

Appendix Q: Well Impact Analysis

Introduction

A well impact analysis was conducted to estimate the number of production wells within the Kern County Subbasin (Subbasin) that would be impacted under Minimum Thresholds (MTs) for the Chronic Lowering of Groundwater Levels. As the Subbasin's Well Mitigation Program is focused on the mitigation of impacts to drinking water wells, the results presented in Section 13.1.2.4 of the Groundwater Sustainability Plan (GSP) specifically reflect impacts to drinking water wells within the Subbasin.

The GSAs' well inventory was used in the analysis, as it provides a comprehensive list of wells within the Subbasin, including information about well location, GSA, and well construction. Wells in the GSAs' well inventory are identified as one of six well types: Domestic, Agricultural, Industrial, Municipal/Public, Small Community, and Recovery. For this analysis, wells identified as Domestic, Municipal/Public, and Small Community well types were considered "drinking water wells".

Prior to conducting the analysis, wells were screened following the screening process described in Section 13.1.2.4 of the GSP. A summary of the wells by well type before and after screening is included in Table 1.

Following this screening process, a total of 4,147 wells were considered for this well impact analysis (2,625 agricultural wells, 98 industrial wells, 1,118 domestic wells, 167 municipal/public supply wells, 12 small community wells, and 127 recovery wells), including 1,297 drinking water wells. Construction records for these wells were compared to spatially interpolated MT values (as a depth below ground surface) across the Subbasin. A well was considered "dewatered" if the interpolated MT depth to groundwater was below 80% of the total well depth. It is recognized that a wide range of well impacts may occur based on the various potential combinations of Representative Monitoring Wells for Chronic Lowering of Groundwater Levels (RMW-WLs) that could exceed MTs. As such, the well impact analysis considered the following five scenarios, three of which consider the criteria for Undesirable Results (i.e., 25% of RMW-WLs reaching MTs):

- Scenario #1 - Worst Case
- Scenario #2 - High-End Bracketed Results
- Scenario #3 - Low-End Bracketed Results
- Scenario #4 - Stochastic Prediction
- Scenario #5 – Modeled Projected Future Conditions

The methodology and results from each of the five scenarios are detailed below.

Table 1. Summary of Wells in GSAs' Well Inventory

Kern County Subbasin, Kern County

Well Type	Number of Recorded
Total Wells in GSAs' Well Inventory	N = 7,232
Agricultural Wells	N = 4,227
<i>Wells older than 70 years by 2040</i>	N = 1,491
<i>Wells dewatered at 2014 low water levels and not older than 70 years by 2040</i>	N = 111
Total Agricultural Wells after screening	N = 2,625
Industrial Wells	N = 189
<i>Wells older than 70 years by 2040</i>	N = 84
<i>Wells dewatered at 2014 low water levels and not older than 70 years by 2040</i>	N = 7
Total Industrial Wells after screening	N = 98
Municipal/Public Wells	N = 264
<i>Wells older than 70 years by 2040</i>	N = 93
<i>Wells dewatered at 2014 low water levels and not older than 70 years by 2040</i>	N = 4
Total Municipal/Public Wells after screening	N = 167
Small Community Wells	N = 17
<i>Wells older than 70 years by 2040</i>	N = 1
<i>Wells dewatered at 2014 low water levels and not older than 70 years by 2040</i>	N = 4
Total Small Community Wells after screening	N = 12
Domestic Wells	N = 2,404
<i>Wells older than 70 years by 2040</i>	N = 979
<i>Wells dewatered at 2014 low water levels and not older than 70 years by 2040</i>	N = 307
Total Domestic Wells after screening	N = 1,118
Recovery Wells	N = 131
<i>Wells older than 70 years by 2040</i>	N = 4
<i>Wells dewatered at 2014 low water levels and not older than 70 years by 2040</i>	N = 0
Total Recovery Wells after screening	N = 127
Total Wells after screening process	N = 4,147
Total Drinking Water Wells after screening	N = 1,297

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

1.1 Scenario #1 – Worst Case

The process for Scenario #1 of the well impact analysis is described in Section 13.1.2.4 of the GSP. It is important to note that while the results discussed in the GSP only include drinking water wells, the full analysis for Scenario #1 includes all of the well types listed above. The results are provided below for each well type in Tables 2-7 and are represented in Figure 13-5 of Section 13.1.2.4 of the GSP.

1.2 Scenario #2 - High-End Bracketed Results

The process for Scenario #2 of the well impact analysis is described in Section 13.1.2.4 of the GSP. It is important to note that while the results discussed in the GSP only include drinking water wells, the full analysis for Scenario #2 was performed on four subsets of the well inventory: industrial wells, agricultural wells, recovery, and drinking water wells (municipal/public, small community, and domestic).

The Kern Subbasin's RMW-WL network contains a total of 186 RMW-WLs, 184 of which have set SMCs for Chronic Lowering of Groundwater Levels. However, the high-end bracketed scenario only considers the 170 RMW-WLs screened in the Principal Aquifer with set SMCs, as deeper wells were not considered representative of shallower domestic wells. Therefore, the 43 RMW-WLs, representing 25% of the 170 RMW-WL subset, with the highest densities were identified for each of the well subsets (industrial, agricultural, recovery, and drinking water).

For industrial wells, the 25% of RMW-WLs with the highest density were identified as those with associated well counts greater than or equal to 0; as such, all 4 of the industrial RMW-WLs with associated well counts greater than 0 were selected under the high-end bracketed scenario, along with 39 RMWs with 0 associated wells selected at random, to represent the 43 RMW-WLs with the highest density. Table 8 shows the RMW-WLs and their associated industrial well counts, with selected RMW-WLs in blue.

For agricultural wells, the 25% of RMW-WLs with the highest density were identified as those with associated well counts greater than or equal to 1; as such, 58 RMW-WLs were selected under the high-end bracketed scenario. Because the high-end bracketed scenario requires the selection of 43 RMW-WLs in total, 15 RMW-WLs with 1 associated well were deselected based on proximity to other selected RMW-WLs. Table 8 shows the RMW-WLs and their associated agricultural well counts, with selected RMW-WLs in green.

For recovery wells, the 25% of RMW-WLs with the highest density were identified as those with associated well counts greater than or equal to 0; as such, 43 RMWs with 0 associated wells were selected at random to represent the 43 RMW-WLs with the highest density. Table 8 shows the RMW-WLs and their associated recovery well counts, with selected RMW-WLs in purple.

For drinking water wells, the 25% of RMW-WLs with the highest density were identified as those with associated well counts greater than or equal to 1; as such, 83 RMW-WLs were selected under the high-end bracketed scenario. Because the high-end bracketed scenario requires the selection of 43 RMW-WLs, 40 RMW-WLs with 1 associated well were deselected based on proximity to other selected RMW-WLs. Table 8 shows the RMW-WLs and their associated drinking water well counts, with selected RMW-WLs in red.

The combined results for drinking water wells from Scenario #2 are represented in Figure 13-6 of Section 13.1.2.4 of the GSP.

1.3 Scenario #3 - Low-End Bracketed Results

The process for Scenario #3 of the well impact analysis is described in Section 13.1.2.4 of the GSP. It is important to note that while the results discussed in the GSP only include drinking water wells, the full analysis for Scenario #3 was performed on four subsets of the well inventory: industrial wells, agricultural wells, recovery, and drinking water wells (municipal/public, small community, and domestic).

Similar to Scenario #2, the 43 RMW-WLs with the lowest densities were identified for each of the well subsets (industrial, agricultural, recovery, and drinking water). In each case, the 25% of RMW-WLs with the lowest density were identified as those with associated well counts equal to 0; as such, no wells were considered dewatered. The results from Scenario #3 are represented in Figure 13-7 of Section 13.1.2.4 of the GSP.

1.4 Scenario #4 – Stochastic Prediction

The process for Scenario #4 of the well impact analysis is described in Section 13.1.2.4 of the GSP. It is important to note that while the results discussed in the GSP only include drinking water wells, the full analysis for Scenario #4 includes all six well types listed above. Histograms of the range of well impacts for each well type under the random stochastic prediction scenario are shown below in Figures 1-6. Similarly, histograms of the range of well impacts for each well type under the weighted stochastic prediction scenario are shown below in Figures 7-12. The combined results for drinking water wells are represented in Figure 13-8 of Section 13.1.2.4 of the GSP.

Table 2. Scenario #1 - Dewatered Domestic Wells by GSA

Kern County Subbasin, Kern County

GSA	Domestic Well Count	Dewatered	%
Arvin GSA	90	2	2%
Buena Vista Water Storage District GSA	23	2	9%
Cawelo Water District GSA	22	3	14%
Greenfield County Water District GSA	4	1	25%
Henry Miller Water District GSA	0	0	-
Kern Non-Districted Lands Authority	112	25	22%
Kern River GSA	436	76	17%
Kern-Tulare Water District GSA	5	1	20%
Kern Water Bank GSA	0	0	-
North Kern Water Storage District GSA	11	2	18%
Olcese Water District GSA	0	0	-
Pioneer GSA	0	0	-
Rosedale-Rio Bravo Water Storage District GSA	189	71	38%
Semitropic Water Storage District GSA	93	27	29%
Shafter-Wasco Irrigation District GSA	69	31	45%
Southern San Joaquin Municipal Utility District GSA	50	15	30%
Tejon-Castac Water District GSA	0	0	-
West Kern Water District GSA	0	0	-
Westside District Water Authority GSA	5	0	0%
Wheeler Ridge-Maricopa GSA	9	3	33%
TOTAL	1118	259	23%

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

Table 3. Scenario #1 - Dewatered Industrial Wells by GSA

Kern County Subbasin, Kern County

GSA	Industrial Well Count	Dewatered	%
Arvin GSA	13	0	0%
Buena Vista Water Storage District GSA	2	0	0%
Cawelo Water District GSA	9	0	0%
Greenfield County Water District GSA	0	0	-
Henry Miller Water District GSA	0	0	-
Kern Non-Districted Lands Authority	13	0	0%
Kern River GSA	23	0	0%
Kern-Tulare Water District GSA	0	0	-
Kern Water Bank GSA	0	0	-
North Kern Water Storage District GSA	2	0	0%
Olcese Water District GSA	0	0	-
Pioneer GSA	0	0	-
Rosedale-Rio Bravo Water Storage District GSA	5	1	20%
Semitropic Water Storage District GSA	6	1	17%
Shafter-Wasco Irrigation District GSA	3	1	33%
Southern San Joaquin Municipal Utility District GSA	6	0	0%
Tejon-Castac Water District GSA	0	0	-
West Kern Water District GSA	3	0	0%
Westside District Water Authority GSA	10	0	0%
Wheeler Ridge-Maricopa GSA	3	1	33%
TOTAL	98	4	4%

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

Table 4. Scenario #1 - Dewatered Agricultural Wells by GSA

Kern County Subbasin, Kern County

GSA	Agricultural Well Count	Dewatered	%
Arvin GSA	230	3	1%
Buena Vista Water Storage District GSA	136	13	10%
Cawelo Water District GSA	114	3	3%
Greenfield County Water District GSA	4	0	0%
Henry Miller Water District GSA	16	0	0%
Kern Non-Districted Lands Authority	73	4	5%
Kern River GSA	481	23	5%
Kern-Tulare Water District GSA	53	2	4%
Kern Water Bank GSA	8	0	0%
North Kern Water Storage District GSA	145	5	3%
Olcese Water District GSA	2	0	0%
Pioneer GSA	4	0	0%
Rosedale-Rio Bravo Water Storage District GSA	203	13	6%
Semitropic Water Storage District GSA	608	19	3%
Shafter-Wasco Irrigation District GSA	172	9	5%
Southern San Joaquin Municipal Utility District GSA	222	5	2%
Tejon-Castac Water District GSA	0	0	-
West Kern Water District GSA	1	0	0%
Westside District Water Authority GSA	72	2	3%
Wheeler Ridge-Maricopa GSA	81	0	0%
TOTAL	2,625	101	4%

