

## Section 5-8 Weskeag River & Tributaries (Weskeag River Monitoring Project)

### Weskeag River & Tributaries

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The Weskeag River/Marsh is one of the largest tidal marshes in midcoast Maine and is recognized for its abundant resource values by state and federal agencies. It is listed as one of the most threatened estuarine systems in the state because of its proximity to development (it is proximate to the Route One corridor, and its watershed includes coastal, industrial, and commercial development). It is also recognized as a state focus area by the Beginning with Habitat Program, by The Nature Conservancy as a portfolio site and by Georges River Land Trust as a conservation focus area because it is a known shorebird area and it is a saltmarsh in good condition. The estuary includes 1,100 acres of brackish tidal marsh and salt marsh, extensive tidal flats and eelgrass beds. The brackish marsh, spartina saltmarsh and the mixed graminoid-form saltmarsh are all state identified significant communities. The marsh is host to thousands of migratory shorebirds as well as tidal and water birds including the state threatened Saltmarsh sharp-tailed sparrow. As many species are in decline, estuarine systems, such as the Weskeag, are increasingly important.

In the 1800s the marsh was ditched for haying which altered the wetland's hydrology. In 1997, the Maine Department of Inland Fisheries & Wildlife initiated a salt marsh restoration project with the National Corporate Wetlands Restoration Partnership (CWRP) to restore portions of the marsh that had been degraded by the 19<sup>th</sup> century ditching, through this project ~137 acres of the upper marsh were restored by plugging ditches, widening a culvert, deepening pannes and removing a small population of *Phragmites australis*, an invasive species. Post restoration monitoring was completed in 2004.

Dragon Cement (plant and mines), Rockland Industrial Park and the Owls Head Airport are at the edges of the watershed. Impacts of mining operations and cement production on water quality and quantity in the Weskeag River estuary are unknown. Impacts from various industries in the Industrial Park and from commercial development along Route One on water supply and quality are unknown. Portions of the upper Weskeag drainage have been filled for residential and commercial development (above Thomaston Street). The freshwater marsh between Dragon Cement and the Industrial Park is degraded.

### Monitoring History

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There are no biomonitoring sites (aquatic macroinvertebrates or algae) on the Weskeag to assess the health of biological communities in the river. Limited water quality data was collected on the Weskeag River from 2015-2016 as part of the VRMP. Results showed low dissolved oxygen at some of the sampling sites and very high bacteria at the freshwater sites. In 2019, local volunteers joined the VRMP to sample the Weskeag River and tributaries again through the Great Old Broads for Wilderness. In 2020 the same volunteer group became self-supported and changed their name to the Weskeag River Monitoring Project.

As described in State Statute, the freshwater portion of the river is classified as Class B waters, and the estuary is Class SB. The entire Weskeag River has been designated as "restricted" for shellfish harvesting

because of moderate pollution levels. Shellfish grown or harvested in the river must be taken to a depuration plant or relayed to a cleaner site before sale.

The objectives of the current Weskeag monitoring program are to:

- 1) Provide information on current watershed conditions.
- 2) Track water quality changes over time.
- 3) Identify areas with degraded water quality for further assessment and/or watershed best management practices' implementation.

