Appendix 2-6: Water Quality Assessment

1 Sierra Valley Groundwater Quality Assessment

Available data are used to determine which constituents may pose water quality concerns in the Sierra Valley basin. Through a December 2020 survey, the Technical Advisory Committee (TAC) identified outcomes that would be considered undesirable results, including:

- Violation of State drinking water standard or other groundwater quality standards
- Transfer of constituents between older wells without sanitary seals
- Spreading of degraded water quality into new areas
- Degradation to levels unsuitable for agricultural use

The assessment of data to assess undesirable results of groundwater quality is described in the following.

1.1 Available Water Quality Data

The information currently available on Sierra Valley groundwater quality comes from DWR's Groundwater Ambient Monitoring and Assessment (GAMA) program. While 206 wells have associated water quality data, going back as far as 1955, there are significant data gaps, including: inconsistent temporal distribution, limited spatial distribution, and missing basic well information. Additionally, the purpose of monitoring generally limits the constituents evaluated. As the available data for the basin is sporadic in time, and variable over space all data for a constituent was aggregated and evaluated against applicable water quality objectives or notification levels, as applicable. The data summary for available constituents from 2011 to 2020 is presented in Table A-1. The table contains the constituent and applicable objective (maximum contaminant level (MCL), secondary MCL, or California Notification Level). To evaluate if the constituents are potentially changing over time, the data are split into two groups ranging from 2011 to 2015, and 2016 to 2020. In each group the number of samples in that time period and number of exceedances are listed along with the maximum concentration measured. The water quality is generally good, where there are exceedances they are under 10% of measurement for most constituents.

Combining the results from Table A-1 and the desire to maintain agricultural use, nitrate, total dissolved solids (TDS), arsenic, boron, pH, iron, manganese, and MTBE were selected for further evaluation in the GSP. Specific conductivity is related to TDS. Consideration of MTBE will likely address benzene, ethylbenzene, and napthalene as they are generally related to underground tank leakage. To evaluate if the constituents are changing over time available data are binned into 7 time periods from 1986 to 2020 and plotted as box and whisker plot in Figure A-1 to Figure A-8. These plots are valuable in displaying the variability in measurements over the 7 time periods. Generally, the conditions appear to be improving or remaining the same with the exception of nitrate which may be worsening. However, the limited data makes a conclusive assessment difficult.

To evaluate the spatial distribution of data, wells with data are plotted in Figure A-9. Nitrate as N, Maximum Groundwater Quality Observations (1990 – 2020)

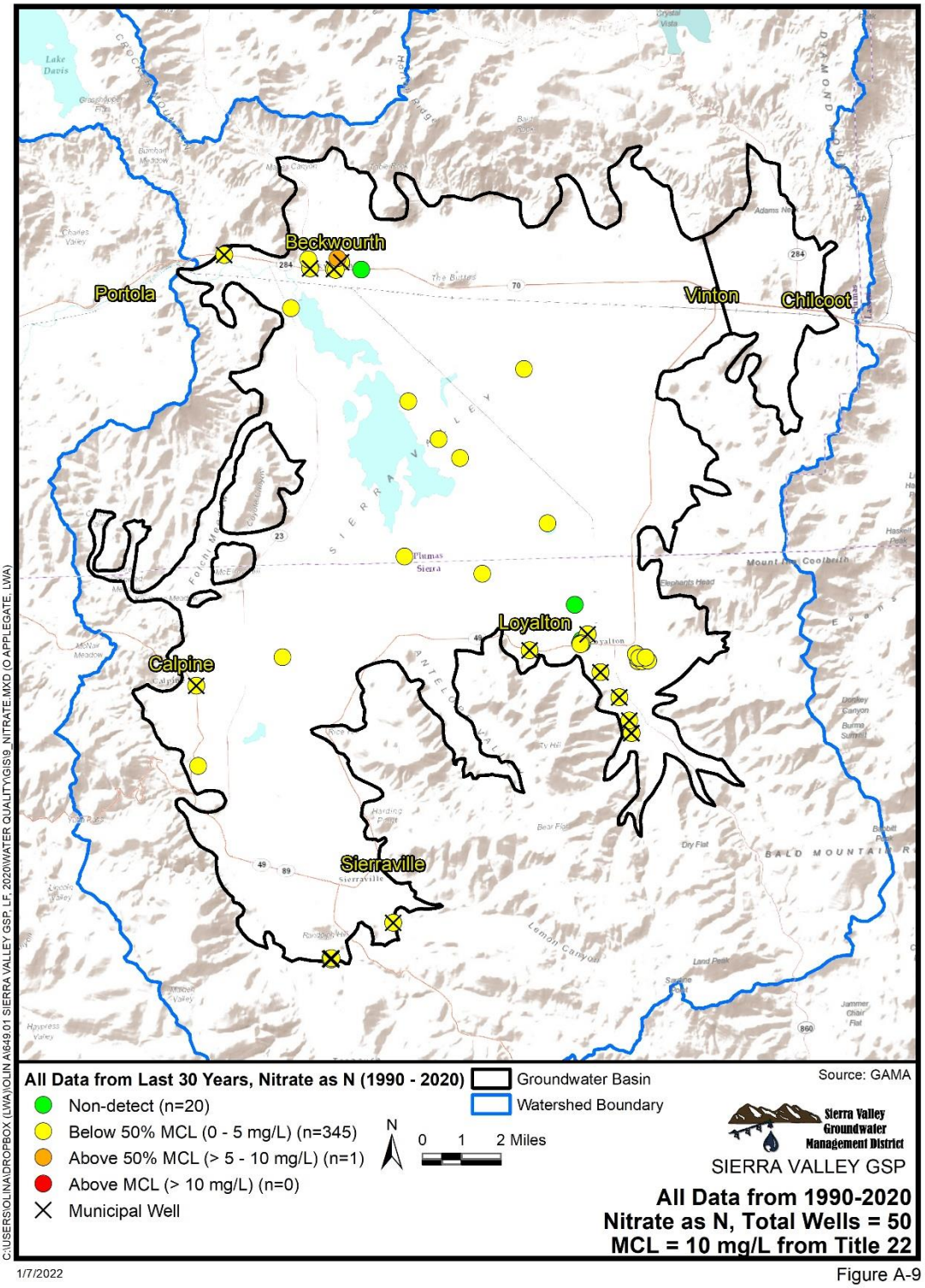

Figure A-9

to Figure A-24. In each figure the wells are color coded to identify where exceedances are occurring. Additionally, each constituent is displayed in two figures, the first with all data

displayed and the second figure displaying only wells where more than one sample was collected over time.

Table A-1. Sierra Valley Groundwater Basin, Groundwater Quality Exceedance Analysis

Constituent	MCL	Units	2016 - 2020			2011 – 2015		
			Number of Wells Sampled	Number of Exceedance Wells	Highest Concentration Measured	Number of Wells Sampled	Number of Exceedance Wells	Highest Concentration Measured
Aluminum	200[a]	µg/L	12	1	210	10	1	750
Arsenic	10	µg/L	13	0	8.5	10	0	2.7
Benzene	1	µg/L	21	2	32	31	0	0.0
Boron	1[b]	mg/L	10	1	1.7	10	1	1.6
Chloride	250[a]	mg/L	14	0	210	12	0	130
Di(2-ethylehexyl)phthalate (DEHP)	4	µg/L	0	0	NA	6	1	5.3
Ethylbenzene	300	µg/L	21	2	1,000	31	0	0
Fluoride	2[a]	mg/L	4	0	0.4	1	0	0
Iron	300[a]	µg/L	13	2	1,500	12	1	2,400
Manganese	50[a]	µg/L	13	3	1,200	10	1	120
Mercury	2	µg/L	13	1	6.2	10	0	0
MTBE	5[a]	µg/L	21	0	0.7	26	6	230
Napthalene	17[b]	µg/L	20	2	450	12	0	0
Nitrate as N	10	mg/L	23	0	4.5	28	0	4.8
Specific Conductivity	900[a]	µS/cm	12	9	400,000	5	1	260,000
Sodium	--	mg/L	14	--	150	13	--	150
Sulfate	250[a]	mg/L	13	0	6.7	22	1	360
TDS	500[a]	mg/L	15	1	630	12	1	530
Tert-Butyl Alcohol (TBA)	12	µg/L	17	0	0	24	2	140

a – secondary MCL
b – California Notification Level

Figure A-1. Nitrate as N, Groundwater Quality Observations (1986 – 2020)

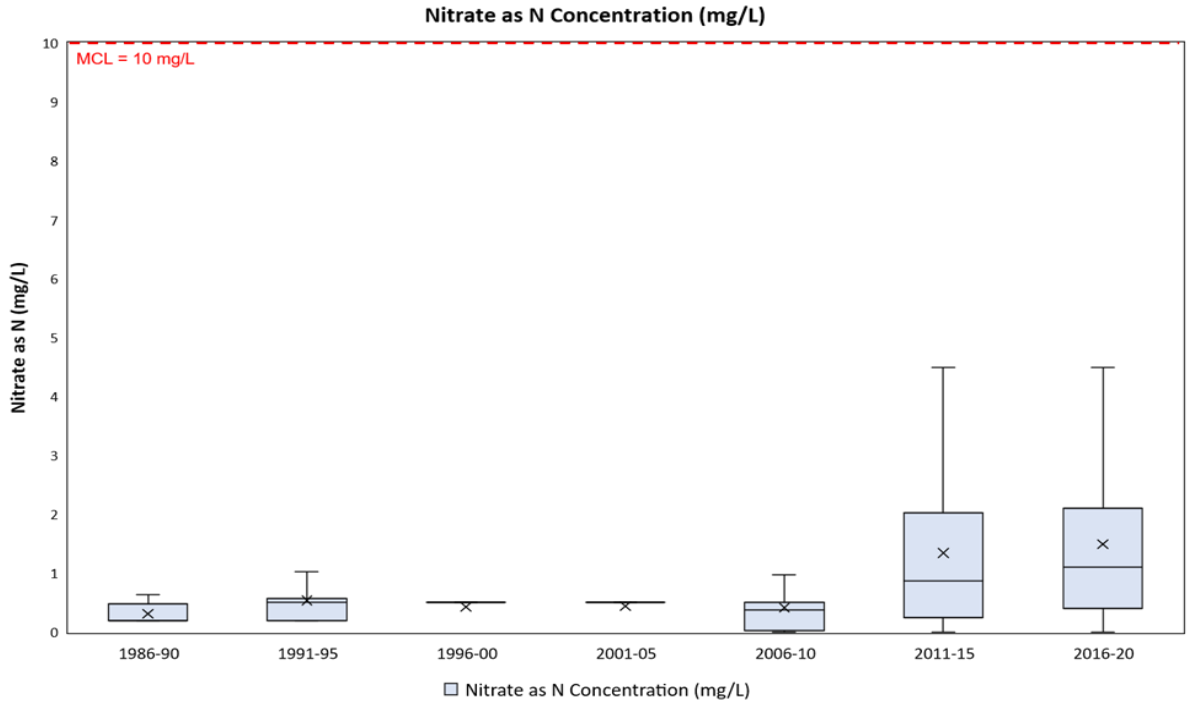

Figure A-2. TDS, Groundwater Quality Observations (1986 – 2020)

