ILLINOIS STATE
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April 9, 2013

Mr. Jeff Smith, Chairman
Imperial Valley Water Authority
25865 E. County Road 1000 N
Easton, IL 62633

Dear Chairman Smith:

The Illinois State Water Survey (ISWS), under contract to the Imperial Valley Water Authority (IVWA), has operated a network of rain gauges in Mason and Tazewell Counties since August 1992 and a network of groundwater observation wells since 1994. The purpose of the rain gauge and groundwater observation well networks is to collect long-term data to determine the impact of groundwater withdrawals during dry periods and during the growing season, and the rate at which the aquifer recharges. This letter serves as the year-end report for Year 20, which covers the time period from September 1, 2011 through August 31, 2012.

The groundwater observation well network consists of 13 wells, MTOW-01 through MTOW-13. The observation wells are drilled wells between 2 and 6 inches in diameter. With the exception of MTOW-05 and MTOW-09, these wells are equipped with pressure transducers that electronically log the groundwater level data.

In Year 15, a new well was drilled to replace MTOW-1. This new well, named Snicarte #2, or MTOW-1A, has taken the place of the original well (MTOW-01 or Snicarte #1) within the monitoring well network.

In accordance with our agreement, each well, with the exception of MTOW-05 and MTOW-09, is visited by ISWS personnel during the first few days of the month during irrigation season and approximately bi-monthly during the non-irrigated portion of the year.

A 25-site rain gauge network (Figure 1) was established in late August 1992 with approximately 5 miles between gauges. The network was reduced to 20 sites in September 1996. The rain gauge network is maintained by a Mason County resident, Bob Ranson, hired to visit each site monthly. During these visits the charts are changed, data downloaded, and other routine services performed. Champaign-based ISWS personnel visit the rain gauge network to perform major maintenance and repairs as needed.

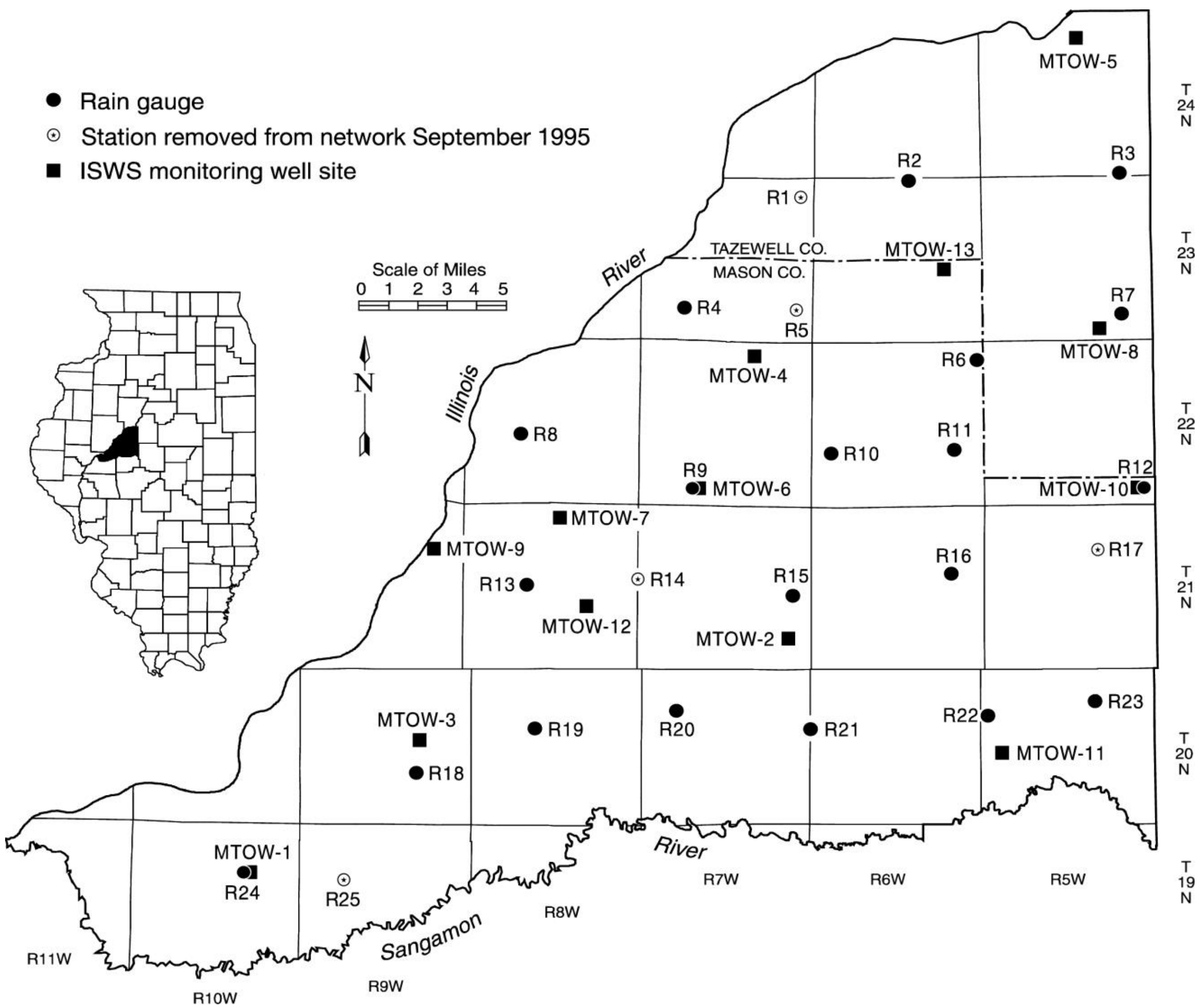

Figure 1. Configuration of the 13-site observation well and 25-site rain gauge networks

Data reduction activities during Year 20 of network operation are similar to those performed during the previous 19 years. Each month, hourly rainfall amounts are totaled from 15-minute digital data and are placed into an array of values for the 20 gauges. This data array is used to check for spatial and temporal consistency between gauges, and to divide the data into storm periods. If the digital data are missing, hourly rainfall amounts from the analog (paper) charts are used. In the rare event that data from both a data logger and the corresponding chart are missing, the hourly amounts are estimated based on an interpolation of values from the nearest surrounding gauges.

Groundwater levels for each well for the period of record (September 1, 2011-August 31, 2012) are in Appendix A. The entire period of record is shown for MTOW-05 and -09 because these wells do not have digital recorders and have been measured only periodically since 2005. These two wells have been shown to mimic stream gages in the Illinois River. Stage data from the Illinois River can be used, if necessary, to recreate groundwater levels in those regions of the study area. Each hydrograph also contains the daily precipitation for the nearest rain gauge.

Since 1995, the IVWA has estimated irrigation pumpage from wells in the Imperial Valley based on electric power consumption. Menard Electric Cooperative provides the IVWA with electric power consumption data for the irrigation services they provide during the growing season (June-September). The pumpage estimate assumes that application rates for the irrigation wells with electric pumps in the Menard Electric Cooperative also are representative of other utilities and other energy sources. Past estimates were based on the assumption that 33 percent of the irrigation wells were in the Menard Electric Cooperative in 1995-1997 and 40 percent in 1998-2001.

In 2002, the U.S. Geological Survey (USGS) updated the formula used to calculate pumpage by closely measuring the pumping rate at 77 irrigation systems serviced by Menard Electric. The updated formula provides estimates that are appreciably lower than the previous formula by approximately 20 percent. Therefore, irrigation withdrawals for the years 1997 to the present were recalculated using the new formula, replacing earlier published estimates (reports through Year 12 use the original formula).

The Year 20 dataset was used to produce summaries for all storm data for each station and the network; monthly, seasonal, and annual rainfall totals; analysis of the rainfall and groundwater level fluctuations; the data obtained from the long-term monitoring well network; the database showing the individual storms in the Imperial Valley region; and an updated version of the irrigation pumpage data.

Precipitation Analysis

The Year 20 network precipitation of 21.44 inches was below average, 13.93 inches below the previous 19-year's average of 35.37 inches. It was the driest year in the 20 years of network operation. Fall, winter, spring, and summer in Year 20 were below average in seasonal total precipitation, with the summer the driest and spring the second driest of 20 years. Table 1 gives the monthly precipitation totals for each rain gauge within the network during Year 20.

Figure 2 presents the 20-year network average, and Figure 3 presents the annual precipitation pattern for Year 20. During Year 20, annual gauge totals varied from 17.73 inches at site 20 to 25.91 inches at site 18 (Figure 3**).** Eleven-inch differences between gauges in annual precipitation amounts are not unusual during any given year, representing natural variability. If large differences between individual gauges are repeated year after year, this would suggest measurement error. During this year, a 5.1 inch difference was found between the gauges at sites 18 and 24.

Only November and December of 2011 received above average precipitation during Year 20. All other months of the year received below average precipitation (Figures 4-9). The network received 34.11 inches less precipitation than in the wettest year (1992-1993). Year 20 was the driest of the 20 years of network observations.

Table 1. Monthly Precipitation Amounts (inches), September 2011-August 2012

							Month						
Station	*Sep*	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Total*
2	3.93	0.33	4.65	2.82	0.93	1.35	1.15	2.05	2.01	1.75	0.57	4.18	25.72
3	2.85	0.46	4.44	2.90	0.65	1.02	0.99	2.53	1.44	0.97	0.34	4.62	23.21
4	3.76	0.26	4.46	2.47	0.50	1.01	0.98	3.53	2.18	1.04	0.31	2.74	23.24
6	2.25	0.28	3.82	2.75	0.69	1.14	1.23	1.77	2.77	1.48	0.77	3.35	22.30
7	1.79	0.45	4.40	2.88	0.66	1.30	1.60	2.24	2.68	1.16	0.20	3.90	23.26
8	4.12	0.52	3.89	2.68	0.52	0.98	0.79	2.13	2.21	1.05	0.24	2.63	21.76
9	2.56	0.18	4.45	2.82	0.89	1.03	1.59	2.03	1.97	1.58	0.28	1.62	21.00
10	2.27	0.20	4.06	2.91	0.55	1.17	1.25	1.81	2.12	1.26	0.99	1.85	20.44
11	1.41	0.42	4.20	3.08	0.53	1.28	0.79	1.94	2.71	1.25	0.37	2.04	20.02
12	2.25	0.34	3.41	2.98	0.63	0.99	1.02	2.24	2.93	1.18	0.38	2.92	21.27
13	2.51	0.46	4.13	2.63	0.61	1.12	1.12	1.87	1.47	2.10	0.05	1.65	19.72
15	1.27	0.50	4.09	2.82	0.58	1.14	1.01	1.52	2.88	1.06	0.13	1.81	18.81
16	1.31	0.51	4.04	3.01	0.54	1.13	0.97	1.93	2.52	0.86	0.52	3.02	20.36
18	2.02	0.81	4.52	3.80	0.83	1.30	1.12	2.18	2.50	2.27	1.50	3.06	25.91
19	1.69	0.57	4.27	3.31	0.87	1.25	1.31	2.27	2.36	2.07	0.68	1.92	22.57
20	1.20	0.33	4.14	2.99	0.53	1.02	0.86	1.70	2.18	0.93	0.29	1.56	17.73
21	1.59	0.70	4.53	3.34	0.59	1.23	0.86	1.95	2.15	1.31	0.08	2.42	20.75
22	1.99	0.49	4.26	3.75	0.57	1.11	0.76	2.18	1.91	0.95	0.54	2.60	21.11
23	1.82	0.50	3.09	3.06	0.74	1.11	1.07	2.12	1.92	1.21	0.25	2.06	18.95
24	2.03	1.06	3.96	3.23	0.53	0.83	0.69	1.79	1.15	1.62	0.37	3.49	20.75
Avg	2.23	0.47	4.14	3.01	0.65	1.13	1.06	2.09	2.20	1.36	0.44	2.67	21.44

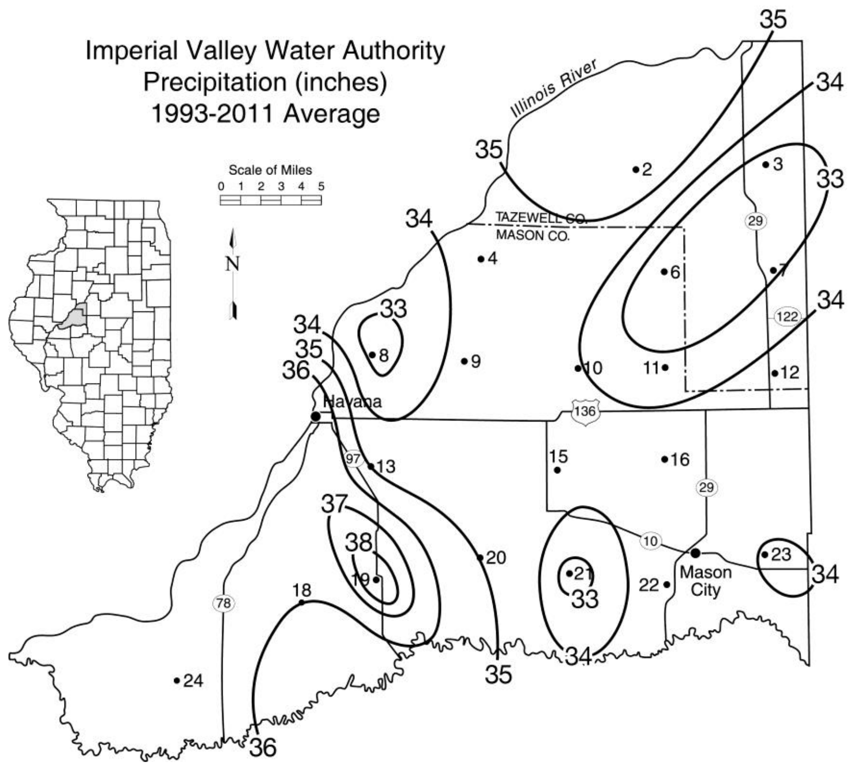

Figure 2. Network average annual precipitation (inches) for September 1993-August 2012

