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Vermont Water Quality Standards

Environmental Protection Rule Chapter 29A

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Subchapter 1. APPLICABILITY, DEFINITIONS, AND POLICIES

§ 29A-101 Applicability

(a) Pursuant to 10 V.S.A. Chapter 47, after the use classification of any water has been established, that water shall be managed by the Secretary in order to obtain and maintain the classification for that use. The Secretary may enforce a classification and these rules against any person affected thereby who, with notice of the classification, has failed to comply.

~~(b) Concerning any application, the Water Quality Standards in effect at the time of the filing shall apply. These Water Quality Standards shall apply to those applications, including applications for the renewal of existing approvals, that are filed on or after the date upon which the amended standards become effective, and to all other activities that occur after that date.~~

(b) These rules shall apply to all "waters," as defined in these rules, including "waters of the United States" as defined in titles 33 and 40 of the Code of Federal Regulations. These rules shall apply to wetlands as articulated in Sections §§ 29A-104(e) and 29A-105(e). Application of these rules to waters shall not require the issuance of a state or federal permit, license, certification, or approval for discharges or activities for which no such permit, license, certification, or approval requirement exists under applicable state or federal law, including discharges and activities that satisfy the exemptions and exclusions set forth at 40 C.F.R. §§ 122.3 and 232.3.

(c) In the event any of these rules, or any portion thereof, is found by a court of competent jurisdiction to be illegal or void, the remainder thereof shall be deemed unaffected and shall continue in full force and effect.

(d) The following exclusions apply only to artificial bodies of water that were not originally created in waters or did not result from impoundment of waters:

(1) Off stream reservoirs (such as snowmaking ponds) may be subject to water level fluctuations that are necessary to achieve the purposes for which the reservoir was constructed and accordingly, shall not be required to meet the criteria of these rules impacted by water level fluctuations in the reservoir;

(2) Waste treatment systems (including waste management systems constructed as part of Best Management Practices under 6 V.S.A. Chapter 215 and treatment ponds, lagoons, or wetlands created solely to meet the requirements of a permit issued for a discharge) determined to be necessary to achieve compliance with these rules shall not be required to be managed as waters under these rules.

(e) Waters created exclusively by rainfall or snowmelt events, such as puddles and overland flow, that are so temporary in nature that they do not support the existing and designated uses, shall not be considered waters.

§ 29A-102 Definitions

For the purposes of these Water Quality Standards, the terms below shall have the following meanings unless a different meaning clearly appears from the context.

~~(1) "Required agricultural practices (RAPs) or acceptable management practices for maintaining water quality on logging jobs (AMPs)" means those land management practices adopted by the Secretary of Agriculture, Food and Markets, and Commissioner of Forests, Parks and Recreation, respectively, in accordance with applicable state law.~~

(~~2~~1) "Act" means the "Vermont Water Pollution Control Act" at 10 V.S.A. Chapter 47.

(~~3~~2) "Applicable water quality criteria" means all criteria specified in Subchapter 3 that are applicable to a water and the classification of its uses.

(~~4~~3) "Application" means any request for a permit required by state or federal law when filed with, and deemed complete by, the reviewing authority.

(~~5~~4) "Aquatic biota" means all organisms that, as part of their natural life cycle, live in or on waters.

(~~6~~5) "Aquatic habitat" means the physical, chemical, and biological components of the water environment.

(~~7~~6) "Assimilative capacity" means a measure of the capacity of the receiving waters to assimilate wastes without lowering their quality below the applicable water quality criteria.

(~~8~~7) "Best management practices (BMPs)" means a practice or combination of practices that may be necessary, in addition to any applicable RAPs or AMPs, to prevent or reduce pollution from nonpoint source wastes to a level consistent with the applicable provisions of these rules.

(~~9~~8) "Biological integrity" means the ability of a body of water to support and maintain a community of organisms that has the expected species composition, diversity, and functional organization comparable to that of the water in its natural condition.

(~~10~~9) "Classification" means the water quality classification attributed to a designated use for a body of water in accordance with the provisions of 10 V.S.A. §§ 1252 and 1253.

(~~11~~10) "Designated use" means any value or use, whether presently occurring or not, for which a water has been designated as Class A(1), A(2), B(1), or B(2).

(~~12~~11) "Discharge" means the placing, depositing, or emissions of any wastes, directly or indirectly, into an injection well or into waters.

(~~13~~12) "EPA or USEPA" means the U.S. Environmental Protection Agency.

(~~14~~13) "Equilibrium condition" means the condition in which water flow, sediment, and woody debris are transported in a watershed in such a manner that the stream maintains its

dimension, pattern, and profile without unnaturally aggrading or degrading the channel bed elevation at the stream reach scale.

(~~15~~14) "Existing discharge" means any discharge to the extent authorized by a valid permit issued under the provisions of 10 V.S.A. §§ 1263 or 1265 as of January 7, 1985.

(~~16~~15) "Existing use" means a use that has actually occurred on or after November 28, 1975, in or on waters, regardless of whether or not the use is presently occurring or included in these rules.

(~~17~~16) "Flow characteristics" means the depth, volume, velocity, and variation of streamflow that, in part, determine stream processes, physical habitat structure, and aquatic habitat quality in channels and floodplains as governed by factors associated with valley setting, geology, and climate.

(~~18~~17) "Full support of uses" means the achievement of the level of water quality necessary to consistently maintain and protect existing and designated uses and the achievement of management objectives consistent with the classification level for designated uses.

(~~19~~18) "Functional component" means a portion of the aquatic biological community identified by its role in the processing of energy within the aquatic ecosystem (e.g., primary producers, detritivores, benthic insectivores and predators, etc.).

(~~20~~19) "Groundwater" means water below the land surface.

(~~21~~20) "Indirect discharge" means any discharge to groundwater, whether subsurface, land-based, or otherwise.

(~~22~~21) "Intolerant aquatic organisms" means those organisms that are particularly sensitive to, and likely to be adversely affected by, the stress of pollution, flow modification, or habitat alteration (e.g., mayflies, stoneflies, and Brook Trout).

(~~23~~22) "Low median monthly flow" means the median monthly flow for that month having the lowest median monthly flow.

(~~24~~23) "Mean daily flow" means the arithmetic mean of the sum of individual flow values measured over a calendar day that is representative of the total flow over that 24-hour period.

(~~25~~24) "Median monthly flow" means, for a given calendar month, the mean daily flow that is equaled or exceeded 50 percent of the time, based on a long-term record.

(~~26~~25) "Median annual flow" means that mean daily flow that is equaled or exceeded 50 percent of the time.

(~~27~~26) "Mixing zone" means a length or area within waters required for the dispersion and dilution of waste discharges adequately treated to meet federal and state treatment requirements and within which it is recognized that specific water uses or water quality criteria associated with the assigned classification for such waters may not be realized. A mixing zone shall not extend more than 200 feet from the point of discharge.

(~~28~~27) "Natural condition" means the range of chemical, physical, and biological characteristics of a body of water that occur with only minimal effects from human influences.

(~~29~~28) "Natural flow regime" means a water's characteristic pattern of variability in flow rates and water levels, annually, seasonally, and daily, without the influence of artificial flow regulation. This pattern of variability is characterized by the magnitude, frequency, duration, timing, and rate of change of hydrologic conditions.

(~~30~~29) "New discharge" means any discharge not authorized under the provisions of 10 V.S.A. § 1263 as of January 7, 1985 or any increased pollutant loading or demand on the assimilative capacity of the receiving waters from an existing discharge that requires the issuance of a new or amended permit.

(~~31~~30) "Nonpoint source waste" or "nonpoint source pollution" means waste that reaches waters in a diffuse manner from any source other than a point source including overland runoff from construction sites, or as a result of agricultural or silvicultural practices.

(~~32~~31) "Nonpolluting waste" means waste that prior to treatment does not have the potential to impair the condition of waters.

(~~33~~32) "Permit" means a certification, dam order, or other authorization in which during the application review process, compliance with the Vermont Water Quality Standards is evaluated pursuant to applicable state or federal law.

(~~34~~33) "Physical habitat structure" means the diverse combination and complexity of instream forms created within substrate and woody debris on and within the bed and banks of the channel by stream processes and flow characteristics, as well as the riparian area that supports woody debris recruitment and temperature refuge. Physical habitat structure, in part, determines aquatic habitat quality at the stream reach and stream network scales by providing for all life cycle functions, which include the full set of forms necessary for the provision of and access to cover, overwintering, and temperature refuge and the substrates necessary for feeding and reproduction of aquatic biota and wildlife.

(~~35~~34) "Point source" means any discernable, confined, and discrete conveyance, including any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft, from which either a pollutant or waste is or may be discharged.

(~~36~~35) "Public interest" means that which shall be for the greatest benefit to the people of the State as determined by the Secretary, in accordance with the criteria set forth 10 V.S.A. § 1253(c).

(~~37~~36) "Receiving waters" means all waters adjacent to a discharge, and all downstream or other waters the quality of which may be affected by that discharge.

(~~38~~37) "Reference water body" means a water that represents the natural condition for a specific water body type against which the condition of waters of similar water body type are evaluated.

(38) "Required agricultural practices (RAPs) or acceptable management practices for maintaining water quality on logging jobs (AMPs)" means those land management practices adopted by the Secretary of Agriculture, Food and Markets, and Commissioner of Forests, Parks and Recreation, respectively, in accordance with applicable state law.

(39) "Riparian areas" means the zones of interaction and influence between aquatic and terrestrial ecosystems along streams, rivers, lakes, wetlands, and other bodies of water.

(40) "Riverine impoundment" means a reach of river or stream subject to the backwater influence of a human-made dam with the water remaining generally within the natural channel.

(41) "Seven day low flow, ten year return period (7Q10)" means a ~~drought~~ flow equal to the lowest mean flow for seven consecutive days, adjusted to nullify any effects of artificial flow regulation, that has a 10% chance of occurring in any given year.

(42) "Secretary" means the Secretary of the Agency of Natural Resources or the Secretary's duly authorized representative.

(43) "Stream processes" means the hydrologic, bed-load sediment, and large woody debris regimes of a particular stream reach and is a term used to describe stream channel hydraulics, or the erosion, deposition, sorting, and distribution of instream materials by the power of flowing water. Stream processes work toward an equilibrium condition;~~,~~ are governed by flow characteristics, stream morphology, channel roughness, ~~and~~ floodplain connectivity, and the riparian area, which supports woody debris recruitment and temperature refuge; and, in part, determine physical habitat structure and aquatic habitat quality.

(44) "Tactical basin plan" means a plan prepared by the Secretary for each of Vermont's 15 basins in conjunction with the basin planning process required by 40 C.F.R. Part 130, 10 V.S.A. Chapter 47, and these rules.

(45) "Taxonomic component" means a portion of the biological community identified by a hierarchical classification system for identifying biological organisms that uses physical and biological characteristics (e.g., Insecta: Plecoptera: Perlidae: Agnetina capitate).

(46) "Thirty day low flow, ten year return period (30Q10)" means a flow equal to the lowest mean flow for 30 consecutive days, adjusted to nullify any effects of artificial flow regulation, that has a 10% chance of occurring in any given year.

(~~46~~47) "Tolerant aquatic organisms" means organisms (e.g., rattail maggots, annelids, Creek Chubs) that, although they may be affected by the stress of pollution, flow modification or habitat alteration, are less sensitive and less likely to be adversely affected than are intolerant aquatic organisms.

(~~47~~48) "Toxic substances" means those wastes and combinations of wastes that, after discharge and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will, on the basis of available information cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions, or physical deformations in such organisms or their offspring.

(~~48~~49) "Waste" means effluent, sewage, or any substance or material, liquid, gaseous, solid or radioactive, including heated liquids, whether or not harmful or deleterious to waters; provided however, the term "sewage" as used in 10 V.S.A. Chapter 47 shall not include the rinse or process water from a cheese manufacturing process.

(~~49~~50) "Waste management zone" means a specific reach of Class B(1) or B(2) waters designated by a permit to accept the discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings. Throughout the receiving waters, water quality criteria must be achieved, but increased health risks exist in a waste management zone due to the authorized discharge.

(~~50~~51) "Waters" include all rivers, streams, creeks, brooks, reservoirs, ponds, lakes, springs and all bodies of surface waters, artificial or natural, which are contained within, flow through, or border upon the State or any portion of it.

(~~51~~52) "Watershed" means a region containing waters that drain into a particular brook, stream, river, or other body of water.

(53) "Wetland" means those areas of the state that are inundated by surface or groundwater with a frequency sufficient to support significant vegetation of aquatic life that depend on saturated or seasonally saturated soil conditions for growth and reproduction. Such areas include marshes, swamps, sloughs, potholes, fens, river and lake overflows, mud flats, bogs, and ponds, but excluding such areas as grow food or crops in connection with farming activities (10 V.S.A. § 902(5)).

§ 29A-103 General Policies

(a) These rules are intended to achieve the goals of the State's ~~water~~ Water ~~quality~~ Quality ~~policy~~ Policy (10 V.S.A. § 1250), set forth below, as well as the objective of the federal Clean Water Act (33 U.S.C. § 1251 et seq.) which is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

(b) ~~(1)~~ Water Quality Policy. It is the policy of the State of Vermont to:

~~(A)~~ (1) protect and enhance the quality, character, and usefulness of its surface waters and to assure the public health;

(2) ~~(B)~~ maintain the purity of drinking water;

(3) ~~(C)~~ control the discharge of wastes to waters, prevent degradation of high quality waters, and prevent, abate, or control all activities harmful to water quality;

(4) ~~(D)~~ assure the maintenance of water quality necessary to sustain existing aquatic communities;

(5) ~~E)~~ provide clear, consistent, and enforceable standards for the permitting and management of discharges;

(~~F~~6) protect from risk and preserve in their natural state certain high quality waters including fragile high-altitude waters, and the ecosystems they sustain;

(7) ~~G)~~ manage waters to promote a healthy and prosperous agricultural community, to increase the opportunities for use of the State's forest, parks, and recreational facilities, and to allow beneficial and environmentally sound development; and~~.~~

(~~2~~8) ~~It is further the policy of the State to~~ seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality.

(c) Water Conservation Policy. Water is a natural resource that should be managed efficiently to reduce waste through promotion of water conservation. It shall be the policy of the State to conserve the water resources of Vermont through technology, methods, and procedures designed to promote efficient use of water; to consider water conservation in all water use decisions; and to reduce or minimize the waste of water through water supply management practices.

(d) Riparian Policy. The State of Vermont recognizes the importance of conserving riparian areas adjacent to surface waters for their important physical, hydrological, and ecological functions, including water temperature moderation; sediment and nutrient filtration and retention; large wood and organic material recruitment and retention; streambank, shoreland, and floodplain stability; and the provision of habitat and travelways for a wide variety of species.

(e) Tactical Basin Planning.

(1) Pursuant to 10 V.S.A. § 1253, the Secretary is required to adopt tactical basin plans. Such plans inventory the existing and potential causes and sources of pollution that may impair the waters. Tactical basin plans establish a strategy to improve or restore waters, and to ensure full support of uses. Tactical basin plans serve as the guide, consistent with applicable state and federal law, for how various sources of pollution within each basin will be managed in order to achieve compliance with these rules. The Secretary is required by state law to revise all 15 tactical basin plans on a five-year rotating basis.

(2) As part of the tactical basin planning process, public participation shall be sought to identify and inventory problems, solutions, high quality waters, existing uses and the quality of such uses, and significant resources of high public interest.

(3) In preparing tactical basin plans, the Secretary shall, to the extent required by applicable law, consider all relevant aspects of approved municipal plans and regional plans adopted under 24 V.S.A. Chapter 117 and coordinate and cooperate with the Secretary of the Agency of Agriculture, Food and Markets as provided for in 6 V.S.A. Chapter 215.

(4) Each tactical basin plan shall identify strategies, where necessary, by which to allocate levels of pollution between various sources as well as between individual discharges. Tactical basin plans shall, to the extent appropriate, contain specific recommendations by the Secretary that include the identification of all known existing uses, any recommended changes in classification and designation of waters,

including reclassifying waters' uses from Class B(2) to a higher classification level and designating waters as Outstanding Resource Waters, schedules and funding for remediation, stormwater management, riparian zone management, and other measures or strategies pertaining to the enhancement and maintenance of the quality of waters within the basin.

(5) Upon adoption of a tactical basin plan, the Secretary shall promptly initiate rulemaking and shall give due consideration to the recommendations contained in the tactical basin plan.

(f) Hydrology Policy.

(1) The proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing, dams, diversions, and other control structures. These rules, in conjunction with other applicable law, provide a means for determining conditions which preserve~~, to the extent practicable,~~ the natural flow regime of waters.

(2) When determining necessary streamflows or conditions necessary to further the goals of this policy through application of the applicable ~~Agency of Natural Resources~~ procedures or regulations, the Secretary, as provided for in 10 V.S.A. § 1003, may cooperate with appropriate federal, state, municipal, and private interests ~~in achieving voluntary agreements relating to artificial streamflow regulation that~~ to assure consistency with these rules.

§ 29A-104 Classification of Water Uses

(a) Uses for waters are classified separately. A body of water may be assigned different classifications for different uses. For each use, management objectives and associated criteria for those objectives are presented by classification level in § 29A-306 of these rules.

(b) All waters of the State shall be managed to support their designated and existing uses. Existing classifications of water uses shall be maintained unless reclassified in a manner consistent with the Act and in compliance with all applicable federal requirements, including 40 C.F.R. § 131.10(g).

(c) Recommendations for use reclassification shall be made during the tactical basin planning process or by the Department of Environmental Conservation on a case-by-case basis. Pursuant to 10 V.S.A. § 1253, on the Secretary's own motion, or on receipt of written request that the Secretary adopt, amend, or repeal a reclassification rule, the Secretary shall comply with 3 V.S.A. § 806 and may initiate a rulemaking proceeding to reclassify one or more uses of all or any portion of the affected waters in the public interest.

(d) The designated uses are:

(1) Aquatic biota and wildlife that may utilize or are present in the waters;

(2) Aquatic habitat to support aquatic biota, wildlife, or plant life;

~~(6~~3) The use of waters for the enjoyment of aesthetic conditions;

~~(3) The use of waters for swimming and other primary contact recreation;~~

(~~4~~4) The use of waters for boating and related recreational uses;

(~~5~~5) The use of waters for fishing and related recreational uses;

~~(6) The use of waters for the enjoyment of aesthetic conditions;~~

(6) The use of waters for swimming and other primary contact recreation;

(7) The use of the water for public water source; and

(8) The use of water for irrigation of crops and other agricultural uses.

(e) For all Class I and II wetlands, as defined in 10 V.S.A. § 902, the uses to be protected include the functions and values of the wetland as described in Section 5 of the Vermont Wetland Rules.

§ 29A-105 Antidegradation Policy

(a) General. All waters shall be managed in accordance with these rules to protect, maintain, and improve water quality.

(b) Protection and Determination of Existing Uses.

Existing uses of waters and the level of water quality necessary to protect those existing uses shall be maintained and protected regardless of the water's classification. Determinations of what constitute existing uses of particular waters shall be made either during the basin planning process or on a case-by-case basis during consideration of an application. The use of waters to receive or transport discharges of waste shall not constitute an existing use for purposes of these rules. In ~~making a determination of~~determining the existing uses to be protected and maintained under this section and all other sections of these rules, the Secretary shall consider the designated uses, and at least the following factors:

(1) Aquatic biota and wildlife that utilize or are present in the waters;

(2) Habitat that supports or is capable of supporting aquatic biota, wildlife, or plant life;

(3) The use of the waters for recreation or fishing;

(4) The use of the water for public water source, or commercial activity that depends directly on the preservation of an existing high level of water quality; and

(5) For factors (1) and (2) above, evidence of the use's ecological significance in the functioning of the ecosystem or evidence of the use's rarity.

(c) Protection and Maintenance of High Quality Waters.

(1) Waters the existing quality of which exceeds any applicable water quality criteria provide important environmental, economic, social, and other benefits to the people of the State. Except as provided in subdivision (2) of this subsection, such waters shall be managed to maintain and protect the higher water quality and minimize risk to existing and designated uses. In all cases, the level of water quality necessary to maintain and protect all existing uses as well as applicable water quality criteria shall be maintained.

(2) A limited reduction in the existing higher quality of such waters may be allowed only when it is shown that:

(A) through the applicable permitting or approval process, the Secretary has provided public notice of the draft decision and an opportunity for public comment on the decision;

(B) after an analysis of alternatives, allowing lower water quality is necessary to prevent substantial adverse economic or social impacts on the people of the State; and

(C) there shall be achieved the highest statutory and regulatory requirements for all new or existing point sources, and all cost effective and reasonable best management practices for nonpoint source control, consistent with state law.

(3) The analysis of alternatives required under subdivision (c)(2)(B) of this subsection shall evaluate a range of alternatives that would prevent or lessen the degradation associated with the proposed activity. When the analysis identifies one or more practicable alternatives, the Secretary shall only find that a lowering is necessary if one such practicable alternative is selected for implementation. For purposes of this section, "practicable" means technologically possible, able to be put into practice, and economically viable.

(4) To the extent any reduction in the quality of high quality waters is allowed, such reduction shall be limited to that which complies with subdivision (c)(2) of this subsection.

(d) Protection of Outstanding Resource Waters. The Secretary may under 10 V.S.A. § 1424a designate certain waters as Outstanding Resource Waters. Outstanding Resource Waters are listed in Appendix H of these rules. Where the Secretary so designates such waters for specific exceptional natural, recreational, cultural, or scenic values, their existing quality, associated with the values for which they have been designated, shall, at a minimum, be protected and maintained.

(e) Protection of Wetlands. Wetlands and their functions and values shall be protected as described by the Vermont Wetland Rules.

§ 29A-106 Discharge Policy

(a) Discharge Criteria. In addition to the other provisions of these rules, new discharges of wastes may be allowed only when all the following criteria are met:

(1) The proposed discharge is in conformance with all applicable provisions of these rules including the classification of the receiving waters adopted by the Secretary as set forth in Appendix F of these rules.

(2) There is neither an alternative method of waste disposal, nor an alternative location for waste disposal, that would have a lesser impact on water quality including the quality of groundwater, or if there is such an alternative method or location, it would be clearly unreasonable to require its use.

