Los Angeles Department of Water and Power 2015 Annual Owens Valley Report

Los Angeles Department of Water & Power

- Annual Owens Valley Operations Plan for the 2015-16 Runoff Year
- Conditions in the Owens Valley
- Enhancement and Mitigation Project Status
- 1991 Environmental Impact Report
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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This report includes Los Angeles Department of Water and Power's (LADWP) proposed Owens Valley operations plan for the first six months of the 2015-16 runoff year, an update on Owens Valley conditions, the current status of LADWP's environmental mitigation projects, and the status of other studies, projects, and activities.

Preface

LADWP will not transport water within the Los Angeles Aqueduct south of the Owens Lake until November of 2015. For the entire runoff year only 42,400 acre-feet (AF) will be exported. However, a net of amount of 32,200 AF from the aqueduct system will be sent to Los Angeles, including a reduction of 10,200 AF of aqueduct storage. This will be the lowest amount by far of water delivered to Los Angeles from the Owens Valley.

This extremely low amount of water deliveries is due to the fact that the Eastern Sierra is experiencing the fourth consecutive year of extreme drought. The April 1, 2015, snowpack was measured to be 4% of normal, certainly the lowest by far on record. The resulting estimated runoff forecast for the first six months of this year is 25% of normal. Runoff is estimated to be approximately 36% for the entire runoff year assuming normal precipitation in the summer, fall, and winter months. This will shatter the lowest years on record by far. Last year, 2014-15, the 52% of normal runoff matched the previous lowest year on record.

Contributing to the extremely low runoff this year is the three previous years runoffs of 57%, 54%, and 52% of normal, respectively. These were the lowest three consecutive years on record, and now including this year, it will be the lowest four consecutive years of runoff on record. This puts Owens Valley water uses and supply for Los Angeles into uncharted territory for water availability. The total Eastern Sierra Owens Valley supply of water this year will be 276,000 AF as compared to an average year of 541,000 AF as shown in Table ES.1

Table ES.1 Owens Valley Water Supply

Owens Valley Water Supply	Post Agreement Average (acre-feet)	2014-15 Runoff Year	2015-16 Runoff Year
Mono Basin & Long Valley Supply to Owens Valley	148,000	100,000	70,000
Owens Valley Runoff & Groundwater	393,000	255,000	209,000
Total Water Supply	541,000	355,000	279,000

Because runoff this year is far below any year experienced to date, and due to the previous three years of drought, there will be a significant challenge to meet water

obligations. In such a dire situation, LADWP encourages continued efficient use of water for all purposes in the Owens Valley and in Los Angeles.

LADWP will monitor water uses on City lands to balance land management needs and to maintain water flows in creeks. Lessees who use surface water from creeks have been directed to maintain sufficient flows downstream of their diversions to sustain existing aquatic resources. LADWP has informed Lessees who depend upon wells for irrigation that pumping volumes may be decreased to avoid environmental impacts or impacts to private wells. Because of the extremely low runoff this year and the resulting limited surface water availability, the most amount of irrigation water that could be provided within the Owens Valley would be approximately 32,500 AF, as long as there are sufficient reductions to other uses in the valley.

The first six months of the 2015-16 runoff year Owens Valley Operations Plan has been prepared in order to supply key water uses within the Owens Valley including Enhancement/Mitigation, LORP, Additional Mitigation Projects developed by the MOU Ad Hoc Group (1,600 Acre-Feet Projects), Native American Indian Lands, Owens Lake Dust Mitigation, recreation, and stockwater. Unfortunately though, with the extreme lack of water, there is significantly less water available for irrigation as shown in Table ES.2.

If agreements and assurances from other parties, such as Inyo County, MOU Parties, Great Basin Air Pollution Control District, State Lands, California Department of Fish and Wildlife, and potentially other Agencies/Groups are reached to reduce any of the Owens Valley uses for the 2015-16 irrigation season, then the water savings will be re-allocated for irrigation in the Eastern Sierra this irrigation season instead of the use(s) outlined in the operations plan.

Table ES.2 Owens Valley Water Use in acre-feet

Owens Valley Uses	Typical Year	2014-15 Runoff Year	2015-16 Runoff Year
Irrigation	49,000	43,500	21,500
Stockwater	11,500	11,500	10,200
E&M	10,000	9,500	9,500
Recreation	9,000	7,400	7,400
Owens Lake	75,000	53,700	58,700
LORP	18,600	14,300	15,300
1,600 acre-feet	1,600	1,600	1,600
Indian Lands	3,200	3,200	3,200
Total Owens Valley Uses			127,400

Despite the large reductions to irrigation, no water will be available for transport within the Los Angeles Aqueduct south of the Owens Lake until November of 2015. Only when the Owens Valley uses have subsided from the summer season is any water left over for transport to Haiwee Reservoir. In November, outflow from Pleasant Valley

Reservoir and downstream creeks flowing into the Owens River and the Los Angeles Aqueduct will finally exceed Owens Valley water use demands. Water will then be available for delivery to Haiwee Reservoir. Exports to Los Angeles before November of 2015 will be drawn from existing storage in Haiwee Reservoir. For the entire runoff year only 42,400 acre-feet (AF) will be exported. However, a net amount of 32,200 AF from the aqueduct system will be sent to Los Angeles, accounting for a reduction of 10,200 AF of aqueduct storage as shown in Table ES.3. This will be the lowest amount by far of water delivered to Los Angeles from the Owens Valley.

Table ES.3 Anticipated Los Angeles Aqueduct Storage and Delivery in 2015-16 Runoff Year

Period	Owens Valley-Bouquet Reservoir Storage Change (acre-feet)	Aqueduct Deliver to Los Angeles (acre-feet)
April to October	-35,700	13,000
November to March	25,500	29,400
Sub-total	-10,200	42,400
Net Export to Los Angeles		32,200

The breakdown of the total water supply for the Owens Valley is shown in table ES.4.

Table ES.4 Break down of Owens Valley Water Supply

Break down of Owens Valley Water Supply	Acre-Feet of Water
Owens Valley Uses	127,400
Micellaneous Uses & Losses *	119,400
Net Export to Los Angeles	32,200
Total Owens Valley Water Supply	279,000

* Micellaneous Uses & Losses are estimated and include conveyance losses such as evaporation, transpiration, and recharge as well as private uses and operational uses within the Owens Valley. For comparison, in the 2014-15 Runoff Year there were 147,000 acre-feet lost to miscellaneous uses and losses. The 1991 EIR projected these losses to average 139,000 acre-feet per year.

Owens Valley Annual Operations Plan Summary

For the period of April 1, 2015, to March 31, 2016, the forecast Eastern Sierra runoff for the Owens River Basin is 148,600 acre-feet or 36% of normal. This is the lowest forecasted Owens Valley runoff for the period of record. Forecast of Eastern Sierra runoff between April 1, 2015, and September 30, 2015, is 76,000 acre-feet or 25% of normal. Average year April through September runoff is 303,903 acre-feet.

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.)*

Accordingly, LADWP has prepared a proposed six month operations plan and pumping program for the period beginning April 1, 2015.

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 128,765 acre-feet of water is available for groundwater pumping from Owens Valley well fields. In addition to the ON/OFF provisions of the Water Agreement, LADWP considers Owens Valley conditions, projected runoff, and operational practicalities when determining its planned pumping. LADWP's groundwater pumping for the first six months of the 2015-16 runoff year is planned to range between 36,782 and 52,557 acre-feet, contingent on environmental conditions and water needs. The lower end of this range is commensurate with non-discretionary pumping requirements including fish hatchery supply, town supply, irrigation, and other required uses. The upper range is in keeping with dry year conservative pumping plans supported by the Inyo County/Los Angeles Standing Committee during the drought recovery period of the early 1990s. For the entire 2015-16 runoff year, LADWP anticipates total acre-feet of pumping to be in the range of low 70,000's.

Owens Valley Conditions

Forecast runoff to the Owens River Basin during the 2015-16 runoff year is 148,600 acre-feet or 36% of normal. The overall Eastern Sierra snowpack in watersheds contributing to the Los Angeles Aqueduct (LAA) was estimated to be 4% of normal as of April 1, 2015. Precipitation on the Owens Valley floor during the 2014-15 runoff year averaged 2.91 inches and was below the long-term average of 5.9 inches. Owens Valley groundwater levels are relatively stable in most areas.

During the 2014-15 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 14,300 acre-feet 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.

Construction for the Owens Lake Dust Mitigation Program (OLDMP) continued during the 2014-15 runoff year. Phase 7a of OLDMP is expected to complete in July 2015. Dust mitigation activities on Owens Lake consumed 53,700 acre-feet of water in 2014-15. OLDMP water uses during the 2015-16 runoff year are anticipated to be 60,700 acre-feet.

Enhancement/Mitigation Project Status

The enhancement/mitigation projects discussed in Section 4 were identified in the *1991 Environmental Impact Report on Water From the Owens Valley to Supply the Second Los Angeles Aqueduct* (1991 EIR) as mitigation for impacts due to LADWP's water gathering activities. There are 26 projects identified as enhancement/mitigation measures; all 26 of these projects have been fully implemented. Four of these projects are complete with no additional action needed, and 22 are implemented and ongoing, meaning that they are fully operational with ongoing water commitments or monitoring and reporting requirements. Refer to Section 4 for more information.

1991 EIR Mitigation Project Status

There are 53 mitigation projects identified for environmental impacts in the 1991 EIR. One of these projects is complete with no additional action needed and 44 are implemented and ongoing, meaning that they are fully operational and are attaining goals but have ongoing water commitments or additional monitoring and reporting requirements. One additional project is fully implemented but is not currently attaining goals, and 7 are in progress. Refer to Section 5 for more information.

Status of Other Mitigation Projects

Implementation status of provisions in the Inyo/Los Angeles Water Agreement (Water Agreement) and the *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) have also been updated. Refer to Section 7 for more information.

Inyo County and LADWP continue to jointly work toward the completion of the Green Book revisions. Status updates of the Green Book revision effort are given at Technical Group and Standing Committee meetings.

1. INTRODUCTION

1. INTRODUCTION

This document is intended to satisfy the Los Angeles Department of Water and Power's (LADWP) annual reporting obligations pursuant to 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); and the *August 2004 Amended Stipulation and Order in Case No. S1CVCV01-29768* (Stip/Order).

1.1 Water Agreement

The Water Agreement requires periodic evaluations of enhancement/mitigation projects to be made by the Inyo County/Los Angeles Technical Group. As required by the Water Agreement, all existing enhancement/mitigation projects will continue unless the Inyo County Board of Supervisors and LADWP agree to modify or discontinue a project. Section 4 of this report provides an update on LADWP enhancement/mitigation project status.

1.2 Annual Operations Plan

The Water Agreement provides that "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 forecast 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 proposed plan and pumping program and any subsequent modifications to it shall be consistent with these goals and principles.

1. A proposed plan shall include, but is not limited to, the following:

    - Owens Valley Runoff estimate (annual)

    - Projected groundwater production by wellfield (monthly)

    - Projected total aqueduct reservoir storage levels (monthly)

    - Projected aqueduct deliveries to Los Angeles (monthly)

    - Projected water uses in the Owens Valley (monthly)

    - Water balance projections at each monitoring site

2. The County through its Technical Group representatives shall review the Department's proposed plan of operations and provide comments to the Department within ten (10) days of receipt of the plan.

3. The Department shall meet with the County's Technical Group representatives within ten (10) days of the receipt of the County's comments, and attempt to resolve concerns of the County relating to the proposed pumping program.

4. The Department shall determine appropriate revisions to the plan, provide the revised plan to the County within ten (10) days after the meeting, and implement the plan.

5. The April 1st pumping program may be modified by the Department during the period covered by the plan to meet changing conditions. The Department shall notify the County's Technical Group representatives in advance of any planned significant modifications. The County shall have the opportunity to comment on any such modifications.

6. Information and records pertaining to the Department's operations and runoff conditions shall be reported to the County's Technical Group representatives throughout the year."

Section 2 of this report is LADWP's Operations Plan for the first six months of Runoff Year 2015-16.

1.3 1997 MOU

In accordance with the 1997 MOU Section III.H, LADWP and Inyo County are required to prepare an annual report describing environmental conditions in the Owens Valley and the associated studies, projects, and activities conducted under the Water Agreement and the 1997 MOU. Sections 3 through 7 of this report are intended to fulfill that requirement.

1.4 1991 EIR Monitoring Program

The 1991 EIR requires that LADWP submit an annual report to the Los Angeles Board of Water and Power Commissioners containing a description of each mitigation effort, its goals, strategies, and actions; its status (completed activities, ongoing activities); the overall effectiveness of each mitigation effort; and status of each mitigation plan for the following year. Section 5 of this report provides the required information.

Mitigation plans for each of the mitigation measures are developed by the Technical Group as set forth in Section I.C.2 of the Green Book, the technical appendix to the Water Agreement. The Green Book states: "as part of each mitigation plan, the Technical Group shall develop a reporting and monitoring program. At least once per year, the Technical Group shall report, in writing to the Standing Committee, on the

effectiveness of the mitigation plan in achieving its goal." Section 5 of this report is intended to complete that annual obligation.

1.5 2004 Amended Stipulation and Order

The Stip/Order, Section 11, 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 is intended to fulfill that requirement.

2. **OWENS VALLEY OPERATIONS PLAN FOR RUNOFF YEAR 2015-16**

2. OWENS VALLEY OPERATIONS PLAN FOR RUNOFF YEAR 2015-16

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.)*

2.1. Eastern Sierra Runoff Forecast

The Eastern Sierra Runoff Forecast for the 2015-16 runoff year (Table 2.1) is based on snow surveys of key Eastern Sierra watersheds in Inyo and Mono counties that contribute the majority of runoff water into the Owens Valley. The Eastern Sierra Runoff Forecast is used for planning aqueduct operations. The April 1 forecast Eastern Sierra runoff for 2015-16 runoff year is 148,600 acre-feet, or about 36% of the 1961-2010 long-term average annual runoff value of 412,284 acre-feet. This will be the driest year for the period of record and together with the low runoff during the last three years, the driest four year runoff period for the period of record in Owens Valley.

For the period of April 1 through September 30, 2014, Eastern Sierra runoff was approximately 143,320 acre-feet, or 47% of long term average value of 303,903 acre-feet. The forecast runoff for the period between April 1 through September 30, 2015, is 76,000 acre-feet for the Owens River Basin or 25% of the long-term average. To emphasize the lack of supply for the 2015 runoff season, only half of the supply will be available this year compared with last year, and last year was tied for the driest year on record.

Figure 2.1 summarizes Owens Valley runoff and groundwater pumping by LADWP since the 1971 runoff year. This figure portrays the extent of the current drought compared to the past runoff in Owens Valley.

Table 2. 1. Owens Valley Runoff Forecast for 2015-16 Runoff Year

2015 EASTERN SIERRA
RUNOFF FORECAST
April 1, 2015

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 (1961 - 2010) (Acre-feet)
MONO BASIN:	20,200	20%	32%	7%	103,522
OWENS RIVER BASIN:	76,000	25%	38%	12%	303,903

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 (1961 - 2010) (Acre-feet)
MONO BASIN:	30,400	25%	38%	12%	122,333
OWENS RIVER BASIN:	148,600	36%	49%	24%	412,284

NOTE - Owens River Basin includes Long, Round and Owens Valleys (not ind 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.

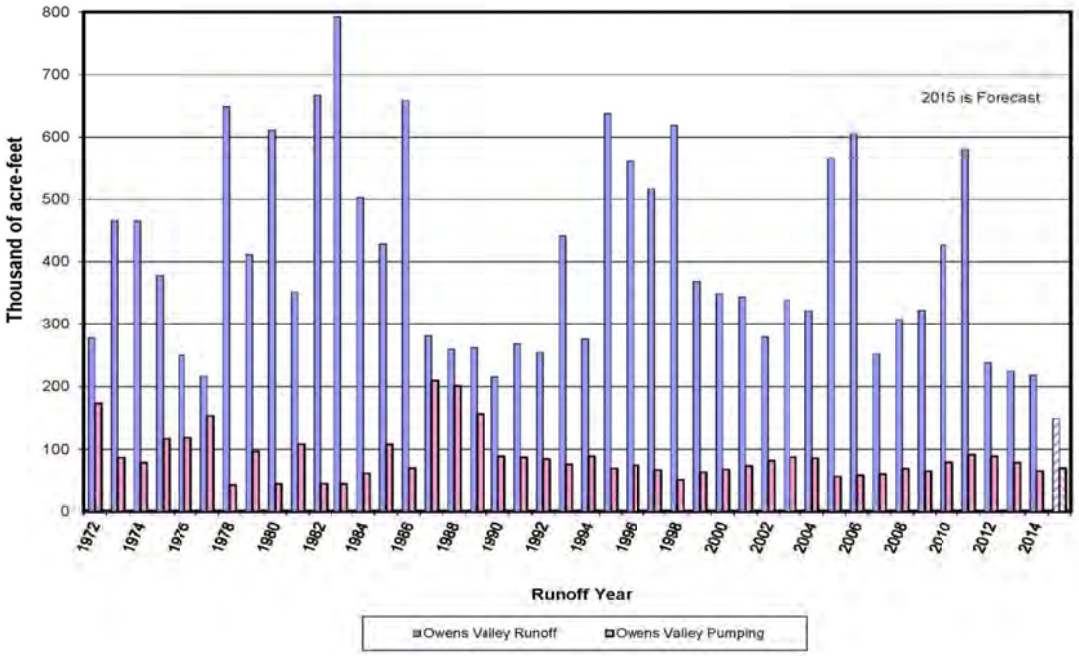

Figure 2. 1. Owens Valley Runoff and Groundwater Pumping

2.2. Owens Valley Groundwater Production

LADWP has prepared its 2015-16 Annual Owens Valley Operations Plan based on the goals and principles of the Water Agreement. The 2015-16 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.

Under the terms of the Water Agreement, the acceptable 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 2.2 lists the ON/OFF status of the monitoring sites within the Owens Valley as of April 2015. 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 2.3 provides a breakdown of the available annual pumping capacity and planned groundwater pumping for the first six months of the 2015-16 runoff year by wellfield. Pursuant to Water Agreement Section V.D, LADWP shall submit a plan for the second six months of the runoff year on or about October 20, 2015. Table 2.3 also shows the monitoring sites in ON status as of April 2015, the wells associated with the ON status monitoring sites, and the exempt wells in each wellfield. Approximately 128,800 acre-feet of water are available for groundwater pumping from Owens Valley wellfields under the terms of the Water Agreement during the 2015-16 runoff year. LADWP plans to pump between approximately 36,800 and 52,600 acre-feet during the

first six months of the 2015-16 runoff year. Groundwater pumping during the first six months of the 2015-16 runoff year will provide water for Owens Valley uses, while no water is planned to be delivered to Haiwee Reservoir for eventual transport to the city during this period. For the entire 2015-16 runoff year, LADWP anticipates the total acre-feet of groundwater pumping to be in the range of the low 70,000's.

Working both independently and with the Inyo/Los Angeles Technical Group, LADWP will monitor Owens Valley environmental conditions to assess if further changes to the planned pumping are needed. LADWP's 2015-16 groundwater management approach is substantially more conservative than the environmentally conservative pumping plans advocated by the Standing Committee during the dry years of the early 1990s. While LADWP plans to pump considerably less groundwater than made available under Water Agreement Section V, the Inyo/Los Angeles Standing Committee may agree upon additional reductions in groundwater pumping pursuant to Water Agreement Section IV.A.

Figure 2.2 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 anticipated pumping for the 2015-16 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 2015-16 pumping program considers the groundwater mining provisions of the Green Book. Table 2.4 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 2015-16 runoff year.

Table 2.5 is a list of Owens Valley wells exempted under the Water Agreement or by approval of the Technical Group from linkage to vegetation monitoring sites and the ON/OFF provisions. The table includes a list of wells by well number, general location of the exempt well, and the reason the well is exempt.

