Quality Assurance Project Plan

**Continuous Stream Temperature Monitoring Program**

CN # 408.0, rev. 1.0

DRAFT

august 2018



**COMMONWEALTH OF MASSACHUSETTS**

**EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS**

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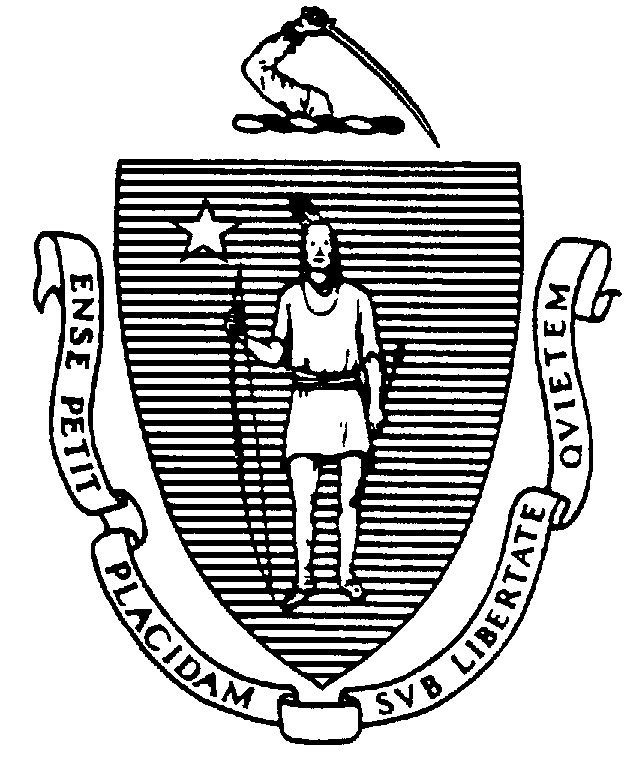
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Quality Assurance Project Plan

**Continuous Stream Temperature Monitoring Program**

Massachusetts Department of Environmental Protection

Bureau of Water Resources - Division of Watershed Management

Watershed Planning Program

CN # 408.0, rev. 1.0

August, 2018

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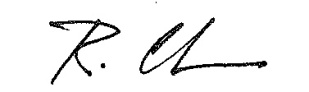
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The format and outline of this report is based on a Quality Assurance Project Plan prepared by the WA State Department of Ecology, which is available here: [www.ecy.wa.gov/biblio/0503202.html](http://www.ecy.wa.gov/biblio/0503202.html)

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# List of QAPP Revisions

|  |  |  |
| --- | --- | --- |
| Revision Date | Revision | Pages #s |
| June 2017 | Added Addendum 1 to include 2017 sampling station information | --- |
| August 2018 | Expanded Addendum 1 to include 2018 sampling station information | --- |
|  |  |  |

# List of ACRONYMs

|  |  |
| --- | --- |
| Acronym | Definition |
| ABS | Acrylonitrile butadiene styrene (plastic) |
| ALU | Aquatic Life Use |
| BAS\_NAME | Basin name |
| CALM | Consolidated Assessment and Listing Methodology |
| CFR | Coldwater Fisheries Resource |
| CN | Control number |
| CWA | Clean Water Act |
| CWF | Cold Water Fishery |
| deg C | Degrees Celsius |
| DO | Dissolved oxygen |
| DQO | Data quality objectives |
| DWM | Division of Watershed Management |
| (US) EPA | (United States) Environmental Protection Agency |
| EQuIS | Environmental Quality Information System |
| ILW | Instrumentation Lab Workbook |
| LT | Long-term |
| MA | Massachusetts |
| MAP2 | Probabilistic (wadeable) Stream Monitoring |
| MAP2-Lakes | Probabilistic Lake Monitoring |
| MassDEP | Massachusetts Department of Environmental Protection |
| MDFG | Massachusetts Department of Fish and Game |
| MDMF | Massachusetts Division of Marine Fisheries |
| mg/L | milligrams per liter |
| µS/cm | microSiemens per centimeter |
| NESQA | Northeast Stream Quality Assessment |
| NIST | National Institute of Standards and Technology |
| NoEaST | NorthEast Stream Temperature Web Portal |
| NPDES | National Pollutant Discharge Elimination System |
| OOW | Out of water |
| PM | Project manager |
| QA | Quality assurance |
| QAPP | Quality Assurance Project Plan |
| QC | Quality control |
| RIFLS | River Instream FLow Stewards |
| RMN | Reference Monitoring Network |
| RSN | Reference Site Network |
| SC | Specific conductivity |
| SOP | Standard Operating Procedure |
| ST | Short-term |
| SWQS | Surface Water Quality Standards |
| T or temp | Temperature |
| TMDL | Total Maximum Daily Load |
| USFS | United States Forestry Service |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| WPP | Watershed Planning Program |

# 

# Objectives

The purpose of the continuous stream temperature monitoring program is to collect temperature data at regular intervals over a fixed time period in selected wadeable streams in Massachusetts (MA), in order to meet the following objectives:

1. Assess the Aquatic Life Use (ALU) status with respect to ambient temperatures (and dissolved oxygen, as feasible), based on applicable water quality standards and data collected at targeted locations using a short-term site network
2. Support the need for continuous temperature data used for other purposes, including Total Maximum Daily Load (TMDL) studies, ecoregional databases, temperature models, National Pollutant Discharge Elimination System (NPDES) permitting, fishery management, protecting cold water fisheries, etc.

# Background

Water temperature is an important monitoring parameter for surface water management and for ALU assessment under the federal Clean Water Act (CWA). Recent temperature monitoring conducted by the Massachusetts Department of Protection (MassDEP) Watershed Planning Program (WPP) has included the following:

* Probabilistic Stream Monitoring (MAP2): Continuous (30 minute interval for up to 4 summer months) temperature data collection at selected wadeable streams throughout Massachusetts based on multi-year probabilistic sampling designs. The most recent effort was a 2011-2015 project. This monitoring includes associated, discrete (side-by-side) Quality Control (QC) measurements.
* Targeted Stream Monitoring: Continuous temperature data collection at selected stations throughout Massachusetts based on one-year sampling plans (and associated discrete QC measurements).
* Reference Site Network Monitoring (RSN): Annual, continuous data collection at the same targeted streams each year, for up to 5 years. Approx. 12 sites monitored annually from 2010-2017.
* Probabilistic Lake Monitoring (MAP2-Lakes): Discrete depth-profiles at targeted TMDL lakes and as part of a probabilistic lakes program (2016-2018).
* Targeted Lake Monitoring: Discrete depth-profiles at targeted TMDL lakes for baseline evaluation and TMDL purposes (e.g., Monponsett Pond, Halifax/Hanson).
* Regional Monitoring Network (RMN): Continuous data collection at 5 targeted reference sites as part of a multi-state, multi-agency RMN project related to climate change. See Table 1.

Table 1. Current Regional Monitoring Network temperature stations in MA being collected by MassDEP



In addition to MassDEP WPP projects involving temperature data collection, there are many other groups in MA that collect this type of information, including volunteer monitoring groups, hydropower facilities, NPDES permittees, other state and federal agencies, et cetera. The majority of these data, however, appear to be short-term or discrete measurements (i.e., not continuous) which, by their nature, do not typically capture temperature maxima (and minima), and are generally not sufficiently robust to describe long-term trends. Extreme temperatures are a potent biological stressor, and are of most interest with respect to climate change studies and risks to aquatic life. Known historic and current continuous surface water temperature data collection projects in Massachusetts, conducted by groups other than MassDEP, are listed in Table 2 (and further described in Appendix 1).

