Data Requirements and Procedures to Support the Designation of Freshwater Streams and Rivers as Cold Waters in the Massachusetts Surface Water Quality Standards

Commonwealth of Massachusetts

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:
Anna Mayor, Section Chief, Surface Water Quality Standards
Richard F. Chase, Section Chief, Data Management and Water Quality Assessment
Richard O. Carey, Ph.D., Director, Watershed Planning Program

Watershed Planning Program
Division of Watershed Management, Bureau of Water Resources
Massachusetts Department of Environmental Protection

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Cover Photo
Clockwise from left: Bread and Cheese Brook, Westport, MA, August 2013, Courtesy of WPP Monitoring Staff; Juvenile Brook Trout, Courtesy of Ryan Hagerty, US Fish and Wildlife Service; Bashbish Brook Rocky Substrate, Mount Washington, MA, July 2013, Courtesy of WPP Monitoring Staff.

Notice of Availability
This report is available on the Massachusetts Department of Environmental Protection website: https://www.mass.gov/regulations/314-CMR-4-the-massachusetts-surface-water-quality-standards

Massachusetts Department of Environmental Protection

The mission of the Massachusetts Department of Environmental Protection (MassDEP) 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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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

AWQC	Ambient Water Quality Criteria
CFR	Coldwater Fish Resource
CMR	Code of Massachusetts Regulations
CWA	Clean Water Act
EBT	Eastern brook trout
EPA	United States Environmental Protection Agency
MassDEP	Massachusetts Department of Environmental Protection
MassWildlife	Massachusetts Division of Fisheries and Wildlife
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SC	Slimy sculpin
SOP	Standard Operating Procedure
WPP	Watershed Planning Program

1.0 Introduction

The Watershed Planning Program (WPP) in the Massachusetts Department of Environmental Protection (MassDEP) developed this guidance document to support the identification of fresh-water streams and rivers for potential designation as Cold Waters in the Massachusetts Surface Water Quality Standards (SWQS), 314 Code of Massachusetts Regulations (CMR) 4.00. The SWQS implement provisions of the federal Clean Water Act (CWA), through designation of the most sensitive uses for which the various waters of the Commonwealth shall be enhanced, maintained and protected; prescribing the minimum water quality criteria required to sustain the designated uses; and implementing standards necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges.

MassDEP developed this guidance document to address data requirements and procedures to support the designation of freshwater streams and rivers as Cold Waters in the SWQS. Surface waters of the Commonwealth are assigned to specific classes in the SWQS. Inland water classes include Class A and Class B surface waters or surface water segments. Class A and B surface waters are defined at 314 CMR 4.02. Certain surface waters are also assigned special qualifiers at 314 CMR 4.06(1)(d), which indicate special considerations and uses for a segment that may affect the application of criteria or antidegradation provisions of 314 CMR 4.00. Designation as a Cold Water in the SWQS means that the stream or river listed at 314 CMR 4.06(6)(b): *Figure A; Figures and Tables 1 through 27* meets or has met the dissolved oxygen (DO) and temperature requirements of the Cold Water Fishery criteria. The latest version of MassDEP's Consolidated Assessment and Listing Methodology (CALM) Guidance Manual (https://www.mass.gov/service-details/water-quality-assessments) describes the assessment of surface waters and surface water segments that have been designated as Cold Waters in the SWQS. Procedures for designating lakes and reservoirs as Cold Waters in the SWQS have not been established.

To support the designation of freshwater streams and rivers as Cold Waters in the SWQS, data must show that surface waters or surface water segments meet the criteria that support the Cold Water Fishery use, including temperature and other ecological factors. The SWQS include the following definition of a Cold Water Fishery at 314 CMR 4.02:

> Waters in which the mean of the maximum daily temperature over a seven-day period generally does not exceed 68°F (20°C) and, when other ecological factors are favorable (such as habitat), are capable of supporting a year-round population of cold water stenothermal aquatic life such as trout (Salmonidae).

To support the SWQS Cold Water Fishery use, Class A and Class B inland surface waters that are designated as Cold Waters at 314 CMR 4.06(6)(b) are required to meet the temperature and DO criteria below, as set forth in 314 CMR 4.05(3)(a)1. and 2. and 314 CMR 4.05(3)(b)1. and 2.:

- DO shall not be less than 6.0 mg/L; and

- temperature shall not exceed 68 degrees Fahrenheit (°F) (20 degrees Celsius (°C)) based on the mean of the daily maximum temperature over a seven-day period in Cold Water Fisheries, unless naturally occurring.

