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**Subject: WQS change proposal, Triennial Review Submittal**

**From: Androscoggin River Watershed Council**

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## **Proposals**

The Androscoggin River Watershed Council submits three recommendations for the Triennial Review. One pertains to the Classification System. Another pertains to the classification of the entire Androscoggin River in Maine under the proposed classification system change. The third pertains to the area commonly referred to as the Deep Hole in Gulf Island Pond on the Androscoggin River.

## **Classification System**

For the purposes of this proposal, the term flowing waters will be used to mean surface waters not classified as Great Ponds. There is significant similarity between Class A and Class B standards. However, there is considerable difference between the C Classification and the B Classification for flowing waters.

Class A and Class B have similar dissolved oxygen limits including those required for spawning and egg incubation. Class C waters have a much lower standard. Class A and B waters require a dissolved oxygen concentration of 7.0mg/l (ppm), and C Classification requires only 5.0 mg/l dissolved oxygen (DO). This significant difference is evidenced from the aesthetic quality of the Androscoggin River when it first met the C Classification several decades ago and the aesthetic quality today which is close to the B standard. Several decades ago, in the Class C segments of the Androscoggin during the vital summer months, DOs were between 5.0 and 6.0 mg/l, and DOs are now above 7.0 mg/l the vast majority of the time, very rarely dropping below 6.0 and seldom dropping below 6.3 mg/l.

ARWC Volunteer River Monitoring (VRMP) that takes instantaneous measurements of DO indicates that there may be a number of flowing waters that are classified as B but do not consistently meet the 7.0mg/l standard.

Given that we have rivers of very good quality and meeting the B standard the vast majority of the time and other rivers and streams meeting the B standard consistently, we are recommending that the B standard be divided into two classifications: "BB" (possibly called B Prime) and "B". BB would be the current Class B, and B would have a minimum DO of 6.0 mg/l. This provides for those rivers that cannot maintain a DO of 7.0 mg/l or 75% saturation, whichever is higher, consistently to be recognized as being much better quality than Class C.

Many of our rivers and streams in Western Maine have been altered by humans. Tributaries were often straightened and impeded by log driving dams; rivers were dammed for water power, and sometimes straightened for log driving. Rivers and streams were cleared of woody and other debris. Relatively large hydroelectric dams were constructed on major rivers in the state. The Androscoggin River has one of the greater elevation changes in New England, and therefore, it was very attractive to harness for power. Development has created non-point sources of pollution, and both residential and industrial development necessitated direct discharges of wastewaters to our rivers and streams. More recent changes in logging operations have “cleaned” the forest floor and reduced both the buffering capacity of the land, but it also may have starved our surface waters of a consistent and measured flow of nutrients. ARWC believes the combination of these factors are responsible for the biology of some river segments not meeting the biological standards.

The following are suggested changes to the classification system to establish a BB (B Prime) classification having the same standards as the current B classification, and a new B classification that is a new standard. The current B standard is not repeated for the new BB standard since they are the same. The proposed standards are in red, serif font with notes on things that would not be changed in black.

#### **Statutory Changes to Classification System: Title 38-465**

3. **Class B Prime waters. Class BB (B Prime) shall be the 3rd highest classification.** The current standards for class B would be used as the standards for this classification.

4. Class B waters. Class B shall be the 4<sup>th</sup> highest classification and reflecting the high quality of waters that have been impacted by a multitude of anthropogenic factors.

A. Class B waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life. The habitat must be characterized as only minimally impaired. [PL 2003, c. 227, §3 (AMD); PL 2003, c. 227, §9 (AFF); PL 2005, c. 561, §10 (AFF).]

B. Class B waters must be of sufficient quality to support all aquatic species indigenous to those waters without detrimental changes in the resident biological community consistent with the availability of food and nutrients that are available from the watershed as impacted by human activity. The dissolved oxygen content of Class B waters may not be less than 6.0 parts per million or 75% of saturation, whichever is lower, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean dissolved oxygen concentration may not be less than 9.5 parts per million and the one-day minimum dissolved oxygen concentration may not be less than 8.0 parts per million in identified fish spawning areas. Between April 15th and October 31st, the number of Escherichia coli bacteria in these waters may not exceed a geometric mean of 64 CFU or MPN per 100 milliliters over a 90-day interval or 236 CFU or MPN per 100 milliliters in more than 10% of the samples in any 90-day interval. [PL 2021, c. 551, §11 (AMD).]