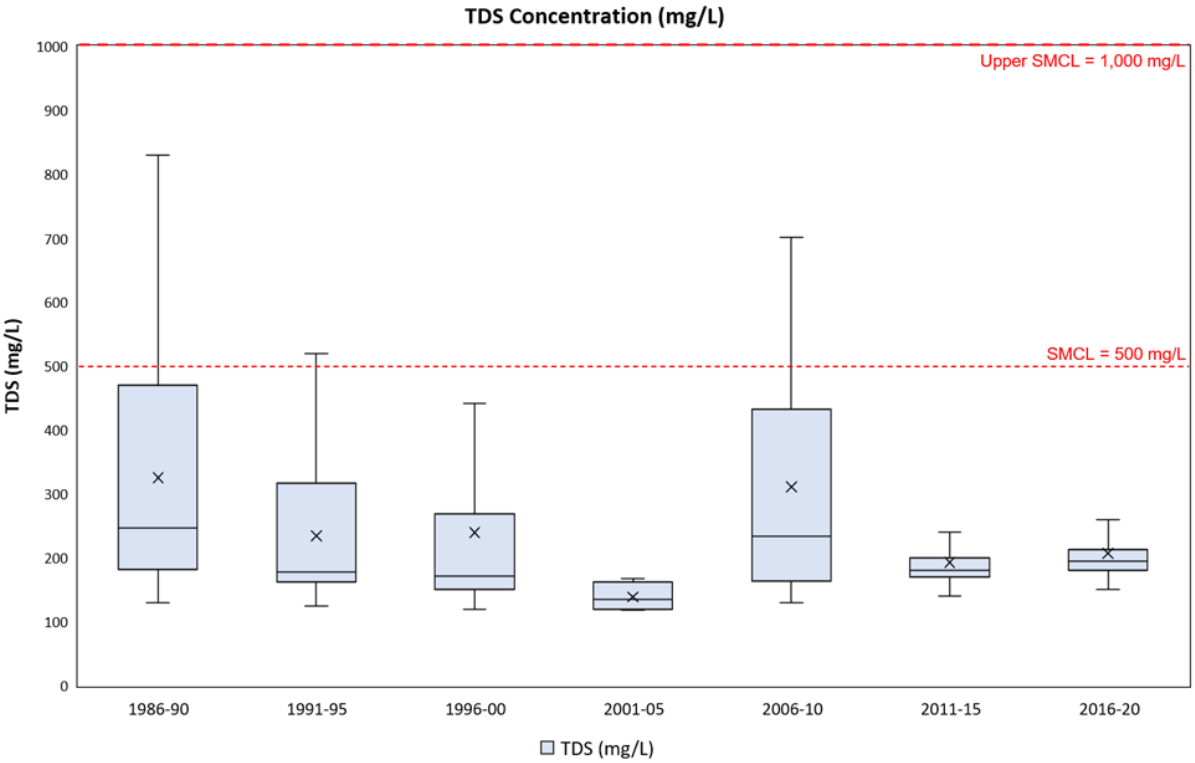

Figure A-3. Arsenic, Groundwater Quality Observations (1986 – 2020)

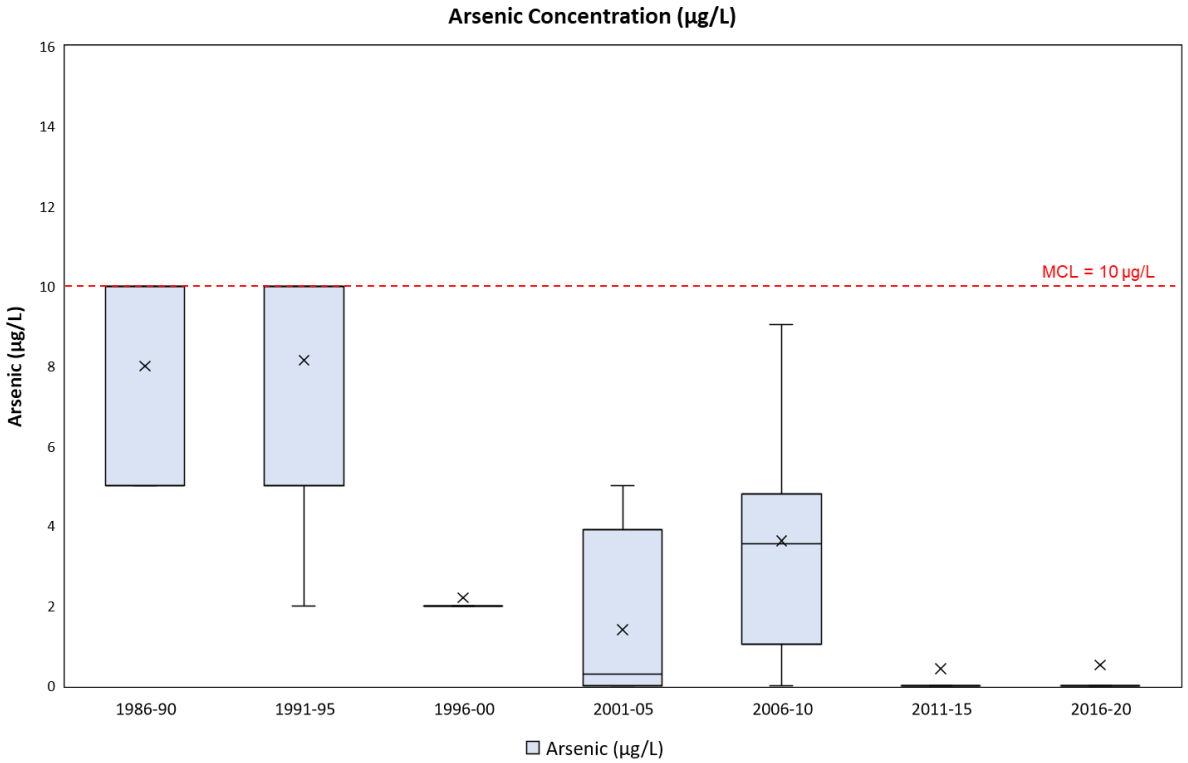

Figure A-4. Boron, Groundwater Quality Observations (1986 – 2020)

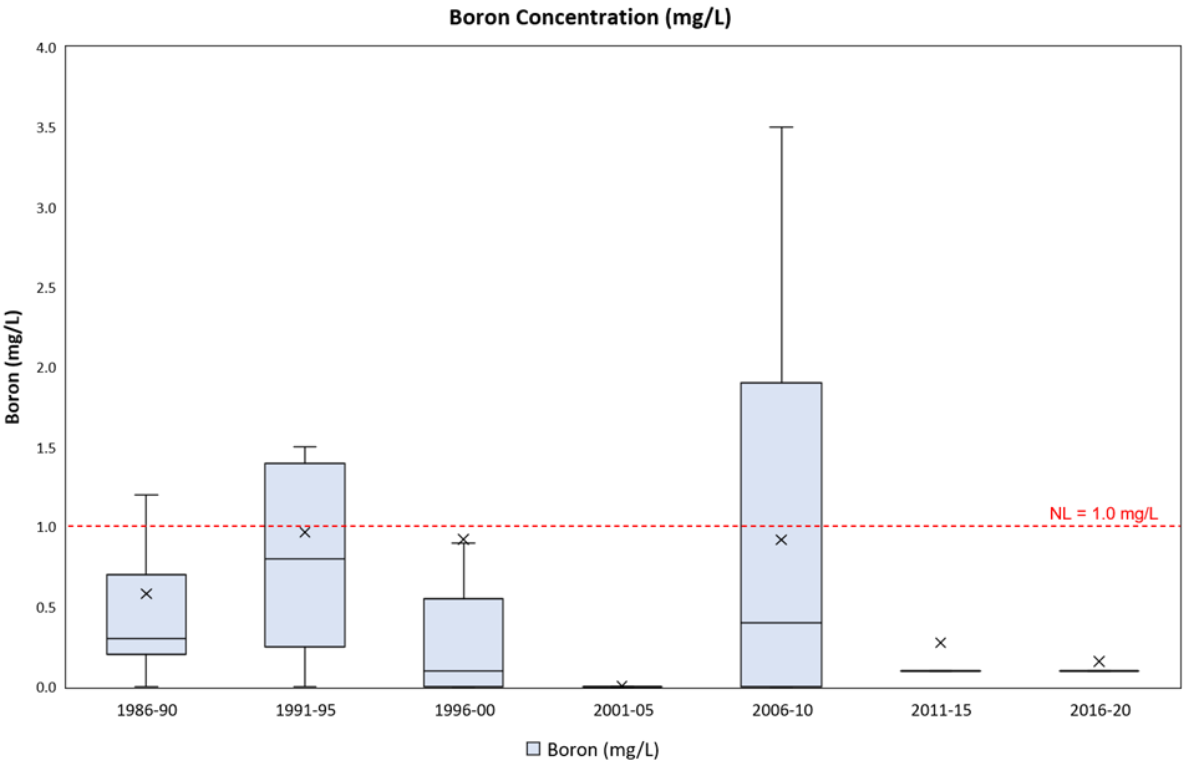

Figure A-5. pH, Groundwater Quality Observations (1986 – 2020)

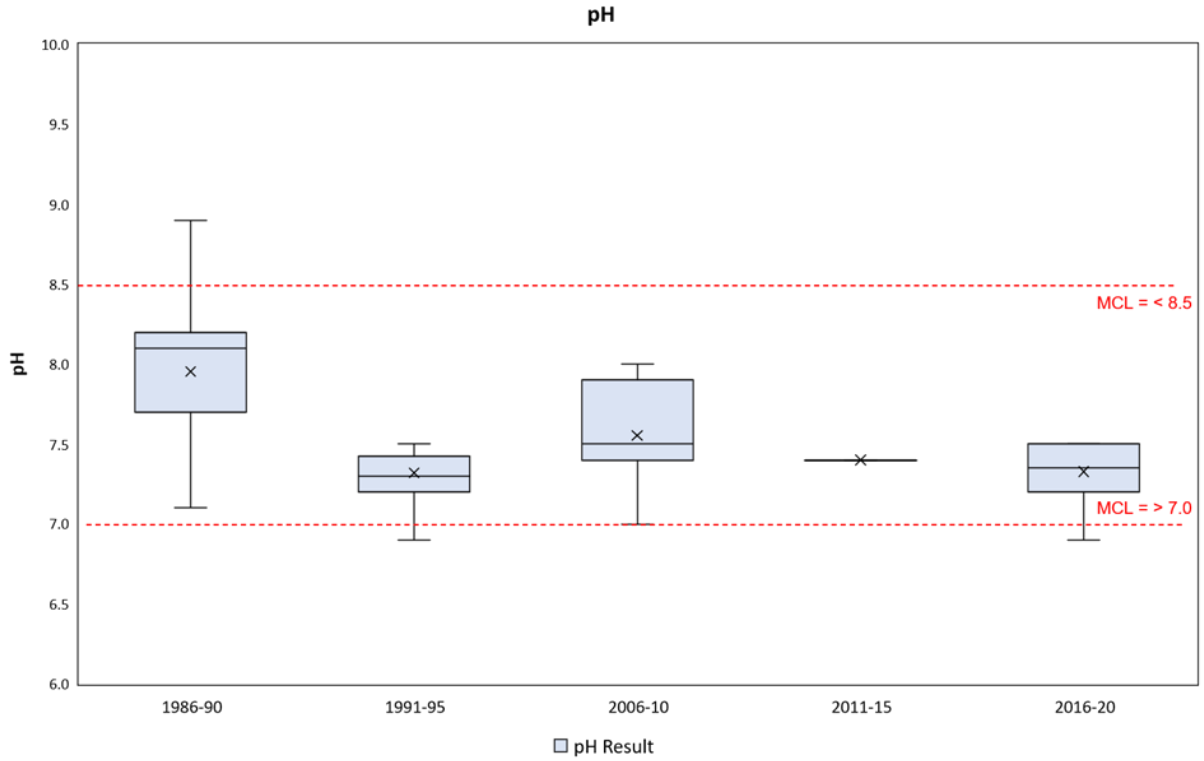

Figure A-6. Iron, Groundwater Quality Observations (1986 – 2020)

