Chloride Concentrations in Massachusetts Rivers and Streams: Data Report (2015 – 2020)

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Executive Office of Energy and Environmental Affairs
Rebecca L. Tepper, Secretary
Massachusetts Department of Environmental Protection
Bonnie Heiple, Commissioner
Bureau of Water Resources
Kathleen M. Baskin, Assistant Commissioner

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Prepared by:
Mason Saleeba, Assessment Coordinator
Peter Mitchell, Monitoring Coordinator
Shervon De Leon, Section Chief, Water Quality Monitoring
Richard F. Chase, Section Chief, Data Management and Water Quality Assessment

Watershed Planning Program
Division of Watershed Management, Bureau of Water Resources
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Cover Photos
Watershed Planning Program staff and interns conducting chloride field surveys.

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Massachusetts Department of Environmental Protection

MassDEP's mission is to protect and enhance the Commonwealth's natural resources – air, water, and land – to provide for the health, safety, and welfare of all people, and to ensure a clean and safe environment for future generations. In carrying out this mission MassDEP commits to address and advance environmental justice and equity for all people of the Commonwealth; provide meaningful, inclusive opportunities for people to participate in agency decisions that affect their lives; and ensure a diverse workforce that reflects the communities we serve.

Watershed Planning Program

The mission of the Watershed Planning Program (WPP) in the Massachusetts Department of Environmental Protection is to protect, enhance, and restore the quality and value of the waters of the Commonwealth. Guided by the federal Clean Water Act, WPP implements this mission statewide through five Sections that each have a different technical focus: (1) Surface Water Quality Standards; (2) Surface Water Quality Monitoring; (3) Data Management and Water Quality Assessment; (4) Total Maximum Daily Load; and (5) Nonpoint Source Management. Together with other MassDEP programs and state environmental agencies, WPP shares in the duty and responsibility to secure the environmental, recreational, and public health benefits of clean water for all people of the Commonwealth.

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Disclaimer

References to trade names, commercial products, manufacturers, or distributors in this report constituted neither endorsement nor recommendation by MassDEP.

Contact Information

Watershed Planning Program
Division of Watershed Management, Bureau of Water Resources
Massachusetts Department of Environmental Protection
8 New Bond Street, Worcester, MA 01606
Website: https://www.mass.gov/guides/watershed-planning-program
Email address: dep.wpp@mass.gov

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List of Acronyms

APHA	American Public Health Association
AU	Assessment Unit
BMPs	Best Management Practices
CALM	Consolidated Assessment and Listing Methodology
CWA	Clean Water Act
DCR	Massachusetts Department of Conservation and Recreation
DFG	Massachusetts Department of Fish & Game
DWP	MassDEP Drinking Water Program
IR	Integrated Report
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MCL	Maximum Contaminant Level
MPCA	Minnesota Pollution Control Agency
MWRA	Massachusetts Water Resources Authority
NEIWPCC	New England Interstate Water Pollution Control Commission
NHDES	New Hampshire Department of Environmental Services
NHDOT	New Hampshire Department of Transportation
NPS	Nonpoint Source
QAPP	Quality Assurance Project/Program Plan
SC	Specific Conductance
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
TRB	Transportation Research Board
UMass	University of Massachusetts
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WPP	Watershed Planning Program

1.0 Introduction and Background

Chloride is a toxic pollutant that adversely impacts aquatic life at concentrations exceeding protective freshwater criteria in the Massachusetts Surface Water Quality Standards (SWQS) (see 314 CMR 4.06(6)(d), Table 29a: Aquatic Life Criteria). The main source of excess chloride in rivers, lakes, wetlands, and groundwater is deicing salts applied to roads, parking lots, and walkways. This report documents chloride data collected by the Watershed Planning Program (WPP), Massachusetts Department of Environmental Protection (MassDEP), from 2015 through 2020 in selected Massachusetts (MA) rivers and streams, as part of WPP's surface water monitoring program. Additional context is also provided on issues surrounding the use of road salts.

1.1 The Road Salt Problem

Heavy snow and cold temperatures during winter months in the northern United States create poor driving conditions on roadways. States and municipalities therefore apply deicers to both prevent ice formation and melt existing ice (abrasives are also added to increase traction on roadways) (Jackson and Jobbagy, 2005). These deicers have been estimated to reduce winter road accidents by 88% (Salt Institute, 2004). Since the first use of road salt around 1940, application of sodium chloride (NaCl)-based road salt has risen dramatically across the U.S. The quantity of salt sold or used in 2023 was estimated to be 41 million tons, and of that, 41% (or 16.8 million tons) was estimated to have been used for road deicing (USGS 2024), compared to roughly 1 million tons in the 1960s (Cañedo-Argüelles et al., 2013). During the winter of 2015-16, state highway departments in the New England states (CT, ME, MA, NH, and VT) and New York state self-reported applying a total of 1.3 million tons of dry NaCl and 2.8 million gallons of NaCl brine (Clear Roads 2016). The application of NaCl to roadways and paved surfaces for the purpose of deicing can be detrimental to private property, public infrastructure, public water supplies, aquatic life, and human health (USEPA, 2020).

Anti-icers and deicers, collectively referred to as deicers, create a solution with a lower freezing point than water, thereby melting the ice, breaking the bond between ice and pavement, and turning ice and snow into a drivable slush. Chloride salts (most commonly NaCl) are the most common deicers used in the United States (Clear Roads 2016). At road temperatures above 12°F (equivalent to -11 °C), NaCl is effective in both melting and preventing ice on asphalt (Salt Institute 2004). Below such temperatures, NaCl has limited to no effect on ice. At lower temperatures (which are typical in New England), an additive, such as calcium chloride (CaCl) or magnesium chloride (MgCl), or abrasive, such as sand, is often used in addition to standard NaCl road salt to achieve improved driving conditions (TRB, 1991). While both CaCl and MgCl are more effective at melting ice at lower temperatures than NaCl, NaCl is much less expensive and, for that reason, remains the primary salt used to treat roads (often with reduced effectiveness in very cold conditions). "Road salts" may also contain chemical additives to reduce caking/clumping and corrosion, which is another deleterious effect of salt use. Increasingly, liquid brine pre-wetting applications are helping to reduce the amount of solid salts used.

The environmental degradation of both terrestrial and aquatic ecosystems has been attributed to extensive road salt application and resultant surface water salinization (Kaushal et al., 2009). Applied road salt readily dissolves and finds its way to surface waters. Use of road salts in deicing operations is one of the leading causes of elevated chloride concentrations impacting water resources (Trowbridge et al., 2010; Morgan et al., 2012; Long et al., 2015). A high NaCl concentration in deeper waters can cause chemical stratification, which can prevent oxygen from reaching the benthic layer, eventually creating conditions unfavorable to aquatic life (Novotny et al., 2008). Salt also affects the osmoregulatory and physiological processes of fish (Blasius and Merritt, 2002). Waterbodies that receive drainage from salted roads have been linked to decreased abundance and diversity of invertebrates (Mattson and Godfrey, 1994) due to lethal effects and/or macroinvertebrate drift to

downstream locations (Blasius and Merritt, 2002). Salt disturbs roadside plants through root absorption or salt spray from roadways. Salt can cause tissue damage, stunt plant growth, and desiccate plant cells to mortality (Mattson and Godfrey, 1994). Road salt also poses great risks to soil by altering pH and chemical composition (Trombulak and Frissell, 2000) and causes calcium, potassium, and magnesium to seep into groundwater (NHDES, 2016). Further, road salts can add undesirable salinity to drinking water. For example, chloride concentrations above 250 mg/L imparts a detectable salty taste (WHO,1996). Since road salt dissolved in water is an ionic solution (electrolytic solution), the removal of salt from water can be difficult and expensive. It is usually accomplished through distillation, reverse osmosis, or ion exchange.

1.2 Factors Affecting Conductivity and Chloride Concentrations in Surface Waters

There is evidence that salt pollution is contributing to widespread salinization of freshwaters, with upward trends in conductivities (and related chloride concentrations) due to road salts and other sources being common across the U.S. (Kaushal, 2018). Conductance is a measure of the capacity of water to pass electrical flow and is directly related to the concentration of ions in solution, where increased ion concentrations result in higher conductivities. Measured conductivities in surface waters can be due to both natural and anthropogenic sources and are a function of the combined ionic content, i.e., positive cations (e.g., Ca, Mg, K, Na) and negative anions (HCO_3, SO_4 and Cl) in solution.

Most chloride in streams is anthropogenic, but some chloride occurs naturally. Natural sources include atmospheric precipitation near coastal areas, soil erosion, and rock weathering (MPCA, 2006). In addition to road salt deicers, other common anthropogenic sources of chloride include wastewater treatment plant discharge, water softeners (Overbo, et al., 2021), potassium chloride fertilizer (USGS, 2020), landfill and septic leachate, and drilling oil and gas wells.

Salt applied to roadways ultimately dissolves in water and the dissociated sodium and chloride ions are transported via runoff to surface water, groundwater, and soil. Chloride and sodium have different physical properties and transport pathways in the environment. Chloride is a non-reactive ion that is highly soluble and very mobile. Its presence in water is a good indicator of pollution because it remains in solution and its remediation is difficult for the same reason. Chloride from road salt applications in winter can accumulate in soils and shallow groundwater and act as an intermittent source of chloride in surface waters in the summer months (Kincaid and Findlay, 2009; Corsi et. al., 2015). Sodium is less easily transported but can alter local soil pH and chemistry (University of Georgia, 2022).

Urbanization and increased impervious surfaces are key factors contributing to elevated chloride concentrations as most salt is used seasonally on roadways, parking lots, driveways, and sidewalks. Urban land cover in the U.S. continues to increase (Nowak and Walton, 2005; Nickerson et al., 2011; University of Michigan, 2023). Although road salt application in northern states is dependent on winter severity, greater urbanization generally leads to greater road salt use (e.g., salt use roughly doubled from 1990 to 2011 (USGS, 2005; USGS, 2011), which has been estimated to outpace the rate of urbanization in the U.S. snow-belt (Corsi et al., 2015). In streams across the Commonwealth of Massachusetts, Mattson and Godfrey (1994) observed a significant correlation between chloride and road type. Shifts in land use to more developed uses are correlated with increases in specific conductivity (Tu and Xia, 2006). In the central Adirondack Mountains of New York, Demers and Sage (1990) found that instream chloride concentrations downstream of major roads were over 30 times higher than at corresponding upstream sites. In a study of four New Hampshire watersheds

along the southern I-93 highway corridor, deicing of roadways and parking lots accounted for over 90% of chloride loading (10-15% from state roads, 30-35% from municipal roads, and 45-50% from private roads and parking lots) (Trowbridge et al., 2010).

1.3 Regulatory Thresholds and Implications for Chloride Impairments

The U.S. Environmental Protection Agency (USEPA) recommended ambient water quality criteria for the protection of aquatic life against acute (one-hour) and chronic (four-day) exposure to chloride (USEPA, 1988). MassDEP adopted these recommended chloride criteria into the MA SWQS in 1995. For freshwater, the acute average chloride concentration should not exceed **860 mg/L** and the chronic average chloride concentration should not exceed **230 mg/L**, each at a frequency no greater than once every three years (MassDEP, 2021a). MassDEP uses these chloride criteria in the MA SWQS to assess MA waterbodies for chloride impairment using the process outlined in the MA Consolidated Assessment and Listing Methodology (CALM) Guidance Manual (MassDEP, 2022b). For comparison, the Secondary Maximum Contaminant Level or MCL (aesthetic standard) for chloride in drinking water is 250 mg/L, beyond which water will have a salty taste (MassDEP, 2020b). This Secondary MCL is separate from the SWQS and is applicable at point-of-use for all drinking water sources, including surface water reservoirs.

MassDEP's Final 2022 Integrated List of Waters lists 27 stream segments (and one reservoir) across the state as anthropogenically impaired due to elevated chloride concentrations (MassDEP, 2022a). These determinations were based on both estimated chloride concentrations derived from specific conductance measurements (see regression tool used in Section 3 below) and corresponding water samples analyzed for chloride to confirm the estimated data. In some cases, caution must be exercised when large differences are observed between paired estimated chloride (derived using specific conductance) and discrete chloride measurements (from laboratory results). These differences can indicate site-specific in-stream chemistry conditions (e.g., due to upstream wastewater discharges) for which the regression tool may be less accurate. As MassDEP, partner agencies, and stakeholder groups collect more chloride or specific conductance data, additional waterbodies will likely be included on the 303(d) list requiring total maximum daily load (TMDL) development and/or alternative restoration measures.

1.4 Monitoring Surface Waters for Chloride

Surface water quality monitoring efforts by MassDEP's WPP support activities that function to preserve, protect, assess, and restore water quality under the federal Clean Water Act. In addition to monitoring for nutrients, metals, bacteria, toxic organic compounds, and other chemicals of concern, WPP also collects data on toxic inorganic constituents, such as chloride. A conductivity-chloride regression can also be used to estimate chloride concentrations using conductivity data (described below in Section 3), allowing MassDEP analysts to further assess the impact of seasonal road salt applications on year-round surface water quality by comparing estimated concentrations to the MA SWQS for chloride (MassDEP, 2021a).

Historic and current WPP ambient chloride data have been based on grab samples for laboratory analysis. While useful for comparison to the acute (1-hour average) criterion in the MA SWQS, these data are inherently limited for comparison with the chronic (4-day average) criterion used to assess potential impairment of the aquatic life designated use, as established in the MA SWQS (MassDEP, 2021a). Also, the preferred laboratory method for determining chloride in water (ion chromatography) is reliable and accurate but is not suitable for field applications or real-time monitoring. MassDEP does not currently utilize ion-selective electrode (ISE) probes for *in-situ* chloride measurements.

As an alternative monitoring technique, WPP investigated the application of continuous, *in-situ* conductivity measurements to estimate ambient chloride concentrations through the development of a linear regression. Using the standardized measure of conductance, known as specific conductance, a direct correlation with chloride concentrations has been demonstrated in New England and other U.S. regions (Table 1). Differences among specific conductance values across multiple studies can largely be explained by geology, such as bedrock variability, stream discharge, and the extent of developed land (USEPA, 2012). Due to the variability in existing empirical relationships between chloride concentrations and measured SC data, WPP developed and validated a regression to estimate chloride concentrations using MA conductance measurements.

Table 1 *- Example relationships between Cl^- (mg/L) and specific conductance (SC, µS/cm)*

Waterbody	Equation	N	Coefficient of determination (R^2)	SC at Chronic Chloride Criterion (230 mg/L)	SC at Acute Chloride Criterion (860mg/L)	Reference
Southern NH streams	Y=0.3070*X - 22.0	649	0.97	821	2,873	Trowbridge et al. 2010
Dark Brook, Auburn, MA	Y=0.2864*X - 21.9	37	0.994	880	3,079	Heath 2014
Barrows Wellfield, MA	Y=0.3688*X - 109.3	68	0.993	920	2,628	Heath and Morse 2013
Sand Creek, MN	Y = 0.1597*X - 55.696	86	0.826	1,789	5,734	Bischoff et al. 2009
Shingle Creek, MN	Y = 0.3788*X - 225.31	138	0.987	1,202	2,865	Bischoff et al. 2009

Note: N represents the number of samples used to develop the model, X is specific conductance at 25°C collected in- situ, and Y represents estimated chloride concentration

This report summarizes discrete and estimated continuous chloride data collected by WPP from 2015 to 2020 in several MA watersheds. A brief description of the development and validation of the regression tool used for the 2015-2020 data years is also provided. Recommendations for future monitoring and management related to road salt impacts, including mitigation alternatives, are also provided. The results of this ongoing project can also provide data relative to the development of TMDLs or alternative restoration measures.

2.0 Project Goals and Objectives

The overall goal of the ongoing chloride monitoring project is to provide water quality data and information on streams, rivers, lakes, and ponds to support the following objectives:

- Determine the general extent and magnitude of chloride impairments within MA (due primarily to road salt application), in relation to watershed characteristics.
- Assess the status or condition of MA surface waters (CWA §305(b)) with respect to chloride concentrations, by comparing chloride data to freshwater chloride criteria in the MA SWQS.
- Refine the chloride-specific conductance regression model, as additional data are collected.
- Explore TMDL-related or alternative strategies to address chloride impairments (CWA §303(d)), and
- Develop supporting data for policies, guidance and/or standards related to chloride.

As part of a longer-term strategy, WPP aims to share chloride monitoring data and collaborate with other MassDEP programs (such as the Drinking Water Program and Wetlands Program), state agencies (such as the Massachusetts

Department of Transportation (MassDOT) and Massachusetts Department of Conservation and Recreation (DCR; Quabbin and Wachusett Reservoir data)), academic institutions, volunteer monitoring groups, USGS, and USEPA.

3.0 Methods

3.1 Sampling Design

Ambient chloride data (2015 to 2020) were collected from lotic (flowing) waters under various land use conditions to capture potential anthropogenic inputs of chloride, such as streams near major highways or in heavily urbanized areas with high road density and paved areas. Continuous monitoring was designed to run from approximately October to June (at a minimum) each year, thus covering the pre-winter, winter, and post-winter seasons. Depending on available resources, near year-round data collection was preferred to capture the full extent of summer baseflow conditions. Additional information related to sampling designs and quality control and assurance is detailed in the project Quality Assurance Project Plan (MassDEP, 2020a) and the annual Sampling & Analysis Plans.

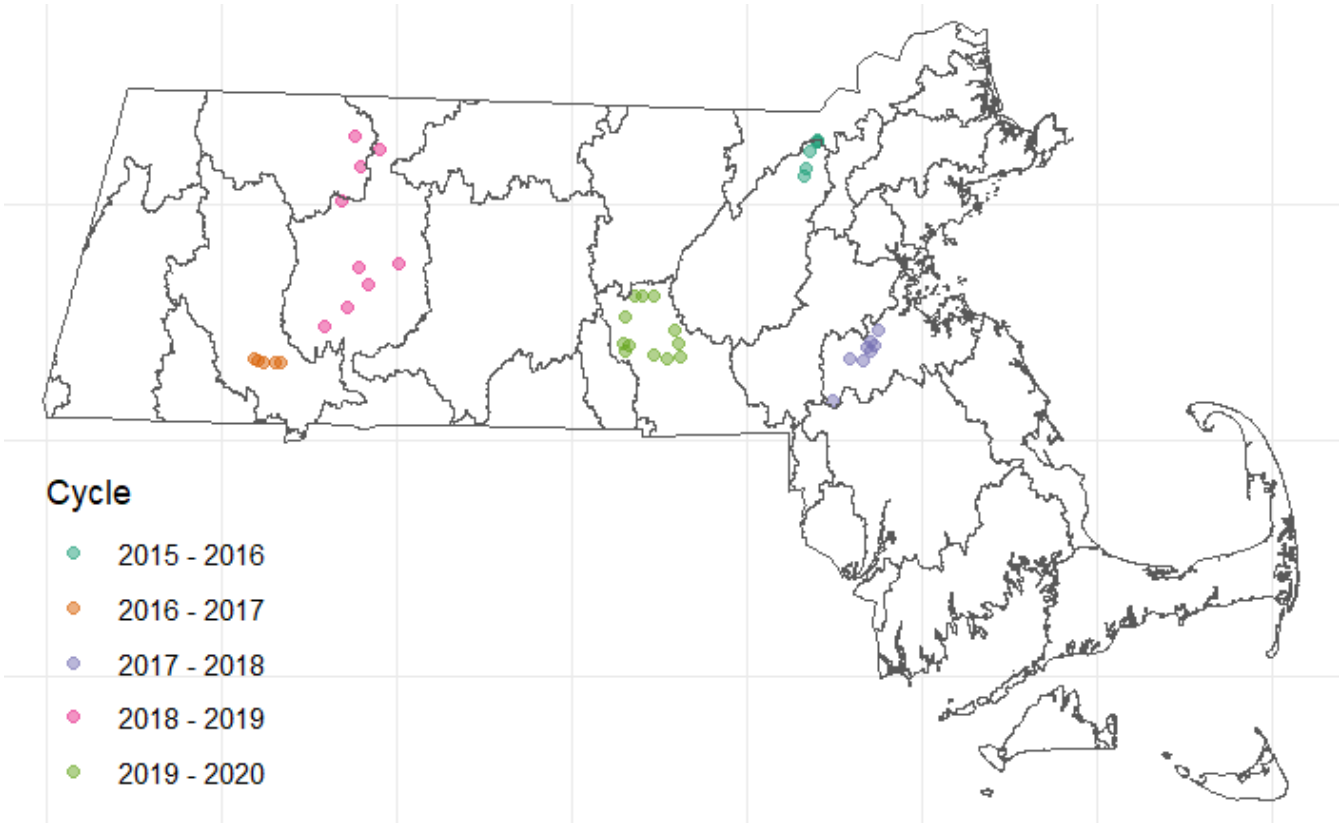

Figure 1 *- MassDEP Chloride Project Station Locations and Monitoring Cycle Periods*

The Chloride Project expanded its spatial coverage and varied its scope between 2015 and 2020 (see Figure 1). The initial focus area for the pilot project in 2015-16 was River Meadow Brook (six sites) in the Concord watershed. This design involved chloride and specific conductance measurements from the headwaters to the mouth of a single brook and enabled the analysis of chloride fluctuations as water flows downstream in a heavily urbanized watershed. In subsequent years, multiple waterbodies in selected watersheds were examined to expand

geographic coverage within MA and introduce variations in land use characteristics. In 2016-2017, Potash Brook (Westfield River watershed) was sampled at five sites to examine this stream's exposure to potential chloride sources from the Massachusetts Turnpike (Route 90). In 2017-2018, The Neponset River watershed was the focus of study with six sites along the mainstem and two tributaries. In 2018-2019, the Chloride Project monitored conditions in six tributaries to the Connecticut River. Finally, in 2019-2020, the Chloride Project examined 12 tributaries within and around the City of Worcester in the Blackstone River watershed. The project, from its initiation in 2015 through 2020, was characterized by the progression from single stream studies aimed at piloting procedures, to major highway effects upon a single stream, to tributary effects upon large rivers, to effects of urban and suburban land use. These advancements allowed WPP to expand the number of sites monitored annually to approximately 30 (by 2021), develop a better understanding of chloride dynamics in-stream and geographically, and to broaden the scope and spatial coverage to include proximity to water supplies and variations in land use types.

3.2 Conductivity Measurements

Continuous conductivity data (at ambient temperatures) were collected at 30-minute intervals using HOBO U24 freshwater data loggers, in adherence to WPP's standard operating procedures for data logger deployments (MassDEP, 2013). Conductivity data were converted to specific conductance in microsiemens per centimeter (µS/cm) at 25 °C using the following equation:

$$SC = \frac{Measured\ conductivity}{1 + r\ (T - 25)}$$

where:
SC = specific conductance (µS/cm) at 25 °C
r = the temperature coefficient of variation
T = temperature of measured conductivity in °C.

The temperature coefficient of variation value used for the specific conductance data transformations was 0.02, which assumes a 2.0% change in conductivity for every degree (°C) change in temperature (Barron and Ashton, 2005). The derived specific conductance data were then used to estimate chloride concentrations using the regression equation (Section 3.4). Discrete quality control (QC) readings for specific conductance (at 25 °C) were also taken at each visit using separate YSI/Hydrolab multiprobe instruments for quality control purposes.

3.3 Chloride Sampling and Analyses

On a subset of site visits, grab water samples were collected for chloride analysis (only), co-located near the deployed conductivity loggers. All samples collected from 2015-2020 were delivered to the MA state laboratory, William X. Wall Experiment Station (WES) in Lawrence, Massachusetts, for analysis. All samples were preserved, held in coolers containing wet ice to < 6^{o} C during transport and delivered under chain-of-custody within one week of collection. Because WPP chloride analyses are typically performed on aliquots from acid-preserved "nutrient" samples, chloride-only samples were preserved with sulfuric acid (9N) immediately after collection for consistency. With minor exception, all samples were analyzed within the 28-day holding time (if holding time exceedance was significant for any individual datum, these data were censored and not available for data analysis). See project QAPP (MassDEP, 2020a) for additional information.

3.4 Development of the Regression Model

The model development dataset was compiled from 2,426 paired chloride and specific conductance data points generated by WPP from 1994 to 2012 at 244 inland stream and river stations across Massachusetts (Figure 2). Model validation was conducted using the USEPA Auburn Project study data (N=37) collected during the winter of 2013-2014 (Heath, 2014), the MassDEP River Meadow Brook study data (N=54) collected between October 2015 and September 2016, and additional WPP data (N = 96) collected from streams and rivers in western Massachusetts in 2013-2014. For additional information on this model development, see Appendix F in the MA CALM Guidance Manual (MassDEP, 2022b).

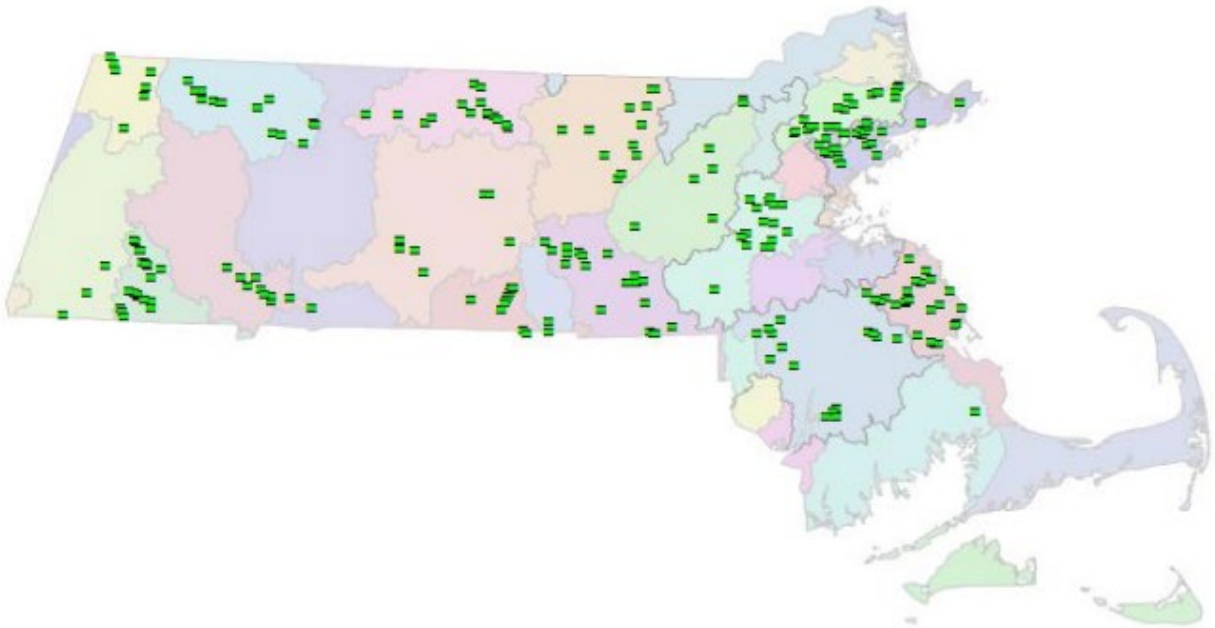

Figure 2 - *Distribution of the 244 sampling stations where paired chloride-specific conductance data were collected (1994 to 2012)*

Development of the freshwater model only included data with specific conductance < 10,000 µS/cm (n=2,426). The lower limit for estimated chloride values using the model is 5 mg/L (i.e., if the model calculates the chloride values as < 5 mg/L, these are reported as 5 mg/L for estimation purposes to account for model error at the extreme lower range). The resulting equation for estimating chloride concentrations is:

$$\mathbf{Y = 0.2753X - 18.987}$$

where:
Y is chloride concentration (mg/L)
X is specific conductance (µS/cm)

Based on this regression, exceedances of the acute and chronic chloride criteria magnitudes in the MA SWQS are estimated to occur at specific conductance concentrations of 3,193 µS/cm and 904 µS/cm, respectively. However, due to the cumulative uncertainty of using specific conductance as a surrogate for chloride, a 10% margin of error is applied when conducting water quality assessments to safeguard against making chloride impairments when

chloride is not actually impaired (avoiding potential Type I errors). With the 10% margin of error, exceedances of the acute and chronic chloride criteria magnitudes are estimated to occur at specific conductance concentrations of 3,512 µS/cm and 994 µS/cm, respectively).

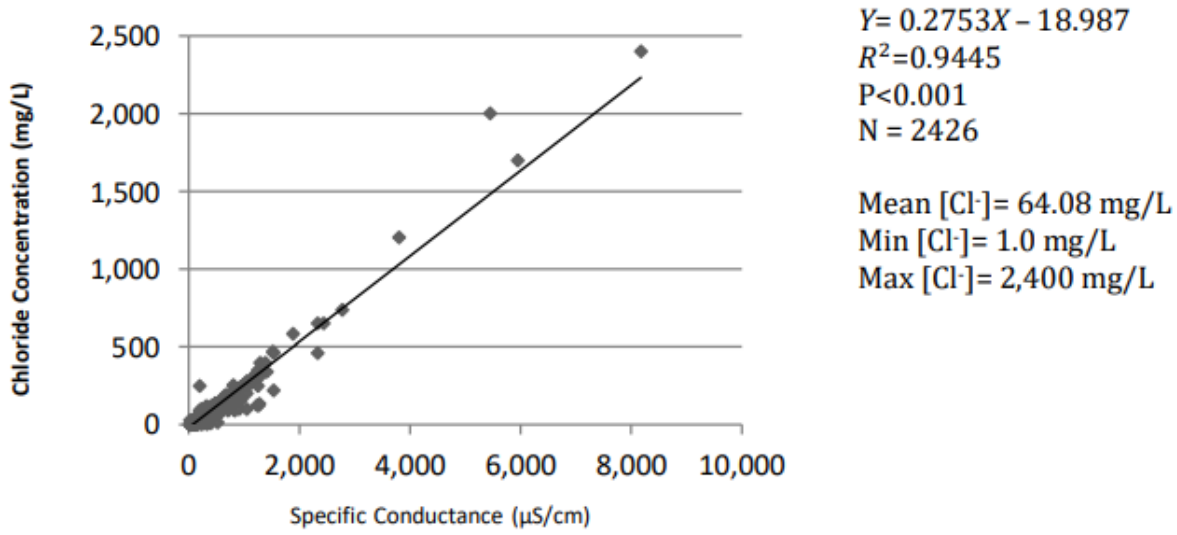

Figure 3 - *Chloride and specific conductance regression for Massachusetts freshwaters.*

4.0 Quality Assurance and Quality Control

Sampling and analyses for conductivity, specific conductance, and chloride were performed following established WPP procedures at the time of sampling, including Quality Assurance Project Plans, Sampling & Analysis Plans, and/or Standard Operating Procedures. Trained WPP staff collected water quality samples and ensured sample representativeness, accuracy, and precision. With minor exceptions, all field surveys included the use of blank and duplicate quality control samples, at a rate of approximately 10% of the total number of samples collected. Field probes for discrete specific conductance measurements were calibrated prior to each use and checked following each use. WPP principal investigators and quality assurance personnel completed the data validation of discrete and continuous data. Data not meeting performance criteria were either qualified or censored. While censored data were excluded from data analyses, qualified data were considered usable, albeit with an appropriate caveat depending on the specific data qualifiers applied. All data used in the development of the regression equation were considered final and usable. Secondary data used in related analyses were from verified sources.

Due to the cumulative uncertainty (e.g., conductivity and temperature probe error, continuous probe drift, sensor fouling, assumptions made in data transformations, and regression model error) of estimated chloride values from the regression, caution and best professional judgment are applied when using the tool for assessment and listing decisions. While this is currently accomplished, at a minimum, by applying a 10% safety factor (or margin of error) to estimated chloride values when conducting assessments, the estimated chloride values in this report are reported “as-is” using the regression (i.e., without a safety factor).

5.0 Results

Summaries of the overall statistical results for each project are presented in Section 5.1 and Appendix B. Tables 2 and 3 present summary statistics for each project dataset. Tables 4-8 provide project-specific summary statistics for continuous specific conductance and estimated acute and chronic exceedances of chloride criteria magnitudes. Blue and red shading denote the degree of chronic and acute percent exceedances, respectively, with color intensity increasing with severity of exceedance. For specific locations sampled within each watershed, refer to Appendix B.

Appendix B contains the site-specific metadata and water quality data for the co-located and contemporaneous discrete (or "attended") specific conductance measurements and chloride samples (by survey date), and the statistical estimates for co-located continuous (or "unattended") specific conductance and estimated chloride data. For each station, figures showing estimated chloride concentrations during the logger deployment periods versus the MA SWQS acute and chronic chloride criteria are also reported. Finally, precipitation type(s) and amounts are presented.

