Section 3-02 Class A(1) Ecological Waters

A. Management Objectives

Managed to achieve and maintain waters in a natural condition, compatible with the following designated uses:

1. **Aquatic Biota, Wildlife, and Aquatic Habitat** - consistent with waters in their natural condition.
2. **Aesthetics** - water character, flows, water level, bed and channel characteristics, and flowing and falling waters in their natural condition.
3. **Swimming and Other Primary Contact Recreation** - highest quality in waters, in their natural condition with negligible risk of illness or injury from conditions that are a result of human activities.
4. **Boating, Fishing, and Other Recreational Uses** - highest quality as compatible with waters in their natural condition.

B. Water Quality Criteria for Class A(1) Ecological Waters

The following water quality criteria shall be achieved in all Class A(1) ecological waters.

1. **Turbidity** - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nepholometric turbidity units) as an annual average under dry weather base-flow conditions.
2. **Escherichia coli** - Not to exceed a geometric mean based on at least ~~3~~5 samples obtained over a ~~30-day~~ representative period not less than 30 days of ~~18~~126 organisms/100 ml, and no ~~single sample~~ more than 10% of samples above ~~33~~235 organisms/100 ml. None attributable to the discharge of wastes.
3. **Aquatic Biota, Wildlife, and Aquatic Habitat** - Change from the natural condition limited to minimal impacts from human activity. Measures of biological integrity for aquatic macroinvertebrates and fish assemblages are within the range of the natural condition. Uses related to either the physical, chemical, or biological integrity of the aquatic habitat or the composition or life cycle functions of aquatic biota or wildlife are fully supported. All life cycle functions, including overwintering and reproductive requirements are maintained and protected.
4. **Dissolved Oxygen** - as exists in waters in their natural condition.
5. **Nutrients** - Compliance with nutrient criteria for Class A(1) waters shall be achieved either by compliance with the nutrient concentration values in Table 3 or by compliance with all nutrient response conditions in Table 3. 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.

Table 3. Nutrient Criteria for Class A(1) Waters.

		Small, High-Gradient Streams[1]	Medium, High-Gradient Streams[1]	Warm-Water, Medium-Gradient Streams[1]	Lakes and Reservoirs[2]	All Other Waters
Nutrient Concentrations						
	Total Phosphorus (µg/L)	10[3]	9[3]	18[3]	12[4]	
Nutrient Response Conditions						
	Secchi Disk Depth (meters)				5.0[5]	
	Chlorophyll-a (µg/L)				2.6[4]	
	pH	Not to exceed 8.5 standard units.				
	Turbidity	Consistent with the criteria in Section 3-02 B.1 of these rules.				
	Dissolved Oxygen	Consistent with the criteria in Section 3-02 B.4 of these rules.				
	Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-02 B.3 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

1. Stream type determinations made by the Secretary for application of numerical biological indices in accordance with Section 3-01 D of these rules shall be used for the application of these nutrient criteria.

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.

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.

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

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

6. In evaluating compliance with these criteria, the impact of additional discharges on downstream uses shall ensure maintenance of uses of downstream waters

Section 3-03 Class A(2) Public Water Supplies

A. Management Objectives

Water managed for public water supply purposes to achieve and maintain waters with a uniformly excellent character and a level of water quality that is compatible with the following designated uses:

1. **Aquatic Biota, Wildlife, and Aquatic Habitat** - high quality aquatic biota and wildlife sustained by high quality aquatic habitat necessary to support their life-cycle and reproductive requirements.

2. **Aesthetics** - water character, flows, water level, and bed and channel characteristics consistently exhibiting aesthetic value.

3. **Swimming and other primary contact recreation** - in waters that pose negligible risk of illness due to conditions that are a result of human activities, but managed as necessary for consistency with use as a public water supply.

4. **Boating, Fishing, and Other Recreational Uses** - suitable for good quality boating, fishing, and other recreational uses.

5. **Public Water Supplies** - highly suited as a source for public water supply with disinfection, and filtration when necessary.

B. Water Quality Criteria for Class A(2) Public Water Supplies

The following water quality criteria shall be achieved in all Class A(2) public water supplies.

1. **Turbidity** - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nepholometric turbidity units) as an annual average under dry weather base-flow conditions.

