

2014 ANNUAL ICR AND TRR WELL FIELD REPORT

Prepared for

ICR WATER USERS ASSOCIATION

Prepared

By

William Meyer

## 2014 ANNUAL ICR AND TRR WELL FIELD REPORT

### ICR WATER USERS ASSOCIATION

The ICR Water Users Association (ICRWUA) is a private member owned non-profit water company that provides water to the Inscription Canyon Ranch, Whispering Canyons, Preserve at the Ranch and Talking Rock subdivisions. The company also provides water to the Talking Rock golf course.

Water for the first three subdivisions comes from the ICR well field while water for the Talking Rock subdivision and golf course comes from the TRR well field. The combined demand for all uses from both well fields for 2014 was 134,533,000 gallons, table 1. Of this amount some 27,500,000 gallons came from the ICR well field and another 107,033,000 gallons came from the TRR well field. The golf course use was approximately 90,289,000 gallons, or about 84 percent of the total pumpage from the TRR well field and 67 percent of the combined pumpage from both well fields.

Total monthly demand at the two well fields for 2014 ranged from a low of 6,213,000 gallons per month in February to a high of 19,337,000 gallons in June. Average daily demand for both well fields combined was 368,583 gallons or about 256 gallons per minute (gpm).

Table 1

<b>Combined 2008 - 2014 ICR and TRR Well Field Pumpage, in gallons</b>							
<b>Month</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
<b>Jan</b>	1,919,000	1,973,000	3,941,500	5,500,000	4,660,000	7,972,000	7,526,000
<b>Feb</b>	1,710,000	1,744,800	6,495,000	1,977,980	4,922,000	2,136,000	6,213,000
<b>March</b>	10,751,000	10,438,200	8,630,800	6,149,000	6,786,000	8,358,000	9,933,000
<b>April</b>	16,652,000	11,904,000	15,152,000	12,268,000	11,677,000	14,556,000	14,654,000
<b>May</b>	17,084,400	17,504,500	17,502,000	13,855,000	15,533,000	17,720,000	17,274,000
<b>June</b>	26,130,500	19,327,000	14,457,000	18,999,000	17,806,000	19,133,000	19,337,000
<b>July</b>	14,447,300	16,980,500	17,439,000	16,976,000	20,887,000	13,711,000	16,342,000
<b>August</b>	17,559,700	21,475,200	12,063,000	18,652,000	14,198,000	15,016,000	8,846,000
<b>Sept</b>	15,500,500	15,479,300	16,356,000	15,659,000	10,267,000	9,619,000	9,438,000
<b>Oct</b>	13,185,000	12,150,000	12,594,000	9,500,000	9,481,000	13,231,000	9,780,000
<b>Nov</b>	6,688,900	7,538,500	9,105,000	8,123,000	9,289,000	8,174,000	8,278,000
<b>Dec</b>	1,893,000	1,696,000	6,833,000	4,125,000	6,119,000	4,269,000	6,912,000
<b>Total</b>	<b>143,521,300</b>	<b>138,211,000</b>	<b>140,568,300</b>	<b>131,783,980</b>	<b>131,625,000</b>	<b>133,895,000</b>	<b>134,533,000</b>

## THE ICR WELL FIELD

There are two wells in the Inscription Canyon Ranch (ICR) well field about 47 feet apart; ICR 1 and ICR 2. The latter well is often referred to as Whispering Canyon 1 (WC 1). ICR 1 is the original well constructed by the developer of the ICR subdivision to serve the subdivision as initially planned. Whispering Canyons L.L.C constructed ICR 2 and paid all other cost associated with bringing this well on line. The well field provides water to the Inscription Canyon Ranch (ICR), Whispering Canyon (WC), and Preserve at the Ranch sub-divisions.

The wells are located in Section 17, Township 16 North, Range 3 West. They are situated in the Mint Wash floodplain about one-half mile west of Williamson Valley road where the road crosses the wash. Construction of ICR 1 began on June 24, 1994 and was completed on August 5, 1994. Construction of ICR 2 began March 30, 2002 and was completed April 10, 2002.

The wells are owned by Aqua Meadows and are on land owned by Aqua Meadows. ICRWUA has an agreement dated August 1, 1995 that gives the Association the right to operate and use ICR 1 as a water supply for the ICR and Preserve at the Ranch subdivisions for 100 years subject to renewal every 25 years. The purpose of this agreement is to satisfy the Arizona Department of Water Resources 100 year Water Adequacy Requirement. An amendment to the agreement (Amendment 1) dated July 24, 2001 adds Whispering Canyon. It is the responsibility of ICRWUA to operate and maintain the two wells and pay all cost associated with operation and maintenance. Per contract with Aqua Meadows, the Association is permitted to withdraw 164,518,498 gallons per year for servicing the ICR, WC, and Preserve at the Ranch subdivisions.

The aquifer tapped by the well consists of a mixture of unconsolidated sediments ranging in size from clay, silt, sand, and gravel. In places the sediment has been cemented to form a conglomerate. The base of the aquifer is formed by granitic and metamorphic rocks occurring at depth of about 223 ft. at ICR 1 and about 220 ft. at well 2. The pump intakes at ICR well 1 is 172 below land surface. Depth to the pump intake at ICR 2 is 160 feet.

The altitude of the water table varies naturally in accordance with the seasonal pattern of precipitation. At the time ICR 1 was completed the regional water table was at a depth of about 18 ft. below land surface. At ICR 2, which is slightly higher in elevation than well 1, the initial depth to water was 19 ft.

The well field is managed so that ICR 1 is the main source of water. Well 2 serves as a backup well and is used in a manner to preserve its operational efficiency. Only one well is used on a given day and it is in service, on average for about 3 hours or less.

The yield of ICR 1 was initially stated to be in excess of 450 gpm, sufficient to supply the 1700 residential lots and a golf course planned for at that time. The yield from ICR well 1 decreased over time however, from about 415 gallons per minute (gpm) when initially constructed in August 1994 to about 340 gpm in 2013 while pumping depths to water increased from about 50 feet below land surface (bls) to as much as 139 bls feet during the same time period. Part of the decline in pumping water levels included a loss of about 35 feet in the pre-pumping water level at the well field. This decline is, in part, from the

continuing drought that began in about 1999 and from the continued pumping since 1994 at the well field and other nearby wells. The total decline in the pumping level, however, had placed this level to within about 30 feet of the pump intake (set at 172 feet bls) and the continued nature of the decline suggested the possibility of potential pump failure from cavitation.

As discussed in the 2013 Annual Report, ICR 1 was rehabilitated in late September 2013 following which, as discussed below, the pumping level has ranged from about 100 to a maximum of about 109 feet bls, a decrease of 30 to 40 feet in the pumping level. In addition, the yield of the well has increased from about 340 gpm to 375 to 395 gpm.

No estimate of yield was made for ICR 2 upon its completion, but as discussed below its yield is similar to ICR 1.

### Demand

The demand at the ICR well field in 2014 was 27,500,000 gallons compared to 26,375,000 gallons in 2013. Average 2014 daily demand was 75,342 gallons compared 72,260 gallons in 2013. As shown in table 2, annual demand at the well field from 2008 through 2014 has ranged from a high of 29,988,500 gallons in 2009 to a low of 24,476,500 gallons in 2010.

