CALENDAR YEAR 2014
FALLOWED LAND VERIFICATION REPORT

PVID/MWD Forbearance and Fallowing Program

Palo Verde Irrigation District,
The Metropolitan Water District of Southern California, and
U.S. Bureau of Reclamation

Final
May 14, 2015

CALENDAR YEAR 2014
FALLOWED LAND VERIFICATION REPORT

Executive Summary

On January 1, 2005, the Palo Verde Irrigation District (PVID) and The Metropolitan Water District of Southern California (MWD) initiated a 35-year "Forbearance and Fallowing Program" (Program) with landowners within PVID. A total of 25,947 acres were enrolled. Participating landowners started fallowing on behalf of the Program on January 1, 2005. The Program is termed to end on July 31, 2040. Water that would have been used to grow crops on the fallowed land is made available to MWD.

In July 2011, Metropolitan issued a fallowing call for minimum fallowing for Contract Years 2012/13 and 2013/14 (August 1, 2012 through July 31, 2014) , i.e., 25% of the landowners' maximum commitments.

In July 2012, Metropolitan did not issue a fallowing call for Contract Years 2013/14 and 2014/15 (August 1, 2013 through July 31, 2015). Instead a letter was sent informing the participants to continue minimum fallowing per the July 2011 fallowing call.

In July 2013, Metropolitan issued a fallowing call for Contract Years 2014/15 and 2015/16 (August 1, 2014 through July 31, 2016) at 50% of the landowners' maximum commitments.

Therefore for calendar year 2014, from January 1, 2014 through July 31, 2014, fallowing was at the minimum 25% call. The fallowed acreage of 6,493 acres is slightly higher than the minimum (e.g., 25 percent of 25,947 acres is 6,486 acres) due to the rounding up or down of each contract to the nearest acre, and to accommodate three contracts, 4 acres were waived from fallowing in the Program. Then starting August 1, 2014 and through December 31, 2014, the fallowing call at the 50% level increased fallowed acreage to an anticipated 12,997 acres. However, a participating landowner initially enrolled 22 acres as part of his contract commitment to the Program. But upon verification, the land did not satisfy the Program's eligibility prerequisites to participate. Unfortunately, a resolution was not reached, resulting in a reduction of the landowner's annual payment for those 22 acres and a corresponding reduction in the total acres fallowed. Therefore, at the 50% level, from August 1st through December 31st total fallowed acreage was 12,975 acres.

Through the act of fallowing, water is saved. However, the exact amount of water saved is difficult to quantify. Because of the Program's existence, the types and acreage of crops that would have been grown on the fallowed lands and hence the exact amount that has been saved through fallowing will never be known.

Two methods were used to estimate the water savings. Under the first method (Historical Use Method), three periods of past years deemed representative of historical conditions in PVID were selected and irrigation water use rates during each period were calculated and used to estimate water savings from the fallowed lands for calendar year 2014. Under the second method (Actual Use Method), irrigation water use rates on irrigated lands during calendar year 2014 were calculated and used to estimate water savings from the fallowed fields. The resulting estimates of saved water by each method are shown in Table E-1.

Table E-1: Estimates of Saved Water by Method – Calendar Year 2014

Method	Saved Water (acre-feet)
12-Year Average (1988-2002)*	38,591
5- Year Average (1998-2002)	40,522
3- Year Average (2000-2002)	42,647
Actual Use Method - CY 2014	43,010

*1992, 1993 and 1994 data were not included in the analysis. From 1992 through 1994, the PVID-MWD Test Fallowing Program was conducted.

Estimates of water saved by the Program in calendar year 2014 ranged from 38,591 acre-feet to 43,010 acre-feet. The Actual Use Method is deemed the method most reflective of the agronomic, weather, and market conditions prevailing in the Palo Verde Valley during calendar year 2014. As such, the best estimate of the amount of water saved during calendar year 2014 is 43,010 acre-feet.

CALENDAR YEAR 2014
FALLOWED LAND VERIFICATION REPORT
Table of Contents

		Page
Executive Summary		2
Table of Contents		4
1.0	Program Description	5
2.0	Palo Verde Irrigation District	5
3.0	The Metropolitan Water District of Southern California	7
4.0	Program Implementation	7
5.0	Saved Water	8
6.0	Historical Use Method	9
6.1	12-Year Average: 1988-2002 (Excluding 1992-94)	9
6.2	5-Year Average: 1998-2002	12
6.3	3-Year Average: 2000-2002	12
7.0	Actual Use Method – CY 2014	13
8.0	Conclusions	14