2. **Escherichia coli** - ~~Not to exceed a geometric mean based on at least 3 samples obtained over a 30 day period of 18 organisms/100 ml, no single sample above 33 organisms/100 ml. None attributable to the discharge of wastes.~~Not to exceed a geometric mean based on at least 5 samples obtained over a representative period not less than 30 days of 126 organisms/100 ml, and no more than 10% of samples above 235 organisms/100 ml. None attributable to the discharge of wastes.

3. **Aquatic Biota, Wildlife and Aquatic Habitat** - Biological integrity is maintained, no change from the reference condition that would prevent the full support of aquatic biota, wildlife or aquatic habitat uses. Change from the reference condition for aquatic macroinvertebrates and fish assemblages shall not exceed moderate changes in the relative proportions of taxonomic, functional, tolerant and intolerant components. All expected functional groups are present in a high quality habitat and none shall be eliminated. All life cycle functions, including overwintering and reproductive requirements are maintained and protected. Changes in the aquatic habitat shall not exceed moderate differences from the reference condition consistent with full support of all aquatic biota and wildlife uses.

4. **Dissolved Oxygen**

The specified dissolved oxygen criteria for each designated fish habitat type will be considered absolute instantaneous minimum values. In addition, fluctuations

above the minimum values shall be maintained as necessary to support aquatic habitat.

a. **Cold Water Fish Habitat** - 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 in areas that the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. Not less than 6 mg/l and 70% saturation at all times in all other waters designated as a cold water fish habitat.

b. **Warm Water Fish Habitat** - Not less than 5 mg/l and 60% saturation at all times.

5. **Nutrients** - Compliance with nutrient criteria for Class A(2) waters shall be achieved either by compliance with the nutrient concentration values in Table 4 or by compliance with all nutrient response conditions in Table 4. 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 criteria on a site-specific basis as necessary to achieve compliance with the nutrient response conditions.

Table 4. Nutrient Criteria for Class A(2) Waters.

		Small, High-Gradient Streams[1]	Medium, High-Gradient Streams[1]	Warm-Water, Medium-Gradient Streams[1]	Lakes and Reservoirs[2]	All Other Waters
Nutrient Concentrations						
	Total Phosphorus (µg/L)	12[3]	15[3]	27[3]	17[4]	
Nutrient Response Conditions						
	Secchi Disk Depth (meters)				3.2[5]	
	Chlorophyll-a (µg/L)				3.8[4]	
	pH	Not to exceed 8.5 standard units.				
	Turbidity	Consistent with the criteria in Section 3-03 B.1 of these rules.				
	Dissolved Oxygen	Consistent with the criteria in Section 3-03 B.4 of these rules.				
	Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-03 B.3 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

1. Stream type determinations made by the Secretary for application of numerical biological indices in accordance with Section 3-01 D of these rules shall be used for the application of these nutrient criteria.

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.

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.

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

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

6. In evaluating compliance with these criteria, the impact of additional discharges on downstream uses shall ensure maintenance of uses of downstream waters

Section 3-04 Class B Waters

A. Management Objectives

Class B waters shall be managed to achieve and maintain a level of quality that fully supports the following designated uses:

1. **Aquatic Biota, Wildlife, and Aquatic Habitat** - aquatic biota and wildlife sustained by high quality aquatic habitat with additional protection in those waters where these uses were sustainable at a higher level based on Water Management Type designation.

2. **Aesthetics** - water character, flows, water level, bed and channel characteristics, exhibiting good aesthetic value and, where attainable, excellent aesthetic value based on Water Management Type designation.

3. **Public water supply** - Suitable for use as a source for a public water supply with filtration and disinfection.

4. **Irrigation of crops and other agricultural uses** - suitable, without treatment, for irrigation of crops used for human consumption without cooking and suitable for other agricultural uses.

5. **Swimming and other primary contact recreation** - suitable for swimming and other forms of water based recreation where sustained direct contact with the water occurs and, where attainable, suitable for these uses at very low risk of illness based on Water Management Type designation.

6. **Boating, fishing and other recreational uses** - Suitable for these uses with additional protection in those waters where these uses are sustainable at a higher level based on Water Management Type designation.

