

2021 Mississippi River Bacteria Sampling

Summary of 2021 Data

Portions of MWMO's reach of the Mississippi River are listed on the MPCA's list of impaired waters for fecal coliform pollution. In 2008, the MPCA changed the bacteria water quality standard from fecal coliform to *E. coli* for bacteria monitoring in Minnesota. The chronic standard for *E. coli* in 2B and 2Bd waters is 126 CFU/100 mL for a monthly geomean of at least five samples. The MPCA *E. coli* acute standard states that *E. coli* cannot exceed 1,260 CFU/100mL in more than 10% of the samples taken in one month. In 2021, one river site (MR859.1W) in May and three locations (MR857.6W, MR849.9W, MR848.1W) in October exceeded the acute standard, as shown in Table 1. Samples were collected on the second and fourth Thursday of each month April through October. Therefore, the small number of samples collected each month greatly affect these results and a monthly geomean is not calculated. Most samples were taken during baseflow conditions with the exception of two sampling dates in May and October, in which samples were collected during a rain event. Figures 1 - 7 show the *E. coli* sample results compared to the MPCA standards, Figure 8 shows all sampling sites together, and Figure 9 shows boxplots of all samples collected from each sampling day. The *E. coli* sample results and other sampling parameters are presented in more detail in Tables 2 - 8.

Mississippi River Bacteria Data

Table 1. Sites exceeded 1,260MPN/100mL in >10% of samples in a given month for the Mississippi River in 2021.

Month	Sites that exceed 1,260 MPN/100 mL in > 10% of samples
April	None
May	MR859.1W
June	None
July	None
August	None
September	None
October	MR857.6W, MR849.9W, MR848.1W

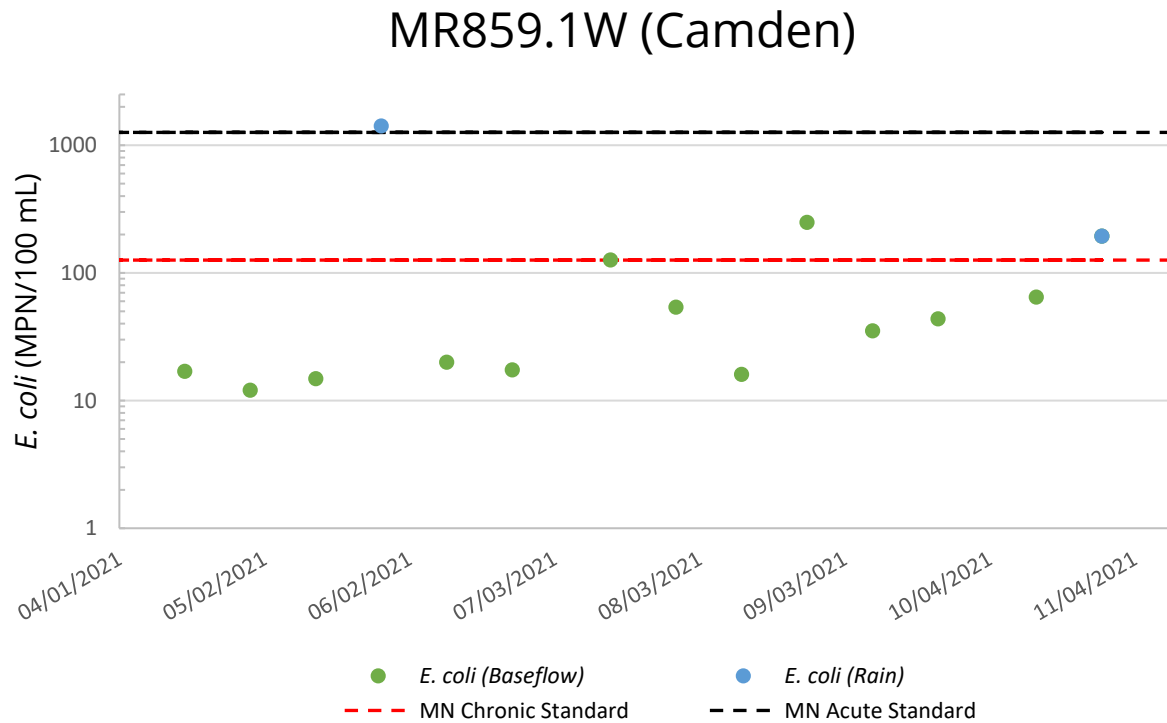


Figure 1. 2021 *E. coli* values at MR859.1W.