5.1 Project Data Summary

Table 2 *- Summary of Discrete Laboratory Chloride Sample Results by Watershed & Monitoring Cycle*

Watershed	Monitoring Cycle	Total Number of Chloride Samples	Number of Samples Exceeding Chronic Chloride Criterion	Percentage of Samples exceeding Chronic Chloride Criterion
Concord (SuAsCo)	2015 - 2016	54	14	26%
Westfield	2016 - 2017	5	3	60%
Neponset	2017 - 2018	16	0	0%
Connecticut	2018 - 2019	14	0	0%
Deerfield	2018 - 2019	3	0	0%
Blackstone	2019 - 2020	24	4	17%

Table 3 *- Summary of Continuous Specific Conductance (SC) Observations by Watershed & Monitoring Cycle*

Watershed	Monitoring Cycle	Station Count	SC Minimum (µS/cm)	SC Average (µS/cm)	SC Maximum (µS/cm)	Percentage of SC Results exceeding Chronic Criterion	Percentage of SC Results exceeding Acute Criterion
Concord (SuAsCo)	2015 - 2016	6	48	698	4,537	13%	0%
Westfield	2016 - 2017	5	85	697	2,386	13%	0%
Neponset	2017 - 2018	8	120	560	3,028	2%	0%
Connecticut	2018 - 2019	7	16	150	745	0%	0%
Deerfield	2018 - 2019	2	21	107	343	0%	0%
Blackstone	2019 - 2020	12	16	745	29,653	20%	1%

Table 4 *- Summary of Continuous Specific Conductance (SC) Monitoring Results in the Concord (SuAsCo) Watershed (2015-2016)*

Waterbody	Station ID	SC Minimum (µS/cm)	SC Average (µS/cm)	SC Maximum (µS/cm)	Percentage of SC Results exceeding Chronic Criterion	Percentage of SC Results exceeding Acute Criterion
Concord River	W2227	455	712	1,774	0%	0%
Concord River	W2549	451	696	1,084	0%	0%
River Meadow Brook	W1488	308	410	635	0%	0%
River Meadow Brook	W1489	253	1,034	3,833	43%	0%
River Meadow Brook	W2548	236	1,057	4,537	34%	0%
Unnamed Tributary	W2547	48	288	501	0%	0%

Table 5 *- Summary of Continuous Specific Conductance (SC) Monitoring Results in the Westfield Watershed (2016-2017)*

Waterbody	Station ID	SC Minimum (µS/cm)	SC Average (µS/cm)	SC Maximum (µS/cm)	Percentage of SC Results exceeding Chronic Criterion	Percentage of SC Results exceeding Acute Criterion
Potash Brook	W0244	85	456	1,482	0%	0%
Potash Brook	W2723	352	875	1,435	30%	0%
Potash Brook	W2724	327	791	2,095	16%	0%
Potash Brook	W2725	176	658	2,386	14%	0%
Potash Brook	W2726	197	718	2,319	1%	0%

Table 6 *- Summary of Continuous Specific Conductance (SC) Monitoring Results in the Neponset Watershed (2017-2018)*

Waterbody	Station ID	SC Minimum (µS/cm)	SC Average (µS/cm)	SC Maximum (µS/cm)	Percentage of SC Results exceeding Chronic Criterion	Percentage of SC Results exceeding Acute Criterion
Neponset River	W0533	179	380	670	0%	0%
Neponset River	W0543	173	568	1,626	3%	0%
Neponset River	W0549	235	603	2,296	2%	0%
Neponset River	W0564	189	657	3,028	2%	0%
Neponset River	W0568	197	627	2,836	3%	0%
Neponset River	W2772	210	652	2,632	5%	0%
Pecunit Brook	W0565	120	437	1,216	0%	0%
Ponkapog Brook	W0566	201	608	2,858	4%	0%

Table 7 *- Summary of Continuous Specific Conductance (SC) Monitoring Results in the Connecticut & Deerfield Watersheds (2018-2019)*

Waterbody	Station ID	SC Minimum (µS/cm)	SC Average (µS/cm)	SC Maximum (µS/cm)	Percentage of SC Results exceeding Chronic Criterion	Percentage of SC Results exceeding Acute Criterion
Fall River	W2856	31	130	479	0%	0%
Fort River	W1051	43	163	460	0%	0%
Fort River	W2845	16	99	218	0%	0%
Manhan River	W1065	37	173	401	0%	0%
Manhan River	W2860	34	105	244	0%	0%
Mill River	W1061	66	163	320	0%	0%
Mill River	W2859	67	205	745	0%	0%
Green River	W2857	21	73	119	0%	0%
Green River	W2858	51	132	343	0%	0%

Table 8 *- Summary of Continuous Specific Conductance (SC) Monitoring Results in the Blackstone Watershed (2019-2020)*

Waterbody	Station ID	SC Minimum (µS/cm)	SC Average (µS/cm)	SC Maximum (µS/cm)	Percentage of SC Results exceeding Chronic Criterion	Percentage of SC Results exceeding Acute Criterion
Big Bummet Brook	W2946	104	649	1,507	3%	0%
Blackstone River	W1242	348	678	1,739	5%	0%
Cold Spring Brook	W2947	101	343	1,070	0%	0%
Dark Brook	W1776	25	523	6,509	0%	0%
Dark Brook	W2949	80	1,353	11,934	92%	1%
Poor Farm Brook	W2945	180	818	7,392	17%	1%
Quinsigamond River	W2188	411	678	875	0%	0%
Singletary Brook	W1767	113	272	1,199	0%	0%
Tatnuck Brook	W1426	16	435	29,653	1%	0%
Unnamed Tributary	W2948	76	447	2,512	0%	0%
Unnamed Tributary	W2950	59	1,646	21,989	71%	6%
Weasel Brook	W2944	92	1,192	12,133	52%	3%

5.2 QC Results

Throughout the project, discrete QC measurements for specific conductance generally compared well to closest-in-time 1-hour average readings for continuous, transformed specific conductance data from the loggers. In most cases, co-located lab samples for chloride closely matched estimated values based on *in-situ* conductivities. This provides additional validation of the regression method approach.

No censored chloride or specific conductance data were used in statistical analyses. Some of the individual data used to generate statistics may have been qualified for one or more reasons, but qualified data are considered by WPP to be generally usable, albeit with caveat. Individual data users should consider the qualifications as needed depending on their intended use of the data. See WPP's final data summaries and information on data qualifiers on MassDEP's website: https://www.mass.gov/guides/water-quality-monitoring-program-data.

5.3 Overall Conclusions

As expected, the estimated chloride data indicate that exceedances of acute and/or chronic chloride criteria in the MA SWQS are most likely to occur in more urbanized, densely developed areas with higher levels of impervious surfaces (e.g., road density). This is evident in the River Meadow Brook (Lowell, MA) and Blackstone River (Worcester, MA area) tributary data. In general, there were very infrequent exceedances of the acute chloride criterion in the MA SWQS.

Depending on site-specific conditions (including stream order, weather and precipitation patterns, streamflow patterns, and basin land use characteristics), the seasonal timing of chloride maxima and criteria exceedances varied. While chloride concentrations at some sites were highest during the winter months (presumably during snowmelt events), other sites exhibited highest chloride concentrations at other times. This has been demonstrated in other studies (see Section 1.2).

The MA regression model for estimating ambient freshwater chloride concentrations by using continuous SC data as a surrogate has been shown to be a valid and essential tool. As additional paired data are gathered, the model will be recalibrated and refined. For WPP's latest regression model, see the most recent MA CALM Guidance Manual.

6.0 Recommendations

MassDEP and WPP intend to continue addressing the unintended consequences of road salt use in Massachusetts through monitoring, education, communication, collaboration, and cost-effective solutions. The list below describes various strategies for addressing road salt.

1. **Continue to monitor for chloride (and sodium) in freshwater rivers and lakes, wetlands and groundwater throughout the Commonwealth.** Numerous groups can contribute to this effort, including MassDEP (WPP, DWP, Wetlands Program, etc.), MassDOT, DCR, DFG, USEPA, USGS, local cities and towns, and volunteer monitoring organizations.
2. Periodically **recalibrate WPP's statewide chloride/specific conductance regression tool** using more recent WPP data (and USGS/other quality-assured data as appropriate). This will enhance WPP's ability to estimate continuous chloride concentrations in freshwater using continuous conductivity data as a surrogate.
3. For chloride impairments, **develop TMDLs or advance restoration plans** aimed at restoring water quality. Given that most impairments have been found in more urbanized areas, consider regional or watershed-based approaches, the use of the Recovery Potential Screening Tool, and/or other pathways.
4. Continue to **engage stakeholders** (including EPA, MassDOT, sister agencies, local governments and NEIWPCC) on road salt issues to expand the implementation of intra- and inter-state solutions.
5. Continue the **participation of agencies within the Executive Office of Energy and Environmental Affairs in the Interagency Salt Working Group**, including staff from MassDEP, DCR, MassDOT, DFG, MWRA and the City of Cambridge, to facilitate information sharing, coordination, and program enhancements.
6. **Develop, implement, share, and maintain a statewide road salt database** for various data elements related to road salt use, including salt application rates, location of salt storage facilities, and water quality data. Such a database is currently not available.

7. Develop new, **effective public information strategies to educate** the public, stakeholders, professionals, and operators on the use of best practices when applying road salt on public and private lands.
8. Continue to **explore successful strategies from other states and their MA applicability** to mitigate the road salt problem, restore water quality impacted by salt applications, and expand the use of best management practices related to salt use (e.g., prewetting, salt application technologies, brine, salt alternatives, etc.). See also Appendix A.

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Appendix A

Progress in Massachusetts to Monitor and Mitigate Anthropogenic Salinization of Surface and Ground Waters

A1. Water Quality Monitoring

Water quality monitoring programs collecting chloride (and/or specific conductance) data in MA include, but are not limited to, the following:

- **MassDEP, Watershed Planning Program (WPP)**: In addition to the 2015-2020 project data included in this report, WPP continues to monitor for chloride in both rivers (including continuous specific conductance) and lakes (discrete specific conductance and chloride only), as part of its statewide monitoring program. Since 2021, WPP has been targeting sites for chloride data collection in combination with a rotating basin approach. The current emphasis on site selection is focusing on areas of high road density, especially in proximity to public water supplies.
- **MassDEP, Drinking Water Program (DWP):** https://www.mass.gov/guides/drinking-water-standards-and-guidelines#-standards-
- **MA Department of Conservation & Recreation (DCR)**
    - **Quabbin and Ware watersheds**: DCR-Quabbin has been conducting monitoring in reservoir and tributary stream samples. These samples are analyzed for chloride and sodium (since August/September 2018 in Quabbin watershed, and since January 2019 in Ware River watershed) and specific conductance since 1987. DCR publishes annual water quality reports including the Quabbin Reservoir and Ware River (https://www.mass.gov/service-details/dcr-watershed-water-quality-reports). The watershed monitoring is conducted to evaluate short- and long-term trends as needed for source water protection. Increasing conductivity and chloride concentrations in surface waters are being tracked, but groundwater monitoring has not been implemented for Quabbin and Ware River watersheds.
    - **Wachusett watershed**: DCR-Wachusett has also been monitoring specific conductance and chloride for many years in both the reservoir and tributary stream. DCR also publishes annual water quality reports for the Wachusett Reservoir (e.g., https://www.mass.gov/doc/2021-wachusett-water-quality-report/download). Similar to Quabbin, the monitoring is conducted to evaluate trends for source water protection purposes. Groundwater monitoring (since 2019) is also being conducted at several former USGS monitoring wells. Recent program improvements include remote telemetry for real-time data collection, collaboration with UMass-Amherst on chloride modeling, launch of a salt reduction grant program, and education initiatives.
- **U.S. Geological Survey (USGS)**: The USGS New England Water Science Center (WSC) has historically cooperated on projects to study chloride, sodium, and specific conductivity in stream sites in MA, CT, and RI. The WSC developed an interactive online mapping tool for viewing and downloading data from sites USGS has monitored for chloride, sodium, and/or specific conductance. Publications include summaries, trends, and chloride loads in New England streams: https://www.usgs.gov/centers/new-england-water-science-center/science/chloride-data-streams-connecticut-massachusetts#overview.

  Intensive monitoring has occurred for the City of Cambridge (13 continuous sites, 10 sites sampled

quarterly plus 4-6 storm samples and auto-sampling triggered by elevated conductance for about 20 years) and the Merrimack River Watershed (10 stream sites sampled monthly, one estuarine site sampled bimonthly in the summer). Selected publications include:

- Water Quality Monitoring of Merrimack River Watershed | U.S. Geological Survey (usgs.gov)
- Water Quality Monitoring in the Cambridge Drinking-Water Source Area, Massachusetts | U.S. Geological Survey (usgs.gov)
- Water Quality Monitoring in the Scituate Reservoir Drainage Area, Rhode Island | U.S. Geological Survey (usgs.gov)
- Effectiveness of Open-Graded Friction Course Pavement in Reducing Suspended-Sediment Loads Discharged from Massachusetts Highways | U.S. Geological Survey (usgs.gov)

In addition to projects, USGS is monitoring specific conductance at four stream gages in or near Massachusetts:

- USGS Current Conditions for USGS 01168250 COLD RIVER AT FLORIDA, MA x
- USGS Current Conditions for USGS 01095220 STILLWATER RIVER NEAR STERLING, MA x
- USGS Current Conditions for USGS 01095375 QUINAPOXET RIVER AT CANADA MILLS NEAR HOLDEN, MA x
- USGS Current Conditions for USGS 01095434 GATES BROOK NEAR WEST BOYLSTON, MA x

- **University of Massachusetts Amherst**: Project-based work, including a recent monitoring project focused on urban dissolved organic carbon and related parameters such as conductivity. This one-year project (2012-2022) included sampling conductivity at 100 sites in/around Boston (Charles, Mystic, and Neponset watersheds) quarterly and deploying sensors year-round at three sites (Alewife Brook, Stony Brook, Beaver Brook). The objective is to investigate drivers of heterogeneity in and across cities (cities include Miami, FL; Atlanta, GA; Salt Lake City, UT; and Portland, OR). The CURB Project.
- **Volunteer monitoring groups**: Using state (e.g., Water Quality Monitoring Grants) and other funding sources, numerous volunteer monitoring organizations in MA have collected data. These include, but not limited to, the following:
  - Charles River Watershed Association
  - Center for Student Coastal Research
  - Mystic River Watershed Association
  - Nashua River Watershed Association
  - Neponset River Watershed Association
  - OARS, for the Assabet, Sudbury, and Concord Rivers
  - Parker River Clean Water Association
  - Chebacco Lake and Watershed Association
  - Berkshire Environmental Action Team
  - Hoosic River Watershed Association
  - Wampanoag Tribe of Gay Head Aquinnah
  - Tisbury Waterways, Inc.
  - Cohasset Center for Student Coastal Research
  - Merrimack River Watershed Council
  - Mystic River Watershed Association

- Neponset River Watershed Association
- North and South Rivers Watershed Association
- MassBays South Shore

A2. Mitigation

The Massachusetts Department of Transportation (MassDOT) is the biggest user of road salt in Massachusetts. In 2014, MassDOT developed a Salt Remediation Program (https://www.mass.gov/massdot-highway-salt-remediation-program) to promote avoidance and mitigation through best management practices (BMPs). The following specific BMPs were included:

- Salt storage and housekeeping BMPs;
- Evaluation and enhancement in equipment performance to improve salt management techniques;
- Deicing chemical alternatives;
- New technologies that may improve the efficiency and effectiveness of snow and ice operations;
- Annual trainings for the proper management and impact minimization of environmentally sensitive areas and drinking water supplies from deicing agents; and
- Annual revision of the Reduced Salt Policy, current deicing chemical application policies, and BMPs by the MassDOT Environmental Services Section committee.

As of 2024, MassDOT continues to operate the remediation program for both salt remediation for public water supplies and salt remediation for private wells impacted by road salt. MassDOT continues to disseminate technical and best management information related to salt use (e.g., https://www.mass.gov/service-details/road-treatment-types).

MassDEP's guidelines for road salt storage (https://www.mass.gov/guides/guidelines-on-road-salt-storage) recommend that sodium chloride, calcium chloride, or chemically treated abrasives or other chemicals used for the removal of snow or ice on roads kept within two hundred yards of an established river or estuary must be stored in a solid frame storage shed to prevent ground leaching and airborne pollution of surrounding property. MassDEP, in consultation with the MassDOT Highway Division, may issue regulations as to the place and manner of storage of such chemicals and may regulate, by specific order in a particular case, the place where such chemicals may be used for such purpose.

MassDEP has also developed snow disposal guidance and a mapping tool for municipalities and businesses to minimize salt contamination to wetlands, water supplies, and other waters (https://maps.env.state.ma.us/dep/arcgis/js/templates/PSF/).

In an effort to curb the trend in increasing chloride concentrations in the Quabbin and Wachusett Reservoirs, MA DCR has developed public educational materials related to salt reduction, including the following video: Importance of Road Salt Reduction.

Many MA municipalities are helping to address the road salt problem through application of BMPs and guidance to applicators and citizens. Some examples include:

- Cambridge: https://www.cambridgema.gov/snow/News/2021/properuseofsaltanddeicers
- Andover: https://jgpr.net/2021/12/06/andover-dpw-using-salt-brine-as-pretreatment-for-roads-to-reduce-ice-buildup-environmental-damage-and-costs/

- Westfield: Getting The Facts About Salt Brine | Westfield, MA - Official Website (cityofwestfield.org)

A3. Other Approaches Taken by States/Municipalities

Examples of programmatic efforts by other states, agencies, and municipalities to mitigate the road salt problem are listed below:

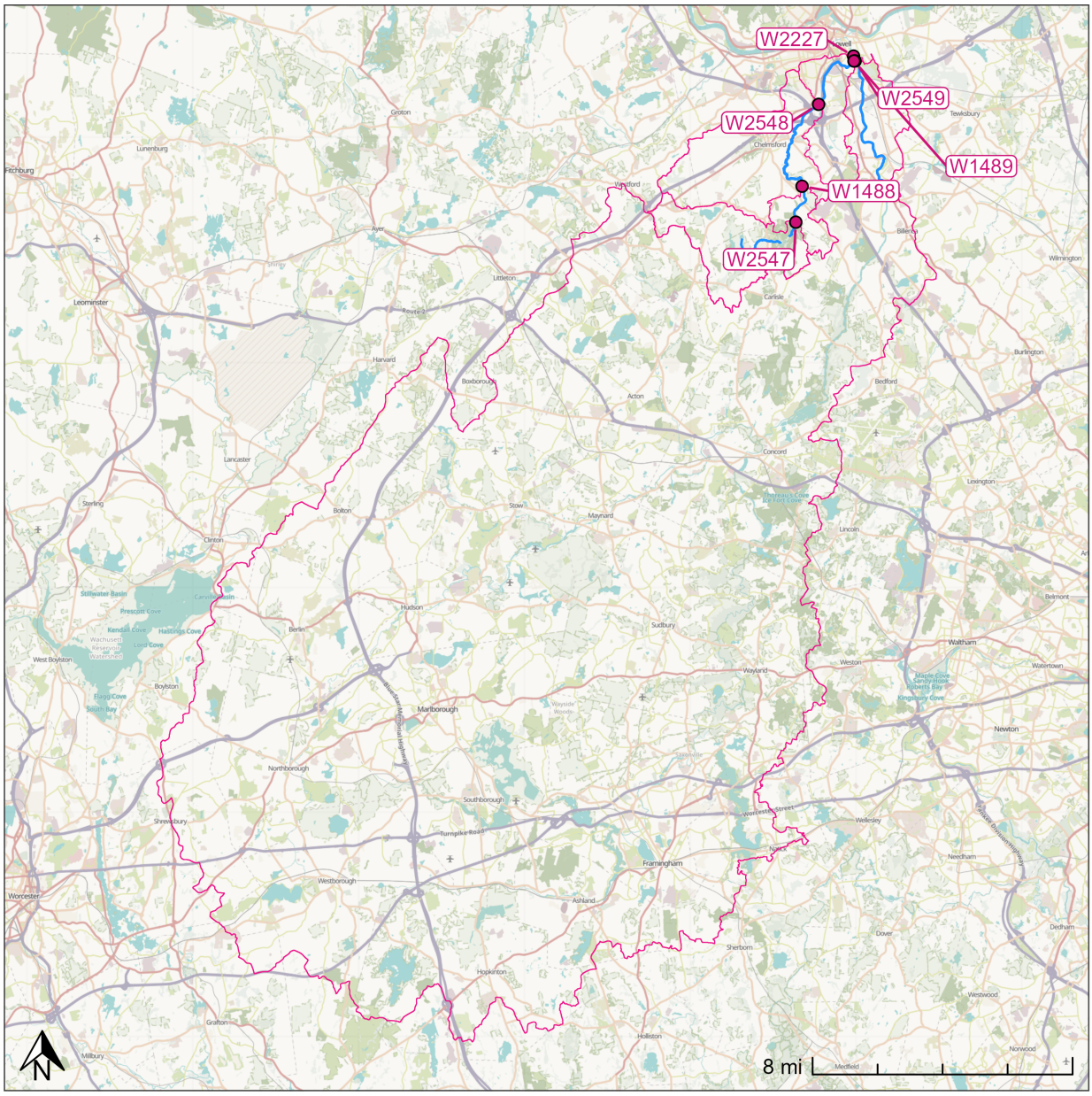
- Maine: Sand & Salt Pile Program, Waste Discharge Program, Maine Department of Environmental Protection (https://www.maine.gov/dep/water/wd/sandsalt/)
- New Hampshire: https://www.des.nh.gov/land/roads/road-salt-reduction
- Vermont: https://vtrans.vermont.gov/operations/winter-maintenance/faq
- Connecticut: https://portal.ct.gov/DEEP/Water-Regulating-and-Discharges/Guidance/Snow-Removal-Guidelines
- Rhode Island: https://www.dot.ri.gov/travel/winter.php
- Lake George, NY: Municipalities in the Lake George area have begun using brine to protect Lake George from road salt impacts. Brine has several advantages over rock salt. Brine solutions are an aqueous mixture of 23% salt by volume. Several models of brine makers are currently available in a variety of sizes to serve commercial, municipal, and State requirements. It is best used as a pretreatment to road surfaces prior to storm events. These towns report great success, in large part due to committed and mobilized program and field staff.
- NEIWPCC: https://neiwpcc.org/news-publications/chloride-resources-clearinghouse/

Appendix B:

Specific Conductance Monitoring & Chloride Sampling Results

List of Chloride (2015-2020) Stations

Concord (SuAsCo) Watershed (2015 - 2016)



Concord River (MA82A-08)

Station W2227

Table 1: W2227 - Station Information

Field	Value
Unique Identifier	W2227
Monitoring Cycle	2015 - 2016
Assessment Unit	MA82A-08
Watershed	Concord (SuAsCo)
Station Waterbody	Concord River
Latitude	42.63595037
Longitude	-71.30148697
Deployment Start	October 06, 2015
Deployment End	September 07, 2016

Table 2: W2227 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 06, 2015	639	180	-
November 03, 2015	716	190	-
December 03, 2015	646	190	-
January 21, 2016	623	180	-
March 07, 2016	568	160	-
April 20, 2016	617	180	-
June 22, 2016	724	210	-
August 03, 2016	965	240	Chronic Exceedance
September 07, 2016	975	250	Chronic Exceedance

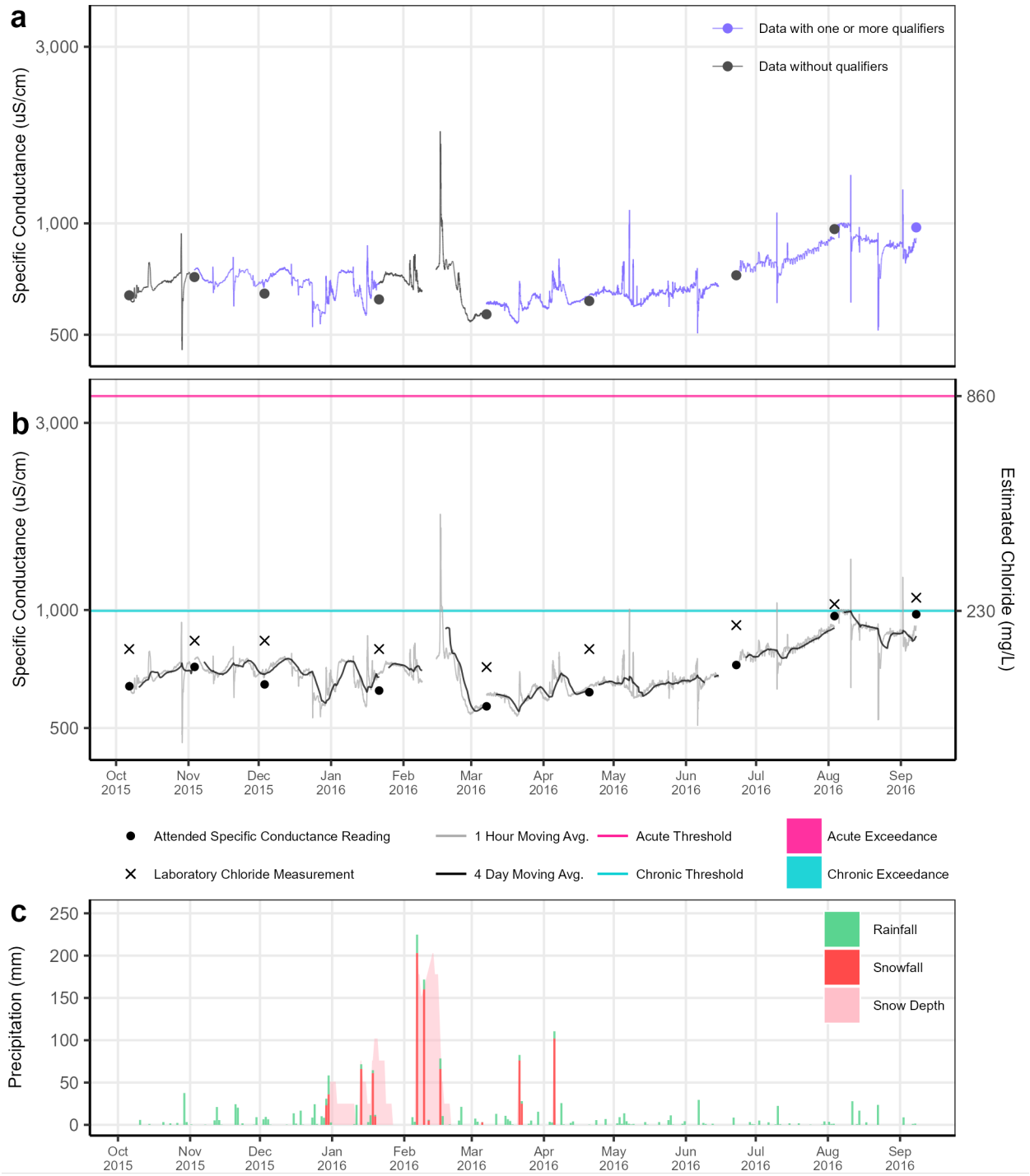
Table 3: W2227 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	455
Deployment Average	712
Deployment Maximum	1774
Maximum 4-Day Moving Average	994
Maximum 1-Hour Moving Average	1755
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2227 - Concord River (MA82A-08)

Concord (SuAsCo) Watershed (42.63595037, -71.30148697)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00194313 - Lowell (42.6408, -71.3636)

Station W2549

Table 4: W2549 - Station Information

Field	Value
Unique Identifier	W2549
Monitoring Cycle	2015 - 2016
Assessment Unit	MA82A-08
Watershed	Concord (SuAsCo)
Station Waterbody	Concord River
Latitude	42.63381819
Longitude	-71.30053328
Deployment Start	October 06, 2015
Deployment End	September 07, 2016

Table 5: W2549 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 06, 2015	624	170	-
November 03, 2015	704	180	-
December 03, 2015	633	170	-
January 21, 2016	591	170	-
March 07, 2016	541	150	-
April 20, 2016	592	180	-
June 22, 2016	681	180	-
August 03, 2016	903	220	-
September 07, 2016	922	230	-

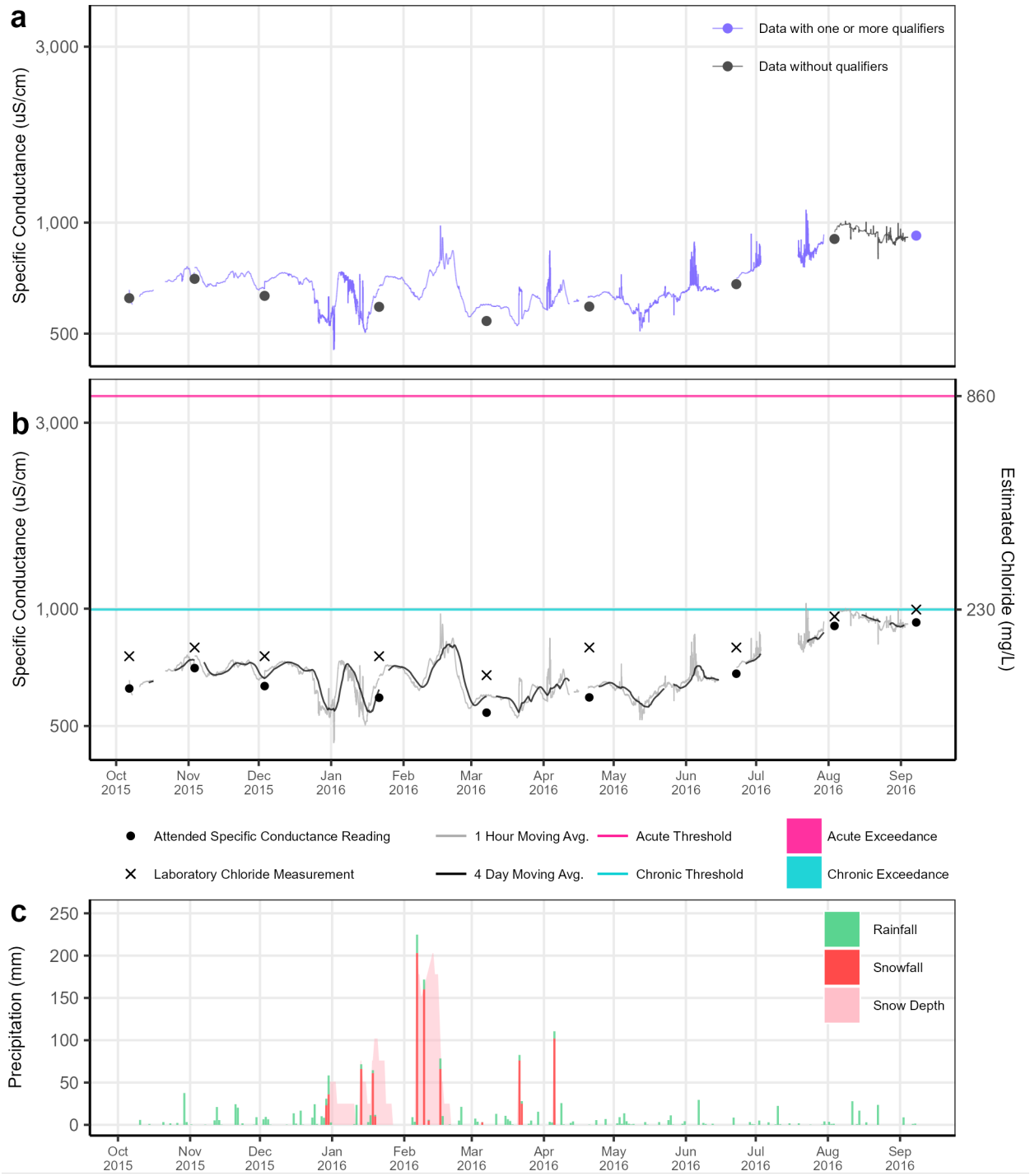
Table 6: W2549 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	451
Deployment Average	696
Deployment Maximum	1084
Maximum 4-Day Moving Average	964
Maximum 1-Hour Moving Average	1032
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2549 - Concord River (MA82A-08)

Concord (SuAsCo) Watershed (42.63381819, -71.30053328)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00194313 - Lowell (42.6408, -71.3636)

River Meadow Brook (MA82A-10)

Station W1488

Table 7: W1488 - Station Information

Field	Value
Unique Identifier	W1488
Monitoring Cycle	2015 - 2016
Assessment Unit	MA82A-10
Watershed	Concord (SuAsCo)
Station Waterbody	River Meadow Brook
Latitude	42.57826214
Longitude	-71.33253012
Deployment Start	October 06, 2015
Deployment End	September 07, 2016

