

## 2022 Mississippi River Bacteria Sampling

### Summary of 2022 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 2022, none of the river sites exceeded the acute standard at any point in the year, 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. All samples were taken during baseflow conditions. 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 2022.

Month	Sites that exceed 1,260 MPN/100 mL in > 10% of samples
April	None
May	None
June	None
July	None
August	None
September	None
October	None

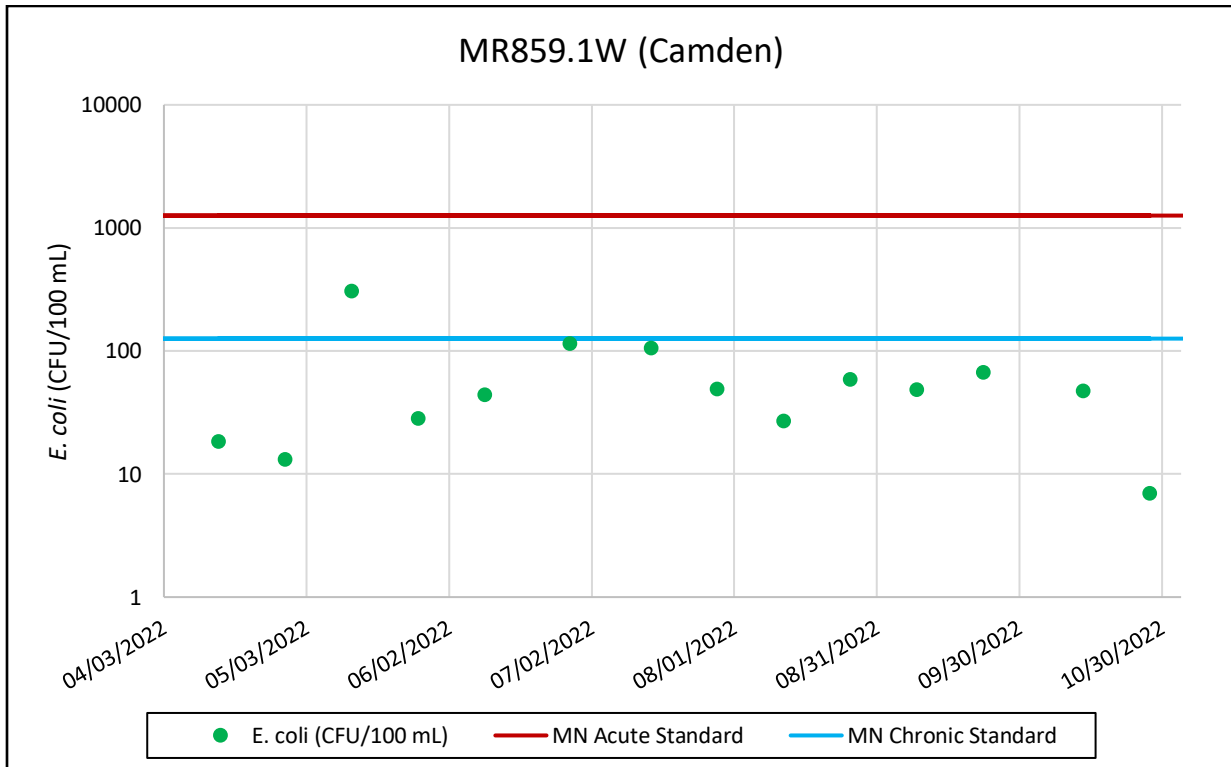


Figure 1. 2022 *E. coli* values at MR859.1W.