Table 2. Summary of Continuous temperature data collection projects in MA by non-MassDEP entities *(see also Appendix 1)*

| **Group** | **Project description** | **Data Years** | **Active / Inactive** |
| --- | --- | --- | --- |
| MDFG | Several stations within mostly now-completed research projects. Currently a few stations associated with habitat improvement, dam removal/development projects. | varies | Mostly Inactive |
| USGS | The USGS has many flow gaging stations in Massachusetts (Table 3), and some measure instream temperature data (Richard J. Verdi, Personal communication on October 6, 2016). Currently 18 stations collecting continuous temperature data, mainly in the Cape Cod, Charles and Merrimack watersheds. | varies | Active |
| USGS | Northeast Stream Quality Assessment (NESQA) project. Temperature data loggers were installed at 12 locations in Massachusetts (Appendix I, provided by David Armstrong). It is not known if this data collection will continue because the project is not designed for long-term monitoring (i.e., no designated continuous funding source) (David Armstrong, Personal communication on October 6, 2016). | varies | Active |
| USGS, other agencies | NoEaST – Stream Temperature Web Portal. This regional framework provides a location where continuous stream temperature data can be uploaded and mapped. Over 700 sites in MA are included. | varies | Active |
| EPA, New England States | As part of EPA’s climate change studies, a Regional Monitoring Network was initiated in 2012 for continuous temperature and benthic macroinvertebrate data collection. MA has 5 sites within the New England network (see Table 1). | 2012-present | Active |
| UMass-Amherst/USGS | From 2014-16, UMass Amherst conducted an impervious cover temperature monitoring project at 40 sites statewide; 9 sites are still active. Macroinvertebrate and fish community data were also collected. | 2014-2017 | Active and inactive |
| Volunteer monitoring groups | *See Appendix 1* | varies | Active and inactive |
| DER | Currently 23 DER RIFLS sites with transducers that record water level and water temperature data at 15-min intervals. All of these sites are actively collecting data. | varies | Active |
| MDMF? | 52 active and 38 inactive bottom temperature logging sites in subtidal coastal streams, embayments and offshore waters, from 1985 to the present. Evaluate temperature as a component of habitat for marine  organisms (e.g., diadromous fish, recreational species, et cetera) | 1985-2018 | Active and inactive |
| USFWS | No active projects in MA (see <http://db.ecosheds.org/viewer>; SHEDS Development Team 2015) |  | Inactive |
| Universities and other research centers | Various (e.g., UMass Amherst, Northeast Climate Science Center) |  | Inactive |

Most of these projects have generated quality-assured, usable data, but in many cases were limited in duration, are currently inactive, or were not conducted at locations needed by WPP for assessment of potential impairments of aquatic life due to temperature.

For descriptions of non-MassDEP continuous temperature monitoring stations, see Appendix 1.

# Project Description and Sampling Design Parameters

Short-Term Network**:**

The short-term temperature monitoring network will also be implemented at the statewide level at locations selected to meet annual data needs. Each year, different stations will be monitored in the summer season only (period of highest stress to biological communities) for temperature (and dissolved oxygen, or DO; specific conductivity, or SC, as feasible). The short-term temperature data (including DO and/or SC if also collected) will inform ALU assessment, help verify the coldwater status of streams designated as coldwater fisheries resources (CFR) and/or coldwater fisheries (CWF), and foster engagement of stakeholders through data sharing.

Typically, single temperature loggers (temp-only or multiprobes) will be deployed at each location to collect continuous temperature at 30 minute intervals. If multiprobes are used, DO and/or conductivity data may also be collected. The number of short-term locations sampled in any given year will be determined annually based on data needs and available resources. The short-term stations will vary on an annual basis and will be visited based on pre-determined routes.

Station Type: Seasonal (summer)

Site Selection: The criteria used for selecting sites for the short-term network are as follows:

1. Suspected thermal impacts
2. Prioritized stream segment (e.g., temperature data needed for 305(b) assessment of ALU in relation to MA surface water quality standards (SQWS)
3. Project-specific, NPDES permitting and/or TMDL data needs
4. Stream orders 1-3 (wadeable)
5. Ease of access for installation and maintenance
6. Excellent riparian cover and shading at the station area
7. Well-mixed, representative location
8. Low estimated potential to go dry during the monitoring period
9. Low estimated potential for vandalism, loss or damage

Sampling Period: Summer only, within one calendar year

Number of Stations: Approx. 15-35+ sites per year (summer only)

Automated Measurement Interval: 30 minutes

Data downloads: Once (at the office following logger retrieval)

QC Sampling Frequency: Approximately every other month for the deployment period (May-Sept)

Additional parameters: None (temp-only loggers). DO and/or specific conductance (if multiprobe units are deployed)

## Note regarding WPP planning for a Long-Term, Fixed-Site Network:

As of 2018, WPP has not developed and implemented a long-term temperature monitoring network that is statewide in scope at fixed (permanent) stations. As resources and needs dictate, WPP plans to continue to explore the feasibility of a long-term (or LT2) network for year-round data collection. A long-term network of approx. 15-20 stations would provide sufficient data for long-term trend analysis, would serve to inform stakeholders on potential thermal impacts to surface waters due to climate change and could also be used for ALU assessment, and would assist to verify the coldwater status of streams with respect to coldwater fisheries resources (CFR, MDFG) and coldwater fisheries (CWF, specified in the Massachusetts Surface Water Quality Standards, or SWQS). Criteria that would be used for establishing the sample population and for selecting sites for the long-term network could be as follows:

1. Catchment size (area contributing to the station location) ranging from X-Y%
2. Stream orders 2-3 (wadeable), targeting those with a low estimated potential to go dry during the monitoring period
3. Impervious cover ranging from (0-25%) for the contributory drainage area
4. % protected area within the catchment ranging from X to Y%
5. Ease of access to the station for installation and maintenance
6. Excellent riparian cover and shading at the station area
7. Well-mixed, riffle/glide (i.e., non-pool), representative location
8. Maximize geographic coverage, including watershed and ecoregion representation
9. Low development pressure (stability relative to impervious cover)
10. Lack of significant tributary influence directly upstream
11. Avoidance of altitude extremes (e.g., sea-level, mountain streams)
12. Avoidance of duplication regarding proximity to other continuous temperature monitoring efforts
13. Low estimated potential for vandalism, loss or damage
14. Upstream of tidal influences

Proposed Short-Term Monitoring Stations: The short-term temperature monitoring locations will be determined annually (and included as addendums to this QAPP).

# 

# Project Organization

This project is intended to be implemented by WPP staff. See Table 4 below for specific staff responsibilities.

Table 4. Personnel and areas of responsibility

| **Personnel** | **Role** | **Duties** |
| --- | --- | --- |
| Arthur Johnson | Monitoring Manager | Oversight, scheduling, management |
| Therese Beaudoin | Project Manager | Project lead; equipment procurement, status reporting, coordination as needed |
| Pete Mitchell | Management & Technical Support | Technical advisor, backup field coordinator/manager |
| Richard Chase | QA Officer | QA/QC oversight; methods, data accuracy |
| Kari Winfield | Data Coordinator | Data management, miscellaneous data analysis and reports |
| Bob Nuzzo | Lab Manager | Technical advisor, QC testing, lab coordination |
| Matt Reardon | Technical Support | Technical advisor, QC testing, lab coordination, data analysis |
| Seasonal staff, interns | Crew assistants | Assistance on sampling surveys |

Sampling Procedures & Logistical Considerations

**Standard Operating Procedures**

WPP’s standard operating procedures for extended duration deployment of data loggers will be implemented. The primary Standard Operating Procedure (SOP) for this work is Control Number (CN) 103.1 (MassDEP 2003), which is generally consistent with the procedures described in the *Continuous Temperature Sampling Protocols for the Environmental Monitoring and Trends Section* (Ward, 2003), and in the USEPA’s *Best Practices for Continuous Monitoring of Temperature and Flow in Wadeable Streams* (EPA, 2014).