Table 2

<b>ICR Well Field Pumpage 2008-2014, in gallons</b>							
<b>Month</b>	<b>2008</b>	<b>2,009</b>	<b>2,010</b>	<b>2,011</b>	<b>2,012</b>	<b>2,013</b>	<b>2014</b>
<b>Jan</b>	1,177,000	1,216,000	1,250,000	1,237,000	1,161,000	1,418,000	1,485,000
<b>Feb</b>	1,078,000	1,098,700	747,300	1,172,980	1,172,000	1,006,000	1,408,000
<b>March</b>	1,737,000	1,825,300	1,438,200	1,441,000	1,423,000	1,710,000	1,771,000
<b>April</b>	2,770,000	2,628,000	1,862,000	2,088,000	2,036,000	2,480,000	2,440,000
<b>May</b>	3,081,000	3,577,500	2,577,000	2,572,000	2,973,000	3,046,000	3,019,000
<b>June</b>	3,915,000	3,195,000	3,170,000	2,981,000	3,464,000	3,700,000	3,753,000
<b>July</b>	3,048,000	3,632,000	3,295,000	2,889,000	3,274,000	2,985,000	3,270,000
<b>August</b>	3,194,000	3,613,000	2,552,000	3,327,000	2,995,000	2,817,000	2,603,000
<b>Sept</b>	2,721,000	3,070,000	3,050,000	2,674,000	2,727,000	2,172,000	2,305,000
<b>Oct</b>	2,450,000	3,044,000	1,838,000	2,234,000	2,621,000	2,304,000	2,642,000
<b>Nov</b>	1,918,000	1,892,000	1,493,000	1,389,000	1,764,000	1,495,000	1,469,000
<b>Dec</b>	1,381,000	1,197,000	1,204,000	1,121,000	1,402,000	1,242,000	1,335,000
<b>Total</b>	<b>28,470,000</b>	<b>29,988,500</b>	<b>24,476,500</b>	<b>25,125,980</b>	<b>27,012,000</b>	<b>26,375,000</b>	<b>27,500,000</b>

As discussed above ICR 1 is the lead well for most of the year with ICR 2 used periodically to assure its viability. As shown in table 3, ICR 1 was the main well in use for every month during the year with the exception of February and September. Pumpage from well 2 was 4,873,000 gallons compared to 22,627,000 gallons at well 1. Columns 2 and 3, table 3, show monthly pumpage from wells 1 and 2.

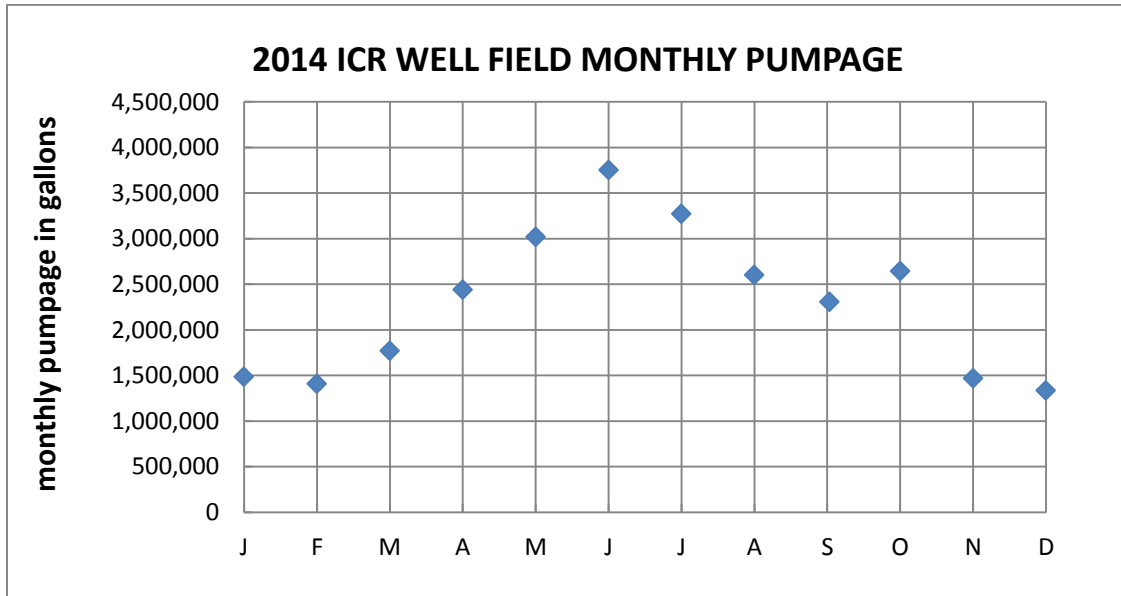
Column 4 shows total monthly pumpage from both wells in gallons. Column 5 shows average daily pumpage in gallons per day, and column 6 shows average demand at the well field during the month in gallons per minute.

Demand varied significantly during the year, increasing from 1,485,000 and 1,408,000 in January and February to a high of 3,753,000 in June when the greatest demand occurred, table 3 and figure 1. Pumpage remained high from April through October. Demand slowly decreased after October, falling to 1,335,000 gallons in December, the lowest demand of the year. The increased demand during the warmer, drier part of the year is mainly associated with residential landscape irrigation.

Table 3 Average 2014 Daily, Monthly and Annual ICR Well Field Pumpage, in Gallons

<b>Month</b>	<b>ICR #1</b>	<b>ICR #2</b>	<b>Total</b>	<b>Daily</b>	<b>GPM</b>
<b>Jan</b>	1,485,000	0	1,485,000	47,903	33
<b>Feb</b>	460,000	948,000	1,408,000	50,286	35
<b>March</b>	1,693,000	78,000	1,771,000	57,129	40
<b>April</b>	2,440,000	0	2,440,000	81,333	56
<b>May</b>	3,019,000	0	3,019,000	97,387	68
<b>June</b>	3,641,000	112,000	3,753,000	125,100	87
<b>July</b>	3,270,000	0	3,270,000	105,484	73
<b>August</b>	2,053,000	550,000	2,603,000	83,968	58
<b>Sept</b>	107,000	2,198,000	2,305,000	76,833	53
<b>Oct</b>	2,282,000	360,000	2,642,000	85,226	59
<b>Nov</b>	842,000	627,000	1,469,000	48,967	34
<b>Dec</b>	1,335,000	0	1,335,000	43,065	30
<b>Total</b>	<b>22,627,000</b>	<b>4,873,000</b>	<b>27,500,000</b>	<b>75,342</b>	<b>52</b>

Figure 1



Yield

ICR 1 was used for 916 hours during the year for an average daily use of 2.5 hours. ICR 2 was used for 219 hours for an average daily use of 0.6 hours. Average yield from ICR 1 ranged from about 375 gpm in the drier warmer months with associated higher pumpage and lower water levels to about 395 gpm in January with relatively low pumpage and higher water levels. Average yield from ICR 2 was 370 gpm.

Water Levels

There is a long-term decline in the water level of a pumped well until water in an amount equal to the rate the well is being pumped is diverted to the well from the aquifer's discharge area. Once this occurs, the long-term decline ceases. For the two ICR wells, this diversion would be expected to take decades if not longer to occur. If water levels fall too far before stabilizing, the wells will cease to be viable. It is important therefore to measure water levels through time in order to monitor the well field's status. There is also a short term, but significant, decline in the water level at a well that is being pumped intermittently, such as those at the ICR well field. Water levels fall while the well is being pumped and subsequently rise to an altitude equal to or near that existent before pumping.

For practical reasons it is best to maintain the pumping water level in the wells at about two-thirds of the original thickness of the aquifer at each well. This consideration maximizes production relative the decline in the pumping water level in the well and to pumping cost. For both wells, this suggests that the maximum depth to water should be about 152 ft.

Another consideration however is the requirement to maintain the pumping water level in a well above the pump intakes which as stated above, is 172 ft. at ICR 1 and 160 ft at ICR 2. Long-term viability of the well therefore requires a pumping level above these depths.