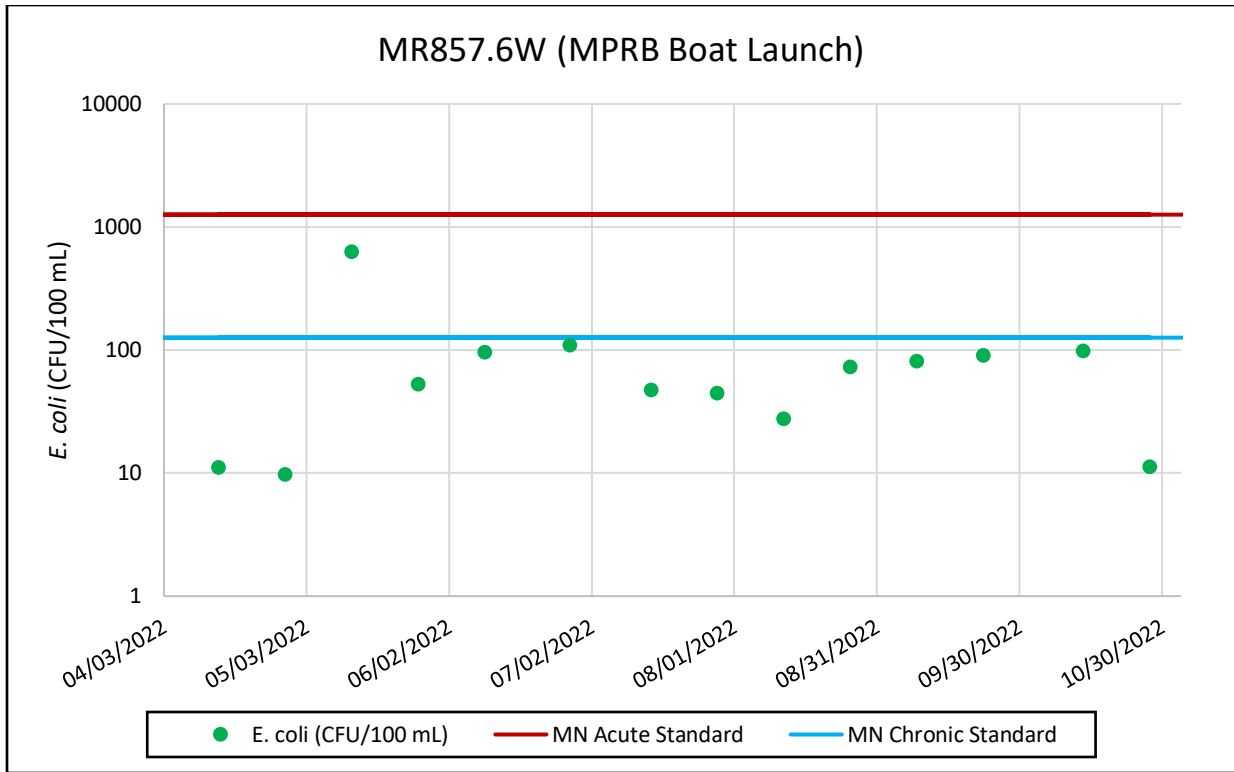


Figure 2. 2022 *E. coli* values at ME857.6W.

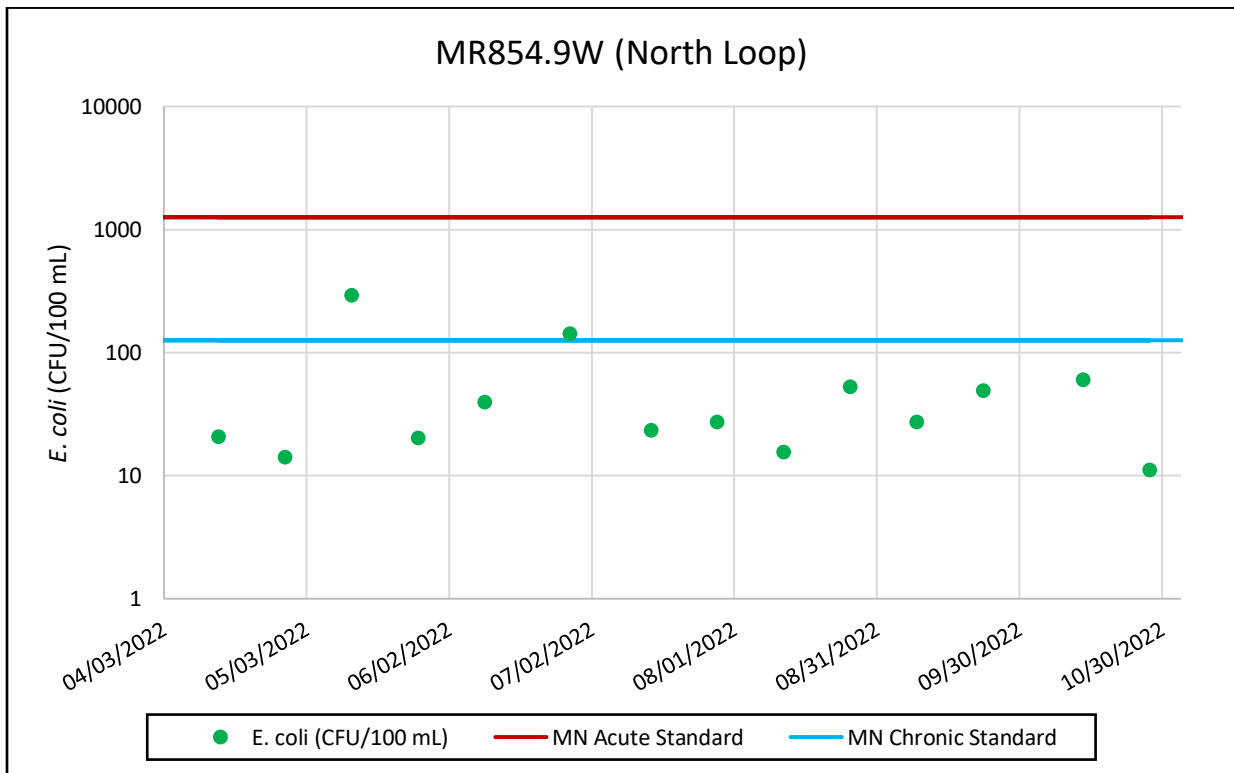


Figure 3. 2022 *E. coli* values at MR854.9W.