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

Table 5. Scenario #1 - Dewatered Small Community Wells by GSA

Kern County Subbasin, Kern County

GSA	Small Community Well Count	Dewatered	%
Arvin GSA	0	0	-
Buena Vista Water Storage District GSA	0	0	-
Cawelo Water District GSA	0	0	-
Greenfield County Water District GSA	0	0	-
Henry Miller Water District GSA	0	0	-
Kern Non-Districted Lands Authority	1	0	0%
Kern River GSA	5	0	0%
Kern-Tulare Water District GSA	0	0	-
Kern Water Bank GSA	0	0	-
North Kern Water Storage District GSA	0	0	-
Olcese Water District GSA	0	0	-
Pioneer GSA	0	0	-
Rosedale-Rio Bravo Water Storage District GSA	5	0	0%
Semitropic Water Storage District GSA	0	0	-
Shafter-Wasco Irrigation District GSA	0	0	-
Southern San Joaquin Municipal Utility District GSA	1	0	0%
Tejon-Castac Water District GSA	0	0	-
West Kern Water District GSA	0	0	-
Westside District Water Authority GSA	0	0	-
Wheeler Ridge-Maricopa GSA	0	0	-
TOTAL	12	0	0%

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

Table 6. Scenario #1 - Dewatered Municipal/Public Wells by GSA

Kern County Subbasin, Kern County

GSA	Municipal/Public Well Count	Dewatered	%
Arvin GSA	6	0	0%
Buena Vista Water Storage District GSA	3	0	0%
Cawelo Water District GSA	4	0	0%
Greenfield County Water District GSA	4	0	0%
Henry Miller Water District GSA	0	0	-
Kern Non-Districted Lands Authority	3	0	0%
Kern River GSA	91	0	0%
Kern-Tulare Water District GSA	0	0	-
Kern Water Bank GSA	0	0	-
North Kern Water Storage District GSA	1	0	0%
Olcese Water District GSA	0	0	-
Pioneer GSA	0	0	-
Rosedale-Rio Bravo Water Storage District GSA	10	1	10%
Semitropic Water Storage District GSA	4	0	0%
Shafter-Wasco Irrigation District GSA	9	0	0%
Southern San Joaquin Municipal Utility District GSA	23	0	0%
Tejon-Castac Water District GSA	0	0	-
West Kern Water District GSA	9	0	0%
Westside District Water Authority GSA	0	0	-
Wheeler Ridge-Maricopa GSA	0	0	-
TOTAL	167	1	1%

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

Table 7. Scenario #1 - Dewatered Recovery Wells by GSA

Kern County Subbasin, Kern County

GSA	Recovery Well Count	Dewatered	%
Arvin GSA	0	0	-
Buena Vista Water Storage District GSA	0	0	-
Cawelo Water District GSA	0	0	-
Greenfield County Water District GSA	0	0	-
Henry Miller Water District GSA	0	0	-
Kern Non-Districted Lands Authority	0	0	-
Kern River GSA	15	0	0%
Kern-Tulare Water District GSA	0	0	-
Kern Water Bank GSA	92	0	0%
North Kern Water Storage District GSA	0	0	-
Olcese Water District GSA	0	0	-
Pioneer GSA	9	0	0%
Rosedale-Rio Bravo Water Storage District GSA	11	0	0%
Semitropic Water Storage District GSA	0	0	-
Shafter-Wasco Irrigation District GSA	0	0	-
Southern San Joaquin Municipal Utility District GSA	0	0	-
Tejon-Castac Water District GSA	0	0	-
West Kern Water District GSA	0	0	-
Westside District Water Authority GSA	0	0	-
Wheeler Ridge-Maricopa GSA	0	0	-
TOTAL	127	0	0%

Abbreviations:

GSA = groundwater sustainability agency

Sources:

1. GSAs' well inventory

Table 8. Scenario #2 Well Counts
Kern County Subbasin, Kern County

Industrial		Agricultural		Recovery		Drinking Water	
RMW-WL	Associated Well Count	RMW-WL	Associated Well Count	RMW-WL	Associated Well Count	RMW-WL	Associated Well Count
29S29E33N001M	0	29S29E33N001M	1	29S29E33N001M	0	29S29E33N001M	1
30S29E11N001M	0	30S29E11N001M	0	30S29E11N001M	0	30S29E11N001M	0
30S30E19E001M	0	30S30E19E001M	0	30S30E19E001M	0	30S30E19E001M	0
30S29E29A001M	0	30S29E29A001M	0	30S29E29A001M	0	30S29E29A001M	1
31S29E05E001M	0	31S29E05E001M	1	31S29E05E001M	0	31S29E05E001M	1
31S29E12M001M	0	31S29E12M001M	0	31S29E12M001M	0	31S29E12M001M	0
31S30E17K001M	0	31S30E17K001M	1	31S30E17K001M	0	31S30E17K001M	1
31S29E34A001M	0	31S29E34A001M	0	31S29E34A001M	0	31S29E34A001M	0
31S30E30J001M	0	31S30E30J001M	0	31S30E30J001M	0	31S30E30J001M	0
ACSD Well #14	0	ACSD Well #14	0	ACSD Well #14	0	ACSD Well #14	0
32S29E12P001M	0	32S29E12P001M	0	32S29E12P001M	0	32S29E12P001M	1
32S29E20L001M	0	32S29E20L001M	0	32S29E20L001M	0	32S29E20L001M	0
32S28E23F001M	0	32S28E23F001M	0	32S28E23F001M	0	32S28E23F001M	0
32S29E31N001M	0	32S29E31N001M	0	32S29E31N001M	0	32S29E31N001M	0
12N20W36G001S	0	12N20W36G001S	0	12N20W36G001S	0	12N20W36G001S	0
11N20W05J001S	1	11N20W05J001S	0	11N20W05J001S	0	11N20W05J001S	0
DMW01	0	DMW01	1	DMW01	0	DMW01	0
DMW02	0	DMW02	0	DMW02	0	DMW02	0
DMW04	0	DMW04	0	DMW04	0	DMW04	0
DMW05	0	DMW05	0	DMW05	0	DMW05	0
DMW06	0	DMW06	4	DMW06	0	DMW06	1
DMW07	0	DMW07	4	DMW07	0	DMW07	1
DMW08	0	DMW08	3	DMW08	0	DMW08	1
DMW10a	0	DMW10a	3	DMW10a	0	DMW10a	0
DMW12b	0	DMW12b	0	DMW12b	0	DMW12b	0
Well 12H	0	Well 12H	0	Well 12H	0	Well 12H	0
Well 4R	0	Well 4R	1	Well 4R	0	Well 4R	1
Well 28L	0	Well 28L	1	Well 28L	0	Well 28L	1
Well 24R	0	Well 24R	1	Well 24R	0	Well 24R	1
Well 11M	0	Well 11M	0	Well 11M	0	Well 11M	2
Well 6C	0	Well 6C	0	Well 6C	0	Well 6C	2
Well 33C	0	Well 33C	1	Well 33C	0	Well 33C	1
EWMA #41	0	EWMA #41	0	EWMA #41	0	EWMA #41	1
HMWD #20	0	HMWD #20	0	HMWD #20	0	HMWD #20	2
HMWD #28	0	HMWD #28	0	HMWD #28	0	HMWD #28	0
HMWD #27	0	HMWD #27	0	HMWD #27	0	HMWD #27	0
HMWD #26	0	HMWD #26	0	HMWD #26	0	HMWD #26	0
HMWD #18	0	HMWD #18	0	HMWD #18	0	HMWD #18	0
RMW-017	0	RMW-017	0	RMW-017	0	RMW-017	1
RMW-018	0	RMW-018	1	RMW-018	0	RMW-018	3
RMW-019R	0	RMW-019R	1	RMW-019R	0	RMW-019R	2
RMW-020	0	RMW-020	0	RMW-020	0	RMW-020	0
RMW-025	0	RMW-025	0	RMW-025	0	RMW-025	1
RMW-026	0	RMW-026	0	RMW-026	0	RMW-026	0
RMW-029	0	RMW-029	0	RMW-029	0	RMW-029	0
RMW-030	0	RMW-030	0	RMW-030	0	RMW-030	2
RMW-031	0	RMW-031	0	RMW-031	0	RMW-031	0
RMW-032	0	RMW-032	0	RMW-032	0	RMW-032	0
RMW-034	0	RMW-034	2	RMW-034	0	RMW-034	4
RMW-035R	0	RMW-035R	0	RMW-035R	0	RMW-035R	0
RMW-037	0	RMW-037	0	RMW-037	0	RMW-037	0
RMW-038R	0	RMW-038R	0	RMW-038R	0	RMW-038R	1
RMW-040	0	RMW-040	0	RMW-040	0	RMW-040	0
RMW-041	0	RMW-041	3	RMW-041	0	RMW-041	1
RMW-042	0	RMW-042	0	RMW-042	0	RMW-042	0
RMW-192	0	RMW-192	4	RMW-192	0	RMW-192	22
RMW-193	0	RMW-193	2	RMW-193	0	RMW-193	1
RMW-195	0	RMW-195	0	RMW-195	0	RMW-195	3
RMW-196	0	RMW-196	0	RMW-196	0	RMW-196	14
RMW-197	0	RMW-197	3	RMW-197	0	RMW-197	1
RMW-200	0	RMW-200	0	RMW-200	0	RMW-200	1
RMW-201	0	RMW-201	0	RMW-201	0	RMW-201	3
RMW-202	0	RMW-202	1	RMW-202	0	RMW-202	8
BK 178-01	0	BK 178-01	0	BK 178-01	0	BK 178-01	0