Table 8: W1488 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 06, 2015	374	100	-
November 03, 2015	317	78	-
December 03, 2015	483	140	-
January 21, 2016	474	130	-
March 07, 2016	364	97	-
April 20, 2016	440	120	-
June 22, 2016	326	80	-
August 03, 2016	360	92	-
September 07, 2016	400	96	-

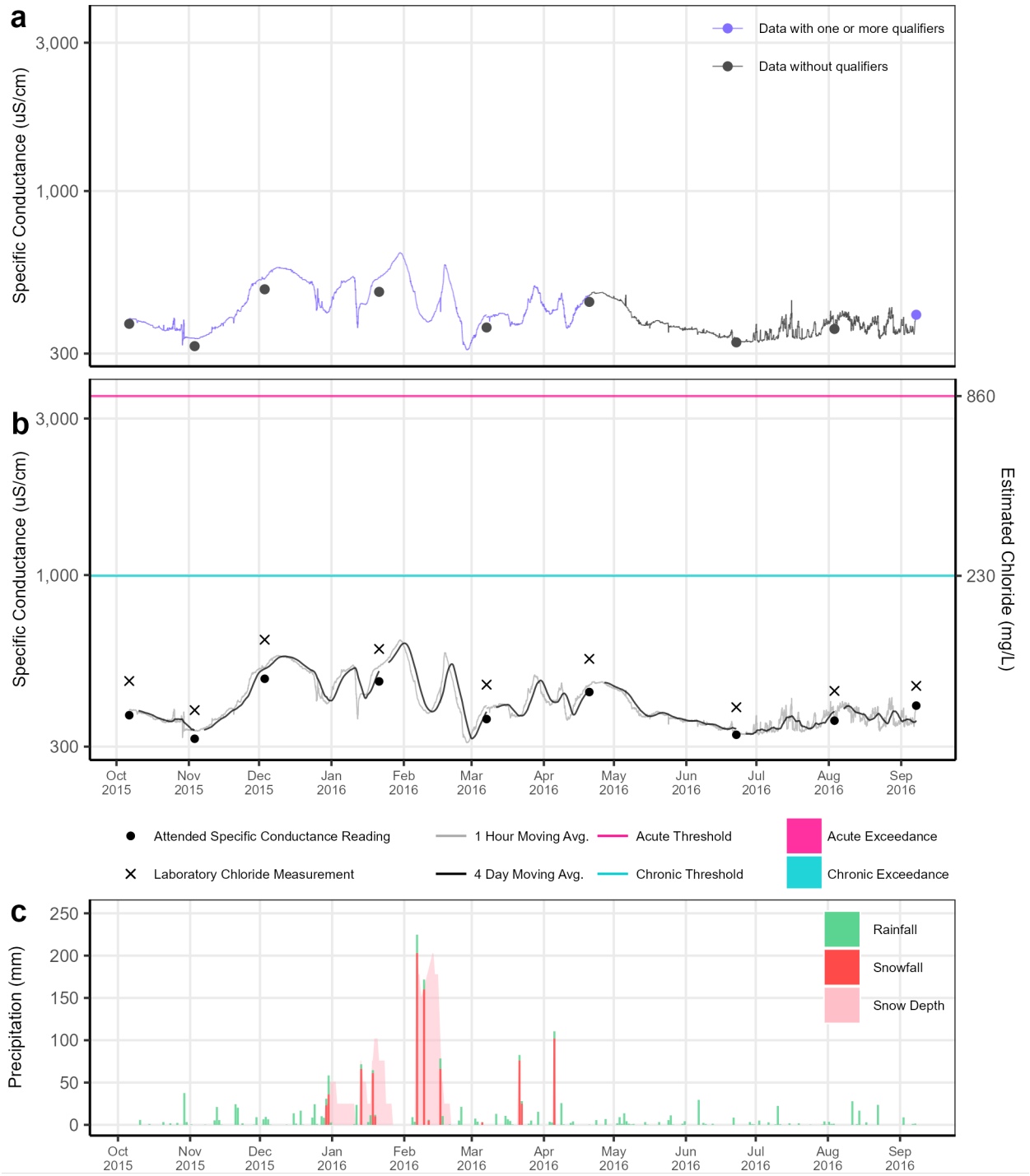
Table 9: W1488 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	308
Deployment Average	410
Deployment Maximum	635
Maximum 4-Day Moving Average	620
Maximum 1-Hour Moving Average	635
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1488 - River Meadow Brook (MA82A-10)

Concord (SuAsCo) Watershed (42.57826214, -71.33253012)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00194313 - Lowell (42.6408, -71.3636)

Station W1489

Table 10: W1489 - Station Information

Field	Value
Unique Identifier	W1489
Monitoring Cycle	2015 - 2016
Assessment Unit	MA82A-10
Watershed	Concord (SuAsCo)
Station Waterbody	River Meadow Brook
Latitude	42.63380122
Longitude	-71.30119731
Deployment Start	October 06, 2015
Deployment End	September 07, 2016

Table 11: W1489 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 06, 2015	1084	320	Chronic Exceedance
November 03, 2015	937	270	Chronic Exceedance
December 03, 2015	690	200	-
January 21, 2016	848	260	Chronic Exceedance
March 07, 2016	752	220	-
April 20, 2016	846	250	Chronic Exceedance
June 22, 2016	1119	330	Chronic Exceedance
August 03, 2016	1786	520	Chronic Exceedance
September 07, 2016	1579	460	Chronic Exceedance

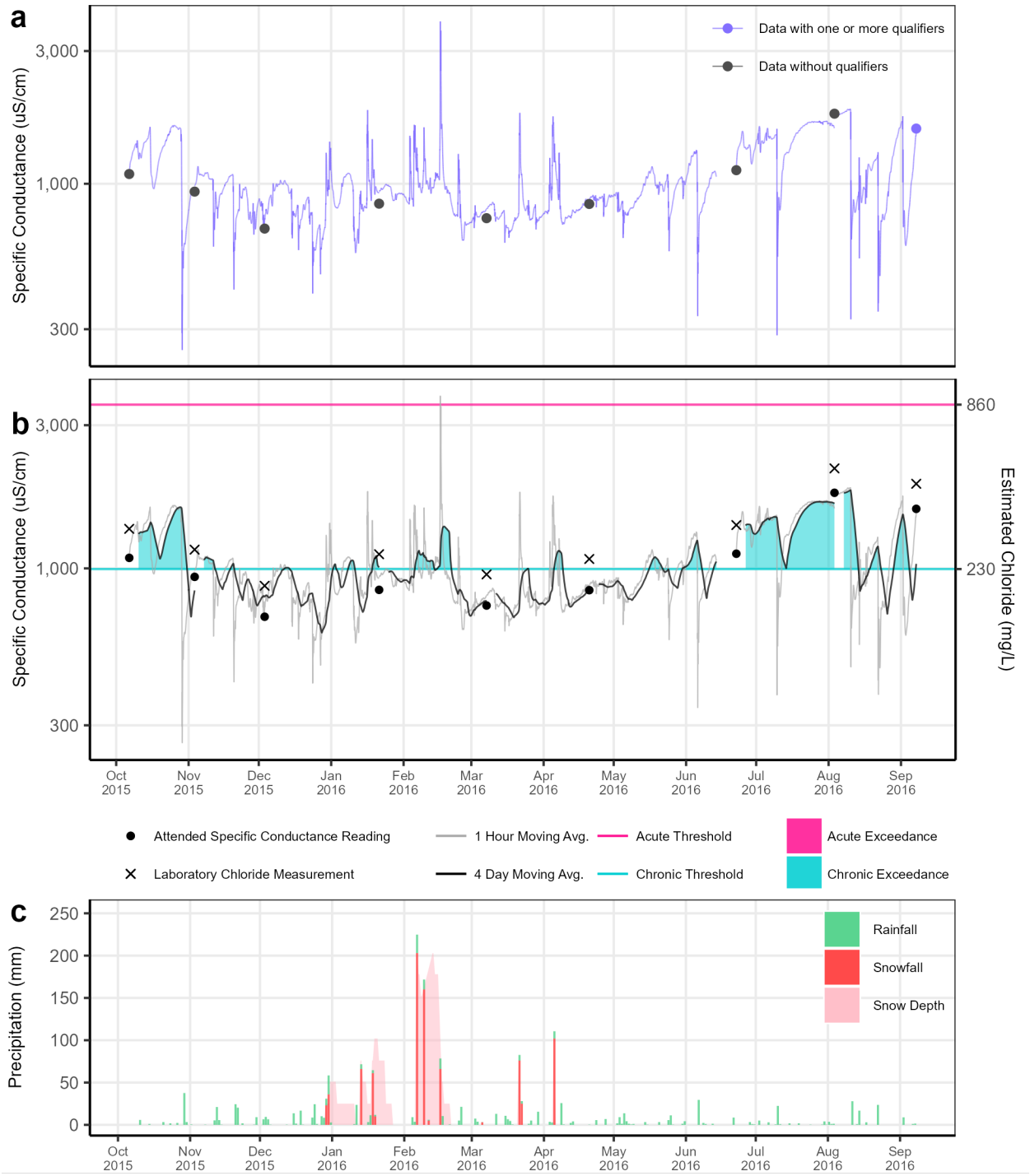
Table 12: W1489 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	253
Deployment Average	1034
Deployment Maximum	3833
Maximum 4-Day Moving Average	1822
Maximum 1-Hour Moving Average	3751
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	43%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1489 - River Meadow Brook (MA82A-10)

Concord (SuAsCo) Watershed (42.63380122, -71.30119731)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00194313 - Lowell (42.6408, -71.3636)

Station W2548

Table 13: W2548 - Station Information

Field	Value
Unique Identifier	W2548
Monitoring Cycle	2015 - 2016
Assessment Unit	MA82A-10
Watershed	Concord (SuAsCo)
Station Waterbody	River Meadow Brook
Latitude	42.61458152
Longitude	-71.32256374
Deployment Start	October 06, 2015
Deployment End	September 07, 2016

Table 14: W2548 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 06, 2015	1271	390	Chronic Exceedance
November 03, 2015	942	270	Chronic Exceedance
December 03, 2015	625	180	-
January 21, 2016	760	220	-
March 07, 2016	650	190	-
April 20, 2016	753	230	-
June 22, 2016	1258	340	Chronic Exceedance
August 03, 2016	1981	590	Chronic Exceedance
September 07, 2016	1644	490	Chronic Exceedance

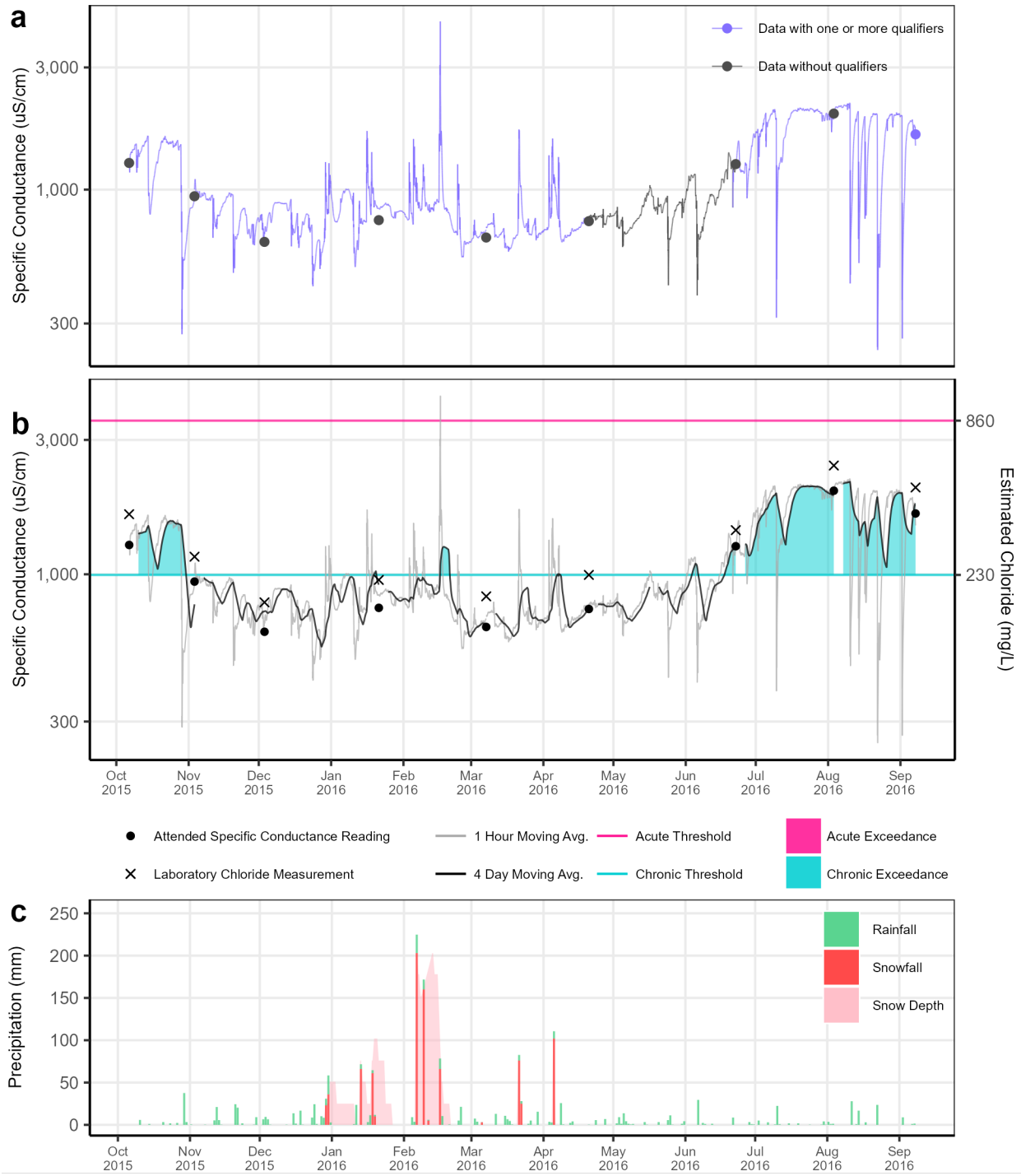
Table 15: W2548 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	236
Deployment Average	1057
Deployment Maximum	4537
Maximum 4-Day Moving Average	2131
Maximum 1-Hour Moving Average	4294
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	34%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2548 - River Meadow Brook (MA82A-10)

Concord (SuAsCo) Watershed (42.61458152, -71.32256374)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00194313 - Lowell (42.6408, -71.3636)

Unnamed Tributary (MA82A-31)

Station W2547

Table 16: W2547 - Station Information

Field	Value
Unique Identifier	W2547
Monitoring Cycle	2015 - 2016
Assessment Unit	MA82A-31
Watershed	Concord (SuAsCo)
Station Waterbody	Unnamed Tributary
Latitude	42.56231539
Longitude	-71.33630595
Deployment Start	October 06, 2015
Deployment End	September 07, 2016

Table 17: W2547 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 06, 2015	367	83	-
November 03, 2015	410	94	-
December 03, 2015	360	86	-
January 21, 2016	358	90	-
March 07, 2016	309	79	-
April 20, 2016	329	84	-
June 22, 2016	206	40	-
August 03, 2016	67	4.4	-
September 07, 2016	66	4.5	-

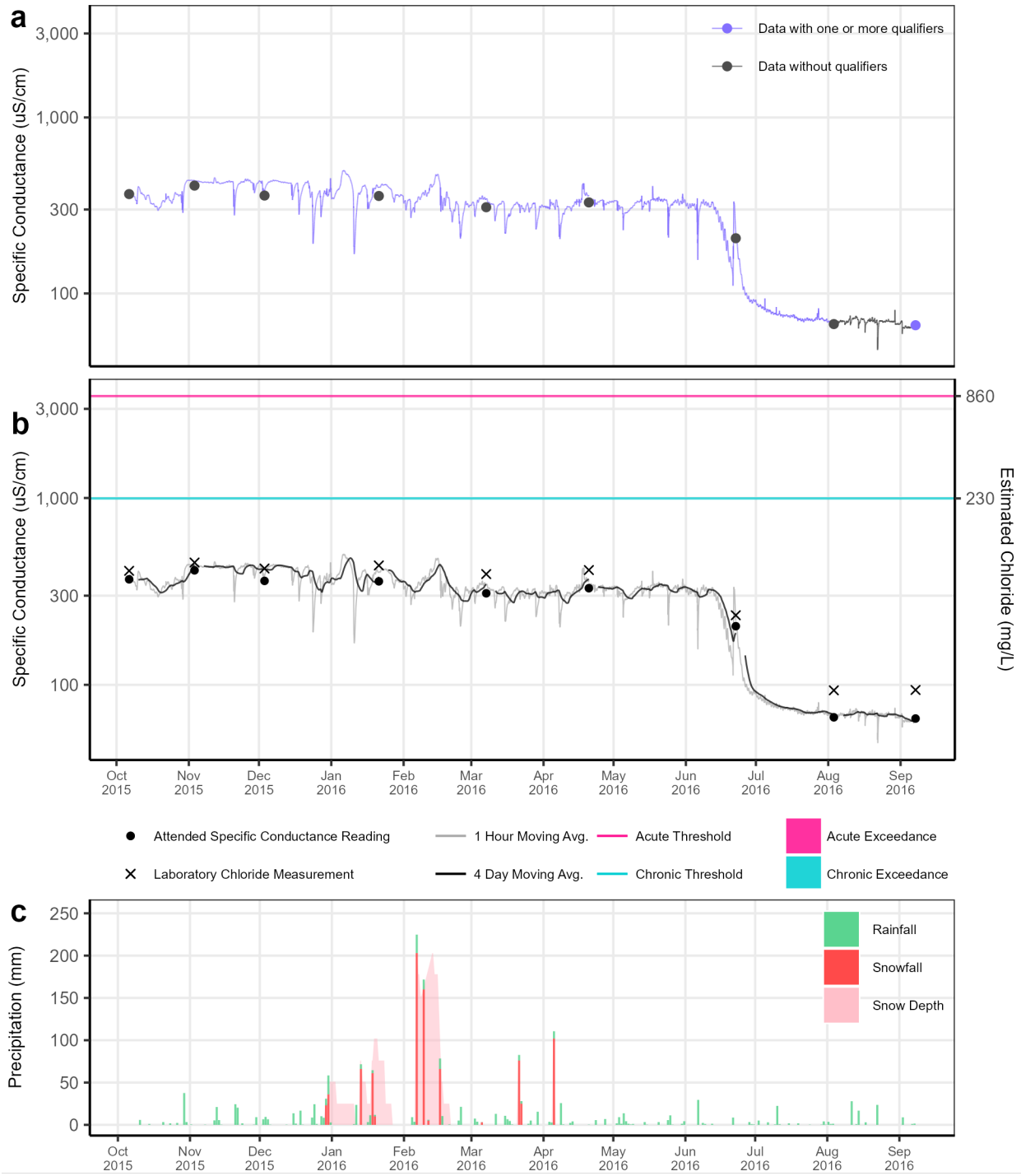
Table 18: W2547 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	48
Deployment Average	288
Deployment Maximum	501
Maximum 4-Day Moving Average	477
Maximum 1-Hour Moving Average	500
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

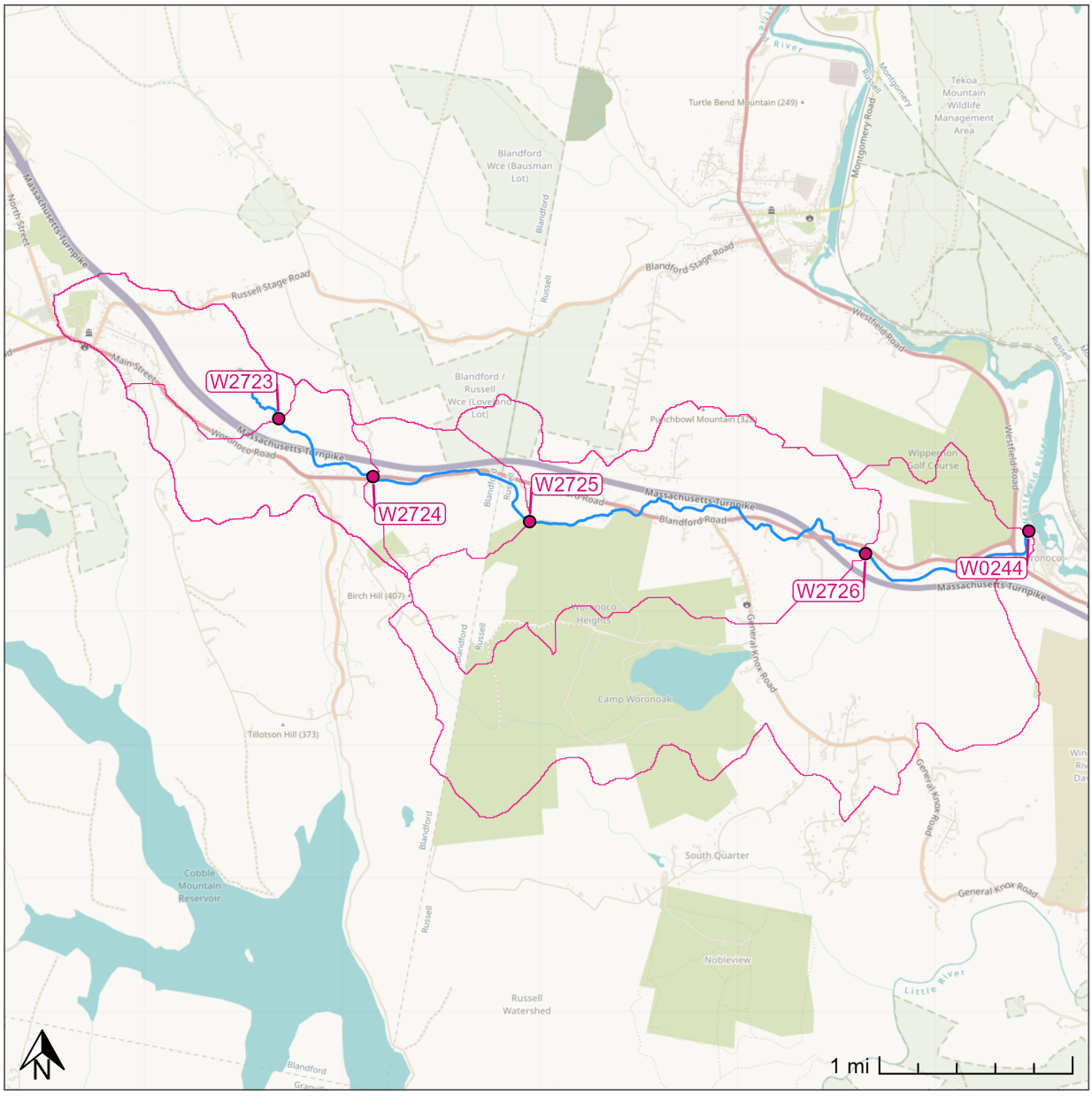
W2547 - Unnamed Tributary (MA82A-31)

Concord (SuAsCo) Watershed (42.56231539, -71.33630595)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00194313 - Lowell (42.6408, -71.3636)

Westfield Watershed (2016 - 2017)



Potash Brook (MA32-22)

Station W0244

Table 19: W0244 - Station Information

Field	Value
Unique Identifier	W0244
Monitoring Cycle	2016 - 2017
Assessment Unit	MA32-22
Watershed	Westfield
Station Waterbody	Potash Brook
Latitude	42.16599233
Longitude	-72.83056299
Deployment Start	November 16, 2016
Deployment End	July 12, 2017

Table 20: W0244 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 16, 2016	471	-	-
January 10, 2017	487	-	-
March 21, 2017	512	-	-
May 09, 2017	273	-	-
July 12, 2017	446	120	-

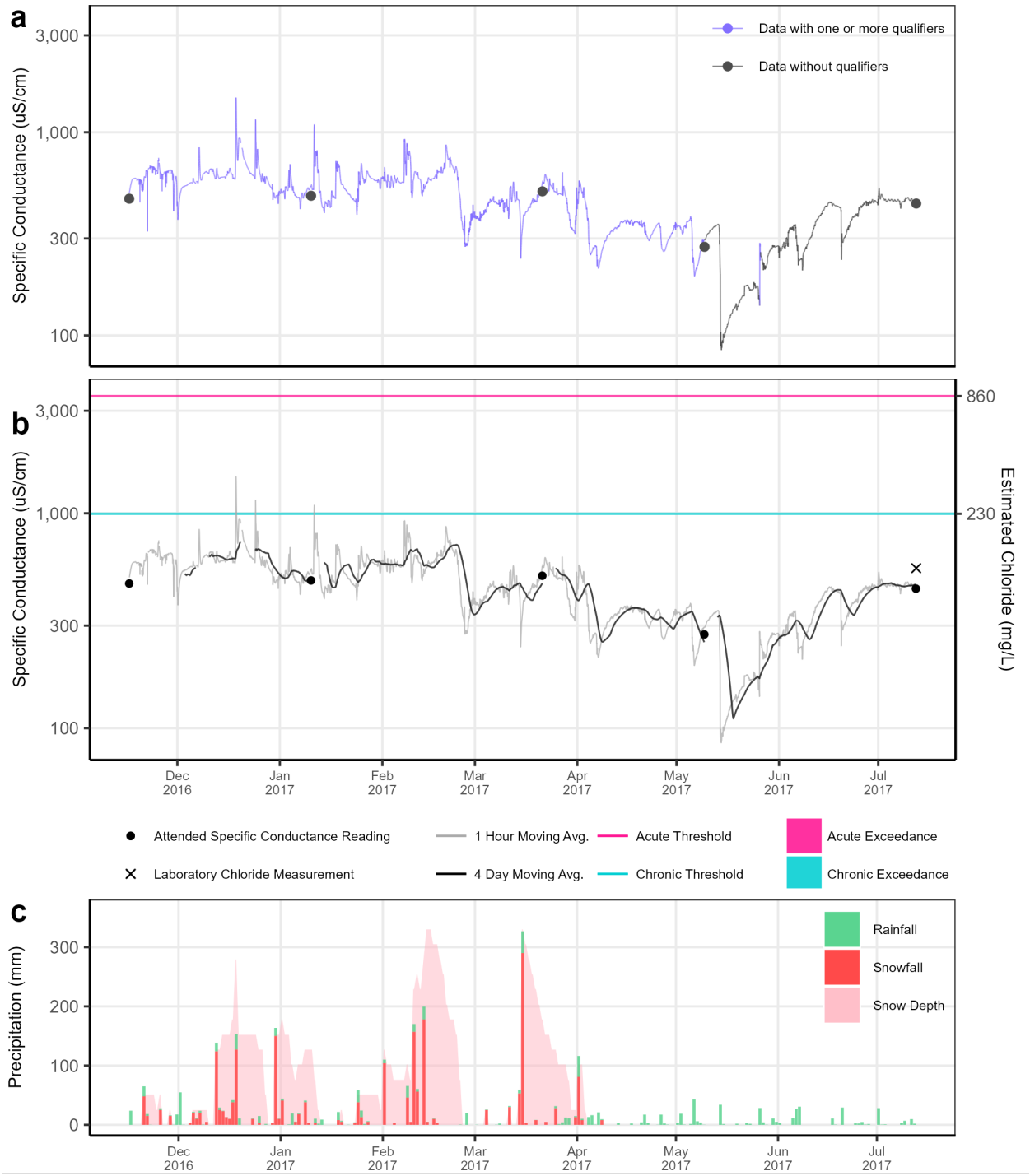
Table 21: W0244 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	85
Deployment Average	456
Deployment Maximum	1482
Maximum 4-Day Moving Average	742
Maximum 1-Hour Moving Average	1481
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0244 - Potash Brook (MA32-22)

Westfield Watershed (42.16599233, -72.83056299)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00199972 - Worthington (42.3869, -72.9211)

Station W2723

Table 22: W2723 - Station Information

Field	Value
Unique Identifier	W2723
Monitoring Cycle	2016 - 2017
Assessment Unit	MA32-22
Watershed	Westfield
Station Waterbody	Potash Brook
Latitude	42.17440807
Longitude	-72.90639061
Deployment Start	November 16, 2016
Deployment End	July 12, 2017

Table 23: W2723 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 16, 2016	724	-	-
January 10, 2017	1041	-	-
March 21, 2017	809	-	-
May 09, 2017	639	-	-
July 12, 2017	958	280	Chronic Exceedance

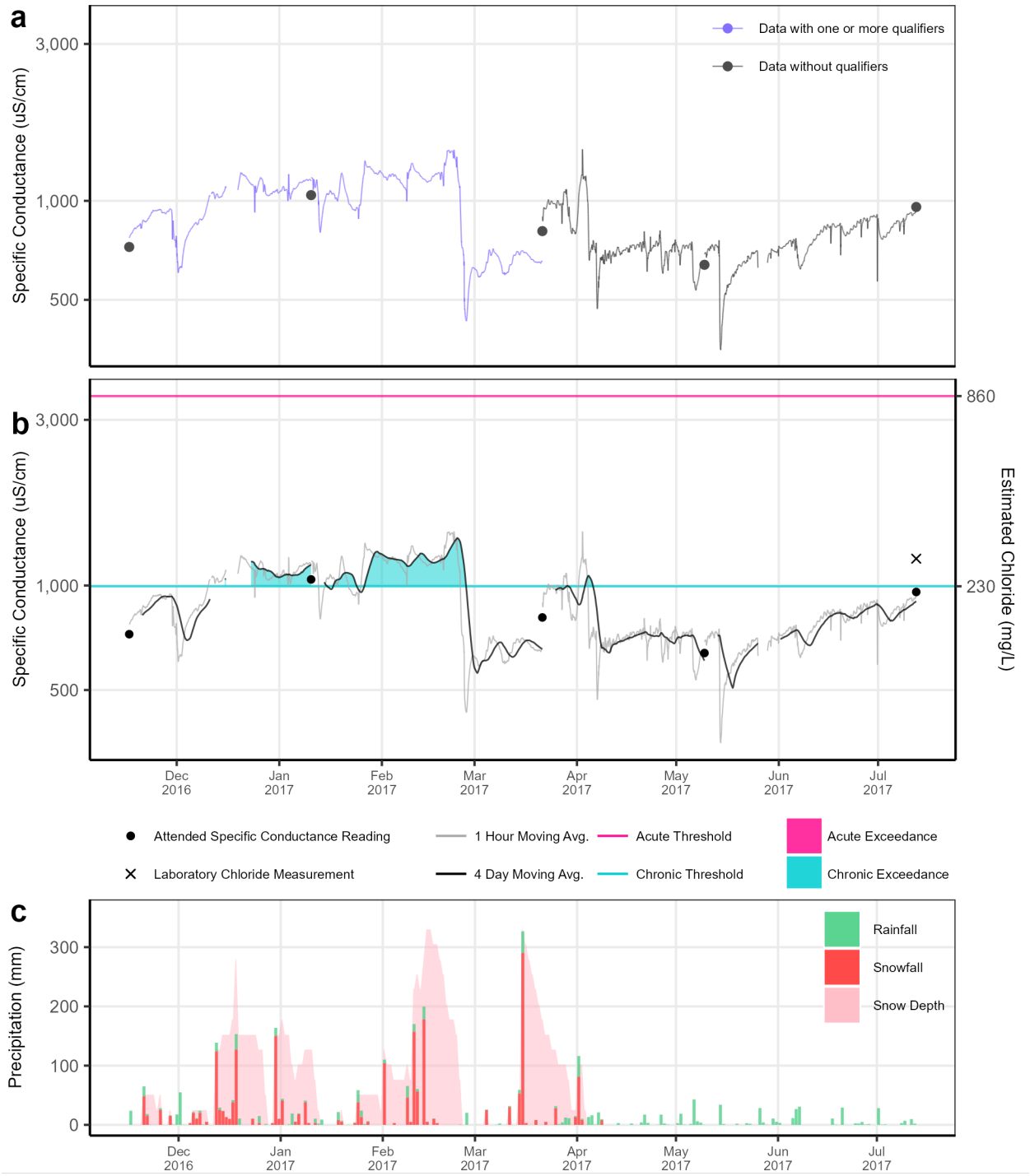
Table 24: W2723 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	352
Deployment Average	875
Deployment Maximum	1435
Maximum 4-Day Moving Average	1370
Maximum 1-Hour Moving Average	1429
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	30%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2723 - Potash Brook (MA32-22)

Westfield Watershed (42.17440807, -72.90639061)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00199972 - Worthington (42.3869, -72.9211)

Station W2724

Table 25: W2724 - Station Information

Field	Value
Unique Identifier	W2724
Monitoring Cycle	2016 - 2017
Assessment Unit	MA32-22
Watershed	Westfield
Station Waterbody	Potash Brook
Latitude	42.17006824
Longitude	-72.8968609
Deployment Start	November 16, 2016
Deployment End	July 12, 2017