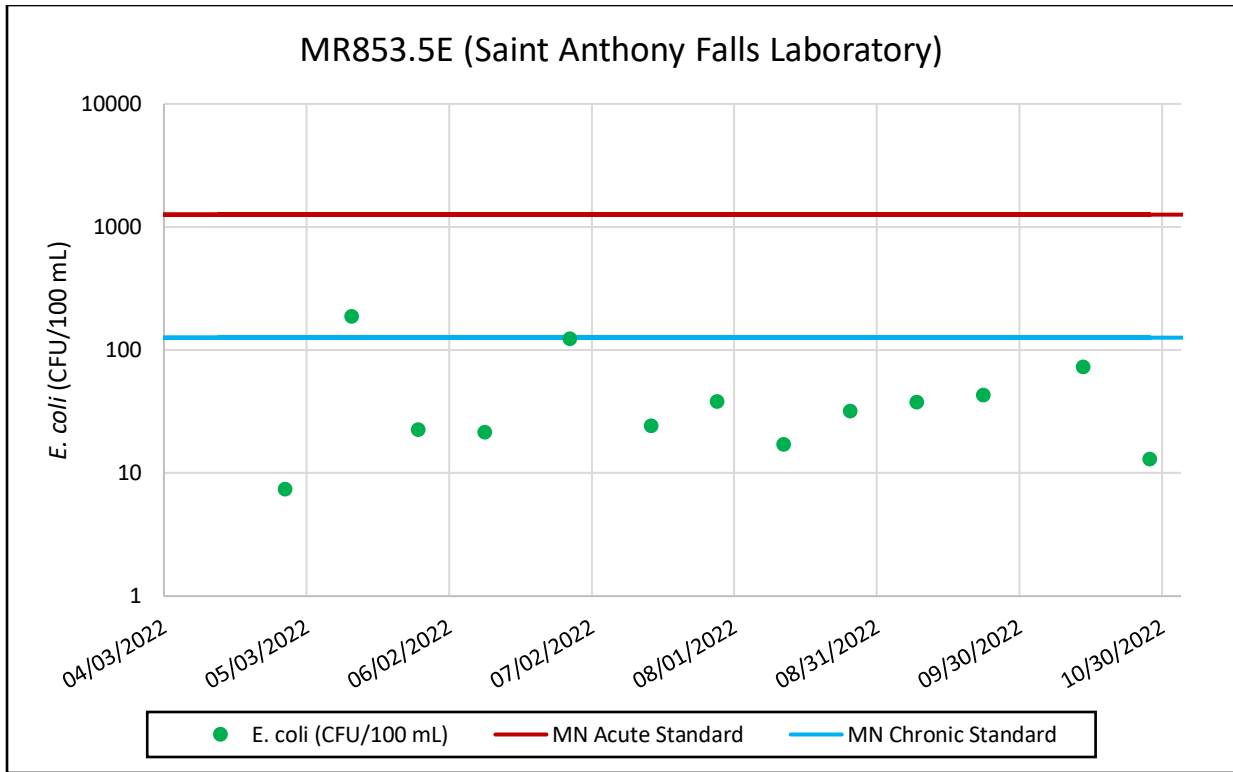


Figure 4. 2022 *E. coli* values at MR853.5E.

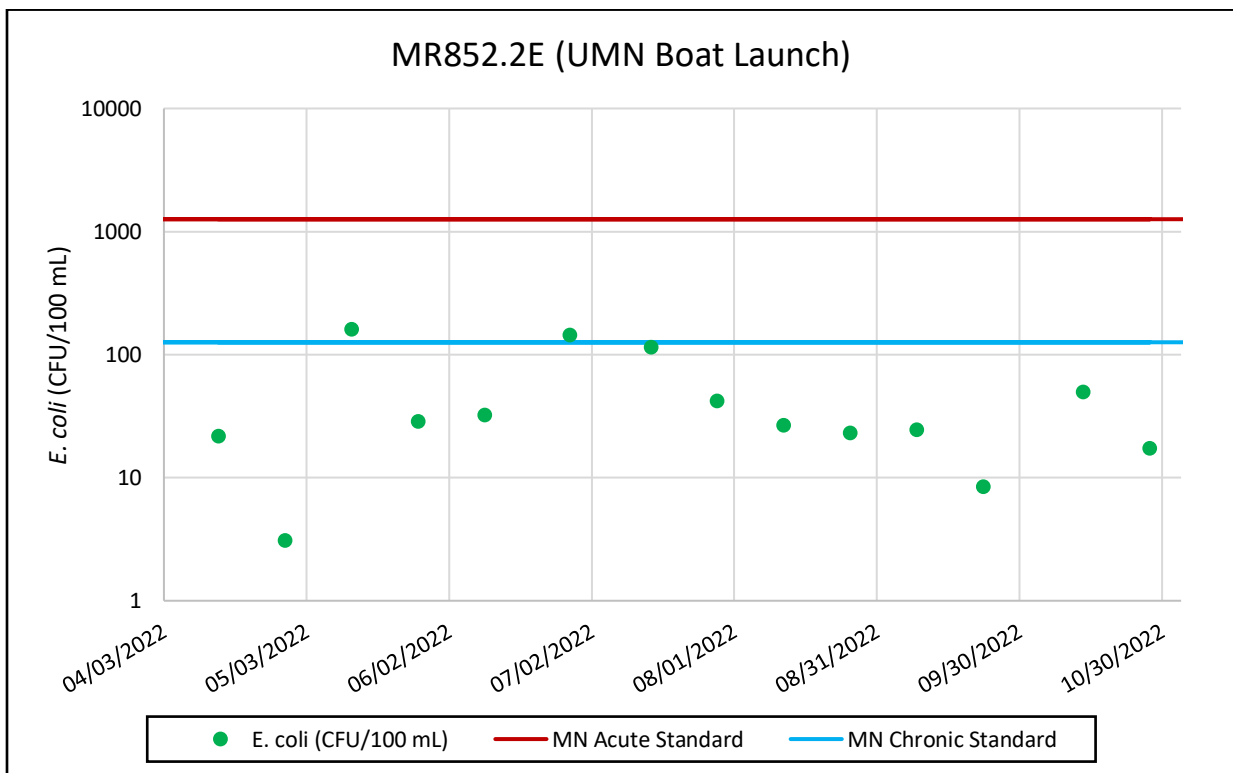


Figure 5. 2022 *E. coli* values at MR852.2E.