MR857.6W (MPRB Boat Launch)

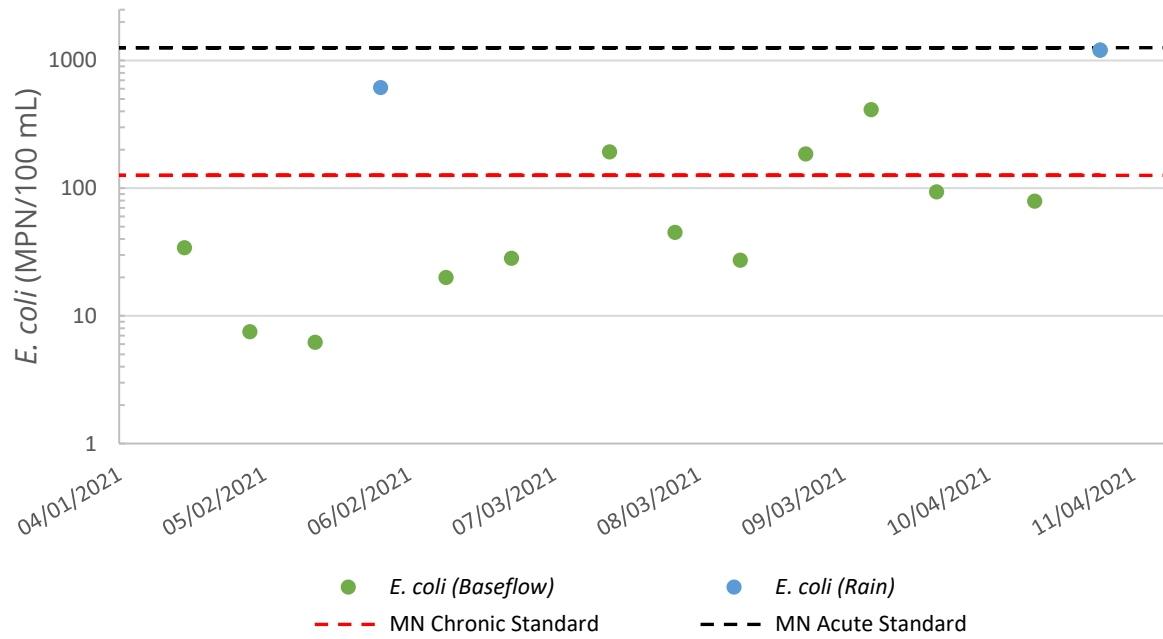


Figure 2. 2021 *E. coli* values at ME857.6W.

MR854.9W (North Loop)

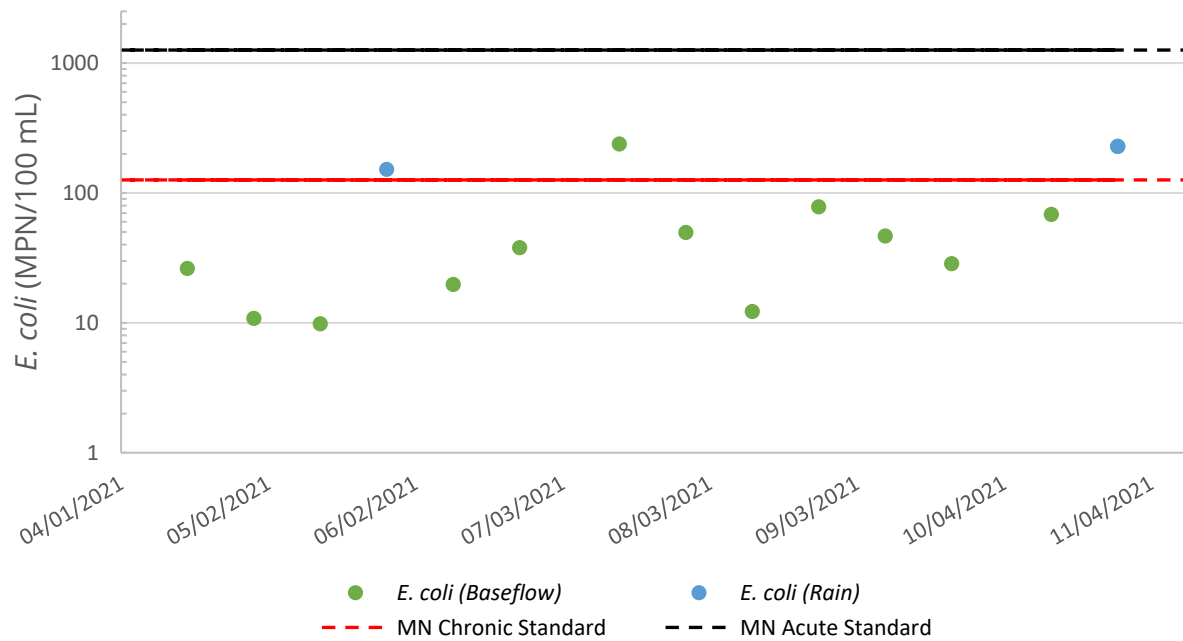


Figure 3. 2021 *E. coli* values at MR854.9W.

