Friends of Casco Bay
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Friends of Casco Bay's Petition to Refine the Class A and B Dissolved Oxygen Criteria and Add Narrative Nitrogen Criteria to Class SB and SC Waters

For 35 years, Friends of Casco Bay has worked to improve and protect the health of Casco Bay. We collect and analyze data to identify problems and find solutions. This petition proposes two changes to Maine's water quality standards. Both pose solutions to fix problems: one to account for advances in how dissolved oxygen is monitored and to fix confusing language; the other to add narrative nitrogen criteria to address a serious source of pollution to Maine's marine waters.

Introduction: An Overview of the Proposed Changes

Dissolved Oxygen: Maine's Class A and B water quality standards contain confusing language regarding how dissolved oxygen (DO) criteria must be met, fail to account for naturally fluctuating conditions, and do not reflect the modern and preferred method of continuously monitoring water quality conditions. This petition recommends changes to address these problems. They exist because this aspect of Maine's DO criteria was last updated in 1985,[1] based on EPA recommendations at the time, when continuous monitoring was in its infancy. For example, we deployed our first continuous monitoring station in 2016, increased to three stations in 2021, and added the capacity to continuously monitor water quality on an episodic basis in 2022. The Department and others also have shifted to continuous monitoring to best assess water quality.

With this shift, we all have more data and can see patterns, including fluctuations in DO caused by natural cycles versus impairments caused by human-induced pollution. Maine should update its Class A and B water quality standards to reflect this advancement. Maine also should revise its Class A and B standards to remove the confusing language that offers a choice between evaluating attainment based on DO concentration or saturation, whichever is higher. In reality, the Department always evaluates DO concentration. Making these changes will not weaken the protective nature of Maine's stringent DO criteria, but will make them easier to apply.

Nitrogen Criteria: In 2007, Maine's legislature directed the Department to adopt nitrogen criteria for coastal waters, with a priority focus on Casco Bay. (2007 Resolve or Resolve) The Resolve did not require that the criteria set numeric thresholds. Nor did it specify whether the criteria should be in statute or rule. Maine should take a two-step approach to adopting nitrogen criteria, similar to Massachusetts and other states. Those states added narrative nitrogen criteria to their marine water quality standards, then later developed numeric limits for specific waters. The numeric limits derive from TMDLs, watershed management plans, or rule. Taking this approach makes sense for Maine. The State has 3,500 miles of coastline, with unique configurations of bays, coves, and islands; rural and urban areas; and differing circulation patterns. Mane should adopt flexible nitrogen criteria that set the basis for attainment and later adopt numeric thresholds by water.

Maine should amend its Class SB and SC water quality standards to add narrative nitrogen criteria that set forth: (1) the problem of nutrient pollution, as articulated in the 2007 Resolve, Maine's Integrated Report, and the N-STEPS report; (2) the criteria that will be used to evaluate impairment; and (3) what permittees might be required to do to reduce nutrient pollution to coastal waters. It can then use flexible means to set numeric thresholds that meet site-specific conditions.

[1] S.P. 915, 112th Leg., Second Reg. Sess., Ch. 698 (ME 1985).

To quote EPA Region 1: "It is not possible at this time to put quantitative nitrogen levels on each Water Quality Class. In fact, total nitrogen level associated with a particular ecological response can vary by over 1.4 fold. However, it does appear that within a single embayment a consistent quantitative nitrogen criterion can be developed."[2]

1. Clarifying and Refining DO Criteria in Class A and B waters

Standard to be Changed: Friends of Casco Bay proposes that the DO criteria in 38 M.R.S. §§ 465(2)(A) and 465(3)(B) be updated. Those sections currently contain the following language:

> "The dissolved oxygen content […] may not be less than 7 parts per million or 75% of saturation, whichever is higher … ."[3]

This language is difficult to understand. It is even harder to apply. How is 7 parts per million (ppm) measured? When is one value higher than the other? In fact, the numeric value of 7 ppm is always used in evaluating attainment with water quality standards or assessing MEPDES permit compliance. That value is more protective and stringent than achieving 75% saturation. It also is more stringent than DO criteria applied in other coastal New England states and should remain so.[4] Comparatively, Maine is best positioned to protect and restore habitat for anadromous, threatened and endangered fish. The proposed changes will retain that purpose, but will account for natural diurnal swings in DO that do not effect biota and are not caused by MEPDES dischargers. The change also would reflect modern monitoring methods.