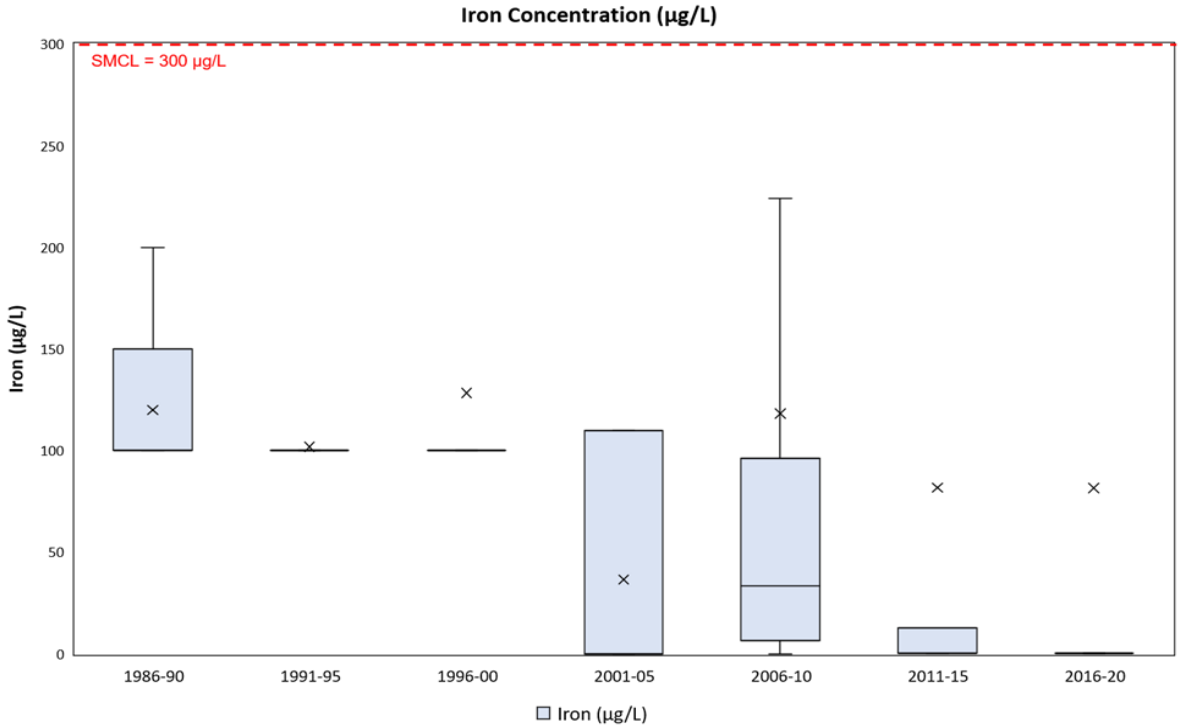

Figure A-7. Manganese, Groundwater Quality Observations (1986 – 2020)

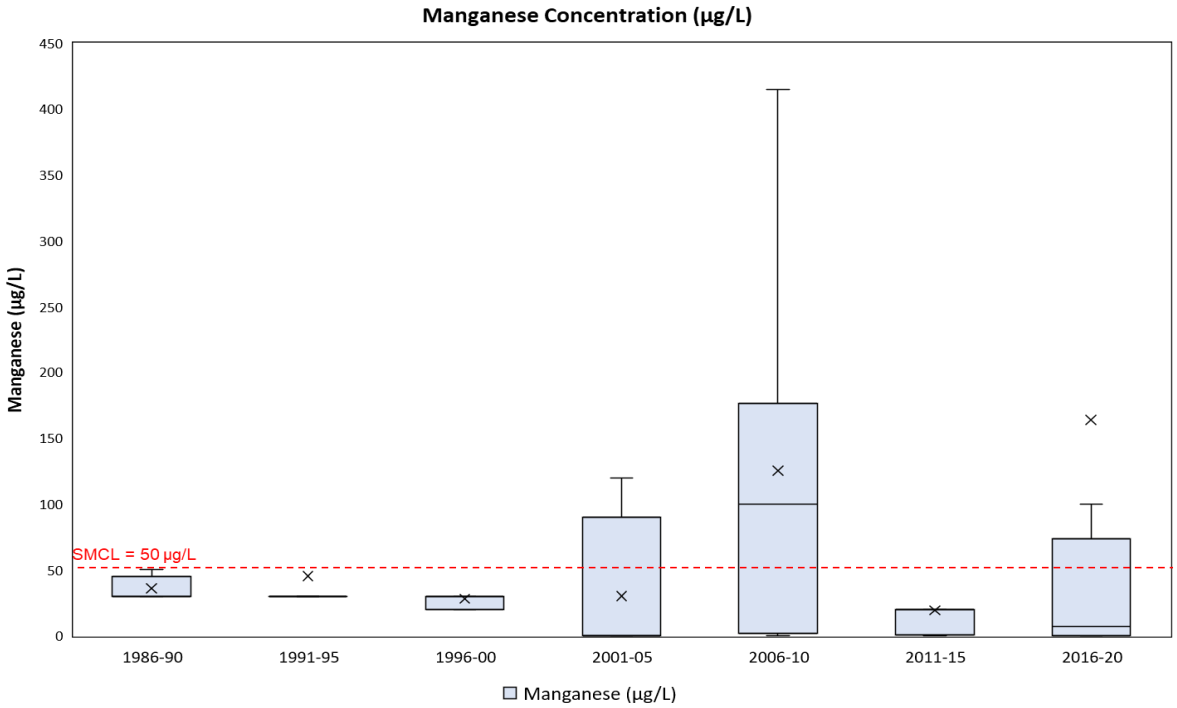

Figure A-8. MTBE, Groundwater Quality Observations (1996 – 2020)

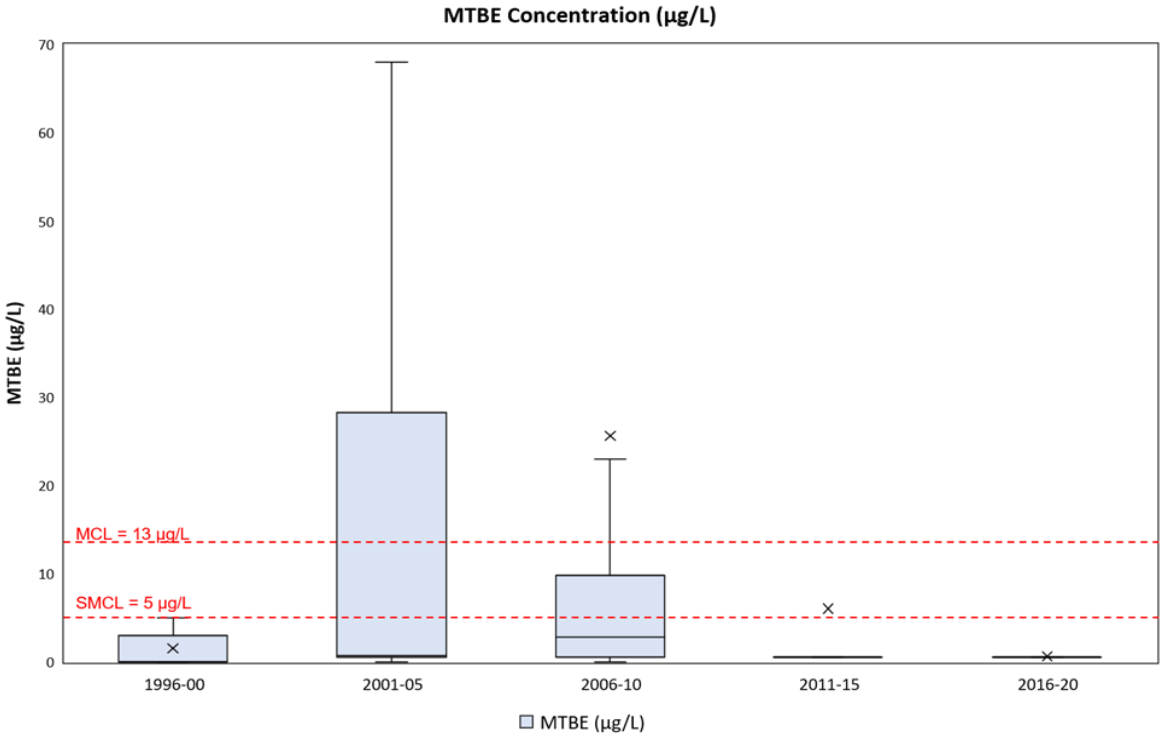

Figure A-9. Nitrate as N, Maximum Groundwater Quality Observations (1990 – 2020)