## Methods and Sampling Sites

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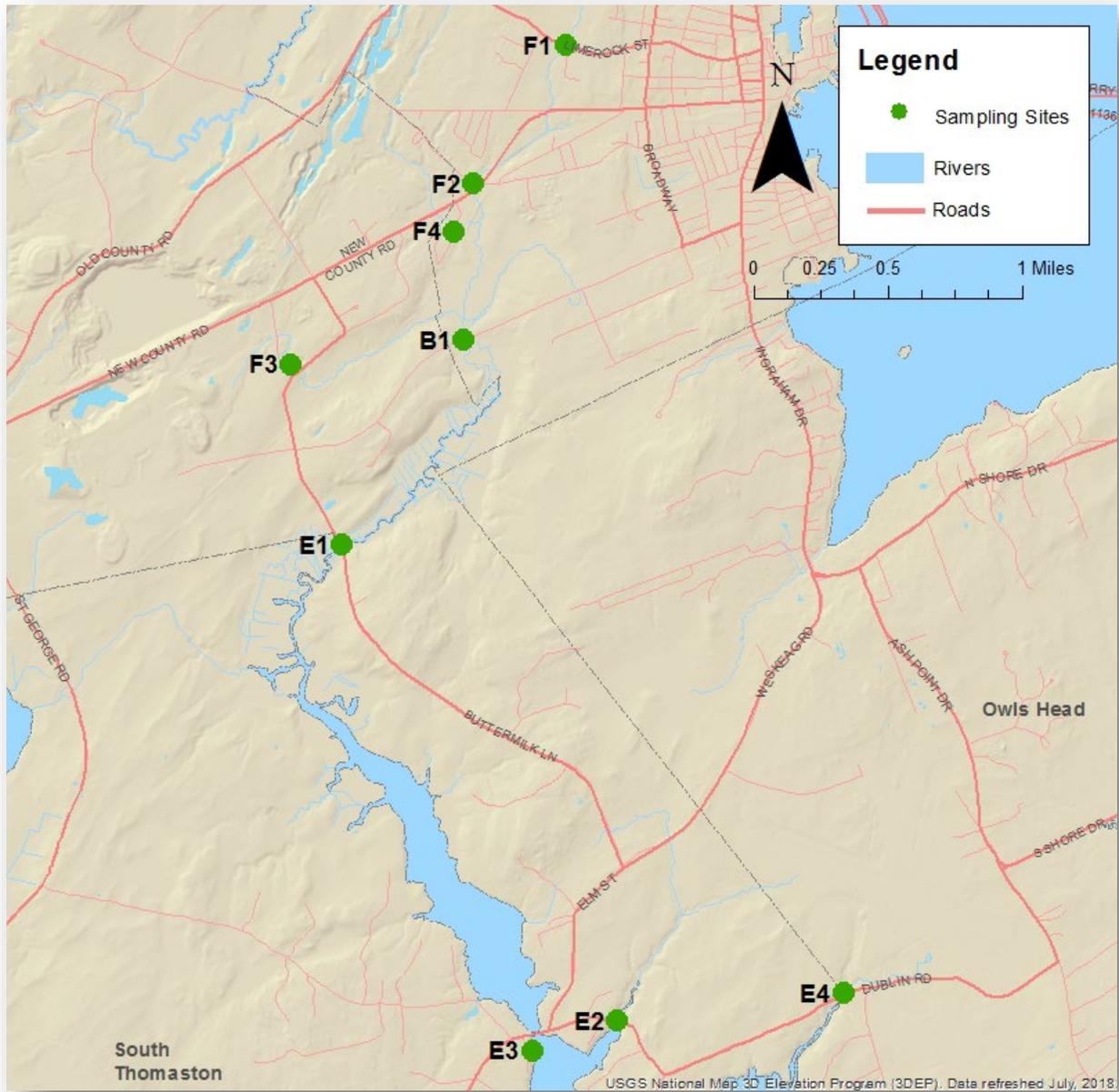
Water quality sampling sites (Figure 5-8-1 and Table 5-8-1) have been established at 9 locations. Four of the sites are freshwater, 1 site is brackish and 4 are tidal.

Following training by, and under the guidance of the MDEP, the volunteer sampling team conducted bi-weekly sampling from June to October. The team also attempted to sample on the day following each significant rain event. The sampling equipment was provided by the MDEP. Volunteer monitors took direct measurements of water temperature, dissolved oxygen, and specific conductance (*freshwater sites*) or salinity (*marine sites*) using YSI Pro2030 meters. The monitors also collected water samples to measure bacteria for either *E. coli* (*freshwater sites*) or *Enterococcus* (*marine sites*). Unfortunately, the *Enterococcus* samples were not processed according to the Standard Operating Procedure and results were not valid.

At freshwater sites, the monitoring was done before 8:00 AM whenever possible, as this is the time of day when dissolved oxygen is at the lowest level. At the tidal sites, monitors attempted to sample during the outgoing or ebb tide.

Bacteria was analyzed using the IDEXX method. *E. Coli* was analyzed at the City of Rockland WWTF Lab, a State certified lab using Colilert®.

# Weskeag River & Tributaries Sampling Sites



**Figure 5-8-1:** Map of Weskeag River sampling sites.

**Table 5-8-1:** Weskeag River and Tributaries Sampling Sites. Sites sampled in 2020 are in bold.

<b>VRMP Site ID</b>	<b>Organization Site Code</b>	<b>Sample Location</b>	<b>Class</b>
UNNAMED TRIBUTARY-NWGM RUB08-VRMP	F1	Limerock St	B
UNNAMED TRIBUTARY-NWGM RUB02-VRMP	F2	Route 1	B
UNNAMED TRIBUTARY-NWGM RUA15-VRMP	F3	Upper Buttermilk Ln	B
MARSH BROOK - NWGM R29 - VRMP	F4	Glenwood	B
MARSH BROOK-NWGM R23-VRMP	B1	Thomaston St	B
MARSH BROOK-NWGM R08-VRMP	E1	Lower Buttermilk Ln	SB
UNNAMED TRIBUTARY-NWGM UC-03-VRMP	E2	Dublin Rd - Cuddy Cove Creek	SB
WESKEAG RIVER-NWGM R28-VRMP	E3	Route 73 - Town Pier	SB
UNNAMED TRIBUTARY-NWGM UD-18-VRMP	E4	Dublin Rd - Bally Hac Cove	SB

## Parameters

### *Dissolved Oxygen*

Dissolved oxygen levels are generally lowest early in the morning and then increase during the day, peaking mid to late afternoon. Monitors should try to collect some samples early in the morning. Dissolved oxygen is also affected by flow conditions and temperature. During high flow conditions, more oxygen is added to the river from the atmosphere as the water is more turbulent and there is more opportunity for mixing. If flow during the summer months is higher or lower than normal, dissolved oxygen will be affected.