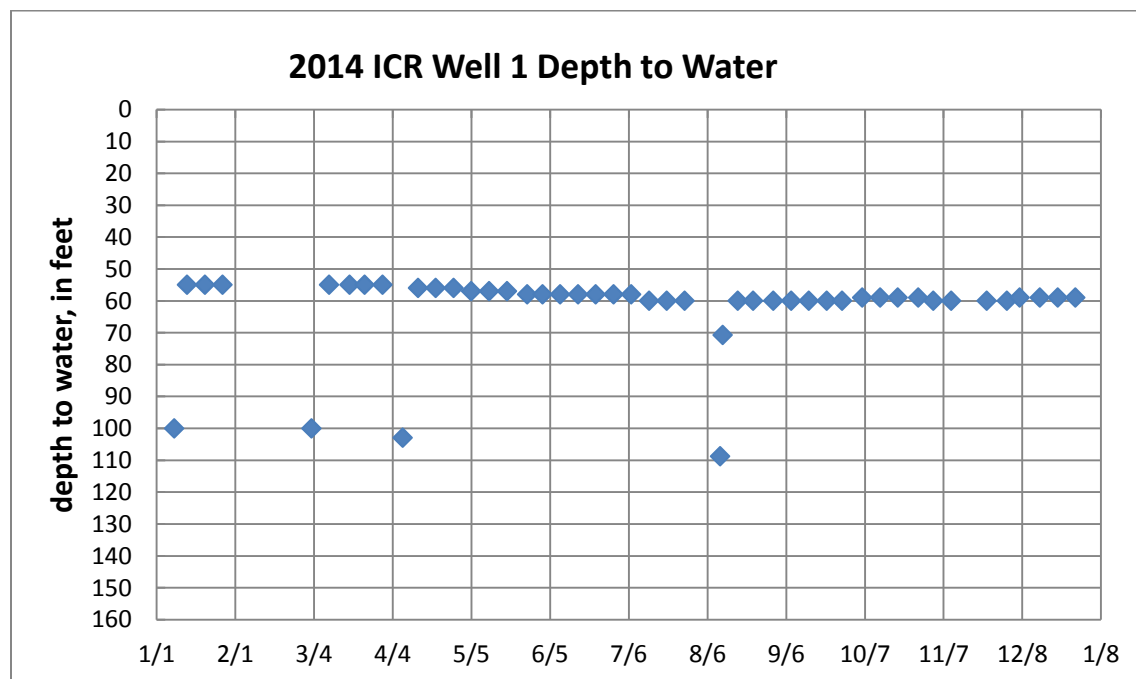
### ICR Well 1

Non-pumping depth to water below land surface at ICR 1 in 2014 ranged from about 55 ft. to 60 ft., with the latter depths occurring during the summer, figure 2. Water levels of 60 ft. or less represent non-pumping conditions at the well field. Water levels lower than this, but above 70 ft. represent non-pumping conditions at ICR 1 and pumping at ICR 2. Lower water levels represent pumping conditions at ICR 1 alone.

As discussed above, the water level at ICR 1 was about 18 ft. below land surface when it was completed on August 5, 1994. The minimum water level at the well of 55 ft. below land surface is 37 ft. lower than that originally measured at completion of the well. This decline is within that which would be considered acceptable for long-term viability of the well.

Depth to water during pumping varied from about 100 ft. to 109 feet; well above the pump intakes.

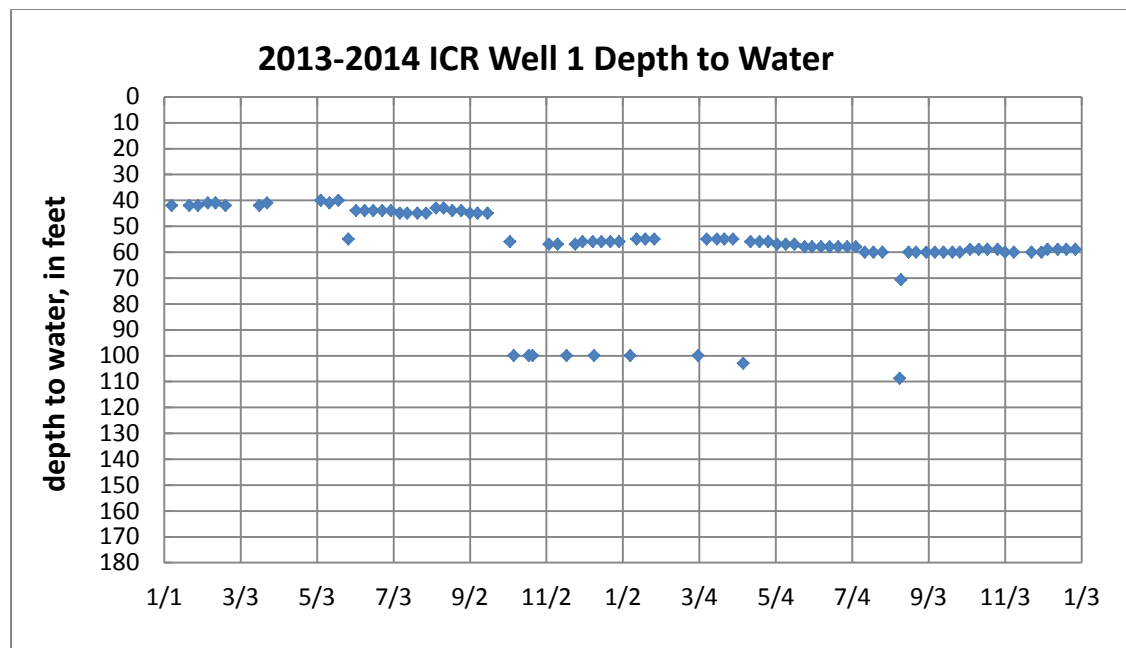
Figure 2



2013 and 2014 water levels are shown in figure 3. Non-pumping depth to water below land surface in 2013 ranged from about 40 ft. to 57 ft., with the latter depths occurring after late September, figure 2.

Non-pumping water levels from September 2013 through 2014 range from about 55 to 60 feet. Unfortunately measurements before September 2013 are above the actual water level in the well owing to the presence of cascading water (water falling down the inside of the well from the aquifer owing to the fact that the water level in the aquifer is higher than the water level in the well) and the apparent decline in non-pumping water levels beginning late September 2013 is the result of removing the influence of cascading water on the water level measurement. In essence there is virtually no difference in water levels between 2013 and 2014 as a result, with non-pumping water levels for 2013 and 2014 ranging between 55 to 60 feet.

Figure 3



### ICR Well 2

Non-pumping depth to water below land surface at ICR 2 ranged from about 56 ft. to 62 ft. figure 4. Water levels lower than this but above a depth of 75 feet represent non-pumping at ICR well 2 and pumping at ICR 1. A single value for a pumping depth of 106 feet was obtained at the well in August.

As discussed above, the water level at ICR 2 was about 19 ft. below land surface when it was completed on April 10, 2002. The minimum water level at the well of 56 ft. below land surface is 37 ft. lower than that originally measured at completion of the well, the same as at ICR well 1 which would be expected. . This decline is within that which would be considered acceptable for long-term viability of the well.

As at ICR well 1, a pumping water level of 108 ft. is well above the pump intakes.

2013 and 2014 water levels are shown in figure 5. As in the case of ICR well 1, the decline in water levels in late September 2013 is not an actual decline; rather it results from negating the influence of



cascading water on the water level measurement at the well that had occurred previously and is not an actual decline as a result. Given this consideration there is no significant difference between non-pumping water levels for the two year period with non-pumping water levels falling between 55 to 60 feet.