(3) The design and operation of any waste treatment or disposal facility is adequate and sufficiently reliable to ensure the full support of uses and to ensure compliance with these rules and with all applicable state and federal treatment requirements and effluent limitations.

(4) Except as provided for in 10 V.S.A. § 1259(d) and (f), the discharge of wastes other than nonpolluting wastes and stormwater runoff is prohibited in Class A(1) and A(2) waters regardless of the degree of treatment provided.

(5) Except as provided for in 10 V.S.A. § 1259, the discharge of wastes that, prior to treatment, contained organisms pathogenic to human beings into waters is prohibited.

(6) The receiving waters will have sufficient assimilative capacity to accommodate the proposed discharge.

(7) Assimilative capacity has been allocated to the proposed discharge consistent with the classification set forth in Appendix F of these rules.

(8) The discharge of wastes to the thermocline or hypolimnion of any lake in manner that may prevent the full support of uses is prohibited.

(9) The discharge of sewage into Class B(1) or B(2) waters shall not pose more than a negligible risk to public health. Compliance with this criterion shall include an assessment of both the level and reliability of treatment achieved and the impact of the discharge on the water quality of the receiving waters.

(b) Assimilative Capacity. The capacity of waters to assimilate both the discharge of wastes and the impact of other activities that may adversely affect water quality, and at the same time to be maintained at a level of water quality that is compatible with their classification, is finite. The Secretary may hold a portion of the assimilative capacity in reserve to provide for future needs, including the abatement of future sources of pollution and future social and economic development. Accordingly, the assimilative capacity of waters shall be carefully allocated in accordance with the "Wasteload Allocation Process" as adopted by the Secretary.

(c) Compliance Schedules. A permit issued pursuant to Vermont's federally- delegated National Pollutant Discharge Elimination System (NPDES) program may, when appropriate, specify a schedule leading to compliance with the Vermont and Federal Clean Water Acts and regulations. The purpose of a schedule of compliance generally is

to afford a permittee adequate time to comply with one or more permit requirements or limitations that are based on new, newly interpreted or revised water quality standards that became effective after both issuance of the initial permit for a discharge and July 1, 1977. For a permit requirement or limitation that is based on such a new, newly interpreted, or revised water quality standard, the Secretary may include a schedule of compliance in a permit at the time of permit reissuance or modification where the permittee either cannot comply with the permit requirement or limitation, or there is insufficient information available to determine whether the permittee can comply with the permit requirement or limitation. A schedule of compliance shall require compliance at the earliest possible time, as determined by the Secretary. A schedule of compliance shall include dates for specified tasks or activities leading to compliance and may include interim effluent limitations, as the Secretary deems appropriate. This provision does not limit the Secretary's authority to include compliance schedules in permits as provided by state law.

§ 29A-107 Interpretation

The Secretary may issue declaratory rulings regarding the water quality standards pursuant to 10 V.S.A. § 1252(f).

Subchapter 2. APPLICATION OF STANDARDS

§ 29A-201 Sampling and Analysis

All numeric water quality criteria shall be applied by rounding to the nearest significant number in accordance with standard mathematic practice. For the purposes of these rules, sample collection, preservation, handling and analysis shall conform as closely as practicable to methods established in the most current edition or publication of any of the following sources:

(1) "Standard Methods f~~F~~or the Examination of Water and Wastewaters," Public Health Association, New York.

(2) "American Society for Testing and Materials," part 23, "Water; Atmospheric Analysis," American Society for Testing and Materials.

(3) "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency.

(4) "Microbiological Methods for Monitoring the Environment - Water and Wastes," U.S. Environmental Protection Agency.

(5) The "Quality Assurance Program and Project Plan" prepared by the Secretary and as approved by EPA.

(6) Any applicable practice or procedure adopted by the Secretary under the provisions of 3 V.S.A. § 835 or any rule adopted as part of the "Vermont Water Pollution Control Permit Regulations" under the provisions of 3 V.S.A. § 836.

(7) Any applicable practices or procedures adopted by the Secretary for conducting nonpoint source pollution monitoring. Such procedures shall be adopted after public notice and comment. Until such procedures are adopted, nonpoint source pollution monitoring shall be conducted in accordance with generally accepted scientific monitoring or evaluation methodologies which the Secretary determines to be appropriate.

§ 29A-202 Flow Values Used to Evaluate Compliance with Applicable Numeric Criteria for Rivers, Streams, Brooks, Creeks, and Riverine Impoundments

(a) Natural Flow Regime. Where the natural flow regime is not altered or substantially influenced by any human-made structure or device, compliance with the applicable numeric water quality criteria shall be calculated on the basis of the 7Q10 flow value unless an alternate flow statistic is specified in Section 3-01 of these rules. This rule shall not be construed to allow less than normal design operation of any treatment facility during periods of low streamflow or to otherwise waive the terms of any permit.

(b) Natural Flow Regime Altered by Human-made Structures.

(1) Where there is a Minimum Flow Agreement or requirement. For waters where the natural flow regime is altered by a human-made structure and where a minimum flow agreement or requirement has been established under 10 V.S.A. § 1003 or pursuant to a Section 401 Water Quality Certification, issued pursuant to the "Vermont Water Pollution Control Permit Regulations", compliance with the applicable numeric water quality criteria shall be calculated on the basis of the 7Q10 flow value or at the agreed/required minimum flow, whichever is less, unless an alternative flow statistic is specified in § 29A-304 of these rules.

(2) Where there is no Minimum Flow Agreement or requirement. For waters where the natural flow regime is altered by human-made structures and where no minimum flow agreement or requirement has been established, compliance with the applicable numeric water quality criteria shall be calculated on the basis of the 7Q10 flow value or at the absolute low flow resulting from flow regulation, whichever is less, unless an alternative flow statistic is specified in § 29A-304 of these rules.

§ 29A-203 Nonpoint Source Pollution

(a) Policy.

(1) The State of Vermont recognizes that certain wastes from nonpoint sources, including nonpoint source waste from agricultural or silvicultural activities, are of such a nature that strategies required by the Act or by 6 V.S.A. Chapter 215, and those strategies developed in the tactical basin planning process, represent a practicable basis for achieving compliance with these rules.

(2) In implementing subdivision (a)(1) of this subsection, the Secretary and the Secretary of the Agency of Agriculture, Food and Markets are encouraged to exercise the full range of discretion authorized by the Act and 6 V.S.A. Chapter 215 and to manage discharges of nonpoint source waste in a practical and cost-effective manner, consistent with the provisions of these rules.

(b) Use of Management Practices and Planning.

(1) The requirements of these rules for any activity causing a nonpoint source discharge shall be presumed to be satisfied when the activity is in compliance with the RAPs, if applicable; is in compliance with the AMPs, if applicable; or is in compliance with BMPs required by statute, rule, permit, order, or other legally enforceable mechanism.

(2) Any presumption provided by this section shall be negated when a water quality analysis conducted according to § 29A-201(7) of these rules demonstrates that there is a violation of these rules.

§ 29A-204 Special Zones

(a) Mixing Zones.

(1) Designation. Mixing zones shall not be created in any Class A(1) or A(2) water. In Class B(1) and B(2) waters the Secretary may, in conjunction with the issuance of a permit, designate a specific portion of the receiving waters not exceeding 200 feet from the point of discharge as a mixing zone for any waste that has been properly treated to comply with all applicable state and federal treatment requirements and effluent limitations. Within any mixing zone the Secretary may, in accordance with the terms of a permit, waive specific provisions of §§ 29A-105, 302, 303, and 306 of these rules when consistent with the criteria in subdivision (2) of this subsection, provided that the quality of the waters outside of the mixing zone complies with all applicable provisions of these rules.

(2) Mixing Zone Criteria. The Secretary shall ensure that conditions due to discharges of waste within any mixing zone shall:

(A) Not result in a significant increase in public health risk when evaluated using reasonable assumptions about exposure pathways;

(B) Not constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses in the receiving waters outside the mixing zone;

(C) Not kill organisms passing through the mixing zone;

(D) Protect and maintain the existing uses of the waters;

(E) Be free from materials in concentrations that settle to form objectionable deposits;

(F) Be free from floating debris, oil, scum, and other material in concentrations that form nuisances;

(G) Be free from substances in concentrations that produce objectionable color, odor, taste, or turbidity; and

(H) Be free from substances in concentrations that produce undesirable aquatic life or result in a dominance of nuisance species.

(b) Waste Management Zones.

(1) Designation. The designation of waste management zones is provided for in 10 V.S.A. § 1252(b)-(d). In Class B(1) and B(2) waters the Secretary may, in conjunction with the issuance of a permit for the direct discharge of properly treated wastes that prior to treatment contained organisms pathogenic to human beings, designate a specific portion of the receiving waters as a waste management zone when the criteria in subdivision (2) of this subsection are met. Waste management zones shall not be created in any Class A(1) or A(2) water. Within such zones, all water quality criteria shall be met.

(2) Waste Management Zone Criteria. The Secretary shall ensure that, in addition to complying with all other applicable provisions of the statute and these rules, any waste management zone meets the following criteria:

(A) It shall be the minimum length necessary to accommodate the authorized discharge;

(B) It shall be consistent with the Antidegradation Policy, § 29A-105 of these rules;

(C) It shall not result in significantly increased health risks when evaluated using reasonable assumptions about exposure pathways;

(D) It will be located and managed so as to not result in more than a negligible increased risk to public health adjacent to or downstream of the waste management zone; and

(E) It will not constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses.

§ 29A-205 Public Water Source

(a) Designation. In accordance with 10 V.S.A. § 1252, waters that are managed for the purpose of public water sources may be designated in Appendix F as Class A(2) Public Water Sources.

(b) Public Water Source Management. In accordance with 10 V.S.A. § 1250, it is the policy of the State of Vermont that public water sources shall be managed in a manner that assures compliance with these rules. The Secretary is encouraged to exercise the full range of discretion consistent with 10 V.S.A. Chapters 47 and 56 to manage public water sources to achieve such compliance.

§ 29A-206 Water Quality Certifications Issued Pursuant to § 401 of the Clean Water Act

(a) Section 401 of the CWA requires that for any federally licensed or permitted activity that may result in a discharge into waters of the United States, the State issue, waive, or deny water quality certification ensuring the discharge will comply with all applicable water quality requirements (33 U.S.C. § 1341).

(b) A water quality certification shall not be issued unless the applicant demonstrates all of the following:

(1) There is no practicable alternative to the proposed activity that would have a less adverse impact on waters and wetlands of the State, and provided that any proposed alternative shall not have other significant adverse human health, safety, or environmental consequences. An alternative is considered practicable if it is available and capable of being completed after taking into consideration cost, existing technology, and logistics in light of overall purposes of the proposed activity.

(A) Projects that are not likely to have significant impacts on water quality or wetland functions or values; railroad projects; or State or municipal road or highway projects do not require an analysis of practicable alternatives.

(B) Failure to comply with the requirements of this section shall not be the basis for denial of an application for a certification under Section 401 of the Clean Water Act if the proposed activity is exempt from those requirements under a rule adopted by the Secretary.

(2) There is reasonable assurance that the discharge will not result in a violation of these rules, including any applicable water quality criteria and the Anti-degradation policy articulated in these rules.

(c) Any certification issued by the State shall establish conditions necessary to ensure that the federally licensed or permitted activity will comply with these rules, as well as with any other appropriate requirement of state law, including:

(1) 10 V.S.A. chapter 37 (wetlands protection and water resources management);
(2) 10 V.S.A. chapter 41 (regulation of stream flow);
(3) 10 V.S.A. § 1264 (stormwater management);
(4) 29 V.S.A. chapter 11 (management of lakes and ponds); and
(5) The Agency of Natural Resources Rules for Water Withdrawals for Snowmaking.

(d) The Secretary may issue a certification required by this subsection to any general permit or authorization issued by a federal agency. An applicant's compliance with that federal permit or authorization shall be presumed to be in compliance with the certification unless the Secretary determines that an individual review of the applicant's activity is necessary to assure compliance with the Vermont Water Quality Standards and other appropriate State laws.

(e) Public noticing of § 401 Water Quality Certification application, draft decision, and final decision.

(1) The applicant shall provide notice of their § 401 Water Quality Certification application to any person or adjoining property owner that receives notice of the federal license or permit application for which the § 401 Water Quality Certification is sought. Adjoining property owners are those whose property adjoins the waterbody or aquatic site where the work is being proposed.

(2) The Secretary shall provide notice of an administratively complete application through the environmental notice bulletin.

(3) The Secretary shall provide notice of the draft decision through the environmental notice bulletin and shall post the draft decision to the bulletin.

(4) The Secretary shall provide a public comment period of no less than 30 days.

(5) Any person may request a public meeting on the draft decision issued under this section within 14 days of the issuance of the draft decision. The Secretary shall hold a public meeting whenever any person files a written request for such a meeting. The Secretary otherwise may hold a public meeting at his or her discretion.

(6) The Secretary shall provide at least 14 days' notice of the public meeting through the environmental notice bulletin. If the notice of the public meeting is not issued at the same time as the draft decision or draft general permit, the Secretary also shall provide notice of the public meeting in the same manner as required for the draft decision or permit.

(7) The Secretary shall provide notice of the final decision through the environmental notice bulletin and shall post the final decision or permit to the bulletin. When the Secretary issues the final decision, the Secretary shall provide a response to comments.

Subchapter 3. WATER QUALITY CRITERIA

§ 29A-301 Natural Influences

Waters in which one or more applicable water quality criteria are not met due to natural influences shall not ~~be considered to~~ be in noncompliance with respect to such criteria. In such waters, activities may be specifically authorized by a permit, provided that those activities do not further reduce the quality of the receiving waters and would comply with all other applicable criteria.

§ 29A-302 Criteria Applicable to Waters Based upon Fish Habitat Designation, Use Classification, or Type of Body of Water

The following water quality criteria shall be achieved in waters, as specified below:

(1) Temperature.

(A) General. The change or rate of change in temperature, either upward or downward, shall be controlled to ensure full support of aquatic biota, wildlife, and aquatic habitat uses. For the purpose of applying this criterion, ambient temperature shall mean the water temperature measured at a control point determined by the Secretary to be outside the influence of a discharge or activity.

(B) Cold Water Fish Habitat. Waters that are cold water fish habitat shall meet the following standards, as applicable, except as provided for in subdivision (D) of this subsection.

(i) Class A(1) Waters for Fishing. No increase in ambient temperature from the natural condition.

(ii) Class B(1) Waters for Fishing.

(I) If the maximum temperature is below 68°F as a rolling seven-day mean of maximum daily water temperatures for the entire period from June 1 to

September 30 of any year, the total increase from the ambient temperature due to all discharges and activities shall not exceed 1.0°F.

(II) If the maximum temperature is above 68° F as a rolling seven-day mean of maximum daily water temperatures for the entire period from June 1 to September 30 of any year, there shall be no increase in temperature due to all discharges and activities.

(iii) Class A(2) and B(2) Waters for Fishing. The total increase from the ambient temperature due to all discharges and activities shall not exceed 1.0°F.

(C) Warm Water Fish Habitat. The total increase from the ambient temperature due to all discharges and activities shall not exceed the following temperature criteria, except as provided for in subdivision (D) of this subsection.

(i) Lakes, Ponds, and Reservoirs not including Riverine Impoundments.

(I) For waters with an ambient temperature above 60°F, the total temperature change shall not exceed 1°F.

(II) For waters with an ambient temperature between 60°F and 50°F, the total temperature change shall not exceed 2°F.

(III)For waters with an ambient temperature below 50°F, the total temperature change shall not exceed 3°F.

(ii) Rivers, Streams, Brooks, Creeks, and River Impoundments.

(I) For waters with an ambient temperature above 66°F, the total temperature change shall not exceed 1°F.

(II) For waters with an ambient temperature between 63°F and 66°F, the total temperature change shall not exceed 2°F.

(III) For waters with an ambient temperature between 59°F and 62°F, the total temperature change shall not exceed 3°F.

(IV) For waters with an ambient temperature between 55°F and 58°F, the total temperature shall not exceed 4°F.

(V) For waters with an ambient temperature below 55°F, the total temperature change shall not exceed 5°F.

(D) Assimilation of Thermal Wastes. The Secretary may, by permit condition, specify temperature limits that exceed the values specified above in order to authorize discharges of thermal wastes when it is shown that:

(i) The discharge will comply with all other applicable provisions of these rules;

(ii) A mixing zone of 200 feet in length is not adequate to provide for assimilation of the thermal waste; and

(iii) After taking into account the interaction of thermal effects and other wastes, that change or rate of change in temperature will not result in thermal shock or prevent the full support of uses of the receiving waters.

(2) Phosphorus.

(A) In all waters, total phosphor~~o~~us loadings shall be limited so that they will not contribute to the acceleration of eutrophication or the stimulation of the growth of aquatic biota in a manner that prevents the full support of uses.

(B) For lakes, ponds, or reservoirs that have drainage areas of less than 40 square miles and a drainage area to surface area ratio of less than 500:1, and their tributaries:

(i) In addition to compliance with subdivision (A) of this subsection, there shall be no significant increase over currently permitted phosphorus loadings. Discharges to tributaries shall not increase in-stream conditions by more than 0.001 mg/l at low median monthly flow. Indirect discharges to lakes, ponds, or reservoirs shall not increase total dissolved phosphorus as measured in the groundwater 100 feet from the mean water level of the lake, pond, or reservoir by more than 0.001 mg/l.

(ii) Applicable basin plans, other applicable plans, permit limitations, and other measures adopted or approved by the Secretary, may define "no significant increase" so as to allow new or increased discharges of phosphorus, only when the permit for such discharges provides for a corresponding reduction in phosphorus loadings to the receiving waters in question.

(C) For Lake Champlain and Lake Memphremagog. All discharges into each of the lake segments identified in Table 1, or into tributaries within the basin, shall comply with the applicable Total Maximum Daily Load (TMDL), tactical basin plans, other applicable plans, permit limitations, and any other measures adopted or approved by the Secretary reasonably designed to achieve the criteria in Table 1.

Table 1. Phosphorus Criteria for Segments Within Lake Champlain and Lake Memphremagog.

Lake Segment (See Appendix B)		Phosphorus Criterion (mg/L as P)[1]
Lake Champlain		
	Main Lake	0.010
	Malletts Bay	0.010
	Burlington Bay	0.014
	Shelburne Bay	0.014
	Northeast Arm	0.014
	Isle LaMotte	0.014

	Otter Creek	0.014
	Port Henry	0.014
	St. Albans Bay	0.017
	Missisquoi Bay	0.025
	South Lake A	0.025
	South Lake B	0.054
Lake Memphremagog		
	Main Lake	0.014
	South Bay	0.025

1. These criteria shall be achieved as the annual mean total phosphorus concentration in the photosynthetic depth (euphotic) zone in central, open water areas of each lake segment.

(3) Nitrates.

(A) In all waters nitrates shall be limited so that they will not contribute to the acceleration of eutrophication, or the stimulation of the growth of aquatic biota, in a manner that prevents the full support of uses.

(B) For lakes, ponds, and reservoirs, not including riverine impoundments, levels of nitrate not to exceed 5.0 mg/l as NO_3-N (nitrate-nitrogen) regardless of classification.

(C) For rivers and streams, levels of nitrate:

(i) Not to exceed 0.20 mg/l, as NO_3-N at flows exceeding low median monthly flows, in Class A(1) and A(2) waters above 2,500 feet altitude, National Geodetic Vertical Datum.

(ii) Not to exceed 2.0 mg/l as NO_3-N at flows exceeding low median monthly flows, in Class A(1) and A(2) waters at or below 2,500 feet altitude, National Geodetic Vertical Datum.

(iii) Not to exceed 5.0 mg/l as NO_3-N at flows exceeding low median monthly flows, in Class B(1) and B(2) waters.

(4) Turbidity.

(A) Class A(1) and A(2) Waters for Any Use or Cold Water Fish Habitat. Turbidity levels not to exceed 10 NTU (~~nepholometric~~ nephelometric turbidity units) as an annual average under dry weather base-flow conditions.

(B) All Other Waters. Turbidity levels not to exceed 25 NTU as an annual average under dry weather base-flow conditions.

(5) Dissolved Oxygen. The dissolved oxygen criteria are instantaneous minimum values.

(A) Cold Water Fish Habitat.

(i) In waters that the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource, not less than 7 mg/l and 75% saturation at all times, nor less than 95% saturation during late egg maturation and larval development of salmonids.

(ii) All Other Waters. Not less than 6 mg/l and 70% saturation at all times.

(B) Warm Water Fish Habitat. Not less than 5 mg/l and 60% saturation at all times.

§ 29A-303 General Criteria Applicable to all Waters

The following water quality criteria shall be achieved in all waters, regardless of their classification:

(1) Sludge deposits or solid refuse. None.

(2) Settleable solids, floating solids, oil, grease, scum, or total suspended solids. None in such concentrations or combinations that would prevent the full support of uses.

(3) Taste and Odor. None that would prevent the full support of uses or have an adverse effect on the taste or odor of fish.

(4) Color. No change from the natural condition that would prevent the full support of uses.

(5) Alkalinity. No change from the natural condition that would prevent the full support of uses.

(6) pH. pH values shall be maintained within the range of 6.5 and 8.5. Both the change and the rate of change in pH values shall be controlled to ensure the full support of uses.

(7) Toxic substances.

(A) General criteria. Waters shall be managed to prevent the discharge of toxic substances in concentrations, quantities, or combinations that exceed:

(i) For toxic substances that are carcinogenic, a maximum individual lifetime risk to human health greater than 10^{-6};

(ii) For toxic substances that are noncarcinogenic, a maximum individual lifetime risk of no adverse effect to human health; or

(iii) Acute or chronic toxicity to aquatic biota or wildlife.

(B) Human health--based criteria.

(i) In rivers, streams, brooks, creeks, and riverine impoundments, the human health based toxic pollutant criteria listed in Appendix C shall be applied at the median annual flow for toxic substances that are classified as known, probable, or possible human carcinogens or at the 7Q10 flow for toxic

substances that are classified as threshold toxicants (not known or probable carcinogens).