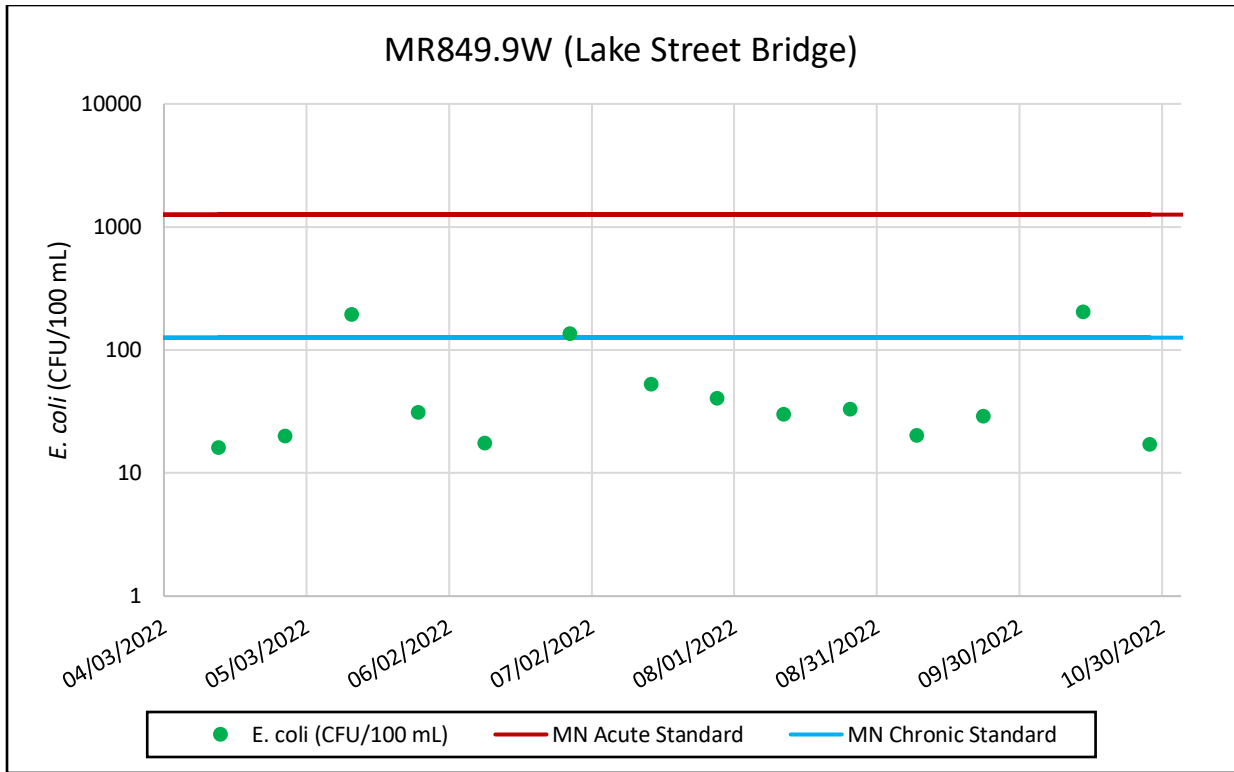


Figure 6. 2022 *E. coli* values at MR849.9W.