List of Tables

Table E-1	Estimates of Saved Water by Method – Calendar Year 2014	2
Table 1	Climatic Data, Palo Verde Valley, California – 1988-2014	6
Table 2	Fallowed Valley Lands – Calendar Year 2014	8
Table 3	Estimated Irrigation Water Use on Valley Lands – 1988-2002	10
Table 4	Farmed Acreage in Valley Portion of PVID – 1988-1991 & 1995-2002	10
Table 5	Estimated Irrigation Water Use Factors on Valley Lands – 1988-2002	11
Table 6	Estimated Saved Water Using the 12-Year Average Method – Calendar Year 2014.	12
Table 7	Estimated Irrigation Water Use Factors on Valley Lands – Calendar Year 2014	13
Table 8	Estimated Saved Water Using the Actual Use Method – Calendar Year 2014	14
Table 9	Estimates of Saved Water by Method – Calendar Year 2014	14

List of Attachments

Attachment 1 Fallowed Fields under the Program on 1/1/2014	16
Attachment 2 Fallowed Fields under the Program on 12/31/2014	17

CALENDAR YEAR 2014
FALLOWED LAND VERIFICATION REPORT

1.0 Program Description

On January 1, 2005, the Palo Verde Irrigation District (PVID) and The Metropolitan Water District of Southern California (MWD) initiated a 35-year "Forbearance and Fallowing Program" (Program) with landowners within PVID that would extend through July 31, 2040. Participation in the Program is voluntary but requires participating landowners to sign a 35-year participation contract. A total of 25,947 acres are enrolled in the Program. MWD paid participating landowners a one-time signup payment for enrolling their lands in the Program and fallowing lands in response to MWD's annual fallowing calls. In addition, MWD compensates participating landowners with annual payments for fallowing land within PVID that is served with Priority 1 Colorado River water delivered by PVID. In return for the payments, the water that would have been used to grow crops on the fallowed lands is made available to MWD.

2.0 Palo Verde Irrigation District

The Palo Verde Irrigation District Act was passed by the California Legislature in 1923. PVID was then organized and began functioning in 1925. Governance is provided by a 7-member Board of Trustees. Administration is provided through a General Manager and a staff of 65, currently, not counting Board members. PVID presently covers about 189 square miles in Riverside and Imperial Counties of California. The principal city in PVID's service area is Blythe which, with its urban fringe, has a population of about 21,800 people. Currently, PVID contains approximately 131,285 acres with 104,485 acres located in the Palo Verde Valley (Valley) portion of PVID and 26,800 acres located on the adjacent Palo Verde Mesa (Mesa). PVID diverts water from the Colorado River, which is regulated by the U.S. Bureau of Reclamation (Reclamation).

The Valley with its long, hot growing season is ideal for agriculture. Crops include vegetables, forage, grains and fibers. Mild winters, with a minimum of frost, permit the growing and harvesting of crops throughout the year.

Climatic data for temperature, precipitation and evapotranspiration (ET_o) in the Valley for the period 1988-2014 are shown in Table 1. The highest maximum annual average temperature was 93.03° Fahrenheit (F) in 2003; and the lowest minimum annual average temperature was 52.81° F in 2011. Annual rainfall ranged between a low of 0.72 inches in 2000 to a high of 6.49 inches in 1998. Annual ET_o varied between a low of 65.05 inches in 2012 at Ripley to a high of 79.32 inches in 1994 at Palo Verde.

Table 1: Climatic Data, Palo Verde Valley, California – 1988-2014

Year	Maximum Annual Average Temperature[1]	Minimum Annual Average Temperature[1]	Annual Rainfall[2]	ET_o Palo Verde[3]	ET_o Blythe NE[4]	ET_o Ripley[5]
	(Fahrenheit)	(Fahrenheit)	(inches)	(inches)	(inches)	(inches)
1988	88.5	57.1	3.53	72.3		
1989	90.1	54.9	1.26	68.99		
1990	88.2	56.3	1.66	73.04		
1991	86.5	55.8	4.32	68.75		
1992	87.5	58.6	6.21	70.47		
1993	88.7	57.2	5.05	77.15		
1994	88.5	57.4	3.4	79.32		
1995	89.2	58.3	2.53	73.55		
1996	90.1	59.6	2.34	73.53		
1997	88.4	58.3	5.79	68.2	69.03	
1998	86.5	56.8	6.49	68.42	66.71	
1999	88.5	56.3	3.2	70.58	72.52	69.67
2000	89.4	58.6	0.72	68.81	69.13	67.22
2001	89.5	56.1	4.78	69.11	67.5	68.81
2002	89.2	57.2	0.76	71.09	72.41	69.34
2003	93.03	60.32	2.68	67.26	68.46	67.15
2004	91.9	59.55	2.57	66.78	66.64	67.69
2005	87.11	55.77	6.39	65.66	67.11	65.13
2006	90.5	57.9	1.57	69.6	75.5	67.9
2007	88.57	59.89	1.93	69.85	73.38	68.27
2008	89.65	57.48	2.41	71.47	73.69	68.18
2009	85.39	52.83	1.31	68.05	70.77	71.42
2010	84.58	54.08	2.56	64.72	72.42	67.02
2011	84.7	52.81	2.41	72.69	68.41	69.51
2012	86.39	54.11	3.36	66.70	67.60	65.05
2013	85.71	53.49	2.32	66.33	70.20	66.94
2014	86.95	54.63	3.31[6]	67.57	71.70	69.51
Average	**88.27**	**56.72**	**3.14**	**70.00**	**70.18**	**68.05**