Class B criteria for dissolved oxygen are a minimum of 7 mg/l (milligrams/liter) or 75% saturation. To meet water quality criteria, both concentration and saturation standards must be met. The Class SB standard is 85% saturation.

### *Water Temperature*

Maine's Regulations Relating to Temperature (06-096 CMR Chapter 582) require that discharge of pollutants not raise the temperature of any river and stream above the EPA criteria for indigenous species (23 °C maximum and 19 °C weekly average) or 0.3 °C (0.5 °F) above the temperature that would naturally occur outside a mixing zone established by the Board of Environmental Protection. Pollutant is defined in statute as many things including dirt and heat. For tidal waters, discharge of pollutants may not raise the temperature more than 4 °F (2.2 °C) or more than 1.5 °F (0.8 °C) from June 1 to September 1, and may not cause the temperature of any tidal waters to exceed 85 °F (29 °C) at any point outside a mixing zone established by the Board of Environmental Protection.

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### Specific Conductance

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Specific conductance is related to the amount of dissolved materials in the water. While there are no numerical standards, a relationship exists between conductivity and chloride which has numerical criteria. In general, streams located in urban areas tend to have high specific conductance due to polluted urban stormwater runoff. This may also in large part be due to salt buildup in surface and groundwater from road maintenance practices.

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### Bacteria

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Enterococcus bacteria are used as the indicator organism for marine waters and *E. coli* bacteria are used for freshwaters. While these types of bacteria are not pathogens, their presence in the water may indicate the presence of other organisms including bacteria and viruses that can cause gastrointestinal illnesses.

Class B criteria (effective August 1, 2018) are as follows: “Between April 15th and October 31st, the number of Escherichia coli bacteria in these waters may not exceed a geometric mean of 64 CFU per 100 milliliters over a 90-day interval or 236 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval.” Class SB criteria (effective August 1, 2018) are as follows: “Between April 15th and October 31st, the number of enterococcus bacteria in these waters may not exceed a geometric mean of 8 CFU per 100 milliliters in any 90-day interval or 54 CFU per 100 milliliters in more than 10% of the samples in any 90-day interval.” Geometric means are calculated instead of average because it is more appropriate to use this calculation for an indicator such as bacteria where there may be one or more very high or low values that can skew the mean.

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## Discussion and Recommendations

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There are numerous sources of pollution and other stresses to the Weskeag River and tributaries that could potentially have a collective impact on water quality. Some of those sources of pollution and stress may include:

- Non-point source pollution (e.g., septic systems, eroded soil, fertilizers, pesticides, heavy metals, petroleum residues, road salt, wildlife, livestock and pet feces) and polluted stormwater originating from impervious surfaces (e.g., streets, parking lots, driveways, rooftops, industries), agriculture, and forestry.
- Ponds and impoundments (which often create more pond-like aquatic habitat conditions that may have higher water temperatures and lower dissolved oxygen concentrations than free-flowing waters).
- Natural effects of wetlands (such as contributing waters to a stream/river that have low dissolved oxygen levels due to the decomposition of large amounts of organic matter, respiration of abundant plant matter, and low re-aeration rates that is characteristic of many wetlands).

The following are recommendations for future monitoring:

- Bacteria samples should be collected at least six times over the sampling season and include both baseflow and storm event samples. Some sites have had high bacteria values.
- Continue monitoring at all stations to develop a long-term trend database and identify areas of concern. Some sites, particularly F1, E1, B1, and E4 have had some low dissolved oxygen readings.