Figure 4

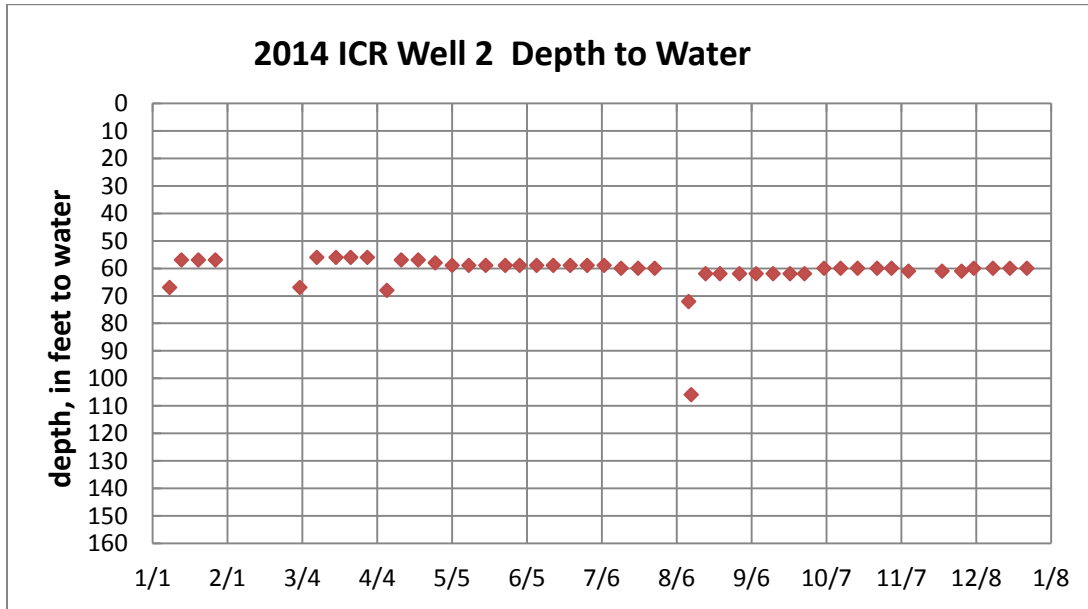
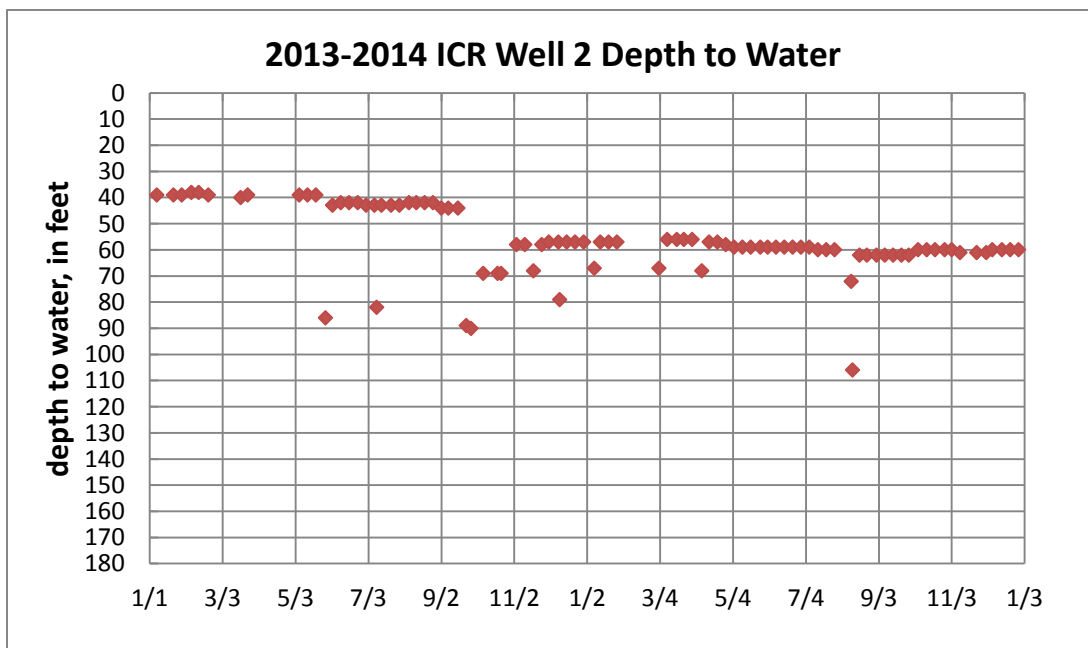


Figure 5



## THE TALKING ROCK WELL FIELD

The Talking Rock Ranch (TRR) well field consists of three wells referred to as TRR wells TRR 1, 2, and 3. Construction of TRR 1 began on January 3, 2001 and was completed on February 5, 2001; construction of TRR 2 began on March 27, 2001 and was completed April 20, 2002; construction of TRR 3 began May 13, 2002 and was completed May 15, 2002. The wells are situated along the eastern edge of the Mint Wash floodplain immediately east of Williamson Valley road where the road crosses the wash. The well field services the TRR subdivision and the TRR golf course. The well field and the land it is on are owned by the ICR Water Users Association.

The aquifer tapped by the TRR well field consist of medium to coarse sand with small amounts of intermixed gravel and layers of gravel and sand mixed with minor amounts of silt and clay. Interbedded within this material is a layer of basalt that is encountered at depths ranging from 70 ft., 108 ft., and 118 ft. below land surface at wells 1, 2, and 3 respectively. Thickness of the basalt ranges from 41 ft. to 50 ft. Geologic logs of nearby wells indicate that the areal extent of the basalt is limited and does not extend to the ICR Well Field. The base of the aquifer is formed by granitic and metamorphic rocks occurring at depths ranging from about 300 ft. below land surface at well 1, 262 ft. at well 2, and 240 ft. below land surface at well 3.

The regional water table lies in the unconsolidated sands and gravel above the basalt. In the absence of pumping, the altitude of the water table varies naturally in accordance with the seasonal pattern of precipitation. Measured depth to water at completion of drilling for each well was 20 ft., 57 ft., and 23 ft. below land surface at wells 1, 2, and 3 respectively. Wells 1 and 3 are at about the same elevation above sea level whereas well 2 is about 10 ft. higher. Subsequent non-pumping measurements at the well field have shown that depth to water at well 2 is about 8-10 ft. greater than that at wells 1 and 3. This difference is consistent with the difference in elevation of well 2 compared to wells 1 and 3. This suggests that the initial water level measurement at well 2 was not representative of non-pumping conditions at the well field.

The pumping capacity at all three wells has been downsized from that originally installed at all three wells due to initial overly optimistic estimates of the long-term yield of each well that resulted in unacceptable decline in water levels and air entrainment at all three wells. The pump at well 3 was downsized from 430 gpm to about 260 gpm in 2003 after which the well has been highly reliable. The pump at well 2 was downsized from about 530 gpm to a pump capacity of about 285 gpm in 2009. Due to an electrical problem the pump at well 2 failed in June 2013 and was replaced in July of that year. The capacity of the new pump ranges from about 275 to 290 gpm. The pump at well 1 was downsized in February 2012 and reliably yields about 330 gpm.

The well field is managed so that the wells are called up sequentially as demand increases. As a result on a given day, only one well is initially in service until demand requires an additional well. In general any two wells can meet daily demand except during the hottest and driest part of the year when the water demand for the TRR golf course is at its greatest. The general practice is to use either well 1 or 2 as the initial well on call followed by well 3.

## Demand

Demand at the TRR well field in 2014 was 107,033,000 compared to 107,520,000 gallons in 2013. As shown in table 4, annual demand from 2008 through 2014 has ranged from 104,613,000 gallons to 116,091,800 gallons with the lowest demand in 2012 and the highest in 2010.

Table 4

<b>TRR Well Field 2008-2014 Pumpage, in Gallons</b>							
<b>Month</b>	<b>2,008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2,012</b>	<b>2013</b>	<b>2014</b>
<b>Jan</b>	742,000	757,000	2,691,500	4,263,000	3,499,000	6,554,000	6,041,000
<b>Feb</b>	632,000	646,100	5,747,700	805,000	3,750,000	1,130,000	4,805,000
<b>March</b>	9,014,000	8,612,900	7,192,600	4,708,000	5,363,000	6,648,000	8,162,000
<b>April</b>	13,882,000	9,276,000	13,290,000	10,180,000	9,641,000	12,076,000	12,214,000
<b>May</b>	14,003,400	13,927,000	14,925,000	11,283,000	12,560,000	14,674,000	14,255,000
<b>June</b>	22,215,500	16,132,000	11,287,000	16,018,000	14,342,000	15,433,000	15,584,000
<b>July</b>	11,399,300	13,348,500	14,144,000	14,087,000	17,613,000	10,726,000	13,072,000
<b>August</b>	14,365,700	17,862,200	9,511,000	15,325,000	11,203,000	12,199,000	6,243,000
<b>Sept</b>	12,779,500	12,409,300	13,306,000	12,985,000	7,540,000	7,447,000	7,133,000
<b>Oct</b>	10,735,000	9,106,000	10,756,000	7,266,000	6,860,000	10,927,000	7,138,000
<b>Nov</b>	4,770,900	5,646,500	7,612,000	6,734,000	7,525,000	6,679,000	6,809,000
<b>Dec</b>	512,000	499,000	5,629,000	3,004,000	4,717,000	3,027,000	5,577,000
<b>Total</b>	<b>115,051,300</b>	<b>108,222,500</b>	<b>116,091,800</b>	<b>106,658,000</b>	<b>104,613,000</b>	<b>107,520,000</b>	<b>107,033,000</b>

Total pumpage at wells 1, 2, and 3 for the year were 31,190,000 gallons, 46,578,000 gallons, and 29,265,000 gallons respectively, table 5. Columns 2, 3, and 4, table 5, show monthly pumpage from TRR wells 1, 2, and 3 respectively; Column 5 shows total monthly pumpage from all three wells in gallons. Column 6 shows average daily pumpage in gallons per day, and column 7 shows average demand at the well field during the month in gallons per minute. The latter demand ranged from 119 gpm in February to 361 gpm in June.