BK 140-01	0	BK 140-01	0	BK 140-01	0	BK 140-01	0
BK 062-02	0	BK 062-02	0	BK 062-02	0	BK 062-02	0
RMW-212	0	RMW-212	0	RMW-212	0	RMW-212	1
BK 154-01	0	BK 154-01	0	BK 154-01	0	BK 154-01	0
BK 123-02	0	BK 123-02	0	BK 123-02	0	BK 123-02	0
BK 125-01	0	BK 125-01	0	BK 125-01	0	BK 125-01	0
RMW-216	0	RMW-216	0	RMW-216	0	RMW-216	1
RMW-217	0	RMW-217	1	RMW-217	0	RMW-217	3
RMW-218	0	RMW-218	1	RMW-218	0	RMW-218	1
RMW-219	0	RMW-219	2	RMW-219	0	RMW-219	4
Well 12A	0	Well 12A	0	Well 12A	0	Well 12A	2
Well 15D1	0	Well 15D1	2	Well 15D1	0	Well 15D1	0
Well 4D1	0	Well 4D1	0	Well 4D1	0	Well 4D1	0
30S/25E-16L01	0	30S/25E-16L01	0	30S/25E-16L01	0	30S/25E-16L01	0
88-03-009R	0	88-03-009R	0	88-03-009R	0	88-03-009R	0
88-09-009	0	88-09-009	2	88-09-009	0	88-09-009	1
88-21-005	0	88-21-005	0	88-21-005	0	88-21-005	0
88-29-014	0	88-29-014	0	88-29-014	0	88-29-014	0
99-00-003	0	99-00-003	0	99-00-003	0	99-00-003	0
99-00-081	0	99-00-081	2	99-00-081	0	99-00-081	1
99-22-084	0	99-22-084	0	99-22-084	0	99-22-084	0
Shafter Well 18	0	Shafter Well 18	0	Shafter Well 18	0	Shafter Well 18	0
3361-62	0	3361-62	1	3361-62	0	3361-62	1
DW097	0	DW097	0	DW097	0	DW097	1
30S/26E-04D003M	0	30S/26E-04D003M	1	30S/26E-04D003M	0	30S/26E-04D003M	12
30S/26E-10P004M	0	30S/26E-10P004M	0	30S/26E-10P004M	0	30S/26E-10P004M	0
30S/26E-15N003M	0	30S/26E-15N003M	0	30S/26E-15N003M	0	30S/26E-15N003M	0
30S/26E-04J003M	0	30S/26E-04J003M	0	30S/26E-04J003M	0	30S/26E-04J003M	0
30S/26E-04J002M	0	30S/26E-04J002M	0	30S/26E-04J002M	0	30S/26E-04J002M	0
Bushnell	0	Bushnell	0	Bushnell	0	Bushnell	0
L.R. Stout	0	L.R. Stout	5	L.R. Stout	0	L.R. Stout	4
RBG School	1	RBG School	1	RBG School	0	RBG School	8
P. Enns Domestic	0	P. Enns Domestic	2	P. Enns Domestic	0	P. Enns Domestic	0
Section 18	0	Section 18	0	Section 18	0	Section 18	14
Blacco HQ	0	Blacco HQ	1	Blacco HQ	0	Blacco HQ	0
Cauzza	0	Cauzza	0	Cauzza	0	Cauzza	0
Parsons	0	Parsons	0	Parsons	0	Parsons	1
West I-5	0	West I-5	0	West I-5	0	West I-5	0
Virgil Bussell	0	Virgil Bussell	0	Virgil Bussell	0	Virgil Bussell	0
27N Mayer	0	27N Mayer	1	27N Mayer	0	27N Mayer	0
25M Enos	0	25M Enos	0	25M Enos	0	25M Enos	6
Chet Reed	0	Chet Reed	2	Chet Reed	0	Chet Reed	11
Home Place	0	Home Place	0	Home Place	0	Home Place	18
31H Greeley	0	31H Greeley	2	31H Greeley	0	31H Greeley	4
Harvest Ranch	0	Harvest Ranch	0	Harvest Ranch	0	Harvest Ranch	0
35H RRBWSD Shop	0	35H RRBWSD Shop	0	35H RRBWSD Shop	0	35H RRBWSD Shop	4
32N Triple	0	32N Triple	0	32N Triple	0	32N Triple	1
28J Triple	0	28J Triple	0	28J Triple	0	28J Triple	0
SSJMUD 8	0	SSJMUD 8	5	SSJMUD 8	0	SSJMUD 8	1
SSJMUD 14	0	SSJMUD 14	1	SSJMUD 14	0	SSJMUD 14	2
SSJMUD 23	0	SSJMUD 23	0	SSJMUD 23	0	SSJMUD 23	1
SSJMUD 53	0	SSJMUD 53	1	SSJMUD 53	0	SSJMUD 53	1
SSJMUD 59	0	SSJMUD 59	0	SSJMUD 59	0	SSJMUD 59	3
SSJMUD 62	0	SSJMUD 62	1	SSJMUD 62	0	SSJMUD 62	2
SSJMUD 42	0	SSJMUD 42	0	SSJMUD 42	0	SSJMUD 42	2
SSJMUD 47	0	SSJMUD 47	1	SSJMUD 47	0	SSJMUD 47	1
Delano 30	0	Delano 30	0	Delano 30	0	Delano 30	0
Delano 34	0	Delano 34	0	Delano 34	0	Delano 34	2
Shafter Well 15	1	Shafter Well 15	1	Shafter Well 15	0	Shafter Well 15	5
Shafter Well 7	0	Shafter Well 7	2	Shafter Well 7	0	Shafter Well 7	3
28S/24E-35C	0	28S/24E-35C	1	28S/24E-35C	0	28S/24E-35C	0
Shafter Well 12	0	Shafter Well 12	0	Shafter Well 12	0	Shafter Well 12	1
Wasco 12	0	Wasco 12	0	Wasco 12	0	Wasco 12	0
Shafter Well 14	0	Shafter Well 14	1	Shafter Well 14	0	Shafter Well 14	0
Wasco 8A	0	Wasco 8A	0	Wasco 8A	0	Wasco 8A	2
28S25E19G	0	28S25E19G	1	28S25E19G	0	28S25E19G	10
Wasco 11	0	Wasco 11	1	Wasco 11	0	Wasco 11	3
S-2	0	S-2	0	S-2	0	S-2	1
S-4	0	S-4	0	S-4	0	S-4	0
S-5	0	S-5	0	S-5	0	S-5	2

S-6	0	S-6	0	S-6	0	S-6	2
S-8A Cluster 1 of 2	0	S-8A Cluster 1 of 2	3	S-8A Cluster 1 of 2	0	S-8A Cluster 1 of 2	0
S-9A Cluster 1 of 2	0	S-9A Cluster 1 of 2	0	S-9A Cluster 1 of 2	0	S-9A Cluster 1 of 2	7
S-11	0	S-11	1	S-11	0	S-11	1
S-12	1	S-12	1	S-12	0	S-12	0
S-13A Cluster 1 of 2	0	S-13A Cluster 1 of 2	3	S-13A Cluster 1 of 2	0	S-13A Cluster 1 of 2	2
S-14B Cluster 2 of 2	0	S-14B Cluster 2 of 2	2	S-14B Cluster 2 of 2	0	S-14B Cluster 2 of 2	1
26S-23E-15A1	0	26S-23E-15A1	2	26S-23E-15A1	0	26S-23E-15A1	4
948L02 Cluster1 of 2	0	948L02 Cluster1 of 2	0	948L02 Cluster1 of 2	0	948L02 Cluster1 of 2	1
S-1	0	S-1	0	S-1	0	S-1	1
28/23/16/G	0	28/23/16/G	2	28/23/16/G	0	28/23/16/G	5
28/23/36/R	0	28/23/36/R	1	28/23/36/R	0	28/23/36/R	1
Caratan Well (RMS-1)	0	Caratan Well (RMS-1)	1	Caratan Well (RMS-1)	0	Caratan Well (RMS-1)	0
7106-63	0	7106-63	1	7106-63	0	7106-63	0
7108-66	0	7108-66	0	7108-66	0	7108-66	0
S#14	0	S#14	0	S#14	0	S#14	0
Berenda Mesa #3	0	Berenda Mesa #3	2	Berenda Mesa #3	0	Berenda Mesa #3	0
WKWD 23M-M	0	WKWD 23M-M	0	WKWD 23M-M	0	WKWD 23M-M	0
NWM1-M	0	NWM1-M	0	NWM1-M	0	NWM1-M	0
7-01	0	7-01	0	7-01	0	7-01	0
North Ag	0	North Ag	0	North Ag	0	North Ag	0
South Ag	0	South Ag	0	South Ag	0	South Ag	0
32S26E20G001M	0	32S26E20G001M	0	32S26E20G001M	0	32S26E20G001M	0
32S27E30N001M	0	32S27E30N001M	0	32S27E30N001M	0	32S27E30N001M	2
32S27E35R001M	0	32S27E35R001M	0	32S27E35R001M	0	32S27E35R001M	1
32S26E24K001M	0	32S26E24K001M	0	32S26E24K001M	0	32S26E24K001M	0
11N22W01D001S	0	11N22W01D001S	0	11N22W01D001S	0	11N22W01D001S	0
11N22W06H001S	0	11N22W06H001S	0	11N22W06H001S	0	11N22W06H001S	0
11N21W16E001S	0	11N21W16E001S	0	11N21W16E001S	0	11N21W16E001S	0
12N21W34N001S	0	12N21W34N001S	0	12N21W34N001S	0	12N21W34N001S	0
11N21W09C001S	0	11N21W09C001S	0	11N21W09C001S	0	11N21W09C001S	0
32S26E34P001M	0	32S26E34P001M	0	32S26E34P001M	0	32S26E34P001M	0
32S26E36P002M	0	32S26E36P002M	0	32S26E36P002M	0	32S26E36P002M	0
32S25E29Q001M	0	32S25E29Q001M	0	32S25E29Q001M	0	32S25E29Q001M	0
32S28E16P001M	0	32S28E16P001M	1	32S28E16P001M	0	32S28E16P001M	4
12N21W35Q001S	0	12N21W35Q001S	0	12N21W35Q001S	0	12N21W35Q001S	0
Total Industrial Dewatered Wells	4	Total Agricultural Dewatered Wells	86	Total Recovery Dewatered Wells	0	Total Drinking Water Dewatered Wells	220

Notes:

(a) Highlighted cells indicate selected RMW-WLs. Wells associated with these RMW-WLs were considered dewatered under Scenario #2.

Abbreviations:

RMW-WL = Representative Monitoring Well for Chronic Lowering of Groundwater Levels

Sources:

1. GSAs' Well Inventory

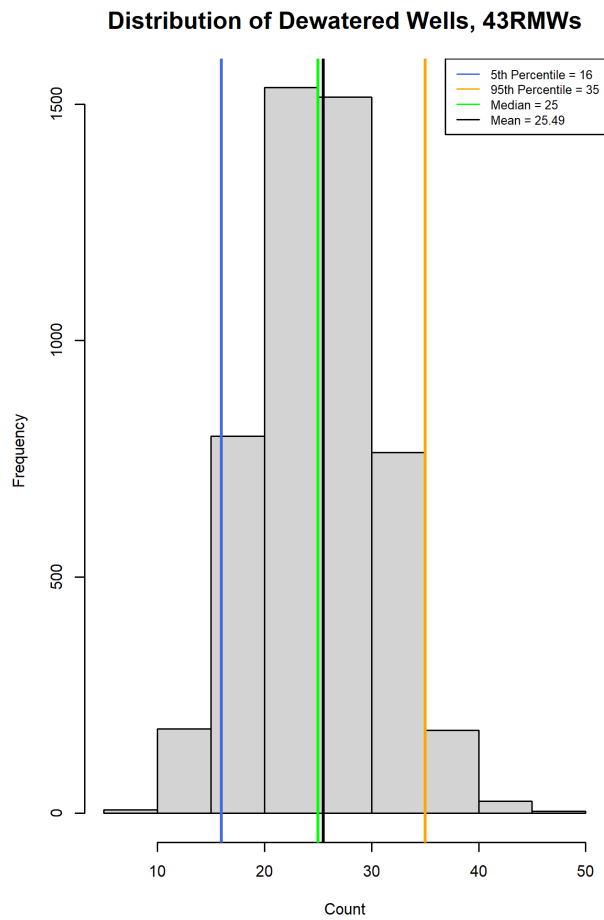


Figure 1. Scenario #4 – Random Stochastic Prediction for Agricultural Wells

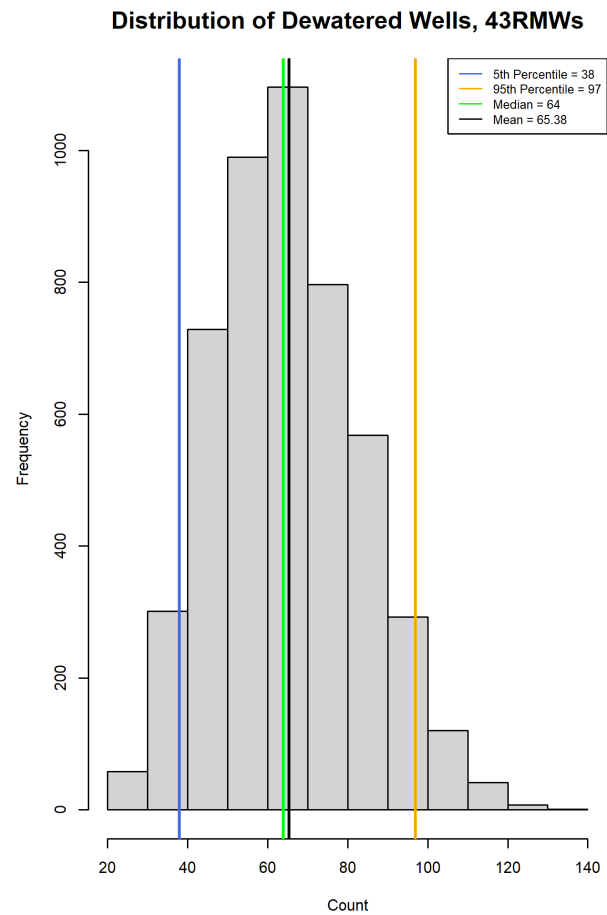


Figure 2. Scenario #4 – Random Stochastic Prediction for Domestic Wells

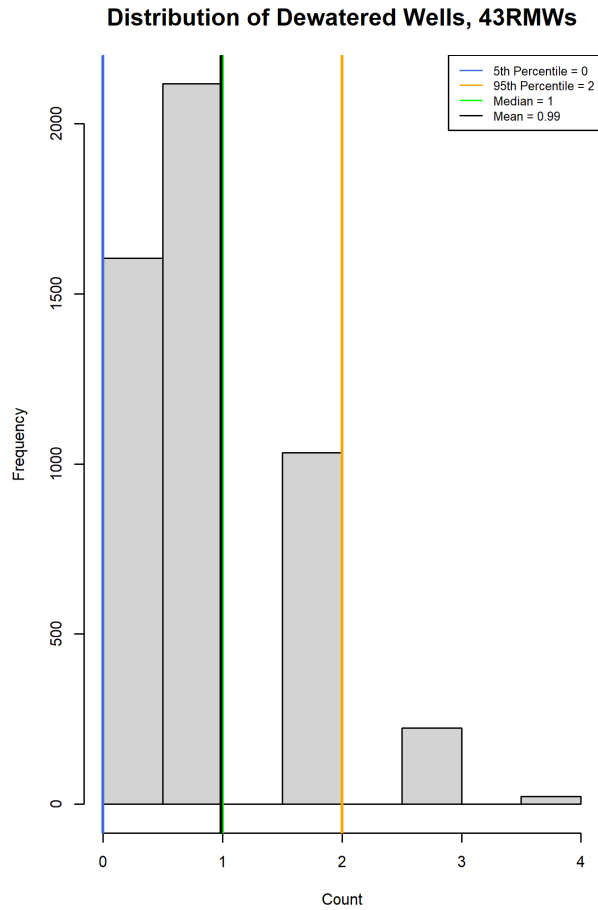


Figure 3. Scenario #4 – Random Stochastic Prediction for Industrial Wells



Figure 4. Scenario #4 – Random Stochastic Prediction for Small Community Wells

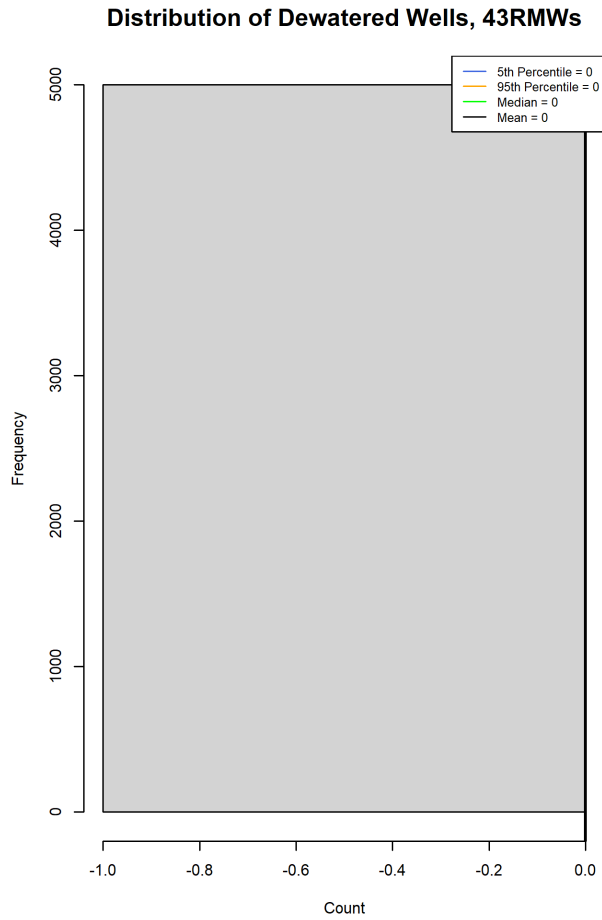


Figure 5. Scenario #4 – Random Stochastic Prediction for Recovery Wells

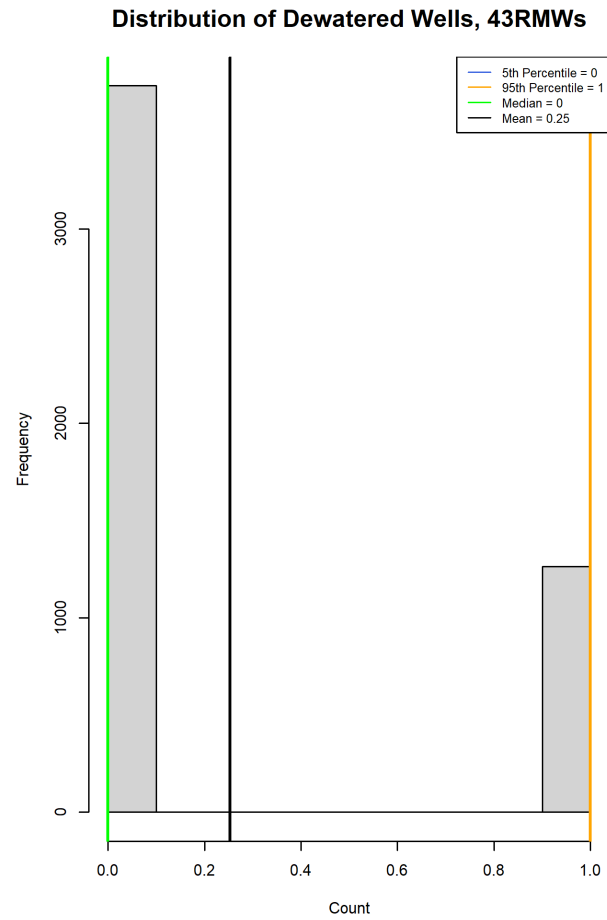


Figure 6. Scenario #4 – Random Stochastic Prediction for Municipal/Public Wells

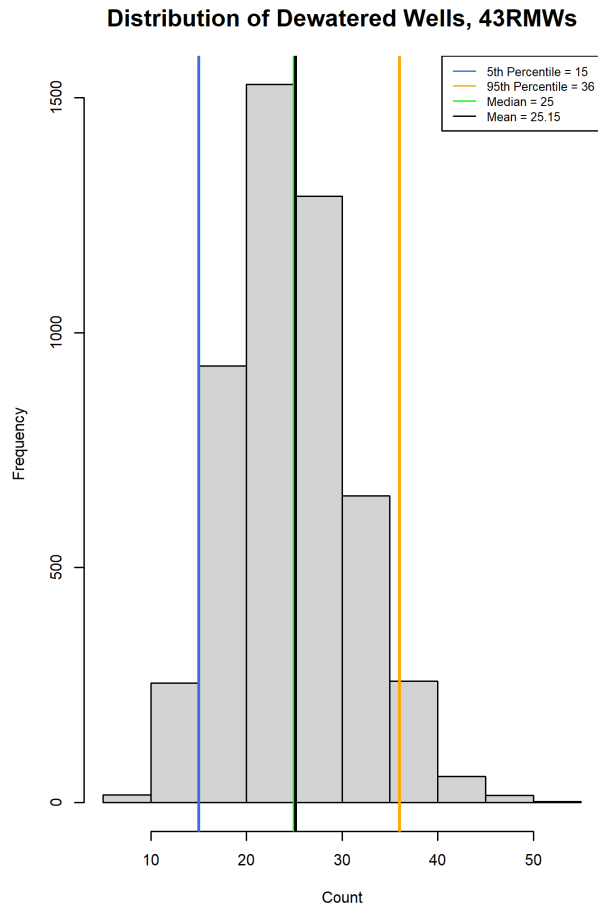


Figure 7. Scenario #4 – Weighted Stochastic Prediction for Agricultural Wells

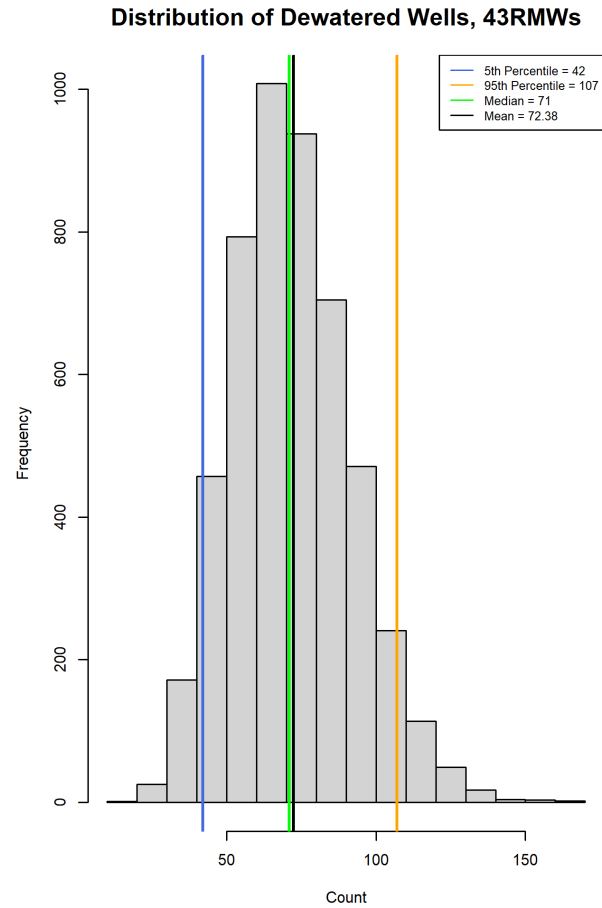


Figure 8. Scenario #4 – Weighted Stochastic Prediction for Domestic Wells

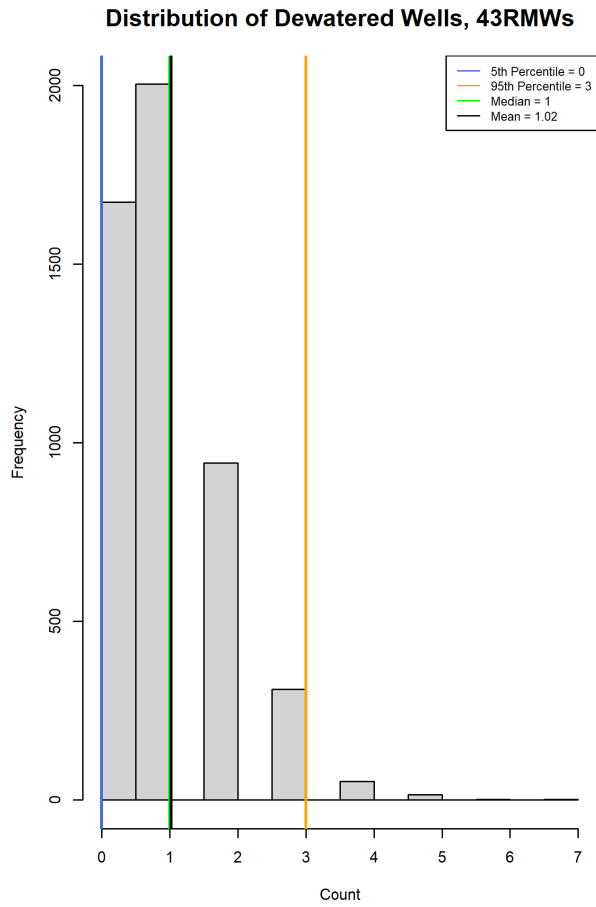


Figure 9. Scenario #4 – Weighted Stochastic Prediction for Industrial Wells

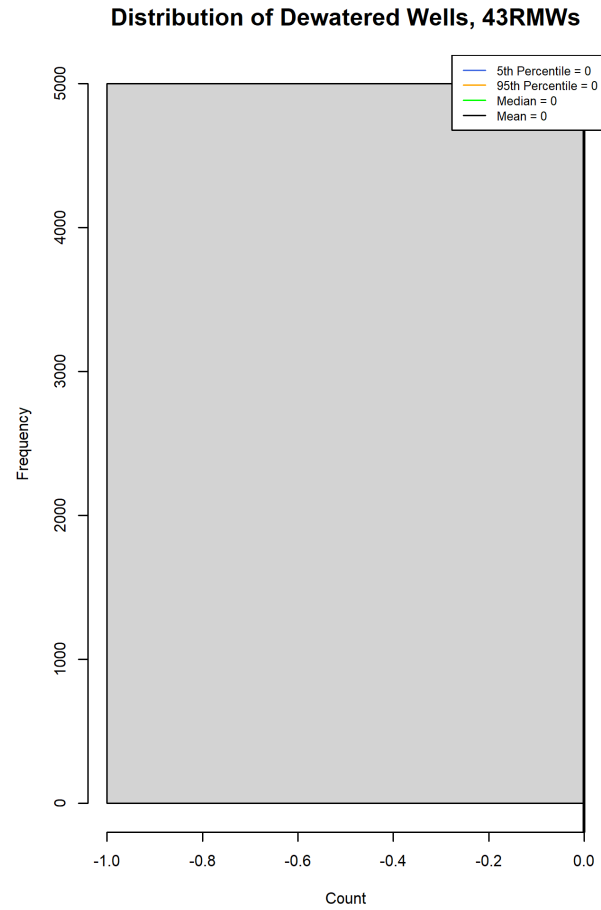


Figure 10. Scenario #4 – Weighted Stochastic Prediction for Small Community Wells