Table 26: W2724 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 16, 2016	660	-	-
January 10, 2017	857	-	-
March 21, 2017	739	-	-
May 09, 2017	510	-	-
July 12, 2017	887	250	Chronic Exceedance

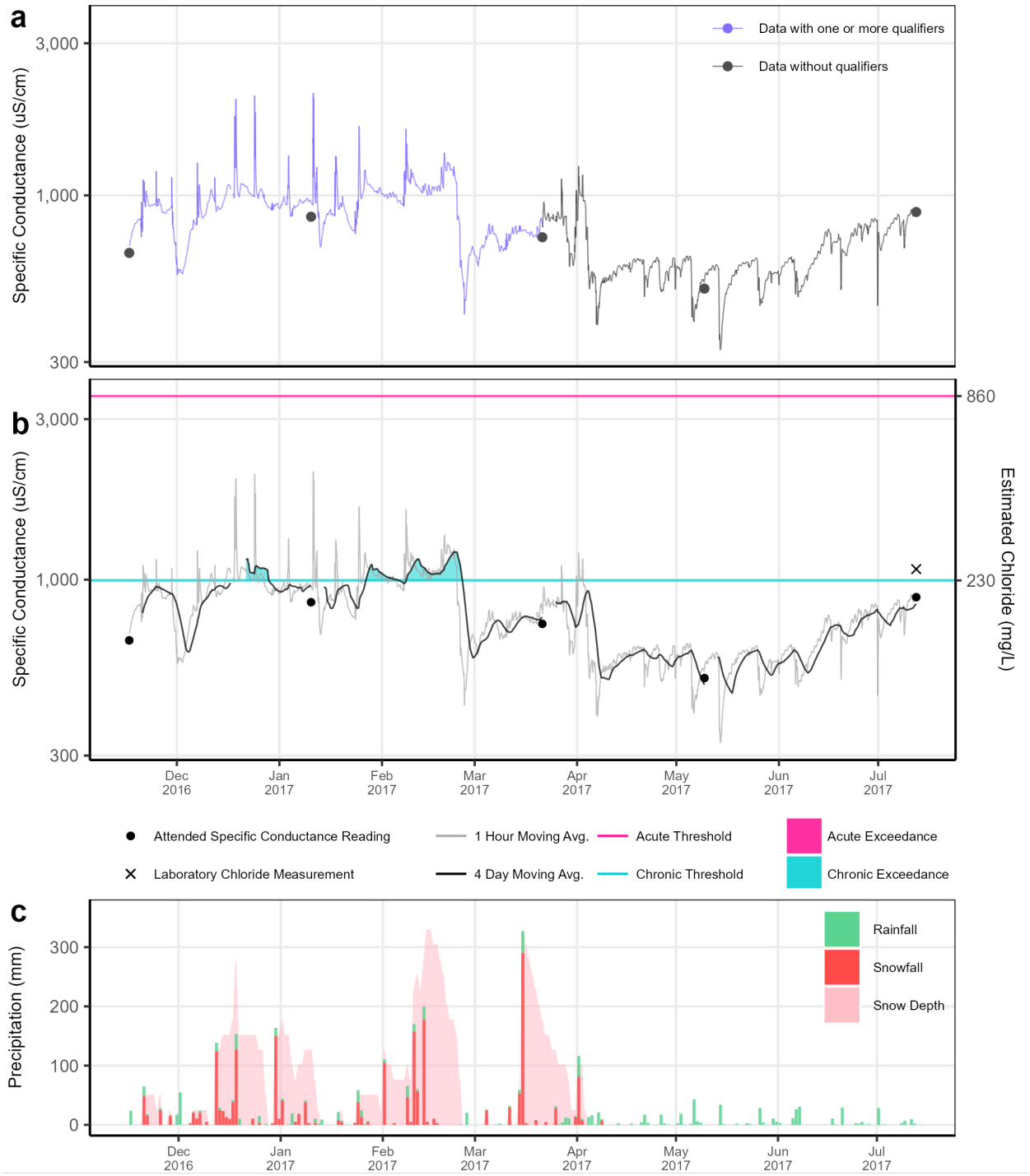
Table 27: W2724 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	327
Deployment Average	791
Deployment Maximum	2095
Maximum 4-Day Moving Average	1211
Maximum 1-Hour Moving Average	2093
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	16%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2724 - Potash Brook (MA32-22)

Westfield Watershed (42.17006824, -72.8968609)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00199972 - Worthington (42.3869, -72.9211)

Station W2725

Table 28: W2725 - Station Information

Field	Value
Unique Identifier	W2725
Monitoring Cycle	2016 - 2017
Assessment Unit	MA32-22
Watershed	Westfield
Station Waterbody	Potash Brook
Latitude	42.1666955
Longitude	-72.8810188
Deployment Start	November 16, 2016
Deployment End	July 12, 2017

Table 29: W2725 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 16, 2016	693	-	-
January 10, 2017	522	-	-
March 21, 2017	821	-	-
May 09, 2017	464	-	-
July 12, 2017	834	240	Chronic Exceedance

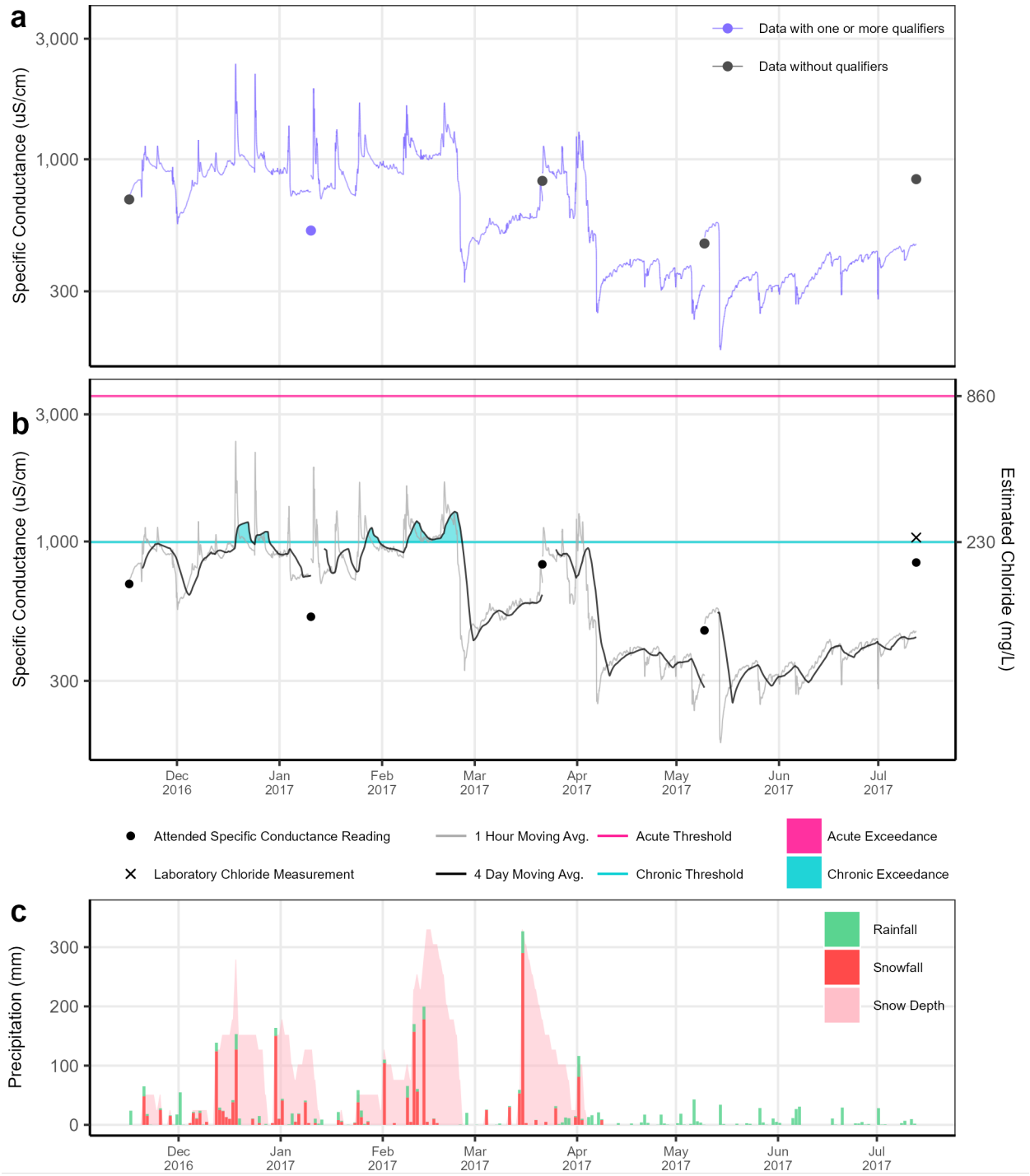
Table 30: W2725 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	176
Deployment Average	658
Deployment Maximum	2386
Maximum 4-Day Moving Average	1294
Maximum 1-Hour Moving Average	2376
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	14%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2725 - Potash Brook (MA32-22)

Westfield Watershed (42.1666955, -72.8810188)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00199972 - Worthington (42.3869, -72.9211)

Station W2726

Table 31: W2726 - Station Information

Field	Value
Unique Identifier	W2726
Monitoring Cycle	2016 - 2017
Assessment Unit	MA32-22
Watershed	Westfield
Station Waterbody	Potash Brook
Latitude	42.16429788
Longitude	-72.84705857
Deployment Start	November 16, 2016
Deployment End	July 12, 2017

Table 32: W2726 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 16, 2016	548	-	-
January 10, 2017	550	-	-
March 21, 2017	712	-	-
May 09, 2017	393	-	-
July 12, 2017	696	190	-

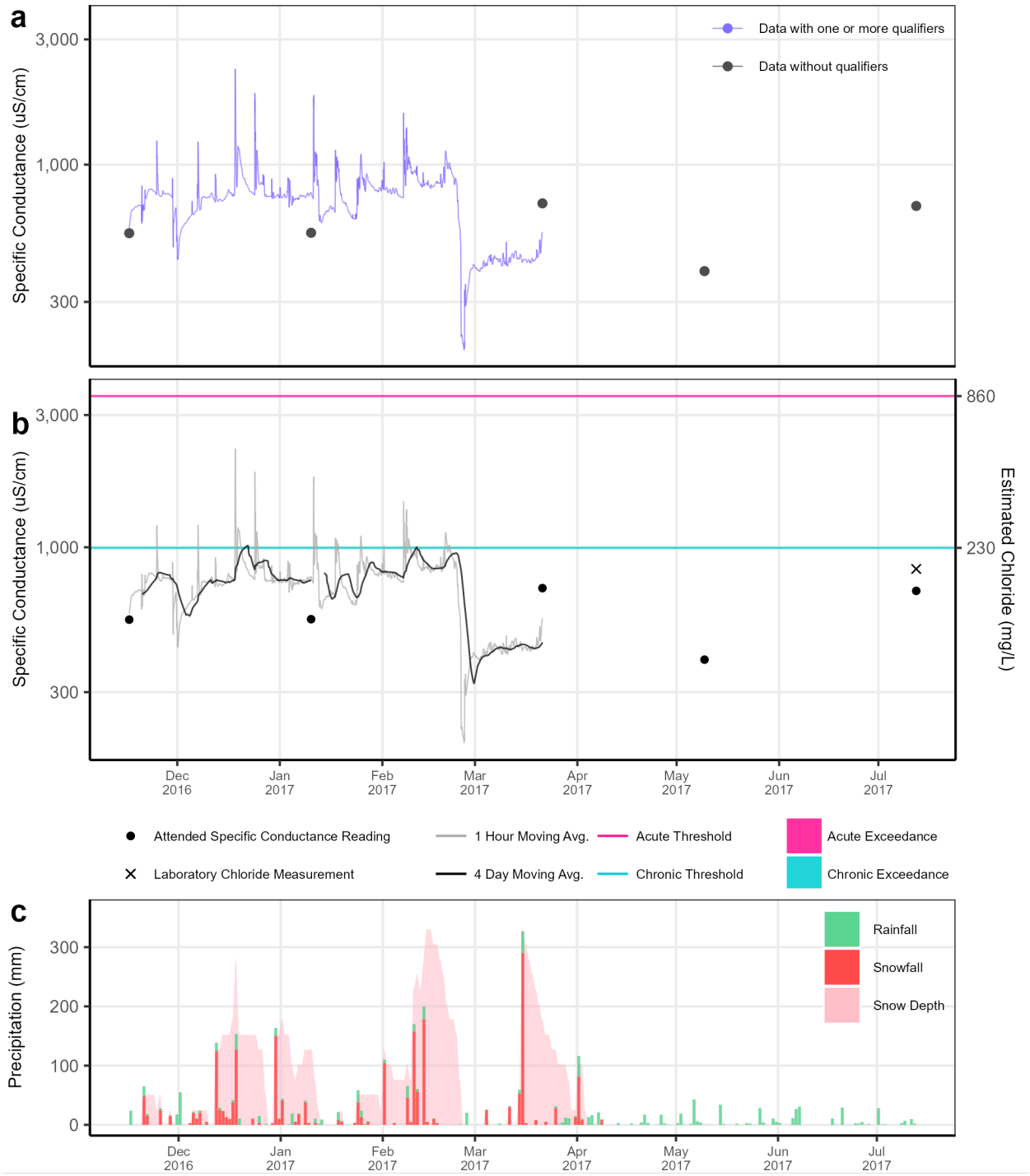
Table 33: W2726 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	197
Deployment Average	718
Deployment Maximum	2319
Maximum 4-Day Moving Average	1014
Maximum 1-Hour Moving Average	2263
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	1%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

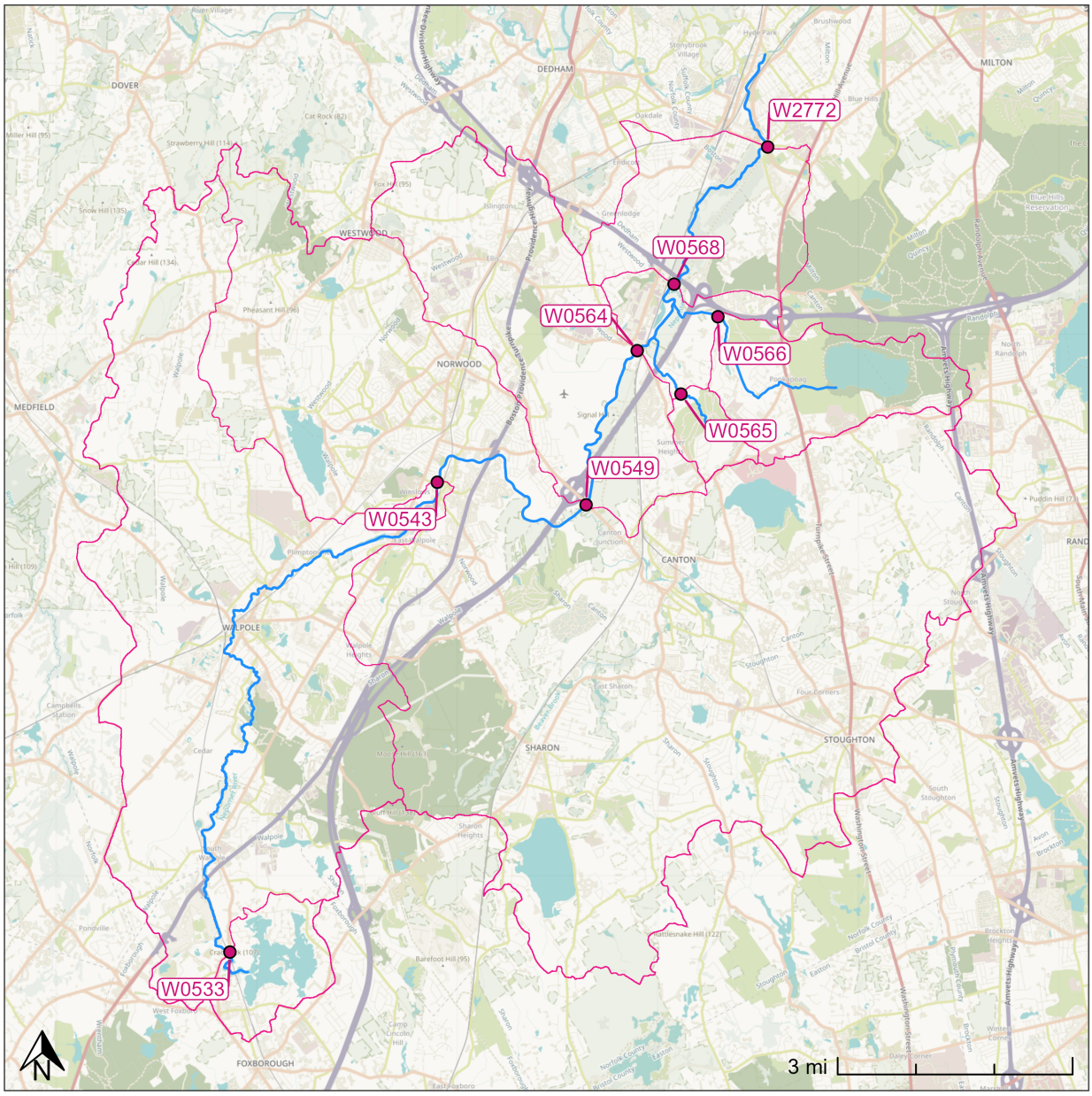
W2726 - Potash Brook (MA32-22)

Westfield Watershed (42.16429788, -72.84705857)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00199972 - Worthington (42.3869, -72.9211)

Neponset Watershed (2017 - 2018)



Neponset River (MA73-01)

Station W0533

Table 34: W0533 - Station Information

Field	Value
Unique Identifier	W0533
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-01
Watershed	Neponset
Station Waterbody	Neponset River
Latitude	42.085924
Longitude	-71.25668829
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 35: W0533 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	449	-	-
October 24, 2017	455	93	-
December 12, 2017	449	-	-
February 06, 2018	334	-	-
April 03, 2018	384	-	-
May 22, 2018	353	82	-

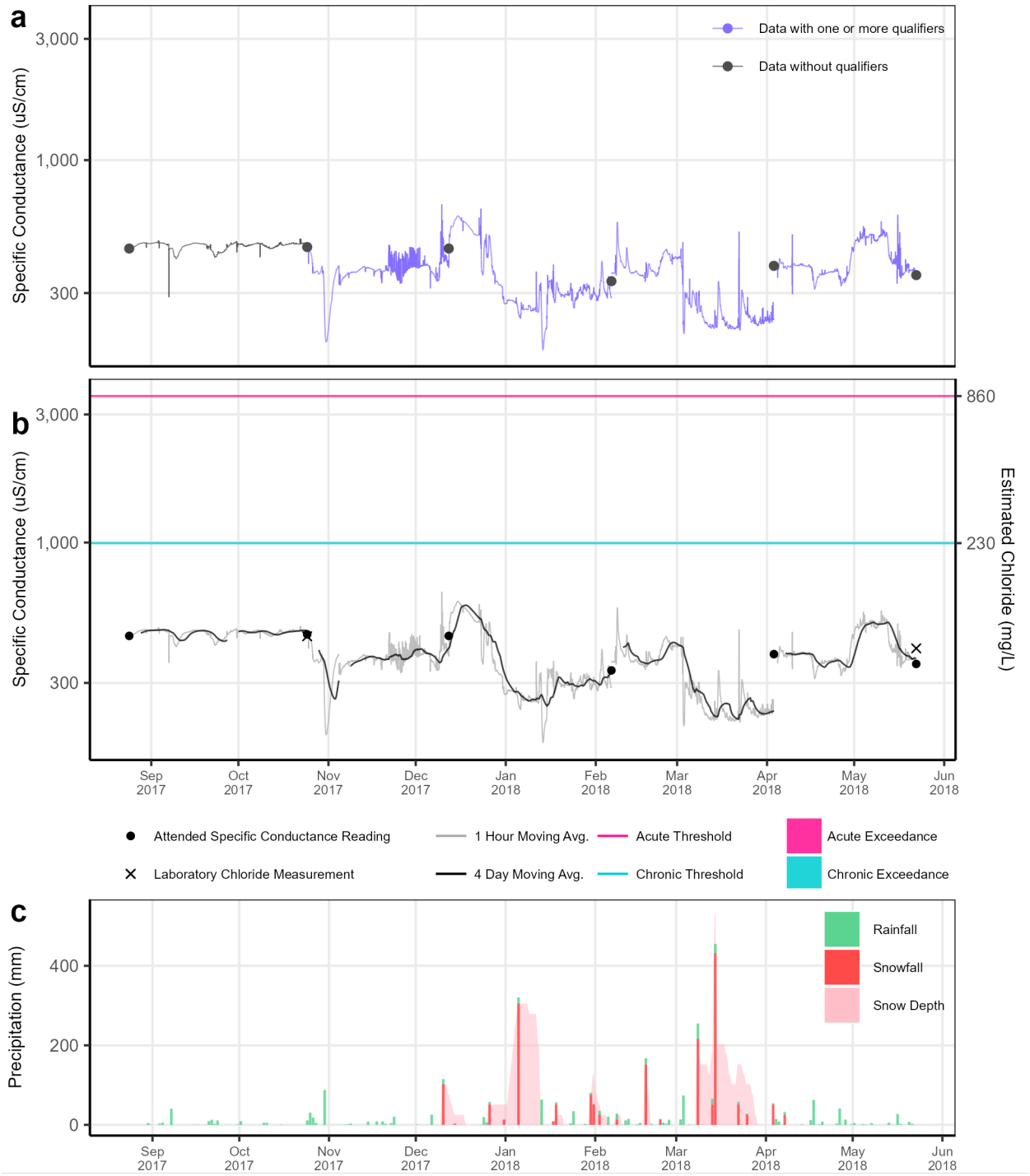
Table 36: W0533 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	179
Deployment Average	380
Deployment Maximum	670
Maximum 4-Day Moving Average	584
Maximum 1-Hour Moving Average	655
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0533 - Neponset River (MA73-01)

Neponset Watershed (42.085924, -71.25668829)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00192913 - Foxboro (42.0786, -71.2381)

Station W0543

Table 37: W0543 - Station Information

Field	Value
Unique Identifier	W0543
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-01
Watershed	Neponset
Station Waterbody	Neponset River
Latitude	42.17269436
Longitude	-71.2049852
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 38: W0543 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	716	-	-
October 24, 2017	733	180	-
December 12, 2017	646	-	-
February 06, 2018	590	-	-
April 03, 2018	494	-	-
May 22, 2018	488	120	-

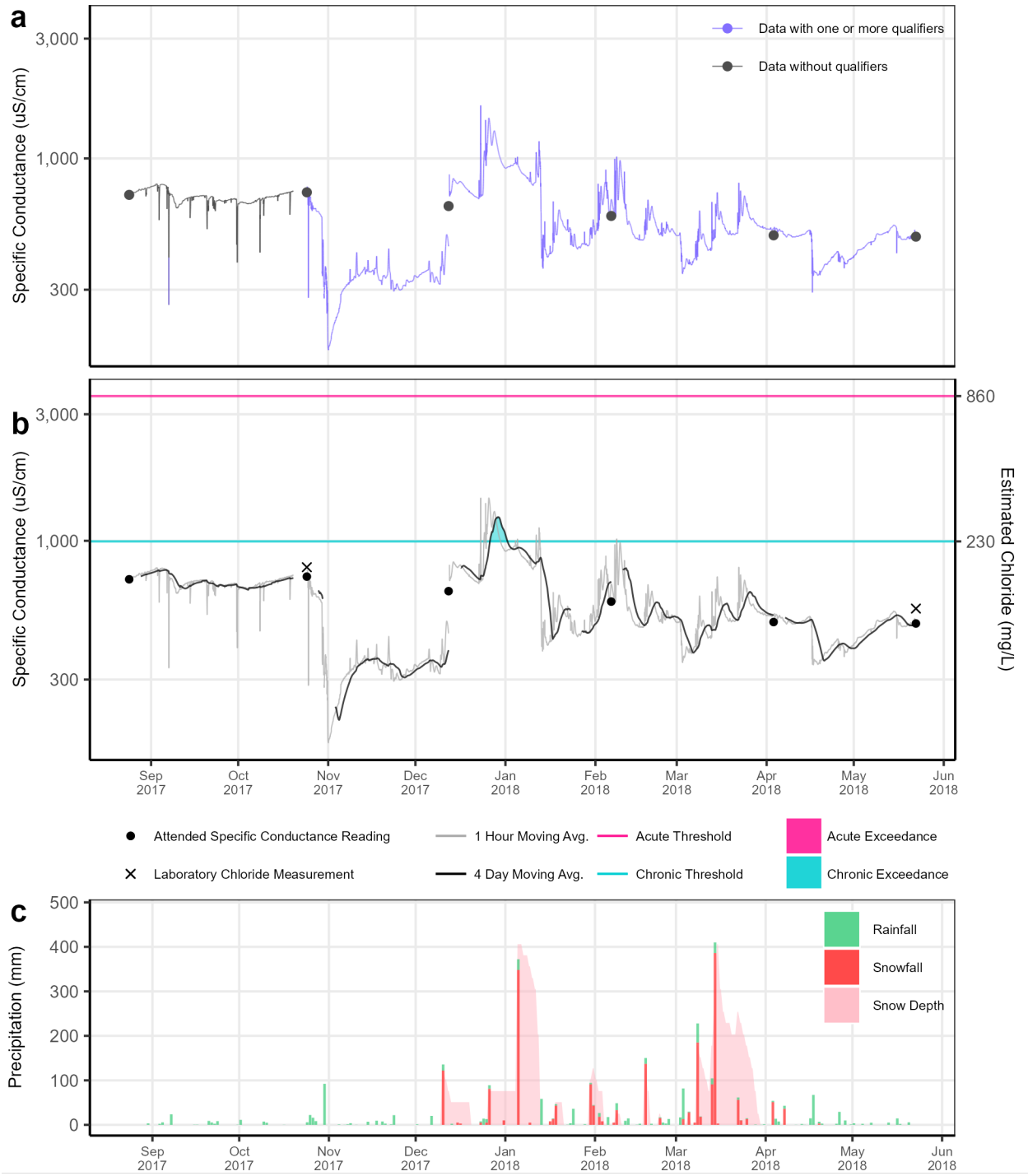
Table 39: W0543 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	173
Deployment Average	568
Deployment Maximum	1626
Maximum 4-Day Moving Average	1228
Maximum 1-Hour Moving Average	1450
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	3%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0543 - Neponset River (MA73-01)

Neponset Watershed (42.17269436, -71.2049852)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00198757 - Walpole 2 (42.1608, -71.2461)

Neponset River (MA73-02)

Station W0549

Table 40: W0549 - Station Information

Field	Value
Unique Identifier	W0549
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-02
Watershed	Neponset
Station Waterbody	Neponset River
Latitude	42.16852193
Longitude	-71.16788696
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 41: W0549 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	684	-	-
October 24, 2017	660	170	-
December 12, 2017	612	-	-
February 06, 2018	531	-	-
April 03, 2018	523	-	-
May 22, 2018	474	120	-

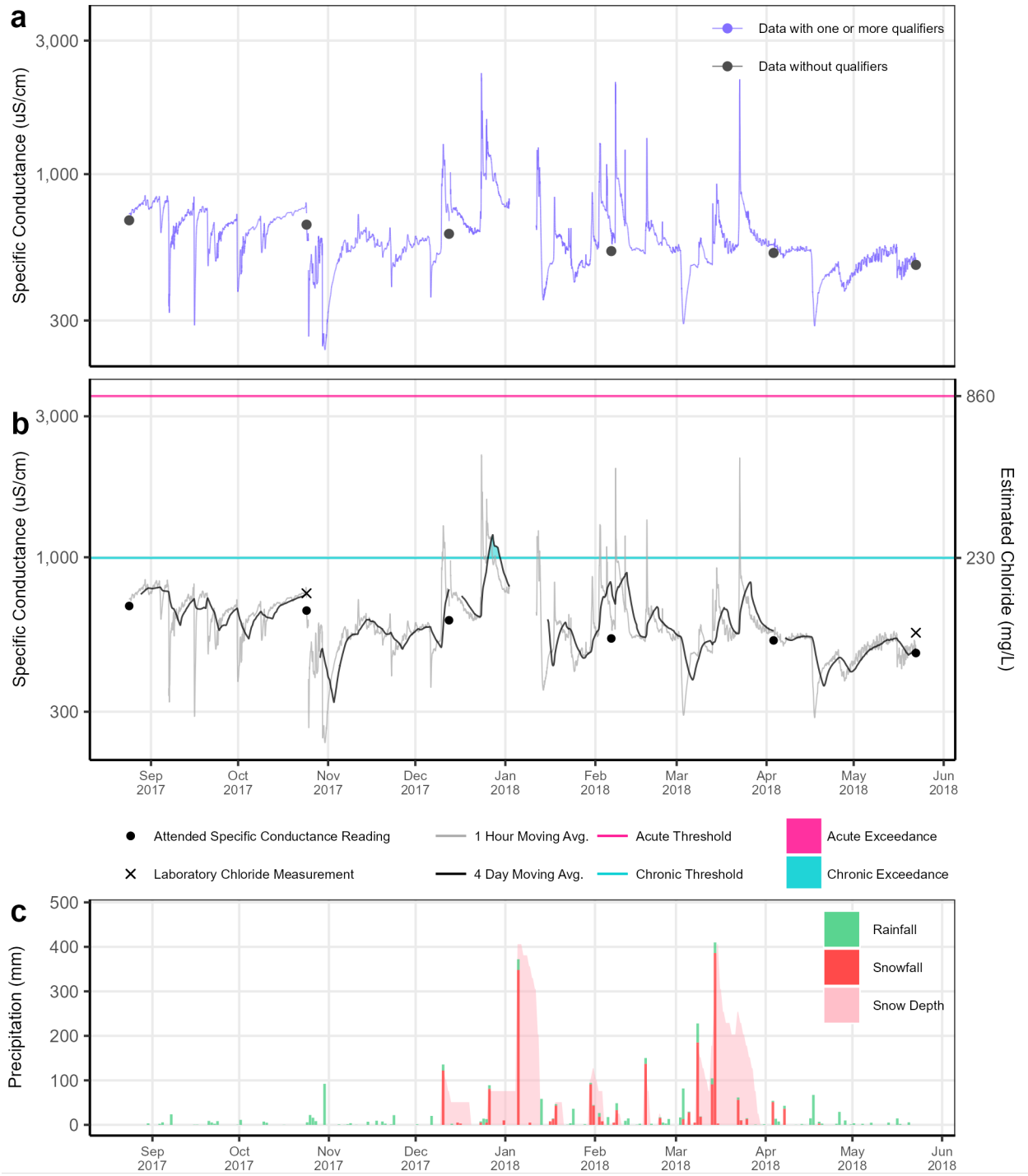
Table 42: W0549 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	235
Deployment Average	603
Deployment Maximum	2296
Maximum 4-Day Moving Average	1190
Maximum 1-Hour Moving Average	2222
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	2%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0549 - Neponset River (MA73-02)

Neponset Watershed (42.16852193, -71.16788696)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00198757 - Walpole 2 (42.1608, -71.2461)

Station W0564

Table 43: W0564 - Station Information

Field	Value
Unique Identifier	W0564
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-02
Watershed	Neponset
Station Waterbody	Neponset River
Latitude	42.19696522
Longitude	-71.15515153
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 44: W0564 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	705	-	-
October 24, 2017	781	200	-
December 12, 2017	729	-	-
February 06, 2018	594	-	-
April 03, 2018	600	-	-
May 22, 2018	558	140	-

