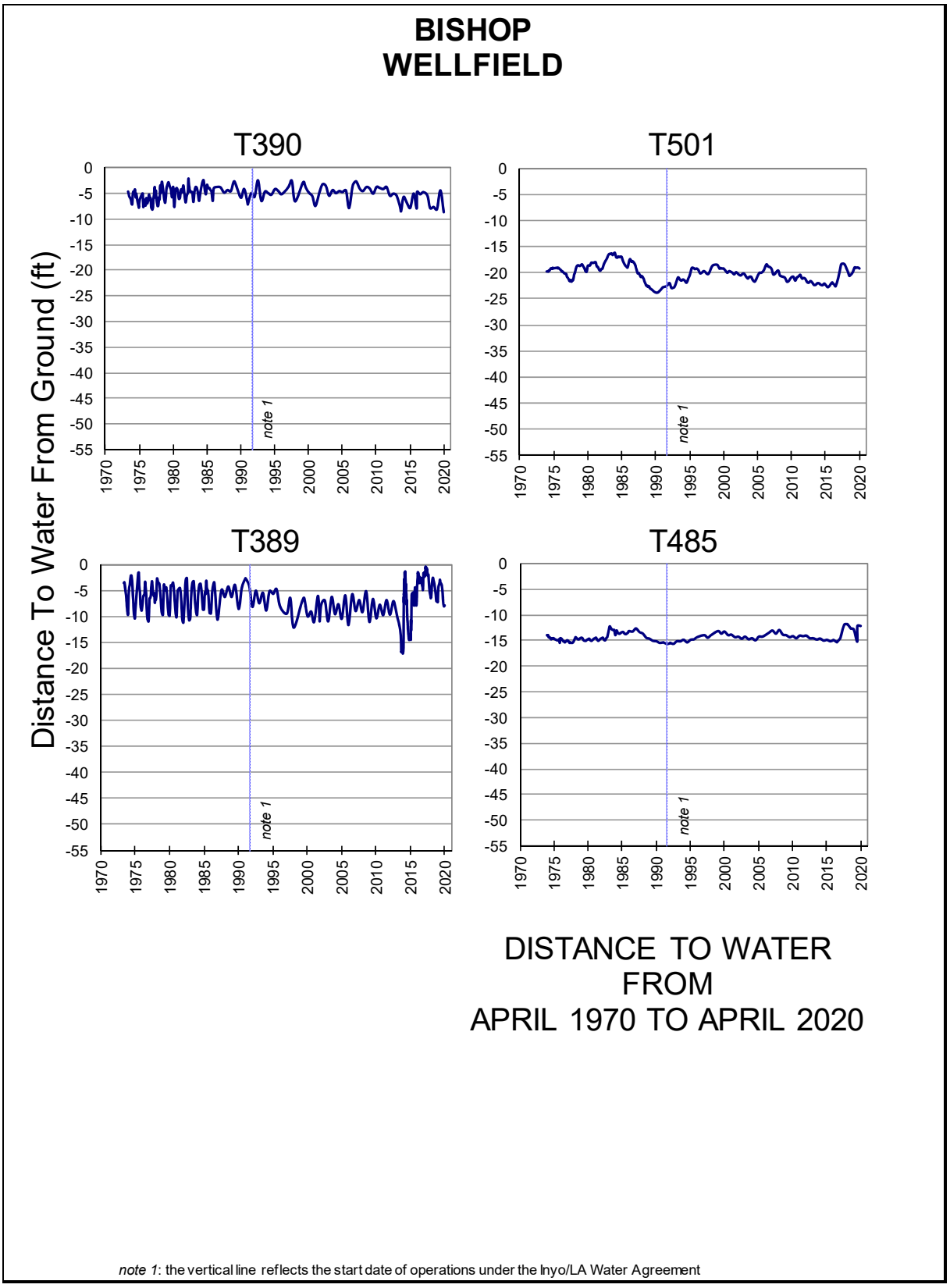


Figure 2.3. Distance to Water Hydrographs for Bishop Wellfield

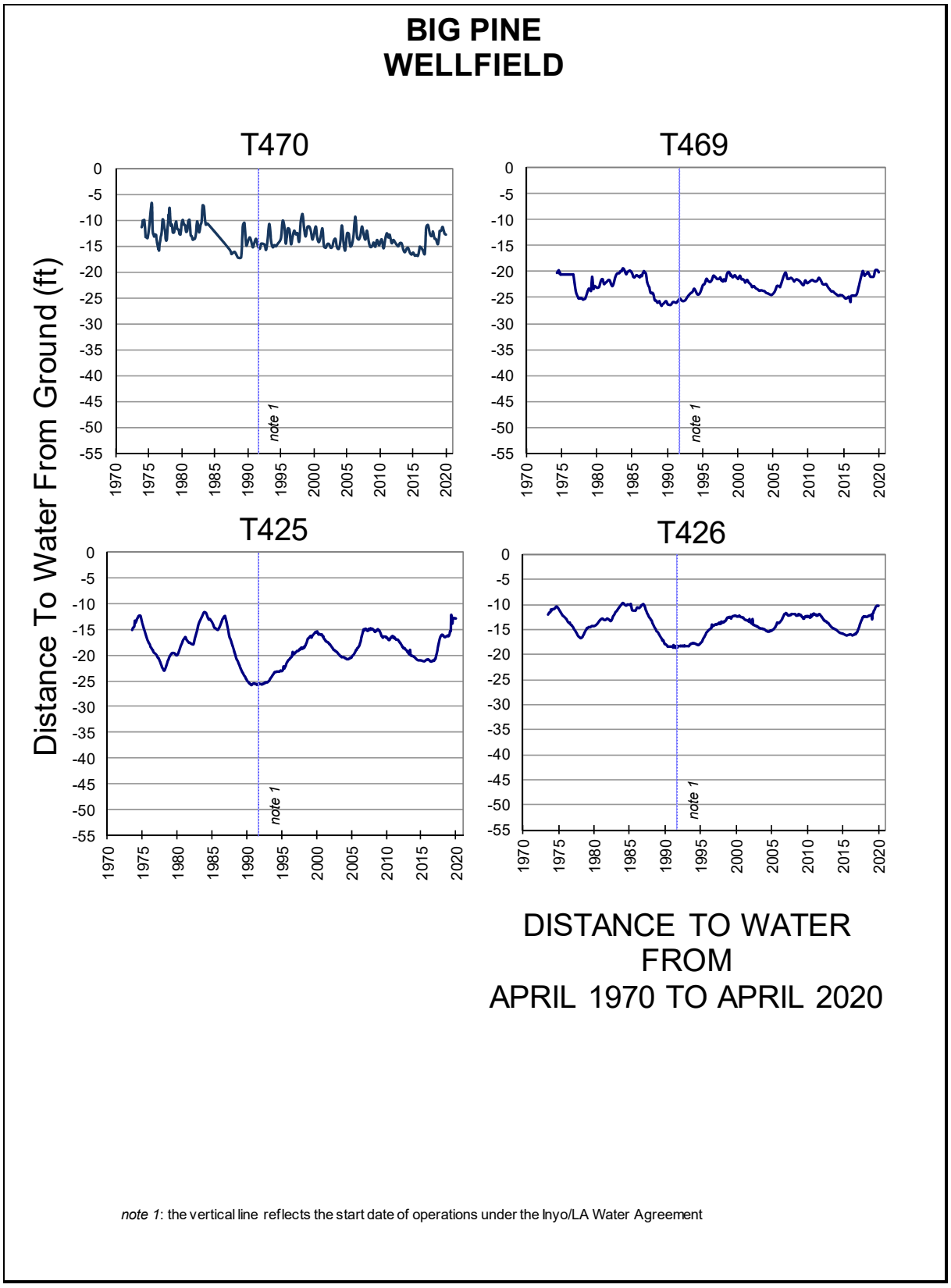


Figure 2.4. Distance to Water Hydrographs for Big Pine Wellfield

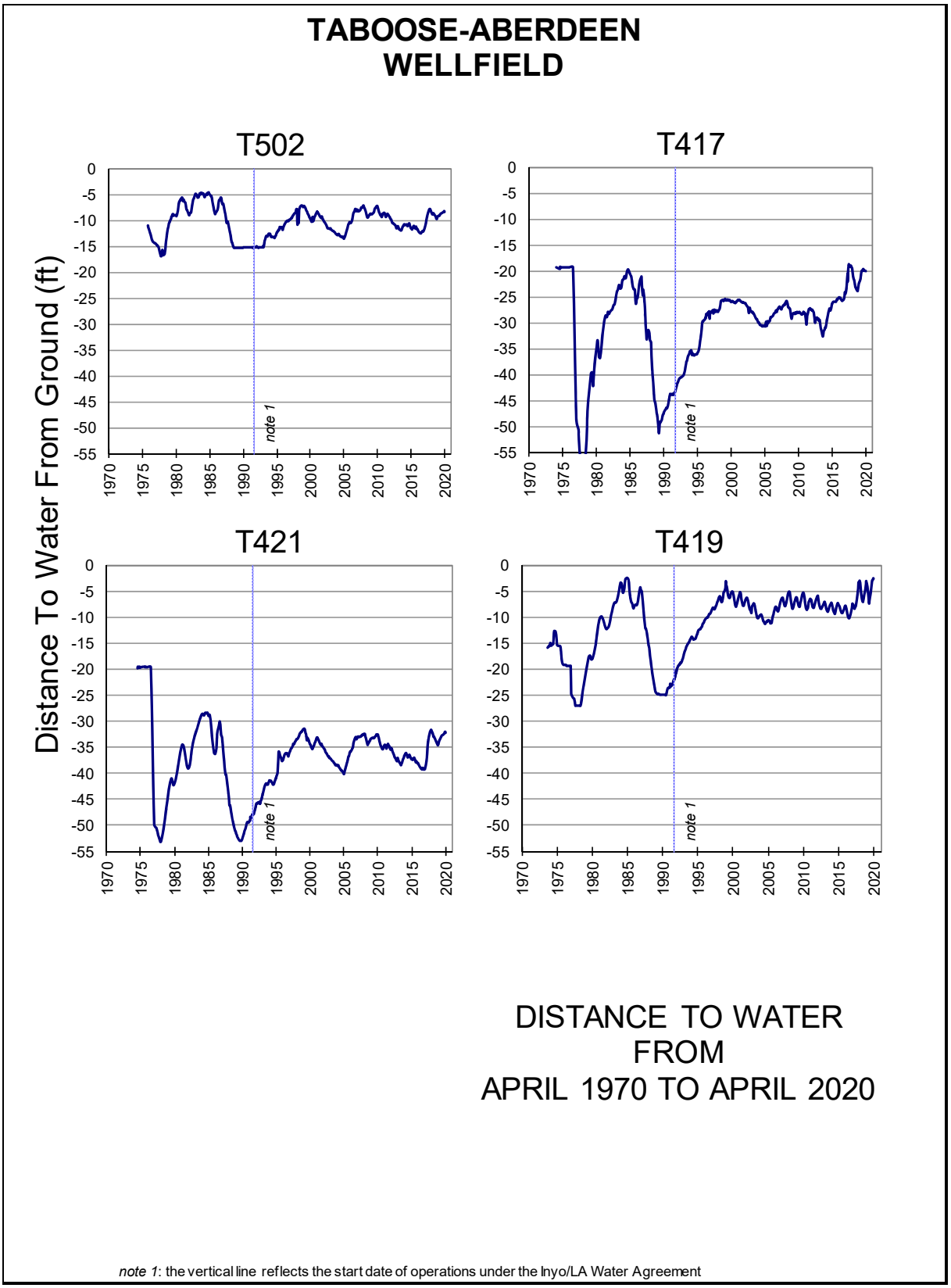


Figure 2.5. Distance to Water Hydrographs for Taboose-Aberdeen Wellfield

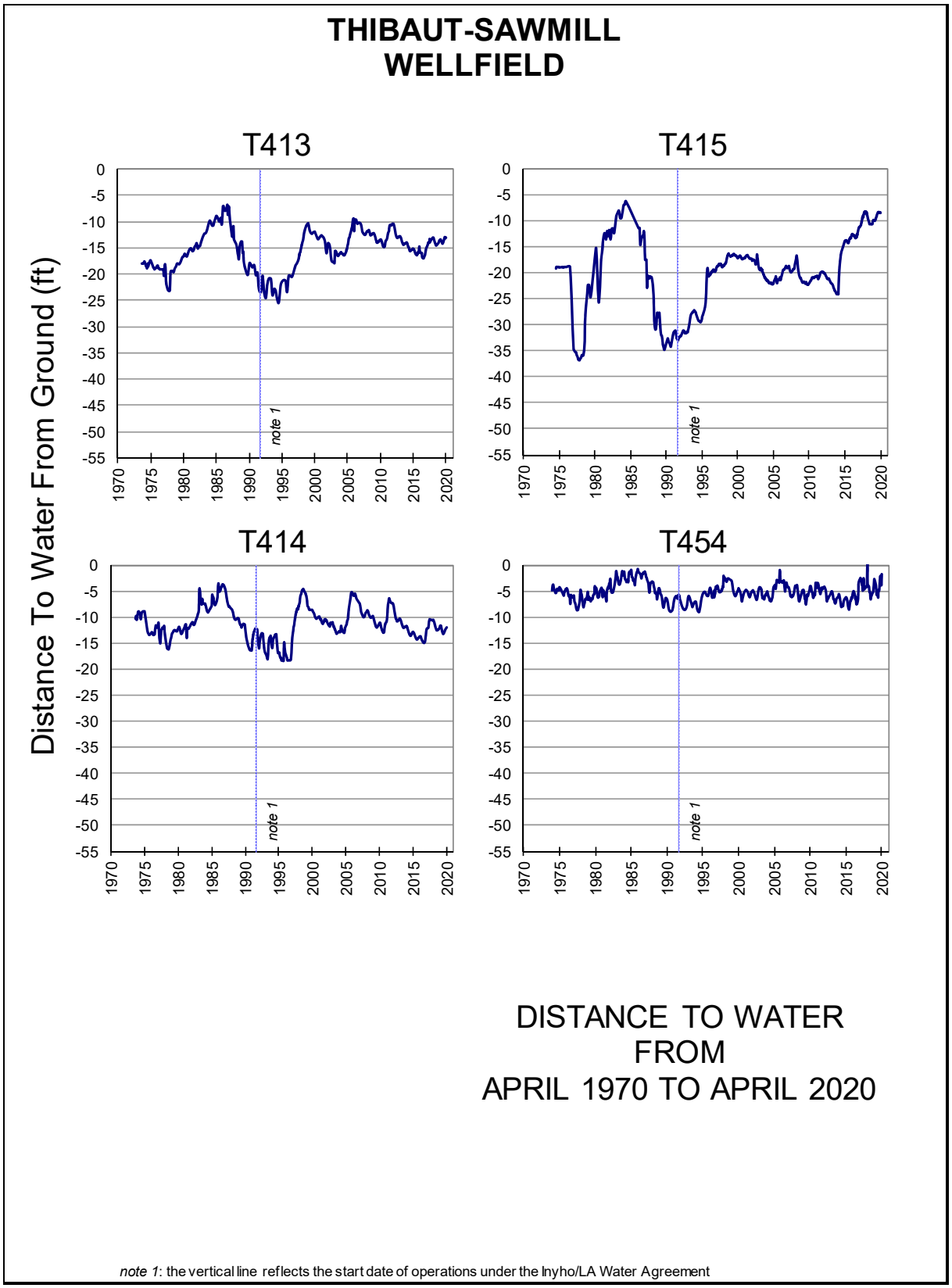


Figure 2.6. Distance to Water Hydrographs for Thibaut-Sawmill Wellfield

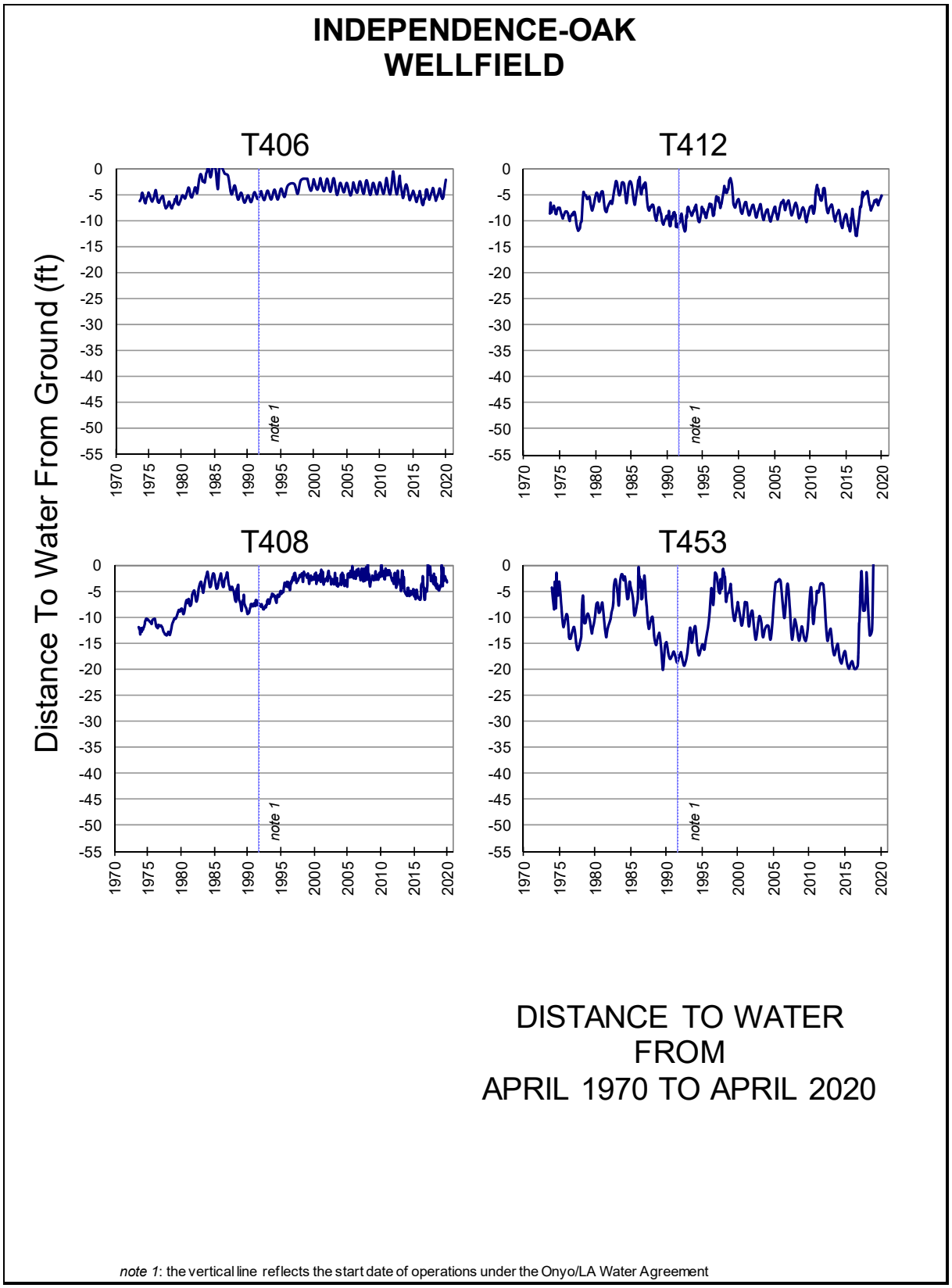


Figure 2.7. Distance to Water Hydrographs for Independence-Oak Wellfield

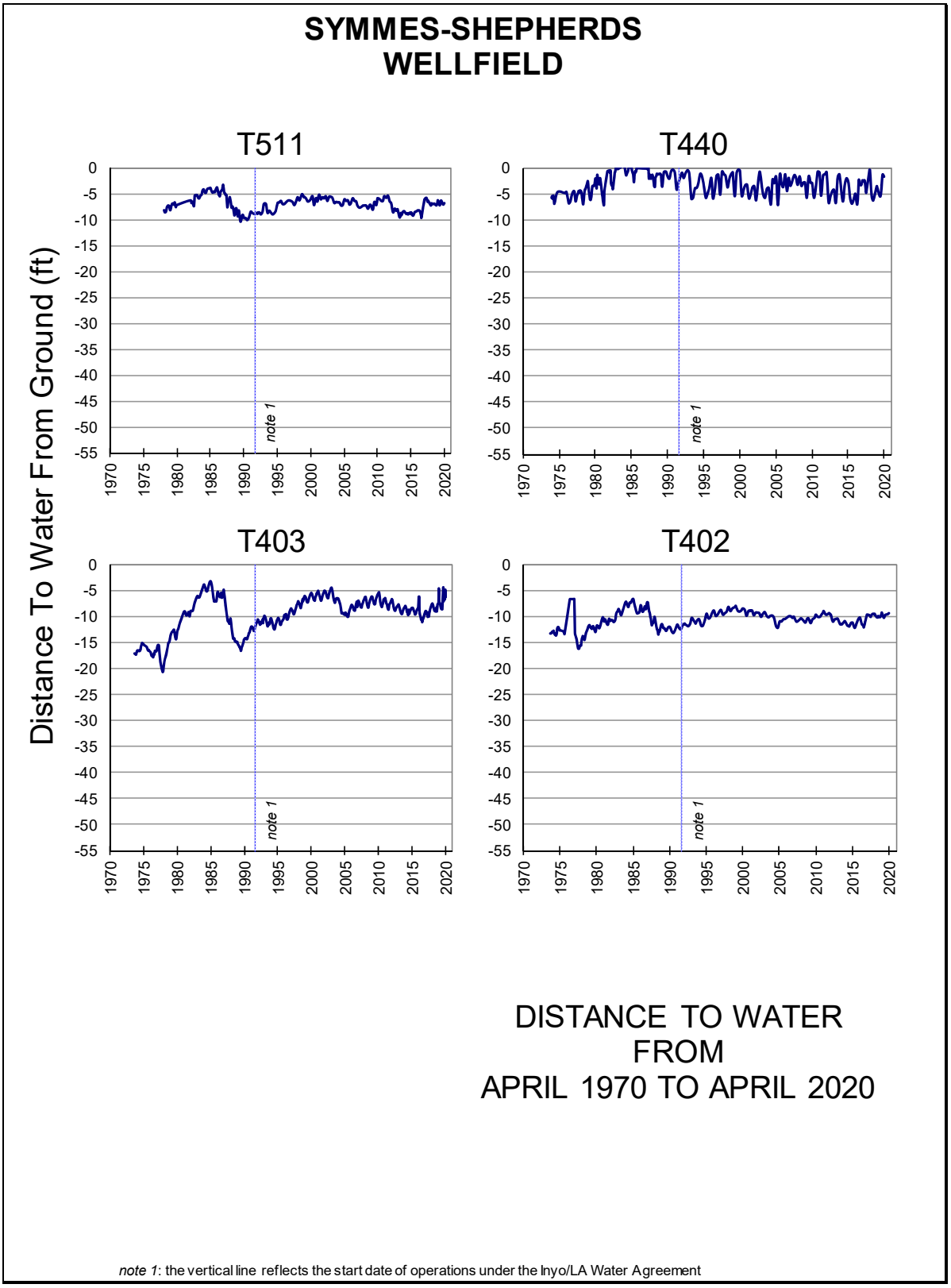


Figure 2.8. Distance to Water Hydrographs for Symmes-Shepherds Wellfield

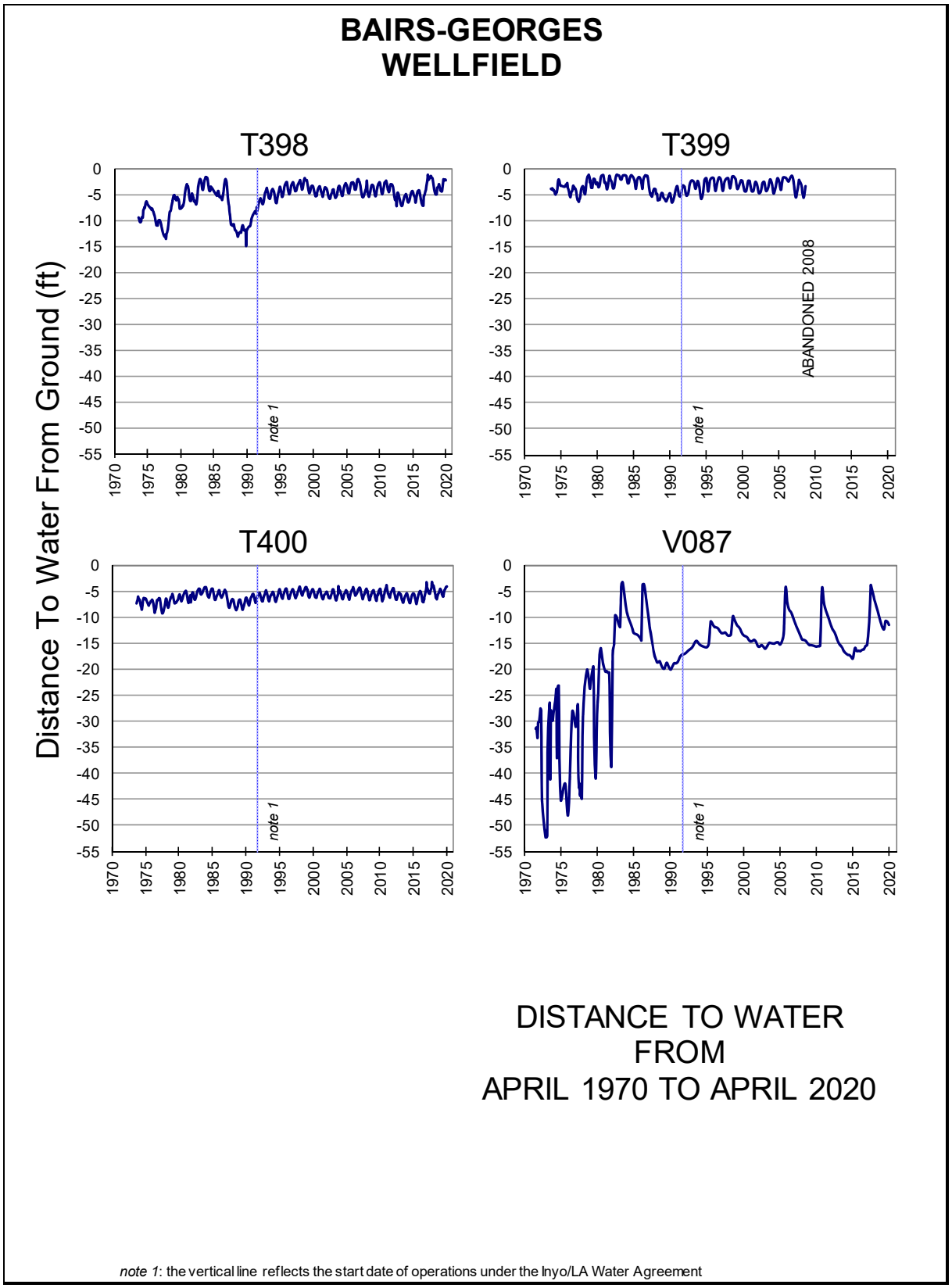


Figure 2.9. Distance to Water Hydrographs for Bairs-Georges Wellfield

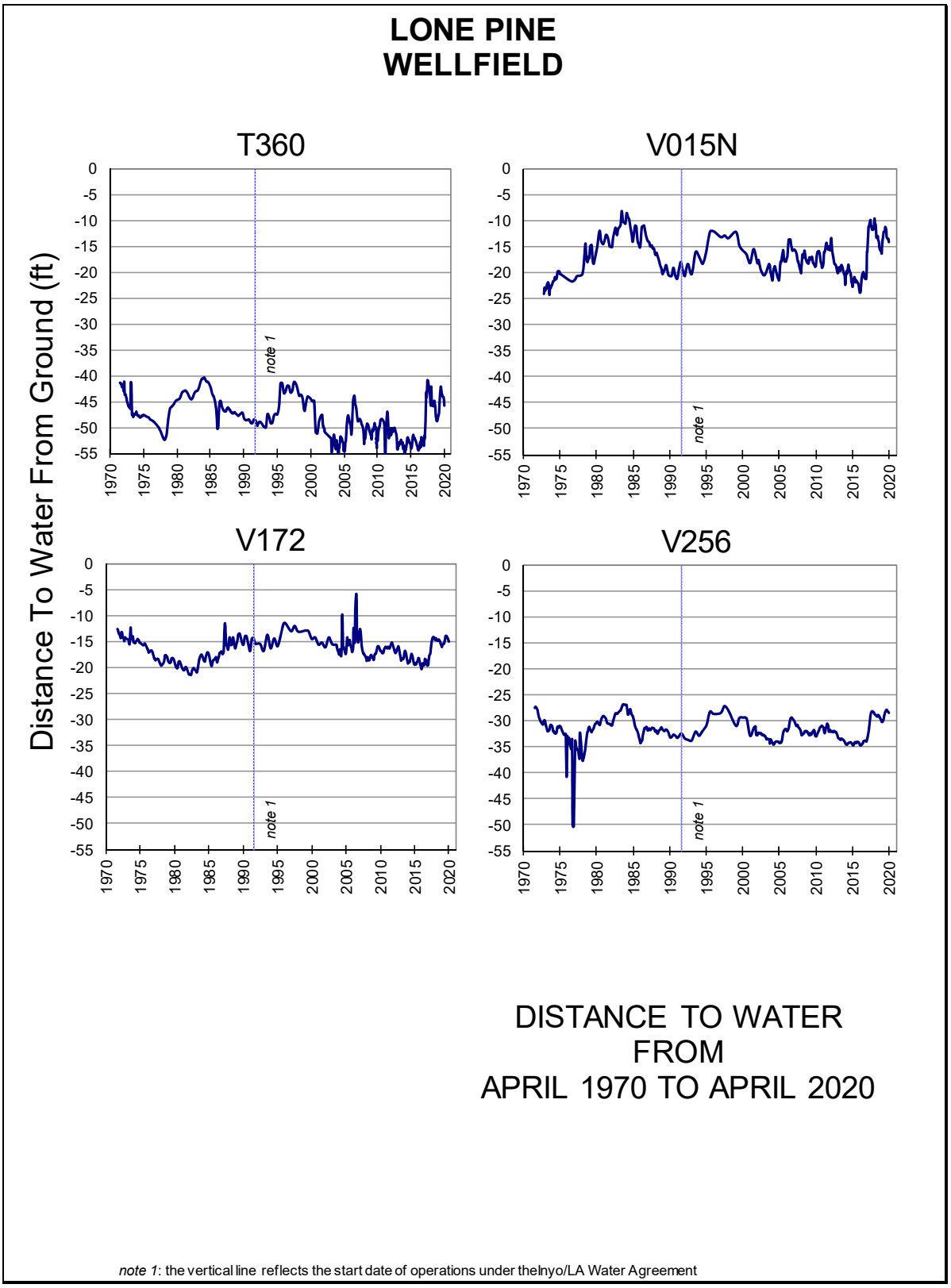


Figure 2.10. Distance to Water Hydrographs for Lone Pine Wellfield

2.3 Precipitation Record and Runoff Forecast

The Eastern Sierra snowpack as of April 1, 2020 was 52% of normal in the Mammoth Lakes area, 32% of normal in the Rock Creek area, 50% of normal in the Bishop area, 44% of normal in the Big Pine area, and 81% of normal in the Cottonwood Lakes area. The Eastern Sierra overall snowpack, weighted by contribution to Owens River watershed runoff was calculated to be 54% of the 50-year (1966-2015) average snowpack as of April 1, 2020 (Table 2.2).

The Eastern Sierra runoff forecast for the 2020-21 runoff year is 299,600 acre-feet or 74% of 50-year average (Section 1, Table 1.1). Figure 2.11 provides a comparison of the forecasted runoff for the 2020-21 year to actual runoff in previous runoff years.

Average precipitation on the valley floor for the 2019-20 year was 3.7 inches, which is 63% of the 50-year average precipitation of 5.8 inches. Table 2.3 details monthly annual precipitation totals for the 2019-20 runoff year as well as the long-term averages at representative precipitation gauges throughout the Owens Valley.

Table 2.2. Eastern Sierra April 1, 2020 Snow Survey Results

EASTERN SIERRA SNOW SURVEY RESULTS
April 1, 2020

MAMMOTH LAKES AREA (Contributes 27% of Owens River Basin runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Mammoth Pass	24.4	42.6	57%
Mammoth Lakes	8.8	20.5	43%
Minarets 2	14.7	29.5	50%
Mammoth Lakes Area Average:	**15.9**	**30.9**	**52%**

ROCK CREEK AREA (Contributes 16% of Owens River Basin runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Rock Creek 1	2.2	7.3	30%
Rock Creek 2	4.4	10.2	44%
Rock Creek 3	3.4	13.7	25%
Rock Creek Area Average:	**3.3**	**10.4**	**32%**

BISHOP AREA (Contributes 19% of Owens River Basin runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Sawmill	9.7	19.3	50%
Bishop Area Average:	**9.7**	**19.3**	**50%**

BIG PINE AREA (Contributes 13% of Owens River Basin runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Big Pine Creek 2	5.3	13.3	40%
Big Pine Creek 3	8.6	18.2	47%
Big Pine Creek Area Average:	**6.9**	**15.7**	**44%**

COTTONWOOD AREA (Contributes 25% of Owens Basin River runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Cottonwood Lakes 1	11.0	12.5	88%
Trailhead*	9.7	13.1	74%
Cottonwood Area Average:	**10.4**	**12.8**	**81%**

EASTERN SIERRA OVERALL SNOW PACK (Weighted by contribution to Owens River Basin runoff)

Average of all Snow Courses	Water Content	April 1 Normal	Percent of Normal
	10.2	**19.0**	**54%**

Table 2.3. - Owens Valley Precipitation during Runoff Year 2019-20 in Inches

Month	Bishop	Big Pine	Tinemaha Reservoir	LAA Intake	Indep. Yard	Alabama Gates	Lone Pine	Cotton-wood	South Haiwee	Average Owens Valley
April, 2019	0.02	0.03	0.02	0.05	0.04	0.01	0.06	0.08	0.11	0.05
May	1.07	1.22	1.16	1.06	0.68	1.02	0.58	0.90	0.75	0.94
June	0.12	0.06	0.08	0.06	0.12	0.00	0.16	0.01	0.14	0.08
July	0.00	0.06	0.03	0.01	0.05	0.00	0.00	0.00	0.00	0.02
August	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.01
September	0.00	0.00	0.00	0.00	0.06	0.34	0.14	0.10	0.36	0.11
October	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
November	0.79	0.62	0.90	1.15	1.19	0.69	1.03	0.86	1.37	0.96
December	0.13	0.43	0.48	0.77	0.73	0.63	0.67	0.76	1.38	0.66
January, 2020	0.08	0.23	0.03	0.03	0.09	0.01	0.24	0.07	0.00	0.09
February	*0.14*	*0.10*	*0.18*	*0.17*	*0.21*	*0.25*	*0.32*	*0.29*	*0.46*	*0.24*
March	*0.26*	*0.17*	*0.17*	*0.33*	*0.57*	*0.48*	*0.71*	*0.91*	*0.92*	*0.50*
2019-20	2.6	2.9	3.1	3.6	3.7	3.4	3.9	4.1	5.5	3.7
Average*	6.2	6.2	6.6	5.6	5.5	4.0	3.9	6.8	7.1	5.8
% of Average	42%	47%	46%	65%	69%	85%	100%	61%	78%	63%

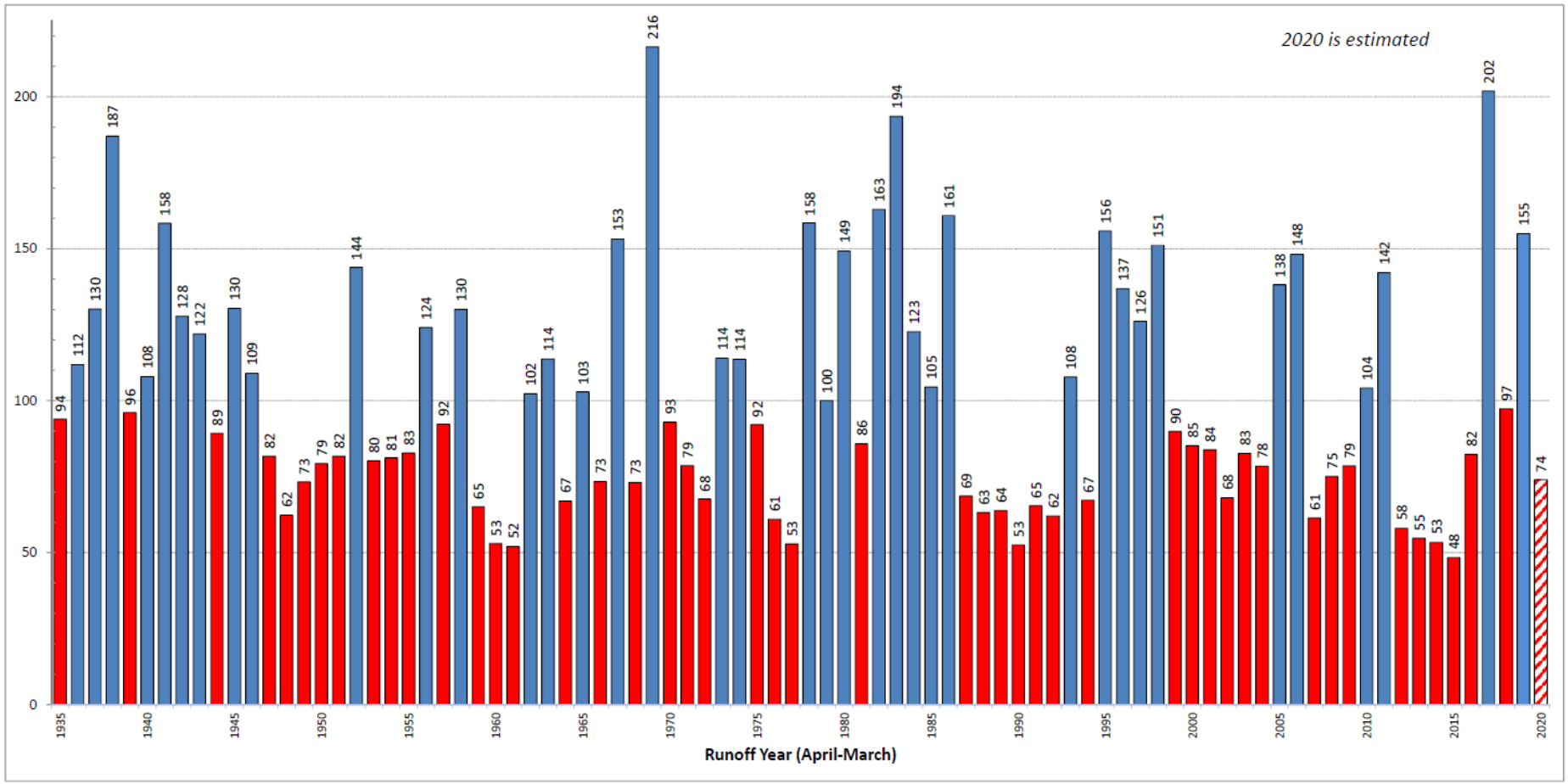


Figure 2.11. Eastern Sierra Runoff – Percent of Normal

Owens Valley Water Supply and Uses

Table 2.4 provides an overview of the Owens Valley water supply, in-valley uses and losses, and Los Angeles Aqueduct (LAA) exports for the post-Water Agreement period (1992-93 through 2019-20 runoff years) as compared to the pre-project average (pre-Second Los Angeles Aqueduct) and projected water supply and uses (based on the Water Agreement, 1991 EIR, and 1997 MOU). Actual water uses in the Owens Valley are generally consistent with the projected values under the 1991 EIR and 1997 MOU.

While Owens Valley water supply (runoff, flowing wells, and pumped groundwater) has remained about the same over the long term average, exports are considerably less than anticipated under the 1991 EIR and 1997 MOU. The fundamental reasons for the reduction in the exports for the municipal water supply in Los Angeles are increased water uses for dust mitigation on Owens Lake, mandated decreases in water exported from the Mono Basin, and less groundwater pumping than anticipated under the Water Agreement.

Current Owens Valley water uses are compared to pre-project uses as well as those uses projected under the Water Agreement and 1997 MOU in Figure 2.12. The components of LADWP's water exports from the Eastern Sierra are compared to pre-project exports as well as those projected under the Water Agreement and 1997 MOU in Figure 2.13.

Table 2.5 provides a breakdown of Owens Valley water uses from 1992 to the present and planned water uses for the 2020-21 runoff year. While much of Table 2.5 is self-explanatory, the following items bear additional explanation:

- Enhancement/mitigation (E/M) water supply is the water supplied to E/M projects referenced in the 1991 EIR,
- LORP is water supplied to the Lower Owens River Project,
- Operations is water used for operational reasons.

Table 2.6 lists a breakdown of water supplied to E/M projects during the 2019-20 runoff year.

Table 2.4. Owens Valley Water Supply and Uses

(Amounts in Thousands of Acre-Feet/Year)

	Pre-Project (1945-70)	Projected per MOU/ Water Agreement	Actual Data for Runoff Year 2019-20	Actual Post Water Agreement Averages (1992-2020)
Owens Valley Water Supply				
Runoff (Owens Valley & Round Valley)	292	310[1]	*447*	290
Flowing Wells	44	15	*34*	32
Pumped Groundwater	10	110[2]	*53*	73
Total	346	435	*534*	395
In-Valley Uses & Losses				
Water Used on City Lands in O.V.				
Irrigated Lands [3]	62	46	*54*	48
Stockwater, Wildlife, and Rec. Uses [4]	20	23	*20*	21
Post 1985 E/M Projects [5]	0	12	*11*	10[8]
Lower Owens River [6]	0	27[7]	*17*	18[8]
Additional Mitigation (1,600 af from MOU)	0	0	*2*	2[8]
Sub-Total	82	110	*103*	99
Other O.V. Uses and Losses [9]	134	135	254	188
Total	216	245	*357*	287
Components of Aqueduct Export				
Owens Valley Contribution to Export	130	190	*177*	108
Long Valley Contribution to Export	134	135	*139*	137
Mono Basin Contribution to Export [10]	58	30	*16*	12
Total	322	355	*332*	257

1. Average runoff for period 1935 to 1988 (Runoff Year)
2. Assumed based on 1991 O.V. Groundwater Pumping EIR
3. Does not include areas receiving water supplies non-tributary to the Owens River/Aqueduct (approx. 7,000 AFY).
4. Includes projects such as the Tule Elk Field, Farmers Ponds implemented after 1970 and before 1985 when E/M projects commenced. Also includes the LORP Off-River Lakes and Ponds uses.
5. Except Lower Owens River Rewatering E/M Project
6. Includes river losses, releases to the Blackrock Waterfowl Habitat Area, and the Delta
7. Assumes: 6,000 AF year-round flow to delta, 1,000 AF to Blackrock, and 19,600 AF for river channel losses.
8. Represents recent history.
9. Includes uses for dust mitigation for Owens Lake, Indian land, private lands, conveyance losses, recharge, evaporation, and operational releases.
10. 1993 Court decision allows approximately 30,000 AFY when lake reaches elevation 6392. Prior to Court decision Mono Basin export averaged 81,000/yr.

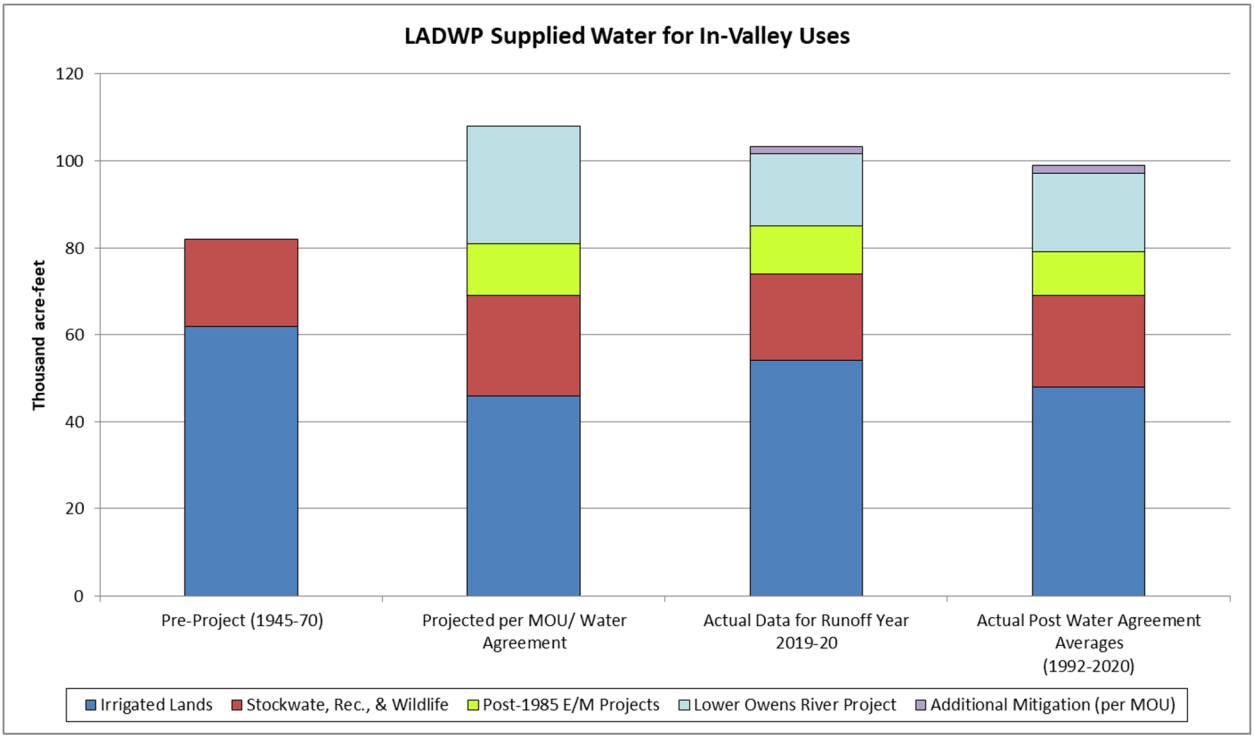


Figure 2.12. Owens Valley Water Uses

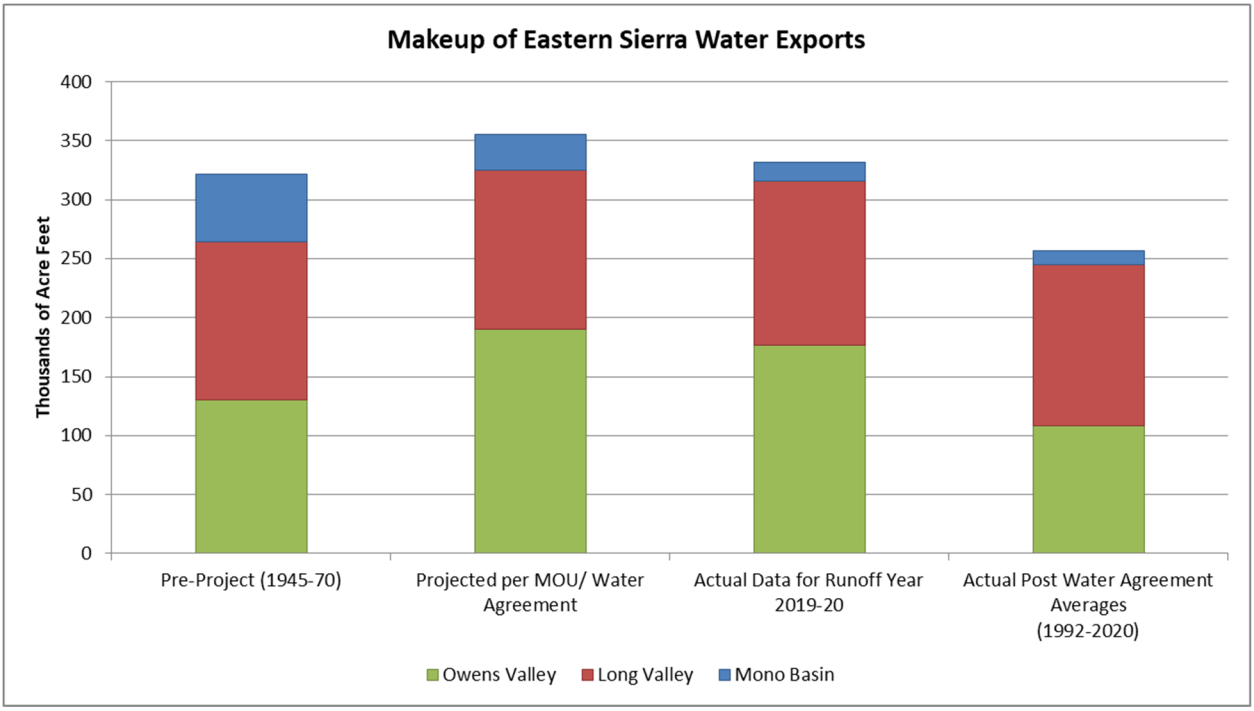


Figure 2.13. Components of the Eastern Sierra Water Exports

Table 2.5. Water Uses for 1992-93 through 2019-20 and Planned Uses for the 2020-21 Runoff Year (acre-feet)

(1) Runoff Year	(2) Owens Valley Runoff %	(3) Owens Valley Pumping (1000 af)	(4) Irrigation	(5) Stock Water	(6) E/M	(7) Rec. & Wildlife	(8) LORP	(9) 1600 AF Projects	(10) In-Valley Uses (sum of 4+5+6+ 7+8+9)	Groundwater Recharge		(13) Operations	(14) All Uses (sum of 10+11+12+13)
										(11) Big Pine & Independence Spreading	(12) Laws Spreading		
1992-93	62%	84	37,131	17,828	9,088	7,725	9,269		81,041	0	0	12,179	93,220
1993-94	108%	76	47,798	17,230	13,443	8,676	5,867		93,014	14,512	10,640	12,433	130,599
1994-95	68%	89	37,790	17,178	9,132	8,116	11,638		83,854	0	56	12,102	96,012
1995-96	156%	70	57,748	20,919	11,162	12,479	11,636		113,944	30,126	21,148	13,561	178,779
1996-97	137%	75	46,171	19,757	10,989	9,438	13,031		99,386	4,606	0	21,125	125,117
1997-98	126%	67	47,114	16,422	8,114	8,022	13,069		92,741	4,113	4,106	13,874	114,834
1998-99	151%	52	45,445	13,654	9,075	8,691	11,192		88,057	24,970	31,077	23,016	167,120
1999-00	90%	64	49,529	14,461	8,836	7,470	15,973		96,269	0	0	11,263	107,532
2000-01	85%	68	49,327	13,442	7,989	7,263	12,090		90,111	0	790	12,517	103,418
2001-02	84%	73	43,296	12,759	9,401	7,487	12,485		85,428	0	230	12,973	98,631
2002-03	68%	82	43,929	12,291	11,442	7,377	9,690		84,729	0	0	8,431	93,160
2003-04	83%	88	45,974	11,620	10,926	6,853	10,243		85,616	0	0	8,787	94,403
2004-05	78%	86	50,311	11,546	9,915	6,866	8,910		87,548	243	695	9,536	98,022
2005-06	138%	57	53,832	11,355	11,587	7,807	7,566		92,147	16,212	24,187	14,814	147,360
2006-07	148%	59	50,968	12,041	11,551	7,849	11,700		94,109	29,457	16,855	38,937	179,358
2007-08	61%	60	47,699	12,161	11,565	10,122	22,501		104,048	0	0	5,631	109,679
2008-09	75%	69	56,130	11,435	10,646	8,479	20,957		107,647	1,342	0	7,651	116,640
2009-10	79%	65	52,933	11,450	10,695	10,398	15,708		101,184	0	0	8,453	109,637
2010-11	104%	80	52,983	12,275	10,807	12,106	17,020		105,191	2,993	1,973	14,280	124,437
2011-12	142%	92	62,391	11,566	11,847	9,702	19,556		115,062	13,231	4,119	8,785	141,197
2012-13	58%	89	48,763	10,961	9,257	9,254	20,927	1,612	100,774	0	0	4,081	104,855
2013-14	55%	79	44,160	11,161	8,222	8,022	17,845	1,625	91,035	0	0	1,926	92,961
2014-15	53%	66	45,491	11,582	9,520	7,615	12,681	1,604	88,493	8,742	0	1,423	98,658
2015-16	*48%*	70	39,598	11,752	8,412	7,934	16,828	1,614	86,138	434	0	1,255	87,827
2016-17	82%	76	49,219	10,969	10,903	8,199	18,585	1,702	99,577	4,200	7,783	17,770	129,330
2017-18	202%	48	53,864	12,534	11,554	10,313	19,533	1,615	109,413	85,175	38,815	90,407	323,810
2018-19	97%	85	49,836	11,437	9,814	7,742	13,777	1,645	94,251	1,406	2,489	2,640	100,786
2019-20	*155%*	*53*	*54,025*	*12,239*	*11,035*	*7,805*	*16,509*	*1,608*	103,221	*33,976*	*26,346*	*31,515*	*195,058*
2020-21	*74%*		*49,600*	*11,350*	*9,700*	*7,530*	*14,000*	*1,600*	*93,780*	*0*	*0*	*0*	93,780
AVG.	99%	72	48,726	13,289	10,229	8,529	14,165	1,625	95,442	9,508	6,597	14,530	126,077

NOTES: PLANNED PUMPING FOR THE 2020-21 RUNOFF YEAR IS ON TABLE 1.6

2020-21 REFLECTS CURRENT YEAR OPERATIONS FORECAST

E/M EXCLUDES RELEASES TO THE LORP

LORP IS RECORD OF THE REWATERING E/M (1985-2006) AND THE MITIGATION PROJECTS (STARTED IN DECEMBER 2006)

LORP RECORD INCLUDES RIVERINE LOSS, RELEASES TO BLACKROCK WATERFOWL, AND RELEASES TO DELTA

Table 2.6. Water Supplied to Enhancement/Mitigation Projects During 2019-20

Project	Water Supplied (acre-feet)
McNally Canals Conveyance Losses	*1,053*
McNally/Laws/Poleta Native Pasture Lands	*1,200*
McNally Ponds	*1,082*
Laws Historical Museum	*110*
Klondike Lake	*1,390*
Big Pine Regreening	*94*
Lower Owens River Rewatering	*--*
Independence Pasture Lands	*1,526*
Independence Springfield	*1,742*
Independence Ditch System	*530*
Independence Woodlot	*115*
Independence Regreening	*70*
Shepherd Creek Alfalfa Lands	*874*
Lone Pine Park/Richards Field	*410*
Lone Pine Woodlot	*78*
Lone Pine Van Norman Field	*454*
Lone Pine Regreening	*307*
Total E/M Uses	11,035

2.4 Owens Valley Vegetation Conditions

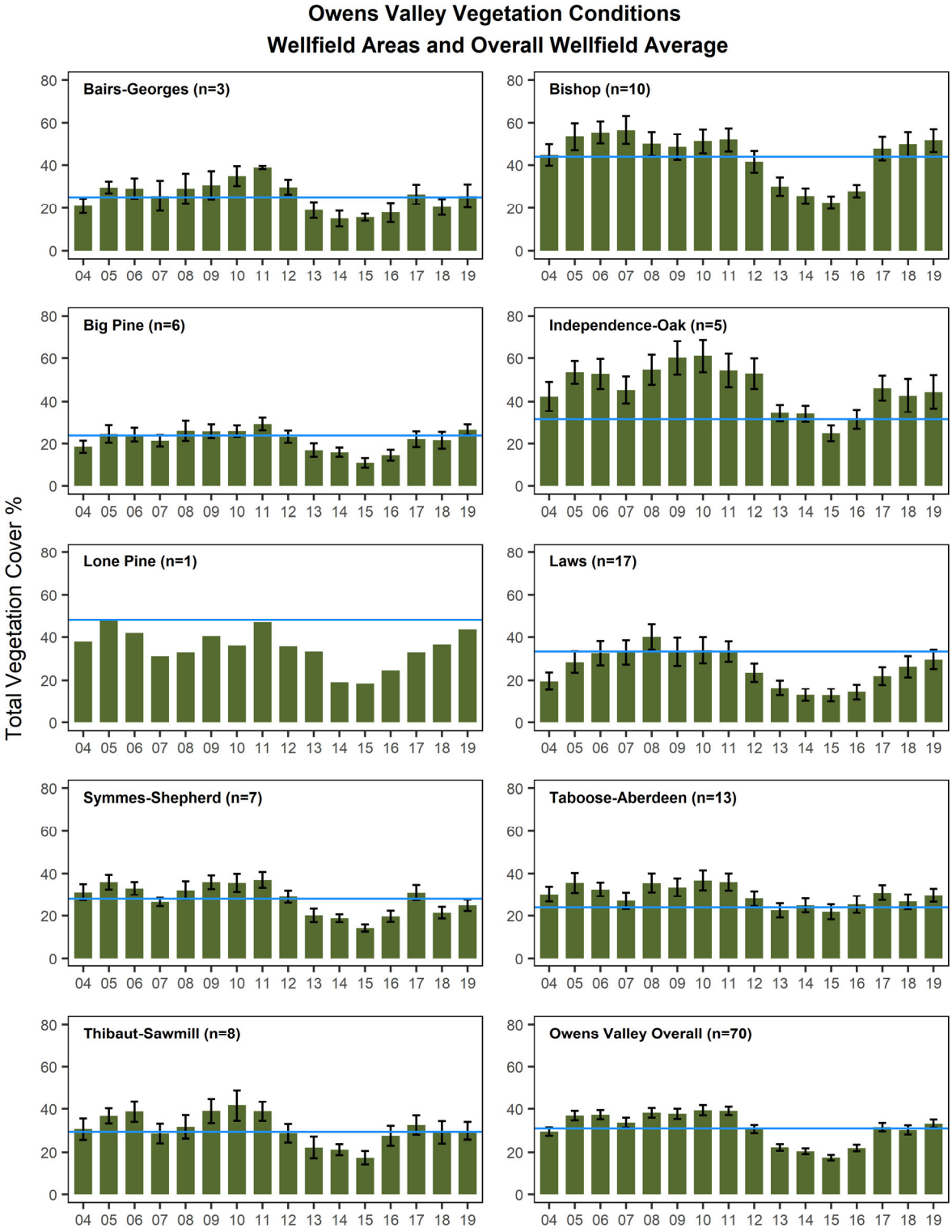
Vegetation conditions within the Owens Valley are monitored using vegetation transects as well as other methods. The Green Book describes the methodology and purposes of vegetation transects. As stated in the Green Book: “Vegetation transects are included within the Green Book to serve two purposes: 1) to estimate transpiration from a monitoring site, and 2) for use in determining whether vegetation has decreased or changed significantly from the previous cover.” A reference for comparison of vegetation changes is the 1984-87 vegetation inventory data.