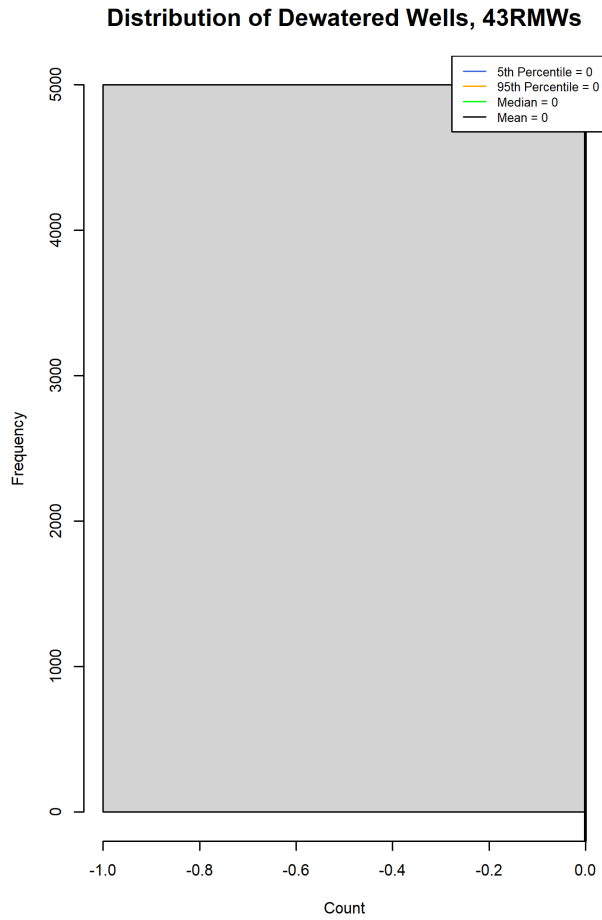


Figure 11. Scenario #4 – Weighted Stochastic Prediction for Recovery Wells

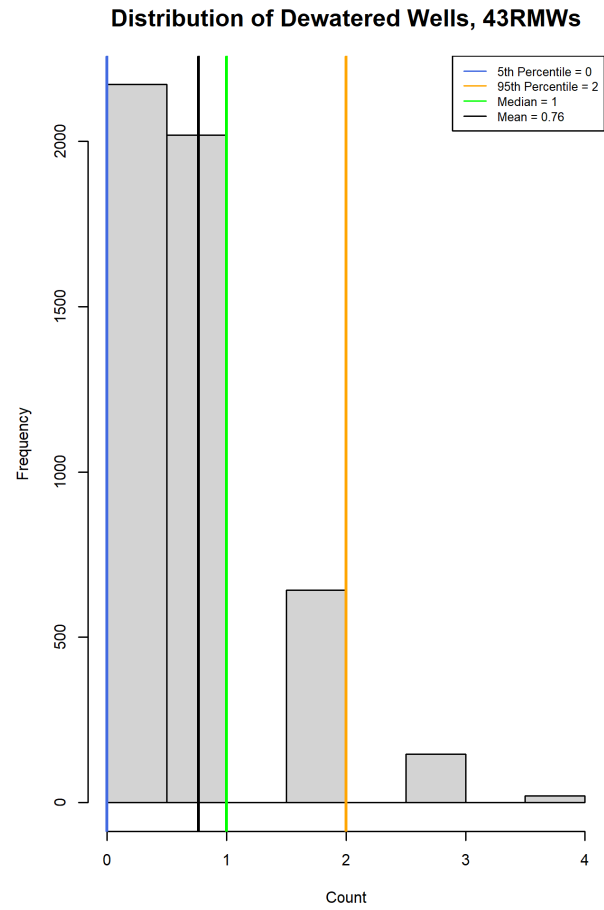


Figure 12. Scenario #4 – Weighted Stochastic Prediction for Municipal/Public Wells

1.5 Scenario #5 – Modeled Projected Future Conditions

The process for Scenario #5 of the well impact analysis is described in Section 13.1.2.4 of the GSP. It is important to note that while the results discussed in the GSP only include drinking water wells, the full analysis for Scenario #5 includes all of the well types listed above. The results for each well type are shown below in Figures 13-24 and Tables 9-14. The combined results for drinking water wells under modeled projected 2030 climate conditions and future conditions with P/MAs are represented in Figure 13-8 and Figure 13-9 of Section 13.1.2.4 of the GSP, respectively.

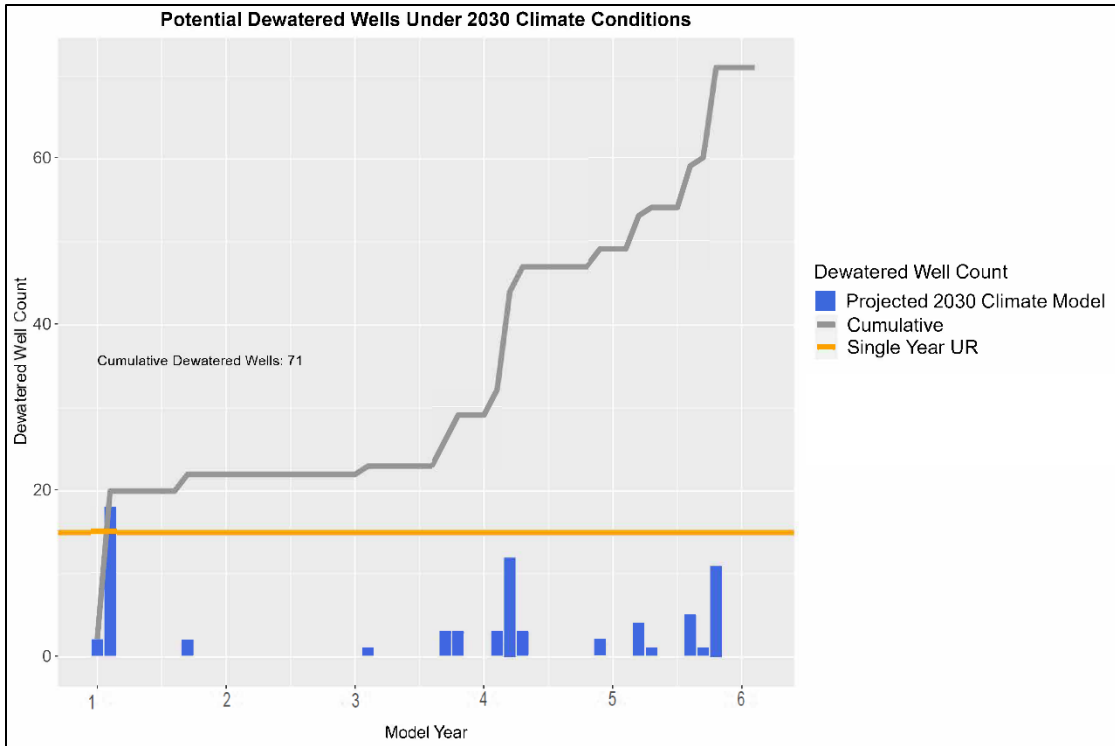


Figure 13. Scenario #5 - Potential Dewatered Domestic Wells Under Modeled Projected Future 2030 Climate Conditions

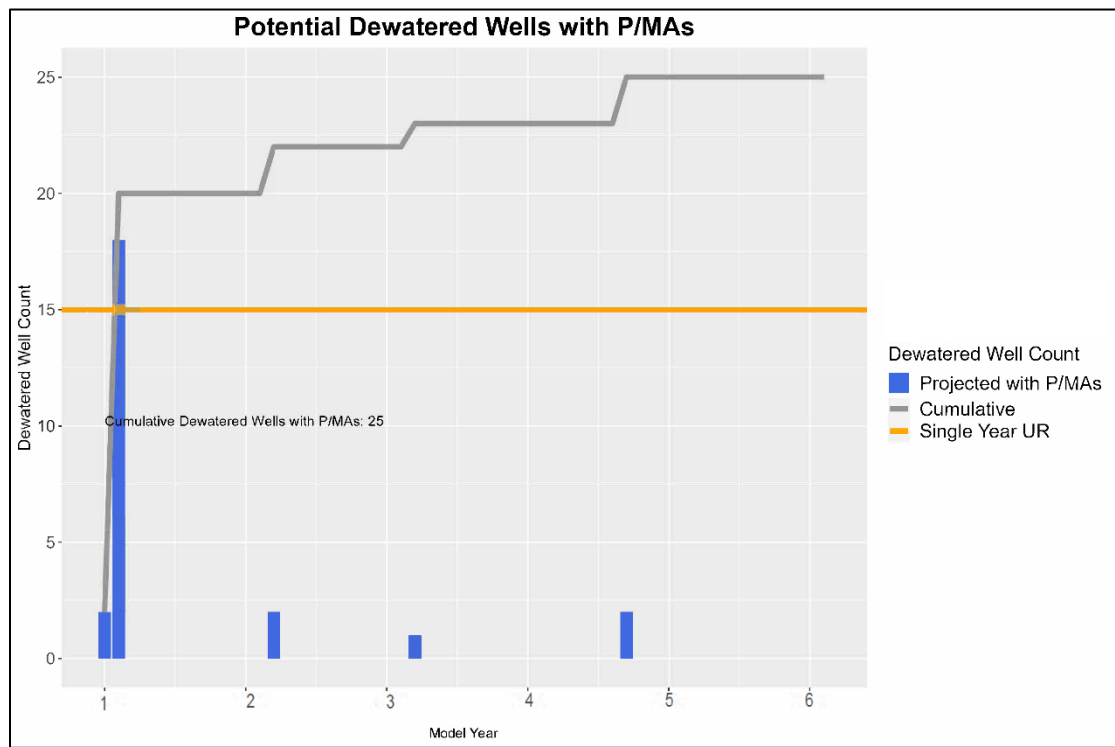


Figure 14. Scenario #5 - Potential Dewatered Domestic Wells Under Modeled Projected Future Conditions with P/MAs

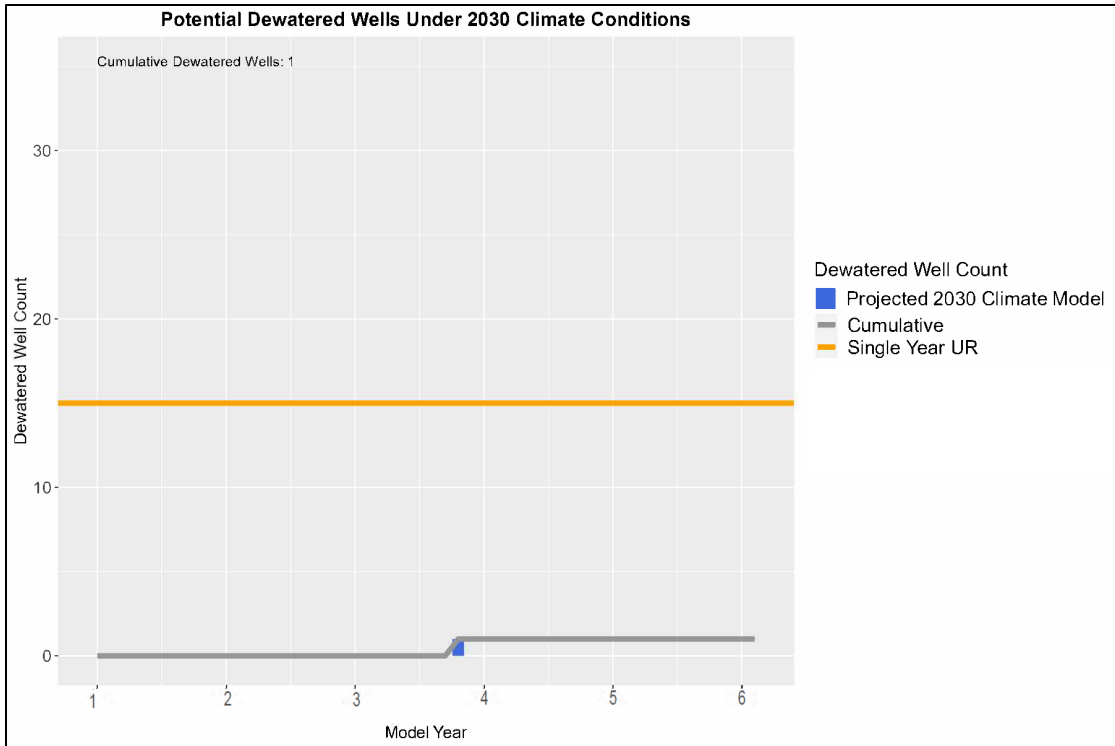


Figure 15. Scenario #5 - Potential Dewatered Industrial Wells Under Modeled Projected Future 2030 Climate Conditions