## Summary of Data by Site and Parameter (2015-2020)

### F1

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: F1							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	6.5	2.9	10.9	7	6
2016	B	5	5.8	3.9	8.3	7	3
2019	B	4	7.1	5.9	7.7	7	1

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: F1							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	59.3	34.3	85.6	75	9
2016	B	5	57.2	37.1	78.2	75	3
2019	B	4	68.0	61.0	72.0	75	4

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: F1							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	B	10	13.6	3.0	19.3	n/a	n/a
2016	B	5	15.8	12.4	20.5	n/a	n/a
2019	B	5	13.4	10.0	16.6	n/a	n/a

A summary of mean, minimum and maximum specific conductance ( $\mu\text{S}/\text{cm}$ ) values at Weskeag River monitoring site: F1							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2015	B	10	454	210	660	n/a	n/a
2016	B	5	376	274	530	n/a	n/a
2019	B	5	392	315	502	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: F1								
Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2015	B	E. Coli	9	174	22	980	236/64	3
2016	B	E. Coli	1	--	--	1300	236/64	1
2019	B	E. Coli	4	--	74	167	236/64	0

\*At least 6 samples should be collected to calculate the geometric mean

## F2

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: F2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	8.0	2.1	12.0	7	4
2016	B	7	7.9	6.3	9.8	7	1
2019	B	7	8.7	6.5	9.8	7	1
2020	B	10	7.1	4.0	8.5	7	2

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: F2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	73.4	18.0	96.7	75	4
2016	B	7	79.6	63.1	92.4	75	2
2019	B	7	84.4	69.0	91.0	75	1
2020	B	10	70.6	34.0	84.0	75	2

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: F2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	B	10	13.4	3.7	18.9	n/a	n/a
2016	B	7	16.3	12.6	20.3	n/a	n/a
2019	B	7	14.1	11.1	18.3	n/a	n/a
2020	B	10	15.9	11.5	20.5	n/a	n/a

A summary of mean, minimum and maximum specific conductance (µS/cm) values at Weskeag River monitoring site: F2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2015	B	10	772	300	1060	n/a	n/a
2016	B	7	684	421	840	n/a	n/a
2019	B	9	683	490	837	n/a	n/a
2020	B	10	769	594	1007	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: F2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	B	3	0.33	0.3	0.4	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: F2								
Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2015	B	E. Coli	8	1314	326	2419	236/64	8
2016	B	E. Coli	5	--	517	>2420	236/64	5
2019	B	E. Coli	9	1054	93	>2420	236/64	8
2020	B	E. Coli	8	642	10	>2420	236/64	7

\*At least 6 samples should be collected to calculate the geometric mean

## F3

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: F3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	9.2	7.3	11.6	7	0
2016	B	7	8.2	7.1	8.8	7	0
2019	B	7	8.7	7.6	9.6	7	0
2020	B	9	7.9	4.0	9.4	7	1

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: F3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	86.5	72.4	93.0	75	1
2016	B	7	84.1	79.1	88.2	75	0
2019	B	7	84.4	76.0	91	75	0
2020	B	9	79.8	37.0	94.0	75	1

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: F3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	B	10	13.6	3.3	19.3	n/a	n/a
2016	B	7	16.4	12.9	20.7	n/a	n/a
2019	B	8	14.3	11.1	18.0	n/a	n/a
2020	B	9	16.2	12.4	19.3	n/a	n/a

A summary of mean, minimum and maximum specific conductance (µS/cm) values at Weskeag River monitoring site: F3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	B	10	844	490	1120	n/a	n/a
2016	B	7	877	676	1006	n/a	n/a
2019	B	9	821	546	1070	n/a	n/a
2020	B	9	755	99	1065	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: F3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	B	3	0.4	0.3	0.5	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: F3								
Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2015	B	E. Coli	9	196	64	548	236/64	5
2016	B	E. Coli	7	694	222	>2420	236/64	6
2019	B	E. Coli	9	157	18	1300	236/64	2
2020	B	E. Coli	8	424	16	>2420	236/64	7

\*At least 6 samples should be collected to calculate the geometric mean

#### F4

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: F4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2019	B	2	9.7	9.4	9.9	7	0
2020	B	9	8.2	2.7	11.1	7	2

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: F4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2019	B	2	90.0	87.0	93.0	75	0
2020	B	9	85.0	46.0	101.0	75	2

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: F4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2019	B	4	12.9	9.7	14.5	n/a	n/a
2020	B	10	15.4	9.5	20.2	n/a	n/a

A summary of mean, minimum and maximum specific conductance ( $\mu\text{S}/\text{cm}$ ) values at Weskeag River monitoring site: F4

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2019	B	4	643	582	686	n/a	n/a
2020	B	9	698	609	807	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: F4

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	B	5	0.33	0.30	0.40	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: F4

Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2019	B	E. Coli	3	--	96	276	236/64	1
2020	B	E. Coli	10	279	28	1046	236/64	7

\*At least 6 samples should be collected to calculate the geometric mean

## B1

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: B1

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	8.4	5.1	11.8	7	3
2016	B	7	6.8	4.7	8.4	7	5
2019	B	7	5.6	4.2	7.6	7	6
2020	B	9	6.1	2.8	9.1	7	5