The Green Book requires the 1984-87 vegetation inventory to be used as a baseline when determining whether vegetation cover and/or species composition have changed. The 1984-1987 inventory transects were chosen using aerial photos to aid in determining transect locations. Transects were located visually by choosing lines that appeared to cover the representative units of vegetation within the parcel being measured. Transects were generally run toward the center of the parcels in order to avoid transitional areas at parcel edges. A minimum of five transects were run on each parcel. If the vegetation cover was particularly heterogeneous, a qualitative method was employed in selecting additional transects. The transect data were checked visually and additional transects were run to lessen the degree of variability as necessary.

The Green Book directs that future transects should be performed in a similar manner as the initial inventory to determine whether vegetation has changed, but allows the technique to be modified by the Technical Group to permit statistical comparison by randomly selected transects. The procedures for modifying the Green Book procedures are included under Water Agreement Section XXV. In any case, the Green Book requires the Technical Group to perform a statistical analysis in order to determine the statistical significance of any suspected vegetation changes from the 1984-87 inventory maps.

In 2004, LADWP began running transects annually within parcels located both inside and outside wellfields. Some parcels are evaluated annually, while others are not. Percent total cover is calculated and compared to data collected within parcels during the period of baseline inventory.

Figure 2.14 includes vegetation transect data collected by LADWP and presented in a series of graphs documenting Owens Valley vegetation conditions. LADWP monitors vegetation using established vegetation transects that enable the Technical Group to reliably assess annual changes in vegetation cover and composition.



Notes: ▬ represents a mean cover during the initial inventory. Data were collected by LADWP and ICWD.

Figure 2.14. Owens Valley Vegetation Condition for Wellfields

2.6 Bishop Cone Audit

LADWP's groundwater pumping on the Bishop Cone is governed by the provisions of the Stipulation and Order filed on August 26, 1940, in Inyo County Superior Court in the case of Hillside Water Company, a corporation et al. vs. the City of Los Angeles, a Municipal Corporation et al., (Hillside Decree) as well as the Water Agreement. Annual groundwater extractions from the Bishop Cone are limited to an amount not greater than the total amount of water used on City of Los Angeles (City) lands on the Bishop Cone during that year. Annual groundwater extractions by LADWP on the Bishop Cone are the sum of all groundwater pumped plus the amount of artesian water that has flowed from wells on the Bishop Cone during the year. Water used on City lands on the Bishop Cone are the quantity of water supplied to such lands, including conveyance losses, less any return flow to the aqueduct system.

The Inyo County Water Department (ICWD) performs an annual audit of LADWP water uses and groundwater extractions by LADWP on the Bishop Cone. Section 2 Appendices contain a copy of ICWD's audit for the 2018-19 runoff year. As shown in Figure 1.5, LADWP has historically pumped much less than allowed under the terms of the Hillside Decree. Beginning in the 2015-16 runoff year, the audit water account methods were modified to analyze each areas inflows and outflows to calculate total water use. In the 2018-19 runoff year LADWP extracted 16,297 acre-feet of water from the Bishop Cone area (10,751 acre-feet pumping, 5,546 acre-feet flowing), about 60 percent of that identified as being allowed using the current audit procedures.

2.7 Reinhackle Spring Monitoring

As required by the 1991 EIR, Owens Valley groundwater pumping is managed to avoid reductions in spring flows that would cause significant decreases or changes in spring-associated vegetation. Groundwater pumping from wells that may affect flow from Reinhackle Spring are managed so that flows from the spring are not significantly reduced compared to flows under prevailing natural conditions. Table 2.7 shows daily flow values for Reinhackle Spring. Over the 2019-20 runoff year, Reinhackle Spring had an average daily flow of about 2.2 cfs.

Analysis of Reinhackle Spring was included in a 2004 cooperative study by LADWP and ICWD on the Owens Valley groundwater geochemistry. During the study, water samples from Reinhackle Spring were chemically analyzed and compared to water samples from the LAA, nearby pumping wells, samples from the deep aquifer, and samples from shallow monitoring wells. The 2004 study concluded that the water flowing from Reinhackle Spring is similar in composition to aqueduct water and not similar to the deep aquifer samples or up-gradient shallow aquifer wells. Testing to determine the effects of groundwater pumping and LAA seepage on Reinhackle Spring flow was conducted between May 2010 and April 2011. Data and analysis from the 2004 cooperative study and 2010-11 testing have been included in a draft monitoring and operations plan for the Bairs-Georges Wellfield known as the draft Reinhackle Spring Flow Characterization Report and Operations Plan. The draft Reinhackle Spring Flow Characterization Report and Operations Plan was sent to the Inyo County Water Department for review in November 2012.

Table 2. 7. Reinhackle Spring Flow in cfs during 2019-20 Runoff Year

Day of Month	April	May	June	July	August	September	October	November	December	January	February	March	Annual
1	1.56	1.70	1.84	1.98	2.19	2.51	2.69	2.69	2.69	2.37	2.03	*1.98*	
2	1.56	1.70	1.84	1.98	2.21	2.52	2.69	2.69	2.69	2.37	2.03	*1.98*	
3	1.56	1.73	1.84	1.98	2.22	2.53	2.69	2.69	2.69	2.37	2.02	*1.98*	
4	1.59	1.74	1.85	1.98	2.22	2.55	2.69	2.69	2.69	2.37	2.03	*1.98*	
5	1.61	1.74	1.88	1.98	2.22	2.58	2.69	2.69	2.69	2.37	2.03	*1.98*	
6	1.61	1.78	1.88	1.99	2.24	2.61	2.69	2.69	2.69	2.37	2.01	*1.98*	
7	1.61	1.77	1.88	1.98	2.27	2.61	2.66	2.69	2.69	2.37	1.98	*1.98*	
8	1.61	1.77	1.88	1.99	2.27	2.62	2.63	2.69	2.69	2.37	1.98	*1.98*	
9	1.61	1.76	1.87	2.00	2.27	2.63	2.65	2.69	2.69	2.37	1.98	*1.98*	
10	1.61	1.79	1.87	2.02	2.27	2.60	2.64	2.69	2.57	2.37	1.98	*1.98*	
11	1.61	1.79	1.88	2.03	2.27	2.58	2.63	2.69	2.43	2.37	1.98	*1.98*	
12	1.61	1.79	1.88	2.03	2.30	2.58	2.63	2.69	2.43	2.37	1.98	*2.00*	
13	1.61	1.79	1.86	2.05	2.32	2.58	2.64	2.69	2.39	2.37	1.96	*2.00*	
14	1.61	1.79	1.86	2.07	2.33	2.58	2.69	2.69	2.37	2.37	1.93	*2.00*	
15	1.61	1.79	1.86	2.07	2.34	2.58	2.69	2.69	2.37	2.37	1.98	*2.00*	
16	1.61	1.79	1.88	2.07	2.34	2.60	2.69	2.69	2.37	2.37	1.98	*2.00*	
17	1.61	1.82	1.88	2.06	2.37	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
18	1.61	1.84	1.88	2.07	2.37	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
19	1.61	1.84	1.88	2.07	2.40	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
20	1.61	1.84	1.88	2.08	2.40	2.63	2.72	2.69	2.37	2.37	1.98	*2.00*	
21	1.61	1.84	1.88	2.07	2.41	2.63	2.70	2.69	2.37	2.37	1.98	*2.00*	
22	1.64	1.82	1.90	2.07	2.44	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
23	1.65	1.84	1.89	2.10	2.43	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
24	1.65	1.83	1.90	2.12	2.45	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
25	1.65	1.82	1.89	2.12	2.46	2.63	2.69	2.69	2.37	2.37	1.98	*2.00*	
26	1.65	1.79	1.91	2.16	2.47	2.64	2.69	2.69	2.37	2.37	1.98	*2.00*	
27	1.66	1.80	1.93	2.17	2.48	2.69	2.69	2.69	2.37	2.37	1.98	*2.00*	
28	1.69	1.81	1.93	2.17	2.48	2.69	2.69	2.69	2.37	2.39	1.98	*2.00*	
29	1.70	1.81	1.93	2.17	2.49	2.69	2.69	2.69	2.37	2.04	1.98	*2.00*	
30	1.70	1.83	1.95	2.17	2.50	2.69	2.69	2.69	2.37	2.04		*2.00*	
31		1.84		2.17	2.51		2.69		2.37	2.03		*2.00*	
Average	1.62	1.79	1.88	2.06	2.35	2.61	2.68	2.69	2.47	2.34	1.99	*1.99*	2.21

2.8 Water Spreading in the Owens Valley

In years with much greater than normal snowmelt, the volume of runoff may at times exceed the capacity of the LAA system. During periods of high snowpack runoff, LADWP may spread runoff water for operational reasons. In addition, other operational needs may require LADWP to spread water.

No water spreading is planned in the Owens Valley for the 2020-21 runoff year.

LADWP ENVIRONMENTAL MITIGATION PROJECTS AND OTHER LEGAL OBLIGATIONS

3.0 LADWP ENVIRONMENTAL MITIGATION PROJECTS AND OTHER LEGAL OBLIGATIONS

3.1. Introduction

Section 3 provides information on all of the Los Angeles Department of Water and Power's (LADWP) mitigation projects and other obligations required under the Inyo/Los Angeles Water Agreement (Water Agreement), the *1991 Environmental Impact Report on Water From the Owens Valley to Supply the Second Los Angeles Aqueduct* (1991 EIR), the subsequent *1997 Memorandum of Understanding between the City of Los Angeles Department of Water and Power, the County of Inyo, California Department of Fish and Game, the California State Lands Commission, the Sierra Club, and the Owens Valley Committee* (1997 MOU) and related documents. Tables 3.1 and 3.2 provide a quick reference guide to all of these commitments. Projects/obligations are listed alphabetically in Tables 3.1 and 3.2 and have a corresponding number in the left column for reporting purposes only and show current status of these projects/obligations.

For reference, status of these projects is classified into the following categories:

Complete: Project has no additional commitments required (no water allotment or other financial or environmental mitigation; no continual monitoring and reporting),

Ongoing as necessary/required: These measures are only applied when necessary (monitoring and reporting for mitigation measures for new projects, construction, etc.),

Implemented and ongoing: Project is fully implemented and is currently meeting goals; however, there may be ongoing water or financial commitments or monitoring and reporting requirements,

Fully implemented but not meeting goals: Project is fully implemented but has not yet met prescribed goals or success criteria,

Not fully implemented: Project is under development or under construction, but not fully implemented.

Presently, of the 64 required environmental mitigation projects, LADWP reports:

- 9 are complete,
- 42 are implemented and ongoing (with ongoing water or financial commitments or monitoring and reporting requirements),
- 13 are fully implemented but not meeting goals,
- 0 are not fully implemented

Of the 48 other obligations, LADWP reports:

- 18 are complete,
- 6 are ongoing as necessary or required,
- 21 are implemented and ongoing,
- 1 are fully implemented and not meeting goals, and
- 2 are not fully implemented

More detailed information regarding each of these projects and other obligations is provided in tabular format later in this chapter in Table 3.3 and 3.5.

Additional monitoring reports are found for the Additional Mitigation Projects Developed by the MOU Ad Hoc Group (Section 3.1.1), the Yellow Billed Cuckoo Habitat Enhancement Plans (Section 3.2.1), and the Owens Valley Land Management Plan (OVLMP) (Section 3.2.2).

Table 3.1. LADWP Mitigation and Monitoring Summary

Reporting No.	1991 EIR	1991 EIR Environmental	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Table 3.1 LADWP MITIGATION AND MONITORING	Complete[1]	Ongoing as Necessary/ Required[2]	Implemented and Ongoing[3]	Fully Implemented but not meeting goals[4]	Not fully implemented[5]
1					X	Aberdeen Ditch Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			X		
2	X	X				Big and Little Seely Springs (1 acre pond near Well W349; EIR Impact 10-14, EIR Table 5-2)			X		
3	X			X		Big Pine Area Revegetation Project (160 acres; EIR Impact 10-19)				X	
4	X			X		Big Pine Area Revegetation Project (20 acres; EIR Impact 10-19)				X	
5	X					Big Pine Ditch System (EIR Impact 10-19)			X		
6	X		X	X		Big Pine Northeast Regreening (30 acres; EIR Impact 10-11, EIR Table 5-3)			X		
7	X			X		Bishop Area Revegetation Project (120 acres; EIR Impact 10-16)				X	
8	X			X		Blackrock 16E Revegetation Project (7.5 acres, EIR Impact 10-11)	X				
9	X					Blackrock Hatchery (EIR Impact 10-14)			X		
10	X	X				Buckley Ponds (EIR Impact 10-5 and 11-1, EIR Table 5-2)			X		
11	X	X				Calvert Slough (EIR Impact 10-5, EIR Table 5-2)			X		
12	X	X			X	Diaz Lake (EIR Table 5-2, Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			X		
13	X		X			Eastern California Museum (EIR Tables 4-3 and 5-3)			X		
14	X	X				Farmers Pond (EIR Impact 10-5, 10-18, 11-1, EIR Table 5-2)			X		
15	X					Fish Springs Hatchery (EIR Impact 10-14)			X		
16	X			X		Five Bridges Area Revegetation Project (300 acres; EIR Impact 10-12)	X				
17					X	Freeman Creek Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			X		
18	X				X	Hines Spring (1 to 2 acres, EIR Impact 10-14), implemented as the Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3)			X		
19	X			X		Hines Spring South (9 acres, EIR Impact 10-11)				X	
20					X	Hines Spring Well 355 Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			X		
21					X	Homestead Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			X		
22	X			X		Independence 105 Revegetation Project (14 acres, EIR Impact 10-13)	X				
23	X			X		Independence 123 Revegetation Project (28 acres, EIR Impact 10-13)	X				
24	X			X		Independence 131 Revegetation Project (23 acres, EIR Impact 10-13)				X	
25	X		X			Independence Ditch System (EIR Table 4-3)			X		
26	X		X	X		Independence East Side Regreening Project (23 acres; EIR Impact 10-11, 12-1, EIR Table 5-3)			X		
27	X		X			Independence Pasturelands and Native Pasturelands (610 acres; EIR Impact 12-1, EIR Tables 4-3 and 5-3)			X		
28	X		X			Independence Roadside Rest Area (0.5 acres; EIR Tables 4-3 and 5-3)	X				
29	X		X			Independence Springfield (286 acres; EIR Impact 10-11, 12-1, EIR Tables 4-3 and 5-3)			X		
30	X		X			Independence Woodlot (20 acres; EIR Impact 10-11, EIR Table 4-3)			X		
31	X	X	X			Klondike Lake Aquatic Habitat (160 acres; EIR Impact 10-5 and 11-1, EIR Tables 4-3, 5-2, and 5-3)			X		
32						Klondike SSHA (Big Pine Ditch System MND)			X		
33				X		LAWS 118 Revegetation Project (19 acre portion, Laws Type E Transfer MND)				X	
34				X		LAWS 129 (47 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)				X	
35				X		LAWS 27 (Native Seed Farm) (Laws Type E Transfer MND)				X	
36				X		LAWS 90 (101 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)				X	
37				X		LAWS 94 (40 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)				X	
38				X		LAWS 95 (46 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)				X	
39	X			X		Laws Area Revegetation Project (140 acres; EIR Impact 10-18)				X	
40	X		X			Laws Historical Museum Pasturelands (21+15 acres; EIR Impact 10-18, EIR Table 5-3)			X		
41	X		X			Laws/Poleta Native Pasture (216 acres; EIR Impact 10-18, EIR Tables 4-3 and 5-3)			X		
42	X	X				Little Blackrock Springs (EIR Impact 10-14, EIR Table 5-2)			X		
43	X		X			Lone Pine East Side Regreening (11 acres; EIR Impact 10-16, EIR Table 5-3)			X		
44	X		X			Lone Pine-North Lone Pine Clean Up (EIR Table 4-3)	X				
45	X		X			Lone Pine Riparian Park (320 acres, EIR Tables 4-3 and 5-3)			X		
46	X		X			Lone Pine Sports Complex (EIR Table 5-3)	X				
47	X		X			Lone Pine West Side Regreening (8 acres; EIR Impact 10-16, EIR Tables 4-3 and 5-3)			X		
48	X		X			Lone Pine Woodlot (12 acres; EIR Impact 10-11, EIR Table 4-3)			X		
49	X	X	X		X	LORP Project (60 miles, perhaps more than 1,000 acres)/ Lower Owens Rewatering Project)			X		
50	X		X			McNally Ponds and Native Pasturelands (300 acres pasture, 60 acres ponds; EIR Impact 10-5 and 10-18, EIR Tables 4-3 and 5-3)			X		
51	X	X	X			Millpond Recreation Area (EIR Impact 10-5, EIR Table 5-2 and 5-3)			X		
52					X	North of Mazourka Canyon Road Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			X		
53	X					Reinhackle Spring (EIR Impact 10-14)			X		

Table 3.2. LADWP Other Legal Obligations Summary

Reporting No.	Inyo/LA Water Agreement	1991 EIR	1997 MOU	Table 3.2 LADWP OTHER LEGAL OBLIGATIONS	Complete[1]	Ongoing as Necessary/ Required[2]	Implemented and Ongoing[3]	Fully Implemented but not meeting goals[4]	Not fully implemntd[5]
1			X	Aerial Photo Analysis (MOU Section III.E)	X				
2			X	Annual Report on the Owens Valley (MOU Section III.H)			X		
3	X			Cooperative Studies (Water Agreement Section IX)			X		
4	X			Dispute Resolution (Water Agreement Section XXVI)		X			
5			X	Dispute Resolution and Litigation (MOU Section VI)		X			
6	X			Enhancement/ Mitigation Projects (Water Agreement Section X)			X		
7	X			Exchange of Information and Access (Water Agreement Section XVII)			X		
8	X			Financial Assistance- Big Pine Ditch System (Water Agreement Section XIV.E)			X		
9	X			Financial Assistance- General Financial Assistance to the County (Water Agreement Section XIV.D)			X		
10	X			Financial Assistance- Park & Environmental Assistance to City of Bishop (Water Agreement Section XIV.F)	X				
11	X			Financial Assistance- Park Rehabilitation, Development, & Maintenance (Water Agreement Section XIV.B)			X		
12	X			Financial Assistance- Salt Cedar Control (Water Agreement Section XIV.A)			X		
13	X			Financial Assistance- Water and Environmental Activities (Water Agreement Section XIV.C)			X		
14			X	Financial Provisions (MOU Section IX)	X				
15			X	Fish Slough (MOU Section IV)			X		
16	X			Groundwater Management (Water Agreement Section II)			X		
17	X			Groundwater Pumping on the Bishop Cone (Water Agreement Section VII)			X		
18	X			Groundwater Recharge Facilities (Water Agreement Section VIII)		X			
19			X	Habitat Conservation Plan (MOU Section III.B)	X				
20	X			Haiwee Reservoir (Water Agreement Section XIII)	X				
21			X	Inventory of Plants and Animals at Spring and Seeps (outside LORP Planning Area) (MOU Section III.C)	X				
22		X		Laws Area Potential Mitigation-Consideration by Standing Committee (640 acres; EIR Impact 10-18)		X			
23	X			Legislative Coordination (Water Agreement Section XVI)			X		
24			X	LORP Agency Consultation and Public Involvement (MOU Section II.D)	X				
25			X	LORP EIR (MOU Section II.F)	X				
26			X	LORP Implementation (MOU Section II.H)	X				
27			X	LORP Monitoring and Adaptive Management Plan (MOU Section II.E)			X		
28			X	LORP Permits Approvals and Licenses (MOU Section II.I)	X				
29			X	LORP Plan (MOU Section II.A)	X				
30			X	LORP Planning Area- Inventory of Plants and Animals at Spring and Seeps (MOU Section III.A.2)	X				
31			X	LORP Pumpback System (MOU Section II.G)	X				
32			X	Lower Owens Off River Lakes and Ponds (MOU Section II.C.3)			X		
33	X			Lower Owens River (financial commitment) (Water Agreement Section XII)			X		
34			X	Lower Owens River Delta Habitat Area (MOU Section II.C.2)			X		
35			X	Lower Owens River Project 1500-Acre Blackrock Waterfowl Habitat Area (MOU Section II.C.4)			X		
36			X	Lower Owens River Riverine- Riparian System (MOU Section II.C.1)			X		
37			X	Mitigation Plans for Impacts Identified in the 1991 EIR and the Water Agreement (MOU Section III.F)				X	
38	X			New Wells & Production Capacity (Water Agreement Section VI)					X
39	X			Owens River Recreational Use Plan (Water Agreement XIV.B)					X[6]
40			X	Owens Valley Land Management Plans (MOU Section III.B)			X		

3.2. LADWP ENVIRONMENTAL MITIGATION PROJECTS

Table 3.3 provides project title, legal reference, mitigation measure/provision, progress to date, and current status (according to LADWP) on each of LADWP's environmental mitigation projects listed in Table 3.1.

Again, categories describing status are:

Complete: Project has no additional commitments required (no water allotment or other financial or environmental mitigation; no continual monitoring and reporting),

Ongoing as necessary/required: These measures are only applied when necessary (monitoring and reporting for mitigation measures for new projects, construction, etc.),

Implemented and ongoing: Project is fully implemented and is currently meeting goals; however, there may be ongoing water or financial commitments or monitoring and reporting requirements,

Fully implemented but not meeting goals: Project is fully implemented but has not yet met prescribed goals or success criteria,

Not fully implemented: Project under development or under construction, but not fully implemented.

Following Table 3.3, there is an annual monitoring report for the Additional Mitigation Projects Developed by the MOU Ad Hoc Group (1600 AF Projects), and updates to the Mitigation Monitoring and Reporting Programs (MMRP) for the Irrigation Project in the Laws Area (Laws Type E Transfer), and the Big Pine Ditch System.

Table 3.3. LADWP Mitigation and Monitoring

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	**Table 3.3 LADWP MITIGATION AND MONITORING**				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
						Project Title	**Impact (Where Relevant)**	**Measure/Provision**	**Progress to Date**	Status				
1					X	Aberdeen Ditch Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in April 2011 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Water continues to be provided annually to this project. Please refer to Section 3.2.1 for more information. Project is implemented and ongoing.			X		
2	X	X				Big and Little Seely Springs (1 acre pond near Well W349; EIR Impact 10-14, EIR Table 5-2)	10-14: Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	In the area of Big and Little Seely Springs, LADWP well number 349 discharges water into a pond approximately one acre in size. This pond provides a temporary resting place for waterfowl and shorebirds when the pump is operating or Big Seely Spring is flowing. This water passes through the pond to the Owens River. Riparian vegetation has become established around this pond.	Project implementation is complete. Water continues to be provided annually to this project from Well 349. Project is implemented and ongoing.			X		
3	X			X		Big Pine Area Revegetation Project (160 acres; EIR Impact 10-19)	10-19: Water management practices in a portion of the Big Pine Well Field have resulted in a significant adverse change and decrease of plant cover.	A revegetation program will be implemented for approximately 160 acres within the Big Pine area, which have lost all or part of its vegetation cover due to increased groundwater pumping or to abandonment of irrigation as part of operations to supply the second aqueduct. Will be revegetated.	Site was fenced to reduce disturbance in 1998. Permanent vegetation transects were established in 1999. Mulch was applied to the site in 1999 and soil microbial studies were conducted in 1999, 2003, 2004, and 2005 by Montgomery Watson Harza (MWH). Drill seeding of the site occurred in Spring 2011 (20 acres), Winter 2014 (28 acres), and Fall/Winter 2015/2016 (154 acres). Seed germination from the 2015/2016 seeding effort was largely successful at this site. Additionally, some natural recruitment is occurring along the perimeter of the site. LADWP planted 100 *Sarcobatus vermiculatus* shrubs utilizing the Cocoon Planting System from Land Life Company in the fall of 2018. This technology allows for shrubs to grow in arid environments without additional irrigation post planting. As of 2019, there was only a 10% survivability rate of shrubs which could be due to the quality of the plants. Unlike the other sites that the Cocoon Planting System was tested, plants used for this effort were bought from an outside vendor. Permanent transects were read in 2019. The parcel has achieved 10% native perennial vegetation cover with 11 native perennial				X	

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	**Table 3.3 LADWP MITIGATION AND MONITORING**				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
						Project Title	**Impact (Where Relevant)**	**Measure/Provision**	**Progress to Date**	Status				
									species (16% cover goal, 8 perennial species). The project has obtained the composition goal. There has been a significant upward trend in cover due to 2017 and 2019 precipitation years. Project is implemented but has not yet attained cover goals.					
4	**X**			**X**		Big Pine Area Revegetation Project (20 acres; EIR Impact 10-19)	10-19: Water management practices in a portion of the Big Pine Well Field have resulted in significant adverse change and decrease of plant cover.	An area of approximately 20 acres directly to the east of Big Pine that is poorly vegetated as a result of pre-project activities and activities which are not a part of the project will be evaluated as a potential enhancement/mitigation project. If, in planning this project, it is determined that it is not feasible to permanently irrigate this area, a revegetation program will be implemented.	Site was fenced to reduce disturbance and promote reestablishment in 2007. In February 2014, LADWP crews seeded approximately 3.2 acres of this area with a native seed mix in conjunction with the adjacent 160 acre Big Pine parcel. Approximately 18 acres were drill seeded at 10lbs/acre using native shrub seed mix during Winter 2015/2016. Seed germination from the 2015/2016 seeding efforts was largely successful at this site. Additionally, some natural recruitment is occurring at this site. Permanent transects were read in 2019. The parcel has achieved 2.4% native perennial vegetation cover with 3 perennial species (16% cover goal, 8 perennial species). The project is implemented but has not yet attained goals.				**X**	
5	**X**					Big Pine Ditch System (EIR Impact 10-19)	10-19: Water management practices in a portion of the Big Pine Well Field have resulted in significant adverse change and decrease of plant cover.	The Big Pine Ditch Project was planned to be implemented as provided in the Agreement. Per the Agreement, LADWP is to provide up to $100,000 for reconstruction and upgrading of the ditch system. Additionally, LADWP is to supply up to 6 cfs to the ditch system from a new well to be constructed west of Big Pine. The Inyo/Los Angeles Water Agreement was modified in 2003 to change the source of the replacement water and to specify new sources for the Big Pine Ditch System. This revised project includes a new well to be drilled in Bell Canyon and also includes an expansion of replacement water to include diversion from Big Pine Creek and Bell Canyon Ditch. Surface water flow in Big Pine Creek will be augmented with groundwater pumped from Well 415, and the surface water flow in Bell Canyon Ditch will	The Standing Committee approved procedures and guidelines for implementing the project in 1998. An *Initial Study and Mitigated Negative Declaration for the Big Pine Ditch System and Modification to the Klondike Lake Project in the Big Pine Area of Inyo County* was circulated in 2003 and was approved by the Board of Water and Power Commissioners on November 12, 2003. The Water Agreement was also amended at this time, changing the project as originally described. The Big Pine Irrigation and Improvement Association has implemented all phases required of them for the project and it has been in operation since 2005. LADWP has provided $99,745 of the $100,000 committed to the project. LADWP annually supplies the required water to the project but is not currently recovering the makeup water. Well 415 has been drilled and equipped but is not yet operational. ICWD and LADWP adopted protocols for a 6 month pumping test of W415 with associated monitoring requirements at their ____2020 Technical Group Meeting. This test is expected to occur in 2020.					**X**	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
								be augmented from the proposed Bell Canyon Well. The project will be constructed, operated and maintained by the Big Pine Irrigation and Improvement Association.	The Bell Canyon well has not yet been drilled. Although these two wells are not operational, this project is implemented and ongoing with water supplied annually to the project.					
6	X		X	X		Big Pine Northeast Regreening (30 acres; EIR Impact 10-11 and 10-19, EIR Table 5-3)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands.10-19: Water management practices in a portion of the Big Pine Well Field have resulted in a significant adverse change and decrease of plant cover.	10-11: In the near future, two enhancement/mitigation projects will be initiated to mitigate areas affected by groundwater pumping adjacent to the towns of Independence (east side regreening project) and Big Pine (northeast regreening project). Each project was originally planned to be approximately 30 acres of irrigated pasture.10-19: LADWP and Inyo County will implement the Big Pine Regreening enhancement/mitigation project by establishing irrigated pasture on approximately 30 acres to the north and east of Big Pine.The Standing Committee approved a revised scope of work for the Big Pine Northeast Regreening Project as an Enhancement/ Mitigation Project under the EIR on November 4, 2010. The revised scope modified the boundaries of the project and amended the water supply source to be Big Pine Creek via the Big Pine Ditch System, Baker Creek via the Mendenhall Park Ditch, or Baker Return Ditch, or the Big Pine Canal, or a combination of these. The project will be supplied with up to 150 AF of water per year, and surface water supplied to the project will be made up by pumping W375 in an amount equivalent to that supplied to the project on an annual basis. Additionally, irrigation water will be supplied by flood or sprinkler irrigation.	LADWP prepared and circulated an Initial Study and Negative Declaration for the Big Pine Northeast Regreening Project. This ND was approved by the Board of Water and Power Commissioners on March 6, 2012 and its Notice of Determination was filed with the State Clearinghouse and Inyo County Clerk on March 7, 2012. The Owens Valley Committee and the Big Pine Paiute Tribe brought a lawsuit against LADWP April 6, 2012 (Case No: SICVPT12-53541) challenging the adequacy of the ND and impacts from the use of W375 for makeup water for the project. This suit was settled in November 26, 2012. The Technical Group exempted well W375 on November 6, 2013 for project makeup water in order to make this project feasible. Installation of the irrigation system for this project occurred in Winter 2013/2014. The Big Pine Northeast Regreening was fully implemented in Spring 2014. Water continues to be provided annually to this project. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
7	X			X		Bishop Area Revegetation Project (120 acres; EIR Impact 10-16)	10-16: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	120 acres of formerly irrigated land near Bishop with a loss of vegetation cover will be revegetated. The process to successfully revegetate these lands will be determined through studies to be conducted by LADWP and Inyo County. These lands will not be permanently irrigated, but will be revegetated with Owens Valley vegetation not requiring irrigation except perhaps during its initial establishment. Depending on the amount of rainfall and runoff, successful revegetation of these lands could take a decade or longer. The goal will be to achieve as full a vegetation cover as is feasible, but at a minimum, a vegetation cover sufficient to avoid blowing dust.	Site was fenced to reduce disturbance in 1998. Permanent transects were established in 1999. MWH conducted dryland revegetation studies at this site in 2003 and a soil microbial study at this site in 2005. In 2011, approximately 35 acres were drill seeded with locally collected seeds. In 2012, a buried drip irrigation system was installed across 16 acres of the site and seed was planted at these emitters. In 2015, approximately 6 acres were hand seeded at emitters with native seed mix and 11.3 acres were drill seeded at the south end of the site. LADWP planted 230 shrubs consisting of *Atriplex canescens*, *Atriplex polycarpa*, and *Eriogonum fasciculatum* utilizing the Cocoon Planting System from Land Life Company in the spring 2019. The cocoon planting technology allows for shrubs to grow in arid environments without additional irrigation post planting. As of 2019, the shrubs had a 48% survivability rate. The shrubs will continue to be monitored for success. Permanent vegetation transects were read in 2019. The parcel has achieved 14.3% cover with 4 native perennial species (goal 14% native perennial cover with 9 species). Project implementation is complete. Water continues to be provided annually to this project through a drip irrigation system. Although species composition has not met 9 species, the goal of 14% native perennial cover has been met.				X	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
8	X			X		Blackrock 16E Revegetation Project (7.5 acres, EIR Impact 10-11)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands.	Approximately 80 acres of land that lost a significant amount of its native vegetation cover as a result of increased groundwater pumping will be revegetated. The techniques that will be employed to revegetate these lands will be determined through studies that will be conducted by LADWP and Inyo County. These lands will not be permanently irrigated, but will be revegetated with native Owens Valley vegetation not requiring irrigation except perhaps during its initial establishment. Depending on the amount of rainfall and runoff, successful revegetation of these lands could take a decade or longer. The goal will be to restore as full a native vegetation cover as is feasible, but at a minimum, vegetation cover sufficient to avoid blowing dust will be achieved in that area.	Site was fenced to reduce disturbance and permanent vegetation transects were established. These transects were run in 2010 and the parcel attained cover and composition goals (31% cover consisting of 5 perennial species). Exclusionary fencing has been removed. Project is complete.	X				
9	X					Blackrock Hatchery (EIR Impact 10-14)	10-14: Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	No on-site mitigation will be implemented at Fish Springs and Big Blackrock Springs; however, CDFW fish hatcheries at these locations serve as mitigation of a compensatory nature by producing fish that are stocked throughout Inyo County.	The Blackrock Hatchery Ponds were first operated in 1941. In 1976, the hatchery was expanded. Spawning activities ceased in 2012 at this hatchery. This hatchery raises rainbow and California Golden trout for distribution to approved waters in the State of California. Hatchery operations are managed by CDFW. The hatchery is on City of Los Angeles property and LADWP annually supplies water to the project. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
10	X	X				Buckley Ponds (EIR Impact 10-5 and 11-1, EIR Table 5-2)	10-5: Between 1970 and 1990, the project resulted in beneficial changes to lakes and ponds, and the creation of new lakes and ponds, with no significant adverse impact on vegetation.11-1: Changes of surface water management practices and increased groundwater pumping have altered the habitats on which wildlife depends. Vegetation changes have been significant in many locations throughout the Valley. Therefore, impacts to certain species of wildlife, which were entirely dependent upon the impacted habitat, can be presumed to be significant.	Under this project, water is provided for a warm-water fishery and waterfowl area.	The dike system forming the Buckley Pond Series was originally constructed in the 1950s to create a water spreading and groundwater recharge area to be used only in above normal years. In 1968, a cooperative agreement between LADWP and CDFG proposed a habitat improvement project and permanent wildlife habitat area. Work under this agreement began in 1970 when it was implemented as an LADWP Environmental Project. LADWP, California Department of Fish and Game, and California Department of Forestry signed onto the joint *Habitat Management Plan for the Buckley Pond Series* in 1976 that described how the pond series was to be managed. LADWP has conducted significant maintenance in these ponds in recent years. In December 2011, LADWP conducted controlled burns on Rawson Ponds #1, 2, and 3 with assistance from Cal Fire. Additional controlled burns were conducted on Rawson Pond #1 in December 2012 and on Rawson Pond #2 in January 2014. Following burning, all ponds were cleaned and new inlet/outlet structures installed, and handicap accessible fishing platforms were constructed by the local Lion's Club at each site. Ponds were back in service at the following times: Rawson Pond #3: March 2012; Rawson Pond #1: March 2013; and Rawson Pond #2: April 2014. Water continues to be provided annually to this project. Maintenance occurs as necessary. Project is implemented and ongoing.			X		
11	X	X				Calvert Slough (EIR Impact 10-5, EIR Table 5-2)	10-5: Between 1970 and 1990, the project resulted in beneficial changes to lakes and ponds, and the creation of new lakes and ponds, with no significant adverse impact on vegetation.	Under this project, water is provided to maintain habitat, small pond, and marsh area near the Los Angeles Aqueduct Intake.	Calvert Slough was originally implemented as an LADWP Environmental Project in the 1970s. Water continues to be provided to this project. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
12	X	X			X	Diaz Lake (EIR Table 5-2, Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))		As described in the EIR, supplemental water supply is provided to Diaz Lake Recreational Area for this project. Under the 1997 MOU as one of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group, the Diaz Lake Project provides a secure water supply for Diaz Lake and reduces the dependence on pumping conducted by Inyo County to supply the lake, as was the case with the original project. The primary benefit of the MOU project is reduced pumping by Inyo County in the Bairs-George wellfield to provide water for Diaz Lake.	The Diaz Lake Project was originally implemented as an LADWP Environmental Project in the 1970s. The changes in water supply and accounting for the project under the MOU were implemented in Spring 2012. Please refer to Section 3.2.1 for more information on this and other Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Project is implemented and ongoing.			X		
13	X		X			Eastern California Museum (EIR Tables 4-3 and 5-3)		This project enhanced the appearance of the Eastern California Museum grounds in Independence. It consists of a small pond, trees, expanded lawn areas, and an irrigation system.	This project was implemented in 1989. Water continues to be provided annually to this project. Project is implemented and ongoing.			X		
14	X	X				Farmers Pond (EIR Impact 10-5, 10-18, 11-1, EIR Table 5-2)	10-5: Between 1970 and 1990, the project resulted in beneficial changes to lakes and ponds, and the creation of new lakes and ponds, with no significant adverse impact on vegetation. 10-18: Significant adverse vegetation decrease and change have occurred in the Laws area due to a combination of factors, including abandoned agriculture, groundwater pumping, water spreading in wet years, livestock grazing, and drought. 11-1: Changes of surface water management practices and increased groundwater pumping have altered the habitats on which wildlife depends. Vegetation changes have been	In the 1970s, LADWP started the Farmer's Pond environmental project. Water is provided in fall of each year to offer increased habitat for migrating waterfowl. The project area is two miles north of Bishop.	This project was originally implemented as an LADWP Environmental Project in the 1970s. Water continues to be provided annually to this project in the fall. Project is implemented and ongoing.			X		

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	**Table 3.3 LADWP MITIGATION AND MONITORING**				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
						Project Title	**Impact (Where Relevant)**	**Measure/Provision**	**Progress to Date**	Status				
							significant in many locations throughout the Valley. Therefore, impacts to certain species of wildlife, which were entirely dependent upon the impacted habitat, can be presumed to be significant.							
15	**X**					Fish Springs Hatchery (EIR Impact 10-14)	10-14: Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	No on-site mitigation will be implemented at Fish Springs and Big Blackrock Springs; however, CDFG fish hatcheries at these locations serve as mitigation of a compensatory nature by producing fish that are stocked throughout Inyo County.	The Fish Springs Hatchery was originally constructed in 1952 and was modernized in 1972 and again in 2009. This hatchery produces and distributes rainbow and Eagle Lake trout to Inyo and Mono Counties. Hatchery operations are managed by CDFW. The hatchery is on City of Los Angeles property and LADWP annually supplies water to the project. Project is implemented and ongoing.			**X**		
16	**X**			**X**		Five Bridges Area Revegetation Project (300 acres; EIR Impact 10-12)	10-12: Vegetation in an area of approximately 300 acres near Five Bridges Road north of Bishop was significantly adversely affected during 1988 because of the operation of the two wells, to supply water to enhancement/mitigation projects.	Water has been spread over the affected area since 1988. By the summer of 1990, revegetation of native species had begun on approximately 80% of the affected area. LADWP and Inyo County are developing a plan to revegetate approximately 60 acres with riparian and meadow vegetation. This plan will be implemented when it has been completed.	Since 1989, LADWP has implemented various efforts to recover native vegetation in the mitigation area through re-irrigating the affected area each growing season, extensive weed treatment to eradicate perennial pepperweed (*Lepidium latifolium),* and development and implementation of a grazing management plan to compliment these efforts. LADWP has also used controlled burns, sprinkler irrigation, seeding banks and outplanting native species to assist in mitigating the original impacts. In 2017, LADWP determined that mitigation for the impacts from groundwater pumping at Five Bridges was complete. Inyo County and LADWP utilized the dispute resolution process to settle disagreements over the W385R pump test and the status of the Five Bridges Mitigation Project in 2017. On June 25, 2018, both parties entered into a Settlement Agreement as resolution to these disputes. Subsequently, at their July 19, 2018 meeting, the Inyo/Los Angeles Technical Group adopted resolutions to (1) adopt a monitoring and management plan for the W385R pump test and (2) amend the 1999 Revegetation Plan to temporarily suspend the provision requiring Wells 385 and 386 be permanently shut down in order to conduct the pump test. At their February 21, 2019 meeting, the Technical Group adopted a Work Plan for the Five Bridges Mitigation Area for the 2019 and 2020 calendar years to	**X**				

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	**Table 3.3 LADWP MITIGATION AND MONITORING**				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
						Project Title	**Impact (Where Relevant)**	**Measure/Provision**	**Progress to Date**	Status				
									coincide with the W385 pump test which occurred December 2019-February 2020. LADWP will conduct the work outlined in that plan per agreement with Inyo County. Mitigation is complete.					
17					**X**	Freeman Creek Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in July 2010 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Water continues to be provided annually to this project. Please refer to Section 3.2.1 for more information on these projects. Project is implemented and ongoing.			**X**		
18	**X**				**X**	Hines Spring (1 to 2 acres, EIR Impact 10-14), implemented as the Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3)	10-14: Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	The original mitigation measure called for onsite mitigation at the Hines Spring vent and its surroundings. This project was also identified in the 1997 MOU and subject of 2004 and 2010 Stipulations and Orders.Per the MOU Section III.A.3 (Additional Mitigation), a total of 1600 AF of water per year will be supplied by LADWP for the implementation of the on-site mitigation measure at Hines Springs and on-site or off-site mitigation identified in the 1991 EIR for impacts at Fish Springs, Big and Little Seely Springs and Big and Little Blackrock Springs. Under the direction of LADWP and the County, Ecosystem Sciences will recommend reasonable and feasible on-site and/or off site mitigation measures, including the implementation of mitigation at Hines Springs.	Ecosystem Sciences developed a draft plan for this project that was finalized in October 2005. The MOU Parties found this plan to be inadequate and decided to enter into an ad hoc process to analyze the project at Hines Springs and other potential project areas. The Additional Mitigation Projects Developed by the MOU Ad Hoc Group document was finalized in September 2008 and describes a series of eight mitigation projects to satisfy this 1600AF mitigation commitment of the 1997 MOU. This plan was completed and agreed to by the MOU Parties. CEQA analysis was conducted in Spring 2010 and the projects were adopted by the Board of Water and Power Commissioners in June 2010. Implementation of the projects began shortly thereafter and all were fully implemented by March 2012, per the 2010 Stipulation and Order (Case No: S1CVCV01-29768). Projects are further described in Section 3.2.1. Projects are implemented and ongoing.			**X**		
19	**X**			**X**		Hines Spring South (9 acres, EIR Impact 10-11)	Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands.	Approximately 80 acres of land that lost a significant amount of its native vegetation cover as a result of increased groundwater pumping will be revegetated. The techniques that will be employed to revegetate these lands will be determined through studies that will be conducted by LADWP and Inyo County. These lands will not be permanently irrigated, but will be revegetated with native Owens Valley vegetation not requiring irrigation except perhaps during its initial establishment. Depending on the amount of rainfall and runoff, successful revegetation of these lands could	Per the Additional Mitigation Projects Developed by the MOU Ad Hoc Group, the timeline for implementing the Hines Spring South Revegetation Project was extended to three years post implementation of the Additional Mitigation Projects. All of the Additional Mitigation Projects were implemented by Spring 2012. The Revegetation Plan for Hines Spring South is complete and was provided in LADWP's 2015 Annual Owens Valley Report. The 9-acre exclosure was fenced in 2015 per this plan. Initial response to exclusion of this area was positive as demonstrated by prolific native grasses. Permanent vegetation transects were established and read in 2019. The parcel has achieved 10.2% cover with 5 native perennial species (goal 31.5% cover with 3 native				**X**	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
								take a decade or longer. The goal will be to restore as full a native vegetation cover as is feasible, but at a minimum, vegetation cover sufficient to avoid blowing dust will be achieved in that area.	perennial species). The composition goal has been met. Project is implemented but cover criteria has not yet been met.					
20					X	Hines Spring Well 355 Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in January 2012 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Please refer to Section 3.2.1 for more information on these projects. Project is implemented and ongoing.			X		
21					X	Homestead Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in February 2012 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Please refer to Section 3.2.1 for more information on these projects. Project is implemented and ongoing.			X		
22	X			X		Independence 105 Revegetation Project (14 acres, EIR Impact 10-13)	Increased groundwater pumping has significantly adversely affected approximately 60 acres of vegetation in the Symmes Shepherd well field area.	A revegetation program will be implemented for these effected areas utilizing native vegetation of the type that has died off. Water may be spread as necessary in these areas to accomplish the revegetation.	This project contains a portion of the 60 acres required for revegetation under EIR Impact 10-13. This 14-acre site was fenced to reduce disturbance in 1999 and permanent vegetation transects were established in 2000. As of 2017, the parcel contained 23% perennial vegetation cover consisting of 3 perennial species, attaining the goal for cover and composition (15% cover and 3 perennial species). Project is complete.	X				
23	X			X		Independence 123 Revegetation Project (28 acres, EIR Impact 10-13)	Increased groundwater pumping has significantly adversely affected approximately 60 acres of vegetation in the Symmes Shepherd well field area.	A revegetation program will be implemented for these effected areas utilizing native vegetation of the type that has died off. Water may be spread as necessary in these areas to accomplish the revegetation.	This project contains a portion of the 60 acres required for revegetation under EIR Impact 10-13. This 28-acre site was fenced to reduce disturbance in 1999 and permanent vegetation transects were established in 2000. As of 2006, this site had attained 17% cover with 4 native perennial species, attaining the goals for cover and composition (15% cover and 3 perennial species). Project is complete.	X				

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
24	X			X		Independence 131 Revegetation Project (23 acres, EIR Impact 10-13)	Increased groundwater pumping has significantly adversely affected approximately 60 acres of vegetation in the Symmes Shepherd well field area.	A revegetation program will be implemented for these effected areas utilizing native vegetation of the type that has died off. Water may be spread as necessary in these areas to accomplish the revegetation.	This project contains a portion of the 60 acres required for revegetation under EIR Impact 10-13. This 74.6 acre revegetation site is segmented by Symmes Creek and was fenced to reduce disturbance in 1999. Permanent vegetation transects were established in 2000. SAIC and MWH conducted dryland revegetation studies using various irrigation methods and planting techniques in 2003 and 2005. 25 acres were drill seeded with locally collected seeds in the spring of 2011. As of 2012, IND131N (north of Symmes Creek) had achieved 15% cover with 5 native perennial species, attaining the goals for cover and composition (15% cover and 3 perennial species). Vegetation transects in IND131S (south of Symmes Creek) were monitored in 2017. This portion of the site had 10% cover and 6 perennial species, meeting the composition requirement. This project has been fully implemented but the southern portion has not yet attained cover goals.				X	
25	X		X			Independence Ditch System (EIR Table 4-3)		This project will provide water to a ditch through Independence. After passing through town, the unused water may supply irrigation water to the Independence Pasturelands and/or Independence Springfield enhancement/mitigation projects.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1987. Water continues to be supplied annually to the project. Project is implemented and ongoing.			X		
26	X		X	X		Independence East Side Regreening Project (23 acres; EIR Impact 10-11, 12-1, EIR Table 5-3)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands. 12-1: Significant impacts on air quality resulting from groundwater pumping during the period of 1970 to 1990 have occurred due to vegetation losses.	10-11: In the near future, two enhancement/ mitigation projects will be initiated to mitigate areas affected by groundwater pumping adjacent to the towns of Independence (east side regreening project) and Big Pine (northeast regreening project). Each project was originally planned to be approximately 30 acres of irrigated pasture.12-1: As part of the Independence Pasturelands and Springfield enhancement/mitigation projects, approximately 730 acres of barren or near barren ground have been revegetated with either native pasture or alfalfa. This area was affected by groundwater pumping and surface diversions of water.	Installation of the irrigation system for this project occurred in Winter 2013/2014. The Independence East Side Regreening Project was fully implemented in spring 2014. Water is supplied annually to the project for irrigation. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
27	X		X			Independence Pasturelands and Native Pasturelands (610 acres (520 acres per EIR Figure 12-2); EIR Impact 12-1, EIR Tables 4-3 and 5-3)	12-1: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	As part of the enhancement/mitigation projects implemented by LADWP and Inyo County since 1985, approximately 942 acres of these abandoned agricultural lands have been revegetated with irrigated pasture or alfalfa. These areas are the Independence Pasture and native pasture lands, the Van Norman and Richards Fields, and the Lone Pine Woodlot adjacent to Lone Pine.	This project was implemented as an LADWP Enhancement/Mitigation Project 1987-1988. Approximately 520 acres are incorporated into the project per Figure 12-2 in the 1991 EIR. Water continues to be provided annually to this project for irrigation. Project is implemented and ongoing.			X		
28	X		X			Independence Roadside Rest Area (0.5 acres; EIR Tables 4-3 and 5-3)		This project consisted of planting shade and windbreak trees and grass, installation of an irrigation system, and placement of a picnic table on a ½-acre site south of the town of Independence.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1989. Water is provided from the Independence Town Water System through a metered connection and paid for by Inyo County. Project is complete.	X				
29	X		X			Independence Springfield (286 acres; EIR Impact 10-11, 12-1, EIR Tables 4-3 and 5-3)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands. 12-1: Significant impacts on air quality resulting from groundwater pumping during the period of 1970 to 1990 have occurred due to vegetation losses.	10-11: As part of the Independence Springfield and Woodlot enhancement/mitigation projects, approximately 317 acres of barren or near-barren ground have been revegetated with either native pasture or alfalfa. This area was affected by groundwater pumping and surface diversions of water. 12-1: As part of the Independence Pasturelands and Springfield enhancement/mitigation projects, approximately 730 acres of barren or near barren ground have been revegetated with either native pasture or alfalfa. This area was affected by groundwater pumping and surface diversions of water.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1988 and irrigates approximately 300 acres. Water continues to be provided annually to the project for irrigation. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
30	X		X			Independence Woodlot (20 acres; EIR Impact 10-11, EIR Table 4-3)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands.	As part of the Independence Springfield and Woodlot enhancement/mitigation projects, approximately 317 acres of barren or near-barren ground have been revegetated with either native pasture or alfalfa. This area was affected by groundwater pumping and surface diversions of water.	The Independence Wood Lot was initially planted in 1987. The wood lot was planted at a high density with the intent of thinning to a 12-foot spacing after planting success was determined. Over time, this high density of trees resulted in reduced growth and increased competition. While the hybrid poplar portions of the wood lots have been harvested several times since project implementation, the locust portions of the wood lots had never been harvested until 2015-2016. At that time, LADWP and CAL Fire conducted a significant thinning effort in both the Lone Pine and Independence Wood Lots resulting in approximately 130 cords of wood harvested and distributed to the Lone Pine Future Farmers of America (FFA), who holds the lease to both wood lots and manages the distribution of wood.In Winter 2016-17, LADWP and CAL Fire continued thinning the Hybrid Popular and Black Locust tree portions of both wood lots, resulting in another 120 cords of wood harvested and distributed to the Lone Pine FFA. Maintenance of the wood lots continues as needed. Replanting efforts of the harvested portions of the Independence woodlot occurred in spring 2017 with the planting of 675 Hybrid Popular pole plantings. Water is supplied annually to the project for irrigation. Project is implemented and ongoing.			X		
31	X	X	X			Klondike Lake Aquatic Habitat (160 acres; EIR Impact 10-5 and 11-1, EIR Tables 4-3, 5-2, and 5-3)	Changes of surface water management practices and increased groundwater pumping have altered the habitats on which wildlife depends. Vegetation changes have been significant in many locations throughout the Valley. Therefore, impacts to certain species of wildlife, which were entirely dependent upon the impacted habitat, can be presumed to be significant.	The importance of riparian, marsh and aquatic habitats is recognized for mitigation of the impacts to wildlife that occurred during the 1970 to 1990 period. Wetter habitats support many more species and greater populations of wildlife; therefore, water management to create wet habitats will be used to mitigate the significant adverse impacts of the project.	The Klondike Lake Project was implemented as an LADWP Enhancement/Mitigation Project in 1986. Klondike sustains a year round water supply in a 160-acre formerly seasonal lakebed area providing nesting and feeding areas for waterfowl, and permitting water skiing and other water sports in summer months. Water continues to be provided annually to the project. The estimated water usage for the project was modified in the Big Pine Ditch System MND from 2,200 AF to 1,700 AF, with 1,500 AF allocated for conveyance and lake level maintenance and up to 200 AF allocated for the Klondike South Shore Habitat Area (SSHA) south of the lake. LADWP provides boat inspections for nonnative quagga and zebra mussels at Klondike annually from Memorial Day to Labor Day to ensure that these mussels are not introduced into LA's water system. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
32						Klondike SSHA (Big Pine Ditch System MND)		Per the Big Pine Ditch System MND, up to 200 acre feet of water will be supplied to a habitat area south of Klondike Lake for waterfowl nesting and feeding.	The Klondike South Shore Habitat Area (SSHA) Project was implemented as part of the Big Pine Ditch System Project and MND (2003), as the water supply for the Klondike Lake Project was modified to supply up to 200 AF of water to the SSHA project. A new diversion was installed and implementation of the releases for waterfowl habitat south of the lake began in May 2005. Delivery and measurement of the total allocation of up to 200 AF to the south was initially problematic because of the low hydraulic gradient between the lake and the waterfowl habitat areas as well as sand accumulation in this area. An alternate water release location was utilized starting in 2012. In March 2015, LADWP disked the tules in the habitat area that had resulted from multiple years of flooding throughout the growing season to increase the amount of shallow flooding acreage available for migrants. Water continues to be provided to the project annually as required; 49 acre feet of water was released to the project in 2019 (April-May; September-October). Project is implemented and ongoing.			X		
33				X		LAWS 118 Revegetation Project (19 acre portion, additional to 1991 EIR commitment; Laws Type E Transfer MND/2003 Laws Revegetation Plan)		Per the 2003 Laws Revegetation Plan, this project requires native revegetation of 19-acre portion of LAWS 118 (in addition to acreage required under 1991 EIR) with 10% cover and eight native species.	The 19-acre portion of Laws 118 covered in the Laws 2003 Plan has a complete irrigation system installed. Approximately 8,000 plants were planted in this parcel from 2008 to 2018. Initial planting is 100% complete. Overplanting in this parcel will continue. Project is fully implemented but has not yet attained goals.				X	
34				X		LAWS 129 Revegetation Project (47 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)		Per the 2003 Laws Revegetation Plan, this project requires native revegetation of 47 acres of abandoned agriculture land with 10% cover and eight native species.	The drip irrigation system is fully installed at this site. Approximately 26,000 plants were planted in this parcel from 2008 to 2018. Initial planting in this parcel was 100% completed by fall 2015. In the fall of 2018, approximately 6,000 plants were overplanted within the parcel, filling in all vacant emitter locations. Overplanting in this parcel will continue until criteria are met. Project is fully implemented but has not yet attained goals.				X	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
35				X		LAWS 27 (Native Seed Farm) (Laws Type E Transfer MND)		Per the Laws Type E Transfer MND (Irrigation Project in the Laws Area, this project requires LADWP to initiate a native seed farm for use on Owens Valley Revegetation projects.	A seed farm was initiated for seed harvest in 2004. The seed farm will aid in the implementation of all revegetation projects in the Owens Valley. In addition, LADWP has purchased and operates two greenhouses to grow up to 18,000 plants biannually for the seed farm and other revegetation efforts. Portions of the Seed Farm are currently well established and are producing viable seed from native grasses and shrubs. Approximately 40 acres of drip irrigation was hand seeded with *Ericameria nauseosa* and 2 acres of land without irrigation was drill seeded with a native upland scrub mix in winter of 2015. LADWP completed initial planting of the Laws Native Seed Farm in Spring 2017 by outplanting approximately 10,500 native plants at the site. LADWP overplanted an additional 6,000 plants at the site in Fall 2017. Survivability monitoring of the outplantings was performed in the fall of 2018. 12,492 emitters were surveyed for living plants. Of them, 8,021 had a live plant, equating to 64% survivability. In the spring of 2018, 15 acres of the sprinkler irrigation area were drill seeded with Indian ricegrass. Success was low possibly due to timing of the seeding and competition from existing weedy growth. In the spring of 2019, the area was mowed and disked to prepare a clean seed bed for seeding. When temperatures were appropriate, the area was again drill seeded at 30lbs/acre and irrigation was commenced. The Indian ricegrass germinated quickly and began to grow, putting on seed early in the season. However, the area became very weedy and the Indian ricegrass was outcompeted. A trial application of herbicide was applied but was largely unsuccessful. This site will be overseeded/planted until the parcel has adequate cover to supply native seed and mitigate blowing dust. There is no specific cover and composition criteria for this site.				X	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
36				X		LAWS 90 Revegetation Project (101 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)		Per the 2003 Laws Revegetation Plan, this project requires native revegetation of 101 acres of abandoned agriculture land with 10% cover and 10 ten native species.	The drip irrigation system is fully installed at this site. Initial planting in this large parcel is 100% complete. Approximately 71,400 plants have been planted in this parcel from 2008 to 2016. In 2014 and 2015, LADWP implemented a series of demonstration projects at Laws 90 including pre-emergent weed control, sand fencing, hay bale placement, exclusionary fencing, and mulch application. Knowledge gained from these demonstration projects have helped guide revegetation efforts in the Laws area. All of Laws 90 was overplanted in 2016 with approximately 26,400 additional plants filling in all emitter basins with either new or established live plants. Survivability monitoring of the outplantings was performed in the fall of 2018. LADWP biologists surveyed 36,072 emitters for living plants. Of them, 26,841 had a live plant, equating to 74% survivability. Initial planting across all 101 acres is 100% complete, but has not yet achieved success criteria. Overplanting in this parcel will be ongoing until goals are met. Project is fully implemented but has not yet attained goals.				X	
37				X		LAWS 94 Revegetation Project(40 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)		Per the 2003 Laws Revegetation Plan, this project requires native revegetation of 40 acres of abandoned agriculture land with 10% cover and ten native species.	The initial planting for the entire parcel was complete in Fall 2013. This parcel was formerly a combination of buried and aboveground drip irrigation systems; as of spring 2018, LADWP replaced all remaining above ground drip line with new buried drip irrigation lines. Approximately 38,000 plants have been planted in this parcel from 2008 to 2019. LADWP seeded the (former) above ground drip portion in 2015/2016 but had little success with germination. Survivability monitoring of the outplantings was performed in the fall of 2018. Biologists surveyed 11,522 emitters for living plants. Of them, 8,191 had a live plant, equating to 71% survivability. In the spring of 2019, approximately 15,000 native plants were overplanted at this site. Initial planting across all 40 acres is 100% complete, but has not yet achieved success criteria. Overplanting in this parcel will be ongoing until goals are met. Project is fully implemented but has not yet attained goals.				X	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
38				X		LAWS 95 Revegetation Project (46 acres, Laws Type E Transfer MND/2003 Laws Revegetation Plan)		Per the 2003 Laws Revegetation Plan, this project requires native revegetation of 46 acres of abandoned agriculture land with 10% cover and ten native species.	The initial planting for the entire parcel was complete in Fall 2013. This parcel was formerly a combination of buried and aboveground drip irrigation systems; as of spring 2018, LADWP replaced all remaining above ground drip line with new buried drip irrigation lines. Approximately 43,500 plants have been planted in this parcel from 2008 to 2019. LADWP seeded the above ground drip portion in 2015/2016 but had little success with germination. Survivability monitoring of the outplantings was performed in the fall of 2018. Biologists surveyed 17,160 emitters for living plants. Of them, 10,837 had a live plant, equating to 63% survivability. In the fall of 2019, approximately 9,000 native plants were overplanted at this site. Initial planting across all 46 acres is 100% complete, but has not yet achieved success criteria. Overplanting in this parcel will be ongoing until goals are met. Project is fully implemented but has not yet attained goals.				X	
39	X			X		Laws Area Revegetation Project (LAWS118) (140 acres; EIR Impact 10-18)	10-18: Significant adverse vegetation decrease and change have occurred in the Laws area due to a combination of factors, including abandoned agriculture, groundwater pumping, water spreading in wet years, livestock grazing, and drought.	Approximately 140 acres will be revegetated within the Laws area, which has lost all or part of its vegetation cover due to increased groundwater pumping or to abandonment of irrigation operations to supply the second aqueduct.	Site was fenced to reduce disturbance in 1998. Permanent transects were established in 1999. Dryland revegetation studies examining various planting and watering techniques were conducted in a portion of LAWS 118 by SAIC and MWH Americas in 2003 and 2004. In 2004, the above ground drip irrigation system was expanded and seed was planted at all emitters. The above-ground irrigation system was moved to a new area in 2005 and seed was planted at the new emitters at that time. In 2005, MWH conducted a soil microbial study at the site. In Spring 2011, 18 acres were seeded with locally collected seeds. In 2012, a buried drip system was installed at this site over approximately 30 acres. In the fall of 2018, approximately 11,000 plants were outplanted within the 30 acres of drip irrigation. New fencing was installed in 2013 on the west side of the project area along the new boundary with the Cashbaugh Lease established in the Laws Type E transfer. Approximately 46 acres was drill seeded during Winter 2015/2016. Permanent vegetation transects were read in 2019. The parcel has achieved 5.5% cover with 15 native perennial species (10% cover goal, 8 perennial species). The composition goal has been met. This project is fully implemented but has not yet attained cover goals.				X	