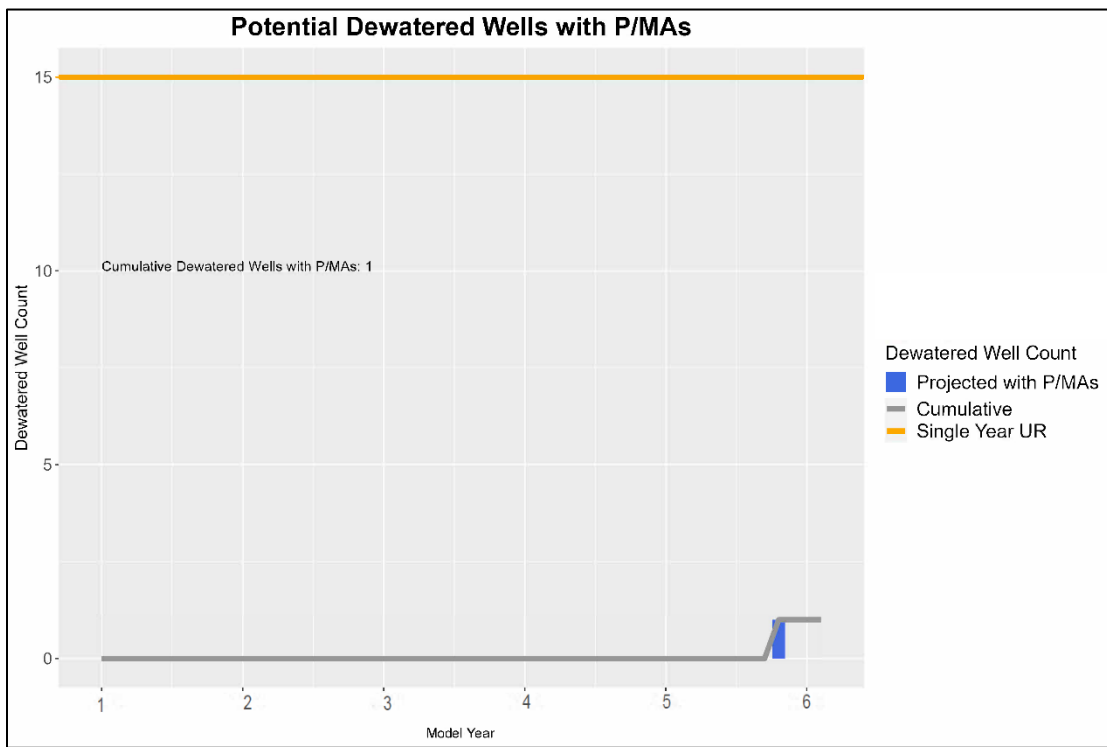


Figure 16. Scenario #5 - Potential Dewatered Industrial Wells Under Modeled Projected Future Conditions with P/MAs

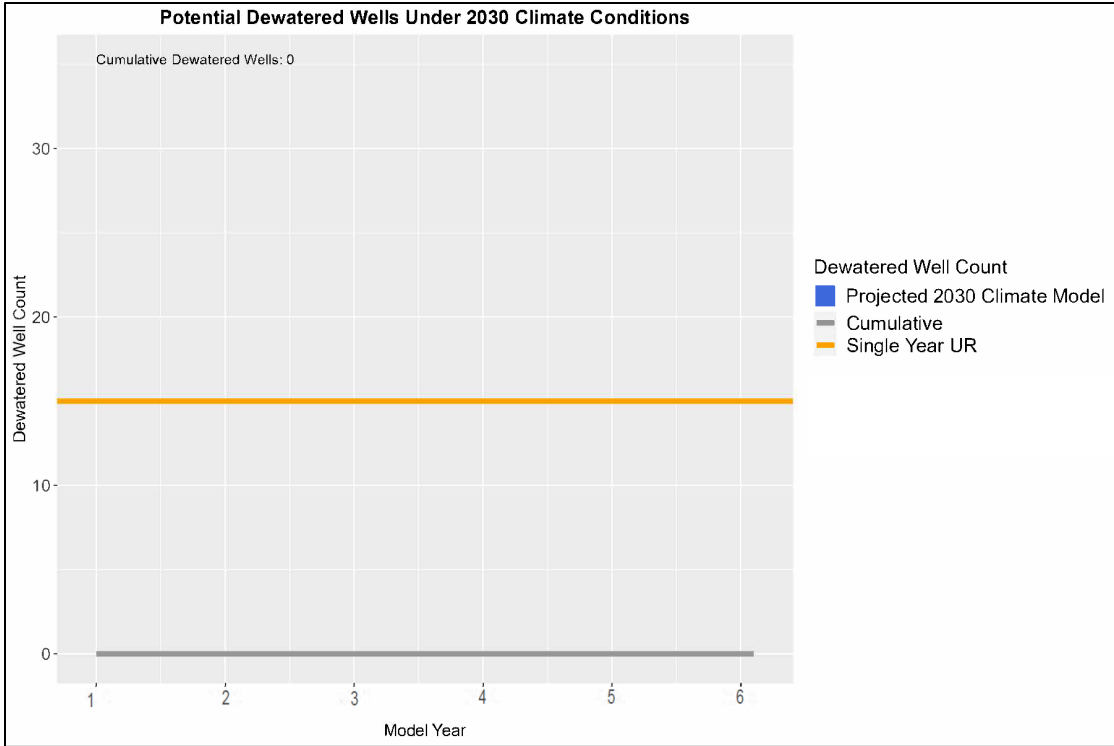


Figure 17. Scenario #5 - Potential Dewatered Municipal/Public Wells Under Modeled Projected Future 2030 Climate Conditions

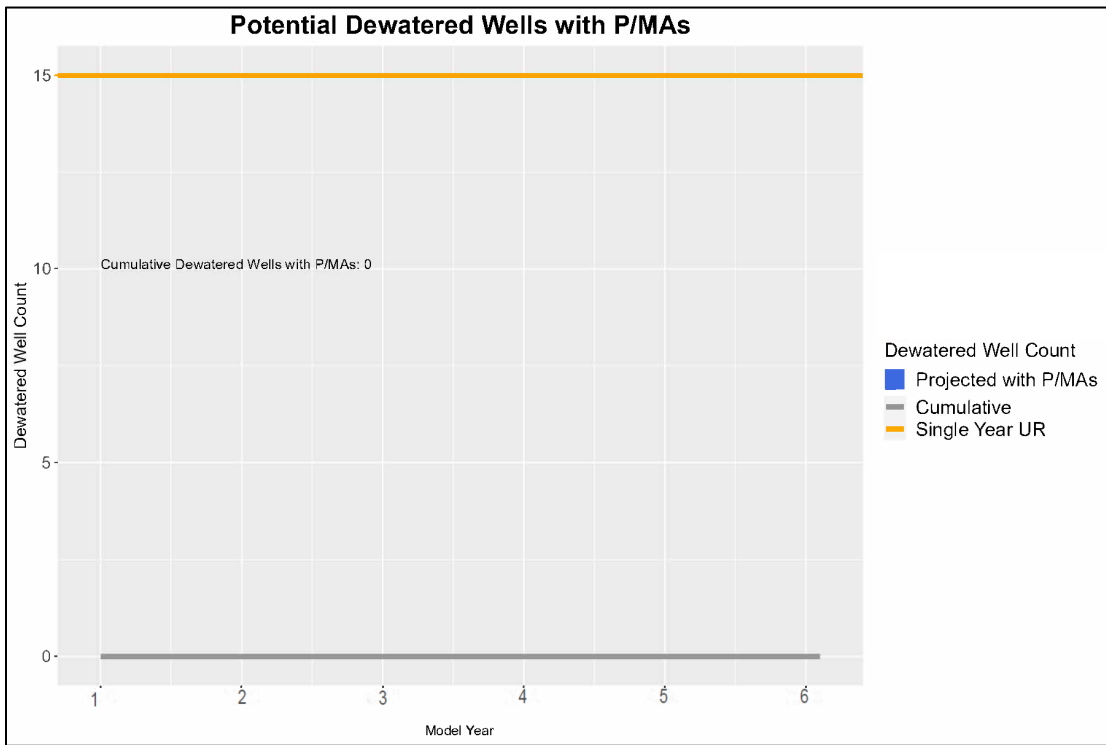


Figure 18. Scenario #5 - Potential Dewatered Municipal/Public Wells Under Modeled Projected Future Conditions with P/MAs

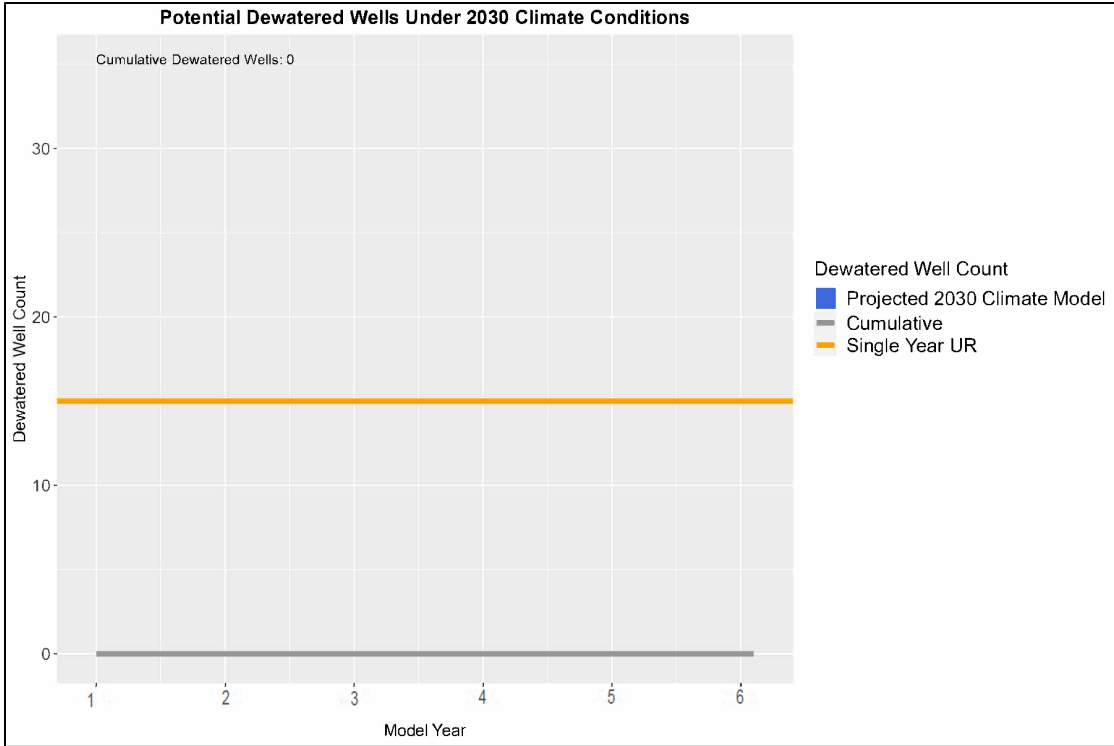


Figure 19. Scenario #5 - Potential Dewatered Small Community Wells Under Modeled Projected Future 2030 Climate Conditions