WPP instrument testing and calibration procedures will be used. These include:

* Continuous Temperature Data Collection (CN 103.1)
* Hydrolab SOPs (CN 4.24, 4.29)
* Onset SOP (CN 4.80)

WPP data management procedures for unattended (i.e., continuous) and attended (i.e., QC) data will be employed. Relevant SOPs include:

* Data Validation (CN 56.3, 56.4 and 56.5)

**Available Instrumentation**

Single probes and multiprobes will be used, based on availability and need, as described in Table 5 for the short-term network.

Table 5. Temperatures Probes potentially available for use

|  |  |  |  |
| --- | --- | --- | --- |
| **Network** | **Probe Type** | **Parameters** | **Manufacturer** |
| Short-Term - Seasonal | Single | Temperature | Onset ProV2 and/or TidBit\* |
| Multiprobe | Temperature, D.O. | Onset DO/T |
| Multiprobe | Temperature, specific conductance | ONSET U24-001 |
| *\*As available, deploy (or include additionally) Onset TidBit loggers which record when the logger is out of water. This assists with subsequent data validation.* | | | |

**Survey Planning**

Each year, the following survey types will be planned to collect data for the short-term network:

1. Probe Deployment
2. Intermediate QC
3. Probe pickup

Each survey will include site visits to the short-term station (changed annually). Short-term (ST) stations will be sampled in the summertime only.

Survey planning activities will include:

1. Sending probe requests to Instrumentation Lab supervisor.
2. Scheduling surveys and needed staff. In addition to a primary Project Manager (PM), a survey assistant shall be present for all surveys (min. 2 persons/survey). It is anticipated that regular monitoring coordinators will generally not be needed for this project, which can be managed by one PM with assistance from monitoring interns.
3. Preparing survey guidebooks.
4. Scheduling vehicles, misc. equipment (including safety gear).

Table 6. General Program Schedule for Short-Term Network

|  |  |
| --- | --- |
| **Date** | **Tasks** |
| **Short-Term Network** | |
| Winter-Spring | Assess equipment needs; purchase supplies and materials; data validation of prior year data files |
| Spring | Pre-deployment temperature logger checks (in the lab); deployment planning for short-term network surveys, including scheduling deployable and QC probes; |
| June-July | Deploy short-term temperature loggers |
| July-September | Perform intermediate QC |
| September | Retrieve short-term temperature loggers |
| Fall | Download data from short-term temperature loggers; coordinate with data management staff as needed; winterize short-term loggers |
| Fall-Winter | Assist in reviewing and validating data, in coordination with data management staff |

**Training**

Training for full-time, seasonal and/or intern staff in the required WPP procedures for this project shall be completed as needed, and include the following activities:

1. Probe deployment and QC
2. Instrument calibration
3. Data file downloading

**Record-Keeping**

1. Instrumentation Lab:
   1. Maintenance logbook
   2. Calibration logbook
   3. Probe requests
   4. Instrumentation Lab Workbook (ILW)
2. Field Surveys:
3. Survey Guidebooks, including station information, driving directions, site coordinates, photographs, etc.
4. WPP Field sheets containing site- and survey-specific information documented on standardized field sheet forms.
5. Photos (digital)
6. Data Management:
   1. Data download logbook
   2. Raw data files
   3. QC2/QC3-level data files
   4. Final data files (QC4-level)

**Field Probe Deployment**

Temperature loggers will be deployed *in-situ* per WPP SOPs and manufacturer’s directions at the selected locations. Each data logger will be housed in a protective plastic (ABS) pipe, mounted horizontally or vertically (depending on probe type and situation) and completely submerged. Horizontal placement may maximize the likelihood of the loggers staying submerged in low-flow streams. Loggers are placed where representative temperature data may be obtained throughout the entire monitoring period. The protective pipes are anchored and cabled to prevent movement and loss. Actual deployment locations at the station are selected to minimize or avoid direct sunlight as much as possible, to minimize the chance of disturbance and vandalism, and to minimize the likelihood of becoming out-of-water if the water levels drop. As part of intermediate QC surveys, data files can be downloaded from each logger (Onset loggers only using Optic Shuttle) and the sensor(s) cleaned after side-by-side multiprobe QC readings are taken. If/when Hydrolabs are deployed, they can be periodically switched out with replacement Hydrolab loggers so that the replaced Hydrolab can be returned to the office to download the data files.

Continuous air temperature data will NOT be collected.

# Measurement Performance Criteria

The measurement performance criteria for continuous temperature data (and for conductivity and dissolved oxygen, as applicable) are contained in WPP’s program QAPP, as follows:

Table 7. Data Quality Objectives (DQO) \*

| **Analyte** | **Units** | **Expected Range (approx.)** | **Accuracy (+/-)** | **Overall Precision (RPD or other)** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| Temperature | °C | 0-30 | +/- 0.5°C | < 0.5 difference when compared to side-by-side field readings using NIST-traceable probe (T) | 0.1°C |
| Dissolved Oxygen | mg/l | 0-15 | +/- 0.5 mg/l | < 0.5 difference when compared to side-by-side field readings using just-calibrated (DO) probe | 0.1 mg/l |
| Conductivity\*\* | µS/cm | 50-1000 (fresh) | 1% of range | 5% | 4 digits |
| Time | --- | --- | ± 1 minute per month (vs. NIST clock) | --- | --- |
| \* Criteria are project DQOs, which allow for additional acceptable uncertainty beyond manufacturer’s specifications  \*\* Conductivity DQOs provided since quality-controlled deployment data using a conductivity logger can be used to determine chloride levels (by regression), in addition to out-of-water conditions | | | | | |

# Quality Assurance

The temperature network monitoring project will follow applicable procedures, guidelines and criteria set forth in WPP’s program QAPP (CN 460.0) and SOP for continuous temperature data collection (CN 103.1) (MassDEP 2003).

Quality control measures will include:

* Collection of co-located, simultaneous temperature (and for DO, as applicable) measurements using National Institute of Standards and Technology (NIST)-traceable field thermometers (and calibrated multiprobes for DO). Approx. every 6-8 weeks.
* Pre-deployment checks on logger accuracy (vs. NIST-traceable thermometer) at near 0.0 deg. C (ice water) and expected maxima (25-30 deg. C)
* Post-deployment checks on logger accuracy (vs. NIST-traceable thermometer)

Accuracy and Precision: The accuracy and precision of each temperature logger is verified through both pre- and post-deployment checks. All temperature loggers that fail to meet the instrument accuracy will be checked a second time, and loggers that fail a second pre-deployment check will not be used.

Representativeness: The continuous temperature data collected through this project are considered to be generally representative of the stream reach being sampled, as long as standard procedures for site selection and deployment methods are followed, and the data are not affected by anomalous or complicating factors such as the effects of direct solar radiation or out-of-water conditions.

Comparability: Measurements and procedures will be documented so that the data can be compared to similar data collected using accepted industry-standard techniques.

Completeness: Data completeness will be maximized through good sampling project design, well-planned and organized survey schedules, effective deployments that minimize the likelihood of out-of-water conditions, care for equipment and other measures that ensure the usability of data.

Corrective Actions: As needed, the project team shall evaluate the need for corrective actions and/or changes to the QAPP.

Changes/Addendums to the QAPP: The project QAPP will be amended annually to include the new short-term stations to be sampled. Additional changes to the QAPP will be made as needed.

# Instrument Testing, Maintenance and Calibration

WPP standard procedures will be followed to prepare, test, calibrate and maintain temperature-only and multiprobe loggers used for data collection and quality control purposes.

**Pre-Deployment Testing of Continuous Probes**

Prior to deployment, each instrument will be checked for proper operation and for temperature accuracy using a NIST-traceable (annually recertified) thermometer in the lab. Water bath checks for loggers will be made at approximately 0.0 deg C (ice water) and at room temperature (approximately 20 deg C). When used, DO and conductivity loggers will be calibrated prior to use. Instruments not meeting data quality objectives shall not be used.