Table 2.6 details planned groundwater pumping for the first six months of the 2015-16 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 2015-16 runoff year is consistent with the provisions of the Water Agreement. No additional testing of wells subject to the Water Agreement is included in this year's planned pumping total and if performed, it will be in addition to the planned pumping for 2015-16. 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 2.3, 2.4, and 2.6 through 2.10 locate LADWP's Owens Valley pumping wells by wellfield. These figures show the location of production wells, monitoring wells, and vegetation monitoring sites in each area.

Table 2. 2. Soil/Vegetation Water Balance Calculations for April 2015 According to Section III of the Green Book

Site	Oct 2014 soil AWC	30% Annual Precipitation	Proj. soil AWC	October 2014 Veg Water Req./ Water Req. for well turn-on	Oct 2014 Status	April 2015 soil AWC	April 2015 Status	Soil AWC req. for well turn-on
	(cm)	(cm)	(cm)	(cm)		(cm)		(cm)
L1	1.2	NA	1.2	4.0/15.6	OFF	1.7	OFF	15.6, OFF 7-10
L2	9.7	4.7	14.4	4.7/NA	ON	10.1	**ON**	NA
L3	7.5	NA	7.5	6.8/25.2	OFF	13.0	OFF	25.2, OFF 10-11
BP1	1.1	NA	1.1	4.5/22.9	OFF	1.7	OFF	22.9†, OFF 10-97
BP2	1.2	NA	1.2	13.3/28.4	OFF	2.3	OFF	28.4, OFF 7-98
BP3	2.6	NA	2.6	9.4/10.6	OFF	4.8	OFF	10.6, OFF 7-12
BP4	37.0	4.9	41.9	7.6/NA	ON	40.9	**ON**	NA
TA3	6.4	NA	6.4	21.6/26.0	OFF	6.6	OFF	26.0, OFF 10-11
TA4	13.2	NA	13.2	8.9/23.3	OFF	17.7	OFF	23.3, OFF 10-11
TA5	20.6	4.9	25.5	2.7/NA	ON	22.3	**ON**	NA
TA6	9.3	NA	9.3	13.6/17.6	OFF	9.8	OFF	17.6, OFF 10-11
TS1	1.4	NA	1.4	7.4/20.4	OFF	1.4	OFF	20.4†, OFF 10-96
TS2	6.8	4.4	11.2	6.2/NA	ON	8.0	**ON**	NA
TS3	18.1	NA	18.1	16.0/32.9	OFF	21.1	OFF	32.9, OFF 10-12
TS4	24.6	NA	24.6	31.0/55.9	OFF	40.3	OFF	55.9, OFF 10-11
IO1	12.3	NA	12.3	66.1/42.2	OFF	14.9	OFF	42.2, OFF 10-98
IO2	5.0	NA	5.0	4.4/18.9	OFF	4.0	OFF	18.9, OFF 7-11
SS1	12.6	3.9	16.5	10.6/NA	ON	12.1	**ON**	NA
SS2	3.4	NA	3.4	3.0/25.6	OFF	2.7	OFF	25.6, OFF 7-11
SS3	18.5	NA	18.5	14.6/33.8	OFF	19.5	OFF	33.8, OFF 10-11
SS4	11.5	NA	11.5	3.5/15.9	OFF	8.9	OFF	15.9, OFF 7-05
BG2	24.3	4.0	28.3	2.5/NA	ON	23.0	**ON**	NA

†: These values of soil water required for well turn-on were derived using calculations based on %cover that were routinely performed in the past. The values have not been updated to conform to the Green Book equations in Section III.D.2, p. 57-59.

Table 2. 3. Annual Pumping Capacity According to Monitoring Sites with ON Status and Planned Pumping for the First Six Months of Runoff Year 2015-16

Wellfield	Monitoring	Associated Production Wells	Available Capacity (AF/year)	Planned Pumping (AF)
Laws	L2	236, 239, 243, 244	10,426	
	L5*	245, 387, 388	9,122	
	Exempt	236, 354, 422, 413	3,337	
	Wellfield Pumpage		**22,885**	**5,837-7,037**
Bishop**				
	All wells	140, 371, 406, 407, 408, 410, 411, 412	18,000	
	Wellfield Pumpage		**18,000**	**7,306-8,806**
Big Pine				
	BP4	331	7,530	
	Exempt	218, 219, 330, 332, 341, 352, 375, 415	28,750	
	Wellfield Pumpage		**36,280**	**10,104-12,334**
Taboose Aberdeen	TA5	349	12,236	
	Exempt	118, 355	2,560	
	Wellfield Pumpage		**14,796**	**1,423-6,203**
Thibaut Sawmill	TS2	155	796	
	Exempt	351, 356	8,000	
	Wellfield Pumpage		**8,796**	**3,996-4,246**
Indep. - Oak				
	Exempt	59, 60, 61, 65, 357, 383EM, 384EM, 401	13,973	
	Wellfield Pumpage		**13,973**	**5,516-8,116**
Symmes Shepherd	SS1	69, 392, 393	7,385	
	Exempt	402EM	980	
	Wellfield Pumpage		**8,365**	**1,181-4,111**
Bairs Georges	BG2	76, 343, 348, 403	4,770	
	Exempt	343	500	
	Wellfield Pumpage		**4,770**	**659-944**
Lone Pine	Exempt	344, 346, 425	900	
	Wellfield Pumpage		**900**	**760**
	Total Owens Valley		**128,765**	**36,782 - 52,557**

* Monitoring site has yet to be located.

** Pumping is subject to the Hillside Decree

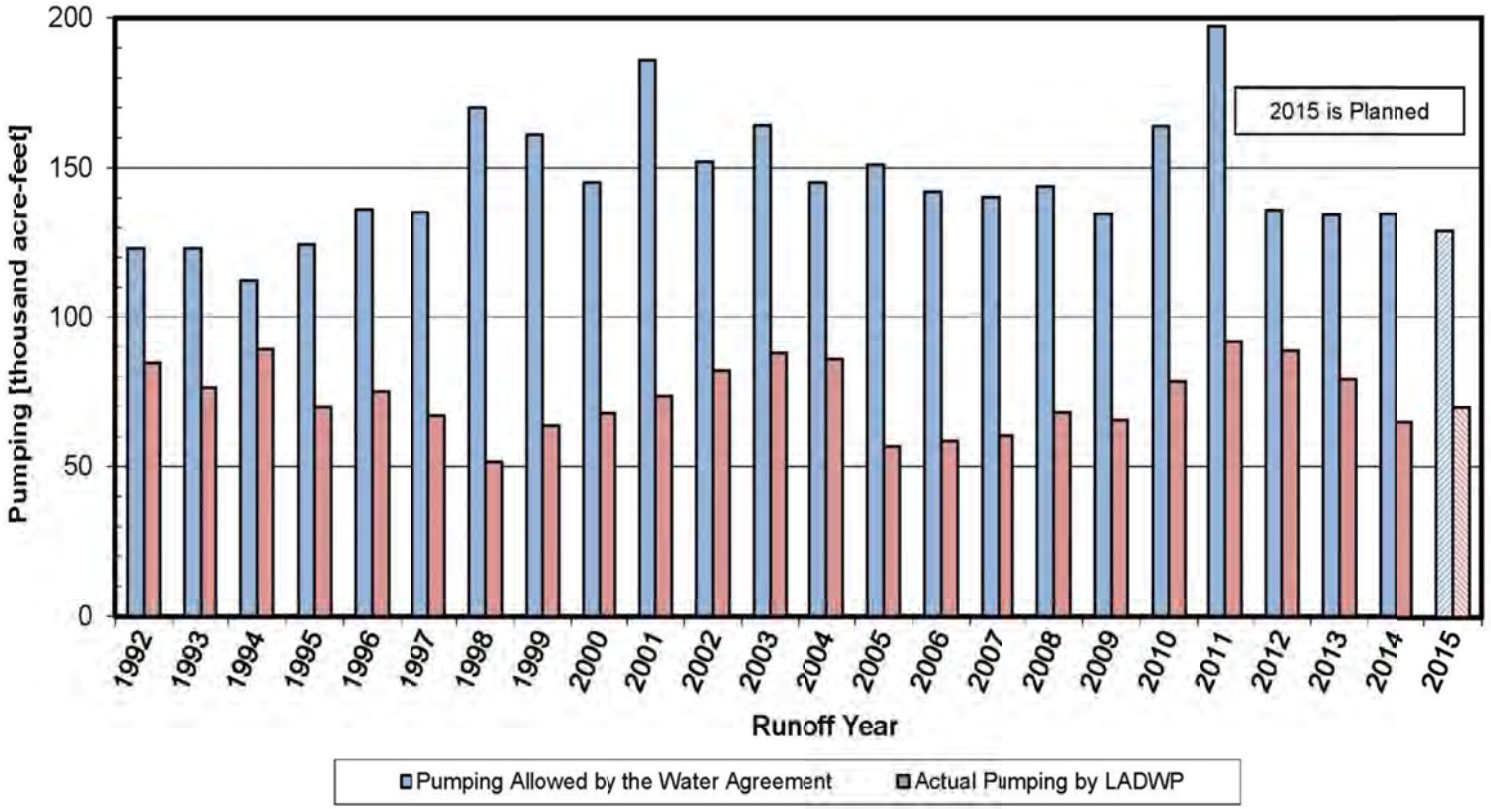

Figure 2. 2. Owens Valley Pumping – Provided by Water Agreement vs Actual

Table 2. 4 - Summary of Recharge and Pumping for Water Year 1994 - 2014 and Estimated Pumping Limit for Apr-Sep 2015 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
1996	123%	12,588	11,535	50,754	9,153	33,228	24,331	42,097	19,906	51,113	12,382	19,757	1,106	209,537	78,413
1997	125%	15,237	8,349	49,949	9,606	33,474	24,002	42,837	21,774	52,100	9,461	19,962	1,128	213,559	74,320
1998	139%	28,195	470	55,309	7,159	40,065	23,729	46,845	16,496	55,605	7,946	20,341	1,365	246,361	57,165
1999	95%	18,546	1,697	42,388	8,672	28,013	21,832	32,426	16,700	41,090	8,424	15,481	2,141	177,944	59,466
2000	80%	11,102	3,974	39,539	10,804	23,213	20,212	27,567	23,143	37,015	8,497	14,344	1,036	152,780	67,666
2001	77%	12,259	2,295	38,772	10,176	22,695	26,785	27,960	17,247	33,469	8,685	13,520	1,942	148,674	67,130
2002	63%	11,184	3,480	35,514	10,839	19,715	26,885	22,495	25,288	28,820	10,599	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	6,301	31,325	10,853	16,871	22,555	21,241	15,766	20,593	11,344	8,960	946	109,382	67,765
2015 (a)	36%	12,485	213	26,260	1,954	10,808	9,928	13,778	8,216	15,967	3,303	7,452	183	86,750	23,797
(b) TOTAL		291,388	110,055	821,282	191,095	507,983	458,999	636,840	392,887	724,191	230,745	282,888	21,863	3,264,571	1,405,644
Estimated Apr-Sep 2015 Pumping Limit			181,333		630,187		48,984		243,953		493,446		261,025		1,858,927

(a) Estimated Recharge for the 2015 Water Year; Approximate Pumping for First Half of Water year 2015 (Oct-Mar).

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

Table 2. 5 LADWP Groundwater Pumping Wells **Exempt** from Water Agreement ON/OFF Provisions

Revised June 22, 2010

Well Number	Wellfield	Duration	Reason
354 p[1]	Laws	Annual	Sole Source-Town Supply
413 b[1]	Laws	Annual	Sole Source-Town Supply and E/M Supply
341 b[1]	Big Pine	Annual	Sole Source-Town Supply
352 b[1]	Big Pine	Annual	Same as above
415 p[1] [6]	Big Pine	Annual	Same as above
357 p[1]	Independence-Oak	Annual	Same as above
384 b[1] [2]	Independence-Oak	Annual	Same as above
344 p[1]	Lone Pine	Annual	Same as above
346 b[1]	Lone Pine	Annual	Same as above
330[3]	Big Pine	Annual	Sole Source-Fish Hatcheries
332[3]	Big Pine	Annual	Same as above
409[3]	Big Pine	Annual	Same as above
351	Thibaut-Sawmill	Annual	Same as above
356	Thibaut-Sawmill	Annual	Same as above
375	Big Pine	Annual	Make-up for Big Pine Re-greening
218	Big Pine	Annual	No impact on areas with groundwater dependent vegetation
219	Big Pine	Annual	Same as above
118	Taboose-Aberdeen	Annual	Same as above
401	Independence-Oak	Annual	Same as above
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[2]	Independence-Oak	Annual	Same as above
61	Independence-Oak	Irrigation season	Sole Source-Irrigation; no impact on areas with groundwater dependent vegetation
402 E/M	Symmes-Shepherd	Irrigation season	Same as above
390 E/M	Lone Pine	Irrigation season	Same as above
343	Bairs-Georges	Irrigation season in below average runoff years	Sole Source-Irrigation in below average runoff years
365[4]	Laws	Annual	Sole Source-Irrigation; no impact on areas with groundwater dependent vegetation
236[4]	Laws	Irrigation Season	Sole Source-Irrigation
413 E/M[5]	Laws	Irrigation Season	Sole Source-Irrigation

1. Primary town supply well is designated by p; Backup town supply well is designated by b.
2. Well 384 is a dual purpose well, water to Enhancement/Mitigation (E/M) supply is indicated by 384 and Independence domestic supply is indicated as 384 b.
3. Wells 330, 332, and 409 may only be pumped two at a time, unless pumped for testing or emergencies.
4. Well 365 designated as primary and Well 236 designated as backup irrigation supply.
5. Well 413 is a dual purpose well. Water is supplied to the Laws Museum Irrigation Projects east and west of the museum and Laws domestic supply is indicated as 413b.
6. Currently not pump-equipped.

Table 2. 6 Planned Owens Valley Pumping for the First Six Months of 2015-16 Runoff Year (acre-feet)

Month	Laws	Bishop	Big Pine	Taboose-Aberdeen	Thibaut-Sawmill	Independ.-Oak	Symmes-Shepherd	Bairs-Georges	Lone Pine	TOTAL
April	1,037	1,306	1,604	223	661	1,116	381	109	120	6,557
May	960-1,200	1,200-1,500	1,700-2,050	240-980	667-717	880-1,400	160-650	110-155	120	6,037-8,772
June	960-1,200	1,200-1,500	1700-2,170	240-1,250	667-717	880-1,400	160-770	110-170	120	6,037-9,297
July	960-1,200	1,200-1,500	1,700-2,170	240-1,250	667-717	880-1,400	160-770	110-170	120	6,037-9,297
August	960-1,200	1,200-1,500	1,700-2,170	240-1,250	667-717	880-1,400	160-770	110-170	140	6,057-9,317
September	960-1,200	1,200-1,500	1,700-2,170	240-1,250	667-717	880-1,400	160-770	110-170	140	6,057-9,317
TOTAL	5,837-7,037	7,306-8,806	10,104-12,334	1,423-6,203	3,996-4,246	5,516-8,116	1,181-4,111	659-944	760	36,782-52,557

Laws Wellfield (Figure 2.3)

Monitoring site L2 is in ON status. Production wells controlled by this monitoring site have an available production capacity of 10,426 acre-feet. Wells linked to monitoring site L5 have a capacity of 9,122 acre-feet. Exempt wells within the Laws Wellfield have a capacity of 3,337 acre-feet. The sum total of available pumping capacity in the Laws Wellfield is 22,885 acre-feet. Well 365 has had a reduction in production capacity and is in the process of being replaced. Well 236, associated with monitoring site L2, is used as a backup along with Well 422 as an exempt well irrigation water supply.

Planned groundwater pumping for the first half of the runoff year in the Laws Wellfield is between approximately 5,800 to 7,000 acre-feet, contingent on water needs and environmental conditions. Groundwater pumping is planned to supply Owens Valley demands including the town water system, E/M projects, and irrigated lands.

LADWP modified production wells W385 and W386 associated with monitoring site L4 recently by sealing the screen zone within the shallow aquifer. LADWP is currently equipping these wells and is planning to conduct the initial operation of these wells, starting with W385. The pumping test of each well is expected to last approximately 6 months and the goal is to determine potential effects of pumping on shallow groundwater levels in the vicinity of these wells.

Bishop Wellfield (Figure 2.4)

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). Under the current audit protocols, recent total water used on City lands within the Bishop Cone area has been approximately 25,000 acre-feet per year. In the 2015-16 Runoff Year, the total water used is likely to be reduced to approximately 18,000 acre-feet. The current total available groundwater extraction capacity in the Bishop Wellfield is approximately 18,000 acre-feet. The planned groundwater pumping from the Bishop Wellfield is between approximately 7,300 to 6,600 acre-feet for the first half of the 2015-16 runoff year, contingent on water needs and environmental conditions.

Figure 2.5 shows water use on City lands on Bishop Cone in comparison with the groundwater extractions (flowing and pumping wells) for runoff years 1996 to present.

The current Bishop Cone Audit does not include a number of known uses and losses, including some uses that are currently being measured. These unaccounted for uses should be added to the total Bishop Cone Audit and the audit protocols should be revised to more accurately reflect actual uses and losses.