(ii) In all other waters, the human health based toxic pollutant criteria listed in Appendix C shall apply at all times.

(C) Aquatic biota-based criteria.

(i) In rivers, streams, brooks, creeks, and riverine impoundments, the aquatic biota based toxic pollutants criteria that prevent acute or chronic toxicity listed in Appendix C shall be applied at 7Q10 flows. For chronic criteria that utilize 30-day average, 30Q10 flows shall apply. The 30Q10 flow is a biologically based design flow used to protect aquatic life from chronic effects.

(ii) In all other waters, the aquatic biota based toxic pollutant criteria for acute or chronic toxicity listed in Appendix C shall apply at all times.

(D) Other toxic substances.

(i) Where numeric criteria for a toxic substance are not established by these rules, the Secretary may establish such criteria consistent with subsection (7) of this section, based on the procedures set forth in the Vermont Toxic Discharge Control Strategy (1994).

(ii) In establishing such limits, the Secretary shall give consideration to the potential for bio-accumulation as well as any antagonistic or synergistic relationship that may exist between the wastes being discharged and the concentration of other wastes or constituents in the receiving waters.

(8) Radioactive Substances.

(A) Waters shall be managed to prevent the discharge of radioactive substances in concentrations, quantities, or combinations that may create a significant likelihood of an adverse impact on human health or a risk of acute or chronic toxicity of aquatic biota or wildlife. Unless otherwise required by these rules, the Secretary shall determine limits for discharges containing radioactive substances based on the results of biological toxicity assessments and the appropriate available scientific data, including:

(i) The Vermont State Health Regulation, Part 5, Chapter 3 "Radiological Health," effective as of January 1, 2010.

(ii) 10 C.F.R. Part 50, Appendix I.

(B) The discharge of radioactive substances shall not exceed the lowest limits which are reasonably achievable.

§ 29A-304 Hydrology Criteria

(a) General. To effectively implement the water conservation and hydrology policies set forth in § 29A-103 of these rules, and to ensure full support of uses, the following hydrology criteria shall be achieved and maintained, where applicable. Where there are

multiple activities that affect flow in a watershed, a determination of compliance with the following criteria shall include consideration of the cumulative effects of these activities.

(b) Streamflow Protection.

(1) Class A(1) Waters for Aquatic Habitat. Changes from the natural flow regime shall not cause the natural flow regime to be diminished, in aggregate, by more than 5% of 7Q10 at any time;

(2) Class B(1) Waters for Aquatic Habitat. Changes from the natural flow regime, in aggregate, shall not result in natural flows being diminished by more than a minimal amount provided that all uses are fully supported; and when flows are equal to or less than 7Q10, by not more than 5% of 7Q10. The method for ensuring compliance with this subsection is a site-specific flow study or studies.

(3) Class A(2) and B(2) Waters for Aquatic Habitat or Recreation – Boating. Any change from the natural flow regime shall provide for maintenance of flow characteristics that ensure the full support of uses and comply with the applicable water quality criteria. The preferred method for ensuring compliance with this subsection is a site-specific flow study or studies. In the absence of ~~site~~ site-specific studies, the Secretary may establish hydrologic standards and impose additional hydrologic constraints, consistent with any applicable Agency of Natural Resources rule or procedure, to ensure compliance with the requirements of this subsection.

(c) Flow Study Requirements.

(1) Parameters for study-based, site-specific streamflow protection requirements. Site specific studies shall be sufficiently based on scientific knowledge so that the study will aid in the Secretary's consideration of appropriate site-specific flow criteria. In the case of aquatic habitat studies, those methodologies that are acceptable for determining streamflow protection requirements pursuant to this section include ~~the Instream Flow Incremental Methodology (IFIM)~~hydraulic habitat studies, as well as other comparable methods of evaluation deemed appropriate by the Secretary, provided that such evaluation complies with each of the following requirements:

(A) the methodology is tailored to provide information from which to determine the relationship between aquatic habitat and streamflow;

(B) the methodology, or the scientific evaluations upon which it is based, have been subjected to peer review and evaluation, and the results of such peer review and evaluation support the conclusion that the methodology is generally acceptable.

(2) Proposals for developing site-specific flow criteria. When considering proposals for developing site-specific flow criteria in conjunction with review of an application, the Secretary may first require the filing of a study plan that defines the method to be used and provides any study details that the Secretary deems necessary, and, in the case of a study designed to evaluate the relationship between aquatic habitat and streamflow, the Secretary shall make a ruling as to the acceptability of the methodology. The Secretary need not consider any flow study unless the study plans

have obtained the Secretary's approval. The plan may include Agency of Natural Resources oversight during study execution and study refinement and modification as the study proceeds. The Secretary should also establish a procedure by which completeness of the evidence in support of the proposed ~~study~~ study-based flow could be determined prior to the Secretary's determination on the application. If the proposal is determined to be incomplete, or if the methodology which is employed is unacceptable to the Secretary, the Secretary shall issue a written request for the submission of additional evidence, with general instructions to the applicant as to the deficiency of the evidence previously submitted.

(d) Water Level Fluctuations.

(1) Class A(1) and B(1) Waters for Aquatic Habitat. Manipulation of the water level of lakes, ponds, reservoirs, riverine impoundments, and any other waters shall result in no more than a minimal deviation from the natural flow regime.

(2) Class A(2) and B(2) Waters for Aquatic Habitat or Recreation – Boating. Lakes, ponds, reservoirs, riverine impoundments, and any other waters may exhibit artificial variations in water level when subject to water level management, but only to the extent that such variations ensure full support of uses.

(e) High Flow Regime.

(1) Class A(1) and B(1) Waters for Aquatic Habitat. No change from the natural flow regime that would result in more than a minimal impact upon these waters.

(2) Class A(2) and B(2) Waters for Aquatic Habitat or Recreation – Boating. No change from the natural flow regime that would result in ~~runoff causing~~ a change in the timing or an increase in the frequency, magnitude, rate of change, or duration of peak flows adversely affecting channel integrity or prevent the full support of uses.

§ 29A-305 Numeric Biological Indices and Aquatic Habitat Assessments

(a) ~~In addition, t~~The Secretary ~~may~~ shall determine whether there is full support of the aquatic habitat use through ~~other~~ appropriate methods of evaluation, including ~~habitat assessments~~ hydrogeomorphic assessments of flow characteristics, physical habitat structure, and stream processes for rivers and streams and aquatic habitat studies for lakes, ponds, and reservoirs. Applicants shall obtain the Secretary's approval of study plans prior to conducting an evaluation.

(b) In addition to other applicable provisions of these rules and other appropriate methods of evaluation, the Secretary ~~may~~ shall establish and apply numeric biological indices to determine whether there is full support of the aquatic biota ~~and aquatic habitat~~ use~~s~~ for each class of water. In establishing numeric biological indices, the Secretary shall establish procedures that employ standard sampling and analytical methods to characterize the biological integrity of the natural condition using reference water bodies.

~~(a)~~(c) Standardized sampling and analytical methods used to characterize the biological integrity of these communities are provided in Appendix G of these rules. Characteristic measures of biological integrity include community level parameters such as: ~~-~~species

richness, diversity, relative abundance of tolerant and intolerant aquatic organisms, density, and the functional group composition.

~~(b) In addition, the Secretary may determine whether there is full support of the aquatic habitat use through other appropriate methods of evaluation, including habitat assessments.~~

§ 29A-306 Use-specific Management Objectives and Criteria by Class

(a) Aquatic Biota and Wildlife.

(1) Class A(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain excellent biological integrity and aquatic biota and wildlife consistent with waters in their natural condition.

(B) Biological Criteria. Measures of biological integrity for aquatic macroinvertebrate and fish assemblages consistent with waters in their natural condition.

(C) Nutrient Criteria. The nutrient criteria are in Table 2.

(2) Class B(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain very good biological integrity.

(B) Biological Criteria. Change from the natural condition for aquatic macroinvertebrate and fish assemblages limited to minor changes in the relative proportions of taxonomic ~~and~~ , functional, tolerant, and intolerant aquatic organisms ~~components~~. ~~Relative proportions of tolerant and intolerant aquatic organisms consistent with waters in their natural condition.~~

(C) Nutrient Criteria. The nutrient criteria are in Table 2.

(3) Classes A(2) and B(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain good biological integrity.

(B) Biological Criteria. Change from the natural condition for aquatic macroinvertebrate and fish assemblages not exceeding moderate changes in the relative proportions of taxonomic, functional, tolerant, and intolerant aquatic organisms.

(C) Nutrient Criteria. The nutrient criteria are in Table 2.

Table 2. Combined Nutrient Criteria for Aquatic Biota and Wildlife in Rivers and Streams[1]

	Class A(1)			Class B(1)			Classes A(2) and B(2)		
Stream Type[2]	Small, High-Gradient	Medium, High-Gradient	Warm-Water, Medium Gradient	Small, High-Gradient	Medium~~,~~ , High-Gradient	Warm-Water, Medium Gradient	Small, High-Gradient	Medium , High-Gradient	Warm-Water, Medium Gradien
Nutrient Concentrations									
Total Phosphorus (µg/L)[3]	10	9	18	10	9	21	12	15	27
Nutrient Response Conditions									
pH	Not to exceed 8.5 standard units.								
Turbidity	Consistent with the criteria in § 29A-302(4) of these rules.								
Dissolved Oxygen	Consistent with the criteria in § 29A-302(5) of these rules.								
Aquatic Biota	Consistent with the criteria under § 29A-305(a) of these rules.								

1. Compliance with nutrient criteria shall be achieved either by compliance with the nutrient concentration values specified above or by compliance with all nutrient response conditions. In situations where the applicable nutrient concentrations are achieved but the nutrient response conditions are not met as a result of nutrient enrichment, the Secretary may establish alternate nutrient concentration values on a site-specific basis, as necessary, to achieve compliance with the nutrient response conditions. All waters shall maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters.

2. Stream type determinations made by the Secretary are based on biological community types that relate to stream size, gradient, and elevation.

3. Not to be exceeded at low median monthly flow during June through October in a section of the stream representative of well-mixed flow.

(b) Aquatic Habitat.

(1) Class A(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain excellent quality aquatic habitat. The physical habitat structure, stream processes, and flow characteristics of rivers and streams and the physical ~~character~~ habitat and water level of lakes and ponds shall be managed consistent with waters in their natural condition.

(B) Criteria.

(i) Rivers and Streams. No change in flow characteristics, physical habitat structure, and stream processes outside the range of the natural condition.

(ii) Lakes, Ponds, and Reservoirs. No change in aquatic habitat measures outside the range of the natural condition.

(iii) Hydrology Criteria. Waters shall comply with the Hydrology Criteria in § 29A-304 of these rules.

(2) Class B(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain very high quality aquatic habitat. The physical habitat structure, stream processes, and flow characteristics of rivers and streams and physical ~~character~~ habitat and water level of lakes and ponds necessary to fully support all life-cycle functions of aquatic biota and wildlife, including overwintering and reproductive requirements, are maintained and protected.

(B) Criteria.

(i) Rivers and Streams. Changes to flow characteristics, physical habitat structure, and stream processes limited to minor differences from the natural condition and consistent with the full support of very high quality aquatic habitat.

(ii) Lakes, Ponds, and Reservoirs. Changes in aquatic habitat limited to minor differences from the natural condition and consistent with very high quality aquatic habitat.

(iii) Hydrology Criteria. Waters shall comply with the Hydrology Criteria in § 29A-304 of these rules.

(3) Classes A(2) and B(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain high quality aquatic habitat. The physical habitat structure, stream processes, and flow characteristics of rivers and streams and the physical ~~character~~ habitat and water level of lakes and ponds necessary to fully support all life-cycle functions of aquatic biota and wildlife, including overwintering and reproductive requirements, are maintained and protected.

(B) Criteria.

(i) Rivers and Streams. Changes to flow characteristics, physical habitat structure, and stream processes limited to moderate differences from the natural condition and consistent with the full support of high quality aquatic habitat.

(ii) Lakes, Ponds, and Reservoirs. Changes in aquatic habitat limited to moderate differences from ~~the~~ natural condition and consistent with high quality aquatic habitat. When such habitat changes are a result of water level fluctuation, compliance may be determined on the basis of aquatic habitat studies.

(iii) Hydrology Criteria. Waters shall comply with the Hydrology Criteria in § 29A-304 of these rules.

(c) Aesthetics.

(1) Class A(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain excellent aesthetic quality.

(B) Criteria.

(i) Rivers and Streams. Water character, flows, water level, bed and channel characteristics, and flowing and falling waters in their natural condition.

(ii) Lakes, Ponds, and Reservoirs. Refer to Table 3.

(2) Classes A(2) and B(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain very good aesthetic quality.

(B) Criteria.

(i) Rivers and Streams. Water character, flows, water level, bed and channel characteristics, and flowing and falling waters of very good aesthetic value.

(ii) Lakes, Ponds, and Reservoirs. Refer to Table 3.

(3) Class B(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain good aesthetic quality.

(B) Criteria.

(i) Rivers and Streams. Water character, flows, water level, bed and channel characteristics, and flowing and falling water of good aesthetic value.

(ii) Lakes, Ponds, and Reservoirs. Refer to Tables 1 and 3.

Table 3. Combined Nutrient Criteria for Aesthetics Uses in Lakes, Ponds, and Reservoirs Except for Lake Champlain and Lake Memphremagog[1,2]

	Class A(1)	Classes A(2) and B(1)	Class B(2)
Nutrient Concentrations			
Total Phosphorus[3] (µg/L)	12	17	18
Nutrient Response Conditions			
Secchi Disk Depth (meters)[4]	5.0	3.2	2.6
Chlorophyll-a (µg/L)[3]	2.6	3.8	7.0
pH	Not to exceed 8.5 standard units.		
Turbidity	Consistent with the criteria in § 29A-302(4) of these rules.		
Dissolved Oxygen	Consistent with the criteria in § 29A-302(5) of these rules.		

1. Compliance with nutrient criteria shall be achieved either by compliance with the nutrient concentration values specified above or by compliance with all nutrient response conditions. In situations where the applicable nutrient concentrations are achieved but the nutrient response conditions are not met as a result of nutrient enrichment, the Secretary may establish alternate nutrient concentration values on a site-specific basis, as necessary, to achieve compliance with the nutrient response conditions. All waters shall maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters.

2. Applies to lakes and reservoirs greater than 20 acres in surface area with a drainage area to surface area ratio less than 500:1, excluding Lake Champlain and Lake Memphremagog.

3. June through September mean not to be exceeded in the photosynthetic depth (euphotic) zone at a central location in the lake.

4. June through September mean not to be less at a central location in the lake.

(d) Recreation – Boating.

(1) Class A(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain excellent quality boating as compatible with the natural condition.

(B) Criteria. Boating to the full extent naturally feasible without degradation due to artificial flow and water level management or artificial physical impediments.

(2) Class B(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain very good quality boating.

(B) Criteria. Boating to the extent feasible with no more than minor degradation due to artificial flow and water level management or artificial impediments, and with appropriate mitigation for artificial physical impediments.

(3) Classes A(2) and B(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain a level of water quality compatible with good quality boating.

(B) Criteria. Waters shall comply with the Hydrology Criteria in § 29A-304 of these rules.

(e) Recreation – Fishing.

(1) Class A(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain excellent quality fishing consistent with the natural condition.

(B) Criteria.

(i) Measures of wild salmonid densities, biomass, and age composition consistent with those expected in waters in their natural condition.

(ii) Waters that are designated cold water fish habitat shall comply with the Temperature Criteria in §29A-302(B) of these rules.

(2) Class B(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain very good quality fishing.

(B) Criteria.

(i) Measures of wild salmonid densities, biomass, and age composition indicative of very good population levels.

(ii) Waters that are designated cold water fish habitat shall comply with the Temperature Criteria in § 29A-302(B) of these rules.

(3) Classes A(2) and B(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain a level of water quality compatible with good quality fishing.

(B) Criteria.

(i) Measures of wild salmonid densities, biomass, and age composition indicative of good population levels.

(ii) Waters that are designated cold water fish habitat shall comply with the Temperature Criteria in § 29A-302(B) of these rules.

(f) Recreation – Swimming and Other Primary Contact Recreation.

(1) Class A(1).

(A) Management Objectives. Waters shall be managed to achieve and maintain a level of water quality compatible with excellent quality swimming and other primary contact recreation with negligible risk of illness or injury from conditions that are a result of human activities.

(B) Criteria. *Escherichia coli* – Not to exceed a geometric mean of 126 organisms/100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100ml. None attributable to the discharge of wastes.

(2) Class A(2).

(A) Management Objectives. Waters shall be managed, as necessary, for consistency with use as a public water source. Where sustained direct contact with the water occurs, waters shall be managed to achieve and maintain a negligible risk of illness or injury from conditions that are a result of human activities.

(B) ~~Critiera~~Criteria. Waters shall comply with the *Escherichia coli* Criteria in subdivision (1)(B) of this subsection.

(3) Class B(1).

(A) Management Objectives. Where sustained direct contact with the water occurs, waters shall be managed to achieve and maintain a level of water quality compatible with very good quality swimming and other primary contact recreation with negligible risk of illness or injury from conditions that are a result of human activities.

(B) Criteria. *Escherichia coli* – Not to exceed a geometric mean of 126 organisms/100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml.

(~~3~~4) Class B(2).

(A) Management Objectives. Where sustained direct contact with the water occurs, waters shall be managed to achieve and maintain a level of water quality compatible with good quality swimming and other primary contact recreation with ~~very little~~negligible risk of illness or injury from conditions that are a result of human activities.

(B) Criteria. *Escherichia coli* – Not to exceed a geometric mean of 126 organisms/100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml. In waters receiving combined sewer overflows, the representative period shall be 30 days. The Secretary may, by permit condition, waive compliance with this criterion during all or any portion of the period between October 31 and April 1, provided that a health hazard is not created. The Secretary shall provide written notice to the Vermont Department of Health prior to issuing a permit waiving compliance with this criterion.

(g) Public Water Sources.

(1) Class A(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain a uniformly excellent character and a level of water quality highly suitable for use as a public water source with filtration and disinfection or other required treatment.

(B) Criteria. Waters shall comply with the *Escherichia coli* Criteria in subsection (f)(1)(B) of this section.

(2) Class B(2).

(A) Management Objectives. Waters shall be managed to achieve and maintain a level of quality that is suitable for use as a public water source with filtration and disinfection or other required treatment.

(B) Criteria. *Escherichia coli* – Not to exceed a geometric mean of 126 organisms/100ml obtained over a representative period of 60 days, and no more than 10% of samples above 235 organisms/100 ml. ~~Waters shall comply with the *Escherichia coli* Criteria in subsection (f)(2)(B) of this section.~~

(h) Irrigation of Crops and Other Agricultural Uses. Class B(2). Management Objectives. Waters shall be managed to achieve and maintain a level of quality that is suitable, without treatment, for irrigation of crops used for human consumption without cooking and suitable for other agricultural uses.

§ 29A-307 Classification of Waters

Pursuant to 10 V.S.A. § 1253, all waters are classified for one or more uses as Class A(1), A(2), B(1), or B(2). Appendix F of these rules lists the specific classifications for all waters.

§ 29A-308 Fish Habitat Designation

To provide for the protection and management of fisheries, waters are designated in Appendix A as being either a cold or a warm water fish habitat. Where appropriate, such designations may be seasonal.

Appendix A. FISH HABITAT DESIGNATION

§ A-01 Warm Water Fish Habitat

All wetlands, except those designated as cold water fish habitat in § A-02 of this appendix, and the following waters are designated as warm water fish habitat for purposes of these rules.

(1) Battenkill, Walloomsac, Hoosic (Basin 1)

(A) Lake Hancock (Sucker Pond), Stamford

(B) Thompsons Pond, Pownal

(2) Poultney, Mettawee, Southern Lake Champlain (Basins 2 & 4)

(A) All waters west of Vermont Route 22A.

(B) Austin Pond, Hubbardton

(C) Beebe Pond, Hubbardton

(D) Billings Marsh Pond, West Haven

(E) Burr Pond, Sudbury

(F) Coggman Pond, West Haven

(G) East Creek Site I, Orwell

(H) Echo Lake (Keeler Pond), Hubbardton/Sudbury

(I) Half Moon Pond, Hubbardton

(J) Hinkum Pond, Sudbury

(K) Lake Champlain south of the Crown Point Bridge.

(L) Lake Champlain, between the Crown Point Bridge and the Ferrisburg-Charlotte town boundary, where depths are less than 25 feet at Low Lake Level (93 feet NGVD) – June 1, through September 30, only.

(M) Lake Hortonia, Hubbardton/Sudbury

(N) Inman Pond, Fair Haven

(O) Lily Pond, Poultney

(P) Little Pond, Wells

(Q) Love’s Marsh, Castleton

(R) Mill Pond (Parson’s Mill Pond), Benson

(S) Northeast Developer's Pond, Wells

(T) Old Marsh Pond, Fair Haven

(U) Perch Pond, Benson

(V) Pine Pond, Castleton

(W) Poultney River from Carvers Falls in West Haven to its confluence with Lake Champlain

(X) Sunrise Lake, Benson/Orwell

(3) Otter Creek, Little Otter Creek, Lewis Creek (Basin 3)

(A) All waters lying west of Vermont Route 22A and south of the City of Vergennes.

(B) Brilyea East Pond, Addison

(C) Brilyea West Pond, Addison

(D) Chipman Lake (Tinmouth Pond), Tinmouth

(E) Danby Pond, Danby

(F) Fern Lake, Leicester

(G) Lemon Fair River

(H) Mud Pond, Leicester

(I) Otter Creek from the outfall of the Proctor wastewater treatment facility in Proctor, to its confluence with Lake Champlain, except that portion between the Beldens Dam and the Huntington Falls Dam in New Haven/Weybridge.

(J) Richville Pond, Shoreham

(K) Stone Bridge Pond, Panton/Addison

(L) Wallingford Pond, Wallingford

(4) Northern Lake Champlain (Basin 5)

(A) All streams, creeks, and brooks in Grand Isle County.