[1] National Oceanic and Atmospheric Administration (NOAA) data from Blythe Station except for October 1997; August, September, and November 1999; January and December 2000; December 2001; and October 2006 when NOAA values from Blythe Airport Station were used because of missing data. Starting 2009, data are averages of the three California Irrigation Management Information System (CIMIS) stations at Palo Verde, Blythe, and Ripley.
[2] Data through 2008 from NOAA Blythe Station, and starting in 2009, data are averaged from the three CIMIS stations at Palo Verde, Blythe, and Ripley.
[3] Data from Palo Verde CIMIS station #72 for 1988-2000; and from Palo Verde II CIMIS station #175 for 2001 onward.
[4] Data from Blythe Northeast CIMIS station #135.
[5] Data from Ripley CIMIS station #151.
[6] The CIMIS station #175 (in Palo Verde) rainfall gauge was offline in 2014.

3.0 The Metropolitan Water District of Southern California

MWD was incorporated in 1928 and currently has 26 member agencies. Governance is provided by a 37-member Board of Directors with each member agency entitled to be represented by one director with representation by additional directors being based on assessed valuation. Administration is provided through a General Manager and a staff of currently 1,827 employees.

MWD provides supplemental water supplies to its service area from two sources: 1) MWD's Colorado River Aqueduct; and 2) the Department of Water Resources' State Water Project/California Aqueduct. Water is provided to approximately 18.5 million people, in a service area of approximately 5,200 square miles consisting of areas that are in portions of Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura counties of California. MWD has increased its ability to supply water, particularly in dry years, through the implementation of storage, conservation, and transfer programs.

On October 10, 2003, the United States, Imperial Irrigation District, Coachella Valley Water District, MWD, and San Diego County Water Authority executed the "Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement for purposes of Section 5(B) of the Interim Surplus Guidelines" (Delivery Agreement). Under the Delivery Agreement, MWD agreed that if consumptive use of Colorado River water in accordance with Priorities 1 and 2 of the contracts for delivery of Colorado River water in California, together with the use of Colorado River water on PVID Mesa lands in accordance with Priority 3(b), exceeds 420,000 acre-feet in a calendar year, the Secretary of the Interior (Secretary) will reduce the amount of water otherwise available to MWD, by the amount that such use exceeds 420,000 acre-feet. To the extent that the amount of water used in accordance with Priorities 1, 2, and 3(b) is less than 420,000 acre-feet in a year, the Secretary will deliver to MWD the difference. For the purposes of the Delivery Agreement, "consumptive use" means diversions from the Colorado River less such measured and unmeasured return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation.

4.0 Program Implementation

Under the Program, MWD issues a yearly fallowing call to participating landowners a year in advance of the fallowing start date of August 1. Each fallowing call is for a two-year period and once issued, may not be rescinded or diminished.

In July 2011, Metropolitan issued a fallowing call for minimum fallowing for Contract Years 2012/13 and 2013/14 (August 1, 2012 through July 31, 2014), i.e., 25% of the landowners' maximum commitments.

In July 2012, Metropolitan did not issue a fallowing call for Contract Years 2013/14 and 2014/15 (August 1, 2013 through July 31, 2015). Instead a letter was sent informing the participants to continue minimum fallowing per the July 2011 fallowing call.

In July 2013, Metropolitan issued a fallowing call for Contract Years 2014/15 and 2015/16 (August 1, 2014 through July 31, 2016) at 50% of the landowners' maximum commitments.

Therefore for calendar year 2014, from January 1, 2014 through July 31, 2014, fallowing was at the minimum 25% call. The fallowed acreage of 6,493 acres is slightly higher than the minimum (e.g., 25 percent of 25,947 acres is 6,486 acres) due to the rounding up or down of each contract to the nearest acre, and to accommodate three contracts, 4 acres were waived from fallowing in the Program. Then starting August 1, 2014 and through December 31, 2014, the fallowing call at

the 50% level increased fallowed acreage to an anticipated 12,997 acres. However, a participating landowner initially enrolled 22 acres as part of his contract commitment to the Program. But upon verification, the land did not satisfy the Program's eligibility prerequisites to participate. Unfortunately, a resolution was not reached, resulting in a reduction of the landowner's annual payment for those 22 acres and a corresponding reduction in the total acres fallowed. Therefore, at the 50% level, from August 1st through December 31st total fallowed acreage was 12,975 acres.