MR853.5E (Saint Anothony Falls Laboratory)

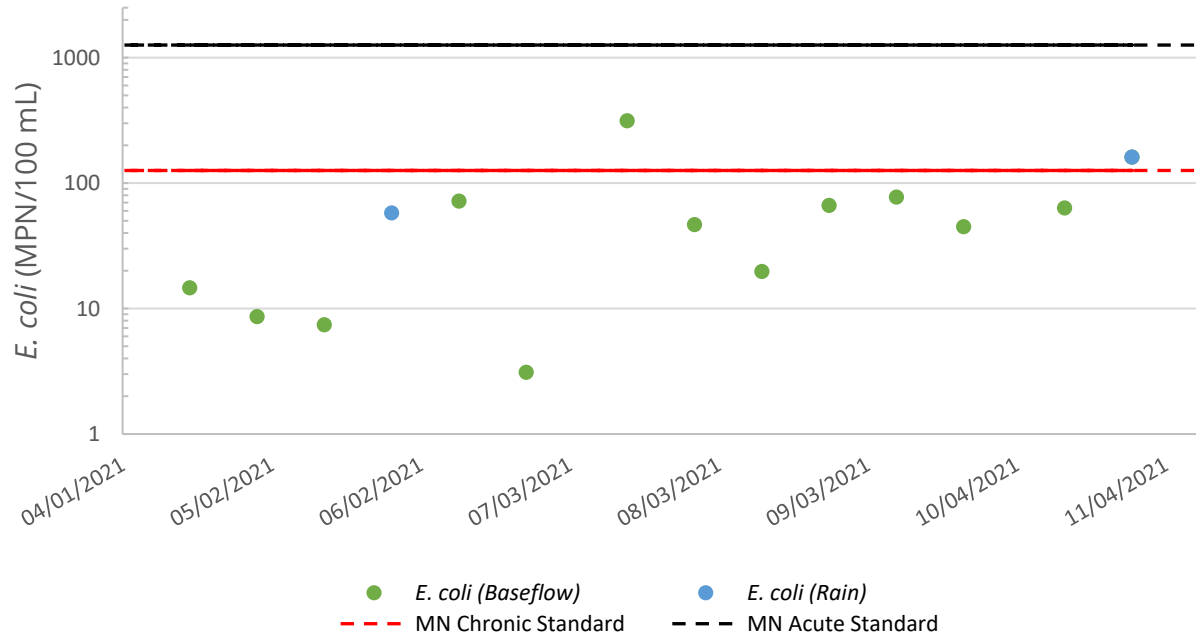


Figure 4. 2021 *E. coli* values at MR853.5E.

MR852.2E (UMN Boat Launch)

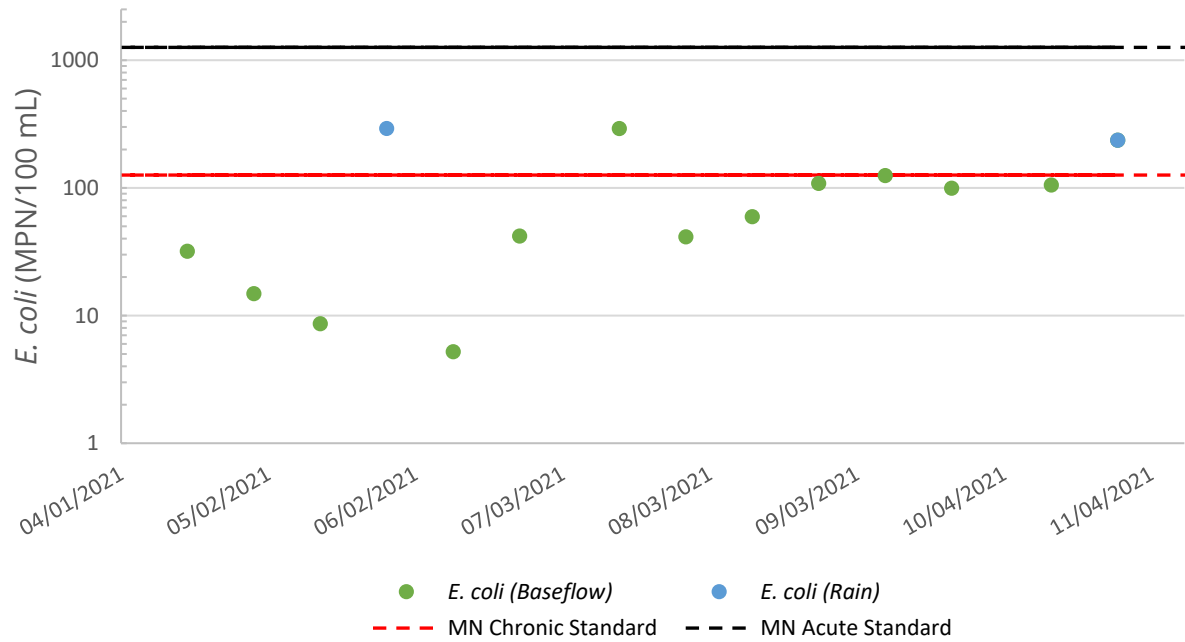


Figure 5. 2021 *E. coli* values at MR852.2E.

