

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

SUMMARY: This Chapter establishes nutrient criteria for all 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 or impairment of designated and existing uses 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:
 - A. "Algal bloom" means a growth of suspended algae in the water column that causes Secchi disk transparency to be less than 2.0 meters.
 - B. "Chlorophyll *a*" means a particular kind of photosynthetic pigment of algae and plants.
 - C. "Class" means the statutory classification goal (*i.e.*, AA, A, B, C) assigned to fresh surface waters as set forth in 38 M.R.S. § 465.
 - D. "Colored" means water having a mean apparent color >25 standard platinum units or equivalent value of true color or dissolved organic carbon.
 - E. "Impounded waters" 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.
 - F. "Nutrient" means any chemical which an organism requires to live and grow, including phosphorus, nitrogen, carbon, and other essential and trace elements.
 - G. "Patches of fungi and filamentous bacteria" means visible growths of aquatic fungi or filamentous bacteria (*e.g.*, sewage fungus), excluding iron and manganese bacteria.
 - H. "Percent nuisance algal cover" means the amount of stream and river substrate covered by filamentous algae greater than 1 centimeter long or periphyton mats greater than 1 millimeter thick.
 - I. "Periphyton" means a layer of algae, bacteria, and fungi growing on a substrate within a waterbody.
 - J. "pH" means a measure of water acidity.
 - K. "Phaeophytin" means a byproduct of chlorophyll degradation formed when chlorophyll loses its central magnesium molecule.
 - L. "Phytoplankton" means algae suspended in the water column.
 - M. "ppb" means parts per billion, which is equivalent to micrograms per liter ($\mu\text{g/L}$).
 - N. "ppm" means parts per million, which is equivalent to milligrams per liter (mg/L).

- O. “Secchi disk transparency” means a measurement of water clarity using a Secchi disk.
 - P. “TP” means total phosphorus.
 - Q. “Turbid” means that the water is not clear or transparent due to small organic and inorganic particles suspended in the water.
 - R. “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 all Class AA, A, B, and C fresh surface waters to protect and assess designated and existing uses 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.
3. **Description of nutrient and response indicators.** The following nutrient and response indicators are components of the nutrient criteria used to protect designated and existing uses for each of the categories of classified waters as outlined in Section 4 and Table 1. The provisions in Sections 3(A) & 3(B) outline how TP and the various response indicators are used and applied for purposes of the nutrient criteria outlined in Section 4 and Table 1. 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. Sampling
- A. **Total phosphorus (TP)** ($\mu\text{g/L}$, ppb). Total phosphorus shall be measured as the mean of samples collected during a sampling season (see Section 5(F)). The Department requires laboratory analytical methods for TP have a reporting limit of ≤ 10 ppb.
 - B. **Response indicators.** The following response indicators serve to protect designated and existing uses described in 38 M.R.S. §§ 464 and 465. The response indicators are used in Section 4 and Table 1 outlining applicable nutrient criteria for Class AA & A, B, and C fresh surface waters, and considered in the decision framework described in Section 5. The response indicators outlined below are necessary because of the variety of waterbody types in Maine. As described below, some response indicators are not applicable to all waterbody types. The Department may exclude response indicators that are not appropriate based on the descriptions of the response indicators below or cannot be measured with Department sampling methods for the type of waterbody being assessed.
 - (1) **Percent nuisance algal cover.** Percent nuisance algal cover shall be estimated with viewing bucket surveys or alternative method approved by the Department. The percent cover shall be computed by adding the percent of surveyed substrate covered by filamentous algae greater than 1 cm long and the percent of surveyed substrate covered by periphyton mats greater than 1 millimeter thick. This indicator shall apply only to wadeable sections of streams and rivers and may be excluded by the Department if it determines in its discretion that there are insufficient wadeable sections in the waterbody being assessed or if the substrate is unsuitable for the growth of attached algae, such as a waterbody with a sandy or mucky substrate.