Table 2 shows the fallowed acreage per month. Attachment 1 shows the fallowed fields on January 1, 2014 and Attachment 2 shows the fallowed fields on December 31, 2014. All fallowed acres designated by the participants were qualified by PVID for fallowing eligibility, i.e., entitled to receive Priority 1 water and had been irrigated and a crop had been harvested at least once during the past five years. Following the designation of fallowed acreage, a MWD representative visited the field before the date fallowing was to commence, verified fallowing conditions had been met and took photographs as needed to document the fallow status of fields. The same procedure was followed when participants would make changes in the acreage and/or location of fallowed lands at various points in time during the year thus ensuring that only qualified land is being fallowed. In addition, Reclamation staff conducted semi-annual field inspections, in March and October 2014, to verify the status of fallowed fields under the Program. In each field inspection, about five percent of the total fallowed acreage was randomly selected and inspected and the fallow status documented. Copies of Reclamation's verification reports are available upon request from Reclamation staff in Boulder City, Nevada.

Table 2: Fallowed Valley Lands – Calendar Year 2014

Month	At Start of Month	Average for Month
Jan	6,493	6,493
Feb	6,493	6,493
Mar	6,493	6,493
Apr	6,493	6,493
May	6,493	6,493
Jun	6,493	6,493
Jul	6,493	6,493
Aug	12,975	12,975
Sep	12,975	12,975
Oct	12,975	12,975
Nov	12,975	12,975
Dec	12,975	12,975
Yearly Average	9,194	9,194

5.0 Saved Water

The purpose of the Program is to save water that would have been otherwise used for agricultural production in PVID. In order to estimate the amount of water saved, it is necessary to estimate the amount of water that would have been consumed on the fallowed lands had crops been

produced. Through the act of fallowing, water is saved. However, the exact amount of water saved is difficult to quantify. Because of the Program's existence, the types and acreage of crops that would have been grown on the fallowed lands and hence the exact amount that has been saved through fallowing will never be known. Therefore, it was necessary to develop acceptable procedures to estimate the amount of saved water to the degree of accuracy allowed by available data.

Two methods were used to estimate the amount of water saved during calendar year 2014. Under the first method (Historical Use Method), three periods of past years deemed representative of conditions in PVID were selected and estimated irrigation water use rates during each period were calculated and used to estimate water savings from the fallowed lands during calendar year 2014. Under the second method (Actual Use Method), estimated irrigation water use rates on irrigated lands during calendar year 2014 were calculated and used to estimate water savings from the fallowed fields during calendar year 2014.

6.0 Historical Use Method

Three historical periods were selected that were deemed representative of typical conditions in PVID when cropping practices were not influenced by outside factors such as an impending fallowing program or a return to irrigation following a fallowing program. Three periods were selected: 12 years, 5 years, and 3 years; and three separate analyses were conducted.

6.1 12-Year Average: 1988-2002 (Excluding 1992-94)

The first period extended from 1988 through 2002, but excluded 1992, 1993, and 1994 because the August 1992-July 1994 PVID/MWD Test Fallowing Program affected water use and the amount of cropped acreage during those three years. This adjustment left 12 years of data for the analysis. Diversions at the Palo Verde Diversion Dam were tabulated by month for each year in the analysis. The 12 data values for each month were averaged, and the resulting averages for each month were summed to determine the average annual diversion.

Similarly, water deliveries to the PVID Mesa were tabulated by month. Diversions at the Palo Verde Diversion Dam were then reduced by measured returns, unmeasured returns, and deliveries to the Mesa; the resulting net diversions were used to estimate the amount of irrigation water used by the Valley lands of PVID. PVID's unmeasured returns are an estimated value, calculated as 5.6% of PVID's total diversions. Since water diverted by PVID is delivered to farmland only for irrigation purposes, it is assumed the estimated amount of irrigation water used by the Valley lands is a good estimate of the amount of water used by crops on the Valley lands. Diversions and cropped acreage for lands upstream of the Palo Verde Diversion Dam were not included in the analysis. Table 3 shows the tabulation for each month, which when summed, results in an estimated average annual crop water use of 400,512 acre-feet.