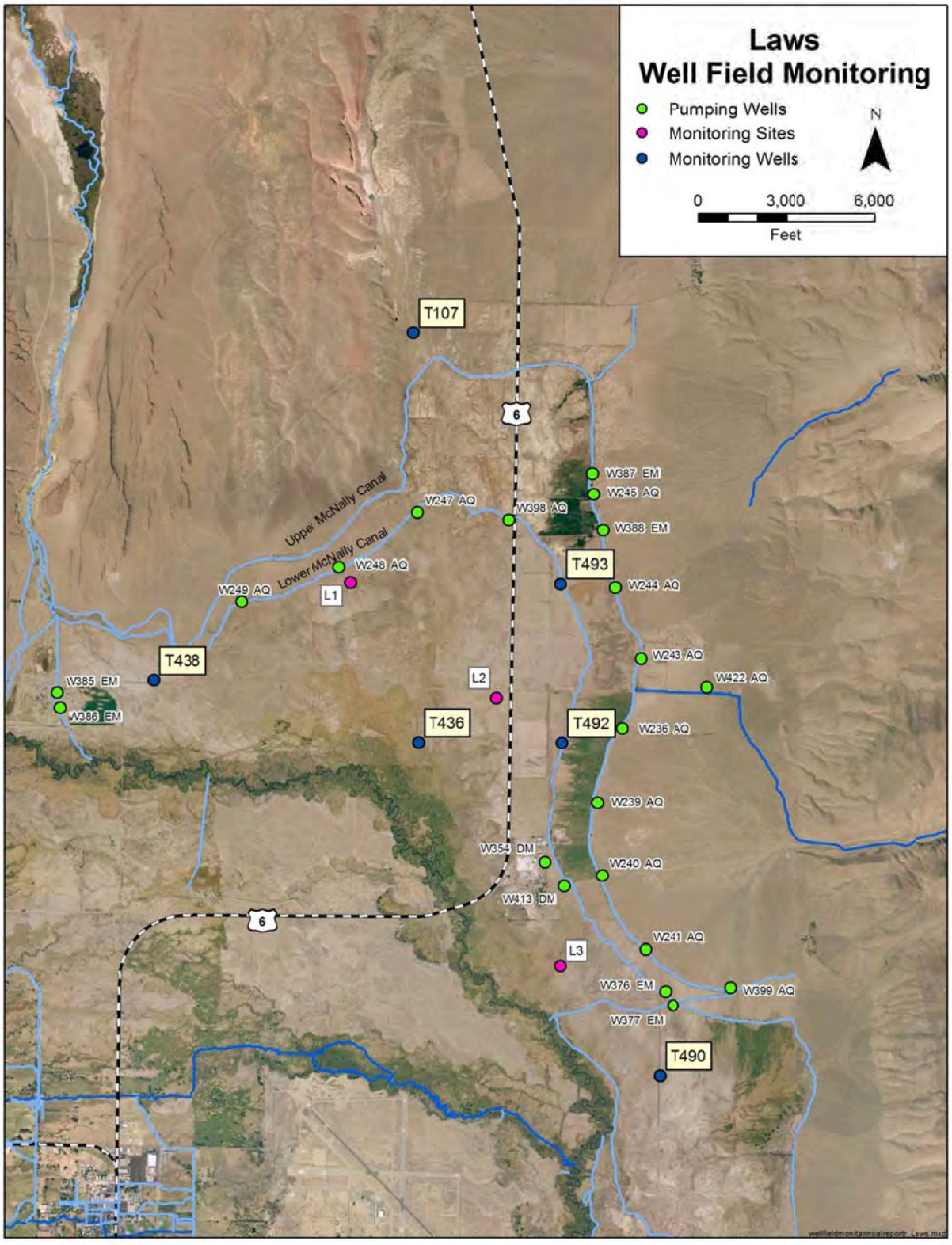

Figure 2. 3 Laws Wellfield

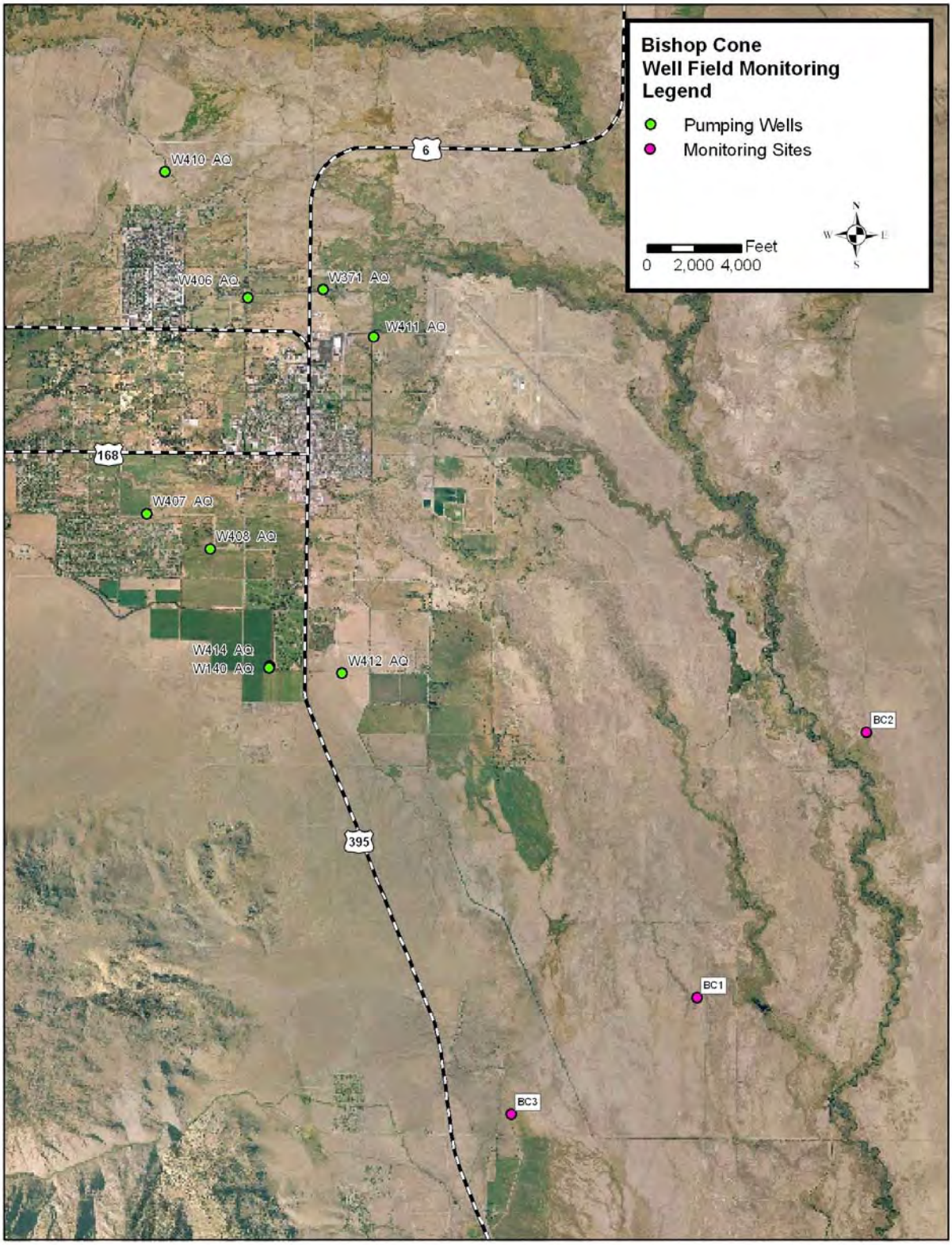

Figure 2. 4 Bishop Wellfield

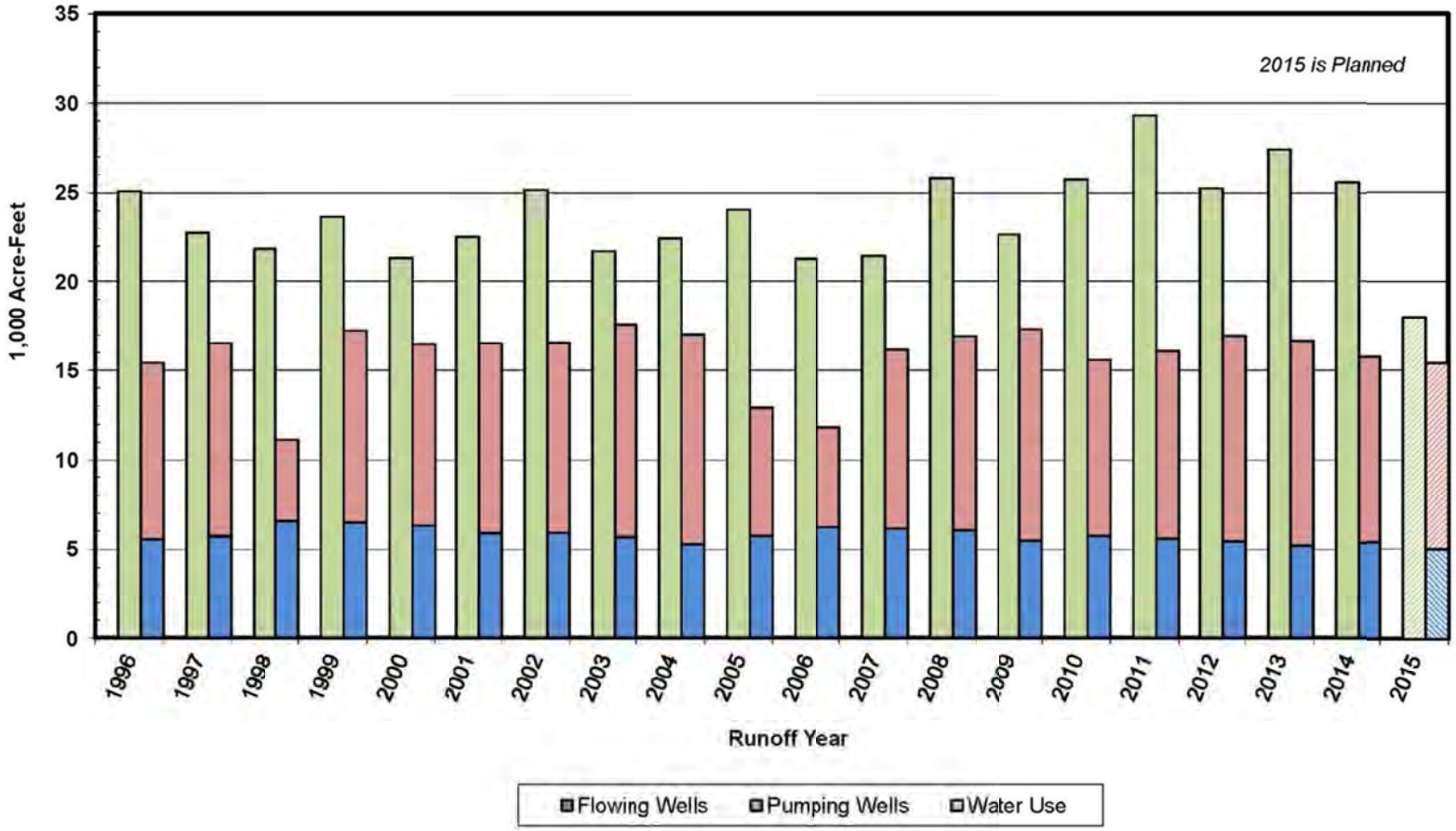

Figure 2. 5 Groundwater Extraction (flowing & pumping) and Water Use on Los Angeles Land on Bishop Cone

Big Pine Wellfield (Figure 2.6)

Monitoring sites BP4 is in ON status. Production Well 331, managed in conjunction with monitoring site BP4, has a production capacity of 7,530 acre-feet. Exempt wells including Well 218, Well 219, town supply wells, and Fish Springs Fish Hatchery wells in the Big Pine Wellfield have a combined capacity of 28,750 acre-feet. The total available capacity in the Big Pine Wellfield is 36,280 acre-feet. The total planned pumping in the Big Pine Wellfield is for the first six months of the 2015-16 runoff year is between approximately 10,100 acre-feet and 12,300 acre-feet, contingent on water needs and environmental conditions.

Taboose-Aberdeen Wellfield (Figure 2.7)

Monitoring site TA5 is in ON status. Production Well 349 is controlled by monitoring site TA5 and has an available pumping capacity of approximately 12,236 acre-feet. Exempt Well 118 in the Taboose-Aberdeen Wellfield has a capacity of 2,320 acre-feet . Exempt well W355 pumps approximately 240 acre-feet to supply the Hines Spring project. The total available groundwater pumping capacity in the Taboose-Aberdeen Wellfield is 14,800 acre-feet. The planned groundwater pumping in the Taboose-Aberdeen Wellfield for the first half of the 2015-16 runoff year is contingent on water needs and prevailing environmental conditions and will range between approximately 1,400 acre-feet and 6,200 acre-feet.

Thibaut-Sawmill Wellfield (Figure 2.8)

Monitoring sites TS2 is in ON status. Production well W155, controlled by monitoring site TS2 has a production capacity of 796 acre-feet and can supply water for irrigation to Eight-Mile Ranch to supplement surface water for the ranch. Exempt Blackrock Fish Hatchery supply wells W351 and W356 have capacities of 13,200 acre-feet and 8,000 acre-feet respectively. The total available pumping capacity in the Thibaut-Sawmill Wellfield for the 2015-16 runoff year is approximately 8,800 acre-feet.

Based on the resolution of a dispute between Inyo County of LADWP regarding the conditions of the vegetation parcel BLK94, located west of the wellfield, the groundwater pumping to supply Blackrock Hatchery will be limited to 8,000 acre-feet per year. Total planned pumping in the Thibaut-Sawmill Wellfield for the first half of the 2015-16 runoff year is planned to range between 4,000 acre-feet and 4,300 acre-feet, subject to hatchery demands, water supply needs, and environmental conditions.

Independence-Oak Wellfield (Figure 2.8)

None of the monitoring sites in the Independence-Oak Wellfield are in ON status. Independence-Oak exempt wells have a combined capacity of 13,973 acre-feet. The total available pumping capacity in the Independence-Oak Wellfield is 13,973 acre-feet. The anticipated range of groundwater pumping in the Independence-Oak Wellfield for the first six months of the 2015-16 runoff year is between approximately 5,500 and 8,100 acre-feet, which includes water for irrigation, town water system, and E/M project supply.

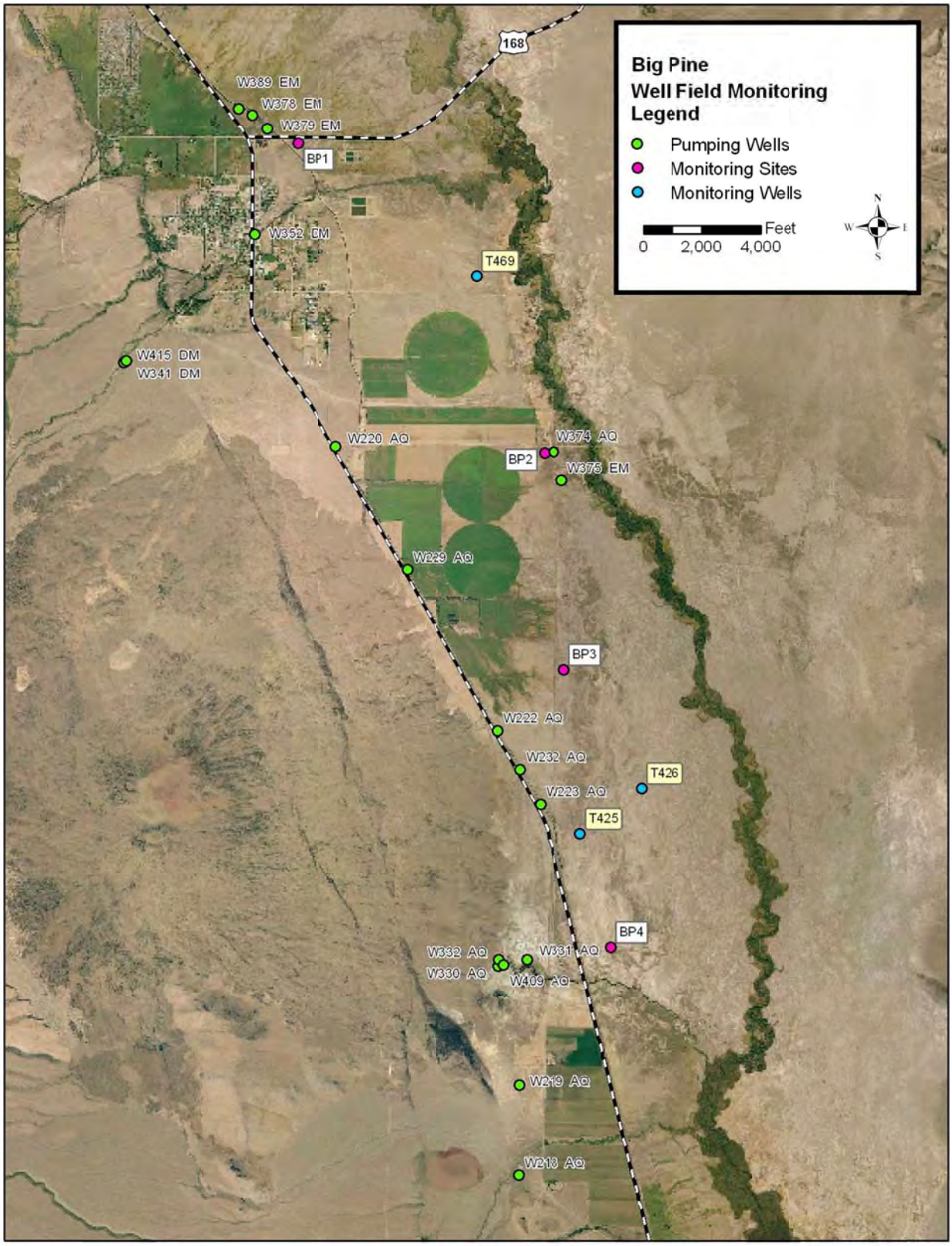

Figure 2. 6 Big Pine Wellfield

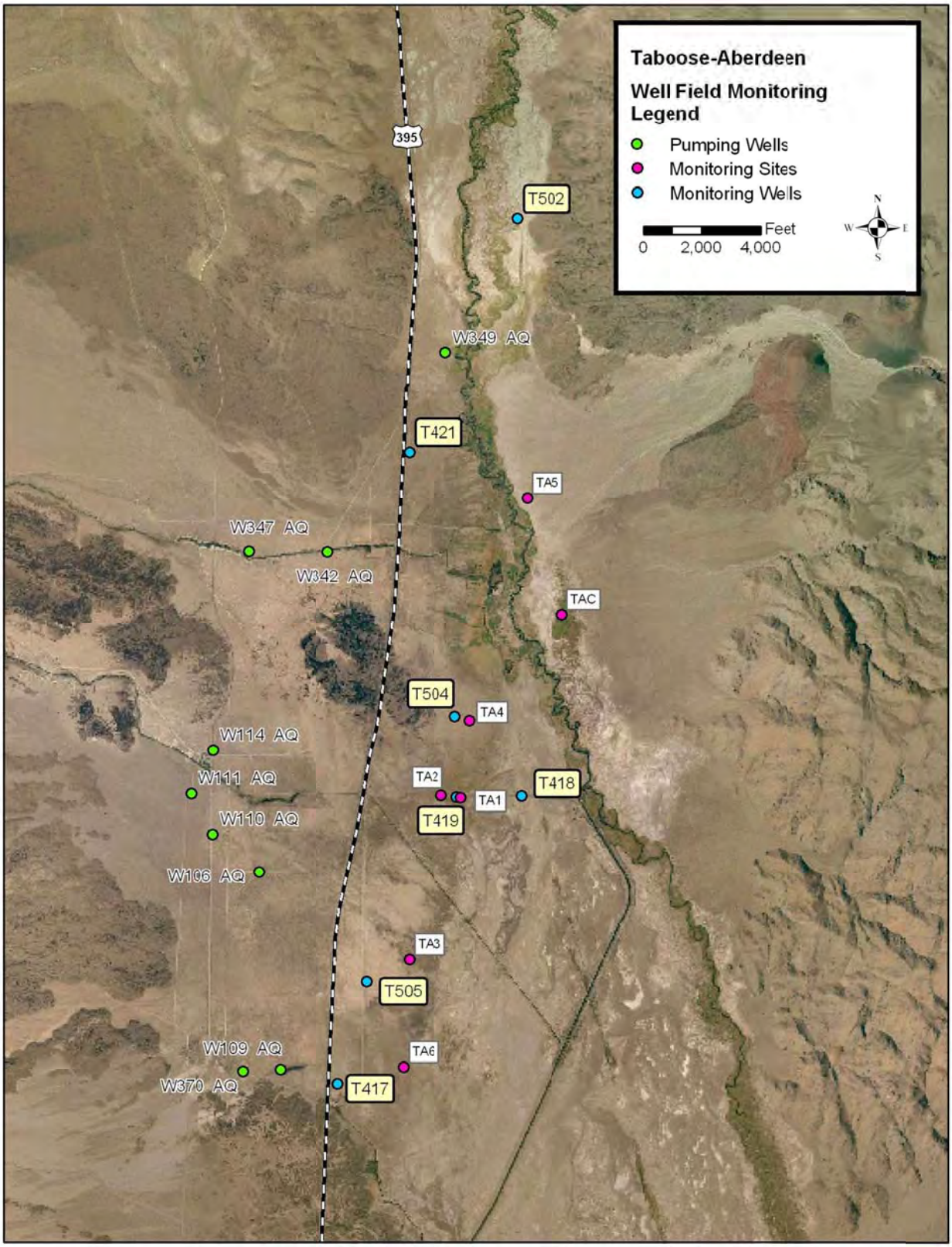

Figure 2. 7 Taboose-Aberdeen Wellfield

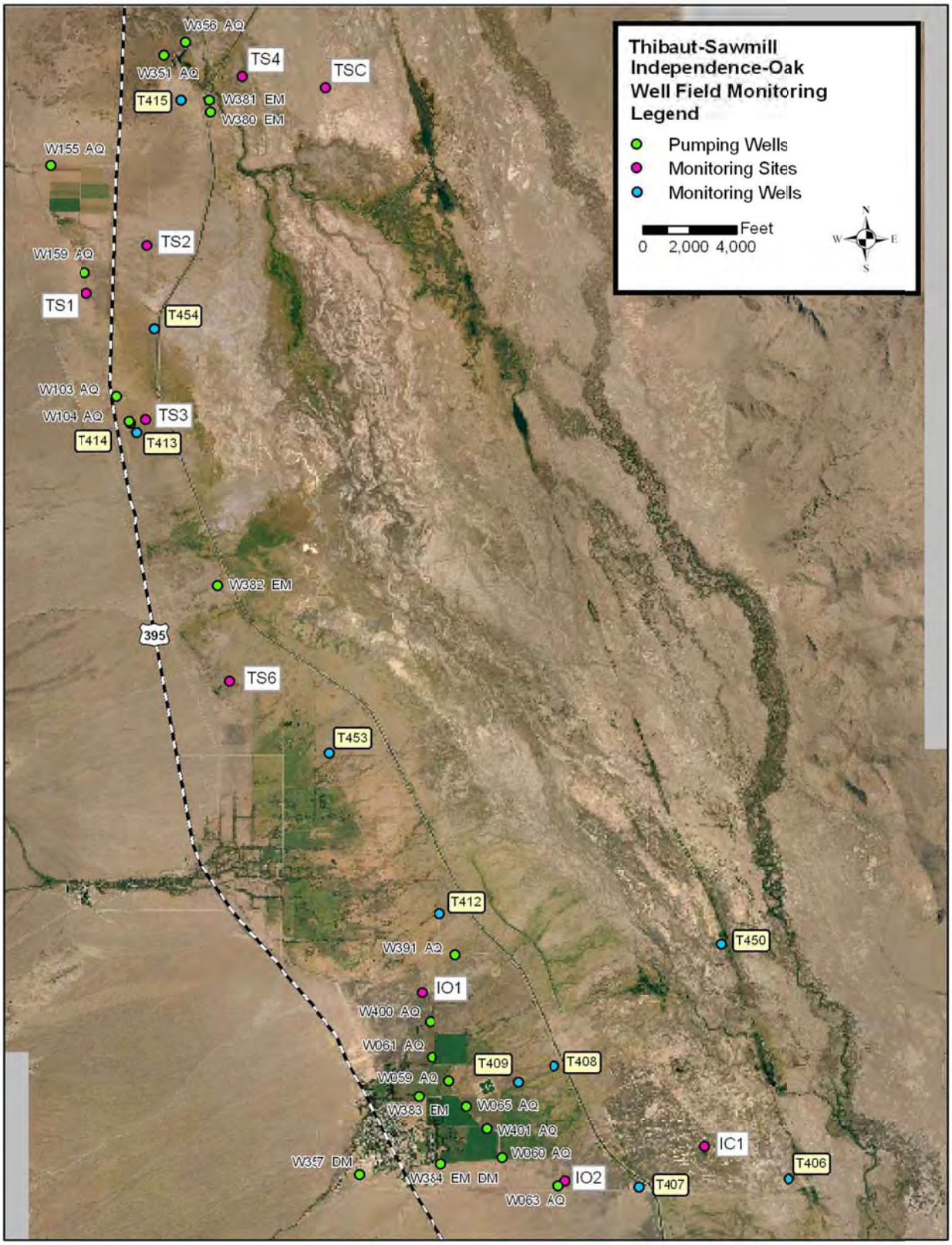

Figure 2. 8. Thibaut-Sawmill and Independence-Oak Wellfields

Symmes-Shepherd Wellfield (Figure 9)