- (2) **Water column chlorophyll *a* ($\mu\text{g/L}$, 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. For Class AA, A, B, and C fresh surface waters that are not impounded, samples shall be collected by grab sample. For impounded sections of Class AA, A, B, and C fresh surface waters, samples shall be collected using either depth-integrated euphotic-zone cores or depth-integrated epilimnetic cores as deemed appropriate by the Department based on its consideration of vertical stratification of the water column. This indicator may be excluded by the Department if it determines in its discretion that water velocity is swift enough to prevent the growth of phytoplankton.
- (3) **Secchi disk transparency (meters, m).** Secchi disk transparency measurements shall be collected in still or slowly moving waters in which water velocity does not interfere with the measurement (*e.g.*, impoundments, non-flowing water). For this response indicator to be attained, Secchi disk transparency must be greater than or equal to 2.0 meters for waterbodies greater than or equal to 2.0 meters deep. For waterbodies less than 2.0 meters deep, Secchi disk transparency must be all the way to the bottom. If the water is colored or turbid, Secchi disk transparency shall be accompanied by chlorophyll *a* samples to confirm a nonattainment condition due to nutrients and phytoplankton growth. This indicator may be excluded by the Department if it determines in its discretion that there are insufficient still or slowly moving waters for Secchi disk transparency measurements or if turbidity or water color precludes proper sampling.
- (4) **Patches of fungi and filamentous bacteria.** This indicator includes visible growth of fungi and filamentous bacteria (*e.g.*, sewage fungus) associated with enrichment of organic materials. This indicator excludes growth of iron and manganese bacteria.
- (5) **pH.** The pH must be within the range of 6.5 – 9.0 as measured with professional-grade water quality meters or tests.
- (6) **Dissolved oxygen concentrations (mg/L , ppm).** This indicator is established for each class of fresh surface waters in 38 M.R.S. § 465 and measured with professional-grade water quality meters or tests.
- (7) **Aquatic life use attainment.** This indicator is established for each class of fresh surface waters in 38 M.R.S. §§ 464 and 465 and where applicable *Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams*, 06-096 C.M.R. ch. 579 (Effective May 27, 2003). This indicator may be excluded by the Department if it determines in its discretion that habitat or waterbody conditions are unsuitable for Department protocols for collecting and evaluating samples.
4. **Nutrient criteria.** The Department will use the nutrient criteria in Table 1 to protect and maintain designated and existing uses of Class AA, A, B, and C fresh surface waters, as well as provide for the attainment and maintenance of water quality standards of downstream waterbodies. The nutrient criteria apply to all Class AA, A, B, and C waters throughout the entire year.. Combinations of nutrient and response indicators apply as described in Table 1, except that the Department may exclude a response indicator if it determines in its

Table 1. Nutrient criteria for Class AA, A, B, and C surface waters of the State.

	Statutory Class			
	AA & A	B	C	
Nutrient criteria	$\leq 18.0 \mu\text{g/L}$ (ppb) TP ^a <i>and</i> if the waterbody has a site-specific value for another nutrient, the mean concentration of that nutrient is less than or equal to the site-specific value <i>and</i> all applicable response indicator ^b values in this column <i>OR</i> all applicable response indicator ^b values in this column	$\leq 30.0 \mu\text{g/L}$ (ppb) TP ^a <i>and</i> if the waterbody has a site-specific value for another nutrient, the mean concentration of that nutrient is less than or equal to the site-specific value <i>and</i> all applicable response indicator ^b values in this column <i>OR</i> all applicable response indicator ^b values in this column	$\leq 40.0 \mu\text{g/L}$ (ppb) TP ^a <i>and</i> if the waterbody has a site-specific value for another nutrient, the mean concentration of that nutrient is less than or equal to the site-specific value <i>and</i> all applicable response indicator ^b values in this column <i>OR</i> all applicable response indicator ^b values in this column	
	Percent Nuisance Algal Cover	≤ 18.0	≤ 24.0	≤ 35.0
	Water Column Chl <i>a</i> ($\mu\text{g/L}$, ppb)	≤ 3.5 (≤ 5.0 for low gradient streams with velocity < 2.0 cm/sec or impoundments)	≤ 8.0 (impoundments must have spatial mean ≤ 8.0 and no value > 10.0)	≤ 8.0 (impoundments must have spatial mean ≤ 8.0 and no value > 10.0)
	Secchi Disk Transparency (m)	≥ 2.0		
	Patches of Bacteria and Fungi	None observed		
	pH	6.5 – 9.0		
	Dissolved Oxygen (mg/L, ppm)	In accordance with 38 M.R.S. § 465 (2020) ^c		
	Aquatic Life	In accordance with 38 M.R.S. §§ 464 and 465 (2020) ^c , and <i>Classification Attainment Evaluation Using Biological Criteria for Rivers and Streams</i> , 06-096 C.M.R. ch. 579 (effective May 27, 2003)		

- a – Site-specific TP values developed pursuant to Section 5(B) shall be substituted for and supersede default TP values of the statutory classes. Site-specific values for other non-TP nutrients pursuant Section 5(C)(3)(b) must also be attained in addition to applicable TP values.
- b – The Department may exclude response indicators that are not appropriate based on indicator descriptions in Section 3(B) or cannot be measured with Department sampling methods for the type of waterbody being assessed.
- c – The statute is available at <http://www.mainelegislature.org/legis/statutes/38/title38ch3sec0.html> and the rule is available at <https://www.maine.gov/sos/cec/rules/06/chaps06.htm>. Also, they could be obtained by calling the Department at 1-800-452-1942 or 1-207-287-7688.

discretion that the indicator does not apply based on the indicator’s description in Section 3(B) and the type of waterbody being assessed (*e.g.*, wadeable stream with rocky substrate, non-wadeable river with unconsolidated substrate). Site-specific TP values developed pursuant to Section 5(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 5(C)(3)(b) must also be attained in addition to TP values.