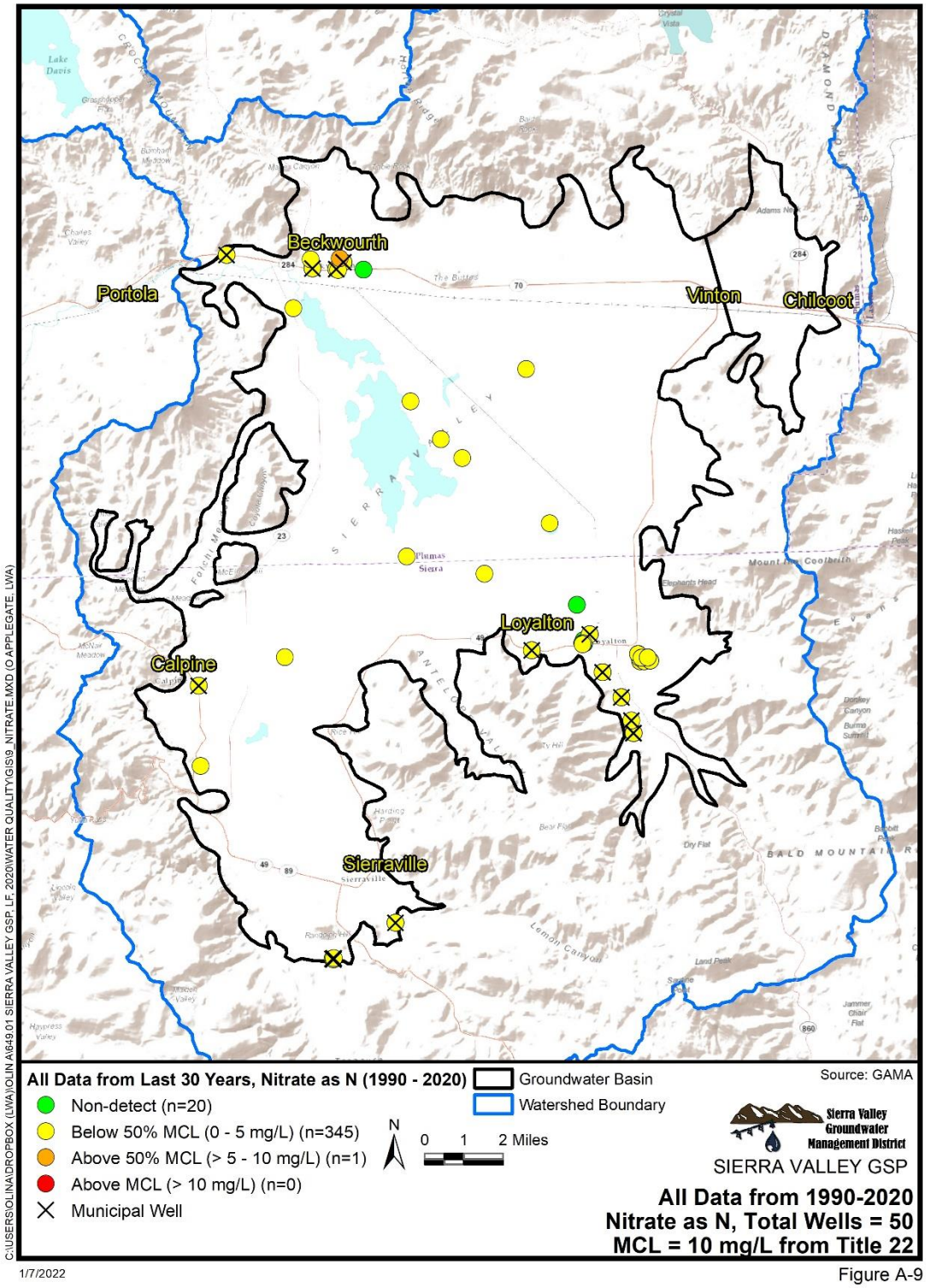

Figure A-10. Nitrate as N, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

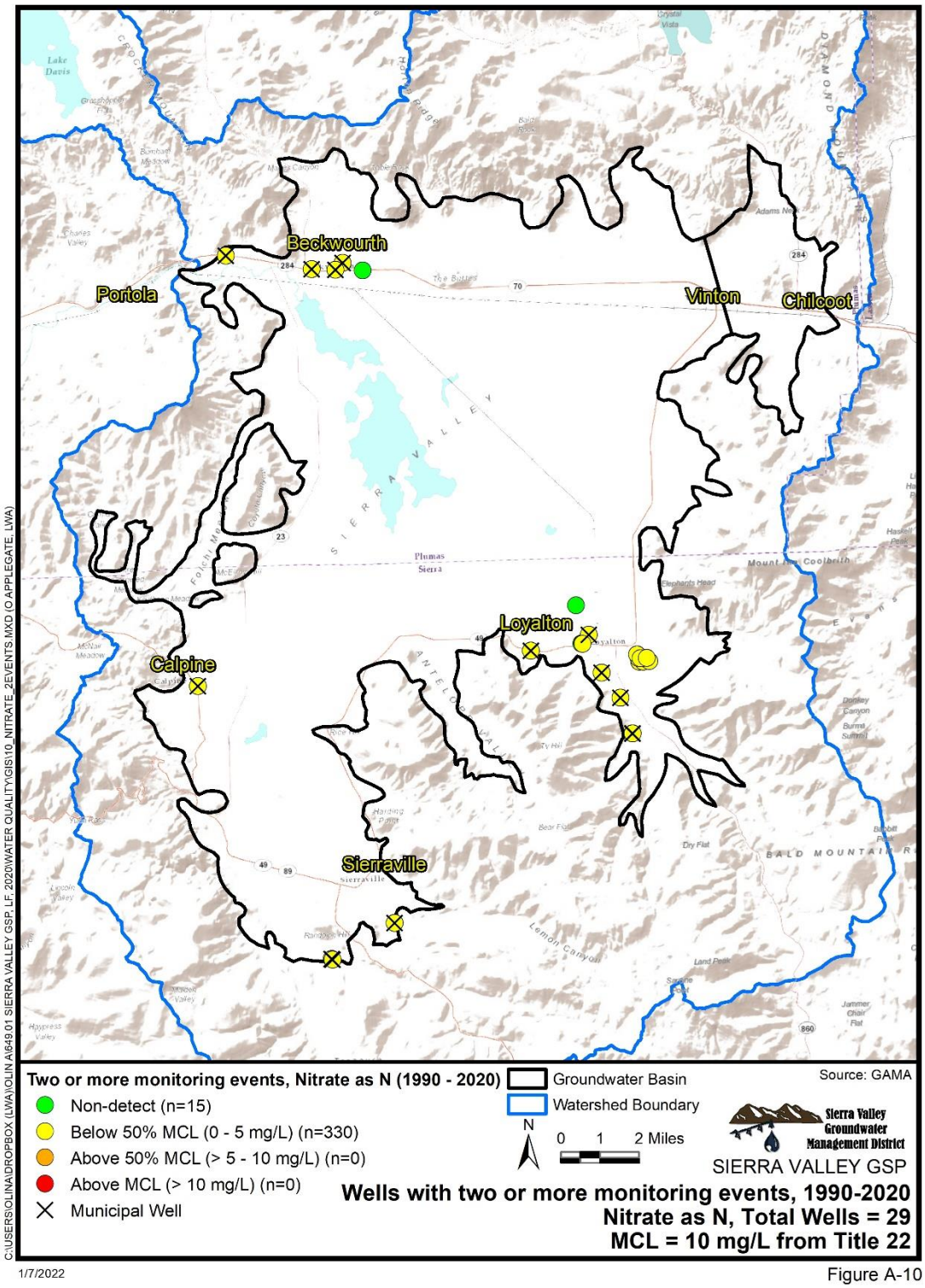

Figure A-10

Figure A-11. TDS, Maximum Groundwater Quality Observations (1990 – 2020)

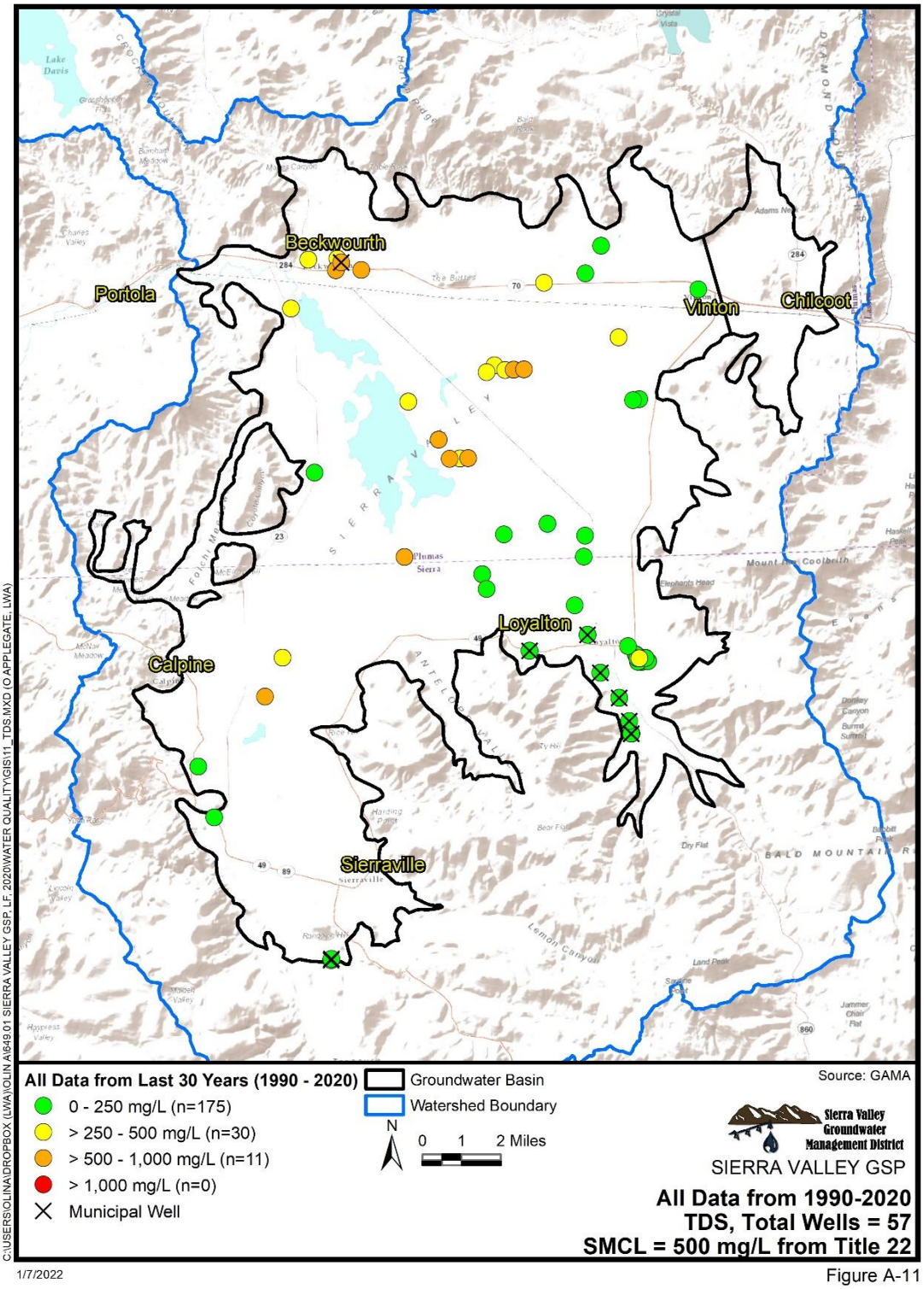

Figure A-11

Figure A-12. TDS, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

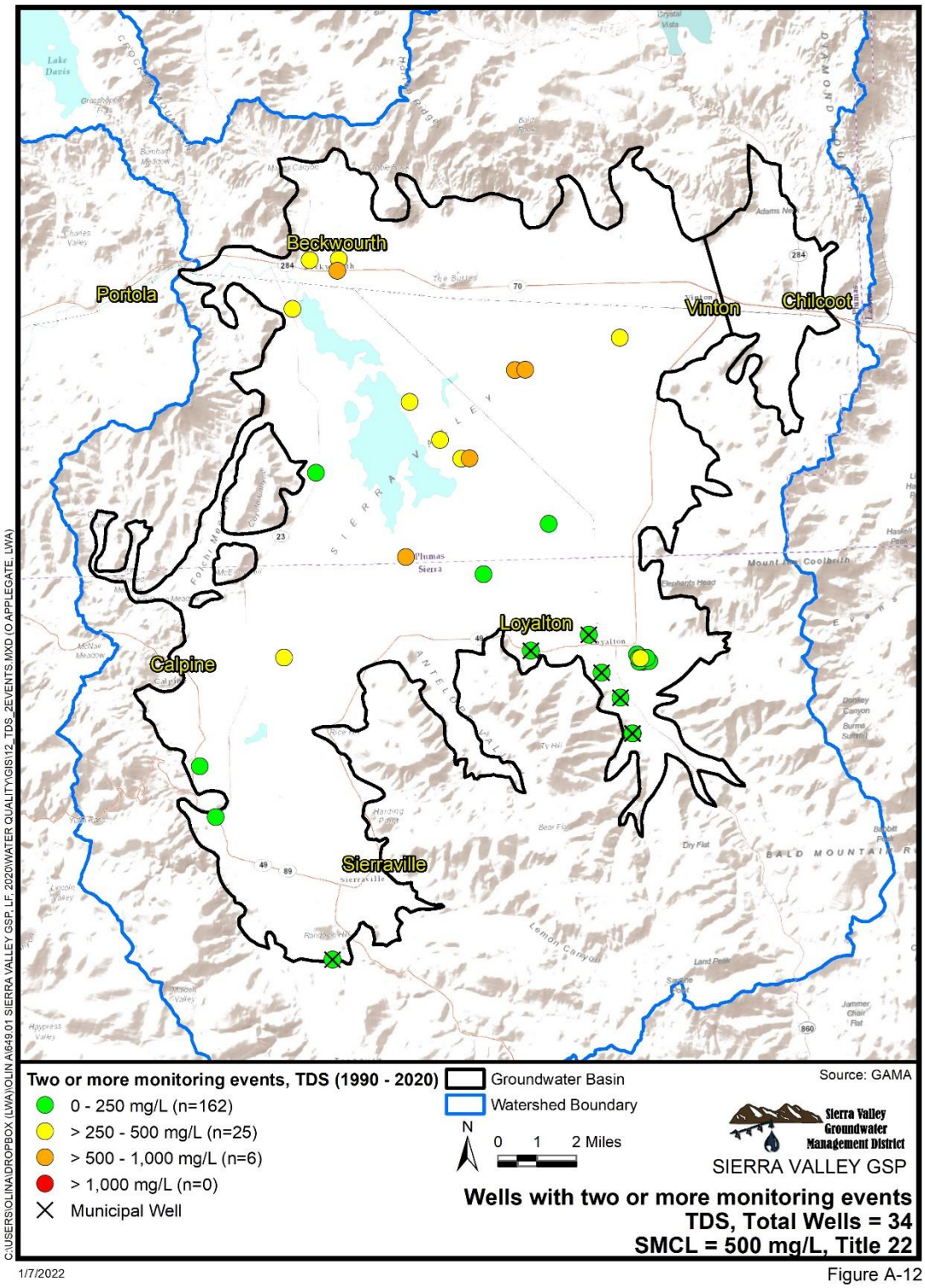

Figure A-12

Figure A-13. Arsenic, Maximum Groundwater Quality Observations (1990 – 2020)