Monitoring sites SS1 is in ON status. Monitoring site SS1 has an annual capacity of 7,385 acre-feet. Exempt Well 402 has a capacity of about 1,000 acre-feet. Total available capacity in the Symmes-Shepherd Wellfield for the 2015-16 runoff year is approximately 8,385 acre-feet. The total pumping in the Symmes-Shepherd Wellfield for the first six months of the 2015-16 runoff year is planned to be between approximately 1,200 and 4,100 acre-feet, contingent on water needs and environmental conditions.

Bairs-Georges Wellfield (Figure 9)

Vegetation monitoring site BG2 is in ON status. The wells managed under this site have a combined annual capacity of approximately 2,900 acre-feet. Exempt Well 343 has an available capacity of 500 acre-feet (based upon a six month exemption period). The current total available capacity in the Bairs-Georges Wellfield for the 2015-16 runoff year is approximately 2,900 acre-feet. Groundwater pumping in the Bairs-Georges Wellfield for the first six months of the runoff year is planned to be between approximately 660 and 940 acre-feet, contingent on water needs and environmental conditions.

Lone Pine Wellfield (Figure 10)

Lone Pine exempt wells are Well 344 and Well 346, and E/M project supply Well 425. These three wells have an annual available capacity of approximately 900 acre-feet. Well 425 is a replacement for the degraded Well W390 acre-feet.

Well 416 is a production well in the Lone Pine Wellfield drilled in 2002. Hydrologic testing was conducted on Well 416 during the 2009-10 runoff year. This well was modified in 2014 to seal the screen portion of the aquifer within the shallow aquifer. LADWP is planning to equip and conduct the initial operation of this well. If initial operation is performed during 2015-16 runoff year, it will be in addition to the currently planned pumping from Lone Pine Wellfield. The Technical Group has been requested to designate a monitoring site for this well.

The planned groundwater pumping from the Lone Pine Wellfield during the first six months of the 2015-16 runoff year is approximately 760 acre-feet, contingent on water supply needs and environmental conditions.

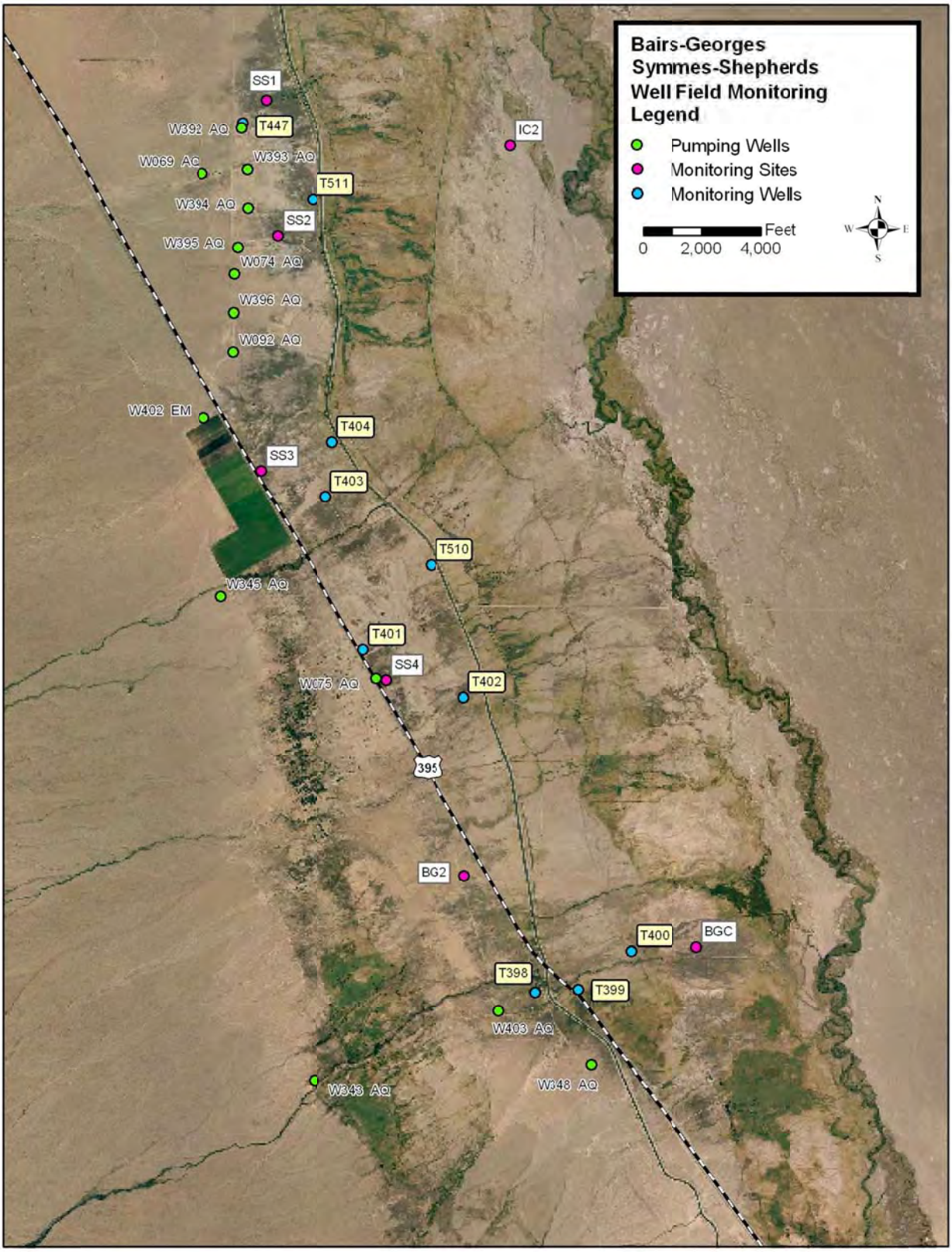

Figure 2. 9 Bairs-Georges and Symmes-Sheperds Wellfields

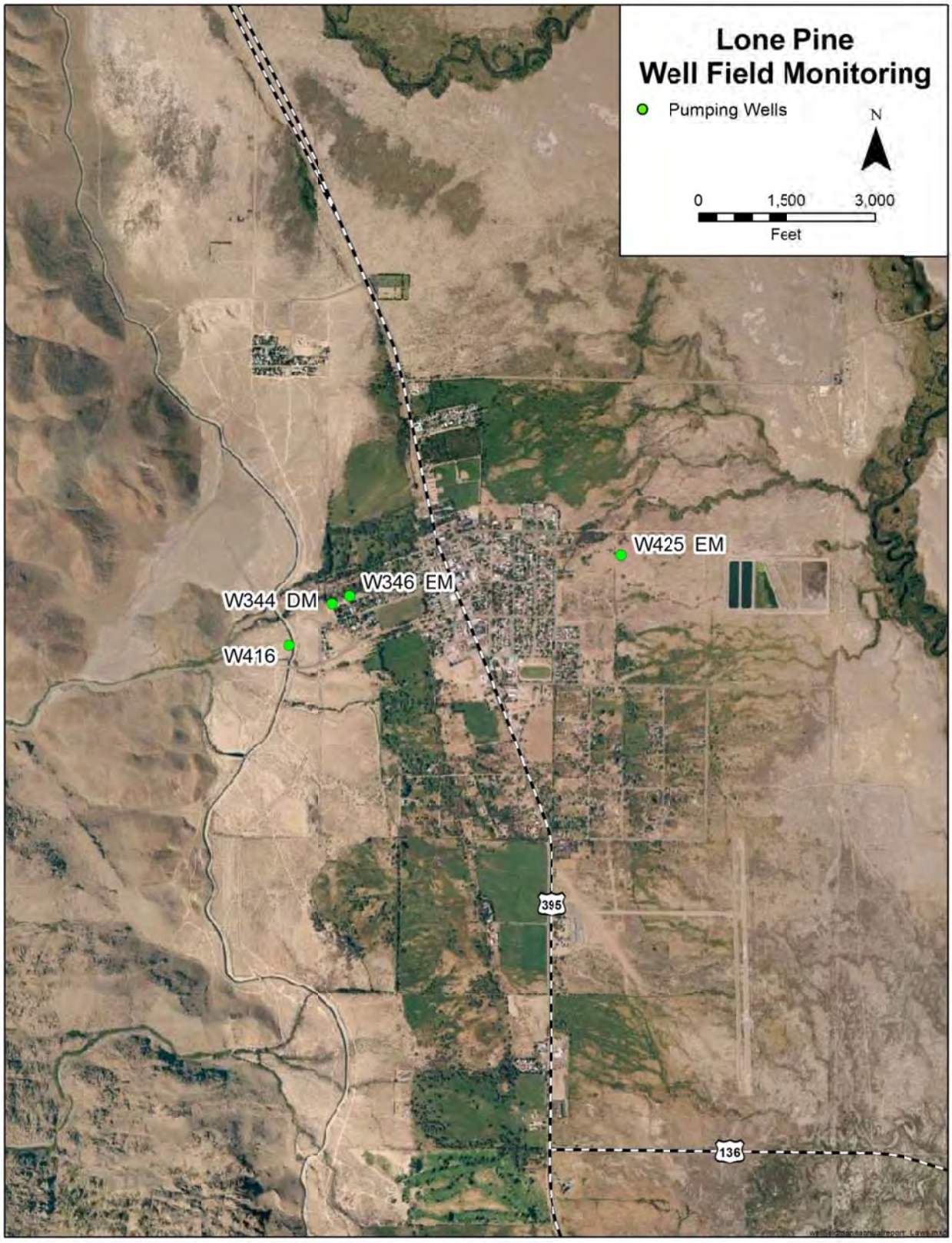

Figure 2. 10 Lone Pine Wellfield

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

Table 2.7 shows the historic (1981-82) uses and the planned monthly uses within the Owens Valley for 2015-16. The in-valley uses shown on Table 2.7 consist of irrigation, stockwater, recreation, and wildlife projects, E/M supply, Lower Owens River Project (LORP) usage, 1600 Acre-Feet Projects, and usage pursuant to California Health and Safety Code Section 42316 for dust abatement projects on Owens Lake. As shown in Table 2.7 and Figure 2.11, LADWP plans to provide approximately 127,400 acre-feet for in-valley uses this runoff year, not including water supplied to the Owens Valley reservations.

The most notable change in the Owens Valley water uses for 2015-16 is the significantly low water availability for irrigation. As shown in Figure 2.11, only 21,500 acre-feet of water is expected to be available for irrigation in 2015-16, while in 2014-15 there was approximately 43,500 acre-feet used for irrigation. However, if agreements are reached to reduce any of the Owens Valley uses for the 2015-16 irrigation season, then the water savings will go to irrigation in the Owens Valley this irrigation season instead of the use(s) outlined in this operations plan.

The extremely low forecasted runoff for the year is the primary reason that there will be a reduction in water supply for irrigation. The expect supply during a 36% of normal expected runoff year will result in a natural drop in irrigation. 2014-15 was a 52% of normal runoff year, which tied for the lowest year on record. Also, export from the Mono Basin will be 4,500 acre-feet, down from 16,000 acre-feet for the recent past. Even with no water expected to be delivered to Haiwee Reservoir during the irrigation season, typical uses in the Owens Valley will far exceed runoff supply in 2015-16.

The primary consumptive use of water in the Owens Valley is the Owens Lake Dust Mitigation Program (OLDMP). Water use in the 2014-15 runoff year by the OLDMP was 53,700 acre-feet. Water used for dust mitigation is anticipated to be 58,700 acre-feet.

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 2.7 shows estimated 2014-15 water use by the Lower Owens River on a monthly basis. Water use by the project during 2014-15 was approximately 14,300 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. LADWP has chosen to supply certain E/M projects from surface water sources in the past. Future E/M allotments may be

influenced by the availability of E/M wells and operational demands. Table 2.8 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 2015-16 runoff year. E/M project water demands during the 2015-16 runoff year are expected to be approximately 9,500 acre-feet greater than E/M groundwater pumping. The cumulative E/M water supply shortfall is estimated to be approximately 195,025 acre-feet by the end of the runoff year.

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.

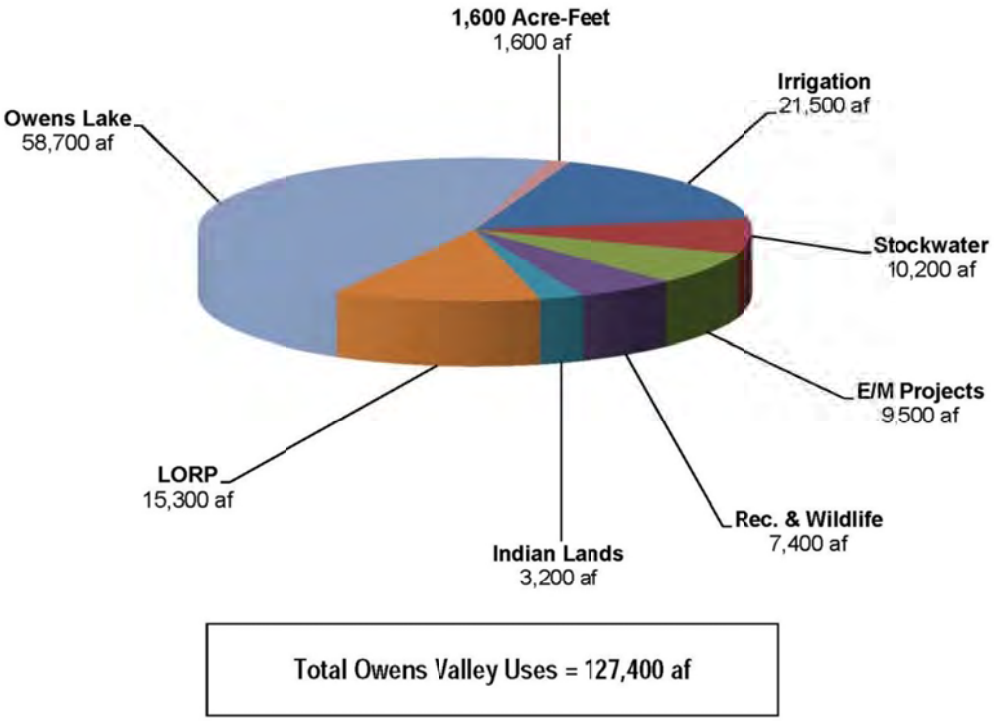

Figure 2. 11 Distribution of Planned Owens Valley Water Use for 2015-16 Runoff Year

Table 2. 7 Historic (1981-82) and Projected (2015-16) Water Uses on City of Los Angeles Land in Owens Valley (acre-feet)

Use	April		May		June		July		August		September		TOTAL Apr-Sep	
	1981	2015	1981	2015	1981	2015	1981	2015	1981	2015	1981	2015	1981	2015
Irrigation	3,980	4,000	7,958	8,500	10,373	3,000	9,476	2,800	8,295	2,250	6,321	2,250	46,403	20,800
Stockwater	1,141	900	1,319	1,100	1,244	1,100	1,245	1,100	1,219	1,000	1,319	800	7,487	6,000
E / M	0	1,320	0	1,680	0	1,640	0	1,710	0	1,300	0	1,100	0	8,750
LORP	0	500	0	1,700	0	2,700	0	3,200	0	2,700	0	2,100	0	12,900
Owens Lake	0	6,800	0	7,500	0	6,000	0	2,500	0	4,000	0	10,000	0	36,800
Rec. & Wildlife	379	500	804	700	1,160	800	1,455	850	1,381	800	1,406	650	6,585	4,300
1600 ACFT Proj.	0	85	0	91	0	116	0	157	0	74	0	115	0	638
Total	*5,500*	*14,105*	*10,081*	*19,271*	*12,777*	*15,356*	*12,176*	*12,317*	*10,895*	*12,124*	*9,046*	*17,015*	*50,475*	*90,188*

Use	October		November		December		January		February		March		TOTAL Oct-Mar		TOTAL Apr-Mar	
	1981	2015	1981	2015	1981	2015	1982	2016	1982	2016	1982	2016	81-82	15-16	81-82	15-16
Irrigation	263	600	0	0	0	0	0	0	0	0	14	100	277	700	46,680	21,500
Stockwater	1,065	700	1,045	700	1,050	700	1,007	700	1,010	700	1,098	700	6,275	4,200	13,762	10,200
E / M	0	250	0	100	0	100	0	100	0	100	0	100	0	750	0	9,500
LORP	0	900	0	250	0	150	0	250	0	250	0	600	0	2,400	0	15,300
Owens Lake	0	8,500	0	3,100	0	2,500	0	1,100	0	2,200	0	4,500	0	21,900	0	58,700
Rec. & Wildlife	781	650	713	550	565	550	478	550	342	400	447	400	3,326	3,100	9,911	7,400
1600 ACFT Proj.	0	215	0	215	0	105	0	97	0	185	0	145	0	962	0	1,600
Total	*2,109*	*11,815*	*1,758*	*4,915*	*1,615*	*4,105*	*1,485*	*2,797*	*1,352*	*3,835*	*1,559*	*6,545*	*9,878*	*34,012*	*70,353*	*124,200*

NOTE: Rec & Wildlife includes LORP off-river lakes and ponds water use

Table 2. 8 Owens Valley Groundwater Pumping for Production and E/M Water Use

(1984-85 through 2015-16 Runoff Year in acre-feet per year)

Runoff Year	Owens Valley Runoff (1)	Total Pumping	Non-E/M Pumping	E/M Pumping	E/M Water Uses	E/M Pumping & Use Imbalance	Cumulative E/M Pumping & Use Imbalance
1984-85	0	61,981	61,981	0	0		0
1985-86	0	107,718	107,718	0	109		0
1986-87	0	69,887	69,887	0	12,696	(3)	0
1987-88	0	209,394	179,884	29,510	29,360		0
1988-89	0	200,443	171,012	29,431	30,872		0
1989-90	0	155,972	133,409	22,563	23,330		0
1990-91	0	88,904	70,817	18,087	17,949		0
1991-92	0	87,310	71,520	15,790	20,517	-4,727	-4,727
1992-93	0	84,453	70,688	13,765	18,357	-4,592	-9,319
1993-94	0	76,329	67,338	8,991	19,310	-10,319	-19,638
1994-95	0	89,219	78,209	11,010	20,812	-9,802	-29,440
1995-96	0	69,752	57,180	12,572	22,914	-10,342	-39,782
1996-97	0	74,904	57,981	16,923	23,949	-7,026	-46,808
1997-98	124	66,914	52,760	14,154	21,500	-7,346	-54,154
1998-99	149	51,574	47,353	4,221	19,672	(3)	-54,154
1999-00	89	63,675	59,342	4,333	24,450	-20,117	-74,271
2000-01	84	67,795	61,456	6,339	20,611	-14,272	-88,543
2001-02	83	73,349	70,055	3,294	21,815	-18,521	-107,064
2002-03	66	81,979	76,059	5,920	21,394	-15,474	-122,538
2003-04	81	87,732	80,734	6,998	21,116	-14,118	-136,656
2004-05	77	85,820	78,110	7,710	18,327	-10,617	-147,273
2005-06	136	56,766	51,695	5,071	19,356	-14,285	-161,558
2006-07	146	58,621	53,925	4,696	17,357	(3)	-161,558
2007-08	61	60,338	53,413	6,925	11,312	-4,387	-165,945
2008-09	74	68,971	61,053	7,918	10,646	-2,728	-168,673
2009-10	77	64,138	57,946	6,192	10,695	-4,503	-173,176
2010-11	104	78,248	71,233	7,015	10,807	-3,792	-176,968
2011-12	142	91,699	84,365	7,334	11,993	-4,659	-181,627
2012-13	57	*88,689*	*83,034*	*5,655*	*8,914*	*-3,259*	*-184,886*
2013-14	54	*78,880*	*73,888*	*4,992*	*8,170*	*-3,178*	*-188,064*
2014-15	51	68,159	62,450	5,709	8,170	-2,461	-190,525
2015-16 (2)	*36*	*70,000*	*65,000*	*5,000*	*9,500*	*-4,500*	*-195,025*

(1) Based on 1961-2010 average: 415,974 acre-feet. Includes some runoff contribution to the Laws Wellfield from the White Mountains.

