To: Maine Department of Environmental Protection

From: Sean Hoskins

Date: 6/12/2025

RE: Lower Kennebec River Dams WQC Comments

Thank you for providing the opportunity to comment on the Water Quality Certification (WQC) for the Lower Kennebec River dams. I am greatly appreciative that the Maine Department of Environmental Protection is reviewing these certifications as a whole. The entire system needs to be considered to understand the water quality impacts of these dams.

The Shawmut, Lockwood, Weston and Hydro-Kennebec dams are interspersed across Class B and Class C waters. As defined under 38 M.R.S. §§465(3)(B), (4)(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" while "Class C waters must be of sufficient quality to support all species of fish indigenous to those waters and to maintain the structure and function of the resident biological community". Neither of these criteria are met regarding the endangered Atlantic salmon as a result of the presence of these four dams. The Final Environmental Impact Statement (FEIS) filed by the Federal Energy Regulatory Commission (FERC) on 2/28/2025 provides evidence that these dams are "detrimental" to the resident biological community under Class B and that the "structure and function of the resident biological community" cannot be maintained under Class C.

The FEIS includes the calculation below to analyze the impact of various dam passage effectiveness rates. The assumptions used are the expected downstream passage rate of 97% and upstream passage rate of 96% at each dam.

Survival analysis provided in the FEIS (FERC 2025 p113):

Smolt - Initial Population	18,420
Downstream Dam Passage[1]	88.5%
Freshwater Survival[2]	84.3%
Smolt - Below Lockwood	13,745
Estuarine Survival[3]	45.5%
Marine Survival	0.4%
Adult Returns to Lockwood	25

[1]97% dam passage at four dams (.97^4)

[2]Mortality rate of .33% per km. Total value derived from FEIS example

[3]Mortality rate of 1.15% per km. Total value derived from FEIS example

This calculation can be continued to show the expected smolt replacement from the return salmon.

Continued Analysis:

Adult Returns to Lockwood	25
Upstream Dam Survival[1]	84.9%
Freshwater Survival[2]	62.6%
Adult Returns to Sandy River	13
Eggs Produced[3]	47,852
Eggs to Smolt[4]	598

[1]96% dam passage at four dams (.96^4)
[2]FEIS p67. Assumption is from Rubenstein (2021) but is unclear if dam passage survival is already included in survival rate.
[3]7,200 eggs per adult salmon. Assumed 50% of returns are female https://trainingcenter.fws.gov/resources/knowledge-resources/salmon/asalmon3.html
[4]1.25% egg to smolt survival rate. https://trainingcenter.fws.gov/resources/knowledge-resources/salmon/asalmon3.html

Under the FERC model of expected returns, an initial population of 18,420 smolt result in the production of only 598 smolt. This is a 4.2% replacement rate. In order for the population to be sustainable the replacement rate needs to be at or above 100%. At the proposed rate, the Atlantic salmon population in the Kennebec would completely die off without smolt stocking in perpetuity.

There are two important takeaways from this model. First, FERC knowingly supports a plan that creates an environment where it is impossible to maintain a salmon population. This is in violation of the recovery objectives outlined in the 2019 Recovery Plan (NMFS 2023) of having a self-sustaining population. Second, and most relevant for the WQC, is that dam passage is only a small component of salmon survival in the Kennebec. Even increasing the dam passage to 100% for downstream and upstream passage only increases the smolt reproduction by 33% which is not enough to reach a sustainable population. The larger impacts to salmon mortality rates are the impact of the dams on the entirety of the waterway.

Upstream mortality of adult salmon is significantly increased by delayed mortality caused by the dams. A partial factor is that the salmon are forced to spend more time in the warmer downstream waters as they pass through the dams. The energy expenditure required for the thermal regulation in these warmer waters results in only 62.6% of salmon surviving upstream. The estimated survival rate would increase to 93% in the Kennebec without dams and the upstream delay caused by them (FERC 2025). This translates to a

33% reduction in survival with the presence of the dams. As outlined in Section 303 of the Clean Water Act, the definition of water quality standards includes thermal water quality. With a reduction this significant, the thermal water quality requirements needed "to support all species of fish indigenous to those waters" (38 M.R.S. §§ 465(3)(B)), in this case salmon, are simply not met.

An additional consideration is the impact to estuarine mortality. The downstream journey through four dams has a delayed mortality effect on smolt due to physiological stress and potentially increased predation. The dams are estimated to cause an increase of mortality rate from .34% per km of estuary passage with no dams to 1.15% per km with four dams (FERC 2025 p121). This is an additional 41% reduction in smolt survival that can be attributed to the dams' impact on the waterway.

Limited research is available on the impacts of the dams on the other key components of this model, specifically marine survival rates and egg to smolt survival rates. However, it is reasonable to assume that the significant increase in estuarine survival under a no dam system would result in healthier salmon entering the ocean which in turn would increase the marine survival rate. Healthier salmon entering the ocean would result in healthier salmon returning and with no dams, healthier salmon reaching spawning grounds. This would increase the health of the eggs and would increase the egg to smolt survival as well. More importantly, under a no dam system there would be an increased likelihood of adults spawning multiple times during their lifespan. This is an important aspect to the conservation of the species as it is known that older females have higher reproductive rates (Rubenstein 2021).

The existence of the four dams along the Kennebec are responsible for at minimum an additional 49% reduction in smolt reaching the ocean (combined impact of individual dam passage of 97% versus 100% with no dams and estuarine mortality at 1.15%/km versus .34%/km with no dams) and at minimum an additional 43% decrease in adult salmon reaching upstream spawning grounds (combined impact of dam passage of 96% versus 100% with no dams and upstream survival at 62.6% versus 93% with no dams). This additional mortality is without a doubt detrimental to the Atlantic Salmon population and eliminates any chance that the population can be maintained. In order to comply with Maine's water classification regulations and the 2019 Atlantic Salmon Recovery Plan, the WQC for all four dams cannot be approved and the dams should be removed.

Thank you for your consideration.

References:

FERC (Federal Energy Regulatory Commission). 2025. Final Environmental Impact Statement for the Amendment of License to Incorporate an Interim Species Protection Plan for the Shawmut Project and a Final Species Protection plan for the Weston, Lockwood, and Hydro-Kennebec Projects; and the Relicensing of the Shawmut Project. February 2025.

NMFS (National Marine Fisheries Service). 2018. Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic Salmon. Hadley, Massachusetts. January 2019.

Rubenstein, Sarah R. 2021 Energetic Impacts of Passage Delays in Migrating Adult Atlantic Salmon. Electronic Theses and Dissertations. 3468.