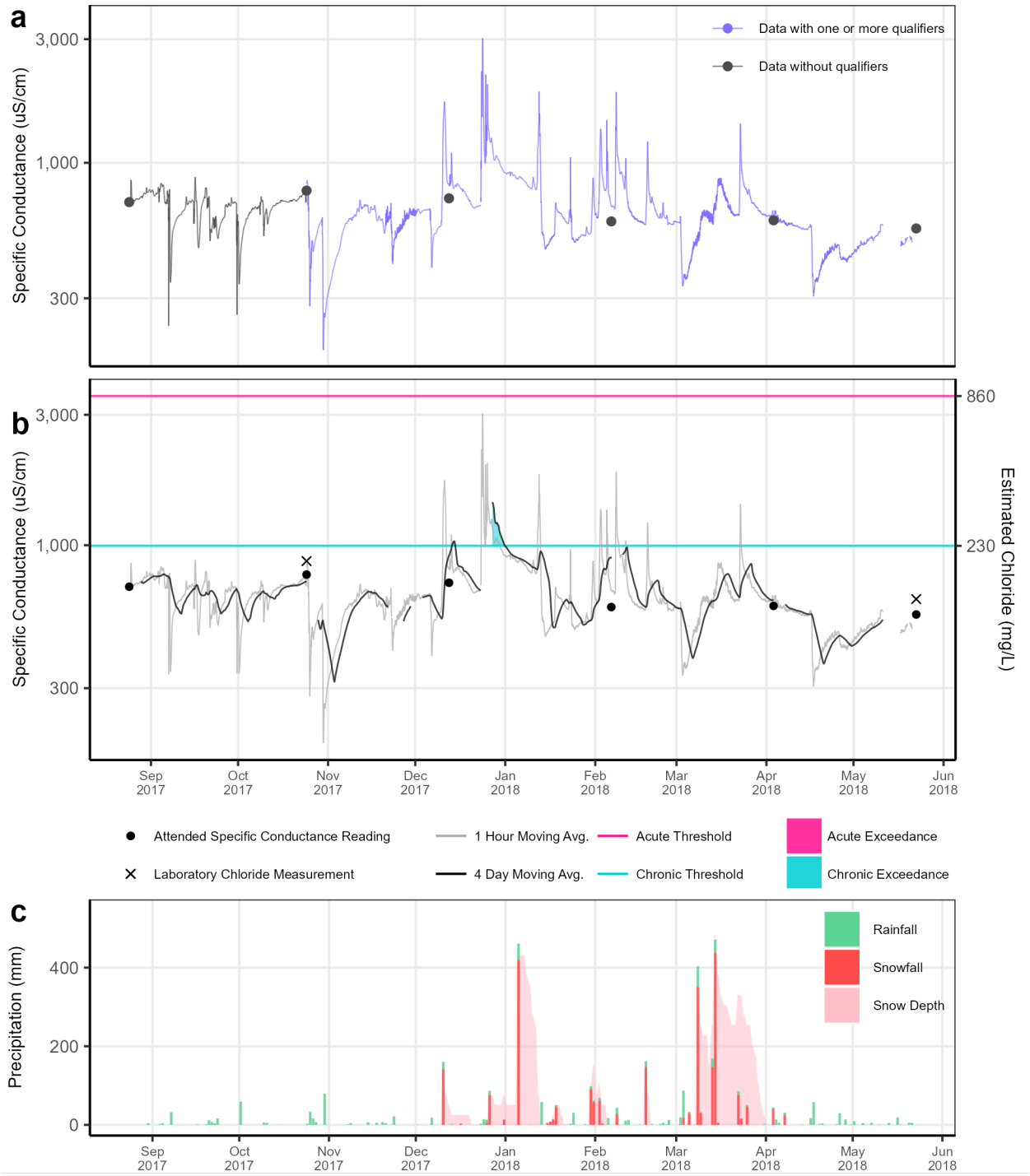
Table 45: W0564 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	189
Deployment Average	657
Deployment Maximum	3028
Maximum 4-Day Moving Average	1430
Maximum 1-Hour Moving Average	3026
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	2%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0564 - Neponset River (MA73-02)

Neponset Watershed (42.19696522, -71.15515153)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190736 - Blue Hill Coop (42.2122, -71.1136)

Station W0568

Table 46: W0568 - Station Information

Field	Value
Unique Identifier	W0568
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-02
Watershed	Neponset
Station Waterbody	Neponset River
Latitude	42.20923111
Longitude	-71.14595217
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 47: W0568 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	688	-	-
October 24, 2017	768	200	-
December 12, 2017	586	-	-
February 06, 2018	589	-	-
April 03, 2018	600	-	-
May 22, 2018	560	140	-

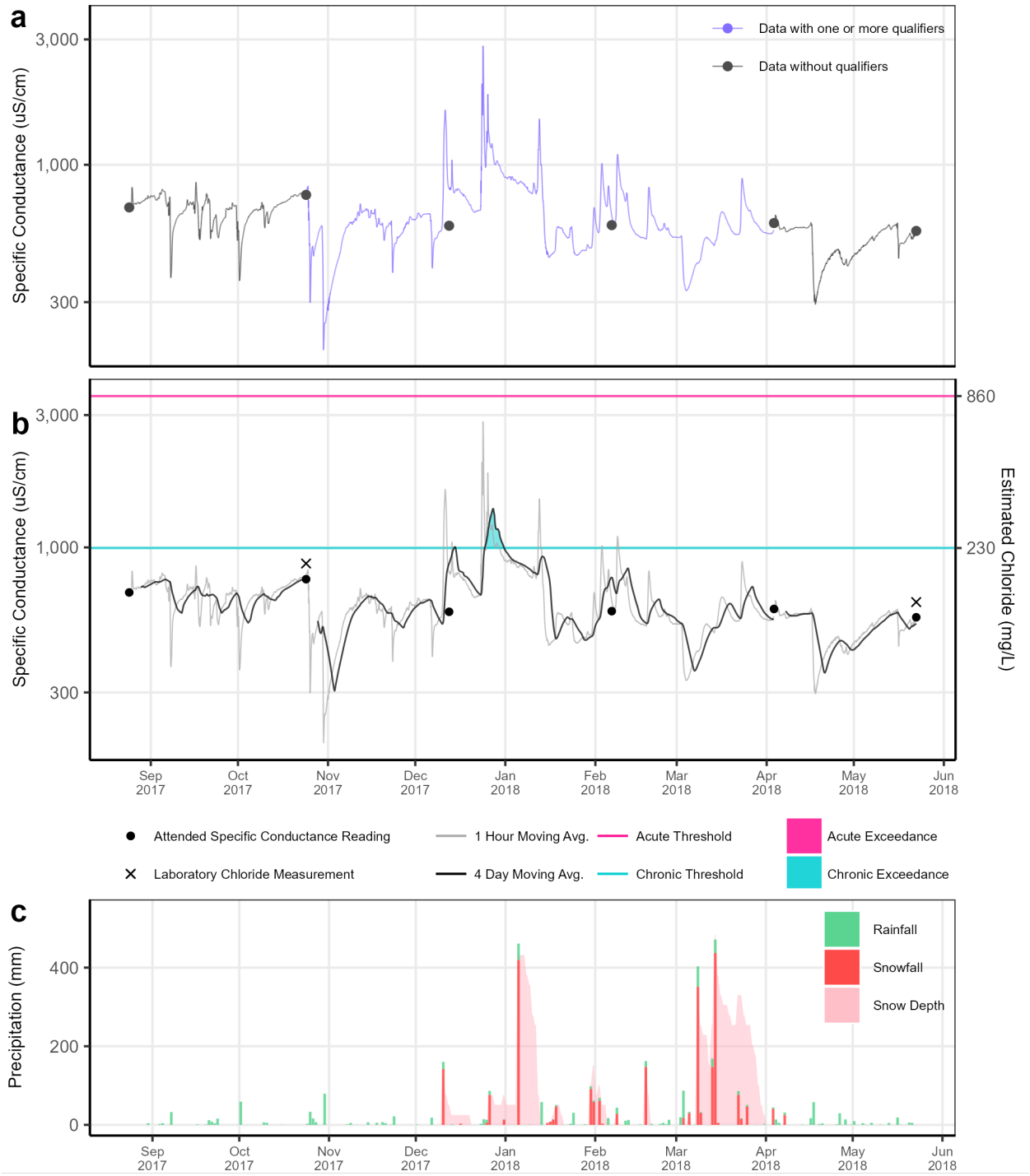
Table 48: W0568 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	197
Deployment Average	627
Deployment Maximum	2836
Maximum 4-Day Moving Average	1379
Maximum 1-Hour Moving Average	2836
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	3%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0568 - Neponset River (MA73-02)

Neponset Watershed (42.20923111, -71.14595217)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190736 - Blue Hill Coop (42.2122, -71.1136)

Station W2772

Table 49: W2772 - Station Information

Field	Value
Unique Identifier	W2772
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-02
Watershed	Neponset
Station Waterbody	Neponset River
Latitude	42.23453213
Longitude	-71.12261455
Deployment Start	August 24, 2017
Deployment End	February 06, 2018

Table 50: W2772 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	679	-	-
October 24, 2017	754	200	-
December 12, 2017	743	-	-
April 03, 2018	624	-	-
May 22, 2018	560	140	-

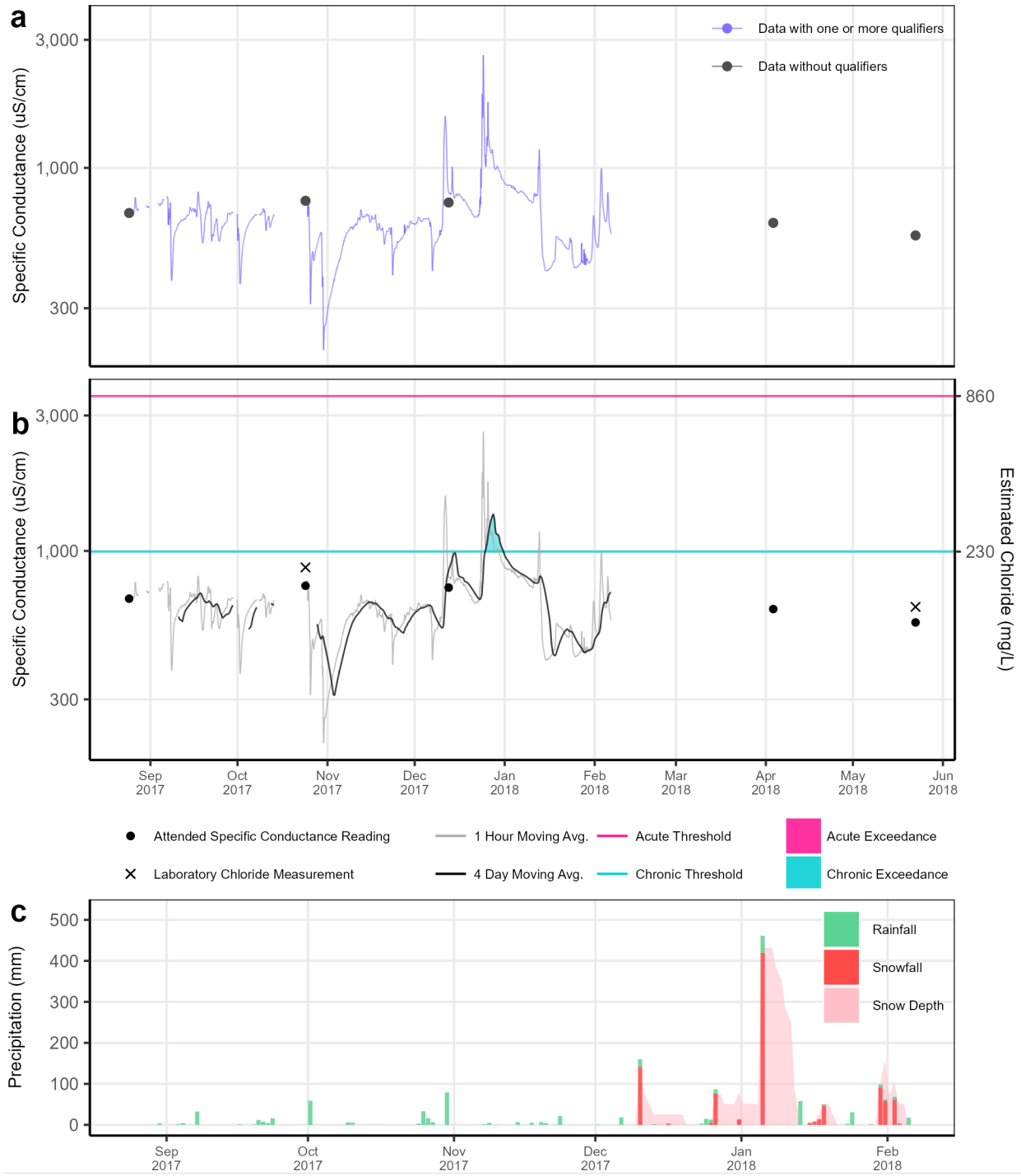
Table 51: W2772 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	210
Deployment Average	652
Deployment Maximum	2632
Maximum 4-Day Moving Average	1345
Maximum 1-Hour Moving Average	2625
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	5%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2772 - Neponset River (MA73-02)

Neponset Watershed (42.23453213, -71.12261455)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190736 - Blue Hill Coop (42.2122, -71.1136)

Pecunit Brook (MA73-25)

Station W0565

Table 52: W0565 - Station Information

Field	Value
Unique Identifier	W0565
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-25
Watershed	Neponset
Station Waterbody	Pecunit Brook
Latitude	42.18896192
Longitude	-71.14424053
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 53: W0565 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	234	-	-
October 24, 2017	228	44	-
December 12, 2017	798	-	-
February 06, 2018	475	-	-
April 03, 2018	466	-	-
May 22, 2018	456	110	-

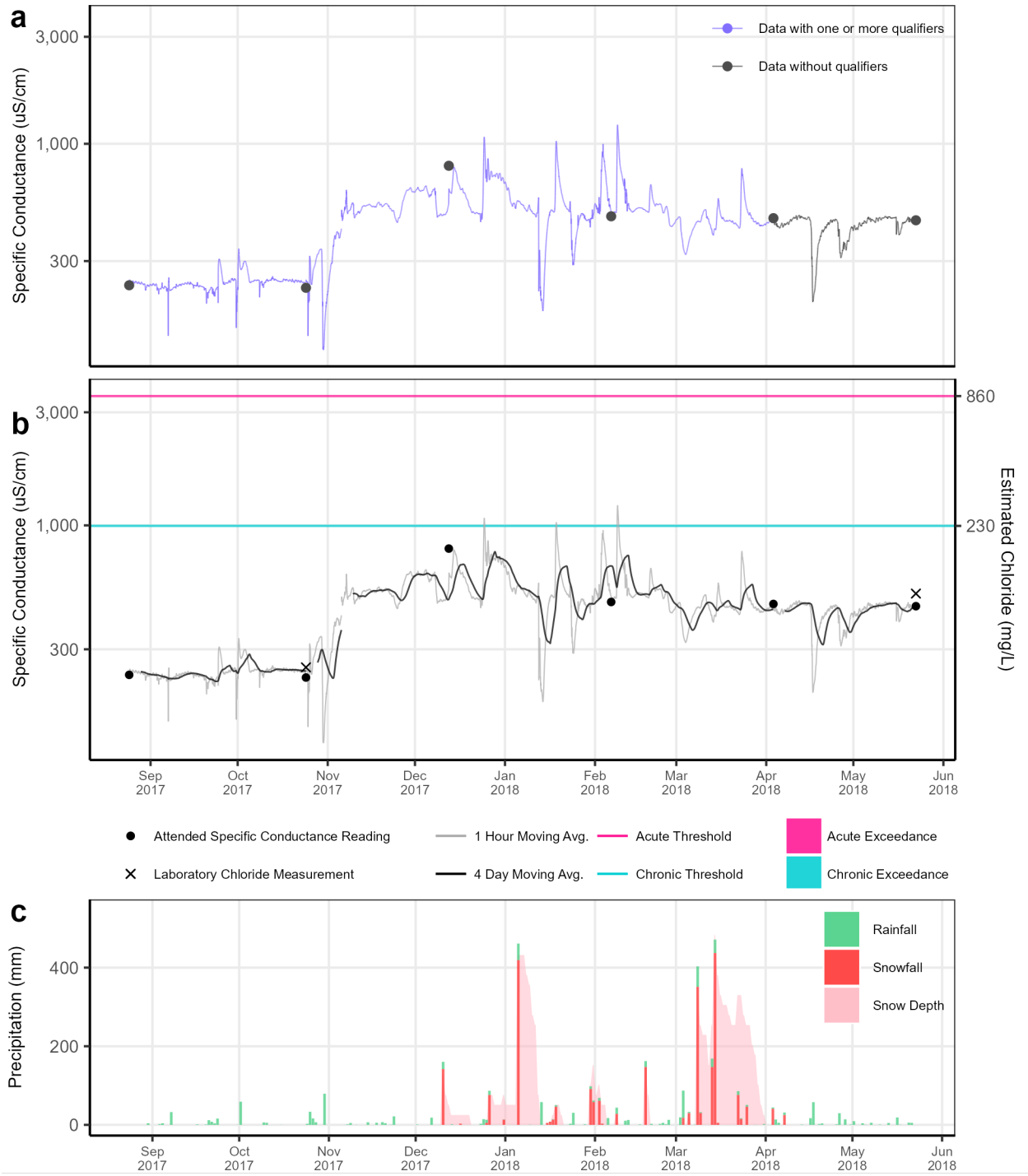
Table 54: W0565 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	120
Deployment Average	437
Deployment Maximum	1216
Maximum 4-Day Moving Average	774
Maximum 1-Hour Moving Average	1213
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W0565 - Pecunit Brook (MA73-25)

Neponset Watershed (42.18896192, -71.14424053)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190736 - Blue Hill Coop (42.2122, -71.1136)

Ponkapog Brook (MA73-27)

Station W0566

Table 55: W0566 - Station Information

Field	Value
Unique Identifier	W0566
Monitoring Cycle	2017 - 2018
Assessment Unit	MA73-27
Watershed	Neponset
Station Waterbody	Ponkapog Brook
Latitude	42.20323377
Longitude	-71.13501796
Deployment Start	August 24, 2017
Deployment End	May 22, 2018

Table 56: W0566 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
August 24, 2017	519	-	-
October 24, 2017	741	190	-
December 12, 2017	742	-	-
February 06, 2018	443	-	-
April 03, 2018	508	-	-
May 22, 2018	564	150	-

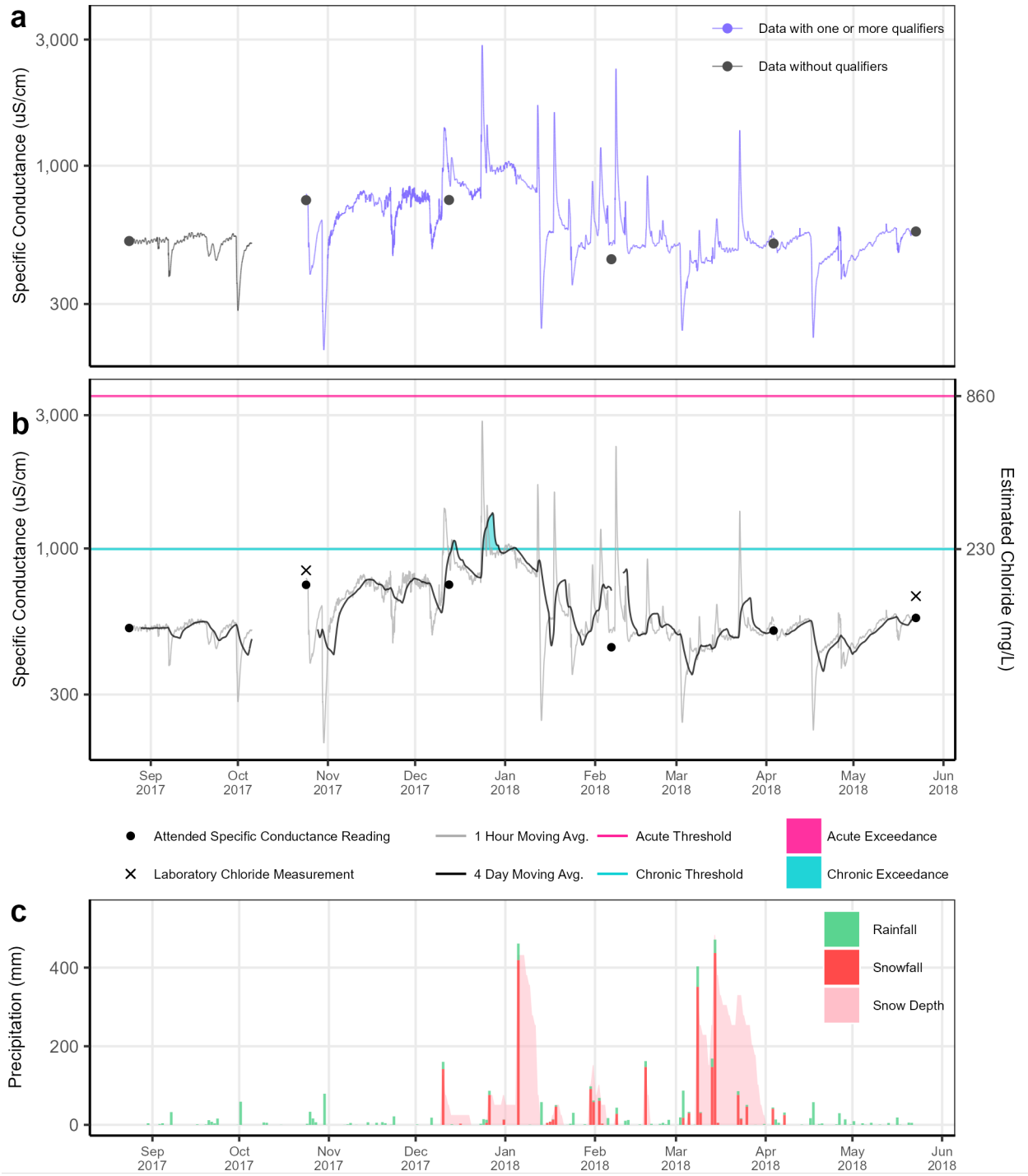
Table 57: W0566 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	201
Deployment Average	608
Deployment Maximum	2858
Maximum 4-Day Moving Average	1340
Maximum 1-Hour Moving Average	2858
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	4%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

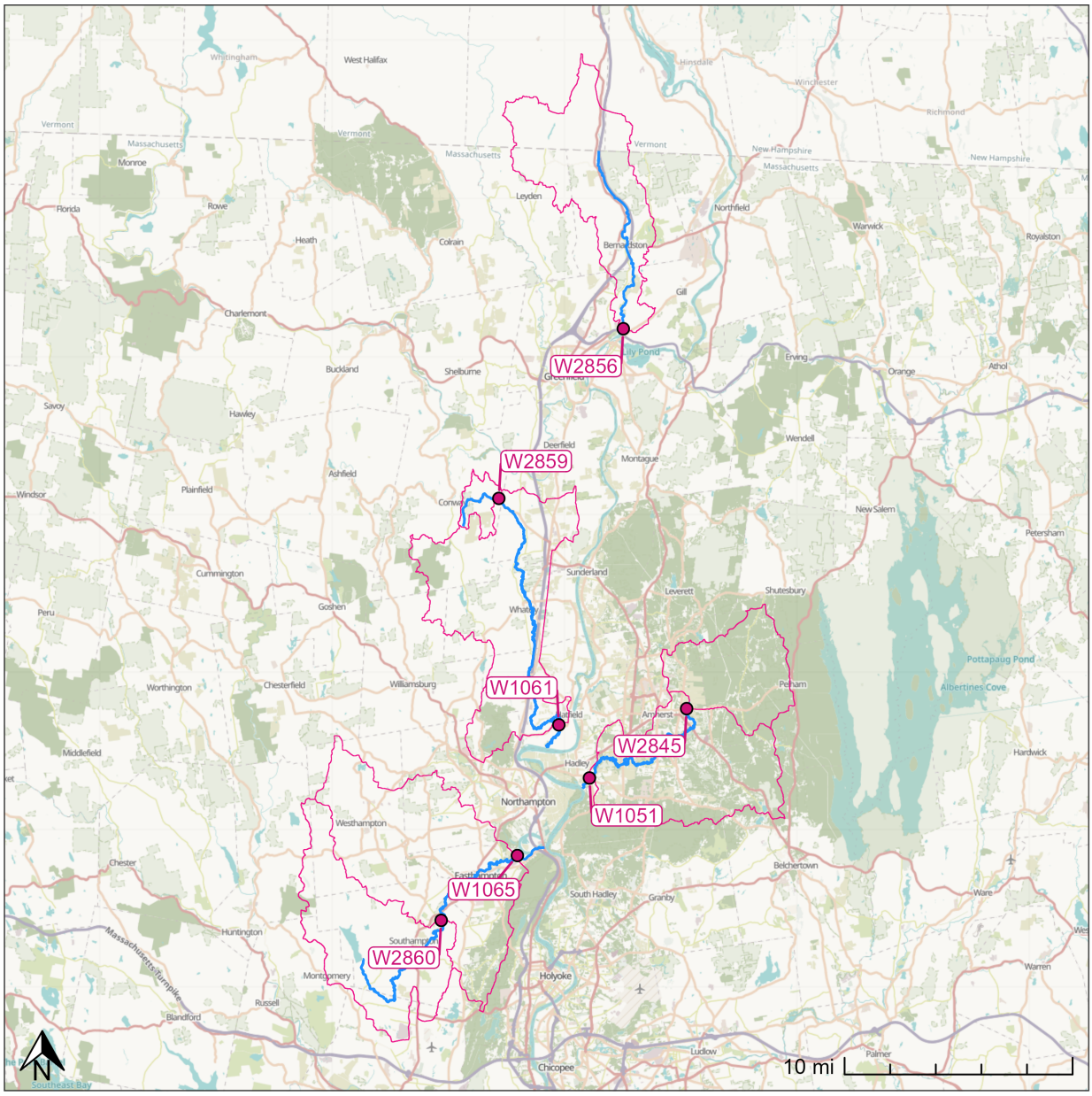
W0566 - Ponkapog Brook (MA73-27)

Neponset Watershed (42.20323377, -71.13501796)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190736 - Blue Hill Coop (42.2122, -71.1136)

Connecticut Watershed (2018 - 2019)



Manhan River (MA34-11)

Station W1065

Table 58: W1065 - Station Information

Field	Value
Unique Identifier	W1065
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-11
Watershed	Connecticut
Station Waterbody	Manhan River
Latitude	42.28349688
Longitude	-72.64060074
Deployment Start	October 23, 2018
Deployment End	September 18, 2019

Table 59: W1065 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	134	23	-
December 04, 2018	103	-	-
February 06, 2019	141	-	-
April 04, 2019	140	-	-
June 05, 2019	183	32	-

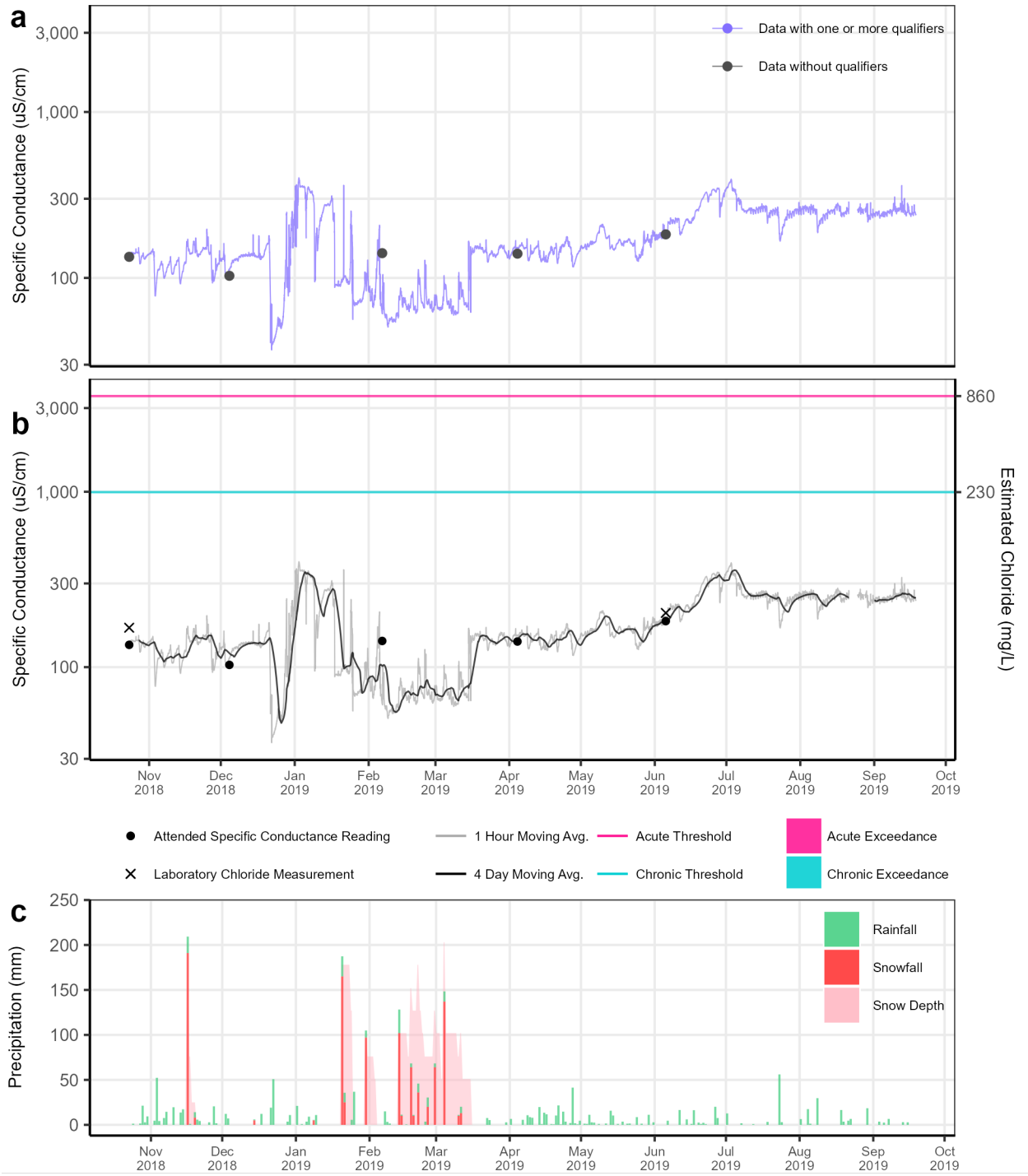
Table 60: W1065 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	37
Deployment Average	173
Deployment Maximum	401
Maximum 4-Day Moving Average	357
Maximum 1-Hour Moving Average	399
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1065 - Manhan River (MA34-11)

Connecticut Watershed (42.28349688, -72.64060074)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190120 - Amherst (42.3861, -72.5375)

Station W2860

Table 61: W2860 - Station Information

Field	Value
Unique Identifier	W2860
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-11
Watershed	Connecticut
Station Waterbody	Manhan River
Latitude	42.24223524
Longitude	-72.70617225
Deployment Start	October 23, 2018
Deployment End	June 05, 2019

Table 62: W2860 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	93	14	-
December 04, 2018	75	-	-
February 06, 2019	100	-	-
April 04, 2019	125	-	-
June 05, 2019	173	31	-

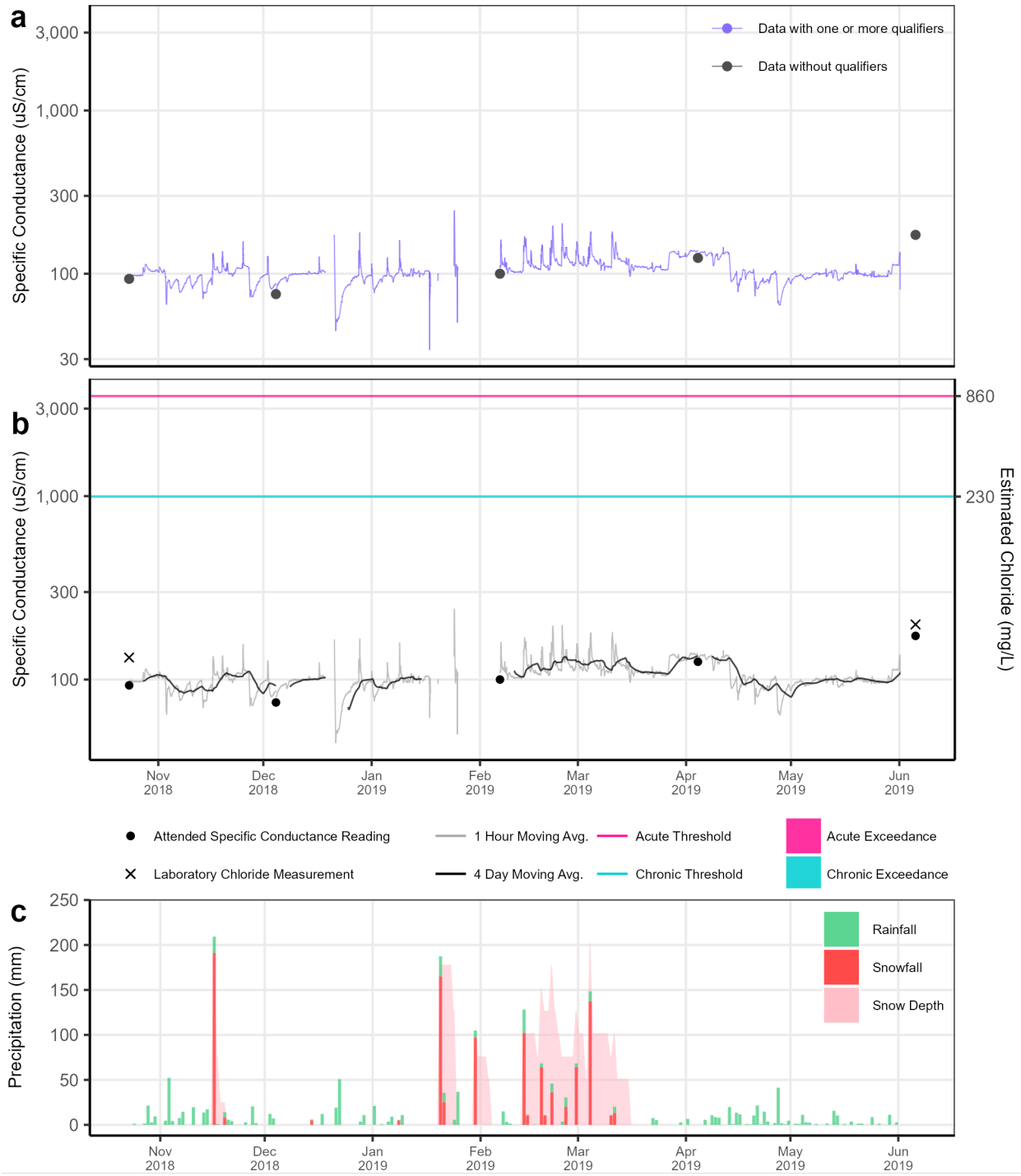
Table 63: W2860 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	34
Deployment Average	105
Deployment Maximum	244
Maximum 4-Day Moving Average	135
Maximum 1-Hour Moving Average	242
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2860 - Manhan River (MA34-11)