As part of each triennial review of the SWQS, MassDEP also intends to designate any Coldwater Fish Resources (CFRs), which have been timely determined to meet the preceding requirements, as Cold Waters at 314 CMR 4.06(6)(b): *Figure A; Figures and Tables 1 through 27*, as appropriate. The Division of Fisheries and Wildlife ("MassWildlife") within the MA Department of Fish and Game identifies CFRs at 321 CMR 5.00. MassWildlife characterizes a CFR as a waterbody (*i.e*., lake, pond, stream, or river in its entirety unless otherwise segmented) used by reproducing cold-water fish to meet one or more of their life history requirements. MassWildlife identifies CFRs based on fish samples collected annually by its biologists and maintains a CFR list and map that are updated annually. The CFR map is available on MassWildlife's website (https://www.mass.gov/info-details/coldwater-fish-resources).

Even in the absence of a Cold Water designation in the SWQS, it is important to note that a CFR cold-water fish population and habitat are nonetheless protected as existing uses pursuant to 314 CMR 4.06(1)(d)7. In the SWQS, existing uses are those that do not impair the designated uses that are attained in a waterbody on or after November 28, 1975. For example, any surface water that has been documented to have held a population of cold-water fish at any time since November 28, 1975, even if that population has been extirpated, is an existing use. See MassDEP's CALM Guidance Manual for procedures used to assess these existing use fish populations and habitats. MassDEP assesses existing use cold-water fish populations and habitats using both cool- (21°C threshold) and cold-water (20°C SWQS criterion) categories, which include a broader range of fish species and ages than applying solely the SWQS 20°C Cold Water criterion. Consequently, the data requirements and procedures outlined in this guidance document are specific to the SWQS Cold Water criteria that support the Cold Water Fishery use and must be met for potential Cold Water designation.

2.0 Data Requirements

There are two data-driven scenarios that can support the designation of freshwater streams and rivers as Cold Waters in the SWQS. Data must demonstrate that the waterbody is capable of supporting a year-round population of cold water stenothermal aquatic life or contain a habitat (temperature and DO) that would support such life as follows: (1) for waterbodies with documented presence of cold-water fish, the fish population must include specified species and ages that indicate the population is reproducing; or, (2) for waterbodies without documented presence of cold-water fish, surface water quality data must include temperature and DO data collected between July 1st and September 15th, a period that would typically include highest water temperatures.

Scenario #1: Fish population data include documented presence of cold-water fish

A Cold Water Fishery is presumed to exist when a cold water habitat is capable of supporting a year round population of stenothermal aquatic life as determined by the presence of the following specific types and sizes of fish during the following specified sampling periods:

- During a single sampling event (*i.e.*, samples taken over a single day) between July 1st and September 15th, show the presence of cold-water fish species in the following minimum numbers and size ranges:
  a) two or more individual *Salvelinus fontinalis* (eastern brook trout or EBT) ≤140 mm (approximately 5.5 inches) in length. A minimum of two larger individual EBT may also qualify if stocking records indicate that the fish were not stocked or did not likely come from a stocked waterbody; or
  b) two or more individual *Cottus cognatus* (slimy sculpin or SC) of any size; or
  c) one individual EBT measuring ≤140 mm in length and one individual SC of any size.

The above specifications are based largely on those established for Tier 1 cold-water fish (fluvial species needing the coldest summertime temperatures for survival) outlined in Appendix D of MassDEP's 2022 CALM Guidance Manual. Meeting these specifications provides evidence of a reproducing, year-round population of cold-water fish.

Scenario #2: Fish population data do not include documented presence of cold-water fish

Alternatively, in the absence of fish population data, a Cold Water Fishery is presumed to exist when a cold water habitat is capable of supporting a year round population of stenothermal aquatic life as determined by specific measurement endpoints for both temperature and DO collected during specific sampling periods, as outlined below and further described in the Cold Water assessment procedures within Appendix D of the 2022 CALM Guidance Manual.

- Between July 1st and September 15th, one or more data collection periods, each comprised of a minimum of seven continuous days, occurs within the subject surface water segment to collect continuous temperature and DO sampling data using deployable data loggers.[1] Samples are collected based on documented and MassDEP-approved Standard Operating Procedures (SOPs), and the following temperature and DO measurement endpoints are met:
  a) temperature measurements are < 20°C based on the mean of daily maximum measurements over each measured 7-day period and an additional acute threshold where the maximum 24-hour average are < 23.5°C; and
  b) DO measurements where each 7-day mean of daily minimums are ≥ 6.0 mg/L and all 1-day minimums are ≥ 5 mg/L.