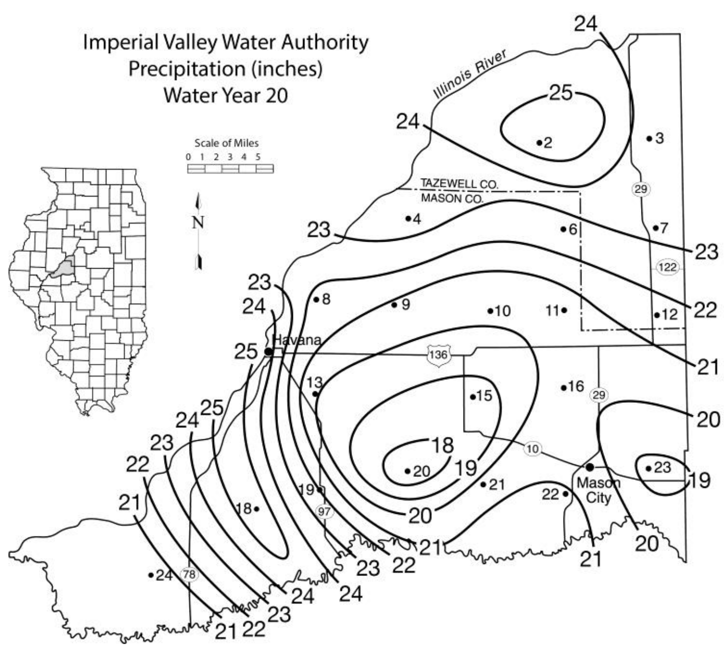

Figure 3. Total precipitation (inches) for September 2011-August 2012

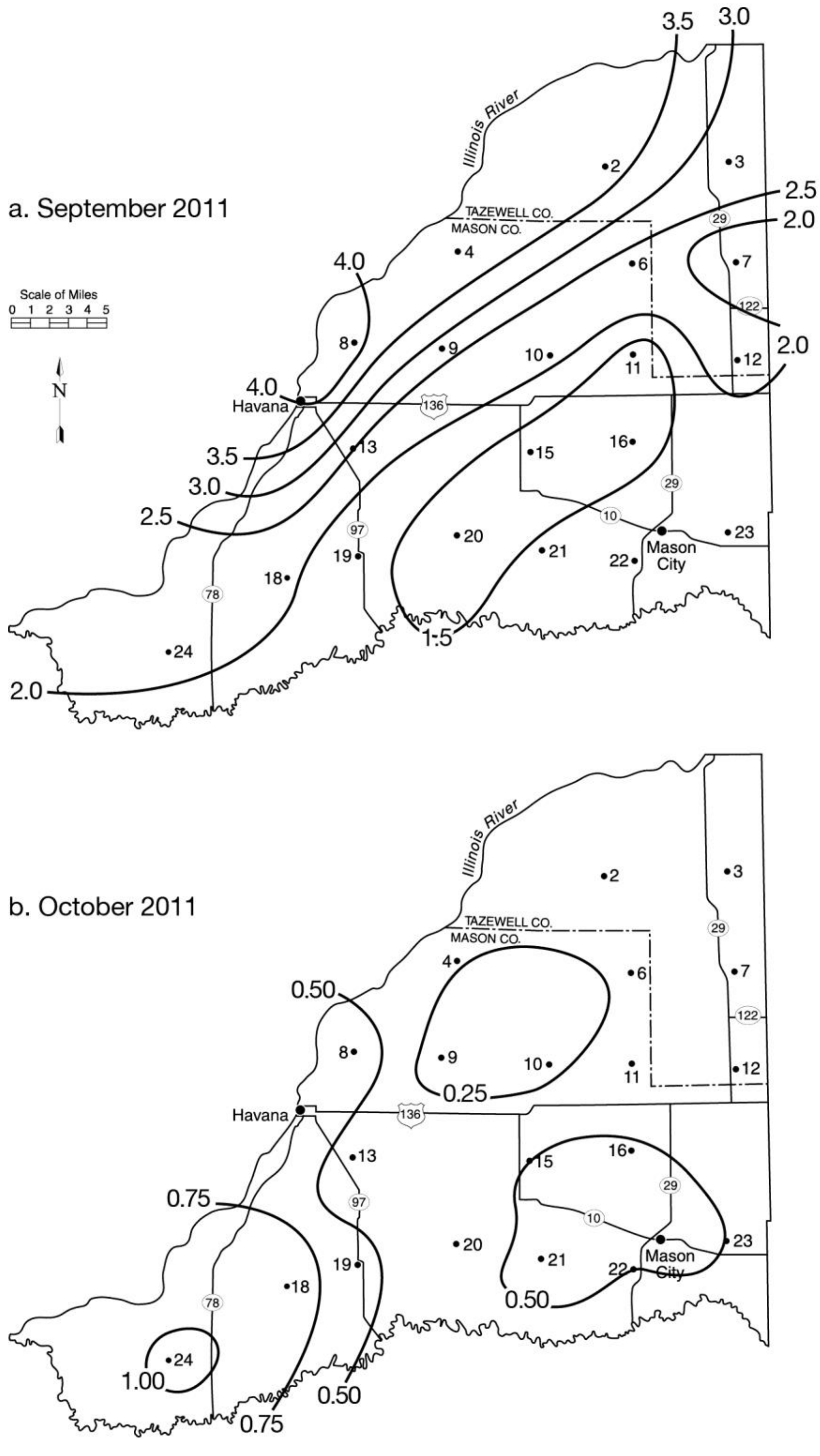

Figure 4. Precipitation (inches) for September 2011 and October 2011

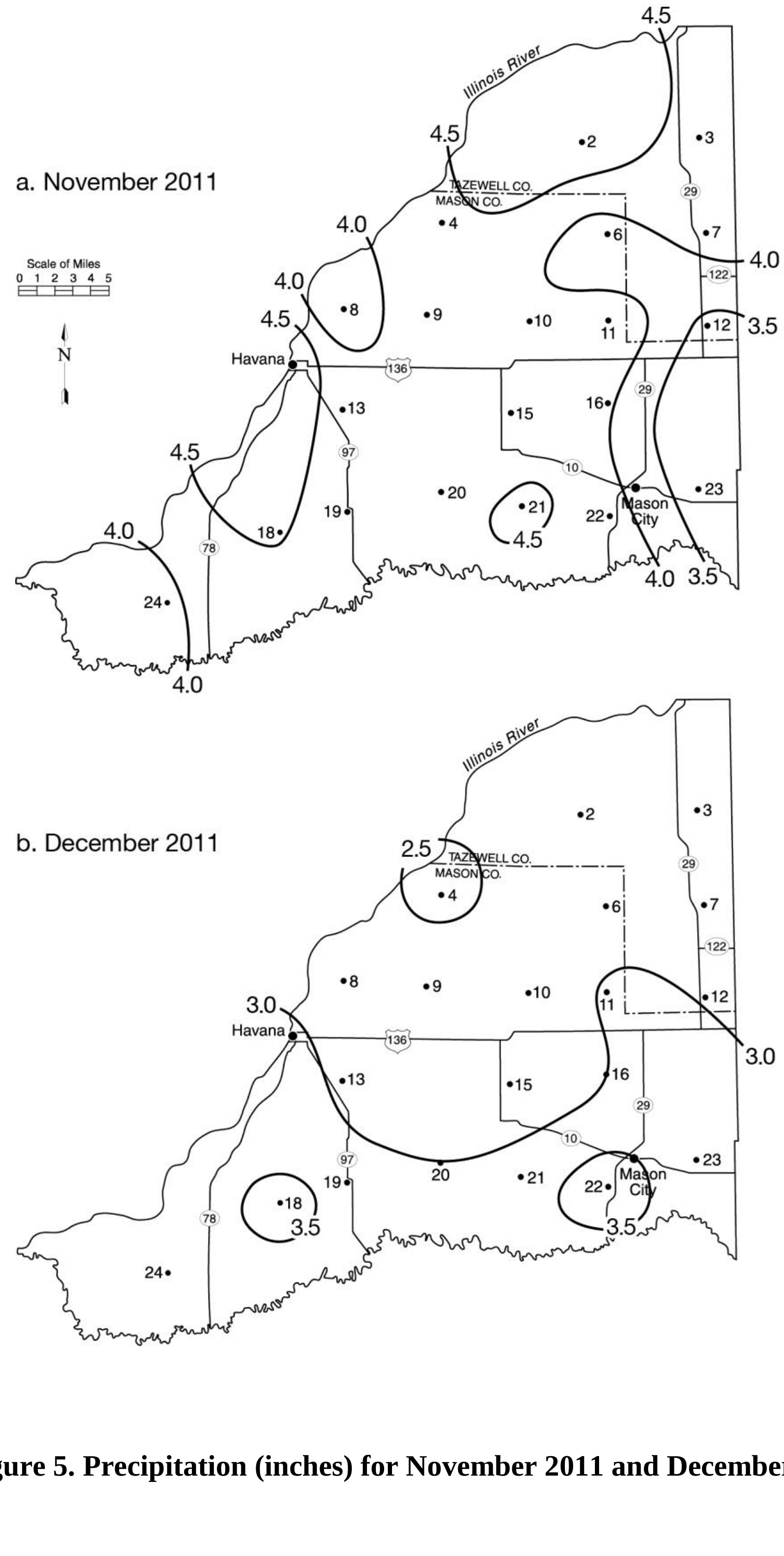

Figure 5. Precipitation (inches) for November 2011 and December 2011

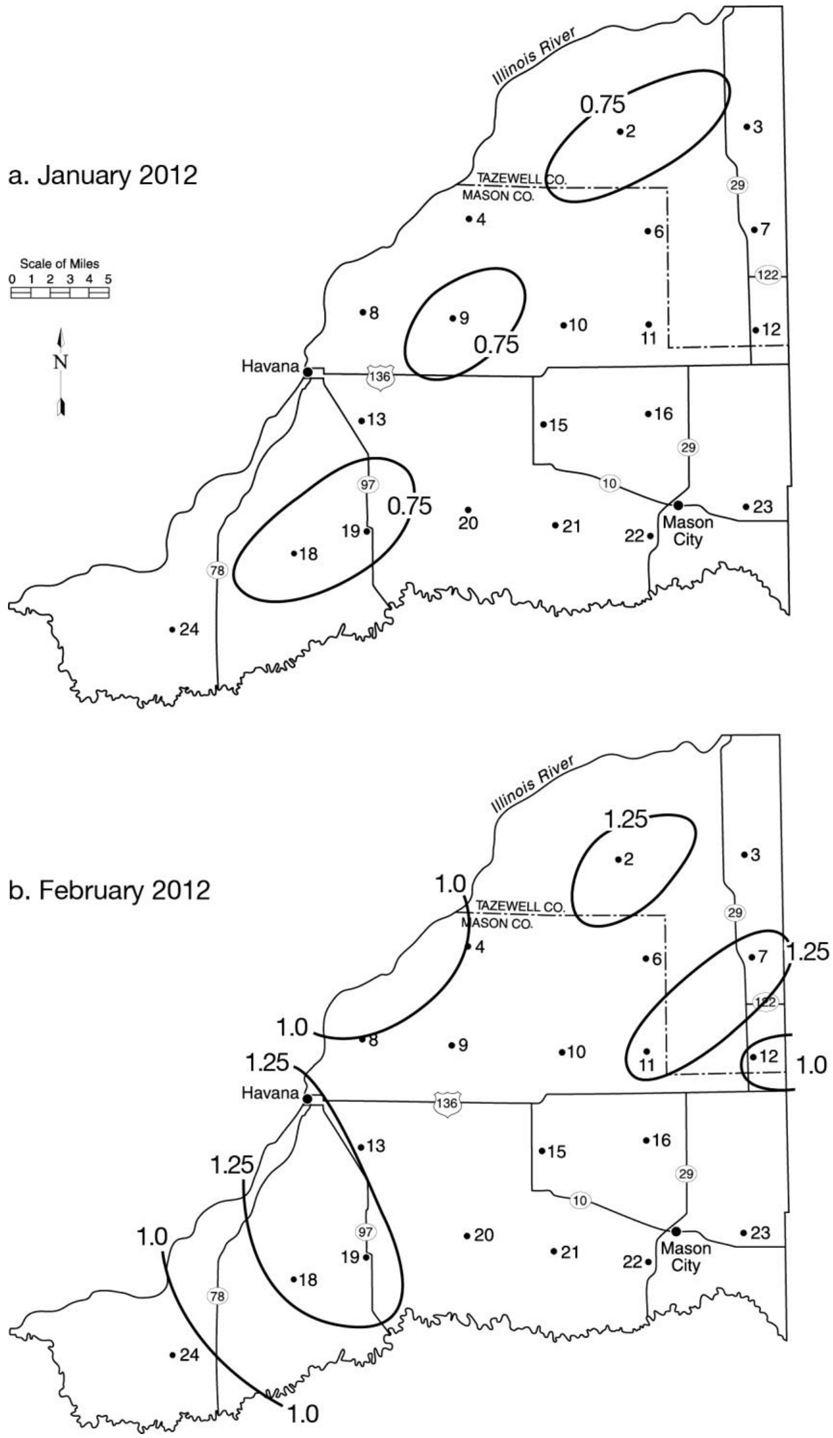

Figure 6. Precipitation (inches) for January 2012 and February 2012

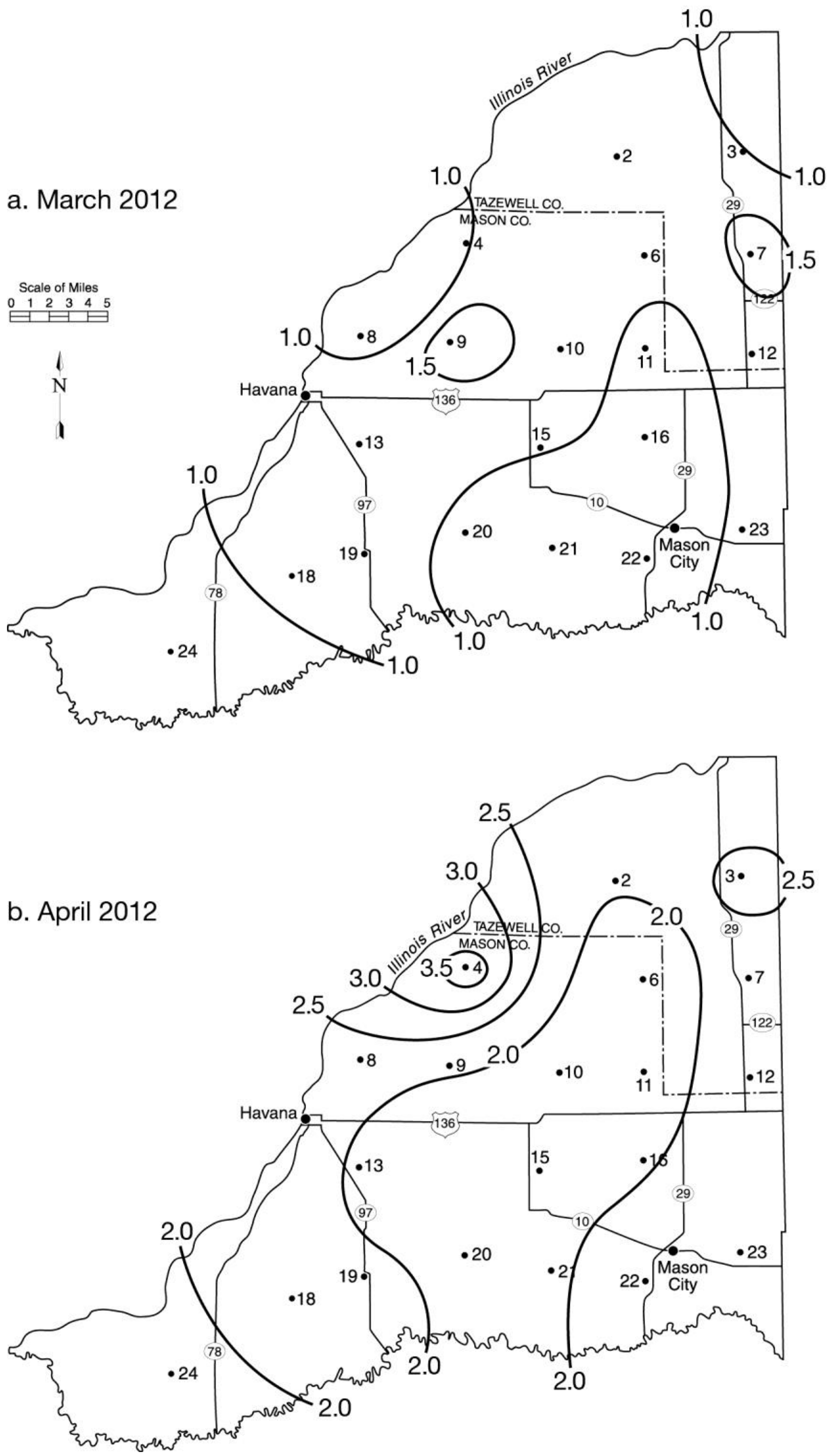

Figure 7. Precipitation (inches) for March 2012 and April 2012

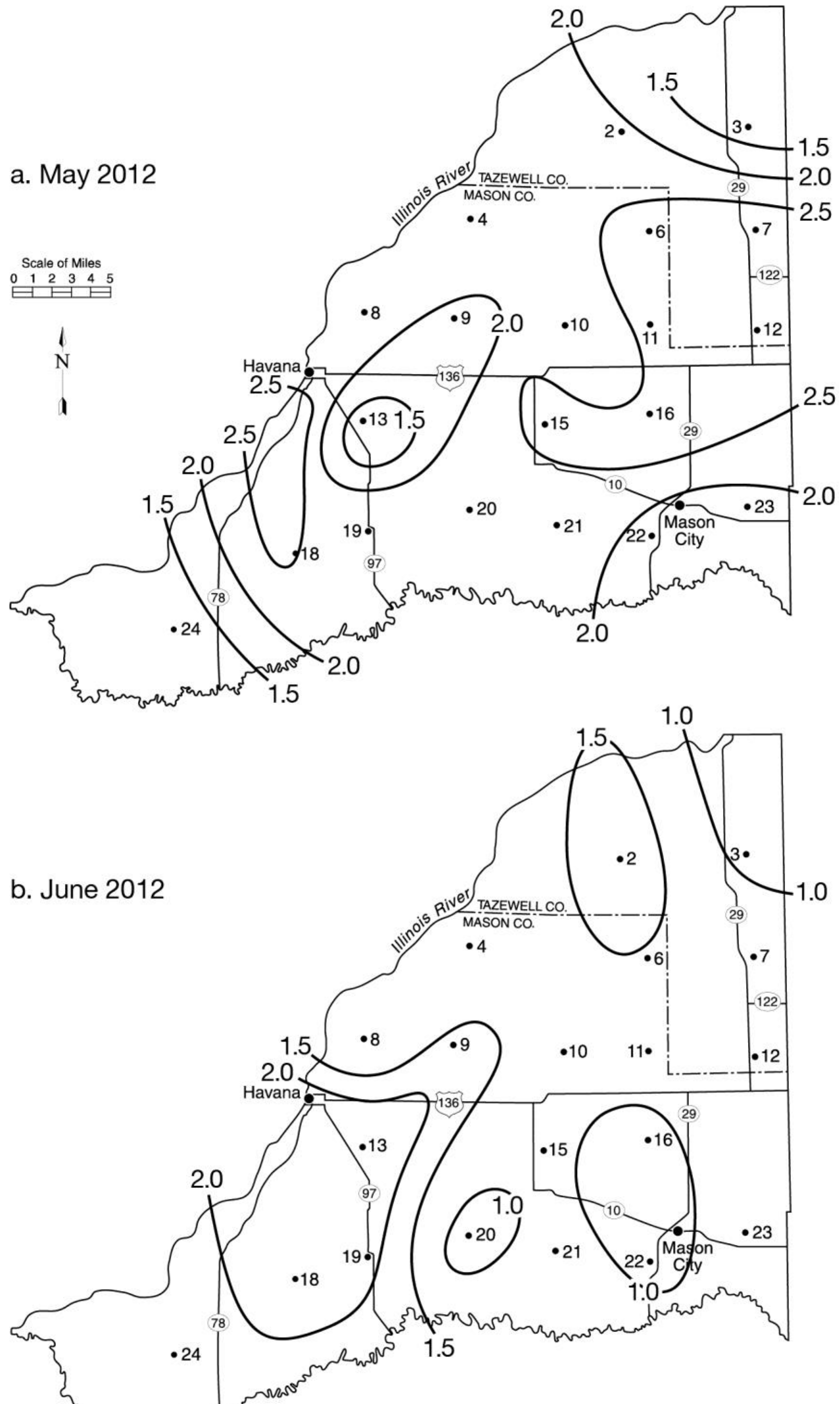

Figure 8. Precipitation (inches) for May 2012 and June 2012

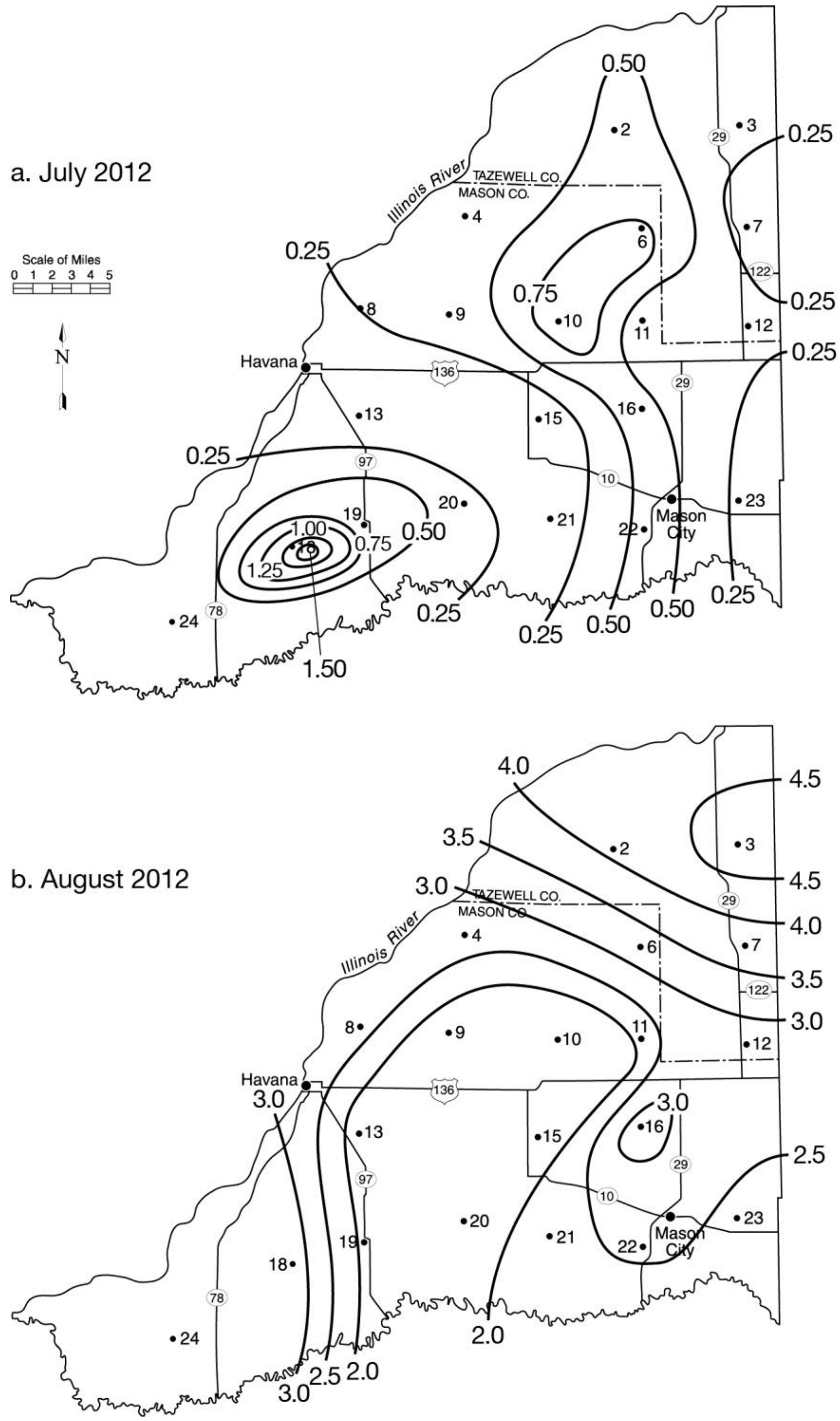

Figure 9. Precipitation (inches) for July 2012 and August 2012

Table 2. Comparison of Total Precipitation (inches), Number of Precipitation Events, and Average Precipitation per Event for Each Month and Season, 1993-2011 and 2011-2012

	1993-2011 19-yr average			*2011-2012 average*		
Period	*Precipitation*	*Events*	*Inches/event*	*Precipitation*	*Events*	*Inches/event*
Sep	3.03	7.5	0.40	2.23	8	0.28
Oct	2.68	8.6	0.31	0.47	10	0.05
Nov	2.64	9.3	0.28	4.14	4	1.04
Dec	1.86	9.3	0.20	3.01	12	0.25
Jan	2.00	9.1	0.22	0.65	9	0.07
Feb	1.76	7.8	0.23	1.13	16	0.07
Mar	2.27	8.5	0.27	1.06	9	0.12
Apr	3.60	11.2	0.32	2.09	10	0.21
May	4.17	13.8	0.30	2.20	7	0.31
Jun	4.17	12.4	0.34	1.36	7	0.19
Jul	3.89	10.9	0.36	0.44	7	0.06
Aug	3.32	11.8	0.28	2.67	9	0.30
Fall	8.34	25.4	0.33	6.84	22	0.31
Winter	5.61	26.2	0.21	4.79	37	0.13
Spring	10.04	33.5	0.30	5.35	26	0.21
Summer	11.38	35.1	0.32	4.47	23	0.19
Annual	35.37	120.1	0.29	21.44	108	0.20

The number of network precipitation periods was determined for the previous 19-year period. Mean monthly, seasonal, and annual number of precipitation events are presented for 2011-2012 (Table 2). The monthly, seasonal, and annual numbers of precipitation events averaged over the 1993-2011 period also are presented (Table 2). A network storm period is defined as a precipitation event separated from proceeding and succeeding events at all network stations by at least three hours.

A total of 2,390 storm periods occurred during the 20-year observation period, resulting in an average of 120 storm events per year. During Year 20, there were 108 precipitation events. Fewer events than average occurred in November 2011, and April 2012 through August 2012. A greater number of events than average occurred in December 2011 and February 2012. The spring and summer had many fewer events than average, and the amount of precipitation per event was much lower than average for winter, spring, and summer.

The plot of the network average monthly precipitation time series (Figure 10) shows the monthly variation of precipitation. From February 2005 through August 2008, a very dry period of record, only six months had precipitation of greater than 3.0 inches. During 2009-10, four months received 4.0 inches of precipitation or greater. In 2010-11, April and June, two months in the early part of the growing season, had more than 5.0 inches of precipitation. From July 2011 through August 2012, only three months had more than 2.5 inches of precipitation (November, December 2011, and August 2012), and six months had less than 2 inches of precipitation.