For Maine Pollutant Discharge Elimination System (MEPDES) permits, or National Pollutant Discharge Elimination System (NPDES) permits for interstate waters, where TP limits are warranted, the values in Table 1 will be used to determine appropriate TP limits, unless replaced by a site-specific value. Where warranted, MEPDES and NPDES permits also will include limits for applicable site-specific values for other non-TP nutrients developed pursuant Section 5(C)(3)(b) of this rule.

5. **Implementation.** The Department will use the following decision framework (Figure 1) with the nutrient criteria provided in Section 4 and Table 1 to determine whether TP or another nutrient (see Section 5(C)(3)(b)) has caused or contributed to the impairment of a designated use, and to guide site-specific TP or other nutrient value development, where warranted. 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. When implementing the nutrient criteria, the Department will determine and apply an appropriate combination of response indicators based on the applicability of indicators described in Section 3(B) and depending on the waterbody type (*e.g.*, wadeable vs. deep, rocky vs. unconsolidated substrate, flowing vs. not flowing).

Figure 1. Decision framework.

	Seasonal 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 5(C)(3)(b), the seasonal mean concentration of the non-TP nutrient is less than or equal to the site-specific value for the non-TP nutrient	Seasonal mean TP concentration is greater than the applicable value in Table 1 or an established site-specific value OR If the waterbody has a site-specific value for a non-TP nutrient pursuant Section 5(C)(3)(b), the seasonal 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. Not Impaired. Nutrient criteria attained	B. Not Impaired. Department may conduct a study to develop a site-specific TP value as described in Section 5(B)
One or more of the applicable response indicators do not meet the values in Table 1	C. Impaired. Department conducts weight-of-evidence analysis to determine cause of impairment as described in Section 5(C)	D. Impaired. Nutrient criteria not attained

A. Figure 1, A. Not impaired

- (1) Nutrient criteria are attained if:
 - (a) the seasonal 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 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 5(C)(3)(b); and
 - (c) all applicable response indicators of a waterbody attain the values of the assigned class in Table 1.

B. Figure 1, B. Not impaired

- (1) Nutrient criteria are attained if:
 - (a) the seasonal mean TP concentration is greater than the value of the assigned class from Table 1 or an established site-specific value OR the seasonal mean concentration of a non-TP nutrient is greater than the applicable site-specific value for a non-TP nutrient pursuant Section 5(C)(3)(b); and
 - (b) all applicable response indicators of a waterbody attain the values of the assigned class in Table 1.

NOTE: Situations where nutrient criteria are attained despite having nutrient enrichment could prompt the Department to sample downstream waterbodies to determine if they attain nutrient criteria.

- (2) The Department may conduct further assessment of TP concentrations and response indicators to determine if a site-specific TP value may be warranted through a proposed amendment to this rule as follows:
 - (a) **Study to establish a site-specific TP value.** The Department may request or independently perform a study to assess whether a site-specific TP value may be warranted. The study shall consist of multiple years of data collection, including sampling during critical ambient conditions (*e.*, below median seasonal water levels, warm temperatures, etc.). The Department will request or independently sample TP concentrations and all response indicators in Table 1 that are appropriate for the type of waterbody being studied. The Department also may request or independently collect other types of data (*e.g.*, habitat, water chemistry) to determine if there is a mitigating factor that is:
 - (i) limiting algal and plant growth; or

- (ii) chemically or physically binding the phosphorus so it is not readily available to plants and algae.

The Department may consider such data in establishing a site-specific TP value pursuant to Section 5(B)(2). Given the potential for TP concentrations in excess of the limits assigned in Table 1 to cause or contribute to downstream water quality impacts, the Department will consider and may request or independently conduct monitoring of downstream waterbodies or segments for adverse effects while assessing the possibility of a site-specific TP value pursuant to Section 5(B)(2).

(b) Interpretation of study results.

- (i) **Does not attain response indicator values.** The waterbody is impaired (C or D in Figure 1) if the Department determines that data collected during the study do not meet all applicable response values in Table 1.
 - (ii) **Site-specific TP value.** If a seasonal mean of TP concentrations in a waterbody exceeds the applicable 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 6 of this rule through a public rulemaking process. The Department will substitute and use the adopted 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 three years of data shall be obtained before proposing adoption of a new site-specific TP value, including at least one year of data obtained during critical ambient conditions (*e.g.*, below median seasonal water flow, warm temperatures). A site-specific TP value may not be greater than the mean of the seasonal TP means found during 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 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. Impaired

- (1) The attainment result is impaired if:
 - (a) the seasonal 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 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 5(C)(3)(b); and
 - (c) one or more response indicators do not attain the values of the assigned class in Table 1.
- (2) The attainment result also is impaired 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 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) The Department may, by considering relevant evidence and through use of a weight-of-evidence approach, determine if TP, another nutrient, or a non-nutrient factor caused or contributed to impairment as follows:
 - (a) The Department may conclude that TP caused or contributed to an impairment of a use if it determines that the weight of the evidence considered by the Department indicates that phosphorus is a potential or likely cause of the impairment. In this case, the nutrient criteria are not attained. The Department may follow steps in Sections 5(B) of this rule to propose adoption of a lower site-specific TP value to achieve attainment of water quality standards.