**Setup of Continuous (Unattended) Probes**

Prior to deployment and following initial checks, continuous loggers are pre-programmed to collect readings every 30 minutes, beginning at the estimated date and time of deployment using the delayed start feature. Loggers are then placed in ABS tubes for deployment by field crews. If multiprobe units are used (i.e., specific conductivity), calibrations are not needed for conductivity which is used simply to mark if/when a logger has come out-of-water (conductivity goes to near 0 µS/cm). Data will be collected until manually stopped in the lab after the loggers are collected

**Calibration/Checks of QC (Attended) Probes**

Field QC checks for temperature are made using single or multi-probe instruments. If attended QC multiprobes are used, units may be calibrated for DO and/or specific conductance depending on need. All calibrations will be done prior to use (within 24 hours) and recorded in the lab calibration notebook. If DO is included in short-term network deploys, only optic DO probes (not membrane-based) will be used since the deploy duration is approx. 2-4 months. If single probes are used for temperature QC, NIST-traceable thermometers are used. Single probe thermometers are not calibrated, but are checked annually against a certified NIST-traceable unit.

# Data Management

**Data Validation**

Project data will be validated by following WPP’s standard procedures for unattended data, as described in CN #s 56.3, 56.5 and 56.9.

Electronic data files from the loggers (or shuttle device) are assembled and processed on an annual basis using standard WPP file management protocols. These procedures include review of QC data from pre- and post-survey accuracy checks, use of relevant metadata from field sheets, et cetera that affect data quality, errors in data collection or in electronic files, completeness checks, comparisons against data quality objectives, checks on reasonableness of the data, and out-of-water conditions. Based on systematic review for potential errors, data errors will be resolved via correction, qualification or censoring. Current validation procedures do not include options to shift the data based on observed biases. If there are unidirectional differences from expected values, data are qualified or censored based on the severity of the exceedance. Censored data are excluded from the database and further analysis and only accepted and qualified data are used. No extrapolations are made to fill data gaps arising due to censored data. Appropriate time shifts are made to the data to reflect Eastern Standard Time (EST) and Daylight Standard Time (DST) changes where needed.

**Data Storage**

Following validation, unattended data are entered into WPP’s water quality warehouse and the Environmental Quality Information System (EQuIS) database. The warehouse provides standardized statistical output that can be augmented by additional analyses.

**Data Analyses**

Analyses of resulting data from the Short-Term Network will involve comparison of continuous temperature data to MA SWQS. Seasonal data collected through the ST2 network will be analyzed based on methods outlined in the Consolidated Assessment and Listing Methodology (CALM) used by the WPP to make Aquatic Life Use (ALU) decisions.

# Reports

**Integrated Reports (biennial)**

Decisions regarding attainment and non-attainment of the ALU as designated in the MA SWQS will be made using the results of temperature monitoring from ST2 network. These decisions are contained in the biennial Integrated List of Waters.

**Technical Memoranda**

Results of temperature monitoring from ST2 network can also be summarized in project Technical Memoranda. These will be generated on an as-needed basis.

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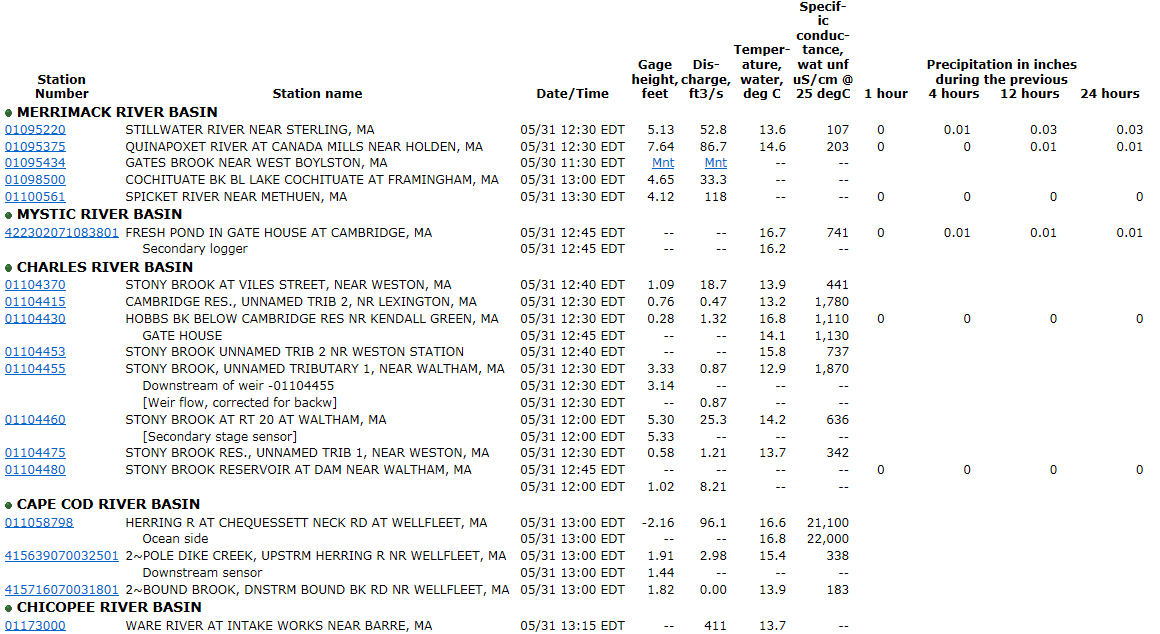
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# APPENDIX 1

**Station Descriptions for Non-MassDEP Continuous Temperature Monitoring Stations in MA**

* + - * 1. **Current USGS Riverine Continuous Temperature Monitoring Stations in MA**

Based on personal email communication with Richard J. Verdi (10/6/2016) from the USGS Hydrologic Surveillance and Surface Water Investigations, there are 18 active USGS stream gages in Massachusetts and most of them are in the Merrimack, Charles and Cape Cod watersheds. They are listed below:



1. **The USGS Northeast Stream Quality Assessment (NESQA) network stations in MA**

# These stations are situated within 6 watersheds and they may not be continued due to funding constraints.

| **USGS Station ID** | **Water Temp** | **Air Temp** | **NAME** | **LATITUDE** | **LONGITUDE** | **TNC size class** | **Drainage area (km^2)** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 01164000 | yes | yes | MILLERS RIVER AT SOUTH ROYALSTON, MA | 42.629809 | -72.150359 | small river | 491.5 |
| 01166500 | yes | yes | MILLERS RIVER AT ERVING, MA | 42.597586 | -72.438142 | medium river | 965.5 |
| 01169000 | yes | yes | NORTH RIVER AT SHATTUCKVILLE, MA | 42.638418 | -72.725092 | small river | 230.64 |
| 01169900 | yes | yes | SOUTH RIVER NEAR CONWAY, MA | 42.54203 | -72.693702 | small stream | 62.31 |
| 01170100 | yes | yes | GREEN RIVER NEAR COLRAIN, MA | 42.703417 | -72.670648 | small stream | 106.99 |
| 01174565 | yes | yes | WEST BRANCH SWIFT RIVER NEAR SHUTESBURY, MA | 42.455089 | -72.381752 | small stream | 32.99 |
| 01175500 | yes | yes | SWIFT RIVER AT WEST WARE, MA | 42.26787 | -72.332582 | small river | 489.9 |
| 01179500 | yes | yes | WESTFIELD RIVER AT KNIGHTVILLE, MA | 42.287867 | -72.864264 | small river | 422.13 |
| 01180500 | yes | yes | MIDDLE B WESTFIELD RIVER AT GOSS HEIGHTS, MA | 42.2587 | -72.872598 | small river | 136.68 |
| 01181000 | yes | yes | WEST BRANCH WESTFIELD RIVER AT HUNTINGTON, MA | 42.237312 | -72.895654 | small river | 243.5 |
| 01185500 | yes | yes | WEST BRANCH FARMINGTON RIVER NEAR NEW BOSTON, MA | 42.079259 | -73.072884 | small river | 237.43 |
| 01333000 | yes | yes | GREEN RIVER AT WILLIAMSTOWN, MA | 42.708969 | -73.196773 | small stream | 112.16 |