**A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: B1**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	B	10	77.2	49.0	87.9	75	3
2016	B	7	66.7	51.0	78.7	75	6
2019	B	7	54.5	45.0	66.0	75	7
2020	B	9	60.2	30.0	80.0	75	6

**A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: B1**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	B	10	13.3	2.9	19.4	n/a	n/a
2016	B	7	15.5	13.2	19.8	n/a	n/a
2019	B	9	15.1	10.9	19.3	n/a	n/a
2020	B	10	15.9	9.8	19.8	n/a	n/a

**A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: B1**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	B	6	0.82	0.3	1.7	n/a	n/a

**A summary of mean, minimum and maximum specific conductance (µS/cm) values at Weskeag River monitoring site: B1**

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2015	B	10	647	370	820	n/a	n/a
2016	B	7	591	427	637	n/a	n/a
2019	B	8	632	539	685	n/a	n/a
2020	B	9	1355	741	3149	n/a	n/a

**A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: B1**

Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2015	B	Enterococci	7	7	1	37	n/a	n/a
2016	B	E. Coli	7	523	37	>2420	236/64	4
2019	B	E. Coli	9	82	21	548	236/64	1
2020	B	E. coli	10	363	24	1553	236/64	6

\*At least 6 samples should be collected to calculate the geometric mean

**E1**

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: E1

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	2	5.4	4.8	6.1	n/a	n/a
2016	SB	9	6.3	4.3	9.4	n/a	n/a
2019	SB	10	5.4	3.4	7.0	n/a	n/a
2020	SB	7	4.3	1.7	7.2	n/a	n/a

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: E1

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	3	76.7	60.4	85.6	85	2
2016	SB	9	82.0	55.1	108.1	85	5
2019	SB	10	64.7	39.8	75.0	85	10
2020	SB	7	53.8	22.0	83.4	85	7

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: E1

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	SB	3	21.9	20.1	25.3	n/a	n/a
2016	SB	9	22.8	17.2	28.4	n/a	n/a
2019	SB	12	19.7	13.5	25.1	n/a	n/a
2020	SB	9	21.0	14.2	26.5	n/a	n/a

A summary of mean, minimum and maximum specific conductance (µS/cm) values at Weskeag River monitoring site: E1

Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	SB	9	37075	22779	47678	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: E1							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2019	SB	12	15.1	0.5	27.4	n/a	n/a
2020	SB	9	23.6	13.8	31.1	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: E1								
Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2015	SB	Enterococcus	7	16	3	66	54/8	1
2020	SB	E.Coli	2	--	>2420	>2420	54/8	2

\*At least 6 samples should be collected to calculate the geometric mean

## E2

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: E2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	2	8.0	7.8	8.1	n/a	n/a
2016	SB	9	7.7	6.4	9.0	n/a	n/a
2019	SB	10	6.9	5.3	9.4	n/a	n/a
2020	SB	6	7.0	5.6	8.7	n/a	n/a

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: E2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	2	90.5	77.0	104.0	85	1
2016	SB	9	102.4	80.5	117.4	85	1
2019	SB	10	84.6	66.3	110.0	85	7
2020	SB	6	86.8	72.0	100.8	85	3

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: E2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	SB	2	19.1	18.4	19.7	n/a	n/a
2016	SB	9	20.2	15.4	23.7	n/a	n/a
2019	SB	12	17.9	14.9	21.9	n/a	n/a
2020	SB	8	18.1	12.8	22.5	n/a	n/a

A summary of mean, minimum and maximum specific conductance ( $\mu\text{S}/\text{cm}$ ) values at Weskeag River monitoring site: E2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	SB	8	45339	43728	47403	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: E2							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2019	SB	12	24.2	1.1	30.5	n/a	n/a
2020	SB	8	29.4	28.2	30.9	n/a	n/a

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**E3**

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: E3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	2	8.8	8.4	9.2	n/a	n/a
2016	SB	9	8.6	7.4	10.6	n/a	n/a
2019	SB	10	8.2	7.3	9.5	n/a	n/a
2020	SB	6	8.8	7.0	10.5	n/a	n/a

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: E3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	3	107.6	100.9	113.1	85	0
2016	SB	9	104.0	93.5	121.6	85	0
2019	SB	10	97.9	92.0	115.0	85	0
2020	SB	6	90.6	30.1	122.8	85	1

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: E3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	SB	3	15.5	14.7	16.7	n/a	n/a
2016	SB	9	16.2	13.0	18.1	n/a	n/a
2019	SB	11	16.1	13.2	18.4	n/a	n/a
2020	SB	8	16.3	11.3	21.0	n/a	n/a