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
40	X		X			Laws Historical Museum Pasturelands (21+15 acres; EIR Impact 10-18, EIR Table 5-3)	Significant adverse vegetation decrease and change have occurred in the Laws area due to a combination of factors, including abandoned agriculture, groundwater pumping, water spreading in wet years, livestock grazing, and drought.	In the mid-1980s, LADWP and Inyo County implemented the Laws-Poleta Pasture Land, Laws Museum, and McNally Ponds enhancement/mitigation projects in the Laws area totaling approximately 541 acres of pasture land.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1990. This project provides a regular water supply to improve the native vegetation on a 21-acre parcel, establish irrigated pasture on 15 acres and establish windbreak trees, all adjacent to the museum. Water continues to be provided annually to this project for irrigation. Project is implemented and ongoing.			X		
41	X		X			Laws/Poleta Native Pasture (216 acres; EIR Impact 10-18, EIR Tables 4-3 and 5-3)	Significant adverse vegetation decrease and change have occurred in the Laws area due to a combination of factors, including abandoned agriculture, groundwater pumping, water spreading in wet years, livestock grazing, and drought.	In the mid-1980s, LADWP and Inyo County implemented the Laws-Poleta Pasture Land, Laws Museum, and McNally Ponds enhancement/mitigation projects in the Laws area totaling approximately 541 acres of pasture land.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1988. This project provides water for irrigation of 220 acres of sparsely vegetated land to reestablish native vegetation on abandoned pasture lands and increase livestock grazing capabilities. Water continues to be provided annually to this project for irrigation. Project is implemented and ongoing.			X		
42	X	X				Little Blackrock Springs (EIR Impact 10-14, EIR Table 5-2)	Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	LADWP will continue to supply water from Division Creek to the site of the former pond at Little Blackrock Springs. The marsh vegetation at this site will thus be maintained.	This project was implemented as an LADWP Environmental Project in the 1970s. Water is supplied from Division Creek to maintain the marsh vegetation as required. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
43	X		X			Lone Pine East Side Regreening (11 acres; EIR Impact 10-16, EIR Table 5-3)	10-16: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	A field of approximately seven acres along the Whitney Portal Road in Lone Pine, and a field of approximately 11 acres north of Lone Pine and east of Highway 395, have been converted to irrigated pasture as part of the Lone Pine Regreening enhancement/mitigation projects.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1990. This project was implemented to enhance the aesthetics of abandoned agricultural or pasture lands in areas around the towns of Big Pine, Independence, and Lone Pine. Water is supplied from LADWP facilities to promote and maintain vegetation. Water continues to be provided annually to this project for irrigation. Project is implemented and ongoing.			X		
44	X		X			Lone Pine-North Lone Pine Clean Up (EIR Table 4-3)		This project consisted of clearing unsightly, diseased or dead trees and cleaning up refuse around the community of Lone Pine.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1989 to improve the aesthetics of a 23-acre area north of Lone Pine east of Highway 395. This project is complete.	X				
45	X		X			Lone Pine Riparian Park (320 acres, EIR Tables 4-3 and 5-3)		Provide a continuous water supply to a reestablished ditch running through Lone Pine Town Park and then easterly to the Lone Pine Woodlot Project. Water not used by this project or the Woodlot Field project could flow to the historic Lone Pine Creek Channel east of Lone Pine and returned to the Owens River Channel.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1987. This project supplies water through a historic ditch to the Lone Pine Riparian Park, the Lone Pine Wood Lot, and approximately 320 acres of reestablished pasturelands in Richards and Van Norman Fields. Water continues to be provided annually to this project for irrigation as required. Project is implemented and ongoing.			X		
46	X		X			Lone Pine Sports Complex (EIR Table 5-3)		This project consists of a sports complex that includes a playground for Lo-Inyo School, soccer fields, softball/baseball fields, and parking and picnic area over approximately 10 acres.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1990. This project converted vacant City property to an outdoor sports complex consisting of baseball fields, soccer fields, parking, picnic, and park areas. Project is complete.	X				

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
47	X		X			Lone Pine West Side Regreening (8 acres; EIR Impact 10-16, EIR Tables 4-3 and 5-3)	10-16: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	A field of approximately seven acres along the Whitney Portal Road in Lone Pine, and a field of approximately 11 acres north of Lone Pine and east of Highway 395, have been converted to irrigated pasture as part of the Lone Pine Regreening enhancement/mitigation projects.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1990. This project was implemented to enhance the aesthetics of abandoned agricultural or pasture lands in areas around the towns of Big Pine, Independence, and Lone Pine. Water is supplied annually from LADWP facilities to promote and maintain vegetation. Project is implemented and ongoing.			X		
48	X		X			Lone Pine Woodlot (12 acres; EIR Impact 10-11, EIR Table 4-3)	10-11: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	As part of the enhancement/mitigation projects implemented by LADWP and Inyo County since 1985, approximately 942 acres of these abandoned agricultural lands have been revegetated with irrigated pasture or alfalfa. These areas are the Independence Pasture and native pasture lands, the Van Norman and Richards Fields, and the Lone Pine Woodlot adjacent to Lone Pine.	The Lone Pine Wood Lot was initially planted in 1987. The wood lot was planted at a high density with the intent of thinning to a 12-foot spacing after planting success was determined. Over time, this high density of trees resulted in reduced growth and increased competition. While the hybrid poplar portions of the wood lots have been harvested several times since project implementation, the locust portions of the wood lots had never been harvested until 2015-2016. At that time, LADWP and CAL Fire conducted a significant thinning effort in both the Lone Pine and Independence Wood Lots resulting in approximately 130 cords of wood harvested and distributed to the Lone Pine Future Farmers of America (FFA), who holds the lease to both wood lots and manages the distribution of wood.In Winter 2017-18, LADWP and CAL Fire planted 825 Hybrid Popular trees in the Popular section of the Lone Pine Wood Lot. The trees were planted in areas where there were spaces from trees not re-sprouting. Maintenance of the wood lots continues as needed. Water is supplied annually to the project for irrigation. Project is implemented and ongoing.			X		

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	**Table 3.3 LADWP MITIGATION AND MONITORING**				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
						Project Title	**Impact (Where Relevant)**	**Measure/Provision**	**Progress to Date**	Status				
49	X	X	X		X	LORP Project (60 miles, perhaps more than 1,000 acres)/ Lower Owens Rewatering Project; EIR Impacts 10-14, 10-17, 10-20; EIR Tables 4-3 and 5-3, 1997 MOU Section II)	Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	Although not all springs and associated riparian and meadow vegetation will receive on-site mitigation, the Lower Owens River Project will provide mitigation of a compensatory nature. This project will rewater over 50 miles of the river channel allowing for restoration of riparian vegetation along the river. This project also will result in the creation of several new ponds along the river and will provide the continuation of existing lakes associated with the project. The project will restore large areas of wetland and meadow vegetation, perhaps exceeding 1,000 acres adjacent to the river and in its delta. In comparison, the area of riparian and meadow vegetation that has been lost and will not be restored because of the elimination of spring flow due to groundwater pumping is estimated to be less than 100 acres.	Flows were initiated in the Lower Owens River Project in December 2006. All four elements of the LORP are functioning and are being adaptively managed. Monitoring is ongoing and water is annually supplied to the project as required. For more information on the monitoring and management of the LORP, refer to LADWP and ICWD's LORP Annual Report. Project is implemented and ongoing.			X		
50	X		X			McNally Ponds and Native Pasturelands (300 acres pasture, 60 acres ponds; EIR Impact 10-5 and 10-18, EIR Tables 4-3 and 5-3)	10-5: Between 1970 and 1990, the project resulted in beneficial changes to lakes and ponds, and the creation of new lakes and ponds, with no significant adverse impact on vegetation.10-18: Significant adverse vegetation decrease and change have occurred in the Laws area due to a combination of factors, including abandoned agriculture, groundwater pumping, water spreading in wet years, livestock grazing, and drought.	In the mid-1980s, LADWP and Inyo County implemented the Laws-Poleta Pasture Land, Laws Museum, and McNally Ponds enhancement/mitigation projects in the Laws area totaling approximately 541 acres of pasture land.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1986-1987. When in operation, this project provides water for 300 acres during the spring and summer months to mitigate and sustain vegetation, and to provide water to 60 acres of ponds during the fall months for waterfowl habitat. The Standing Committee agreed in 1991 to reduce the water commitment to the McNally Ponds Project because of dry conditions. In most normal and below-normal runoff years since that time, the Standing Committee has reduced water releases to this project. In years of abundant runoff the project receives its full allotment of water. In drier years the McNally Canals are not operated. The Water Agreement states that LADWP shall operate the canals in accordance with its practices from 1970. There is an alternate water supply source when wells are in ON status. This project was supplied with water in 2017 due to the high runoff conditions and water spreading in the Laws Area. Project is implemented and ongoing with water supplied to the project in years where the McNally Canals are in operation or the associated wells are in ON status. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
51	X	X	X			Millpond Recreation Area (EIR Impact 10-5, EIR Table 5-2 and 5-3)	Between 1970 and 1990, the project resulted in beneficial changes to lakes and ponds, and the creation of new lakes and ponds, with no significant adverse impact on vegetation.	This project was first implemented as an LADWP Environmental Project and required water to be provided to the pond as the recreation area either by creek flow or a well at the site. Millpond is also an Enhancement Mitigation Project that has required LADWP to provide funds to purchase energy to operate the recreation area's sprinkler system that waters 18 acres of the community park including two softball fields.	This project is managed by the Inyo County Parks and Recreation. LADWP continues to provide water and funds for power annually to this project. Project is implemented and ongoing.			X		
52					X	North of Mazourka Canyon Road Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in December 2011 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Please refer to Section 3.2.1 for more information on these projects. Project is implemented and ongoing.				X		
53	X					Reinhackle Spring (EIR Impact 10-14)	10-14: Increased groundwater pumping has reduced or eliminated flows from Fish Springs, Big and Little Seely Springs, Hines Spring, Big and Little Blackrock Springs, and Reinhackle Spring. This has caused significant adverse impacts to vegetation at several of these spring areas.	When it was determined in the late 1980s that groundwater pumping was affecting the flow from Reinhackle Spring, pumping from certain wells in the area was discontinued and the spring flow increased. No significant adverse impacts on vegetation in this area have resulted from the reduced flow. At Reinhackle Spring, groundwater pumping from wells that affect the spring flow will be managed so that flows from the spring will not be significantly reduced compared to flows under prevailing natural conditions. In addition, all of the provisions for protecting springs, described in impact 10-15 and contained in the Water Agreement and the Green Book, will be applied equally to Reinhackle Spring.	Spring flows are being monitored continually. The flow followed the typical seasonal pattern of reaching a peak flow in winter and a low flow in the spring. A geochemistry study of flow in Reinhackle Spring was conducted in 2003 as a cooperative study by LADWP, MWH Americas, Inc., and ICWD, which concluded that water from Reinhackle Spring is similar in origin to the Los Angeles Aqueduct and dissimilar to the deep aquifer samples and up gradient shallow aquifer wells. An operational test was conducted in Bairs Georges Wellfield to study the response of the spring flow to groundwater pumping by active wells in the wellfield and the flow in the Los Angeles Aqueduct (March 2011). Results show that the flow in Reinhackle Spring is affected mainly by the water levels in the shallow aquifer west of the spring. Groundwater pumping in the Bairs Georges Wellfield could affect the flow in the spring only to the extent that it affects water levels in the shallow aquifer west of the spring.LADWP has developed a monitoring and operational plan for Bairs Georges Wellfield that has been submitted to ICWD for comment. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
54	X		X			Richards Fields (160 acres; EIR Impact 10-16, EIR Table 4-3)	10-16: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	As part of the enhancement/mitigation projects implemented by LADWP and Inyo County since 1985, approximately 942 acres of these abandoned agricultural lands have been revegetated with irrigated pasture or alfalfa. These areas are the Independence Pasture and native pasture lands, the Van Norman and Richards Fields, and the Lone Pine Woodlot adjacent to Lone Pine.	This project was implemented as a LADWP Enhancement/Mitigation Project in 1987. Water continues to be provided annually to the project for irrigation. Project is implemented and ongoing.			X		
55	X	X				Saunders Pond (EIR Impact 10-5, EIR Table 5-2)	10-5: Between 1970 and 1990, the project resulted in beneficial changes to lakes and ponds, and the creation of new lakes and ponds, with no significant adverse impact on vegetation.	Under this project, water is provided for a warm-water fishery and waterfowl area.	The dike system forming the Buckley Pond Series was originally constructed in the 1950s to create a water spreading and groundwater recharge area to be used only in above normal years. In 1968, a cooperative agreement between LADWP and CDFG proposed a habitat improvement project and permanent wildlife habitat area. Work on Saunders Pond was complete in 1971. LADWP, California Department of Fish and Game, and California Department of Forestry signed onto the joint Habitat Management Plan for the Buckley Pond Series in 1976 that described how the pond series was to be managed. More recently, LADWP burned Saunders Pond in spring 2016, removed aquatic vegetation, and resumed flows to the pond in fall 2016. The local Lion's Club installed a handicap accessible fishing platform/dock on the south end of the pond in summer 2016. Water continues to be provided annually to the project. Project is implemented and ongoing.			X		

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
56	X		X			Shepherd Creek Alfalfa Field (198 acres; EIR Impact 10-11, 12-1, EIR Tables 4-3 and 5-3)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands. 12-1: Significant impacts on air quality resulting from groundwater pumping during the period of 1970 to 1990 have occurred due to vegetation losses.	10-11: Under the Shepherd Creek enhancement/mitigation project, approximately 198 acres of poorly vegetated land has been converted to alfalfa. This area was affected by groundwater pumping and abandonment of irrigation. In addition, an area of approximately 60 acres to the east of the existing project area on the opposite side of U.S. Highway 395 is poorly vegetated. If the density of the native cover in this area does not naturally increase, the existing enhancement/mitigation project may be expanded to include this additional area. 12-1: Under the Shepherd Creek enhancement/mitigation project, approximately 200 acres of poorly vegetated land has been converted to alfalfa.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1986. The Shepherd Creek Alfalfa Field Project has been revegetated with alfalfa that is sprinkler irrigated and wind break trees. Water continues to be provided annually to the project for irrigation. Project is implemented and ongoing.			X		
57	X		X			Shepherd Creek Potential (60 acres; EIR Impact 10-11, 12-1, EIR Table 5-3)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands. 12-1: Significant impacts on air quality resulting from groundwater pumping during the period of 1970 to 1990 have occurred due to vegetation losses.	10-11: Under the Shepherd Creek enhancement/mitigation project, approximately 198 acres of poorly vegetated land has been converted to alfalfa. This area was affected by groundwater pumping and abandonment of irrigation. In addition, an area of approximately 60 acres to the east of the existing project area on the opposite side of U.S. Highway 395 is poorly vegetated. If the density of the native cover in this area does not naturally increase, the existing enhancement/mitigation project may be expanded to include this additional area.	The Shepherd Creek Potential Project was evaluated and natural increases in the density of native cover have occurred making the site comparable to baseline conditions in adjacent undisturbed parcels. Therefore, the goals for this potential project, as stated in the EIR, have been met. Project is complete.	X				

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
58	X					Steward Ranch (EIR Impact 9-14)	9-14: Los Angeles Department of Water and Power (LADWP) pumping between 1970 and 1990 in the Big Pine area contributed to lowered water levels in the wells of Steward Ranch and resulted in an adverse economic effect. It is expected that LADWP will continue to pump from this area in the future. The proposed mitigation measure would reduce this impact to less-than significant.	Because groundwater pumping in the Big Pine well field was contributing to a lowering of groundwater levels at Steward Ranch, one of two wells became inoperable. LADWP reached agreement with the ranch owners to permanently mitigate the lowered groundwater levels that have existed since 1972.	The mitigation efforts are complete. LADWP continues to compensate the ranch owners for added power costs of pumping water from a greater depth. Project is implemented and ongoing.			X		
59	X			X		Tinemaha 54 Revegetation Project (EIR Impact 10-11)	10-11: Fluctuations in water tables due to groundwater pumping have caused approximately 655 acres of groundwater dependent vegetation to die off. Loss of vegetation cover has occurred on these lands.	Approximately 80 acres of land that lost a significant amount of its native vegetation cover as a result of increased groundwater pumping will be revegetated. The techniques that will be employed to revegetate these lands will be determined through studies that will be conducted by LADWP and Inyo County. These lands will not be permanently irrigated, but will be revegetated with native Owens Valley vegetation not requiring irrigation except perhaps during its initial establishment. Depending on the amount of rainfall and runoff, successful revegetation of these lands could take a decade or longer. The goal will be to restore as full a native vegetation cover as is feasible, but at a minimum, vegetation cover sufficient to avoid blowing dust will be achieved in that area.	Project implementation is complete. The 0.4 acre area has been fenced, planted with 108 grass plants and drip irrigated between 1999 and 2004 to encourage plant establishment. In 2016-2017, LADWP planted 125 shrubs consisting of *Atriplex torreyi, Atriplex canescens, Atriplex polycarpa*, and *Krascheninnikovia lanata* utilizing the Cocoon Planting System from Land Life Company. The cocoon planting technology allows for shrubs to grow in arid environments without additional irrigation post planting. As of 2019, there was a 56% survivability rate of the shrubs. The shrubs will continue to be monitored for success. The road through the middle of the site was removed and reclaimed as well during this planting process. Plantings will be periodically monitored. Permanent transects were run in 2017 and the site had attained 5% cover with 4 native perennial species (30% cover goal with 2 native perennial species). The composition goal has been met. Project is implemented but has not yet attained cover goals.				X	
60	X		X			Tree Planting along Roadways (EIR Table 4-3)		This project consisted of planting new trees and maintaining new and existing trees along roadways within the towns of Laws, Big Pine, Independence, and Lone Pine.	The goal of this project was to provide shade and greenways in Owens Valley communities to mitigate trees lost since the 1970s due to a reduction in surface water irrigation, higher water costs, age, disease, etc. LADWP was responsible for purchasing and planting the trees and replacement once within two years if needed. This project was implemented in Laws, Independence and Lone Pine as an LADWP Enhancement/Mitigation Project in 1988. Additional planting occurred in Big Pine in 1992. This project	X				

Table 3.3
LADWP MITIGATION AND MONITORING

Reporting No.	1991 EIR	1991 EIR Environmental Project (1970-1984)	1991 EIR E/M Project (1985-present)	Revegetation Project	1997 MOU	Project Title	Impact (Where Relevant)	Measure/Provision	Progress to Date	Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
										Status				
									resulted in 14 trees planted in Laws, approximately 130 trees in Big Pine (Arizona cypress), 84 in Independence, and 77 in Lone Pine. Ongoing irrigation is the responsibility of the adjacent property owner. Project is complete.					
61	X	X				Tule Elk Field (EIR Table 5-2)		Under this project, water is provided to a field that is heavily used in summer by Tule elk, near U.S. Highway 395 and Tinemaha Reservoir.	This project was implemented as and LADWP Environmental Project in the 1970's to enhance/expand elk feeding grounds in the Owens Valley. Water continues to be provided annually to this project for irrigation. This project is implemented and ongoing.			X		
62	X		X			Van Norman Fields (170 acres; EIR Impact 10-16, EIR Table 4-3)	10-16: Approximately 1,080 acres of formerly irrigated lands had not successfully revegetated following the abandonment of agriculture. This was a significant adverse impact because these lands had a loss of vegetation and were the source of blowing dust.	As part of the enhancement/mitigation projects implemented by LADWP and Inyo County since 1985, approximately 942 acres of these abandoned agricultural lands have been revegetated with irrigated pasture or alfalfa. These areas are the Independence Pasture and native pasture lands, the Van Norman and Richards Fields, and the Lone Pine Woodlot adjacent to Lone Pine.	This project was implemented as an LADWP Enhancement/Mitigation Project in 1987. A portion of the project could not be irrigated due to topography. Additionally, Well 390 met the end of its service life and was replaced with Well 425 in 2014. The project was modified by the Standing Committee April 22, 2014 to include 10 acres for the Lone Pine High School Farm. The agreed upon water allotment for the modified project is approximately 2.8 AF/acre. Water continues to be provided annually to the project for irrigation. Project is implemented and ongoing.			X		
63					X	Warren Lake Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in April 2011 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. The Warren Lake Project is implemented and ongoing as needed; it serves to balance the annual 1600 acre-foot water commitment for this provision of the MOU. Please refer to Section 3.2.1 for more information on these projects. Project is implemented and ongoing.			X		
64					X	Well 368 Project (Additional Mitigation Projects Developed by the MOU Ad Hoc Group (MOU Section III.A.3))			Project was implemented in February 2012 as part of the Additional Mitigation Projects Developed by the MOU Ad Hoc Group. Please refer to Section 3.2.1 for more information on these projects. Project is implemented and ongoing.			X		

3.2.1. Additional Mitigation Projects Developed by the MOU Ad Hoc Group

Introduction

Section III.A.3. Additional Mitigation of the 1997 MOU describes LADWP's commitment to supply 1,600 acre-feet (AF) of water per year for:

> 1) the implementation of the on-site mitigation measure at Hines Spring identified in the 1991 EIR, and
>
> 2) the implementation of on and/or off-site mitigation in addition to that identified in the 1991 EIR for impacts that occurred at Fish Springs, Big and Little Blackrock Springs, and Big and Little Seely Springs.

The Second Amendment of Amended Stipulation and Order Case No. S1CVCV01-29768 was executed on March 8, 2010, by the Superior Court of California, Inyo County. This order accepts the eight projects described in the *Additional Mitigation Projects Developed by the MOU Ad Hoc Group* (Additional Mitigation Projects) document as mitigation for impacts identified above and establishes a two year timeline for their implementation. The projects are named according to their locations: Freeman Creek, Warren Lake, Hines Spring Well 355, Hines Spring Aberdeen Ditch, North of Mazourka Canyon Road, Homestead, Well 368, and Diaz Lake. LADWP completed an Initial Study for the Additional Mitigation Projects and prepared a Mitigated Negative Declaration (MND) and released it for public review March 23 - April 26, 2010. The final MND, Mitigation Monitoring and Reporting Program, and proposed implementation schedule were approved by the City of Los Angeles Board of Water and Power Commissioners (Board) on June 1, 2010. A Notice of Determination was filed with the Inyo County Clerk on June 2, 2010. LADWP began implementing the projects shortly thereafter and implemented all eight Additional Mitigation Projects by March 8, 2012 as required in the Stipulation and Order.

3.2.1.1. Additional Mitigation Projects Annual Monitoring Report

LADWP conducted the required monitoring described in the Additional Mitigation Projects document for five years post implementation and performed a five-year evaluation of the projects in 2017. This evaluation was provided in LADWP's 2017 Annual Owens Valley Report, and described implementation, monitoring data, and recommendations for the future management of each project where relevant. Many of the initial monitoring efforts were discontinued following this evaluation.

Flow monitoring for the projects is still conducted monthly per the Additional Mitigation Project document. Table 3.4 shows flow data recorded for each of the projects from April 1, 2019 through March 31, 2020. During this time, LADWP provided 1,608 acre-feet of water to the Additional Mitigation Projects.

Table 3.4. Additional Mitigation Projects Developed by the MOU Ad Hoc Group
Annual Water Accounting in Acre-feet (April 1, 2019 - March 31, 2020)

Additional Mitigation Projects Developed by the MOU Ad Hoc Group
Annual Accounting in Acre Feet (April 1, 2019-March 31, 2020)

	Freeman Creek (*Average**) (2054)	Warren Lake (2173)	Hines Well 355 (W355)	Aberdeen Ditch (400)	North of Mazourka (F418)	North of Mazourka (404)	Homestead T775 (F421)	Homestead Well (F419)	Well 368 (F420)	Diaz Lake (86)	Total
April	20	0	20	10	7	2	7	18	16	0	100
May	19	0	20	10	7	3	7	19	17	50	151
June	14	27	19	10	7	2	7	18	16	0	119
July	13	87	20	11	7	3	7	19	16	50	231
August	10	21	20	12	7	2	7	19	15	25	139
September	13	0	19	10	6	2	7	18	13	0	89
October	22	39	20	11	7	3	5	18	13	0	137
November	22	56	19	7	7	2	10	18	18	0	158
December	23	19	20	8	7	2	8	19	17	50	172
January	23	15	13	5	7	3	10	19	18	0	113
February	18	21	13	5	7	2	7	18	17	0	107
March	18	0	19	5	7	3	8	19	15	0	93
Total					*81*	*29*	*90*	*220*			*1608*
Project Total	*215*	*285*	*221*	*103*	*110*		*310*		*190*	*174*	
Annual Target AF	*215**	*0*	*240*	*145*	*300*		*300*		*150*	*250*	***1600***

**Freeman Creek will be recorded as 215 AF/year based on long term average regardless of varying flow reads.*

***Amount in excess of project allotment may not be carried over to future years.*

3.2.2. Irrigation Project in the Laws Area (Laws Type E Transfer)

3.2.2.1. Laws 2003 Revegetation Plan

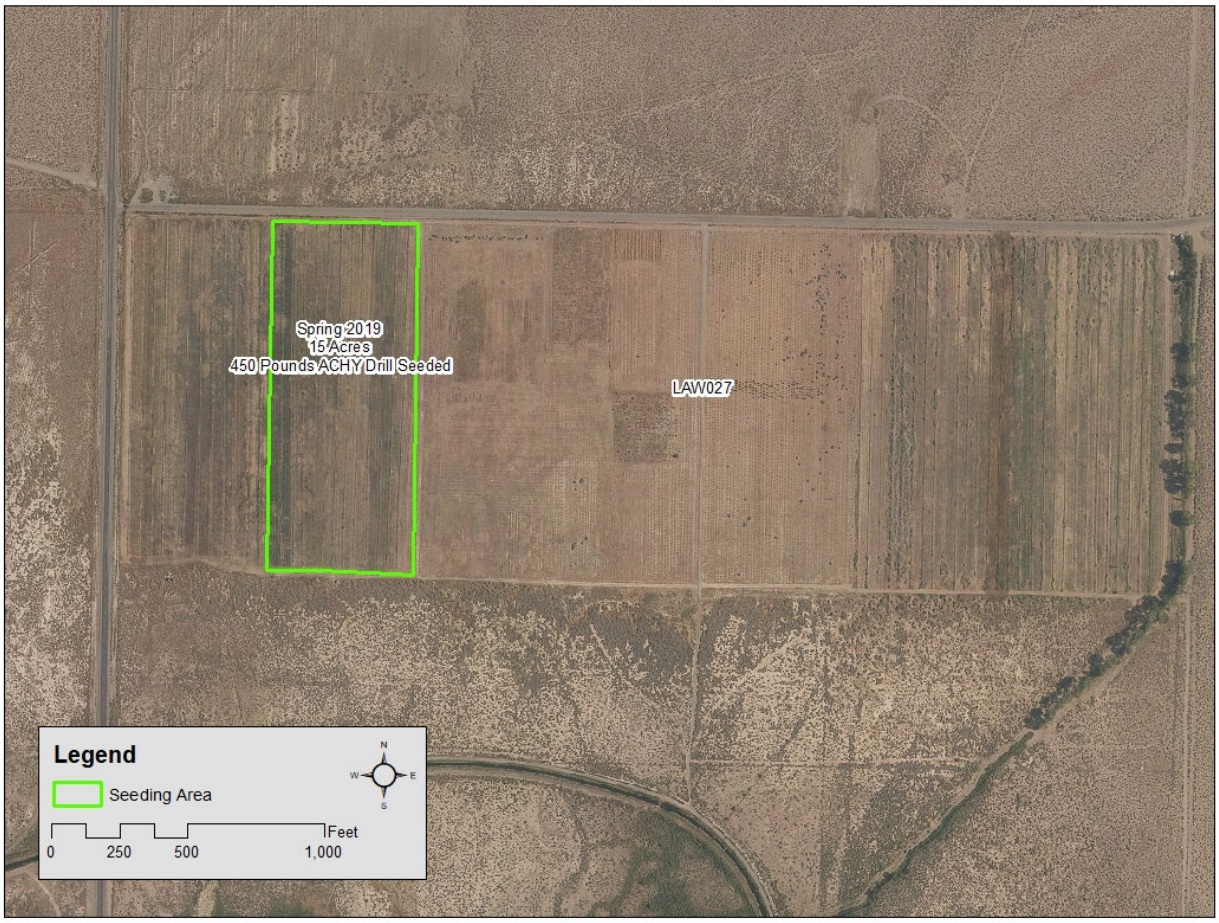
Introduction

The Revegetation Plans for Lands Removed from Irrigation, Laws Parcels 90, 95, and 129 and Abandoned Agricultural Land Parcel 94 (Plan) (January 2003) established goals to restore native vegetation in each of these parcels that is similar in cover and species composition to nearby sites. Under this Plan, all 253 acres of these parcels were to be successfully revegetated by 2013 and persist for an additional two years with no onsite revegetation activities.

Previous Owens Valley Annual Reports describe the various methods used to attain successful revegetation of these parcels at Laws as well as the challenges this project has presented since 2003. The text below describes LADWP's active revegetation efforts at the Laws parcels in 2019. Please refer to LADWP's 2018 Owens Valley Annual Report for more detailed discussion on the progression of this project since 2003. While success criteria has not been met at these sites, LADWP has acted in good faith and has completed initial planting across all 253 acres at Laws 90, 94, 95, 118, and 129, as well as 92 acres at the Laws Native Seed Farm to date. These efforts totaled nearly 176,000 greenhouse-propagated plants and thousands of pounds of seed. All parcels will be overplanted as necessary and/or treated with alternative methods as they become available to achieve goals. Please refer to Table 3.3 for current status of each of these parcels.

Spring 2019 Planting Effort

The Spring 2019 planting effort consisted of reseeding a 15 acre portion of the Laws Native Seed Farm (LAW027) and outplanting native plants at LAW094 (see figures and table below). In March, 15 acres at LAW027 were prepared for drill seeding an additional 450 pounds of Indian ricegrass (*Achnatherum hymenoides,* ACHY). The 2018 drill seeding effort did not take. This was attributed to not preparing the soil for drill seeding. Because there was a lot of thatch and root balls in the field, the seed drill was unable to penetrate the soil horizon which prevented seed from germinating. For the 2019 seeding effort, preparation of the field consisted of mowing and disking prior to seeding, in order to properly prepare a clean seed bed. Once the field was prepared, a long irrigation set was commenced to thoroughly saturate the soil to help mitigate dust and to facilitate even penetration of seed. This effort was extremely successful, with 100% of the drill seeded area germinating within one month with a large percentage of the plants going to seed. However, an unforeseen issue quickly diminished results. The vigorous growth of annual weeds began to out compete the Indian ricegrass and take over the entire field. With this new information, the 2020 drill seeding effort will have an herbicide application plan associated with it. The goal is to reduce the extent of weedy, broadleaf growth, in order to reduce competition with the Indian ricegrass.



Area drill seeded at LAW027 in Spring 2019

Beginning April 4, 2019, 15,000 native plants were planted at LAW094. This effort focused on a 10 acre area of recently installed buried drip irrigation and overplanting the remainder of the parcel. This effort also utilized fertilizer packs that were tested on Owen Lake, that had positive results. Species included *Atriplex canescens* (ATCA2), *Atriplex polycarpa* (ATPO), *Eriogonum fasciculatum* (ERFA2), and *Eriogonum umbellatum* (ERUM).

Species planted at LAW094 in April 2019

SPECIES	NUMBER PLANTED
ATCA2	8,000
ATPO	4,000
ARFA2	1,500
ERUM	1,500



Area planted at LAW094 in Spring 2019

Fall 2019 Planting Effort

The fall planting effort was conducted September 30-October 3, 2019 (see figure and table below). A total of 9,000 native plants were planted at LAW094 and LAW095. The goal of this planting effort was to finish overplanting LAW094, continuing into LAW095. Fertilizer packs were used and plant vigor will be monitored. The low number of plants are a result of two power outages in the greenhouses that resulted in seedlings reaching their wilting point and ultimately dying. Alarms are being installed in the greenhouses to prevent situations like this from occurring in the future.

Species for both sites included *Atriplex canescens* (ATCA2), *Atriplex polycarpa* (ATPO), Eriogonum fasciculatum (ERFA2), and Eriogonum umbellatum (ERUM).

Species planted at LAW094 and LAW095 in October 2019

Species	Number Planted
ATCA2	1,000
ATPO	3,000
ARFA2	2,500
ERUM	2,500



Area planted at LAW094 and LAW095 in fall 2019.

3.2.2.2. Mitigation Monitoring Reporting Program for Irrigation Project in the Laws Area

POT. IMPACT		MITIGATION			MONITORING			
Summary of Impact	**MM No.**	**Measure**	**Timing**	**Responsibility**	**Method**	**Period**	**Frequency**	**Responsibility**
Air Quality								
Creation of dust during pipeline installation and ground preparation for planting.	M-1	Ground surfaces will be thoroughly wet prior to and during work to minimize dust.	To be implemented throughout the project as needed.	LADWP construction staff and/or LADWP lessee.	Water trucks will pre-wet construction areas and water as necessary throughout construction. Ground will be pre-irrigated prior to planting.	As needed throughout construction and/ or prior to planting.	Throughout the construction or agricultural period.	LADWP construction staff and/or LADWP lessee.
Groundwater pumping to supply water to the project could adversely affect groundwater dependent vegetation in the vicinity of the project and cause blowing dust.	M-2	Section III and Section IV of the Agreement between the County of Inyo and the City of Los Angeles and its Department of Water and Power on a Long Term Groundwater Management Plan for Owens Valley and Inyo County	To be implemented throughout the project as needed.	Inyo/Los Angeles Technical Group	Annual monitoring of the vegetation in the vicinity is being conducted.	During the period when groundwater pumping and water management practices could affect vegetation.	Annually during the growing season.	Inyo/Los Angeles Technical Group
Hydrology and Water Quality								
Groundwater pumping	M-3	Water Agreement	To be implemented throughout the project as needed.	Inyo/Los Angeles Technical Group	Monitoring at each identified site will consist of one or more field visits during the period when groundwater pumping and water management practices could affect such vegetation.	During the period when groundwater pumping and water management practices could affect vegetation.	Annually during the growing season.	Inyo/Los Angeles Technical Group

POT. IMPACT		MITIGATION			MONITORING			
Summary of Impact	**MM No.**	**Measure**	**Timing**	**Responsibility**	**Method**	**Period**	**Frequency**	**Responsibility**
Reducing the irrigation duty from 5 AF per acre to 3 AF per acre and of changing from flood irrigation to sprinkler irrigation.	M-4	Water Agreement	To be implemented throughout the work as needed.	Inyo/Los Angeles Technical Group	Monitoring at each identified site will consist of one or more field visits during the period when groundwater pumping and surface water management practices could affect such vegetation.	During irrigation season	Annually during the growing season.	Inyo/Los Angeles Technical Group
Biological Resources								
Altering the flow in a ditch that carries water diverted from Coldwater Canyon.	M-5	Water Agreement	To be implemented throughout the work as needed.	Inyo/Los Angeles Technical Group	Monitoring at each identified site will consist of one or more field visits during the period when surface water management practices could affect such vegetation.	During the period of changes in surface water management practices could affect vegetation.	Annually during the growing season.	Inyo/Los Angeles Technical Group
Altering the flow in Silver Canyon Ditch.	M-6	Water Agreement	To be implemented throughout the work as needed.	Inyo/Los Angeles Technical Group	Monitoring at each identified site will consist of one or more field visits during the period when surface water management practices could affect such vegetation.	During the period of changes in surface water management practices could affect vegetation.	Annually during the growing season.	Inyo/Los Angeles Technical Group
Growth of noxious weeds	M-7	LADWP or its lessee or lessees, in conjunction with Inyo County's weed abatement program, will promptly treat or remove the weed.	To be implemented throughout the work as needed.	LADWP Watershed Resources Staff; LADWP Lessee; and/or Inyo County Agricultural Department.	Monitoring consists of field visits during the growing season.	Annually during the growing season.	Annually during the growing season.	LADWP Watershed Resources Staff; LADWP Lessee; and/or Inyo County Agricultural Department.

POT. IMPACT		MITIGATION			MONITORING			
Summary of Impact	**MM No.**	**Measure**	**Timing**	**Responsibility**	**Method**	**Period**	**Frequency**	**Responsibility**
Cultural Resources								
Archaeological investigations identified six previously unrecorded archaeological sites and 11 isolates within the project area.	M-8	Pipeline placement was to avoid identified sites; if new sites are encountered during implementation, work will be halted until an archaeologist can be consulted.	To be implemented throughout the work as needed.	LADWP Construction Manager	Construction personnel will monitor for unidentified sites during the progression of construction.	During construction activities.	Throughout the construction period.	LADWP Construction Manager

MITIGATION MEASURES

Mitigation Measure M-1

Impact: Creation of dust during pipeline installation and ground preparation for planting.

Measure: Ground surfaces will be thoroughly wet prior to and during work to minimize dust.

All seeding work during 2019 was conducted utilizing the Truax No-till drill seeder. Water was applied before initiating seeding and following seeding to control dust emissions.

LADWP currently applies water through irrigation systems at the revegetation sites as described in the previous section and additionally with water trucks for dust control if and where necessary.

Mitigation Measure M-2 and M-3

Impact: Groundwater pumping to supply water to the project could adversely affect groundwater-dependent vegetation in the vicinity of the project and cause blowing dust.

Measure: *1991 Agreement between the County of Inyo and the City of Los Angeles and its Department of Water and Power on a Long Term Groundwater Management Plan for Owens Valley and Inyo County* (Water Agreement).

The following table shows the vegetation cover in vegetation parcels within the Laws Wellfield as determined by LADWP. Data from the baseline period 1985 to 1987 (depicted as 1986 for simplicity) indicates estimates of vegetation cover in the parcels prior to implementation of the irrigation project in the Laws area. Data since 2004 are estimates of vegetation cover after implementation of the irrigation project in the Laws area.

Vegetation Cover in Selected Parcels within the Laws Wellfield

Parcel	1986	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
FSL048	18												8	8	20	34	30
LAW030	23	26	30	51	40	39	36	31	35	22	24	12	13	17	24	33	23
LAW035	31	3	14	17	11	13	3	12	17	4	2	1	1	1	6	5	17
LAW043	41	5	13	10	16	21	8	11	20	7	3	3	6	4	14	10	16
LAW052	28	5	14	11	9	15	15	6	16	8	4	4	4	3	5	11	13
LAW062	21	5	11	14	16	22	12	12	17	10	5	4	2	2	4	9	9
LAW063	11	9	17	15	19	26	14	15	25	12	6	6	4	5	10	14	19
LAW065	10	7	8	11	12	18	12	10	20	7	5	4	3	2	7	9	12
LAW070	37	6	8	18	20	21	14	20	23	10	6	3	4	3	12	11	33
LAW072	63										10	6	6	4	35	47	36
LAW078	52	36	49	54	59	67	69	65	53	35	27	23	23	16	35	46	40
LAW082	17	4	5	10	6	9	8	12	10	8	6	5	4	6	8	9	13
LAW085	30	7	13	21	26	35	29	31	14	15	6	5	4	6	13	17	17
LAW105	26	35	49	48	44	68	41	58	43	43	27	19	26	21	33	38	44
LAW107	47	46	68	71	79	80	90	81	65	54	45	31	35	47	59	67	68
LAW112	20	17	37	33	38	49	40	31	33	33	14	11	8	10	21	20	36
LAW120	26	33	41	47	48	48	50	52	47	35	39	26	30	21	41	49	55
LAW122	60	64	73	78	75	70	78	68	77	60	45	42	30	32	51	82	61
LAW137	22	19	33	32	24	27	20	27	28	21	17	14	14	16	23	23	24

The following table illustrates the depth to water in Laws area test holes prior to and after implementation of the irrigation project in the Laws area.

April Depth to Water (in feet) for Test Holes in the Laws Wellfield

	Test Hole				
Year	T107	T436	T438	T490	T492
2004	30.1	10.1	11.6	14.6	31.9
2005	31.9	10.2	8.9	14.7	31.5
2006	18.1	4.5	3.7	13.2	24.0
2007	21.1	5.3	6.3	10.2	23.1
2008	25.1	7.3	8.6	12.5	27.6
2009	28.0	8.8	9.4	13.8	29.1
2010	30.8	9.5	11.4	13.6	31.0
2011	31.5	9.6	9.1	13.2	32.3
2012	31.9	10.1	9.6	10.9	32.7
2013	33.1	11.1	12.0	13.2	32.7
2014	34.4	11.8	12.5	15.1	33.9
2015	35.5	12.7	13.0	16.0	36.6
2016	35.8	12.8	13.2	16.5	36.2
2017	35.8	10.4	8.7	16.0	33.3
2018	22.9	5.1	5.5	8.6	21.9
2019	27.2	6.4	5.1	8.4	26.3

Mitigation Measure M-4

Impact: Reducing the irrigation duty from 5 AF per-acre to 3 AF per acre and of changing from flood irrigation to sprinkler irrigation.

Measure: Water Agreement

LADWP evaluates pasture condition using the Natural Resource Conservation Service Pasture Condition Assessment (Cosgrove et. al. 1991). This protocol is designed to optimize plant and livestock productivity while minimizing detrimental effects to soil or water resources. These pastures were most recently evaluated in 2019. The average pasture score for the 2019 growing season was 89%.

Mitigation Measure M-5

Impact: Altering the flow in a ditch that carries water diverted from Coldwater Canyon.

Measure: Water Agreement

Diversions from Coldwater Canyon Ditch are utilized for irrigation of the Seed Farm. During operation, approximately one-quarter of the total flow remains in the ditch.

Diversions for irrigation from Coldwater Canyon Ditch continued in 2019. Periodic examinations were conducted along the ditch throughout the growing season. These examinations did not indicate any signs of vegetation stress.

Mitigation Measure M-6

Impact: Altering the flow in Silver Canyon Ditch.

Measure: Water Agreement

Diversions from Silver Canyon Ditch are utilized for irrigation of Parcels LAWS 90, 94, and 95. During operation, approximately one-quarter of the total flow remains in the ditch.

Diversions for irrigation from Silver Canyon Ditch for the Laws Parcels 90, 94, and 95, continued in 2098. Periodic examinations were conducted along the ditch throughout the growing season.

Mitigation Measure M-7

Impact: Growth of State-rated A or B noxious weeds in the project area.

Measure: LADWP or its lessee or lessees, in conjunction with Inyo County's weed abatement program, will promptly treat or remove the weed.

Surveys were conducted on the irrigation project in the Laws area for noxious weeds during the 2012 growing season. No A or B listed noxious weeds were found. The lessee treats weeds through a combination of grazing and burning as necessary.

Mitigation Measure M-8

Impact: Archaeological investigations identified six previously unrecorded archaeological sites and 11 isolates within the project area.

Measure: Pipeline placement was to avoid identified sites; if new sites are encountered during implementation, work will be halted until an archeologist can be consulted.

No cultural resources were encountered during construction or operation of the irrigation project in the Laws area in 2006.

3.2.3. Irrigation Project in the Big Pine Area (Big Pine Ditch System)

POT. IMPACT		MITIGATION			MONITORING			
Summary of Impact	**MM No.**	**Measure**	**Timing**	**Responsibility**	**Method**	**Period**	**Frequency**	**Responsibility**
Hydrology and Water Quality								
The cumulative effect of groundwater pumping from Well W415, the new Bell Canyon well, as proposed in the project, in combination with the operation of other wells in the Big Pine area could cause significant adverse impacts to groundwater dependent vegetation, other vegetation, or non-LADWP wells in the area.	M-1	Water Agreement	To be implemented throughout the project as needed.	Inyo/Los Angeles Technical Group	A monitoring site will be developed by the Inyo/Los Angeles Technical Group as called for in the Inyo/Los Angeles Water Agreement to manage operation of each well.	During the period when groundwater pumping is needed for the project.	As decided by the Inyo/Los Angeles Technical Group, consistent with the Water Agreement.	Inyo/Los Angeles Technical Group

As of Spring 2019, Well 415 has been drilled and equipped but is not yet in operation. The Bell Canyon Well has not yet been drilled. In Spring of 2020, ICWD and LADWP agreed upon a 6-month pumping test and associated monitoring for W415. The test has not yet been conducted.

3.3. LADWP OTHER OBLIGATIONS

Table 3.5 provides title, legal reference, provision, progress to date, and current status on each of LADWP's other obligations listed on Table 3.2.

Again, categories describing status are:

Complete: Project has no additional commitments required (no water allotment or other financial or environmental mitigation; no continual monitoring and reporting),

Ongoing as necessary/required: These measures are only applied when necessary (monitoring and reporting for mitigation measures for new projects, construction, etc.),

Implemented and ongoing: Project is fully implemented and is currently meeting goals; however, there may be ongoing water or financial commitments or monitoring and reporting requirements,

Fully implemented but not meeting goals: Project is fully implemented but has not yet met prescribed goals or success criteria,

Not fully implemented: Project under development or under construction, but not fully implemented.

Following Table 3.5, there are additional reports for the Yellow-Billed Cuckoo Habitat Enhancement Plan and the Owens Valley Land Management Plan (OVLMP).

Table 3.5. LADWP Other Legal Obligations

Reporting No.	Table 3.5 LADWP OTHER LEGAL OBLIGATIONS				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
	Commitment	**Legal Reference**	**Provision**	**Progress to Date**	Status				
1	Aerial Photo Analysis	MOU Section III.E	By June 2000, LADWP, the County, and experts in aerial photography interpretation will conduct a study analyzing existing air photos of the Owens Valley to evaluate the merits of using air photos in monitoring vegetation in the valley, to determine the feasibility of using air photos to analyze and refine the vegetation map data base, and to provide recommendations on how aerial photography, or other remote sensing techniques, could be used to monitor vegetation conditions and changes. If feasible and cost-effective relative to other field monitoring techniques, recommendations will be implemented.	The deadline was extended by the 1997 MOU Parties. In January 2002, Ecosat Geobotanical Surveys, Inc. completed reports addressing the 1997 MOU requirements. Complete.	X				
2	Annual Report on the Owens Valley	MOU Section III.H	LADWP and the County will prepare an annual report describing environmental conditions in the Owens Valley and studies, projects, and activities conducted under the Inyo-Los Angeles Agreement and the MOU. Copies of the report will be distributed to the other Parties and made available to the public. The report will be released on or about May 1 of each year.	ICWD has prepared annual reports since 1991. LADWP has released annual reports since 2001. Presently, annual reports are written separately by each agency due to timing constraints; LADWP must issue their annual report in conjunction with their Annual Operations Plan near May 1 each year. ICWD is not required to meet this timeline for their report.			X		
3	Cooperative Studies	Water Agreement Section IX	It is recognized that additional cooperative studies related to the effects of groundwater pumping on the environment of the Owens Valley are necessary. The reasonable costs of the studies implemented under the Stipulation and Order or the Green Book shall be funded by the Department. If necessary, such funding will be in addition to funds provided under section XIV (Financial Assistance).	Several cooperative studies have been performed to date. Currently, LADWP and ICWD are conducting a cooperative study with Formation Environmental LLC to evaluate the utility of remote sensing technology in Owens Valley vegetation monitoring. Information gathered may be used to improve upon current methods of monitoring described in the Green Book.			X		
4	Dispute Resolution	Water Agreement Section XXVI	The agreement provides a process for resolving disputes between Inyo and Los Angeles regarding issues related to the agreement or the Green Book.	Inyo County and Los Angeles use the Dispute Resolution process identified in the Water Agreement as needed. Inyo County and Los Angeles entered into a Settlement Agreement on June 25, 2018 as resolution to the dispute regarding issues surrounding W385R pump test and the status of the Five Bridges Mitigation Project. The pump test was conducted December 2019-February 2020.		X			
5	Dispute Resolution and Litigation	MOU Section VI	The parties to the 1997 MOU will maintain frequent, informal communications to minimize disagreements. In the event of a dispute among the parties over the 1997 MOU, the parties will meet and confer before any litigation concerning the dispute may be commenced. The parties may elect to retain the services of a mutually acceptable impartial mediator/facilitator to assist in dispute resolution. Any litigation arising out of the 1997 MOU is to be commenced in the Inyo County Superior Court.	The MOU Signatory Group has met regularly and on an as needed basis.		X			

Reporting No.	Table 3.5 LADWP OTHER LEGAL OBLIGATIONS				Complete	Ongoing as Necessary/Required	Implemented and Ongoing	Fully Implemented but not meeting goals	Not fully implemented
	Commitment	**Legal Reference**	**Provision**	**Progress to Date**	Status				
6	Enhancement/ Mitigation Projects	Water Agreement Section X	All existing E/M projects will continue unless the Standing Committee agrees to modify or discontinue a project. Periodic evaluations should be made by the Technical Group. Enhancement/mitigation projects shall continue to be supplied by enhancement/mitigation wells as necessary. New enhancement projects will be implemented if such projects are approved by the Standing Committee.	All Enhancement/Mitigation Projects defined in the 1991 EIR are complete or are implemented/ongoing.			X		
7	Exchange of Information and Access	Water Agreement Section XVII	The County and LADWP shall make any data or information in its possession that reasonably pertains to purposes of the Water Agreement available to the other party with reasonable notice.	LADWP and ICWD exchange data and information as necessary per the Water Agreement.			X		
8	Financial Assistance-Big Pine Ditch System	Water Agreement Section XIV.E	LADWP is to provide up to $100,000 for reconstruction and upgrading of the Big Pine ditch system. LADWP is to supply up to 6 cfs to the ditch system from a new well to be constructed west of Big Pine.	The Big Pine Irrigation and Improvement Association has implemented all Phases of the project. LADWP has provided $99,745 of the $100,000 committed to the project. The Improved Big Pine Ditch System has been in operation since 2005. After test pumping and identification of a monitoring site for Well 415 to supply supplemental water and makeup water for the ditch system, a contract will be considered for the installation of another well in Bell Canyon to provide additional water for the project.			X		
9	Financial Assistance-General Financial Assistance to the County	Water Agreement Section XIV.D	LADWP is to make an annual payment to Inyo to assist the County in providing services to its citizens. The first payment shall be $1,221,685 minus previous contributions made during the 1991-1992 fiscal year. The annual payment thereafter is to be adjusted upward or downward each year in accordance with a formula in the State Constitution for an assessment of Los Angeles-owned property in Inyo County.	Los Angeles has provided these annual payments to Inyo County since 1991, and provided $4,362,264 in 2019. Funds provided by Los Angeles have been deposited into Inyo County's General Fund and expended on Inyo County services as directed by the Board of Supervisors. LADWP has paid Inyo County more than $70 million since 1991 for this purpose.			X		
10	Financial Assistance-Park & Environmental Assistance to City of Bishop	Water Agreement Section XIV.F	LADWP is to make an annual payment to the City of Bishop to assist the City in maintaining its park and for other environment-related activities. The payment of $125,000 is to be adjusted upward or downward each year in accordance with the consumer price index, not to exceed 5% in any year. Inyo County shall make an annual payment to the City of Bishop in an amount equal to the payment made by LADWP.	Los Angeles has provided annual payments to the City of Bishop, and provided $194,455 as a final payment in 2016. LADWP has paid the City of Bishop $3,325,892 since 1997 for this purpose. Inyo County has made its required payment under this section of the agreement.	X				
11	Financial Assistance-Park Rehabilitation, Development, & Maintenance	Water Agreement Section XIV.B	LADWP shall provide funding to the County for rehabilitation of existing County parks and campgrounds, development of new County campgrounds, parks, and recreational facilities and programs, and for the annual operation and maintenance of existing and new facilities and programs on lands owned by the City of Los Angeles. LADWP is to provide up to $2 million to the County for these purposes. LADWP is to make an annual payment of $100,000 (adjusted upward or downward in accordance with the consumer price index not to exceed 5%) by July 10 of each year. The annual funding will be placed in trust by the County and shall be used only for the purposes of existing and new parks, recreational facilities and programs. If at any time $300,000 or more is accumulated in the trust, LADWP shall not be required to make an additional annual payment until the trust is less than $100,000 as of June 30 any given year.	LADWP has provided annual payments to Inyo County for parks operation and maintenance activities including a payment in 2019 of $171,637 for a total of $3,099,179. Combined with the $1,831,914 paid to Inyo County for parks rehabilitation during the first 10 years of the Stipulation and Order, LADWP has paid Inyo County $4,931,093 since 1997 under this provision of the Agreement.			X		

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12	Financial Assistance-Salt Cedar Control	Water Agreement Section XIV.A	LADWP shall provide funding to Inyo County to implement a Saltcedar Control Program: a total of $750,000 for the first three years of the program; thereafter, $50,000 per year for annual maintenance and control efforts (adjusted upward or downward in accordance with the consumer price index not to exceed 5% in any year). The funds are to be placed in trust with the County and will be used only for the purposes of salt cedar control. If at any time, $150,000 or more is accumulated in trust, LADWP shall not be required to make an annual payment until fund in trust are less than $50,000.	ICWD initiated the Saltcedar Control Program in 1997. LADWP began making required payments at that time. In 2019, LADWP paid ICWD $80,401 for this work. LADWP has paid Inyo County $2,054,627 since 1997 under this provision of the Water Agreement. In 2004, as part of a Wildlife Conservation Board (WCB) grant, LADWP provided $56,000 for Saltcedar control, and the balance of the program was funded from a WCB grant for $490,000 obtained by Inyo County working in cooperation with LADWP. A second grant from the WCB for $560,000 was received in February 2004. A third grant for $600,000 from the WCB was received by ICWD in November 2007.			X		
13	Financial Assistance-Water and Environmental Activities	Water Agreement Section XIV.C	LADWP shall assist the County in funding water and environmentally related activities by making an annual payment to the County. The amount of the first payment shall be $820,580. The annual payment is to be adjusted upward or downward each year in accordance with the consumer price index and shall be made by July 10th each year. The maximum adjustment shall not exceed 5% in any year.Annual funding has been placed in trust with the County and shall be used only for purposes of operation and maintenance of water and environmentally related activities. If at any time $1,500,000 or more is accumulated in the trust, LADWP should not be required to make an additional payment until the funds in the trust are less than $820,580 as of June 30 of any year.	Los Angeles has provided annual payments to Inyo County, and provided $1,599,870 in 2019. Funds provided by Los Angeles have been expended to fund Inyo County Water Department. LADWP has paid Inyo County $34,598,673 since 1988 for this purpose.			X		
14	Financial Provisions	MOU Section IX	Within 90 days after the discharge of the writ, the County will pay the sum of $53,000 to Sierra Club, and the sum of $30,000 to the Owens Valley Committee for professional services in the development and preparation of the MOU.	The specified amounts have been paid by the County to the identified parties.	X				
15	Fish Slough	MOU Section IV	The Parties acknowledge that LADWP and CDFG have reached agreement concerning threatened and endangered species that involves land management and other activities in the Fish Slough area of Mono County. The agreement is to be memorialized in a letter from LADWP to CDFG.	A letter agreement was never memorialized; however, LADWP has worked closely with CDFG on the Fish Slough Area of Critical Environmental Concern (ACEC) for many years.			X		
16	Groundwater Management	Water Agreement Section II	Inyo and LADWP are to manage water resources within Inyo County 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.	By agreement of the Standing Committee, implementation of groundwater management pursuant to the Agreement commenced in 1987.			X		