B. Water Quality Criteria for Class B waters

In addition to the criteria specified in §3-01 of these rules, the following criteria shall be met in all Class B waters:

1. **Turbidity** - The following criteria shall be achieved:

   a. In Cold Water Fish Habitat waters - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 10 NTU (nepholometric turbidity units) as an annual average under dry weather base-flow conditions; and

   b. In Warm Water Fish Habitat waters - None in such amounts or concentrations that would prevent the full support of uses, and not to exceed 25 NTU (nepholometric turbidity units) as an annual average under dry weather base-flow conditions.

2. **Dissolved Oxygen** -

   The specified dissolved oxygen criteria for each designated fish habitat type will be considered absolute instantaneous minimum values. In addition, fluctuations above the minimum values shall be maintained as necessary to support aquatic habitat.

a. Cold Water Fish Habitat waters - 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 in areas that the Secretary determines are salmonids spawning or nursery areas important to the establishment or maintenance of the fishery resource. Not less than 6 mg/l and 70% saturation at all times in all other waters designated as a cold water fish habitat, and

b. Warm Water Fish Habitat waters - Not less than 5 mg/l and 60% saturation at all times.

3. Escherichia coli -

In all Class B waters - ~~Not to exceed 77 organisms/100 ml.~~ Not to exceed a geometric mean based on at least 5 samples obtained over a representative period not less than 30 days of 126 organisms/100 ml, and no more than 25% of samples above 235 organisms/100 ml. 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 the Escherichia coli criterion.

4. **Aquatic Biota, Wildlife and Aquatic Habitat** - No change from the reference condition that would prevent the full support of aquatic biota, wildlife, or aquatic habitat uses. Biological integrity is maintained and all expected functional groups are present in a high quality habitat. All life-cycle functions, including overwintering and reproductive requirements are maintained and protected. In addition, the following criteria shall be achieved:

   a. In Water Management Type One waters - change from the reference condition for aquatic macroinvertebrate and fish assemblages shall be limited to minor changes in the relative proportions of taxonomic and functional components; relative proportions of tolerant and intolerant components are within the range of the reference condition. Changes in the aquatic habitat shall be limited to minimal differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses.

   b. In Water Management Type Two waters - change from the reference condition for aquatic macroinvertebrate and fish assembledges shall be limited to moderate changes in the relative proportions of tolerant, intolerant, taxonomic, and functional components. Changes in the aquatic habitat shall be limited to minor differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses.

   c. In Water Management Type Three waters - change from the reference condition for aquatic macroinvertebrate and fish assemblages shall be limited to moderate changes in the relative proportions of tolerant, intolerant, taxonomic, and functional components. Changes in the aquatic habitat shall be limited to moderate differences from the reference condition consistent with the full support of all aquatic biota and wildlife uses. When such habitat changes are a result of hydrological modification or water level fluctuation, compliance may be determined on the basis of aquatic habitat studies.

   d. In all other Class B waters - no change from reference conditions that would have an undue adverse effect on the composition of the aquatic biota, the physical or chemical nature of the substrate or the species composition or propagation of fishes.

5. Nutrients

a. In all Class B waters except for segments within Lake Champlain and Lake Memphremagog, compliance with nutrient criteria shall be achieved either by compliance with the nutrient concentration values in Table 5 or by compliance with all nutrient response conditions in Table 5. 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 criteria on a site-specific basis as necessary to achieve compliance with the nutrient response conditions.

Table 5. Nutrient Criteria for Class B Waters Other Than Segments Within Lake Champlain and Lake Memphremagog.

		Small, High-Gradient Streams[1]	Medium, High-Gradient Streams[1]	Warm-Water, Medium-Gradient Streams[1]	Lakes and Reservoirs[2]	All Other Waters
Nutrient Concentrations						
	Total Phosphorus (µg/L)	12[3]	15[3]	27[3]	18[4]	
Nutrient Response Conditions						
	Secchi Disk Depth (meters)				2.6[5]	
	Chlorophyll-a (µg/L)				7.0[4]	
	pH	Not to exceed 8.5 standard units.				
	Turbidity	Consistent with the criteria in Section 3-04 B.1 of these rules.				
	Dissolved Oxygen	Consistent with the criteria in Section 3-04 B.2 of these rules.				
	Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-03 B.4 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

1. Stream type determinations made by the Secretary for application of numerical biological indices in accordance with Section 3-01 D of these rules shall be used for the application of these nutrient criteria.

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

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

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

6. In evaluating compliance with these criteria, the impact of additional discharges on downstream uses shall ensure maintenance of uses of downstream waters