A summary of mean, minimum and maximum specific conductance (µS/cm) values at Weskeag River monitoring site: E3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	SB	8	45759	44643	47335	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: E3							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2019	SB	11	29.0	22.3	30.8	n/a	n/a
2020	SB	8	29.7	28.8	30.8	n/a	n/a

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#### E4

A summary of mean, minimum and maximum dissolved oxygen concentration (mg/l) values at Weskeag River monitoring site: E4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	2	7.4	6.5	8.3	n/a	n/a
2016	SB	9	7.3	4.3	9.7	n/a	n/a
2019	SB	10	6.2	3.7	9.4	n/a	n/a
2020	SB	6	6.2	3.6	8.9	n/a	n/a

A summary of mean, minimum and maximum dissolved oxygen saturation (%) values at Weskeag River monitoring site: E4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Not Meeting Criterion
2015	SB	2	92.2	77.2	107.2	85	1
2016	SB	9	95.9	51.7	118.2	85	1
2019	SB	10	71.1	44.0	118.0	85	8
2020	SB	6	70.1	47.0	92.1	85	5

A summary of mean, minimum and maximum water temperature (°C) values at Weskeag River monitoring site: E4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	# Exceeding Criterion
2015	SB	2	19.0	17.7	20.2	n/a	n/a
2016	SB	9	20.3	14.5	26.4	n/a	n/a
2019	SB	12	16.2	12.0	19.8	n/a	n/a
2020	SB	8	16.6	11.2	22.0	n/a	n/a

A summary of mean, minimum and maximum specific conductance (µS/cm) values at Weskeag River monitoring site: E4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2020	SB	8	37187	26282	42867	n/a	n/a

A summary of mean, minimum and maximum salinity (PPTH) values at Weskeag River monitoring site: E4							
Year	Class	# Sample Points	Mean	Minimum	Maximum	Criterion	#Exceeding Criterion
2019	SB	12	24.7	17.9	29.1	n/a	n/a
2020	SB	8	23.8	16.4	27.8	n/a	n/a

A summary of geometric mean, minimum and maximum bacteria (MPN/100 mL) values at Weskeag River monitoring station: E4								
Year	Class	Bacteria Type	# Sample Points	Mean	Minimum	Maximum	Criterion Instant/Geo	# Exceeding Criterion
2015	B	Entero	8	9	0	57	54/8	1

\*At least 6 samples should be collected to calculate the geometric mean

**Appendix A**

\* Sampling depths are only reported for Tier 1 VRMP sites.

\*\* "N/A" = normal environmental sample ; "D" = field duplicate; "L" = lab duplicate.

\*\*\* D.O. = dissolved oxygen; "Spec. Cond" = specific conductance; "TDS" = Total dissolved solids; "TSS" = total suspended solids."