MR849.9W (Lake Street Bridge)

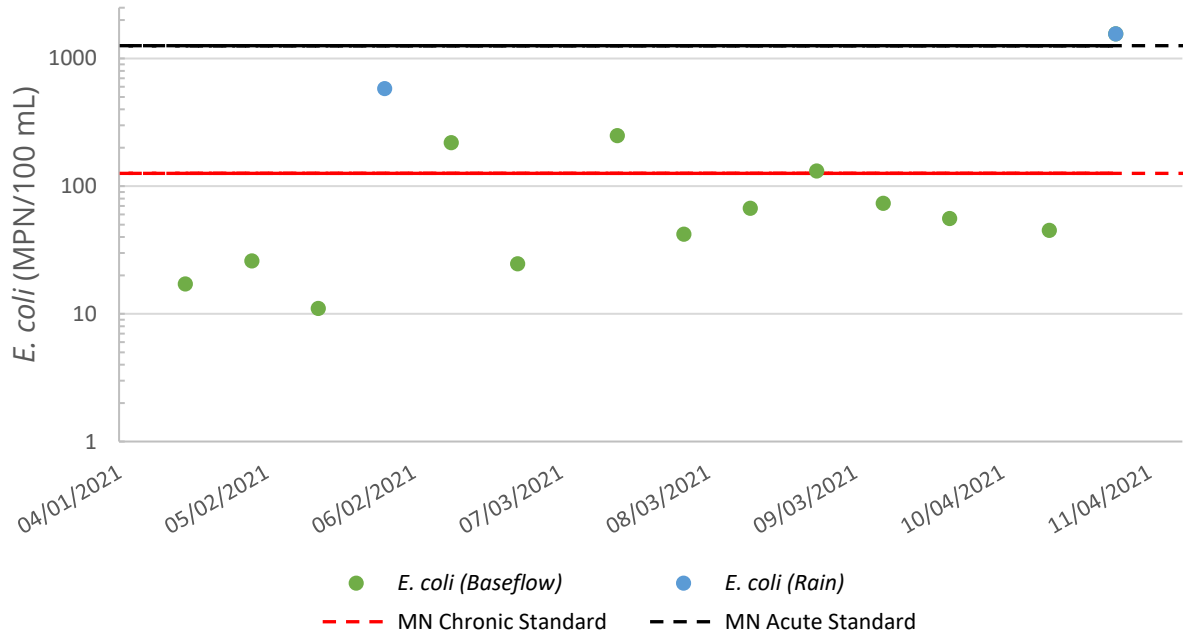


Figure 6. 2021 *E. coli* values at MR849.9W.

MR848.1 (4300 West River Parkway)

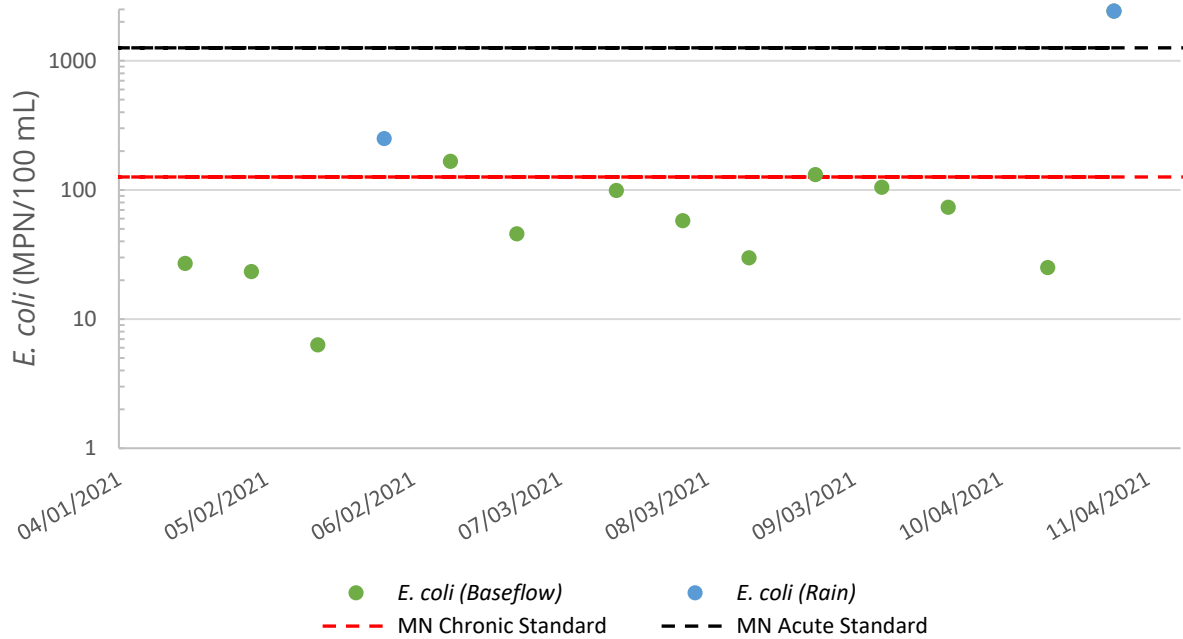


Figure 7. 2021 *E. coli* values at MR848.1W.