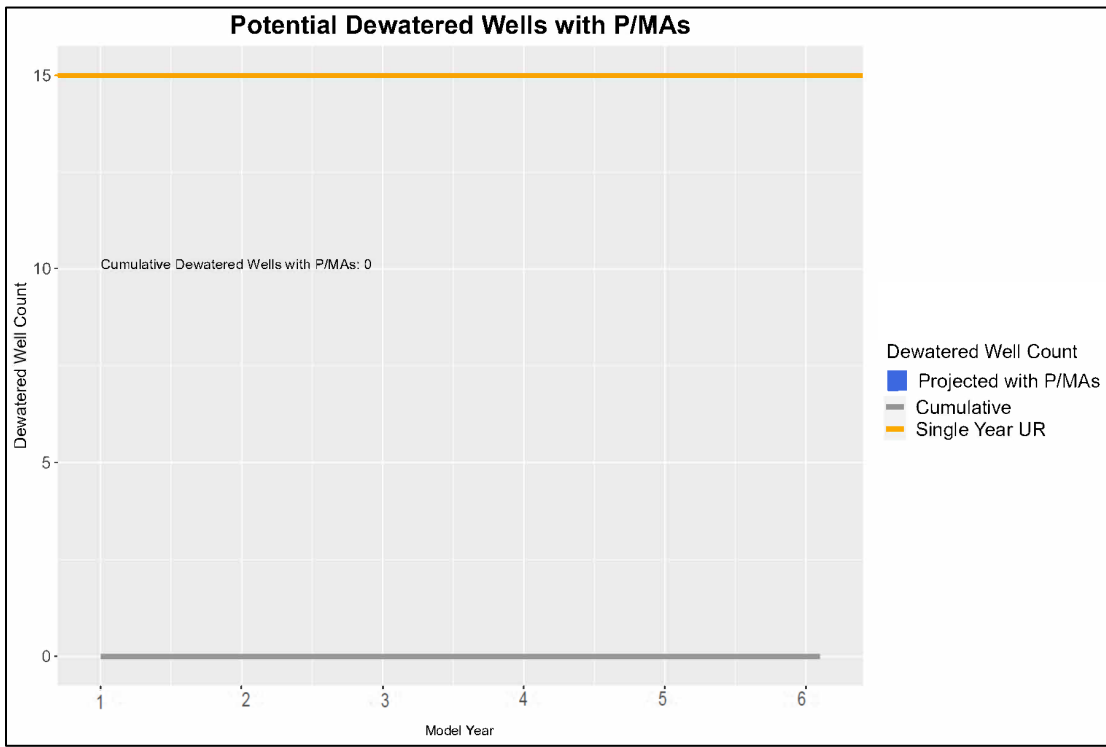


Figure 20. Scenario #5 - Potential Dewatered Small Community Wells Under Modeled Projected Future Conditions with P/MAs

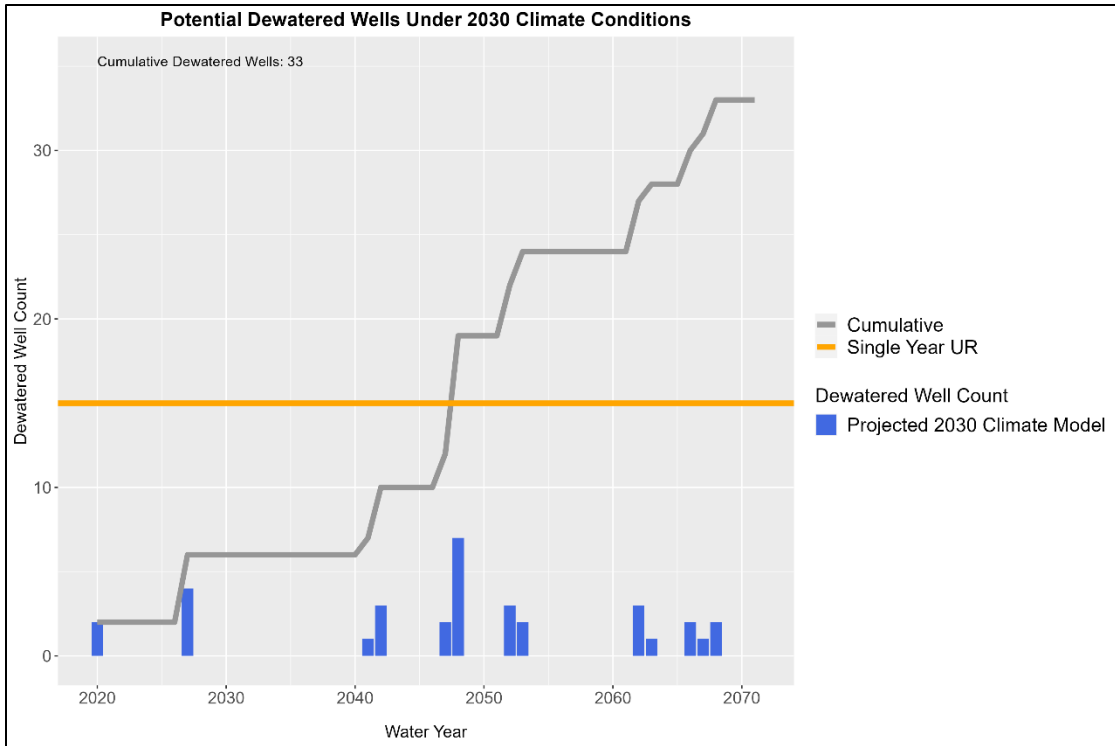


Figure 21. Scenario #5 - Potential Dewatered Agricultural Wells Under Modeled Projected Future 2030 Climate Conditions

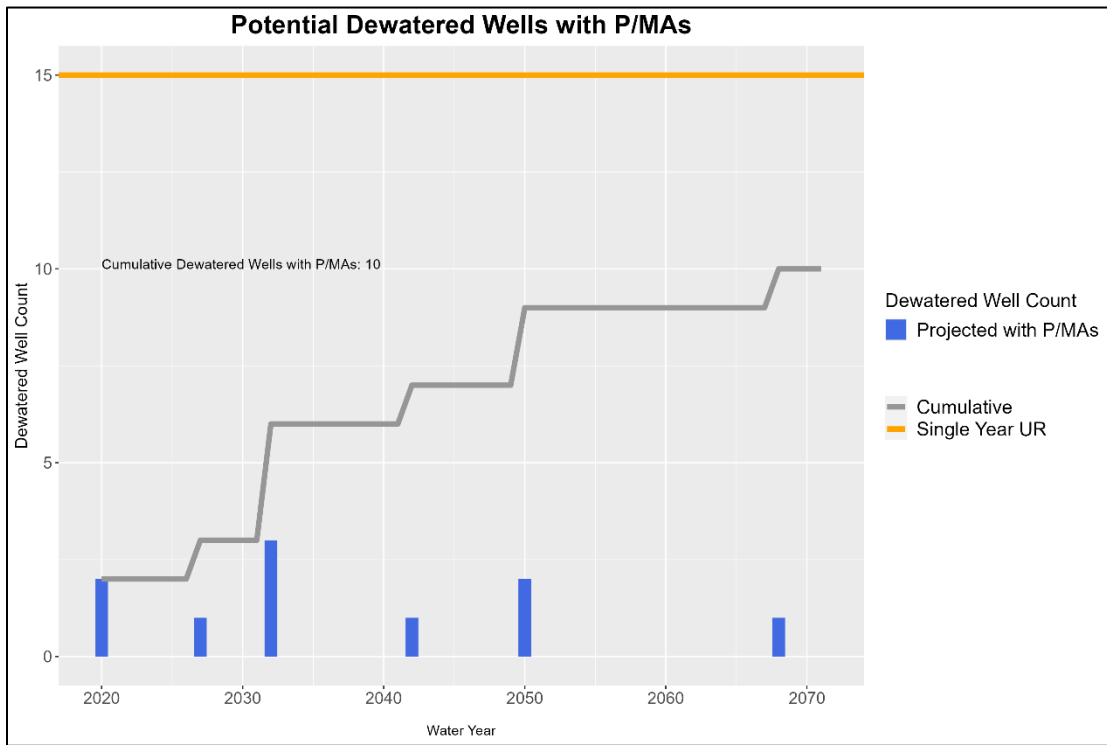


Figure 22. Scenario #5 - Potential Dewatered Agricultural Wells Under Modeled Projected Future Conditions with P/Mas

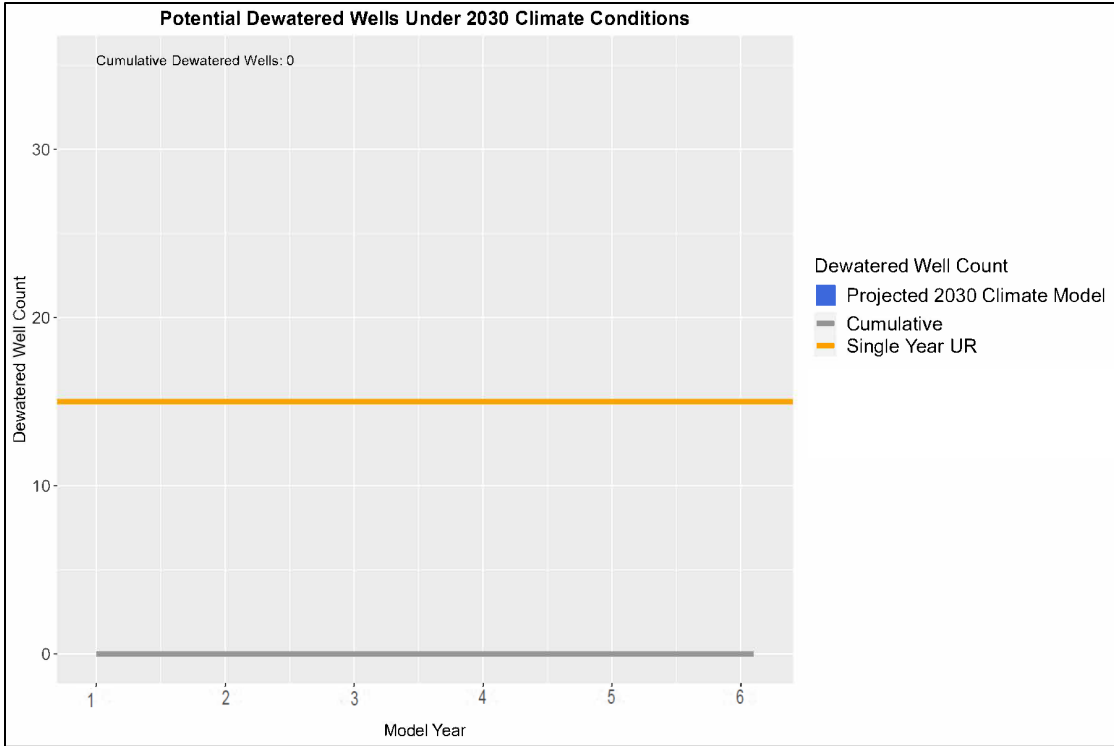


Figure 23. Scenario #5 - Potential Dewatered Recovery Wells Under Modeled Projected Future 2030 Climate Conditions