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	*** D.O. (MG/L)	*** D.O. Sat. (%)	*** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	*** TDS (MG/L)	*** TSS (MG/L)	E. coli Bacteria (MPN/100ML)
B1	MARSH BROOK-NWGMR23-VRMP	6/3/2020	8:55 AM	NA			12.7	5.6	54.0	741					24
B1	MARSH BROOK-NWGMR23-VRMP	6/17/2020	8:48 AM	NA			12.7	6.1	57.0						135
B1	MARSH BROOK-NWGMR23-VRMP	7/1/2020	8:24 AM	NA			17.2	4.9	51.0	970					250
B1	MARSH BROOK-NWGMR23-VRMP	7/15/2020	8:11 AM	NA			17.9	5.2	53.0	955					980
B1	MARSH BROOK-NWGMR23-VRMP	7/15/2020	8:11 AM	L											816
B1	MARSH BROOK-NWGMR23-VRMP	7/15/2020	8:11 AM	D			17.9	5.3	55.0	952					
B1	MARSH BROOK-NWGMR23-VRMP	7/29/2020	8:25 AM	NA			19.4	2.8	30.0	827	0.4				1553
B1	MARSH BROOK-NWGMR23-VRMP	8/12/2020	8:15 AM	NA			19.8			786	0.3				206
B1	MARSH BROOK-NWGMR23-VRMP	8/26/2020	8:12 AM	NA			17.4	7.0	72.0	1391	0.7				1120
B1	MARSH BROOK-NWGMR23-VRMP	9/9/2020	8:26 AM	NA			17.4	7.3	75.0	2051	1.1				135
B1	MARSH BROOK-NWGMR23-VRMP	9/23/2020	8:15 AM	NA			9.8	9.1	80.0	1326	0.7				299
B1	MARSH BROOK-NWGMR23-VRMP	10/1/2020	8:07 AM	NA			13.1	8.0	75.0	3149	1.7				1553
E1	MARSH BROOK-NWGMR-08-VRMP	6/2/2020	11:12 AM	NA			14.2	7.2	81.6	40121	25.7				
E1	MARSH BROOK-NWGMR-08-VRMP	6/15/2020	9:44 AM	NA			19.6	7.1	83.4	24021	14.6				
E1	MARSH BROOK-NWGMR-08-VRMP	7/1/2020	9:45 AM	NA			18.5	4.6	54.8	33662	21.2				
E1	MARSH BROOK-NWGMR-08-VRMP	7/15/2020	9:27 AM	NA			21.7			22779	13.8				
E1	MARSH BROOK-NWGMR-08-VRMP	7/29/2020	9:18 AM	NA			26.0	2.1	31.0	43568	28.1				
E1	MARSH BROOK-NWGMR-08-VRMP	8/12/2020	7:46 AM	NA											>2420
E1	MARSH BROOK-NWGMR-08-VRMP	8/12/2020	7:48 AM	NA			26.5	3.0	44.0	44077	28.4				
E1	MARSH BROOK-NWGMR-08-VRMP	8/19/2020	12:49 PM	NA			22.1	4.6	60.0	37240	23.6				
E1	MARSH BROOK-NWGMR-08-VRMP	8/26/2020	7:38 AM	NA			21.4	1.7	22.0	40532	26				
E1	MARSH BROOK-NWGMR-08-VRMP	8/26/2020	7:45 AM	NA											>2420
E1	MARSH BROOK-NWGMR-08-VRMP	9/29/2020	12:11 PM	NA			18.7			47678	31.1				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	6/2/2020	10:28 AM	NA			12.8	8.7	98.5	45094	29.2				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	6/15/2020	9:00 AM	NA			15.7	8.5	100.8	43728	28.2				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	7/1/2020	9:19 AM	NA			16.8	7.4	90.7	44490	28.8				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	7/15/2020	8:57 AM	NA			18.8			43810	28.3				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	7/15/2020	8:57 AM	D			18.8			43810	28.3				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	7/29/2020	8:36 AM	NA			21.3	5.9	80.0	46543	30.3				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	8/12/2020	7:15 AM	NA			22.5	5.7	79.0	46941	30.6				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	8/26/2020	6:48 AM	NA			18.8	5.6	72.0	46230	30.1				
E2	UNNAMED TRIBUTARY-NWGUC-03-VRMP	9/29/2020	11:35 AM	NA			17.2			47403	30.9				

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	*** D.O. (MG/L)	*** D.O. Sat. (%)	*** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	*** TDS (MG/L)	*** TSS (MG/L)	E. coli Bacteria (MPN/100ML)
E3	WESKEAG RIVER-NWG-28-VRMP	6/2/2020	10:09 AM	NA			11.3	10.1	111.8	44675	28.8				
E3	WESKEAG RIVER-NWG-28-VRMP	6/15/2020	8:39 AM	NA			14.2	10.5	122.8	44643	28.9				
E3	WESKEAG RIVER-NWG-28-VRMP	7/1/2020	9:08 AM	NA			14.5	9.7	113.6	45226	29.3				
E3	WESKEAG RIVER-NWG-28-VRMP	7/15/2020	8:43 AM	NA			16.7			45630	29.6				
E3	WESKEAG RIVER-NWG-28-VRMP	7/29/2020	8:20 AM	NA			18.2	8.3	105.0	46002	29.9				
E3	WESKEAG RIVER-NWG-28-VRMP	7/29/2020	8:20 AM	D			19.7	8.2	57.0	46004	30				
E3	WESKEAG RIVER-NWG-28-VRMP	8/12/2020	7:02 AM	NA			21.0	7.0	94.0	45842	29.8				
E3	WESKEAG RIVER-NWG-28-VRMP	8/26/2020	6:39 AM	NA			16.4	7.5	30.1	46470	30.2				
E3	WESKEAG RIVER-NWG-28-VRMP	9/29/2020	11:15 AM	NA			15.0			47335	30.8				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	6/2/2020	10:52 AM	NA			11.2	8.9	92.1	31244	20.3				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	6/15/2020	9:18 AM	NA			12.8	8.3	83.5	26282	16.4				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	7/1/2020	9:29 AM	NA			15.9	6.6	77.9	42381	27.3				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	7/15/2020	9:09 AM	NA			17.4			34923	22				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	7/29/2020	8:54 AM	NA			19.6	4.8	59.0	42768	27.5				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	8/12/2020	7:29 AM	NA			22.0	3.6	47.0	41101	26.4				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	8/26/2020	7:46 AM	NA			16.9	5.2	61.0	35926	22.7				
E4	UNNAMED TRIBUTARY-NWGUD-18-VRMP	9/29/2020	11:55 AM	NA			17.0			42867	27.8				
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	6/3/2020	8:12 AM	NA			12.5	8.0	75.0	864					>2420
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	6/17/2020	8:14 AM	NA			12.9	8.5	78.0	825					1203
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	7/1/2020	7:49 AM	NA			16.7	8.1	84.0	594					457
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	7/1/2020	7:49 AM	L											602
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	7/1/2020	7:49 AM	D			17.0	8.2	85.0	638					
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	7/15/2020	7:44 AM	NA			17.0	7.5	75.0	655					1986
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	7/29/2020	7:58 AM	NA			20.5	4.2	46.0	807					10
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	8/12/2020	7:49 AM	NA											
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	8/19/2020	12:03 PM	NA			18.7	7.7	83.0	678	0.3				
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	8/26/2020	7:41 AM	NA			16.5	7.7	79.0	606	0.3				1733
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	9/9/2020	8:00 AM	NA			18.0	7.3	75.0	793	0.4				2420
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	9/23/2020	7:45 AM	NA			11.5	4.0	34.0	1007					
F2	UNNAMED TRIBUTARY-NWGMRUB02-VRMP	10/1/2020	7:46 AM	NA			14.2	8.0	77.0	865					261