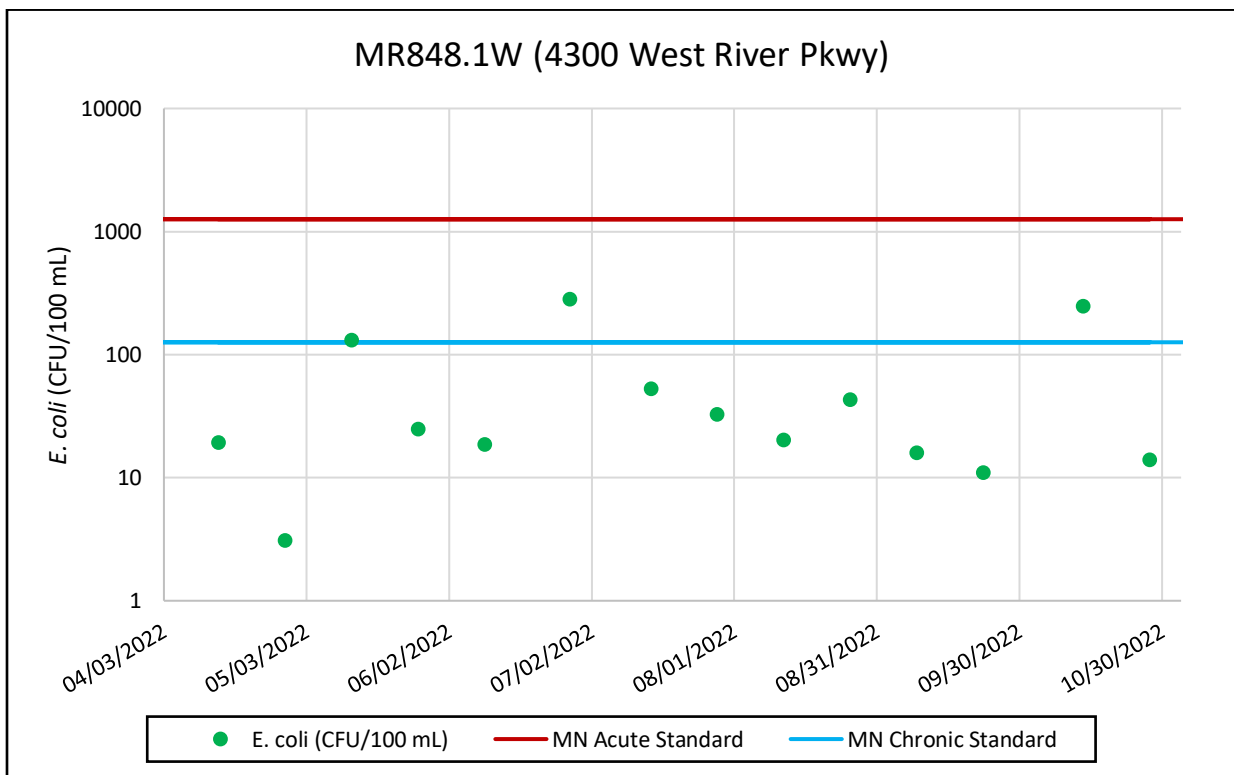


Figure 7. 2022 *E. coli* values at MR848.1W.

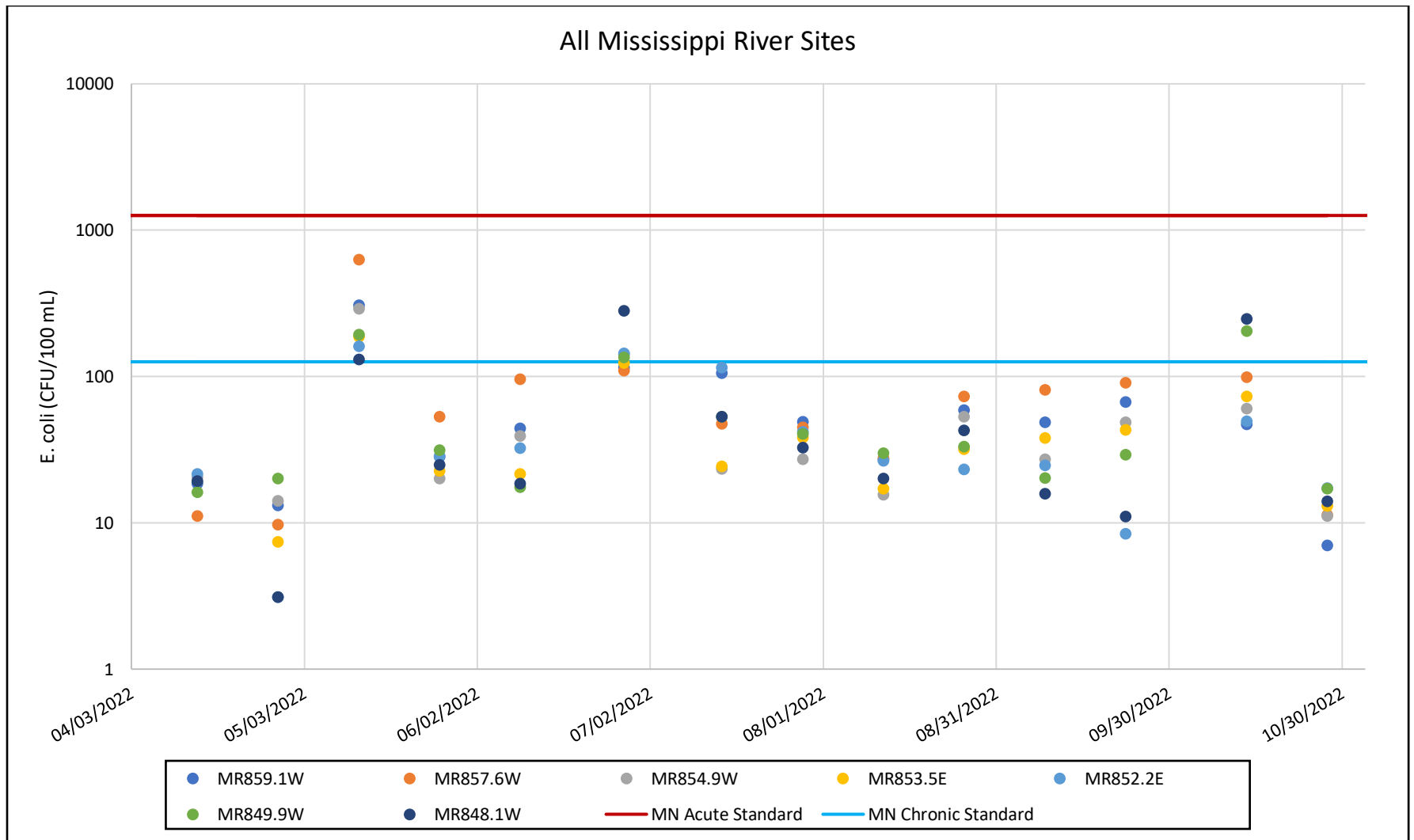


Figure 8. 2022 *E. coli* values for all Mississippi River sites.

