Chapter 583 Nutrient Criteria for Class AA, A, B, and C Fresh Surface Waters

SUMMARY: This Chapter establishes nutrient criteria for Class AA, A, B, and C fresh surface waters of the State of Maine. Nutrient enrichment can cause negative environmental impacts to surface waters, such as algal blooms, low dissolved oxygen concentrations, excessive growths of filamentous algae or bacteria, generation of cyanotoxins, or affect the resident biological community. The Department will use the methods described in this Chapter to make decisions about attainment of designated and existing uses of aquatic life support, habitat, and recreation in and on the water of surface waters established in the State's water quality classification system (38 M.R.S. §§464-470). This Chapter also sets forth a framework to establish and identify site-specific phosphorus and other nutrient criteria through additional rulemaking.

1. Definitions. The following terms are defined for purposes of this Chapter as follows:

August median flow means the median of all the daily arithmetic mean stream flows in August. August median flow may be calculated from river gage measurements or estimated based on drainage area size and proportion of the drainage area underlain by sand and gravel aquifers and are subject to Department approval.

Chlorophyll *a* means a particular kind of photosynthetic pigment of algae and plants.

Class means the statutory classification (*i.e.*, AA, A, B, C) assigned to fresh surface waters as set forth in 38 M.R.S. § 465.

Critical ambient conditions means conditions in a waterbody that are conducive to the expression of the adverse effects of nutrient enrichment such as low flow or water level, warm temperatures, etc.

Geometric mean means the average value that signifies the central tendency of the set of numbers by taking the root of the product of their values. Geometric mean = $(x_1 \cdot x_2 \cdot \ldots \cdot x_n)^{1/n}$

Impoundments means riverine waters upstream of a dam classified as AA, A, B, or C, and not classified as GPA where the surface elevation is approximately the same as found at the dam.

Nutrient means any chemical which an organism requires to live and grow, including phosphorus, nitrogen, carbon, and other essential and trace elements.

Percent nuisance algal cover means the percent of stream and river substrate covered by filamentous algae and thicker periphyton mats. It is calculated by adding the percent of substrate with filamentous algae greater than 1 centimeter long and the percent of substrate covered with periphyton mats greater than 1 millimeter thick.

Periphyton means a layer of algae, bacteria, and fungi growing on a substrate within a waterbody.

Phaeophytin means a byproduct of chlorophyll degradation formed when chlorophyll loses its central magnesium molecule.

Phytoplankton means algae suspended in the water column.

ppb means parts per billion, which is equivalent to micrograms per liter (µg/L).

Reasonable potential means the results of a reasonable potential analysis conducted by the permitting authority that indicate that a discharge causes, has the reasonable potential to cause, or contributes to an

in-stream excursion above narrative or numeric criteria within a State water quality standard, pursuant to Chapter 523 § 5(d).

Season means the period from June through September in a calendar year.

Sewage fungus means visible growths of aquatic bacteria and fungi associated with organic pollution, excluding iron and manganese bacteria.

TP means total phosphorus.

Turbid means that the water is not clear or transparent due to small organic and inorganic particles suspended in the water.

Wadeable stream means a perennial or intermittent stream in which most of the wetted channel is safely wadeable by a person during baseflow conditions.

Waterbody type means a kind of waterbody based on size, geomorphology, movement of water, and substrate type, such as a wadeable stream with rocky bottom, wadeable stream with unconsolidated substrate, impoundment, and non-wadeable river.

2. **Purpose and applicability**. This Chapter establishes nutrient criteria for Class AA, A, B, and C fresh surface waters to protect and assess the designated and existing uses of aquatic life support, habitat, and recreation in and on the water as described in 38 M.R.S. §§ 464 and 465. This Chapter also provides related implementation policy and sets forth a framework to establish and identify site-specific nutrient criteria for such waters through additional rulemaking. The rule does not apply to Class GPA waters. Also, this rule does not apply to Class AA, A, B, and C wetlands that usually lack aboveground water from June through September.