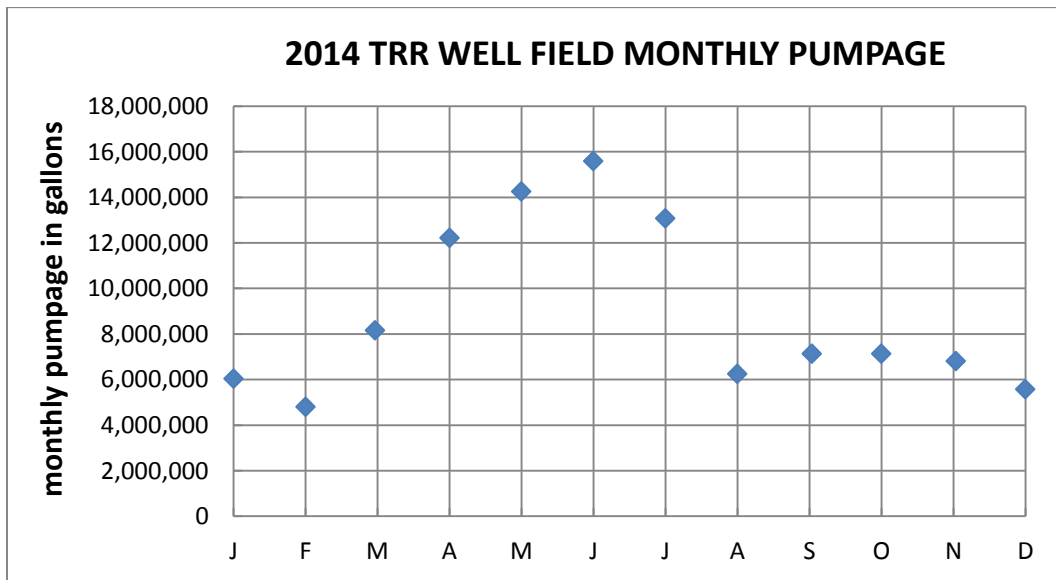
Monthly demand on the well field in 2014 increased from about 4,805,000 gallons in February to about 8,162,000 gallons in March, 12,214,000 gallons in April, and 15,584,000 gallons in June when pumpage peaked. Demand slowly decreased from this level falling to about 5,557,000 gallons in December, table 5 and figure 6.

2014 demand varied significantly during the year (figure 6) with greatest demand occurring from March through August due to increasing golf course demand at this time. Golf course demand was approximately 90,289,000 million gallons; about 84 percent of the annual pumpage.

**Table 5. 2014 Monthly, Annual and Average Daily, TRR Well Field Pumpage, in Gallons**

1	2	3	4	5	6	7
Month	TRR 1	TRR 2	TRR 3	Total	Daily	GPM
Jan	4,936,000	20,000	1,085,000	6,041,000	194,871	135
Feb	3,997,000	0	808,000	4,805,000	171,607	119
March	391,000	5,234,000	2,537,000	8,162,000	263,290	183
April	0	8,416,000	3,798,000	12,214,000	407,133	283
May	38,000	9,624,000	4,593,000	14,255,000	459,839	319
June	104,000	10,265,000	5,215,000	15,584,000	519,467	361
July	157,000	8,537,000	4,378,000	13,072,000	421,677	293
Aug	53,000	4,416,000	1,774,000	6,243,000	201,387	140
Sept	5,179,000	51,000	1,903,000	7,133,000	237,767	165
Oct	5,596,000	15,000	1,527,000	7,138,000	230,258	160
Nov	5,655,000	0	1,154,000	6,809,000	226,967	158
Dec	5,084,000	0	493,000	5,577,000	179,903	125
<b>Total</b>	<b>31,190,000</b>	<b>46,578,000</b>	<b>29,265,000</b>	<b>107,033,000</b>	<b>293,241</b>	<b>204</b>

Figure 6



## Yield

In general the TRR well field is operated with only two wells pumping during a given day. As discussed above, either well 1 or well 2 serves as the primary well on call while well 3 is used to provide additional water if required. The third well comes on line during periods when the primary well and well 3 cannot meet the immediate demand while maintaining the desired water level in the storage tanks.

Well 1 was primary in January, February and September through December. Well 2 was primary from March through August.

Yield from the well field varies with the water level at the well field, with yield falling during the summer as water levels decline. The decline in water level is relatively small and therefore the range in yield is also relatively small. Yield of well 1 averaged about 330 gpm with little variation during the year. The yield of well 2 ranged from about 250 gpm during the warmer months to about 300 gpm during the cooler months; the yield of well 3 varied between 220 to 230 gpm over the same time period.

## Water Levels

As discussed, the pumping water level in the wells should be limited to about two-thirds of the original thickness of the aquifer to maximize production relative the pumping water level in the well and to pumping cost. Under this consideration, the maximum depth to water at well 1 should be about 185 ft. For well 2 the maximum depth should be about 155 ft. and about 145 ft. at well 3. An additional consideration however, is that in order to limit problems with air entrainment at wells 1 and 2, the pumping level in well 1 should not be more than about 165 ft. below land surface and the pumping water level in well 2 should be no more than about 155 ft. below land surface.

The pump intakes at TRR wells 1 and 2 are set at approximately 262 ft. below land surface. Maintaining a pumping level of 165 ft. or less at well 1, although not maximizing production relative to pumping cost, assures at least 97 ft. of water above the pump intakes. Maintaining a pumping level of 155 ft. or less at well 2 assures at least 107 ft. of water above the intakes and also meets the two-thirds rule. The pump intake at well 3 is set at approximately 230 ft. below land surface. Maintaining a pumping level of 145 ft. assures at least 85 ft. of water above the intakes.

### TRR Well 1

Depth to water below land surface at TRR 1 in 2014 ranged from about 47 ft. to 118 ft., figure 7. Water levels that are less than 80 ft. below land surface represent non-pumping conditions at the well, but not necessarily at one or both of the other wells. Water levels deeper than about 80 ft. represent pumping conditions at well 1.

Non-pumping water levels at the well varied throughout the year, being deeper in the summer months when well field use was greatest. Non-pumping water levels varied from about 47 feet below land surface in February to about 80 feet in August. Non-pumping water levels rose to about 49 feet below land surface by the end of the year when pumping at the well field was relatively low. 2013 and 2014 water levels at the well are shown in figure 8. As can be seen, non-pumping water levels fall with the same range for both years.

Pumping water levels in 2014 ranged from about 90 feet to 118 feet below land surface. This range is essentially identical to that of 2013. These depths are considerably above 165 feet below land surface required to preclude air entrapment. The intakes for the pump at TRR well 1 are at a depth of 255 feet, so that at its deepest point during the year, pumping water levels were about 137 feet above the intakes.

As discussed above, the water level at TRR well 1 was about 20 ft. below land surface when it was completed on February 5, 2001. The minimum non-pumping water level of 47 ft. below land surface in 2014 represents a decline of about 27 ft. since 2001, which is not considered to be excessive. Given this, and the fact that pumping water levels remained about 137 feet above the pump intakes, there is no concern regarding the long-term viability of the well.