Organization Site Code	VRMP Site ID	Date	Time	** Sample Type Qualifier	* Sample Depth	Depth Unit	Water Temp (DEG C)	*** D.O. (MG/L)	*** D.O. Sat. (%)	*** Spec. Cond. (US/CM)	Salinity (PPTH)	Turbidity (NTU)	*** TDS (MG/L)	*** TSS (MG/L)	E. coli Bacteria (MPN/100ML)
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	6/3/2020	8:35 AM	NA			12.4	9.4	89.0	942					16
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	6/17/2020	8:30 AM	NA			13.1	9.3	88.0	1065					326
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	7/1/2020	8:11 AM	NA			17.2	7.8	81.0	99.1					436
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	7/15/2020	7:55 AM	NA			17.1	7.8	80.0	655					1733
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	7/29/2020	8:08 AM	NA			19.3	7.6	83.0	929	0.5				>2420
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	7/29/2020	8:08 AM	L											>2420
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	7/29/2020	8:08 AM	D			19.3	7.2	79.0	930	0.5				
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	8/12/2020	8:04 AM	NA											
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	8/19/2020	12:35 PM	NA			19.2	8.7	94.0	704	0.3				
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	8/26/2020	7:53 AM	NA			16.3	8.5	88.0	787	0.4				866
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	9/9/2020	8:12 AM	NA			17.4	7.6	78.0	805					461
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	9/23/2020	7:55 AM	NA											
F3	UNNAMED TRIBUTARY-NWGMRIA15-VRMP	10/1/2020	7:56 AM	NA			13.4	4.0	37.0	805					276
F4	MARSH BROOK - NWGMR29 - VRMP	6/3/2020	9:15 AM	NA			9.5	10.9	96.0	635					28
F4	MARSH BROOK - NWGMR29 - VRMP	6/17/2020	9:12 AM	NA			11.3	11.1	101.0						93
F4	MARSH BROOK - NWGMR29 - VRMP	7/1/2020	8:46 AM	NA			15.2	9.2	91.0	702					272
F4	MARSH BROOK - NWGMR29 - VRMP	7/15/2020	8:13 AM	NA			15.9	8.9	89.0	663					365
F4	MARSH BROOK - NWGMR29 - VRMP	7/29/2020	8:41 AM	NA			17.4	9.2	96.0	609	0.3				261
F4	MARSH BROOK - NWGMR29 - VRMP	8/12/2020	8:44 AM	NA			20.2			671	0.3				727
F4	MARSH BROOK - NWGMR29 - VRMP	8/12/2020	8:44 AM	L											461
F4	MARSH BROOK - NWGMR29 - VRMP	8/12/2020	8:44 AM	D			20.2			667	0.3				
F4	MARSH BROOK - NWGMR29 - VRMP	8/26/2020	8:25 AM	NA			16.9	8.9	92.0	714	0.4				1046
F4	MARSH BROOK - NWGMR29 - VRMP	9/9/2020	8:43 AM	NA			17.7	8.2	84.0	776	0.4				1046
F4	MARSH BROOK - NWGMR29 - VRMP	9/23/2020	8:30 AM	NA			11.4	2.7	70.0	703	0.3				921
F4	MARSH BROOK - NWGMR29 - VRMP	10/1/2020	8:18 AM	NA			13.9	5.0	46.0	807					35
F4	MARSH BROOK - NWGMR29 - VRMP	10/1/2020	8:18 AM	L											60
F4	MARSH BROOK - NWGMR29 - VRMP	10/1/2020	8:18 AM	D			14.1	4.4	41.0	804					