Table 3: Estimated Irrigation Water Use on Valley Lands – 1988–2002[1]

Month	Gross Diversions	Measured & Unmeasured Return Flows [2]	Deliveries to Mesa	Estimated Irrigation Water Use on Valley Lands
	(acre-feet)			
Jan	31,460	30,191	210	1,059
Feb	52,419	32,927	403	19,089
Mar	71,357	38,837	639	31,881
Apr	87,610	41,522	948	45,140
May	102,507	46,644	1,169	54,694
Jun	109,957	48,197	1,273	60,487
Jul	116,762	50,094	1,371	65,297
Aug	108,093	52,536	1,385	54,172
Sep	79,391	48,362	987	30,042
Oct	65,820	45,938	787	19,095
Nov	49,483	40,725	528	8,230
Dec	51,782	39,908	548	11,326
Yearly Average	926,641	515,881	10,248	400,512

[1] 1992, 1993 and 1994 data were not included due to the 1992-94 PVID-MWD Test Fallowing Program. This reduced the data series to 12 years.
[2] Source of Gross Diversions, Measured and Unmeasured Return Flows data is Reclamation records. Source of Deliveries to Mesa data is PVID records.

Over the same 12-year period of data, the irrigated acreage on Valley lands averaged 88,053 water toll acres (Table 4). Dividing the estimated average annual irrigation water use of 400,512 acre-feet by 88,053 water toll acres resulted in an estimated average annual irrigation water use of 4.55 acre-feet per water toll acre. The next step is to extrapolate the irrigation water use per acre estimate to the fallowed lands in calendar year 2014.

Table 4: Farmed Acreage in Valley Portion of PVID – 1988-1991 and 1995-2002[1]

Year	Cropped Land (water toll acres)	Year	Cropped Land (water toll acres)	Year	Cropped Land (water toll acres)
1988	87,086	1995	88,243	1999	88,910
1989	86,701	1996	88,721	2000	88,709
1990	86,561	1997	88,645	2001	88,901
1991	86,601	1998	88,921	2002	88,633
				Average	88,053

[1] 1992, 1993, and 1994 farmed acreages are not included due to the 1992-94 PVID-MWD Test Fallowing Program; 2003 farmed acreage is not included due to the Coachella Valley Water District Fallowing Program; and 2004-2014 farmed acreages are not included due to the current PVID-MWD Fallowing Program. Source: PVID records.

The estimated values of monthly irrigation water use on Valley lands shown in Table 3 were converted to percentages of the yearly total as shown in Table 5. Applying the resulting monthly percentages to the average annual irrigation use estimate of 4.55 acre-feet per water toll acre resulted in an estimate of the monthly irrigation water use factors on Valley lands. These

estimated monthly irrigation water use factors on Valley lands were used to provide a reasonable estimate of saved water by fallowed fields in PVID during calendar year 2014.

Table 5: Estimated Irrigation Water Use Factors on Valley Lands – 1988-2002[1]

Month	Estimated Irrigation Water Use on Valley Lands (acre-feet)	Percent of Yearly Total (%)	Estimated Irrigation Water Use Factors on Valley Lands (acre-feet/acre)
Jan	1,059	0.264412	0.012031
Feb	19,089	4.766149	0.216860
Mar	31,881	7.960061	0.362183
Apr	45,140	11.270574	0.512811
May	54,694	13.656020	0.621349
Jun	60,487	15.102419	0.687160
Jul	65,297	16.303382	0.741804
Aug	54,172	13.525687	0.615419
Sep	30,042	7.500899	0.341291
Oct	19,095	4.767647	0.216928
Nov	8,230	2.054870	0.093497
Dec	11,326	2.827880	0.128669
Total	400,512	100	4.55

[1] Data for 1992, 1993 and 1994 were not included. From 1992 through 1994, the PVID-MWD Test Fallowing Program was conducted. This reduced the data series to 12 years.

Landowners provided PVID/MWD with the location of the fields they were going to fallow and the date when fallowing would begin. PVID/MWD recorded the information from each landowner into a database, located the fallowed land on maps, and inspected the land to verify the land was fallow on the date indicated by the landowner. This procedure assured appropriate accounting for and verification of the number of fallowed acres.

The number of fallowed acres during each month in calendar year 2014 was determined from the database, resulting in 12 separate time periods during the year (Table 6). The monthly factors, as discussed above, were multiplied by the number of average monthly fallowed acres during the corresponding time period to estimate the corresponding amount of saved water.