Figure 7

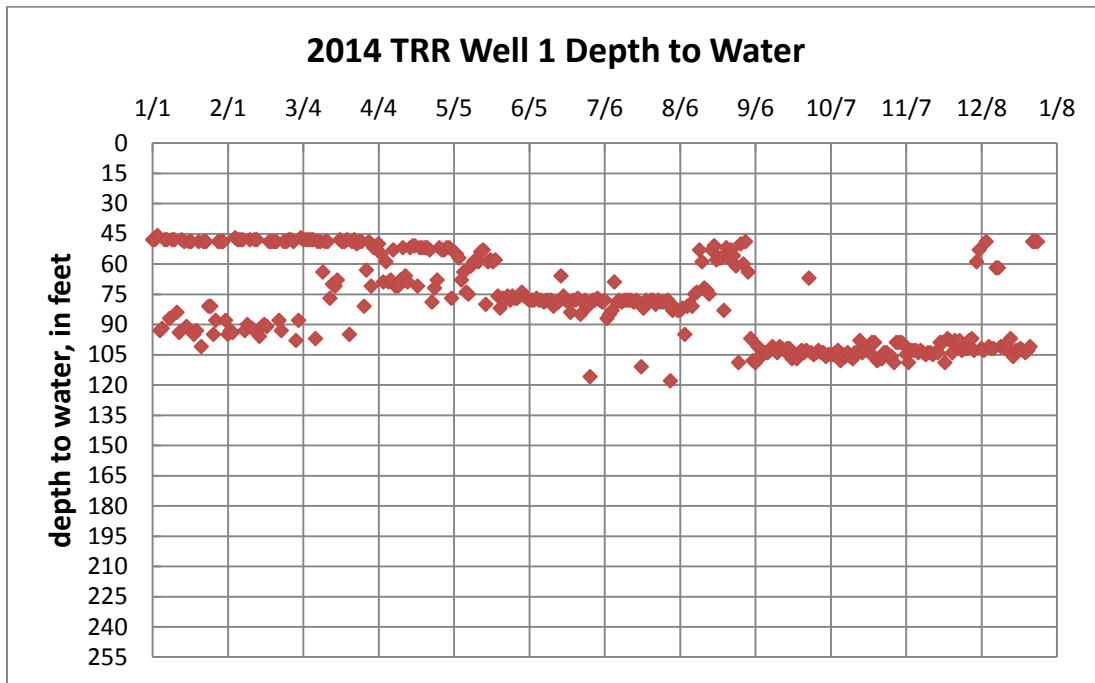
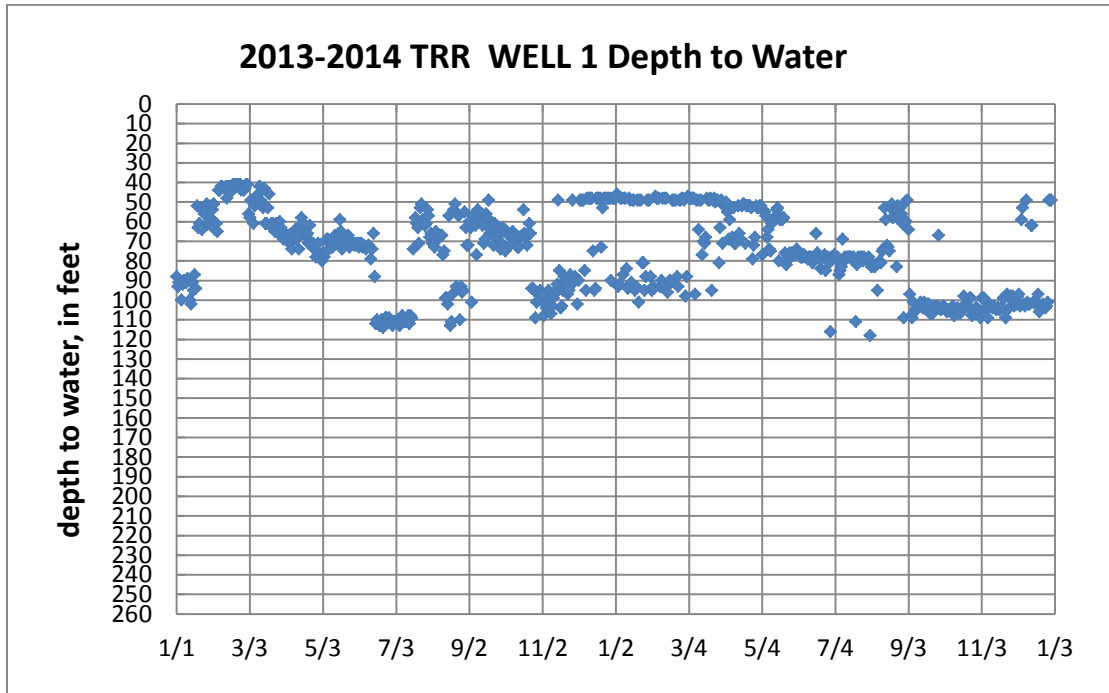


Figure 8



#### TRR Well 2

Depth to water below land surface at TRR 2 in 2014 ranged from about 54 feet to about 159 feet at its deepest level, figure 9. Water levels that are less than 105 feet below land surface represent non-pumping conditions at the well, but not necessarily at one or both of the other wells. Water levels deeper than 105 feet represent pumping conditions at the well. The maximum depth to water of about 159 feet is 4 feet below that required for practical reasons and for problems associated with air entrainment. This depth only occurred once however; otherwise pumping water levels fell between 105 to 140 feet during the year. These values place the pumping water level from 157 to 122 feet above the pump intakes. Non-pumping water levels recovered to about 59 feet below land surface at the end of the year.

2013 and 2014 water levels at the well are shown in figure 10. As can be seen, pumping and non-pumping water levels are similar for both years.

As discussed above, the water level at TRR well 2 was about 57 ft. below land surface when it was completed on April 20, 2002. The minimum water level of 54 ft. below land surface in 2013 is about 3 ft. higher than that originally measured at completion of the well indicating no long-term decline in water levels since the wells construction.