5. same wording as #4 for Class C waters.

## **Classification of the Androscoggin River**

ARWC proposes that the entire section of the Androscoggin River in Maine be classified as the proposed Class B. Continuous monitoring of the Androscoggin River at Center Bridge in Turner, at the head of Gulf Island Pond and at the Deep Hole in Gulf Island Pond indicate very good water quality, although not meeting 7.0mg/l 100 percent of the time. For lack of additional data by regulatory agencies, the Volunteer River Monitoring Program also indicates that the river has very good water quality, yet it does not attain 7.0 mg/l 100 percent of the time. This is true for both sections of the river that are currently classified as B, including segments upriver from the Rumford mill, and for those classified as C.

Climate change and the warming of our waters is certainly the most recent anthropogenic impact on our waters. Rainfall acidification is another impact that has occurred over the past four to five decades. A combination of these changes and more distant past changes, even not including the construction of the hydroelectric dams, has created impacts that, while difficult to measure, are, most probably, impacting dissolved oxygen levels and aquatic communities in all sections of the river. One of the river morphological shape, possibly natural or possibly human altered, of a wide and very shallow section in the Durham area encourages considerable aquatic plant growth taking oxygen out of the water during the nighttime hours. This may be reflected in DO readings further downriver.

We have looked at data from the continuous monitors at Turner Center Bridge and the Deep Hole. The monitors provide data from the first of June to the end of September. The Turner Center Bridge data shows the following.

### ***Turner Center Bridge data***

- In 2021
  - Dissolved oxygen fell below 7.0 mg/l on approximately 26 days
  - Dissolved oxygen never fell below 6.2 mg/l.
  - Only two days had readings below 6.3 mg/l
  - Of 2,803 readings, only 258 were below 7.0 mg/l (9.2%)
  - Only 31 (1.1%) were below 6.5 mg/l.
  - Very few days exhibited readings below 6.9 mg/l for long periods during the day.
  
- In 2022
  - Dissolved oxygen fell below 7.0 on 11 days.
  - Dissolved oxygen did not fall below 6.3 mg/l.
  - Of 2925 readings, only 103 (3.5%) fell below 7.0 mg/l
  
- In 2023
  - No readings fell below 7.0 mg/l.

The analysis at the Deep Hole in Gulf Island Pond is more complicated by the stratification that occurs at low flows and high temperatures. We have considered the readings from the 13-meter depth to the surface. The depth of thermal stratification and topographic stratification vary slightly and are dependent on flows. At higher flows, mixing becomes almost complete in the Deep Hole. We selected 13 meters as the depth at which the stratification occurs under low flow conditions. (DEP has additional information on the stratification based on flow and temperature). Some highlights of our analysis follow.

### ***Gulf Island Pond data***

- In 2015, only two (2) of 18,875 total readings above 14 meters were 6.9 mg/l and all other readings were 7.0 mg/l or higher.
- In 2016, again, only two (2) readings of 19,018 were below 7.0 at 6.6 and 6.8 mg/l.
- In 2017, water quality was not nearly as good as in any other year.
  - Of 18,835 readings above 14 meters, 230 (1.2%) were from 5.2 to 5.9 mg/l.
  - Of the total above 14 meters, 16.7% were below 7 mg/l.
  - From review of graphs of monthly average discharges for the two mills in Maine, the total BOD5 load from mills probably increased by 30% from the previous year.
- For 2018, dissolved oxygen levels improved significantly but was the second worse year for dissolved oxygen readings from 2015 on.
  - Only 2 readings were below 6.0 mg/l at 5.9 mg/l.
  - Approximately 9.7% of dissolved oxygen readings were below 7.0mg/l.
  - Total discharges from the mills appear similar to 2017.
- In 2019 the dissolved oxygen concentrations improved remarkably.
  - Only one reading at the 13-meter depth was 5.9 mg/l.
  - The percent from 6.0 to 6.9 mg/l dropped to 2.2 or 419 readings out of 18,674.
  - All readings above 12 meters were 7.0 mg/l or greater.
- In 2020
  - One reading at 13 meters was 5.9 mg/l with all other readings at 6.0 mg/l or above.
  - A total of 765 readings out of 18,849 or 4.1% were below 7 mg/l.
- In 2021
  - One reading at 13 meters was 5.9 mg/l and all other readings were 6.0 mg/l or above.
  - Of the readings at 13 meters, 12.5% were below 7.0 mg/l.
  - In the column from 13 meters to the top, 3.1 % of readings were between 6.0 and 7.0 mg/l
  - Discharges appeared to be lower than in the previous year.
- In 2022
  - No dissolved oxygen readings below 7.0 mg/l occurred from the 12 meter depth to the surface.
  - Out of 19,003 readings only 397 (2.1%) in the 13 meter depth profile were between 6.1 and 6.9 mg/l with approximately 28% falling below 6.9.
  - At the 13 meter depth, 21 days were below 7.0 mg/l
- In 2023
  - No dissolved oxygen readings below 7.0 mg/l occurred from the 12 meter depth to the surface.
  - Out of 19,018 readings only 858 (4.5%) in the 13 meter depth profile were between 6.1 and 6.9 mg/l with only 12.7% falling below 6.9 mg/l.
  - At the 13 meter depth, 17 days were below 7.0 mg/l