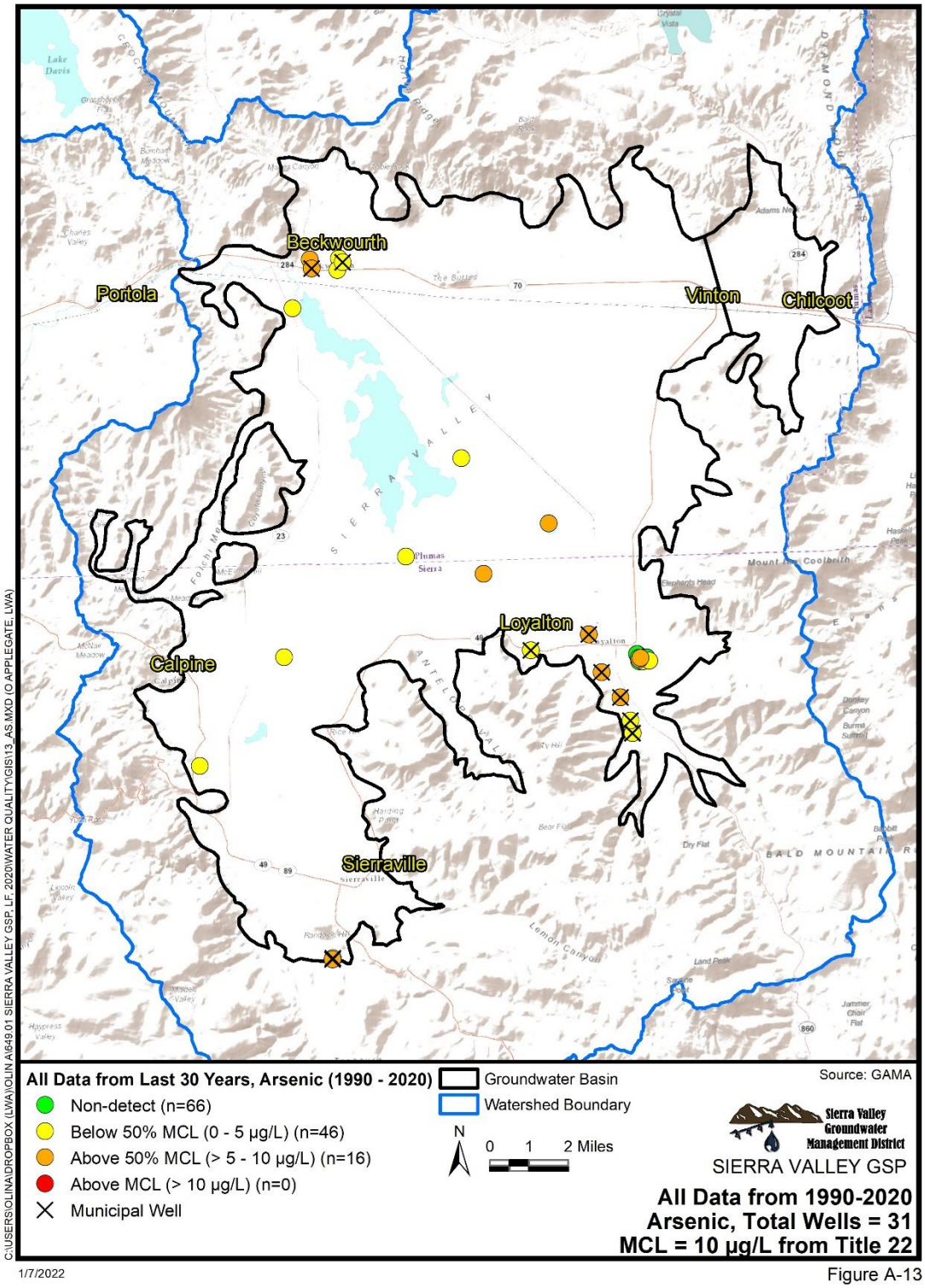

Figure A-14. Arsenic, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

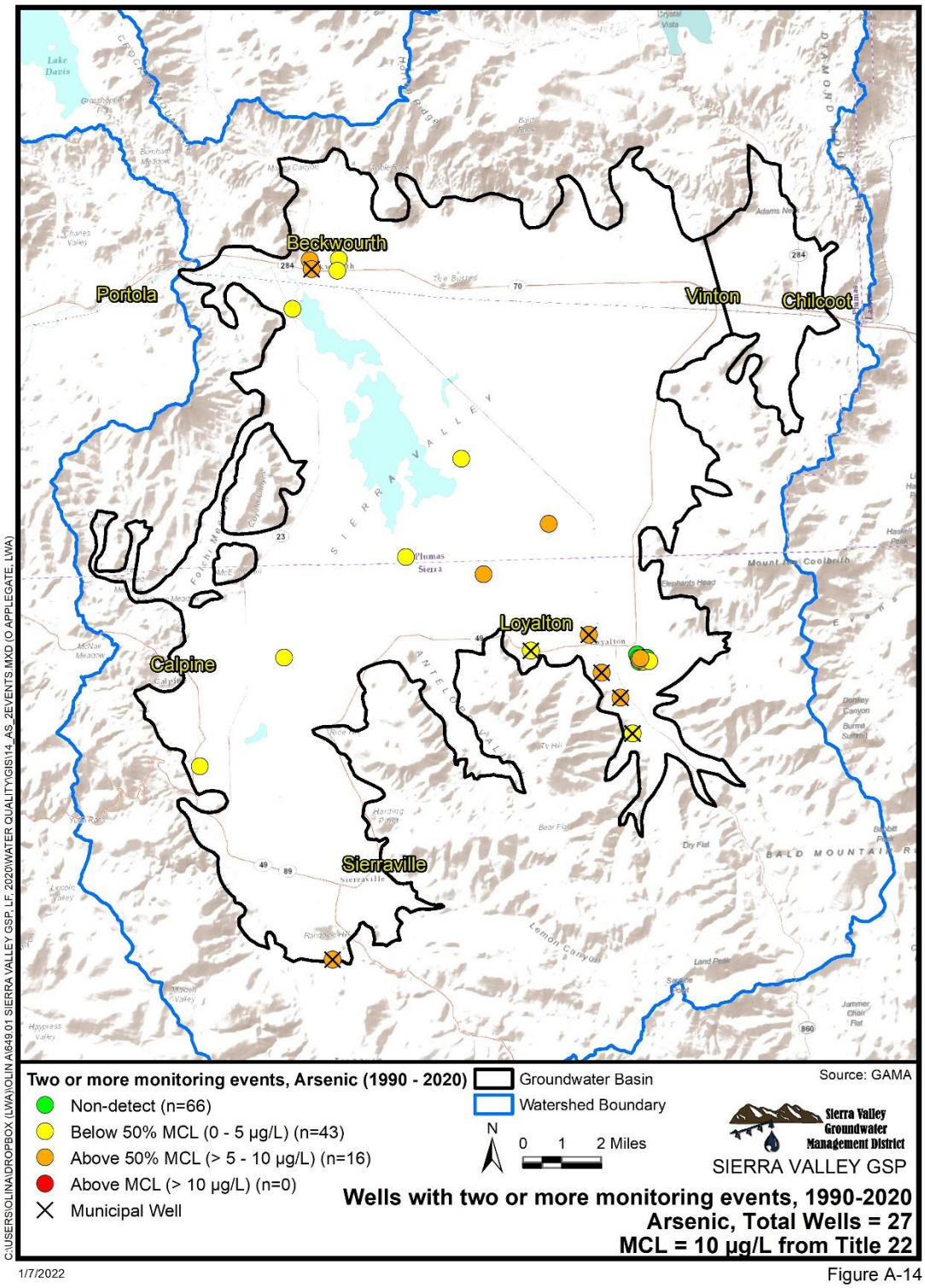

Figure A-14

Figure A-15. Boron, Maximum Groundwater Quality Observations (1990 – 2020)