Proposed Change: Maine should remove the DO saturation criterion and modernize how the numeric limit of 7 ppm will be evaluated in 38 M.R.S. § 465(2)(A) and 465(3)(B), as follows:

> 38 M.R.S. § 465(2)(A): The dissolved oxygen content of Class A waters may not be less than 7 parts per million ~~or 75% of saturation, whichever is higher,~~ at any place or time, except as naturally occurs, or not less than 7 ppm at least 20[5] hours of any 24-hour period.

[2] City of Taunton, MA, NPDES Permit No. MA0100897 Fact Sheet at 17.
[3] 38 M.R.S. § 465(2)(B) and 465(3)(B).
[4] In Massachusetts, DO concentration "shall not be less than 6.0 mg/L in cold water fisheries" for Class A and B waters. 314 Mass. Code Regs. 4.05(3). In New Hampshire, Class A waters "shall have a dissolved oxygen content of at least 75% saturation, based on a daily average, and an instantaneous minimum of at least 6 mg/l at any place or time except as naturally occurs…Class B waters shall have a dissolved oxygen content of: (1) At least 75% of saturation… based on a daily average; and (2) An instantaneous minimum dissolved oxygen concentration of at least 5 mg/l." N.H. Code Admin. R. Env-Wq 1703.07. In Rhode Island, Class A, Class B, and Class B1 waters shall have a "dissolved oxygen content of not less than 75% saturation, based on a daily average, and an instantaneous minimum dissolved oxygen concentration of at least 5 mg/l, except as naturally occurs." 250 R.I. Code R. § 1.10(D).
[5] This number is based on our evaluation of available data and literature. The Department, in exercising its best professional judgment, may wish to further refine this window of time or set an acceptable floor below which DO concentration cannot go in a 24-hour period. For example, the language could read: The dissolved oxygen content of Class A waters may not be less than 7 parts per million ~~or 75% of saturation, whichever is higher,~~ at any place or time, except as naturally occurs, or not less than 7 ppm at least 20 hours of any 24-hour period, as long as the lowest concentration reached is not below 6 ppm (as a suggestion based on criteria from other states and a literature review). This would allow for diurnal fluctuations, but the floor would still be protective and high enough to account for impairments caused by anything other than natural causes.

> 38 M.R.S. § 465(3)(B): The dissolved oxygen content of Class B waters may not be less than 7 parts per million ~~or 75% of saturation, whichever is higher,~~ at any place or time, except as naturally occurs, or not less than 7 ppm at least 20[6] hours of any 24-hour period.[7]

Why the standard should be changed: First, it is confusing. The language "[t]he dissolved oxygen content […] may not be less than 7 parts per million or 75% of saturation, whichever is higher…" reads as though the body of water must ***either*** meet 7 ppm ***or*** 75% saturation, whichever is higher, but not both. In reality, regardless of whether saturation remains above 75%, the Department evaluates water bodies using the concentration criterion. The Department should correct this confusing language to reflect its intent to always apply a concentration limit. In the alternative, the Department should look at the language adopted by other states,[8] and clarify when it will consider percent saturation.

Second, the language fails to account for advanced monitoring and understanding of natural diurnal cycles that typically do not harm biota. The Department is moving in this direction. For example, in evaluating Class B streams with continuous monitoring, the Department has begun to acknowledge that brief early morning dips in dissolved oxygen do not necessarily affect biota.[9] Moreover, in the Triennial Report on Water Quality Standards that the Department submits to EPA, it has set forth a Consolidated Assessment Listing Methodology (CALM) that allows some deviation from the 7 ppm DO concentration without finding cause for impairment.[10] That methodology does not apply when the water body contains a licensed discharger, despite the fact that natural daily swings in oxygen within a prescribed and scientifically-recognized range[11] are known to occur and are not attributed to a MEPDES permittee. The State should complete the

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[6] *Id.*

[7] This proposed language is not the only option to consider. Another example the Department may consider is: The dissolved oxygen content of Class B waters may not be less than 7 parts per million ~~or 75% of saturation, whichever is higher~~, at any place or time, except as naturally occurs, or as a minimum daily average.

[8] *See* note 3.