(B) Lake Carmi, Franklin

(C) Lake Champlain, between the Ferrisb~~e~~urg~~h~~-Charlotte town boundary and the Canadian boundary, where depths are less than 25 feet at Low Lake Level (93 feet NGVD) - June 1, through September 30, only.

(D) Bartlett Brook, South Burlington

(E) Cutler Pond, Highgate

(F) Englesby Brook, Burlington

(G) Holmes Creek, Charlotte,

(H) Indian Brook, Colchester from Vermont Routes 2 & 7 to its confluence with Lake Champlain.

(I) Jewett Brook, St. Albans Town

(J) Kimball Brook, Ferrisburgh

(K) Lake Iroquois, Hinesburg/Williston

(L) LaPlatte River from its confluence with Patrick Brook in Hinesburg extending downstream to the Spear Street extension bridge in Charlotte annually from the period June 1, through September 30, only.

(M) Long Pond, Milton

(N) Lower Lake, (Lake Sunset), Hinesburg

(O) Malletts Creek, Colchester, from Vermont Routes 2 & 7 to its confluence with Lake Champlain.

(P) McCabes Brook, Shelburne

(Q) Milton Pond, Milton

(R) Mud Creek Pond, Alburg

(S) Murr (Monroe) Brook, Shelburne

(T) Pond Brook, Colchester

(U) Potash Brook, South Burlington

(V) Rock River from the Canadian boundary to its confluence with Lake Champlain.

(W) Round Pond, Milton

(X) Rugg Brook, Georgia

(Y) St. Albans Reservoir (N), Fairfax

(Z) Stevens Brook, St. Albans

(AA) Trout Brook, Milton

(5) Missisquoi (Basin 6)

(A) Metcalf Pond, Fletcher

(B) Fairfield Pond, Fairfield

(C) Fairfield Swamp Pond, Fairfield

(D) Missisquoi River from the outfall of the Enosburg Falls wastewater treatment facility to the Swanton Dam Swanton.

(6) Lamoille (Basin 7)

(A) Arrowhead Mountain Lake, Milton/Georgia

(B) Flagg Pond, Wheelock

(C) Halfm~~a~~oon Pond, Fletcher

(D) Hardwick Lake, Hardwick

(E) Horse Pond, Greensboro

(F) Lake Elmore, Elmore

(G) Lamoille River from the Peterson Dam in Milton to its confluence with Lake Champlain - June 1, through September 30, only.

(H) Long Pond (Belvidere Pond), Eden

(I) Long Pond, Greensboro

(J) Tuttle Pond, Hardwick

(K) Wapanaki Lake, Wolcott

(7) Winooski (Basin 8)

(A) Berlin Pond, Berlin

(B) Bliss Pond, Calais

(C) Coits Pond, Cabot

(D) Cranberry Meadow Pond, Woodbury

(E) Curtis Pond, Calais

(F) Gillett Pond, Richmond

(G) Harwood Pond, Elmore

(H) Molly's Pond, Cabot

(I) North Montpelier Pond, East Montpelier/Calais

(J) Richmond Pond, Richmond

(K) Shelburne Pond, Shelburne

(L) Sodom Pond, East Montpelier/Calais

(M) Valley Lake (Dog Pond), Woodbury

(N) Winooski River from Green Mountain Power Corporation #19, in Essex/Williston to its confluence with Lake Champlain – June 1, through September 30, only.

(8) White River (Basin 9)

(A) Lamson Pond, Brookfield

(B) Silver Lake, Barnard

(9) Ottauquechee, Black (Basins 10 & 13)

(A) Black River from the Lovejoy Dam in Springfield to its confluence with the Connecticut River - June 1, through September 30, only.

(B) Deweys Mill Pond, Hartford

(C) Lake Ninevah, Mount Holly

(D) Lake Pinneo, Hartford

(E) Lake Runnemede (Evart's Pond), Windsor

(F) North Hartland Reservoir, Hartland/Hartford

(G) North Springfield Reservoir, Springfield/Weathersfield

(H) Ottauquechee River from the North Hartland Dam in Hartland to its confluence with the Connecticut River.

(10) West, Williams, Saxtons (Basins 11 & 13)

(A) Burbee Pond, Windham

(B) Cole Pond, Jamaica

(C) Lily Pond, Londonderry

(D) Lowell Lake, Londonderry

(E) Mindard's Pond, Rockingham

(11) Deerfield (Basins 12 & 13)

(A) Gates Pond, Whitingham

(B) Grout Pond, Stratton

(C) Howe Pond, Readsboro

(D) Jacksonville Pond, Whitingham

(E) Lily Pond, Vernon

(F) North Pond, Whitingham

(G) Sadawaga Pond, Whitingham

(H) Shippee Pond, Whitingham

(12) Stevens, Wells, Waits, Ompompanoosuc (Basins 14 & 16)

(A) Halls Lake, Newbury

(B) Harriman Pond, Newbury

(C) Lake Abenaki, Thetford

(D) Lake Morey, Fairlee

(E) Lower Symes Pond, Ryegate

(F) Ticklenaked Pond, Ryegate

(G) Waits River from the CVPS Dam in Bradford to its confluence with the Connecticut River - June 1, to September 30.

(13) Passumpsic (Basin 15)

(A) Bruce Pond, Sheffield

(B) Chandler Pond, Wheelock

(C) Keiser Pond, Peacham/Danville

(14) Upper Connecticut, Nulhegan, Willard Stream, Paul Stream (Basin 16)

(A) Dennis Pond, Brunswick

(B) Stevens Pond, Maidstone

(15) Lake Memphremagog, Black, Barton, Clyde, Coaticock (Basin 17)

(A) Daniels Pond, Glover

(B) Lake Derby, Derby

(C) Long Pond, Sheffield

(D) Little Hosmer Pond, Craftsbury

(E) Mud Pond, Craftsbury

(F) Mud Pond, (North) Morgan

(G) Tildy's Pond (Clark Pond), Glover

(H) Toad Pond, Charleston

(I) Turtle Pond, Holland

§ A-02 Cold Water Fish Habitat

(a) All waters not designated as warm water fish habitat under § A-01 of this appendix are hereby designated as cold water fish habitat for purposes of these rules.

(b) The following wetlands are designated as cold water fish habitat:

(1) Those wetlands adjacent to the Dog River and its tributaries from the headwaters of the Dog River to the point where it first crosses State Aid H~~h~~ighway #62 in Roxbury, ~~a distance of~~ approximately 1.5 miles.

(2) Those wetlands adjacent to the headwaters of the Winhall River and its tributaries on the east and west side from the outlet of Stratton Pond to the Stratton-Winhall boundary, ~~a distance of~~ approximately 2.0 miles.

(~~C~~3) Those wetlands adjacent to the Batten Kill River from a point .75 miles north of East Dorset and extending to its confluence with Dufresne Pond in Manchester, ~~a distance of~~ approximately 5.5 miles.

(~~D~~4) Those wetlands adjacent to the New Haven River and its tributaries from its confluence with Blue Bank Brook in Lincoln upstream to the headwaters of the respective tributaries, ~~a distance of~~ approximately 1.75 miles.

Appendix B. DESCRIPTION OF LAKE CHAMPLAIN AND LAKE MEMPHREMAGOG SEGMENTS FOR APPLICATION OF PHOSPHORUS CRITERIA

Segment	**Description**
Lake Champlain	
Missisquoi Bay	Area north of East Alburgh (Route 78) bridge and south of the international border.
Isle La Motte	Area within Vermont waters west of Grand Isle and North Hero Islands, and north of a line from Cumberland Head, NY to Wilcox Point on Grand Isle.
St. Albans Bay	Area northeast of a line from Hathaway Point to Lime Rock Point.
Northeast Arm	Area within Vermont waters east of Grand Isle and North Hero Islands, and north of the Sandbar Bridge, excluding St. Albans Bay, and including the large bays on Grand Isle and North Hero.
Malletts Bay	Area south of Sandbar Bridge and east of the causeway from Colchester Point to Grand Isle.
Main Lake	Area within Vermont waters south of a line from Cumberland Head, NY to Wilcox Point on Grand Isle, and north of a line from Split Rock Point, NY to Thompsons Point, VT, excluding Malletts Bay, Burlington Bay and Shelburne Bay.
Burlington Bay	Area east of a line from Lone Rock Point to Oakledge.

Shelburne Bay	Area south of a line from Shelburne Point to Red Rock Point.
Otter Creek	Area within Vermont waters south of a line from Split Rock Point, NY to Thompsons Point, VT, and north of a line from Rock Harbor, NY to Basin Harbor, VT.
Port Henry	Area within Vermont waters south of a line from Rock Harbor, NY to Basin Harbor, VT, and north of Crown Point Bridge.
South Lake A	Area within Vermont waters south of Crown Point Bridge and north Benson Landing.
South Lake B	Area within Vermont waters south of Benson Landing.
Lake Memphremagog	
Main Lake	Area within Vermont waters north of the Route 5 Bridge.
South Bay	Area south of the Route 5 bridge and north of the mouth of the Barton River.

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a.]	Average Allowable Concentration - Chronic Criteria[a.]
Toxic Metals							
Aluminum pH 5.0 – 10.5	EPA 7429905	7429905	TT	---	---	See Appendix K of EPA December 2018 water quality criteria document for Aluminum, which provides lookup tables for various water chemistry conditions. The Aluminum Criteria Calculator V2.0 can also be used to determine criteria.[r.] Application of this criteria is described in the Implementation Procedure for Aluminum.[s.]	
Antimony	65FR66443	7440360	TT	5.6	640	---	---
Arsenic	65FR31682	7440382	A	0.02[g]	1.5[g]	340	150
Cadmium [d. e.]	81FR19176 EPA 820-R-16-002	7440439	TT	---	---	0.94	0.43
Chromium (VI)[d.]	65FR31682	18540299	TT	---	---	16	11
Chromium (III) [d. e.]	EPA820/B-96-001	16065831	TT	---	---	322	42
Copper [d. e.o.]	65FR31682	7440508	TT	---	---	7.0[L]	4.95[L]
Cyanide	80FR36986-02 EPA 820-R-15-031	57125	TT	4	400	22 [n]	5.2 [n]

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a.]	Average Allowable Concentration - Chronic Criteria[a.]
Iron [c.]	EPA 440/5-86-001	7439896	TT	300	---	---	1,000
Lead [d. e.]	65FR31682	7439921	TT	---	---	30.1	1.17
Mercury	62FR42160 EPA 440/5-86-001	7439976	TT/BC	---	---	1.4 [d.f.]	0.012 (1986)
Methylmercury	EPA823-R-01-001	22967926	---	---	0.3 mg/kg [l.]	---	---
Nickel [d. e.]	65FR31682	7440020	TT	610	4,600	260	29
Selenium	62FR42160 65FR31682 65FR66443	7782492	TT	170	4200	See EPA June 2016 water criteria document for Selenium (Table 1).[p. q.]	
Silver [d. e.]	65FR31682	7440224	TT	---	---	1.02	---
Thallium	68FR75510	7440280	TT	0.24	0.47	---	---
Zinc [d. e]	65FR31682	7440666	TT	---	---	65	65
Volatile Organic Compounds							
Acrolein	80FR36986-02 EPA 820-R-15-003	107028	TT	3	400	3	3

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Acrylonitrile	80FR36986-02 EPA 820-R-15-004	107131	C	0.061	7.0	---	---
Benzene	80FR36986-02 EPA 820-R-15-009	71432	A	2.1	58	---	---
Bromoform	80FR36986-02 EPA 820-R-15-021	75252	C	7.0	120	---	---
Carbon Tetrachloride	80FR36986-02 EPA 820-R-15-023	56235	C	0.4	5	---	---
Chlorodibromomethane	80FR36986-02 EPA 820-R-15-026	124481	C	0.80	21	---	---
Chloroform	80FR36986-02 EPA 820-R-15-027	67663	C	60	2,000	---	---
Dichlorobromomethane	80FR36986-02 EPA 820-R-15-033	75274	C	0.95	27	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
1,2-Dichloroethane	80FR36986-02 EPA 820-R-15-075	107062	C	9.9	650	---	---
1,1-Dichloroethylene	80FR36986-02 EPA 820-R-15-071	75354	C	300	20,000~~3,000~~	---	---
1,2-Dichloropropane	80FR36986-02 EPA 820-R-15-076	78875	---	0.90	31	---	---
1,3-Dichloropropylene	80FR36986-02 EPA 820-R-15-080	542756	TT	0.27	12	---	---
Ethylbenzene	80FR36986-02 EPA 820-R-15-042	100414	TT	68	130	---	---
Methyl Bromide	80FR36986-02 EPA 820-R-15-056	74839	TT	100	10,000	---	---
Methylene Chloride	80FR36986-02 EPA 820-R-15-057	75092	C	20	1,000	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Monochlorobenzene	80FR36986-02 EPA 820-R-15-025	108907	TT	100	800	---	---
1,1,2,2-Tetrachloroethane	80FR36986-02 EPA 820-R-15-069	79345	C/BC	0.2	3	---	---
Tetrachloroethylene	80FR36986-02 EPA 820-R-15-063	127184	C	10	29	---	---
Toluene	80FR36986-02 EPA 820-R-15-064	108883	TT	57	520	---	---
1,2-Trans-Dichloroethylene (DCE)	80FR36986-02 EPA 820-R-15-078	156605	---	100	4,000	---	---
1,1,1-Trichloroethane	80FR36986-02 EPA 820-R-15-068	71556	---	10,000	200,000	---	---
1,1,2-Trichloroethane	80FR36986-02 EPA 820-R-15-070	79005	C	0.55	8.9	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Trichloroethylene (TCE)	80FR36986-02 EPA 820-R-15-070	79016	C	0.6	7	---	---
Acid Organic Compounds							
Vinyl Chloride	80FR36986-02 EPA 820-R-15-067	75014	C	0.022	1.6	---	---
2-Chlorophenol	80FR36986-02 EPA 820-R-15-089	95578	---	30	800	---	---
2,4-Dichlorophenol	80FR36986-02 EPA 820-R-15-084	120832	TT	10	60	---	---
2,4-Dimethylphenol	80FR36986-02 EPA 820-R-15-085	105679	---	100	3,000	---	---
Dinitrophenols	80FR36986-02 EPA 820-R-15-038	25550587	TT	10	1,000	---	---
2,4 Dinitrophenol	80FR36986-02 EPA 820-R-15-086	51285	TT	10	300	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
2-Methyl-4,6-Dinitrophenol	80FR36986-02 EPA 820-R-15-090	534521	TT	2	30	---	---
Pentachlorobenzene	80FR36986-02	608935	BC	0.1	0.1	---	---
Pentachlorophenol	80FR36986-02 EPA 820-R-15-060	87865	C/BC	0.03	0.04	19[k]	15[k]
Phenol	80FR36986-02 EPA 820-R-15-061	108952	TT	4,000	300,000	---	---
Nonylphenol	EPA-822-F05-003	84852153	C/BC	---	---	28	6.6
2,4,6-Trichlorophenol	80FR36986-02 EPA 820-R-15-083	88062	C/BC	1.5	2.8	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Base Neutral Compounds							
Acenaphthene	80FR36986-02 EPA 820-R-15-002	83329	---	70	90	---	---
Anthracene	80FR36986-02 EPA 820-R-15-008	120127	TT/BC	300	400	---	---
Benzidine	80FR36986-02 EPA 820-R-15-010	92875	A	0.00014	0.011	---	---
Benzo(a)Anthracene	80FR36986-02 EPA 820-R-15-011	56553	C/BC	0.0012	0.0013	---	---
Benzo(a)Pyrene	80FR36986-02 EPA 820-R-15-012	50328	C/BC	0.00012	0.00013	---	---
Benzo(b)Fluoranthene	80FR36986-02 EPA 820-R-15-013	205992	C/BC	0.0012	0.0013	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Benzo(k)Fluoranthene	80FR36986-02 EPA 820-R-15-014	207089	C/CB	0.012	0.013	---	---
Bis(Chloromethyl) Ether (BCME)	80FR36986-02 EPA 820-R-15-017	542881	C	0.00015	0.017	---	---
Bis(2-Ethylhexyl)Phthalate	80FR36986-02 EPA 820-R-15-020	117817	C/BC	0.32	0.37	---	---
Butylbenzyl Phthalate[w]	80FR36986-02 EPA 820-R-15-022	85687	C/BC	0.10	0.10	---	---
Chloroethyl ether (Bis-2)	80FR36986-02 EPA 820-R-15-018	111444	C	0.030	2.2	---	---
Chloroisopropyl ether(Bis-2)	80FR36986-02 EPA 820-R-15-019	108601	TT	200	4,000	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
2-Chloronaphthalene	80FR36986-02 EPA 820-R-15-088	91587	---	800	1,000	---	---
Chrysene	80FR36986-02 EPA 820-R-15-030	218019	C/BC	0.12	0.13	---	---
Dibenzo(a,h)Anthracene	80FR36986-02 EPA 820-R-15-032	53703	C/BC	0.00012	0.00013	---	---
1,2-Dichlorobenzene	80FR36986-02 EPA 820-R-15-074	95501	TT/BC	1,000	3,000	---	---
1,3-Dichlorobenzene	80FR36986-02 EPA 820-R-15-079	541731	TT/BC	7	10	---	---
1,4-Dichlorobenzene	80FR36986-02 EPA 820-R-15-081	106467	TT/BC	300	900	---	---
3,3'-Dichlorobenzidine	80FR36986-02 EPA 820-R-15-091	91941	C/BC	0.049	0.15	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Diethyl Phthalate	80FR36986-02 EPA 820-R-15-035	84662	TT	600	600	---	---
Dimethyl Phthalate	80FR36986-02 EPA 820-R-15-036	131113	TT	2,000	2,000	---	---
Di-n-butyl Phthalate	80FR36986-02 EPA 820-R-15-037	84742	TT/BC	20	30	---	---
2,4-Dinitrotoluene	80FR36986-02 EPA 820-R-15-087	121142	C	0.049	1.7	---	---
1,2-Diphenylhydrazine	80FR36986-02 EPA 820-R-15-077	122667	C	0.03	0.2[b]	---	---
Fluoranthene	80FR36986-02 EPA 820-R-15-043	206440	TT/BC	20	20	---	---
Fluorene	80FR36986-02 EPA 820-R-15-044	86737	TT/BC	50	70	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Hexachlorobenzene	80FR36986-02 EPA 820-R-15-048	118741	C/BC	0.000079	0.000079	---	---
Hexachlorobutadiene	80FR36986-02 EPA 820-R-15-049	87683	C/BC	0.01	0.01	---	---
Hexachlorocyclohexane (HCH) -Technical	80FR36986-02 EPA 820-R-15-050	608731	C	0.0066	0.010	---	---
Hexachlorocyclopentadiene	80FR36986-02 EPA 820-R-15-051	77474	TT/BC	4	4	---	---
Hexachloroethane	80FR36986-02 EPA 820-R-15-052	67721	C/BC	0.1	0.1	---	---
Indeno(1,2,3-cd) Pyrene	80FR36986-02 EPA 820-R-15-053	193395	C/BC	0.0012	0.0013	---	---
Isophorone	80FR36986-02 EPA 820-R-15-054	78591	TT	34	1,800	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
3-Methyl-4-Chlorophenol	80FR36986-02 EPA 820-R-15-092	59507	---	500	2,000	---	---
Nitrobenzene	80FR36986-02 EPA 820-R-15-058	98953	TT	10	600	---	---
N-Nitrosodimethylamine	65FR66443	62759	C	0.00069[h]	3.0[h]	---	---
N-Nitrosodi-n-Propylamine	65FR66443	621647	---	0.0050[h]	0.51[h]	---	---
N-Nitrosodiphenylamine	65FR66443	86306	C	3.3[h]	6.0[h]	---	---
Pyrene	80FR36986-02 EPA 820-R-15-062	129000	TT/BC	20	30	---	---
1,24,5-Tetrachlorobenzene	80FR36986-02 EPA 820-R-15-073	95943	TT	0.03	0.03	---	---
1,2,4-Trichlorobenzene	80FR36986-02 EPA 820-R-15-072	120821	---	0.071	0.076	---	---
2,4,5-Trichlorophenol	80FR36986-02 EPA 820-R-15-082	95954	----	300	600	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Pesticides/PCBs							
Aldrin	80FR36986-02 EPA 820-R-15-005	309002	C/BC	0.00000077	0.00000077	3.0 [b]	---
Carbaryl	EPA-820-R-12-007	63252	TT	---	---	2.1	2.1
Chlordane	80FR36986-02 EPA 820-R-15-024	57749	C/BC	0.00031	0.00032	2.4 [b]	.004 [b]
Chorophenoxy Herbicide (2,4-D)	80FR36986-02 EPA 820-R-15-028	94757	C	1,300	12,000	---	---
Chorophenoxy Herbicide (2,4,5-TP) [Silvex]	80FR36986-02 EPA 820-R-15-029	93-72-1	C	100	400	---	---
Chlorpyrifos [c]	EPA 440/5-86-001	2921882	---	---	---	0.083	0.041
4,4'-DDT	80FR36986-02 EPA 820-R-15-095	50293	C/BC	0.000030	0.000030	1.1 [b]	0.001 [b]

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a.]	Average Allowable Concentration - Chronic Criteria[a.]
4,4'-DDE	80FR36986-02 EPA 820-R-15-094	72559	C/BC	0.000018	0.000018	---	---
4,4'-DDD	80FR36986-02 EPA 820-R-15-093	72548	C/BC	0.00012	0.00012	---	---
Demeton [c.]	EPA 440/5-86-001	8065483	---	---	---	---	0.1
Diazinon	EPA-822-R-05-006	333415	TT	---	---	0.17	0.17
Dieldrin	80FR36986-02 EPA 820-R-15-034	60571	C	0.0000012	0.0000012	0.24	0.056

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
alpha-Endosulfan	80FR36986-02 EPA 820-R-15-007	959988	TT	20	30	0.22 [b]	0.056 [b]
beta-Endosulfan	80FR36986-02 EPA 820-R-15-016	33213659	TT	20	40	0.22 [b]	0.056 [b]
Endosulfan Sulfate	80FR36986-02 EPA 820-R-15-039	1031078	TT	20	40	---	---
Endrin	80FR36986-02 EPA 820-R-15-040	72208	TT	0.03	0.03	0.086	0.036
Endrin Aldehyde	80FR36986-02 EPA 820-R-15-041	7421934	TT	1	1	---	---
Guthion	EPA 440/5-86-001	86500	-				0.01

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Heptachlor	80FR36986-02 EPA 820-R-15-046	76448	C	0.0000059	0.0000059	0.52 [b]	0.0038 [b]
Heptachlor Epoxide	80FR36986-02 EPA 820-R-15-047	1024573	C	0.000032	0.000032	0.52 [b]	0.0038 [b]
Benzene hexachloride-alpha	80FR36986-02 EPA 820-R-15-006	319846	C/BC	0.00036	0.00039	---	---
Benzene hexachloride-beta	80FR36986-02 EPA 820-R-15-015	319857	C/BC	0.0080	0.014	---	---
Benzene hexachloride-gamma (Lindane)	EPA 820-R-15-045	58899	TT/BC	4.2	4.4	0.95	---
Malathion [c]	EPA 440/5-86-001	121755	---	---	---	---	0.1
Methoxychlor	80FR36986-02 EPA 820-R-15-055	72435	TT	0.02	0.02	---	0.03
Mirex	EPA 440/5-86-001	2385855	---				0.001

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a]	Average Allowable Concentration - Chronic Criteria[a]
Parathion [c]	EPA 440/5-86-001	56382	---	---	---	0.065	0.013
Total PCB's [m]	65FR31682 65FR66443	53469219	C/BC	0.000064 [h]	0.000064 [h]	---	0.014 [b]
Dioxin (2,3,7,8-TCDD)	65FR66443	1746016	C/BC	$5.0x10^{-9}$	$5.1x10^{-9}$	---	---
Toxaphene	80FR36986-02 EPA 820-R-15-065	8001352	C/BC	0.00070	0.00071	0.73	0.0002
Tributyltin (TBT)	EPA 822-R-03-031		---			0.46	0.072
Other Substances							
Ammonia [e]	EPA 822-R-13-001	7664417	---	---	---	See EPA April 2013 water quality criteria document for Ammonia. Tables 5a and 5b provide the acute criteria values and Table 6 provides the chronic criteria.[c, p]	
Asbestos	57FR60848	1332214	A	7 million fibers/L	---	---	---
Barium [c]	EPA 440/5-86-001	7440393	---	1,000	---	---	---

Appendix C. WATER QUALITY CRITERIA FOR THE PROTECTION OF HUMAN HEALTH AND AQUATIC BIOTA

Criteria are in micrograms per liter (µg/l - parts per billion) unless indicated otherwise.