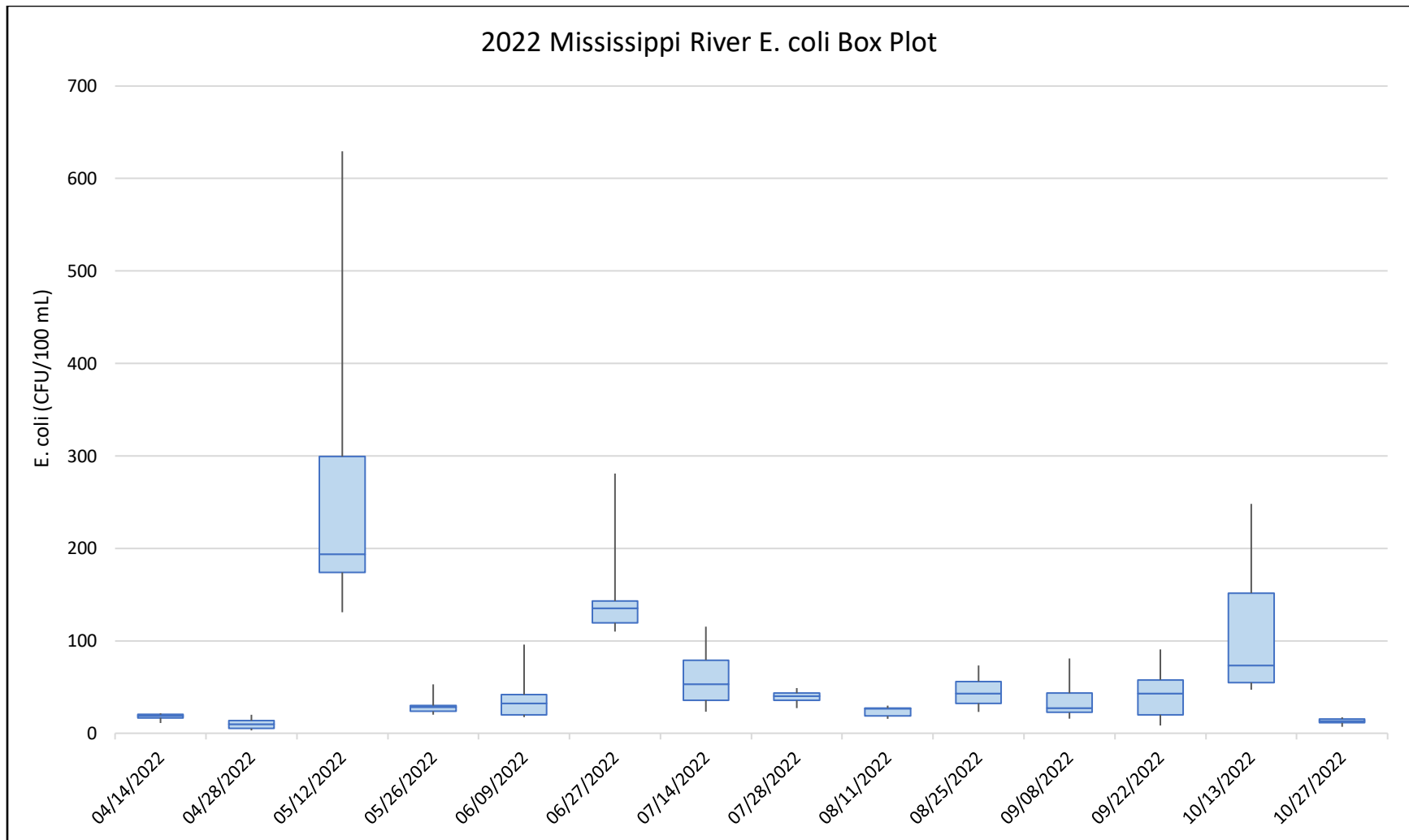


Figure 9. Boxplot of Mississippi River *E. coli* values in 2022. May 12 and October 13 samples were collected a day after a rain event

Table 2. 2022 Mississippi River site MR859.1W (Camden) physical parameters and *E. coli* sample data.

Station	Sampling Time	Sampling Conditions	Conductivity (µS/cm)	Dissolved			Specific Conductivity (µS/cm)	Transparency (cm)	Water Temperature (°C)	<i>E. Coli</i> (CFU/100 mL)
				Oxygen (mg/L)	pH	Salinity (ppt)				
MR859.1W	04/14/2022 10:20	Base	219.5	12.74	8.4	0.17	359.3	45	4.6	18.5
MR859.1W	04/28/2022 10:20	Base	227.5	13.06	8.3	0.17	352.3	55	6.4	13.2
MR859.1W	05/12/2022 11:00	Base	275.6	10.10	8.1	0.16	336.0	24	15.6	307.6
MR859.1W	05/26/2022 10:40	Base	294.1	10.20	8.1	0.18	368.5	58	14.4	28.2
MR859.1W	06/09/2022 10:35	Base	326.7	9.37	8.0	0.17	358.1	25	20.4	44.1
MR859.1W	06/27/2022 10:35	Base	315.9	9.31	7.6	0.16	329.3	33	22.9	115.3
MR859.1W	07/14/2022 10:35	Base	389.0	8.82	7.8	0.19	388.9	53	25.0	105.4
MR859.1W	07/28/2022 10:20	Base	350.2	9.52	7.9	0.17	356.6	72	24.1	48.9
MR859.1W	08/11/2022 10:14	Base	439.6	10.04	8.1	0.21	441.1	42	24.8	26.9
MR859.1W	08/25/2022 10:20	Base	390.2	8.81	8.2	0.19	406.9	94	22.9	59.1
MR859.1W	09/08/2022 10:30	Base	364.6	9.01	7.9	0.18	373.3	90	23.8	48.8
MR859.1W	09/22/2022 09:50	Base	346.2	9.36	8.2	0.19	385.4	>100	19.7	66.9
MR859.1W	10/13/2022 11:00	Base	308.3	10.32	7.5	0.19	391.9	>100	13.8	47.1
MR859.1W	10/27/2022 10:30	Base	278.8	11.36	7.5	0.19	393.9	>100	9.7	7.0