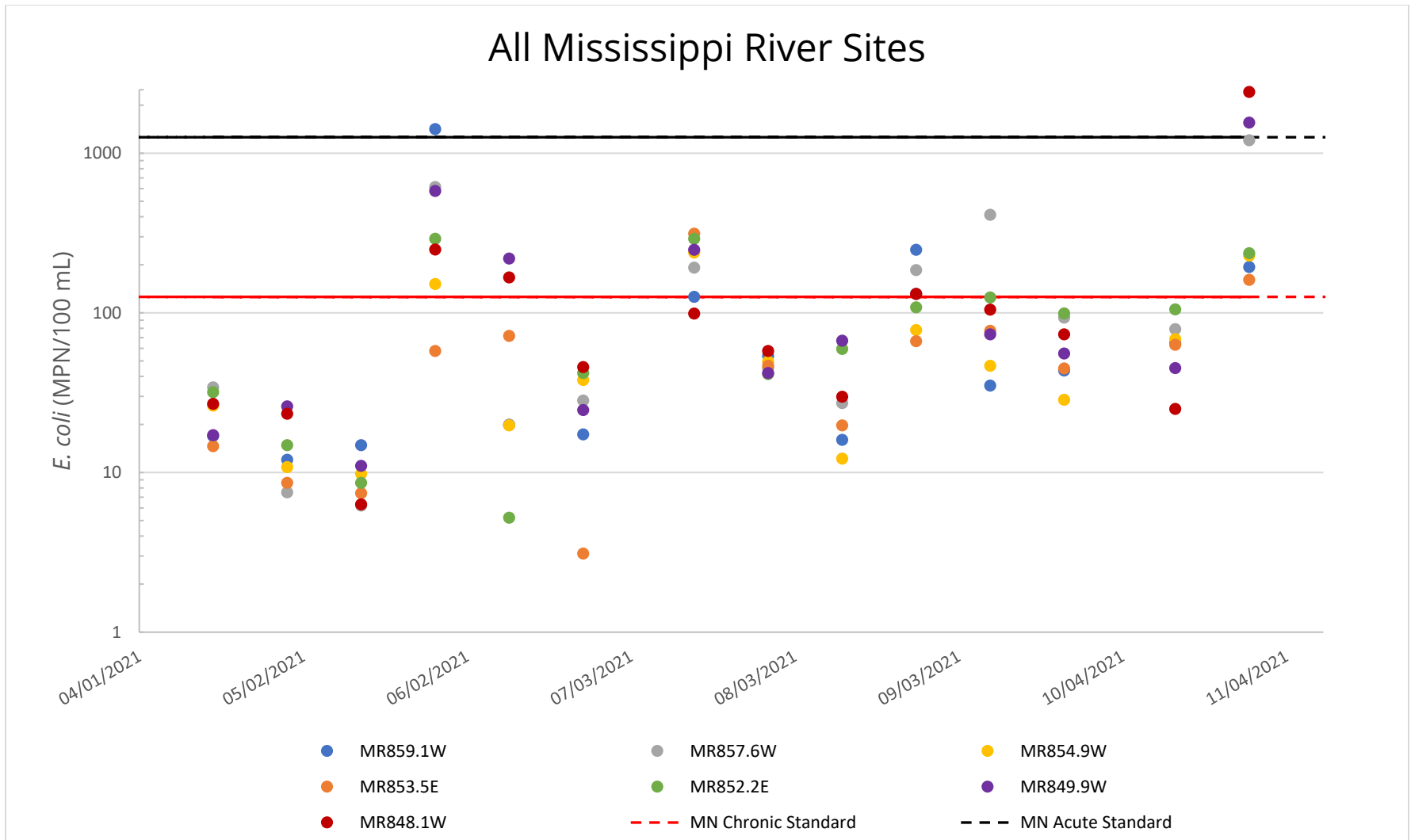


Figure 8. 2021 *E. coli* values for all Mississippi River sites.