[9] *See* Maine Dep't of Env't Prot., Falmouth Study Streams Stressor Report, Individual Watershed Reports (January 2022). In this report, the Department evaluated Falmouth streams to support "Falmouth[s] Proactive Watershed Management" Coastal Community Grant Project awarded to the Greater Portland Council of Governments. *Id*. at 1. For two streams, the Department acknowledged that slight deviations from the DO criteria of 7 ppm likely would not stress biota. *Id*. at 11, 21. For a third stream, the Department noted that diurnal depression of DO did not drop low enough to be a serious stressor on the stream's biota, but could in the future if certain other conditions changed. *Id*. at 31. For a fourth stream, the Department concluded that early morning DO concentrations drop to very low levels during periods of extreme low flow. The Department noted that these low DO concentrations are likely a function of the very low flows in the stream and not attributable to excessive algal production and associated nutrient inputs. According to the Department, the concentrations were low enough to affect the viability of particularly sensitive organisms (*e.g*. mayflies, stoneflies and brook trout) if the condition were to persist for a period of time, but the impact on these organisms when exposure to low DO is for relatively short times during relatively infrequent events is less well understood. *Id*. at 40.

[10] Maine Dep't of Env't Prot., 2018 / 2020 / 2022 Integrated Water Quality Monitoring and Assessment Report at 53-56 (March 30, 2022).

[11] In fact, EPA's 1986 recommendations for dissolved oxygen criteria allowed for daily averages where cycles of dissolved oxygen are sinusoidal. EPA coupled these averages with instantaneous minimums to protect specific life stages. U.S. EPA, Ambient Water Quality Criteria for Dissolved Oxygen at 35 (April 1986).

transition to modernize how it applies its stringent DO criteria by revising the DO language in its Class A and B water quality standards to reflect natural diurnal swings.[12]

Effect on Stakeholders: The proposed change should benefit stakeholders. It will retain and clarify Maine's highly protective Class A and B DO standards. It also will clearly articulate the difference between swings in DO caused by natural diurnal cycles and not by MEPDES permittees. The window of time selected should help set forth that difference.

2. Adding Narrative Criteria to Class SB and SC Waters

Standard to be Changed: Maine should add narrative nitrogen criteria to its Class SB (38 M.R.S. § 465-B(2)) and Class SC (38 M.R.S. § 465-B(3)) water quality standards. The Department intends, at some future date, to adopt a rule that includes numeric thresholds for evaluating narrative impairments to estuarine and marine waters. [13] That rule may not be adopted for years to come[14] and may be subject to legal challenges.[15] Maine should adopt narrative criteria in statute now, then later adopt numeric thresholds by rule for specific embayments or regions along the coast. Maine cannot wait to develop nitrogen criteria. Maine's nearshore estuarine and marine waters have historically shown increasing signs of nutrient impairment and must be protected now.[16] Moreover, Maine must comply with the 2007 Resolve.

Proposed Change: Maine should add a subsection D to both 38 M.R.S. § 465-B(2) and 38 M.R.S. § 465-B(3).[17] Subsection D should address nutrient pollution to estuarine and marine waters as follows:

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[12] The statutory language raised in this petition might be further refined to consider other points of analyses the Department already uses, such as those contained in the CALM methodology it uses to evaluate attainment. We express no opinion regarding the current seasonal DO language as it comports with available EPA guidance, but encourage the Department to consider whether that language also needs to be modernized.

[13] *See*, *e.g.*, U.S. EPA Nutrient Steps, Maine Casco Bay: Summary of State Narrative Nutrient Criteria and Consolidated Listing and Assessment Methods at 7 (Feb. 2021) (discussing combined criteria approach) [hereinafter N-STEPS Summary of Narrative Criteria]; Tetra Tech Inc., Ecological Sciences for U.S. EPA, Exploring Development of Numeric Nitrogen Targets in Portland Area, Casco Bay, Maine under the Nutrient Scientific Technical Exchange Partnership and Support (N-STEPS) (Version 4 July 2022) (discussing throughout tying numeric limits to healthy reference waters and stressor responses) [hereinafter N-STEPS Report].

[14] *See* ME Dept. of Env. Prot., Nutrient Criteria, https://www.maine.gov/dep/water/nutrient-criteria (stating Maine began work on its Phosphorus Rule in 2001 and hopes to commence rule-making in 2024); *see also* ME Dept. of Env. Prot., Development of Nutrient Criteria for Maine's Coastal Waters (June 2008) (outlining the plan for setting nitrogen criteria for marine waters with an "optimistic forecast" to draft criteria in 2012) [hereinafter Maine Development of Nutrient Criteria].