(2) this is only Apr-Sep pumping/uses. Forecast for planned pumping of 47,930 acre-feet (planned pumping ranges 36,250-47,830 acre-feet)

(3) surface water was available

2.4. Aqueduct Operations

Table 9 shows planned LAA reservoir storage levels and monthly deliveries to Los Angeles. Based on this plan, approximately 42,377 acre-feet will be exported from Inyo and Mono Counties to the City during the 2015-16 runoff year.

2.5. Water Exports to Los Angeles

Figure 2.12 provides a record of water exports from the Eastern Sierra to Los Angeles, averaging approximately 337,000 acre-feet per year since 1970. Figure 2.13 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 527,000 acre-feet of water during the 2015-16 runoff year. It is anticipated that water from the Eastern Sierra will make up about 8% of the 2015-16 supply. Water purchases from the Metropolitan Water District of Southern California will provide about 70% of the City's supply, groundwater from Los Angeles area aquifers will provide about 20%, and recycled water will supply about 2% of the City's water needs.

Table 2. 9 Planned Los Angeles Aqueduct Operations for 2015-16 Runoff Year

Month	Owens Valley-Bouquet Reservoir Storage 1st of month Storage (acre-feet)	Flow to Haiwee (acre-feet)	Aqueduct Delivery to Los Angeles (acre-feet)
April	160,819	0	400
May	163,228	0	300
June	157,377	0	300
July	151,707	0	3,000
August	145,270	0	6,000
September	137,163	0	3,000
October	125,129	0	600
November	123,781	5,100	3,000
December	130,495	8,000	7,700
January	135,643	9,900	6,077
February	143,951	9,000	6,000
March	150,609	9,300	6,000
TOTAL	***-10,210***		***42,377***

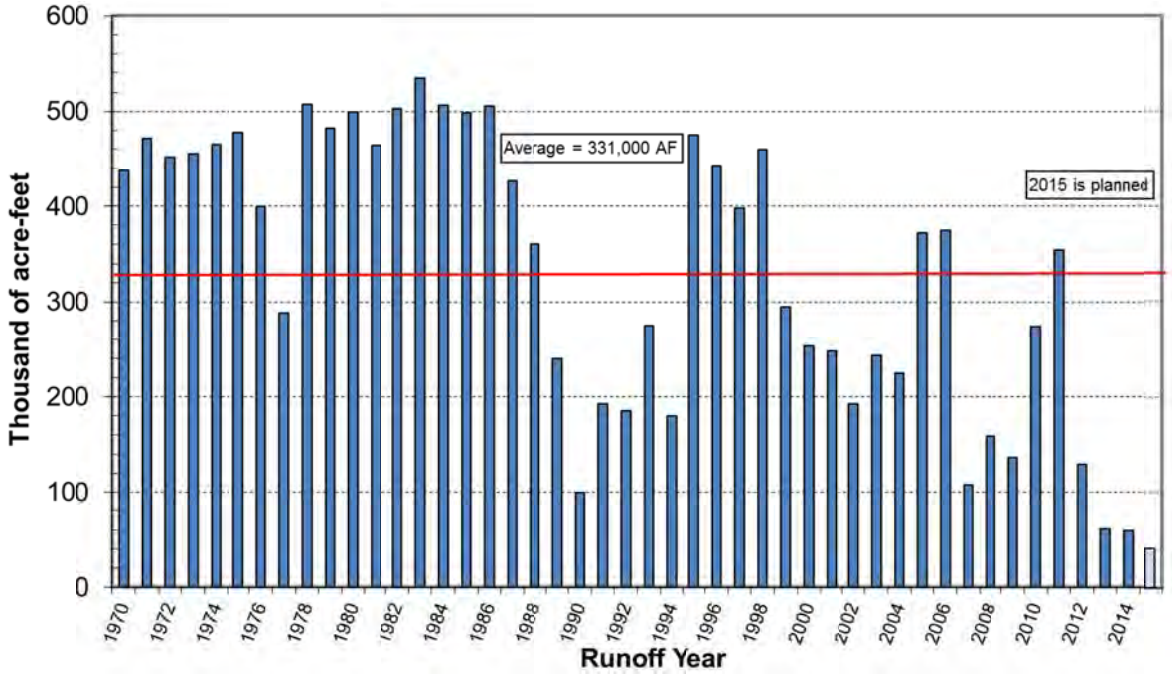

Figure 2.12 Water Export from Eastern Sierra to Los Angeles

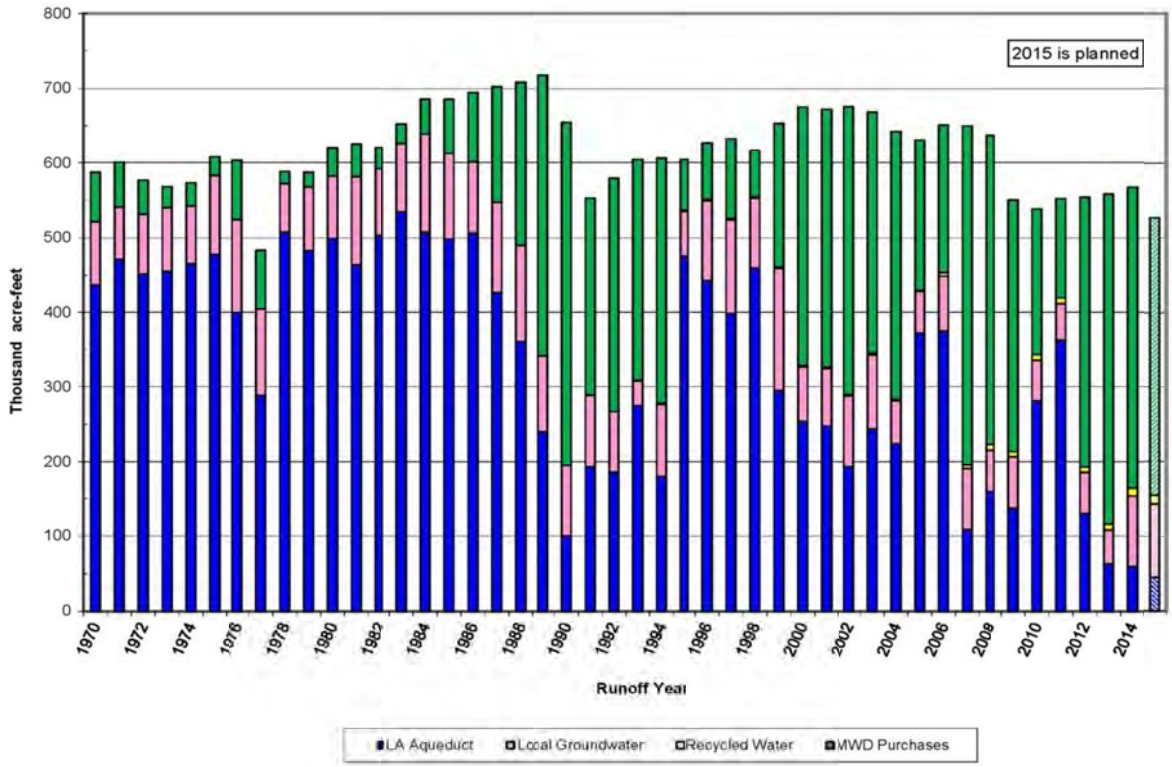

Figure 2. 13 Sources of Water for the City of Los Angeles

3. CONDITIONS IN THE OWENS VALLEY

3. CONDITIONS IN THE OWENS VALLEY

As of April 1, 2015, the Eastern Sierra overall snowpack was measured to be 4% of normal and Owens Valley floor precipitation over the 2014-15 year was about 49% of average (Tables 3.2 and 3.3). Owens Valley runoff during the 2015-16 runoff year is forecast to be 148,600 acre-feet or approximately 36% of normal (Table 2.1). Overall vegetation cover in the Owens Valley is comparable to 1980s baseline conditions. A graphical summary of Owens Valley conditions is provided in Figure 3.1. Groundwater levels are generally high in most areas of the valley.

3.1. 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 3.1 provides a listing of Owens Valley monitoring site ON/OFF status as of April 2015, 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 Table 2.5.

3.2. 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 3.2 through 3.8 illustrate hydrographs of selected monitoring wells in Owens Valley wellfields. As shown in Figures 3.2-3.8, groundwater levels are generally high in most areas of the valley considering that hydrographs show groundwater levels following three driest years with lowest runoff since LADWP has beeping record of flows in Owens Valley.

LADWP uses regression models to forecast change in depth to water. Groundwater pumping for the first six months of the 2015-16 runoff year will be contingent on environmental conditions and water needs assessed during the year. The range of planned pumping by well field is included in Table 2.3 (Section 2). Based upon the first six

months of planned groundwater pumping in each wellfields during the 2015-16 runoff year, the forecast depth to water changes between April 1, 2015, and April 1, 2016, in selected Owens Valley well fields are as follows:

- Groundwater levels in the Laws Well Field are forecast to decrease between approximately 0.2 and 0.6 feet.
- Groundwater levels in the Big Pine Well Field are forecast to decrease between 0.9 and 1.1 feet.
- Groundwater levels in the Taboose-Aberdeen Well Field are forecast to decrease between 0.3 and 1.2 feet.
- Groundwater levels in the Thibaut-Sawmill Well Field are forecast to decrease between 2.1 and 2.2 feet.
- The forecast change in depth to water in the Independence-Oak Well Field ranges between a 0.1 foot increase and a 0.7 foot decrease.
- Groundwater levels in the Symmes-Shepherd Well Field are forecast to change from an increase of 0.6 feet and a decrease of 0.2 feet.
- Groundwater levels in the Bairs-Georges Well Field are forecast to decrease between 0.5 and 0.7 feet.

It should be noted that the forecasted Owens Valley runoff for 2015-16 of 36% of normal is well below the ranged runoff values that were used in developing the regression models for predicting changes in groundwater levels. Therefore, the predicted groundwater levels will be less reliable than years within the range that the regression models were developed with.

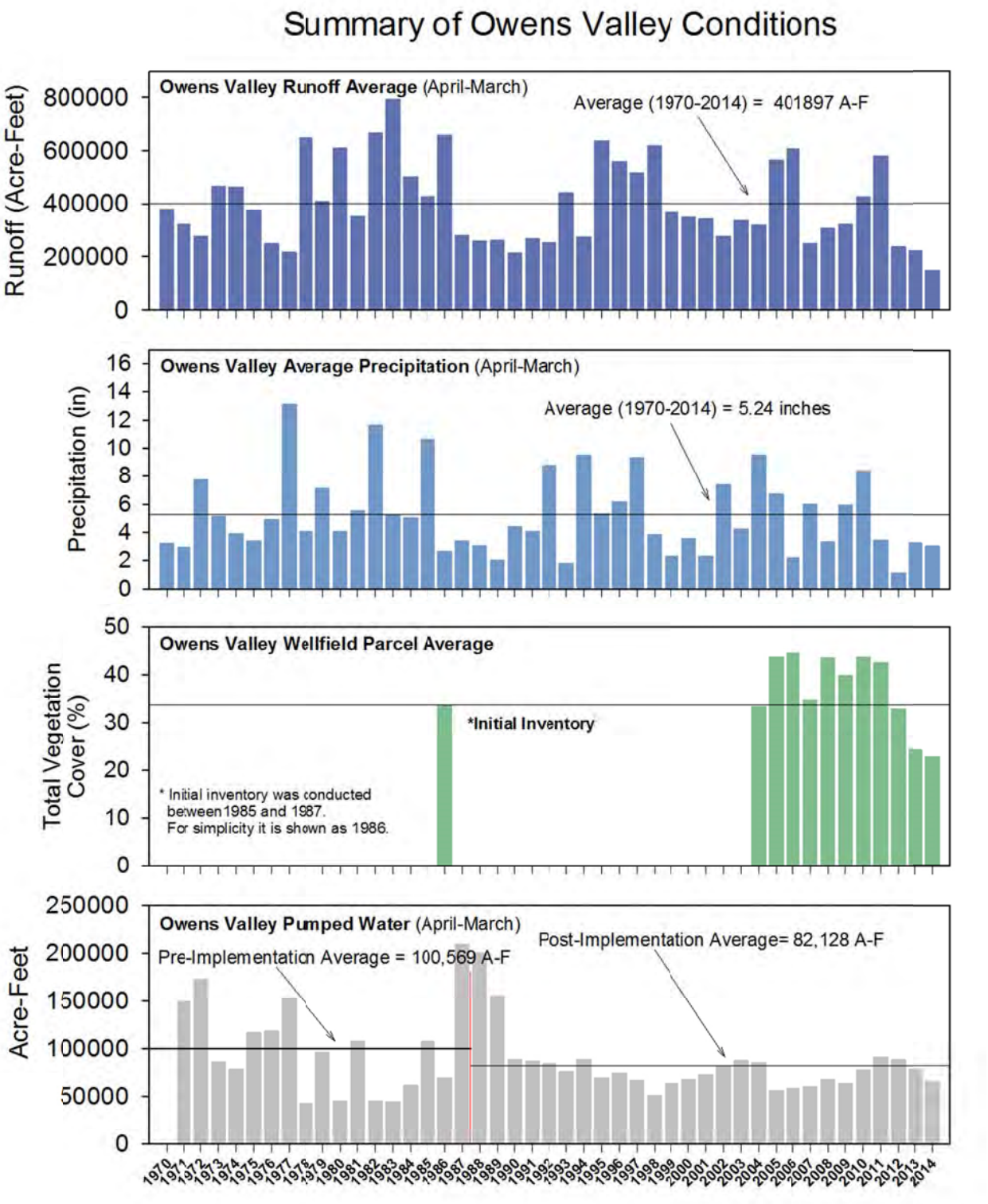

Figure 3. 1 Summary of Owens Valley Conditions

Table 3. 1 Owens Valley Monitoring Site Status (ON/OFF) as of April 2015

Wellfield	Monitoring Site	Monitoring Well	Pumping Wells	E/M Wells	ON/OFF Status
Laws	L1	795T	247, 248, 249, 398		OFF
	L2	USGS 1	236*, 239, 243, 244		ON
	L3		240, 241, 242	376, 377	OFF
	L4a, L4b			385, 386	na
	L5**		245	387, 388	na
	Exempt		236*, 354, 365, 413		Exempt
Bishop	All wells		140, 411, 410, 371		na
			406, 407, 408, 412		na
Big Pine	BP1	798T	210, 352	378, 379, 389	OFF
	BP2	799T	220, 229, 374	375	OFF
	BP3	567T	222, 223, 231, 232		OFF
	BP4	800T	331		ON
	Exempt		218, 219, 330, 332, 341, 352, 415		Exempt
Taboose-Aberdeen	TA3	505T	106, 110, 111, 114		OFF
	TA4	586T	342, 347		OFF
	TA5	801T	349		ON
	TA6	803T	109, 370		OFF
	Exempt		118		Exempt
Thibaut-Sawmill	TS1	807T	159		OFF
	TS2	T806	155		ON
	TS3	454T	103, 104	382	OFF
	TS4	804T		380, 381	OFF
	Exempt		351, 356		Exempt
Independence-Oak	IO1	809T	391, 400		OFF
	IO2	548T	63		OFF
	Exempt		59, 60, 61, 65, 401, 357, 384*	383, 384	Exempt
Symmes-Shepherd	SS1	USGS 9G	69, 392, 393		ON
	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	390	Exempt
	Other		416		na