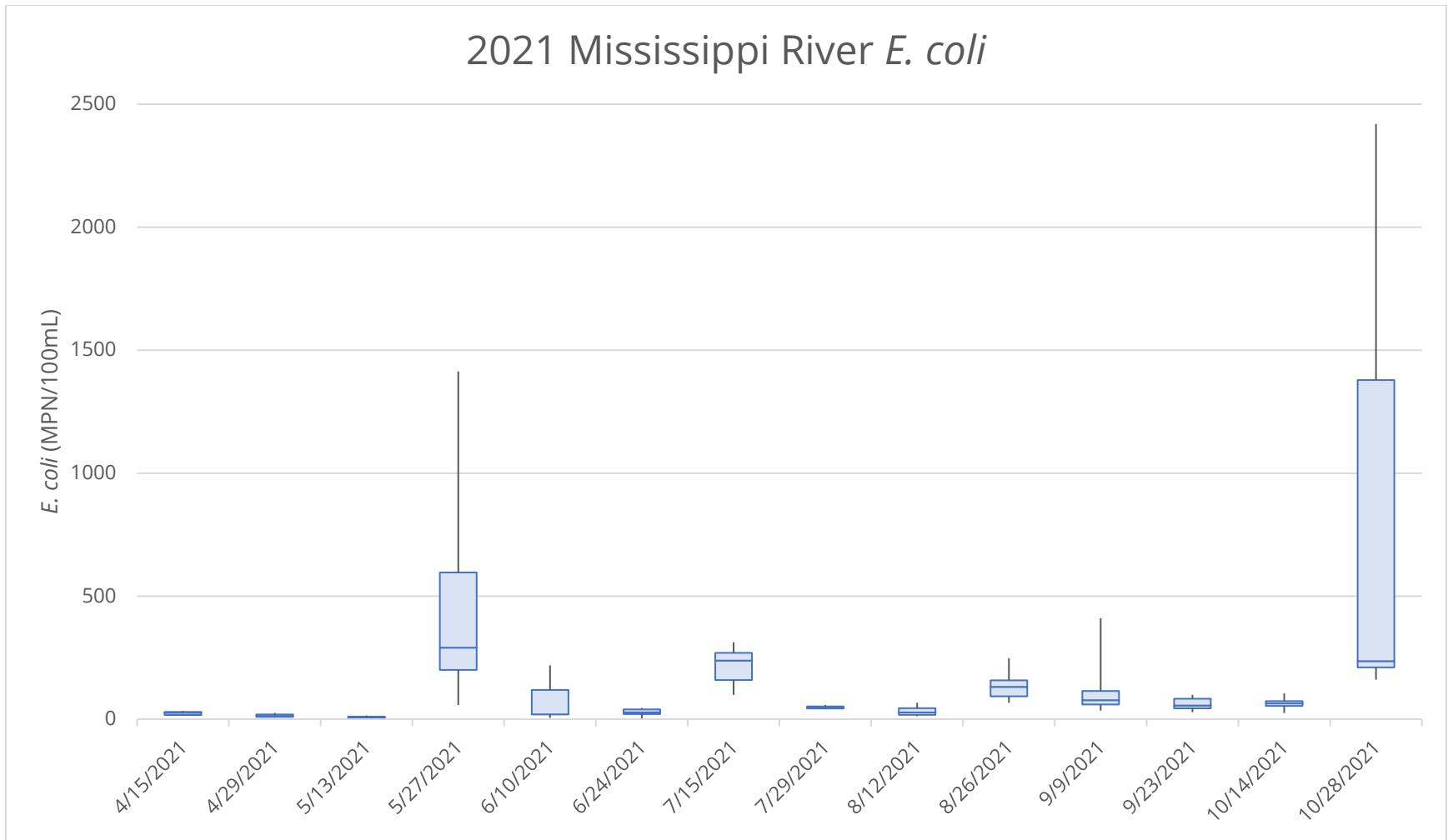


Figure 9. Boxplot of Mississippi River *E. coli* values in 2021. May 27 and October 28 were samples collected during rain events.

Table 2. 2021 Mississippi River site MR859.1W (Camden) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR859.1W	04/15/2021 10:35	Base	216.2	12.85	8.2	0.16	331.1	47	6.8	16.9
MR859.1W	04/29/2021 10:55	Base	244.9	11.56	8.7	0.16	339.9	60	10.4	12.0
MR859.1W	05/13/2021 10:10	Base	323.1	11.85	8.5	0.19	390.4	38	16.0	14.8
MR859.1W	05/27/2021 08:40	Rain	242.7	12.22	8.0	0.14	290.2	47	16.4	1413.6
MR859.1W	06/10/2021 09:20	Base	525.0	9.40	8.1	0.24	496.7	37	28.0	19.9
MR859.1W	06/24/2021 10:40	Base	405.5	9.37	7.8	0.2	412.7	82	24.1	17.3
MR859.1W	07/15/2021 10:35	Base	421.2	8.12	8.0	0.2	423.0	>100	24.8	125.9
MR859.1W	07/29/2021 10:25	Base	442.2	8.02	7.8	0.2	423.7	52	27.3	53.7
MR859.1W	08/12/2021 10:25	Base	440.7	8.15	8.0	0.21	443.8	44	24.6	16.0
MR859.1W	08/26/2021 10:15	Base	440.5	8.63	7.8	0.22	454.9	72	23.3	248.1
MR859.1W	09/09/2021 10:40	Base	401.1	10.97	8.0	0.21	429.7	64	21.5	35.0
MR859.1W	09/23/2021 10:15	Base	393.0	9.71	7.3	0.22	449.5	75	18.4	43.5
MR859.1W	10/14/2021 11:19	Base	389.1	9.63	7.3	0.23	474.9	>100	15.5	64.4
MR859.1W	10/28/2021 13:01	Rain	322.2	10.97	7.6	0.22	450.1	>100	10.1	193.5

Table 3. 2021 Mississippi River site MR857.6W (MRPB Boat Launch) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR857.6W	04/15/2021 10:20	Base	242.5	12.55	8.3	0.18	370.9	49	6.9	34.1
MR857.6W	04/29/2021 10:40	Base	286.6	11.83	8.6	0.19	393.3	53	10.8	7.5
MR857.6W	05/13/2021 09:55	Base	362.2	11.41	8.5	0.21	440.1	51	15.7	6.2
MR857.6W	05/27/2021 09:05	Rain	358.7	9.57	7.8	0.20	408.6	50	18.6	613.1
MR857.6W	06/10/2021 09:00	Base	457.4	8.29	8.3	0.21	434.7	42	27.7	19.9
MR857.6W	06/24/2021 10:25	Base	439.6	8.35	7.7	0.21	448.3	91	24.0	28.2
MR857.6W	07/15/2021 10:15	Base	401.0	7.70	8.0	0.20	410.6	78	23.8	191.8
MR857.6W	07/29/2021 10:10	Base	446.5	7.52	7.8	0.21	430.7	24	26.9	45.0
MR857.6W	08/12/2021 10:05	Base	453.5	9.33	8.0	0.22	451.3	36	25.3	27.2
MR857.6W	08/26/2021 09:50	Base	449.2	8.49	7.7	0.22	464.1	30	23.3	185.0
MR857.6W	09/09/2021 10:20	Base	420.9	10.19	7.8	0.21	441.4	37	22.6	410.6
MR857.6W	09/23/2021 10:05	Base	403.7	9.09	7.2	0.22	462.3	58	18.4	93.2
MR857.6W	10/14/2021 11:08	Base	397.4	9.23	7.4	0.24	485.7	95	15.5	78.9
MR857.6W	10/28/2021 11:40	Rain	344.6	10.46	7.6	0.23	482.1	88	10.1	1203.3