- (b) The Department may conclude that another nutrient, such as nitrogen or carbon, has caused or contributed to an impairment of a use if it determines that the weight of the evidence considered by the Department indicates that the nutrient is a potential or likely cause of the impairment. In this case, the nutrient criteria are not attained. The Department may conduct a study like those described in Section 5(B)(2) for the other nutrient and propose adoption of a rule amendment establishing a site-specific value for such nutrient that would be included in the nutrient criteria for that waterbody to achieve attainment of water quality standards. In such case, the provisions of Section 5(B)(2) would apply to the Department's assessment of and decision to propose any site-specific value for such other nutrient. The Department will add site-specific values for TP or another nutrient to Section 6 of this rule through a public rulemaking process.
- (c) The Department may conclude that the impairment is the result of a non-nutrient cause if the Department determines that the weight of the evidence considered by the Department indicates that the non-nutrient stressor is the primary cause responsible for the impairment. In this case, the nutrient criteria are attained but the waterbody is impaired for other non-nutrient reasons.
- (d) The Department cannot conclude the cause of impairment if it determines there is insufficient information to determine the cause of impairment. In this case, the nutrient criteria are not attained, and more data may be collected to determine the cause of impairment.

D. Figure 1, D. Impaired

- (1) Nutrient criteria are not attained if:
 - (a) the seasonal mean TP concentration is greater than the value of the assigned class from Table 1 or an established site-specific value, or the seasonal mean concentration of a non-TP nutrient is greater than the applicable site-specific value for a non-TP nutrient pursuant Section 5(C)(3)(b); and
 - (b) one or more response indicators in a waterbody do not attain the values of the assigned class in Table 1.

NOTE: Listing impaired waterbodies (identified in Section 5(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 cause that contributes to an impaired use, the Department may list more than one cause of the impairment.

- E. **Natural conditions.** As provided in 38 M.R.S. § 464(4)(C), the Department may use best professional judgment to interpret decision framework outcomes and make a final determination of attainment of water quality standards when natural conditions have contributed to non-attainment of nutrient criteria. Examples of natural conditions affecting designated use attainment related to

nutrients include, but are not limited to, proximity to unimpaired wetlands, unenriched lake outlets, tidal areas, or naturally occurring concentrations of plants, fish, or wildlife.

F. Data requirements

- (1) **Responsibility for sampling.** In general, it is the responsibility of the Department, or its agents, to 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 or holder of a waste discharge license, water quality certification, or other Department issued permit to conduct sampling of effluent or 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, and the nature, magnitude, and variability of the activity relative to the affected water. Sampling must be performed by qualified persons based on considerations such as relevant education, training, and experience. The Department may provide training with respect to Department standard operating procedures for purposes of such sampling. 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 Department standard operating protocols and quality assurance procedures. Biological assessments to evaluate attainment of aquatic life criteria are typically performed once per sample season. TP and other response indicators are typically sampled monthly but may be sampled more frequently.

- (2) **Routine sampling.** Routine sampling will take place during the summer months (June 1 – September 30) for unimpounded fresh surface waters and ice-free months (April 1 – October 31) for impoundments, with exceptions for special circumstances. Routine phosphorus samples shall not be taken during or soon after storms or flood events. The Department will use best professional judgment and accepted statistical practices to determine the amount of nutrient and response indicator data necessary to meet data quality objectives to make an attainment decision.
- (3) **Special circumstances.** If the Department determines that routine sampling procedures are not ecologically appropriate or sampling is necessary outside of the routine sampling period, a sampling and analysis plan shall be developed in accordance with methods established in the scientific literature that are appropriate for the habitat conditions of the sample site or time of year.
- (4) **Data quality.** The Department will evaluate quality of data to ensure that data are representative of ambient conditions and are suitable for analysis, and to identify potential circumstances of natural conditions as described in Section 5(E). 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 also require additional sampling if it determines such

sampling is necessary after the Department reviews data quality and sufficiency and determines that it is not of sufficient quantity or quality.

6. Established site-specific nutrient values.

NOTE: Site-specific nutrient values for TP or another nutrient will be adopted through a public rulemaking process and added to this section of this rule.

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

DRAFT