Compound	FR Cite/Source	CAS Number	Protection of Human Health			Protection of Aquatic Biota	
			Tox Class	Consumption of Water & Organisms	Consumption of Organisms Only	Maximum Allowable Concentration - Acute Criteria[a.]	Average Allowable Concentration - Chronic Criteria[a.]
Chlorine [c.]	EPA 440/5-86-001	7782505	---	---	---	19	11
Chloride [c.]	53FR19028	16887006	---	---	---	860,000	230,000

GENERAL NOTES:

This Appendix has been updated to reflect USEPA recommendations as of ~~March 2016~~August 2021.

~~The most significant changes from previous versions of this appendix are to Human Health criteria and reflect EPA's 2015 update to Human Health Ambient Water Quality Criteria (EPA 820-F-15-001, June 2015) as published in 80FR36986-02. Additional notes and information concerning these criteria can be found in the documents referenced here.~~

The Appendix reflects EPA December 2018 water quality criteria for Aluminum. Site Specific freshwater copper criteria can also be calculated utilizing the Biotic Ligand Model (BLM) procedures identified in EPA's Aquatic Life Ambient Freshwater Quality Criteria – Copper (2007), EPA-822-R-07-001, the more stringent criterion will apply. EPA Technical Support Document for Water Quality-based Toxics Control (TSD) provides additional guidance on procedures for water quality-based toxics control for both human health and aquatic toxicity issues.

Tox Class - designated toxicity class for substance: A=Class A carcinogen (known human carcinogen); C=Carcinogenic (probable or possible human carcinogen); TT=Threshold Toxicant (not a known or probable carcinogen); BC=High potential to bioconcentrate or bioaccumulate~~;~~

Carcinogenic - for those toxic substances that are identified as carcinogens (A or C) the criteria have been established at a risk level of 10^{-6} assuming a lifetime exposure to a 80 Kg male consuming 22 grams per day of fish and shell-fish products and ingesting 2.4 liters of water per day.

Threshold Toxicants - for those toxic substances that are identified as non-carcinogens (TT) the criteria are best estimates of concentrations that are not expected to produce adverse effects in human health assuming a lifetime exposure to a 80 Kg male consuming 22 grams per day of fish and shell-fish products and ingesting 2.4 liters of water per day.

Footnotes:

a. Maximum Allowable Concentration (MAC) = the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) once every three years without deleterious effects. Average Allowable Concentration (AAC) - the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) once every three years without deleterious effects. µg/l = micrograms per liter. The MAC is the equivalent to the Federal Criteria Maximum Concentration (CMC) and the AAC is equivalent to the Federal Criteria Continuous Concentration (CCC).

b. The aquatic life criteria for this compound were developed in 1980 using 1980 EPA guidelines for criteria development. The MAC (CMC) or acute value shown is a final acute value (FAV) that by the 1980 guidelines is an instantaneous value.

c. The EPA 2013 Aquatic Life Ambient Criteria for Ammonia document is posted at https://dec.vermont.gov/sites/dec/files/documents/epa-2013-aquatic-life-criteria-ammonia.pdf.~~Compound is not listed in EPA's Section 304(a) Criteria for Priority Toxic Pollutants as published in the December 22, 1992, pages 60911-60917, of the Federal Register but is included in this appendix of the Vermont Water Quality Standards because the pollutant can be deleterious to aquatic life and criteria have been developed for the protection of aquatic organisms.~~

d. Criteria for this metal are expressed in terms of dissolved metal in the water column. Dissolved metal concentrations in the water column can be determined analytically or can be estimated from total metal concentrations using the conversion factors in Appendix D.

e. Aquatic life criteria for this metal is expressed as a function of total hardness (mg/l as CaCO3) in the water column and as a function of the pollutant's water effect ratio, WER, as defined in § 131.36(c). Unless otherwise determined by the Secretary, in a manner consistent with the most current USEPA guidance, the WER shall be 1.0. The specific value given here corresponds to a hardness of 50 mg/l. Criteria values for other hardness may be calculated from the equations shown in Appendix E.

f. This criterion was derived from data for inorganic mercury (II) but is applied here to total mercury.

g. Vermont promulgated numerical criteria for arsenic based on freshwater fish species bioconcentration factors (BCF). A BCF of 4 was used to calculate human health protection criteria.

h. This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.

i. ~~The MAC = 1/[(f1/MAC1) + (f2/MAC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and MAC1 and MAC2 are 185.9 g/l and 12.82 g/l, respectively. This value for selenium is expressed in terms of total recoverable metal in the water column. It can be expressed in terms of dissolved metal by using the conversion factor (0.996- MAC or 0.922- AAC).~~No longer applicable.

j. This human health criterion is the same as originally published in the Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value is now published in the Gold Book.

k. Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: MAC = exp(1.005(pH)-4.869); AAC = exp(1.005(pH)-5.134). Values displayed in table correspond to a pH of 7.8.

l. This fish tissue residue criterion for methylmercury is used for the purpose of determination of attainment pursuant to these Standards. Fish consumption advisory guidance for mercury in fish taken from the waters of Vermont is developed by the Vermont Department of Health and is available on their website.

m. These criteria apply to total PCB's (e.g. the sum of all congener or all isomer or homolog or Arochlor analyses).

n. These criteria expressed as ug free cyanide (as CN)/l.

o. Site-specific freshwater copper criteria may also be calculated utilizing the Biotic Ligand Model (BLM) procedures identified in EPA's Aquatic Life Ambient Freshwater Quality Criteria – Copper (2007), EPA-822-R-07-001, the more stringent criterion will apply. Site specific BLM-based criteria may be required for waters where the hardness-based copper criteria could be under-protective, such as waters with low pH (e.g., pH <6.5). EPA Technical Support Document for Water Quality-based Toxics Control (TSD) provides additional guidance on procedures for water quality-based toxics control for both human health and aquatic toxicity issues.

p. For chronic criteria that utilize 30-day average duration, 30Q10 flows shall apply.

q. The EPA 2021 Revision to the 2016 Aquatic Life Ambient Water Quality Criterion for Selenium document is posted at https://dec.vermont.gov/sites/dec/files/documents/epa-2021-revision-2016-aquatic-life-criteria-selenium.pdf.

r. The EPA 2018 Aquatic Life Ambient Water Quality Criteria for Aluminum document is posted at https://dec.vermont.gov/sites/dec/files/documents/epa-2018-aquatic-life-criteria-aluminum.pdf and the Aluminum Criteria Calculator can be downloaded at https://www.epa.gov/wqc/aquatic-life-criteria-aluminum.

s. The Implementation Procedure for Aluminum is posted at https://dec.vermont.gov/sites/dec/files/documents/vermont-implementation-procedure-aluminum.pdf.

t. The Implementation Procedure for Copper is posted at https://dec.vermont.gov/sites/dec/files/documents/vermont-implementation-procedure-copper.pdf.

Appendix D. CONVERSION FACTORS FOR ESTIMATING DISSOLVED METALS FROM TOTAL VALUES

To convert total metal values to dissolved metal, multiply total metal values/concentrations by the conversion factor listed (or calculated) in the table below. Alternative methods for translating total to dissolved values following USEPA guidance ("The Metals Translator: Guidance for Calculating a Total Recoverable Metals Permit Limit from a Dissolved Criterion"; EPA 823-B-96-007) may be considered on a case-by-case basis.

Metal	Conversion Factor for MAC	Conversion Factor for AAC
Arsenic	1.0	1.0
Cadmium	1.136672 – [(ln hardness)(0.041838)]	1.101672 - [(ln hardness)(0.041838)]
Chromium III	0.316	0.860
Chromium VI	0.982	0.962
Copper	0.96	0.96
Lead	1.46203 – [(ln hardness)(0.145712)]	1.46203 – [(ln hardness)(0.145712)
Mercury	0.85	0.85
Nickel	0.998	0.997
Selenium	---	---
Silver	0.85	---
Zinc	0.978	0.986

Appendix E. PARAMETERS FOR CALCULATING FRESHWATER TOTAL METALS CRITERIA THAT ARE HARDNESS DEPENDENT

MAC and AAC values are calculated using the equations below the table and inserting the metal-specific values shown in the table.

Metal	m_A	b_A	m_C	b_C
Cadmium	0.9789	-3.866	0.7977	-3.909
Chromium III	0.8190	3.7256	0.8190	0.6848
Copper	0.9422	-1.700	0.8545	-1.702
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59	---	---
Zinc	0.8473	0.884	0.8473	0.884

Hardness-dependent metals criteria can be calculated from the following equations:

MAC (dissolved) = $\exp\{m_A [\ln (\text{hardness})] + b_A\}$ (Conversion Factor from Appendix D)

AAC (dissolved) = $\exp\{m_C [\ln (\text{hardness})] + b_C\}$ (Conversion Factor from Appendix D)

Appendix F. WATER QUALITY CLASSIFICATIONS

(a) The classification of all waters has been established by a combination of legislative acts and by classification or reclassification decisions issued by the Water Resources Board or Secretary pursuant to 10 V.S.A. § 1253. Those waters reclassified by the Secretary to Class A(1), A(2), or B(1) for any use shall include all waters within the entire watershed of the reclassified waters unless expressly provided otherwise in the rule.

(b) All waters above 2,500 feet altitude, National Geodetic Vertical Datum, are designated Class A(1) for all uses, unless specifically designated Class A(2) for use as a public water source.

(c) All waters at or below 2,500 feet altitude, National Geodetic Vertical Datum, are designated Class B(2) for all uses, unless specifically designated as Class A(1), A(2), or B(1) for any use.

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Hab.itat**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigateion**	**Date**	**Approx. Miles/Acres**
Battenkill, Walloomsac, Hoosic (Basin 1)										
Battenkill										
Unnamed tributary to Bromley Brook. Abandoned – Village of Manchester water source. The first unnamed tributary to Bromley Brook and all waters within its watershed upstream of the Manchester Water Company intake. The tributary is the first tributary on the right upstream of Bromley Brook's confluence with Bourn Brook. The intake is approximately 0.5 mile upstream of its juncture with Bromley Brook.	A2	A2	A2	A2	A2	A2	A2	B2	6/30/64	0.5 mile
***Surface waters of the Glastenbury Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally - designated Glastenbury Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 4
***Surface waters of the Lye Brook Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally- designated Lye Brook Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 4
Walloomsac River										
Basin Brook and Furnace Brook. Basin Brook – Permanent; Furnace Brook – Abandoned – Village of North Bennington (WSID 5017) water sources. Basin Brook and all waters within its watershed to and including the North Bennington Reservoir in the Towns of Glastenbury and Shaftsbury.	A2	A2	A2	A2	A2	A2	A2	B2	12/23/52	5.0 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Bolles Brook. Permanent – Village of Bennington (WSID 5016) water source. That portion of Bolles Brook and all waters within its watershed in the Towns of Glastenbury and Woodford upstream of the Bennington water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	5.3 miles
Sucker Pond (Lake Hancock) and tributaries. Emergency – Village of Bennington (WSID 5016) water source. Lake surface and all waters within its watershed in Stamford.	A2	A2	A2	A2	A2	A2	A2	B2	12/23/52	70 acres
Barney Brook. Abandoned – Village of Bennington water source. That portion of Barney Brook and all waters within its watershed in the Town of Woodford upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.3 miles
Unnamed tributary to South Stream. Abandoned – Village of Bennington water source. That portion tributary to South Stream and all waters within its watershed in the Town of Woodford upstream of the water intake in Bennington.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.0 mile
Hoosic River										
Roaring Branch. Abandoned – Town of Bennington water source. That portion of Roaring Branch and all waters within its watershed in the Town of Stamford upstream of the water intake in Pownal.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	2.3 miles
Unnamed tributaries. Abandoned – Village of Pownal water source. That portion of unnamed tributaries and their watersheds on Mann Hill in the Town of Pownal upstream of the water intake in Oak Hill Cemetery.	A2	A2	A2	A2	A2	A2	A2	B2	3/6/59	2.9 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Habitat**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Pub-lic WS**	**Irrigateion**	**Date**	**Approx. Miles/Acres**
Reservoir Hollow Brook. Abandoned ~~-~~ Village of North Pownal water source. Reservoir Hollow Brook and reservoir and all waters within its watershed. (Reservoir is approximately 0.5 mile upstream of the Hoosic River).	A2	A2	A2	A2	A2	A2	A2	B2	3/6/59	0.8 mile
Ladd Brook. Abandoned ~~-~~ Village of Pownal water source. Ladd Brook and all waters within its watershed in the Town of Pownal.	A2	A2	A2	A2	A2	A2	A2	B2	3/6/59	1.5 miles
Poultney, Mettawee, Southern Lake Champlain (Basins 2 & 4)										
Poultney River										
Inman Pond. Permanent ~~-~~ Village of Fair Haven (WSID 5218) water source. Inman Pond and all waters within its watershed in Fair Haven.	A2	A2	A2	A2	A2	A2	A2	B2	6/15/67	79 acres (Pond only)
Sucker Creek. Abandoned ~~-~~ Village of Fair Haven water source. Sucker Creek and all waters within its watershed upstream of the Howard Dam and Sheldon Dam, both ~~of which are~~ located in Fair Haven.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	0.6 mile

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Otter Creek, Little Otter Creek, Lewis Creek (Basin 3)										
Upper Otter Creek										
***Surface waters of the Big Branch Wilderness Areas.** All streams, lakes, and ponds located within the boundaries of the federally-designated Big Branch Wilderness Areas of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 3
***Surface waters of the Peru Peak Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally-designated Peru Peak Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 3
***Surface waters of the Robert T. Stafford White Rocks National Recreation Areas.** All streams, lakes, and ponds located within the boundaries of the federally-designated Robert T. Stafford White Rocks National Recreation Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 3
Unnamed tributary to Cold River. Abandoned – City of Rutland water source. Unnamed tributary to Cold River and all waters within its watershed upstream of its diversion into the Mendon Brook watershed in Killington.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	2.0 miles
Mendon Brook. Permanent – City of Rutland (WSID 5229) water source. Mendon Brook and all waters within its watershed upstream of the water intake just south of Meadow Lake Drive in the Town of Mendon.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	6.0 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Tenney Brook. Abandoned – Rutland-Mendon Town water source. Tenney Brook and all waters with its watershed upstream of and including a small intake impoundment.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	2.0 miles
Rutland City Reservoir. Permanent – City of Rutland (WSID 5229) water source. Rutland City Reservoir in Rutland Town and all waters within its watershed in Rutland Town and Mendon.	A2	A2	A2	A2	A2	A2	A2	B2	Legis.[1]	No record
Moon Brook. Abandoned – Gleason Road water system. Moon Brook and all waters within its watershed in Mendon upstream of and including a small intake impoundment.	A2	A2	A2	A2	A2	A2	A2	B2	Legis.[1]	2.0 miles
Unnamed tributary to Tenney Brook. Abandoned – Gleason Road water system. Unnamed tributary to Tenney Brook and all waters within its watershed in Mendon upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	Legis.[1]	1.1 miles
Young's Brook. Abandoned – Village of West Rutland water source. Young's Brook and reservoir and all waters within its watershed in West Rutland and Ira upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	2.0 miles
Furnace Brook and Kiln Brook. Furnace Brook – Emergency; Kiln Brook – Abandoned – Village of Proctor (WSID 5228) water sources. Furnace Brook and Kiln Brook and all waters within their watersheds in Chittenden upstream of their confluence.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	5.5 miles

[1] These waters were classified as a result of 1949 and 7/1/71 legislation that defined what constituted Class A waters.

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigate Irri**	**Date**	**Approx. Miles/Acres**
Sugar Hollow Brook. Abandoned – Town of Brandon water source. Sugar Hollow Brook and all waters within its watershed in Goshen and Chittenden upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	2.0 miles
Leicester Hollow Brook. Abandoned – Town of Brandon water source. Leicester Hollow Brook and all waters within its watershed in Leicester upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	2/17/61	2.0 miles
Lower Otter Creek										
***Surface waters of the Breadloaf Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally -designated Breadloaf Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 1 and Map 2
***Surface waters of the Bristol Cliffs Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally-designated Bristol Cliffs Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 1
***Surface waters of the Joseph Battell Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally-designated Joseph Battell Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 1 and Map 2

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Surface waters of the Moosaelamoo National Recreation Area.** All streams, lakes, and ponds located within the boundaries of the federally designated ~~Mooselamoo~~ Moosalamoo National Recreation Area of the Green Mountain National Forest, ***except for all waters managed by the Silver Lake Hydroelectric Project, including Sugar Hill Reservoir (a.k.a. Goshen Dam), Sucker Brook Diversion Dam, Silver Lake, Dutton Brook downstream of the Sucker Brook Diversion, and Sucker Brook including all tributaries.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 1 and Map 2
Brandy Brook. Emergency – Middlebury College Breadloaf Campus (WSID 20866) water source. Brandy Brook and all waters within its watershed.	A2	A2	A2	A2	A2	A2	A2	B2	11/13/61	1.0 mile
Unnamed tributary to Beaver Meadow Brook. Abandoned – Village of Bristol water source. Unnamed tributary to Beaver Meadow Brook and all waters within its watershed upstream of the water intake in Lincoln.	A2	A2	A2	A2	A2	A2	A2	B2	11/13/61	1.3 miles
Unnamed tributary to Lewis Creek. Abandoned – Village of Starksboro water source. Unnamed tributary to Lewis Creek and all waters within its watershed in Starksboro upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	2.0 miles
Two unnamed tributaries to Little Otter Creek. Abandoned – City of Vergennes water source. Two unnamed tributaries to Little Otter Creek and all waters within their watersheds in Monkton and Bristol upstream of two water intakes.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.6 miles and 1.4 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Notch Brook. Abandoned – Village of Middlebury water source. Notch Brook and all waters within its watershed upstream of the water intake in Bristol.	A2	A2	A2	A2	A2	A2	A2	B2	11/13/61	2.0 miles
Roaring Brook. Emergency – Wallingford Village (WSID 5242) water source. Roaring Brook and all waters within its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	3.3 miles
Northern Lake Champlain (Basin 5)										
Lake Champlain including Minor Tributaries										
Milton Pond. Abandoned – Village of Milton water source. Milton Pond and all waters within its watershed in Milton.	A2	A2	A2	A2	A2	A2	A2	B2	3/21/68	20 acres (Pond only)
Indian Brook Reservoir. Abandoned – Essex Town water source. Indian Brook Reservoir and all waters within its watershed in Essex Town.	A2	A2	A2	A2	A2	A2	A2	B2	3/21/68	95 acres (Reservoir only)
Colchester Pond. Abandoned – Village of Colchester water source. Colchester Pond and all waters within its watershed in the Town of Colchester.	A2	A2	A2	A2	A2	A2	A2	B2	3/21/68	93 acres (Pond only)