Table 4. 2021 Mississippi River site MR854.9W (North Loop) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR854.9W	04/15/2021 10:00	Base	204.3	12.51	8.4	0.15	312.8	43	6.8	26.2
MR854.9W	04/29/2021 10:25	Base	225.3	11.51	8.7	0.15	315.0	58	10.1	10.8
MR854.9W	05/13/2021 09:35	Base	297.1	10.53	8.4	0.18	364.6	33	15.3	9.8
MR854.9W	05/27/2021 09:25	Rain	345.5	8.74	7.7	0.18	383.3	71	19.8	151.5
MR854.9W	06/10/2021 08:35	Base	437.8	7.66	8.4	0.20	414.1	43	28.0	19.7
MR854.9W	06/24/2021 10:05	Base	414.0	9.31	7.9	0.20	418.9	39	24.4	37.9
MR854.9W	07/15/2021 09:55	Base	397.5	8.14	7.9	0.19	394.9	60	25.3	238.2
MR854.9W	07/29/2021 09:45	Base	438.1	7.99	7.7	0.20	420.6	62	27.2	49.5
MR854.9W	08/12/2021 09:40	Base	462.3	9.72	8.0	0.21	448.2	65	26.6	12.2
MR854.9W	08/26/2021 09:35	Base	464.1	10.12	7.7	0.22	468.7	60	24.5	78.0
MR854.9W	09/09/2021 10:05	Base	402.5	12.18	7.9	0.20	423.1	46	22.5	46.5
MR854.9W	09/23/2021 09:40	Base	399.1	9.25	7.2	0.21	445.5	60	19.5	28.5
MR854.9W	10/14/2021 10:44	Base	392.8	8.80	7.4	0.23	468.1	96	16.9	68.3
MR854.9W	10/28/2021 11:27	Rain	334.7	10.63	7.5	0.22	458.1	>100	10.9	228.2

Table 5. 2021 Mississippi River site MR853.5E (SAFL) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR853.5E	04/15/2021 09:35	Base	182.2	12.38	8.3	0.13	279.1		6.8	14.6
MR853.5E	04/29/2021 10:10	Base	207.9	11.22	8.7	0.14	293.2		9.8	8.6
MR853.5E	05/13/2021 09:10	Base	280.3	10.11	8.4	0.17	347.3	38	14.9	7.4
MR853.5E	05/27/2021 08:35	Rain	350.3	9.28	8.8	0.19	385.9	>100	20.2	57.6
MR853.5E	06/10/2021 08:10	Base	434.0	7.53	8.7	0.19	408.9	56	28.2	71.7
MR853.5E	06/24/2021 09:45	Base	404.2	8.37	7.7	0.20	412.1	82	24.0	3.1
MR853.5E	07/15/2021 09:30	Base	405.0	8.35	7.9	0.19	404.4	65	25.1	313.0
MR853.5E	07/29/2021 09:25	Base	437.7	8.01	7.8	0.20	422.5	63	26.9	46.5
MR853.5E	08/12/2021 09:15	Base	458.9	8.12	8.0	0.22	450.6	40	26.0	19.7
MR853.5E	08/26/2021 09:15	Base	475.7	8.20	7.6	0.23	480.2	78	24.5	66.3
MR853.5E	09/09/2021 09:40	Base	398.9	8.65	7.8	0.21	427.9	24	21.5	77.1
MR853.5E	09/23/2021 09:25	Base	395.9	9.21	7.2	0.21	441.5	55	19.6	44.8
MR853.5E	10/14/2021 10:24	Base	392.3	9.74	7.5	0.23	465.9	86	16.7	63.1
MR853.5E	10/28/2021 10:47	Rain	334.3	10.79	7.6	0.22	458.3	>100	10.8	160.7