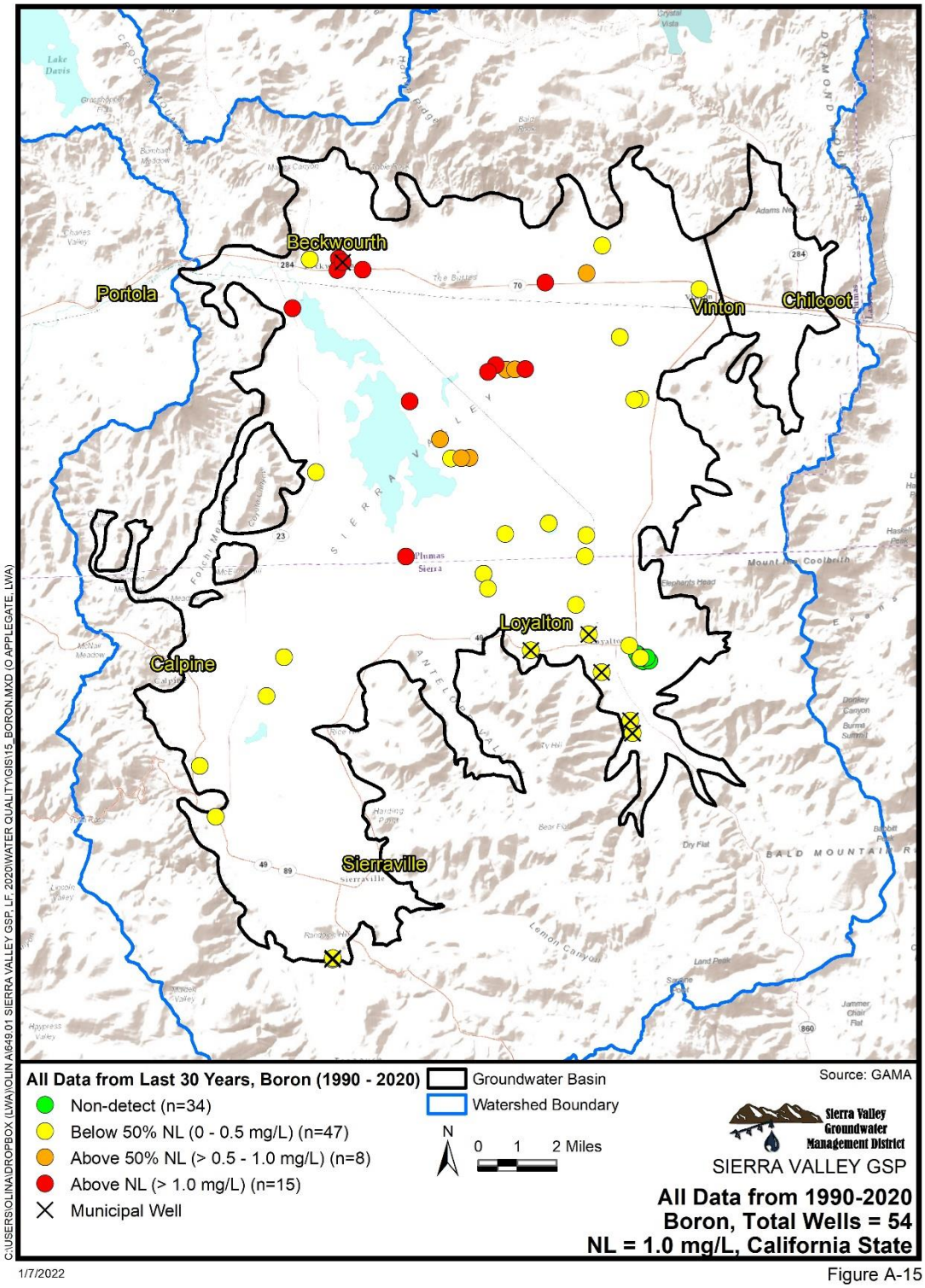

Figure A-16. Boron, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

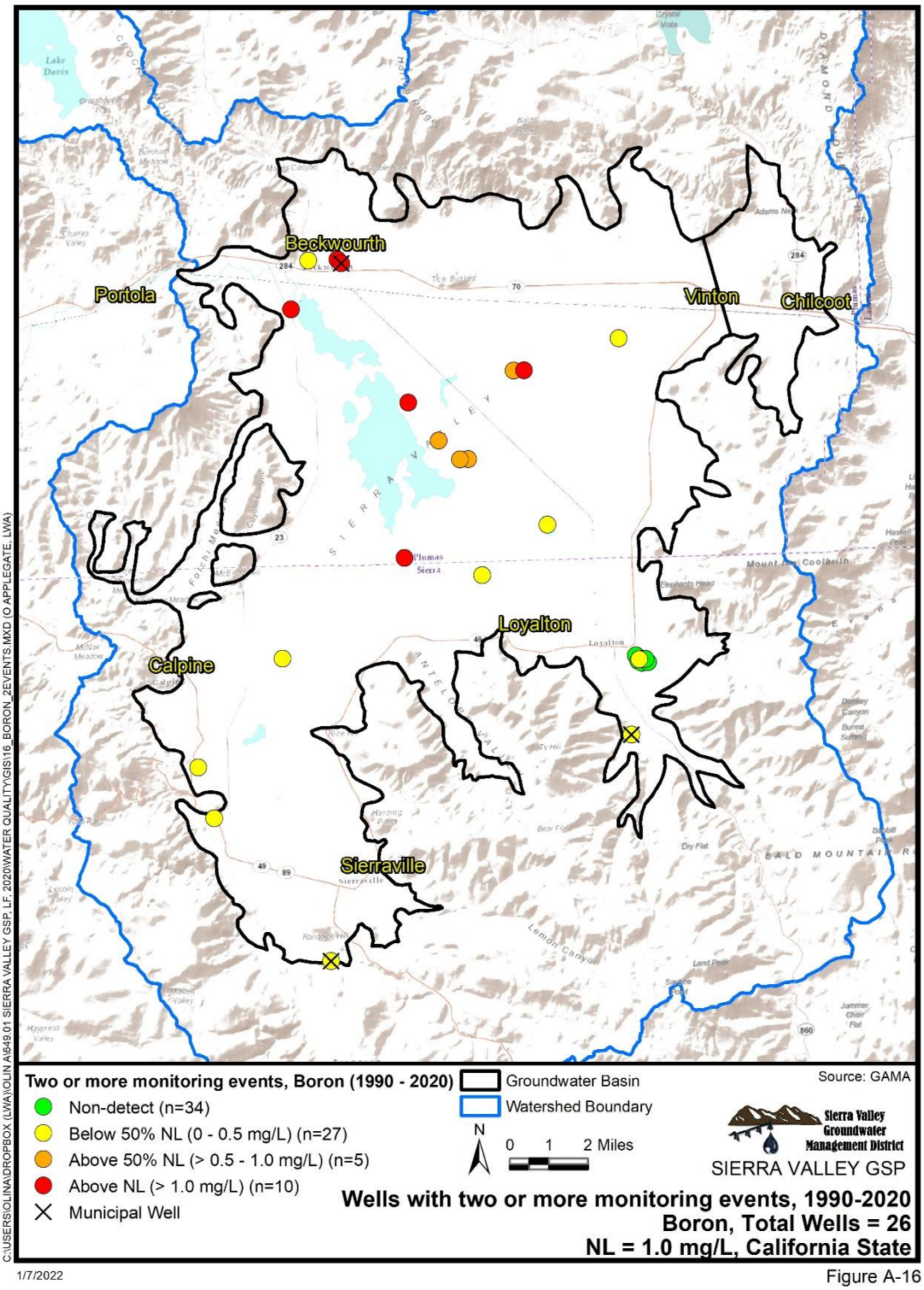

Figure A-17. pH, Groundwater Quality Observations (1990 – 2020)

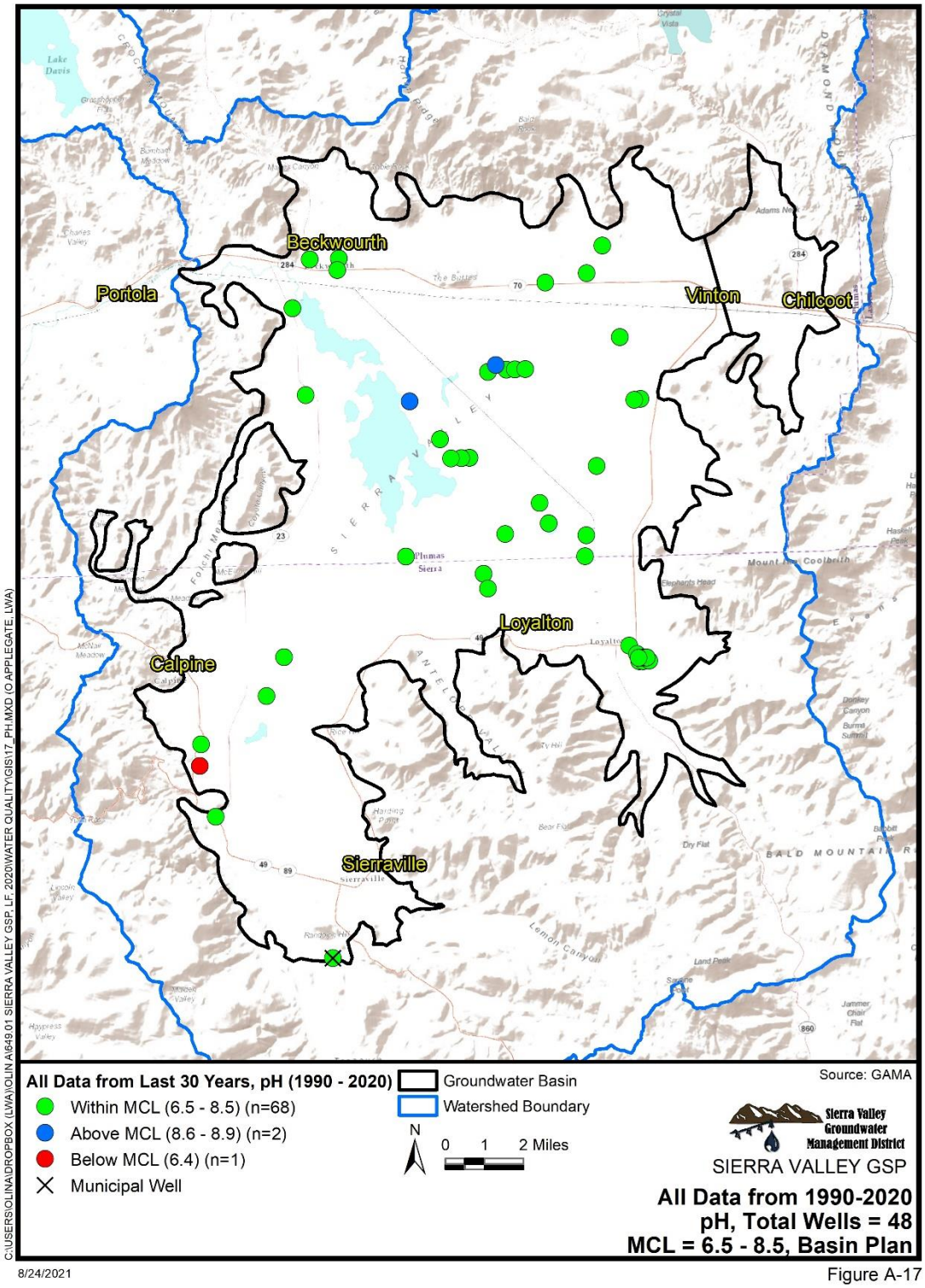

Figure A-18. pH, Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

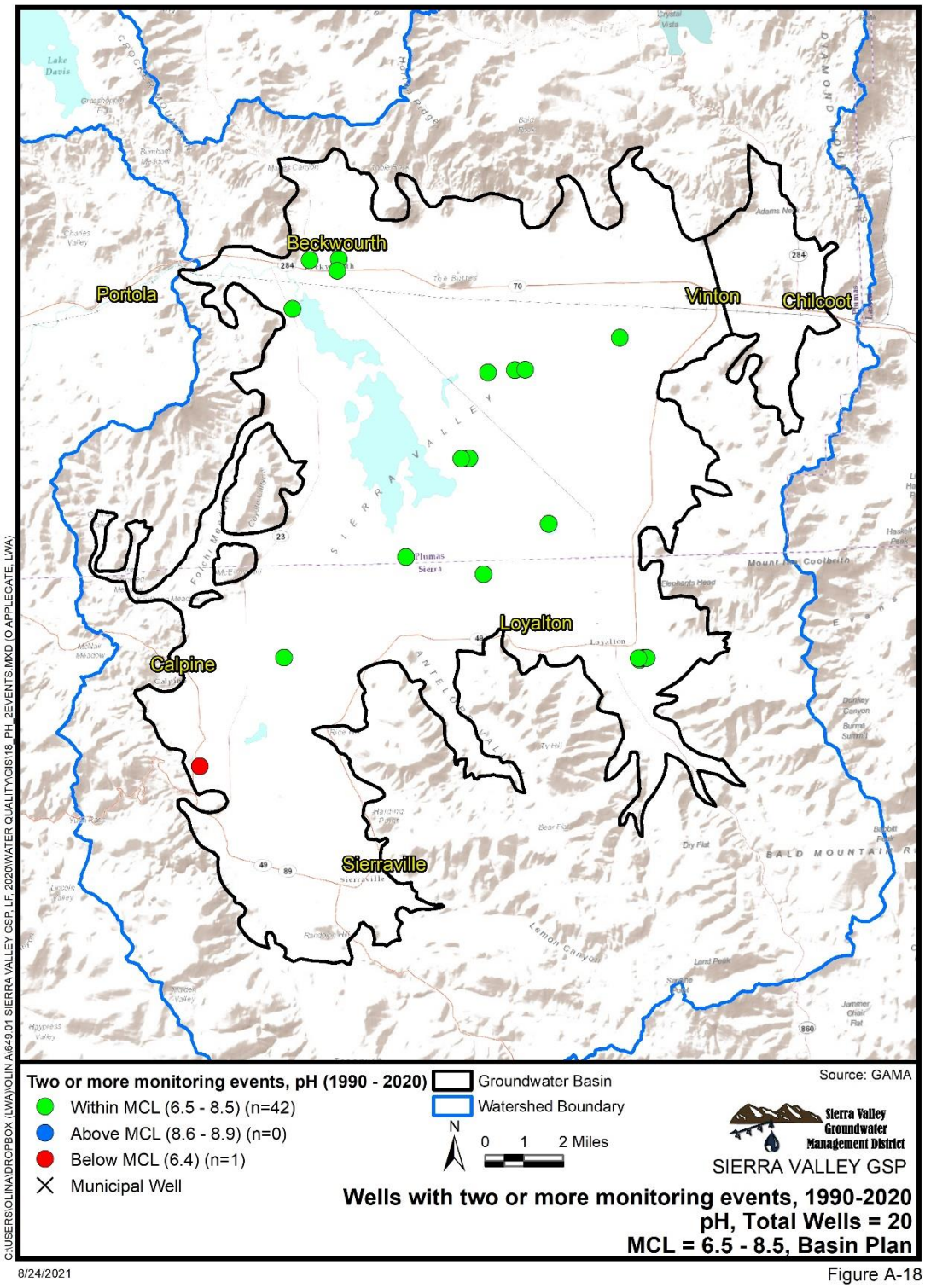

Figure A-19. Iron, Maximum Groundwater Quality Observations (1990 – 2020)