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17	Groundwater Pumping on the Bishop Cone	Water Agreement Section VII	LADWP pumping on the Bishop Cone must be in strict adherence to the provisions of the "Hillside Decree." Before LADWP may increase groundwater pumping on the Cone, or construct new wells on the Cone, the Technical Group must agree on a method for determining the exact amount of water annually used on Los Angeles owned lands on the Cone. The agreed upon method shall be based on a jointly conducted audit of such water uses. LADWP's annual groundwater extractions from the Cone shall be limited to an amount not greater than the total amount of water used on Los Angeles owned lands on the Cone during that year.	The Standing Committee adopted the Bishop Cone audit procedure and the audit has been conducted since 1996. In 1998, the Superior Court entered a "Memorandum of Judgment" in Matlick vs. City of Los Angeles which reaffirmed LADWP's pumping practices on the Bishop Cone. Revised audit methods were agreed upon by Inyo County and LADWP in 2016 because past audits did not account for stockwater use and ditch losses on the Bishop Cone. Audits beginning with the 2015-16 runoff year reflect all sources of water supplied to the Bishop Cone.			X		
18	Groundwater Recharge Facilities	Water Agreement Section VIII	LADWP may construct groundwater banking and groundwater recharge facilities in the Owens Valley and in Rose Valley. (The EIR describes certain groundwater recharge facilities in Laws, Big Pine, and Rose Valley.) Development of such facilities are subject to agreement by the Standing Committee.	These facilities have not been constructed to date and are not under development at this time.		X			
19	Habitat Conservation Plan	MOU Section III.B	LADWP, in consultation with the parties to the 1997 MOU and others, is to identify areas of City-owned land, which are not included in the LORP planning area, and develop plans for the identified areas to remedy problems caused by livestock grazing and other uses of the land. Priority will be given to riparian areas, irrigated meadows and sensitive plant and animal habitats. The plans will provide for the continuation of sustainable uses (including recreation, livestock grazing, agriculture, and other activities) will promote biodiversity and a healthy ecosystem, and will consider the enhancement of threatened and endangered species habitats. Habitat conservation plans for Threatened and Endangered Species will be incorporated if and where appropriate.	LADWP finalized the *Habitat Conservation Plan for City lands in Inyo and Mono Counties* in 2015. On October 7, 2015 the USFWS announced the availability of the Draft Low Effect Habitat Conservation Plan (draft HCP) for LADWP's operations, maintenance, and management activities on City land in Inyo and Mono Counties, California. The comment period ended on January 15, 2016. A total of nine comment letters were received from the public and other governmental agencies. LADWP and USFWS staff have completed responses to comments and developed the final HCP. Complete as of April 2017.	X				
20	Haiwee Reservoir	Water Agreement Section XIII	Inyo County and Los Angeles will develop a recreational plan for South Haiwee. The recreation plan will be implemented and operated by Inyo County or a concessionaire. Any plan must take into account Los Angeles' operating and security needs.	A recreational plan has not been developed. A security audit was performed following the September 11, 2001 national security incident. This audit concluded that due to a potential security threat to a municipal water source, Haiwee Reservoir should be closed to the public. A Negative Declaration was filed to close Haiwee Reservoir on December 16, 2004. The facility was officially closed to the public in 2005.	X				
21	Inventory of Plants and Animals at Spring and Seeps (outside LORP Planning Area)	MOU Section III.C	Within 36 months of the discharge of the writ, DWP and the County will jointly complete an inventory of plants and animals at existing springs and seeps and associated wetlands on lands owned by the City of Los Angeles within the portion of the Owens River watershed located in Inyo County that is not included in the LORP Planning area.	LADWP completed data collection for spring and seep discharge. Ecosystem Sciences completed the inventory of plants and animals from 1998-2000.	X				

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22	Laws Area Potential Mitigation-Consideration by Standing Committee	1991 EIR Impact 10-18	Approximately 640 acres in the Laws area have a very low density of vegetation cover. The loss or reduction of vegetation cover in these areas was caused by the abandonment of agriculture following purchase of lands by Los Angeles, wet year water spreading from the McNally Canals by LADWP during the pre-project and project periods, wildfire, groundwater pumping, and other factors. The primary cause of the loss or reduction of the vegetation is, therefore, not a result of the project. Although these conditions on these lands are not a result of the project, because of the existing sparse vegetation conditions, these lands will be considered by the Standing Committee for selective mitigation, which would be compatible with water spreading and groundwater recharge activities during wet years.	These lands have not been presented to the Standing Committee to date for selective mitigation. LADWP continues to implement the defined mitigation requirements prescribed in the 1991 EIR and other guiding legal documents.		X			
23	Legislative Coordination	Water Agreement Section XVI	Except under certain circumstances, Inyo and LA are to refrain from seeking or supporting any legislation, administrative regulation, or litigation that would weaken or strengthen local or state authority to regulate groundwater or that would affect any provision of the agreement.	The legislative coordination policy has been followed by both Inyo County and Los Angeles to date.			X		
24	LORP Agency Consultation and Public Involvement	MOU Section II.D	Consultation with the Parties, agencies, DWP ranch lessees, and the public concerned with the development of the LORP Plan will occur throughout the development and implementation of the LORP Plan.	The MOU Parties, agencies, LADWP ranch lessees, and the public were consulted during the development of Ecosystem Sciences' 2002 LORP Ecosystem Management Plan.	X				
25	LORP EIR	MOU Section II.F	DWP as the lead agency and the County as responsible agency will jointly prepare an EIR on the LORP. A draft LORP EIR will be released within 36 months of the discharge of the writ, and a final LORP EIR will be completed and presented for certification as soon as possible following the release of the draft. Extension of these deadlines may be granted by unanimous consent of the Parties or due to circumstances beyond the control of the DWP and/or the County.	The LORP DEIR was released November 1, 2002. The public comment period concluded January 14, 2003. The Final EIR was approved by the Board of Water and Power Commissioners in July 2004 and the Inyo County Board of Supervisors in November 2005. LADWP received all the necessary permits for implementation by January 9, 2006 and construction began immediately thereafter.	X				
26	LORP Implementation	MOU Section II.H	DWP will commence the baseflow of 40 cfs in the river channel by the 72nd month after the discharge of the writ unless circumstances beyond DWP's control prevent the completion of the pumpback system and/or the commencement of the baseflow within the 72 month period. DWP will commence implementation of the other physical features of the LORP upon the certification of the LORP EIR.	The LORP DEIR stated that the baseflow would not commence on June 13, 2003. The Final EIR was completed in June 2004 per the February 13, 2004 Stipulation and Order. Phase I flow releases began December 6, 2006. Phase II releases of 40 cfs were achieved in February 2007, and were certified by the court in July 2007. Additional punitive conditions involving maintaining flows and recording of flows were added to the 2007 Stipulation and Order following certification of the 40 cfs base flows.	X				
27	LORP Monitoring and Adaptive Management Plan	MOU Section II.E	Monitoring sites and water flow gaging stations will be identified and a program for data collection, analysis, and reporting will be described as part of this plan. Should the reported information reveal that adaptive modifications to the LORP management are necessary to ensure the successful implementation of the project, or the attainment of the LORP goals, such adaptive modifications will be made.	Ecosystem Sciences finalized the LORP Monitoring and Adaptive Management Plan (MAMP) in 2008. Monitoring follows that prescribed in this plan and LADWP and ICWD generate a joint annual report each year that contains monitoring results and adaptive management recommendations.			X		

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28	LORP Permits Approvals and Licenses	MOU Section II.I	The Parties will work cooperatively with LADWP and/or the County in obtaining, and will support the issuance of, any permits, approvals, licenses, or agreements which are required by law and/or are necessary for the implementation of the LORP.	Permits were received from the following agencies to facilitate implementation of the LORP: California State Water Resources Control Board, California Department of Fish and Game, California State Lands Commission, US Army Corps of Engineers, California Department of Transportation, and the Bureau of Land Management.	X				
29	LORP Plan	MOU Section II.A	LADWP and the County will direct and assist Consultants in the preparation and implementation of the LORP ecosystem management plan. This plan will apply to all lands within the LORP Planning area and will address the four physical features of the LORP.	The Lower Owens River Project Ecosystem Management Plan was authored by Ecosystem Sciences in 2002. This document was prepared for LADWP and ICWD per the 1997 MOU.	X				
30	LORP Planning Area-Inventory of Plants and Animals at Spring and Seeps	MOU Section III.A.2	An inventory of plants and animals at existing springs and seeps and associated wetlands on lands owned by the City of Los Angeles located within the LORP Planning Area will be conducted by Consultants.	Ecosystem Sciences completed the inventory and submitted results to the MOU Parties in June 2001.	X				
31	LORP Pumpback System	MOU Section II.G	Construction of a pumpback system will commence as soon as possible following the certification of the LORP EIR and will proceed as expeditiously as possible. Construction should be completed within 3 years after it is commenced.	The Pumpback Station was constructed prior to flow releases associated with project implementation in December 2006.	X				
32	Lower Owens Off River Lakes and Ponds	MOU Section II.C.3	Off-river lakes and ponds in the LORP area will be maintained and/or established through flow and land management to provide habitat for fisheries, waterfowl, shorebirds, and other animals. These habitats will be as self-sustaining as possible.	Several of these ponds were originally supplied water in the 1980s as part of the Lower Owens River Rewatering (E/M) Project. Water supply to the ponds continues as managed under the LORP.			X		
33	Lower Owens River (financial commitment)	Water Agreement Section XII	Los Angeles will pay the costs of implementing the LORP. Inyo County will repay Los Angeles one half of the project costs up to maximum of $3.75 million. Any funds provided for the project from sources other than Los Angeles will be an off-set against Inyo County's repayment obligation. Los Angeles will pay the annual costs of operating the pumpback system. Inyo County and Los Angeles will each pay one half of the other costs of the project.	As part of a negotiated agreement with Inyo County to not pursue funding from the USEPA, LADWP has credited Inyo County $5.1 million to cover Inyo County's $3.75 million obligation for LORP implementation with the remaining $1.35 million to be used by Inyo County towards post implementation costs. LADWP and Inyo County continue to share costs of operations and maintenance of the LORP per the LORP Post Implementation Agreement.			X		
34	Lower Owens River Delta Habitat Area	MOU Section II.C.2	This feature provides for the enhancement and maintenance of approximately 325 acres of existing habitat and the establishment and maintenance of new habitat consisting of riparian areas and ponds suitable for shorebirds, waterfowl, and other animals. An annual average of approximately 6 to 9 cfs will be released below the pumpback system to supply this area.	Releases for the Delta Habitat Area occur simultaneously with the 40 cfs baseflow. No construction was necessary for this component of the project other than the completion of the Pumpback Station.			X		

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35	Lower Owens River Project 1500-Acre Blackrock Waterfowl Habitat Area	MOU Section II.C.4	The goal of this component is to maintain this waterfowl habitat area to provide the opportunity for the establishment of resident and migratory waterfowl populations and to provide habitat for other native species. Diverse natural habitats will be created and maintained through flow and land management to the extent feasible consistent with the needs of the "habitat indicator species" for the Blackrock Waterfowl Habitat Area. These habitats will be as self-sustaining as possible. In average and above runoff years, approximately 500 acres within an overall project area of 1500 acres will be flooded to provide habitat for resident and migratory waterfowl and other native species. In years when the runoff is forecasted to be less than average, the water supply to the area will be reduced in general proportion to the forecasted runoff in the watershed.	All preliminary construction work identified for implementation of the Blackrock Waterfowl component is complete. The Blackrock Waterfowl Habitat Area is managed in accordance with the LORP EIR. In 2019, the Winterton, Thibaut, and Drew Units were flooded for a required acreage of 500 acres based on a 137% runoff year.			X		
36	Lower Owens River Riverine- Riparian System	MOU Section II.C.1	A continuous flow will be established and maintained in the river channel from at or near the intake structure which diverts the Owens River into the Los Angeles Aqueduct to a pumpback system located near the river delta which will convey water from the river to the Los Angeles Aqueduct. A base flow of approximately 40 cfs from at or near the Intake to the pumpback system will be maintained year round. Additionally, a seasonal habitat flow of up to 200 cfs will be released annually based on estimated runoff in the Owens River watershed.Any water in the river channel that is above the amount specified in this MOU for release below the pumpback system to supply the Owens River Delta Habitat Area will be recovered by the pumpback system for delivery to Los Angeles.	The Lower Owens River Project was implemented in 2006 and project base flows were achieved in July 2007 throughout the system. Seasonal habitat flows are released annually according to the guidelines provided in the LORP EIR (2004).			X		
37	Mitigation Plans for Impacts Identified in the 1991 EIR and the Water Agreement	MOU Section III.F	The Technical Group will prepare mitigation plans and implementation schedules for all areas for which on-site mitigation measures have been adopted in the 1991 EIR. The plans will be completed by June 1998. In accordance with the EIR, on-site mitigation will be accomplished through revegetation with native Owens Valley species and through establishment of irrigation.	To date, projects associated with all mitigation measures have been implemented, satisfying the relevant mitigation measures found in the 1991 EIR. Project and plan enforcement is within the jurisdiction of the LTWA and the Technical Group through dispute resolution. Some projects are complete, some are implemented and ongoing, and some are implemented but not yet meeting goals. Refer to Table 3.1 for current status of each of these projects.				X	
38	New Wells & Production Capacity	Water Agreement Section VI	LADWP's groundwater pumping capacity may be increased to provide increased operational flexibility and to facilitate rotational pumping. The Department may replace existing wells and construct new wells in areas where hydrogeologic conditions are favorable, and where the operation of that well will not cause a change in vegetation that would be consistent with these goals and principles.	The Water Agreement and 1991 EIR describe 15 new wells that LADWP proposes to construct in the Owens Valley. LADWP has constructed 6 replacement wells on Bishop Cone and one of the 15 new wells allowed under the Water Agreement (located in Lone Pine). The Technical Group must establish management for the well before it can be operated. Development of two new wells on the Bishop Cone (B2 and B5) is presently on hold. LADWP is evaluating potential new well development in the Owens Valley.					X

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39	Owens River Recreational Use Plan	Water Agreement XIV.B	As part of the parks rehabilitation program, Inyo is to develop a plan for recreational use and management of the Owens River from Pleasant Valley Reservoir to the Owens River delta as one of the first new programs.	Inyo County Water Department initiated this project in 2007 by forming a collaborative group to gather preliminary information. In 2010, MIG Consultants were selected to write the LORP Recreational Use Plan. A Draft Recreation Use Plan was released February 2012. This plan was presented to the Standing Committee and the public in October 2012. Next steps include further review of the draft plan, CEQA evaluation and obtaining permits prior to implementation of the project. Inyo County is pursuing the development of the Owens River Water Trail in 6 river miles of the LORP. ICWD obtained a $500,000 grant from California Boating and Waterways to implement the project. LADWP funded the CEQA evaluation of the project ($546,000) in 2018; the Draft EIR for the project was issued for public review in Spring 2010.					X[6]
40	Owens Valley Land Management Plans	MOU Section III.B	LADWP, in consultation with the parties to the 1997 MOU and others, is to identify areas of City-owned land, which are not included in the LORP planning area, and develop plans for the identified areas to remedy problems caused by livestock grazing and other uses of the land. Priority will be given to riparian areas, irrigated meadows and sensitive plant and animal habitats. The plans will provide for the continuation of sustainable uses (including recreation, livestock grazing, agriculture, and other activities) will promote biodiversity and a healthy ecosystem, and will consider the enhancement of threatened and endangered species habitats.	LADWP's Owens Valley Land Management Plan (OVLMP) was completed in 2010. The OVLMP contains guidance on grazing management of City lands, as well as recreation, fire, cultural resources, commercial uses, and flow management. A Mitigated Negative Declaration was prepared and circulated with the plan which was adopted by the Board of Water and Power Commissioners in June 2010. Implementation of fencing and recreational management measures were complete in early 2011. City lands outside the LORP Planning Area are currently being managed under this plan.			X		
41	Release of City Owned Lands - Lands for Public Purposes	Water Agreement Section XV.D	Los Angeles shall negotiate in good faith for the sale or lease to the County of any Los Angeles-owned land requested by the County for use as a public park or for other public purposes.	LADWP currently has 40 leases, 13 license agreements, 0 use permits, and 3 sign permits with Inyo County for public purposes. These include agreements for local parks, campgrounds, landfills, maintenance yards, borrow pits, etc. LADWP responds as needed upon request by Inyo County.		X			
42	Release of City Owned Lands- Bishop	Water Agreement Section XV.B	Los Angeles will sell at public auction, or sell directly to the City of Bishop Community Development Agency, properties within the Bishop City limits totaling 26 acres of surplus Los Angeles owned land.	LADWP has fulfilled this requirement by selling 26 acres in the Bishop City limits in 1995.	X				
43	Release of City Owned Lands- Inyo County	Water Agreement Section XV.A	Los Angeles shall offer for sale 75 acres of Los Angeles owned lands in Inyo County for the orderly development of the towns in the county.	LADWP has fulfilled this requirement by offering for sale 75 acres in 2011.	X				

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44	Release of City-owned lands-Additional Sales (Water Agreement Section XV.C)	Water Agreement Section XV.C	Upon the request of the Inyo County Board of Supervisors or Bishop City Council, Los Angeles shall negotiate in good faith for the sale at public auction of additional surplus City land in or near valley towns for specific identified needs.	**Big Pine Area** • LADWP has released land to the Big Pine Fire Department for the sale of 1.02 acres. • LADWP released land to Inyo County for Butcher Lane to correct an encroachment upon LADWP property. LADWP is negotiating with Inyo County for the development of a Veteran's Walking Path. **City of Bishop Area** • LADWP released land where Bishop Nursery is located. • LADWP entered escrow with the City of Bishop for the sale of 3.48 acres of property for disabled and affordable housing purposes. • LADWP and the City of Bishop are in negotiations for the sale of property for a multi-use path for the Seibu to School Project. This is going to the Board soon. • LADWP and the Forest Service are in negotiations for the sale of 1.4 acres for the expansion of its facility. • LADWP is participating in a strategic development plan with Inyo County, City of Bishop, and Bishop Tribe to analyze the feasibility of changing land uses along N. Sierra Highway for future commercial development. • LADWP is negotiating with Caltrans for the sale of property to expand its Bishop Maintenance Yard facility and to complete its Bishop ADA Compliance Project. • CHP has approached LADWP looking for property to build a new headquarters facility. **Lone Pine Area** • LADWP has released land to Inyo County for the widening of Whitney Portal Road. • LADWP is negotiating with the LP Tribe for an easement to relocate its domestic water reservoir. **LADWP Initiative** • LADWP has taken steps to meet with its commercial lessees and modify its land divestment policy for in-town leased property. It is planning to present a policy to its Board this year that focuses on divesting of in-town properties that are no longer needed for operational purposes. Commitment is complete.	X				
45	Technical Group Meetings	MOU Section III.G	All scheduled meetings of the Technical Group will be open to the public.	Scheduled Technical Group meetings were opened to the public beginning October 15, 1997.		X			
46	Town Water Systems	Water Agreement Section XI	LADWP shall transfer ownership of the water systems in the towns of Lone Pine, Independence, and Laws to Inyo County, or another Owens Valley public entity or entities. Prior to transferring the systems, evaluations of each system will be performed by a mutually agreed upon consultant, and if necessary, work will be done to upgrade the systems.	Inyo County contracted with a private company to assume the operation, maintenance and billing for the systems in July 1999. Pursuant to an agreement with LADWP, the County completed upgrades of the systems in December 2002, using $2.6M in funds provided by LADWP. LADWP completed the transfer of ownership to Inyo County in January 2005.	X				

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47	Type E Vegetation Inventory	MOU Section III.D	Within 30 months of the discharge of the writ (December 1999), LADWP and the County are to develop baseline conditions for management of vegetation classified as Type E in the long-term agreement. These conditions will be adopted by the Standing Committee.	The inventory of Type E Vegetation was conducted by Resource Concepts, Inc. (RCI) under a contract administered by Inyo County and funded by LADWP. The final report on the inventory was complete in December 1999.	X				
48	Yellow-billed Cuckoo Habitat	MOU Section III.A.1	The MOU Consultants will conduct an evaluation of the condition of Yellow-billed Cuckoo habitat in the riparian woodland areas of Hogback and Baker Creeks. Based on that evaluation, Consultants will develop, as they deem warranted, Yellow-billed Cuckoo Habitat Enhancement Plans for these areas.	Ecosystem Sciences completed a Yellow-billed Cuckoo (YBC) Habitat Enhancement Plan in April 2005. LADWP released a Draft EIR in January 2006. The MOU Parties and others expressed displeasure with the Consultant's project. The MOU Parties and the lessees for the Baker Creek and Hogback Creek areas entered into negotiations with LADWP staff to develop another alternative for the YBC Habitat Plan. The *Ad Hoc Yellow-billed Cuckoo Habitat Enhancement Plan* was completed and a Mitigated Negative Declaration was released for public review in 2010. The Los Angeles Board of Water and Power Commissioners approved the project on January 19, 2010. Required initial plantings and replacement plantings have been fully implemented on schedule per the plan. Please see Section 3.3.1 for a progress report on this project.			X		

3.3.1. Yellow Billed Cuckoo Habitat Enhancement Plan

The *Final Ad Hoc Yellow-billed Cuckoo Habitat Enhancement Plan* (Enhancement Plan) states in Section 2.1.8.3:

> *"Annual reports will be prepared each year by LADWP to summarize the progress of the willow and cottonwood planting and black locust control. The annual reports will include a brief introduction to include the performance standards, monitoring methodologies, monitoring results for the year, and discussion of any adjustments required to achieve the overall goal to improve the habitat."*

Fences

All fencing required by the Enhancement Plan was completed as of 2011.

Baker Creek Planting

All planting areas (Figure 3.1) within Baker Creek have received their initial plantings and replacement pole plantings based on the first growing season monitoring.

Nonnative Species Control -Black Locust (*Robinia pseudoacacia*)

All planting area cover values are below the criterion for upper canopy nonnative values.

Planting Area Monitoring

Section 2.1.8.1. of the Enhancement Plan states:

> *"Quantitative monitoring will assess the attainment of final success criteria and identify the need to implement contingency measures in the event of failure. Monitoring will begin in late summer after the second growing season since initial planting to capture the fullest extent of the growing season and after the majority of avian species have finished breeding. Monitoring will continue annually through Year 6 within each planting area or until the success criteria are met."*

Planting criteria for the planting area are as follows: Absolute cover values for upper and mid canopy native species is greater than or equal to 50 percent for planting areas E, and F. Planting area G, absolute cover values for upper and mid canopy native species is greater than or equal to 65 percent. In LADWP's 2017 Owens Valley Annual Report, LADWP recommended that the native understory cover criterion of 50% be eliminated due to competing goals with upper and mid canopy cover values and the resulting drop in ground water levels due to the prolonged drought that had negative impacts on the understory. Nonnative species will be less than five percent for all canopy cover and understory values will be less than 25 percent in all planting areas.

A comprehensive analysis of each planting area was conducted in 2016 and is summarized in LADWP's 2017 Owens Valley Annual Report. From this analysis, it was recommended to discontinue further planting and monitoring efforts in areas A, B, and C

(through Adaptive Management Sections 2.1.9. and 2.1.9.1 of the Enhancement Plan) based on little success since implementation at each of these sites. Although all planted multiple times, Planting areas A, B, and C have been unable to support the establishment of pole plantings to attain desired canopy cover as described in the Enhancement Plan, most likely due to clay soils as a limiting factor and poor suitability of planting sites.

Planting areas D, F and H have met all enhancement criteria as of 2018 and therefore, vegetation monitoring in these areas was not conducted in 2019. Vegetation monitoring for areas E and G occurred August 14-16, 2019. This information is summarized in Table 3.6. Since initial planting was phased over three years, 2019 was the eighth year that line point monitoring for planting area G, and the seventh year for planting area E.



Figure 3.1. Overview of Pole Planting Areas in the Baker Creek Watershed

Table 3.6. Percent Absolute Cover Values for 2011-2019 within Planting Areas D, E, F, G & H

		Planting Area D Met Criteria	Planting Area E	Planting Area F Met Criteria	Criteria for Areas D, E and F	Planting Area G	Planting Area H Met Criteria	Criteria for Area G and H
Upper Canopy Native	2011			1		6		
	2012	2		1		5	7	
	2013	3	7	2		15	8	
	2014	2	8	2		13	4	
	2015	5	11	3		3	8	
	2016	8	9	2		17	5	
	2017	7	13	6		27	12	
	2018	**	13	4		13	**	
	2019	**	19	**		15	**	
Upper Canopy Non-Native	2011			T*		1*		
	2012	0*		2*		4*	1*	
	2013	0*	6	1*		T*	T*	
	2014	0*	5	T*		T*	T*	
	2015	0*	7	T*	**<5**	T*	1*	**<5**
	2016	0*	11	1*		13	T*	
	2017	0*	9	3*		1*	4*	
	2018	**	11	2*		T*	**	
	2019	**	7	**		1*	**	
Mid Canopy	2011			30		15		
	2012	45		45		15	35	
	2013	48	6	42		26	37	
	2014	55	6	36		21	46	
	2015	62	6	50		31	47	
	2016	59	8	46		27	48	
	2017	67	14	51		37	71	
	2018	**	15	52		35	**	
	2019	**	14	**		40	**	
Upper & Mid Canopy	2011			32		21		
	2012	46		46		20	42	
	2013	51*	12	44		41	45	
	2014	57*	15	38		34	48	
	2015	67*	17	52*	**≥50**	34	55	**≥65**
	2016	67*	16	48		44	53	
	2017	74*	28	57*		64	83*	
	2018	**	27	56*		48	**	
	2019	**	33	**		55	**	
Understory Non-Native	2011			11*		13*		
	2012	3*		11*		13*	4*	
	2013	T*	7*	10*		7*	9*	
	2014	2*	2*	2*		6*	7*	
	2015	2*	4*	2*	**<25**	1*	6*	**<25**
	2016	3*	17*	2*		11*	11*	
	2017	18*	9*	36		14*	11*	
	2018	**	16*	18*		12*	**	
	2019	**	8*	**		1*	**	

**Has met criteria as stated above. **Area has met all enhancement plan criteria. T=Trace<1*

Planting Area E

Pre-existing conditions

Located in the Brown Pasture, planting area E is approximately 8.7 acres in size. The site is dominated by meadow vegetation with tree and shrub willows, as well as cottonwoods and black locust (*Robinia pseudoacacia*) scattered throughout the site. This area was burned during the Center Fire in 2011. Soils in this planting area are loam to sandy loam to sand in the near surface horizons.

Desired condition

Recommended number of pole planting for area E is 3,036 pole plantings based on 12-foot spacing. If successful, planting in area E would increase habitat acreage and connect with existing habitat located to the south in the Brown Pasture to habitat in the north in the Apple Orchard Exclosure. Pre-fire habitat suitability was classified as low. Habitat condition 6 to 10 years post implementation of medium suitability is desired.

Implementation Efforts

In 2012, initial pole planting was implemented in area E. The plan called for an estimate of 3,036 pole plantings but only 1,205 were planted due to 12 foot spacing from existing canopy and depth to ground water. The Enhancement Plan required that 222 of the original 1,205 pole plantings in area E be replanted in 2013. In 2014, an additional 260 pole plantings were planted to again try and meet the target canopy cover goals by the sixth year following the initial planting. A total of 1,687 pole plantings were planted in area E over three years. In 2019, an additional 300 pole plantings were planted to fill in areas that had low survivability and to help meet cover criteria goals.

Current conditions

Planting of area E is in the seventh year since the initial planting. According to the Enhancement Plan, upper and mid canopy cover should be ≥50%. Nonnative canopy cover should be < 5% and nonnative understory should be <25%.

Upper and mid canopy cover has slowly been trending upward since the implementation of the planting area (Figure 3.3). Upper and mid canopy cover has increased from a low of 12% in 2013 to 33% in 2019. At 33%, this planting area is 17% from meeting the enhancement criterion of ≥50%.

The nonnative canopy cover in 2019 was 7% which is 2% over the criterion for this planting area. As reported in previous reports, there are mature stands of black locust that were not removed because they may not be able to be replaced with willows and cottonwoods due to the depth of ground water in the area. The nonnative understory cover value of 8% in 2019 has met the enhancement plan's criteria of ≤25% for area E. (Table 3.6).

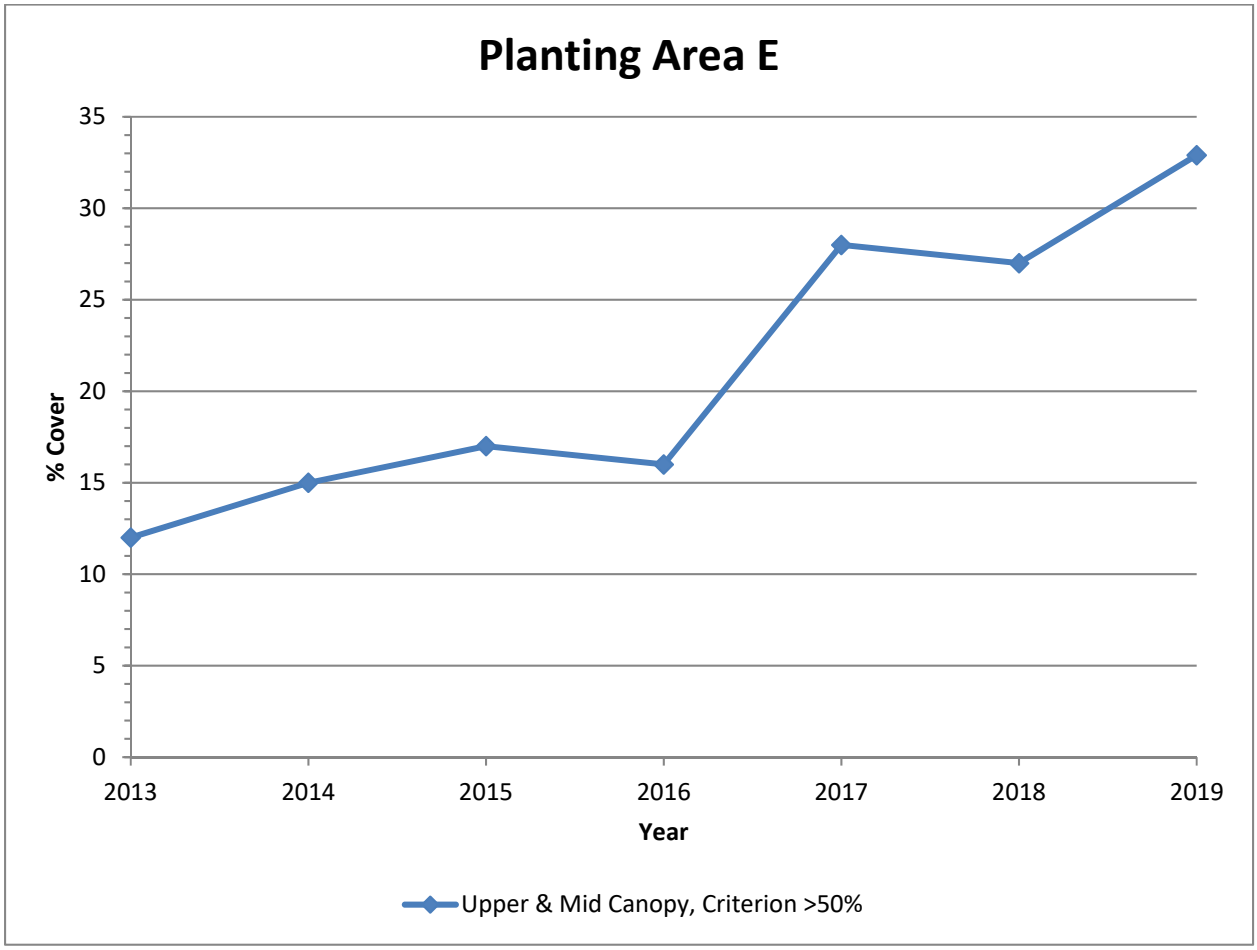


Figure 3.2. Percent Absolute Cover Values for 2013-2019 for Area E

Depth to Groundwater – Planting Area E

As recommended in the 2017 Owens Valley Annual Report, a depth to groundwater analysis was completed in January 25, 2019 in planting area E (Figure 3.7). This analysis determined that groundwater levels are suitable for replanting in this planting area. Approximately 200 *Salix laevigata* and 100 *Populus fremontii* poles were harvested and placed into cold storage in January 2019 and were planted in area E in March 2019.

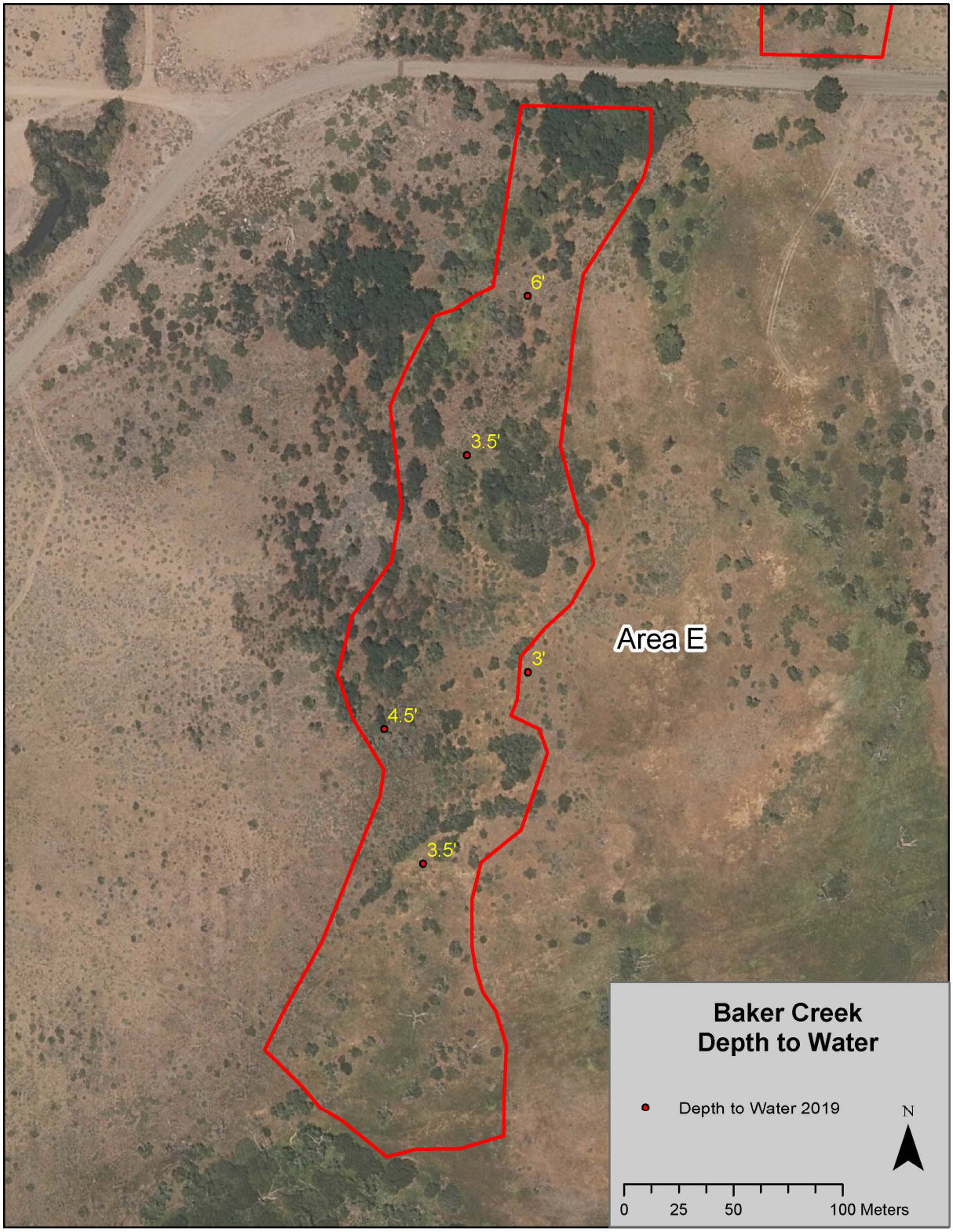


Figure 3.3. Depth to Water for Planting Area E January 25, 2019

Planting Area G

Pre-existing conditions

Area G lies adjacent to area F but has been designated as a separate planting area due to variation in the vegetation composition between the two areas. Planting area G is approximately 1.0 acres in size and is also located in the Apple Orchard exclosure. Vegetation in this area includes creeping wildrye, brome (*Bromus* spp.), tree and shrub willow, and black locust. Vegetation in this area is also recovering from the 2007 Inyo Complex Fire. Soils are sandy loam in the near surface horizons with sand at depth.

Desired condition

A total of 262 pole plantings were recommended based on 12-foot spacing. If planting area G is successful, it combined with existing habitat to the north and east would increase the acreage of suitable habitat in the Apple Orchard Exclosure. Prefire suitability for area G was medium with a desired condition in 6 to 10 years of high suitability.

Implementation Efforts

Area G was implemented as one unit with area F. In 2010, the initial pole planting was implemented in planting area F. Area F and G were planted as one planting area due to their proximity with each other and received 589 of the recommended 995 due to the 12 foot spacing from existing canopy. In 2011, areas F and G received the replacement pole plantings required by the plan. A total of 371 of the 589 pole plantings were replanted in areas F and G. In 2013, area F and G received an additional 55 pole plantings and then another 130 in 2014. Total number of poles planted in areas F and G was 1,145.

Current conditions

Planting of area G is in the ninth year since the initial planting. According to the Enhancement Plan, upper and mid canopy cover requirement is higher for this planting area at ≥65%. Nonnative canopy cover should be < 5% and nonnative understory should be <25%.

Upper and mid canopy cover decreased from 64% in 2017 to 55% in 2019 (Figure 3.5). At 64% planting area G was only 1% from meeting the Enhancement Plan's criterion of 65%. Now at 55%, planting area G is 10% from meeting the 65% criterion.

Nonnative cover values in 2019 are at trace levels well below the 5% criterion. Nonnative understory had decreased in cover from 12% in 2018 to 1% in 2019 and is 24% below the Enhancement Plan's criterion (Table 3.6).

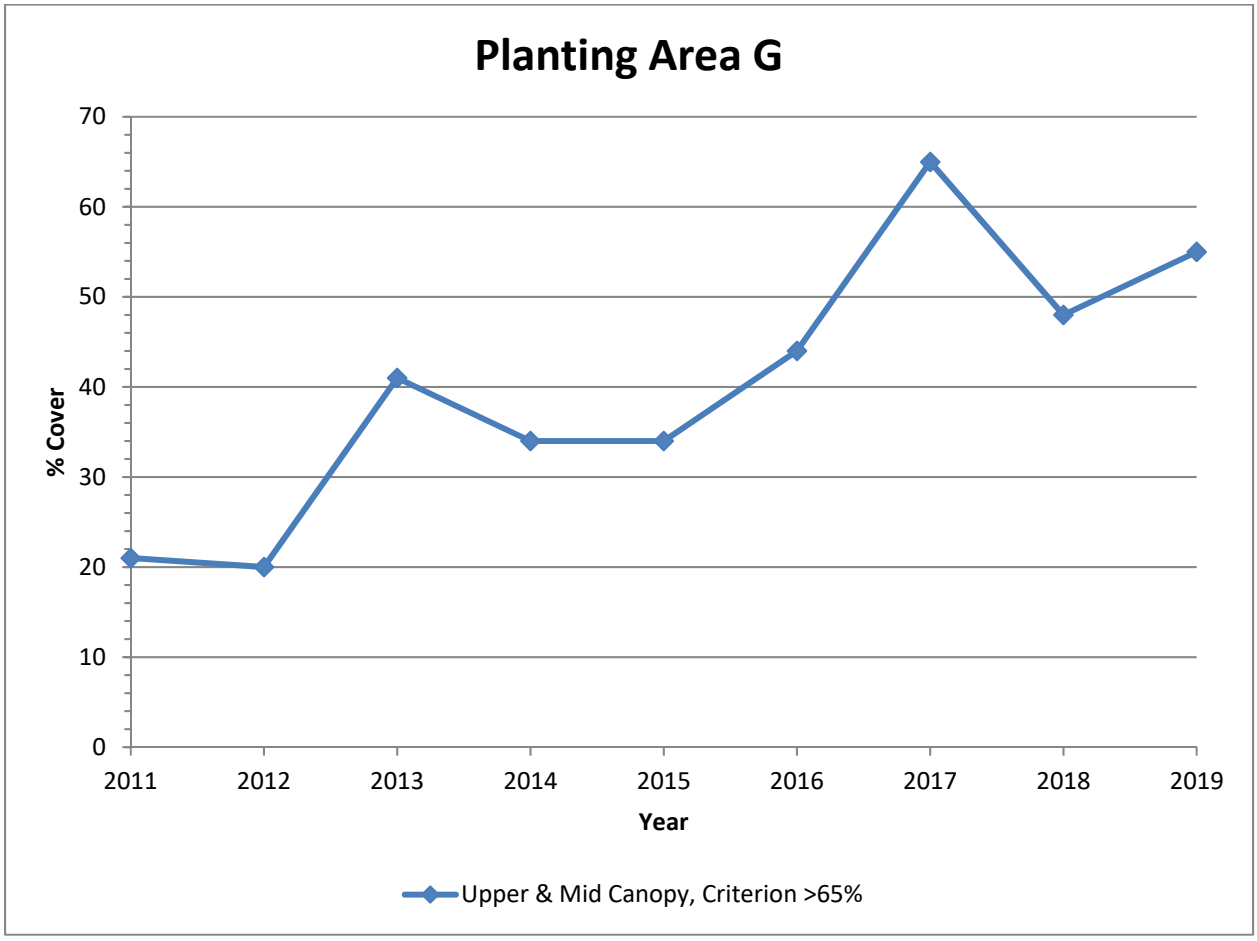


Figure 3.4. Percent Absolute Cover Values for 2011-2019 for Area G

Discussion

Year 2019 marks the ninth year since pole planting at the Baker Creek yellow-billed cuckoo project was implemented. In those nine years, the project area has seen one major wildland fire, a five year drought and the second wettest winter on record. The 2018/2019 winter was above average for precipitation.

Out of the five planting areas, areas D and H have met the goals stated in the Enhancement Plan were complete as of 2017. In 2018, planting area F met all criteria stated in the Enhancement Plan and is also complete. Planting area G met all non-native criteria and is 10% percent from meeting the 65% criterion for upper and mid canopy cover. Planting area E was initially planted in 2013 and is in its seventh year. At 33% in 2019, upper and mid canopy cover for this planting area is still 17% from meeting the criterion stated in the Enhancement Plan.

Recommendations

LADWP recommends discontinuing monitoring in all planting areas that have met the criterion in the Enhancement Plan. Additionally, it is recommended that no new pole plantings be planted in areas E and G.

LADWP will continue monitoring planting areas E and G until the planting areas reach the criteria as described in the Enhancement Plan. LADWP will report on conditions of the two remaining planting areas (E and G) in its 2021 Owens Valley Annual Report.

3.3.2. Owens Valley Land Management Plan (OVLMP)

Introduction

Section II.B of the 1997 MOU describes the requirement for a land management plan for City of Los Angeles (City) non-urban lands in the Owens River Watershed in Inyo County (excluding the LORP planning area). The 1997 MOU states that LADWP shall continue to protect water resources used by the citizens of Los Angeles while providing for the continuation of sustainable uses such as recreation, livestock grazing, agriculture, and other activities. In doing so, LADWP shall promote biodiversity and healthy ecosystems, and address situations or problems that occur from the effects of various land uses on City property. The 1997 MOU states that priority is to be given to riparian areas, irrigated meadows, and sensitive plant and animal habitats.

Subsequently, LADWP developed the Owens Valley Land Management Plan (OVLMP) (LADWP and Ecosystem Sciences 2010) to fulfill this requirement of the 1997 MOU and guide management of the City's lands in the Owens Valley. The OVLMP consists of 10 chapters that describe current conditions and future management of grazing, riverine-riparian ecosystems, recreation, cultural resources, fire, commercial uses, threatened and endangered species, and areas of special management concern. The fundamental role of resource management is to assess and evaluate the effects of existing land and water use practices, and recommend flow management and land management improvements if necessary.

CEQA Process for the OVLMP

An Initial Study and Mitigated Negative Declaration (MND) (LADWP 2010) was prepared for the OVLMP in March 2010. After review of the comments received and based on the information in the Initial Study, LADWP determined that with adoption of mitigation measures, implementation of the OVLMP would not have a significant impact on the environment. The final MND and Mitigation Monitoring and Reporting Program were approved by the City of Los Angeles Board of Water and Power Commissioners on June 1, 2010. A Notice of Determination was filed with the Inyo County Clerk on June 2, 2010.

3.3.2.1. OVLMP Grazing Management Monitoring Report

Introduction

The land use component of the OVLMP is composed of project elements related to livestock grazing management. Under the land management program, the intensity, location, and duration of grazing is managed through the establishment of riparian pastures, forage utilization rates, and prescribed grazing periods (described in Section 3.3 Owens Valley Land Management Plan, 2010). Other actions include protection of rare plant populations, establishment of off-river watering sources (to reduce use of the river and off-river ponds for livestock watering) and the monitoring of utilization and rangeland trend throughout the leases to ensure that grazing rates maintain the long-term productivity.

Grazing management plans developed modified grazing practices in riparian and upland areas on LADWP leases in order to support OVLMP goals. The leases contained in the Owens Valley Report are listed in Table 3.7 below. Maps detailing the locations of each of these leases can be found in the OVLMP.

Table 3.7. Ranch Lease Numbers and Names

RL #	Ranch Name		RL #	Ranch Name		RL #	Ranch Name	
-401	Brockman Ranch Lease		I-438	Big Pine Canal Lease		I-480	Horse Shoe Ranch Lease	
-402	U Bar Ranch Lease		I-439	Rafter DD Ranch Lease		I-483	Round Valley Ranch Lease	
-404, 413	Quarter Circle B Ranch Lease		I-451, 500	CT Ranch Lease		I-487	LI Bar Ranch Lease	
-406, 489	Fort Independence Ranch Lease		I-452	Lone Pine Dairy Lease		I-489	Archie Adjunct	
-407	Coloseum Ranch Lease		I-453	Reata Ranch Lease		I-489	Georges Creek Parcel	
-408	Eight Mile Ranch Lease		I-454	Independence Lease		I-489	Island Ranch Lease	
-411	Cashbaugh Ranch Lease		I-455	Independence Lease		I-490	Delta Ranch Lease	
-412	Chance Ranch Lease		I-456	Lone Pine Ranch Lease		I-491,	Twin Lakes Ranch Lease	
-420	Rockin DM Ranch Lease		I-460	Rainbow Pack Outfit Lease		I-491, 499	Four J Ranch Lease	
-424	Mandich Ranch Lease		I-461	ST Ranch Lease		I-492	Reinhackle Ranch Lease	
-427	Olancha Creek Adjunct		I-462	Horseshoe Bar Ranch Lease		I-493	Rockin' C Ranch Lease	
-428	Blackrock Ranch Lease		I-464	Three Corner Round Ranch Lease		I-495	Mount Whitney Pack Lease	
- 428A	Homeplace Adjunct		I-475	Intake Ranch Lease		I-497	Warm Springs Ranch Lease	
-430	Thibaut Ranch Lease		I-475	Baker Road Ranch Lease		I-498	Pine Creek Ranch	
-435	3V Ranch Lease		I-479	Aberdeen Pack Lease				

Utilization Monitoring

Monitoring methodologies are fully described in Section 4.6.2 of the *Lower Owens River Monitoring Adaptive Management and Reporting Plan* (Ecosystem Sciences, 2008), as they are also used for monitoring City land within the Lower Owens River Project Area.

Utilization is compliance monitoring and involves determining whether the utilization guidelines set forth in the grazing plans are being adhered to. Similar to precipitation data, utilization data alone cannot be used to assess ecological condition or trend. Utilization data is used to assist in interpreting changes in vegetative and soil attributes collected from other trend monitoring methods.

Utilization monitoring is conducted annually. Permanent utilization transects have been established in upland and riparian areas of pastures within the MORP, LORP, and areas outside these two project locations. An emphasis has been placed on establishing utilization monitoring sites within riparian management areas. Each monitoring site is visited prior to any grazing in order to collect ungrazed plant heights for the season. Sites are visited again approximately mid-way through the grazing period (mid-season) and again at the conclusion of the grazing period (end-of-season).

Utilization estimates are conducted on all range trend transects if there is an adequate amount of the key forage species (alkali sacaton, saltgrass, etc.). There are additional utilization transects not associated with range trend sites. These are designated as spatial utilization transects and will be read annually as long as they represent typical use in a pasture. If they fail to be representative (e.g. fire, flooding, and change in grazing patterns) they will be temporarily or permanently abandoned.

Watershed Resources staff updates each lessee with their mid-season if close to or exceeding utilization standards (40% or 65%). In either case the lessee is instructed to move livestock. All lessees are informed on end-of-season utilization results for each year. This allows LADWP and the lessees to communicate and make grazing management changes as needed in order to meet land management goals.

Target stubble heights have been calculated for each transect and pasture on a given lease. The lessee is notified of the set utilization standards and corresponding pasture or field associated with either riparian (40%), or upland (65%) standards. If requested by the lessee, field visits will occur to assess utilization on a particular field. If not requested, Watershed Resources staff adhere to the monitoring schedule previously mentioned. To calculate target stubble heights, ungrazed plant heights are collected after the end of the growing season to allow the plants to reach maximum production before the grazing season begins. The ungrazed heights are then averaged by species and transect in order to calculate the stubble heights that will meet the utilization standards for each field. The resulting calculated stubble heights are based on the same height/weight curves used in the mid- and end-of-season utilization calculations.

Range Trend Monitoring

Overview of Monitoring and Assessment Program

Monitoring is conducted at all irrigated pastures and at key areas within riparian and upland management areas. Areas not identified as irrigated pasture, riparian management areas, or springs and seeps are considered upland management areas. Monitoring and assessment of key sites in riparian and upland management areas includes utilization and range trend monitoring.

This report presents data collected during various periods typically beginning in 2007. Each site will generally be read every three years unless a significant change has occurred such as a fire or a major change in management.

A description of monitoring methods, data compilation and analysis techniques can be found in the *2008 LORP Monitoring, Adaptive Management and Reporting Plan*. Descriptions of the range trend monitoring sites and their locations on the leases are in the individual lease monitoring narratives and maps in this section.

Because of the high resource value associated with riparian areas on City property in the Owens Valley, the majority of the monitoring plots are either located on Moist Floodplain or Saline Meadow sites in close proximity to the Owens River.

Utilization is compliance monitoring and involves determining whether the utilization guidelines set forth in the grazing plans are being adhered to. Similar to precipitation data, utilization data alone cannot be used to assess ecological condition or trend. Utilization data is used to assist in interpreting changes in vegetative and soil attributes collected from trend monitoring methods.

Following implementation of the grazing management plans, the utilization standard for riparian management areas is 40%. The utilization standard for upland areas is 65% if grazing occurs during the plant dormancy season. The standard for upland areas is 50% if grazing occurs during the active plant growing period; however, if the pasture is completely rested for a minimum of 60 continuous days during the latter part of the active stage to allow seed set, allowable forage utilization is 65%.

These standards are not expected to be met precisely every year because of the influence of annual climatic variation, livestock distribution and the inherent variability associated with techniques for estimating utilization. Rather, these levels should be reached over an average of several years. If utilization levels are consistently 10% above or below desired limits during this period, adjustments should be implemented (Holecheck and Galt, 2000; Smith et al., 2007).

An additional driver for the 40% utilization rate on riparian pastures in the northern portion of the Owens Valley are grazing requirements as they relate to the federally listed Southwestern Willow Flycatcher. Within the Middle Owens River management area, beginning from just north of Tinemaha Reservoir to Pleasant Valley and adjacent

Horton Slough, LADWP and the United States Fish and Wildlife (USFWS), developed a Conservation Strategy designed to increase the endangered Southwestern Willow Flycatcher habitat in the Owens Valley. This strategy also specifies a 40% utilization limit along the river with livestock grazing permitted between October and May of each year.

Range trend monitoring involves the quantitative sampling of the following attributes: frequency of all plant species, canopy cover estimates for herbaceous plant species, line intercept sampling for shrub canopy cover, estimates for ground cover, shrub density, and age classification of shrubs. Photo documentation of the site conditions is included as part of range trend monitoring.

Range trend monitoring at permanent transects provides quantitative data to determine the state of monitoring sites relative to baseline conditions and how a given site compares to the desired plant community. The desired plant community can be one of several plant communities that may occupy a site or one that has been identified through a management plan to best meet the plan's objective for the site. The desired plant community must protect the site as a minimum and may be described as dynamic, changing through time, or within a range of variability (Bedell, 1988). Until site-specific objectives are established, the desired plant community, which will serve as the benchmark for evaluating conditions, will be the "reference plant community" described in the ecological site description for a site. The reference plant community is the historic climax or potential plant community described for each ecological site.

Ecological site descriptions are a tool developed by USDA Natural Resource Conservation Service (NRCS) that can be used to assist in management decisions. Ecological sites are distinct units distinguished between one another by significant differences in potential vegetation composition or production between soils (NRCS, 2003). Ecological site descriptions are represented spatially as soil map units, developed from soil survey data in the Owens Valley.

Soil surveys in the area were conducted by NRCS and the final data can be found in the *Soil Survey of Benton-Owens Valley Area, California, Parts of Inyo and Mono Counties* (USDA NRCS, 2002). Vegetation data used to develop the ecological site descriptions were collected by LADWP between 1984 and 1994. This vegetation data is also referred to as "baseline" as described in the *Green Book for the 1990 Long-Term Groundwater Management Plan for the Owens Valley and Inyo County.* Ecological site descriptions include the expected production (pounds per-acre) for each soil map unit based on growing conditions (normal, favorable, unfavorable). Yearly growing conditions are based on annual precipitation data (October through September).

Nested frequency, and cover data are presented for each lease and are presented as range trend transect data tables for each sampling transect and sampling year. To compare range trend sites to the associated reference plant community in the ecological site descriptions, the soil map unit that each transect was located on was cross-referenced to the *Soil Survey of Benton-Owens Valley Area, California*, *Parts of Inyo*

and Mono Counties (USDA NRCS, 2002). The soil map unit narrative references the ecological site descriptions. The ecological site description describes the potential plant community by percent composition by dried weight of the major plant species. The potential plant community information does not set a specific percent composition for each species, but specifies an expected range of abundance of each of the major plant species by soil type and ecological site.

The majority of land management monitoring transects are located on the Moist Floodplain Ecological Site (MLRA 29-20). The site describes axial-stream floodplains. This ecological site does not include actual river or stream banks. Moist floodplain sites are dominated by saltgrass and to a lesser extent alkali sacaton and Beardless wildrye (*Leymus triticoides*). Only 10% of the total plant community is expected to be composed of shrubs and the remaining 10% forbs.

Saline Meadow ecological sites (MLRA 29-2) are the second most commonly encountered ecological sites on the MORP. These sites are located on fan, stream, lacustrine terraces, and may also be found on axial stream banks. Potential plant community groups are 80% perennial grass with a larger presence of alkali sacaton than moist floodplain sites. Shrubs and trees comprise up to 15% of the community while forbs are only 5% of the community at potential. Saline Bottom (MLRA 29-7) and Sodic Fan (MLRA 29-5) ecological sites were also associated with several range trend sites. These are more xeric stream and lacustrine terrace sites. Saline Bottom ecological sites still maintain up to 65% perennial grasses, the majority of which is alkali sacaton, while shrubs compose up to 25% of the plant community, and forbs occupy the remaining 10%. Sodic Fan ecological sites are 70% shrubs, primarily Nevada saltbush (*Atriplex torreyi*), with a minor component of alkali sacaton of up to 25% and 5% forbs.

With regard to the ecological site descriptions for the Owens Valley, management objectives for a given area may or may not correlate directly to high similarity indexes or different seral conditions. For example, a portion of the reference plant communities described for the moist floodplain ecological site allow for a species composition (dry weight) of 10% for shrubs and 80% for perennial grass; optimum wildlife habitat for a particular species might require more woody plants than allowed for and livestock production would improve with a greater percent composition of perennial grass and a decrease in shrubs. Each of these scenarios are feasible through different management prescriptions but none would reflect a high similarity to the reference plant community for the ecological site. Furthermore, due to historical or existing disturbances or the presence of nonnative species, attaining “excellent condition” or 76-100% similarity may not be feasible.

It is important to note that reference plant communities associated with ecological sites are amalgamations of both existing reference sites and professional judgment of what the site’s potential could have been under pristine conditions. The reference plant community is a conceptual model intended to help managers gauge how a site compares to what potentially could be found on similar sites. To expect any existing location to identically match the described community would be erroneous. Estimating

how similar a given site is to its potential described in the ecological site description is useful when conducting an inventory across an area. However, if repeat monitoring is available for the site (as it is for most LADWP leases), changes over time (trend) compared to baseline data collected at the same location is a more effective approach to assessing the trend of that particular key area. This is because comparisons are made directly to the site and not between the key area and a reference plant community in an ecological site description, which ultimately has no physical existence. For this reason similarity indices were not calculated and discussions in trend will not focus on changes in similarity indices.