*dual use

** Monitoring site has not yet been located.

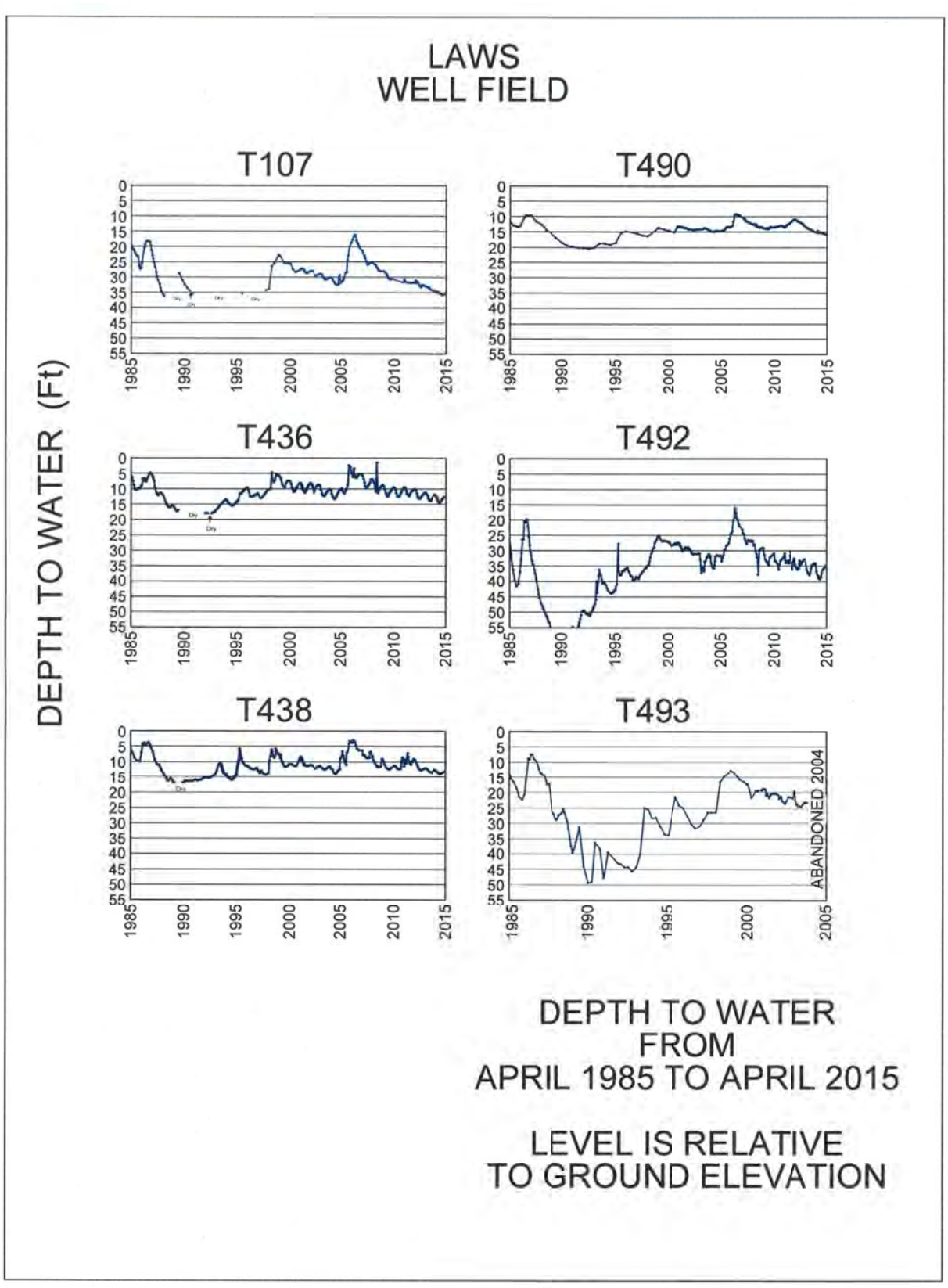

Figure 3. 2 Depth to Water Hydrographs for Laws Wellfield

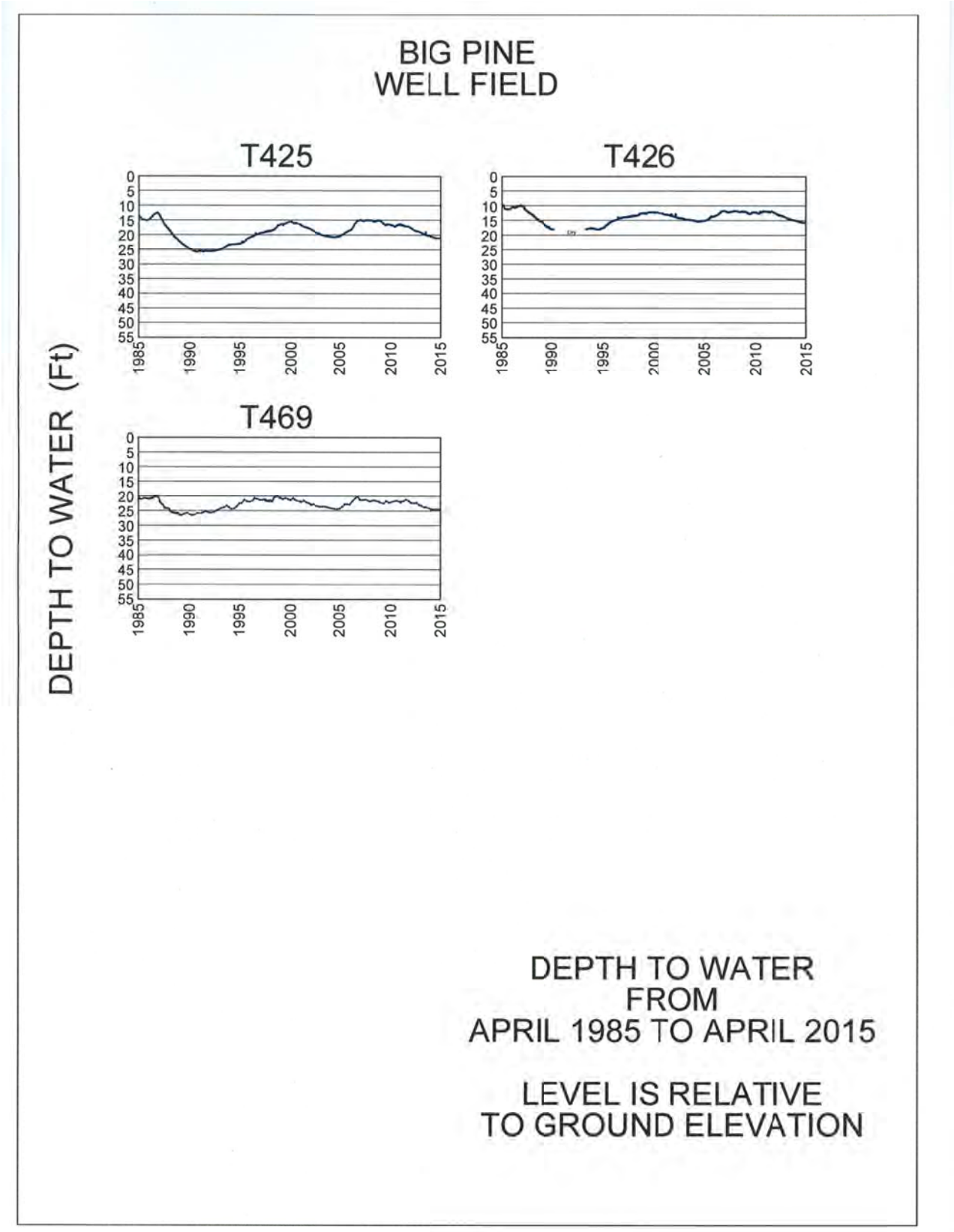

Figure 3. 3 Depth to Water Hydrographs for Big Pine Wellfield

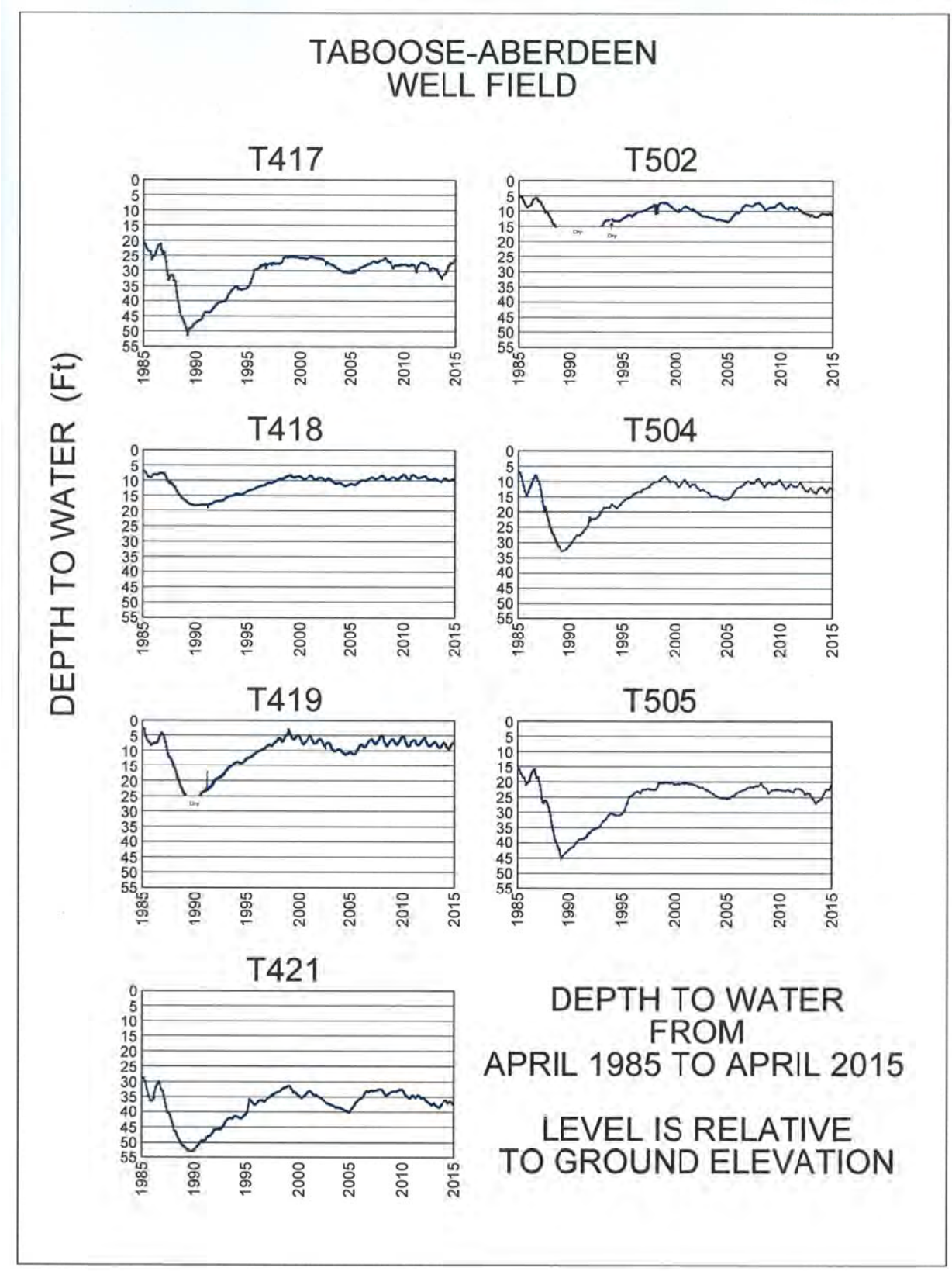

Figure 3. 4 Depth to Water Hydrographs for Taboose-Aberdeen Wellfield

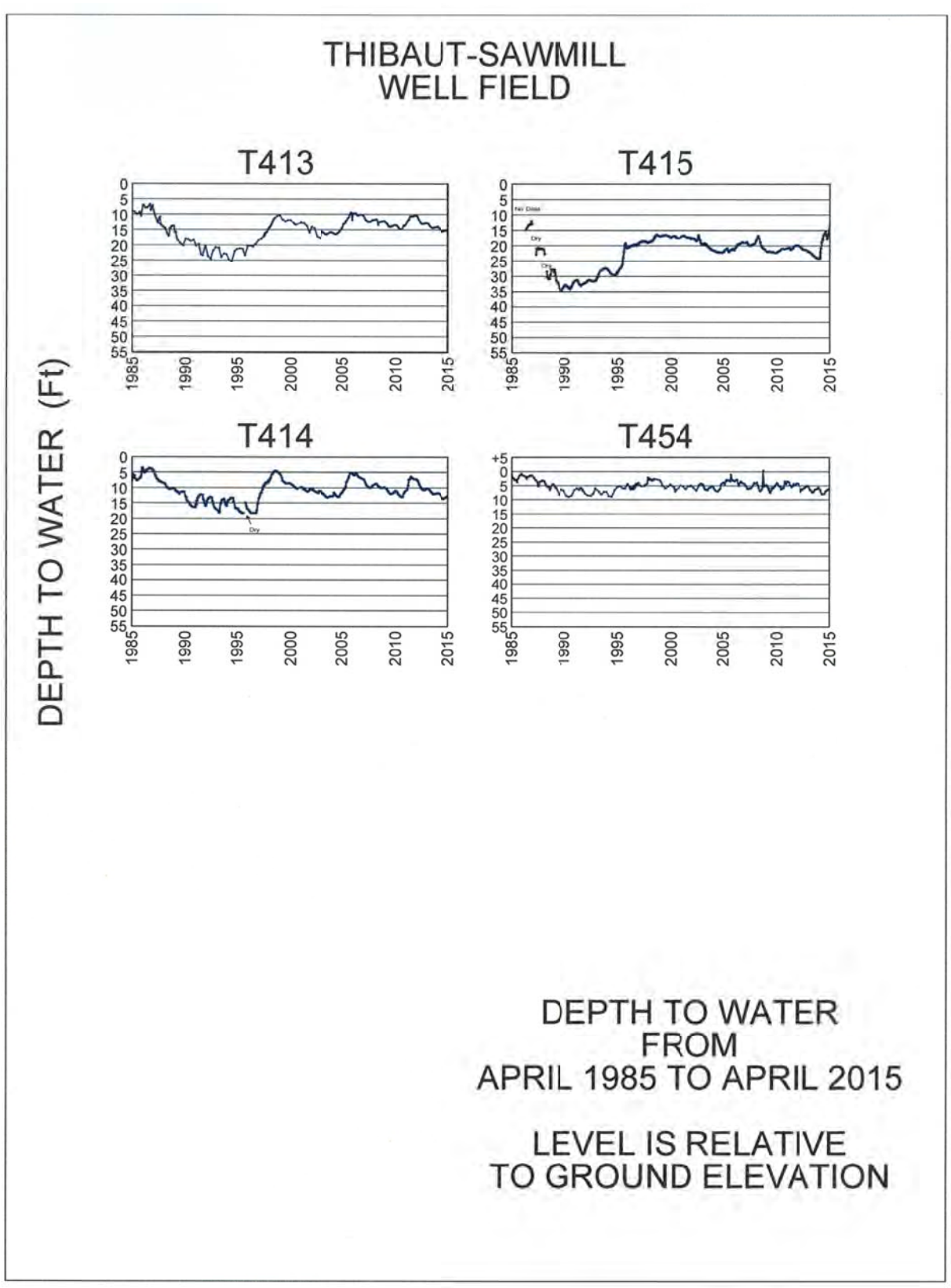

Figure 3. 5 Depth to Water Hydrographs for Thibaut-Sawmill Wellfield

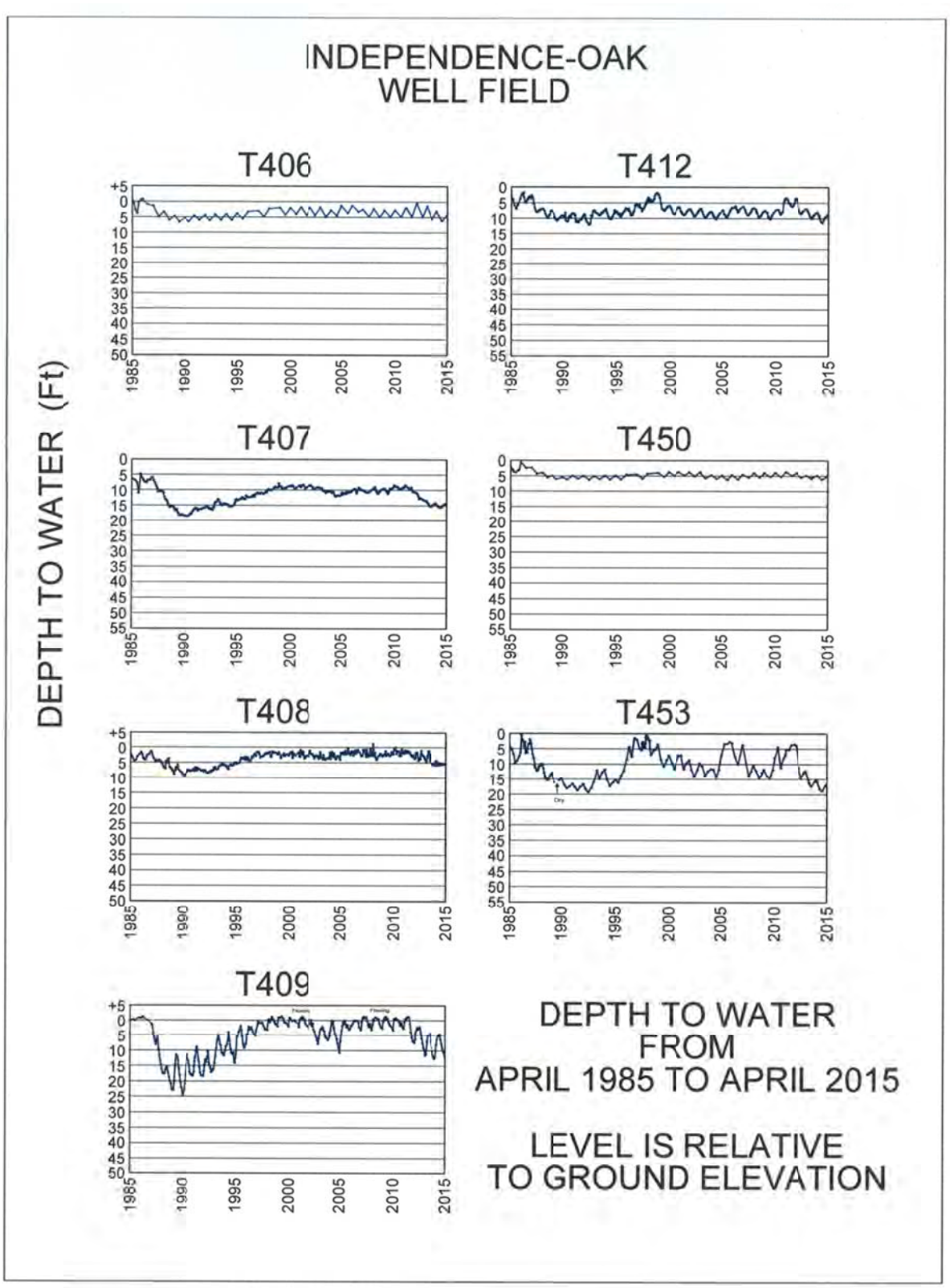

Figure 3. 6 Depth to Water Hydrographs for Independence-Oak Wellfield

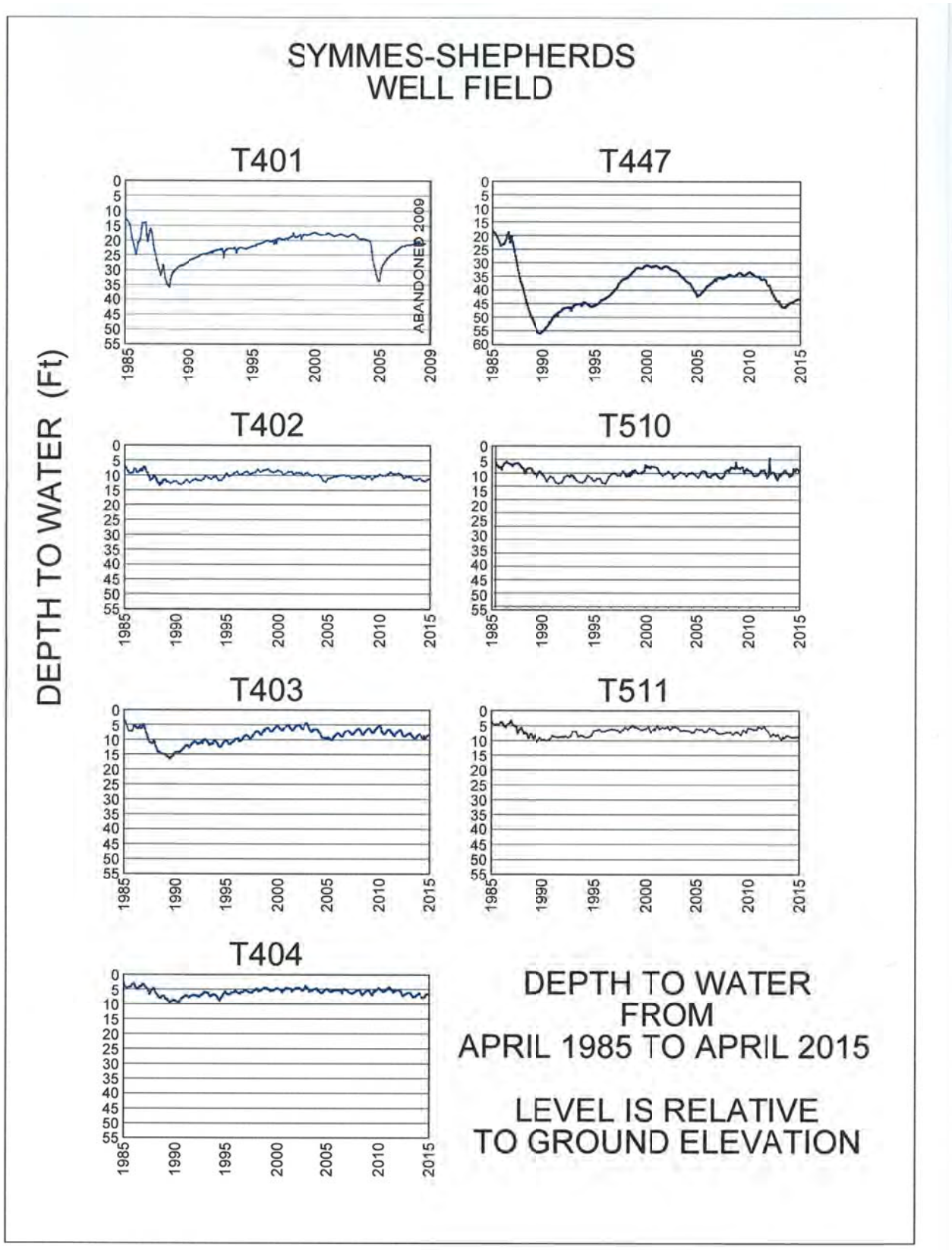

Figure 3. 7 Depth to Water Hydrographs for Symmes-Shepard Wellfield

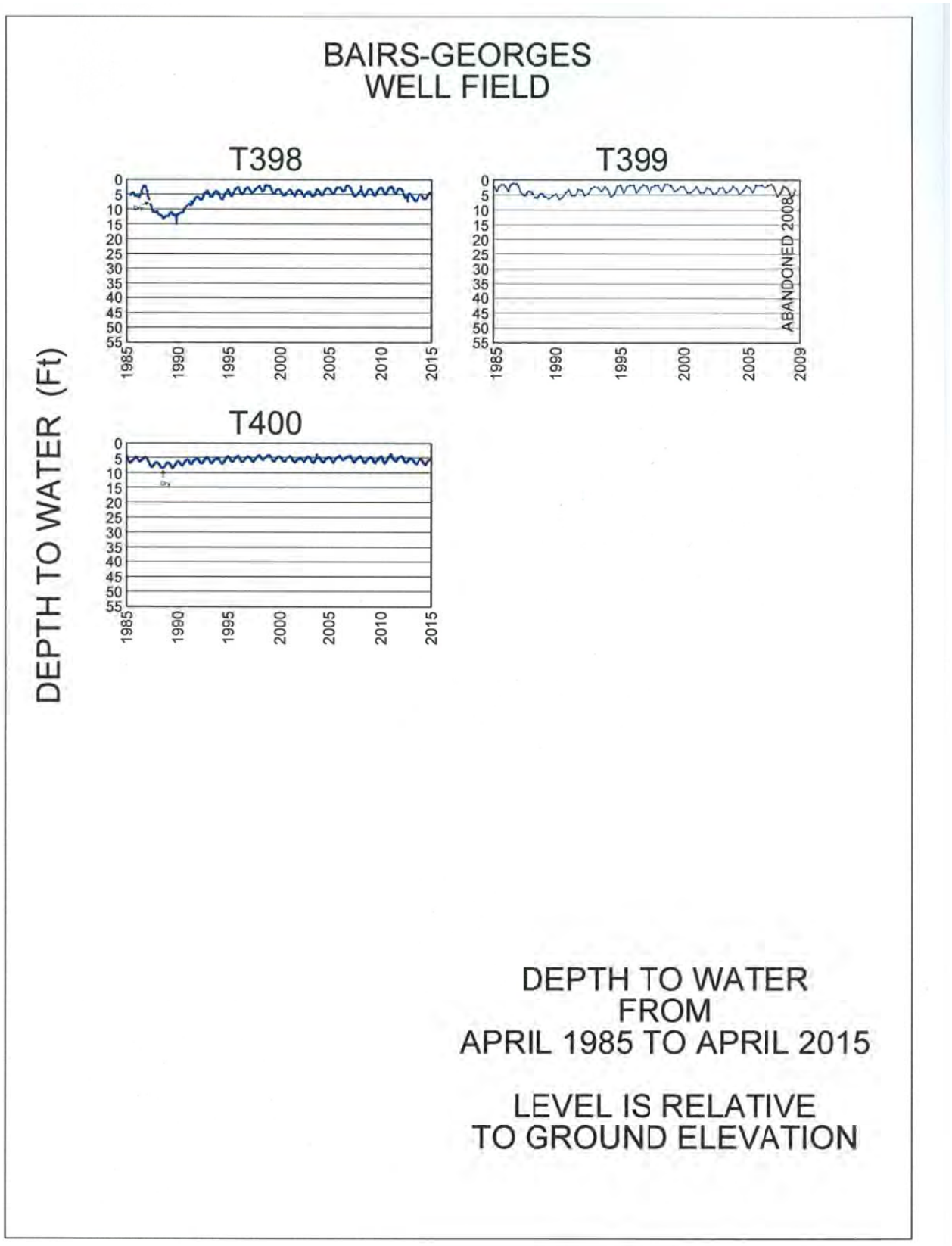

Figure 3. 8 Depth to Water Hydrographs for Bairs-Georges Wellfield

3.3. Precipitation Record and Runoff Forecast

The Eastern Sierra snowpack as of April 1, 2015 was 3% of normal in the Mammoth Lakes area, 1% of normal in the Rock Creek area, 5% of normal in the Bishop area, 8% of normal in the Big Pine area, and 4% of normal in the Cottonwood Lakes area. The Eastern Sierra overall snowpack, weighted by contribution to Owens River runoff was calculated to be 4% of the normal snowpack as of April 1, 2015, (Table 3.2).

The Eastern Sierra runoff forecast for the 2015-16 runoff year is 148,600 acre-feet or 36% of normal (Table 2.1). Figure 3.9 compares the forecast runoff for the 2015-16 year to previous runoff years.

Average precipitation on the valley floor for the 2014-15 year was 2.91 inches, which is less than half the fifty-year average of 5.9 inches. Table 3.2 details monthly annual precipitation totals for the 2014-15 runoff year as well as the long-term averages throughout the Owens Valley.

Table 3. 2 Eastern Sierra April 1, 2015 Snow Survey Results

EASTERN SIERRA SNOW SURVEY RESULTS
April 1, 2015

MAMMOTH LAKES AREA (Contributes 25% of Owens River Basin runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Mammoth Pass	1.4	43.5	3%
Mammoth Lakes	0.0	21.1	0%
Minarets 2	1.0	30.1	3%
Mammoth Lakes Area Average:	**0.8**	**31.5**	**3%**

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

Course	Water Content	April 1 Normal	Percent of Normal
Rock Creek 1	0.0	7.4	0%
Rock Creek 2	0.0	10.5	0%
Rock Creek 3	0.2	14.4	1%
Rock Creek Area Average:	**0.1**	**10.8**	**1%**

BISHOP AREA (Contributes 20% of Owens River Basin runoff)

Course	Water Content	April 1 Normal	Percent of Normal
Sawmill*	1.0	19.7	5%
Bishop Area Average:	**1.0**	**19.7**	**5%**

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

Course	Water Content	April 1 Normal	Percent of Normal
Big Pine Creek 2	0.8	13.9	6%
Big Pine Creek 3	1.8	18.6	10%
Big Pine Creek Area Average:	**1.3**	**16.3**	**8%**

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

Course	Water Content	April 1 Normal	Percent of Normal
Cottonwood Lakes 1	0.5	13.0	4%
Trailhead'*	0.7	13.7	5%
Cottonwood Area Average:	**0.6**	**13.3**	**4%**

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

Average of all Snow Courses	Water Content	April 1 Normal	Percent of Normal
	0.7	19.2	4%

Normals are based on the 1961-2010 period.
* Measured by Dept of Water Resources
** Trailhead has only been measured since 1982, so the normal is estimated.

PSS 4/1/2015

Table 3. 3 Owens Valley Precipitation During Runoff Year 2014-15 in Inches

Month	Bishop	Big Pine	Tinemaha Reservoir	LAA Intake	Indep. Yard	Alabama Gates	Lone Pine	Cotton-wood	South Haiwee	Average Owens Valley
April, 2014	0.15	0.12	0.06	0.03	0.04	0.00	0.01	0.00	0.00	0.05
May	0.34	0.84	0.50	0.30	0.06	0.03	0.27	0.04	0.09	0.27