Figure 9

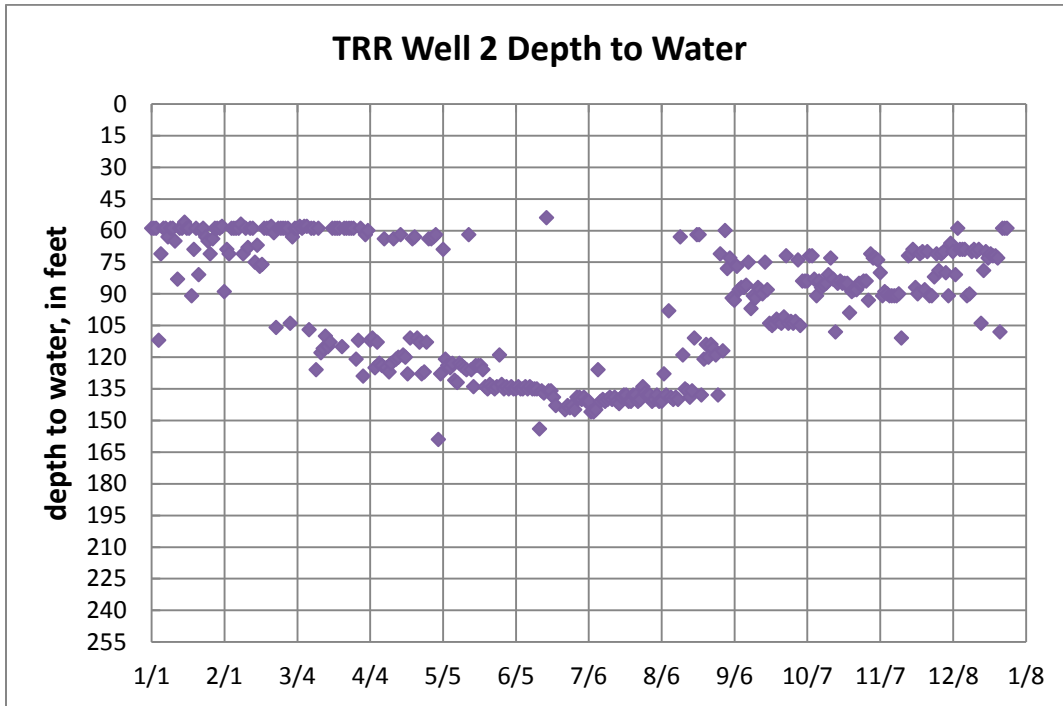
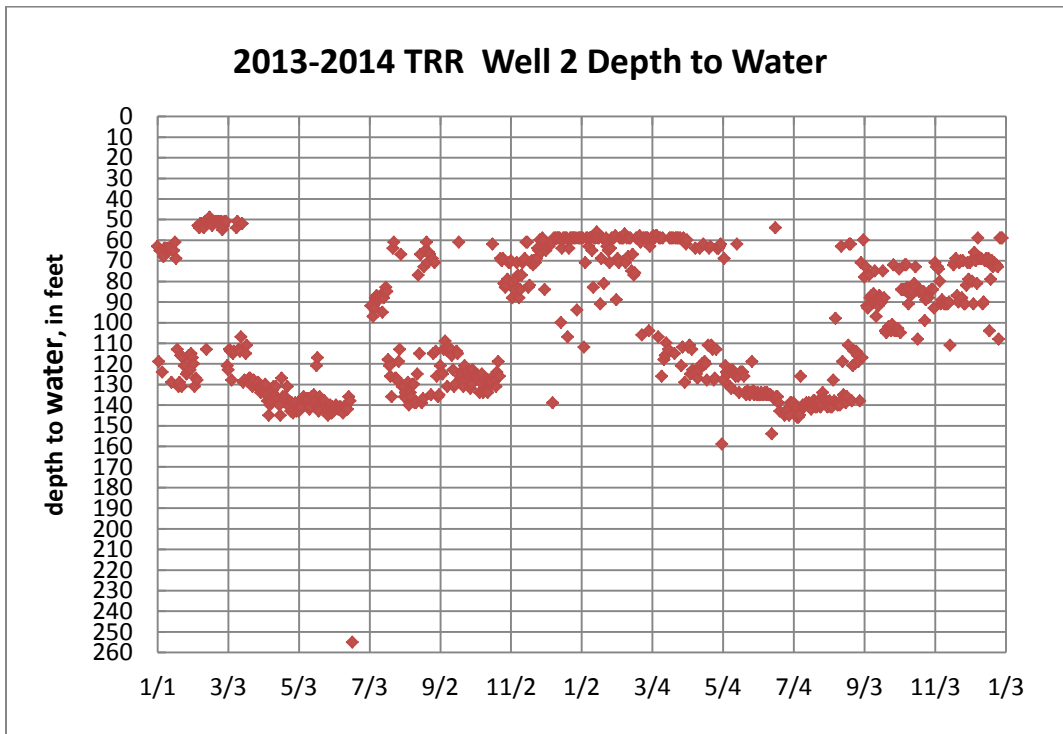


Figure 10





### TRR Well 3

Depth to water below land surface at TRR 3 in 2014 ranged from about 46 feet to 185 feet, figure 11. The pumping water level varied from about 140 feet below land surface over much of the year to as much as 185 feet on May 10. For the most part the pumping depth to water fell between 140 and 170 feet below land surface and averaged about 155 feet.

Non-pumping water levels ranged from about 46 feet below land surface in February to about 95 feet in August and 102 feet in December reflecting the continuous and relatively heavy pumpage at the well for much of the year. The average non-pumping water level was about 60 feet below land surface.

The maximum depth to water of about 185 feet is about 40 feet lower than that required for efficiency reasons although it provides 45 feet of water above the pump intakes. The average pumping depth to water of about 155 feet is 10 feet below that required for practical reasons and provided about 75 feet of water above the pump intakes; both of which are acceptable.

2013 and 2014 water levels are shown in figure 12. As can be seen, pumping and non-pumping water levels are similar for both years.

The minimum non-pumping water level of 46 ft. below land surface in 2014 represents a decline of about 23 ft. since the well's completion. As in the case of well 1, this decline is not considered to be excessive. Given this, and the fact that pumping water level remained about 75 feet above the pump intakes, there is no concern regarding the long-term viability of the well.

Figure 11

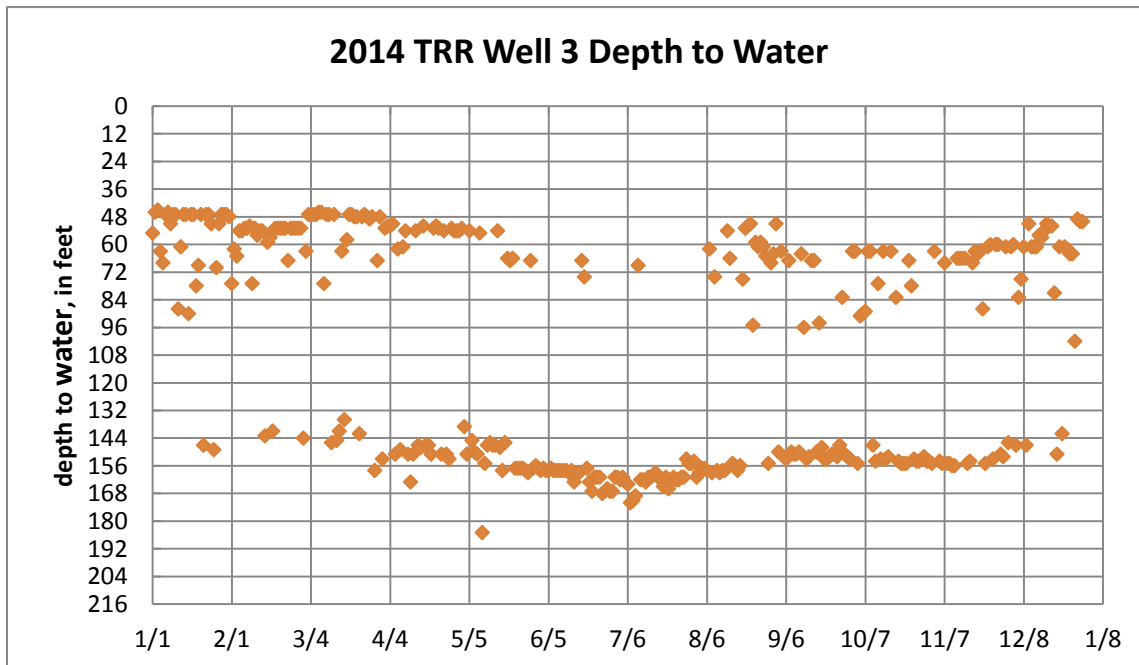
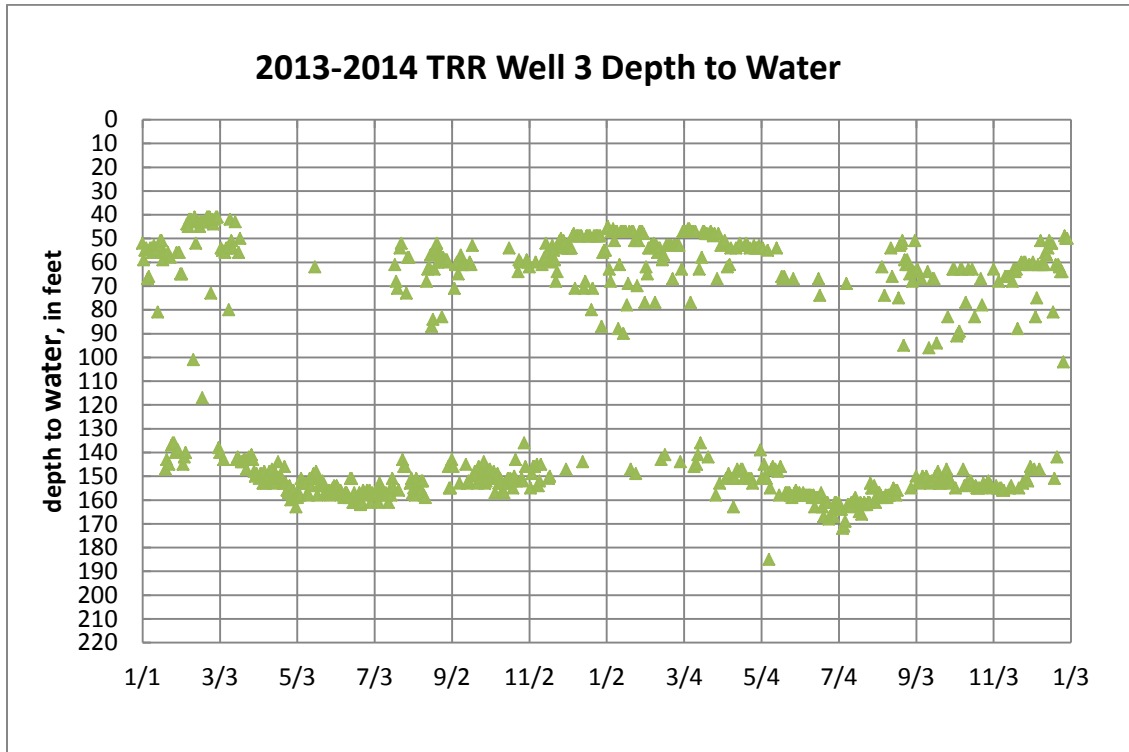