Reference plant community data is derived from annual aboveground production (dry weight). The vegetative attribute of annual production and canopy cover are very sensitive to annual growing conditions and will therefore vary in accordance to natural climatic fluctuations. Annual production and canopy cover are inappropriate attributes to interpret long-term impacts of management decisions on plant communities when compared to other plant monitoring methods such as nested frequency.

Because frequency data is sensitive to plant densities and dispersion, frequency is an effective method for monitoring and documenting changes in plant communities (Mueller-Dombois and Ellenberg, 1974; Smith et al., 1986; Elzinga, Salzer et al., 1988; BLM 1996; Heywood and DeBacker, 2007). For this reason frequency data will be the primary means for evaluating trend at a given site during subsequent years. Based on recommendations for evaluating differences between summed nested frequency plots (Smith et al.,1987 and Mueller-Dombois and Ellenberg, 1974), a Chi-Square analysis with a Yate's correction factor was used to determine significant differences between years. Future analysis will compare estimates to the baseline datasets presented in this report.

During the pre-project period, a range of environmental conditions were encountered including "unfavorable" growing years when precipitation in the southern Owens Valley was less than 50% of the 1970-2009 average, "normal" years, when precipitation was 50-150% of average, and "favorable" conditions when precipitation was greater than 150% of average. Many of the monitoring sites responded to the variability in precipitation during the baseline period, this provided the Watershed Resources staff an opportunity to sample across a broad amplitude of ecological conditions for these sites which contributed to a robust baseline dataset.

Range trend analysis on the LORP leases began in 2002. In response to the potential critical habitat designation and subsequent MOU with the USFWS concerning the Southwestern Willow Flycatcher, rangeland analysis expanded to include the Middle Owens River areas beginning in 2007. Because of the lengthier period of monitoring on the LORP leases there is greater discussion of overall trends on those leases. As monitoring continues on the MORP leases, further discussion of results will be included in the reporting component of the project.

On transects with a long history of monitoring, trends appear to be fairly static with no obvious trajectories as each year captures and extends what appears to be the normal range of variability. The majority of range trend sites are situated on moist flood plain or saline meadow ecological sites. These sites are naturally sub-irrigated and less influenced by annual fluctuations in precipitation when compared to the more xeric ecological sites such as Saline Bottom or Sodic sites. In general perennial grass and forb communities on the mesic sites are resilient to both moderate and heavy grazing, particularly if grazing occurs during the dormant season which is the case for most LADWP grazing leases.

Sites where apparent trends are occurring tend to be on:

1) shrub dominated sites where encroachment accelerates in a non-linear fashion;
2) burned sites where shrub cover is significantly reduced;
3) on sites where changes in water tables act as the primary driver for plant community composition and/or species abundance.

Rising water tables in moist flood plain sites adjacent to the Owens River will reduce shrub cover as the root zone of shrubs becomes permanently inundated. A dropping water table will have the reverse effect but similar end results with increased shrub mortality as well as a shift in plant composition. Transects along the Owens River on the Twin Lakes, Thibaut, and Blackrock leases have experienced a spike in cover and then a subsequent mortality of Nevada saltbush on terraces closest to the water's edge. Conversely, diminished flows on the Middle Owens River have contributed to a declining water table on moist floodplain sites and have led to a decrease in abundance of herbaceous graminoids.

Range Trend in 2019

Range Trend transects were sampled on the Reinhackle Lease (RLI-492), Big Pine Canal Lease (RLI-438), Blackrock Lease (RLI-428), and the Delta Lease (RLI-490).

Irrigated Pasture Monitoring

Irrigated Pasture Condition Scoring is used to monitor all irrigated pastures using protocols developed by the (NRCS, 2001). Irrigated pastures that score 80% or greater are considered to be in good to excellent condition. If a pasture rates below 80%, changes to pasture management will be implemented. All pastures were evaluated in 2019.

Because all pastures are evaluated every three years, only irrigated pastures that scored 80% or below are evaluated in off years. Most pastures have recovered from the 2011-2015 extreme drought conditions. All pastures will be reevaluated in 2022.

3.3.2.1.1. 2019 Grazing Management Monitoring Data

Tables containing summarized utilization, range trend, and irrigated pasture data for each pasture/field and transects within the pasture/field can be found in Appendices 1-3.

ST Ranch Lease (RLI-461)

The ST Ranch Lease (10,925 acres) consists of parcels from Aberdeen, Bishop, and Round Valley. The ST Ranch is a commercial cow/calf operation that also raises and sells quarter horses. Almost the entirety of moist floodplains in the Bishop area were burned by a wildfire in late February of 2018. Range trend transects will be resampled in the summer of 2020 and will provide information regarding post-fire recovery on the transects that burned during the 2018 fire.

Utilization

Utilization on the Aberdeen portion of the lease was below the allowable utilization prescription of 40%. Efforts to reduce the stocking rate in the Calvert Slough Field and repairs to the northern fence resulted in 5% utilization.

The Charlie Butte Field has only one transect, TATUM_10 (21%), which was below allowable utilization standards. LADWP Watershed Resources Staff recommends periodically moving supplemental feeding locations and cattle to help distribute livestock better throughout the field.

The Pleasant Valley portion of the lease recovered from a wildfire that occurred on February 19, 2018. The fire started at the Pleasant Valley Campground and moved east burning all of the riparian pastures. Post fire, livestock that had not been lost were moved to the lease's irrigated pastures. There was no grazing restriction placed on the Pleasant Valley portion of the lease for 2019 due to the seven months of rest and recovery that the riparian pastures received. Utilization in 2019 was below the allowable standard in all fields except South Horton Slough Field (79%). This was due to flow fluctuation in the Owens River allowing cattle to cross back and forth. The lessee was notified and all livestock was moved to the south.

In April 2016, LADWP constructed a 23-acre exclosure on City of Los Angeles (City) property along Horton Creek within the lease. The exclosure was subsequently reinforced in 2019.

Range Trend

Range trend transects were sampled in the summer of 2017 and were relatively stable on the RLI-461 lease. To capture the effects of the Pleasant Fire that occurred on February 19, 2018, range trend transects inside the burned area were re-read in the summer of 2018 (Tatum_01, Tatum_02, Tatum_03, Tatum_04, Tatum_05, and Tatum_06). Transects will be sampled again in the summer of 2020.

Dixon Place Parcel

Northeast McCumber Field

TATUM_01 is located on a Saline Meadow Ecological Site. The transect corresponds to the Torrifluvents-Fluvaquentic Endoaquaolls Complex soil unit however the site is on an elevated terrace above the functioning floodplain and exhibits botanical characteristics similar to a Torrifluvent site (Saline Meadow). No sampling occurred in 2019.

North Horton Slough Riparian Pasture

TATUM_02 is located on a Saline Meadow Ecological site in the North Horton Slough Riparian Pasture on a Torrifluvent soil unit. Frequency trends have remained static on the site during the sampling period of 2007-2017. No sampling occurred in 2019.

Southeast McCumber Riparian

TATUM_03 is located on a Moist Floodplain Ecological Site on the Torrifluvents-Fluvaquentic Endoaquaolls Complex soil unit. No sampling occurred in 2019.

Northwest McCumber Riparian

TATUM_04 is located on a Saline Meadow Ecological Site, directly south the terrace elevation drops down to a Moist Floodplain Ecological Site. The entire area from the river north to chalk bluffs is mapped as a Torrifluvents-Fluvaquentic Endoaquaolls Complex soil unit. However the site is on a Torrifluvent soil unit. No sampling occurred in 2019.

Southwest McCumber Riparian

TATUM_05 is located on a Moist Floodplain Ecological Site on the Torrifluvents-Fluvaquentic Endoaquaolls Complex soil unit. No sampling occurred in 2019.

South Horton Slough Riparian Pasture

TATUM_06 is located on a Moist Floodplain Ecological Site on the Torrifluvents-Fluvaquentic Endoaquaolls Complex soil unit. No sampling occurred in 2019.

Irrigated Pastures

Watershed Resources staff has been working with the lessee to improve irrigated pasture condition scores since 2007. One of the main problems on the lease was water management and availability which was being impeded by old irrigation diversions and lack of water supply. A new irrigation schedule was implemented and maintenance and repairs to ditches and head gates has improved irrigated pasture condition scores. The

swamp (72%), Wanacott (78%) and Steward (74%) are still below the 80%. The lessee is continuing to work on them.

Stockwater Sites

There are no stockwater sites planned for the ST Ranch Lease. Stockwater is provided by the Owens River and irrigation diversions on the lease.

Fencing

Portions of the perimeter fence were destroyed in the 2018 Pleasant Fire. Approximately 0.7 miles of new fence, separating the ST Ranch Lease (RLI-461) and the Reinhackle Lease (RLI-492) was constructed in the summer of 2018. In addition, approximately 0.5 miles of perimeter fence was replaced on the west side of the Pleasant Valley Camp Ground road.

Salt and Supplement Sites

Feed pellets that contain trace minerals and protein are distributed for supplement on the lease.

Pine Creek Ranch (RLI-498)

The Pine Creek Lease (2,632 acres), consists of two separate leases: the Round Valley Parcel RLI-498 (1,175 acres) is located between Birchim Lane and Pine Creek Road. Forage consists primarily of irrigated pasture with a small section of Big Sagebrush Scrub. The Paradise Field RLM-486 (1,457 acres) is located west of Old Sherwin Grade Road and south of Paradise in Mono County. Forage consists of primarily Big Sagebrush Scrub with native perennial bunch grasses occurring throughout. The ranch is a commercial cattle business that also runs goats and sheep in contained pastures near the lease headquarters. The Paradise Field (RLM-486) will not be discussed in this report since it is located in Mono County.

Utilization

All pastures on the lease are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pasture scores on the Pine Creek Ranch Lease have been consistently high, with scores ranging 90% and higher since 2007. There has been some heavy runoff from Pine Creek on above average water years. This has caused some flooding and head cuts on the irrigated pastures. The lessee has since repaired these but the potential for reoccurrence remains.

Stockwater Sites

Stockwater is provided by irrigation diversions on the lease.

Fencing

Repair to an existing boundary fence along Lower Rock Creek Road and Birchim Lane was conducted on the lease.

Salt and Supplement Sites

Cattle are fed hay and protein supplement during the winter.

3V Ranch Lease (RLI-435)

The 3V Ranch, west of Bishop is 33 acres. There are four irrigated pastures that comprise the lease and they are grazed on a rotational grazing schedule year round.

The ranch is a commercial cow/calf operation.

Utilization

All pastures on the lease are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

All pastures on the lease are irrigated. Irrigated pastures are not subject to range trend monitoring.

Irrigated Pastures

Irrigated pasture scores on the 3V Ranch Lease have been consistently high since 2007. Under new management in 2010 an irrigation schedule was implemented that measured irrigation water more accurately. As a result any excess water that was received previously, is no longer available. Drought had decreased irrigated pasture scores for several years but, due an above normal water year irrigated pasture conditions have improved. Although pasture scores have increased, annual and perennial weeds continue to persist. The swamp pasture (76%) was the only pasture on

the lease that did rate at 80%. This was due to weeds, the lessee has begun to mow and treat the weeds.

Stockwater Sites

Stockwater is provided by irrigation diversions on the lease.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cattle are fed hay and protein supplement during the winter.

Reata Ranch Lease (RLI-453)

The Reata Ranch (139 acres) consists of the Fish Slough Parcel (84 acres), north of Bishop; and the Reata Parcel (55 acres) west of Bishop. The ranch is a cow/calf operation; pairs spend summer months on private property and winter on the Reata Parcel. The Fish Slough Parcel is in nonuse.

Utilization

The Fish Slough Parcel is in nonuse and the remaining pastures on the lease are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures on lease are in good condition all rating 82%. There are no weed or spot grazing issues on the lease.

Stockwater Sites

Stockwater is provided by irrigation diversions and Bishop Creek.

Fencing

Routine fence repairs continue on the lease.

Salt and Supplement Sites

Cattle are supplemented with hay and protein during the winter months.

Horseshoe Bar Ranch Lease (RLI-462)

The Horseshoe Bar Ranch (329 acres) is a cow/calf operation that consists of two separate parcels: the 144-acre Sewer Parcel, which lies to the east of Bishop; and the 185-acre Dairy Parcel, which lies west of Bishop. Pastures are typically grazed during the winter months but the Sewer Parcel does get some grazing during the summer.

Utilization

All pastures on the lease are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease because it lacks rangelands and is comprised of irrigated pastures.

Irrigated Pastures

Irrigated pastures were scored in 2019, the West Pasture (70%), Front Pasture (70%), and Sewer (72%) were below 80%. These low scores were due to spot grazing, a large amount of weeds and shrub encroachment. The lessee was contacted and is working on irrigation diversions and spraying weeds.

Stockwater Sites

All stockwater is provided by irrigation diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cattle are supplemented with protein tubs during the winter.

Rainbow Pack Outfit Lease (RLI-460)

The Rainbow Pack Outfit Lease (144 acres) is a commercial pack operation that grazes horses and mules. The lease consists of the Wye Road, Brockman, and Dutch John Parcels, all in the Bishop area. The Wye Road Parcel consists of the Spruce Street and the Wye Road Fields, which are separated by a ditch. The Brockman Pasture is irrigated and is located just off of U.S. Highway 395 and Brockman Lane. The Dutch John Parcel is located up the Bishop Creek drainage off of Highway 168, it currently does not receive any use.

Utilization

The Wye Road Field is the only field on the lease that requires utilization monitoring. Livestock begin grazing in January and remain in the field until a 2-inch stubble height is reached, or rare plants Owens Valley checkerbloom (*Sidalcea covillei*) begin growing. When either one of these criteria are met, livestock are moved from the field.

Grazing by horses and mules exceeded the 2" maximum stubble height in 2019. The lessee was asked to move the livestock.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

In 2007, the Brockman Pasture was not rated because there was no grazing allowed. At that time the condition of the pasture was too poor to allow any grazing. In 2008, irrigated pasture condition improved as a result of better irrigation practices and grazing management. In the winter and Spring of 2019 the lessee overgrazed the pasture and was asked to remove the livestock. The pasture condition improved over the summer of 2019 to meet the minimum pasture condition score of 80%. Water distribution and weeds have continued to be a problem that the lessee is working on.

Stockwater Sites

Stockwater is provided by irrigation diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Supplements are placed in a previously disturbed location at the north end of the Wye Road pasture.

Rockin C Ranch Lease (RLI-493)

The Rockin C Ranch (320 acres) lies east of Bishop and is used to graze cattle and five to ten horses. The livestock spend the summer on the Sewer Farm Pasture (RLI-462). Grazing occurs on the Sewer Farm Pasture, Holding Pasture and Little Horse Pasture, all of which are irrigated pastures.

Utilization

The lease is comprised of irrigated pastures and dry grazing. Irrigated pastures are not subject to utilization monitoring. The dry grazing portions on the lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures Rain Gun (80%) and Little Horse (84%) rated at or above the irrigated pasture standard in 2019.

Stockwater Sites

Stockwater is provided by irrigation diversions, water troughs, and the Kingsley Ditch.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cattle and horses are fed hay in the winter along with cake and salt blocks.

Rafter DD Ranch Lease (RLI-439)

The Rafter DD Ranch (80 acres), is located east of Bishop. The Bishop Parcel consists of irrigated pastures and some dry grazing located in the Desert Field.

Utilization

The Mare Pasture, Pasture 1, Pasture 2, and Pasture 3 are all irrigated. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures Mare (86%), Pasture 1(80%), and Pasture 2 (68%) were rated in 2019. The low pasture condition score in Pasture 2 was a result of overgrazing during the growing season. Cattle were left on the lease year round with all gates open to all pastures allowing livestock to continually graze the pastures while irrigation was in progress. This management did not allow the pastures to recover and grow. This

caused over grazing and all livestock will be removed from the lease and it will be rested for 2020.

Stockwater Sites

All stockwater is provided by irrigated diversions or troughs.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and salt are provided for horses and mules on the lease during the winter.

Frontier Pack Lease (RLI-426)

The Frontier Pack Lease (160 acres) is located in Round Valley, one mile west of U.S. Highway 395 on Pine Creek Road. Vegetation on the lease is comprised entirely of irrigated pastures (159 acres). The lease grazes 50-100 horses and mules.

Utilization

All pastures on the lease are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures were evaluated in 2019. All pastures scored above 80% except for the Corral Holding (74%), Schober (74%), and South Schober (74%) pastures. These pastures rated low due to willow and cattail encroachments caused by consistently elevated groundwater levels. The lessee plans to mow shrubs within pasture interiors and herbicide treat cattails to gain better control. Saturated soils make mechanical control difficult in some locations. However, existing wildlife habitat also provides refuge and foraging opportunities to a multitude of plants, small mammals, ungulates, insects and birds. This habitat value will be considered in future pasture evaluations.

Stockwater Sites

All stockwater is provided by irrigated diversions or troughs.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and salt are provided for horses and mules on the lease during the winter.

Quarter Circle B Ranch Lease (RLI-404, 413)

The Quarter Circle B Ranch (1,129 acres) lies west of Bishop and is a cow/calf operation. The RLI-404 portion of the lease produces alfalfa or grass hay, the stubble is subsequently grazed by cattle and horses in the winter. The RLI-413 portion of the lease consists of irrigated and dry grazing fields which are which are both primarily grazed by cattle.

Utilization

The lease is comprised of irrigated pastures and dry grazing. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Pasture condition scores have been consistently below or at the minimum standard of 80%. These pastures rate continually low, due to a lack of consistent irrigation, weed control, and sucker elm tree growth. The lessee has been working on removing the elm trees and treating the weeds. They have also been working on different irrigation strategies to improve pasture condition. Yearly evaluations of the lease will continue to be made until pasture conditions improve.

Stockwater Sites

Stockwater is provided by irrigation ditches when livestock are present.

Fencing

There are no new fencing projects planned for the lease beyond regular maintenance.

Salt and Supplement Sites

Hay and protein supplement are fed to the cattle during the winter months.

CT Ranch Lease (RLI-412, 451,500)

The C-T Ranch (6,055 acres) consists of three different leases. The Chance Ranch Lease RLI-451 (1,040 acres) is located in Round Valley. The first parcel (569 acres) in this lease is located approximately 10 miles northwest of Bishop, east of Rock Creek Road, and north of Birchim Road. The second Parcel (471 acres) consists of the Roberts Ranch, north of Pine Creek Road and west of Rock Creek Road; and the Evans Ranch west of U.S. Highway 395 and south of Pine Creek Road. The Sunland Parcel RLI-500 (249 acres) is southwest of Bishop and west of Sunland Road; and the Patch Parcel (4,766 acres) is 13 miles northeast of Bishop in Mono County, near Chalfant Valley. The livestock program is a commercial cow/calf operation.

Utilization

All of CT Ranch pastures within Inyo County are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

All of the pastures on the CT Ranch are well above the required irrigated pasture condition score of 80%. Irrigated pastures will be rated again in 2022.

Stockwater Sites

All stockwater is provided by irrigation diversions or perennial streams.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and protein supplement are fed on a seasonal basis, and sites are rotated.

Mandich Ranch Lease (RLI-424)

The Mandich Ranch (163 acres) southwest of Bishop is a cow/calf operation.

Utilization

All Mandich Ranch Lease pastures are irrigated. Irrigated pastures are not subject to utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures on this lease have consistently scored high since 2007. The lessee routinely mows, sprays weeds and drags all pastures. All pastures rated above the irrigated pasture condition score of 80%.

Stockwater Sites

All water is provided by irrigation diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and protein supplements are fed during the winter and all feed sites are rotated.

LI Bar Ranch Lease (RLI-487)

The LI-Bar Ranch Lease (684 acres) consists of two separate parcels: the South Bishop Place, which lies to the southeast of Bishop, east of U.S. Highway 395; and the Hess Place, which is west of Bishop, south of west Line Street, and east of Barlow Lane. The LI Bar Ranch is a commercial cow/calf operation.

Utilization

The LI Bar Ranch lease is comprised of irrigated pastures and upland vegetation. Irrigated pastures are not subject to utilization monitoring. The upland portion of the lease is comprised of shrubs and annual vegetation. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

All irrigated pastures on the lease have consistently been at or above 80% since 2007. Irrigated pastures were rated in 2019 and scored above 80%.

Stockwater Sites

All stockwater is provided by irrigation diversions and the Bishop Creek Canal.

Fencing

There were no new fencing projects on the lease.

Salt and Supplement Sites

Cattle are supplemented with hay pellets and protein tubs.

U-Bar Ranch Lease (RLI-402)

The U-Bar Ranch Lease (407 acres) lies south of Bishop, east of U.S. Highway 395 and is a cow/calf operation. The ranch is comprised of irrigated pasture and abandoned agriculture used for dry grazing.

Utilization

All pastures are either irrigated or abandoned agriculture. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

The irrigated pastures on the lease are managed by mowing and spraying weeds, this has kept them in good condition since 2007. Irrigated pastures were rated in 2019 and scored above 80%.

Stockwater Sites

Stockwater is provided by irrigation diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and protein supplement are fed to the cattle during the winter months. Feeding areas are rotated periodically for cattle health and to minimize grazing impacts.

Round Valley Ranch Lease (RLI-483)

The Round Valley Ranch Lease (19,780 acres) is a commercial cow/calf operation. The Round Valley Ranch is broadly distributed across several different locations within the Owens Valley. In the Big Pine area, the lease consists of 13 separate pastures. The southernmost pasture lies on the east side of the Owens River and extends from Tinemaha Reservoir, on the south, to U.S. Highway 168, on the north. On the east side of the Owens River, the lease extends from north of Steward Lane to north of Klondike Lake. The Round Valley portion of the ranch, approximately eight miles northwest of Bishop, consists of 22 pastures/fields. The Buttermilk portion of the ranch lies approximately eight miles west of Bishop, and consists of eight pastures/fields.

There are five pastures on the Round Valley Ranch lease within the MORP boundary. The East Side Riparian, East Side River Field, Hole Pasture, River Pasture, and Zurich Riparian are all located in the Big Pine portion of the lease.

Utilization

The end-of-season utilization for RLI-483 was light. The East Side Riparian (0%) was rested 2018/19. Grazing in the Zurich Riparian Pasture (40%), East Side River Field (30%) and River Riparian (27%) were all below the allowable utilization standard of 40%. The Hole Field (76%) exceed utilization standards and was rested in 2018/19.

Range Trend

Range trend transects were not scheduled for monitoring in 2019. Range trend sampling will occur in the summer of 2020.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

No new stockwater sites were developed on the lease in 2019.

Fencing

A new cross fence to separate the riparian and upland portion of the Zurich Pasture from the irrigated portion to the west was completed in 2019.

Salt and Supplement Sites

Hay and protein supplement tubs are used during the winter. Supplement sites are rotated regularly to improve livestock distribution and reduce impacts to supplement sites.

Big Pine Canal Lease (RLI-438)

The Big Pine Canal Lease (9,441 acres) is made up of the Canal and Coyote Mountain Parcels. The Canal Parcel (9,084 acres) lies south of the City of Bishop, along U.S. Highway 395. The Coyote Mountain Parcel (357 acres) includes three fields north of Baker Creek that are surrounded by U.S. Forest Service land. The livestock operation is a cow/calf operation.

Utilization

Grazing was light throughout the North 40 (14%) and South 40 (8%) Fields.

Range Trend

North 40 Pasture

YRIB_04 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site, situated in the North 40 Pasture. Trends remained stable on the site.

YRIB_06 is located on a Torrifluvents, 0-2% slopes soil unit, on a Saline Meadow ecological site in the North 40 Pasture. The site was not accessible in the summer of 2019 because of high flows on the Middle Owens River.

South 40 Pasture

YRIB_03 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site. The site remains stable with no changes in vegetation trends.

YRIB_05 is located on a Torrifluvents, 0-2% slopes soil unit, on a Saline Meadow ecological site. The site continues to remain relatively static.

Irrigated Pastures

All irrigated pastures on the lease have consistently rated well. Sanger and Cow Creek are high altitude meadows located on the Coyote Flat and irrigation water comes from spring flow and snow melt. Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

One stockwater well is located in the Horse Field and provides water for the Old Bull, North 40 Pasture, and Horse Fields.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and mineral supplement are fed during the winter months. Supplemental feeding sites are rotated regularly to improve livestock distribution and reduce impacts to supplement sites.

Cashbaugh Ranch Lease (RLI-411)

The Cashbaugh Ranch Lease (23,602 acres) is located around the eastern edges of Bishop, extending south to Big Pine on the east side of the Owens River. The lease is a commercial cow/calf operation.

Utilization

Utilization was below or at the allowable 40% standard in 2019 with the Laws River Field (0%), East of the River Field (21%) and Bishop Creek Field (10%). The lessee's continued effort to keep gates closed in the Warm Springs Holding Field and East of the River Field has made a significant difference in utilization. There was no utilization in the Ears Field.

Range Trend

Range trend transects on the Cashbaugh Ranch were sampled in 2007, 2009, 2010, 2012, 2015, and 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

No additional stockwater sites are planned for RLI-411.

Fencing

A quarter acre extension (holding pen) to an existing operating structure located on Laws Poleta Road was constructed in 2017.

Salt and Supplement Sites

Hay and Protein supplement tubs are fed during the winter months. Supplemental feeding sites are rotated regularly to improve livestock distribution and reduce impacts to supplement sites.

Warm Springs Ranch Lease (RLI-497)

The Warm Springs Lease (4,161 acres) lies southeast of Bishop, north of Warm Springs Road, between U.S. Highway 395 and the Owens River. The ranch operates a commercial cow/calf operation.

Utilization

Utilization was below the allowable 40% on the River Field (7%) and White Mountain Field (41%). Although utilization is technically above the allowable standard there are no management changes recommended.

Range Trend

Range trend transects were not scheduled for monitoring in 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

No additional stockwater wells are planned for the lease.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cottonseed meal and protein supplement tubs are fed during the winter months at rotated supplement sites.

Reinhackle Ranch Lease (RLI-492)

The Reinhackle Ranch Lease (5,563 acres) consists of three separate parcels: the Reinhackle Parcel, which lies to the east of Bishop and south of U.S. Highway 395; the Five Bridges Parcel, which is north of Bishop and west of Five Bridges Road; and the Laws Parcel, which lies west of U.S. Highway 6 and east of Five Bridges Road.

Utilization

Utilization in the Laws Holding Riparian Field has remained below the allowable utilization standard of 40%. A portion of the lease was not monitored for utilization in 2018. Utilization standards had been suspended due to a wildfire that occurred on February 19, 2018. The fire started at the Pleasant Valley Campground and moved east burning all of the riparian pastures. Post fire livestock that had not been lost were

moved to the leases irrigated pastures. There was no grazing restrictions placed on the Pleasant Valley portion of the lease for 2019 due to the seven months of rest and recovery that the riparian pastures received. All fields were below the allowable utilization standard of 40% in 2019.

Range Trend

Triangle Field

LACEY_01 in the Triangle Field on a saline meadow ecological site. Saltgrass on the site has shown a strong upward trend in 2019. Trends for all other species remains relatively stable.

LACEY_02 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site. This site is in decline with a general trend of significant decreases in saltgrass, Baltic rush, and beardless wildrye. The site is situated along cutoff oxbows which on above average years are inundated.

LACEY_04 is on a Torrifluvents 0-2% slopes, saline meadow ecological site. The site is off the floodplain and not directly affected by flow levels on the river. There were no significant changes in 2016 compared to 2013 but there is a general downward trend for the site. Results in 2019 indicate a significant increase in alkali sacaton.

LACEY_06 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site. Saltgrass declined on the site when compared to 2013 but is still inside historic parameters from sampling events in 2007, 2009, 2013, and 2016. In 2019 trends remained unchanged compared to 2016.

LACEY_07 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site. The site showed a positive increase in trend for all perennial graminoids.

Laws Holding Riparian Field

LACEY_08 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site. Because of inaccessibility resulting from high flows the transect was not read in 2019.

Laws Holding Field

LACEY_03 is on a Torrifluvents 0-2% slopes, saline meadow ecological site, situated in the Laws Holding Field. Up until 2019, the site pointed towards a drying trend with an increase in saltgrass and a steady drop in the more mesic beardless wildrye. However, in 2019 beardless wildrye frequency increased to its highest observed level in 2019.

LACEY_05 is on a Torrifluvents-Fluvaquentic Endoaquolls complex, 0-2% slopes, moist flood plain ecological site. The site has shown a significant decline in beardless wildrye and alkali sacaton. In 2019 results were slightly upward compared to 2016.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Two stockwater wells were drilled in 2011 in the Laws area. One supplies water for the Holding Field. The second well, situated just north of the Lower McNally Canal supplies water for the northern portion of the lease.

Fencing

Fencing along the east and west side of the Multi-completion Field on the Five Bridges Parcel were rebuilt, and a new northern section was constructed following the Pleasant Fire.

Salt and Supplement Sites

Portable liquid supplement stations are used during the winter. These stations are placed in designated areas outside the riparian corridor and are periodically moved.

Four J Cattle Ranch Lease (RLI-491, RLI-499)

The 4-J Ranch Lease consists of two different ranches. The Big Pine Ranch (RLI-491) contains approximately 10,993 acres, and is located near the community of Big Pine. The Laws Ranch (RLI-499) contains approximately 1,197 acres and lies north of Laws, between U.S. Highway 6 and the Upper McNally Canal. The Big Pine Lease (RLI-491) is comprised of the Baker Creek area near Big Pine and the Twin Lakes area near Blackrock. The majority of the mature breeding cattle graze in the Owens Valley in winter and summer in Long Valley. However, there are small herds that graze the Laws Ranch and Baker Creek Ranch periodically throughout the year. Cattle that graze on the Long Valley and Baker Creek leases also utilize adjacent federal grazing allotments.

The Big Pine portion of the lease consists of irrigated pastures with the surrounding fields being a mix of native alkali sacaton meadows and dry uplands. Cattle typically graze from late October to early May. The duration of grazing may vary from year to year dependent upon forage conditions in Long Valley. During the grazing season cattle are moved using the best pasture rotation strategy.

The Laws Ranch consists entirely of irrigated pastures. Cattle graze the ranch on a year round basis under various stocking rates that are dependent upon available forage.

Utilization

All grazing on the lease occurs on irrigated pastures or federal grazing allotments. Irrigated pastures are not subject to utilization monitoring. The Twin Lakes portion of the lease is part of the LORP which will be discussed later in this report.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80% except for the Fish Springs Pasture (78%). The low score was mainly due to weed invasion. The lessee is working on controlling weeds.

Stockwater Sites

All stockwater is provided by irrigation diversions, the Big Pine Canal, Baker Creek, and Big Pine Creek for RLI-491. Laws RLI-499 is supplied by Silver Canyon or the Upper McNally Canal or troughs.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay and liquid supplement are used during the winter.

Independence Ranch Lease (RLI-416, 454, 455)

The Independence Lease (9,619 acres) consists three leases in Inyo county; one in Big Pine and two in the Independence area. The Big Pine lease (4,630 acres) consists of seven irrigated pastures and a large upland/riparian pasture. The Independence Lease consists of the Springfield's Parcel and the Shepherds Creek Parcel. The Springfield's Parcel (4,674 acres) consists of 13 pastures (plus a county landfill, several revegetation sites, and livestock corrals) east of U.S. Highway 395 and west of the Los Angeles Aqueduct near the town of Independence. The Shepherds Creek Parcel (315 acres) is an irrigated alfalfa field and hay yard west of U.S. Highway 395 and north of the Manzanar National Monument.

Utilization

Utilization has increased in the South River Field mainly due to a change in management in 2010. The utilization increased under the new lessee and was over utilized for several years. Since 2010, the lessee has been working with Watershed Resources staff to decrease utilization. More frequent pasture rotation along with

changing the timing of the grazing has resulted in 2019 utilization in the South River Field of 36%. Utilization in 2017/18 on the Manzanar Field (Ind_65) exceeded 65% with a total use of 79% for the upland transect. The lessee opted to not stock the pasture and let the area rest during the 2018/19 grazing season.

Range Trend

Range trend transects were monitored in 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by irrigation diversions or the Owens River.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cake blocks that contain trace minerals and protein are distributed for supplement on the lease.

Rockin DM Ranch Lease (RLI-420)

The 110-acre Rockin DM Ranch Lease west of Big Pine is a cow/calf operation. The ranch is located on the south side of the Baker Creek Road and contains one irrigated pasture and two dry grazing fields.

Utilization

All pastures on the lease are either irrigated or dry grazing. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by irrigation diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cake blocks that contain trace minerals and protein are distributed for supplement on the lease.

Baker Road Ranch Lease (RLI-475)

The Baker Road Ranch Lease is managed in conjunction with the lessee's other LADWP ranch leases in the LORP project area. The lease grazes horses and mules that are used in a commercial packer operation. The Baker Road Ranch Lease (391 acres) is comprised of nine irrigated pastures and two mountain meadows. The Fuller and Saulk mountain meadow portions of the lease are located at the base of Kid and Birch Mountains and are naturally irrigated by annual spring flows. These meadows are also grazed by pack stock during the summer.

The 185-acre Intake Pasture lies to the west of the Owens River and the LAA at the Intake. The 104-acre Big Meadow Pasture lies to the east of the Owens River, north of the Intake and east of the LAA below the Intake. These areas are inside the LORP project area.

Utilization

Utilization on the Intake portion (LORP) of the Baker Road Ranch has been well below the allowable riparian utilization standard of 40%. There are no management changes planned the lease.

Range Trend

Because of the small area of meadow on the Intake Pasture the initial range trend transect had been decommissioned. If conditions decline on the site the transect monitoring will resume.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater

Stockwater is provided by irrigation diversions, springs and the Owens River.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement

No salt supplements are used by the lessee.

Aberdeen Pack Lease (RLI-479)

The Aberdeen Lease is used to graze horses and mules used in a commercial packer operation. The lease (3,081 acres) is made up of the Hines Spring and Haystack Parcels. The Bairs Parcel is a use permit and is managed in conjunction with this ranch lease. The Hines Spring Parcel includes the area from the Blackrock Fish Hatchery north to Hines Spring. This is an upland area and utilization is set at 65% for all fields. There are three fields in this portion of the lease. The Haystack Parcel borders the east side of the town of Independence. The Independence sewer treatment facilities border the northeast corner of the parcel. The lessee uses the parcel to raise alfalfa and graze pack stock. There are 16 pastures and operating structures in the lease.

Utilization

Utilization on the Aberdeen lease has been maintained at an allowable level since 2007.

Range Trend

Range trend transects were not monitored on the lease in 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019. The North (78%), Middle (78%), and South (74%) were below the irrigated pasture standard of 80%. The pastures were below the standard due to summer grazing and weeds. The lessee is making management changes to improve pasture in 2020.

Stockwater Sites

Since the implementation of the Hines Spring Well 355 Mitigation Project in 2012 stock no longer water at Aberdeen Ditch.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Pack stock is supplemented with hay and trace mineral blocks if needed by the lessee.

Coloseum Ranch Lease (RLI-407)

The Coloseum Ranch Lease lies West of Lone Pine in the Alabama hills, and south of the Blackrock Fish Hatchery and Eight Mile Ranch on the west and the east side of U.S. Highway 395. The ranch grazes horses on the Lone Pine portion of the lease (Movie Field) and cattle on the Blackrock portion of the lease (South East Field). Cattle graze the South East Field in the fall, winter and summer on federal grazing allotments.

Utilization

Utilization on the Coloseum Lease has been below the allowable standard of 65% for the past eight years.

Range Trend

Range trend transects were not monitored in 2019.

Irrigated Pastures

There are no irrigated pastures on the Coloseum Ranch Lease.

Stockwater Sites

Stockwater is provided by a diversion coming off Sawmill Creek.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay is fed during the winter, no other supplements are used.

Three Corner Round Lease (RLI-464)

The Three-Corner-Round Ranch Lease (1,792 acres) is east of Aberdeen, between new and old U.S. Highway 395, and is leased to the Three-Corner-Round Pack Outfit. The ranch grazes burros that are used during the summer months for youth camp and pack trips in the Sierra Nevada Mountains. The fields are upland vegetation.

Utilization

There are no utilization transects for this lease due the composition of the vegetation. There are no perennial grasses and the bulk of the vegetation is made up of sagebrush, Nevada Saltbush, and annuals. The burros forage on the shrubs and annuals when available in the Spring. If needed they are supplemented with hay during the winter. The lease was evaluated in 2016 and was found to be in good condition with current stocking rates.

Range Trend

There are no range trend transects on the lease. Grazing pressure is relatively low and the xeric plant communities appear to be in good condition. If a decline from current conditions is observed then a range trend monitoring program for the lease will be initiated.

Irrigated Pastures

There are no irrigated pastures on the lease.

Stockwater Sites

Stockwater is provided from well V108 and Goodale Creek

Salt and Supplement Sites

Hay is fed throughout the year, no other supplements are used.

Fencing

No new fencing projects occurred on the lease in 2019.

Eight Mile Ranch Lease (RLI-408)

The 770-acre Eight-Mile Lease is operated as a commercial packer operation and uses the ranch to graze pack stock during winter and grow alfalfa hay during the summer. The lease is located south of Aberdeen, bordered on the east by U.S. Highway 395. Horses and mules graze the hay stubble in the fall and winter, if precipitation allows spring grazing will occur on the upland portions of the lease. The lease includes an alfalfa field, a small partially irrigated field (Tree Lot), two small fields (Yearling and Feed Lot) and six large fields (Upper North, Lower North, West, Upper South, Lower South and Willow Fields) that are not irrigated. A corral and a stockyard complete the lease.

Utilization

There are no utilization data for the upland fields on the lease as they are recovering from the 2007 Inyo Complex fire. The South Field was partially burned. Utilization transects have been established in this field, which has perennial grass components and monitoring is planned once grazing resumes.

Range Trend

There are no range trend transects on the lease. Grazing pressure is relatively low the xeric plant communities appear to be in good condition. If a decline from current conditions is observed then a range trend monitoring program for the lease will be initiated.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement

When necessary, hay is provided to livestock during the winter months.

Fort Independence Ranch Lease (RLI-406,489)

The Fort Independence Lease includes 3,849 acres covered by RLI-406, and 1526 acres covered by RLI-489. The Fort Independence Lease is managed in conjunction with the Islands (north of Lone Pine); Delta (south of Lone Pine); Georges Creek (northwest of Lone Pine); Archie Adjunct (south of Owens Lake); and Lubkin Adjunct (south of Lone Pine) grazing leases. The livestock program is a commercial cow/calf operation.

Utilization

The Fort Independence lease is comprised entirely of irrigated pastures. Irrigated pastures are not subject to utilization monitoring.

Range Trend

The Fort Independence lease is comprised entirely of irrigated pastures. Irrigated pastures are not subject to range trend monitoring.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by irrigation ditches and diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Mineral tubs or cake blocks are used to supplement feed in designated areas.

Georges Creek Parcel (RLI-489)

The Georges Creek Parcel (4,000 acres) is a cow/calf operation in conjunction with a surrounding BLM grazing allotment. This parcel borders BLM land to the west, U.S. Highway 395 to the east, the Moffat Ranch to the south, and the Shepherd Creek alfalfa field to the north. The parcel is presently managed as four pastures.

The Georges Creek parcel is managed in conjunction with the Fort Independence Lease, the Islands (north of Lone Pine); Delta (south of Lone Pine); Archie Adjunct (south of Owens Lake); and Lubkin Adjunct (south of Lone Pine) grazing leases. The livestock program is a commercial cow/calf operation.

Georges Pastures #1 and #2 are irrigated and the perimeters are fenced. The North Field, north and west of Manzanar, is not fenced separate from BLM lands. This pasture is grazed with the adjacent BLM grazing allotment and has no utilization transects in it. The South Field is located between Moffat Ranch and Georges Creek irrigated pastures. It also borders BLM land and has no fences, so it is managed the same as the North Field. The only portion of the parcel presently fenced is the irrigated pasture in the center western edge of the parcel. A small corral near Georges Creek along the west boundary of the parcel is used to work cattle.

Utilization

Utilization on the Georges Creek Parcel has been within the upland standard of 65%. Grazing has been moderate to light for the past eight years.

Range Trend

Range trend transects have not been monitored since 2014 because of the relatively static trends in the past and minimal use by livestock.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by Georges Creek, irrigation ditches and diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Mineral tubs and cake blocks are used to supplement cattle in designated areas.

Lone Pine Dairy Lease (RLI-452)

The Lone Pine Dairy Lease (80 acres) is south of Lone Pine, north of the Lone Pine Golf Course, and west of U.S. Highway 395. The Lone Pine Dairy Lease grazes stocker steers and heifer pairs.

Utilization

The lease is comprised entirely of irrigated pastures. Irrigated pastures are not subject to utilization monitoring.

Range Trend

The lease is comprised entirely of irrigated pastures. Irrigated pastures are not subject to range trend monitoring.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by irrigation diversion and water troughs.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

All salt and supplemental feeding is in designated areas away from any riparian areas.

Mount Whitney Pack Lease (RLI-495)

The Mount Whitney Ranch (626 acres) consists of the Diaz Parcel (146 acres), south of Diaz Lake and Lone Pine; and the Tuttle Parcel (480 acres), west of Lone Pine, and is periodically used for horses/mules.

Utilization

The Tuttle Field is rarely grazed. Most use typically occurs from wildlife. Monitoring will continue regardless of grazing frequency. Utilization in 2019 was again below the standard 65%.

Range Trend

Range trend transects were not scheduled for monitoring in 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

There were no stockwater sites implemented on the Mount Whitney Lease. Stockwater is provided by the irrigation ditches and diversions.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

All salt and supplemental feeding is in designated areas.

Horseshoe Ranch Lease (RLI-480)

The 2,966-acre Horseshoe Grazing Lease (RLI-480) is comprised of the Lake and Cottonwood Parcels. The Cottonwood Parcel, located on the Kern Plateau at 10,000 feet elevation, is being grazed under USDA Forest Service grazing prescriptions. The lower elevation Lake Parcel borders the southwest side of Owens Lake.

Lake Parcel

The Lake Parcel includes a portion of what was once the Owens lakebed and later the shoreline of Owens Lake. The 1,956-acre parcel lies west and east of U.S. Highway 395, about 24 miles south of Lone Pine near lower Cottonwood Creek. Some of the lease lies west of U.S. Highway 395 (West Field), while most of the forage lies east of U.S. Highway 395, in the East Field. Only very dry vegetation types (i.e., Creosote bush) survive on the west side. The eastern part of the lease lies along a remnant wind wave-formed shoreline of Owens Lake.

The majority of the livestock forage occurs along a north-south running fault that forces underground water to the surface along an old lakeshore contour. Springs emerge from

the fault forming open water ponds, marshes, and wet and dry meadows. The springs all drain eastward and disappear in the "old" lakebed.

Utilization is not measured on this portion of the lease due to species composition of the vegetation around the spring. Annual monitoring of seeps and springs is conducted.

Cottonwood Parcel

The Cottonwood Parcel lies in high elevation hills with topography heavily modified by snow and ice during past glacial periods. These rolling hills enclose grassy, high elevation meadows. A Forest Service trailhead and camping area borders the parcel on the north and serves as a "jump-off" point for recreationists to the Golden Trout Wilderness. City lands, totaling 1,010 acres, abut the south end of the trailhead parking and camping area. City lands are scattered in separate sub-parcels surrounded by Forest Service lands. These sub-parcels lie in and around Horseshoe Meadows, two parcels are in or around Round Valley Meadows, and the last and largest sub-parcel is in Last Chance Meadow, with Cottonwood Creek flowing through it. The Last Chance Meadow area is classified as a "Research Natural Area." All LADWP meadows being grazed in this parcel are approximately 10,000 feet in elevation.

Horseshoe and Round Valley Creeks flow through City lands and merge downstream with Cottonwood Creek. The Golden Trout Wilderness surrounds City lands.

Since these parcels are surrounded by the national forest and there are no fences, the parcels are managed under federal grazing guidelines.

Utilization

Utilization standards fall under USFS management guidelines.

Range Trend

Vegetation monitoring is conducted by the USFS.

Irrigated Pastures

There are no irrigated pastures on the Cottonwood Parcel. Naturally irrigated meadows are managed by the USFS.

Stockwater Sites

Stockwater is provided by riparian streams and springs.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

All salt and supplemental feeding is in designated areas.

Archie Adjunct (RLI-490)

The Archie Adjunct Lease comprises about 627 acres and is managed in conjunction with the LADWP leases at Islands, Delta, Georges Creek, Fort Independence, and Lubkin, as well as the lessees' private land. The Archie Adjunct Lease is located just north of Olancha, lying on both sides of U.S. Highway 395 and south of the Crystal Geyser Bottling Plant. The lease borders the Homeplace Lease to the south and BLM land to the west and north. The lease is divided into one pasture, two fields, a corral, and holding pen. The Archie Pasture east of U.S. Highway 395 is irrigated exclusively from Cartago Creek through a water delivery pipeline. A 17-acre marsh along the east side of the Archie Pasture has formed in response to irrigation run-off.

In 1989, mudslides covered large parts of the North Field and eliminated large forage areas. The North Field is used in the Spring to hold livestock prior to going to a Forest Service grazing allotment for summer grazing and again in the fall when they return from the Forest Service grazing allotment.

Utilization

The Archie Adjunct is comprised primarily of irrigated pastures and dry grazing. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

There are no new stockwater sites planned for the lease.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Supplement cake tubs are used in designated sites.

Olancha Creek Adjunct (RLI-427)

The Olancha Creek Adjunct Lease (RLI–427) is managed in conjunction with the Lone Pine Lease (RLI–456) in the Lower Owens River area. The lessee manages the Olancha Creek Adjunct Lease in combination with the Ash Creek BLM allotment located

between Cartago and Lone Pine, and the Monache Meadows Forest Service allotment in the southern Sierras.

The lease has been used as a staging area for cattle coming to and from the Lower Owens River area on their way to graze Forest Service lands in the southern Sierras. The lessee typically sends cows with calves to the Forest Service's Monache Meadows on July 1 and grazes this allotment until about October 1. Animals are taken to the Lone Pine area for the winter.

The lease lies in Olancha and is bisected by U.S. Highway 395. Saltgrass-sacaton meadow, irrigated pasture, and semi-desert shrub vegetation types are prominent. The lease shares a common boundary with the Homeplace Lease to the north. The Olancha Creek Adjunct Lease is made up of seven fields and pastures (269 acres).

There are 56 acres on the lease irrigated with water diverted from Olancha Creek. Both Olancha Creek and the diversion ditch need frequent cleaning to allow sufficient water to reach irrigated lands. The irrigated pastures are used to grow livestock forage. No grass hay or alfalfa hay is produced on the lease. All four Esta fields and most of the two Oesta Fields are irrigated. The West Field, east of the Olancha Creek Diversion Ditch, is abandoned agricultural land that is not grazed except for two days in October and one day in the Spring for weed control. The West Field, west of the diversion ditch, is semi-desert shrubland.

Utilization

The majority of the lease is comprised primarily of irrigated pastures and dry grazing. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80% except Oesta 1(76%). This was due to high runoff in the Spring of 2019 that washed sand all over the field and covered up the pasture and rabbit brush encroachment. The rabbitbrush was mowed during the fall of 2019 and grasses are colonizing the sanded areas.

Stockwater Sites

Stockwater is provided by irrigation ditches and troughs located in the pastures.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cake mineral and protein tubs are put out during the winter. Supplement tubs are rotated through the pastures to minimize impacts across all supplement areas.

Homeplace Adjunct (RLI-428)

The Homeplace Adjunct Lease is located just north of Olancha, between the Olancha Creek Lease to the south and the Archie Lease to the north. The lease consists of 14 pastures and fields. The lease is bisected by U.S. Highway 395. Two small fields (Little Bull and South Fields) are west of the highway. About a third of the lease is irrigated grass pasture (207 acres) east of the highway. No irrigated grass hay or alfalfa hay is harvested on the lease.

The Homeplace Adjunct Lease (644 acres) is managed as part of the 32,641-acre Blackrock Lease (RLI-428). The lease is managed by Mark Lacey and John Lacey, in combination with their Blackrock Lease in the Lower Owens River area. The Homeplace Adjunct Lease was a pivotal part of the Lacey grazing operation in the past. Historically, the lease was used as a holding area for cattle herds going to and from Forest Service lands in the southern Sierras. During this holding period, the lease was nearly vacant of livestock most of the summer and fall (a 90-day period) when the herd was on Forest Service lands. The lessees sold their Forest Service permits and cattle must now either remain on the Homeplace Adjunct Lease year-round or go to another grazing property.

The lease is mainly grazed as a cow-calf operation. Olancha Creek provides irrigation and stockwater. LADWP Well 404 supplies supplemental irrigation and stockwater water when Olancha Creek flows decrease.

Livestock are fed supplements when needed. Supplemental feeding sites are rotated around the pastures to reduce trampling effects. Feeding sites are mainly on the more alkali portions of the pastures where less grass is produced. One hired person manages the grazing and irrigation on the lease year-round.

Pastures and fields are flood irrigated from April 1 to October 1 to increase livestock forage production. Most pastures are also sub-irrigated by the elevated water table resulting from irrigation. Because Gus Walker Creek recently washed out and changed channels, the stream no longer delivers water to the lease. Olancha Creek, in combination with well water, delivers water year-round for livestock. All irrigated pastures have ditches to carry the necessary livestock drinking water. Water troughs are present in all pastures that are supplemented by irrigation water. All pastures and fields are completely fenced. The lessees maintain all exterior and interior fences, which are in good to fair condition.

A proposed California Department of Transportation plan for the reconstruction and widening of U.S. Highway 395 could take the eastern side of this lease for construction of a new roadway. Most of the land identified for the proposed roadway is now irrigated pasture. The grazing plan assumes that highway relocation will not take place and there will be no infringement on the lease. If, in the future, the highway construction project takes part of the lease the plan will be modified. Cattle numbers, grazing duration, and timing will all need to be adjusted to match the lesser amount of forage available on the remaining grazing lands.

Utilization

The majority of the lease is comprised primarily of irrigated pastures with limited dry grazing. Irrigated pastures are not subject to utilization monitoring. Dry grazing fields within this lease do not have sufficient forage to warrant utilization monitoring.

Range Trend

Range trend monitoring is not appropriate for this lease.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by irrigation ditches and troughs located in the pastures.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Supplement is comprised of hay and liquid molasses. Feeding locations are designated each year.

Blackrock Lease (RLI-428)

The Blackrock Lease is a cow/calf operation consisting of 32,641 acres divided into 26 management units or pastures. Blackrock is the largest LADWP grazing lease within the LORP area. The pastures/leases on the Blackrock Lease provide eight months of Fall through Spring grazing, which can begin any time after 60 continuous days of rest. A normal grazing season begins in early to mid-October and ends in mid-May or June.

There are 26 pastures/fields on the Blackrock Lakes lease within the LORP boundary. Twelve of these pastures are monitored using range trend and utilization. The other 14

pastures are holding pastures for cattle processing or parts of the actual operating facilities.

Utilization

The Blackrock Lease has shown a steady decline in utilization in riparian pastures since 2007. This has been due to the implementation of the Lower Owens River Project (LORP). Since the beginning of the project there has been a need to add or drop transects in the riparian pastures due to flooding. If current management of the LORP continues there will likely be a substantial loss of meadow habitat to wetlands. This will reduce viable grazing areas from the Blackrock lease portion of the LORP. It will also continue to hinder the establishment of woody recruitment.

Range Trend

Range Trend transects were read on the Blackrock lease in 2019. Above average valley floor precipitation in the winter and Spring of 2019 led to a marked increase in Bassia (BAHY), particularly on Saline Meadow sites. Aside from the predictable increase in Bassia (BAHY), most changes were positive on the transects.

White Meadow Riparian Field

BLKROC_10 is located in the White Meadow Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The transect is located within the historical dry reach of the river. Because livestock cannot access the area no utilization estimates occur at this location. An increase in Nevada saltbush and bassia frequency outside baseline parameters were detected during the monitoring year 2009 but in 2010 frequency for both species decreased. Nevada saltbush continues to have a high frequency when compared to 2002-2007, which coincided with the pre-watering years. As waters rise, saturating the soil profile along the floodplain, Nevada saltbush has responded with only 2.8 m of canopy cover in 2003 to 59.7 m of cover in 2010 and is now beginning to decline again because of excess water (13.4m in 2019). Nevada saltbush density has also declined. The site has begun to show an increase in beardless wildrye (LETR) and saltgrass while alkali sacaton has remained stable as well as the perennial forb, mallow (MALE3). Bassia frequency increased to the highest level seen on the site in 2019, responding to record valley floor precipitation. Fire would not improve the site, because of the negligible perennial grass component in the area.

BLKROC_11 is located in a riparian management area in the White Meadow Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Trends were static in 2016. The transect is located within the historical dry reach of the river. Inkweed, Nevada saltbush, and bassia frequency increased in 2009 and have subsequently stabilized with the exception of inkweed which did decrease in 2010 but remained within levels typically seen for the site. Perennial grass frequency have remained stable during the

last 14 years until 2019 where saltgrass decreased to levels seen in 2016. Nevada saltbush remains higher than pre-implementation of LORP flows.

BLKROC_25 is located in a riparian management area in the White Meadow Riparian Field. The transect is situated inside a grazing exclosure and runs perpendicular to BLKROC_11 with the key difference between the two sites being the area has not been grazed since 2010. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The transect is located within the historical dry reach of the river. Frequency remains static and Nevada saltbush cover increased dramatically in 2016 from 9% to 24% cover and continued to rise in 2019. Bassia increased significantly while saltgrass remains in a downward trend.

BLKROC_14 is located within the historical dry reach of the Owens River in the White Meadow Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is in poor condition when compared to its corresponding ecological site description. Nevada saltbush significantly increased in 2009 and saltgrass significantly decreased to 0 in 2009 and remained so in 2010, in 2013 saltgrass frequency began to increase again and continued in 2016 but has remained at similar levels in 2019. Nevada saltbush is increasing on the site with canopy cover increasing from 8.8 m to 31.3 m and then dropping to 22m in 2019. These increases are likely a result from rewatering this portion of the Owens River. With the permanently raised water table, shrub cover declined after 2014 and continued to decline in 2015 and 2016. In 2010, frequency for bassia was at its highest recorded on the site since 2004 (prior to the 2008 burn) but has subsequently dropped until 2019 where levels were the highest seen on the site. Utilization was not sampled on this transect due to the lack of measurable forage.

White Meadow Field

BLKROC_01 is located on an upland site in the White Meadow Field. The soils are mapped as the Division-Numu Complex, 0-2% slopes soil series, which corresponds to a Saline Meadow ecological site. Herbaceous production for the site is much lower than potential, while shrub production is much higher than typical for a Saline Meadow site at its potential. In 1968-69, this entire area was scraped to store runoff. This type of activity significantly altered the area's ability to resemble a Saline Meadow in high ecological condition. Frequency trend was static in 2016 when compared to baseline years. In 2019the site saw an increase in nearly all plant frequencies.

BLKROC_39 is located on an upland site in the White Meadow Field. The soils are Division-Numu Complex, 0 to 2% slopes, which corresponds to the Saline Meadow ecological site. Production is far less than typical for a Saline Bottom site. The site was scraped during the wet winter of 1968-69. The loss of the "A horizon" during this period has likely contributed to the poor productivity of the site. However in 2019 saltgrass significantly increased, likely in response to water spreading during the 2017 run off year.

Reservation Field

BLKROC_02 is located in the Reservation Field, which is designated as an upland pasture. The soils are mapped as Manzanar-Winnedumah Association, 0-2% slopes soil series, which corresponds to the Saline Meadow ecological site. The similarity index has varied widely during the baseline period ranging between 28-55%, largely because of fluctuations in alkali sacaton production. The site is dominated by shrubs and may not be able to reach site potential unless shrub densities are reduced. There was no significant change in frequency in 2019. The general trend for the area is static. Cover has remained static since 2003.

BLKROC_03 is located in the Reservation Field on the Shondow Loam 0-2% slopes soil series. The transect is on a Saline Meadow ecological site in an upland pasture. The area in good to excellent condition with regards to its similarity to reference sites for Saline Meadows. The site produces large quantities of alkali sacaton. Frequency results indicate the site has been relatively stable over the past six monitoring periods with the exception of an increase in rubber rabbitbrush cover.

BLKROC_51 is located in an upland site in the Reservation Field. The soils are Winnedumah Silt Loam, 0-2% slopes, which corresponds to the Sodic Fan ecological site. The site has a higher grass component and lower shrub component than expected for Sodic Fan site.

Reservation Riparian Field

BLKROC_15 is in a riparian management area, located in the Reservation Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is located on the historical ‘dry reach’ of the Owens and has only begun to show signs of recovery since the return of flows in December 2006 with a significant upsurge in saltgrass. Saltgrass declined again in 2019. The similarity index is poor for the site. Tamarisk slash was burned at the site in the winter months of 2008 and subsequently invaded by bassia in 2010 with frequency at its highest seen on the site. There is a disappearance of all annual forbs that is a result of the increased canopy cover of Nevada saltbush and bassia. Shrub cover has more than doubled on the site in 2013, declined in 2016 and has increased again in 2019.

BLKROC_17 is located in a riparian management area on the Reservation Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Similar to other sites on the historical ‘dry reach’ of the Owens River, BLKROC_17 has not begun to respond to returned river flows. The site is shrub dominated (Nevada saltbush) with little to no perennial grass component. Canopy cover of Nevada saltbush increased substantially in 2010 and decreased slightly in 2013 and continued to decrease in 2016 but has since increased in 2019.

Robinson Field

BLKROC_04 is located on an upland site within the Robinson Pasture. The soil series is Manzanar Silt Loam, 0-2% slopes and is a Saline Meadow ecological site. The site has shown a decline in grass species and an increase in shrub cover.