Table 6: Estimated Saved Water Using the 12-Year Average Method – Calendar Year 2014

Month	Estimated Irrigation Water Use Factors on Valley Lands (acre-feet/acre)	Monthly Average of Fallowed Lands (water toll acres)	Saved Water (acre-feet)
Jan	0.012031	6,493	78
Feb	0.216860	6,493	1,408
Mar	0.362183	6,493	2,352
Apr	0.512811	6,493	3,330
May	0.621349	6,493	4,034
Jun	0.687160	6,493	4,462
Jul	0.741804	6,493	4,817
Aug	0.615419	12,975	7,985
Sep	0.341291	12,975	4,428
Oct	0.216928	12,975	2,815
Nov	0.093497	12,975	1,213
Dec	0.128669	12,975	1,669
Average for Year		9,194	
Total for Year	4.55		38,591

For example, for the month of January, the average of 6,493 water toll acres was verified to be fallowed under the Program. Based on the 12 years of historical data, 0.264412% of the total annual irrigation water use on Valley lands occurred in January. Multiplying 0.00264412 by 4.55 acre-feet/acre resulted in 0.012031 acre-feet/acre, the average quantity of irrigation water used by each water toll acre during January. Multiplying the average quantity of irrigation water used by each water toll acre in January by the 6,493 water toll acres of fallowed land in January resulted in an estimated water savings for January of 78 acre-feet. This same procedure was applied to the fallowed acreage for all 12 months during calendar year 2014 and resulted in an estimated 38,591 acre-feet of saved water.

6.2 5-Year Average: 1998-2002

The 5-year historical use was based on PVID data for the period 1998 through 2002. The procedure used to calculate the estimated water saved from fallowing Valley lands during calendar year 2014 was the same as that applied in computing the 12-year historical use estimates. The 5-year historical use method yielded an estimated irrigation water use of 4.75 acre-feet/acre and 40,522 acre-feet of saved water during calendar year 2014.

6.3 3-Year Average: 2000-2002

The 3-year historical use method was based on PVID data for the period 2000 through 2002. Following the same procedure as used for the other historical use methods, computations based on the 3-year historical use resulted in an estimated irrigation water use of 5.03 acre-feet/acre and 42,647 acre-feet of saved water during calendar year 2014.

7.0 Actual Use Method – Calendar Year 2014

Under the actual use method, irrigation water use and acreage data from PVID and Reclamation records for calendar year 2014 were used to estimate the amount of saved water. Diversions at the Palo Verde Diversion Dam were reduced by measured returns, unmeasured returns, and deliveries to the Mesa and were used to estimate the amount of irrigation water used by the Valley lands. Based on information provided by PVID, there were a total of 89,107 water toll acres in the Valley portion of PVID that could have received water. Estimated monthly irrigation water use on Valley lands were divided by the average number of water toll acres in production for each month and summed for the 12 months, resulting in an estimated annual irrigation use of 5.13 acre-feet per acre (Table 7).

Table 7: Estimated Irrigation Water Use Factors on Valley Lands – Calendar Year 2014

Month	Diversions Less Measured and Unmeasured Returns (acre-feet)	Deliveries to Mesa (acre-feet)	Estimated Irrigation Water Use on Valley Lands (acre-feet)	Irrigated Valley Lands (water toll acres)	Estimated Irrigation Water Use Factors on Valley Lands (acre-feet/acre)
Jan	7,695	529	7,166	82,614	0.086741
Feb	19,634	748	18,886	82,614	0.228605
Mar	36,211	881	35,330	82,614	0.427651
Apr	49,298	938	48,360	82,614	0.585373
May	63,698	956	62,742	82,614	0.759460
Jun	66,360	988	65,372	82,614	0.791294
Jul	62,985	961	62,024	82,614	0.750769
Aug	34,048	903	33,145	76,132	0.435362
Sep	44,413	947	43,466	76,132	0.570929
Oct	24,441	948	23,493	76,132	0.308582
Nov	10,114	905	9,209	76,132	0.120961
Dec	5,664	908	4,756	76,132	0.062470
Total for Year	424,561	10,612	413,949		5.128197
Yearly Average				79,913	

Source: PVID and Reclamation records.

The same procedure used in Table 6 was followed to develop Table 8. Estimated monthly irrigation water use factors were multiplied by the fallowed acres for each month to estimate the monthly water savings resulting in a total of 43,010 acre-feet of water saved during calendar year 2014.

Table 8: Estimated Saved Water Using the Actual Use Method – Calendar Year 2014

Month	Estimated Irrigation Water Use Factors on Valley Lands (acre-feet/acre)	Monthly Average of Fallowed Lands (water toll acres)	Monthly Saved Water (acre-feet)
Jan	0.086741	6,493	563
Feb	0.228605	6,493	1,484
Mar	0.427651	6,493	2,777
Apr	0.585373	6,493	3,801
May	0.759460	6,493	4,931
Jun	0.791294	6,493	5,138
Jul	0.750769	6,493	4,875
Aug	0.435362	12,975	5,649
Sep	0.570929	12,975	7,408
Oct	0.308582	12,975	4,004
Nov	0.120961	12,975	1,569
Dec	0.062470	12,975	811
Average for year		9,194	
Total for Year	5.128197		43,010