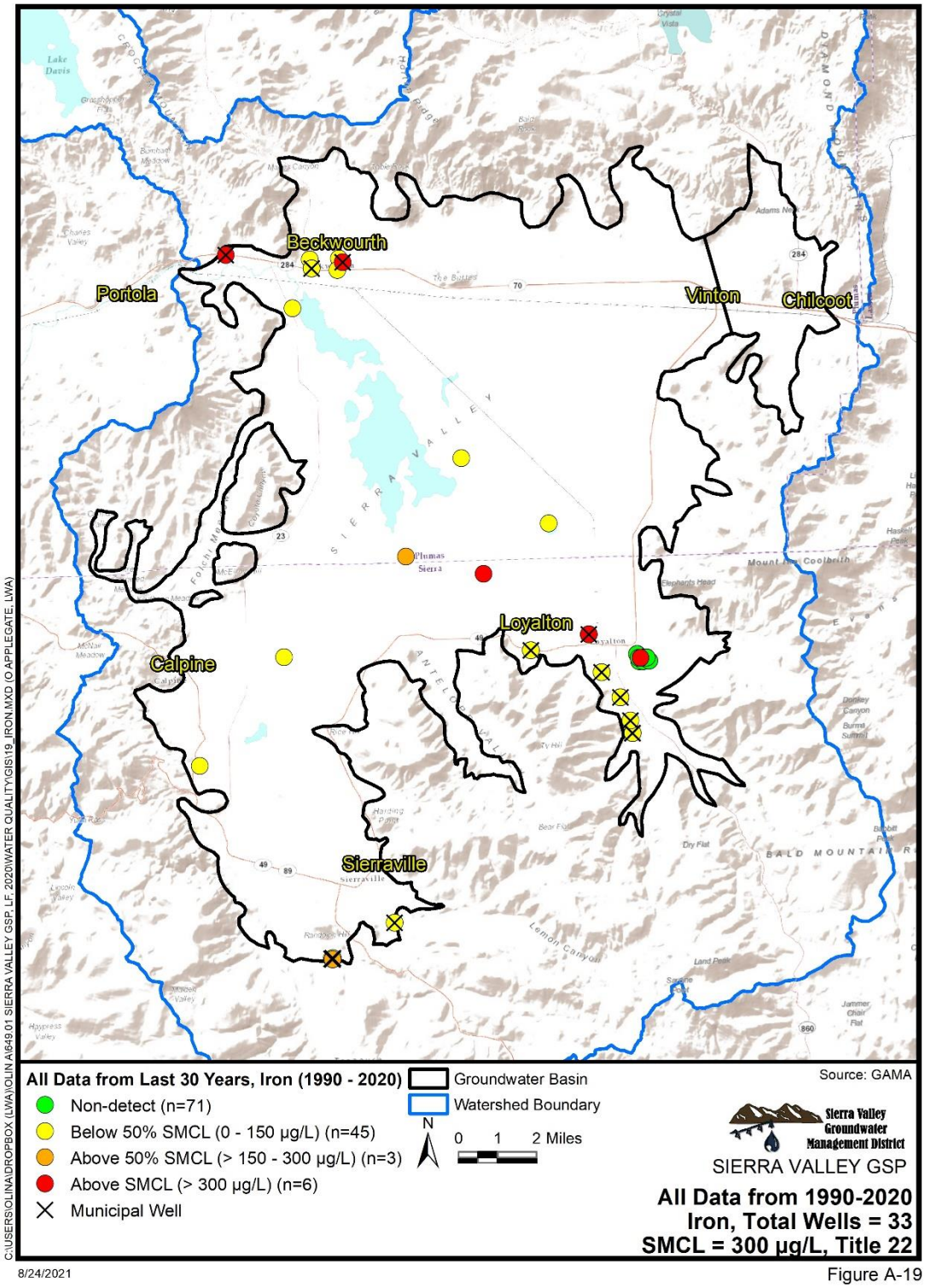

Figure A-20. Iron, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

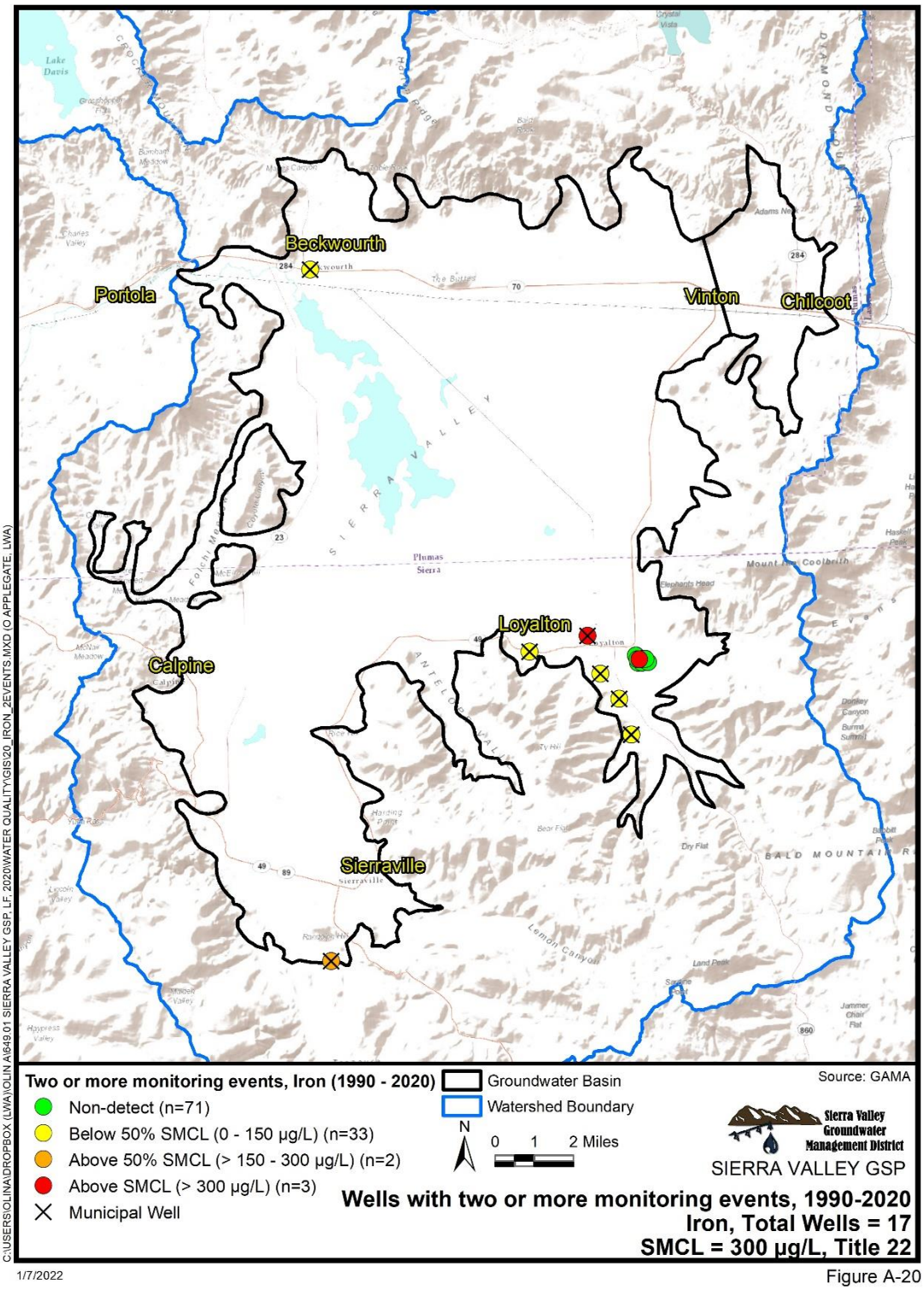

Figure A-21. Manganese, Maximum Groundwater Quality Observations (1990 – 2020)