1. **Massachusetts Division of Fisheries and Wildlife Continuous Water Temperature Stations**

These stations were part of a couple of research projects that have been completed. Now only a few stations that are still out in association with dam removals or development projects, but nothing at the large scale of the previous work (Personal email communication with Todd Richards on 9/7/2016). Active sites are shaded.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Watershed** | **Waterbody** | **SARIS** | **TriggerDate** | **Lat** | **Long** | **Location** | **Town** |
| Chicopee | Parkers Br | 3628000 | 7/19/2005 | 42.37944 | 72.02992 | Rt 122 N -parking area on right, down incline toward brook. | Oakham |
| Millers | Collar Br | 3523200 | 7/20/2005 | 42.68405 | 72.25032 | Butterworth Rd xing, 4/10 mi. W of Rt 32. | Royalston |
| Millers | Gulf Br | 3523500 | 7/20/2005 | 42.62401 | 72.18050 | Off Gulf Rd (from Rt 68) on small road (Bearsden Rd) to residence/fishing area access. | Athol |
| Millers | Lyons Br | 3522175 | 7/22/2005 | 42.55147 | 72.45056 | Wendell State Forest, DS of Ruggles Pond, 1st left into park. | Wendell |
| Millers | Whetstone Br | 3522450 | 7/22/2005 | 42.58674 | 72.35693 | Kempfield Rd, 1st bridge xing | Wendell |
| Westfield | Bronson Br | 3211550 | 7/21/2005 | 42.41789 | 72.91468 | Where Dingle Rd meets Rt 143, parking area @ intersection | W. Chesterfield |
| Westfield | Kearney Br | 3211625 | 7/21/2005 | 42.43621 | 72.92976 | off Rt 112 after Cudworth Rd @ Worthington Rod & Gun club, out back. | Worthington |
| Westfield | Roaring Br (2) | 3210125 | 7/21/2005 | 42.25530 | 72.90691 | Skyline Trl, up from Old State Highway 1.1 mi. | Chester |
| Westfield | Roaring Br (1) | 3210000 | 7/28/2005 | 42.23056 | 72.85739 | 2nd road xing on Carrington Rd, ~1/2mi N of Pomeroy Rd | Montgomery |
| Westfield | Freeland Br | 3209900 | 7/28/2005 | 42.18059 | 72.88805 | Stage Rd pulloff, DS of bridge, Across road from Hull Forest Products site | Blandford |
| Westfield | Shaker Mill Br | 3210625 | 7/28/2005 | 42.33128 | 73.09206 | Lovers Lane off of Brooker Hill Rd, road xing | Becket |
| Westfield | Tower Br | 3211700 | 7/28/2005 | 42.41275 | 72.88241 | Cummington Rd N of Mount Rd, S of bridge 1/10mi. | W. Chesterfield |
| Deerfield | Hog Hollow Br | 3314776 | 8/4/2005 | 42.59251 | 72.76092 | Off E. Buckland Rd, thru woods past Clark Brook. | Buckland |
| Deerfield | Fife Br | 3316350 | 8/11/2005 | 42.68811 | 72.99947 | Monroe Rd xing, US ~75' | Florida |
|  |  |  |  |  |  |  |  |

1. **Massachusetts Division of Ecological Restoration**

Based on email communication with Kate Bentsen (FWE), there are currently 23 DER RIFLS sites with transducers that record water level and water temperature data at 15-min intervals. All of these sites are actively collecting data.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **site\_id** | **River** | **Street Crossing** | **Town** | **Watershed** | **x coord** | **y coord** | **Logger - Start** | **Logger - End** |
| 15 | First Herring Brook | Eisenhower Lane | Scituate | South Coastal | 261764.89 | 881803.31 | 1/26/2012 | active |
| 18 | Jones River | Lake Street | Kingston | South Coastal | 259022.36 | 862737.19 | 10/29/2013 | active |
| 20 | Larrywaug Brook | Route 183 | Stockbridge | Housatonic | 48981.11 | 897903.67 | 10/6/2004 | active |
| 31 | West Branch Housatonic River | Wahconah Street | Pittsfield | Housatonic | 55850.30 | 914121.81 | 10/9/2009 | active |
| 41 | Mattapoisett River | Snipatuit Pond outlet | Rochester | Buzzards Bay | 252489.46 | 834865.75 | 9/30/2013 | active |
| 44 | Pecks Brook | Valentine Road | Pittsfield | Housatonic | 54789.38 | 915360.77 | 10/9/2009 | active |
| 61 | Onota Lake | Lake level at outlet | Pittsfield | Housatonic | 54693.78 | 915472.56 | 11/29/2015 | active |
| 84 | First Herring Brook | Country Way | Scituate | South Coastal | 262004.69 | 881046.44 | 6/29/2007 | active |
| 108 | Ipswich River | Haverhill Street | North Reading | Ipswich | 234460.09 | 924736.25 | 5/28/2014 | active |
| 110 | Martins Brook | Park Street | North Reading | Ipswich | 232737.90 | 924634.52 | 5/22/2013 | active |
| 117 | May Brook | May Brook Road | Holland | Quinebaug | 145440.67 | 865056.13 | 10/25/2012 | active |
| 119 | Parkers Brook | Coldbrook Road | Oakham | Chicopee | 154939.70 | 905026.88 | 12/5/2012 | active |
| 124 | Fish Brook | Mill Road | Boxford | Ipswich | 241038.31 | 933984.56 | 10/2/2014 | active |
| 127 | Gulf Brook | Lawrence Road | Pepperell | Nashua | 188958.13 | 938737.10 | 9/4/2014 | active |
| 129 | Gulf Brook | Bemis Road Conservation | Pepperell | Nashua | 189219.40 | 939384.85 | 9/6/2014 | active |
| 132 | Fort River | NULL | Amherst | Connecticut | 117181.85 | 901343.74 | 4/29/2013 | active |
| 134 | Adams Brook | NULL | Amherst | Connecticut | 119451.00 | 907435.91 | 10/15/2012 | active |
| 135 | Dean Brook | NULL | Shutesbury | Connecticut | 119725.39 | 907995.74 | 7/2/2012 | active |
| 136 | Nurse Brook | NULL | Shutesbury | Connecticut | 119694.10 | 908070.42 | 7/2/2012 | active |
| 140 | Montague Brook | US of Well 3 | Belchertown | Connecticut | 121026.78 | 898696.44 | 7/18/2012 | active |
| 141 | Montague Brook | DS at Warren Wright Road | Belchertown | Connecticut | 120644.46 | 898052.98 | 4/29/2013 | active |
| 143 | Third Herring Brook | South Street | Norwell | South Coastal |  |  | 6/24/2015 | active |
| 146 | Atkins Diversion Channel | NULL | Shutesbury | Connecticut |  |  | 9/22/2016 | active |

1. **UMass-Amherst/USGS Project**

Based on an email from Kate Bentsen (FWE), prior to joining DER, Ms. Bentsen collected continuous water temperature data at 40 sites across the state for a master’s research project with Allison Roy at UMass Amherst. This project was a collaboration between UMass and USGS, funded by MassDEP, focused on sites with low levels of impervious cover (<10%). She retrieved the data loggers at 31 of these sites after completion of her master’s project, but left the loggers at 9 sites in the Nashua watershed, which are now maintained by USGS. Active sites are shaded.