June	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
July	0.12	0.02	0.21	0.49	0.46	0.31	0.10	0.05	0.11	0.21
August	0.23	0.51	0.19	0.79	1.00	1.55	0.91	0.98	0.50	0.74
September	0.18	0.12	0.03	0.00	0.07	0.22	0.22	0.17	0.03	0.12
October	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
November	0.01	0.05	0.00	0.04	0.01	0.05	0.04	0.09	0.02	0.03
December	0.49	0.74	0.63	0.85	0.68	0.90	0.86	1.18	1.74	0.90
January, 2015	0.01	0.06	0.09	0.06	0.14	0.22	0.84	0.35	0.54	0.26
February	0.14	0.42	0.47	0.24	0.31	0.31	0.13	0.02	0.15	0.24
March	0.00	*0.00*	0.28	0.07	0.12	0.13		0.05	0.17	0.10
2014-15 Total	*1.67*	*2.88*	*2.46*	*2.87*	*2.89*	*3.72*	*3.38*	*2.93*	*3.35*	*2.91*
Average*	6.37	6.46	6.76	5.76	5.48	4.03	4.01	6.89	7.31	5.90
% of Average	26%	45%	36%	50%	53%	92%	84%	43%	46%	49%

* Average for 1960 to 2010 runoff year

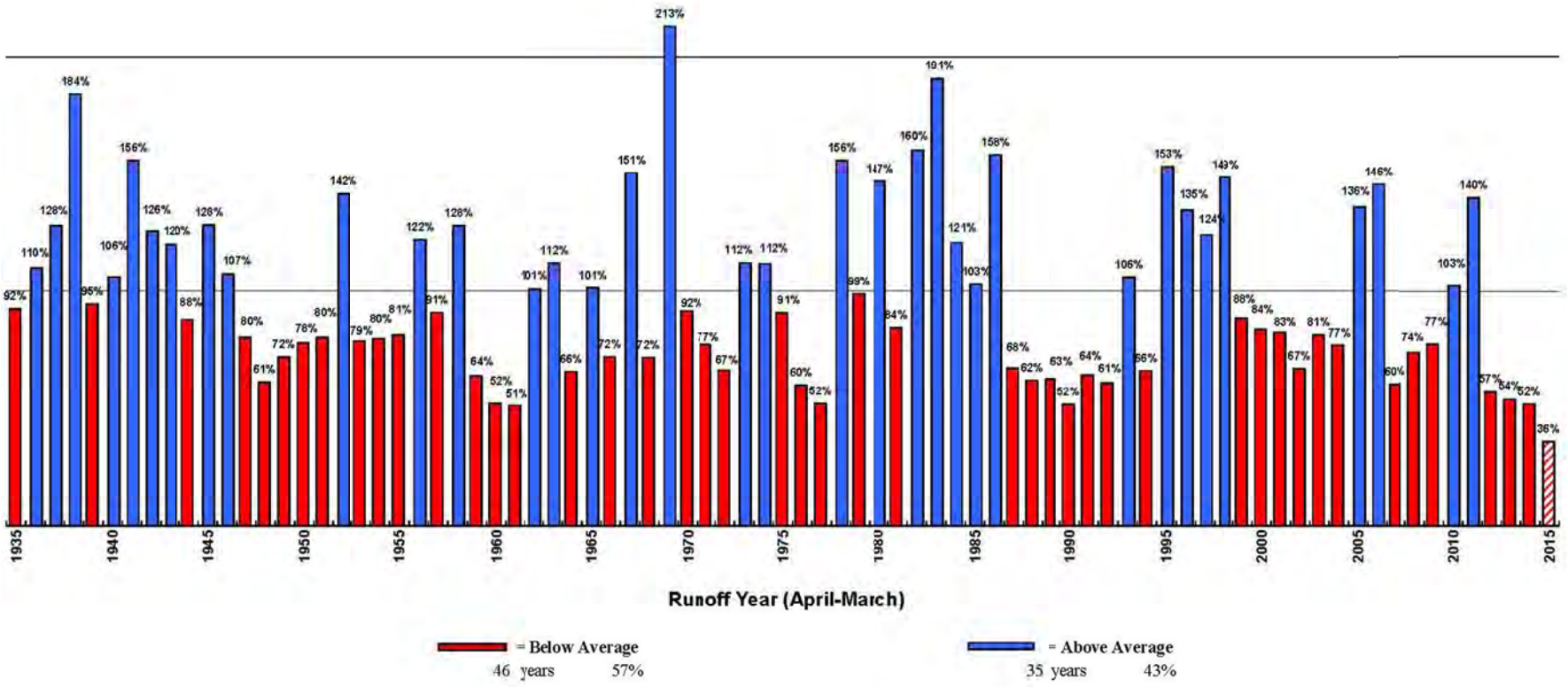

Figure 3. 9 Owens Valley Runoff – Percent of Normal

3.4. Owens Valley Water Supply and Use

Table 3.4 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 2014-15 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 with the notable exception of significant diversions to the OLDMP. While the average Owens Valley water supply (surface water flow, flowing wells, and pumped groundwater) has remained about the same over time, exports are considerably less than anticipated under the 1991 EIR and 1997 MOU. The fundamental reasons for this reduction in the municipal water supply are increased uses within Owens Valley for dust abatement, 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-Water Agreement uses as well as those uses projected under the Water Agreement and 1997 MOU in Figure 3.10. The components of LADWP's water exports from the Eastern Sierra are compared to pre-Water Agreement exports as well as those projected under the Water Agreement and 1997 MOU in Figure 3.11.

Table 3.5 provides a breakdown of Owens Valley water uses from 1985 to the present and planned water uses for the 2015-16 runoff year. While much of Table 3.5 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,
- Owens Lake Release tracks water supplied to the Owens Lake Dust Mitigation Program,
- Operations is water used for operational reasons.

Table 3.6 lists a breakdown of water supplied to E/M projects during the 2014-15 runoff year.

Table 3. 4 Owens Valley Water Supply and Uses

(Amounts in Thousands of Acre-Feet/Year)

	Pre-Project (1945-70)	Projected per MOU/ Agreement	Actual Data for Runoff Year 2014-2015	Actual Post Water Agreement Averages (1992-2015)
Owens Valley Water Supply				
Runoff (Owens Valley & Round Valley)	292	310	158	287
Flowing Wells	44	15	32	33
Pumped Groundwater	10	110[2]	65	73
Total	346	435	255	393
In-Valley Uses & Losses				
City Water Used in O.V.				
Irrigated Lands [3]	62	46	43	48
Stockwater, Wildlife, and Rec. Uses [4]	20	23	19	22
Post 1985 E/M Projects [5]	0	12	10	10
Lower Owens River [6]	0	27[7]	14	19[8]
Additional Mitigation (1,600 af from MOU)	0	0	2	2[8]
Owens Lake	0	0	54	68[8]
Sub-Total	82	110	142	169
Other O.V. Uses and Losses [9]	134	135	147	109
Total	216	245	289	278
Components of Aqueduct Export				
Owens Valley Contribution to Export	130	190	-(34)	115
Long Valley Contribution to Export	134	135	84	139
Mono Basin Contribution to Export [10]	58	30	16	16[8]
Total	322	355	66	276

1. Average runoff for period 1935 to 1938 (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, and 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 on private lands, conveyance losses, recharge, evaporation, and operation 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.