[15] New Hampshire tried to develop numeric nitrogen criteria based on its narrative water quality standard which set the regulatory framework to adopt numeric thresholds. *See* Phillip Trowbridge, Numeric Nutrient Criteria for the Great Bay Estuary, New Hampshire Department of Environmental Services (with input from the Piscataqua Region Estuaries Partnership) at 1 (2009). Those efforts never succeeded. Various NH municipalities filed legal challenges. Although the courts and the Environmental Appeals Board upheld the criteria, New Hampshire never adopted them. New Hampshire's narrative criteria, however, firmly support impairment assessments and numeric thresholds set in NPDES permits.

[16] H.P. 915, 123rd Leg., First Reg. Sess., Ch. 49, Preamble and Sec. 3 (ME 2007) (citing nutrient pollution as a source of marine pollution and contribution to water quality degradation, and prioritizing Casco Bay for various reasons) [hereinafter the Resolve].

[17] This proposal does not address Class SA waters. The Resolve is broad enough to require setting nutrient criteria for all coastal waters, but the Department has focused on setting nitrogen criteria only for Class SB and SC waters.

D. Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients, including but not limited to nitrogen, in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed any site-specific numeric criteria developed in a TMDL or as otherwise established by the Department pursuant to rule. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, impairment to eelgrass beds, decreases in dissolved oxygen, increases in chlorophyll-a concentrations, detrimental changes in the biological community, or degraded habitat, shall be addressed through the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for publicly-owned treatment works (POTWs) and best available technology (BAT) for non-POTWs, to remove such nutrients and restore and maintain designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.[18]

Why the standard should be changed: Pursuant to the 2007 Resolve, the Department must establish nitrogen criteria to protect coastal waters, and must first set criteria for Casco Bay.[19] The Resolve sets forth many of the effects of eutrophication - nuisance algal growth, harmful red tide, habitat impacts and oxygen depletion - that rationalize addressing this pollution source with expediency.[20] The Resolve does not require the Department to adopt numeric criteria, nor does it dictate whether the changes are made by statute or by rule.[21] Maine should adopt sound and effective narrative nutrient criteria into its water quality standards now to meet the Resolve and protect water quality. It can later set numeric thresholds for specific waters by rule or other means. This two-step approach is used in other states that regulate nutrient pollution in coastal waters.[22]

This makes sense because there can be no direct discharges to Class SA waters, except stormwater discharges in compliance with state and local requirements, and the estuarine and marine life and dissolved oxygen content of Class SA waters shall be as naturally occurs. 38 M.R.S. § 465(B)(1). For Class SA, the Department could clarify and require that stormwater discharges contain no anthropogenic nitrogen sources that would impair naturally occurring estuarine and marine life (including algae and plants) and dissolved oxygen content.

[18] *See* 314 Mass. Code Regs. § 4.05(5)(c), upon which this proposed language is based.

[19] The Resolve *supra* note 15.

[20] *Id; see also* Maine Development of Nutrient Criteria *supra* note 13.

[21] The Resolve simply directs the Department to report its findings and *any* necessary legislation to implement those findings to the Joint Standing Committee on Natural Resources. The Resolve *supra* note 15 at § 4.

[22] This footnote discusses Massachusetts as an example. Massachusetts' water quality standards set minimum criteria for each class of surface water and additional minimum criteria. 314 CMR 4.05(2)(a). In relevant part, the State's Class SB waters protect seagrass as habitat for fish, other aquatic life, and wildlife. 314 Mass. Reg. 4.05(4)(b). (Maine also might consider whether seagrasses should be added to the habitat requirements for Class SB and SC waters.) Massachusetts' additional minimum criteria ban nutrient pollution that causes or contributes to impairment. The nutrient criteria are similar to the language we propose for Maine: "Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site-specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00 including, but not limited to, those established in 314 CMR 4.06(6)(c): *Table 28: Site-specific Criteria*. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the

The Department should act now. From 2007 to the present, the need to control nitrogen pollution has heightened. Friends of Casco Bay consistently documents troubling nitrogen levels near wastewater effluent pipes, stormwater and CSO outfalls, and urbanized streams and shorelines. That excess nitrogen causes nuisance algal blooms that smother and degrade clam flats; fuel excess phytoplankton blooms that deplete dissolved oxygen, sometimes kills marine life, and sometimes produces toxins harmful to humans; degrades critical eelgrass habitat; and contributes to coastal acidification.[23] All of these factors could be referenced in the narrative criteria.