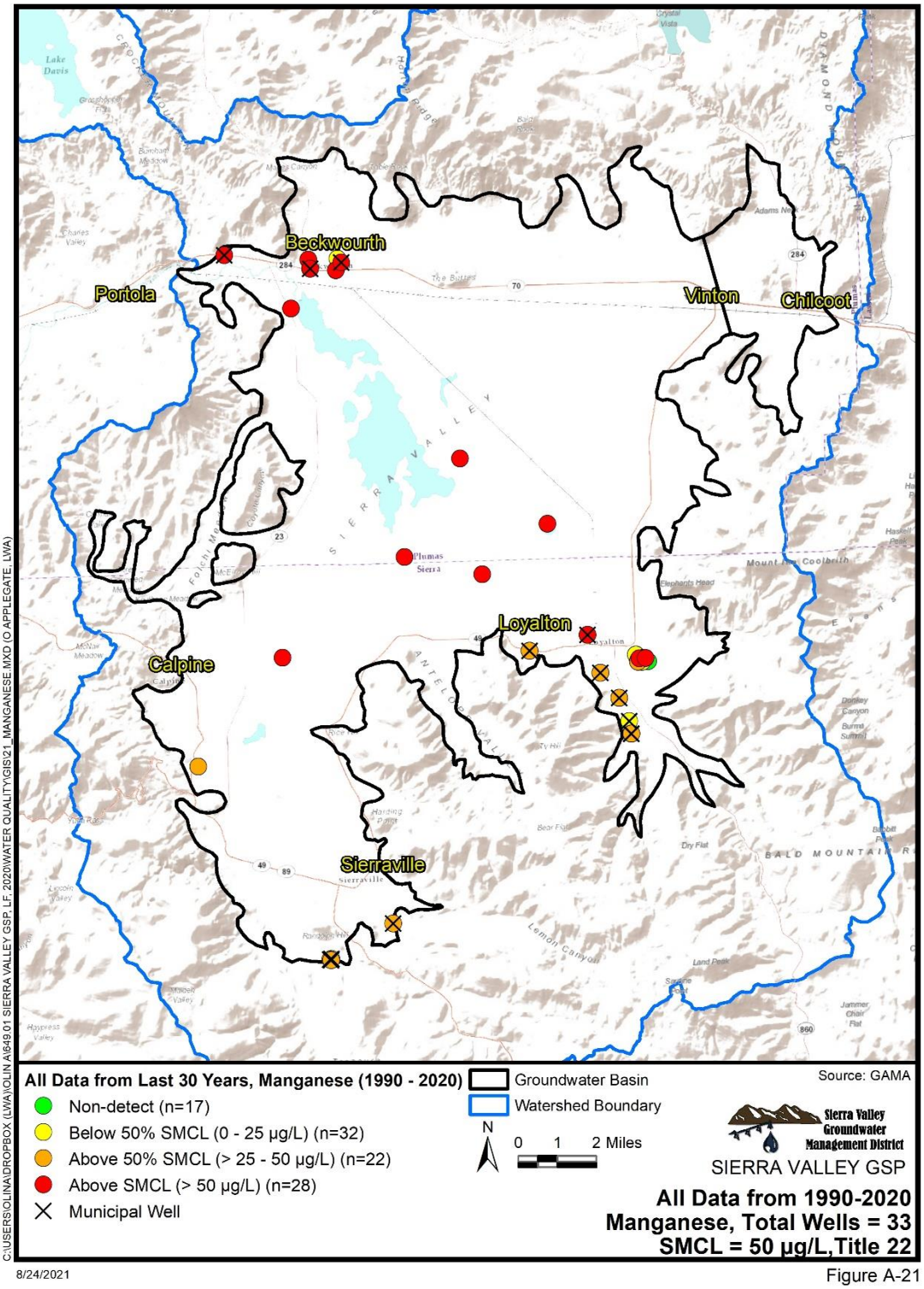

Figure A-22. Manganese, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

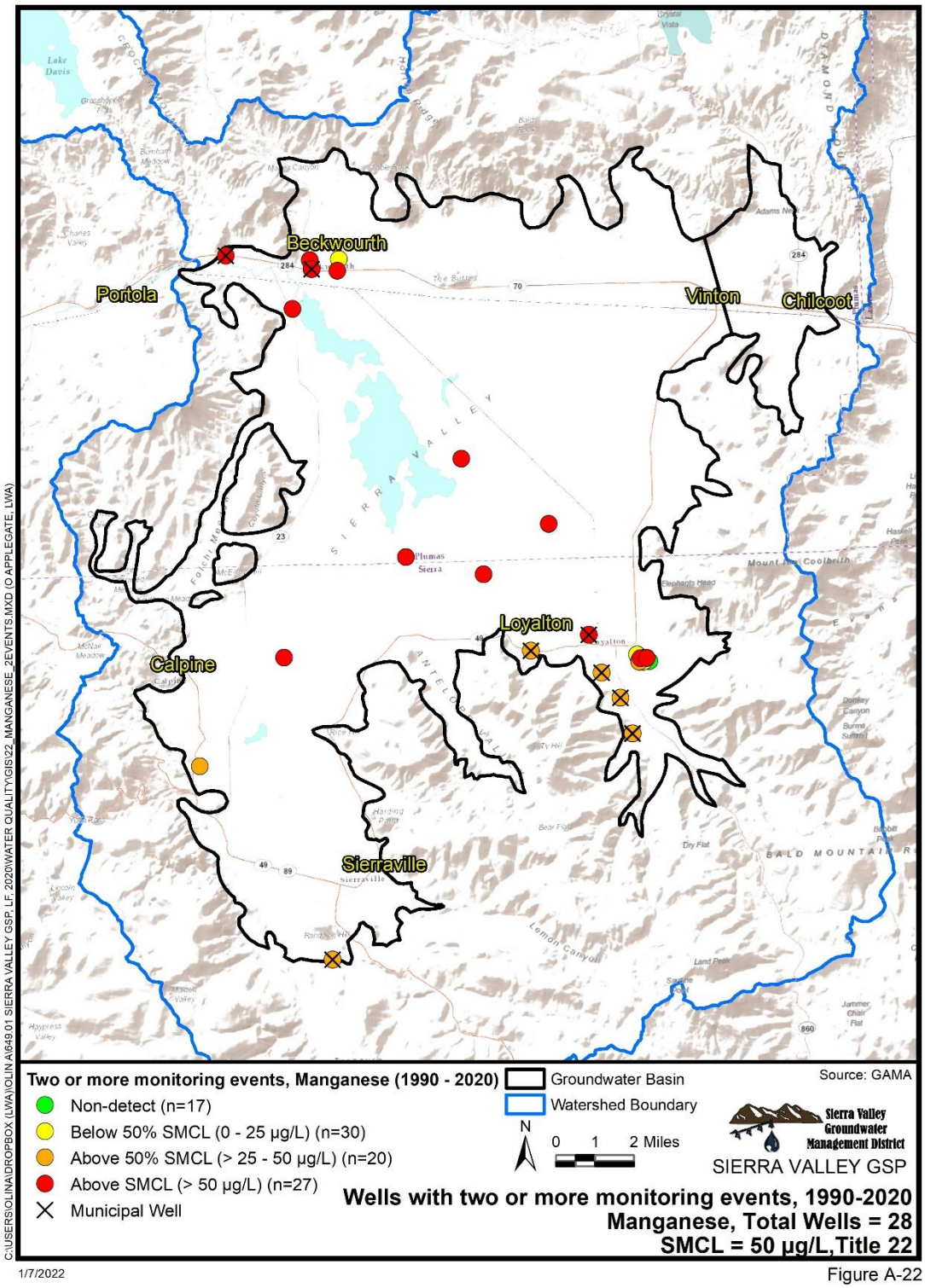

Figure A-23. MTBE, Maximum Groundwater Quality Observations (1990 – 2020)

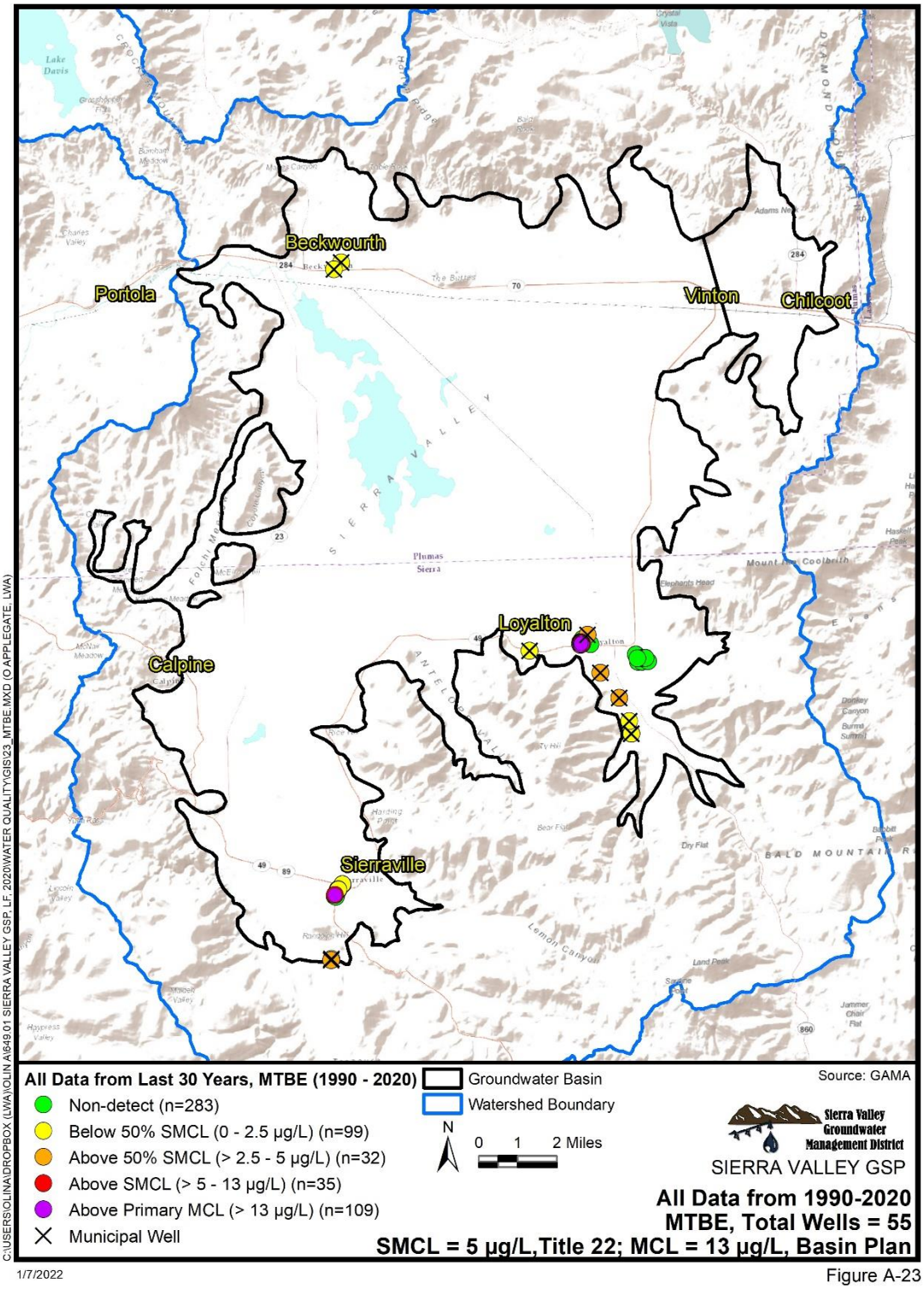

Figure A-24. MTBE, Maximum Groundwater Quality Observations from Wells with Two or More Measurements (1990 – 2020)

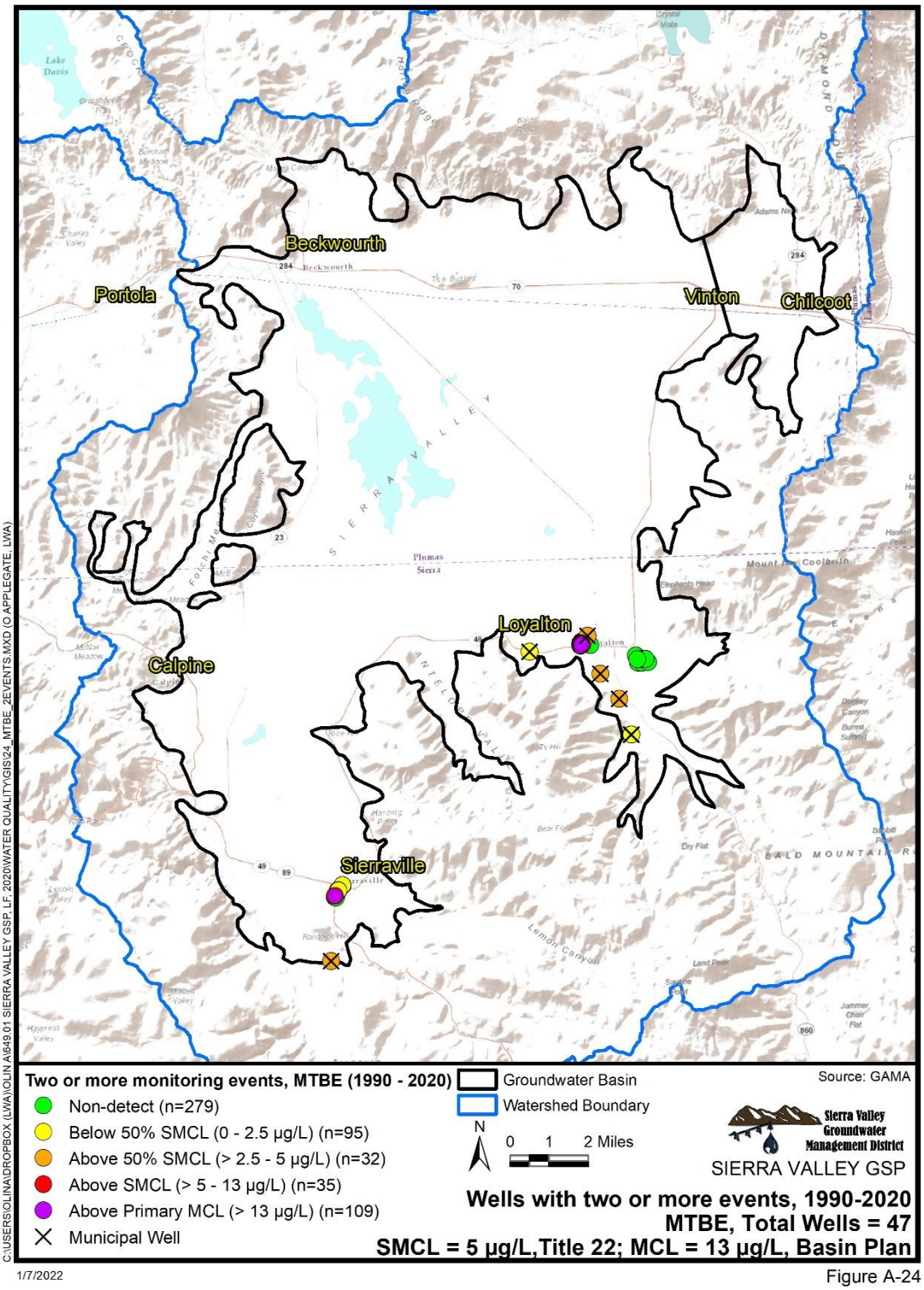

Figure A-24