Table 6. 2021 Mississippi River site MR852.2E (UMN Boat Launch) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR852.2E	04/15/2021 09:15	Base	186.3	12.26	8.3	0.14	285.7	41	6.8	31.8
MR852.2E	04/29/2021 09:40	Base	219.7	11.96	8.6	0.15	307.1	46	10.1	14.8
MR852.2E	05/13/2021 08:55	Base	287.2	11.29	8.3	0.17	357.4	40	14.7	8.6
MR852.2E	05/27/2021 10:20	Rain	334.3	9.58	8.1	0.18	375.0	35	19.3	290.9
MR852.2E	06/10/2021 09:00	Base	447.0	6.96	8.0	0.20	416.6	45	28.8	5.2
MR852.2E	06/24/2021 09:25	Base	408.2	8.43	7.5	0.20	425.0	92	22.9	41.9
MR852.2E	07/15/2021 09:05	Base	435.3	7.66	7.7	0.21	434.0	69	25.2	290.9
MR852.2E	07/29/2021 09:00	Base	457.8	7.44	7.8	0.21	438.7	51	27.3	41.3
MR852.2E	08/12/2021 08:55	Base	475.8	8.24	7.7	0.22	467.8	41	25.9	59.4
MR852.2E	08/26/2021 08:55	Base	494.7	8.01	7.6	0.24	503.0	67	24.2	108.1
MR852.2E	09/09/2021 09:20	Base	410.4	8.85	7.8	0.21	444.5	30	21.0	124.6
MR852.2E	09/23/2021 09:00	Base	402.0	9.35	7.1	0.22	446.4	52	19.8	99.1
MR852.2E	10/14/2021 10:03	Base	400.2	9.19	7.5	0.23	473.4	88	16.9	105.0
MR852.2E	10/28/2021 10:23	Rain	336.2	11.02	7.6	0.22	461.2	>100	10.8	235.9

Table 7. 2021 Mississippi River site MR849.9W (Lake Street Bridge) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR849.9W	04/15/2021 08:45	Base	195.9	12.99	8.4	0.14	298.6	43	7.0	17.1
MR849.9W	04/29/2021 08:45	Base	218.3	11.55	8.9	0.15	309.1	52	9.6	25.9
MR849.9W	05/13/2021 08:35	Base	284.7	10.64	8.5	0.17	355.8	48	14.5	11.0
MR849.9W	05/27/2021 10:05	Rain	310.6	9.13	8.2	0.17	351.1	50	19.0	579.4
MR849.9W	06/10/2021 08:40	Base	445.1	8.29	8.4	0.19	411.1	60	29.3	218.7
MR849.9W	06/24/2021 09:10	Base	411.1	8.19	7.5	0.21	430.4	90	22.7	24.6
MR849.9W	07/15/2021 08:45	Base	423.6	7.61	7.8	0.20	417.9	82	25.7	248.1
MR849.9W	07/29/2021 08:35	Base	459.3	7.00	7.8	0.21	441.7	68	27.1	41.9
MR849.9W	08/12/2021 08:35	Base	473.9	8.25	8.6	0.23	469.4	75	25.5	66.9
MR849.9W	08/26/2021 08:35	Base	474.6	8.10	7.5	0.23	486.5	78	23.7	131.3
MR849.9W	09/09/2021 08:55	Base	399.2	9.39	7.6	0.21	429.1	29	21.4	73.3
MR849.9W	09/23/2021 08:35	Base	381.0	8.96	7.1	0.21	426.7	49	19.4	55.6
MR849.9W	10/14/2021 09:46	Base	404.9	9.07	7.5	0.23	478.7	84	16.9	45.0
MR849.9W	10/28/2021 10:18	Rain	319.2	10.65	7.5	0.21	440.0	>100	10.6	1553.7

Table 8. 2021 Mississippi River site MR848.1W (4300 West River Parkway) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling conditions	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Salinity (ppt)	Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. coli</i> (CFU/100 mL)
MR848.1W	04/15/2021 08:15	Base	197.9	12.58	9.0	0.14	300.5	40	7.1	26.9
MR848.1W	04/29/2021 08:20	Base	217.0	11.65	9.3	0.15	307.9	50	9.5	23.3
MR848.1W	05/13/2021 08:10	Base	300.2	10.44	8.8	0.18	373.0	35	14.8	6.3
MR848.1W	05/27/2021 09:50	Rain	346.8	9.05	8.1	0.18	382.8	51	20.1	248.9
MR848.1W	06/10/2021 08:25	Base	439.3	8.18	8.8	0.19	410.8	38	28.6	166.4
MR848.1W	06/24/2021 08:50	Base	419.9	10.32	7.5	0.21	429.1	89	23.9	45.7
MR848.1W	07/15/2021 08:20	Base	436.1	7.84	7.5	0.21	434.6	75	25.2	98.8
MR848.1W	07/29/2021 08:05	Base	462.4	6.60	8.3	0.21	445.7	79	27.0	57.6
MR848.1W	08/12/2021 08:05	Base	478.2	8.26	8.6	0.23	475.4	65	25.3	29.8
MR848.1W	08/26/2021 08:10	Base	476.1	7.84	7.9	0.23	483.1	77	24.2	131.3
MR848.1W	09/09/2021 08:25	Base	401.8	10.78	7.8	0.21	433.0	36	21.2	104.6
MR848.1W	09/23/2021 08:15	Base	381.9	9.39	7.7	0.20	423.8	55	19.8	73.3
MR848.1W	10/14/2021 09:30	Base	409.8	9.02	8.4	0.23	483.8	>100	17.0	25.0
MR848.1W	10/28/2021 09:57	Rain	332.6	10.58	7.5	0.22	459.5	>100	10.5	2419.2