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
St. Albans Bay										
Mill River. Permanent – City of St. Albans (WSID 5130) water source. Two reservoirs which drain to the Mill River and all waters within their watersheds in the Towns of Fairfax, St. Albans, and Fairfield. Locally known as Fairfax Reservoir.	A2	A2	A2	A2	A2	A2	A2	B2	6/28/54	62 acres (Reservoir only)
Missisquoi (Basin 6)										
Missisquoi River										
Mountain Brook and tributary. Abandoned – Village of North Troy water source. Mountain Brook and a tributary and all waters within their watersheds upstream of two separate water intakes in Jay.	A2	A2	A2	A2	A2	A2	A2	B2	5/28/70	1.6 miles and 1.1 miles
Coburn Brook Reservoir and tributaries. Abandoned – Village of Troy water source. Coburn Brook and Coburn Brook Reservoir in Westfield and all waters within their watersheds upstream of the water intake in Coburn Brook.	A2	A2	A2	A2	A2	A2	A2	B2	5/28/70	2.0 miles
Unnamed tributary to Trout River. Abandoned – Village of East Berkshire water source. Unnamed tributary to the Trout River in Enosburg and all waters within its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	5/28/70	0.6 mile
Hannah Clark Brook. Abandoned – Village of Montgomery Center water source. Hannah Clark Brook in Montgomery and all waters in its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	5/28/70	4.0 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Stanhope Brook. Permanent – Village of Richford (WSID 5216) water source. Stanhope Brook in Richford and all waters in its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	5/28/70	5.0 miles
Trout Brook. Abandoned – Village of Enosburg Falls water source. Trout Brook in Berkshire and all waters within its watershed upstream of the outlet of Enosburg Reservoir.	A2	A2	A2	A2	A2	A2	A2	B2	5/28/70	2.0 miles
Loveland Brook. Emergency – Village of Richford (WSID 5126) water source. Loveland Brook in Richford and all waters within its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	2.0 miles
Black Falls Brook. Abandoned – Village of Montgomery Center water source. Black Falls Brook in Montgomery and Richford and all waters within its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	5.0 miles
Lamoille (Basin 7)										
Lamoille River										
Smith Brook. Abandoned – Village of Johnson water source. Smith Brook in Johnson and all waters in its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.6 miles
French Hill Brook. Emergency – Village of Johnson (WSID 5156) water source. French Hill Brook in Johnson and all waters in its watershed upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	2.4 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimmi**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Silver Lake. Emergency – City of St. Albans (WSID 5130) water source. Silver Lake and all waters in its watershed in the Towns of Georgia and Fairfax.	A2	A2	A2	A2	A2	A2	A2	B2	2/13/70	30 acres (Lake only)
Unnamed tributary to the Lamoille River. Abandoned – Village of Hardwick water source. Unnamed tributary to the Lamoille River and all waters in its watershed in Hardwick upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.0 mile
Unnamed tributary to the Lamoille River. Abandoned – Village of Fairfax water source. Unnamed tributary to the Lamoille River and all waters in its watershed in Fairfax upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	0.1 mile
Winooski (Basin 8)										
Lower Winooski River										
Unnamed tributary to Alder Brook. Abandoned – Former water source for Winooski, Essex Center, Essex Junction, and Pinewood Manor. Unnamed tributary and all waters within its watershed in Essex.	A2	A2	A2	A2	A2	A2	A2	B2	6/6/69	0.4 mile
Middle Winooski River										
***Surface waters of the Breadloaf Wilderness.** All streams, lakes, and ponds located within the boundaries of the federally -designated Breadloaf Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 1

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Unnamed tributaries to Thatcher Brook. Tyler Brook – Permanent; Merriam Brook – Permanent – Village of Waterbury (WSID 5284) water sources. Unnamed tributaries to Thatcher Brook (known locally as Tyler and Merriam Brooks) and all waters upstream of the intakes in Stowe.	A2	A2	A2	A2	A2	A2	A2	B2	5/14/63	2.5 miles
Unnamed tributary to the West Branch of the Little River. Abandoned – Village of Stowe water source. An unnamed tributary to the West Branch of the Little River and all waters within its watershed in Stowe to the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.3 miles
Stevens Branch										
Martin Brook, Reservoir, and tributaries. Abandoned – City of Barre water source. Martin Brook in Williamstown and all waters within its watershed, including unnamed tributaries, to the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/69	3.5 miles
Bolster Reservoir and tributaries. Abandoned – Old City of Barre water source. Bolster Reservoir in South Barre and all waters within its watershed including Bolster Reservoir Brook, Pecks Pond, and unnamed tributaries.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	2.0 acres (Reservoir) and 2.2 miles tributaries

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Thurman W. Dix Reservoir, Lower Reservoir, and tributaries. Orange Reservoir – Permanent; Dix Reservoir – Permanent – City of Barre (WSID 5254) water sources. Thurman W. Dix Reservoir, Lower Reservoir, and all waters within their watersheds in the Towns of Barre and Orange including Orange Brook, Nelson Brook, Nate Smith Brook, and unnamed tributaries.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	119 acres and 9.9 miles
Unnamed brook and tributaries. Abandoned – Village of East Barre water source. Unnamed brook and tributaries in the Town of Barre and all waters within their watersheds to the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	1.4 miles
Little John and Milne Quarries. Abandoned – Village of East Barre water sources. Little John Quarry and Milne Quarries in Barre Town (located southwest of East Barre Village).	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	No record
Consolidated Quarries. Barclay Quarry – Permanent; Quarry Hole #1 – Permanent; Capital Quarry – Emergency – Websterville (WSID 5247) water sources. When Barclay Quarry is low and demand is high, water is pumped from Quarry Hole #1 directly into the Barclay Quarry. Barclay Quarry is also known as Jones Brothers Quarry.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	No record
Old Granite Quarry. Abandoned – Town of Barre water source located south of Websterville. Locally known as Standard Quarry.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	No record
Berlin Pond. Permanent – City of Montpelier (WSID 5272) water source. Berlin Pond upstream of the dam and all waters within its watershed in the Towns of Berlin, Northfield, and Williamstown. The dam is located 300' downstream of where Paine Turnpike crosses the pond.	A2	A2	A2	A2	A2	A2	A2	B2	8/7/62	256 acres

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Habitat**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
White River (Basin 9)										
White River										
***Surface waters of the Breadloaf Wilderness.** All streams, lakes, and ponds located within the boundaries of the ~~federally designated~~federally designated Breadloaf Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 1 and Map 2
***Surface waters of the Joseph Battell Wilderness.** All streams, lakes, and ponds located within the boundaries of the ~~federally designated~~federally designated Joseph Battell Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 2
***Bingo Brook.** Bingo Brook and tributaries from headwaters downstream to the Green Mountain National Forest boundary above Kings Pond (Hancock/Rochester).	A1	A1	B2	A1	A1	B2	B2	B2	01/15/17	33.3 MILES
***Smith Brook.** Smith Brook and tributaries from headwaters downstream to Rt. 73.	A1	A1	B2	B2	A1	B2	B2	B2	01/15/17	6.8 MILES
***Beaver Meadows Ponds.** All ponds and tributaries, beginning from headwaters, and ending at outlet of downstream most pond.	A1	A1	B2	B2	B2	B2	B2	B2	01/15/17	1.5 MILES
Farnsworth Brook. Abandoned ~~-~~ Village of East Braintree water source. Farnsworth Brook and all waters within its watershed in the Town of Braintree upstream of the water intake.	A2	A2	A2	A2	A2	A2	A2	B2	12/28/77	2.0 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Lake Casper and Lake John. Lake Casper – Abandoned; Lake John – Permanent – Village of South Royalton (WSID 5330) water sources. Lake Casper and Lake John and all waters within their watersheds in the Town of Royalton. Water is pumped from the Carpenter Field infiltration gallery in the White River up to Lake John.	A2	A2	A2	A2	A2	A2	A2	B2	12/28/77	No record
Ottauquechee, Black (Basins 10 & 13)										
Ottauquechee River										
Spring and unnamed tributary to the Ottauquechee River. Abandoned – Village of North Hartland water source. A spring and unnamed tributary to the Ottauquechee River and all waters within its watershed upstream of the water intake. The spring and brook are located approximately 1 mile north-northwest of North Hartland Village.	A2	A2	A2	A2	A2	A2	A2	B2	11/16/67	0.3 mile
Cox, Vondell, and Carlton Hill Reservoirs. Cox and Vondell – Emergency; Carlton Hill – Abandoned – Village of Woodstock (WSID 5342) water sources. Cox, Vondell, and Carlton Hill Reservoirs in the Town of Woodstock and all waters within their watersheds.	A2	A2	A2	A2	A2	A2	A2	B2	11/16/67	2.5 miles (Stream only)
Grant Brook (off Jewell Brook). Abandoned – Village of Ludlow water source. Grant Brook and all waters within its watershed upstream of the flood control dam.	A1	A1	A1	A1	A1	A1	A2	B2	3/30/66	3.2 miles

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Wright, Upper Hurricane, and Lower Hurricane Reservoirs. Wright – Emergency; Hurricane – Abandoned – Hartford Town (WSID 5319) water sources. Wright, Upper Hurricane, and Lower Hurricane Reservoirs and all waters within their watersheds in the Town of Hartford.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	10.4 acres
Black River										
Springfield Reservoir Brook. Abandoned – Village of Springfield water source. Springfield Reservoir Brook and tributaries and all waters in its watershed upstream of Springfield Reservoir.	A2	A2	A2	A2	A2	A2	A2	B2	3/30/66	1.8 miles
Springfield Reservoir and tributaries. Abandoned – Village of Springfield water source. Springfield Reservoir all waters within its watershed.	A2	A2	A2	A2	A2	A2	A2	B2	3/30/66	9.8 acres
Unnamed tributary to Mill Brook. Abandoned – Village of Ascutney water source. Unnamed tributary to Mill Brook and all waters in its watershed above the water intake. The unnamed tributary is the first tributary to Mill Brook in the Town of Weathersfield.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.7 miles
West, Williams, Saxtons (Basins 11 & 13)										
West, Williams, and Saxtons Rivers										
***Surface waters of the Peru Peak Wilderness.** All streams, lakes, and ponds located within the boundaries of the ~~federally~~	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 3

~~designated~~federally designated Peru Peak Wilderness Area of the Green Mountain National Forest.										
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Biota**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Pub-lic WS**	**Irrigateion**	**Date**	**Approx. Miles/Acres**
***Surface waters of the Robert T. Stafford White Rocks National Recreation Areas.** All streams, lakes, and ponds located within the boundaries of the ~~federally designated~~federally designated Robert T. Stafford White Rocks National Recreation Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 3
***Surface waters of the Lye Brook Wilderness.** All streams, lakes, and ponds located within the boundaries of the ~~federally designated~~federally designated Lye Brook Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 3
***Mount Tabor Brook.** Mount Tabor Brook from headwaters in the Peru Peak Wilderness and Robert T. Stafford White Rocks National Recreation area, and tributaries, downstream to confluence with Utley Brook.	A1	A1	B2	B2	A1	B2	B2	B2	01/15/17	7.2 MILES
***Moses Pond.** Moses Pond including upstream tributaries.	A1	A1	B2	B2	B2	B2	B2	B2	01/15/17	12 acres
Sunset Lake and Stickney Brook. Sunset Lake – Permanent; Stickney Brook – Permanent ~~–~~ Town of Brattleboro (WSID 5290) water source. Sunset Lake, Langlie Brook, Kelly Brook, and Stickney Brook and all waters in their watersheds above the water diversions in the Towns of Dummerston, Marlboro, Newfane, and Brattleboro. (Also refer to the classification of Pleasant Valley Reservoir ~~–~~ Basin 13).	A2	A2	A2	A2	A2	A2	A2	B2	7/26/78	3.0 sq. miles

Styles Brook. Abandoned – Stratton Corp. water source. Styles Brook and all waters in its watershed above the diversion to Styles Reservoir.	A2	A2	A2	A2	A2	A2	A2	B2	7/26/78	1.0 sq. mile
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Chester Reservoir and the outlet stream above the water intake. Emergency – Village of Chester (WSID 5318) water source. Chester Reservoir, the outlet stream above the water intake, and all waters within their watersheds in the Town of Chester. The water intake is approximately 0.3 mile below the reservoir. Locally known as Pierce Brook Reservoir.	A2	A2	A2	A2	A2	A2	A2	B2	7/26/78	1.0 sq. mile
Bolles Brook (renamed Signal Hill Brook in 2016 by the Vermont Department of Libraries). Emergency – Vermont Academy (WSID 5303) water source. Abandoned – Village of Saxtons River. Bolles/Bowles Pond Brook (now Signal Hill Brook) and all waters in its watershed above the water intake in the Town of Rockingham.	A2	A2	A2	A2	A2	A2	A2	B2	7/26/78	1.0 sq. mile
Kidder Brook and tributaries. That portion of Kidder Brook and all its headwaters, including named and unnamed tributaries, beginning in the Town of Stratton at an elevation of 2,500 feet and continuing downstream to its confluence with the North Branch in the Town of Jamaica.	A1	A1	A1	A1	A1	A1	B2	B2	10/11/89	2.5 miles
Cobb Brook. That portion of Cobb Brook and its tributaries beginning in the Town of Windham at an elevation of 2,500 feet and	A1	A1	A1	A1	A1	A1	B2	B2	10/09/91	6.0 miles

continuing downstream to its confluence with the West River in the Town of Jamaica.										
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Upper Reach of the Winhall River. That portion of the upper reach of the Winhall River including the river's two principal headwaters, beginning at an elevation of 2,500' in the Town of Stratton, and continuing downstream a distance of approximately 7.4 miles to the point at which the river crosses the current boundary of the Green Mountain National Forest in the Town of Winhall.	A1	A1	A1	A1	A1	A1	B2	B2	10/09/91	7.4 miles
Back Pond/Minards Pond. Permanent – Village of Bellows Falls (WSID 5298) water source. Back Pond and all water within its watershed, which is diverted to Minards Pond. Back Pond is located 0.1 mile northwest of Minards Pond in the Town of Rockingham.	A2	A2	A2	A2	A2	A2	A2	B2	3/21/68	2.0 acres
Ellis Brook. Permanent – Village of Bellows Falls (WSID 5298) water source. Ellis Brook and all waters in its watershed above the water intake, which is situated at elev. 715' MSL in the Town of Rockingham.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	246 acres (water-shed)
Farr Brook. Permanent – Village of Bellows Falls (WSID 5298) water source. Farr Brook and all waters in its watershed above the water intake, which is located at elev. 710' MSL in the Town of Rockingham.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	154 acres (water-shed)
Mill Brook. Emergency – Kurn Hattin School (WSID 5452) water source. Mill Brook and all water within its watershed above the water	A2	A2	A2	A2	A2	A2	A2	B2	3/21/68	3.0 miles

intake in the Town of Westminster. The intake is located approximately 1.0 miles upstream of its confluence with the Connecticut River.										

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Deerfield (Basins 12 & 13)									
Deerfield River									
***Surface waters of the Glastenbury Wilderness.** All streams, lakes, and ponds located within the boundaries of the ~~federally designated~~federally designated Glastenbury Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 4
***Surface waters of the George D. Aiken Wilderness.** All streams, lakes, and ponds located within the boundaries of the ~~federally designated~~federally designated George D. Aiken Wilderness Area of the Green Mountain National Forest.	A1	A1	A1	A1	A1	A1	B2	B2	01/15/17	Refer to Map 4
***Upper Deerfield River.** Deerfield River and tributaries beginning upstream of the confluence of the Rake Branch watershed, including the Castle Brook and Glastenbury River watersheds.	A1	A1	B2	B2	A1	B2	B2	B2	01/15/17	88.7 miles
***Stamford Pond.** Stamford Pond and upstream tributaries.	A1	A1	B2	B2	B2	B2	B2	B2	01/15/17	12 acres
	A2	A2	A2	A2	A2	A2	A2	B2	1/27/61	36 acres

Haystack Pond. Permanent – Village of Wilmington (WSID 5310) water source. Haystack Pond and all waters within its watershed in the Town of Wilmington.										
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Habitat**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Howe Pond and Howe Pond Brook. Permanent – Village of Readsboro (WSID 5028) water source. Howe Pond and all waters within its watershed. Howe Pond Brook and all waters within its watershed above the water intake, which is located approximately 1.1 miles downstream from Howe Pond. Both pond and brook are located in the Town of Readsboro.	A2	A2	A2	A2	A2	A2	A2	B2	1/27/61	62 acres
Cold Brook and tributaries. That portion of Cold Brook and its tributaries between an elevation of 2,500 feet and continuing downstream to its confluence with Mountain Brook in the Town of Dover.	A1	A1	A1	A1	A1	A1	B2	B2	10/7/96	1.5 miles
Pleasant Valley Reservoir. Permanent – Town of Brattleboro (WSID 5290) water source. Pleasant Valley Reservoir and all waters in its watershed in the Town of Brattleboro. Langlie, Kelly, and Stickney Brook diversions send their waters to Pleasant Valley Reservoir. (Also refer to the classification of Sunset Lake & Stickney Brook – Basin 11)	A2	A2	A2	A2	A2	A2	A2	B2	3/21/68	25 acres
Stevens, Wells, Waits, Ompompanoosuc (Basins 14 & 16)										

Mill Pond Brook. Abandoned – Village of Bradford water source. Mill Pond Brook and all waters within its watershed above the intake dam in the Towns of Fairlee, Bradford, and West Fairlee. Locally known as the Brushwood Impoundment.	A2	A2	A2	A2	A2	A2	A2	B2	2/19/60	3.0 miles
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Habitat**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Artificial impoundment on South Peacham Hollow Brook. Abandoned – Peacham water source. An artificial impoundment on South Peacham Hollow Brook, and all waters within its watershed above the intake. The impoundment is located approximately 1/2 mile east of Fosters Road in the Town of Peacham.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	No record
Charles Brown Brook. Abandoned – Village of Norwich water source. Charles Brown Brook and all waters within its watershed above the water intake in the Town of Norwich.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	2.5 miles
Unnamed tributary to Connecticut River. Emergency – Village of Newbury (WSID 5175) water source. An unnamed tributary to the Connecticut River and all waters within its watershed above the water intake in the Town of Newbury. The tributary is approximately one mile south of Pulaski Mountain. The intake is located approximately 0.7 mile upstream of its confluence with the Connecticut River.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.0 mile
Unnamed tributary to Lake Morey. Abandoned – Village of Fairlee water source. An unnamed tributary to Lake Morey and all	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	1.1 miles

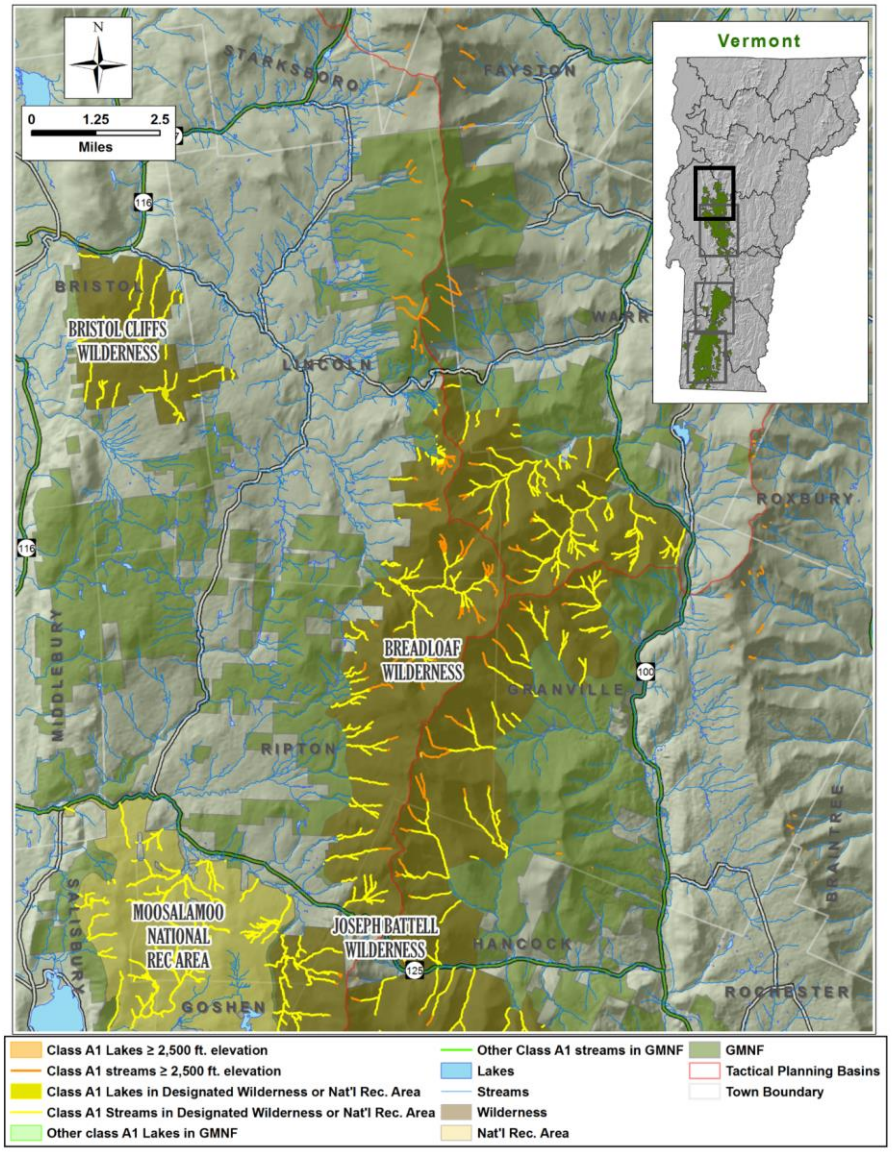
waters in its watershed in the Town of Fairlee to the water intake dam, including a man-made impoundment.										

Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Passumpsic (Basin 15)										
Passumpsic River										
Unnamed tributary to Miller Run including Mathewson Reservoir. Abandoned – Village of Lyndonville water source. Unnamed tributary to Miller Run including Mathewson Reservoir and all waters within their watersheds above the intake in the Towns of Lyndon and Sutton.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	1.5 miles
Unnamed tributary to Miller Run including Copeland Reservoir. Abandoned – Village of Lyndonville water source. Unnamed tributary to Miller Run including Copeland Reservoir and all waters within their watersheds above the intake in the Towns of Lyndon and Sutton.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	1.5 miles
Two unnamed tributaries to Sutton River. Abandoned – Unknown water source. Two unnamed tributaries to the Sutton River, near West Burke, and all waters within their watersheds above the intakes.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	0.8 mile

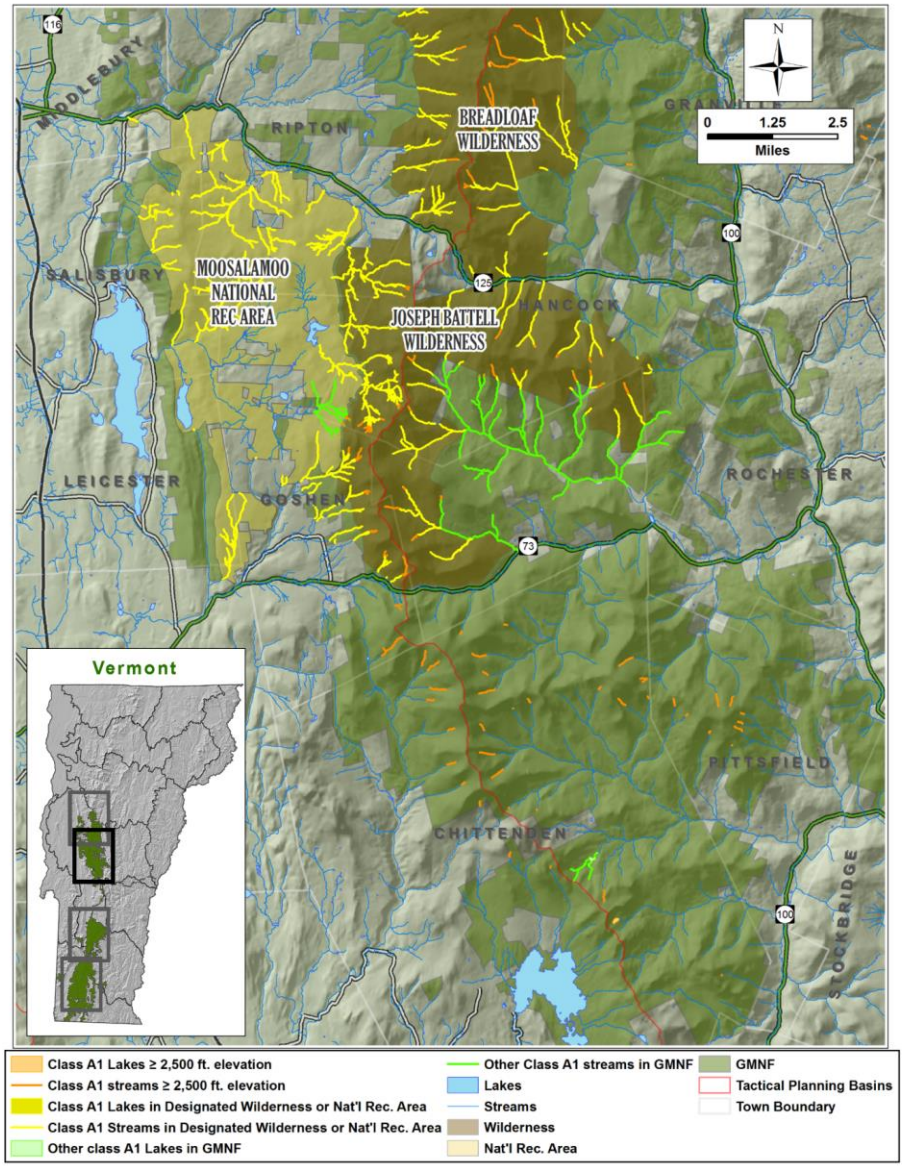
Chandler Pond. Abandoned – Lyndonville Village water source. Chandler Pond and all waters within its watershed in the Town of Wheelock. Wheelock Pond drains to the South Wheelock Branch.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	59 acres
Woodworth Reservoir. Abandoned – Lyndonville water source. Woodworth Reservoir and all waters within its watershed in the Town of Lyndon. Woodworth Reservoir flows to the South Wheelock Branch.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	No record
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Wildlife**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
Stiles Pond. Permanent – St. Johnsbury Village (WSID 5045) water source. Stiles Pond and all waters within its watershed in the Town of Waterford. Stiles Pond is in the St. Johnsbury municipal forest and flows to the Moose River.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	5.5 miles and 146 acres (Stiles Pond)
Danville Reservoir. Emergency – Danville (WSID 5037) water source. Danville Reservoir on tributary of Brown Brook and all waters within its watershed in Danville.	A2	A2	A2	A2	A2	A2	A2	B2	4/28/76	2.0 miles
Upper Connecticut, Nulhegan, Willard Stream, Paul Stream (Basin 16)										
Unnamed tributary to Connecticut River. Abandoned – Village of Bloomfield water source. An unnamed tributary to the Connecticut River and all waters within its watershed above the water intake in the Town of Bloomfield. The intake is approximately 0.5 mile above "Basin Hole."	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	0.2 mile
Lake Memphremagog, Black, Barton, Clyde, Coaticock (Basin 17)										

Lake Memphremagog and International Stream										
Unnamed reservoir near Derby Line. Reservoir and all waters in its watershed in the Town of Derby.	A2	A2	A2	A2	A2	A2	A2	B2	7/1/71	No record
Appendix F. WATER QUALITY CLASSIFICATIONS **Waters**	**Aq. Biota**	**Aq. Habitat**	**Aesthetics**	**Boating**	**Fishing**	**Swimming**	**Public WS**	**Irrigation**	**Date**	**Approx. Miles/Acres**
May Pond Brook and May Pond. Permanent – Village of Barton (WSID 5189) water source. May Pond Brook and all waters within its watershed in the Town of Barton above and including the water source reservoir and May Pond. The reservoir is located approximately ¾ mile upstream of the brook's confluence with Crystal Lake.	A2	A2	A2	A2	A2	A2	A2	B2	10/30/87	13 acres
Black, Barton, Clyde Rivers										
Unnamed tributary to the Black River. Abandoned – Coventry water source. An unnamed tributary to the Black River and all waters within its watershed above the water intake in the Town of Coventry.	A2	A2	A2	A2	A2	A2	A2	B2	2/20/75	1.0 mile
Unnamed tributary to Island Pond. Permanent – Town of Brighton (WSID 5105) water source. An unnamed tributary to Island Pond and all waters within its watershed in the Town of Brighton above the water intake at ~~approx.~~ approx. elev. of 1544.0' MSL. The tributary flows northerly to Island Pond. Locally known as Brook #1.	A2	A2	A2	A2	A2	A2	A2	B2	2/20/75	1.0 mile
Unnamed tributary to Lightning Brook. Permanent – Town of Brighton (WSID 5105) water source. Two unnamed tributaries to an unnamed tributary to Lightning Brook and all waters in their watersheds in the Town of Brighton above the intakes. The main	A2	A2	A2	A2	A2	A2	A2	B2	2/20/75	2.0 miles

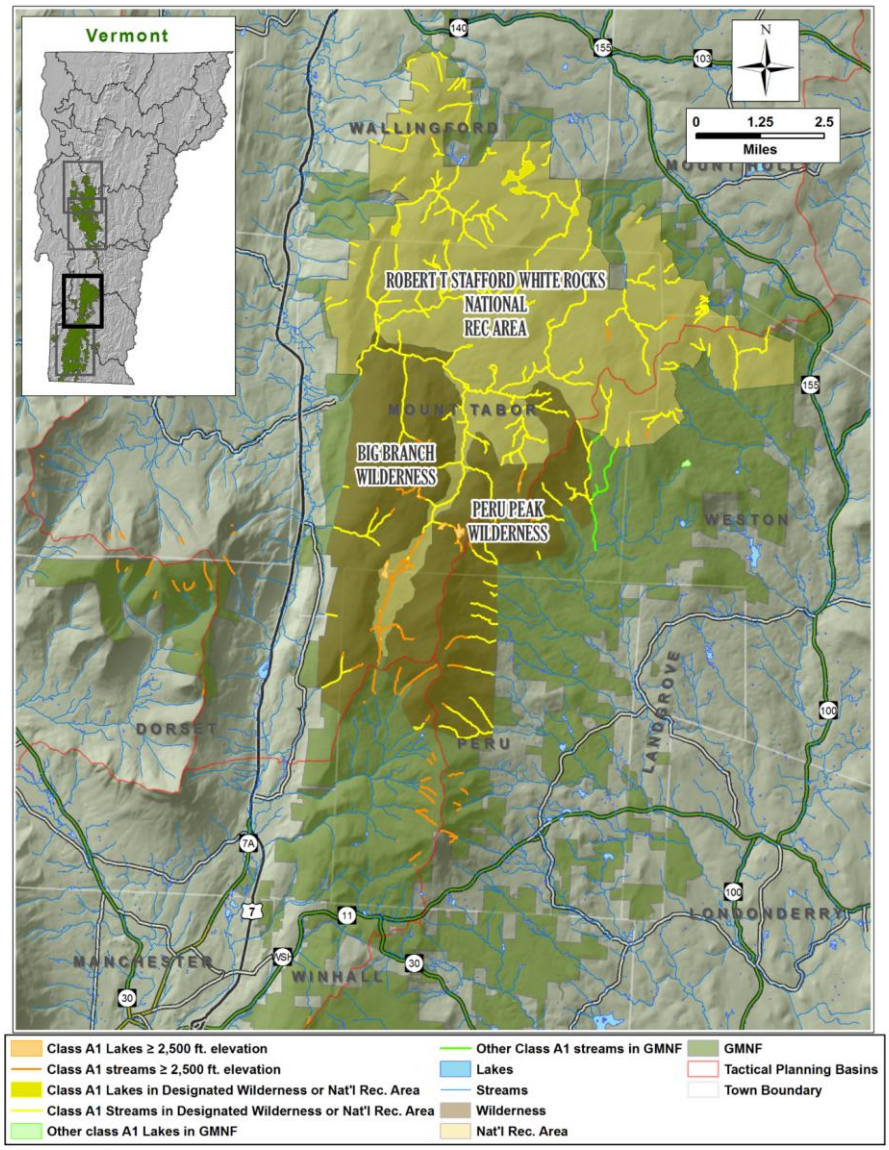
intake is at approx. elev. 1526.0’ MSL, and the upper, more northerly intake is diverted to the main intake. Locally known as Brook #2.										



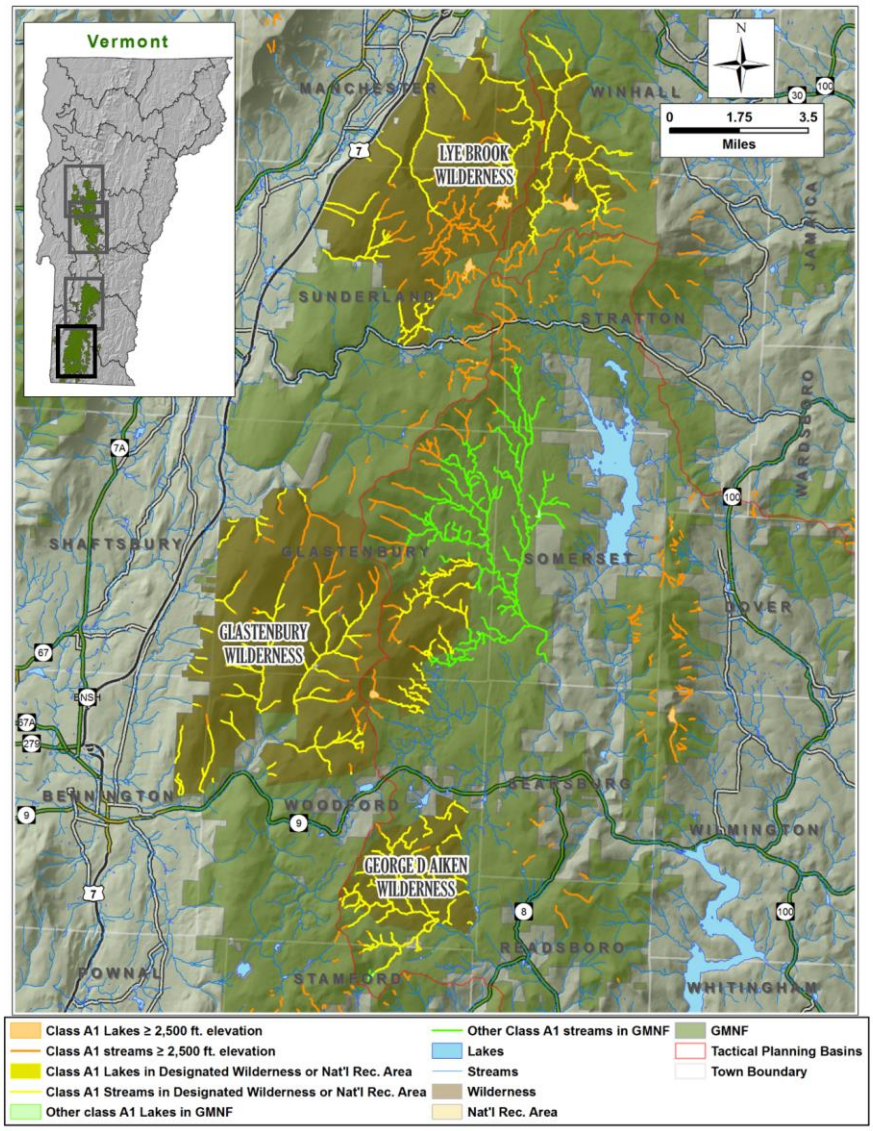
~~Map 1. Class A(1) surface waters in the Green Mountain National Forest – Breadloaf Area.~~


MIDDLEBURY
RIPTON
BREADLOAF WILDERNESS
GRANVILLE
N
0 1.25 2.5
Miles
SALISBURY
MOOSALAMOO NATIONAL REC AREA
JOSEPH BATTELL WILDERNESS
HANCOCK
LEICESTER
GOSHEN
ROCHESTER
PITTSFIELD
CHITTENDEN
STOCKBRIDGE
Vermont
Class A1 Lakes ≥ 2,500 ft. elevation
Class A1 streams ≥ 2,500 ft. elevation
Class A1 Lakes in Designated Wilderness or Nat'l Rec. Area
Class A1 Streams in Designated Wilderness or Nat'l Rec. Area
Other class A1 Lakes in GMNF
Other Class A1 streams in GMNF
Lakes
Streams
Wilderness
Nat'l Rec. Area
GMNF
Tactical Planning Basins
Town Boundary

~~Map 2. Class A(1) surface waters in the Green Mountain National Forest, Moosalamoo, and Battell Areas.~~


Vermont
N
0 1.25 2.5
Miles
WALLINGFORD
ROBERT T STAFFORD WHITE ROCKS NATIONAL REC AREA
MOUNT TABOR
BIG BRANCH WILDERNESS
PERU PEAK WILDERNESS
WESTON
DORSET
PERU
LANDGROVE
LONDONDERRY
MANCHESTER
WINHALL
Class A1 Lakes ≥ 2,500 ft. elevation
Class A1 streams ≥ 2,500 ft. elevation
Class A1 Lakes in Designated Wilderness or Nat'l Rec. Area
Class A1 Streams in Designated Wilderness or Nat'l Rec. Area
Other class A1 Lakes in GMNF
Other Class A1 streams in GMNF
Lakes
Streams
Wilderness
Nat'l Rec. Area
GMNF
Tactical Planning Basins
Town Boundary

~~Map 3. Class A(1) surface waters in the Green Mountain National Forest – White Rocks/Big Branch/Peru Areas.~~



~~Map 4. Class A(1) surface waters in the Green Mountain National Forest – Lye Brook and Glastenbury areas.~~

Appendix G. APPLICATION OF BIOCRITERIA FOR FISH AND MACROINVERTEBRATE COMMUNITIES IN VERMONT WADEABLE STREAMS AND RIVERS

Introduction

Section 29A-305 of these rules states that the Secretary ~~may~~ shall establish and apply numeric biological ~~indices~~ indexes to determine whether there is support of the aquatic biota use for each class of water. This appendix incorporates into these rules procedures for the collection and analysis of fish and aquatic macroinvertebrate community data used to determine compliance with the class-specific narrative criteria included in § 29A-306(a) of these rules.

Community metrics and Indexes of Biotic Integrity (IBI~~s~~) have been developed expressly for Vermont wadeable rivers and streams to measure the biological integrity of each community. High biological integrity corresponds to a high degree of similarity to the natural condition. The natural condition was determined for each stream type by analyzing fish and macroinvertebrate ~~data on~~ community structure and function from Vermont waters least affected by human activities. In order of increasing departure from the natural condition of fish and macroinvertebrate communities, waters are categorized as Excellent ~~-~~ Class A(1), Very Good ~~-~~ Class B(1), and Good ~~-~~ Class (B2)[2]. Guidance on this appendix is provided on the Department's website at: http://dec.vermont.gov/watershed/map/monitor/biomonitoring.

Macroinvertebrate Community Biocriteria

Macroinvertebrate Community Types. Stream macroinvertebrate community types are largely differentiated based on streambed gradient, which dictates substrate coarseness. Moderate to high gradient streams are dominated by gravel to boulder size material, while low gradient streams are dominated by silt and sand bottoms. Three community types have been identified from moderate and high gradient riffle habitats and are differentiated ~~based on~~ largely on ~~sample~~ site drainage area and elevation. They are "Small High Gradient (SHG)," "~~Moderate~~ Medium High Gradient (MHG)," and "Warm Water Moderate Gradient (WWMG)." Two low gradient communities are differentiated by ~~the presence or absence of gravel~~ habitat characteristics in ~~the~~ sand~~-~~ and silt dominated ~~substrate~~streams. They are "Hybrid Low Gradient (HLG)," and "Slow Low Gradient (SLG)" respectively. Community types are assessed with different combinations of biological criteria and different scales of metric scoring. Community metrics are ~~scored~~ assessed *independently* for the three moderate ~~to~~ and high gradient (riffle habitat) community types. The two low gradient community types are assessed using ~~calculated~~ ~~Indices~~ Indexes of Biotic Integrity (IBIs), in which individual metric ~~values~~ scores are summed to produce a *single index value*.

Macroinvertebrate Community Sampling Methods. The macroinvertebrate biocriteria are applicable to wadeable streams. For moderate and~~to~~ high gradient communities, a bottom kick-net shall be used to sample four representative riffle habitats from a given stream reach. The four sub-samples

[2] For waters in which the aquatic biota and wildlife use is classified as A(2), the metrics for Class B(2) waters shall apply.

shall be composited into a single sample. For low gradient communities, a sample shall consist of a composite of four kick-net sweeps or jabs into ~~logjams~~woody debris, root wads, macrophytes and or submerged stream-side vegetation.

Samples shall be preserved in the field and processed in the lab to remove macroinvertebrates from plant and mineral detritus. A minimum of ~~at least~~ 25% of the sample shall be processed to ensure accurate community metric calculations. If 300 organisms are not removed in the initial 25% subsample, the subsample size shall be incrementally expanded until a minimum of 300 organisms are removed. All macroinvertebrates removed shall be identified by taxonomists to the lowest practical level, with a target level of genus or species for most organisms.

~~Moderate~~ Medium ~~to~~ and High Gradient "Riffle Habitat" Macroinvertebrate Metrics

The biological integrity of macroinvertebrate communities in moderate to high gradient streams shall be evaluated using an independent multi-metric scoring system calibrated for each of the three stream community types: SHG, MHG, and WWMG (Tables A-1, A-2, and A-3). Threshold values for each community type have been established for each metric that correspond to increasing levels of departure from the natural condition. In a site ~~evaluation~~assessment, the metric or metrics with the greatest departure from natural condition (lowest level of quality) shall be used to assign the community to a level of biological integrity ranging from Poor to Excellent.

Scoring Community Data. Each threshold metric value identifies a level of biological integrity: Excellent, Very Good, ~~and~~ Good, or failing to fully support aquatic biota (Fair or Poor).~~.~~ Metric values from a macroinvertebrate community assessment that fall within a specified range immediately below a threshold indicate an "indeterminate" finding for that metric being intermediate between that level and the next lower level.

An assessment of metric values consists of a systematic comparison of each value against threshold criteria for each level, beginning with Excellent, using the following procedure:

(1) The biological integrity of the community shall achieve classification criteria A(1), B(1), or B(2) when all metrics are at or above the ~~quality~~ threshold for that class.

(2) When one or more metrics fall below the threshold "indeterminate" range, all metric values shall be compared to the next lower level of biological integrity until (1) above is met.

(3) If neither (1) nor (2) above are met, an "indeterminate" finding shall be made for that assessment. An indeterminate finding shall result in a transitional assessment rating between the level the site is indeterminate for and the one immediately below that (e.g. Fair/Good ~~to~~ or Good/Very Good).

(4) An outcome ~~determination of "indeterminate"~~ for a single metric may be adjusted upward ~~to meet the threshold for a class~~ or ~~be lowered~~downward ~~to non-support for a class,~~ if it is ~~determined~~ documented by the biologist that the ~~"indeterminate" finding~~metric value is ~~due to an aberration in~~not representative of the macroinvertebrate community ~~composition~~. For example,

this could be due to an unusual hyper-dominance of a taxon in its early stages of development.

Table A-1. ~~Macroinvertebrate community m~~Metrics for Small High Gradient (SHG) ~~Vermont streams~~macroinvertebrate communities.

SHG Metric		Biological Integrity		
		Excellent A(1)	Very Good B(1)	Good B(2)
Total density (number per ~~m²~~square meter)	*Threshold:*	**500**	**400**	**300**
	Indeterminate range:	(450-<500)	(350-<400)	(250-<300)
Total richness of all unique taxa	*Threshold:*	**35**	**31**	**27**
	Indeterminate range:	(34-<35)	(30-<31)	(26-<27)
Richness of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa	*Threshold:*	**21**	**19**	**16**
	Indeterminate range:	(20-<21)	(18-<19)	(15-<16)
Ratio of EPT individuals to EPT plus Chironomidae individuals	*Threshold:*	**0.65**	**0.55**	**0.45**
	Indeterminate range:	(0.63-<0.65)	(0.53-<0.55)	(0.43-<0.45)
Percent model affinity of orders (PMA-O)	*Threshold:*	**65**	**55**	**45**
	Indeterminate range:	(60-<65)	(50-<55)	(40-<45)
Percent of individuals as Oligochaeta	*Threshold:*	**2.0**	**5.0**	**12.0**
	Indeterminate range:	(≥2.0-3.0)	(≥5.0-6.5)	(≥12.0-14.5)
Hilsenhoff Biotic Index value	*Threshold:*	**3.00**	**3.50**	**4.50**
	Indeterminate range:	(≥3.00-3.30)	(≥3.50-3.65)	(≥4.50-4.65)
Pinkham-Pearson Coefficient of similarity of functional groups (PPCS-F)	*Threshold:*	**0.50**	**0.45**	**0.40**
	Indeterminate range:	(0.45-<0.50)	(0.40-<0.45)	(0.35-<0.40)

Table A- 2. ~~Macroinvertebrate m~~Metrics for ~~Moderate~~ Medium High Gradient (MHG) ~~Vermont streams~~macroinvertebrate communities.