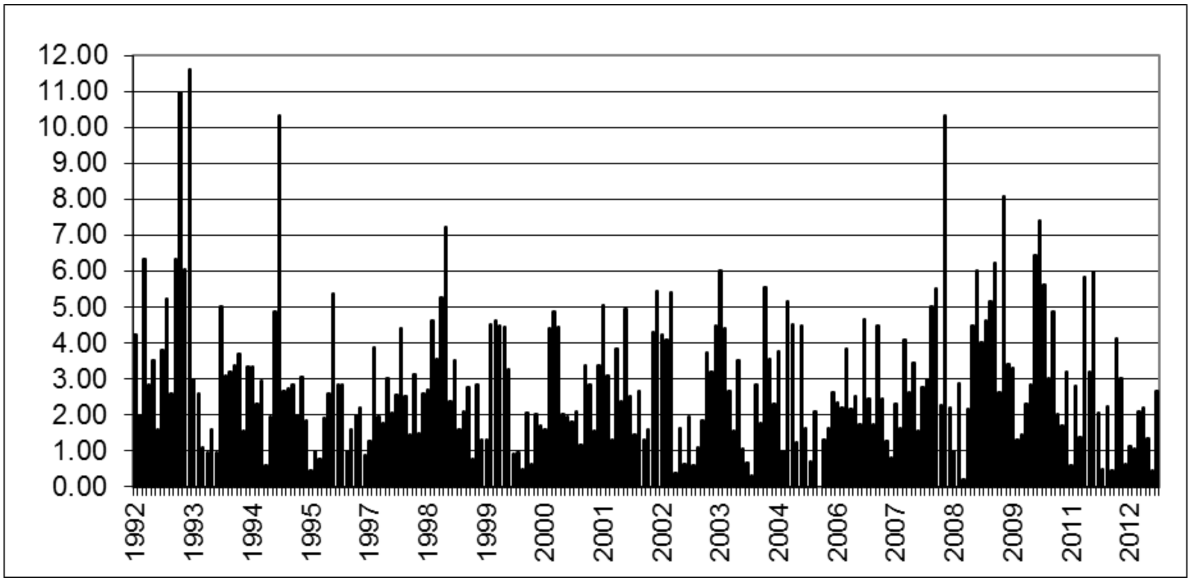

Figure 10. Network average monthly precipitation (inches), September 1992-August 2012

The storm recurrence frequency is the statistical probability of the recurrence of a storm with the reported precipitation (i.e., a 10-year storm would be expected to occur on average only once every 10 years at a given station, or have a 10 percent chance of occurring in any given year). The recurrence frequencies computed here are for each gage and are based upon the gage total storm precipitation and the total storm duration for the gages with precipitation.

In the first 20-years of network operation, 89 of 2,390 storm events produced maximum precipitation at one or more gages with a recurrence frequency greater than one year: 50-yr (1 storm), 10-year (6 storms), 5-year (10 storms), 2-year (38 storms), and 1-year events (34 storms). The 50-year storm occurred on 13 September 1993, and the 10-year storms on 16 May 1995, 8 May 1996, 19 July 1997, 30-31 March 2007, and 11-14 September 2008. An average of 120 rain events and 5 heavy rain events occurred per year.

In Year 20, one of the 108 network storm periods exceeded the 1-year or greater recurrence frequency. Year 20 had a below average number of storm periods but an average number of heavy rainfall events. One event exceeded the 1-year recurrence frequency. No 2-year, 5-year, 10-year, or 50-year events occurred.

Groundwater Levels

The long-term hydrograph at MTOW-01A (Snicarte) provides a reference for comparison with the shorter records of the other network wells (Figure 11). The ISWS has a record of water levels at this site since 1958. Annual fluctuations from less than a foot to more than 8 feet have been observed. Based on the data available, these annual fluctuations often appear to be superimposed on longer term trends, perhaps 10 years or more.

A detailed look at water levels at the Snicarte site since 1990 is shown in Figure 12. During and shortly after the drought years of 1988 and 1989, the water level fell to 40.5 feet below land surface from September 1989 until April 1990, the only time in its 45-year history that the

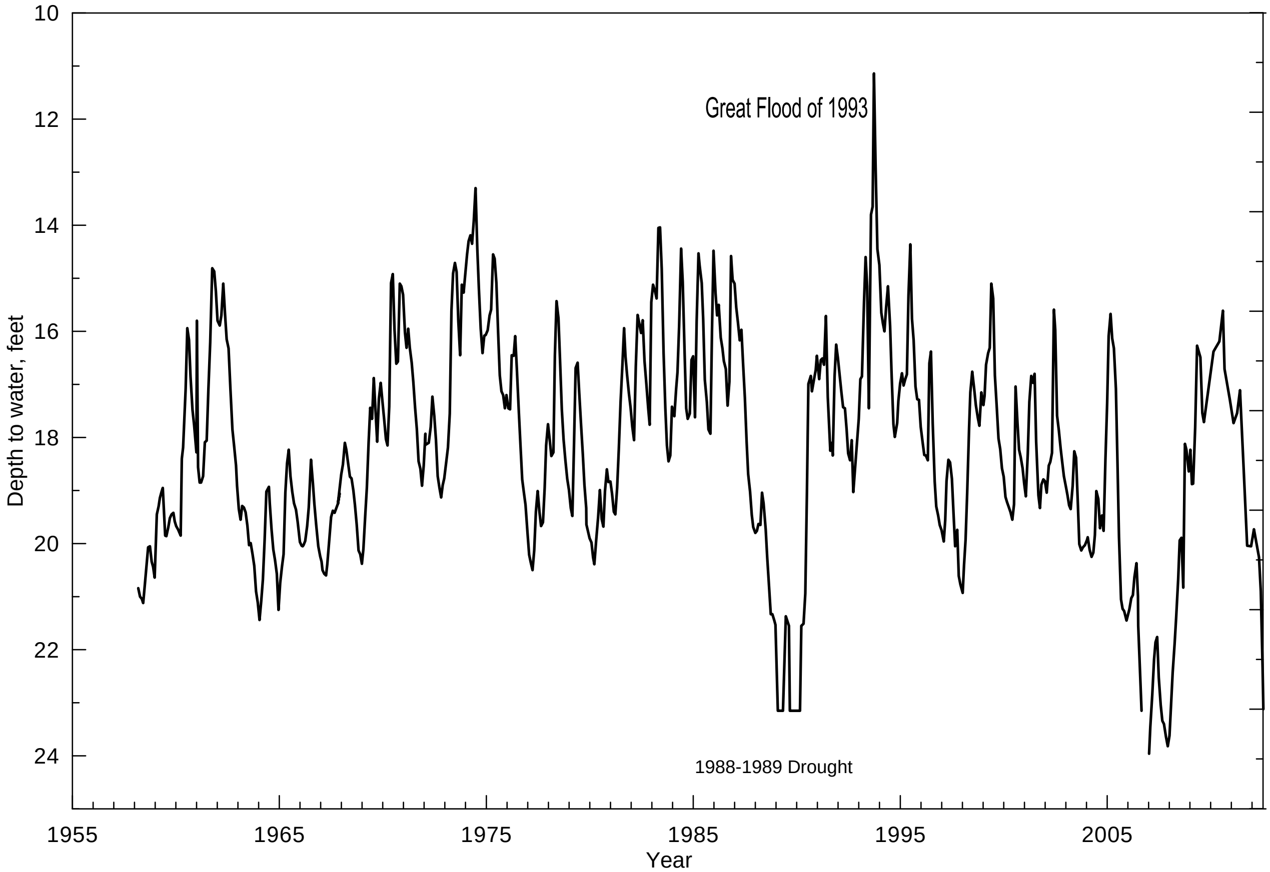

Figure 11. Groundwater levels at the Snicarte wells, 1958-2012

well went dry, until it did so again in 2006 and 2007. During the 1993 flood, groundwater levels rose around 8 feet and peaked at approximately 11 feet (depth to water) in September 1993.

The dramatic drop in 1988-89 shows how significantly a major drought can impact the aquifer. Although we don't have irrigation data for 1988, based on data from the other parts of the state (Cravens, et al., 1989), it is likely that the amount of irrigation in 1988 was one of the highest ever. This is because summer precipitation was so low and summer temperatures were so high in 1988. Similarly, the irrigation amounts in 2005 (72 billion gallons) were 164 percent of average since 1995 and we saw similar dramatic declines in water levels. In Year 14 (2005-2006), temperatures were high and summer precipitation was low. Conversely, Year 17 (2008-2009), Year 18 (2009-2010), and most of Year 19 (2010-2011) were relatively wet years with low irrigation withdrawals and rising water levels. It is likely that local summer precipitation in future years will cause similar fluctuations in aquifer levels.

From late 2002 until 2008 the study area received below average rainfall. These below average precipitation totals in combination with irrigation withdrawals affected the groundwater elevations in the study area. Above average precipitation in Year 17 elevated groundwater levels to the point of near record highs since the observation well network was established in 1995. A second year of higher than average precipitation in Year 18 elevated groundwater levels to record highs in several of the network wells.

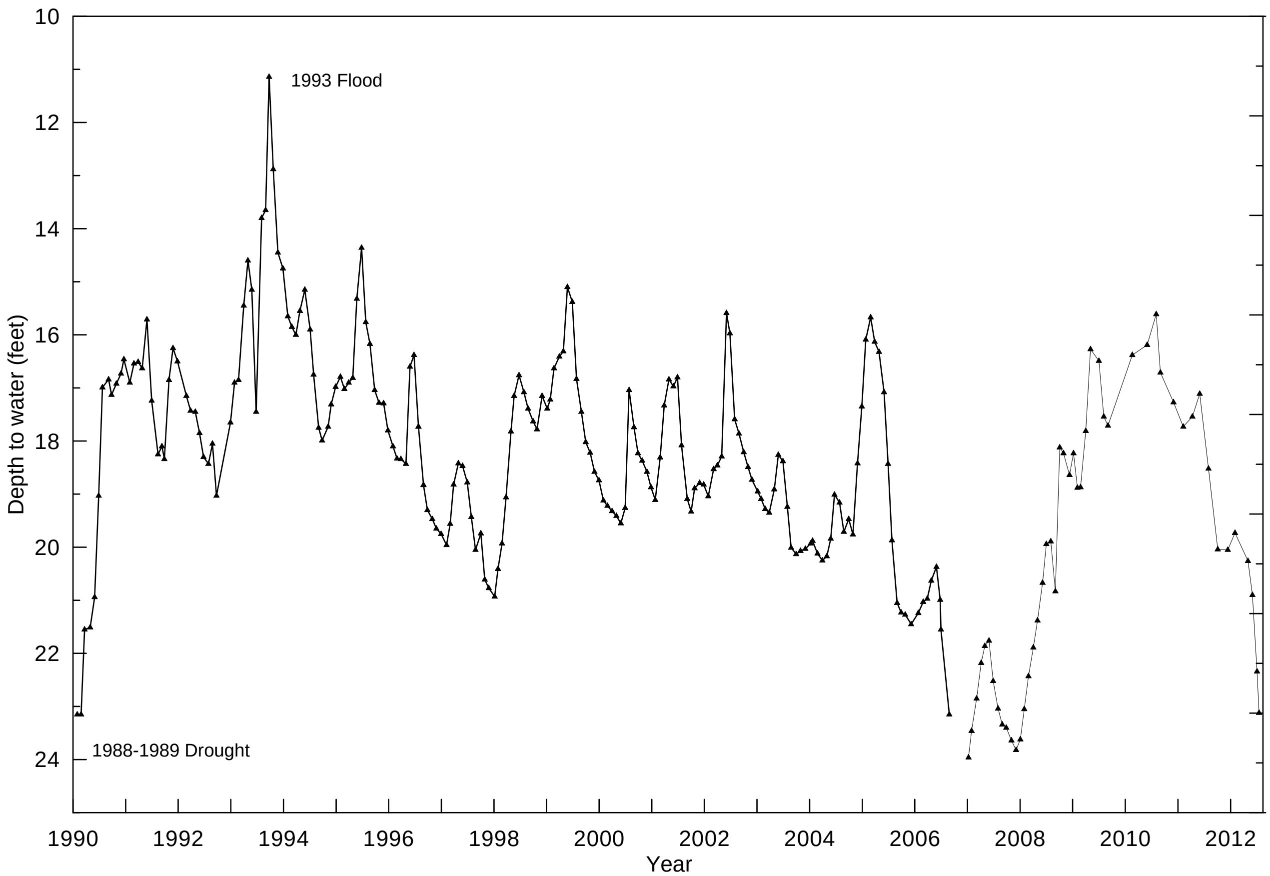

Figure 12. Groundwater levels at the Snicarte wells, 1990-2012

The above average precipitation continued until June 2011. Because of the high precipitation totals over the past few years, the study area has experienced widespread groundwater flooding (Figures 13 and 14). The flooding subsided during the late summer and fall 2011.

Previous reports have shown hydrographs indicating recharge events in the aquifer occurring within a few days after a rainfall event. In other words, recharge occurs on a scale of days after a precipitation event, and so historical monthly measurements missed many such events. Based on these results, the IVWA purchased 10 data loggers that were installed in wells between December 30, 2004 and August 2005.

The hydrographs generated by the continuous water level measurements have led to an increased understanding of the relationship between rainfall, irrigation, water levels, and recharge. Appendix A shows the hydrographs for all 13 wells within the observation well network. The hydrographs run from September 1, 2011 to August 31, 2012 and contain all groundwater elevation data and daily precipitation totals for nearby rain gauges. Looking at the figures from Appendix A, the rainfall/recharge relationship is evident as groundwater levels rise dramatically during periods of precipitation and how the lack of precipitation, along with pumpage, caused groundwater elevations to drop.

Figure 13. Groundwater flooding near Easton (Photo courtesy of Dr. George Roadcap)

Figure 14. Groundwater flooding of Sand Lake near Havana (Photo courtesy of Dr. George Roadcap)

Figure 15 and Figure 16 show precipitation events during the summers of 2011 and 2012 at Easton (MTOW-02), while Figures 17 and 18 show precipitation events during the summers of 2011 and 2012 at the IL Route 136 Rest Area (MTOW-07). The events of 2011 produced over 1 foot of recharge within several days, while the few rainfall events of 2012 produced very little to no recharge that was detectable within the observation wells. Also, while not mentioned in previous reports, MTOW-06 (Mason State Tree Nursery) and MTOW-10 (San Jose) continue to show the effects of local pumping. The hydrographs are in Appendix A. At MTOW-06 and MTOW-10, while the groundwater level short-term trends are affected by local pumpage, long-term trends are affected by seasonal and long-term climatic trends.

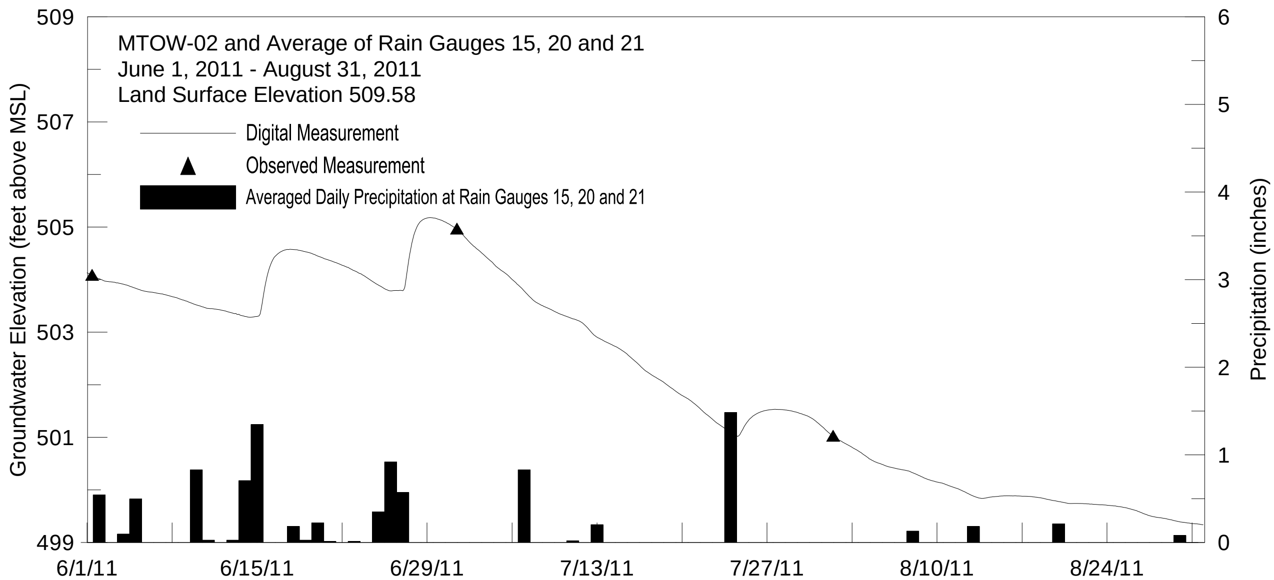

Figure 15. Groundwater elevations at the Easton well, MTOW-02, June 1, 2011-August 31, 2011

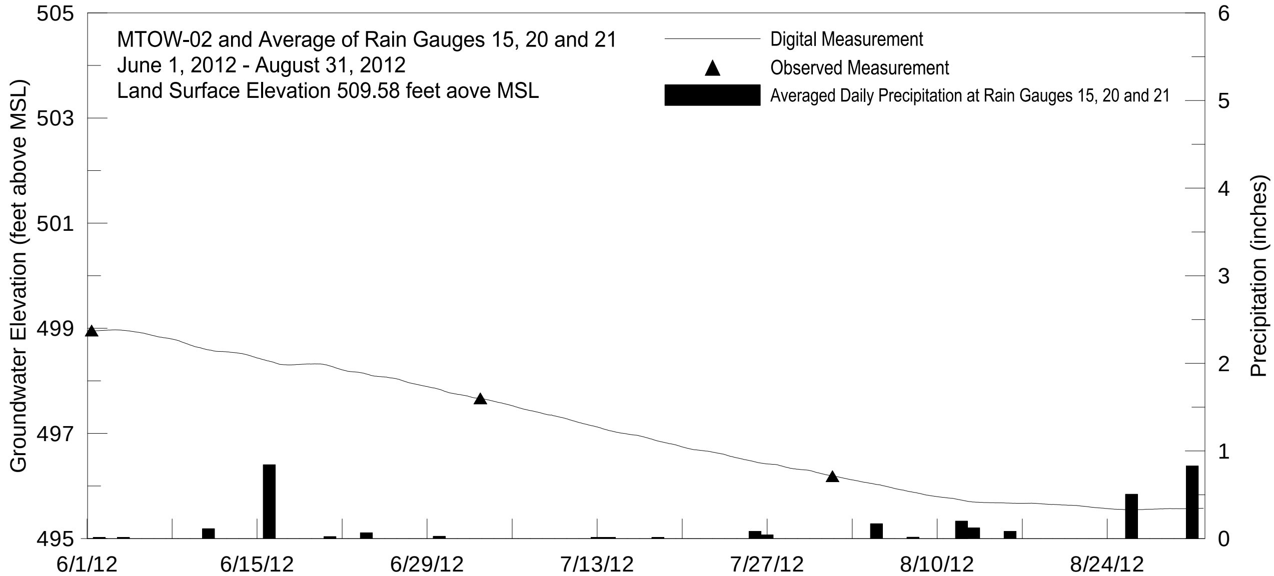

Figure 16. Groundwater elevations at the Easton well, MTOW-02, June 1, 2012-August 31, 2012

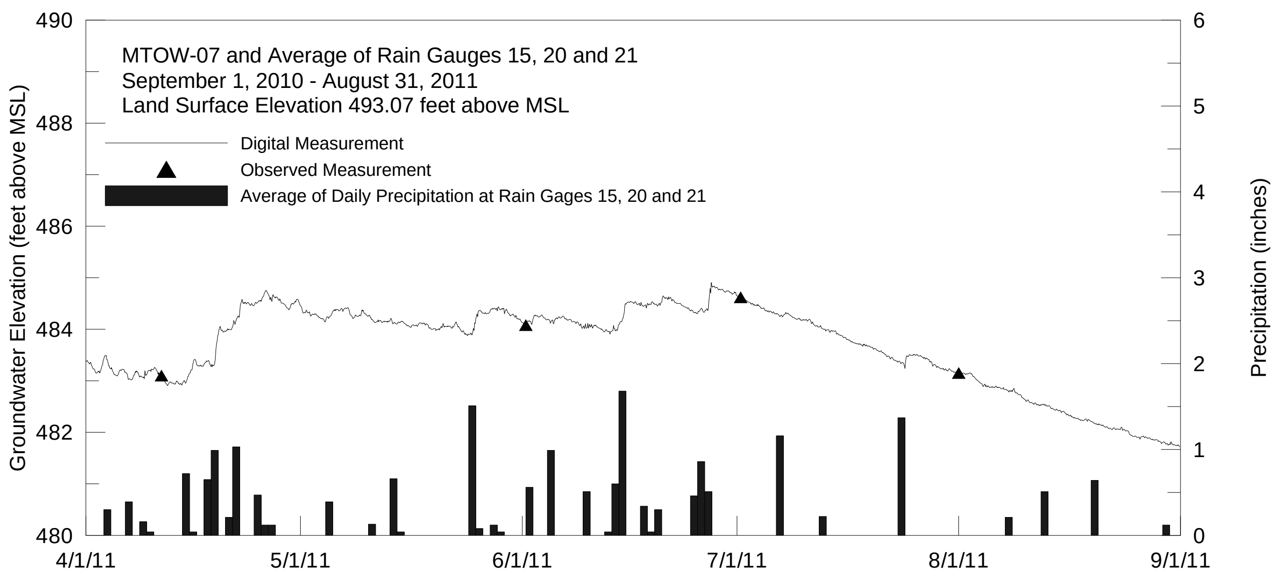

Figure 17. Groundwater elevations at the Rest Area well, MTOW-07, April 1, 2011-August 31, 2011

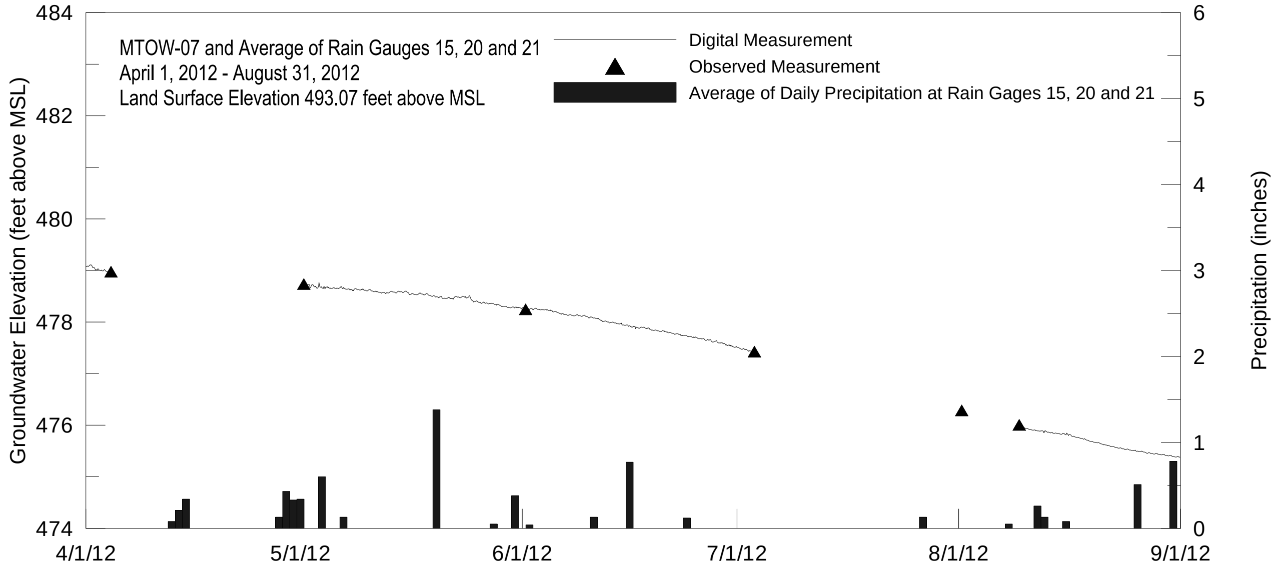

Figure 18. Groundwater elevations at the Rest Area well, MTOW-07, April 1, 2012-August 31, 2012

Groundwater levels in the Pekin (MTOW-05) and Havana-IDOT (MTOW-09) wells, which are in close proximity to the Illinois River, have been found to fluctuate largely in response to river stage. Since these two monitoring wells are so strongly influenced by the Illinois River, the wells are not outfitted with pressure transducers and in the future will be measured infrequently. The hydrographs for these two wells (MTOW-05 and MTOW-09) are in Appendix A.

Irrigation Water Use

The total irrigation pumpage in 2012 was approximately 98 billion gallons (bg), which is the highest irrigation amount for the observation period, considerably more than the next highest years, 2005 (~ 72 bg) and 2007 (~57 bg). For Year 20, the lower than normal precipitation affected irrigation practices significantly. Irrigation in June was the highest for June over the length of the study, for July the second highest, for August the highest, and for September the second highest. It should be noted that the totals from June and September are skewed as the irrigation season was longer than normal which resulted in more pumpage during May and October. The totals from these months were added to the June and September totals for reporting purposes. The hot and dry summer clearly affected pumpage. The pumpage from 2012 was 36 percent higher than the previous high during 2005 and 88 percent higher than the 52 bg pumped in 2011. August pumpage totaled 39.7 bg. Amazingly, this monthly total was greater than eight previous yearly totals.

Monthly and seasonal estimates of irrigation withdrawals are shown in Table 3. These data were calculated for the Imperial Valley by previously described methods. Total annual irrigation withdrawals, from highest to lowest, are as follows: 2012, 2005, 2007, 1996 and 2011 (equal), 2006; 2001 and 2002 (equal); 2003; 2004; 1999; 1995 and 1997 (equal); 2008, 1998 and 2000 (equal); 2010; and 2009. The highest and two lowest irrigation withdrawals have occurred in the past 4 years. Typically, irrigation withdrawals are greatest in July and August, with September and June withdrawals being much less. Though more irrigation systems are added each year, suggesting that irrigation pumpage should keep increasing, it is clearly apparent that the timing and amount of rainfall received during the irrigation season (rather than throughout the whole year) are the primary factors affecting the amount of irrigation.

The estimated monthly irrigation pumpage is displayed graphically in Figure 19 along with average monthly network precipitation. There is a tendency for lower irrigation amounts during times of increasing precipitation and vice versa, but irrigation is dependent on the timing of precipitation. For example, only 30 bg were pumped in 2000 (Year Eight), even though Year Eight showed a deficit of 9.5 inches (Table 4). This was because significant precipitation fell during the summer of 2000, reducing the need for irrigation. Similarly, Year Fifteen (summer 2007) was the ninth driest of network operation, but ranked number 2 for irrigation pumpage.

Table 3. Estimated Monthly Irrigation Withdrawals (billion gallons), Number of Irrigation Systems, Withdrawal per System, and Withdrawal Rank

Year	*June*	*July*	*August*	*September*	*Total*	*# Systems*	*BG/system*	*Rank*
1995	2.6	14	10	11	38			12
1996	2.0	20	18	12	52			4
1997	2.6	19	14	2.0	38			12
1998	2.1	7.8	13	6.9	30	1622	0.018	15
1999	2.8	18	12	6.0	39	1771	0.022	11
2000	6.4	6.0	12	5.6	30	1799	0.017	15
2001	4.4	21	17	5.0	47	1818	0.026	7
2002	3.4	24	16	3.7	47	1839	0.026	7
2003	4.1	16	15	10.0	46	1867	0.025	9
2004	5.3	12	19	5.7	42	1889	0.022	10
2005	15	29	23	4.8	72	1909	0.038	2
2006	7.2	22	16	5.2	50	1940	0.026	6
2007	16	17	19	4.9	57	1971	0.029	3
2008	1.2	10	14.5	7.1	33	2014	0.016	14
2009	1.6	9.3	12.1	2.9	26	2054	0.013	18
2010	1.8	2.4	11.7	10.6	27	2077	0.013	17
2011	0.7	2.5	24.7	24.5	52	2100	0.025	4
2012	12.3	26.4	39.7	17.4	98	2160	0.045	1
Average	5.1	15.3	17	8.1	46			

Note:

Total annual withdrawal may differ from sum of monthly withdrawals due to rounding error. Also, data regarding the number of systems in 1995-1997 are unavailable. Also, the BG/system was rounded incorrectly for 2009 and should be 0.013.

As the influence of the abundant rainfall early in Year 19 was evidenced by both the decreased amount of water withdrawn for irrigation and in higher groundwater levels throughout the study area, the severe drought conditions since have seen record amounts of irrigation pumpage. During September of 2011 and the 2012 irrigation season, 122.5 bg of water has been pumped. Table 4 also shows that for 8 of the past 10 years and for 13 of the past 17 years, rainfall has been below the 30-year (1981-2010) historical average of 38.38 inches (average of Havana and Mason City).

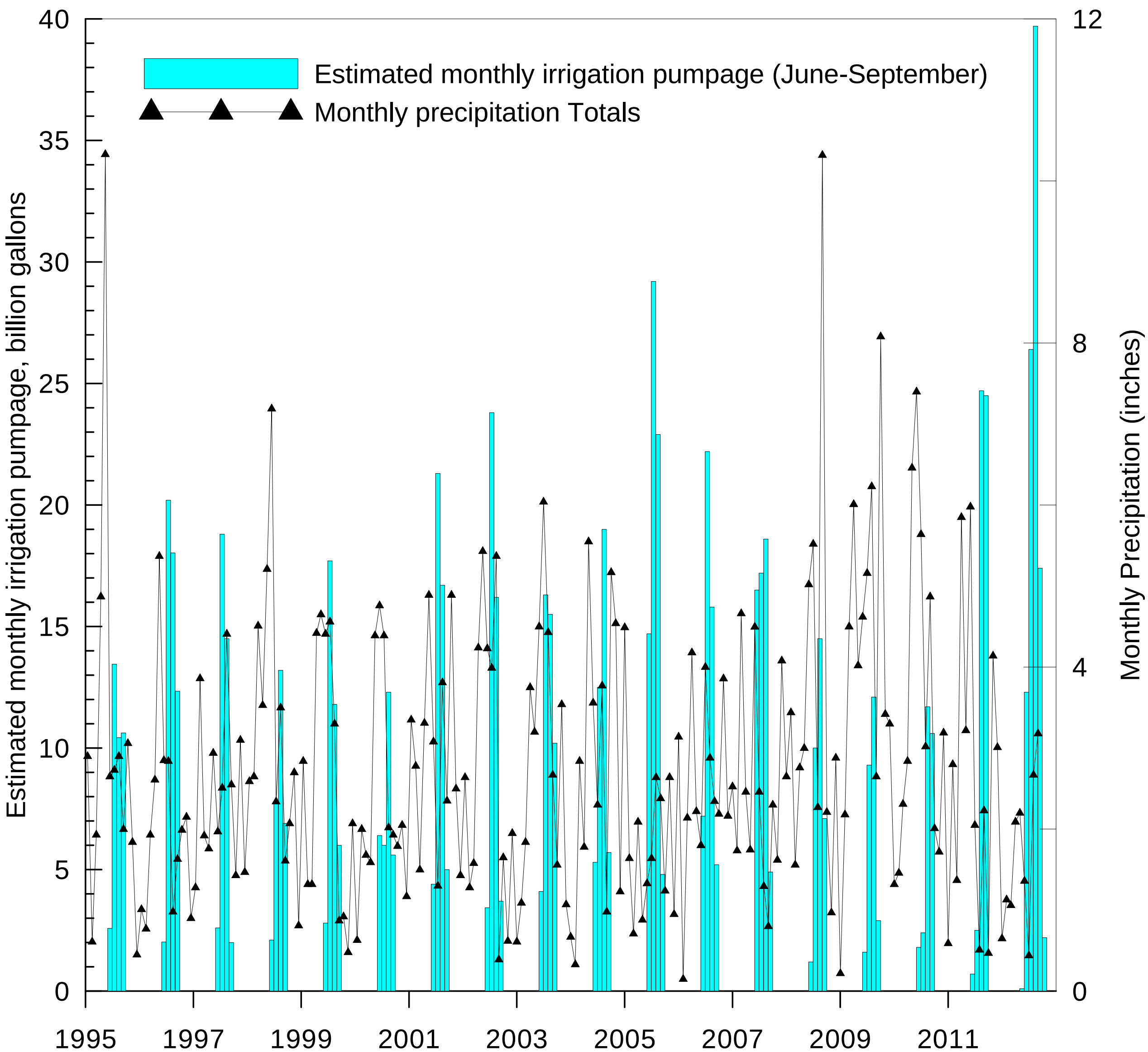

Figure 19. Estimated irrigation pumpage and average monthly precipitation, Imperial Valley

Table 4. Average Annual Precipitation, Annual Precipitation Surplus, Running Surplus, and Ranked Annual Precipitation and Irrigation, Imperial Valley Network

September-August period	*Network average precipitation (in.)*	*Annual surplus (in.)*	*Running surplus (in.)*	*Rank*	
				Precip.	*Irrigation*
1992 - 1993	55.55	+18.79	+18.79	1	-
1993 - 1994	40.21	+3.45	+22.24	4	-
1994 - 1995	39.42	+2.66	+24.90	7	12
1995 - 1996	25.70	-11.06	+13.84	19	4
1996 - 1997	27.31	-9.45	+4.39	17	12
1997 - 1998	40.06	+3.30	+7.69	5	15
1998 - 1999	34.02	-2.74	+4.95	9	11
1999 - 2000	25.81	-10.95	-6.00	18	15
2000 - 2001	30.97	-5.79	-11.79	12	7
2001 - 2002	39.91	+3.15	-8.64	6	7
2002 - 2003	30.06	-6.70	-15.34	13	9
2003 - 2004	29.64	-7.12	-22.46	14	10
2004 - 2005	27.34	-9.42	-31.88	16	2
2005 - 2006	27.74	-9.02	-40.90	15	6
2006 - 2007	31.94	-4.82	-45.72	11	3
2007 - 2008	35.02	-1.74	-47.46	8	14
2008 - 2009	49.34	+12.58	-34.88	2	18
2009 - 2010	47.91	+11.15	-23.73	3	17
2010 - 2011	34.17	-1.27	-25.00	10	4
2011 - 2012	21.44	- 15.94	-40.94	20	1
1981 - 2010 30-yr average	39.80 (Havana)				
1981 - 2010 30-yr average	36.98 (Mason City)				
1981 - 2010 30-yr average	38.38 (average of Mason City and Havana used to determine surplus)				

Note: Site 16 was excluded from network average computations from 1996-1997 through 2001-2002.

Summary

In summary, during Year 20 of the rain gauge network operation (September 2011-August 2012), the network received an average of 21.44 inches of precipitation, 13.93 inches below the network's previous 19-year average precipitation of 35.37 inches, and 15.94 inches below the 30-year average for the study area. Year 20 was the driest year since the deployment of the precipitation network.

The amount of rainfall was such that the need for irrigation in the early summer of 2012 and throughout the remaining irrigation season was greatly increased, when 98 bg was pumped for irrigation from the aquifer. It was hot and dry all summer, pumpage was at an all-time high, and little more need be said.

Data collected over the past 20 years as part of this project have been invaluable to the ISWS in developing a better understanding of the groundwater system in the Havana Lowlands, as well as the Mahomet Aquifer as a whole. The ISWS has released a comprehensive report about the Mahomet Aquifer, based on the modeling work of Dr. Roadcap at the ISWS. His report, "Meeting East-Central Illinois Water Needs to 2050: Potential Impacts on the Mahomet Aquifer and Surface Reservoirs," was developed with funding from a number of sources, including the

Imperial Valley Water Authority. Hard copies are available to the IVWA upon request and digital copies are available on the ISWS website. The report highlights the unique features of the aquifer in the IVWA area as well as the role it plays in being the discharge area for the Mahomet Aquifer. It specifically shows that the Illinois, Sangamon, and Mackinaw Rivers, along with Crane and Quiver Creeks, are discharge points for the aquifer, all in the Havana Lowlands. It also discusses the Snicarte data in depth, using the long-term record to help describe the hydrology of the area, and the Irrigation Test site, which taught us how significant groundwater recharge is in the area. Lastly, the report discusses the unusual depressions around Mason City and describes their likely cause and significance. What amazes many people who have looked at the data for the Havana Lowlands Region is the fact that water levels are basically unchanged from the 1960s even though there is now significant pumpage for irrigation in the area, a point made in the report.

Please contact Kevin Rennels, Steve Wilson, or Nancy Westcott if you have any questions or comments.

Sincerely,

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Appendix A. Hydrographs, Imperial Valley Observation Well Network