Table 3. 2022 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	04/14/2022 10:05	Base	238.9	12.73	8.4	0.19	390.7	49	4.6	11.1
MR857.6W	04/28/2022 10:05	Base	245.0	12.95	8.4	0.18	378.5	49	6.5	9.7
MR857.6W	05/12/2022 10:45	Base	292.9	9.85	8.1	0.17	355.7	24	15.8	629.4
MR857.6W	05/26/2022 10:25	Base	304.4	10.12	8.0	0.18	381.8	63	14.4	52.9
MR857.6W	06/09/2022 10:15	Base	354.3	9.30	7.9	0.19	389.7	32	20.2	95.9
MR857.6W	06/27/2022 10:20	Base	325.1	9.15	7.6	0.16	339.3	48	22.8	110.0
MR857.6W	07/14/2022 10:20	Base	385.4	8.77	7.8	0.18	387.7	68	24.7	47.4
MR857.6W	07/28/2022 10:05	Base	371.3	9.59	7.9	0.18	378.5	97	24.0	44.8
MR857.6W	08/11/2022 10:00	Base	396.3	9.10	8.0	0.19	400.6	38	24.4	27.5
MR857.6W	08/25/2022 10:05	Base	391.7	8.21	8.2	0.19	407.2	92	23.0	73.3
MR857.6W	09/08/2022 10:15	Base	380.9	8.70	7.9	0.19	393.6	62	23.3	80.9
MR857.6W	09/22/2022 09:40	Base	358.9	9.13	8.2	0.19	403.0	>100	19.3	90.7
MR857.6W	10/13/2022 10:45	Base	318.5	9.94	7.5	0.20	407.3	>100	13.6	98.7
MR857.6W	10/27/2022 10:20	Base	288.8	10.88	7.5	0.20	409.4	>100	9.6	11.3

Table 4. 2022 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	04/14/2022 09:50	Base	209.0	12.96	8.5	0.16	342.3	59	4.6	20.6
MR854.9W	04/28/2022 09:40	Base	217.6	12.88	8.4	0.16	336.2	51	6.5	14.1
MR854.9W	05/12/2022 10:20	Base	261.3	9.97	8.2	0.15	319.6	25	15.5	290.9
MR854.9W	05/26/2022 10:00	Base	279.0	10.15	8.0	0.17	348.6	58	14.5	20.1
MR854.9W	06/09/2022 09:50	Base	313.1	9.41	7.9	0.16	343.9	50	20.3	39.3
MR854.9W	06/27/2022 09:55	Base	304.3	9.23	7.5	0.15	317.5	54	22.8	142.1
MR854.9W	07/14/2022 10:00	Base	342.3	8.42	7.7	0.16	343.2	69	24.8	23.3
MR854.9W	07/28/2022 09:40	Base	334.0	8.70	7.9	0.16	344.8	79	23.4	27.2
MR854.9W	08/11/2022 09:33	Base	375.1	8.10	8.0	0.18	377.1	53	24.7	15.6
MR854.9W	08/25/2022 09:45	Base	366.0	7.94	8.2	0.18	372.2	97	24.1	52.9
MR854.9W	09/08/2022 09:55	Base	363.8	8.23	7.9	0.18	374.1	>100	23.6	27.2
MR854.9W	09/22/2022 09:20	Base	343.5	9.08	8.4	0.18	380.6	>100	19.9	48.7
MR854.9W	10/13/2022 10:25	Base	313.4	9.74	7.5	0.19	398.8	>100	13.8	60.1
MR854.9W	10/27/2022 10:00	Base	284.4	11.01	7.5	0.19	394.0	>100	10.4	11.1

Table 5. 2022 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	04/28/2022 09:20	Base	198.0	12.76	8.5	0.15	306.9		6.4	7.4
MR853.5E	05/12/2022 09:55	Base	240.2	10.05	8.3	0.14	294.9		15.3	187.2
MR853.5E	05/26/2022 09:35	Base	249.6	10.20	8.1	0.15	312.0	55	14.5	22.6
MR853.5E	06/09/2022 09:30	Base	287.0	9.29	7.8	0.15	316.7	30	20.1	21.6
MR853.5E	06/27/2022 09:35	Base	291.5	9.06	7.5	0.15	305.5	35	22.6	123.6
MR853.5E	07/14/2022 09:40	Base	330.3	8.23	7.6	0.16	332.9	64	24.6	24.3
MR853.5E	07/28/2022 09:25	Base	325.5	8.75	7.8	0.16	337.8	72	23.1	38.4
MR853.5E	08/11/2022 09:13	Base	367.0	8.24	8.0	0.18	371.1	78	24.4	17.1
MR853.5E	08/25/2022 09:25	Base	359.0	8.34	8.2	0.18	367.2	73	23.8	31.8
MR853.5E	09/08/2022 09:30	Base	356.5	8.60	7.9	0.18	367.9	83	23.4	37.9
MR853.5E	09/22/2022 09:00	Base	339.0	9.52	8.2	0.18	374.9	90	20.0	43.1
MR853.5E	10/13/2022 10:05	Base	308.7	10.41	7.6	0.19	391.1	>100	14.0	73.3
MR853.5E	10/27/2022 09:45	Base	394.6	11.51	7.5	0.19	387.8	>100	10.3	13.0