MHG Metric		Biological Integrity		
		Excellent A(1)	Very Good B(1)	Good B(2)
Total density (number per square meter)	*Threshold:*	**500**	**400**	**300**
	Indeterminate range:	(450-<500)	(350-<400)	(250-<300)
Total richness of all unique taxa	*Threshold:*	**43**	**39**	**30**
	Indeterminate range:	(41-<43)	(37-<39)	(28-<30)
Richness of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa	*Threshold:*	**24**	**22**	**18**
	Indeterminate range:	(22-<24)	(20-<22)	(16-<18)
Ratio of EPT individuals to EPT plus Chironomidae individuals	*Threshold:*	**0.65**	**0.55**	**0.45**
	Indeterminate range:	(0.63-<0.65)	(0.53-<0.55)	(0.43-<0.45)
Percent model affinity of orders (PMA-O)	*Threshold:*	**65**	**55**	**45**
	Indeterminate range:	(60-<65)	(50-<55)	(40-<45)
Percent of individuals as Oligochaeta	*Threshold:*	**2.0**	**5.0**	**12.0**
	Indeterminate range:	(≥2.0-3.0)	(≥5.0-6.5)	(≥12.0-14.5)
Hilsenhoff Biotic Index value	*Threshold:*	**3.50**	**4.00**	**5.00**
	Indeterminate range:	(≥3.50-3.80)	(≥4.00-4.15)	(≥5.00-5.15)
Pinkham-Pearson coefficient of similarity of functional groups (PPCS-F)	*Threshold:*	**0.50**	**0.45**	**0.40**
	Indeterminate range:	(0.45-<0.50)	(0.40-<0.45)	(0.35-<0.40)

Table A-3. ~~Macroinvertebrate metrics~~Metrics for Warm Water Moderate Gradient (WWMG) ~~Vermont streams~~macroinvertebrate communities.

WWMG Metric		Biological Integrity		
		Excellent A(1)	Very Good B(1)	Good B(2)
Total density (number per square meter)	*Threshold:*	**500**	**400**	**300**
	Indeterminate range:	(450-<500)	(350-<400)	(250-<300)
Total richness of all unique taxa	*Threshold:*	**40**	**35**	**30**
	Indeterminate range:	(38-<40)	(33-<35)	(28-<30)
Richness of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa	*Threshold:*	**21**	**19**	**16**
	Indeterminate range:	(20-<21)	(18-<19)	(15-<16)
Ratio of EPT individuals to EPT plus Chironomidae individuals	*Threshold:*	**0.65**	**0.55**	**0.45**
	Indeterminate range:	(0.63-<0.65)	(0.53-<0.55)	(0.43-<0.45)
Percent model affinity of orders (PMA-O)	*Threshold:*	**65**	**55**	**45**
	Indeterminate range:	(60-<65)	(50-<55)	(40-<45)
Percent of individuals as Oligochaeta	*Threshold:*	**2.0**	**5.0**	**12.0**
	Indeterminate range:	(≥2.0-3.0)	(≥5.0-6.5)	(≥12.0-14.5)
Hilsenhoff Biotic Index value	*Threshold:*	**4.25**	**4.75**	**5.40**
	Indeterminate range:	(≥4.25-4.40)	(≥4.75-4.~~80~~90)	(≥5.40-5.65)
Pinkham-Pearson coefficient of similarity of functional groups (PPCS-F)	*Threshold:*	**0.50**	**0.45**	**0.40**
	Indeterminate range:	(0.45-<0.50)	(0.40-<0.45)	(0.35-<0.40)

Low Gradient Macroinvertebrate IBIs

Two IBIs shall be used to assess the two macroinvertebrate community types in low gradient streams (Tables A-4 and A-5). The IBIs for Slow Low Gradient (SLG) or Hybrid Low Gradient (HLG) community types contain ten metrics, with each metric scored with a value from one to five. A value of one corresponds with Poor, indicating the most departure from natural condition. A value of five corresponds with Excellent, indicating ~~the most~~ similarity to the natural condition. Table A-6 shows ~~corresponding~~ IBI scores with corresponding levels of biological integrity and water classification.

An initial IBI score shall be calculated by summing all individual metric scores, which results in a range of 10-50. The final IBI score shall be determined by applying the following steps:

(1) If the initial IBI score is less than 29, then score as shown in Table A-6.

(2) If the score is equal to or more than 29, then proceed to (3) below.

(3) If metric 1, or metrics 2 and 3, or any four metrics score a "1" or "2", then score community a 28 (Fair).

(4) Determinations for any assessment level on Table A-6 may be adjusted upward or downward if it is documented by the biologist that the finding is not representative of the macroinvertebrate community.

Table A-4. ~~Macroinvertebrate~~ IBI metrics for Hybrid Low Gradient (HLG) ~~Vermont streams~~macroinvertebrate communities.

HLG Metric	Score				
	5	**4**	**3**	**2**	**1**
1. Total Density (number per sample)	≥ 500	400-≤500	300-≤400	200-≤300	< 200
2. Richness~~[1]~~ of ~~EOT (~~Ephemeroptera, Odonata, and Trichoptera~~)~~ (EOT) taxa	≥ 15	13-≤~~14~~15	11-~~12~~≤13	7-≤1~~0~~1	< 7
3. Richness~~[1]~~ of intolerant taxa, based on ~~BCG (~~Biological Condition Gradient (BCG) attribute scores 1-3	≥ 14	11-≤~~13~~14	9-≤~~10~~11	5-≤8	< 5
4. Percent of individuals as intolerant ~~COTE (~~Coleoptera, Odonata, Trichoptera, and Ephemeroptera (COTE), based on BCG scores 1-3	≥ 28	20-≤28	13-≤20	5-≤13	< 5
5. ~~Ratio[2]~~-Ratio[1] of EOT individuals to EOT plus Chironomidae individuals	≥ 0.50	0.38-≤0.50	0.26-≤0.38	0.13-≤0.26	< 0.13
6. ~~PMA-O (~~Percent model affinity of orders (PMA-O)	≥ 75	65-≤75	55-≤65	45-≤55	< 45
7. Percent of individuals as Amphipoda and Isopoda (excluding the genus *Hyallela*)	0	>0-1	≥1-5	≥5-25	> 25
8. Hilsenhoff Biotic Index value	< 4.0	4.0-≤5.0	5.0-≤6.0	6.0-≤6.5	≥ 6.5
9. ~~PPCS-F (~~Pinkham-Pearson coefficient of similarity of functional groups (PPCS-F)	≥ 0.57	0.49-≤0.57	0.41-≤0.49	0.36-≤0.41	< 0.36
10. Ratio of individuals as shredders to individuals as shredder and collector-filterers	≥ 0.50	0.35-≤0.50	0.20-≤0.35	0.10-≤0.20	< 0.10

~~[1] In samples where two replicates were processed, richness metrics may have decimal values. In this case, values would be rounded down to odd numbers and rounded up to even numbers.~~

~~[2]~~ [1]These metrics exclude individuals in the families Baetidae (Ephemeroptera) and Hydropsychidae (Trichoptera).

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Table A-5. ~~Macroinvertebrate~~ IBI metrics for Slow Low Gradient (SLG) ~~Vermont streams~~macroinvertebrate communities.

SLG Metric	Score				
	5	4	3	2	1
1. Total Density (number per sample)	≥ 500	400-<500	300-<400	200-<300	< 20
2. Richness~~[1]~~ of ~~EOT (~~Ephemeroptera, Odonata, and Trichoptera (EOT) taxa	≥ 15	11-<~~14~~15	8-<~~10~~11	5-<~~7~~8	< 5
3. Richness~~[1]~~ of intolerant taxa, based on ~~BCG (~~Biological Condition Gradient (BCG) attribute scores 1-3	≥ 10	7-<~~9~~10	5-<~~7~~6	2-~~4~~<5	< 2
4. Percent of individuals as intolerant ~~COTE (~~Coleoptera, Odonata, Trichoptera, and Ephemeroptera (COTE) based on BCG scores 1-3	≥ 20	14-<20	9-<14	3-<8	< 3
5. ~~Ratio[2]~~-Ratio[1] of EOT individuals to EOT plus Chironomidae individuals	≥ 0.50	0.36-<0.50	0.23-<0.35	0.11-<0.22	< 0.11
6. ~~PMA-O (~~Percent model affinity of orders (PMA-O)	≥ 65	57-<65	50-<57	40-<50	< 40
7. Percent of individuals as Amphipoda and Isopoda (excluding the genus *Hyallela*)	0	>0-1	≥1-5	≥~~6~~5-25	> 25
8. Hilsenhoff Biotic Index value	< 5.5	5.5-<6.0	6.~~1~~0-<6.5	6.~~6~~5-<7.0	≥ 7.0
9. ~~PPCS-F (~~Pinkham-Pearson coefficient of similarity of functional groups (PPCS-F~~)~~)	≥ 0.50	0.42-<0.50	.34-<0.~~41~~40	0.29-0.~~35~~34	< 0.29
10. ~~EOT[2]~~-EOT[1] Density (number per ~~m[2]~~square meter)	≥ 500	351-<500	200-<350	100-<20~~1~~0	< 1

~~[1] In samples where two replicates were processed, richness metrics may have decimal values. In this case, values would be rounded down to odd numbers and rounded up to even numbers.~~

~~[2]~~[1] These metrics exclude individuals in the families Baetidae (Ephemeroptera) and Hydropsychidae (Trichoptera).

Table A-6. IBI Assessment Scale for low gradient streams.

Class Equivalent and Assessment	IBI Range
A(1) Excellent ~~Threshold~~: *Indeterminate range (Very Good/Excellent):*	46-50 (44-45)
B(1) Very Good ~~Threshold~~: *Indeterminate range (Good/Very Good):*	39-43 (37-38)
B(2) Good ~~Threshold~~: *Indeterminate range (Fair/Good):*	31-36 (29-30)

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Fair: *Indeterminate range (Poor/Fair):*	21-28 (19-20)
Poor:	10-18

Fish Community Biocriteria

Fish Community Indexes of Biotic Integrity (IBI)s. The health or biological integrity of fish communities in wadeable sized, hard bottomed Vermont streams shall be evaluated by one of two IBIs, the Cold Water IBI (CWIBI) or the Mixed Water IBI (MWIBI). These two IBIs measure the extent of departure of the fish community from the natural condition. The CWIBI is used to assess the biological integrity of cold water, hard bottom streams that support two to four native species. The CWIBI is comprised of six metrics, with each metric having a possible score of 1.5 (Poor) to 7.5 (Excellent). The MWIBI is used to assess the biological integrity of both warm water and cold water, hard bottom streams that support five or more native fish species. The MWIBI is comprised of nine metrics, which each haveing a possible score of 1 (Poor) to 5 (Excellent). In applying the two IBIs, each metric is scored and then summed to produce a final score. Final scores for both Vermont IBIs range from 9 (Poor) to 45 (Excellent). Assessment scores that are within 1 2 points of the next highest or next lowest rating may be placed into that next highest or lower level by the biologist. Extenuating factors that are considered in making these determinations may include metric values that show dramatically higher or lower values, the proportion of the community composed of nonnative fish species, and species dominance.

Fish Community Sampling Methods. Both the CWIBI and MWIBI shall be used to assess data from wadeable streams. All fFish are collected using one or more backpack electrofishers. A sample shall be taken of from a section of a waterstream that is representative of the habitat present in the overall stream reach and shall be long enough to provide a reliable sample.in which the sample is to be taken. The length of stream fished shall be great enough to provide a representative sub-sample of the overall stream reach. The minimum section length to be fished in wadeable streams shall be 75 meters regardless of width and increases with mean section width (Table A-7). When mean river widths exceed 12 meters, sampled area shall be reduced to the area from both banks out to approximately 4 6 meters. An IBI shall be calculated from a single electrofishing run. Where density is a of particular concern, two or to three runs shall be conducted, and a population estimate shall be calculated; when second run catch density exceeds 50% of first run, a third run shall be performed. Individual fish captured during the electrofishing run shall be enumerated by species, and the count of deformities, fin erosion, and lesions or tumor anomalies shall be noted for each species.

Table A-7. Minimum section lengths for sampling fish communities in wadeable Vermont streams by stream based on wetted width.

Stream Mean Wetted Width (meters)	≤3.5 or less	>3.5--≤5	>5--≤8	>8--≤12[1]	≥12+ [1]
Minimum Section Length Sampled (meters)	75	100	120	150	150-200

[1] May include from banks out to ~~4~~ 6 meters, shocked only.

MWIBI

Table A-8. ~~The Vermont~~ Mixed Water Index of Biotic Integrity. ~~Metric s~~Scoring procedure for Metric 1 is presented in Figures A-1 and A-2. See Table A-~~8~~ 9 for additional scoring procedures for metrics 2, 3, 6, 7, and 9.

MWIBI Metric	Score				
	5	**4**	**3**	**2**	**1**
1. Total number of native fish species	Maximum Species Richness Line				
2. Number and identity of native intolerant species *statewide, except for < 400 ft. elevation in Champlain drainage*	>1	-	1	-	0
< 400 ft. elevation in Champlain drainage	1	-	-	-	0
3. Number and identity of native benthic insectivores	>1	-	1	-	0
4. Proportion of individuals as White Sucker~~s~~ and Creek Chub~~s~~	<11%	11-<18	18-<26	26-33	>33
5. Proportion of individuals as native and nonnative generalist feeders *statewide except for < 500 ft. elevation in Champlain drainage*	<20%	20-<28	28-<36	36-45	>45
< 500 ft. elevation in Champlain drainage	<30%	30-<40	40-<50	50-60	>60
6. Proportion of individuals as native water column and benthic **insectivores** *statewide, except < 500 feet elevation in Champlain drainage*	>65%	54-65	43-<54	31-<43	<31
< 500 feet elevation in Champlain drainage	>55%	44-55	32-<44	20-<32	<20
7. Proportion of individuals as native top carnivores *cold water population (include nonnative salmonids)*	>15%	11-15	8-<11	5-~~-~~<8	<5
warm water population (if drainage at sample site is <25km² then score 5)	>10%	9-10	7-<9	3-<7	<3
8. Proportion of sample with deformities, fin erosion, lesions or tumors	<1%	1-<2	2-<3	3-4	>4
9. Abundance[1] of n~~N~~ative ~~S~~species (~~*numbers#*~~*/100m²)* *<500 ft. elevation in Champlain drainage*	>20	-	10-20	-	<10
All other sites statewide: site alkalinity >9 mg/l	>10	-	7-10	-	<7
site alkalinity <9 mg/l	>6	-	3-6	-	<3

[1] Nonnative trout are included in metric 9.

Figure A-1. The~~e~~is Maximum Species Richness Line (MSRL) shall be used for scoring the native species richness metric in the MWIBI for sample sites above 500 feet in elevation and all sites in the Connecticut River watershed. A metric score of 1-5 is achieved by the visual intersection of the site drainage area (km^2) with the number of native species collected.

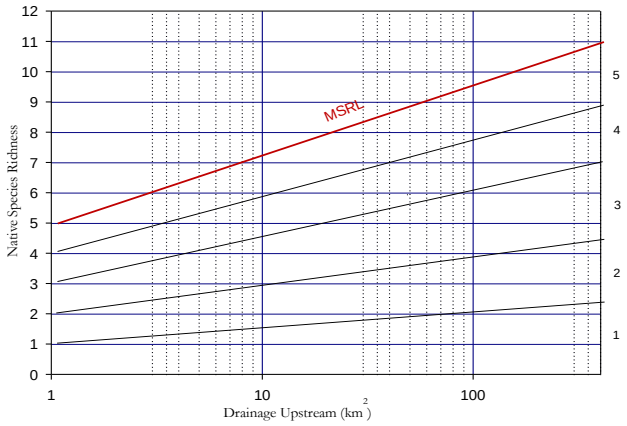

Figure A-2. Th~~e~~is ~~Maximum Species Richness Line (~~MSRL~~)~~ shall be used for scoring the native species richness metric in the MWIBI for sample sites below 500 feet in the St. Lawrence River watershed. A metric score of 1-5 is achieved by the visual intersection of the site drainage area with the number of native species collected.

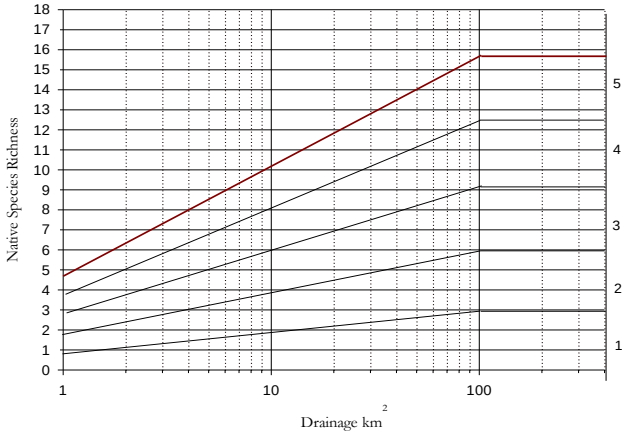

Table A-9. Scoring procedure for MWIBI metrics 2, 3, 6, 7, and 9.

Metric 2 (< 400 ft. elevation)	(1) If one species represented by two or more individuals OR two species represented by one fish each, then score **5**. (2) If one species represented by one individual, then score **3**. (3) If no species, then score **1**.
Metric~~s~~ 2 (> 400 ft. elevation) and Metric 3	(1) If two or more species represented by two or more individuals each, then score **5**; (2) If two species, one represented by two or more individuals and the other represented by one individual, then score **4**; (3) If one species represented by two or more individuals OR two species represented by one fish each, then score **3**; (4) If one species represented by one individual, then score **2**; or (5) If no species, then score **1**.
Metric 6	If proportion of Blacknose Dace exceeds 55% of total sample or if the only insectivore, then score **1**.
Metric 7	A cold-water fish community is a community that naturally supports one or more of the following species: Brook Trout, Slimy Sculpin, Longnose Sucker, or Burbot.
Metric 9	If less than 20 individuals collected in sample, then score metrics 4-8 as **1**.

Table A-10. MWIBI Assessment Scale**.**

~~Class Equivalent and Assessment~~	~~IBI Range~~	Score	Biological Integrity	Class Equivalent
~~A(1) Excellent~~	~~41-45~~	41-45	Excellent	A(1)
~~B(1) Very Good~~	~~36-40~~	36-40	Very Good	B(1)
~~B(2) Good~~	~~30-35~~	30-35	Good	B(2)
~~Fair~~	~~27-29~~	27-29	Fair	Non-Support
~~Poor~~	~~<27~~	<27	Poor	Non-Support

CWIBI

Table A-11. Cold Water Index of Biotic Integrity. Scoring rules for metrics 1, 2, 3, and ~~through~~ 4 shown in Table A-12. ~~Final index values rounded up for even values and down for odd values.~~

CWIBI Metric	Score				
	7.5	**6**	**4.5**	**3**	**1.5**
1. Number of native, intolerant species	2	-	1	-	0
2. Proportion of sample as cold water stenothermic species	> 75%	67-75	59-<67	50-<59	< 50
3. Proportion of individuals as generalist feeders	< 5%	5-7	>7-10	>10-13	> 13
4. Proportion of individuals as top carnivores	> 35%	32-35	29-<32	25-<29	< 25
5. Brook ~~trout~~ Trout density (~~numbers~~#/100 m^2 from ~~one~~ first electrofishing pass)	>4.0	-	2.0-4.0	-	<2.0
6. Brook ~~trout~~ Trout age class structure	YOY[1] and adults present	-	YOY only, no adults	-	YOY and adults absent

[1] Young of Year.

Table A-12. Metric scoring rules for CWIBI

For Metric 1	1) If two species represented by two or more individuals, then score 7.**5**; 2) If two species, one represented by two or more individuals and a second represented by one individual, then score ~~**4**~~**6**; 3) If one species represented by two or more fish OR two species represented by one individual each, then score ~~**3**~~**4.5**; 4) If species represented by one individual, then score ~~**2**~~**3**; or 5) If no intolerant species, then score **1.5**.
For Metrics 2, 3, and 4	1) If less than 20 individuals in sample, then score **1.5**.

Table A-13. CWIBI Assessment Scale. ~~Total scores that fall in between whole numbers shall be rounded up for odd values and down for even values.~~

Score	Biological Integrity	Class Equivalent
~~42~~41-45	Excellent	A(1)
36-40	Very Good	B(1)
30-3~~4~~5	Good	B(2)
27-2~~8~~9	Fair	Non-Support
<27	Poor	Non-Support

Appendix H. OUTSTANDING RESOURCE WATERS

1. **Batten Kill**, Towns of East Dorset and Arlington. Designated June 12, 1991. The main stem of the Batten Kill from its headwaters in East Dorset and the West Branch to the New York border at Arlington, Vermont, a distance of approximately 26 miles. Designated on the basis of exceptional natural, recreational, cultural, and scenic values.

2. **Pike's Falls/Ball Mountain**, Town of Jamaica. Designated June 21, 1991. A portion of the North Branch between the point where Kidder Brook enters the brook above Pike's Falls to the point below the falls where an unnamed tributary, which originates from the Winhall Municipal Forest, enters the North Branch. This segment is approximately 4,000 feet in length and within this distance the stream descends 140 feet, much of the drop occurring within Pike's Falls. Designated on the basis of exceptional natural, recreational, and scenic values.

3. **Poultney River**, Towns of Poultney and Fair Haven. Designated June 28, 1991. The lower portion of the Poultney River beginning at the Poultney/Fair Haven town line and continuing downstream to its confluence with Lake Champlain. Designated on the basis of exceptional natural, cultural, and scenic values.

4. **Great Falls, Ompompanoosuc River**, Town of Thetford. Designated March 6, 1996. That portion of the Ompompanoosuc between its confluence with a tributary draining both Gillette Swamp and Mud Pond, also known as Forsyth Pond, and its confluence with the West Branch, 3.8 miles downstream in the Town of Thetford. Designated on the basis of exceptional recreational, cultural, scenic, and natural values.