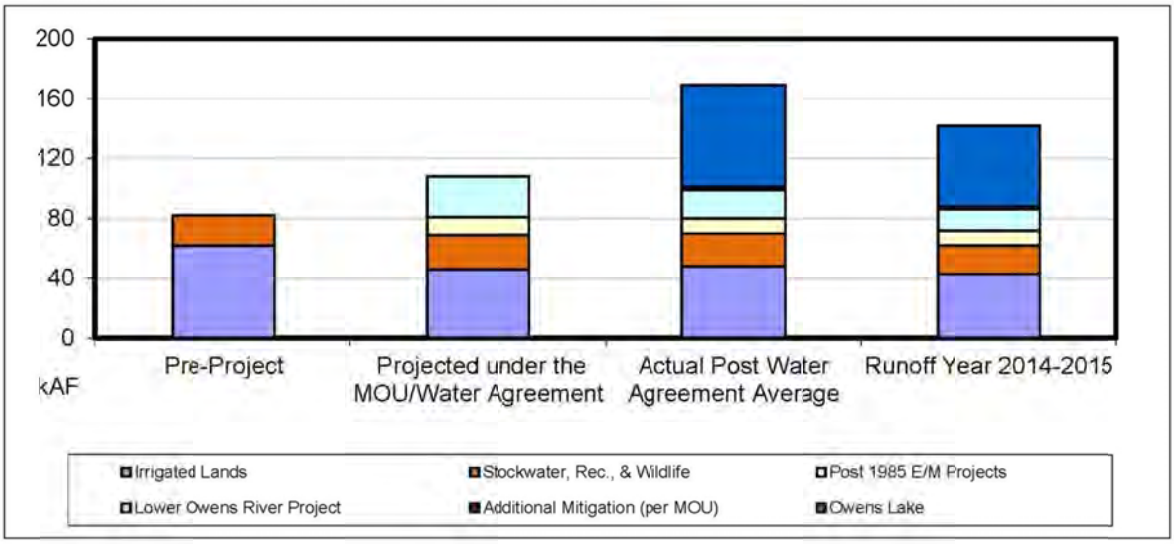

Figure 3. 10 Owens Valley Water Uses

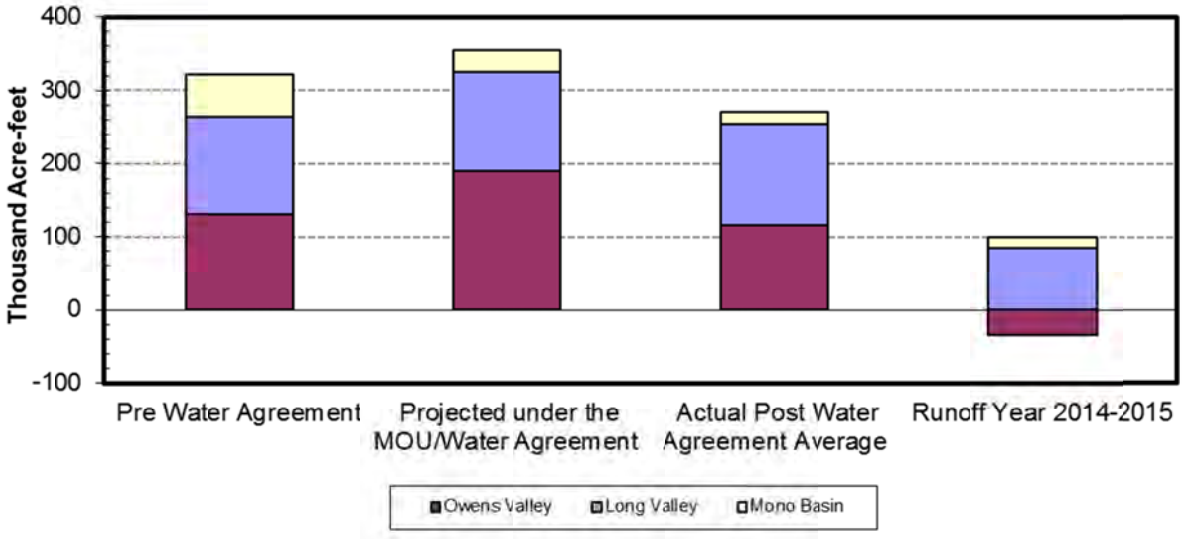

Figure 3. 11 Components of the Eastern Sierra Water Exports

Table 3. 5 Owens Valley Water Uses for 1985-86 through 2014-15 and Planned Uses for the 2015-16 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) Indian Land Uses	(9) LORP	(10) 1600 AF Projects	(11) Owens Lake Release	(12) In-Valley Uses (sum of 4+5+6+7+8+9+10-11)	Groundwater Recharge (13a) Big Pine & Independence Spreading	Groundwater Recharge (13b) Laws Spreading	(14) Operations	(15) All Uses (sum of 12+13+14)
1985-86	103	108	47,390	15,394	109	9,205	4,248	4,191			80,537	4,822	4,068	13,712	103,139
1986-87	158	70	47,884	15,125	1,610	9,735	3,873	12,551			90,778	67,251	20,429	72,387	250,845
1987-88	68	209	48,679	15,443	13,818	6,420	3,902	15,542			103,804	0	0	7,499	111,303
1988-89	62	200	46,463	14,381	17,102	8,429	5,299	13,856			105,530	0	0	6,705	112,235
1989-90	63	156	48,232	13,922	15,261	8,669	5,460	8,069			99,613	0	0	8,935	108,548
1990-91	52	89	46,424	14,360	9,242	9,983	5,445	8,657			94,111	0	0	5,312	99,423
1991-92	64	87	42,112	14,662	8,301	9,143	5,938	10,251			90,407	0	0	9,923	100,330
1992-93	61	84	37,131	17,828	9,088	7,725	5,211	9,269			86,252	0	0	12,179	98,431
1993-94	105	76	47,798	17,230	13,443	8,676	5,270	5,867			98,284	14,512	10,640	12,433	135,869
1994-95	66	89	37,790	17,178	9,132	8,116	5,641	11,680			89,537	0	56	12,102	101,695
1995-96	153	70	57,748	20,919	11,162	12,479	5,170	11,752			119,230	30,126	21,148	13,561	184,065
1996-97	135	75	46,171	19,757	10,989	9,438	5,540	12,960			104,855	4,606	0	21,125	130,586
1997-98	124	67	47,114	16,422	8,114	8,022	5,548	13,494			98,714	4,113	4,106	13,874	120,807
1998-99	149	52	45,445	13,654	9,075	8,691	4,589	10,597			92,051	24,970	31,077	23,016	171,114
1999-00	89	64	49,529	14,461	8,836	7,470	4,232	15,616			100,144	0	0	11,263	111,407
2000-01	84	68	49,327	13,442	7,989	7,263	5,792	12,793			96,606	0	790	12,517	109,913
2001-02	83	73	43,296	12,759	9,401	7,487	4,931	12,414			90,288	0	230	12,973	103,491
2002-03	66	82	43,929	12,291	11,442	7,377	4,922	9,952		22,983	112,896	0	0	8,431	121,327
2003-04	81	88	45,974	11,620	10,926	6,853	5,293	10,190		27,049	117,905	0	0	8,787	126,692
2004-05	77	86	50,311	11,546	9,915	6,866	4,739	9,003		28,981	121,361	243	695	9,536	131,835
2005-06	136	57	53,832	11,355	11,587	7,807	3,281	7,769		31,643	127,274	16,212	24,187	14,814	182,487
2006-07	146	59	50,968	12,041	11,551	7,849	3,315	11,700		42,542	139,966	29,457	16,855	38,937	225,215
2007-08	61	60	47,699	12,161	11,565	10,122	2,931	22,501		66,580	173,559	0	0	5,631	179,190
2008-09	74	69	56,130	11,435	10,646	8,479	3,527	20,957		61,326	172,500	1,342	0	7,651	181,493
2009-10	77	65	52,933	11,450	10,695	10,398	4,142	15,708		66,940	172,266	0	0	8,453	180,719
2010-11	103	80	52,983	12,275	10,807	12,106	3,703	17,020		75,267	184,161	2,993	1,973	14,280	203,407
2011-12	140	92	62,391	11,566	11,847	9,702	3,156	19,556		74,031	192,249	13,231	4,119	8,785	218,384
2012-13	57	89	48,763	10,961	9,257	9,254	2,690	20,927	1,612	75,450	178,914	0	0	4,081	182,995
2013-14	*54*	79	44,160	11,161	8,222	8,022	3,333	17,845	1,625	67,948	162,316	0	0	1,926	164,242
2014-15	*52*	*65*	*43,500*	*11,500*	*9,520*	*7,400*	*3,200*	*14,300*	*1,600*	*53,700*	*144,720*	*14*	*0*	*1,750*	*146,484*
2015-16	*36*	*73*	*21,500*	*10,200*	*9,500*	*7,400*	*3,200*	*15,300*	*1,600*	*58,700*	*127,400*	*0*	*0*	0	*127,400*
AVG.	90	86	47,213	13,823	10,005	8,600	4,436	12,977	1,612	66,660	121,556	6,900	4,528	12,986	145,970

NOTES:
2015 PUMPING IS ESTIMATED FOR THE YEAR. PLANNED PUMPING FOR THE FIRST SIX MONTHS OF THE 2015-16 RUNOFF YEAR ISON TABLE 3 IN SECTION 2.
PUMPING 1987 TO PRESENT INCLUDES E/M PUMPING
2015-16 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
LORP OFF-RIVER LAKES & PONDS USE OF 2,230 AF IS INCLUDED IN REC & WILDLIFE.
TOTAL INDIAN LAND USES ARE THE SUM OF LADWP-SUPPLIED SURFACE WATER AND TRIBAL SURFACE WATER DIVERSIONS AND PUMPING FOR THE BISHOP, BIG PINE, AND LONE PINE RESERVATIONS. HOWEVER, COLUMN (8) REPRESENTS ONLY LADWP SUPPLIED SURFACE WATER.

Table 3. 6 Water Supplied to Enhancement/Mitigation Projects During 2014-15

Project	Water Supplied (acre-feet)
McNally Canals Conveyance Losses	315
McNally/Laws/Poleta Native Pasture Lands	1,376
McNally Ponds	0
Laws Historical Museum	119
Klondike Lake	1,600
Big Pine Regreening	103
Lower Owens River Rewatering	--
Independence Pasture Lands	1,932
Independence Springfield	1,427
Independence Ditch System	343
Independence Woodlot	186
Independence Regreening	63
Shepherd Creek Alfalfa Lands	980
Lone Pine Park/Richards Field	429
Lone Pine Woodlot	74
Lone Pine Van Norman Field	343
Lone Pine Regreening	233
Total E/M Uses	9,523

3.5. 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 has 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 well fields. 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 3.12 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.

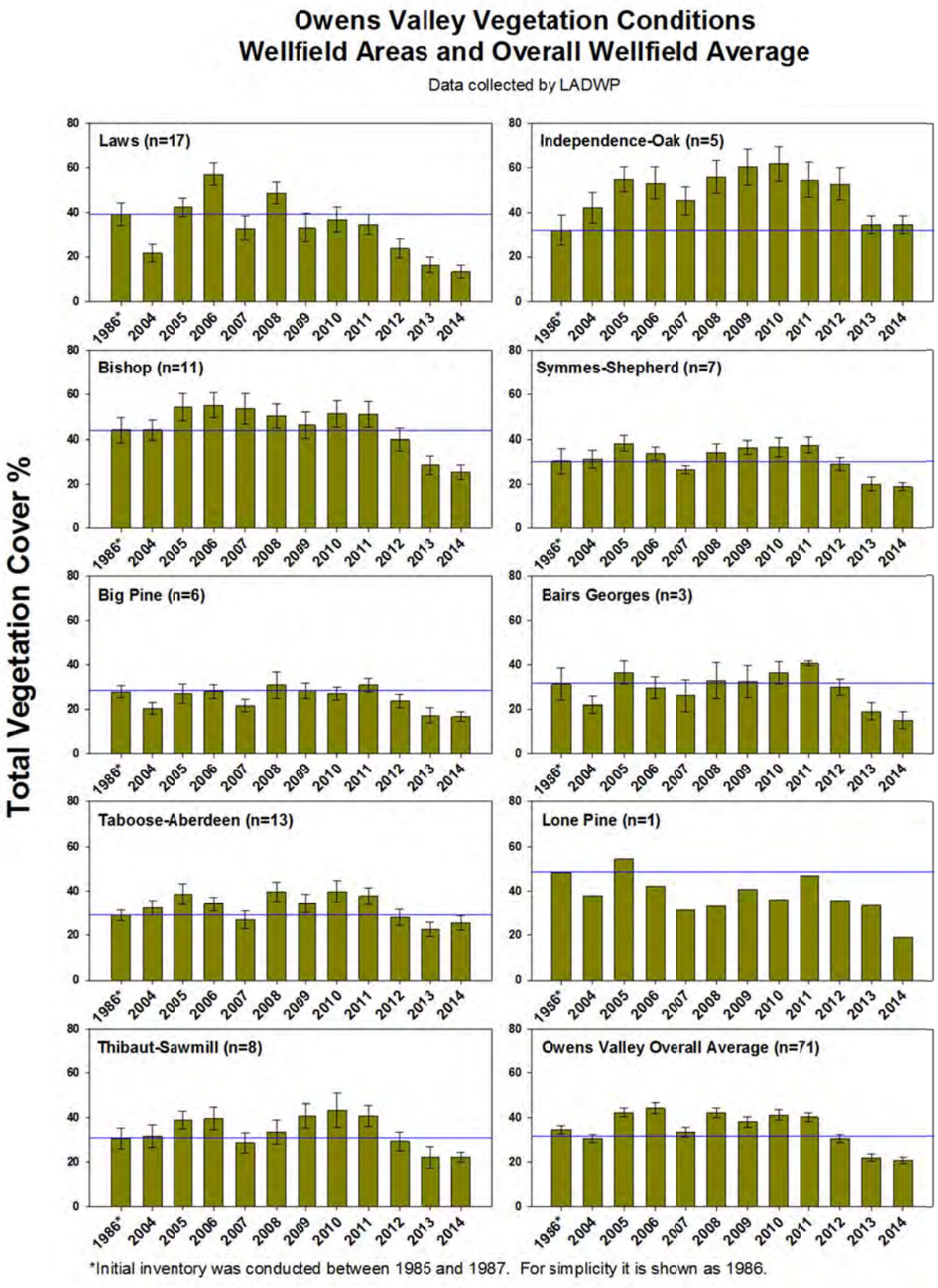

Figure 3. 12 – Owens Valley Vegetation Condition Wellfield

3.6. 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. The Appendices contain a draft copy of the most recent audit dated January 6, 2015. As shown in Figure 2.5, LADWP has historically pumped much less than allowed under the terms of the Hillside Decree. In the 2014-15 runoff year LADWP pumped about 10,400 acre-feet of water from the Bishop Cone area, less than half of that identified as being allowed using the current audit procedures.

The current Bishop Cone audits do not provide an accurate accounting of ditch losses and stockwater uses on the Bishop Cone and existing audit protocols should be revised to better reflect a true accounting of water supplied.

3.7. 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 3.7 shows daily flow values for Reinhackle Spring. Over the 2014-15 runoff year, Reinhackle Spring had an average daily flow of about 1.15 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 3. 7 Reinhackle Spring Flow in cfs During 2014-15 Runoff Year

Day of Month	April	May	June	July	August	September	October	November	December	January	February	March	Annual
1	1.19	1.19	1.15	1.24	1.27	1.27	1.27	1.19	1.03	1.03	1.11	0.98	
2	1.19	1.19	1.15	1.25	1.27	1.26	1.27	1.19	1.03	1.03	1.11	0.99	
3	1.19	1.19	1.15	1.25	1.28	1.27	1.27	1.19	1.03	1.03	1.11	0.99	
4	1.19	1.19	1.13	1.23	1.27	1.27	1.27	1.19	1.03	1.03	1.11	0.99	
5	1.19	1.19	1.11	1.23	1.27	1.27	1.27	1.19	1.03	1.03	1.11	0.99	
6	1.19	1.19	1.11	1.24	1.25	1.27	1.27	1.17	1.03	1.03	1.09	0.99	
7	1.19	1.19	1.11	1.25	1.24	1.27	1.25	1.15	1.03	1.03	1.07	0.99	
8	1.19	1.19	1.14	1.23	1.25	1.27	1.24	1.15	1.03	1.03	1.07	0.99	
9	1.19	1.19	1.15	1.19	1.25	1.27	1.24	1.15	1.03	1.03	1.06	0.99	
10	1.19	1.19	1.15	1.19	1.27	1.31	1.23	1.15	1.03	1.03	1.03	1.02	
11	1.19	1.19	1.17	1.19	1.27	1.31	1.27	1.15	1.03	1.03	0.99	1.03	
12	1.19	1.19	1.19	1.19	1.27	1.31	1.27	1.15	1.04	1.03	0.95	1.03	
13	1.19	1.19	1.19	1.19	1.27	1.31	1.25	1.09	1.07	1.03	0.95	1.01	
14	1.19	1.19	1.19	1.19	1.27	1.31	1.25	0.99	1.07	1.03	0.95	0.99	
15	1.19	1.19	1.19	1.19	1.25	1.31	1.23	0.99	1.07	1.03	0.95	0.99	
16	1.19	1.19	1.19	1.19	1.19	1.32	1.23	0.99	1.07	1.03	0.95	0.99	
17	1.19	1.19	1.19	1.19	1.19	1.31	1.23	0.99	1.07	1.03	0.95	0.99	
18	1.19	1.18	1.19	1.19	1.19	1.31	1.23	0.99	1.07	1.03	0.95	0.99	
19	1.19	1.19	1.19	1.22	1.22	1.31	1.19	0.99	1.07	1.03	0.95	0.99	
20	1.19	1.19	1.19	1.23	1.23	1.31	1.19	0.99	1.07	1.07	0.95	0.99	
21	1.19	1.19	1.19	1.23	1.23	1.31	1.19	0.99	1.07	1.07	0.96	0.99	
22	1.19	1.19	1.20	1.23	1.23	1.31	1.19	0.99	1.07	1.07	0.96	0.99	
23	1.19	1.18	1.21	1.23	1.23	1.31	1.19	1.02	1.07	1.07	0.99	1.00	
24	1.19	1.16	1.22	1.23	1.23	1.31	1.19	1.03	1.07	1.07	0.99	1.01	
25	1.19	1.15	1.23	1.23	1.23	1.31	1.19	1.03	1.07	1.09	0.99	1.02	
26	1.19	1.15	1.23	1.23	1.25	1.31	1.19	1.03	1.07	1.11	0.98	1.03	
27	1.19	1.15	1.23	1.23	1.27	1.31	1.19	1.03	1.06	1.11	0.95	1.03	
28	1.19	1.15	1.23	1.26	1.26	1.31	1.19	1.03	1.06	1.11	1.05	1.03	
29	1.19	1.15	1.25	1.27	1.27	1.31	1.19	1.03	1.03	1.11		1.03	
30	1.29	1.15	1.08	1.27	1.27	1.17	1.19	1.08	1.03	1.11		1.03	
31		2.04		1.96			2.00		1.62	1.50		1.03	
Average	1.19	1.21	1.18	1.25	1.25	1.29	1.25	1.08	1.07	1.07	1.01	1.00	1.15

3.8. Water Spreading in the Owens Valley

The April 1, 2014, Eastern Sierra overall snowpack was estimated to be 30% of normal and Owens Valley runoff was about 52% of normal during the 2014-15 runoff year. 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. No water was spread from water spreading diversions during the 2014-15 runoff year.

Overall estimated snowpack as of April 1, 2015, is about 4% of normal and forecast runoff in the Owens River Basin is about 148,600 acre-feet or 36% of average. Water spreading is not anticipated during the 2015-16 runoff year; however, based upon the prevailing temperature, precipitation, and available LAA capacity in the upcoming year, some limited water spreading may occur for operational reasons.

3.9. Owens Lake Dust Mitigation

In accordance with the Great Basin Unified Air Pollution Control District's (GBUAPCD) *2003 and 2008 Owens Valley PM_{10} Planning Area Demonstration of Attainment State Implementation Plans*, LADWP has mitigated dust emissions from just over 42 square miles of the Owens Lakebed to date. A total of 53,700 acre-feet of water was released for dust control on Owens Lake during the 2014-15 runoff year.

Shallow flooding, managed vegetation, and gravel cover dust control measures have been used to mitigate dust emissions from the lakebed and are recognized as the approved Best Available Control Measures by GBUAPCD.

Currently, Phase 7a of the Owens Lake Dust Control Project is under construction, which would bring an additional 3.1 square miles of new dust control into operation in areas formerly designated for Moat and Row under Phase 7. In addition, Phase 7a is converting 3.4 square miles currently operated as shallow flooding to managed vegetation, gravel cover, or a hybrid of the approved control measures to use water more efficiently and to maintain/enhance wildlife habitat value on Owens Lakebed.

Furthermore, LADWP is anticipating receiving an order from the GBUAPCD within the next few months to mitigate dust emissions from up to 300 acres on Owens Lake playa as part of the Owens Lake Dust Mitigation Program - Phase 7b Project.

LADWP has prepared a Draft Environmental Impact Report (DEIR) for implementation of the GBUAPCD's 2011 and 2012 Supplemental Control Requirements Determinations (also known as Owens Lake Dust Mitigation Program – Phase 9/10 Project) which requires mitigating dust emissions from an additional 3.61 square miles of Owens Lakebed. The public comment period for the DEIR began on February 12, 2015 and ended on March 30, 2015. LADWP anticipates that the final Environmental Impact Report for these dust mitigation activities will be adopted and certified on or about July 1, 2015. LADWP is required to complete the implementation of the Owens Lake Dust Mitigation Program – Phase 9/10 Project by December 31, 2017.

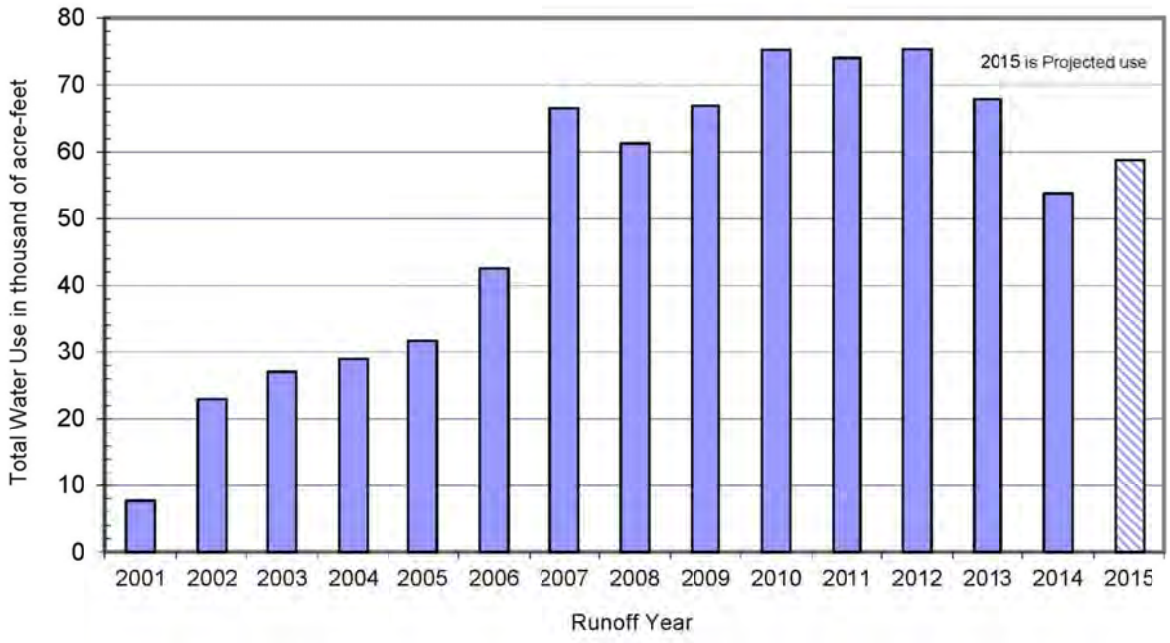

Figure 3. 13 Water Use by Owens Lake Dust Mitigation Activities