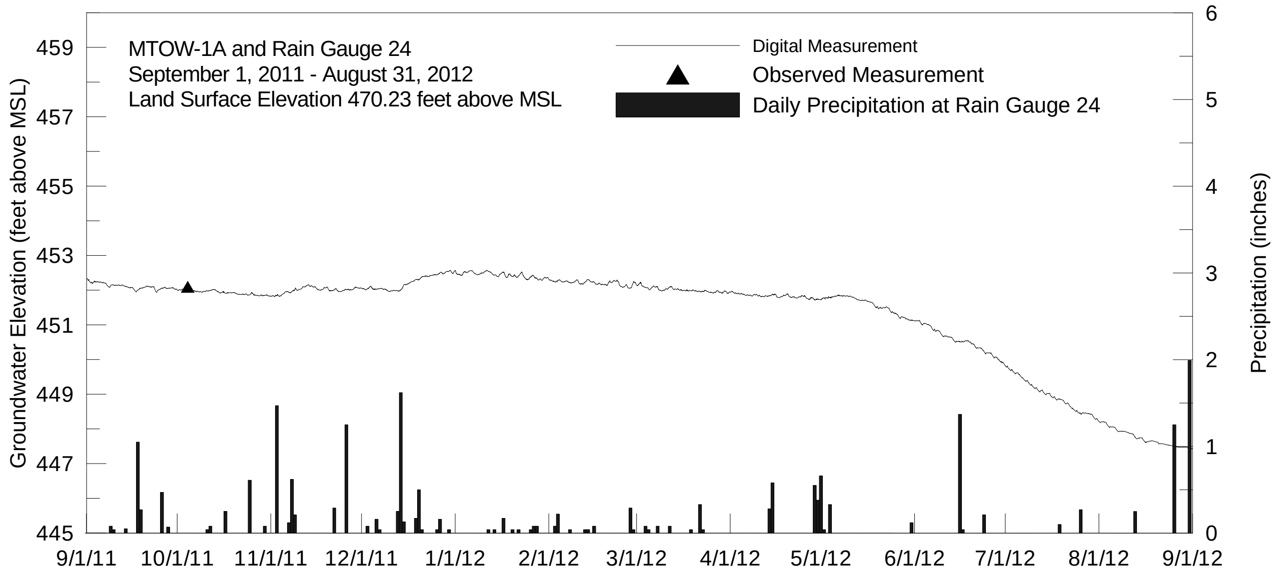

Figure A-1. Year 20 groundwater depth and precipitation for MTOW-01

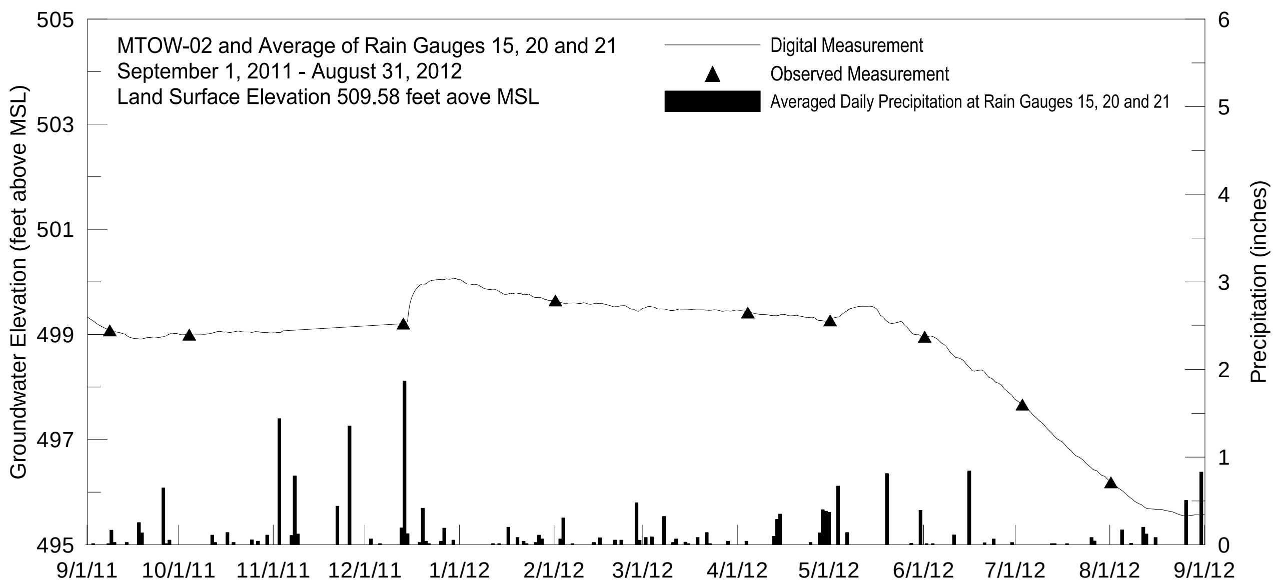

Figure A-2. Year 20 groundwater depth and precipitation for MTOW-02

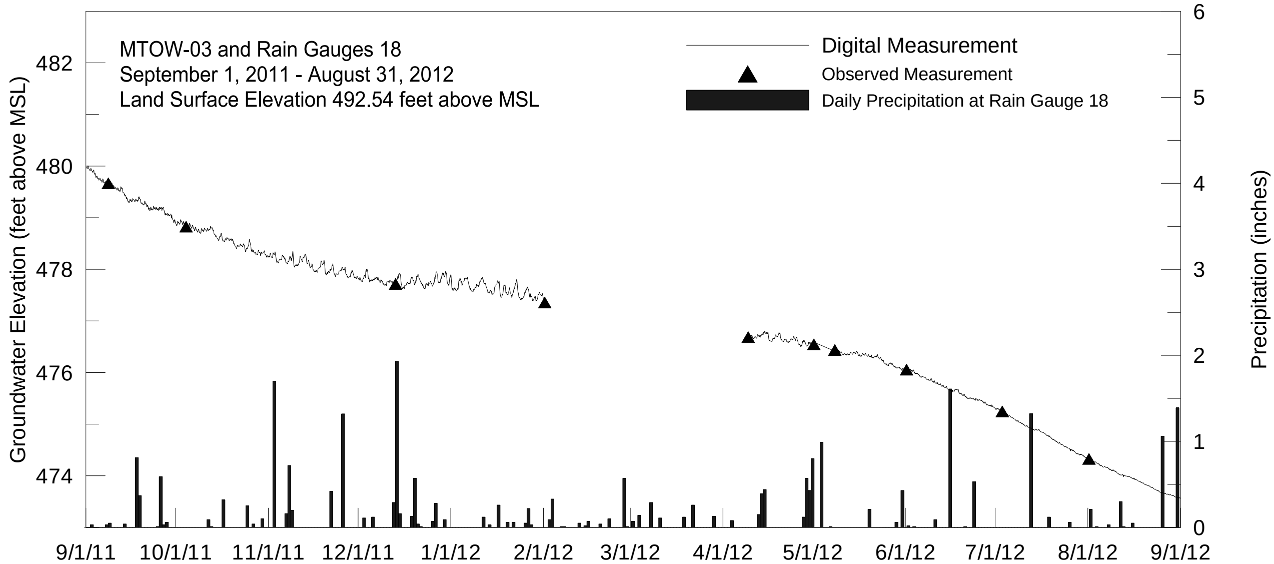

Figure A-3. Year 20 groundwater depth and precipitation for MTOW-03

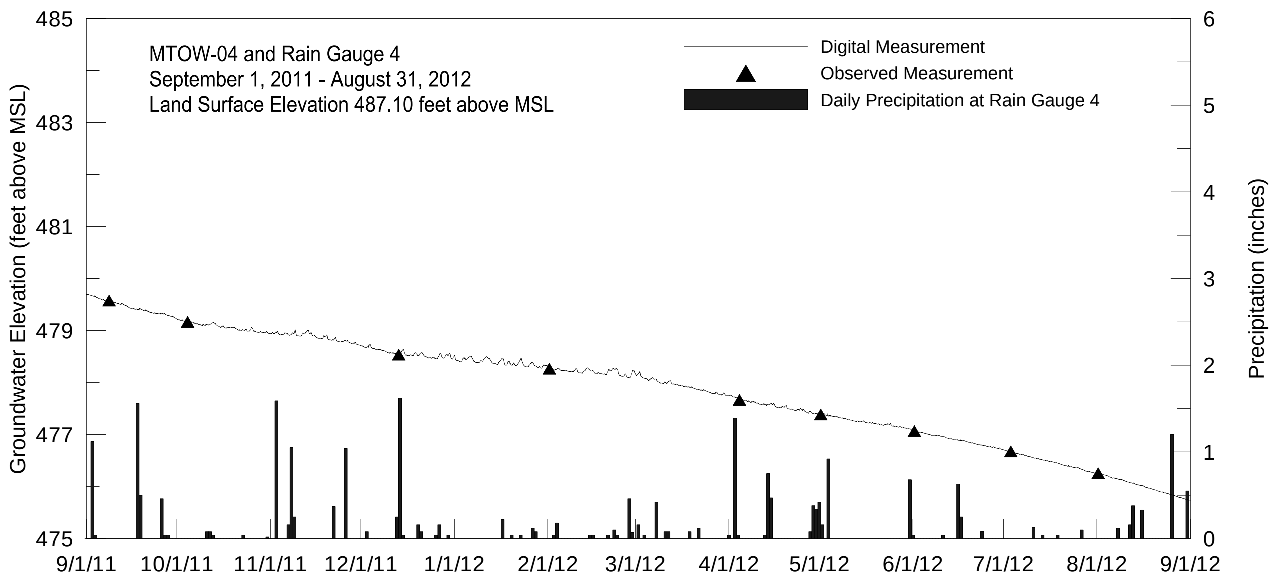

Figure A-4. Year 20 groundwater elevation and precipitation for MTOW-04

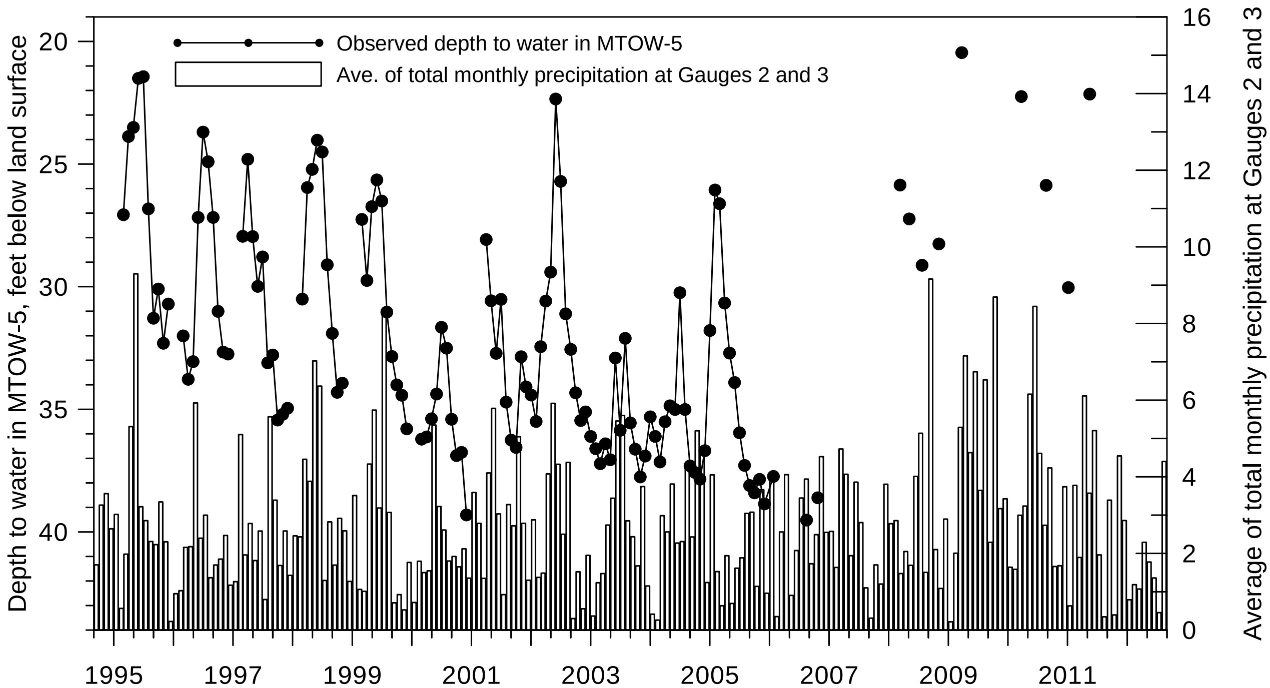

Figure A-5. Year 20 groundwater depth and precipitation for MTOW-05 (not continuous recorder)