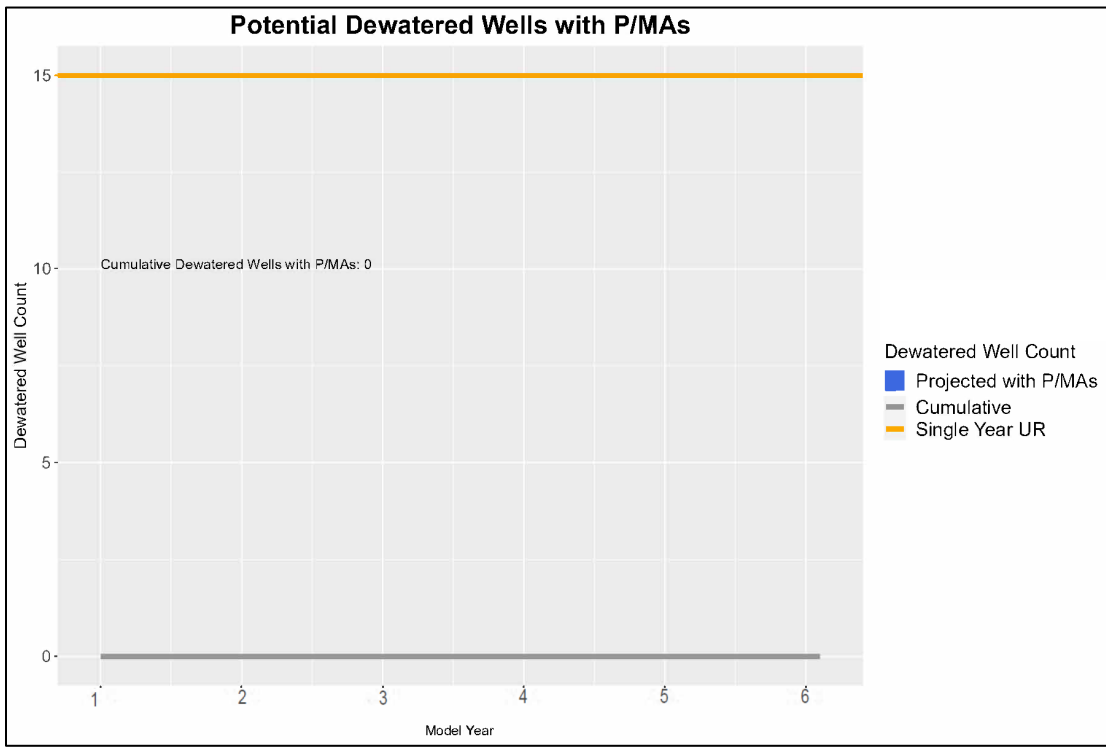


Figure 24. Scenario #5 - Potential Dewatered Recovery Wells Under Modeled Projected Future Conditions with P/MAs

Table 9. Scenario #5 - Baseline and P/MA Dewatered Domestic Well Counts
Kern County Subbasin, Kern County

Year	Baseline		P/MA	
	Total	Cumulative Total	Total	Cumulative Total
2020	2	2	2	2
2021	18	20	18	20
2022	0	20	0	20
2023	0	20	0	20
2024	0	20	0	20
2025	0	20	0	20
2026	0	20	0	20
2027	2	22	0	20
2028	0	22	0	20
2029	0	22	0	20
2030	0	22	0	20
2031	0	22	0	20
2032	0	22	2	22
2033	0	22	0	22
2034	0	22	0	22
2035	0	22	0	22
2036	0	22	0	22
2037	0	22	0	22
2038	0	22	0	22
2039	0	22	0	22
2040	0	22	0	22
2041	1	23	0	22
2042	0	23	1	23
2043	0	23	0	23
2044	0	23	0	23
2045	0	23	0	23
2046	0	23	0	23
2047	3	26	0	23
2048	3	29	0	23
2049	0	29	0	23
2050	0	29	0	23
2051	3	32	0	23
2052	12	44	0	23
2053	3	47	0	23
2054	0	47	0	23
2055	0	47	0	23
2056	0	47	0	23
2057	0	47	2	25
2058	0	47	0	25
2059	2	49	0	25
2060	0	49	0	25
2061	0	49	0	25
2062	4	53	0	25
2063	1	54	0	25
2064	0	54	0	25
2065	0	54	0	25
2066	5	59	0	25
2067	1	60	0	25
2068	11	71	0	25
2069	0	71	0	25
2070	0	71	0	25
2071	0	71	0	25
	Total Domestic Dewatered Under Baseline	71	Total Domestic Dewatered with P/MAs	25

Abbreviations:

P/MA = Project and Management Action

Sources:

1. GSAs' Well Inventory

Table 10. Scenario #5 - Baseline and P/MA Dewatered Small Community Well Counts
Kern County Subbasin, Kern County

Year	Baseline		P/MA	
	Total	Cumulative Total	Total	Cumulative Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0
2023	0	0	0	0
2024	0	0	0	0
2025	0	0	0	0
2026	0	0	0	0
2027	0	0	0	0
2028	0	0	0	0
2029	0	0	0	0
2030	0	0	0	0
2031	0	0	0	0
2032	0	0	0	0
2033	0	0	0	0
2034	0	0	0	0
2035	0	0	0	0
2036	0	0	0	0
2037	0	0	0	0
2038	0	0	0	0
2039	0	0	0	0
2040	0	0	0	0
2041	0	0	0	0
2042	0	0	0	0
2043	0	0	0	0
2044	0	0	0	0
2045	0	0	0	0
2046	0	0	0	0
2047	0	0	0	0
2048	0	0	0	0
2049	0	0	0	0
2050	0	0	0	0
2051	0	0	0	0
2052	0	0	0	0
2053	0	0	0	0
2054	0	0	0	0
2055	0	0	0	0
2056	0	0	0	0
2057	0	0	0	0
2058	0	0	0	0
2059	0	0	0	0
2060	0	0	0	0
2061	0	0	0	0
2062	0	0	0	0
2063	0	0	0	0
2064	0	0	0	0
2065	0	0	0	0
2066	0	0	0	0
2067	0	0	0	0
2068	0	0	0	0
2069	0	0	0	0
2070	0	0	0	0
2071	0	0	0	0
	Total Small Community Dewatered Under Baseline	0	Total Small Community Dewatered with P/MAs	0

Abbreviations:

P/MA = Project and Management Action

Sources:

1. GSAs' Well Inventory

Table 11. Scenario #5 - Baseline and P/MA Dewatered Municipal/Public Well Counts
 Kern County Subbasin, Kern County

Year	Baseline		P/MA	
	Total	Cumulative Total	Total	Cumulative Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0
2023	0	0	0	0
2024	0	0	0	0
2025	0	0	0	0
2026	0	0	0	0
2027	0	0	0	0
2028	0	0	0	0
2029	0	0	0	0
2030	0	0	0	0
2031	0	0	0	0
2032	0	0	0	0
2033	0	0	0	0
2034	0	0	0	0
2035	0	0	0	0
2036	0	0	0	0
2037	0	0	0	0
2038	0	0	0	0
2039	0	0	0	0
2040	0	0	0	0
2041	0	0	0	0
2042	0	0	0	0
2043	0	0	0	0
2044	0	0	0	0
2045	0	0	0	0
2046	0	0	0	0
2047	0	0	0	0
2048	0	0	0	0
2049	0	0	0	0
2050	0	0	0	0
2051	0	0	0	0
2052	0	0	0	0
2053	0	0	0	0
2054	0	0	0	0
2055	0	0	0	0
2056	0	0	0	0
2057	0	0	0	0
2058	0	0	0	0
2059	0	0	0	0
2060	0	0	0	0
2061	0	0	0	0
2062	0	0	0	0
2063	0	0	0	0
2064	0	0	0	0
2065	0	0	0	0
2066	0	0	0	0
2067	0	0	0	0
2068	0	0	0	0
2069	0	0	0	0
2070	0	0	0	0
2071	0	0	0	0
	Total Municipal/Public Dewatered Under Baseline	0	Total Municipal/Public Dewatered with P/MAs	0

Abbreviations:

P/MA = Project and Management Action

Sources:

1. GSAs' Well Inventory

Table 12. Scenario #5 - Baseline and P/MA Dewatered Agricultural Well Counts
Kern County Subbasin, Kern County

Year	Baseline		P/MA	
	Total	Cumulative Total	Total	Cumulative Total
2020	2	2	2	2
2021	0	2	0	2
2022	0	2	0	2
2023	0	2	0	2
2024	0	2	0	2
2025	0	2	0	2
2026	0	2	0	2
2027	4	6	1	3
2028	0	6	0	3
2029	0	6	0	3
2030	0	6	0	3
2031	0	6	0	3
2032	0	6	3	6
2033	0	6	0	6
2034	0	6	0	6
2035	0	6	0	6
2036	0	6	0	6
2037	0	6	0	6
2038	0	6	0	6
2039	0	6	0	6
2040	0	6	0	6
2041	1	8	0	6
2042	3	10	1	7
2043	0	10	0	7
2044	0	10	0	7
2045	0	10	0	7
2046	0	10	0	7
2047	2	12	0	7
2048	7	19	0	7
2049	0	19	0	7
2050	0	19	2	9
2051	0	19	0	9
2052	3	22	0	9
2053	2	24	0	9
2054	0	24	0	9
2055	0	24	0	9
2056	0	24	0	9
2057	0	24	0	9
2058	0	24	0	9
2059	0	24	0	9
2060	0	24	0	9
2061	0	24	0	9
2062	3	27	0	9
2063	1	28	0	9
2064	0	28	0	9
2065	0	28	0	9
2066	2	30	0	9
2067	1	31	0	9
2068	2	33	1	10
2069	0	33	0	10
2070	0	33	0	10
2071	0	33	0	10
	Total Agricultural Dewatered Under Baseline	33	Total Agricultural Dewatered with P/MAs	10

Abbreviations:

P/MA = Project and Management Action

Sources:

1. GSAs' Well Inventory

Table 13. Scenario #5 - Baseline and P/MA Dewatered Industrial Well Counts
Kern County Subbasin, Kern County

Year	Baseline		P/MA	
	Total	Cumulative Total	Total	Cumulative Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0
2023	0	0	0	0
2024	0	0	0	0
2025	0	0	0	0
2026	0	0	0	0
2027	0	0	0	0
2028	0	0	0	0
2029	0	0	0	0
2030	0	0	0	0
2031	0	0	0	0
2032	0	0	0	0
2033	0	0	0	0
2034	0	0	0	0
2035	0	0	0	0
2036	0	0	0	0
2037	0	0	0	0
2038	0	0	0	0
2039	0	0	0	0
2040	0	0	0	0
2041	0	0	0	0
2042	0	0	0	0
2043	0	0	0	0
2044	0	0	0	0
2045	0	0	0	0
2046	0	0	0	0
2047	0	0	0	0
2048	1	1	0	0
2049	0	1	0	0
2050	0	1	0	0
2051	0	1	0	0
2052	0	1	0	0
2053	0	1	0	0
2054	0	1	0	0
2055	0	1	0	0
2056	0	1	0	0
2057	0	1	0	0
2058	0	1	0	0
2059	0	1	0	0
2060	0	1	0	0
2061	0	1	0	0
2062	0	1	0	0
2063	0	1	0	0
2064	0	1	0	0
2065	0	1	0	0
2066	0	1	0	0
2067	0	1	0	0
2068	0	1	1	1
2069	0	1	0	1
2070	0	1	0	1
2071	0	1	0	1
	Total Industrial Dewatered Under Baseline	1	Total Industrial Dewatered with P/MAs	1

Abbreviations:

P/MA = Project and Management Action

Sources:

1. GSAs' Well Inventory

Table 14. Scenario #5 - Baseline and P/MA Dewatered Recovery Well Counts
 Kern County Subbasin, Kern County

Year	Baseline		P/MA	
	Total	Cumulative Total	Total	Cumulative Total
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0
2023	0	0	0	0
2024	0	0	0	0
2025	0	0	0	0
2026	0	0	0	0
2027	0	0	0	0
2028	0	0	0	0
2029	0	0	0	0
2030	0	0	0	0
2031	0	0	0	0
2032	0	0	0	0
2033	0	0	0	0
2034	0	0	0	0
2035	0	0	0	0
2036	0	0	0	0
2037	0	0	0	0
2038	0	0	0	0
2039	0	0	0	0
2040	0	0	0	0
2041	0	0	0	0
2042	0	0	0	0
2043	0	0	0	0
2044	0	0	0	0
2045	0	0	0	0
2046	0	0	0	0
2047	0	0	0	0
2048	0	0	0	0
2049	0	0	0	0
2050	0	0	0	0
2051	0	0	0	0
2052	0	0	0	0
2053	0	0	0	0
2054	0	0	0	0
2055	0	0	0	0
2056	0	0	0	0
2057	0	0	0	0
2058	0	0	0	0
2059	0	0	0	0
2060	0	0	0	0
2061	0	0	0	0
2062	0	0	0	0
2063	0	0	0	0
2064	0	0	0	0
2065	0	0	0	0
2066	0	0	0	0
2067	0	0	0	0
2068	0	0	0	0
2069	0	0	0	0
2070	0	0	0	0
2071	0	0	0	0
	Total Recovery Dewatered Under Baseline	0	Total Recovery Dewatered with P/MAs	0

Abbreviations:

P/MA = Project and Management Action

Sources:

1. GSAs' Well Inventory