| **Stream name** | **Town name** | **Latitude** | **Longitude** | **MDEP Unique ID\_B** | **MDEP Unique ID\_W** | **MDEP SiteID** | **MDEP BenSampID** | **MDEP ProjectCode** | **MDFW SampleID** | **SARIS** | **Logger - start** | **Logger - end** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Beaver | Sharon | 42.1345 | -71.1762 | B0139 |  | BB01 | 2009019 | Boston Harbor/Neponset 2009 | SID2527 | 7341400 | 10/19/2014 | 4/20/2017 |
| Beaver | Templeton | 42.5951 | -72.1216 | B0450 |  | BB01 | 2005088.1 | Millers 2005 | SID4952 | 3523600 | 10/5/2014 | 4/17/2017 |
| Bowers | Harvard | 42.5319 | -71.5791 | B0725 | W2205 | MAP2-055 | 2011018 | MAP2 2011 | SID4583 | 8144400 | 7/23/2014 | active |
| Bread and Cheese | Westport | 41.6327 | -71.0604 | B0827 | W0344 | RSN-BCB01 | 2014014.A | RSN 2014 |  | 9560150 | 8/19/2014 | 4/18/2017 |
| Broad | Easthampton | 42.2502 | -72.6589 | B0879 | W2219 | MAP2-526 | 2014024 | MAP2 2014 |  |  | 7/28/2014 | 5/20/2017 |
| Catacoonamug | Shirley | 42.5531 | -71.6695 | B0708 | W2186 | MAP2-023 | 2011019 | MAP2 2011 | SID4582 | 8144525 | 8/8/2014 | active |
| Chicken | Medway | 42.1506 | -71.4289 | B0690 | W2152 | MA09A-164 | 2010030 | MA09A 2010 | SID4546 | 7240175 | 7/21/2014 | 4/20/2017 |
| Coys | North Brookfield | 42.2622 | -72.1066 | B0897 | W2166 | MAP2-523 | 2014025 | MAP2 2014 |  |  | 8/15/2014 | 5/20/2017 |
| Cronin | Grafton | 42.1849 | -71.7120 |  |  |  |  |  | SID4928 | 5132625 | 8/25/2014 | 8/25/2015 |
| Doggett | Rochester | 41.7279 | -70.7981 | B0832 | W2374 | MAP2-328 | 2013003 | MAP2 2013 |  | 9559050 | 8/22/2014 | 4/18/2017 |
| East Branch Housatonic | Dalton | 42.4739 | -73.1412 | B0795 | W2258 | MAP2-186 | 2012032 | MAP2 2012 |  | 2105275 | 7/14/2014 | 5/20/2017 |
| Ellinwood | Athol | 42.5562 | -72.2310 | B0720 | W2199 | MAP2-045 | 2011016 | MAP2 2011 | SID4595 | 3522850 | 7/30/2014 | 4/20/2017 |
| Fall | Freetown | 41.7557 | -70.9831 | B0840 | W2382 | MAP2-360 | 2013010 | MAP2 2013 |  | 6236475 | 8/19/2014 | 4/18/2017 |
| Fish | Boxford | 42.6601 | -71.0076 | B0157 |  | FB00 | 2005077 | Ipswich 2005 | SID5464 | 9253850 | 11/23/2014 | 4/20/2017 |
| French | Oxford | 42.1892 | -71.8984 |  |  |  |  |  | SID3026 |  | 7/23/2015 | 4/17/2017 |
| Gravelly | Ipswich | 42.6610 | -70.9040 | B0440 |  | GB01 | 2005052 | Ipswich 2005 |  | 9253725 | 7/31/2015 | 4/20/2017 |
| Jabish | Belchertown | 42.2822 | -72.3919 | B0650 |  | JB00 | 2008052 | Chicopee 2008 | SID1956 | 3626550 | 10/31/2014 | 5/20/2017 |
| James | Ayer | 42.5794 | -71.5884 |  |  |  |  |  | SID4016 | 8143925 | 8/26/2014 | active |
| Kinderhook | Hancock | 42.5450 | -73.3128 | B0793 | W2256 | MAP2-182 | 2012043 | MAP2 2012 |  | 1202150 | 7/16/2014 | 5/20/2017 |
| Little | Charlton | 42.1386 | -71.9118 |  |  |  |  |  | SID3029 |  | 7/27/2015 | 4/17/2017 |
| Massapoag | Sharon | 42.1205 | -71.1643 | B0143 |  | 9BOB | 2009047 | Boston Harbor/Neponset 2009 | SID4786 | 7341375 | 8/28/2014 | 4/20/2017 |
| Miles | Ipswich | 42.6610 | -70.8450 | B0439 |  | MR01 | 2005051.1 | Ipswich 2005 |  | 9253650 | 6/30/2015 | 4/20/2017 |
| Mill | Blackstone | 42.0489 | -71.5203 |  |  |  |  |  | SID2630 | 5131200 | 7/9/2015 | 4/18/2017 |
| Mill | Concord | 42.4575 | -71.3329 |  |  |  |  |  | SID2507 |  | 9/19/2014 | 4/20/2017 |
| Monoosnoc | Leominster | 42.5266 | -71.7569 | B0703 | W2180 | MAP2-007 | 2011014 | MAP2 2011 | SID4581 |  | 8/5/2015 | active |
| North | Medfield | 42.1972 | -71.3284 | B0612 |  | W1586 | 2007015 | Charles 2007 | SID5463 | 7239875 | 10/17/2014 | 4/20/2017 |
| Pine Tree | Milton | 42.2434 | -71.0944 | B0844 | W2385 | MAP2-366 | 2013038 | MAP2 2013 |  | 7341075 | 10/3/2014 | 4/18/2015 |
| Pond | Montague | 42.5529 | -72.5195 | B0887 | W2453 | MAP2-534 | 2014041 | MAP2 2014 |  |  | 7/10/2014 | 4/17/2017 |
| Pond | Westfield | 42.1248 | -72.7220 | B0575 |  | PNDB00.1 | 2006094 | Westfield 2006 | SID5465 | 3208600 | 9/28/2014 | 5/20/2017 |
| Sevenmile | North Attleborough | 41.9516 | -71.3419 | B0052 |  | SM00 | 2007051 | Ten Mile 2007 | SID5460 | 5233675 | 12/20/2014 | 4/18/2017 |
| Sewall | Sherborn | 42.2222 | -71.3544 |  | W2154 | MA09A-106 |  |  | SID5462 | 7239750 | 8/5/2014 | 4/20/2017 |
| South Branch Mill | East Longmeadow | 42.0863 | -72.4803 |  |  |  |  |  | SID5466 |  | 9/14/2014 | 5/20/2017 |
| South Branch Souhegan | Ashby | 42.7098 | -71.8517 | B0671 | W2158 | MA09A-101 | 2010017 | MA09A 2010 | SID4553 | 8451850 | 7/31/2014 | active |
| Stony | South Hadley | 42.2535 | -72.5917 |  |  |  |  |  |  |  | 9/21/2014 | 5/20/2017 |
| Stop | Medfield | 42.1590 | -71.3030 | B0067 |  | SR03 | 2007020.A | Charles 2007 |  | 7239925 | 7/2/2015 | 4/20/2017 |
| Sucker | Pepperell | 42.6968 | -71.6102 | B0318 |  |  |  |  | SID2171 |  | 8/12/2015 | active |
| Trout | Holden | 42.3838 | -71.8378 | B0743 | W2226 | RSN-TR01 | 2014007 | RSN 2014 | SID4584 | 8145350 | 7/11/2014 | active |
| unnamed | Charlton | 42.1401 | -71.9985 |  | W2217 | MAP2-079 |  |  | SID5461 | 4100000 | 7/22/2014 | 4/17/2017 |
| unnamed | Westminster | 42.5563 | -71.8749 |  |  |  |  |  | SID3054 | 8145040 | 9/7/2014 | active |
| Whitman | Westminster | 42.5821 | -71.9026 | B0716 | W2194 | MAP2-035 | 2011011 | MAP2 2011 | SID4614 | 8145075 | 7/2/2014 | active |