Figure 12



## SUMMARY

The ICR Water Users Association (ICRWUA) is a private non-profit water company that provides water to the Inscription Canyon Ranch, Whispering Canyons, Preserve at the Ranch and Talking Rock subdivisions. The company also provides water to the Talking Rock golf course. Water for the first three subdivisions comes from the ICR well field while water for the Talking Rock subdivision and golf course comes from the TRR well field. The combined demand for all uses from both well fields for 2014 was 134,533,000 gallons. Of this amount 27,500,000 gallons came from the ICR well field and another 107,033,000 gallons came from the TRR well field. The golf course use was approximately 90,289,000 gallons, or about 84 percent of the total pumpage from the TRR well field and 67 percent of the combined pumpage from both well fields.

There is a long-term decline in the water level of a pumped well until water in an amount equal to the rate the well is being pumped is diverted to the well from the aquifer's discharge area. Once this occurs, the long-term decline ceases. For the wells in the ICR and TRR well fields this diversion would be expected to take decades if not longer to occur. If water levels fall too far before stabilizing, the wells will cease to be viable. It is important therefore to measure water levels through time in order to monitor the well field's status. There is also a short term, but significant, decline in the water level at a well that is being pumped intermittently, such as at the two well fields. Water levels fall while the well is being pumped and subsequently rise to an altitude equal to or near that existent before pumping. The long-term decline at both well fields that began with the initiation of pumpage is about 37 feet at the ICR well field and about 23 feet at the TRR well field. Both declines are within acceptable limits for long-term viability of the wells. Pumping water levels are also within the range of values necessary for long-term viability.

There are two wells in the Inscription Canyon Ranch (ICR) well field about 47 feet apart; ICR 1 and ICR 2. The ICR well field is operated with only one well pumping during a given day. ICR 1 was used for 916 hours during the year for an average daily use of about 2.5 hours. ICR 2 was used for 219 hours for an average daily use of 0.7 hours. Average yield from ICR 1 ranged from about 375 gpm in the drier warmer months with associated higher pumpage and lower water levels to about 395 gpm in January with relatively low pumpage and higher water levels. Average yield from ICR 2 was 370 gpm.

Non-pumping depth to water below land surface at ICR 1 in 2014 ranged from about 55 ft. to 60 ft., with the latter depths occurring during the summer. These depths are essentially identical to those of 2013. The minimum water level at the well of 55 ft. below land surface is 37 ft. lower than that originally measured at completion of the well. This decline is within that which would be expected and considered acceptable for long-term viability of the well. Pumping water levels varied from about 100 to 108 feet below land surface. At a depth of 108 feet the water level is 64 feet above the pump intakes which is fully acceptable.

Non-pumping depth to water below land surface at ICR 2 ranged from about 56 ft. to 62 ft. A single value for pumping depth of 106 feet was obtained at the well in August. The minimum water level at the well of 56 ft. below land surface is 37 ft. lower than that originally measured at completion of the well,

the same as at ICR well 1 which would be expected. . This decline is within that which would be considered acceptable for long-term viability of the well. As at ICR well 1, a pumping water level of 106 ft. is well above the pump intakes and fully acceptable. 2014 water levels were essentially identical to those of 2013.

The Talking Rock Ranch (TRR) well field consists of three wells referred to as TRR wells TRR 1, 2, and 3. The well field is managed so that the wells are called up sequentially as demand increases. As a result on a given day, only one well is initially in service until demand requires an additional well. In general any two wells can meet daily demand except during the hottest and driest part of the year when the water demand for the TRR golf course is at its greatest. The general practice is to use either well 1 or 2 as the initial well on call followed by well 3.

Yield of TRR well 1 in 2014 averaged about 330 gpm with little variation during the year. The yield of TRR well 2 ranged from about 250 gpm during the warmer months to about 300 gpm during the cooler months; the yield of TRR well 3 varied between 220 to 230 gpm over the same time period.

As at the ICR wells, 2014 pumping and non-pumping water levels at the TRR wells are similar to those for 2013 and are consistent with those required for long-term viability of the wells.

Non-pumping water levels at TRR well 1 in 2014 ranged from about 47 feet below land surface in February to about 80 feet in August. The latter depths reflected pumpage at either TRR well 2 and/ or TRR well 3. These water levels are essentially identical to 2013. Pumping water levels at TRR well 1 in 2014 ranged from about 90 feet to 118 feet below land surface. This range is essentially identical to that of 2013. These depths are considerably above that required to preclude air entrapment. The intakes for the pump at TRR well 1 are at a depth of 262 feet, so that at its deepest point during the year, pumping water levels were about 137 feet above the intakes which is highly acceptable. The minimum non-pumping water level of 47 ft. below land surface in 2014 represents a decline of about 27 ft. since 2001, which within the range that would be expected and is acceptable.

Depth to water below land surface at TRR 2 in 2014 for non-pumping conditions at the well, but not necessarily at one or both of the other wells ranged from about 54 feet to about 90 feet. Pumping water levels ranged from about 105 feet to a maximum depth of about 159 feet. The latter depth only occurred once however; otherwise pumping water levels fell between 105 to 140 feet during the year. These values place the pumping water level from 157 to 122 feet above the pump intakes. Non-pumping water levels recovered to about 59 feet below land surface at the end of the year. Pumping and non-pumping water levels are similar for both years. The water level at TRR well 2 was about 57 ft. below land surface when it was completed on April 20, 2002. The minimum water level of 54 ft. below land surface in 2014 is about 3 ft. higher than that originally measured at completion of the well indicating no long-term decline in water levels since the wells construction.

Depth to water below land surface at TRR 3 in 2014 ranged from about 46 feet to 185 feet. Non-pumping water levels ranged from about 46 feet below land surface in February to about 95 feet in August and 102 feet in December reflecting the continuous and relatively heavy pumpage at the well for much of the year. The average non-pumping water level was about 60 feet below land surface. The

pumping water level varied from about 140 feet below land surface over much of the year to as much as 185 feet on May 10. For the most part the pumping depth to water fell between 140 and 170 feet below land surface and averaged about 155 feet. The average pumping depth to water of about 155 feet is 10 feet below that required for practical reasons and provided about 75 feet of water above the pump intakes; both of which are acceptable. The minimum non-pumping water level of 46 ft. below land surface in 2014 represents a decline of about 23 ft. since the well's completion. As in the case of well 1, this decline is not considered to be excessive. Given this, and the fact that pumping water level remained about 75 feet above the pump intakes, there is no concern regarding the long-term viability of the well.