NOTE: **Waterbodies classified as GPA or AA, A, B, or C**

Waterbody	**GPA[1]**	**AA, A, B, or C[2]**	**Covered by Chapter 583**
Great Ponds (definition in 38 M.R.S. § 480-B), which include • natural lakes or ponds greater than 10 acres in size • impoundments greater than 30 acres in size • impoundments that are less than 30 acres in size but were greater than 10 acres in size before being impounded	X		
Natural lakes and ponds less than 10 acres in size (including marshes)	X		
Wetlands associated with Class GPA waters	X		
Several river segments specifically classified as GPA in 38 M.R.S. §§ 467	X		
Streams and rivers		X	X
Impoundments less than 30 acres in size that were less than 10 acres in size before being impounded		X	X
Wetlands associated with Class AA, A, B, or C streams, rivers, or impoundments		X	X
Class AA, A, B, or C wetlands that usually lack aboveground water during June through September (e.g., fen, raised bog)		X	

[1] - 38 M.R.S. §§ 465-A
[2] - 38 M.R.S. §§ 465

3. Nutrient criteria. The Department will use the nutrient criteria in Table 1 to protect and maintain the designated and existing uses of aquatic life support, habitat, and recreation in and on the water of Class AA, A, B, and C fresh surface waters, excluding wetlands that usually lack aboveground water during June through September. The nutrient criteria apply from June through September. Site-specific TP values developed pursuant to Section 4(B) shall be substituted for and supersede default TP values for the statutory classes of fresh surface waters set forth in Table 1. Site-specific values for other non-TP nutrients developed pursuant Section 4(C)(3) must be attained in addition to TP values. Determinations of attainment or nonattainment of nutrient criteria are based on all data collected during a season (June through September during a calendar year).

When reasonable potential exists for TP or another nutrient, the applicable values in Table 1 or Section 5 will be used to determine appropriate nutrient limits in Maine Pollutant Discharge Elimination System (MEPDES) permits or National Pollutant Discharge Elimination System (NPDES) permits for interstate waters. Site-specific values for TP established in Section 5 will supersede the applicable TP value in Table 1.

A. Total phosphorus (TP) (µg/L, ppb). The geometric mean of total phosphorus (TP) concentrations in Class AA, A, B, and C waters may not exceed the corresponding TP values in Table 1 during a season.

B. Response indicators. The following response indicators serve to protect the designated and existing uses of aquatic life support, habitat, and recreation in and on the waters described in 38 M.R.S. §§ 464 and 465. The response indicators apply to all Class AA, A, B, and C waters unless otherwise specified below.

(1) *Percent nuisance algal cover.* Percent nuisance algal cover in Class AA, A, B, and C wadeable stream and river segments with rocky substrate may not exceed the corresponding values in Table 1. This indicator is restricted to wadeable segments of streams and rivers with rocky substrate. Percent nuisance algal cover shall be computed by adding the percent of substrate covered by filamentous algae greater than 1 cm long and the percent of surveyed substrate covered by periphyton mats greater than 1 mm thick.

(2) *Water column chlorophyll a (µg/L, ppb).* This indicator is a measurement of phytoplankton in the water and shall be based on measurements of chlorophyll *a* that have not been adjusted for phaeophytin. Water column chlorophyll *a* from Class AA, A, B, and C waters may not exceed the corresponding values in Table 1.

(3) *Sewage fungus.* This indicator includes visible growth of aquatic bacteria and fungi associated with enrichment of organic materials. This indicator excludes growth of iron and manganese bacteria. There must not be visible patches of sewage fungus in Class AA, A, B, C waters.

Table 1. Nutrient Criteria for Class AA, A, B, and C surface waters[a]

Waterbody Type	**Table**
Class AA, A, B, and C wadeable stream and river segments with rocky substrate	Table 1a
Class AA, A, B, and C impoundments	Table 1b
Other Class AA, A, B, and C waters[a]	Table 1c

a – Excluding Class AA, A, B, and C wetlands that usually lack aboveground water from June through September

Table 1a. Nutrient criteria for Class AA, A, B, and C wadeable stream and river segments with rocky substrate

		Statutory Class		
		AA & A	B	C
Nutrient criteria[a]	Nutrient Indicators			
	Total Phosphorus	≤ 19.0 µg/L (ppb) TP[b]	≤ 30.0 µg/L (ppb) TP[b]	≤ 44.0 µg/L (ppb) TP[b]
	Other Site-Specific Parameter	See Section 5.		
	Response Indicators			
	Percent Nuisance Algal Cover[c]	≤ 19.0	≤ 24.0	≤ 35.0
	Sewage Fungus[c]	No visible patches of sewage fungus		

a – Attainment of these criteria will be assessed according to the decision framework in Section 4.
b – Geometric mean of TP in a season. Site-specific TP values developed pursuant to Section 4(B) shall supersede default TP values of the statutory classes. Site-specific values for other non-TP nutrients pursuant Section 4(C)(3) must also be attained in addition to applicable TP values.
c – This indicator must meet the specified conditions during the entire season.