F**. Volunteer Organizations (stream/river sites ONLY) Note: Table incomplete**

| **Vol Group** | **Site ID** | **River** | **Station Description** | **Town** | **SARIS** | **x coord** | **y coord** | **DEP-Approved QAPP?** | **Data Logging Active?** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Jones River Watershed Association** | | | | | | | | | |
|  |  | Pine Tree Brook |  | Milton |  |  |  |  | yes |
|  |  | Traphole Brook |  | Walpole |  |  |  |  | yes |
|  |  | Turner Pond |  | Walpole | 42.151389 -71.261361 |  |  |  | yes |
|  |  | Mill Brook |  | Medfield | 42.186067 -71.2824 |  |  |  | yes |
|  |  | Ponkapoag Brook |  | Canton | 42.203167 -71.13477 |  |  |  | yes |
|  |  |  |  |  |  |  |  |  |  |
| **Neponset River Watershed Association** | | | | | | | | | |
|  | SR3A | South River |  | Marshfield |  |  |  | yes | yes |
|  | Herring Run Park | Herring Brook |  | Pembroke |  |  |  | yes | yes |
|  | SR3A | North River |  | Marshfield |  |  |  | yes | yes |
|  |  |  |  |  |  |  |  |  |  |
| **Millers River Watershed Council** | | | | | | | | | |
|  |  | Mormon Hollow Brook |  | Wendell |  | 42°34'48.96"N 72°26'15.81"W |  |  | No |
|  |  | Keyup Brook |  | Erving |  | 42°36'8.29"N 72°23'58.88"W |  |  |  |
|  |  | Whetstone Brook headwaters |  | Wendell |  | 42°32'43.05"N 72°22'12.04"W |  |  | No |
|  |  | Whetstone Brook lower |  | Wendell |  | 42°35'16.02"N 72°21'26.64" |  |  |  |
|  |  | Moss Brook |  | Orange/Warwick |  | 42°36'29.99"N 72°21'31.63"W |  |  | No |
|  |  | Ellinwood Brook |  | Athol |  | 42°32'57.26"N 72°14'25.51"W |  |  | No |
|  |  | Mill Brook |  | Athol |  | 42°35'32.70"N 72°14'7.71"W |  |  | No |
|  |  | West Branch Tully River |  | Orange |  | 42°37'20.40"N 72°14'41.32"W |  |  |  |
|  |  | Thousand Acre Brook |  | Athol/Phillipston |  | 42°36'23.30"N 72° 9'47.24"W |  |  | No |
|  |  | Otter River |  | Templeton/Gardner |  | 42°35'35.36"N 72° 2'45.52"W |  |  |  |
|  |  | Bailey Brook |  | Winchendon/Gardner |  | 42°35'20.34"N 72° 2'17.35"W |  |  | No |
|  |  | Templeton Brook |  | Templeton/Hubbardston |  | 42°31'48.39"N 72° 1'31.82"W |  |  |  |
|  |  | Priest Brook |  | Royalston |  | 42°40'57.33"N 72° 6'54.05"W |  |  |  |
|  |  | Tarbell Brook |  | Winchendon |  | 42°41'53.39"N 72° 5'11.69"W |  |  | No |
|  |  | North Branch Millers River |  | Winchendon |  | 42°42'13.21"N 72° 0'38.44"W |  |  | No |
|  |  | East Branch Millers |  | Ashburnham/Winchendon |  | 42°39'20.91"N 71°59'14.44"W |  |  |  |
|  |  | Lake Rohunta Outlet |  | Athol |  | 42°34'11.31"N 72°16'20.80"W |  |  | No |
|  |  | Millers Mainstem near CT R |  | Millers Falls/Erving |  | 42°34'53.10"N 72°30'10.70"W |  |  |  |
| **Charles RWA** | | | | | | | | | |
|  |  | Charles River | near Longfellow Br | Boston |  |  |  | yes |  |
| **OARS** | | | | | | | | | |
|  |  | Cranberry Brook at footbridge, Memorial Forest |  |  |  | 42.37576 | -71.46920 | yes | yes |
|  |  | Cranberry Brook off Desert Trail, Memorial Forest |  |  |  | 42.37739 | -71.47237 | yes | yes |
|  |  | Cranberry Brook, Old Concord Rd Trail, Desert Area |  |  |  | 42.37884 | -71.48121 | yes | yes |
|  |  | Hop Brook nr Surrey Lane, Hop Brook Marsh |  |  |  | 42.3795 | -71.4626 | yes | yes |
|  |  | Hop Brook, nr Dutton Road, Memorial Forest |  |  |  | 42.37283 | -71.46723 | yes | yes |
|  |  | UNT to Hop; groundwater stream, Hop Brook Marsh |  |  |  | 42.37888 | -71.46465 | yes | yes |
|  |  | Trout Brook, DS of pipeline, Memorial Forest |  |  |  | 42.3716 | -71.47726 | yes | yes |
|  |  | UNT to Cranberry, Old Concord Road Trail, Marlboro |  |  |  | 42.37738 | -71.48540 |  |  |
| **Buzzards Bay Coalition** | | | | | | | | | |
|  |  |  | March to June concurrent with river herring fish counters |  |  |  |  | yes | yes |
| **ConnRWA** | | | | | | | | | |
|  |  | Connecticut River | Continuous loggers, numerous locations, (4) years through Fall 2016 |  |  |  |  | yes | yes |
|  |  |  |  |  |  |  |  |  |  |