Connecticut Watershed (42.24223524, -72.70617225)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190120 - Amherst (42.3861, -72.5375)

Mill River (MA34-24)

Station W1061

Table 64: W1061 - Station Information

Field	Value
Unique Identifier	W1061
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-24
Watershed	Connecticut
Station Waterbody	Mill River
Latitude	42.36655405
Longitude	-72.60488814
Deployment Start	October 23, 2018
Deployment End	September 04, 2019

Table 65: W1061 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	197	35	-
December 04, 2018	142	-	-
February 06, 2019	186	-	-
April 04, 2019	155	-	-
June 05, 2019	212	40	-

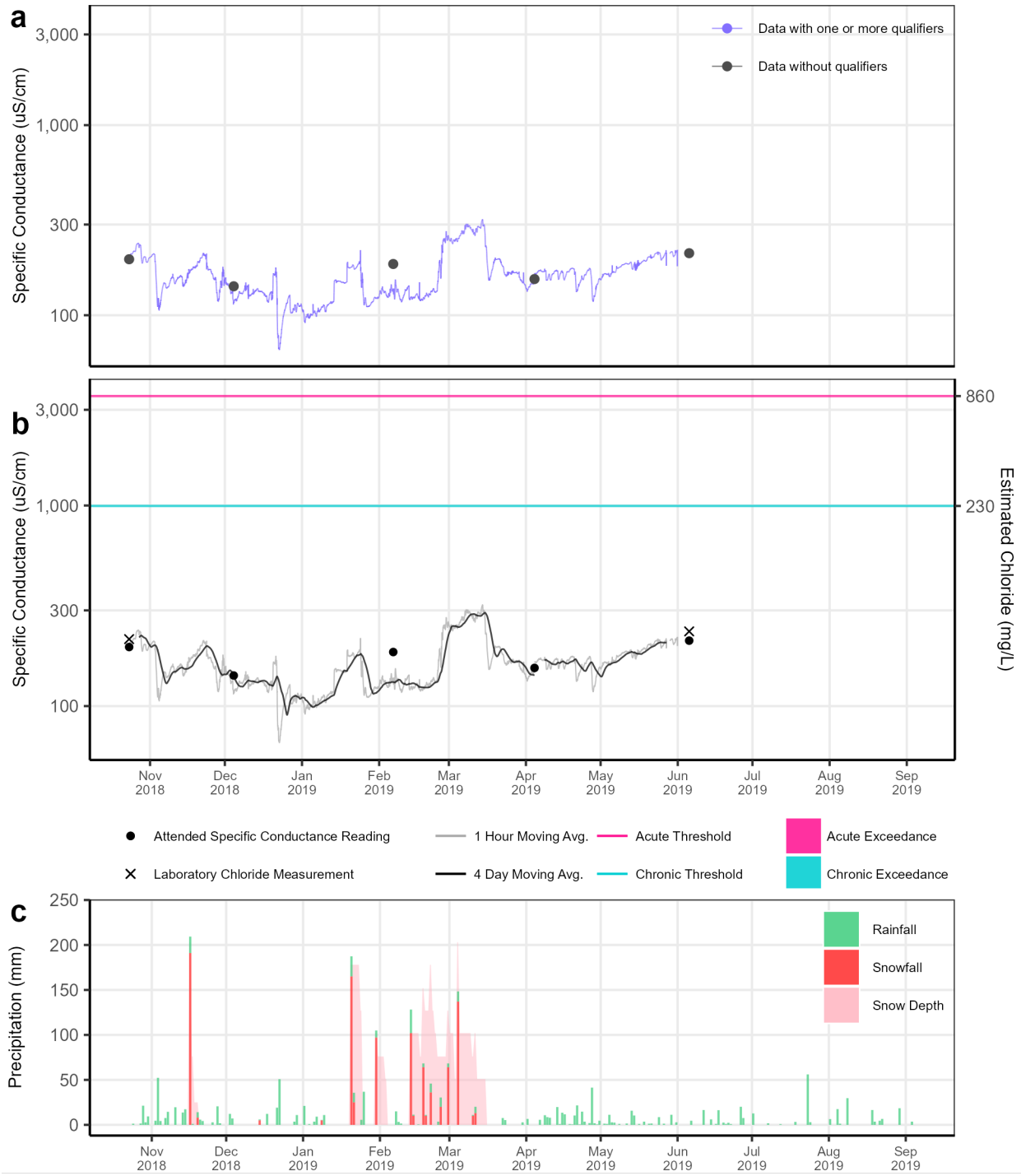
Table 66: W1061 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	66
Deployment Average	163
Deployment Maximum	320
Maximum 4-Day Moving Average	292
Maximum 1-Hour Moving Average	320
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1061 - Mill River (MA34-24)

Connecticut Watershed (42.36655405, -72.60488814)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190120 - Amherst (42.3861, -72.5375)

Station W2859

Table 67: W2859 - Station Information

Field	Value
Unique Identifier	W2859
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-24
Watershed	Connecticut
Station Waterbody	Mill River
Latitude	42.51021166
Longitude	-72.65656844
Deployment Start	October 23, 2018
Deployment End	June 05, 2019

Table 68: W2859 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	239	26	-
December 04, 2018	172	-	-
February 06, 2019	185	-	-
April 04, 2019	194	-	-
June 05, 2019	250	35	-

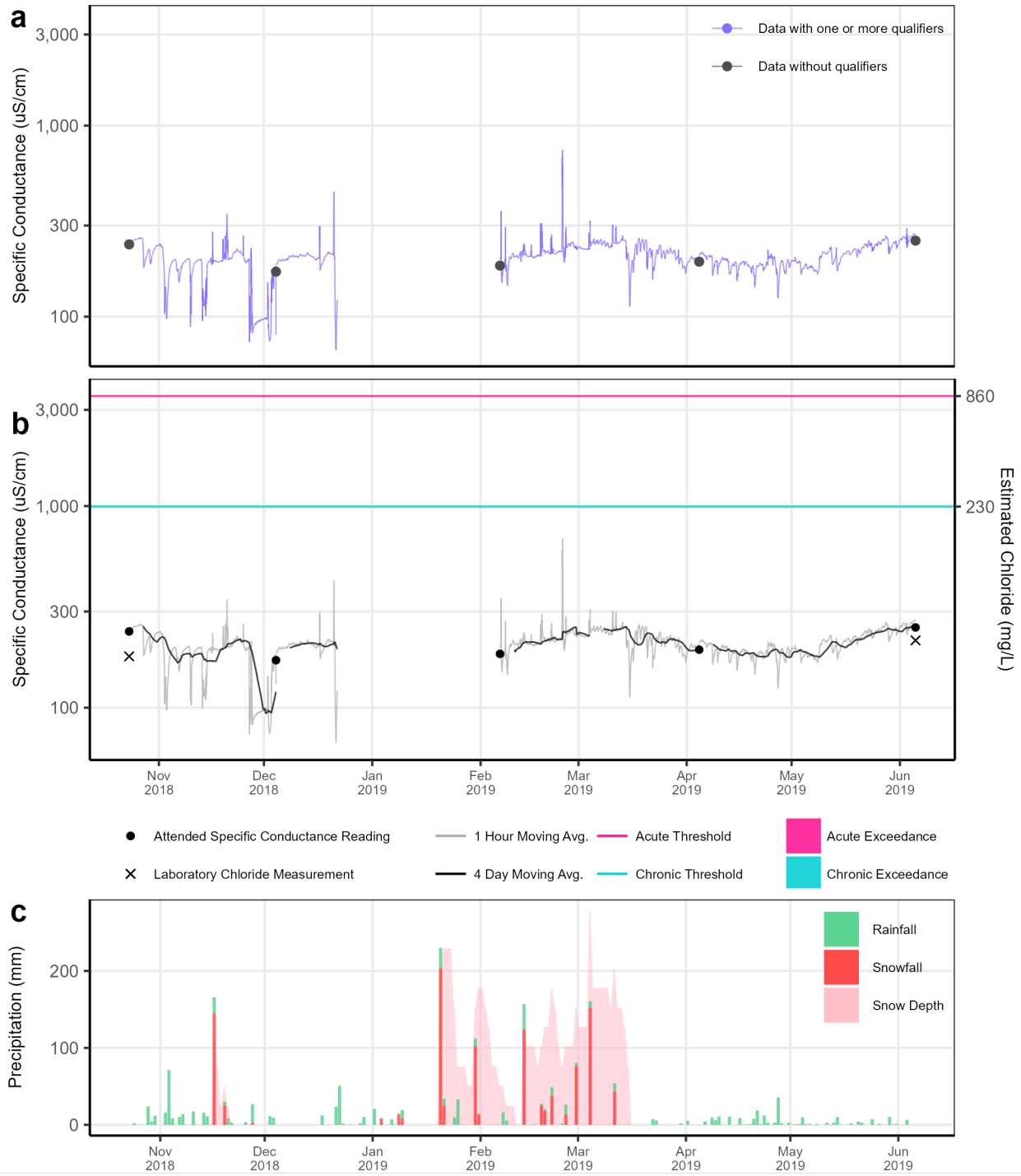
Table 69: W2859 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	67
Deployment Average	205
Deployment Maximum	745
Maximum 4-Day Moving Average	258
Maximum 1-Hour Moving Average	689
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2859 - Mill River (MA34-24)

Connecticut Watershed (42.51021166, -72.65656844)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00193229 - Greenfield #3 (42.5719, -72.5975)

Fort River (MA34-27)

Station W1051

Table 70: W1051 - Station Information

Field	Value
Unique Identifier	W1051
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-27
Watershed	Connecticut
Station Waterbody	Fort River
Latitude	42.33278638
Longitude	-72.57858317
Deployment Start	October 23, 2018
Deployment End	September 11, 2019

Table 71: W1051 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	145	26	-
December 04, 2018	100	-	-
February 06, 2019	131	-	-
April 04, 2019	136	-	-
June 05, 2019	169	33	-

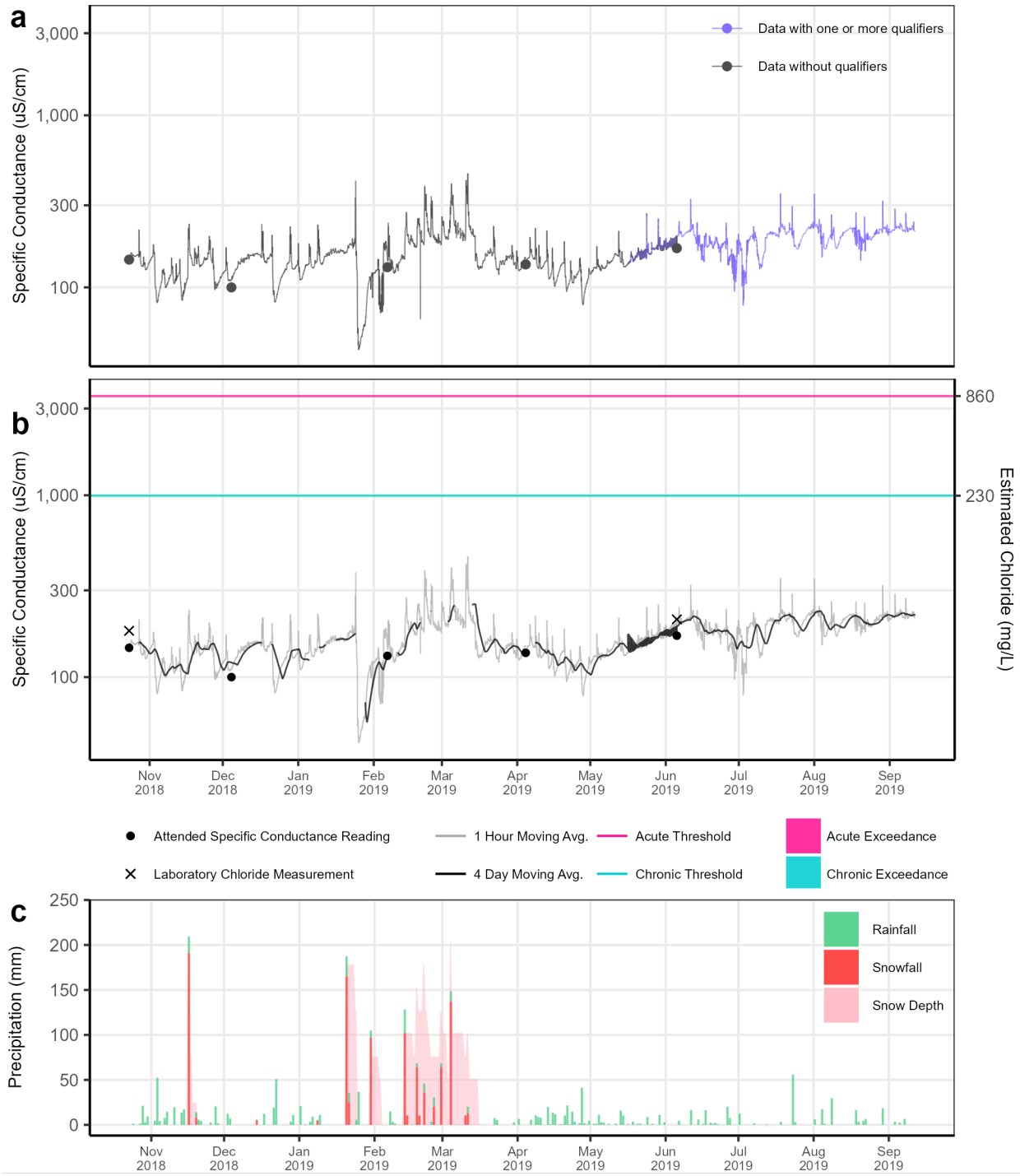
Table 72: W1051 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	43
Deployment Average	163
Deployment Maximum	460
Maximum 4-Day Moving Average	252
Maximum 1-Hour Moving Average	460
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1051 - Fort River (MA34-27)

Connecticut Watershed (42.33278638, -72.57858317)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190120 - Amherst (42.3861, -72.5375)

Station W2845

Table 73: W2845 - Station Information

Field	Value
Unique Identifier	W2845
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-27
Watershed	Connecticut
Station Waterbody	Fort River
Latitude	42.37683842
Longitude	-72.49492563
Deployment Start	October 23, 2018
Deployment End	September 11, 2019

Table 74: W2845 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	87	17	-
December 04, 2018	63	-	-
February 06, 2019	81	-	-
April 04, 2019	80	-	-
June 05, 2019	96	21	-

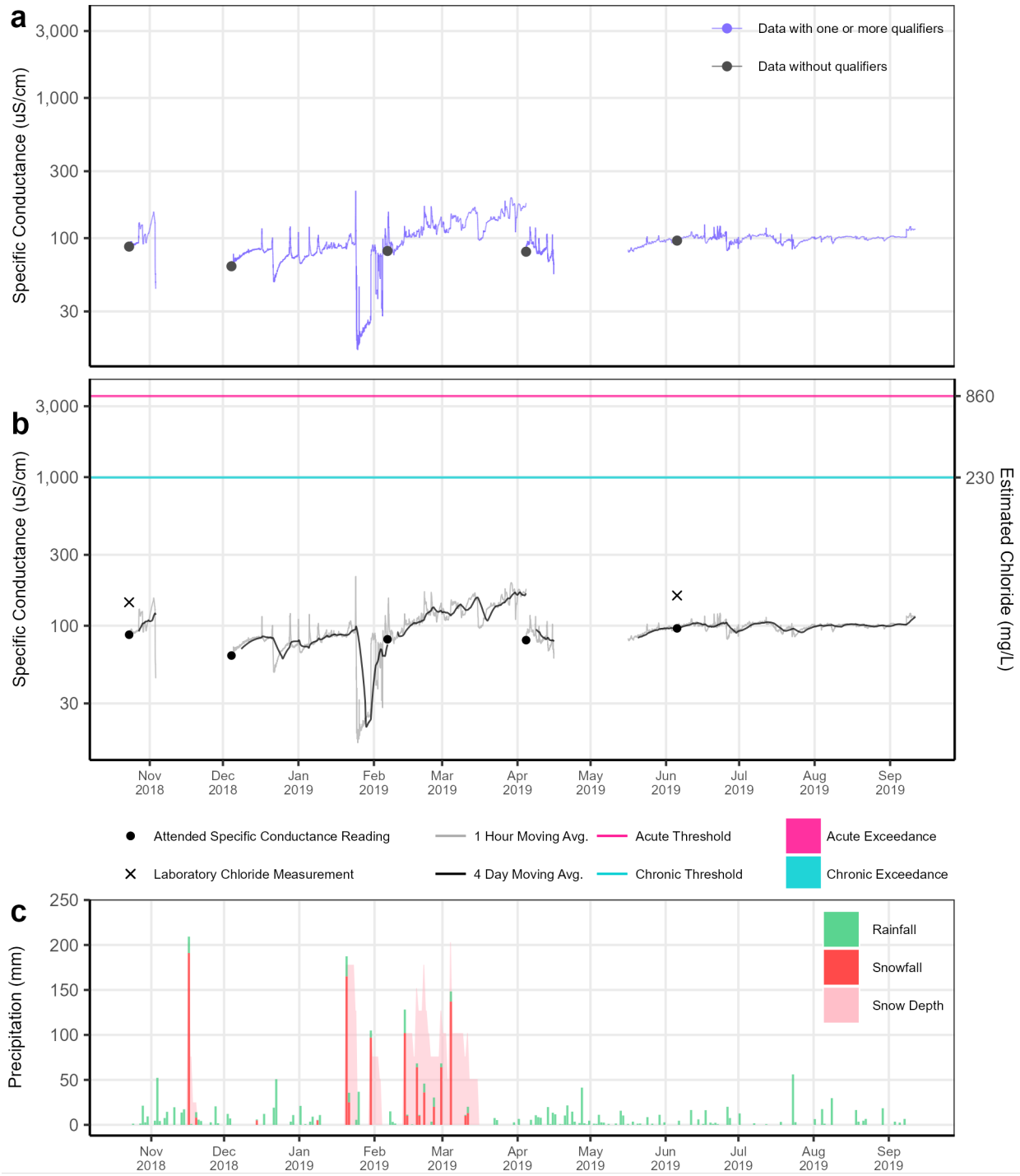
Table 75: W2845 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	16
Deployment Average	99
Deployment Maximum	218
Maximum 4-Day Moving Average	168
Maximum 1-Hour Moving Average	215
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2845 - Fort River (MA34-27)

Connecticut Watershed (42.37683842, -72.49492563)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190120 - Amherst (42.3861, -72.5375)

Fall River (MA34-33)

Station W2856

Table 76: W2856 - Station Information

Field	Value
Unique Identifier	W2856
Monitoring Cycle	2018 - 2019
Assessment Unit	MA34-33
Watershed	Connecticut
Station Waterbody	Fall River
Latitude	42.61764417
Longitude	-72.54942908
Deployment Start	October 23, 2018
Deployment End	June 05, 2019

Table 77: W2856 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	174	32	-
December 04, 2018	100	-	-
February 06, 2019	138	-	-
April 04, 2019	116	-	-
June 05, 2019	181	37	-

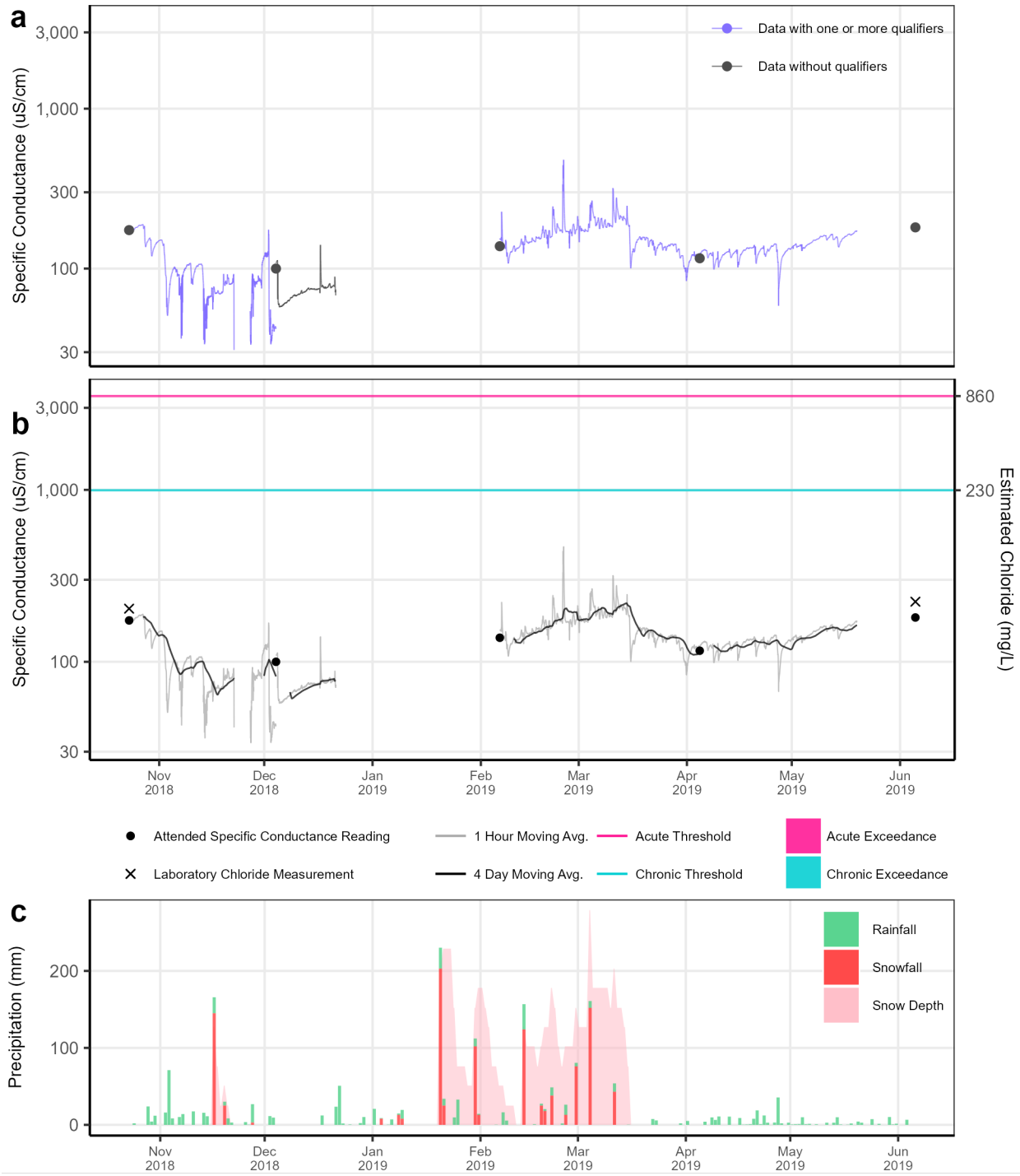
Table 78: W2856 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	31
Deployment Average	130
Deployment Maximum	479
Maximum 4-Day Moving Average	219
Maximum 1-Hour Moving Average	467
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

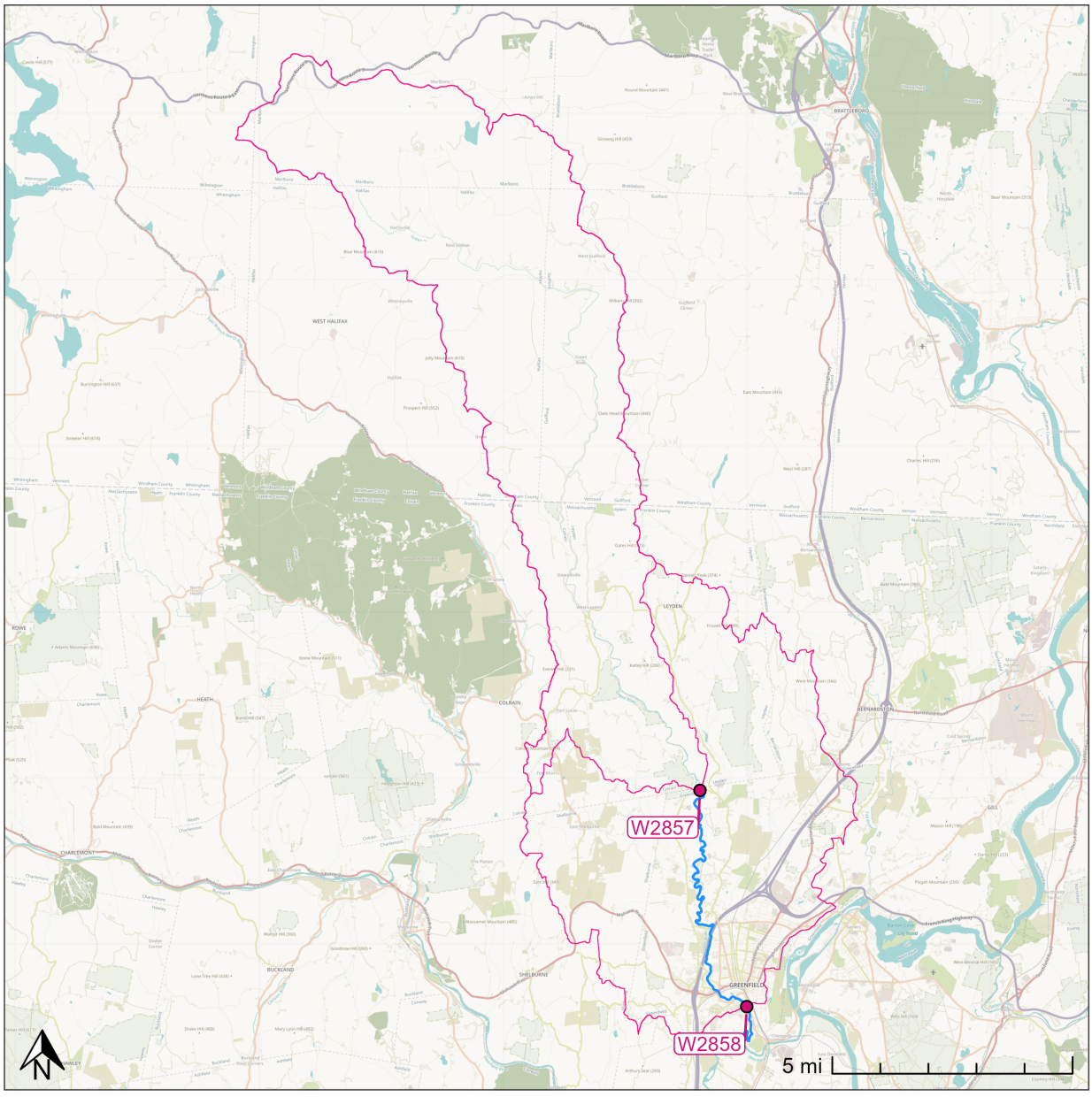
W2856 - Fall River (MA34-33)

Connecticut Watershed (42.61764417, -72.54942908)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00193229 - Greenfield #3 (42.5719, -72.5975)

Deerfield Watershed (2018 - 2019)



Green River (MA33-29)

Station W2857

Table 79: W2857 - Station Information

Field	Value
Unique Identifier	W2857
Monitoring Cycle	2018 - 2019
Assessment Unit	MA33-29
Watershed	Deerfield
Station Waterbody	Green River
Latitude	42.64626318
Longitude	-72.61938681
Deployment Start	October 23, 2018
Deployment End	June 05, 2019

Table 80: W2857 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	111	-4	-
December 04, 2018	70	-	-
February 06, 2019	80	-	-
April 04, 2019	70	-	-
June 05, 2019	107	4.6	-

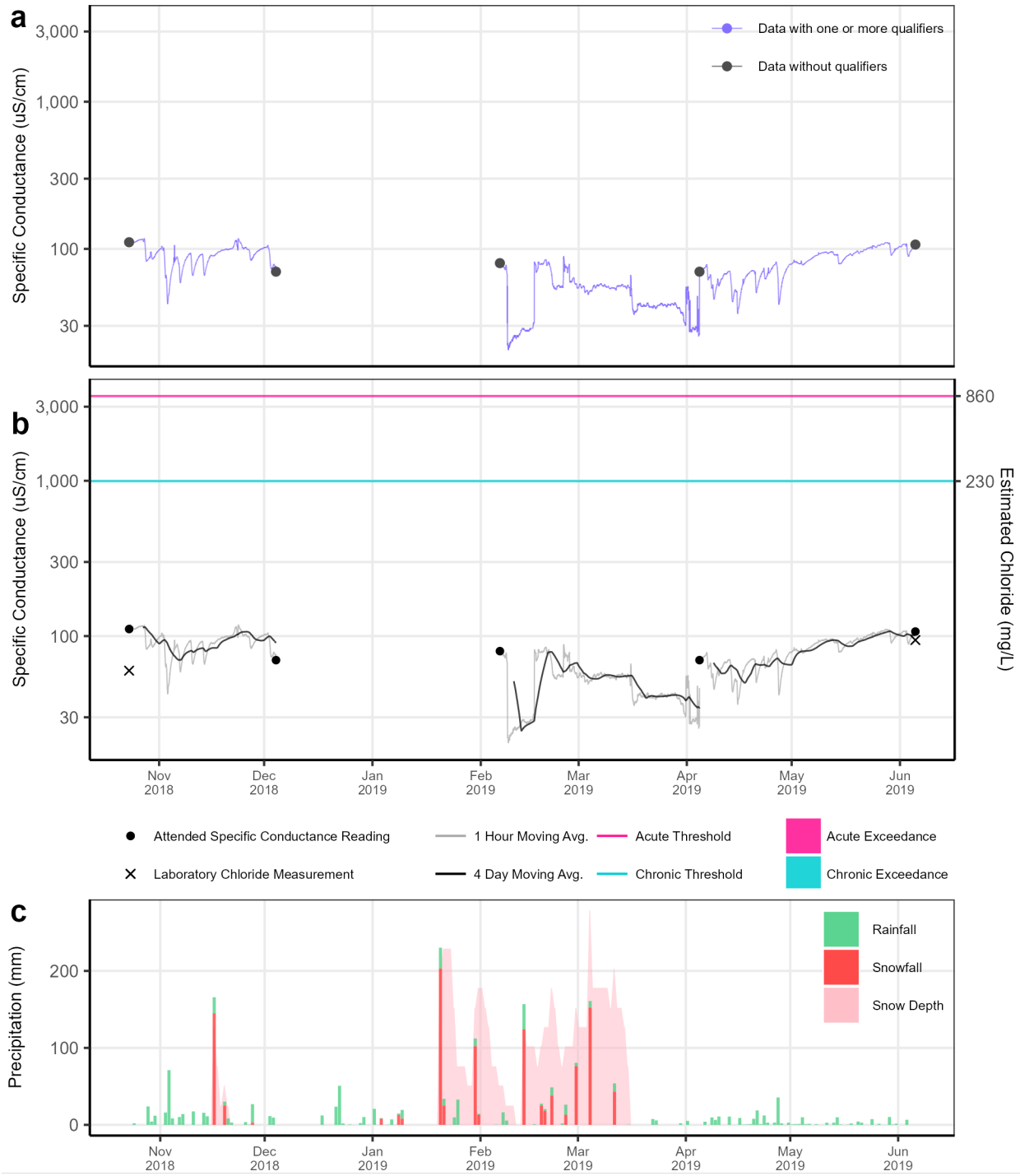
Table 81: W2857 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	21
Deployment Average	73
Deployment Maximum	119
Maximum 4-Day Moving Average	114
Maximum 1-Hour Moving Average	119
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2857 - Green River (MA33-29)