Table 1b. Nutrient criteria for Class AA, A, B, and C impoundments

		Statutory Class		
		AA & A	B	C
Nutrient criteria[a]	Nutrient Indicators			
	Total Phosphorus	≤ 19.0 µg/L (ppb) TP[b]	≤ 30.0 µg/L (ppb) TP[b]	≤ 44.0 µg/L (ppb) TP[b]
	Other Site-Specific Parameter	See Section 5.		
	Response Indicators			
	Water Column Chl *a* (µg/L, ppb)[b]	Spatial geometric mean ≤ 6.0 and no value > 8.0	Spatial geometric mean ≤ 8.0 and no value > 10.0	Spatial geometric mean ≤ 8.0 and no value > 10.0
	Sewage Fungus[c]	No visible patches of sewage fungus		

a – Attainment of these criteria will be assessed according to the decision framework in Section 4.
b – Spatial geometric mean of TP in a season. Site-specific TP values developed pursuant to Section 4(B) shall supersede default TP values of the statutory classes. Site-specific values for other non-TP nutrients pursuant Section 4(C)(3) must also be attained in addition to applicable TP values.
c – This indicator must meet the specified conditions during the entire season.

Table 1c. Nutrient criteria for other Class AA, A, B, and C surface waters

		Statutory Class		
		AA & A	B	C
Nutrient criteria[a]	Nutrient Indicators			
	Total Phosphorus	≤ 19.0 µg/L (ppb) TP[b]	≤ 30.0 µg/L (ppb) TP[b]	≤ 44.0 µg/L (ppb) TP[b]
	Other Site-Specific Parameter	See Section 5.		
	Response Indicators			
	Water Column Chl *a* (µg/L, ppb)[b]	Seasonal mean ≤ 6.0	Seasonal mean ≤ 8.0	Seasonal mean ≤ 8.0
	Sewage Fungus[c]	No visible patches of sewage fungus		

a – Attainment of these criteria will be assessed according to the decision framework in Section 4.

b – Geometric mean of TP in a season. Site-specific TP values developed pursuant to Section 4(B) shall supersede default TP values of the statutory classes. Site-specific values for other non-TP nutrients pursuant Section 4(C)(3) must also be attained in addition to applicable TP values. Site-specific values are listed in Section 5.

c – This indicator must meet the specified conditions during the entire season.

4. **Implementation.** The Department will use the following decision framework (Figure 1) to determine if nutrient criteria are attained. The Department may divide fresh surface waters into segments that are evaluated independently based on factors such as changes in statutory class or changes in habitat or waterbody characteristics. Failure to meet any of the response indicators is sufficient to determine that a waterbody does not attain nutrient criteria. The Department at its discretion may decide to not assess a given response indicator where water conditions would preclude observations (e.g., high turbidity, high color, deep water) would preclude observations.

Figure 1. Decision framework

	Seasonal geometric mean TP concentration is less than or equal to the applicable value in Table 1 or an established site-specific value *AND* If the waterbody has a site-specific value for a non-TP nutrient pursuant Section 4(C)(3), the seasonal geometric mean concentration of the non-TP nutrient is less than or equal to the site-specific value for the non-TP nutrient	Seasonal geometric mean TP concentration is greater than the applicable value in Table 1 or an established site-specific value *AND/OR* If the waterbody has a site-specific value for a non-TP nutrient pursuant Section 4(C)(3), the seasonal geometric mean concentration of the non-TP nutrient is greater than the site-specific value for the non-TP nutrient
All applicable response indicators meet the values in Table 1	A. **Nutrient Criteria Are Attained**	B. **Nutrient Criteria Are Attained** Department may conduct a study to develop a site-specific TP value as described in Section 4(B)
One or more of the applicable response indicators do not meet the values in Table 1	C. **Does Not Attain Nutrient Criteria** Department may conduct a study to develop a site-specific value for a nutrient other than TP as described in Section 4(C)	D. **Does Not Attain Nutrient Criteria**

A. Figure 1, A. Nutrient Criteria are Attained

(1) Nutrient criteria are attained if:

(a) the seasonal geometric mean TP concentration is less than or equal to the value of the assigned class from Table 1 or an established site-specific value;

(b) the seasonal geometric mean concentration of a non-TP nutrient is less than or equal to the applicable site-specific value for a non-TP nutrient pursuant Section 4(C)(3); and

(c) all applicable response indicators attain the values of the assigned class in Table 1.