8.0 Conclusions

Two methods were used to estimate the amount of saved water during calendar year 2014: a historical use method and an actual use method. Three historical periods were used covering 12-year, 5-year and 3-year periods. The 12-year historical use method estimated a yearly irrigation water use of 4.55 acre-feet/acre, the 5-year historical use method estimated a yearly irrigation water use of 4.75 acre-feet/acre, and the 3-year historical use method estimated a yearly irrigation water use of 5.03 acre-feet/acre. Compilation of crop and irrigation water use data for calendar year 2014 in PVID resulted in an estimated irrigation use of 5.13 acre-feet/acre. Estimates of saved water for calendar year 2014 are shown in Table 9 and ranged from 38,591 acre-feet to 43,010 acre-feet.

Table 9: Estimates of Saved Water by Method – Calendar Year 2014

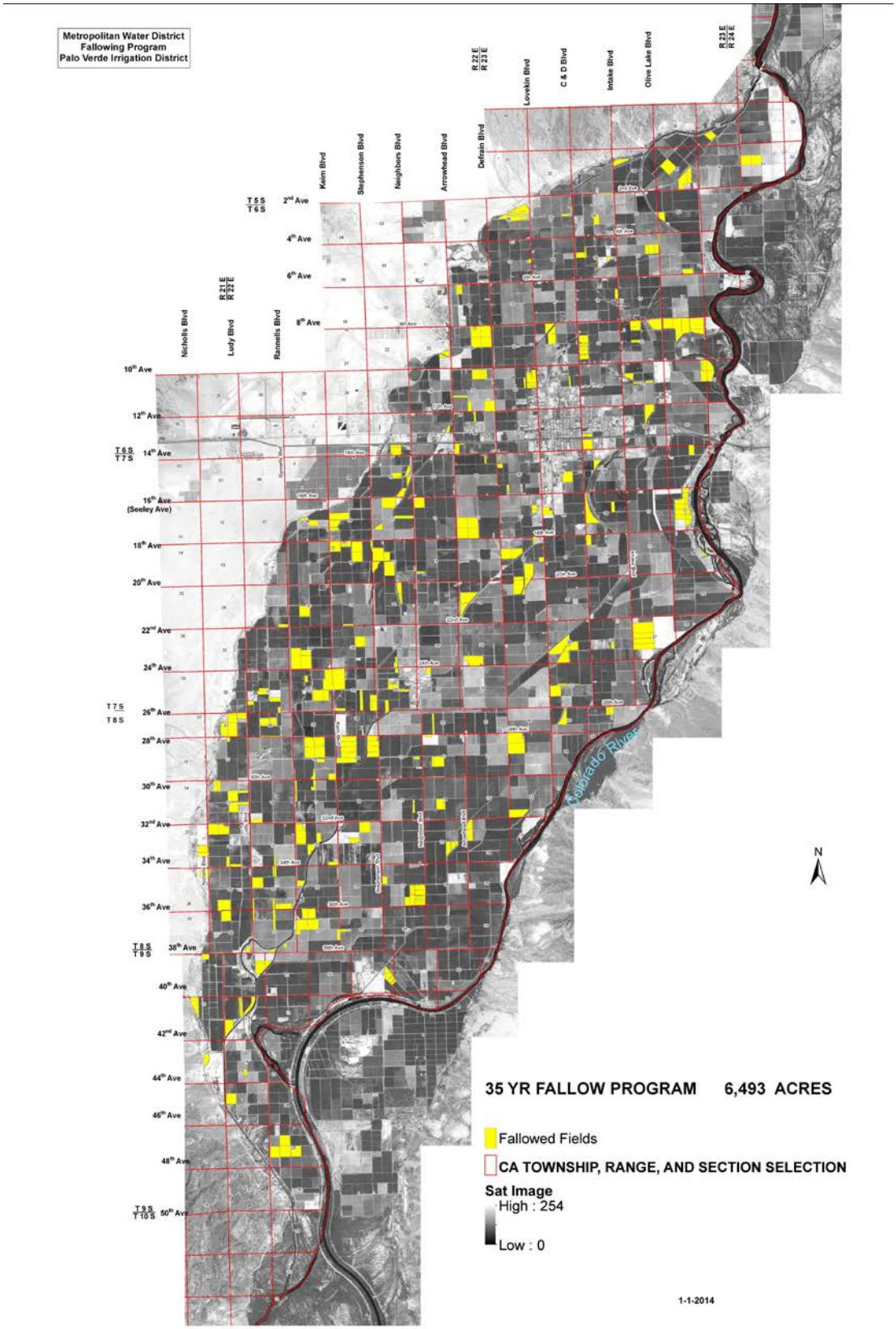
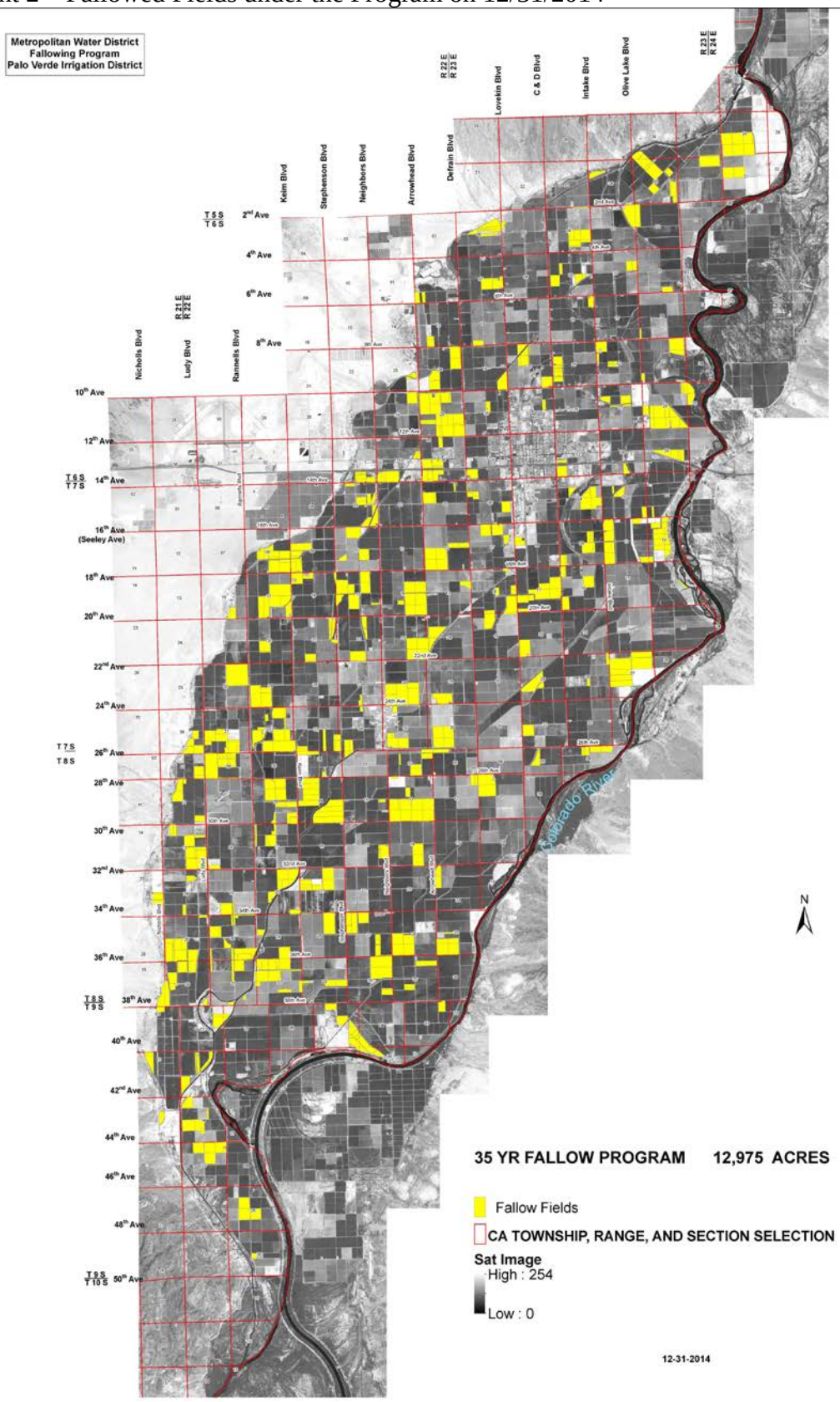
Method	Saved Water (acre-feet)
12-Year Average (1988-2002)*	38,591
5- Year Average (1998-2002)	40,522
3- Year Average (2000-2002)	42,647
Actual Use Method - CY 2014	43,010

*1992, 1993 and 1994 data were not included in the analysis. From 1992 through 1994, the PVID-MWD Test Fallowing Program was conducted.

The Actual Use Method is deemed the method most reflective of the agronomic, weather, and market conditions prevailing in the Palo Verde Valley during calendar year 2014. As such, the

best estimate of the amount of water saved during calendar year 2014 by the Program is 43,010 acre-feet.

Attachment 1 – Fallowed Fields under the Program on 1/1/2014



Attachment 2 – Fallowed Fields under the Program on 12/31/2014