Table 6. 2022 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	04/14/2022 09:05	Base	191.5	13.92	8.7	0.15	315.0	56	4.5	21.6
MR852.2E	04/28/2022 09:00	Base	202.4	13.56	8.5	0.15	311.6	43	6.7	3.1
MR852.2E	05/12/2022 09:25	Base	241.4	10.44	8.3	0.14	296.1	34	15.3	160.7
MR852.2E	05/26/2022 09:10	Base	256.8	10.50	8.0	0.15	320.6	54	14.6	28.5
MR852.2E	06/09/2022 09:05	Base	289.2	9.78	7.7	0.15	318.8	32	20.2	32.3
MR852.2E	06/27/2022 09:15	Base	293.9	9.54	7.3	0.15	308.2	45	22.6	143.9
MR852.2E	07/14/2022 09:20	Base	335.8	9.18	7.5	0.16	339.0	64	24.5	115.3
MR852.2E	07/28/2022 09:05	Base	337.1	9.42	7.7	0.17	350.7	76	23.0	41.9
MR852.2E	08/11/2022 08:54	Base	381.2	8.63	8.0	0.18	383.6	40	24.7	26.5
MR852.2E	08/25/2022 09:00	Base	364.4	9.06	8.2	0.18	375.2	85	23.5	23.1
MR852.2E	09/08/2022 09:15	Base	370.9	9.17	7.9	0.18	379.7	72	23.8	24.6
MR852.2E	09/22/2022 08:40	Base	349.7	9.22	8.2	0.18	385.2	85	20.2	8.4
MR852.2E	10/13/2022 09:45	Base	318.8	10.22	7.8	0.19	403.5	>100	14.0	49.5
MR852.2E	10/27/2022 09:25	Base	410.3	11.01	7.7	0.19	403.3	>100	11.2	17.3

Table 7. 2022 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	04/14/2022 08:45	Base	202.1	12.93	9.1	0.16	330.3	42	4.7	16.2
MR849.9W	04/28/2022 08:40	Base	211.3	13.46	8.7	0.16	324.8	47	6.7	20.0
MR849.9W	05/12/2022 09:05	Base	249.3	10.42	8.4	0.15	304.6	37	15.5	193.6
MR849.9W	05/26/2022 08:50	Base	266.6	10.75	7.9	0.16	331.7	54	14.7	31.3
MR849.9W	06/09/2022 08:45	Base	302.9	9.75	7.6	0.16	332.6	54	20.3	17.5
MR849.9W	06/27/2022 08:55	Base	301.2	9.62	7.0	0.15	315.9	46	22.6	135.4
MR849.9W	07/14/2022 09:00	Base	338.7	8.80	7.3	0.16	341.7	67	24.6	53.0
MR849.9W	07/28/2022 08:50	Base	335.4	8.99	7.7	0.17	348.3	78	23.1	40.4
MR849.9W	08/11/2022 08:39	Base	383.1	8.49	8.1	0.18	379.2	81	25.5	29.9
MR849.9W	08/25/2022 08:35	Base	369.5	8.73	8.2	0.18	375.6	53	24.1	33.1
MR849.9W	09/08/2022 08:55	Base	370.3	9.10	7.9	0.18	375.2	75	24.3	20.3
MR849.9W	09/22/2022 08:30	Base	341.9	9.17	8.5	0.18	377.2	87	20.1	29.1
MR849.9W	10/13/2022 09:30	Base	314.2	10.08	8.1	0.19	398.4	>100	13.9	204.6
MR849.9W	10/27/2022 09:10	Base	405.0	11.28	7.7	0.19	398.1	>100	11.5	17.1

Table 8. 2022 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	04/14/2022 08:25	Base	204.4	13.01	9.6	0.16	333.4	37	4.7	19.3
MR848.1W	04/28/2022 08:15	Base	214.4	12.94	9.1	0.16	329.2	45	6.8	3.1
MR848.1W	05/12/2022 08:30	Base	249.4	10.21	9.0	0.15	304.3	38	15.6	130.9
MR848.1W	05/26/2022 08:30	Base	269.0	10.59	8.1	0.16	334.3	60	14.8	24.9
MR848.1W	06/09/2022 08:25	Base	302.6	9.70	7.6	0.16	332.2	55	20.3	18.5
MR848.1W	06/27/2022 08:25	Base	301.9	9.40	7.1	0.15	316.1	35	22.7	280.9
MR848.1W	07/14/2022 08:40	Base	338.7	8.55	7.1	0.16	341.6	62	24.6	52.9
MR848.1W	07/28/2022 08:30	Base	337.8	8.52	7.6	0.17	348.0	69	23.5	32.7
MR848.1W	08/11/2022 08:20	Base	380.6	8.45	8.2	0.18	376.0	85	25.6	20.1
MR848.1W	08/25/2022 08:10	Base	370.1	8.55	8.2	0.18	374.7	82	24.3	42.8
MR848.1W	09/08/2022 08:35	Base	366.8	9.07	7.9	0.18	374.1	76	24.0	15.8
MR848.1W	09/22/2022 08:10	Base	337.9	9.26	8.8	0.18	376.9	81	19.6	11.0
MR848.1W	10/13/2022 09:10	Base	314.2	9.61	8.7	0.19	398.6	>100	13.9	248.1
MR848.1W	10/27/2022 08:55	Base	294.3	10.65	8.1	0.19	399.1	>100	11.3	14.0