North Riparian Field

BLKROC_22 is located in a riparian management area in the North Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. Saltgrass has declined dramatically on the site and bassia increased substantially. The site was burned in 2018.

South Riparian Field

BLKROC_13 is in a riparian management area located in the South Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is in excellent condition as it related to reference sites for moist floodplain ecological sites. The relative abundance of creeping wildrye when compared to the total plant community is still minor with cover for the grass ranging from trace to 4%. Shrub cover is steadily increasing on the meadow. The site was static in 2019.

BLKROC_23 is in a riparian management area located in the South Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is in excellent condition with a minimal shrub component. Frequency values have not varied significantly over the seven sampling periods. The site was burned in 2018 and appears to be static in 2019.

Russell Field

BLKROC_05 is located on an upland site in the Russell Field. The soil series is Manzanar Silt Loam, 0-2% slopes. The site is a Saline Meadow ecological site. The site is in excellent condition. Frequency results appear static.

Wrinkle Field

BLKROC_07 is located on an upland site in the Wrinkle Field. The soil series is Manzanar Silt Loam, 0-2% slopes and is a Saline Meadow ecological site. The site is in excellent condition. Frequency values remain static. Shrub cover and density appear to be stable on the site.

Locust Field

BLKROC_06 is located on an upland site in the Locust Field. The soil series is Manzanar Silt Loam, 0-2% slopes and the ecological site is a Saline Meadow. The site is in excellent condition. Frequency values have remained static.

Wrinkle Riparian Field

BLKROC_18 is a riparian management area located in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site was static in 2019.

BLKROC_19 is located in a riparian management area in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is in good condition as it relates to the corresponding ecological site. Plant frequencies are static.

BLKROC_20 is located in the Wrinkle Riparian Field. The soils are Torrifluvents-Fluvaquentic Endoaquolls Complex, 0-2% slopes, which corresponds to the Moist Floodplain ecological site. The site is in good condition. Creeping wildrye continued to increase beyond baseline parameters in 2010 but then dropped significantly in 2013 and then increased in 2016 and significantly increased again in 2019. Nevada saltbush cover and density have steadily increased since 2005 until 2013 where a decrease in cover occurred but subsequently risen in 2016. In 2018 shrub cover was reduced to 0 as a result of the Moffat Fire.

Horse Holding Field

BLKROC_09 is located on an upland site in the Horse Holding Field, on the Winnedumah Fine Sandy Loam 0-2% slopes soil unit. The transect is located on a Sodic Fan ecological site, and was in good condition during the baseline period. Trends remain static in 2019 with the exception of an increase in Nevada saltbush.

Irrigated Pastures

There is a small portion of irrigated acreage on the Blackrock lease. It is surrounded by upland vegetation and is not monitored.

Stockwater Sites

All the wells for the Blackrock lease had been drilled and fitted for solar pumps and necessary plumbing for the troughs. However, the north of Mazourka stockwater well was drilled on BLM property and is going to be removed and a new stockwater well will be drilled south of the current location. The lessee will be responsible for water trough installation. There are also three other stockwater sites that have been developed as part of the 1997 MOU, which required additional mitigation (1600 Acre-Foot Mitigation Projects). The North of Mazourka Canyon Road Project will provide stockwater in the

Reservation Field and the Well 368 and Homestead Projects will provide stockwater in the Little Robinson Field and East Robinson Field.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Many of the supplement sites located on the Blackrock Lease have been in place for many years and are located in upland management areas. Some of these sites have been moved in order to adapt to the installation of new fencing. These new locations were selected as to better distribute cattle within the newly created riparian pastures.

Twin Lakes Lease (RLI-491)

The Twin Lakes Lease is a 4,971-acre cow/calf operation situated just south of the Los Angeles Aqueduct Intake. It includes a reach of the Owens River that lies mainly north of Twin Lakes, which is located at the southern end of the Twin Lakes Lease. Of the 4,971 acres, approximately 4,200 acres are used as pastures for grazing; the other 771 acres are comprised of riparian/wetland habitats and open water. In all but dry years, cattle usually graze the lease from late October or early November to mid-May.

There are four pastures on the Twin Lakes Lease within the LORP boundary: Lower Blackrock Riparian Field, Upper Blackrock Field, Lower Blackrock Field, and the Holding Field. The Lower Blackrock Riparian, Upper Blackrock Riparian, and Lower Blackrock Fields contain both upland and riparian vegetation. The Holding Field contains only upland vegetation. There are no irrigated pastures on the Twin Lakes Lease. Range trend and utilization transects exist in all fields except the Holding Field.

Utilization

Utilization in the Lower Blackrock Riparian (1%) and Upper Blackrock Field (31%) was below the allowable utilization for the grazing season.

Range Trend

Range trend transects were not monitored in 2019.

Irrigated Pasture

There are no irrigated pastures on the Twin Lakes Lease.

Stockwater Sites

Livestock access water from the Owens River, Blackrock Ditch, Twin Lakes, Drew Slough and several springs present on the lease.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Supplement is composed of a liquid mix that is put in large tubs with rollers for cattle consumption. These tubs are placed in established supplement sites and are used annually.

Intake Lease (RLI-475)

The Intake Lease is a commercial packer operation used to graze horses and mules. The lease is comprised of three fields: Intake, Big Meadow Field, and East Field (289 acres). The Intake Field contains riparian vegetation and an associate range trend transect. The Big Meadow Field contains upland and riparian vegetation. There are no utilization or range trend transects in the Big Meadow Field due to a lack of adequate areas to place a transect that would meet the proper range trend/utilization criteria. Much of the meadow in the Big Meadow Field has been covered with dredged material from the LORP Intake. The East Field consists of upland and riparian vegetation. There are no irrigated pastures on the Intake Lease.

Utilization

Utilization on the Intake Lease was well below the allowable 40% utilization standard.

Range Trend

LADWP no longer monitors range trend transects on this lease because of the small size of the riparian area. The area receives an ocular evaluation annually.

Irrigated Pastures

There are no irrigated pastures on the Intake Lease.

Stockwater Sites

Livestock access water from the Owens River.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Hay is occasionally provided to horses and mules during the winter.

Thibaut Lease (RLI-430)

The 5,259-acre Thibaut Lease is utilized by three lessees for wintering pack stock. Historically, the lease was grazed as one large pasture by mules and horses. Since the implementation of the LORP and installation of new fencing, four different management areas have been created on the lease. These areas are the Blackrock Waterfowl Management Area, Rare Plant Management Area, Thibaut Field, and the Thibaut Riparian Exclosure. Management differs among these areas. The Riparian Exclosure which was excluded from grazing for 11 years is now accessible to livestock beginning in 2018/19.

Utilization

Utilization on the Thibaut Lease remained below the upland standard of 65% in 2018/19.

Range Trend

Range trend transects were not scheduled for monitoring in 2019.

Irrigated Pasture

Irrigated pastures were monitored in 2019, the Thibaut (72%) was below the irrigated pasture standard of 80%. This was due to spot grazing, weeds, and grazing during the growing season.

Stockwater Sites

Livestock access water from the Owens River, livestock wells, and stockwater ditches.

Fencing

A livestock exclosure was constructed in the Thibaut riparian pasture in 2018.

Salt and Supplement Sites

Hay is provided to horses and mules during the winter.

Islands Lease (RLI-489)

The Islands Lease is an 14,981-acre cow/calf operation divided into 11 pastures. In some portions of the lease, grazing occurs year round with livestock rotated between pastures based on forage conditions. Other portions of the lease are grazed October through May. The Islands Lease is managed in conjunction with the Delta Lease. Cattle from both leases are moved from one lease to the other as needed throughout the grazing season.

Utilization

The Depot Riparian Field and River Field remained below the allowable standard of 40%.

All fields on the lease were in good condition except the large meadow portion of the River Field located southeast of the Alabama Gates. This location had been previously burned by LADWP in an effort to remove perennial shrubs, saltcedar slash, and improve forage production. This burn was successful meeting the previously mentioned goals. Despite the beneficial effects of the burn, the prolonged inundation from flow augmentation, has had a negative effect on this area. A shift in vegetation composition is occurring, accompanied by visually stressed perennial grasses and spreading of aquatic vegetation such as bull rush, that thrive in flooded and saturated locations. Continued inundation of this area has resulted in the loss of meadow habitat.

Range Trend

Range trend transects were not scheduled for monitoring in 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

There are two stockwater sites located 1-1.5 miles east of the river in the River Field uplands near the old highway. These wells were drilled in 2010 and are now operational. The lessee has yet to install water troughs at the wells.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Site

Cake blocks and molasses tubs that contain trace minerals and protein are distributed for supplement on the lease. The blocks and tubs are dispersed randomly each time and if uneaten they are collected to be used in other areas.

Lone Pine Lease (RLI-456)

The Lone Pine Lease is a 7910-acre cow/calf operation divided into 16 pastures and adjacent to private ranch land. Grazing on the lease occurs from January 1 to March 30 and again in late May to early June. In early June the cattle are moved south to Olancha and then driven to Forest Service Permits in Monache.

Utilization

The Johnson Pasture was lightly utilized at 10%. The River Field utilization was 24%, and grazing was even throughout the field.

Range Trend

Range trend was not monitored in 2019.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

One stockwater well was drilled in the River Pasture uplands approximately two miles east of the river on an existing playa. The lessee had made an effort to install a trough but, the well had a silting problem that plugged the pipes and floats. A new well was drilled in 2018 and is currently awaiting installation of the pad, pump, and storage tank.

Fencing

No ne fence projects occurred on the lease.

Salt and Supplement Sites

All supplement tubs were situated outside of the floodplain.

Delta Lease (RLI-490)

The Delta Lease is a cow/calf operation and consists of 7,004 acres divided into four pastures: Lake Field, Bolin Field, Main Delta Field, and the East Field. The Delta lease is located within the LORP boundary. Grazing typically occurs for 6 months, from mid-November to April. Grazing in the Bolin Field may occur during the growing season. The Delta and Islands Leases are managed as one, in conjunction with state lands leases to the east of the Delta lease.

Grazing utilization is monitored in the Main Delta Field and the Bolin Field which contains the Owens River. The East Field, located on the upland of Owens Lake, supports little in the way of forage and has no stockwater.

Utilization

Utilization in the Main Delta in 2019 was below the 40% limit for riparian pastures. Utilization was well below 65% for the upland, Bolin pasture.

Range Trend

Range Trend transects were read in 2019 on the Delta Lease. Sites responded favorably to the above average winter and spring runoff, with saltgrass significantly increasing on three sites and remaining static on the other two sites.

Irrigated Pastures

Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

The Bolin Field was supposed to receive a stockwater site supplied by the Lone Pine Visitors Centers well in 2010. After a more in-depth analysis of water availability was undertaken, it was ascertained that there was not an adequate amount of water to sustain both uses. To address the issue, stockwater is now being supplied from a diversion that runs from the LAA.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Sites

Cake blocks that contain trace minerals and protein are distributed for supplement on the lease. The blocks are dispersed randomly each time and if uneaten they biodegrade within one grazing season. There are also supplement tubs that are used in established supplement sites.

Brockman Lease (RLI-401)

The Brockman Ranch Lease lies west of Bishop and west of Brockman Lane between West Line Street (to the south) and U.S. Highway 395 (to the north). The Brockman Ranch (182 acres) is a cow/calf operation that produces registered Red Angus cows.

Utilization

The lease consists entirely of irrigated pastures. Irrigated pastures are not subject to utilization monitoring.

Range Trend

All pastures on the lease are irrigated pastures and are not subject to range trend monitoring.

Irrigated Pastures

Irrigated pastures on the Brockman Lease have rated well in the past but with drought conditions and water availability scores have declined. With several good years of precipitation the pastures should recover. Irrigated pastures were monitored in 2019 and all were above the irrigated pasture condition standard of 80%.

Stockwater Sites

Stockwater is provided by irrigation diversions, Bishop Creek, and troughs.

Fencing

No new fencing projects occurred on the lease.

Salt and Supplement Site:

Hay and mineral are supplied for supplementing feeding.

Summary and Conclusion

Overall utilization on all leases was within allowable standards with range conditions stable with little vegetation change. However, continued inundation in the Lower Owens River Project (LORP), especially below Mazourka Canyon road, will continue to aggrade the existing meadows and result in the loss of meadow habitat and riparian forest. This could result in greater grazing pressure on the upland and irrigated portions of the leases in the LORP. All irrigated pastures were evaluated in 2019 analysis of the data showed overall pasture condition to be good with a few pastures on 11 leases that need improvement. These leases were contacted and management changes should improve the pastures in the upcoming years. However the winter of 2019/20 has been below average and this could affect irrigation water delivery on some leases. This could cause increased grazing pressure on all grazing lands managed by LADWP.

Land Management Appendix 1. End of Season Grazing Utilization by Lease and Pasture, 2007-2019

e	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Spring ure	ABERDEEN_30	63%	75%	48%	49%	44%	66%				36%			
	HINES_SPRING_02			44%	27%	45%	20%			11%	30%	19%	39%	14%
	HINES_SPRING_03			44%	1%	33%	20%			9%	41%	28%	43%	7%
Spring ure e		63%	75%	45%	25%	41%	35%			10%	35%	23%	41%	11%
e	ABERDEEN_33	5%	20%	29%	26%	5%	57%			14%	31%	8%	23%	9%
	PIPELINE_02			19%	7%	34%	35%			11%	26%			
	PIPELINE_03			10%	8%	38%	26%			20%	33%	10%	26%	6%
e e		5%	20%	19%	14%	26%	39%			15%	30%	9%	25%	8%
		34%	47%	32%	20%	33%	37%			13%	33%	16%	33%	9%
0	YRIB_03							33%		69%	18%	51%		4%
	YRIB_04			52%	34%	37%	28%	23%	25%	49%	49%	48%	11%	38%
	YRIB_06					10%	46%	30%	4%	40%	10%	0%	28%	0%
0 e				52%	34%	24%	37%	29%	15%	53%	25%	33%	20%	14%
40	YRIB_01			20%	0%		28%	26%	2%	22%	8%	9%	14%	1%
	YRIB_02			59%	69%	0%	10%	9%		26%	24%	79%	40%	0%
	YRIB_05			7%				17%		15%	16%	6%	23%	4%
40 e				29%	35%	0%	19%	17%	2%	21%	16%	31%	26%	1%
				34%	34%	16%	28%	23%	10%	37%	21%	32%	23%	8%
g	BLKROC_09	67%	13%	1%	36%	29%	31%	0%	0%	0%	0%	0%		0%
	HORSEHOLD_02		59%	37%	34%				0%					0%
g e		67%	36%	19%	35%	29%	31%	0%	0%	0%	0%	0%		0%
Field	BLKROC_06	68%	15%	14%	34%	13%	32%	32%	53%	18%	32%	0%	25%	0%
Field e		68%	15%	14%	34%	13%	32%	32%	53%	18%	32%	0%	25%	0%
n	BLKROC_12		67%	6%	16%									
	BLKROC_22	72%	36%	36%	43%	31%	10%		21%	20%	23%	20%	12%	9%
n														

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ation	BLKROC_02	69%	31%		36%		18%	35%	0%	17%	11%	30%	0%	0%
	BLKROC_03	81%	44%	54%	46%	53%	27%	33%	12%	13%	13%	11%	3%	0%
	BLKROC_44	72%	37%	49%	45%		28%	40%	22%	43%	10%	0%	0%	3%
	BLKROC_49	41%	10%	12%	16%	0%	11%	0%	0%	0%	0%	0%	0%	0%
	BLKROC_51	80%	46%	48%	33%	41%	39%	44%	15%	30%	16%	12%	26%	0%
	RESERVATION_06			29%	48%	23%	34%	30%	18%	15%	13%	30%	0%	2%
ation e		68%	34%	38%	37%	29%	26%	30%	11%	20%	10%	14%	5%	1%
ation n	BLKROC_17		65%											
ation Riparian Field e			65%											
on	BLKROC_04	76%	58%	14%	22%	8%	38%	24%		9%	1%	0%	0%	6%
	ROBINSON_02		52%	15%	23%	4%	18%	25%			7%	0%	0%	
on e		76%	55%	14%	23%	6%	28%	25%		9%	4%	0%	0%	6%
Field	BLKROC_05	85%	43%	19%	48%	13%	24%	22%	2%	2%	13%	0%	13%	9%
	RUSSELL_02		55%	12%	31%	0%	28%	31%	0%	1%	4%	0%	13%	0%
Field e		85%	49%	15%	39%	6%	26%	26%	1%	1%	8%	0%	13%	5%
n	BLKROC_13	45%	29%	28%	10%	31%			15%		0%	5%	23%	
	BLKROC_23	25%	8%	43%	20%	22%	8%			27%	0%	25%	7%	15%
	SOUTHRIP_03		39%	5%	33%	19%			7%	12%	0%	7%		
	SOUTHRIP_04					20%			2%	5%		0%	5%	
n e		35%	25%	26%	21%	23%	8%		8%	15%	0%	9%	12%	15%
er	BLKROC_08	77%	43%						0%	5%	1%	0%		1%
er e		77%	43%						0%	5%	1%	0%		1%
w	BLKROC_01	7%	2%	4%	4%	0%	9%	18%	0%		7%	0%	0%	0%
	BLKROC_39	0%	4%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	
	WHITEMEADOW_03		15%	37%	12%		29%	43%	0%	10%	19%		4%	0%
	WHITEMEADOW_04		7%	0%	0%	0%	3%	0%	5%	0%	0%	0%	0%	4%
	WHITEMEADOW													

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
w e		3%	9%	19%	10%	9%	19%	19%	7%	3%	12%	0%	3%	1%
w n	BLKROC_11			75%	0%	68%	55%		16%	27%	26%	22%	5%	11%
	BLKROC_14	87%	0%											
	BLKROC_26					45%			18%				31%	
	WMRIP_T2										0%	0%		
	WMRIP_T5						23%				11%	3%		
	WMRIP_T4						23%				44%		4%	
	WMRIP_T1						26%				12%	27%		
Meadow Riparian Field e		87%	0%	75%	0%	57%	32%		17%	27%	19%	13%	13%	11%
e Field	BLKROC_07	51%	28%	26%	40%		7%	28%	6%	7%	16%	0%	4%	0%
	WRINKLE_03		37%	28%	48%	24%	34%	17%	35%	0%		0%	9%	7%
e Field e		51%	33%	27%	44%	24%	20%	22%	21%	3%	16%	0%	6%	3%
e n	BLKROC_18	30%	21%	43%	46%	48%				3%	10%	7%	10%	
	BLKROC_19	0%	10%	12%	26%	8%				10%	18%	0%	13%	11%
	BLKROC_20	0%	11%	34%	53%	12%				28%	15%	13%	0%	13%
	BLKROC_21	0%	9%	28%	38%	6%				15%	19%	0%	0%	12%
e n e		8%	13%	29%	41%	18%				14%	16%	5%	6%	12%
eld	WRINKLE_02				22%	38%	41%	36%	9%	39%	7%	0%	0%	0%
eld e					22%	38%	41%	36%	9%	39%	7%	0%	0%	0%
		49%	29%	26%	29%	22%	25%	24%	11%	13%	12%	6%	7%	4%
Field	CASHBA_02		7%	2%	0%	11%	11%	10%	1%	7%	12%	15%	33%	17%
	CASHBA_04		75%	59%	51%	37%	53%	81%	74%	0%	12%	22%	23%	1%
	CASHBA_05			1%	13%	0%	14%	27%	10%	12%	30%	6%	25%	20%
	CASHBA_06		27%	40%	20%	0%	14%	12%	36%	7%	2%	0%	2%	1%
	CASHBA_09			33%	20%	26%	16%	17%	0%	46%	22%	0%	21%	9%
Field e			36%	27%	21%	15%	22%	29%	24%	14%	16%	9%	21%	10%
eld	CASHBA_19			0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%
	CASHBA_20			0%	0%	0%	0%	0%		0%	60%	0%	0%	0%
	CASHBA_21			4%	0%	0%	15%		0%	0%	41%	0%	0%	0%
	CASHBA_22			0%	0%	0%	0%	0%	0%	0%	14%	0%	0%	0%
	CASHBA_25				0%	0%		16%	0%	0%	20%	0%	0%	0%

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
e														
the ield	CASHBA_16			21%	21%	24%	28%		7%	30%	8%	0%	12%	42%
	CASHBA_24			31%	10%	27%	38%		0%	15%	18%	11%	6%	12%
	CASHBA_26						48%		62%	24%	47%	0%		9%
	CASHBA_27										18%			
the ield e				26%	15%	25%	38%		23%	23%	23%	4%	10%	21%
iver	CASHBA_01			8%	12%	22%	44%	50%		37%	46%	26%	40%	1%
	CASHBA_03			46%	44%	49%	66%	56%						
	CASHBA_07				0%	15%	47%	31%	6%	19%	32%	1%	0%	0%
	CASHBA_08			5%	9%	14%	31%	43%	14%	17%	22%	5%	7%	0%
iver e				20%	16%	25%	47%	45%	10%	24%	34%	10%	16%	0%
Field	CASHBA_17			42%		20%	19%	25%	31%	24%	22%	24%	27%	7%
	CASHBA_18			34%		25%	39%	15%	12%	50%	17%	33%	23%	0%
	CASHBA_23			27%		32%	30%	6%	15%	28%	17%	27%	30%	18%
Field e				34%		25%	29%	15%	19%	34%	18%	28%	27%	8%
s g	CASHBA_15			76%		77%			32%		44%	31%	0%	11%
Springs Holding Field e				76%		77%			32%		44%	31%	0%	11%
in	CASHBA_12			17%	17%		55%	64%	53%	37%	54%	51%	41%	14%
	CASHBA_14			15%	0%	18%	29%	21%	24%	9%	32%	25%		7%
in e				16%	8%	18%	42%	42%	39%	23%	43%	38%	41%	10%
			36%	23%	12%	19%	28%	26%	19%	17%	28%	13%	14%	8%
Field	COLOSEUM_01	65%				0%				25%	41%	19%	2%	
	COLOSEUM_02	70%				0%								
	COLOSEUM_03	74%					3%							
Field e		70%				0%	3%			25%	41%	19%	2%	
East	COLOSEUM_38	77%	0%				70%						80%	0%
	COLOSEUM_T1									23%		62%	71%	
	COLOSEUM_T2						74%						43%	
	COLOSEUM_T3						79%			36%		39%	58%	
	COLOSEUM_T4						64%						17%	27%

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
East														
e		77%	0%				72%			20%		50%	52%	
ast														
e	NORTHEAST_01						0%			0%		10%		
ast														
e														
e							0%			0%		10%		
		72%	0%			0%	48%			17%	41%	36%	45%	14%
ield	BOLIN_02							25%		5%			16%	0%
	BOLIN_01						65%	27%	16%				0%	0%
ield														
e							65%	26%	16%	5%			8%	0%
elta	DELTA_01	58%	56%	59%	70%	38%	30%	19%	39%	35%	53%	9%	3%	26%
	DELTA_02	61%	49%											
	DELTA_03	72%	60%	54%	71%	12%	45%	26%	50%	8%	59%	12%		18%
	DELTA_04	83%	50%	55%	62%	33%	44%	38%	30%	11%	63%	15%	5%	31%
	DELTA_05	50%	73%	54%	29%	50%	42%	40%	22%	60%	43%	24%	14%	0%
	DELTA_06	26%	50%	35%	23%	42%	41%	26%	30%	66%	55%	36%		8%
	DELTA_07	60%	65%	61%	49%	51%	58%	36%	49%	63%	20%	13%	21%	14%
elta														
e		58%	58%	53%	51%	38%	43%	31%	37%	41%	49%	18%	11%	16%
e	DELT_UP_01					0%								
e														
e						0%								
		58%	58%	53%	51%	32%	47%	30%	34%	35%	49%	18%	10%	16%
	STUART_01				0%									
e					0%									
					0%									
eld	ISLAND_03	38%												
eld														
e		38%												
o														
n														
outh	ISLAND_06	28%	18%	11%			26%	21%		5%	41%	3%		
o Riparian Field South														
e		28%	18%	11%			26%	21%		5%	41%	3%		
o														
	ISLAND_05	50%	0%											
o														
e		50%	0%											
n														
	ISLAND_08	72%	18%	12%	20%	0%	68%	27%	31%	23%	25%	16%	13%	5%

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	RIVERFIELD_07				26%	29%	52%	47%	19%	60%	61%	24%	14%	10%
	RIVERFIELD_09				9%	8%	9%		51%		15%	27%		
	RIVERFIELD_12				44%	41%	71%	58%	38%	63%	53%	1%	0%	30%
n e		82%	29%	30%	30%	20%	53%	43%	46%	54%	41%	16%	17%	12%
	LUBKIN_01	48%	0%	14%		0%	5%	6%	3%	16%	34%	33%	8%	0%
e		48%	0%	14%		0%	5%	6%	3%	16%	34%	33%	8%	0%
ckle	ISLAND_04	63%	0%											
ckle e		63%	0%											
ield -	ISLAND_07	63%		46%	0%	0%		0%	0%					
	ISLAND_10	63%	16%	3%	28%	0%	40%	44%	0%	25%	40%	8%	22%	20%
	ISLAND_11	0%	6%	22%		11%	6%	0%		7%	0%	0%	3%	1%
	ISLAND_12			25%	0%	34%	31%	0%	41%	28%				
	RIVERFIELD_08			47%	3%	0%	71%	52%		34%	0%	5%		17%
	RIVERFIELD_11				0%	58%	89%	0%		20%				
	RIVERFIELD_06				0%	0%	31%		0%	0%				
	ISLAND_14						81%	20%	48%	49%	67%	0%		
ield - e		42%	11%	27%	4%	15%	50%	17%	18%	23%	27%	3%	13%	13%
Field	ISLAND_02	31%	15%	8%		23%	0%		0%		14%			
	ISLAND_59	74%	47%	18%	0%				0%	0%	29%		0%	
	SOUTHFIELD_02			3%	7%	24%	19%		0%	0%	36%		14%	
Field e		52%	31%	8%	3%	23%	10%		0%	0%	26%		7%	
		52%	16%	20%	13%	17%	42%	24%	23%	27%	33%	12%	13%	12%
on e	LONEPINE_05	44%	0%	34%	63%	14%	0%		79%	0%	21%	0%	10%	0%
on e e		44%	0%	34%	63%	14%	0%		79%	0%	21%	0%	10%	0%
ield - ine	LONEPINE_01	80%	45%	61%	49%	28%	22%		38%	42%	26%	26%	37%	39%
	LONEPINE_02	79%	47%	48%	25%	30%	32%		30%		29%	24%	45%	29%
	LONEPINE_03	81%	49%	70%	37%	52%	63%		64%	49%	45%	25%	28%	26%
	LONEPINE_04	67%	55%	47%	32%	45%	45%		20%	40%	29%	26%	47%	20%
	LONEPINE_06	78%	44%											
	LONEPINE_07		52%	51%	38%	8%	21%		0%	19%	25%	13%	20%	5%
	LONEPINE_08						42%		52%	21%	24%	35%	49%	
ield - ine e		77%	49%	55%	36%	32%	37%		34%	34%	30%	25%	38%	24%

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
g	LACEY_03			32%	37%	5%	34%	27%	41%	19%	44%	13%		4%
	LACEY_05			40%	52%	62%	65%	35%	79%	45%	58%	0%		31%
	LACEY_08					8%	19%	38%	26%	18%	42%	9%	0%	23%
g e				36%	44%	25%	39%	33%	49%	27%	48%	7%	0%	19%
e	LACEY_01			56%	33%	41%	79%	56%	38%	58%	29%	0%		21%
	LACEY_02			50%	33%	19%	35%	41%	0%	3%	34%	0%		0%
	LACEY_04			17%	0%	34%	21%	0%	0%	21%	0%	12%	26%	0%
	LACEY_06			25%		26%	62%	50%	29%	29%	4%	17%	18%	24%
	LACEY_07			41%	39%	65%	31%	65%	23%	33%	39%	17%	64%	18%
e e				38%	26%	37%	46%	43%	18%	29%	21%	9%	36%	13%
				37%	32%	32%	43%	39%	29%	28%	31%	9%	27%	15%
de n	MEND_04			75%	14%	14%	28%	0%		56%	68%	63%	0%	0%
de n e				75%	14%	14%	28%	0%		56%	68%	63%	0%	0%
de ield	MEND_05							0%		33%	64%	46%	41%	
	MEND_06			73%	20%	46%	62%	29%		34%	39%	41%	35%	30%
	MEND_07			52%	15%	40%	12%	26%		33%	57%	38%	0%	
	MEND_08			15%		47%	17%	0%		0%	35%	0%	0%	
de ield e				47%	17%	44%	30%	14%		25%	49%	31%	19%	30%
asture	MEND_12			79%	63%	61%				11%	30%	50%	76%	
asture e				79%	63%	61%				11%	30%	50%	76%	
n	MEND_03			79%	33%	53%	51%	28%		36%	26%	25%	44%	41%
	MEND_09			10%	0%	0%	2%	6%		17%	5%	0%	16%	2%
	MEND_10			41%	0%	3%	0%	33%		5%	15%	0%	1%	35%
	MEND_11			94%	29%	15%	25%	0%		82%	19%	4%	0%	
	MENDI_1													27%
n e				56%	16%	18%	20%	17%		35%	16%	7%	15%	27%
n	MEND_02				20%	33%	18%	16%		61%	31%	55%	13%	
n e					20%	33%	18%	16%		61%	31%	55%	13%	

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
e	CALVERT_02				55%	18%		0%						
	CALVERT_03			62%	39%	0%	0%	0%	55%		27%			
	CALVERT_04			34%		26%		0%	35%	5%	9%		0%	0%
	TATUM_11			77%	64%	37%	69%	71%	86%	85%		48%		
	TATUM_13			34%	37%	13%	42%	20%	28%	31%	28%	11%	43%	14%
	TATUM_29	51%	40%	63%	75%	55%	0%	0%	29%	35%	14%	5%	15%	0%
e e		51%	40%	54%	54%	25%	28%	15%	47%	39%	20%	21%	19%	5%
Butte	TATUM_10			62%		24%	29%	15%	60%	51%	49%	39%	35%	21%
Butte e				62%		24%	29%	15%	60%	51%	49%	39%	35%	21%
ver	TATUM_07			67%	0%	0%	16%	31%	26%	41%	13%	0%	0%	20%
	TATUM_08			65%	4%	11%	28%	28%	28%	10%	32%	26%	74%	14%
	TATUM_09			77%	48%	61%	49%	30%	52%	45%		54%	56%	27%
	TATUM_12			39%	23%	14%	28%	22%	5%	6%	19%	11%	36%	11%
	TATUM_14			47%	28%	11%	17%	17%	27%	29%	16%	21%	64%	11%
ver e				59%	21%	19%	28%	26%	28%	26%	20%	22%	46%	17%
lorton n	TATUM_02			13%	3%	0%	21%	0%	17%	0%	5%	13%		74%
lorton Slough Riparian e				13%	3%	0%	21%	0%	17%	0%	5%	13%		74%
ast ber n	TATUM_01			20%	0%	12%	45%	0%	3%	0%	8%	21%		7%
ast McCumber Riparian e				20%	0%	12%	45%	0%	3%	0%	8%	21%		7%
est ber n	TATUM_04			74%		0%	59%	21%	11%	8%	7%	1%		29%
est McCumber Riparian e				74%		0%	59%	21%	11%	8%	7%	1%		29%
n	TATUM_06			68%	28%		28%	0%	52%	31%	15%	59%		79%
Horton Slough Riparian e				68%	28%		28%	0%	52%	31%	15%	59%		79%
ast ber n	TATUM_03			59%	25%	28%	14%	77%	45%	41%	49%	26%		6%
ast McCumber Riparian														

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
vest ber n	TATUM_05			90%	40%	66%	72%			54%	23%	27%		5%
vest McCumber Riparian e				90%	40%	66%	72%			54%	23%	27%		5%
iver	TATUM_15			44%	57%	66%	34%	8%	46%	37%	29%	34%	25%	34%
iver e				44%	57%	66%	34%	8%	46%	37%	29%	34%	25%	34%
		51%	40%	55%	33%	25%	32%	19%	36%	30%	21%	25%	35%	22%
ant ement	RAREPLANT_02	76%		77%	0%					0%		16%	22%	
	RAREPLANT_03	98%		58%	7%		45%	4%		8%	15%			
	THIBAUT_02	88%		49%	0%		34%	36%	29%	13%	34%	11%	7%	
ant Management Area e		87%		61%	2%		39%	20%	29%	7%	25%	14%	14%	
t Field	THIBAUT_03	89%	65%	36%	65%	74%	15%	20%	40%	6%	56%	78%	16%	4%
	THIBAUT_08		15%	8%	4%	0%	14%	0%	0%	1%	7%	2%	0%	1%
	THIBAUT_09		3%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	THIBAUTFIELD_ 02	81%	64%	62%	31%	76%	30%	0%	22%		44%			
	THIBAUTFIELD_ 03			13%	3%	0%		5%	0%		2%	0%		
	THIBAUTFIELD_ 04			6%	0%	0%	0%	0%	0%		7%	0%		0%
t Field e		85%	37%	22%	17%	25%	12%	4%	10%	2%	19%	16%	8%	
owl ement	THIBAUT_01	80%			3%				50%	40%	3%	9%	0%	1%
	WATERFOWL_02	15%			40%	30%			56%	30%	16%	8%		
	WATERFOWL_03				21%	33%			33%	25%	4%		7%	
	WATERFOWL_04	57%			11%	51%								
	WATERFOWL_05	77%				39%								
owl Management Area e		57%			19%	38%			46%	32%	8%	8%	3%	
		73%	37%	35%	14%	30%	19%	8%	23%	14%	17%	14%	8%	1%
Field	TUTTLE_01	61%	0%	0%		0%	27%			0%	6%	12%	59%	
Field e		61%	0%	0%		0%	27%			0%	6%	12%	59%	
		61%	0%	0%		0%	27%			0%	6%	12%	59%	
	BLKROC_37	40%	9%	0%	0%	0%	5%	15%		2%		5%	16%	3%
	BLKROC_FIELD_ 04		10%		0%	0%		23%				7%	0%	
	TWINLAKES_02	16%	17%		0%	4%		0%	6%		0%	0%		0%
	TWINLAKES_05	65%	23%											

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ock n	BLKROC_RIP_07		61%	53%		34%	72%		14%	0%		0%	11%	
	TWINLAKES_03	82%	28%	21%	6%	42%	36%				0%	14%		
	TWINLAKES_04	85%												
	TWINLAKES_06	102%												
Blackrock Riparian Field e		89%	44%	37%	6%	38%	54%		14%	0%	0%	7%	11%	
River	4J_02			25%			61%		26%	51%	68%		51%	
	4J_03			9%		31%	6%		7%	12%	10%	0%	33%	
	4J_04			17%		61%	24%		9%	33%	34%	0%	25%	
River e				17%		46%	30%		14%	32%	37%	0%	36%	
ock	BLKROC_RIP_05			52%	21%	25%	51%		9%	0%	10%	3%	2%	26%
	BLKROC_RIP_06			53%	19%	29%	74%		10%		0%		56%	66%
	BLKROC_RIP_08		41%	42%	17%	18%	70%		50%		69%	27%	61%	
	INTAKE_01	45%		25%	13%	30%	49%		10%	12%	2%	9%	4%	0%
	BLKROC_RIP_09									43%				
ock e		45%	41%	43%	17%	26%	61%		20%	18%	20%	13%	31%	
		62%	25%	30%	10%	25%	45%	13%	16%	19%	21%	7%	26%	19%
ield - s	CASHBA_10			14%		25%	32%	48%	53%	60%	44%	18%	15%	22%
	CASHBA_11			5%		0%	21%	22%	6%	11%	18%	0%	0%	
	CASHBA_13			20%		7%	34%	41%	30%	18%	50%	0%	0%	
ield - Warm Springs e				13%		11%	29%	37%	30%	30%	37%	6%	5%	
				13%		11%	29%	37%	30%	30%	37%	6%	5%	22%
al	FISHSLOUGH_01						15%			84%				
al e							15%			84%				
Bench	FISHSLOUGH_02						9%			46%		0%		
Bench e							9%			46%		0%		
eld	FISHSLOUGH_07										5%	8%		0%
eld														

	Transect Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Field	FISH04_2015										0%			
Field e											0%			
al	HOSPITAL EAST											27%		
al e												27%		
Bench	FISHSLOUGH_05									100%				
	FISH03_2015											21%		
	FISHSLOUGH_02 _RT										0%			
Bench e										100%	0%	21%		
	FISHSLOUGH_03									27%				
e										27%				
ortis	FISHSLOUGH_05 _RT										0%	11%		
ortis e											0%	11%		
							12%			64%	1%	11%		0%
ar	INDEP_65							52%	75%	65%	12%	60%	79%	0%
ar e								52%	75%	65%	12%	60%	79%	0%
								52%	75%	65%	12%	60%	79%	0%

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TATUM_01		Northeast McCumber				
Species	2007	2009	2010	2014	2017	2018
ATPH	0	0	0	0	3	0
CLOB	0	0	0	0	3	0
ASTER	0	0	0	0	0	0
NIOC2	0	4	6	0	8	8
PYRA	30	27	32	32	16	28
CRRU3	0	0	31	0	3	0
CAREX	0	4	12	0	0	0
DISP	109	106	116	115	115	112
JUBA	65	74	57	49	16	24
LETR5	4	0	4	0	0	0
POSE	2	0	9	15	0	0
SPAI	85	72	53	85	66	75
SPGR	13	28	27	24	24	19
DESO2	0	0	4	0	32	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

TATUM_02		North Horton Slough				
Species	2007	2009	2010	2014	2017	2018
NIOC2	6	10	10	5	3	3
DISP	119	132	124	105	135	129
JUBA	0	0	0	0	0	0
PADI6	2	0	0	0	0	0
SPAI	54	59	65	88	70	4

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

TATUM_03		Southeast McCumber Riparian				
Species	2007	2009	2010	2014	2017	2018
ATTR	0	0	1	0	1	0
COMAC	0	0	0	0	24	0
HEAN3	0	0	2	0	4	5
ASTER	0	0	1	0	0	0
ERIGE2	5	0	0	0	0	0
NIOC2	7	16	5	3	2	0
PYRA	15	8	7	0	6	4
CADO2	4	0	0	0	0	0
CAREX	0	0	0	14	0	0
DISP	121	128	111	92	77	103

SPAI	11	15	17	19	25	13
ATTO	14	12	0	11	48	0
ERNA10	0	0	0	0	2	0
BAHY	0	6	24	5	43	11
LELA2	0	0	2	0	0	0
MEOF	0	0	0	0	1	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014	2017	2018
6.8	12.9	17.15	18.87	27.51	0
0.45	0.55	0	0.7	0	0
7.25	13.45	17.15	19.57	27.51	0

TATUM_04 Northwest McCumber Riparian

Species	2007	2009	2014	2017	2018
ATPH				21	0
ATTR				45	0
GLLE3	0	1	0	5	0
PYRA	0	0	0	0	2
SUMO	0	0	1	9	6
DISP	11	18	29	3	30
JUBA	17	24	2	0	4
LETR5	2	2	0	5	3
SPAI	107	119	124	137	132
ERNA10	10	3	3	0	1
BAHY	3	0	0	27	0
LELA2	0	0	0	3	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2014
0.15	0	0
4.35	0.95	1.44
0.45	0	0.49
4.95	0.95	1.93

TATUM_05 Southwest McCumber Riparian

Species	2007	2009	2014	2017	2018
ATTR	0	0	11	99	0

JUBA	73	66	51	28	32
LETR5	79	78	51	69	65
SPAI	0	2	0	0	3
ERNA10	0	0	5	3	2

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2014
0.4	0.8	2.94

TATUM_06 South Horton Slough

Species	2007	2009	2014	2017	2018
GLLE3	0	7	3	4	3
NIOC2	80	94	88	84	96
PYRA	3	0	3	0	0
DISP	141	165	145	143	97
JUBA	34	34	29	5	2
LETR5	0	92	93	73	31
LELA2	0	0	0	0	5

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

TATUM_07 East River Field

Species	2007	2009	2010	2014	2017
CORA5	0	0	2	0	0
SUMO	1	1	0	0	0
DISP	2	2	2	2	0
SPAI	96	96	92	118	69
ATCO	22	21	22	21	10
ATPA3	2	2	1	1	1
ERNA10	0	0	0	0	5
SAVE4	8	5	12	6	1
TEAX	2	1	1	0	0
ARTR2	0	0	2	2	0
PIDE4	12	14	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014	2017
0	0	1.4	0	0

0.1	0.9	0	0	0	
4.4	4.3	14.75	4.23	11.48	
0.5	0.3	0	0.55	0	
0	0	0	0	0.36	
8.15	8.25	18.45	8.96	16.62	

TATUM_08 East River Field

Species	2007	2009	2010	2014	2017
COMAC	0	0	0	0	2
DISP	84	86	94	90	87
JUBA	four	8	1	11	0
SPAI	74	99	79	69	77
SPGR	0	0	1	0	0
ATTO	3	1	2	0	10
ERNA10	20	19	9	15	23
BAHY	0	0	1	0	4

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014	2017
0.85	0.94	1.1	0.06	0.24
11.5	17.89	11.8	19.69	22.63
12.35	18.83	12.9	19.75	22.87

TATUM_09

Species	2007	2009	2014	2017
ANCA10	37	44	40	51
GLLE3	0	3	0	0
HECU3	1	1	2	0
NIOC2	5	0	3	7
DISP	111	124	97	106
JUBA	10	13	10	9
LETR5	0	4	3	0
SPAI	17	23	19	11
ATTO	2	8	6	13
ERNA10	6	7	0	0
BAHY	2	31	9	25
LELA2	0	0	1	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

10.7	14.65	10.2	15.38
6.6	6.7	2.55	0.15
17.3	21.35	12.75	15.53

TATUM_10 Charlie Butte Field

Species	2007	2009	2010	2014
CALI4	0	1	0	3
STEPH	0	7	0	0
STPA4	0	0	12	11
CASTI2	0	0	2	0
DISP	0	14	12	18
LECI4	0	1	0	0
SPAI	78	85	88	76
ATTO	21	15	6	9
ERNA10	2	11	13	14
SAVE4	3	0	1	1
ARTR2	2	0	0	0

indicates a significant difference, $\alpha \leq 0.1$ between 2014 and prior sampling event

2007	2009	2010	2014
3.51	5.74	6.25	4.3
1.1	8.47	3.9	6.05
0	0	0.2	0
1	1.16	1	0.55
5.61	15.37	11.35	10.9

TATUM_11 Calvert Slough Pasture

Species	2007	2009	2010	2014	2017
ATPH	0	0	5	0	0
CORA5	0	0	4	0	5
GLLE3	0	2	1	11	1
HECU3	0	0	0	1	0
DISP	152	157	141	152	157
JUBA	32	33	28	31	12
LETR5	25	18	21	34	36
SPAI	0	0	4	0	6
SPGR	0	0	4	0	0
ATTO	3	8	10	2	32
ERNA10	0	0	0	0	1

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014	2017
5.05	11.85	16.55	8.8	34.31
0	0.08	2.35	0.95	2.26
5.05	11.93	18.9	9.75	36.57

TATUM_12

Species	2007	2009	2010	2014	2017
ATPH	0	0	8	0	0
NIOC2	0	3	2	1	3
PYRA	0	0	0	1	3
STEPH	0	0	0	0	0
DISP	140	159	146	148	123
SPAI	7	11	8	8	10
ATTO	7	16	11	5	16
ERNA10	0	0	0	4	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014	2017
3.2	3.46	3.1	4.14	
0	0.04	0	1.61	
3.2	3.5	3.1	5.75	

TATUM_13 Calvert Slough Pasture

Species	2007	2009	2010	2014	2017
ATPH	0	0	0	0	11
CLPL2	0	0	6	1	11
NIOC2	0	5	0	0	0
DISP	88	79	79	90	101
JUBA	5	13	4	5	4
SPAI	64	57	51	63	67
SPGR	0	0	3	0	0
ATTO	20	16	12	7	15
ERNA10	0	3	0	0	0
SAVE4	0	0	0	0	2
BAHY	0	0	3	0	2

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

5.35	9.98	9.1	6	5.7	
0.1	0.12	0	0.2	0.2	
5.45	10.1	9.1	6.2	5.8	

TATUM_14

Species	2007	2009	2010	2014	2017
ATPH	0	0	12	1	18
ATTR	0	0	0	0	11
COMAC	0	0	13	0	12
ANCA10	4	5	2	6	5
PYRA	1	1	0	0	1
STPA4	0	3	0	0	0
SUMO	0	0	0	2	1
DISP	103	124	103	111	112
JUBA	19	21	20	42	24
SPAI	37	37	22	48	37
ATTO	8	5	8	6	6
ERNA10	3	13	10	0	5
BAHY	0	19	0	0	3
SATR12	0	0	0	0	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014	2017
2.15	2.52	3.15	2.18	4
6.3	7.81	6.35	4.86	8.6
0	0	0	0.13	0
8.45	10.33	9.5	7.17	12.6

TATUM_15 West River

Species	2007	2009	2010	2014	2017
DISP	7	7	6	8	
SPAI	92	102	97	95	
SPGR	0	0	1	0	
ATCO	20	26	26	18	
ATTO	14	9	2	2	
ERNA10	15	3	2	6	
MACA17	0	3	0	0	
TEAX		2	2	3	
SATR12	0	0	0	2	

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2014
1.75	0.85	0.35	1.5
0.75	1	0.8	1.05
1.25	1.55	2.85	0.55
0	0.3	0	0.4
3.75	3.7	4	3.5

TATUM_29 Calvert Slough

Species	2002	2003	2007	2009	2010
2FORB	6.8	0	0	0	0
CLOB	0	3	0	0	0
CORA5	0	13	0	0	64
ERIAS	0	3	0	0	0
STEPH	0	1	0	0	0
SUMO	0	1	0	0	0
DISP	11.9	6	8	2	4
SPAI	120.7	107	109	123	115
ARTRW8	0	0	0	0	0
ATCO	0	0	0	3	0
ERNA10	0	9	0	5	0
SAVE4	0	2	0	0	3
ARTR2	8.5	20	14	30	21
SATR12	0	3	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2007	2009	2010
1.6	3.05	3.11	3.92
0	0.4	0.12	0
0.5	0	0	0
0.48	1.15	1.24	0.8
0	1	1.68	2.2
2.58	5.6	6.15	6.92

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CASHBA_01

Species	2007	2010
ATTR	2	17
DISP	137	134
JUBA	6	4

ATTO	0	2
BAHY	0	12

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

CASHBA_02

Species	2007	2009	2010	2012	2015	2018
ATPH	0	0	6	0	0	0
ATTR	0	0	28	0	0	0
CLOB	0	0	7	0	0	0
ANCA10	0	18	0	0	0	0
GLLE3	6	17	9	5	16	19
PYRA	0	0	0	4	0	0
CAREX	0	4	0	0	0	0
DISP	72	141	60	59	39	39
JUBA	21	9	15	4	3	4
LETR5	0	69	0	0	0	0
SPAI	77	21	79	79	75	88
ATTO	0	0	1	0	2	13
ERNA10	0	0	2	0	0	5
BAHY	0	11	3	2	0	1
SATR12	0	0	1	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2010	2012	2015
0	0.55	1.29
0.45	0.3	1.5
0.45	0.85	2.79

CASHBA_03

Species	2007	2010	2012	2015
ATTR	0	5	0	0
COMAC	0	2	0	0
ANCA10	12	0	17	13
GLLE3	8	0	21	10
CADO2	4	0	0	0
DISP	117	124	154	130
JUBA	4	17	4	3
LETR5	41	84	82	34
SPAI	20	0	15	26
SPGR	1	0	0	0
ROWO	0	2	0	3
BAHY	1	2	24	18

2010	2015
0.3	0
6.3	0
0.65	0
7.25	0

CASHBA_04

Species	2007	2009	2012	2015	2018
HEAN3				1	0
ANCA10	3	0	9	5	13
CAREX				3	0
DISP	113	121	137	129	122
JUBA	56	60	62	29	34
LETR5	17	16	12	36	77.0
PADI6	0	0	0	3	0
SPAI	0	0	0	0	3
ATTO	2	0	5	3	10
ERNA10				1	0
SAEX				1	4
BAHY	0	0	1	0	7
LELA2	0	0	0	0	1
PHAU7	1	3	0	0	4

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2009	2012	2015
0.2	0.53	2.2
0.3	0	1
0	0	1.3
0.5	0.53	4.5

CASHBA_05

Species	2007	2010	2012
ATPH	0	7	0
ATTR	0	5	0
COMAC	0	4	0
GLLE3	2	3	3
NIOC2	2	6	3
DISP	101	109	74
JUBA	39	41	38
LETR5	0	0	1

ATPA3	0	0	0			
BAHY	0	7	0			

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

CASHBA_05

2012
0.09
0.09

CASHBA_06

Species	2007	2009	2010	2012	2015	2018
ATTR	0	0	4	0	0	0
COMAC	0	0	9	0	0	0
GLLE3	15	13	12	6	3	4
NIOC2	0	3	0	0	0	0
PYRA	0	4	0	0	0	0
DISP	118	223	129	138	98	127
JUBA	5	44	7	9	7	8
LETR5	8	8	11	6	0	9
SPAI	0	65	0	5	0	0
ATTO	3	7	9	9	0	67
ERNA10	3	1	0	3	2	1
BAHY	0	0	69	9	0	29
LELA2	0	0	0	0	0	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
0.4	3.35	6.68	7.01	9.3	16.7
2.2	3.65	2.35	5.65	5.9	0
2.6	7	9.03	12.66	15.2	16.7

CASHBA_07

Species	2007	2009	2010	2012	2015	2018
ATTR	0	0	17	0	0	0
CORA5	0	0	6	0	0	0
GLLE3	16	12	20	13	24	16
PYRA	1	0	0	0	0	0
JUBA	8	9	19	12	11	14
LECI4	0	0	0	1	0	0
SPAI	88	97	110	101	106	110
ALOC2	7	3	1	1	2	1
ATTO	1	1	0	0	0	5

BAHY	4	0	5	0	0	4

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
1.8	0.61	0	0	0	0
1.75	1.93	2.65	2.77	3.9	5.2
3.55	2.54	2.65	2.77	3.9	5.2

CASHBA_08

Species	2007	2010	2012	2015	2018
ATPH	0	0	6	0	0
ATTR	0	40	0	0	0
CORA5	0	11	0	0	0
GLLE3	13	22	6	7	13
DISP	96	93	96	75	47
JUBA	24	24	26	8	24
LETR5	9	10	3	3	4
SPAI	58	73	56	74	85
ATTO	9	0	11	2	25
BAHY	0	15	0	0	13

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2010	2012	2015	2018
1.8	1.1	0.5	0.4	1.3
0	0.1	0	0.6	2.8
1.8	1.2	0.5	1	4.1

CASHBA_09

Species	2007	2009	2010	2012	2015	2018
ATPH	0	0	1	0	0	0
ATTR	0	0	3	0	0	0
COMAC	0	0	13	0	0	0
HEAN3	0	0	4	0	0	0
ASTER	0	0	10	0	0	0
CIMO	0	0	11	0	0	0
CIOC2	0	7	0	0	0	0
CIRSI	13	0	0	0	0	1
ERIGE2	0	0	0	0	0	0
GLLE3	16	17	13	9	6	7
PYRA	11	6	14	0	2	1
CAREX	21	44	0	0	0	10
DISP	64	73	70	94	46	68
JUBA	24	14	8	0	2	18

POSE	2	0	25	0	0	0
SPAI	78	86	96	73	75	87
ATTO	0	0	0	0	0	0
ERNA10	5	2	5	2	3	8
MACAI3	0	2	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2009	2010	2012	2015
0.75	0.3	3.23	6.4
0.75	0.3	3.23	6.4

CASHBA_10

Species	2007	2009	2014	2015
CIOC2	2	0	0	
GLLE3	3	0	0	
NIOC2	26	20	25	
DISP	100	103	103	
JUBA	5	1	5	
LETR5	9	8	1	
SPAI	73	88	87	
SAVE4	2	0	0	

CASHBA_12

Species	2007	2009	2010	2012	2015	2018
ATTR	0	0	20	0	0	0
CORA5	0	0	4	0	0	0
GLLE3	1	2	0	3	2	5
DISP	90	58	67	104	89	93
JUBA	0	0	2	0	0	0
LETR5	0	0	0	3	0	0
SPAI	104	115	115	112	115	123
SPGR	0	0	3	0	0	0
ATTO	1	5	1	0	3	10
BAHY	0	1	19	10	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2009	2012	2015
0.48	1.23	1.5
0.48	1.23	1.5

CASHBA_14

Species	2007	2009	2010	2012	2015	2018
ATTR	0	0	18	0	0	0

GLLE3	14	14	14	11	13	9
PYRA	5	5	0	0	5	0
DISP	16	23	7	24	14	7
JUBA	13	7	0	2	3	0
LETR5	3	0	3	0	1	0
SPAI	118	132	137	130	130	131
ALOC2	3	6	8	7	3	8
ATTO	4	5	1	0	1	0
ERNA10	0	0	0	5	1	3
BAHY	0	0	2	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
0.55	0.1	0	0	0	0
0	0	0.2	0.01	0	0
0	0	0	0	0.7	0.9
0.55	0.1	0.2	0.01	0.7	0.9

CASHBA_15

Species	2007	2009	2010	2012	2015	2018
ATPH	0	0	3	0	0	0
GLLE3	15	2	5	1	7	8
HECU3	2	2	0	0	0	1
DISP	83	66	79	85	58	46
JUBA	3	0	2	0	0	0
LETR5	15	19	23	25	0	0
SPAI	79	99	95	81	80	90
BAHY	0	9	31	16	14	10

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
0.15	1.45	0.3	0.48	2.1	6.5
1.55	0.4	0.7	0.9	1.85	1.6
1.7	1.85	1	1.38	3.95	8.1

CASHBA_16

Species	2007	2009	2010	2012	2015
DISP	24	32	26	14	27
SPAI	105	100	99	86	99
ATCO	0	0	8	0	0
ATTO	12	5	1	5	2
BAHY	0	0	3	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

0.3	0.65	0.75	0.42	0.7	
1.25	1.8	2	2.26	2.3	
0	0	0	0.04	0	
1.55	2.45	2.75	2.72	3	

CASHBA_17

Species	2007	2009	2010	2012	2015	2018
ATPH	0	0	29	0	0	0
ATTR	0	0	4	0	0	0
CLOB	0	0	1	0	0	0
COMAC	0	0	15	0	0	0
CORA5	0	0	4	0	0	0
CLPL2	0	0	0	1	0	0
GLLE3	0	0	0	0	0	0
MACA2	0	0	11	0	0	0
PYRA	0	4	4	0	0	0
STPA4	0	0	0	5	0	0
DISP	67	69	47	59	78	55
LECI4	0	0	0	0	0	0
SPAI	107	88	91	111	94	102
ERNA10	3	7	1	0	1	5
MACA17	11	0	0	0	8	7
MACAI3	0	5	0	0	0	0
BAHY	0	0	5	0	0	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
2.13	4.35	2.65	3.55	2.5	2.4
2.13	4.35	2.65	3.55	2.5	2.4

CASHBA_18 Slough Pasture

Species	2007	2009	2012	2015
CALI4	0	0	0	0
GLLE3	0	12	0	0
STPA4	4	1	0	0
DISP	74	147	45	47
JUBA	0	27	0	0
LETR5	0	9	0	0
SPAI	95	122	39	41
ATCO	18	0	4	3
ATPA3	19	1	3	3

ERNA10	12	10	2	2
MACA17	12	0	13	0
SAVE4	4	0	0	0
MACAI3	0	7	0	0
BAHY	0	3	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2012	2015
0	0.75	0	0
1.35	0.55	2.14	0.7
0.7	1.3	0	0.8
0	1.1	0	0
3.2	3.7	2.24	1.9
1.05	0	0	0
6.3	7.4	4.38	3.4

CASHBA_19 Revisited in 2018

Species	2007	2009	2010	2012	2015
ATPH	0	0	5	0	
CORA5	0	0	16	0	
ERAM2	0	0	1	0	
GLLE3	5	6	10	4	
HECU3	0	0	3	0	
MACA2	0	0	4	0	
NIOC2	0	2	1	0	
STEPH	0	0	4	9	
STPA4	6	7	0	0	
DISP	40	45	41	38	
JUBA	3	5	4	2	
SPAI	90	96	97	87	
ATCO	7	2	4	15	
ATTO	15	11	15	0	
ERNA10	17	15	17	15	
MACA17	0	7	0	0	
ROWO	0	0	0	2	

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012
0	0	0	0.2
0.5	0.35	0.15	0.23
0	0	0.1	0
4.75	4.6	4.55	2.34
5.25	4.95	4.8	2.77

CASHBA_20

Species	2007	2009	2010	2012	2015
ASTRA	0	1	2	0	0
MACA2	0	0	7	0	0
STEPH	0	0	22	0	0
STPA4	22	0	0	15	18
DISP	7	5	7	5	8
SPAI	82	83	84	78	71
ATCO	2	1	3	0	1
ATTO	8	4	3	4	3
ERNA10	34	19	14	23	34
MACA17	0	30	0	0	2
SAVE4	8	9	10	4	9
TEAX	1	1	0	0	1
ATPO	0	0	0	9	0
BRTE	0	3	0	0	0
BRRU2	0	0	68	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015
0.1	0	0.25	0	0
0	0.2	0	0.01	0.4
5.68	8.5	7.55	6.29	5.6
2.1	2.2	2.4	3.07	2.25
0	0	1.75	0	0
0	0	0	0	0.3
7.88	10.9	11.95	9.37	8.55

CASHBA_21 Revisited in 2018

Species	2007	2009	2010	2012
ATPH	0	0	3	0
CORA5	0	0	44	0
HEAN3	0	0	0	4
ASFA	4	2	1	3
HECU3	3	2	3	0
MACA2	0	0	9	0
NIOC2	0	2	2	0
STEPH	0	0	11	0
STPA4	19	0	0	11
SUMO	0	0	0	3
DISP	25	27	24	15
LECI4	13	10	16	16
SPAI	58	61	48	47