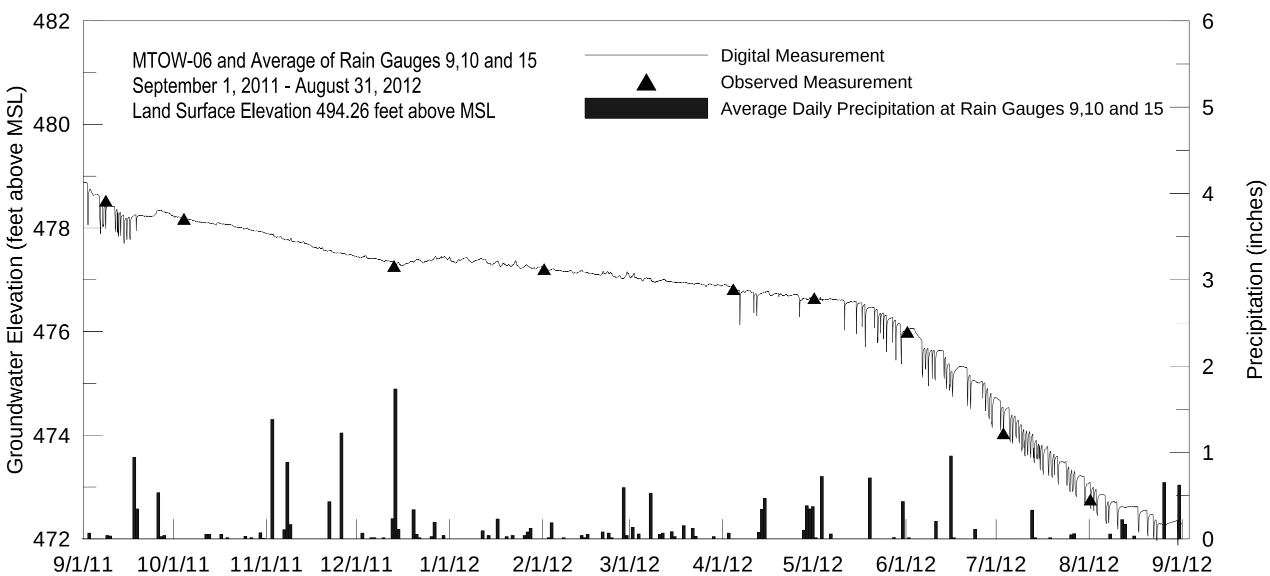

Figure A-6. Year 20 groundwater elevation and precipitation for MTOW-06

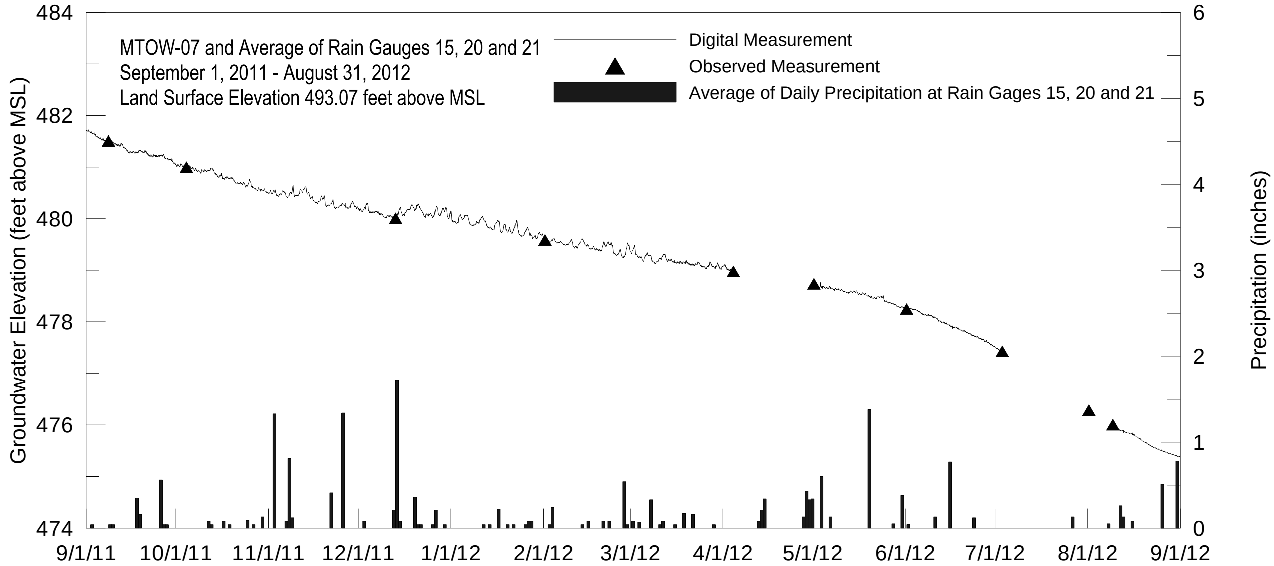

Figure A-7. Year 20 groundwater elevation and precipitation for MTOW-07

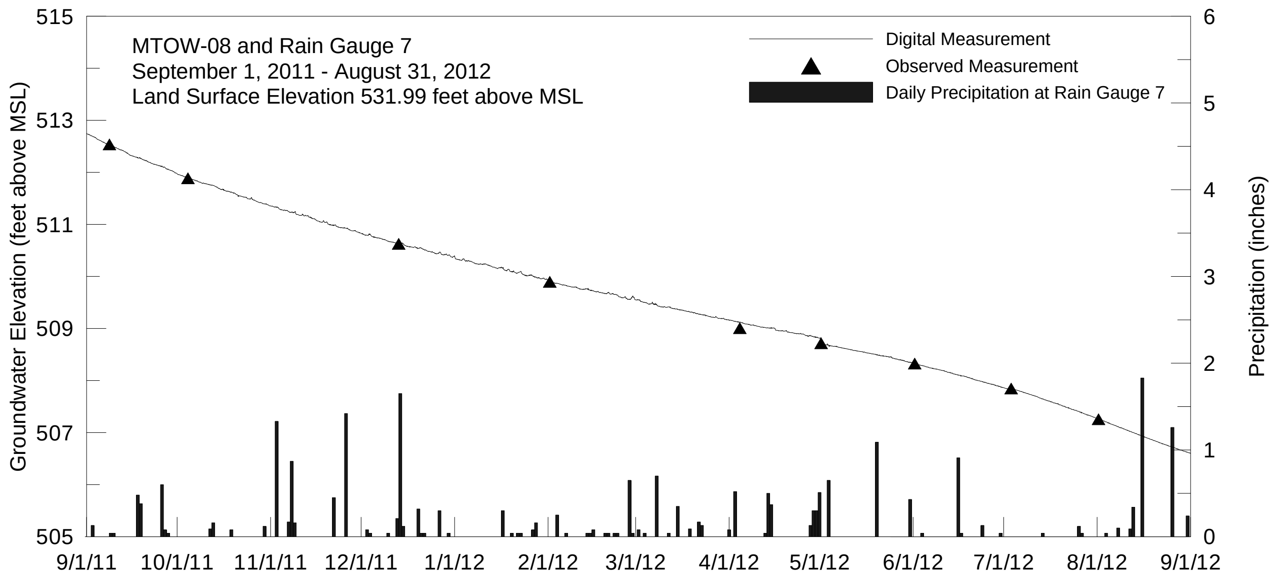

Figure A-8. Year 20 groundwater elevation and precipitation for MTOW-08

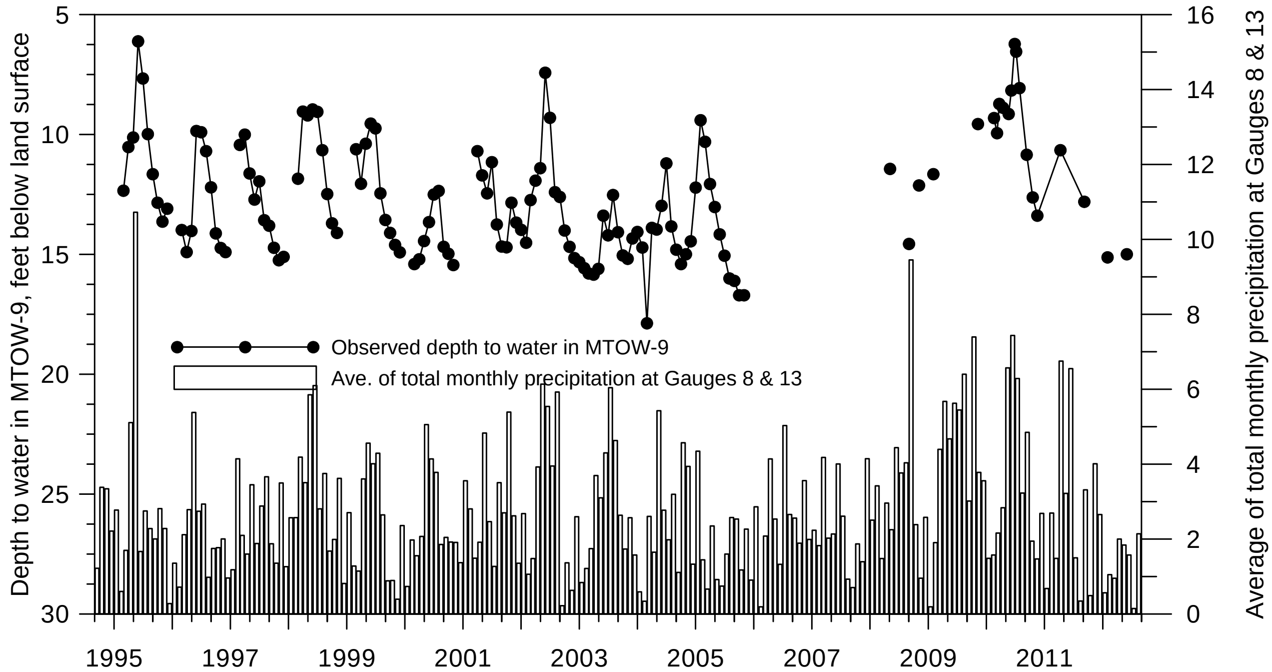

Figure A-9. Year 20 groundwater depth and precipitation for MTOW-09 (not continuous recorder)

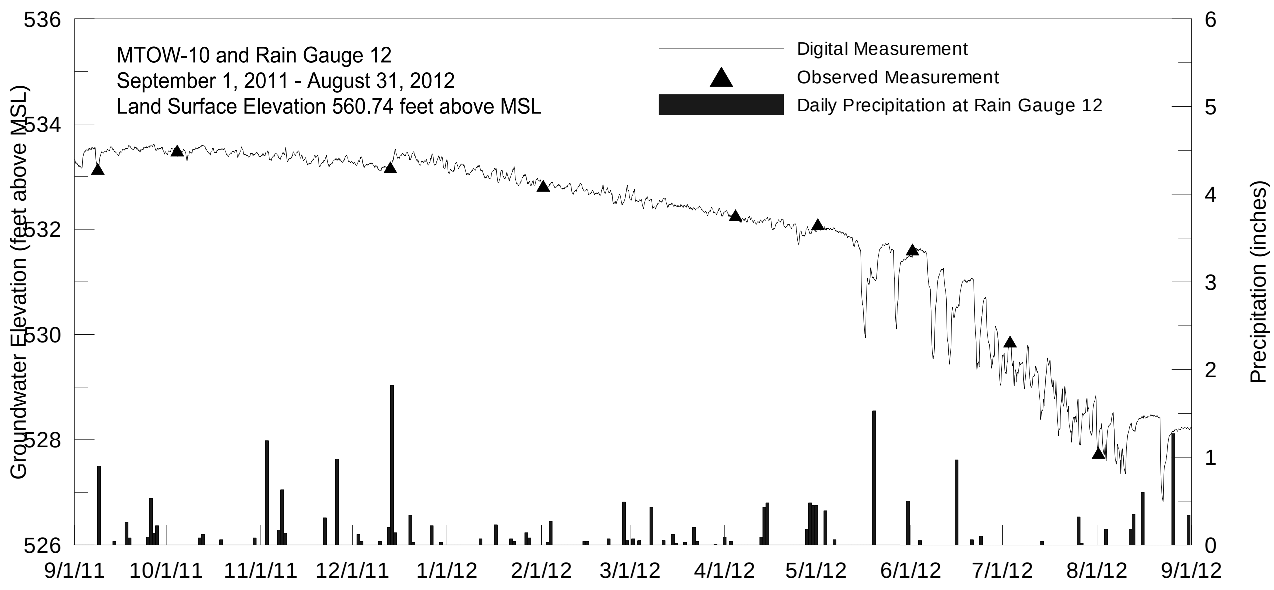

Figure A-10. Year 20 groundwater depth and precipitation for MTOW-10

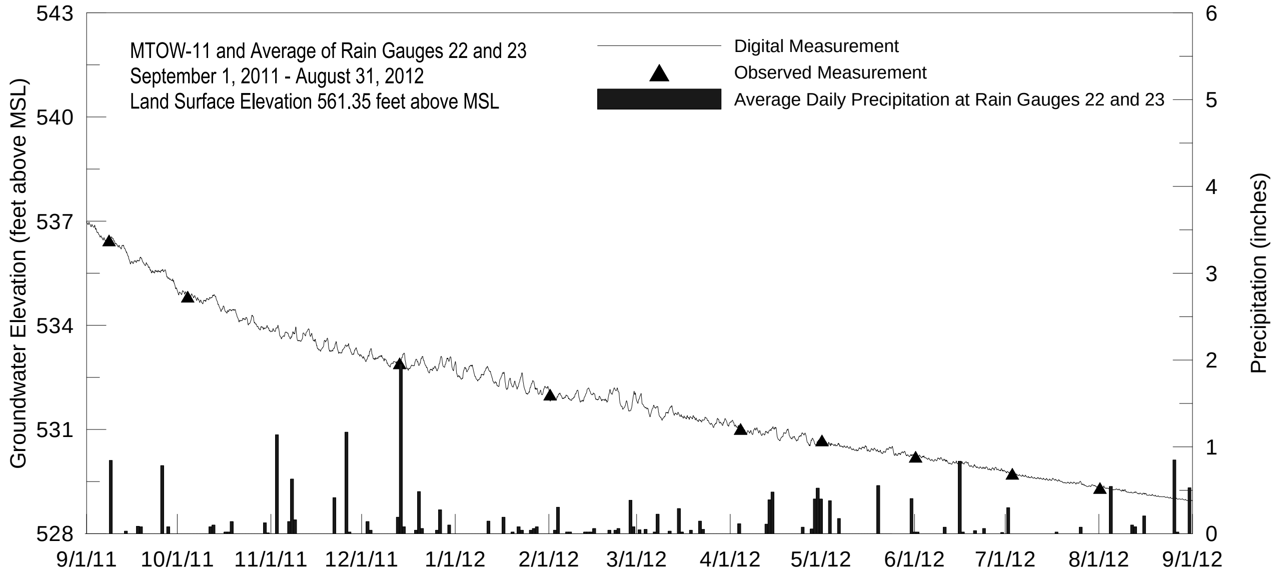

Figure A-11. Year 20 groundwater elevation and precipitation for MTOW-11

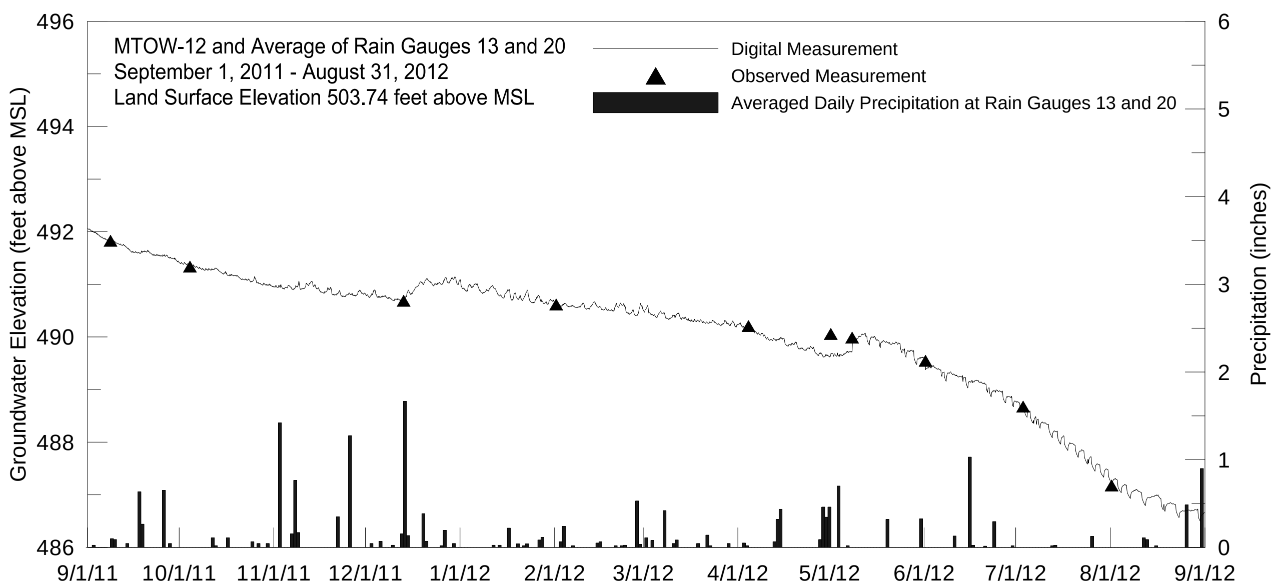

Figure A-12. Year 20 groundwater elevation and precipitation for MTOW-12

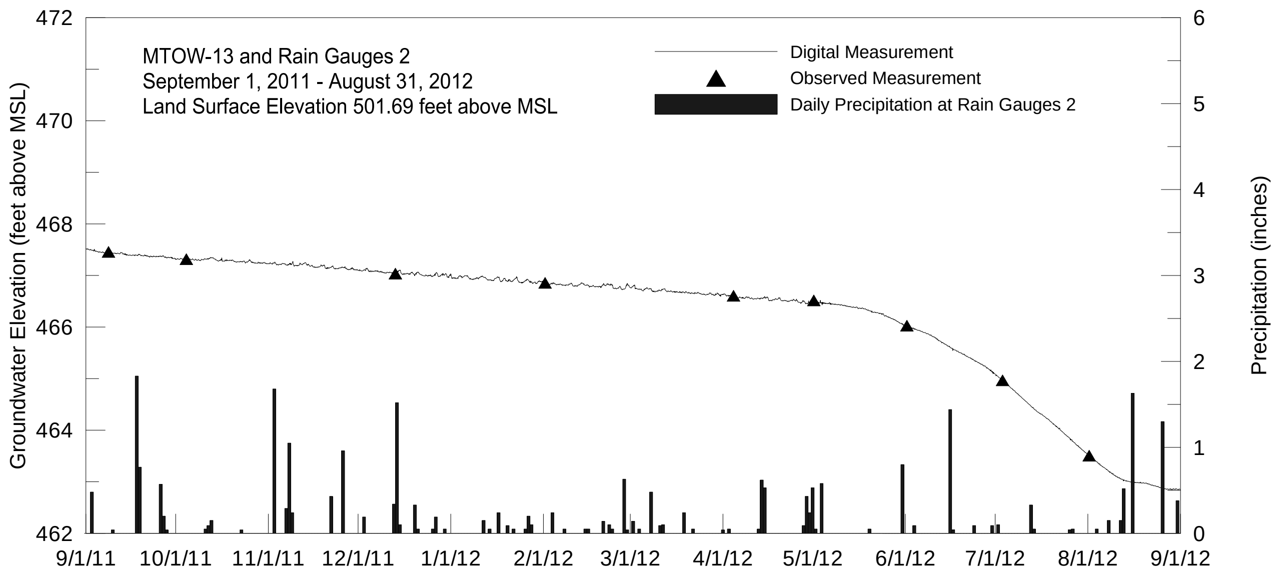

Figure A-13. Year 20 groundwater depth and precipitation for MTOW-13