Deerfield Watershed (42.64626318, -72.61938681)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00193229 - Greenfield #3 (42.5719, -72.5975)

Green River (MA33-30)

Station W2858

Table 82: W2858 - Station Information

Field	Value
Unique Identifier	W2858
Monitoring Cycle	2018 - 2019
Assessment Unit	MA33-30
Watershed	Deerfield
Station Waterbody	Green River
Latitude	42.58106734
Longitude	-72.60023327
Deployment Start	October 23, 2018
Deployment End	June 05, 2019

Table 83: W2858 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
October 23, 2018	165	18	-
December 04, 2018	107	-	-
February 06, 2019	134	-	-
April 04, 2019	104	-	-
June 05, 2019	160	22	-

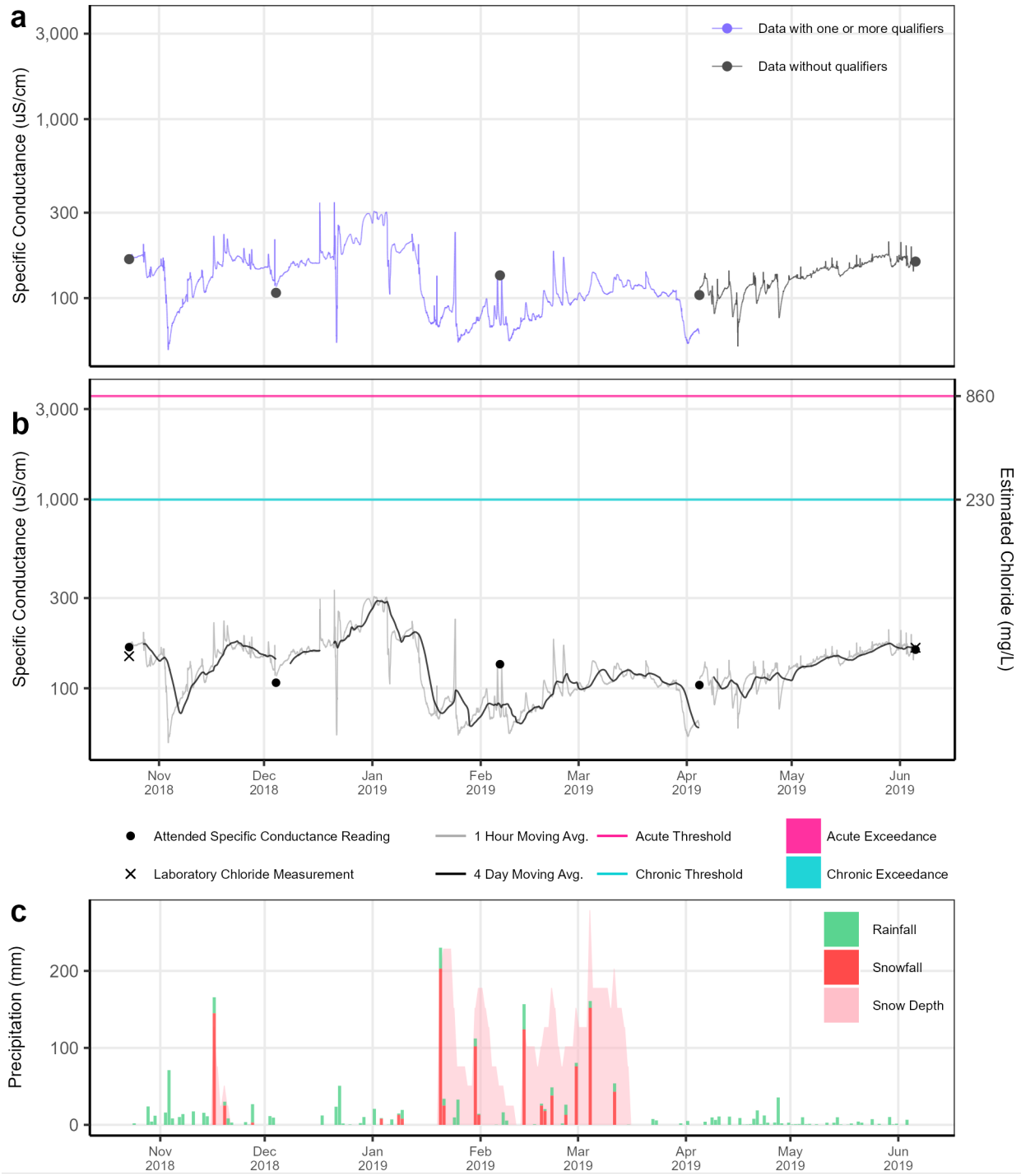
Table 84: W2858 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	51
Deployment Average	132
Deployment Maximum	343
Maximum 4-Day Moving Average	290
Maximum 1-Hour Moving Average	330
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

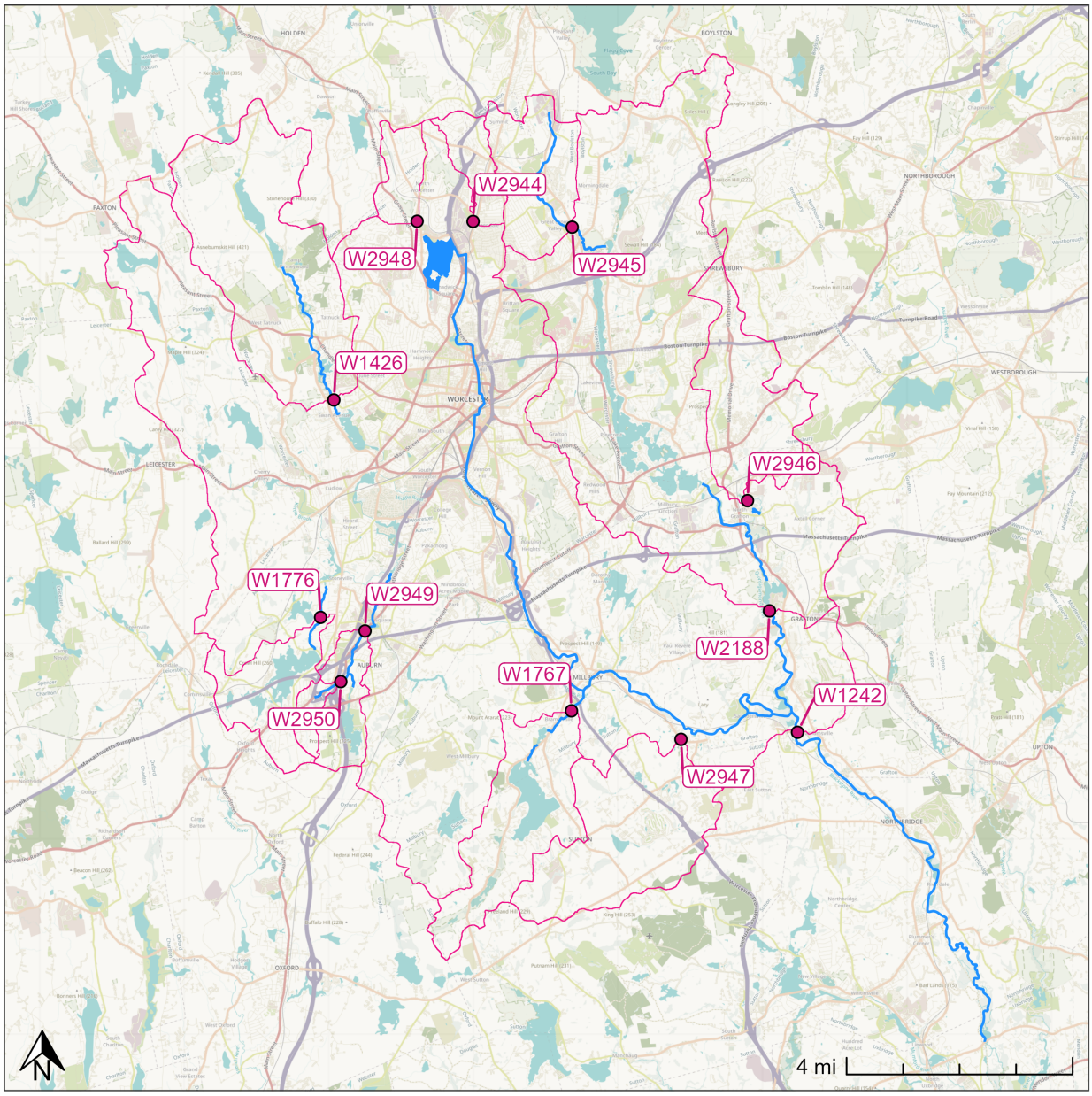
W2858 - Green River (MA33-30)

Deerfield Watershed (42.58106734, -72.60023327)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00193229 - Greenfield #3 (42.5719, -72.5975)

Blackstone Watershed (2019 - 2020)



Cold Spring Brook (MA51-03)

Station W2947

Table 85: W2947 - Station Information

Field	Value
Unique Identifier	W2947
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-03
Watershed	Blackstone
Station Waterbody	Cold Spring Brook
Latitude	42.17548786
Longitude	-71.72816762
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 86: W2947 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	246	56	-
December 11, 2019	225	-	-
January 30, 2020	273	-	-
April 09, 2020	251	-	-
July 01, 2020	364	-	-
September 16, 2020	393	89	-

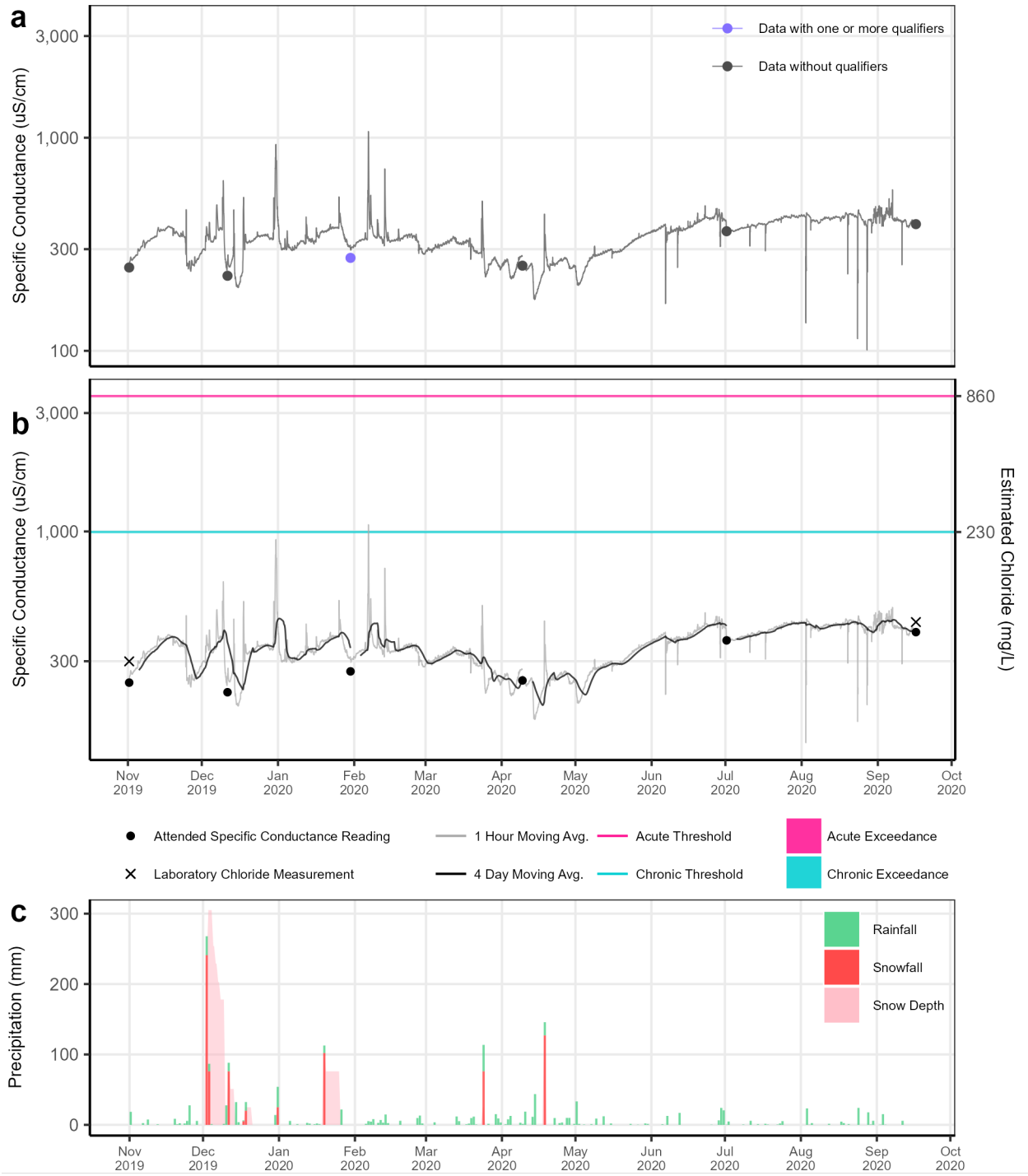
Table 87: W2947 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	101
Deployment Average	343
Deployment Maximum	1070
Maximum 4-Day Moving Average	446
Maximum 1-Hour Moving Average	1065
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2947 - Cold Spring Brook (MA51-03)

Blackstone Watershed (42.17548786, -71.72816762)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Blackstone River (MA51-04)

Station W1242

Table 88: W1242 - Station Information

Field	Value
Unique Identifier	W1242
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-04
Watershed	Blackstone
Station Waterbody	Blackstone River
Latitude	42.17728889
Longitude	-71.68788468
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 89: W1242 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	426	93	-
December 11, 2019	580	-	-
January 30, 2020	592	-	-
April 09, 2020	604	-	-
July 01, 2020	561	-	-
September 16, 2020	816	160	-

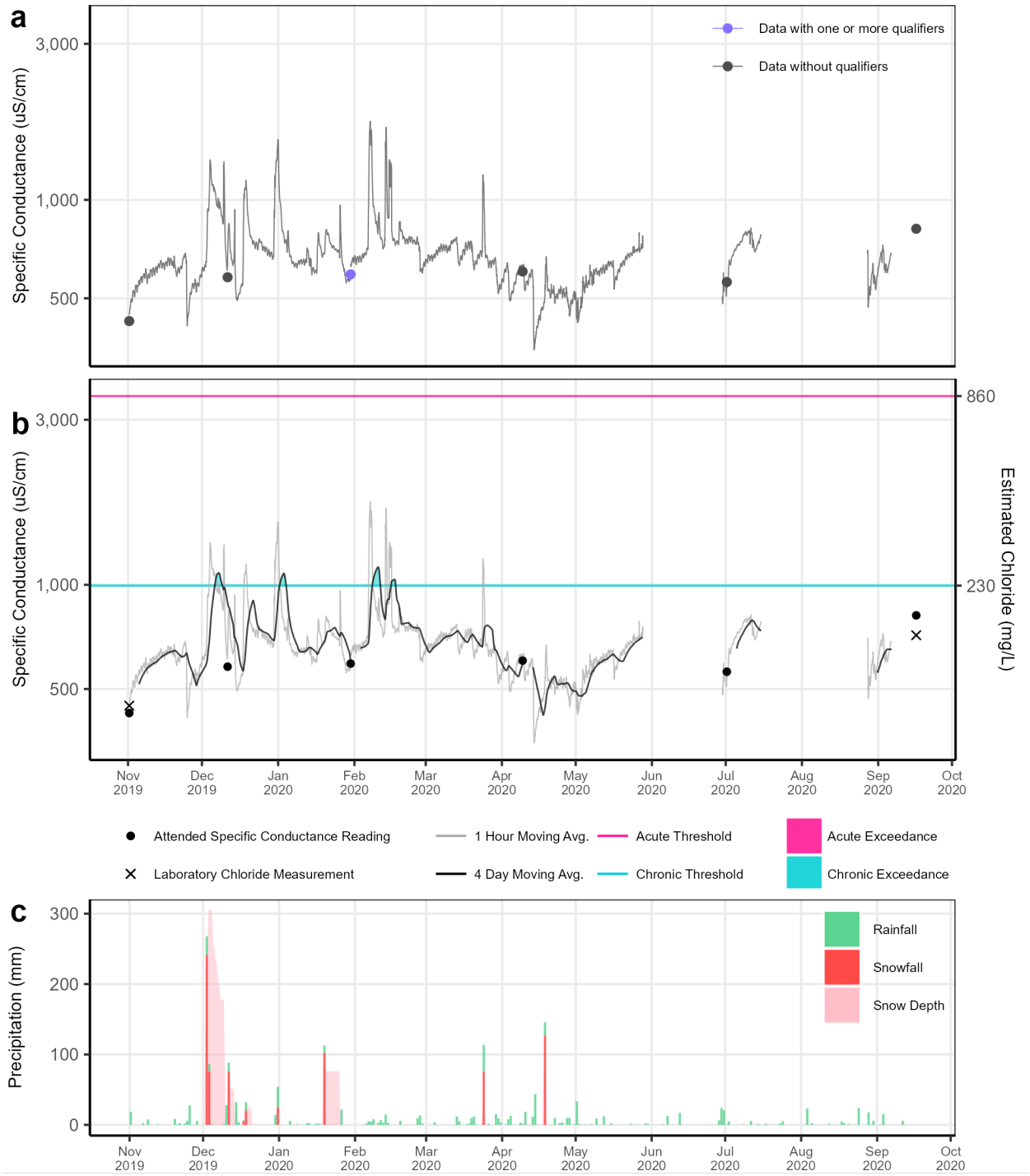
Table 90: W1242 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	348
Deployment Average	678
Deployment Maximum	1739
Maximum 4-Day Moving Average	1125
Maximum 1-Hour Moving Average	1738
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	5%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1242 - Blackstone River (MA51-04)

Blackstone Watershed (42.17728889, -71.68788468)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Weasel Brook (MA51-08)

Station W2944

Table 91: W2944 - Station Information

Field	Value
Unique Identifier	W2944
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-08
Watershed	Blackstone
Station Waterbody	Weasel Brook
Latitude	42.30793443
Longitude	-71.80008188
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 92: W2944 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	484	110	-
December 11, 2019	1699	-	-
January 30, 2020	1004	-	-
April 09, 2020	981	-	-
July 01, 2020	486	-	-
September 16, 2020	726	160	-

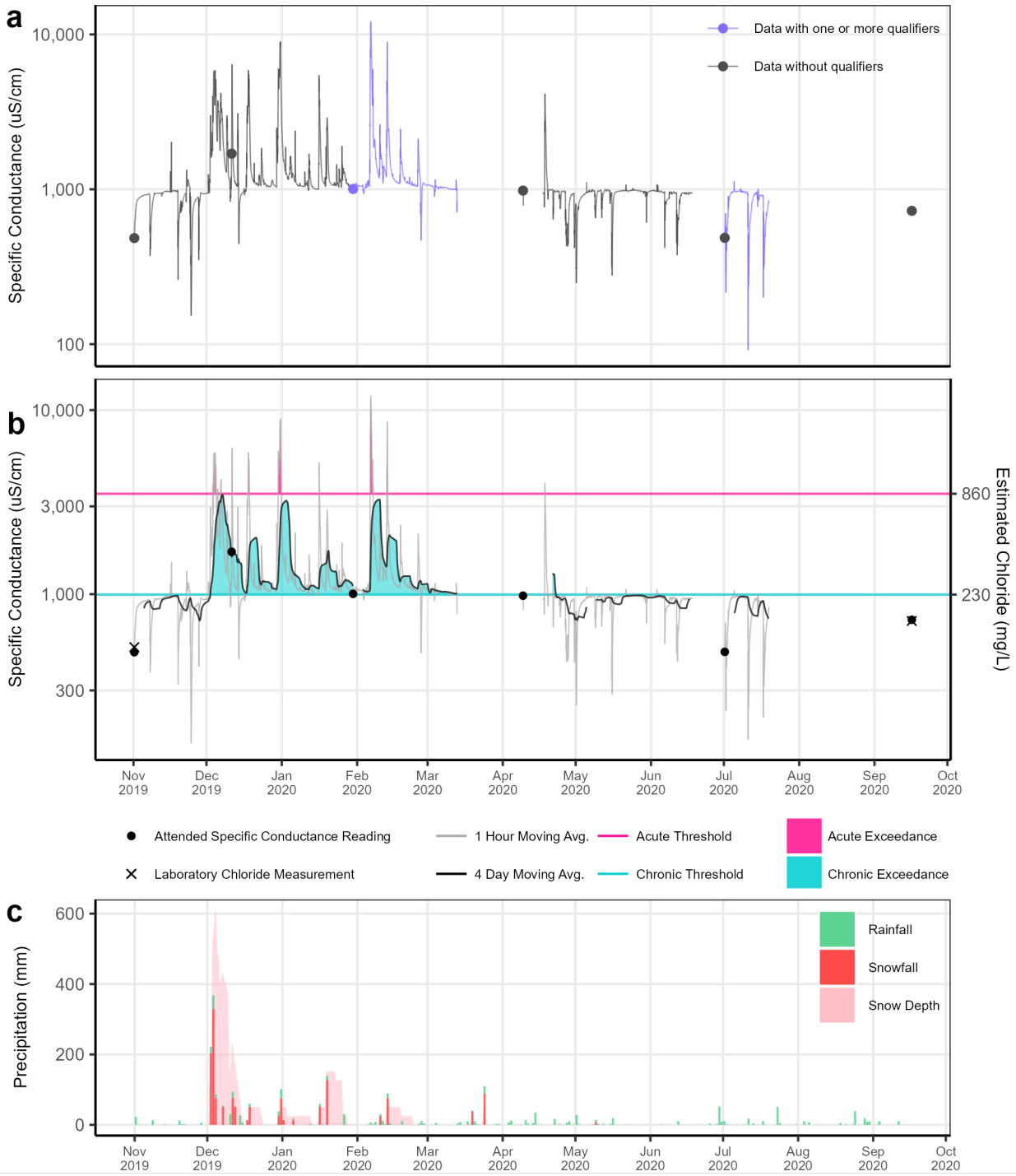
Table 93: W2944 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	92
Deployment Average	1192
Deployment Maximum	12133
Maximum 4-Day Moving Average	3470
Maximum 1-Hour Moving Average	11917
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	52%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	3%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2944 - Weasel Brook (MA51-08)

Blackstone Watershed (42.30793443, -71.80008188)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190408 - Barre Falls Dam (42.4281, -72.0275)

Quinsigamond River (MA51-09)

Station W2188

Table 94: W2188 - Station Information

Field	Value
Unique Identifier	W2188
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-09
Watershed	Blackstone
Station Waterbody	Quinsigamond River
Latitude	42.20836571
Longitude	-71.69757011
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 95: W2188 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	516	130	-
December 11, 2019	569	-	-
January 30, 2020	655	-	-
April 09, 2020	623	-	-
July 01, 2020	658	-	-
September 16, 2020	664	170	-

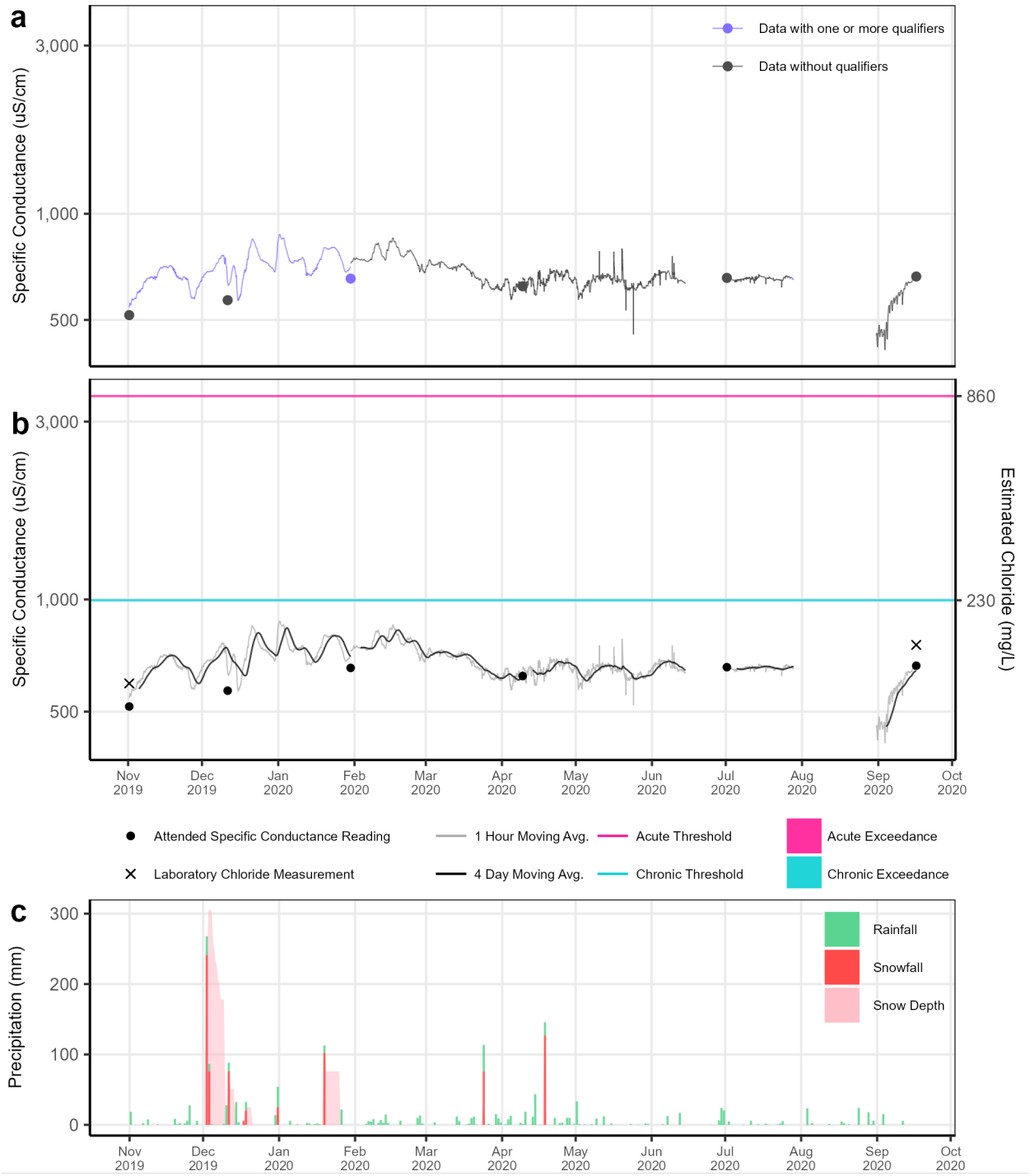
Table 96: W2188 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	411
Deployment Average	678
Deployment Maximum	875
Maximum 4-Day Moving Average	839
Maximum 1-Hour Moving Average	875
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2188 - Quinsigamond River (MA51-09)

Blackstone Watershed (42.20836571, -71.69757011)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Tatnuck Brook (MA51-15)

Station W1426

Table 97: W1426 - Station Information

Field	Value
Unique Identifier	W1426
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-15
Watershed	Blackstone
Station Waterbody	Tatnuck Brook
Latitude	42.26230119
Longitude	-71.84822737
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 98: W1426 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	252	58	-
December 11, 2019	404	-	-
January 30, 2020	328	-	-
April 09, 2020	327	-	-
July 01, 2020	349	-	-
September 16, 2020	332	71	-

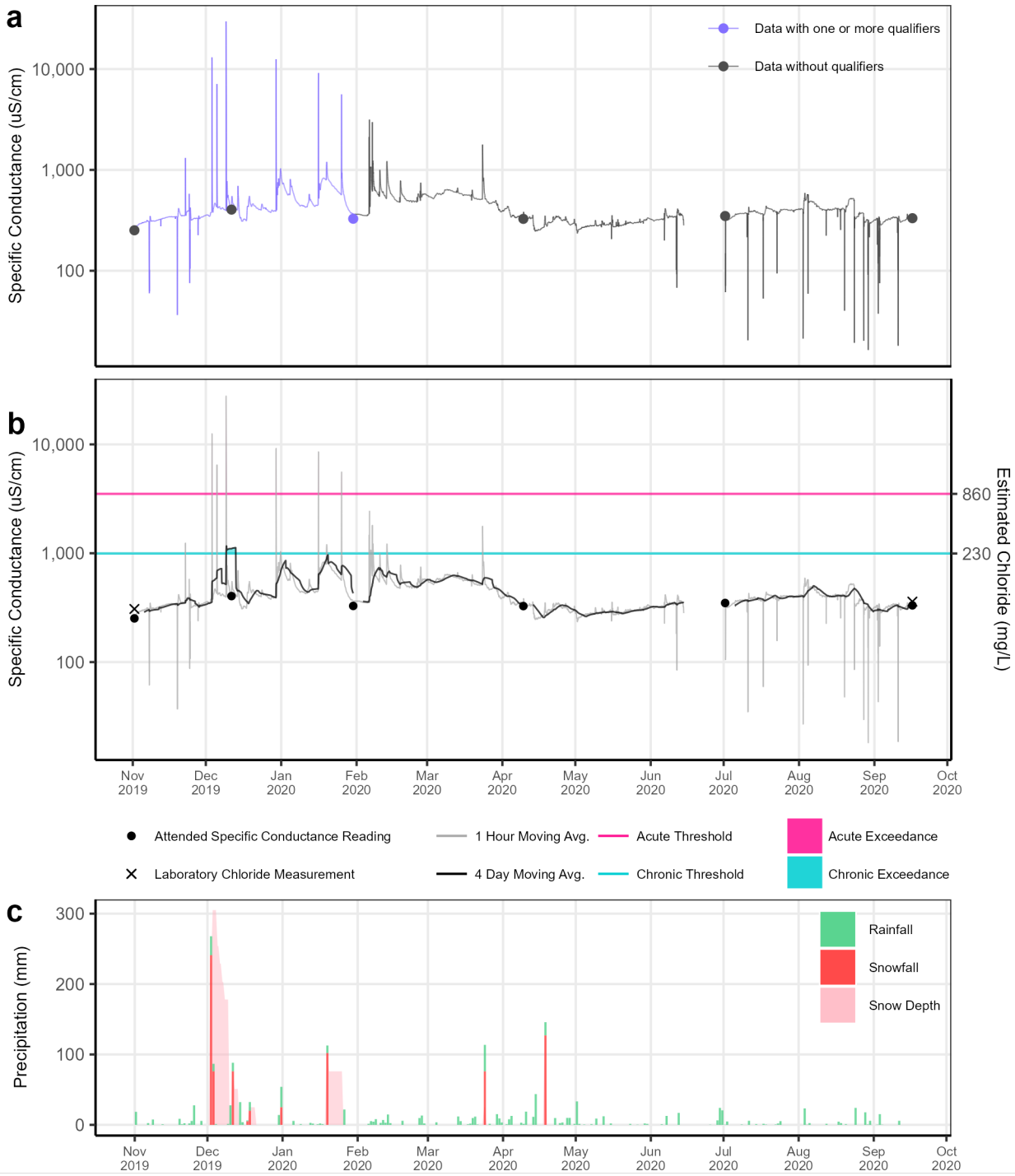
Table 99: W1426 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	16
Deployment Average	435
Deployment Maximum	29653
Maximum 4-Day Moving Average	1165
Maximum 1-Hour Moving Average	27792
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	1%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1426 - Tatnuck Brook (MA51-15)

Blackstone Watershed (42.26230119, -71.84822737)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Dark Brook (MA51-16)

Station W2949

Table 100: W2949 - Station Information

Field	Value
Unique Identifier	W2949
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-16
Watershed	Blackstone
Station Waterbody	Dark Brook
Latitude	42.20322946
Longitude	-71.8374543
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 101: W2949 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	961	250	Chronic Exceedance
December 11, 2019	2671	-	-
January 30, 2020	1209	-	-
April 09, 2020	963	-	-
July 01, 2020	1079	-	-
September 16, 2020	2255	620	Chronic Exceedance

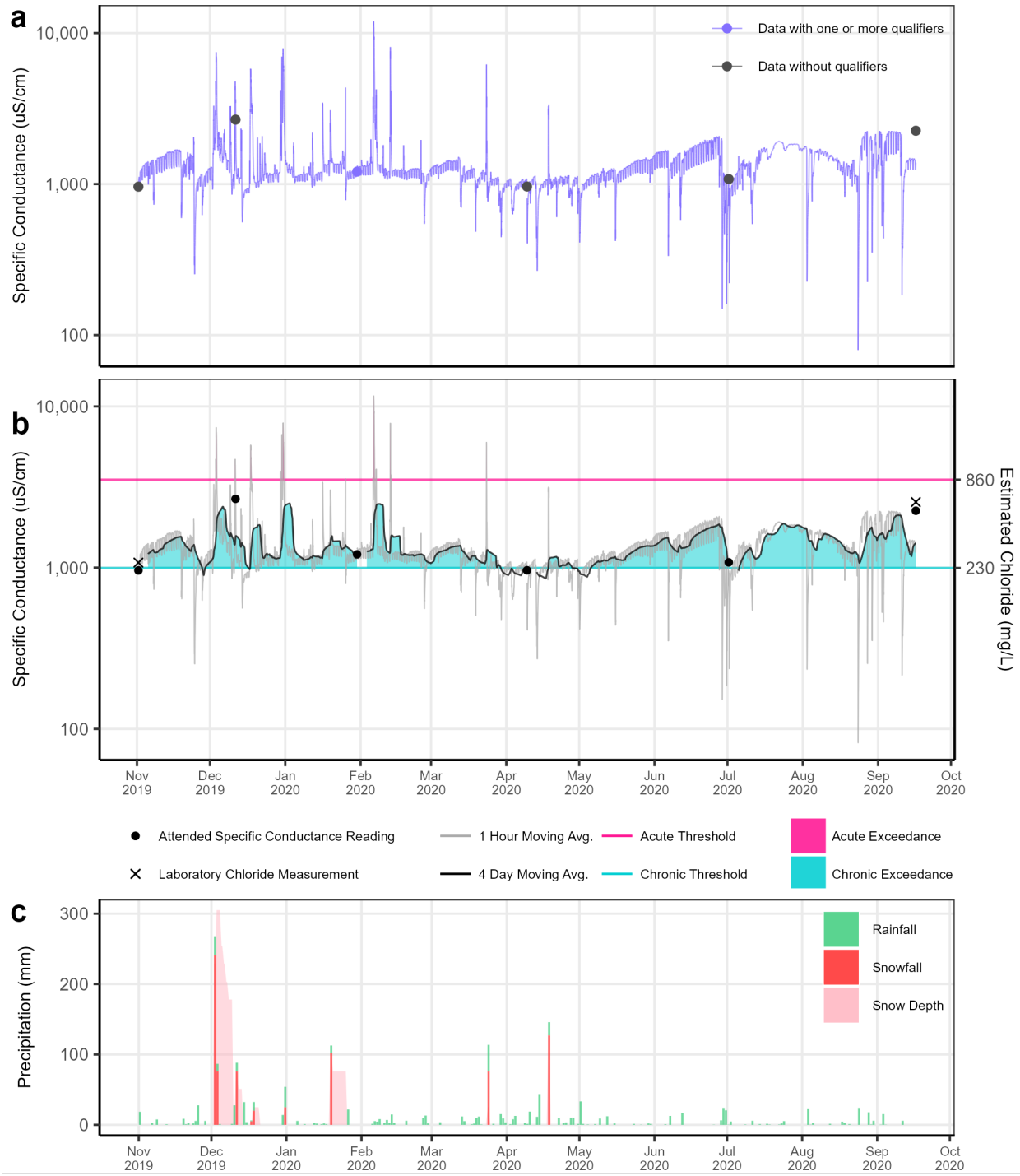
Table 102: W2949 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	80
Deployment Average	1353
Deployment Maximum	11934
Maximum 4-Day Moving Average	2506
Maximum 1-Hour Moving Average	11593
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	92%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	1%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2949 - Dark Brook (MA51-16)

Blackstone Watershed (42.20322946, -71.8374543)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Poor Farm Brook (MA51-17)

Station W2945

Table 103: W2945 - Station Information

Field	Value
Unique Identifier	W2945
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-17
Watershed	Blackstone
Station Waterbody	Poor Farm Brook
Latitude	42.30647078
Longitude	-71.76580774
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 104: W2945 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	521	120	-
December 11, 2019	1134	-	-
January 30, 2020	734	-	-
April 09, 2020	661	-	-
July 01, 2020	587	-	-
September 16, 2020	1011	270	Chronic Exceedance

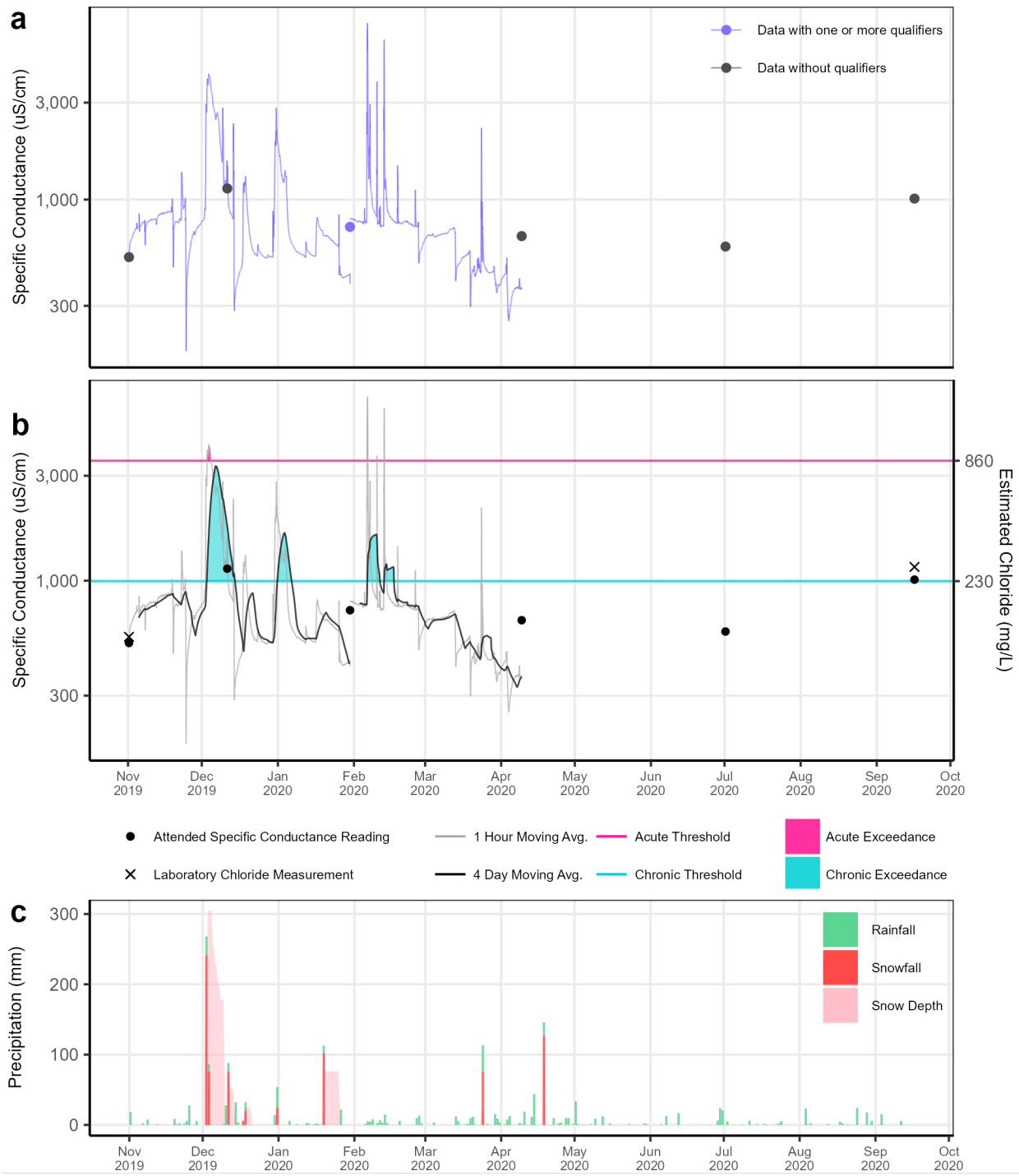
Table 105: W2945 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	180
Deployment Average	818
Deployment Maximum	7392
Maximum 4-Day Moving Average	3323
Maximum 1-Hour Moving Average	6833
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	17%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	1%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2945 - Poor Farm Brook (MA51-17)

Blackstone Watershed (42.30647078, -71.76580774)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Singletary Brook (MA51-31)

Station W1767

Table 106: W1767 - Station Information

Field	Value
Unique Identifier	W1767
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-31
Watershed	Blackstone
Station Waterbody	Singletary Brook
Latitude	42.18277682
Longitude	-71.76604587
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 107: W1767 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	192	36	-
December 11, 2019	370	-	-
January 30, 2020	169	-	-
April 09, 2020	292	-	-
July 01, 2020	288	-	-
September 16, 2020	335	72	-

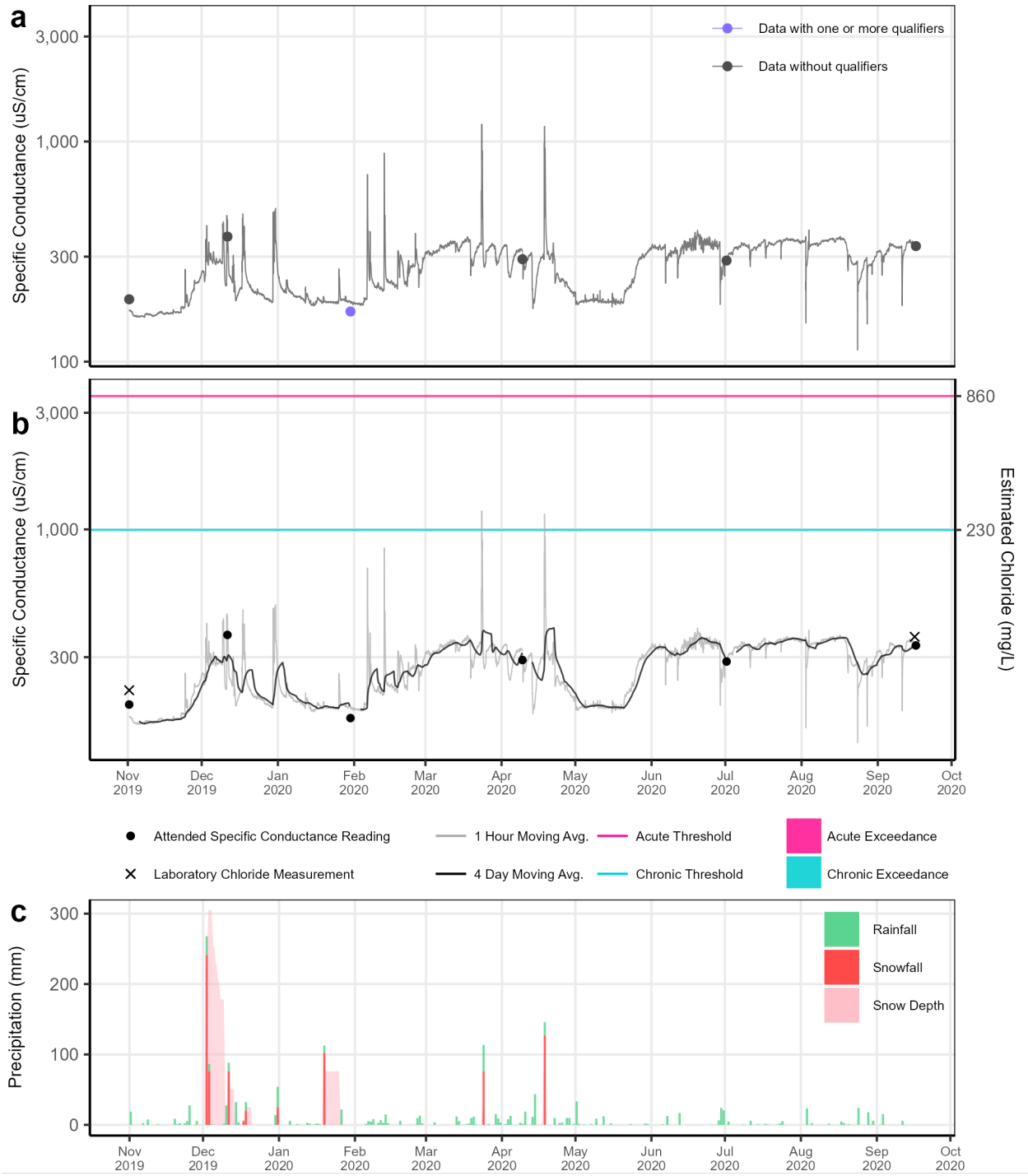
Table 108: W1767 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	113
Deployment Average	272
Deployment Maximum	1199
Maximum 4-Day Moving Average	395
Maximum 1-Hour Moving Average	1191
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1767 - Singletary Brook (MA51-31)

Blackstone Watershed (42.18277682, -71.76604587)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Unnamed Tributary (MA51-38)

Station W2950

Table 109: W2950 - Station Information

Field	Value
Unique Identifier	W2950
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-38
Watershed	Blackstone
Station Waterbody	Unnamed Tributary
Latitude	42.19026146
Longitude	-71.84582602
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 110: W2950 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	763	190	-
January 30, 2020	1558	-	-
April 09, 2020	756	-	-
July 01, 2020	1207	-	-
September 16, 2020	2069	560	Chronic Exceedance

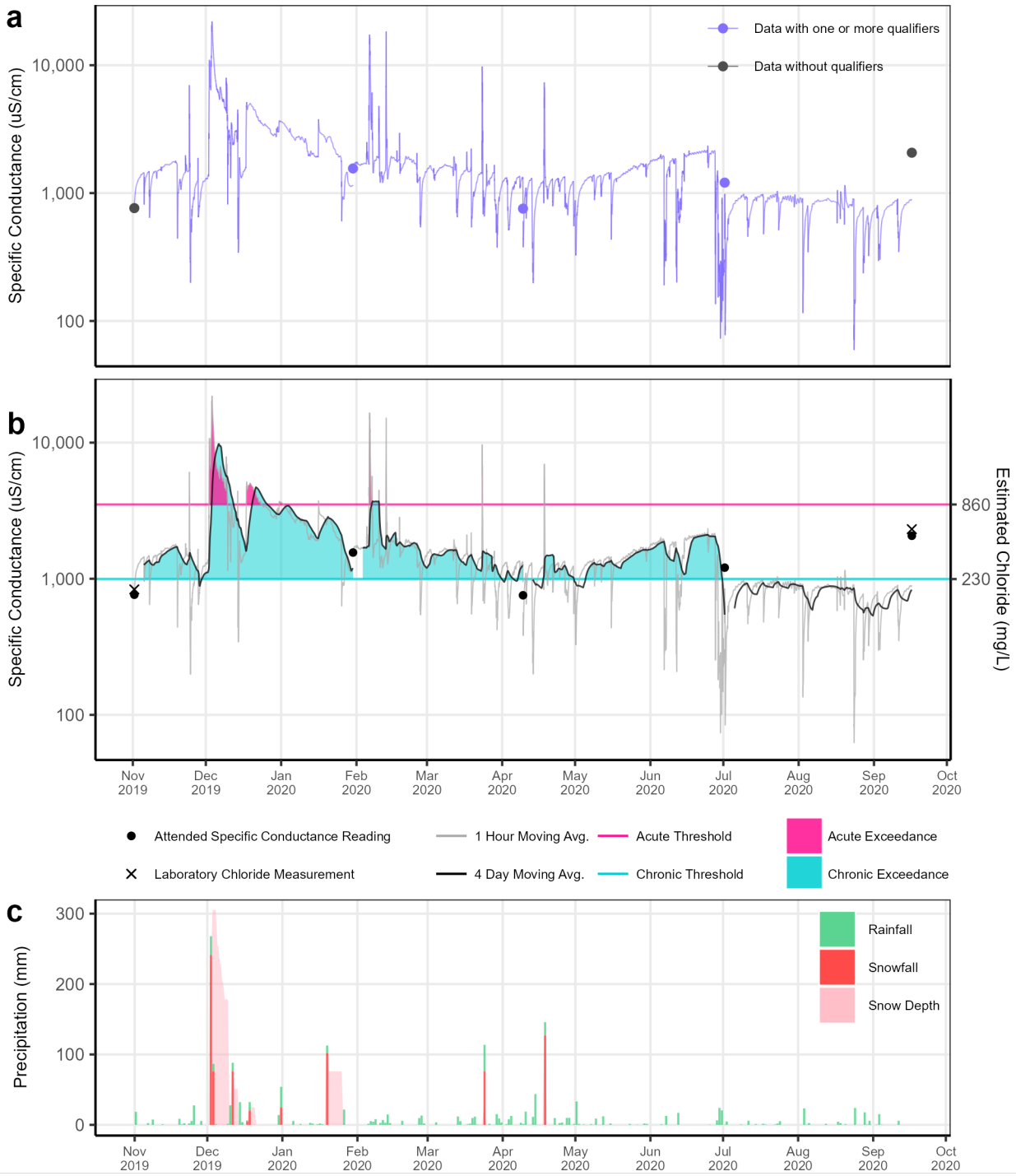
Table 111: W2950 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	59
Deployment Average	1646
Deployment Maximum	21989
Maximum 4-Day Moving Average	9794
Maximum 1-Hour Moving Average	21981
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	71%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	6%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2950 - Unnamed Tributary (MA51-38)

Blackstone Watershed (42.19026146, -71.84582602)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Dark Brook (MA51-49)

Station W1776

Table 112: W1776 - Station Information

Field	Value
Unique Identifier	W1776
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51-49
Watershed	Blackstone
Station Waterbody	Dark Brook
Latitude	42.20670671
Longitude	-71.85281517
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 113: W1776 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	505	130	-
December 11, 2019	605	-	-
January 30, 2020	538	-	-
April 09, 2020	326	-	-
July 01, 2020	302	-	-
September 16, 2020	593	150	-

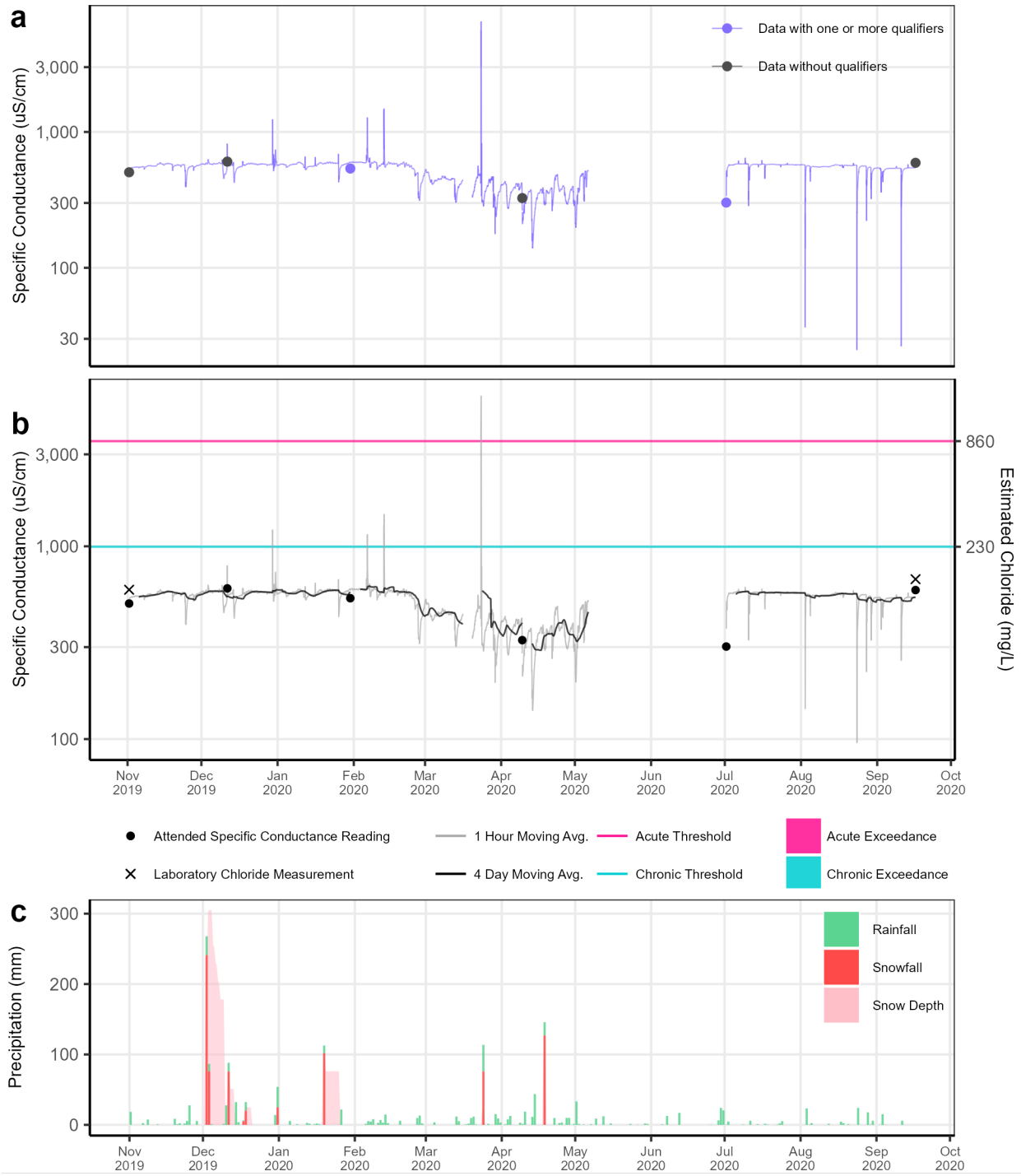
Table 114: W1776 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	25
Deployment Average	523
Deployment Maximum	6509
Maximum 4-Day Moving Average	621
Maximum 1-Hour Moving Average	6017
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W1776 - Dark Brook (MA51-49)

Blackstone Watershed (42.20670671, -71.85281517)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Big Bummet Brook (MA51060)

Station W2946

Table 115: W2946 - Station Information

Field	Value
Unique Identifier	W2946
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51060
Watershed	Blackstone
Station Waterbody	Big Bummet Brook
Latitude	42.23658166
Longitude	-71.70515602
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 116: W2946 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	451	110	-
December 11, 2019	571	-	-
January 30, 2020	684	-	-
April 09, 2020	568	-	-
July 01, 2020	458	-	-
September 16, 2020	608	150	-

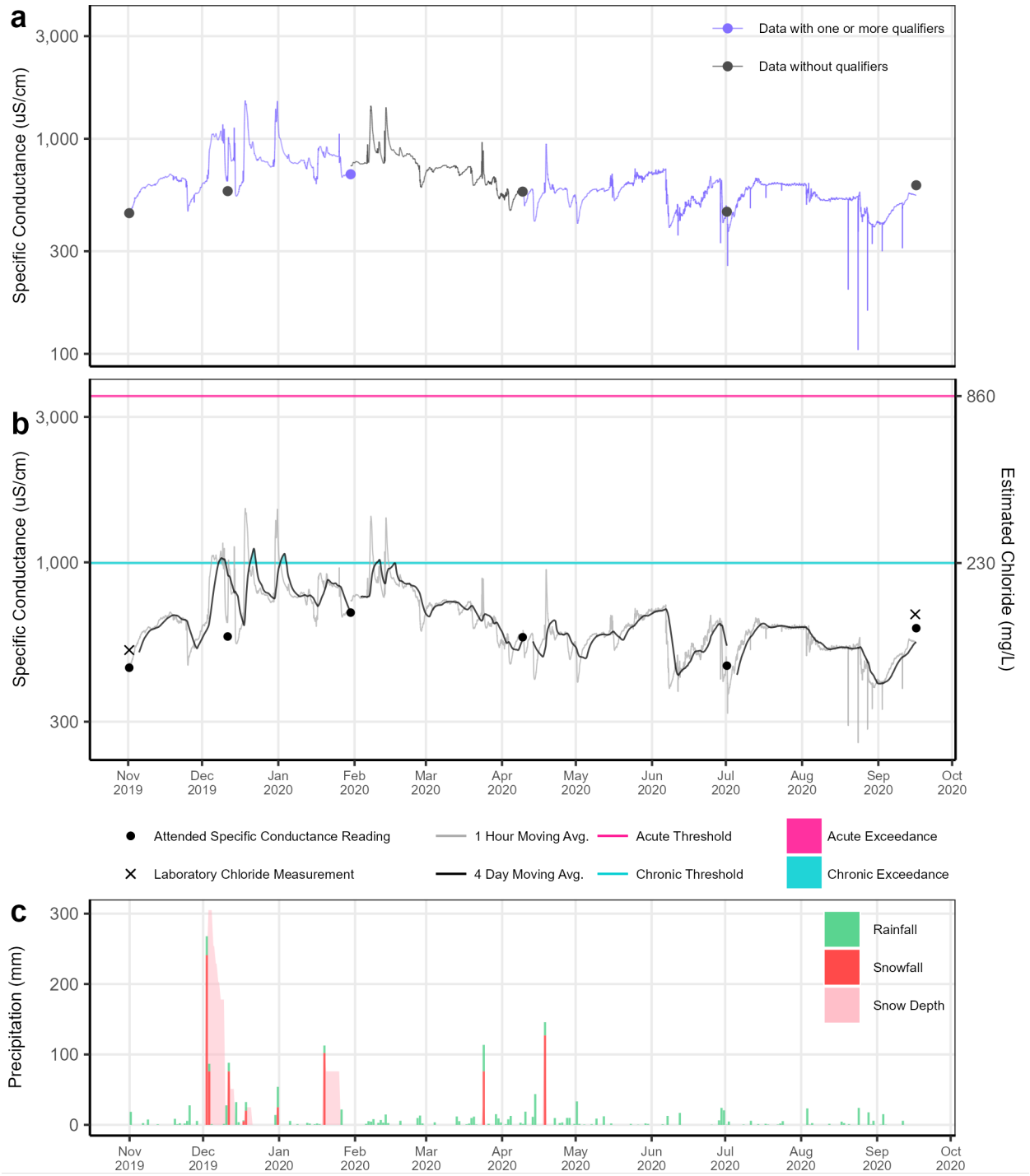
Table 117: W2946 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	104
Deployment Average	649
Deployment Maximum	1507
Maximum 4-Day Moving Average	1109
Maximum 1-Hour Moving Average	1503
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	3%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2946 - Big Bummet Brook (MA51060)

Blackstone Watershed (42.23658166, -71.70515602)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190998 - Buffumville Lake (42.1164, -71.9075)

Unnamed Tributary (MA51073)

Station W2948

Table 118: W2948 - Station Information

Field	Value
Unique Identifier	W2948
Monitoring Cycle	2019 - 2020
Assessment Unit	MA51073
Watershed	Blackstone
Station Waterbody	Unnamed Tributary
Latitude	42.30798331
Longitude	-71.81943101
Deployment Start	November 01, 2019
Deployment End	September 16, 2020

Table 119: W2948 - Attended Specific Conductance Readings and Laboratory Chloride Samples

Date	Specific Conductance (uS/cm)	Chloride (mg/L)	Chloride Criterion Exceedance
November 01, 2019	331	74	-
December 11, 2019	646	-	-
January 30, 2020	428	-	-
April 09, 2020	283	-	-
July 01, 2020	349	-	-
September 16, 2020	417	92	-

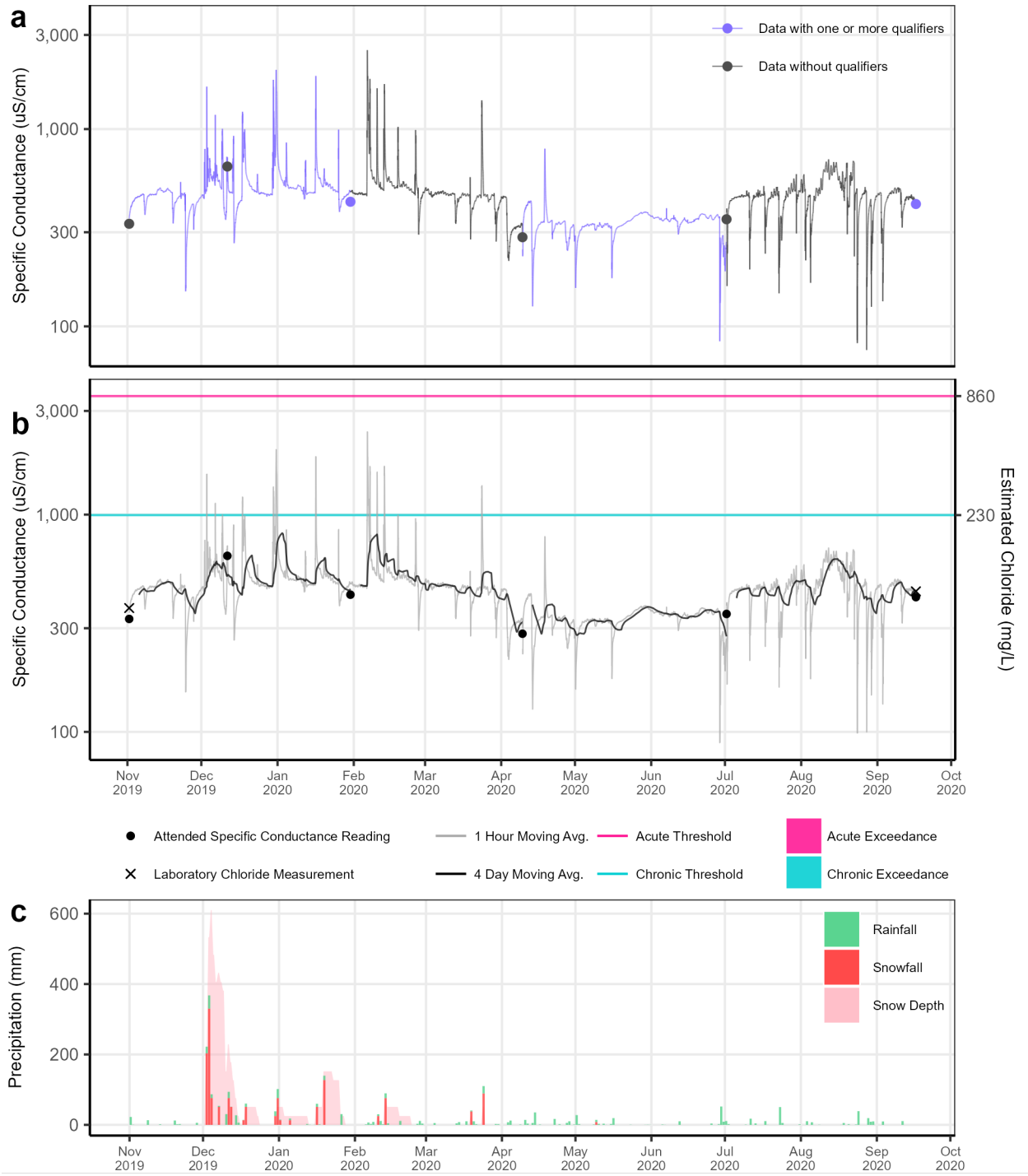
Table 120: W2948 - Continuous Specific Conductance (SC) Data Summary

Statistic	Specific Conductance (uS/cm)
Deployment Minimum	76
Deployment Average	447
Deployment Maximum	2512
Maximum 4-Day Moving Average	822
Maximum 1-Hour Moving Average	2405
Percentage of 4-Day Average results exceeding the chronic SC threshold* (994 uS/cm)	0%
Percentage of 1-Hour Average results exceeding the acute SC threshold* (3,512 uS/cm)	0%

* Specific conductance thresholds correspond to the Massachusetts SWQS chronic chloride criterion of 230 mg/L (four-day average) and acute chloride criterion of 860 mg/L (one-hour average).

W2948 - Unnamed Tributary (MA51073)

Blackstone Watershed (42.30798331, -71.81943101)



(a) Continuous, unattended specific conductance observations and attended quality control readings.
(b) 1-hour and 4-day moving average specific conductance and estimated continuous chloride concentration. Thresholds correspond to Massachusetts SWQS chloride criteria of 230 mg/L (chronic) and 860 mg/L (acute). Estimated chloride concentration was developed using measured specific conductance and Appendix F of the Consolidated Assessment & Listing Methodology Guidance Manual for the 2022 Reporting Cycle [CN 564.0] Laboratory chloride concentration data were measured from discrete water samples collected by MassDEP.
(c) Precipitation observations at NOAA Station USC00190408 - Barre Falls Dam (42.4281, -72.0275)