ATTO	1	0	0	0
ERNA10	35	29	35	34
MACA17	11	32	0	0
SAVE4	7	2	4	8
SATR12	0	1	0	0
BRRU2	0	0	8	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012
0	0.4	0	0.05
0.7	1	0.98	1.04
4.55	6	4.37	6.31
2	1.3	2.37	1.66
7.25	8.7	7.72	9.06

CASHBA_22

Species	2007	2009	2010	2012
ATPH	0	0	2	0
MACA2	0	0	17	0
MALE3	0	0	1	0
NIOC2	0	0	0	0
STEPH	0	0	10	0
STPA4	0	0	0	3
SUMO	2	1	2	0
DISP	56	51	59	44
SPAI	116	116	117	116
ATCO	19	6	7	0
ATTO	0	2	0	0
ERNA10	3	8	1	3
MACA17	20	20	0	0
MESP2	2	0	0	0
SAVE4	4	0	4	4
ARTR2	5	4	1	4
LYCO2	0	0	0	2

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012
0.65	0.53	0	0.67
0.75	0.79	0.65	0.5
0.2	0	0	0
0.05	0.62	0	0.05
0	0.15	0	0.17
0	0.13	0	0

CASHBA_23		Slough Pasture				
Species	2007	2009	2010	2012	2015	2018
ATPH	0	0	13	0	0	0
CLEOM2	0	0	0	2	0	0
COMAC	0	0	12	0	0	0
CORA5	0	0	21	0	0	0
MACA2	0	0	6	0	0	0
PYRA	6	7	5	6	8	3
STPA4	0	0	0	9	0	0
SUMO	0	5	0	0	0	0
DISP	118	144	125	125	110	123
JUBA	4	0	3	0	1	0
SPAI	18	145	30	23	17	27
ATCO	0	3	0	0	0	0
ATTO	0	25	0	0	0	1
ERNA10	0	2	0	0	0	0
MACA17	6	0	0	0	4	0
SAVE4	3	1	3	6	3	5
MACAI3	0	4	0	0	0	0
BAHY	0	0	0	2	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
0.85	3.85	0.8	0.42	0.6	0.8
0	1.25	0.45	0.26	0.7	1.2
6.45	6.32	5.8	5.11	6.67	5
7.3	11.42	7.05	5.79	7.97	7

CASHBA_24					
Species	2007	2010	2012	2015	2018
ATPH	0	3	0	0	0
COMAC	0	4	0	0	0
CORA5	0	1	0	0	0
SUMO	6	5	3	5	0
DISP	24	35	49	15	6
SPAI	120	132	128	92	83
ATCO	11	6	0	4	0
ATTO	18	20	21	9	28
ERNA10	7	2	3	6	0
BAHY	0	23	15	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

0.15	0.05	0	0.35	0	
3.25	4.5	5.67	1.65	11	
0.55	1.2	1.09	1	1	
0.3	0.4	0.71	0.35	1.2	
0	0.1	0	0.05	0	
4.25	6.25	7.47	3.4	13.3	

CASHBA_25

Species	2009	2010	2012	2015	2018
ATPH	0	30	2	0	0
CLOB	0	2	0	0	0
COMAC	0	2	0	0	0
MACA2	0	5	0	0	0
PYRA	0	0	3	0	0
DISP	87	78	78	64	57
SPAI	116	97	99	95	88
ALOC2	0	0	0	0	2
ATCO	0	11	0	0	3
ATPA3				3	0
ERNA10	10	5	10	12	9
MACA17	7	0	0	14	0
SAVE4	3	0	3	6	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2009	2010	2012	2015	2018
0	0	0	0	0.1
0	0.02	0	0.4	0.5
0.25	1.12	1.76	2.5	2.8
0	0.12	0	0	0.3
0.25	1.26	1.76	2.9	3.7

Lease (RLI-454)

4J_02 South River Field

Species	2007	2009	2010	2012	2015	2018
COCA5	0	0	0	0	0	2
ARSP	0	1	0	0	0	0
ASFA	4	3	3	0	1	0
GLLE3	6	8	11	12	12	12
ARDR4	0	1	1	0	0	0
DISP	69	83	57	45	55	55

LETR5	33	40	50	53	50	47
SPAI	90	65	79	66	74	70
ATTO	0	0	0	1	5	3
ERNA10	0	0	0	0	1	0
BAHY	0	12	22	3	4	9
DESO2	0	0	0	0	0	0
LOCO6	2	0	0	3	1	2

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
1.45	2.15	2.3	1.27	0.6	1.3
0	0	0	0	0.3	0
1.45	2.15	2.3	1.27	0.9	1.3

4J_03 South River Field

Species	2007	2009	2010	2012	2015	2018
ATPH	0	0	2	0	0	0
CLPA4	0	0	1	0	0	0
CLPL2	0	0	25	0	0	0
STPA4	4	4	6	2	0	0
DISP	137	136	137	143	112	110
SPAI	46	48	44	34	36	24
ATTO	3	0	0	3	0	0
SAVE4	8	4	2	3	4	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018
0.2	0	0.75	0.3	0	0
0.5	1.55	2	2.15	1.2	0.9
0.7	1.55	2.75	2.45	1.2	0.9

4J_04

Species	2007	2009	2010	2012	2015	2018
GLLE3	3	0	0	3	0	0
NIOC2	18	18	22	18	19	20
DISP	144	126	134	152	147	127
LECI4	5	0	0	0	0	0
LETR5	24	27	27	16	22	21
SPAI	30	30	36	24	16	29
ATTO	0	2	0	0	0	0
ERNA10	0	0	0	5	1	3

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2007	2009	2010	2012	2015	2018

1	0	0	0.64	1.4	0.7
2.4	2.1	8.42	2.15	2.8	3
2.4	2.1	8.42	2.15	2.8	3

h (RLI-479)

ABERDEEN_30

Species	2002	2003	2004	2007	2009	2010	2012	2015	2018
2FORB	37.4	0	0	0	0	0	0	0	0
ATPH	0	3	0	0	0	0	0	0	0
ATTR	0	82	76	0	0	0	0	0	0
CLOB	0	2	0	0	0	0	0	0	0
GILIA	0	8	0	0	0	0	0	0	0
OENOT	0	12	4	0	0	0	0	0	0
SPAI	81.6	57	68	59	60	60	70	46	49
ATTO	8.5	51	51	34	64	58	48	29	33
SAVE4	0	0	3	0	0	0	0	0	0
BAHY	0	3	3	0	0	0	0	0	0
SCAR	0	58	3	0	0	0	0	0	0
SATR12	6.8	122	127	0	0	4	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2015	2018
0	0	0.35	0.8	0.75	0.72	0.3	0
2.6	6.35	37.3	40.75	46.65	42.12	46.7	67.6
6.2	7.3	6.85	5.3	8.85	5.47	3.8	2.4
8.8	13.65	44.5	46.85	56.25	48.31	50.7	70

ABERDEEN_33

Species	2002	2003	2004	2007	2009	2010	2012	2015	2018
2FORB	0	0	3	0	0	0	0	0	0
ERIAS	0	3	18	0	0	0	0	0	0
GILIA	0	0	6	0	0	0	0	0	0
STEPH	3.4	3	4	0	0	0	0	0	0
STPA4	0	0	0	2	0	0	0	0	0
DISP	0	6	8	5	6	6	8	5	4
ELEL5	0	8	4	0	0	0	0	0	0
JUBA	0	0	0	0	0	0	0	0	0
SPAI	103.7	111	111	111	103	90	96	120	99
ARTRW8	0	0	0	0	0	0	0	0	0
ATCO	1.7	14	9	24	13	12	12	10	9
ATTO	3.4	0	0	0	0	0	0	0	0
EPNE	5.1	1	2	0	1	0	0	0	0

SAVE4	0	0	0	0	0	0	0	0	0
ARTR2	37.4	45	36	34	35	29	26	25	27
BRTE	0	0	0	0	4	0	0	0	0
BRRU2	0	0	0	0	2	0	0	0	0
	indicates a significant difference, α≤0.1 between 2014 and prior sampling event								S
2003	2004	2007	2009	2010	2012	2015	2018		
17.34	7.5	13.55	13.85	14.2	12.1	10	12.5		
1.7	0.6	3.45	1.9	2.6	1.24	1.55	0		
0	0	0	0.4	0	0.2	0.3	0		
0.41	0	0	0	0	0	0	0		
0.44	0	0	0	0	0	0	0		
19.89	8.1	17	16.15	16.8	13.54	11.85	12.5		

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COLOSEUM_02

Species	**2003**	**2004**	**2007**	**2009**	**2010**	**2012**
ATPH	36	0	0	0	31	3
CLEOM2	7	0	0	0	0	0
CLOB	2	3	0	0	0	0
CORA5	0	0	0	0	2	0
PSRA	4	0	0	0	0	0
MACA2	0	0	0	0	9	0
PYRA	4	14	0	0	0	0
STEPH	11	0	0	0	0	0
PSATH	0	0	0	3	0	0
DISP	93	116	110	93	100	98
JUBA	16	26	25	18	27	17
POSE	0	0	5	0	0	0
SPAI	27	24	35	41	41	40
ATCO	0	2	0	0	0	0
ATTO	0	0	1	0	0	0
ERNA10	0	19	0	3	4	0
LEFR2	0	0	1	2	0	0
MACA17	0	0	13	10	0	10
SAVE4	3	17	7	8	1	5
ARTR2	0	2	0	1	0	0
PHAU7	0	0	0	0	1	0
POA	3	0	0	0	0	0

2003	2004	2007	2009	2010	2012

0.82	0	0.35	0.6	1.35	0.25
0	0	0.3	0	0	0
5.53	3.2	6.05	4.35	7.5	5.19
3.27	51.9	4.15	3.9	3.25	4.55
10.33	55.45	11.15	9.2	12.8	10.19

COLOSEUM_38 South East Pasture

Species	2002	2003	2004	2007	2009	2010	2012	2015	2018
2FORB	0	39	0	0	0	0	0	0	0
ATPH	0	0	3	0	8	13	0	0	0
CORA5	0	0	10	0	0	0	0	0	0
ERIAS	0	21	15	0	0	0	0	0	0
ERSP3	0	0	0	0	2	0	0	0	0
STEPH	17	11	16	0	0	0	0	0	0
STPA4	0	0	0	0	3	12	10	2	0
STEX	0	0	0	0	0	0	3	0	0
DISP	13.6	21	29	6	27	25	27	20	6
SPAI	107.1	136	123	126	133	136	138	119	109
ARTRW8	0	0	0	0	0	0	0	0	0
ATCO	0	5	2	0	0	0	0	0	0
ATPA3	0	10	0	0	0	0	0	0	0
ATTO	8.5	7	5	0	0	0	1	6	9
ERNA10	10.2	13	21	5	19	3	2	4	37
MACA17	0	0	0	0	3	0	3	1	3
SAVE4	3.4	0	0	0	1	0	1	0	9
ARTR2	42.5	30	31	5	0	0	1	3	13
FESTU	0	2	0	0	0	0	0	0	0
SATR12	0	0	0	0	10	1	2	0	0
BRRU2	0	0	0	0	9	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2015	2018
9.28	4.18	0	0	0	0.12	0.85	0.3
0.1	0	0	0	0	0	0	0
1.77	2.05	0	0.05	0	0.23	0.4	1
1.13	0.8	0.5	0.3	0	1.31	3.15	2.9
0	0	0	0.3	0.2	0.24	0.4	0.9
0	0	0	0	1.65	0	0	0
12.28	7.03	0.5	0.65	1.85	1.9	4.8	5.1

ch (RLI-491)

INTAKE_01

ATPH	0	18	5	0	0	0	0	0	6	0
ATTR	0	0	2	0	0	0	0	0	0	0
CHST	0	2	0	0	0	0	0	0	0	0
CLEOM2	0	2	0	0	0	0	0	0	0	0
CLOB	0	3	0	0	0	0	0	0	5	0
CRCI2	0	0	7	0	0	0	0	0	0	0
ERIAS	0	23	0	0	0	0	0	0	0	0
ERIOG	0	5	0	0	0	0	0	0	0	0
ERMA2	0	0	2	0	0	0	0	0	0	0
MEAL6	0	0	10	0	0	0	0	0	0	0
CLPL2	0	0	0	0	0	5	0	0	0	0
MACA2	17	0	0	0	0	11	0	0	0	0
MALAC3	0	2	1	0	0	0	0	0	0	0
STEPH	0	18	16	0	0	0	0	0	0	0
SUMO	3.4	4	4	2	2	2	0	0	0	0
DISP	59.5	54	67	52	82	59	92	77	106	104
JUBA	13.6	19	15	11	11	8	14	15	14	13
SPAI	96.9	117	103	105	109	117	115	101	104	112
ATCO	23.8	15	23	19	25	11	25	19	12	15
ATPA3	0	0	0	1	1	2	0	0	0	0
ATTO	0	10	8	6	3	11	3	5	9	8
ERNA10	8.5	22	27	26	28	17	12	11	2	0
MACA17	0	0	0	14	18	0	10	12	7	4
BAHY	0	0	0	0	10	10	0	0	3	0
BRTE	0	0	1	0	0	0	0	0	0	0
POMO5	0	3	0	0	0	0	0	0	0	0
SATR12	0	0	0	0	0	0	0	3	0	0
BRRU2	0	0	0	0	1	0	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

INTAKE_01

2003	2004	2007	2009	2010	2012	2015	2017	2018
1.15	0.85	0.95	0.75	0.75	1.52	0.5	0.64	0.1
0.76	1.35	1.6	1	2.35	1.07	0.05	0.31	0
1.16	3.6	3.5	4.5	2.55	2.45	0.71	0.05	0
0	0	0.25	0.15	0	0	0.28	0.15	0
0	0	0	0.1	0	0.18	0	0	0
3.07	5.8	6.3	6.5	5.65	5.22	1.54	1.15	0.1

TWINLAKES_02

Species	2002	2003	2004	2007	2009	2010	2012	2015	2018
ATPH	0	2	1	0	0	2	0	0	0

CHHI	0	0	2	0	0	0	0	0	0
CLOB	0	8	3	0	0	0	0	0	0
COMAC	0	0	0	0	0	1	0	0	0
NIOC2	3.4	4	2	3	5	15	14	11	14
PYRA	0	6	2	7	9	12	2	2	10
STEPH	0	3	0	0	0	0	0	0	0
DISP	74.8	61	65	60	73	80	81	89	103
JUBA	73.1	96	103	78	72	72	76	79	82
LECI4	0	4	16	0	0	1	0	4	3
LETR5	3.4	4	0	0	0	0	0	0	0
POSE	0	0	0	0	2	11	0	0	0
SPAI	59.5	53	69	44	36	39	68	24	32
SPGR	34	20	19	65	57	76	89	90	97
ATTO	0	6	5	5	0	0	0	0	3
ERNA10	11.9	28	24	27	1	0	0	0	0
FESTU	0	3	1	0	0	0	0	0	1
POA	0	0	0	11	0	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2015	2018
6.4	5.9	4.3	0.32	1.05	1.17	0	0
18.3	15.85	13.52	0	0	0	0	0
24.7	21.75	17.82	0.32	1.05	1.17	0	0

TWINLAKES_03

Species	2002	2003	2004	2007	2009	2010	2012	2015	2017	2018
HECU3	0	0	0	0	0	0	0	0	0	46
SUMO	0	0	5	11	15	2	14	0	0	3
DISP	144.5	144	141	153	163	127	158	150	115	153
SPAI	0	1	5	1	2	0	0	0	0	1
ATTO	47.6	0	64	18	31	10	11	0	0	0
BAHY	0	37	27	0	26	38	0	0	3	30

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2015	2017	2018
16.95	16.95	6.45	8.4	12.1	8.58	0	0	0
0	0.1	2.4	0.6	0.9	1.08	0.2	0	0
16.95	17.05	8.85	9	13	9.66	0.2	0	0

TWINLAKES_04

Species	2002	2003	2004	2007	2009	2010	2012	2014	2015	2016	2017	2018

CRCI2	0	0	3	0	0	0	0	0	0	0	0	0
HECU3	0	0	0	0	0	0	0	0	0	1	0	68
SUMO	1.7	0	1	9	24	33	4	3	3	0	0	0
DISP	17	4	12	0	0	0	0	0	0	0	10	0
LETR5	0	0	0	0	0	0	0	0	4	6	58	12
ATTO	5.1	8	27	18	13	9	3	0	0	1	2	0
BAHY	0	6	41	0	15	24	0	0	0	1	104	6
DESO2	0	0	7	0	0	0	0	0	0	0	0	0
SATR12	0	4	82	0	0	0	0	0	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2014	2015	2016	2017	2018
13.6	22.4	11.15	17.85	15.7	12.49	13.55	17.75	20.5	0.5	7.1
0	0	20	27.25	37.2	12.49	8.15	8.71	na	0	0
13.6	22.4	31.15	45.1	52.9	24.98	21.7	26.46	20.5	0.5	7.1

TWINLAKES_05

Species	2002	2003	2004	2007
ATTR	0	156	91	0
MALE3	49.3	60	66	61
DISP	88.4	101	87	70
JUBA	0	6	8	2
LETR5	5.1	11	0	0
SPAI	0	0	6	0
ATTO	17	15	45	29
ERNA10	11.9	30	16	18
BAHY	0	18	35	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007
4.2	2.6	8.85
6.5	10.15	18.95
10.7	12.75	27.8

TWINLAKES_06

Species	2006	2007	2009	2010	2012	2014	2015	2016	2017	2018
LACO13	0	0	0	0	0	0	0	0	0	11
HECU3	0	0	8	8	11	8	1	3	28	94
SUMO	48	30	29	16	10	9	6	3	0	0
DISP	57	38	32	13	30	53	43	20	31	32
SPAI	0	0	10	0	0	0	2	0	0	1
ATTO	23	20	63	71	51	36	27	31	4	1
BAHY	0	0	22	29	0	0	0	0	25	0

LELA2	0	0	0	0	0	0	**0**	0	0	1
SATR12	11	0	0	0	0	0	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2006	2007	2009	2010	2012	2014	2015	2016	2017	2018
5.4	11.3	50.15	66.55	62.75	35.88	51.79	55.5	5.2	0
30.5	44.75	14.85	13.4	3.4	2.42	2.3	0	0	0
35.9	56.05	65	79.95	66.15	38.3	54.09	55.5	5.2	0

BLKROC_37

Species	2002	2003	2004	2007	2009	2010
2FORB	0	9	0	0	0	2
ATPH	0	4	0	0	0	3
CLEOM2	0	0	1	0	0	0
CLPA4	0	0	0	0	0	0
CLPL2	0	0	0	0	0	21
CRTR5	0	0	0	9	4	0
HECU3	0	0	2	0	0	0
MACA2	0	0	1	0	0	3
STEPH	0	1	6	0	0	0
STPA4	0	0	0	12	4	0
SUMO	0	0	4	6	13	4
DISP	105.4	72	115	112	107	110
JUBA	10.2	0	0	2	0	1
SPAI	39.1	15	33	34	28	29
ATCO	0	0	11	5	7	7
ATTO	22.1	23	39	26	27	20
ERNA10	5.1	1	23	17	14	17
MACA17	0	0	0	0	0	0
SAVE4	1.7	0	0	0	1	0
BAHY	0	0	13	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010
0	0.73	0.5	0	0.15
0.1	1.15	0.1	1.39	0.4
0	0	0	0	0.1
5.6	6.15	2.86	2.38	2.35
3.8	2.9	2.85	3.28	6.55
0.3	0.3	1.05	1.7	0.35
9.8	11.23	7.36	8.75	9.9

e (RLI-456)

HEAN3	0	0	0	0	2	0	0	0	0	0
ANCA10	0	0	0	0	2	0	0	0	0	0
GLLE3	0	0	0	0	0	0	0	0	0	0
MALE3	0	0	0	0	0	0	0	0	0	0
PYRA	0	0	0	0	0	0	3	0	3	0
SUMO	3.4	0	0	0	0	0	0	0	0	0
DISP	142.8	133	155	147	136	139	135	150	155	138
JUBA	5.1	4	0	25	13	16	18	10	19	26
LETR5	11.9	29	18	32	50	47	48	49	48	25
SPAI	10.2	13	17	19	14	15	10	12	14	11
ATTO	1.7	4	7	3	3	0	0	0	0	1
ERNA10	0	0	4	0	0	0	0	0	0	1

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2013	2015	2018
7.13	5.2	4.7	1.8	2.95	3.19	2.85	2.8	1.1
2.24	2.6	2.05	0	0.1	0.65	0.63	0.8	0
0.08	0	0.75	0	0	0	0	0.4	0
9.45	7.8	7.5	1.8	3.05	3.84	3.48	4	1.1

LONEPINE_02

Species	2002	2003	2004	2007	2009	2010	2012	2013	2015	2018
2FORB	0	0	0	0	0	0	0	0	0	0
ATPH	0	0	0	0	0	0	0	0	0	0
ANCA10	0	0	0	0	0	0	0	0	0	0
PYRA	0	0	0	0	0	0	4	2	0	0
STEPH	0	0	0	0	0	0	0	0	0	0
DISP	146.2	125	142	143	164	141	152	132	160	131
JUBA	8.5	13	20	17	14	15	15	14	0	0
LETR5	0	0	0	3	0	1	4	1	0	0
SPAI	64.6	78	65	64	52	65	69	48	0	6
ATTO	0	0	3	0	0	0	0	0	0	0
ERNA10	0	1	4	3	1	2	3	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2013	2015	2018
2.23	2.15	0.6	0.85	0	0.95	0	0	0
2.05	3.35	1.8	2.45	2	3.35	0.05	0	0
4.28	5.5	2.4	3.3	2	4.3	0.05	0	0

LONEPINE_03

Species	2002	2003	2004	2007	2009	2010	2012	2013	2015	2018
2FORB	0	1	0	0	0	0	0	0	0	0

ANCA10	0	0	0	3	0	7	10	7	7	7
GLLE3	11.9	0	7	0	5	3	2	3	7	2
HECU3	0	0	0	0	0	0	0	2	1	0
MALE3	6.8	3	5	2	5	3	0	5	0	1
PYRA	6.8	0	0	0	0	0	0	0	3	0
DISP	151.3	148	152	152	142	137	137	130	169	165
JUBA	39.1	59	52	41	43	34	42	29	37	47
LETR5	34	33	31	34	52	48	54	26	30	37
SPAI	8.5	0	10	5	4	4	5	0	0	4
ATTO	13.6	2	13	0	1	3	0	0	0	0
ERNA10	0	0	2	0	4	1	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2015	2018
13.51	13.4	6	0.8	4.85	5.6	0	0
1.99	2.7	0.55	2.75	0.6	0.2	0	0
0	0	0	3.6	0	0	0	0
15.5	16.1	6.55	7.15	5.45	5.8	0	0

LONEPINE_04

Species	2002	2003	2004	2007	2009	2010	2012	2013	2015	2018
2FORB	0	0	1	0	0	0	0	0	0	0
ATPH	0	29	12	0	0	10	0	0	0	0
ANCA10	5.1	7	8	8	7	6	6	4	5	2
MACA2	0	0	0	0	0	2	0	0	0	0
NIOC2	3.4	0	0	2	2	0	0	0	2	0
STEPH	5.1	0	11	0	5	0	0	0	0	0
SUMO	3.4	4	6	2	3	0	0	0	3	15
DISP	105.4	101	114	97	88	77	87	88	99	99
JUBA	15.3	18	25	11	15	15	23	14	4	4
LETR5	0	0	0	0	0	0	0	0	2	0
SPAI	47.6	63	56	69	79	84	72	60	59	54
ATCO	0	0	4	0	0	0	0	0	0	3
ATTO	0	2	0	0	0	0	0	0	0	0
ERNA10	0	2	0	0	0	0	0	0	0	0
MACA17	0	0	0	4	0	0	0	1	0	0
BAHY	0	0	0	0	2	0	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2004	2007	2009	2010	2012	2013	2015	2018
0.14	0.55	0	0	0	0.4	0	0	0
0	0	0	10	0.2	0	0	0	0
2.28	2.1	4.5	1.05	1	1.35	0	0	0

14.83	3.65	4.5	11.05	2.45	3.61	0	0.8	0

LONEPINE_05

Species	2002	2003	2007	2009	2010	2012	2015
ATSES	0	3	0	0	0	0	0
ATTR	0	3	0	0	0	0	0
ERPR4	0	0	3	0	0	0	0
LACO13	0	0	5	0	0	0	0
COCA5	0	0	0	0	0	4	0
ARLU	0	0	5	0	0	0	0
GLLE3	35.7	26	49	29	37	43	40
MALE3	15.3	11	16	8	0	7	1
ARPU9	0	0	5	0	0	0	0
DISP	34	40	23	42	24	26	10
JUBA	6.8	4	1	0	3	0	0
SPAI	52.7	69	73	77	71	73	39
ATTO	42.5	40	24	21	13	9	8
SAEX	3.4	0	16	8	4	9	9
ARTR2	0	0	0	0	2	0	0
BAHY	0	16	0	0	0	0	0

indicates a significant difference, α≤0.1 between 2014 and prior sampling event

2003	2007	2009	2010	2012	2015
32.82	28.85	9.65	13.18	13.39	6.6
1.54	14.45	21.1	1.52	4.04	1.9
34.36	43.3	30.75	14.7	17.43	8.5

LONEPINE_06

Species	2003	2004	2005	2007	2009	2010	2012	2013	2015	2018
ANCA10	0	0	0	5	3	0	0	0	0	0
PYRA	0	0	0	0	0	0	0	0	0	2
SUMO	0	0	0	0	0	0	0	0	0	15
DISP	124	136	132	149	145	147	130	145	154	139
JUBA	0	0	0	0	0	0	0	0	12	12
SPAI	25	28	29	16	20	16	16	3	42	54
BAHY	0	0	5	0	0	3	0	0	0	0

2003	2004	2005	2007	2009	2010	2012	2015	2018
0.45	0.6	0.4	0.45	1.4	1.22	1.5	0	0
0.09	0.25	0.2	0	0	0	0	0	0
0.54	0.85	0.6	0.45	1.4	1.22	1.5	0	0

Species	2007	2009	2010	2012	2013	2015	2018
DISP	150	157	160	151	140	157	136

LONEPINE_08

Species	2012	2013	2015	2017
2FORB	0	4	0	0
HEAN3	0	7	0	0
ANCA10	3	83	74	93
NIOC2	3	0	0	0
CADO2	0	1	0	0
CAREX	0	0	5	4
DISP	155	144	140	142
JUBA	0	0	5	5
SCAM6	0	22	37	49

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	92	X	X	86	X	Dry	Dry	X	X	78	80	80	82	80	80	88
	92	X	X	86	X	82	96	X	X	90	86	86	90	84	X	88
	92	X	X	84	X	X	94	X	X	84	82	82	86	88	X	92
	92	X	X	88	X	X	92	X	X	76	68	68	82	74	80	86
	92	X	X	88	X	X	90	X	X	89	68	68	82	82	X	92
	92	X	X	92	X	X	98	X	X	88	96	96	86	88	X	88
	92	X	X	Dry	Dry	Dry	68	78	Dry	72	60	60	Dry	78	78	86
	92	X	X	86	X	X	96	X	X	94	96	96	90	90	X	88
	92	X	X	86	X	X	96	X	X	94	94	94	90	90	X	92
	94	X	X	88	X	X	92	X	X	80	X	X	86	X	X	86
	98	X	X	88	X	X	92	X	X	80	X	X	86	X	X	86
	98	X	X	88	X	X	90	X	X	86	X	X	88	X	X	94
	94	X	X	88	X	X	88	X	X	92	X	X	88	X	X	94
	98	X	X	92	X	X	94	X	X	92	X	X	88	X	X	86
	94	X	X	88	X	X	90	X	X	92	X	X	84	X	X	86
	92	X	X	84	X	X	80	86	X	84	X	X	82	X	X	82
	100	X	X	92	X	X	96	X	X	94	X	X	88	X	X	94
	100	X	X	80	X	X	96	X	X	94	X	X	88	X	X	94
e	100	X	X	92	X	X	90	X	X	96	X	X	88	X	X	94
	100	X	X	90	X	X	98	X	X	94	X	X	88	X	X	94
	100	X	X	92	X	X	98	X	X	94	X	X	88	X	X	94
	100	X	X	92	X	X	96	X	X	94	X	X	88	X	X	94
	100	X	X	86	X	X	92	X	X	84	X	X	86	X	X	86
	94	X	X	82	X	X	82	X	X	80	X	X	80	X	X	86
	94	X	X	86	X	X	86	X	X	80	X	X	84	X	X	X
e	94	X	X	82	X	X	88	X	X	84	X	X	80	X	X	86
	80	X	X	76	60	X	82	X	X	70	56	56	76	76	72	84
	X	X	X	X	X	90	86	X	X	96	X	X	86	X	X	84
	76	74	70	76	76	76	74	70	80	78	72	72	78	80	76	92
	72	78	72	78	76	76	72	70	80	78	72	72	78	80	76	84
	X	X	82	80	72	76	76	76	78	81	X	X	78	76	Dry	70
	98	X	X	98	X	X	98	X	X	92	X	X	88	X	X	100
nd	98	X	X	100	X	X	100	X	X	96	X	X	86	X	X	98
	92	X	X	94	X	X	100	X	X	92	X	X	90	X	X	70

	96	X	X	88	X	X	96	X	X	96	X	X	82	X	X	86
	92	X	86	70	82	X	86	X	X	80	X	X	X	76	76	84
	92	X	X	86	X	X	96	X	X	88	X	X	88	X	X	94
	86	X	X	86	X	X	90	X	X	88	X	X	88	X	X	94
	94	X	X	90	X	X	86	X	X	90	X	X	88	X	X	96
	94	X	X	86	X	X	86	X	X	90	X	X	88	X	X	96
	92	X	X	88	X	X	94	X	X	90	X	X	88	X	X	96
	92	X	X	84	X	X	90	X	X	88	X	X	88	X	X	86
	100	X	X	90	X	X	86	X	X	90	X	X	88	X	X	96
	94	X	X	88	X	X	92	X	X	90	X	X	88	X	X	96
	94	X	X	88	X	X	90	X	X	90	X	X	88	X	X	94
	84	X	X	84	X	X	88	X	X	92	X	X	86	X	X	96
	84	X	X	92	X	X	90	X	X	92	X	X	86	X	X	98
	86	X	X	X	X	X	88	X	X	92	X	X	86	X	X	98
	84	X	X	X	X	X	88	X	X	86	X	X	86	X	X	98
	78	76	88	72	84	78	82	80	86	86	X	X	86	X	X	76
	82	74	86	58	74	78	82	80	86	86	X	X	86	X	X	86
	88	X	X	84	X	X	X	X	X	X	X	X	X	X	X	X
	84	X	X	80	88	X	94	X	X	94	X	X	92	X	X	94
	94	X	X	80	90	X	94	X	X	94	X	X	92	X	X	98
	96	X	X	92	X	X	96	X	X	96	X	X	92	X	X	96
	98	X	X	80	88	X	96	X	X	94	X	X	92	X	X	98
	98	X	X	80	90	X	92	X	X	98	X	X	92	X	X	96
	80	X	X	80	90	X	94	X	X	80	X	X	92	X	X	96
a	88	X	X	X	X	X	68	82	81	78	78	78	80	X	X	72
	98	X	X	96	X	X	90	X	X	72	70	70	78	90	90	76
	98	X	X	96	X	X	94	X	X	88	X	X	78	92	92	80
	98	X	X	96	X	X	94	X	X	84	X	X	78	92	92	80
	100	X	X	96	X	X	94	X	X	82	X	X	78	92	92	80
	96	X	X	96	X	X	96	X	X	78	X	X	82	X	X	96
	94	X	X	94	X	X	96	X	X	91	X	X	82	X	X	96
	92	X	X	92	X	X	94	X	X	91	X	X	82	X	X	96
	94	X	X	94	X	X	98	X	X	94	X	X	94	X	X	100

	100	X	X	90	X	X	100	X	X	96	X	X	92	X	X	98
	100	X	X	94	X	X	94	X	X	90	X	X	82	X	X	94
	98	X	X	96	X	X	96	X	X	98	X	X	94	X	X	98
	98	X	X	100	X	X	98	X	X	94	X	X	86	X	X	98
	X	X	98	X	98	96	X	X	X	80	X	X	X	X	X	84
v	X	X	98	X	98	96	X	X	X	X	X	X	X	X	X	84
	X	X	100	X	98	96	X	X	X	X	X	X	X	X	X	84
	80	84	X	84	X	X	86	X	X	86	X	X	92	X	X	86
	86	84	X	86	X	X	92	X	X	82	X	X	92	X	X	80
	86	84	X	86	X	X	92	X	X	82	X	X	92	X	X	68
	82	98	X	92	X	X	92	X	X	92	X	X	92	X	X	86
	80	98	X	84	X	X	86	X	X	88	X	X	88	X	X	74
	80	98	X	94	X	X	94	X	X	88	X	X	88	X	X	80
	80	98	X	88	X	X	90	X	X	96	X	X	88	X	X	74
	80	98	X	88	X	X	88	X	X	88	X	X	80	X	X	74
	98	X	X	90	X	X	90	X	X	84	X	X	88	X	X	84
	98	X	X	88	X	X	88	X	X	86	X	X	90	X	X	74
	98	X	X	88	X	X	92	X	X	86	X	X	90	X	X	84
	98	X	X	90	X	X	90	X	X	84	X	X	88	X	X	92
	88	X	X	92	X	X	82	X	X	88	X	X	92	X	X	88
	90	X	X	94	X	X	86	X	X	86	X	X	92	X	X	86
	86	X	X	94	X	X	88	X	X	86	X	X	92	X	X	98
	98	X	X	96	X	X	90	X	X	86	X	X	92	X	X	98
	94	X	X	94	X	X	88	X	X	86	X	X	92	X	X	98
k	90	X	X	90	X	X	88	X	X	86	X	X	92	X	X	98
	90	X	X	86	X	X	88	X	X	86	X	X	90	X	X	90
	96	X	X	86	X	X	90	X	X	86	X	X	90	X	X	90
	96	X	X	86	X	X	90	X	X	86	X	X	90	X	X	90
	98	X	X	94	X	X	92	X	X	92	X	X	92	X	X	90
	98	X	X	88	X	X	94	X	X	86	X	X	92	X	X	90
	98	X	X	94	X	X	84	X	X	96	X	X	92	X	X	98
	96	X	X	90	X	X	92	X	X	88	X	X	92	X	X	98
	96	X	X	96	X	X	92	X	X	96	X	X	92	X	X	98
	94	X	X	94	X	X	96	X	X	96	X	X	92	X	X	98
	90	X	X	92	X	X	100	X	X	92	X	X	92	X	X	98
e	98	X	X	94	X	X	98	X	X	92	X	X	92	X	X	98
	96	X	X	96	X	X	86	X	X	88	X	X	92	X	X	98
	98	X	X	94	X	X	96	X	X	92	X	X	92	X	X	98
	96	X	X	88	X	X	94	X	X	84	X	X	92	X	X	98
	88	X	X	88	X	X	86	X	X	88	X	X	92	X	X	90
	94	X	X	92	X	X	94	X	X	96	X	X	92	X	X	80
	94	X	X	94	X	X	86	X	X	98	X	X	92	X	X	88

	98	X	X	90	X	X	90	X	X	94	X	X	92	X	X	88
	100	X	X	94	X	X	94	X	X	98	X	X	90	X	X	88
	98	X	X	94	X	X	90	X	X	96	X	X	88	X	X	88
e	94	X	X	92	X	X	90	X	X	96	X	X	92	X	X	88
	96	X	X	92	X	X	94	X	X	96	X	X	92	X	X	88
	96	X	X	98	X	X	92	X	X	94	X	X	92	X	X	88
e	94	X	X	94	X	X	90	X	X	94	X	X	92	X	X	88
	94	X	X	90	X	X	82	90	X	94	X	X	92	X	X	88
e	92	X	X	90	X	X	86	X	X	90	X	X	92	X	X	88
	90	X	X	84	X	X	90	X	X	96	X	X	92	X	X	88
	94	X	X	84	X	X	82	94	X	98	X	X	92	X	X	88
	94	X	X	84	X	X	98	X	X	96	X	X	82	X	X	90
	96	X	X	84	X	X	98	X	X	96	X	X	82	X	X	92
	98	X	X	96	X	X	96	X	X	98	X	X	90	X	X	90
	98	X	X	96	X	X	96	X	X	96	X	X	90	X	X	90
	96	X	X	96	X	X	94	X	X	98	X	X	90	X	X	90
	81	X	X	86	X	X	90	X	X	90	X	X	84	X	X	82
	94	X	X	86	X	X	88	X	X	84	X	X	84	X	X	82
	94	X	X	86	X	X	92	X	X	90	X	X	84	X	X	82
	96	X	X	92	X	X	90	X	X	90	X	X	84	X	X	82
	80	X	X	84	X	X	84	X	X	84	X	X	84	X	X	82
1	96	X	X	84	X	X	96	X	X	86	X	X	86	X	X	98
3	96	X	X	96	X	X	84	X	X	84	X	X	94	X	X	98
2	96	X	X	84	X	X	92	X	X	86	X	X	94	X	X	98
	100	X	X	88	X	X	94	X	X	94	X	X	94	X	X	98
	98	X	X	90	X	X	90	X	X	94	X	X	94	X	X	98
	84	X	X	82	X	X	90	X	X	86	X	X	94	X	X	92
	84	X	X	84	X	X	98	X	X	94	X	X	94	X	X	98
	90	X	X	90	X	X	92	X	X	94	X	X	94	X	X	98
er	X	X	X	X	Planted	X	92	X	X	100	X	X	94	X	X	98
	92	X	X	80	80	94	90	X	X	84	X	X	84	X	X	80
	98	X	X	64	82	92	84	X	X	84	X	X	84	X	X	92
	Pump off	X	78	X	X	X	80	X	X	84	X	X	84	X	X	84
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	90	X	X	88	X	X	96	X	X	84	X	X	84	X	X	94
	88	X	X	94	X	X	86	X	X	86	X	X	84	X	X	90
	92	80	80	X	72	82	80	82	80	80	X	X	81	84	84	82

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90	X	X	88	X	86	86	X	X	94	X	X	92	X	X	96
86	X	X	82	X	90	90	X	X	94	X	X	92	X	X	96
92	X	X	86	X	90	92	X	X	90	X	X	80	X	X	96
74	66	X	X	X	X	82	X	X	88	X	X	80	X	X	80
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44	74	X	X	X	X	78	X	X	88	X	X	80	X	X	82
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86	X	X	84	X	X	84	X	X	76	70	70	62	92	92	94
100	X	X	86	X	X	90	X	X	94	X	X	80	X	X	78
100	X	X	86	X	X	84	X	X	94	X	X	X	X	X	88

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	X	X	X	X	X	X	X	X	X	84	X	X	84	X	X	80
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	X	X	X	88	X	X	86	X	X	96	X	X	78	96	96	92
	X	X	X	84	X	X	86	X	X	96	X	X	98	X	X	92
	84	X	X	84	X	X	92	X	X	82	X	X	86	X	X	90
	94	X	X	86	X	X	96	X	X	86	X	X	86	X	X	92

3.4. LADWP Invasive Species Treatment and Removal

Background

The LADWP noxious-weed treatment program began in 1994 when perennial pepperweed (*Lepidium latifolium*) was initially found in the Owens Valley. Following this discovery, LADWP has focused on the control and eradication of weeds having a class "A" rating. Stipulated by the *California Department of Food and Agriculture,* this class of weeds must be eradicated or contained because of their high potential to cause either economic or environmental detriment. Currently there are three weeds found on City of Los Angeles lands in the Owens Valley that possess this rating. These weeds are pepperweed, halogeton (*Halogeton glomeratus*), and Russian knapweed (*Rhaponticum repens*). In addition to these species LADWP also treats saltcedar (*Tamarix ramosissima*). This introduced species is an aggressive colonizer throughout shorelines and riparian areas in the western states. Without control, native communities can be replaced by extensive monocultures of saltcedar resulting in decreased biodiversity, riparian process and function and overall habitat value.

2019 Pepperweed Treatment Efforts

In 2019, treatment began in April and concluded in September. Over this period, 3780 mapped acres were treated. Field crews reported a noted reduction of pepperweed cover from the previous year's efforts in the following areas: meadows in the vicinity of the Matlick and Young Ditches south of highway 395, meadows in and around China Slough and the A1-Drain south of West line Street, Big Pine Canal, and the Upper reach of the LA Aqueduct. Successes in these areas are likely the result of consistent year to year treatments involving twice annual herbicide applications or mowing and then treating with herbicide.

Each season weed crews begin in the headwaters of the Owens Valley near Pleasant Valley (PV) Reservoir progressing south along water conveyances, irrigated meadows, and water spreading areas. Pepperweed in all locations is treated with the broadleaf specific herbicide Telar. Application equipment consists of backpack sprayers for small localized populations and either a tractor with a spray boom or ATV mounted hand-sprayers for larger populations.

Due to high snowpack runoff in 2019 many low lying areas were inaccessible until late in the summer. As a result, treated acres in 2019 were less than previous years. Despite challenges due to runoff, crews were able to treat weeds from PV reservoir south to Gus Cashbaugh Lane in Bishop, south along the Big Pine canal to Big Pine, and along the upper reach of the LA aqueduct before dormancy set in (Figures 3.6-3.8).

A total of 3,780 mapped acres of pepperweed were treated in 2019 by LADWP. Pepperweed treatment will resume beginning in April, 2020 and will continue through September, 2020 using methods described above or similar.

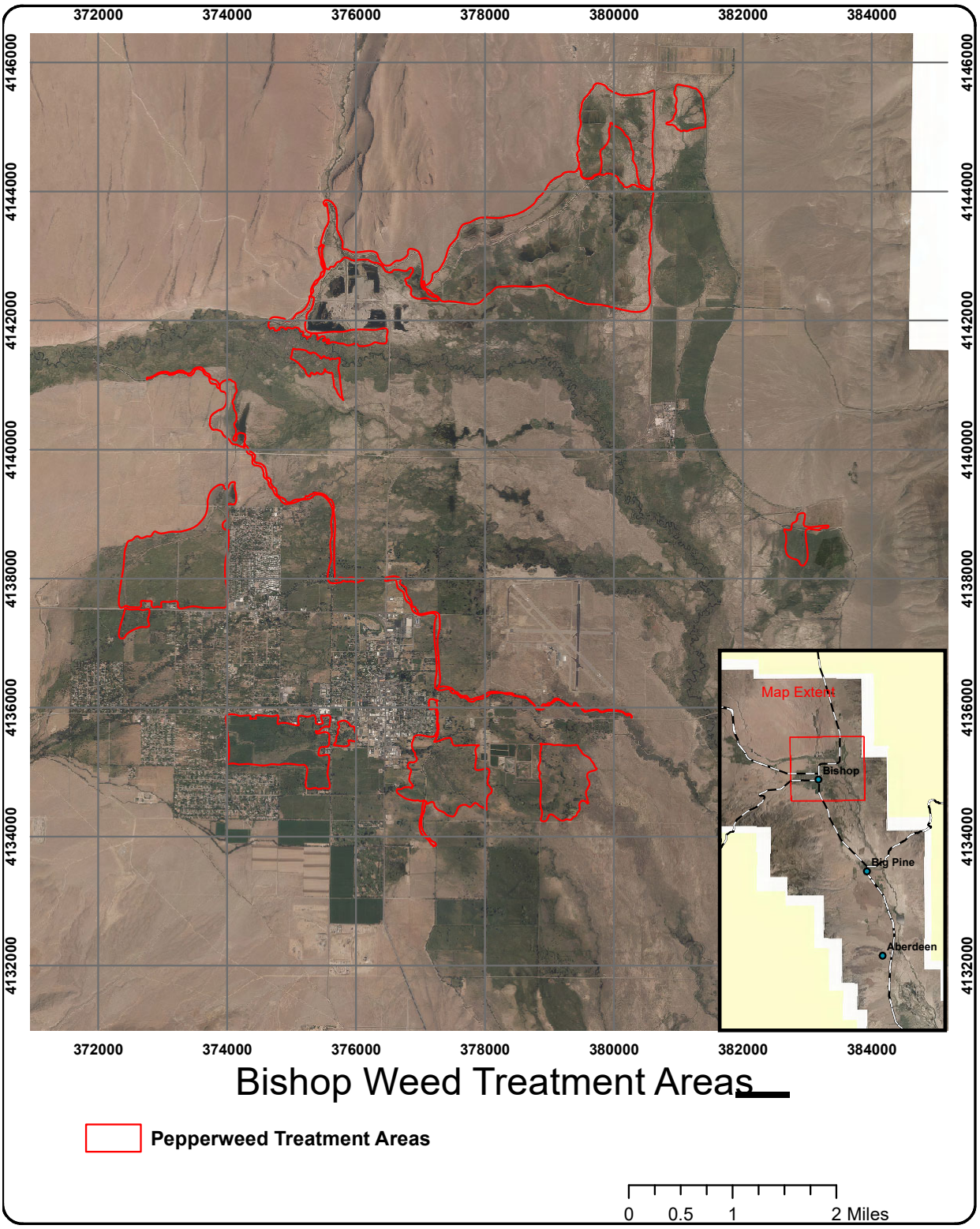


Figure 3.5. Pepperweed Treated in Bishop 2019

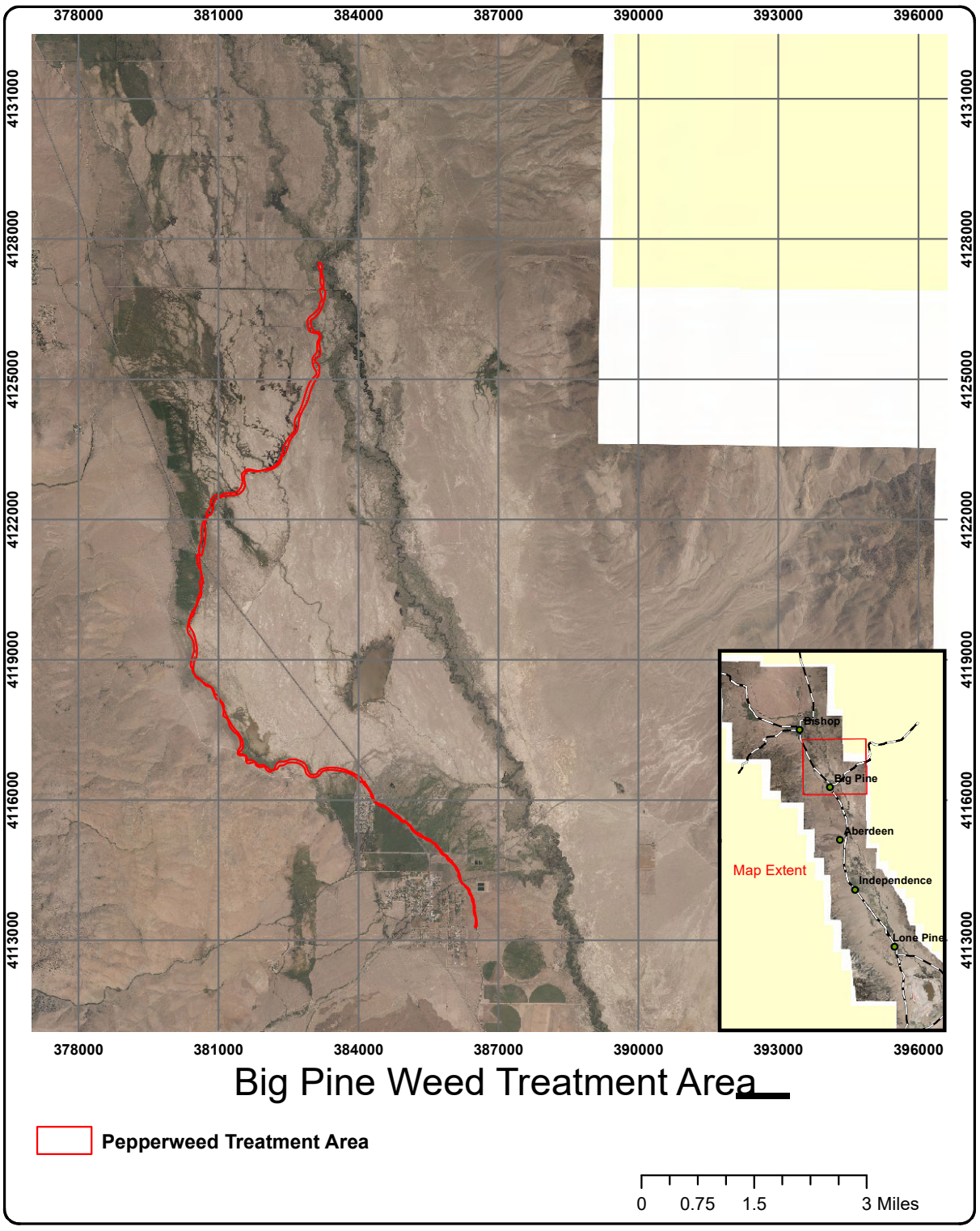


Figure 3.6. Pepperweed Treated in Big Pine 2019

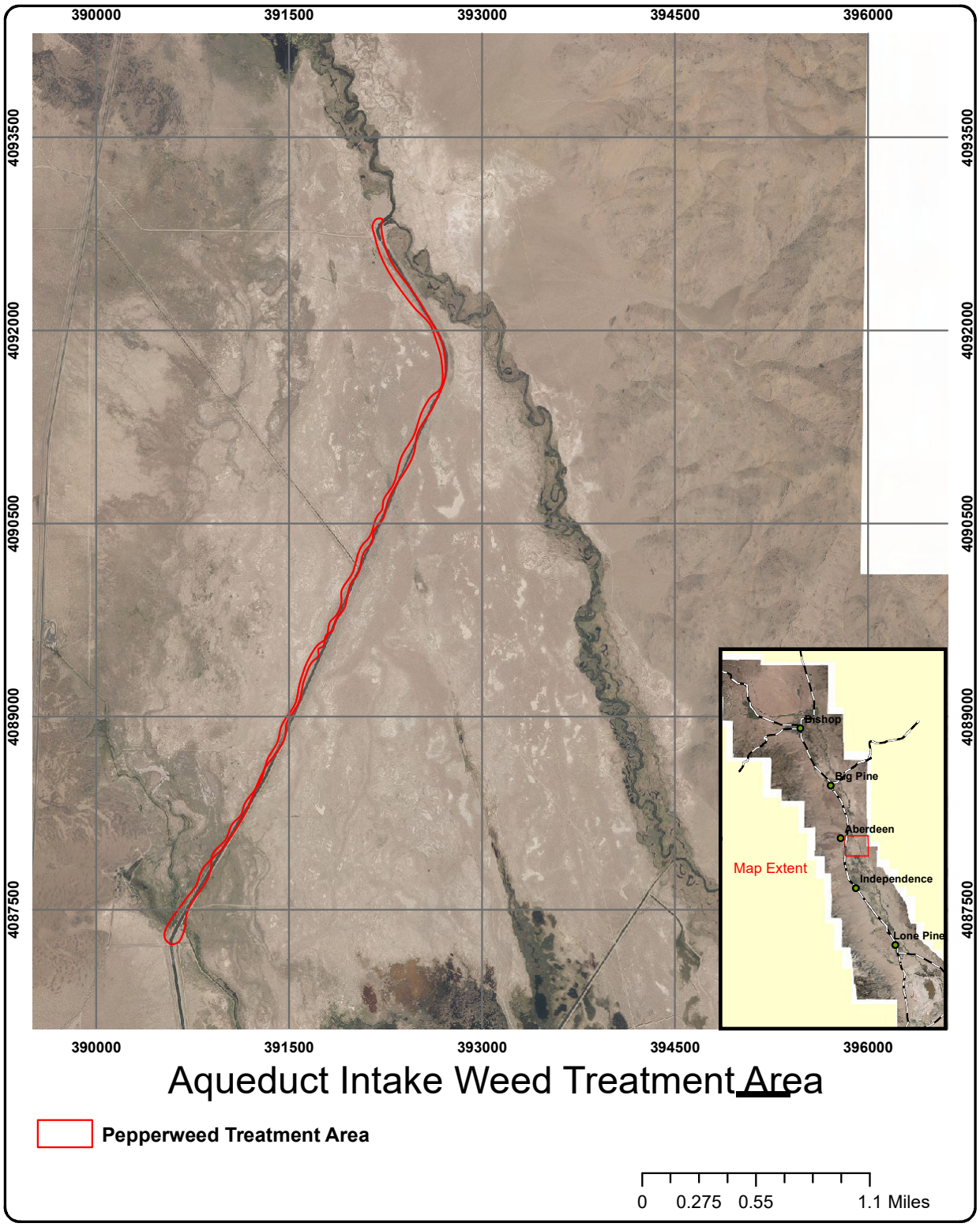


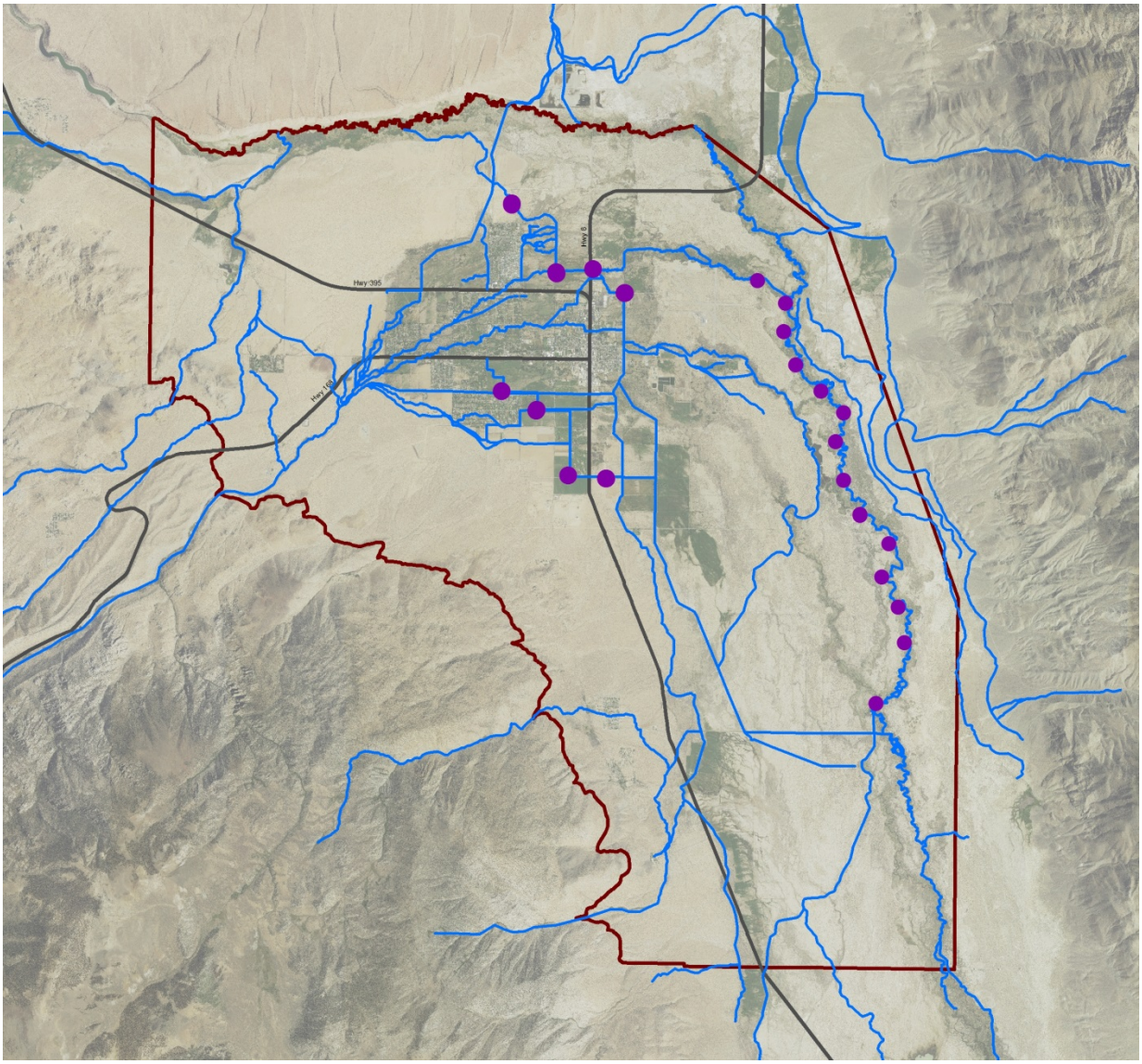
Figure 3.7 Pepperweed Treated in Aqueduct Intake 2019

2019 Saltcedar Treatment Efforts

Saltcedar treatment in 2019 was conducted exclusively within the LORP boundary. The primary treatment areas were the spreading basins north and east of Billy Lake and spreading basins southeast of Twin Lakes. Treatment locations and methods for these areas can be referenced in the 2019 Lower Owens River Project Annual Report

4.0 APPENDIX A. BISHOP CONE AUDIT

THE BISHOP CONE AUDIT
FOR THE 2018-19 RUNOFF YEAR



Inyo County Water Department
Report 2018-19
July 2019

THE BISHOP CONE AUDIT
FOR THE 2018-19 RUNOFF YEAR

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THE BISHOP CONE AUDIT
FOR THE 2018-19 RUNOFF YEAR

1.0 INTRODUCTION

The Bishop Cone Audit (Audit) is an annual comparison between Los Angeles Department of Water and Power's (LADWP) water usage on Los Angeles-owned lands on the Bishop Cone and its amount of groundwater extraction from wells on the Bishop Cone. The Bishop Cone Audit is required by the Inyo County/Los Angeles Long-term Groundwater Management Agreement (Water Agreement). The "Bishop Cone" is a reference to the legally defined area in the 1940 Hillside Decree which incorporates most of the Bishop Creek alluvial fan along with a portion of the northern Owens Valley from Bishop south towards Big Pine (Map 1). The Water Agreement and the Green Book (the technical appendix to the Water Agreement) define the terms, conditions, and procedures of the Bishop Cone Audit. Inyo County Water Department (ICWD) staff compiles the Bishop Cone Audit from data provided by LADWP. The Audit sums pumping and flowing well amounts and compares those totals to water use on Los Angeles-owned land during a given runoff year (April 1 to March 31) to determine whether LADWP's groundwater extractions exceed its surface water uses on the Bishop Cone.