Adding narrative nutrient criteria to Class SB and SC waters will place Maine in better alignment with other states that start with narrative criteria and later develop numeric limits specific to target waters.[24] The indicators of impairment in proposed subsection D correspond to the indicia of nutrient impairment set forth in Maine's most recent Integrated Report and discussed during the stakeholder process the Department convened to help develop the N-STEPS analysis.[25]

Effect on Stakeholders: Narrative criteria will beneficially affect many marine users, including clammers, wormers, and aquaculturists[26] who rely on clean water that is free from nuisance algal blooms and harmful algal blooms (HABs). Narrative criteria may also benefit recreationalists who swim and paddle along Maine's coast and property owners who want their shores free of slimy, thick algal blooms. It will benefit all who love wildlife and enjoy healthy marine waters. It will protect and restore habitat, such as eelgrass that many fish species depend upon, and we in turn feed upon. It also will reduce one of the causes of coastal acidification.

Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non-POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control." 314 Mass. Reg. 4.05(5)(c). Table 28 contains nitrogen criteria for specific waters with different criterion for each water. 314 Mass. Code Regs. § 4.06(6)(c)(Table 28). EPA, which issues NPDES permits in the state, applies this narrative and numeric criteria, data, and any waste load allocations from TMDLs to set permit limits. *See*, *e.g.*, City of Taunton, MA, NPDES Permit No. MA0100897.

The Department may also wish to review other states that have adopted narrative criteria with either site-specific numeric criteria by water or by interpreting the narrative criteria into thresholds for NPDES permits. *See*, *e.g.*, New Hampshire (N.H. Code Admin. R. Env-Wq 1703.14 and numeric limits that apply those narrative criteria in the Great Bay Total Nitrogen General Permit, NH, NPDES Permit No. NHG58A000; Delaware (Delaware 7-7000-7401 Del. Admin. Code § 4.5.8 (narrative criteria) and https://dnrec.delaware.gov/watershed-stewardship/assessment/tmdls (nutrient TMDLs used to set numeric limits in NPDES permits)); and Rhode Island (250 R.I. Code R. § 1.10(E)(1) (narrative criteria) and limits set in various NPDES permits, such as Cranston, RI, NPDES Permit No. RI0100013 which sets an average monthly nitrogen discharge limit).

[23] *See also* ME Dept. of Env. Prot., Nutrient Criteria, https://www.maine.gov/dep/water/nutrient-criteria (stating that excess nitrogen can cause: blooms of phytoplankton and macroalgae that can smother organisms living on and within mudflats; loss of marine vegetation like seagrasses that are important for carbon sequestration, shoreline protection, and provide important habitat and feeding grounds for juvenile fish and invertebrates; declines in oxygen concentrations in bottom waters that can cause losses to the biological community, even fish or shellfish kills; and loss of recreational uses like swimming).

[24] *See* note 21.

[25] Maine Dep't of Env't Prot., 2018 / 2020 / 2022 Integrated Water Quality Monitoring and Assessment Report at 102-103 (March 30, 2022); N-STEPS Summary of Narrative Criteria and N-STEPS Report *supra* note 12.

[26] The benefits will mostly accrue to shellfish and seaweed farmers. Narrative criteria could be used to evaluate and set meaningful nitrogen limits in MEPDES permits for finfish farms.

In addition, establishing narrative criteria will formalize how the State will evaluate nitrogen pollution in MEPDES permits. This has some effect on MEPDES permittees, who are already subject to a reasonable potential analysis to determine if their nitrogen discharges are contributing to impairment. The revised language would provide clarity and flexibility regarding how impairments might be assessed and what permittees might be expected to do. In Casco Bay, major POTWs that discharge into Class SB and SC waters already must monitor nitrogen loads from May to October. Some facilities also must optimize nitrogen removal, and more are on notice that they may be subject to monitoring and load reduction requirements in their next permit. Adopting narrative criteria now will help the State clear its backlog of expired permits by setting a framework for evaluating nitrogen discharges and requiring monitoring, circulation studies, and measures to reduce nitrogen loads where supported by the data. Establishing flexible narrative criteria now could also accelerate rule-making to set numeric thresholds for target water bodies.

The benefits of establishing narrative nitrogen criteria now dwarf any potential argument against taking this step. It will support, not detract, from future numeric criteria rule-making. It will happen within the year, not years in the future.