B. Figure 1, B. Nutrient Criteria Are Attained

(1) Nutrient criteria are attained if:

(a) the seasonal geometric mean TP concentration is greater than the value of the assigned class from Table 1 or an established site-specific value OR the seasonal geometric mean concentration of a non-TP nutrient is greater than the applicable site-specific value for a non-TP nutrient pursuant Section 4(C)(3); and

(b) all applicable response indicators attain the values of the assigned class in Table 1.

(2) The Department may conduct or request further assessment of TP concentrations, other nutrients, and response indicators to determine if a site-specific TP value may be warranted. The study could be initiated and paid for by the Department and/or another entity. Study plans must be approved by the Department in coordination with the U. S. Environmental Protection Agency and meet data requirements in Section 4.E. Site-specific TP values shall be added to Section 5 through public rulemaking and approval by the U. S. Environmental Protection Agency.

(a) *Study to establish a site-specific TP value.* The study shall include TP and applicable response indicator data pursuant to Table 1, for at least one year during critical ambient conditions (*e.g.*, below August median flow and warm temperatures). Typically monitoring should occur between June 1 and September 30. Monitoring frequency should be at least monthly for TP and all applicable response indicators. The Department may require additional years of monitoring and may require additional habitat and water quality measurements, such as nitrogen concentrations. Any relevant data meeting the data requirements of paragraph 5.E, collected within 5 years prior to initiation of the study should be considered in the study. The study must also evaluate the potential for adverse impact due to nutrient enrichment of downstream waterbodies or segments. The study may also investigate if mitigating factor(s) are present that limit algal and plant growth or chemically or physically bind phosphorus, so it is not readily available to plants and algae.

(b) *Interpretation of study results.*

(i) Does not attain response indicator values. The waterbody does not attain nutrient criteria (C or D in Figure 1) if the Department determines that data collected during the study do not meet one or more applicable response values in Table 1.

(ii) Site-specific TP value. If a seasonal geometric mean of TP concentrations in a waterbody exceeds the applicable Table 1 TP value, but the Department determines that the waterbody consistently attains all applicable response indicator values of the assigned class (see Table 1) during the study, then the waterbody attains nutrient criteria and the Department may propose an amendment to this rule establishing a site-specific TP value greater than the applicable value in Table 1. The Department will add site-specific values for TP to Section 5 of this rule through a public rulemaking process and subsequent approval by the U. S. Environmental Protection Agency. Once adopted, the Department will substitute and use the site-specific TP value for decisions regarding attainment of nutrient criteria for that waterbody. The applicable TP value in Table 1 shall remain in effect until a new site-specific value is adopted through an amendment to this rule. At least one year of data obtained during critical ambient conditions (*e.g.*, below August median flow, warm temperatures) shall be considered before

proposing adoption of a new site-specific TP criteria. A site-specific TP value may not be greater than the geometric mean TP concentration measured in the study.

(c) *Considerations for site-specific TP values.* The Department will consider the following factors when determining if a site-specific TP value may be appropriate and when deciding whether to propose an amendment to this rule establishing a site-specific TP value.

(i) The risk of any applicable response indicators not meeting applicable values. For example, is a response indicator already close to an applicable value? What were the ambient conditions with respect to applicable response indicators in previous years?

(ii) Natural environmental conditions mitigating the impact of phosphorus enrichment and the risk of those conditions changing. For example, natural limiting factors can reduce light availability (*e.g.*, shade, turbidity, water color), bind phosphorus (*e.g.*, clay, dissolved organic carbon, aluminum hydroxide can make phosphorus unavailable for plant growth), or reduce habitat quality for algae (*e.g.*, fine substrate, high water velocity).

(iii) The risk of adversely affecting downstream waterbodies by establishing a site-specific TP value greater than the applicable value in Table 1.

(d) *Qualification.* The Department may propose through rulemaking a reduction of an adopted site-specific TP value if the Department determines that environmental conditions or mitigating factors have changed and the adopted site-specific value is no longer sufficiently protective or appropriate based on the above considerations. An existing site-specific value may be replaced with either the applicable TP value in Table 1 or a new site-specific TP value provided it is less than the established site-specific value.