2.0 BACKGROUND

The City of Los Angeles owns prior appropriative surface water rights in the Bishop area. Los Angeles also owns groundwater rights on the Bishop Cone as a consequence of its ownership of overlying land. A system of ditches and canals exist to convey both surface water from Bishop Creek and the Owens River and also groundwater pumped from LADWP wells to irrigated land throughout the Bishop Cone with some water exiting the Cone. In 1930 and 1931, Los Angeles extracted groundwater from wells on the Bishop Cone for the purpose of export to Los Angeles. This export of groundwater was challenged by local residents, and in the 1940 Hillside Decree, Los Angeles agreed not to pump groundwater for the purpose of export off the Bishop Cone.

Relevant language of the 1940 Hillside Decree is presented below (a link to the entire decree can be found at the ICWD's website at www.inyowater.org/documents/hillside-decree-1940/):

XI

That the defendants [LADWP]*, their servants, agents, employees, and assigns, and each of them, be, and they are hereby, enjoined, prohibited, and restrained from in any manner whatsoever pumping, extracting, taking, or transporting out of the Bishop Cone area any subterranean waters from beneath said area: provided, however, that nothing in this judgment contained shall in any manner enjoin, prohibit, or restrain the defendants, their servants, agents, employees, assigns, or any of them, from maintaining or operating their presently–existing drainage ditches to the full extent of their present normal capacity, or from taking artesian water that may arise to the surface of said area outside the casings of any of defendants' capped wells, or from pumping, extracting, taking, or using any such water as may be reasonably necessary for beneficial use upon any lands belonging to the defendants, …..*

In 1972, Inyo County filed a California Environmental Quality Act suit claiming that increased groundwater pumping by LADWP was harming the environment of the Owens Valley and demanding that an Environmental Impact Report (EIR) be completed to analyze the effects of this increased pumping. After numerous legal challenges and negotiations, in 1991 an EIR was approved for LADWP's groundwater pumping and a long term groundwater management plan was agreed upon by Inyo County and LADWP. Section VII.A of the 1991 Water Agreement addresses the Bishop Cone and Hillside Decree with relevant language quoted below (full text of the 1991 EIR, the Water Agreement and the Greenbook can be found at the ICWD's website at http://www.inyowater.org/documents/governing-documents/):

"*Before the Department* [LADWP] *may increase groundwater pumping above present levels, or construct any new wells on the* [Bishop] *Cone, the Technical Group must agree on a method for determining the exact amount of water annually used on Los Angeles-owned lands on the Cone. The agreed upon method shall be based on a jointly conducted audit of such water uses. The Department's annual groundwater extractions from the Cone shall be limited to an amount not greater than the total amount of water used on Los Angeles-owned lands on the cone during that year*." (Water Agreement Section VII.A, Appendix A)

At its October 17, 1995 meeting, the Technical Group agreed to recommend to the Inyo County/Los Angeles Standing Committee the description of a Bishop Cone Audit procedure to be incorporated into the Green Book. The Standing Committee adopted the agreed-upon Bishop Cone Audit procedure on November 7, 1996 as Section IV.D of the Green Book.

Section IV.D.1.a. of the Green Book states: *"For the purposes of the Bishop Cone audit, water usage on Los Angeles-owned land on the Bishop Cone is defined as the quantity of water supplied to such land, including conveyance losses, less any return flow to the aqueduct system. Water usage is documented on a runoff-year basis and is compiled by LADWP each May in the Bishop Area Water Use Report* [Bishop Cone Audit Uses Report]*."* (Appendix B)

In theory compliance with the Water Agreement and the Green Book is simple: LADWP can only extract groundwater to be used on its lands and leases on the Bishop Cone with no flow leaving the system. In a simplified, hypothetical situation, LADWP would have groundwater extraction wells at the "top" of the cone which would provide surface water to ditches running downhill to its lands and leases. Upon reaching the "lowest" land, no surface water would leave. However, there are many practical factors that dictate and complicate how the Bishop Cone Audit accounts for LADWP extractions and uses. Some of these factors are: the Bishop Cone topography (generally sloping west to east in the Bishop area, and north to south from Bishop towards Big Pine), the location of LADWP-owned lands throughout the Bishop Cone area, the location of LADWP's groundwater extraction wells (in central Bishop), the location of LADWP's flowing wells (east of Bishop adjacent to the Owens River), the location of the various ditch and canal systems used to convey water in the Bishop Cone, and operational necessities for conveying surface water both on and off the Bishop Cone.

To illustrate further, the primary source of water available for use on LADWP lands in the topographically higher west Bishop area of the cone is LADWP surface water from Bishop Creek that is diverted into various ditches for irrigation (use) on LADWP-owned land. Groundwater pumped from LADWP wells in central Bishop supplements the remaining Bishop

Creek surface water. The now combined surface and groundwater flows east and south and is used on LADWP land in the central and southern portions of the Cone. Groundwater extracted from flowing wells provides water to the Owens River for export. Some mixture of surface and groundwater also leaves the Bishop Cone either in canals or the Owens River.

Prior to the adoption of the Water Agreement, several methods were researched to determine the best procedure for tracking LADWP's uses and extractions on the Bishop Cone. A final method was selected which compares the sum of pumped groundwater from production wells and flowing groundwater from artesian wells (extractions) to surface water applied to LADWP-owned lands on the Cone (uses). To determine the total uses, a lease-wise approach was selected which tracks the difference between water coming onto a given LADWP lease and the water (if any) that exits that lease to return to the conveyance system (ditch, canal, creek or river). LADWP supplies a listing of surface water uses by each individual lease account in its annual Bishop Cone Audit Uses Report (Use Report). Credit for a use is granted on accounts that have been agreed to and inspected by ICWD staff. A combination of monitoring devices are used to track extractions and uses on the Bishop Cone, including flumes, weirs, and propeller meters. Flow measurements are taken either manually or continuously using data-logging devices at these devices.

It is important to note that the Bishop Cone Audit does not attempt to compute a complete surface or groundwater budget. Its purpose is to monitor compliance with the dictates of the Water Agreement, the Green Book, and the legal interpretations of the Hillside Decree. The Audit compares LADWP's total water uses to groundwater extractions during a given runoff year. ICWD staff gave a presentation on the Bishop Cone Audit to the Inyo County Water Commission on December 7, 2016, explaining the principles of the BCA in detail. A copy of the PowerPoint presented at the ICWC meeting can be found on the ICWD website: http://www.inyowater.org/wp-content/uploads/2016/12/Bishop-Cone-Audit-12_7_16.pdf

3.0 WATER USES ON LADWP-OWNED LAND ON THE BISHOP CONE

The location of the Bishop Cone and the pumping and flowing wells on the Bishop Cone are shown in Map 1. Also shown on Map 1 are the general locations of the LADWP-owned lease accounts used in the Bishop Cone Audit Uses Report (Appendix C).

Table 1 (below) is a compilation of water usage by account number in acre-feet (AF) on LADWP-owned land on the Bishop Cone for the runoff years of 2017-18 and 2018-19. These water-usage amounts are a yearly total of the surface water coming onto a given lease minus the surface water leaving the lease. Overall, there was a decrease in total water use on the Bishop Cone of 19,448 AF from 2017-18 (Use: 46,440) to 2018-19 (Use: 26,992). Due to the exceptional 2017-18 runoff year which was 200% of the long-term average, LADWP conducted extensive operational spreading on the Bishop Cone and other areas. This resulted in many accounts receiving substantially more water than normal years. The 2018-19 runoff year was close to average and water use reverted to more normal amounts.

TABLE 1
WATER USES ON LOS ANGELES-OWNED LAND ON THE BISHOP CONE

LADWP ACCOUNT NUMBER *2	RUNOFF YEAR*1 2017-2018 (AF)	RUNOFF YEAR*1 2018-2019 (AF)
BC502B (BA354B or BA362B)	781	620
BC302A	174	133
BC302B	2011	1236
BC311	5097	3303
BC313	1358	918
BC324	1660	1437
BC1478 (BAICR) *2	385	505
BC387A	1708	529
BCRECF	837	453
BC339	1111	394
BC393	160	94
BC362D	(No Credit) *3	(No Credit) *3
BC304	210	238
BC500	2175	1071
BC397 (BA387B) *2	6991	2839
BC361A	1921	1634
BC361B	2563	2047
BC502A (BA354A or 362A) *2	1193	1000
BCRECA	1830	943
BCRECC	223	151
BCRECD	3546	2351
BC338	5594	3083
BCOPRB	2301	162
BCLAEMH	1125	440
BC353	16	351
BC005A	41	36
BC005B	412	77
BC006A	99	97
BC1479 (BA342) *2	15	48
BC392	(No Credit) *3	(No Credit) *3
BC301	592	541
BC335	311	261
BCRVRECA	(No Credit) *3	(No Credit) *3
TOTAL	**46,440**	**26,992**

*1 - A runoff year is defined as starting April 1st and ending March 31st of the following year.

*2 – Former account names listed in parenthesis; in 2015/16 “BA” prefix was changed to “BC”

*3 - Accounts need additional monitoring or diversion infrastructure to establish credit.

During fall 2016 through winter 2017, joint field visits to the active BCA accounts were conducted by ICWD and LADWP staff. Based on these visits and as a result of observations and discussion of past infrastructure workings, several accounts were either granted or denied credit for the 2016/17 Audit. The accounts denied credit for 2016/17 were: BC362D, BC392, and BCRVRECA. At these three sites, ICWD staff deemed there to be insufficient flow monitoring, potentially allowing unmetered water to affect the accounts without proper quantification. ICWD staff visited BCA accounts in 2018-19 and no additional flow monitoring devices have been installed at these accounts. Therefore, BC362D, BC392, and BCRVRECA were not granted credit in the current year.

Also based on the 2016/17 field inspections, the method for calculating Use on a given account for the purpose of the BCA was changed. Prior to 2015/16, LADWP used Stockwater and Ditch Loss as credits to its lessees to distinguish between surface water used for irrigation and not used for irrigation. However, the Audit's water balance is to determine the total amount of water used on the Bishop Cone between metering devices. The Audit is not specifically concerned with how the water is used (stockwater or irrigation). Stockwater is simply water supplied to a parcel during the year for the purpose of providing surface water to stock instead of irrigation to grow plants; it is a distinction made by LADWP for the lessees but is a "Use" for the purpose of the Audit with properly metered water flowing through diversions onto an account and not exiting the account. Ditch Loss is a similar accounting distinction made by LADWP and its lessees; it is an estimation of the water that seeps into the ground from the Account's metering device prior to arriving at the actual surface water diversion point on the lease (these are sometimes large distances apart). The Ditch Losses are credited to the lessee to reflect water that cannot be used for irrigation. This water, however, is a Use for purposes of the BCA. The Stockwater and Ditch Loss estimates from previous BCA's (prior to 2015/16) have been replaced with the more rigorous and accurate calculation of subtracting flow onto each account from flow off of that account.

The data reporting format used by LADWP for the BCA has also been updated with approval from ICWD staff. The updated Use Report contained in Appendix C has been simplified by removing LADWP's internal, lessee-related notations. The new Use Report now contains totals of water entering and leaving a lease (the pertinent information for conducting the Audit). All flow monitoring stations were inspected during the 2016/17 field campaign.

Finally, ICWD staff continues to receive the previous LADWP version of the Use Report to check for historic consistency. The changes in adding Stockwater and Ditch Loss credits for BCA reporting are the primary reason 2015-16 Uses were substantially greater than 2014-15 Uses. The additional increase in Use between 2015-16 and 2016-17 is primarily due to increased surface water availability due to a moderately wet runoff year combined with operational spreading in early 2017. The increase in use from 2016-17 to 2017-18 is due to heavy runoff following the historic winter (appx. 200% of long-term average). As noted previously, LADWP actively spread surface water throughout the Owens Valley; and a significant amount of surface water was spread throughout the Bishop Cone.

4.0 TOTAL LADWP GROUNDWATER EXTRACTION ON LADWP-OWNED LAND ON THE BISHOP CONE FOR RUNOFF YEARS 2017-18 AND 2018-19

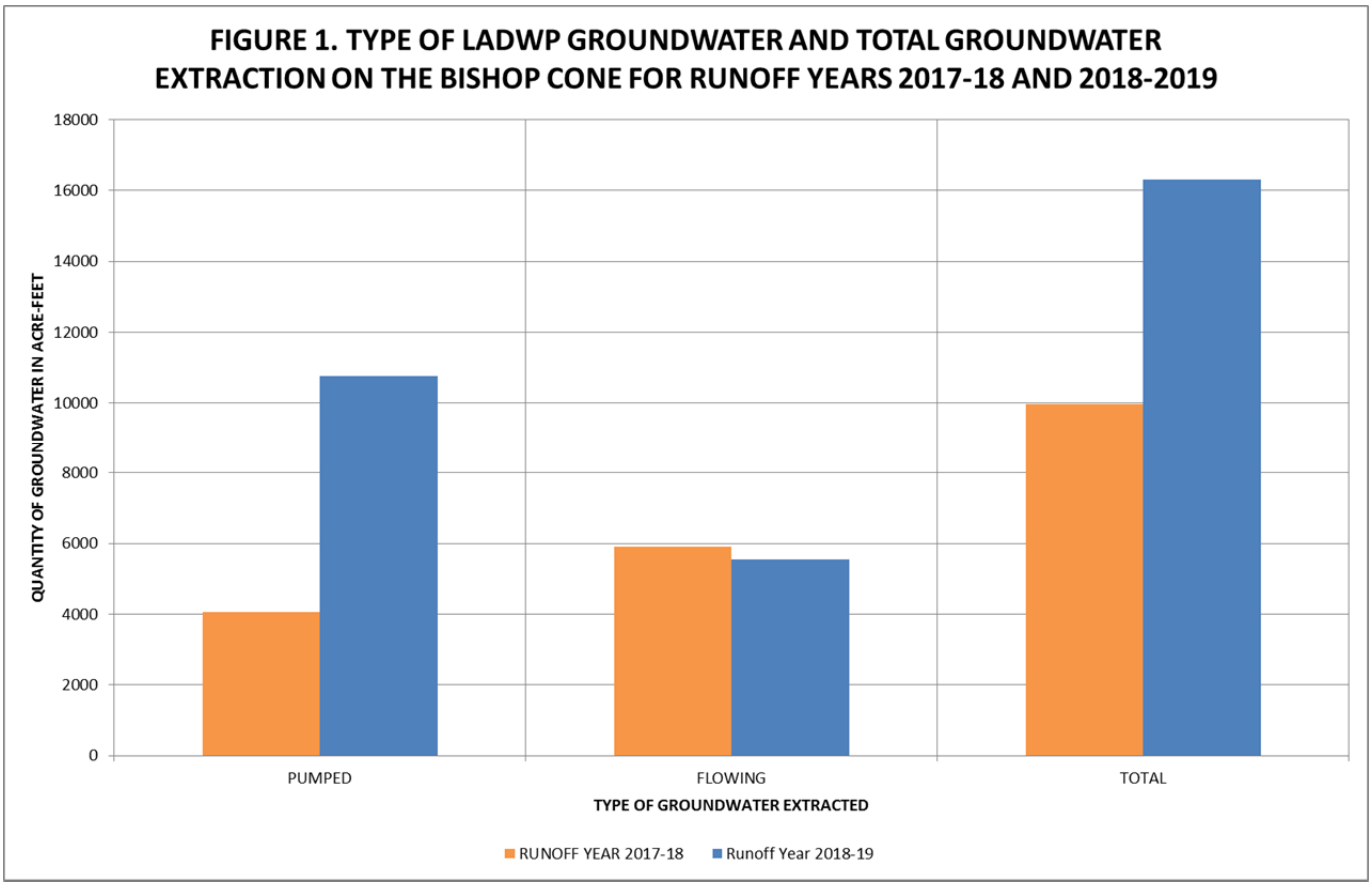
Section IV.D.1.d of the Green Book states: "*Total groundwater extraction by LADWP will be compared with corrected water usage on the Bishop Cone for the runoff year. Total groundwater extraction is defined as the sum of all groundwater pumped by LADWP plus the amount of artesian water that flowed out of LADWP uncapped wells on the Bishop Cone during the runoff year*." (Appendix B)

Figure 1 (below) presents the total amount LADWP groundwater extraction and the groundwater extraction classified as flowing and pumped groundwater on the Bishop Cone in acre-feet for runoff years of 2017-18 and 2018-19.

For runoff year 2017-18, LADWP extracted 9,972 AF of groundwater (4,061 AF from pumped wells and 5,911 AF from flowing wells). For runoff year 2018-19, LADWP extracted 16,297 AF of groundwater (10,751 AF from pumped wells and 5,546 AF from flowing wells).

LADWP groundwater extractions on the Bishop Cone for the 2018-19 runoff year increased by 6,325 AF compared to the previous year due to a return to more typical pumping amounts.

FIGURE 1. TYPE OF LADWP GROUNDWATER AND TOTAL GROUNDWATER EXTRACTION ON THE BISHOP CONE FOR RUNOFF YEARS 2017-18 AND 2018-2019



Flowing and pumped groundwater on the Bishop Cone are broken into detail by each well in Table 2.

TABLE 2
FLOWING AND PUMPED GROUNDWATER BY WELL ON THE BISHOP CONE IN RUNOFF YEAR 2018-19

WELL	FLOWING GROUNDWATER (AF)	PUMPED GROUNDWATER (AF)
F121	54	NA
F122	74	NA
F123	340	NA
F125	1210	NA
F126	380	NA
F127	443	NA
F128	302	NA
F129	128	NA
F130	428	NA
F131	640	NA
F132	401	NA
F133	350	NA
F134	675	NA
F136	122	NA
W140	NA	1406
W371	NA	970
W406	NA	1183
W407	NA	977
W408	NA	1093
W410	NA	2424
W411	NA	1361
W412	NA	1338
TOTAL	**5,546**	**10,751**

5.0 COMPLIANCE WITH THE INYO COUNTY/LOS ANGELES LONG-TERM GROUNDWATER MANAGEMENT AGREEMENT

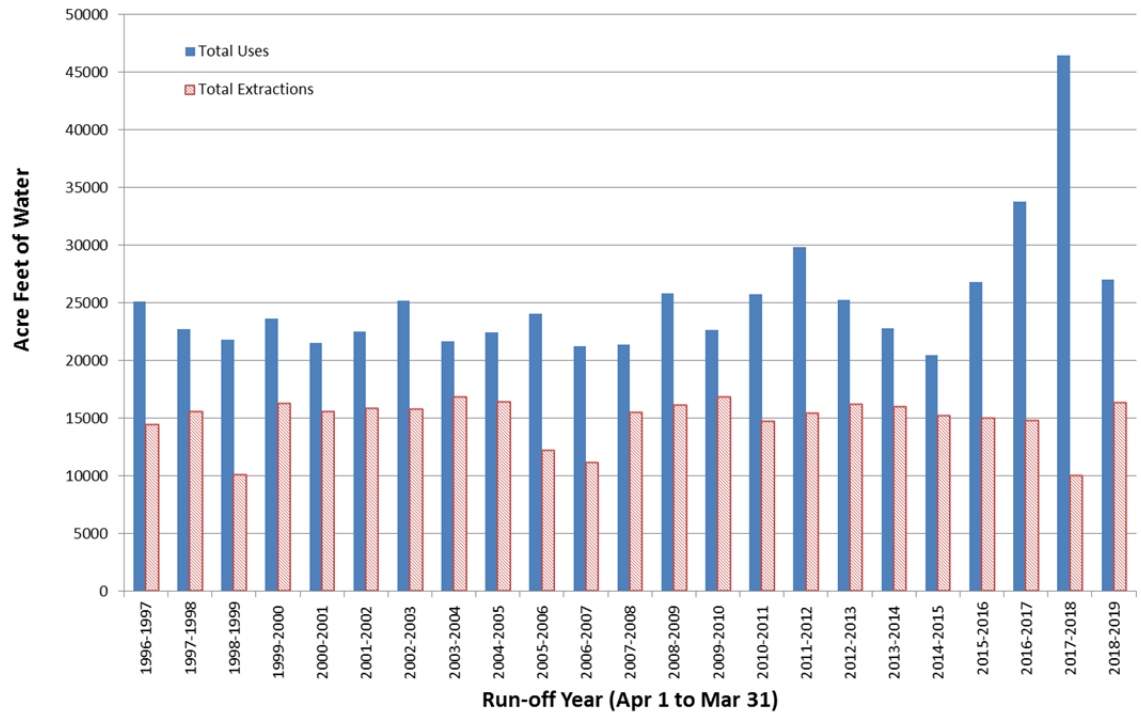
The Water Agreement provides that, during any runoff year, total groundwater extraction by LADWP on the Bishop Cone shall not exceed water usage on Los Angeles-owned land on the Cone. Table 3, below, shows that LADWP was in compliance with the above provision for runoff years 2017-18 and 2018-19 as the total uses on the Bishop Cone exceeded the total groundwater extractions for each year.

TABLE 3
LADWP USES IN COMPARISON TO LADWP GROUNDWATER EXTRACTION ON THE BISHOP CONE

	RUNOFF YEAR 2017-18 (AF)	RUNOFF YEAR 2018-19 (AF)
TOTAL USES	46,440	26,992
TOTAL GROUNDWATER EXTRACTION	9,972	16,297
USES MINUS EXTRACTIONS	36,468	10,695
IN COMPLIANCE?	YES	YES

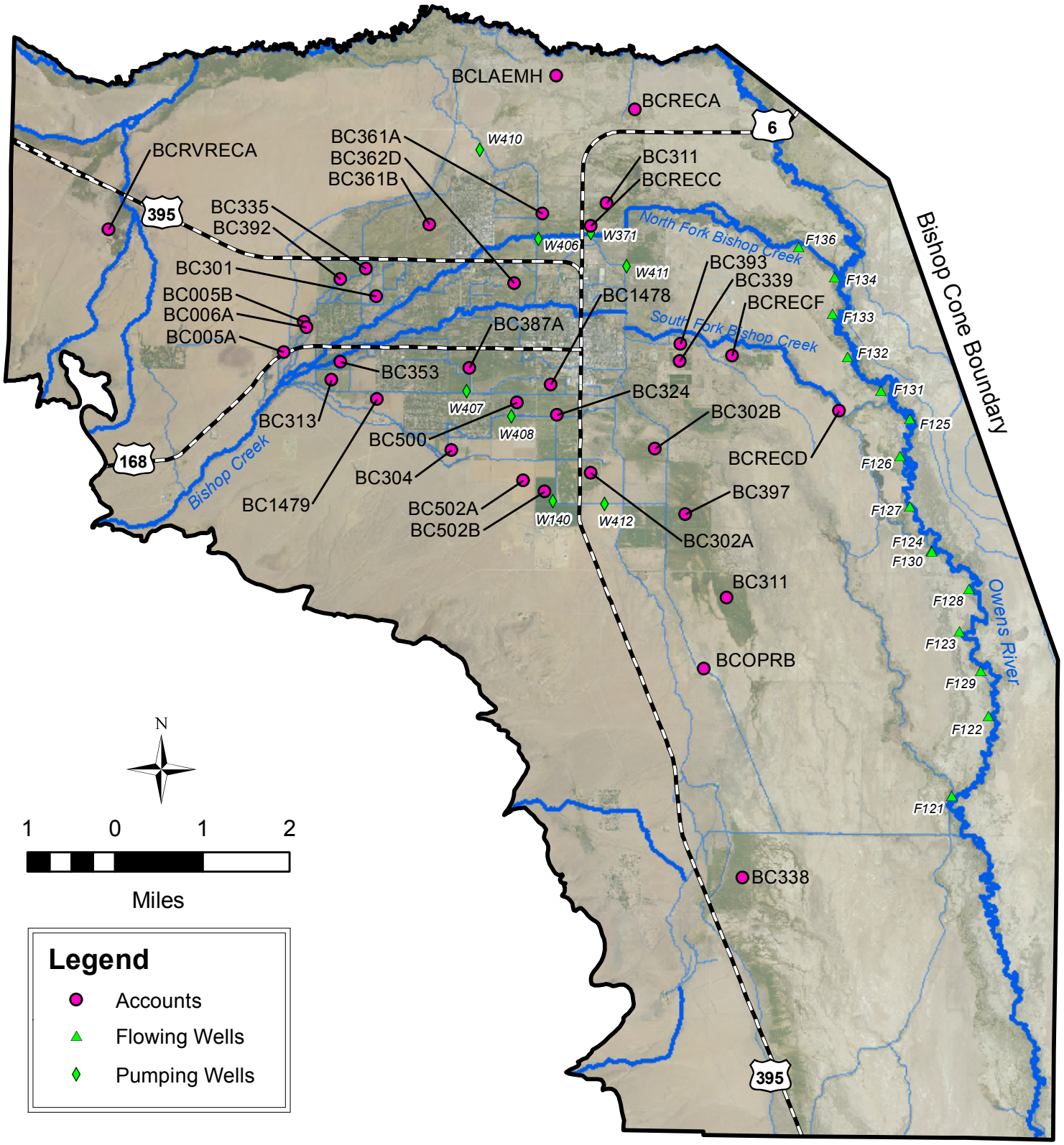
Figure 2 presents LADWP's water uses versus extractions since runoff year 1996-97. Uses have exceeded extractions throughout the data period; therefore, LADWP has been in compliance with Section IV.D.1.a. of the Green Book and the Water Agreement.

FIGURE 2
WATER USES VERSUS EXTRACTIONS ON THE BISHOP CONE



Note: starting in 2015-16, Total Use computation was clarified and simplfied (see full explanation in Section 3) and some Uses that were denied credit in previous Bishop Cone Audits were effectively granted credit

Map 1. Bishop Cone Audit Features



APPENDIX A

Section VII.A of the Inyo County/Los Angeles Long-Term Groundwater Management Agreement

Section VII of the Agreement

VII. GROUNDWATER PUMPING ON THE BISHOP CONE

A. Any groundwater pumping by the Department on the "Bishop Cone" (Cone) shall be in strict adherence to the provisions of the Stipulation and Order filed on the 26th day of August, 1940, in Inyo County Superior Court in the case of Hillside Water Company, a corporation, et al. vs. The City of Los Angeles, a Municipal Corporation, et al., ("Hillside Decree").

Before the Department may increase groundwater pumping above present levels, or construct any new wells on the Cone, the Technical Group must agree on a method for determining the exact amount of water annually used on Los Angeles-owned lands on the Cone. The agreed upon method shall be based on a jointly conducted audit of such water uses.

The Department's annual groundwater extractions from the Cone shall be limited to an amount not greater than the total amount of water used on Los Angeles-owned lands on the Cone during that year. Annual groundwater extractions by the Department shall be the total of all groundwater pumped by the Department on the Cone, plus the amount of artesian water that flowed out of the casing of uncapped wells on the Cone during the year. Water used on Los Angeles-owned lands on the Cone, shall be the quantity of water supplied to such lands, including conveyance losses, less any return flow to the aqueduct system.

B. The overall management goals and principles and the specific goals and principles for each vegetation classification of this Stipulation and Order apply to vegetation on the Cone.

APPENDIX B

Section IV.D of the Green Book

COPY FOR YOUR INFORMATION

AGENDA ITEM 4

MEMORANDUM

7 November 1996

TO: Inyo County/Los Angeles Standing Committee
FROM: Inyo County/Los Angeles Technical Group

CONSIDERATION OF GREEN BOOK SECTION DESCRIBING THE BISHOP CONE AUDIT

Background

Section VII.A of the Inyo County/Los Angeles long-term water management agreement provides that "before the Department may increase groundwater pumping above present levels, or construct any new wells on the [Bishop] Cone, the Technical Group must agree on a method for determining the exact amount of water annually used on Los Angeles-owned lands on the Cone. The agreed upon method shall be based on a jointly conducted audit of such water uses."

At its 17 October 1995 meeting, the Technical Group agreed to recommend to the Inyo County/Los Angeles Standing Committee the attached description of a Bishop Cone audit to be incorporated into the Green Book (the technical appendix to the long-term agreement).

Request

The Technical Group requests that the Standing Committee adopt the attached description as section IV.D of the Green Book.

D. Bishop Cone Audit

This sub-section describes the procedures for conducting the Bishop Cone audit in accordance with Section VII.A of the Agreement. The Bishop Cone audit is an annual accounting of LADWP groundwater extraction and water usage on Los Angeles-owned land on the Bishop Cone. The Agreement provides that, during any runoff year, total groundwater extraction by LADWP on the Bishop Cone shall not exceed water usage on Los Angeles-owned land on the Cone. The area defined as the Bishop Cone is shown as Figure IV.D.1.

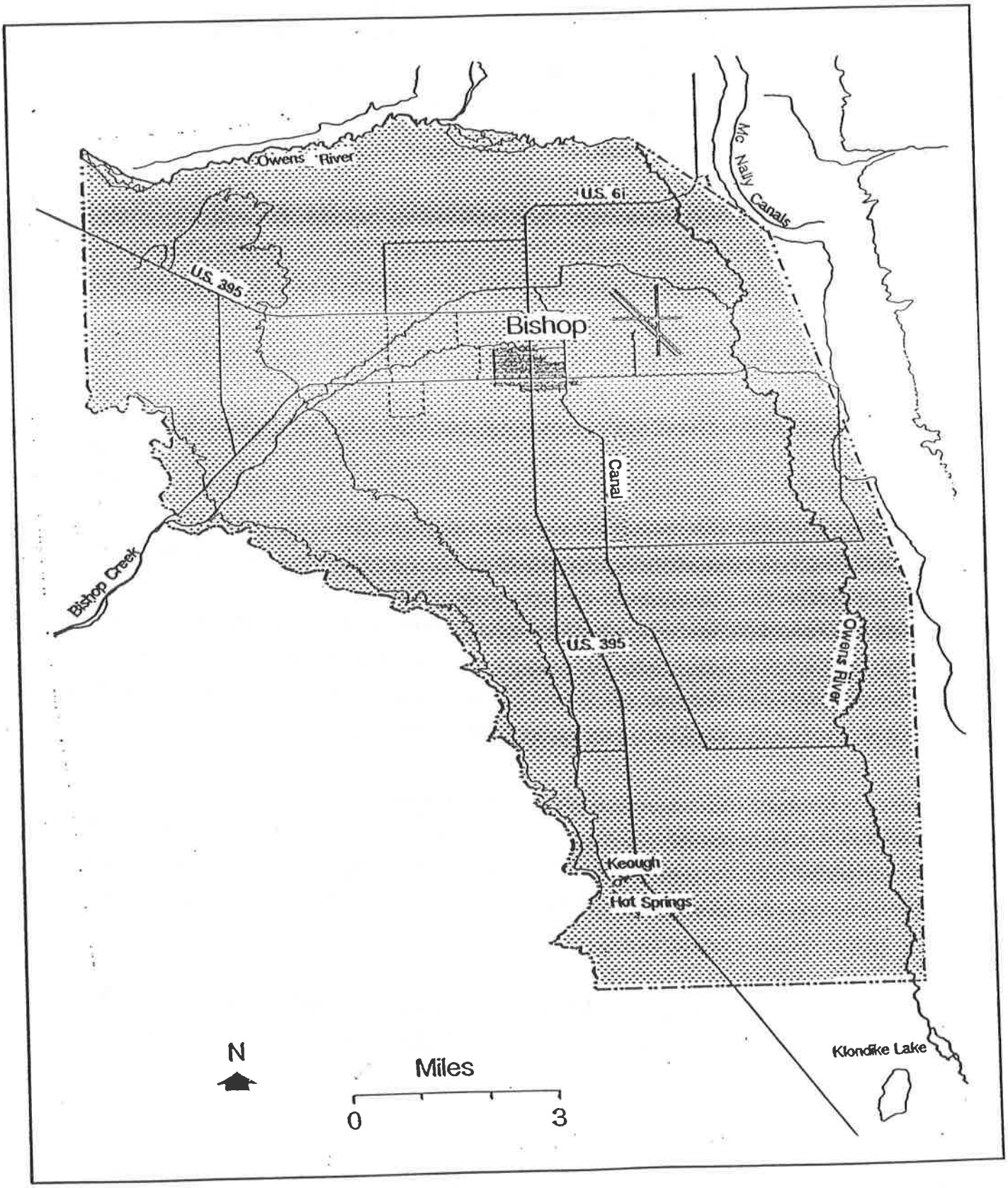
1. Procedures for Conducting the Bishop Cone Audit

a. For the purposes of the Bishop Cone audit, water usage on Los Angeles-owned land on the Bishop Cone is defined as the quantity of water supplied to such land, including conveyance losses, less any return flow to the aqueduct system. Water usage is documented on a runoff-year basis and is compiled by LADWP each May in the Bishop Area Water Use Report. At the conclusion of each runoff year, LADWP will forward the final water use report for the runoff year to Inyo County.

b. The final water use report will be compared for consistency with the previous year's report. If measuring stations have been added or removed from the water-use report during the year, or if a significant change in the pattern of water usage occurs (for example, an account that has not received water for one year receives a

FIGURE IV.D.1

Bishop Cone Boundary



considerable amount the next year), the location will be field-checked. The field-check will evaluate whether changes in water usage warrant the changes noted in the report. If a change is made in the method of delivery to or return from an account that results in an overestimation of uses on the Bishop Cone, water usage for that account will not be credited to the total uses for the audit.

c. Water usage for accounts BAIND (Bishop Indian Reservation), BA391 (outside of Bishop Cone boundary), and BAWEST (West Bishop private uses) will be subtracted from the total reported water usage.

d. Total groundwater extraction by LADWP will be compared with the corrected water usage on the Bishop Cone for the runoff year. Total groundwater extraction is defined as the sum of all groundwater pumped by LADWP plus the amount of artesian water that flowed out of uncapped wells on the Bishop Cone during the runoff year. During any runoff year, total groundwater extraction by LADWP on the Bishop Cone shall not exceed water usage on Los Angeles-owned land on the Cone.

e. A draft report summarizing the results of the Bishop Cone audit will be prepared annually as an Inyo County Water Department report and will be submitted to the Technical Group in June for a 30-day review.

f. A final Bishop Cone audit report will be submitted in July to the Technical Group, the Standing

Committee, the Inyo County Board of Supervisors, and the Inyo County Water Commission.

LADWP will notify Inyo County of any changes in the status, location, or operation of any measuring station used to conduct the Bishop Cone audit at the time the final Bishop Area Water Use Report is submitted to the County. LADWP will also notify the County of any changes in the boundaries of the accounts included in the audit.

Upon request by Inyo County, LADWP will provide measuring station data for accounts included in the audit to assist the County in verifying water usage for individual accounts.

APPENDIX C

Data on Uses and Total Groundwater Extracted on the Bishop Cone
(Supplied by LADWP)

2018/19 RUNOFF YEAR BISHOP CONE PUMPING WELL TOTALS

(ACRE-FEET)

	2018									2019			
WELL	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	TOTAL
W140	205	209	200	203	202	194	194	0	0	0	0	0	1406
W371	91	93	55	70	95	90	95	92	95	94	85	13	970
W406	208	214	168	208	203	182	0	0	0	0	0	0	1183
W407	163	171	164	152	167	159	0	0	0	0	0	0	977
W408	187	193	178	179	185	172	0	0	0	0	0	0	1093
W410	243	260	4	183	250	241	248	240	247	249	224	35	2424
W411	245	255	151	219	254	237	0	0	0	0	0	0	1361
W412	240	251	148	216	248	235	0	0	0	0	0	0	1338
TOTAL	1582	1645	1069	1430	1604	1511	537	332	342	343	309	48	10751

2018/19 RUNOFF YEAR BISHOP CONE FLOWING WELL TOTALS

(ACRE-FEET)

	2018									2019			
WELL	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	TOTAL
F121	3	3	3	4	6	6	6	6	6	6	5	1	54
F122	6	8	9	7	6	6	5	5	5	6	6	5	74
F123	16	17	19	21	27	30	37	42	44	42	33	13	340
F124	0	0	0	0	0	0	0	0	0	0	0	0	0
F125	107	93	90	98	104	107	113	108	102	97	88	103	1210
F126	33	39	32	31	33	31	31	30	31	31	28	31	380
F127	35	37	35	39	35	33	34	33	34	39	46	42	443
F128	26	26	25	27	25	25	25	28	24	24	21	26	302
F129	6	8	15	10	9	8	14	11	16	14	9	9	128
F130	36	36	35	37	35	33	37	36	36	35	34	39	428
F131	64	64	68	57	53	51	52	51	56	51	33	39	640
F132	37	37	37	35	37	36	32	27	29	31	30	32	401
F133	33	33	31	30	28	26	27	26	28	30	27	31	350
F134	60	64	61	55	54	53	52	52	54	55	52	63	675
F136	15	15	11	7	6	5	8	9	9	11	11	16	122
TOTAL	479	482	471	458	456	449	472	463	475	471	422	448	5546

LOS ANGELES DEPARTMENT OF WATER AND POWER
NORTHERN AQUEDUCT OPERATIONS
RUNOFF YEAR 2018-19

BISHOP CONE AUDIT RUNOFF SUMMARY
IN ACRE-FEET

STAID	STATION NAME	+/-	2018 APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	2019 JAN	FEB	MAR	TOTAL APR-MAR
3049	#161 OTEY		60	98	80	72	77	36	36	48	58	43	50	52	710
3377	OTEY DITCH RETURN AT MATLICK DITCH	(-)	56	97	73	66	61	32	35	45	57	45	51	57	675
BC005A			**4**	**2**	**7**	**6**	**16**	**4**	**2**	**3**	**1**	**-2**	**-2**	**-5**	**36**
3378	OTEY DITCH DIV. ABOVE MATLICK DITCH		17	7	6	18	20	9	0	0	0	0	0	0	77
BC005B			**17**	**7**	**6**	**18**	**20**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**77**
3048	#61-A FRANK ROUFF		53	83	102	101	57	39	27	26	25	22	20	39	594
3063	DUGGAN DITCH FLOW THROUGH	(-)	46	71	89	88	46	31	21	20	19	16	15	33	495
BC006A			**6**	**12**	**13**	**12**	**10**	**8**	**6**	**6**	**6**	**6**	**6**	**6**	**97**
3002	GEORGE DITCH W. OF SUNLAND AVENUE		78	67	81	57	87	63	47	22	43	26	22	34	627
3264	NORTH INDIAN DITCH BELOW A-1 DRAIN B3A		66	191	206	181	304	239	92	61	39	23	37	16	1455
3068	GEORGE DITCH C-3	(-)	53	50	43	38	54	44	39	17	35	22	18	28	441
3370	NORTH INDIAN DIVERSION W/O SUNLAND	(-)	1	26	3	11	6	0	0	0	0	0	0	0	47
3364	NORTH INDIAN DITCH W/O HWY 395	(-)	31	145	153	133	262	176	59	42	28	13	36	11	1089
BC1478			**60**	**37**	**88**	**56**	**69**	**82**	**41**	**24**	**19**	**14**	**5**	**10**	**505**
3025	SOUTH INDIAN DITCH DIVERSION #3		7	6	9	9	9	7	1	0	0	0	0	0	48
BC1479			**7**	**6**	**9**	**9**	**9**	**7**	**1**	**0**	**0**	**0**	**0**	**0**	**48**
3396	NELLIGAN DIV. #1		90	121	238	123	74	51	35	52	60	102	68	121	1135
3397	NELLIGAN BELOW DIV. #1		90	118	152	134	117	120	86	51	73	55	42	109	1147
3401	YOUNG DITCH #2		118	96	112	122	105	87	45	47	51	45	48	49	925
3421	TOM KEY DITCH ABOVE DIVERSION		28	78	63	56	81	69	30	35	29	29	21	20	539
3050	HOLLAND #63-B	(-)	30	33	38	38	31	35	32	24	27	29	19	38	374
3404	NELLIGAN DITCH #2	(-)	112	144	252	192	117	96	89	81	91	142	101	185	1602
3402	YOUNG DITCH #3	(-)	72	56	90	91	61	57	39	54	52	48	48	55	723
3407	YOUNG DITCH #4	(-)	0	6	6	5	1	0	0	0	0	0	0	0	18
3422	TOM KEY DITCH BELOW DIVERSION	(-)	23	73	57	42	74	63	29	32	27	28	21	18	487
BC301			**89**	**102**	**123**	**66**	**94**	**75**	**7**	**-5**	**16**	**-17**	**-11**	**2**	**541**
3006	HALL DITCH @ GOLF COURSE RETURN		0	27	12	23	52	19	0	0	0	0	0	0	133
BC302A			**0**	**27**	**12**	**23**	**52**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**133**

3161	BISHOP CK DITCH #16		73	55	51	60	74	54	29	26	30	34	18	21	525
3162	BISHOP CK DITCH #17		66	33	45	37	39	71	0	0	0	0	0	0	291
3164	BISHOP CK DITCH #20		10	54	70	59	62	46	22	16	13	17	19	34	422
3165	BISHOP CK DITCH #21		0	0	0	0	0	0	0	0	0	0	0	0	0
BC302B			**148**	**143**	**165**	**156**	**175**	**171**	**50**	**42**	**43**	**50**	**38**	**55**	**1236**
3026	NEWLON DITCH BOYD PUMP PLANT		45	27	36	44	42	27	13	4	0	0	0	0	238
BC304			**45**	**27**	**36**	**44**	**42**	**27**	**13**	**4**	**0**	**0**	**0**	**0**	**238**
3166	BISHOP CK DITCH #5		37	74	65	69	72	58	0	0	0	0	0	20	395
3022	BISHOP CK DITCH #5-A		66	173	87	61	68	70	0	0	0	0	0	0	525
3167	BISHOP CK DITCH #9		84	19	76	81	54	53	0	0	0	0	0	12	379
3168	BISHOP CK DITCH #30		318	217	261	254	270	275	84	80	71	60	39	59	1988
3392	FORD RAWSON-DIV 1A		2	2	2	5	7	1	0	0	0	0	0	0	19
BC311			**506**	**485**	**490**	**470**	**471**	**456**	**84**	**80**	**71**	**60**	**39**	**91**	**3303**
3016	NORTH INDIAN DITCH ABOVE MUMY LANE #58-E		528	703	705	778	855	457	297	187	175	264	267	304	5520
3017	WONACOTT A-2		50	53	71	65	87	62	29	22	39	24	22	30	554
3015	WONACOTT A-1	(-)	72	98	108	94	119	91	41	32	44	36	38	44	817
3054	WONACOTT A-3 RETURN	(-)	15	19	19	19	95	58	13	19	21	16	10	13	317
3051	WONACOTT #58-F	(-)	34	37	58	35	34	47	24	14	11	7	8	13	322
3018	NORTH INDIAN B-2	(-)	359	549	417	501	587	266	206	114	96	183	201	226	3705
BC313			**99**	**54**	**174**	**194**	**107**	**57**	**43**	**30**	**43**	**46**	**33**	**38**	**918**
3370	NORTH INDIAN DIVERSION W/O SUNLAND		1	26	3	11	6	0	0	0	0	0	0	0	47
3270	SOUTH INDIAN D-3		324	384	409	419	405	333	161	222	67	121	73	146	3064
3005	SOUTH INDIAN DITCH D-4	(-)	173	175	181	132	208	217	127	179	54	86	45	101	1678
BC324			**153**	**236**	**232**	**299**	**204**	**116**	**34**	**43**	**13**	**35**	**28**	**44**	**1437**
3402	YOUNG DITCH #3		72	56	90	91	61	57	39	54	52	48	48	55	723
3407	YOUNG DITCH #4		0	6	6	5	1	0	0	0	0	0	0	0	18
3403	YOUNG DITCH RETURN TO NELLIGAN	(-)	17	20	40	66	41	37	26	36	50	48	48	50	479
BC335			**55**	**41**	**55**	**30**	**20**	**21**	**13**	**17**	**2**	**0**	**1**	**6**	**261**
2026	FORD RAWSON CANAL BELOW BISHOP CK CANAL		561	594	620	753	965	216	0	0	0	0	0	0	3709
3368	RAWSON & KEOUGH DITCH E/O HWY 395		44	28	21	19	18	21	28	30	31	30	31	42	343
2004	FORD RAWSON CANAL DIV. #7	(-)	135	142	167	251	256	0	0	0	0	0	0	0	951
2043	YRIBARREN RETURN #2	(-)	--	--	--	--	--	--	--	--	--	--	--	--	--	
3369	RAWSON & KEOUGH DITCH RETURN AT A-DRAIN	(-)	0	1	0	0	0	0	0	0	0	6	2	8	17
BC338			**470**	**480**	**474**	**521**	**726**	**237**	**28**	**30**	**31**	**23**	**29**	**34**	**3083**

3170	KINGSLEY C-1		60	57	61	55	61	33	15	14	11	10	8	9	394
BC339			**60**	**57**	**61**	**55**	**61**	**33**	**15**	**14**	**11**	**10**	**8**	**9**	**394**
3015	WONACOTT A-1		72	98	108	94	119	91	41	32	44	36	38	44	817
3053	TOMMY SMITH DITCH #162-A		9	25	10	21	19	5	0	0	0	0	0	0	89
3017	WONACOTT A-2	(-)	50	53	71	65	87	62	29	22	39	24	22	30	554
BC353			**30**	**70**	**47**	**50**	**51**	**35**	**12**	**10**	**5**	**12**	**15**	**14**	**351**
3036	NORTH FORK BISHOP CREEK I-1(#155 STANLEY MATLICK)		12	95	176	175	174	102	36	12	1	16	92	85	976
3004	BISHOP CK N. FORK I-2		0	0	0	0	0	0	0	0	0	0	0	0	0
3316	IRRIGATION FROM WELL #406		174	136	89	220	199	231	3	3	0	0	0	0	1055
3042	TATUM RETURN AT HIGHWAY 6	(-)	19	13	16	29	15	3	0	0	0	0	0	0	95
3039	TATUM RETURN AT BISHOP CK CANAL	(-)	34	35	38	37	16	8	8	14	18	28	30	34	300
BC361A			**132**	**183**	**211**	**329**	**342**	**320**	**31**	**1**	**-16**	**-12**	**62**	**51**	**1634**
3009	MATLICK DITCH F-10		254	255	228	218	215	147	50	39	41	43	33	42	1565
3040	MATLICK DITCH F-13 N		86	156	238	201	92	95	119	98	123	113	112	204	1637
3008	MATLICK DITCH F-13 E		14	13	1	8	46	30	26	23	45	70	19	47	342
3007	MATLICK DITCH F-14		12	27	31	22	22	21	13	6	5	6	7	9	181
3035	MATLICK DITCH #154		60	196	144	112	95	45	42	19	9	7	15	31	775
3154	SCHILDER RETURN G-2	(-)	17	59	33	40	28	18	8	7	7	10	14	15	256
3037	MATLICK DITCH #63-A	(-)	23	35	37	26	36	36	9	19	43	77	53	73	467
3038	TATUM RETURN H-1	(-)	108	128	156	90	93	60	19	3	6	19	16	20	718
3003	MATLICK DITCH RETURN @ B-1 DRAIN	(-)	3	5	4	6	2	5	24	9	1	0	6	14	79
3010	MATLICK RETURN TO "C" DRAIN	(-)	18	10	16	41	11	28	120	102	130	128	119	204	927
BC361B			**256**	**408**	**395**	**359**	**299**	**191**	**69**	**44**	**36**	**5**	**-20**	**5**	**2047**
3388	INDIAN S. RETURN ON SEE-VEE LANE		34	143	127	85	38	68	22	10	5	1	0	4	537
3389	INDIAN MIDDLE RETURN ON SEE-VEE LANE		1	0	0	1	0	1	0	0	0	0	0	0	3
3390	INDIAN N. RETURN ON SEE-VEE LANE		38	123	71	31	16	31	40	13	18	17	11	20	429
BC362D			**74**	**266**	**199**	**116**	**54**	**100**	**62**	**22**	**23**	**18**	**11**	**24**	**969**
3043	NORTH INDIAN DITCH B-3		75	66	79	23	43	70	0	0	0	0	0	0	356
3011	WEST LINE L-2		17	21	33	42	37	19	4	0	0	0	0	0	173
BC387A			**92**	**87**	**111**	**65**	**81**	**89**	**4**	**0**	**0**	**0**	**0**	**0**	**529**
3387	MATLICK DITCH TO THE N.		102	202	145	153	193	163	34	47	62	59	56	57	1273
3398	MATLICK DITCH #1		230	365	437	412	404	311	200	128	140	125	115	146	3013
3399	REINHACKLE #1		177	282	254	220	204	94	122	120	83	93	93	184	1926
3400	YOUNG DITCH #1		94	48	70	102	66	82	0	0	0	0	0	0	462
3424	MCLAREN TAILWATER		65	93	69	68	68	58	45	47	51	45	48	49	706
3401	YOUNG DITCH #2	(-)	118	96	112	122	105	87	45	47	51	45	48	49	925
3406	C-DRAIN AT INTAKE	(-)	256	510	594	547	480	335	327	310	285	249	227	379	4499
3009	MATLICK DITCH F-10	(-)	254	255	228	218	215	147	50	39	41	43	33	42	1565
BC392			**41**	**129**	**40**	**69**	**136**	**137**	**-21**	**-53**	**-41**	**-14**	**4**	**-34**	**393**

3061	KINGSLEY DITCH PUMP DIV. AT DIV. #2		4	7	7	7	8	5	0	0	0	0	0	0	38
3171	BISHOP CK DITCH #11		0	0	31	0	25	0	0	0	0	0	0	0	56
BC393			**4**	**7**	**39**	**7**	**32**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**94**
3163	BISHOP CK DITCH #19		103	74	54	50	65	35	0	0	0	0	0	0	381
3174	BISHOP CK DITCH #22		84	113	65	53	66	42	0	0	0	0	0	0	423
3019	BISHOP CK CANAL DIV. #24		56	105	152	125	141	144	16	30	28	7	0	0	804
3020	BISHOP CK CANAL DIV. #25		0	35	36	45	48	42	0	0	0	0	0	0	206
3391	BISHOP CK CANAL DIV. 26A		67	43	83	124	104	0	0	0	0	0	0	0	421
3024	BISHOP CK CANAL DIV. #29		65	95	71	48	52	43	12	45	41	36	39	58	605
BC397			**375**	**466**	**461**	**444**	**476**	**306**	**28**	**74**	**69**	**43**	**39**	**58**	**2839**
3012	GEORGE DITCH C-1		102	101	140	85	151	87	37	21	32	32	26	31	845
3365	PARK W. RETURN S/O A-DRAIN		92	130	123	123	106	66	24	22	1	1	2	1	691
3047	4 X - 58D		129	319	278	311	305	214	192	330	402	363	275	294	3412
3366	SOUTH INDIAN DITCH DIVERSION #1 N/O SCHOBER LANE		3	4	11	4	12	3	0	0	0	0	0	0	37
3367	SOUTH INDIAN DITCH DIVERSION #2 N/O SCHOBER LANE		42	10	119	51	142	27	0	0	0	0	0	0	391
W408	WELL 408		187	193	178	179	185	172	0	0	0	0	0	0	1094
3002	GEORGE DITCH W. OF SUNLAND AVENUE	(-)	78	67	81	57	87	63	47	22	43	26	22	34	627
3046	SOUTH INDIAN RETURN AT A-1 DRAIN	(-)	41	168	88	144	124	63	52	115	315	233	211	152	1706
3270	SOUTH INDIAN D-3	(-)	324	384	409	419	405	333	161	222	67	121	73	146	3064
BC500			**112**	**136**	**270**	**132**	**285**	**111**	**-7**	**14**	**11**	**15**	**-2**	**-6**	**1071**
3027	HALL DITCH PUMP PLANT #2@DON TATUM LEASE(KOCH)		5	0	0	19	33	32	4	0	0	0	0	0	93
3028	HALL DITCH PUMP PLANT #4 AT DON TATUM LEASE		200	133	161	152	134	113	13	0	0	0	0	0	906
BC502A			**205**	**133**	**161**	**172**	**168**	**145**	**16**	**0**	**0**	**0**	**0**	**0**	**1000**
3031	A-1 DRAIN PUMP PLANT #1 S/O HALL DITCH		--	--	--	--	--	--	--	--	--	--	--	--	--
3032	A-1 DRAIN PUMP PLANT #3 AT WELL #140		127	74	56	79	147	107	22	8	0	0	0	0	620
BC502B			**127**	**74**	**56**	**79**	**147**	**107**	**22**	**8**	**0**	**0**	**0**	**0**	**620**
2086	A-DRAIN DIV. TO ARKANSAS FLATS		0	0	0	0	0	0	0	0	0	0	0	162	162
BCOPRB			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**162**	**162**
3155	BISHOP CK DITCH #5-B		0	0	0	0	0	0	232	132	127	2	180	270	943
BCRECA			**0**	**0**	**0**	**0**	**0**	**0**	**232**	**132**	**127**	**2**	**180**	**270**	**943**
3021	BISHOP CK CANAL DIV. #67		0	0	0	0	0	0	0	0	0	0	12	139	151
BCRECC			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12**	**139**	**151**
3194	SOUTH FORK BISHOP CREEK BELOW BISHOP CREEK CANAL		428	453	489	597	575	463	444	332	314	259	250	302	4906
3193	SANDERS POND RETURN AT OWENS RIVER	(-)	120	90	73	118	129	80	114	106	144	132	154	185	1445
3066	RAWSON POND #3 RETURN TO OWENS RIVER	(-)	145	139	105	133	124	46	123	90	43	53	58	49	1108
BCRECD			**163**	**223**	**311**	**346**	**322**	**336**	**206**	**136**	**127**	**75**	**38**	**68**	**2351**

3023	KINGSLEY DITCH DIV. C-4		134	86	104	95	120	81	73	43	19	15	15	32	817
3183	CEMETERY DITCH AT E. LINE ST.	(-)	48	36	33	47	69	47	54	23	0	0	0	6	363
BCRECF			**87**	**49**	**71**	**48**	**51**	**34**	**19**	**20**	**19**	**15**	**15**	**25**	**453**

3242	BISHOP CK CANAL DIV. TO 5 BRIDGES #2		0	0	0	0	0	0	0	4	32	25	22	26	109
3317	BISHOP CK CANAL DIV. TO 5 BRIDGES #6		31	34	51	61	30	9	0	0	0	10	20	85	331
BCLAEMH			**31**	**34**	**51**	**61**	**30**	**9**	**0**	**4**	**32**	**35**	**41**	**112**	**440**

3185	MCGEE CK AT ABERLOUR RANCH		393	275	230	238	174	168	198	215	193	207	196	256	2743
3235	MILL POND RETURN	(-)	252	230	166	181	76	83	62	65	71	78	76	94	1434
BCRVRECA			**141**	**45**	**64**	**57**	**98**	**85**	**135**	**150**	**122**	**129**	**120**	**162**	**1308**

BC005A	4	2	7	6	16	4	2	3	1	-2	-2	-5	36
BC005B	17	7	6	18	20	9	0	0	0	0	0	0	77
BC006A	6	12	13	12	10	8	6	6	6	6	6	6	97
BC1478	60	37	88	56	69	82	41	24	19	14	5	10	505
BC1479	7	6	9	9	9	7	1	0	0	0	0	0	48
BC301	89	102	123	66	94	75	7	-5	16	-17	-11	2	541
BC302A	0	27	12	23	52	19	0	0	0	0	0	0	133
BC302B	148	143	165	156	175	171	50	42	43	50	38	55	1236
BC304	45	27	36	44	42	27	13	4	0	0	0	0	238
BC311	506	485	490	470	471	456	84	80	71	60	39	91	3303
BC313	99	54	174	194	107	57	43	30	43	46	33	38	918
BC324	153	236	232	299	204	116	34	43	13	35	28	44	1437
BC335	55	41	55	30	20	21	13	17	2	0	1	6	261
BC338	470	480	474	521	726	237	28	30	31	23	29	34	3083
BC339	60	57	61	55	61	33	15	14	11	10	8	9	394
BC353	30	70	47	50	51	35	12	10	5	12	15	14	351
BC361A	132	183	211	329	342	320	31	1	-16	-12	62	51	1634
BC361B	256	408	395	359	299	191	69	44	36	5	-20	5	2047
BC362D	74	266	199	116	54	100	62	22	23	18	11	24	969
BC387A	92	87	111	65	81	89	4	0	0	0	0	0	529
BC392	41	129	40	69	136	137	-21	-53	-41	-14	4	-34	393
BC393	4	7	39	7	32	5	0	0	0	0	0	0	94
BC397	375	466	461	444	476	306	28	74	69	43	39	58	2839
BC500	112	136	270	132	285	111	-7	14	11	15	-2	-6	1071
BC502A	205	133	161	172	168	145	16	0	0	0	0	0	1000
BC502B	127	74	56	79	147	107	22	8	0	0	0	0	620
BCOPRB	0	0	0	0	0	0	0	0	0	0	0	162	162
BCRECA	0	0	0	0	0	0	232	132	127	2	180	270	943
BCRECC	0	0	0	0	0	0	0	0	0	0	12	139	151
BCRECD	163	223	311	346	322	336	206	136	127	75	38	68	2351
BCRECF	87	49	71	48	51	34	19	20	19	15	15	25	453
BCLAEMH	31	34	51	61	30	9	0	4	32	35	41	112	440
BCRVRECA	141	45	64	57	98	85	135	150	122	129	120	162	1308
BCAUDIT	**3590**	**4024**	**4432**	**4295**	**4648**	**3333**	**1145**	**853**	**770**	**548**	**687**	**1342**	**29667**