ARWC believes that this data supports the proposed new classification of B for the entire river.

### **Recognizing the Cavern or Trench that is the so-called Deep Hole**

ARWC also proposes that the Deep Hole, the water below 13 meters, in Gulf Island Pond have a special designation. The water stratifies under low flow and high temperature conditions. In addition, the topography of the Deep Hole leads to morphologic stratification unless flows are relatively high. The combination of low flows, high temperatures, and topography serve to create a stratification that leads to very low dissolved oxygen levels in the Deep Hole. Changes in mill discharges do not appear to have a significant impact on the dissolved oxygen in the Deep Hole, especially since 2019 on. It is also unclear whether the oxygenation (bubblers) significantly impact dissolved oxygen in the Deep Hole. We did not have exact data on the discharges, the climate, or the frequency of bubbler operation to conduct a statistical analysis. It is our belief that the bubblers added some oxygen to the dissolved oxygen in the Deep Hole but not enough to make any significant improvement in the aquatic community or support fish. Prior to the reductions in discharges in the early 2000s, the bubblers probably helped to improve the upper, non-stratified layer of water at the Deep Hole location and made it more suitable for aquatic organisms including fish.

We propose that the legislature recognize the stratification in the Deep Hole during periods of low flow and not treat the river as not meeting the classification standards of the upper layer of water in Gulf Island Pond. While the DEP has determined that the Deep Hole topographic isolation occurs at 18 feet, at low flows, the lack of current and topographic isolation at the 18-meter depth, may be contributing to lack of mixing a few meters above 18 meters. Therefore, we propose areas below 13 meters be designated as both thermally and topographically isolated.

The Department should carefully consider Title 38 – 464 Sections 9 and 10. However, we propose that a change to section 13 of 38-464 as noted below is adequate to allow dissolved oxygen below 13 meters to be less than the B classification standard.

### **Change to Title 38-464, subsection 13 to support treating the Deep Hole as a riverine impoundment**

13. Measurement of dissolved oxygen in riverine impoundments. Compliance with dissolved oxygen criteria in existing riverine impoundments must be measured as follows.

A and B to remain as is.....

C. Where mixing is inhibited due to natural topographical features in an existing riverine impoundment, compliance with numeric dissolved oxygen criteria may not be measured within that portion of the impoundment that is topographically isolated. Such natural topographic features may include, but not be limited to, natural deep holes or river bottom sills. [PL 2003, c. 257, §1 (NEW).]

Notwithstanding the provisions of this subsection, dissolved oxygen concentrations in existing riverine impoundments must be sufficient to support existing and designated uses that are expected to be feasible within the licensing period of the dam forming the impoundment ~~of these waters~~. For purposes of this subsection, "existing riverine impoundments" means all impoundments of rivers and streams in existence as of January 1, 2001 and not otherwise classified as GPA.

## **Impact on Stakeholders and the General Public**

None of these proposed changes will adversely impact the industries and municipalities that discharge wastewater to the river. People are currently recreating, including fishing and swimming, on all sections of the Androscoggin River. The above proposals will not impact the enjoyment of the river, and there is some potential to increase recreation on and in the river based on its upgrade from Class C to the proposed Class B.