[1] Unless an equivalent approach using discrete data is otherwise approved by MassDEP.

3.0 Data Collection

To ensure the reliability of data used to support the designation of freshwater streams and rivers as Cold Waters in the SWQS, MassDEP will verify (in accordance with 314 CMR 4.03(6)) that such data have been collected following Department-approved procedures for sampling and analysis, such as an approved Quality Assurance Project Plan (QAPP) and/or SOP(s).

If appropriate existing water quality data for a stream or river are not available, a sampling QAPP may be developed and implemented by a third party, subject to MassDEP approval per 314 CMR 4.03(6), to collect appropriate new fish population and/or water quality data. Sampling within a stream or river must be conducted in locations that are representative of water quality and hydrologic conditions in the waterbody, outside the influence of effluent discharge(s), and, where possible, away from stormwater outflows. For purposes of determining whether an inland surface water is a Cold Water Fishery, in the absence of appropriate fish population data, MassDEP will consider continuous water quality data collected as specified above, in its Cold Water designation determination.

For additional guidance regarding procedures for data collection, please see MassDEP's Watershed Planning Program's quality assurance information (https://www.mass.gov/guides/water-quality-monitoring-quality-management-program) or contact the Watershed Planning Program at dep.wpp@mass.gov.

4.0 Quality Assurance Project Plans

Field data collection by agencies, such as MassWildlife and MassDEP, are guided by program QAPPs and/or SOPs that help to ensure consistent data quality. For non-agency data collection, draft and final QAPPs may be submitted to MassDEP for review and approval prior to initiation of monitoring. Guidance on QAPP preparation and submittal to MassDEP can be found online at: https://www.mass.gov/guides/external-data-submittals-to-the-watershed-planning-program.

QAPPs to describe the data collection required to support the designation of freshwater streams and rivers as Cold Waters in the SWQS would typically include the following elements:

a. Project organization, distribution, and relevant agency approvals.
b. Project/Task overview, definition, background, and schedule.
c. Training, certifications, documents, and records.
d. Data quality objectives and performance criteria.
e. Detailed sampling location descriptions.
f. Sample design, requirements, procedures, handling, and tracking.
g. Field and laboratory analytical method requirements and procedures.
h. Instrument and equipment calibration, testing, inspection, and maintenance.

i. Quality assurance and quality control requirements.
j. Data acquisition, management, verification, validation, and usability requirements and procedures.
k. Assessment and response actions.
l. Project evaluation and reporting procedures.
m. Field SOPs, including DO and/or temperature probe deployment and fish population sampling methods for in-river sampling.
n. Laboratory quality assurance plans and SOPs (if applicable).

For additional QAPP guidance, please submit inquiries to the attention of the Watershed Planning Program's Quality Assurance Analyst at dep.wpp@mass.gov.

5.0 Data Submittal to MassDEP

After data collection has been completed, fish survey and/or DO and temperature data can be submitted to MassDEP, according to procedures outlined here: https://www.mass.gov/guides/external-data-submittals-to-the-watershed-planning-program. In addition to submitted data, electronic reports are also acceptable. Reports can include background information, sampling and analysis information, results of QC sampling, and data analyses and conclusions.

For additional information on external data submittals, please submit inquiries to the attention of the Watershed Planning Program's External Monitoring and Data Coordinator at dep.wpp@mass.gov.

6.0 MassDEP Data Review and Cold Water Designation

Upon receiving data collected from a surface water or surface water segment, MassDEP will evaluate whether the data meet: (1) data quality objectives of the agency or the monitoring QAPP; (2) data quality guidelines for external data submittals (as appropriate); and (3) data requirements to support the designation of the waterbody as a Cold Water in the SWQS, as outlined in this guidance. If MassDEP determines that the data are quality-assured and usable, and meet the data requirements for consideration of the waterbody as a Cold Water in the SWQS, then MassDEP, in its sole discretion, may propose to include designation of the applicable waterbody as a Cold Water during the formal process to amend the SWQS. For an amendment to the SWQS, such as a Cold Water designation, to be enforceable under federal law, it must meet federal CWA requirements, be promulgated under state law, and be approved by EPA.