ADDENDUM 1: Annual ST2 Monitoring Stations

2017 SHORT-TERM MONITORING STATIONS

| Short-Term Continuous Temperature Data Collection Stations (wadeable) for Year: **2017** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Segment ID** | **Unique ID** | **Watershed** | **Waterbody** | **Description** | **CFR Status** | **Latitude** | **Longitude** |
| MA31-01 | W2768 | Farmington | West Branch Farmington River | Tannery Rd, Otis | No | 42.21 | -73.0947222 |
| MA31-01 | W0198 | Farmington | West Branch Farmington River | Reservoir Rd bridge, Otis | No | 42.156888 | -73.073528 |
| MA31-01 | W0201 | Farmington | West Branch Farmington River | Clark Road bridge, near USGS Gage #01185500, Sandisfield | No | 42.070432 | -73.061979 |
| MA32-01 | W2744 | Westfield | West Branch Westfield River | Approx. 100 ft upstream of Huntington WWTP discharge | Yes | 42.231381 | -72.874897 |
| MA32-04 | W2769 | Westfield | Westfield River | Approx. 290 ft upstream of Main Road (Route 8A), Savoy (approx. 70 ft upstream of fire department driveway west off Center Road) | Yes | 42.56929 | -73.031453 |
| MA32-04 | W0216 | Westfield | Westfield River | West Main Street bridge, Cummington | Yes | 42.492881 | -72.973807 |
| MA32-04 | W0218 | Westfield | Westfield River | Route 9/112, at roadside park upstream of Swift River confluence, Cummington | Yes | 42.440771 | -72.861201 |
| MA32-04 | W0219 | Westfield | Westfield River | Base of Chesterfield Gorge, just upstream of confluence with Whitside Brook, Chesterfield | Yes | 42.389167 | -72.880278 |
| MA32-04 | W2770 | Westfield | Westfield River | Approx. 775 ft upstream of confluence of Florida Brook, in the Knightville State Wildlife Management Area, Huntington | Yes | 42.315111 | -72.851312 |
| MA32-04 | W0220 | Westfield | Westfield River | Gardner State Park, approx. 660 ft downstream of bathing beach, Route 112, Huntington | Yes | 42.271389 | -72.86667 |
| MA32-12 | W1467 | Westfield | Swift River | Shaw Rd bridge, Goshen | Yes | 42.455729 | --72.850032 |
| MA32-13 | W2745 | Westfield | West Falls Branch | (a.k.a. West Branch) adjacent to the rest stop approx. 1200 ft west of the Thayer Hill Rd intersection with Route 143, Worthington | Yes | 42.414855 | -72.907166 |
| MA32-13 | W2246 | Westfield | West Falls Branch | (a.k.a. West Branch) approximately 225 feet upstream of Main Road (Route 143), Chesterfield | Yes | 42.400926 | -72.876264 |
| MA32-13 | W0271 | Westfield | West Falls Branch | (a.k.a. West Branch) Ireland St bridge, Chesterfield | Yes | 42.400926 | -72.876264 |
| MA32-14 | W2746 | Westfield | Watts Stream | Approx. 150 ft upstream of Prentice Rd, Worthington | Yes | 42.369945 | -72.913731 |
| MA32-15 | W2747 | Westfield | Wards Stream | Approx. 250 ft upstream from Route 112 (Huntington Rd), Worthington | Yes | 42.370067 | -72.910832 |
| MA32-19 | W2748 | Westfield | Yokum Brook | Approx. 150 ft downstream from Maple St, Becket | Yes | 42.331389 | -73.083611 |
| MA32-20 | W2749 | Westfield | Walker Brook | Approx. 300 ft upstream from Route 20 (Huntington Rd), Chester | Yes | 42.277704 | -72.981323 |
| MA32-32 | W2750 | Westfield | Kinne Brook | Adams Rd, Worthington | Yes | 42.353017 | -72.928714 |
| MA32-32 | W0265 | Westfield | Kinne Brook | Approx. 250 meters south (downstream) of confluence of Skunk Bk off the west side of Kinne Brook Rd, Chester | Yes | 42.32574 | -72.912585 |
| MA32-32 | W1459 | Westfield | Kinne Brook | West off Kinney Brook Rd approx. 0.1 mile from the confluence with the Middle Branch Westfield River, Chester | Yes | 42.30604 | -72.906705 |
| MA32-37 | W2751 | Westfield | Ashley Brook | Approx. 115 ft downstream of Hillside Rd, Westfield | No | 42.102055 | -72.772203 |
| MA32-41 | W2752 | Westfield | Moose Meadow Brook | Old House Rd, Montgomery | Yes | 42.185328 | -72.810829 |
| MA32-41 | W2753 | Westfield | Moose Meadow Brook | Approx. 150 ft downstream of Pochassic Road, Westfield | Yes | 42.148995 | -72.792982 |
| MA32-41 | W2754 | Westfield | Moose Meadow Brook | Approx. 260 ft upstream from mouth at confluence with the Westfield River, Westfield (approx. 100 ft downstream of farm crossing)] | Yes | 42.138105 | -72.784764 |
| MA32-47 | W2755 | Westfield | Tower Brook | Mount Rd, Chesterfield | Yes | 42.410648 | -72.876589 |
| MA32-48 | W2756 | Westfield | Stones Brook | Dyer Rd, Ashfield | Yes | 42.499297 | -72.819905 |
| MA32-48 | W2757 | Westfield | Stones Brook | Loomis Rd, Goshen | Yes | 42.455525 | -72.840048 |
| MA32-49 | W2758 | Westfield | Mill Brook | West Hill Rd (a.k.a. High St), Plainfield | Yes | 42.527528 | -72.930468 |
| MA32-49 | W2759 | Westfield | Mill Brook | South Union St, Plainfield | Yes | 42.502343 | -72.915815 |
| MA32-49 | W2760 | Westfield | Mill Brook | Stage Rd, Cummington | Yes | 42.480626 | -72.904869 |
| MA32-51 | W2761 | Westfield | Westfield Brook | Potash St (aka Nobody Rd), Windsor | Yes | 42.510143 | -73.052045 |
| MA32-51 | W2762 | Westfield | Westfield Brook | Approx. 100 ft upstream of High St Hill Rd, Windsor | Yes | 42.493141 | -73.019038 |
| MA32-51 | W2763 | Westfield | Westfield Brook | Approx. 100 ft upstream of SR9, Cummington | Yes | 42.490884 | -72.975222 |
| MA32-52 | W2764 | Westfield | Shaw Brook | Approx. 250 ft upstream of Berkshire Trail (Route 9), Windsor | Yes | 42.497707 | -73.009617 |
| MA32-60 | W2765 | Westfield | Stage Brook | Blandford Stage Rd crossing east of Upper Moss Hill Rd, Russell | Yes | 42.18414 | -72.871431 |
| MA32-30 | W2766 | Westfield | Roaring Brook | Carrington Rd crossing east of Thomas Rd, Montgomery | Yes | 42.287292 | -72.931141 |
| MA32-61 | W2767 | Westfield | Roaring Brook | Approx. 50 ft downstream of Fiske Ave, Huntington | Yes | 42.239543 | -72.902891 |

2018 SHORT-TERM MONITORING STATIONS

| Short-Term Continuous Temperature Data Collection Stations (wadeable) for Year: **2018** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Segment ID** | | **Unique ID** | **Watershed** | **Waterbody** | **Description** | **CFR Status** | **Latitude** | **Longitude** |
| MA31-03 | | W2820 | Farmington | Clam River | Upstream of Town Hill Rd, Sandisfield | Yes | 42.176194 | -73.145198 |
| MA31-03 | | W2821 | Farmington | Clam River | Upstream of Montville Rd (aka Hammertown Rd), Sandisfield | Yes | 42.133298 | -73.105207 |
| MA31-03 | | W2822 | Farmington | Clam River | Off Sandisfield Rd (SR57) across from New Boston Cemetery, Sandisfield | Yes | 42.096882 | -73.088686 |
| MA31-10 | | W0211 | Farmington | Dimmock Brook | Downstream of East Otis Rd (SR23), Otis | Yes | 42.195396 | -73.077226 |
| MA31-33 | | W2826 | Farmington | Pond Brook | Downstream of Schoolhouse Rd, Tolland | No | 42.098470 | -73.005376 |
| MA31-14 | | W2823 | Farmington | Sandy Brook | Downstream of East Hill Rd below York Lake, New Marlborough | Yes | 42.094889 | -73.181435 |
| MA31-14 | | W1446 | Farmington | Sandy Brook | Downstream of Sandy Brook Turnpike, Sandisfield | Yes | 42.043369 | -73.135952 |
| MA31-13 | | W0207 | Farmington | Silver Brook | Upstream of River Rd, Sandisfield | Yes | 42.100997 | -73.096503 |
| MA31-27 | | W2825 | Farmington | Spectacle Pond Brook | Unnamed dirt road near Spectacle Pond Brook, Otis | No | 42.187973 | -73.120106 |
| MA31-09 | | W2828 | Farmington | Unnamed tributary | Downstream of North Main Rd (SR8), Otis | No | 42.195885 | -73.092134 |
| MA97-22 | | W2816 | Islands | Mill Brook | Lucy Vincent Beach Rd, Chilmark | Yes |  |  |
| MA97-23 | | W2818 | Islands | Paint Mill Brook | Downstream of North Rd, Chilmark | Yes |  |  |
| MA97-37 | | W2819 | Islands | Roaring Brook | Downstream of Gosnold’s Way, Chilmark | Yes |  |  |
| MA97-36 | | W2817 | Islands | Witch Brook | Downstream of North Rd, West Tisbury | Yes |  |  |
| MA32-58 | | W2824 | Westfield | Arm Brook | Downstream of Egleston Rd, Westfield | Yes | 42.160654 | -72.731554 |
| MA32-38 | | W2827 | Westfield | Cook Brook | North West Rd, Westfield | No | 42.123735 | -72.820503 |
| MA32-36 | | W1462 | Westfield | Little River | North West Rd, Westfield | Yes | 42.130498 | -72.822981 |
| MA32-36 | | W0237 | Westfield | Little River | Horton’s Bridge, Westfield | Yes | 42.120218 | -72.786794 |