C. Figure 1, C. Does Not Attain Nutrient Criteria

(1) Nutrient criteria are not attained if:

(a) the seasonal geometric mean TP concentration is less than or equal to the value of the assigned class from Table 1 or an established site-specific value;

(b) the geometric mean concentration of a non-TP nutrient is less than or equal to the applicable site-specific value for a non-TP nutrient pursuant Section 4(C)(3); and

(c) one or more response indicators do not attain the values of the assigned class in Table 1.

(2) Also, nutrient criteria are not attained if:

(a) one or more response indicators do not attain values of the assigned class in Table 1; and

(b) there is insufficient data to determine if seasonal geometric mean of TP (or an applicable non-TP nutrient) is less than or equal to the values assigned in Table 1 or a site-specific value.

(3) If the Department determines that nitrogen, carbon, or another nutrient caused or contributed to a non-attainment of nutrient criteria, then it may conduct a study like the study outlined in Section 4(B)(2) to establish a site-specific value for such nutrient. In such case, the provisions of Section 4(B)(2) would apply to the Department's assessment of and decision to propose through rulemaking any site-specific value for such other nutrient. If a site-specific value for a waterbody was adopted

through rulemaking and approved by the U. S. Environmental Protection Agency, then it would be added to Section 5 and would be included in the nutrient criteria for that waterbody to achieve attainment of water quality standards.

D. Figure 1, D. Does Not Attain Nutrient Criteria

(1) Nutrient criteria are not attained if:

(a) the seasonal geometric mean TP concentration is greater than the value of the assigned class from Table 1 or an established site-specific value, or the seasonal geometric mean concentration of a non-TP nutrient is greater than the applicable site-specific value for a non-TP nutrient pursuant Section 4(C)(3); and

(b) one or more response indicators in a waterbody do not attain the values of the assigned class in Table 1 OR there is insufficient data to determine that one or more of the response indicators in a waterbody attain the values of the assigned class in Tables 1a-1c.

NOTE: **Listing waterbodies that do not attain nutrient criteria (**identified in Section 4(C) or 5(D) of this Chapter). The Department will follow the listing methodology in the biennial Integrated Water Quality Monitoring and Assessment Report (Federal Clean Water Act §§ 305(b), 303(d), and 314). The listing methodology is available for review during the public comment period of each report. When phosphorus enrichment is accompanied by another factor that contributes to non-attainment, the Department may list more than one cause of impairment.

E. Data requirements

(1) Responsibility for sampling. The Department, or its agents, generally conduct sampling for the purpose of making decisions on the attainment of designated uses or maintenance of existing uses. The Department may request or require an applicant for, or holder of a waste discharge license, water quality certification, or other Department issued permit to conduct sampling of effluent and ambient conditions. The decision by the Department to request or require monitoring and sampling may be based on the classification goal of the water, attainment status, existing water quality information, past performance of existing controls for point and nonpoint sources of pollution, the nature, magnitude, and variability of the activity relative to the affected water, or other factors at the discretion of the department. Sampling must be performed by qualified persons based on considerations such as relevant education, training, and experience. Outside entities must submit sampling plans to the Department and receive approval from the Department before collecting data.

NOTE: **Data collection.** All data collection must follow protocols and quality assurance procedures approved by the Department.

(2) Sampling. The Department will use best professional judgment to determine the amount of nutrient and response indicator data necessary to meet data quality objectives to make an attainment decision. The Department will in its discretion determine the appropriate number, timing, and frequency of samples required to evaluate attainment of the nutrient criteria for a particular waterbody by considering relevant factors and information, including without limitation, the type of waterbody being sampled, knowledge of past water quality, applicability of response indicators, and potential variation in response indicator values.

(4) Data quality. The Department will evaluate the quality of data to ensure that data are representative of ambient conditions and are suitable for analysis. Data from outside sources may be used if the Department determines them to be of sufficient quantity and quality based on consideration of factors such as the training and expertise of the people that collected data, standard operating procedures, quality assurance and quality control practices, and other documentation. The Department may require additional sampling if it determines that data from an outside source is insufficient.

5. Established site-specific nutrient values.

NOTE: Site-specific nutrient values for TP or another nutrient adopted through a public rulemaking process and approved by the U. S. Environmental Protection Agency will be added to this section of the rule.

AUTHORITY: 38 M.R.S. §§ 341-D(1-C), 341-H, and 464(5)
EFFECTIVE DATE: