

Evaluating Public Comments
Regarding the Fate of the Dams on the Mousam River

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Introduction:

The Mousam River has a total of 15 dams. The three dams in Kennebunk (the Kesslen, Twine Mill, and Dane Perkins dams) are licensed to create hydropower until 2022, when their Federal Energy Regulatory Commission (FERC) license expires. FERC requires licensees to indicate their plan for the future of the dams five years prior to the expiration date, in the Mousam River's case, March of 2017. Due to the impending need to notify FERC, the Kennebunk Light and Power District (KLPD) has been evaluating their options regarding the dams.

These options have been condensed into four options by the environmental engineering firm, Wright-Pierce. Option number one, "seek new license to continue operations", would allow the dams to continue producing energy for 30 to 50 years, granted the license is issued. Upstream and downstream passage for certain anadromous and catadromous fish would likely be required. Option number two, "Seek license exemption to continue operation", would allow the developments to continue operation indefinitely. This would require additional energy creating capacities to be installed and the KLPD to have all land rights to the impoundments and facilities. These are not granted often. Option number three, "Seek FERC non-jurisdiction only for the Kesslen site", would allow operation of the Kesslen dam, and only the Kesslen dam, without any government oversight. There is no legal precedence for this option. Option number four, "Cease operation and surrender the FERC license for all three sites", would result in the discontinuance of hydropower and measures would be taken to ensure no future energy generation at these sites. It is possible that this would involve removal of the dams.

Option four has inspired debate, largely on the condition that it could involve dam removal. Dam removal would change the state of the river from impounded to free-flowing and alter the aesthetics. Such a dramatic change has worried Kennebunk residents and prompted them to voice their worry and concerns through solicitation of public comments by KLPD.

This report examines comments submitted to KLPD by Kennebunk residents regarding dam removal. The KLPD has received many letters and emails detailing the public's concerns and opinions regarding license renewal and the possibility of dam removal. This report analyzes the type and frequency of comments and identifies documented sources of information that addresses them, in hopes of increasing understanding of the effects of the possible dam removal on the Mousam River.

Methods:

To analyze the concerns and responses of the public, the two commentaries on the KLPD website were accessed and read through (Written Dam Commentary I +II). New concerns were marked and repeated concerns were noted with frequency. The frequency allowed for the primary and foremost concerns of the public to be noted. Only comments in support of option 1, 2, or 3 had their concerns noted, as this report had the goal of analyzing and addressing concerns related to dam removal.

After completing this, the comments under the Change.org petition (as of May 24, 2016), Support the Mousam River Dams, were analyzed and new comments were noted, although repeat comments were not.

In order to answer the questions, the Wright-Pierce Alternatives Report (the May 3, 2016 version), studies published in tangent with this, and the Wright-Pierce depictions, models, and memos were read through for relevant information because it is the most site specific source of information for the Mousam River.

After the relevant knowledge from the aforementioned sources was exhausted, literature that was reliable and pertained to the questions was found on JSTOR. The “property value” question was answered using papers and references mailed to the KLPD by Bates professor Dr. Lynne Lewis.

Results:

The following table shows the concerns found in the public comments submitted to the KLPD. The concerns found were, in order of frequency:

Concerns	Frequency
Preservation of the current aesthetic of the river, similarity of dam removal to the drawdowns	35
Ability to kayak/other recreation opportunities	32
Worry that the current ecosystem will be lost	29
Reduction of property values	27
Condition of sediments directly above the dams	13
Increased dependence on outside energy sources , such as CMP or fossil fuels	9
Impact on tourism	9
Cost of dam removal on energy prices	9
Soundness of studies and depictions related to efficacy of fish ladders, sediments, erosion, etc.	8
Suitability of Mousam for fish species	8
Erosion as a threat to property, riverbank stability	7
Loss of tax revenue due to decreased home values	7
Loss of the dam’s historical significance	5
Increase in breeding ground for mosquitoes	5
Effect on sewer maintenance	4
Increased flood risk if there is a breach in the Sanford dams or heavy rainfall	4
Lack of disclosure between KLPD, Kennebunk selectmen and others	4
Effect of climate change on the river after dam removal (volatility in flow patterns, drought)	3
Job losses	2

Rate of revegetation not being what is projected	2
Lack of historical presence of fish in the Mousam	2
Benefits of dam removal on fish species if they are unable to access Mousam Lake	1

For ease of answering, these concerns were then transferred into questions to direct:

Concerns	Questions	Frequency
Preservation of the current aesthetic of the river, similarity of dam removal to the drawdowns	Will the river after dam removal resemble the drawdowns?	35
Ability to kayak/other recreation opportunities	Will the Mousam lose its recreational value?	32
Worry that the current ecosystem will be lost	Will dam removal threaten the current wetland ecosystem?	29
Reduction of property values	How will dam removal impact property values?	27
Condition of sediments directly above the dams	What is the risk of contaminated sediments washing downstream? If contaminated sediments need to be removed, who will pay for it?	13
Increased dependence on outside energy sources , such as CMP or fossil fuels	Why abandon the possibility of increased “clean” energy usage in the Kennebunks?	9
Impact on tourism	<i>No data regarding this</i>	9
Cost of dam removal on energy prices	What will the cost of the lost power creation by the dam be?	9
Soundness of studies and depictions related to efficacy of fish ladders, sediments, erosion, etc.	<i>The Wright-Pierce report was vetted by the KLPD.</i>	8
Suitability of Mousam for fish species	Have there been fish in the Mousam River historically?	8
Erosion as a threat to property, riverbank stability	Will erosion caused by a change in river dynamics threaten homes?	7
Loss of tax revenue due to decreased home values	<i>Too hypothetical to answer</i>	7

Loss of the dam's historical significance	<i>Too hypothetical of a question</i>	5
Increase in breeding ground for mosquitoes	Will the removal of dams create more breeding grounds for mosquitoes?	5
Effect on sewer maintenance	Could the dam removal have an impact on sewer maintenance and wells?	4
Increased flood risk if there is a breach in the Sanford dams or heavy rainfall	What would the effect of the Sanford dams being released and the reservoirs traveling downstream to Kennebunk? Will the ability to control floods be lost?	4
Lack of disclosure between KLPD, Kennebunk selectmen and others	<i>Too personal to be an answerable question</i>	4
Effect of climate change on the river after dam removal (volatility in flow patterns, drought)	<i>Too many variables</i>	3
Job losses	How could dam removal impact jobs in Kennebunk?	2
Rate of revegetation not being what is projected	How could dam removal impact riverbanks?	2
Lack of historical presence of fish in the Mousam	Have there been fish in the Mousam River historically?	2
Benefits of dam removal on fish species if they are unable to access Mousam Lake	Will dam removal or putting in fish ladders have a positive effect, even if the fish species won't have access to Mousam Lake due to the dams in Sanford?	1

Through the use of the Wright-Pierce reports, related depictions and studies, and literature, these questions were then answered. Citations are included, with pages for the Wright-Pierce report and associated documents and years with literature. The questions and answers are as follows to these questions are:

1. Would the Mousam lose its recreational value?

While the average water level of the Mousam River will decrease significantly, with the seasons, water level will vary. High spring flows will increase the water level, allowing for canoe and kayak activity. The Mousam may gain recognition from more experienced boaters, as more challenging conditions may occur. Increased recreational use has been observed on the Penobscot River where the

Great Works and Veazie Dams were recently removed, as boaters were attracted to the more dynamic river flow conditions (Wright-Pierce Report p. 5-7).

Additionally, judging by the topography of the river, wetlands may be formed in other areas, which will provide new areas for boating recreation (Wright-Pierce Report p. 5-3).

2. Would the river after dam removal resemble the drawdowns?

The river draw downs were not intended to show what the river without dams would resemble. They were intended to make the Mousam's river banks more accessible to test sediments and model the contour of the riverbed.

The Mousam River dams don't regulate the flow of the river, as they are run-of-river dams. Because of this, the flow of the river after dam removal may resemble the portion of the Mousam below the Kesslen dam. According to General Manager Shea at the March 29, 2016 public meeting, "some of those scenarios that are being portrayed as this is what the river would be, are actually artificially lowered, because we actually had to stop flow completely [during the drawdowns]".

3. Would dam removal threaten the current wetland ecosystem?

While areas of wetland ecosystem will likely be lost with the removal of the dams and will evolve into upland habitats, it is reasonable to assume that new wetlands will be formed in other areas along the river.

Also, the health of these new wetland ecosystems is likely to improve as well. The river's return to a more natural state and natural flow conditions and variances can cause better flushing of the remaining or new wetlands, thus improving the overall health of these systems. As the health of the ecosystem betters, the biodiversity and amount of animals may increase, such as an increase in aquatic insects and freshwater mussels. With an increase in prey, an increase in birds and other wildlife is also expected to occur. According to the Wright-Pierce Report, the overall use of the river's riparian areas by wildlife is not expected to change significantly (p. 5-3).

4. How could dam removal impact property values?

There is a consistent trend of people being willing to pay more for homes further away from dammed rivers, while this penalty is lost with the removal of the dams, according to Dr. Lynne Lewis, professor of economics at Bates College, in a letter she wrote to Mr. Shea and the other trustees on the KLPD board. In a 2008 study of properties surrounding the Kennebec river before and after the 1999 removal of the Edwards dam, it was found that property values rose along the river, while property values further away from the river remained constant (Lewis, et al. 2008).

William Provencher and colleagues at the University of Wisconsin also studied the effect of dam removals on property values in 2008. In this, it was found that property values of homes along impoundments were relatively lower when compared to similar homes along free-flowing streams (Provencher et al. 2008).

It has repeatedly been found that healthy riparian and wetland habitats are highly valued, which is reflected in property values. A study from Noelwah Netusil (2014) in Oregon found that property owners value lots with ecologically valuable habitats and discount lots with lower-valued habitats. These improvements could signify improvements in property values around the Mousam.

5. What is the risk of contaminated sediments washing downstream?

Two samples were taken from directly above the Kesslen dam location. The first sample was below both standards the Maine DEP uses to evaluate sediment quality (threshold effect concentration levels and probable effect concentration levels). This indicates that the sediment is likely similar to other soils in the river and should not elicit concern.

The second sample from the Kesslen dam location showed concentrations of lead and target chemicals released from burning organic substances slightly above threshold effect concentration levels but below the probable effect concentration levels. This means that it is likely that the concentrations are consistent with other soils along the Mousam and would not necessarily require removal or cause concern if spread downstream (Wright-Pierce Report p. 5-12).

Only the area above the Kesslen Dam was analyzed because it has been in place the longest, since 1954, and would likely contain the most sediments, said General Manager Shea during a March 29, 2016, public meeting.

Wright-Pierce recommends continued sampling of the sediments to confirm the absence of contaminants (Wright-Pierce Sediment Sampling Results).

6. If contaminated sediments need to be removed, who will pay for it?

The Wright-Pierce report estimates the cost of sediment removal to be approximately \$6,000 to \$10,000 (p. 5-10). The cost would be paid for by the KLPD, but would likely be transferred to the public in the form of increased energy costs.

7. Why abandon the possibility of increased “clean” energy usage in the Kennebunks?

There are several reasons for this. First of all, the Mousam River dams are especially inefficient at producing energy. The generators and turbines at all three sites are operating below rated capacities. As of 2011, the Kesslen dam was only operating at 20%-25% efficiency (Wright-Pierce Report p. C-1).

Replacing the turbines and generators would be difficult and expensive. Because of the Kesslen dam being located directly beneath a restaurant, it would require significant reconstruction and deconstruction costs to replace the generator (Wright-Pierce p. 1-1). 2011 studies determined that replacement of the existing generation units to install new ones would not be economically viable. An estimated cost of a new generator is \$400,000-\$500,000, with an annual debt service payment of \$40,000. The situation for the Dane Perkins dam is similar to that of Kesslen. There is no way to create enough extra energy to offset the cost. Also, although it is the newest turbine, the Twine Mill turbine only operates at approximately 37-47% efficiency as of 2011 (Wright-Pierce Report p. C-1).

Additionally, as FERC will likely impose a demand for a fish ladder, flows diverted to the ladder will not be able to be used for energy. This would greatly limit the ability of additional energy creation.

The loss of the hydroelectric power does not necessarily mean a correlating increase in fossil fuel energy or energy bought from CMP. The Wright-Pierce Report also outlines that the town could also “incorporate other energy management programs to reduce the amount of energy used within the system” (p. 1-6).

8. What would the cost of the lost power creation by the dam be?

According to the most recent Wright-Pierce report (p. 6-7), Alternative 1A (License renewal (Low End)) and 1B (License renewal (High End)) would result in an energy cost of \$0.1878 per kWh and \$0.2501 per kWh, respectively. The cost of purchasing energy lost after dam removal would be approximately \$0.08158 per kWh, and replacing that lost energy with solar energy would cost about

\$0.10 per kWh. Replacing the energy with either purchased energy or solar energy would be the cheapest option.

The loss of hydroelectric energy does not necessarily mean an increase in energy use from other energy sources. The Wright-Pierce Report also outlines that the town could also “incorporate other energy management programs to reduce the amount of energy used within the system” (p. 1-6).

9. What would the effect of the Sanford dams being released and the reservoirs traveling downstream to Kennebunk?

According to Arthur Cleaves, Director of the York County Emergency Management Agency, the amount of water voluntarily released from the Sanford dams would be “insignificant to have any flooding effects”.

Additionally, the State has a dam safety inspector who maintains and inspects dams to ensure no breaches occur. If a breach does occur and there is a sudden flood, there are safety and coordination plans in place. Even if the three Kennebunk dams were still in place, flooding caused by an upstream breach would not be able to be addressed, as the dams are run-of-river dams, which provide no flood control. Both the New Dam and the Old Falls dam have Emergency Management procedures in place to

10. Would the ability to control floods be lost?

The three dams on the Mousam are run-of-river dams, and so they have no ability to control flooding. Run-of-river dams are characterized by small reservoir areas and reduced storage capacities within the impoundment.

After dam removal, the river flow would be within the existing river channel and the flood elevations modeled after dam removal would be below the existing dammed condition flow flood elevations. Using conditions for the 100-year flood scenario, it is indicated that there should be “less concern for river flooding elevations in a free-flowing condition than a dammed condition” (Wright-Pierce, Mousam River Modeling for Streambank Stability Memo)

11. How could dam removal impact riverbanks?

Initial plant colonists of sites characteristic of former reservoir bottoms (bare, moist, nutrient-rich, with a depauperate seed bank) tend to be plants characterized by rapid growth, high levels of seed production, and effective dispersal mechanisms (Shafroth et al., 2002). In less productive areas, such as mountainous terrain, it will take several years to reestablish. The Mousam River, however, is more productive, and, according to the Wright-Pierce estimations, it is a primary community is likely to be established within a few years. As time progresses, woody species will likely be established.

Under natural conditions, seeds and diaspores float downstream and establish themselves on the banks, but dams block these diaspores from dispersal downstream. This lack of dispersal may homogenize bank communities and decrease genetic variation, thus decreasing the ability of a species to survive long-term because of an inability to adapt, which was found in a study of run-of-river dams, the same type as the Mousam river dams (Jansson et al. 2000). This shows the habitat fragmentation caused by dams, and the removal of this habitat fragmentation may enhance river restoration efforts (Shafroth et al., 2002).

Additionally, it was found that on river banks, impounded areas had only a third of the species present compared to similar free rivers. It has also been shown that the depletion of the variety and richness of bank communities are “likely to lead to higher local extinction rates”, according to ecologist

Stuart Pimm at the University of Tennessee, Knoxville (Williams, 1997). This could indicate that impounded areas could lead to higher local extinction rates.

12. Would the dam removal have an impact on sewer maintenance and wells?

Based on discussions held between KLPD and the Sewer District in 2015, the dam removal is not expected to have any impacts on the operation of the Kennebunk Sewer District. Because the three dams are run-of-river dams, flows simply pass through. The removal of the KLPD dams wouldn't reduce the flows in the Mousam, where the Sewer district would continue to draw from. (Wright-Pierce Alt Report p. 5-9).

Additionally, shallow wells within 500 feet of the river will be impacted slightly, while deeper wells are typically not affected (Wright-Pierce Alternatives Report p. 5-5).

13. Would the Mousam River be suitable for fish species after the dam removal?

Just as before the Mousam River dams were constructed, the river will be suitable for fish after the dams are breached. Above the dams in the impoundments, the water temperature is typically higher because the flow rate is slower. In general, coldwater gamefish, such as trout or salmon, require cooler water than what is available in the impoundments, so the fish ladders would be useless to them (Wright-Pierce Report p. 2-4). Dam removal would benefit these species because the increased flow rates would cause cooler water temperatures during the summer months (Wright-Pierce Report p. 5-5). While coldwater fish may not be able to tolerate the heat of the river at its current state, with the removal of the dams, the temperature will likely decrease and be more tolerable for coldwater fish.

Also, the fish will be able to migrate to their historical spawning grounds. Shad and blueback herring both will have access to increased spawning grounds, and American Eel would benefit from increased habitat (Wright-Pierce Report p. 5-4).

14. Will erosion caused by a change in river dynamics threaten homes?

According to the Wright-Pierce Alternatives Report and based on a cursory review of the river channel and hydrology, widespread issues relating to bank stability are not expected (p. 5-7). Also, the most changed portion of the river will be a relatively underdeveloped area, where only the I-95 crossing, the railroad crossing above Twine Mill, and the Mill Street crossing above Dane Perkins are the only structures of concern. Most buildings and homes are set back from the river where erosion is most likely due to high flow velocities. It does not appear that widespread bank stabilization is necessary (Wright-Pierce Mousam River Modeling for Streambank Stability Memo).

If the dams are removed, KLPD would be responsible for preventative measures taken against erosion.

15. Have there been fish in the Mousam River historically?

Several species of fish have historically been recorded in the Mousam River, and several other are likely to have been in the Mousam River because of their presence in other Maine rivers. While there is no historical data marking the extent of their habitats, the Mousam River was known to sustain Atlantic salmon populations. It is also likely that American shad, American eel, and river herring were also present (Alden Lab Fisheries Report).

16. Would dam removal or putting in fish ladders have a positive effect, even if the fish species won't have access to Mousam Lake due to the dams in Sanford?

According to the Wright-Pierce Report (p. 2-5), the targeted species that dam removal or construction of a fish ladder would aid are Alewife, American Shad, Blueback Herring, American Eel, and Smelt.

Alewives spawn in lakes, ponds, or slow moving rivers. While passage to Mousam Lake would be blocked by the Old Mill dam and others, there have been several observed areas which would be suitable to alewife breeding (Wright-Pierce Report 2-5). Additionally, increased presence of alewives would increase food sources for predatory birds in the Mousam River, such as heron, ospreys, bald eagles, and cormorants (Columbia University Introduced Species Summary Project).

American Shad spawn in freshwater rivers and streams, like the Mousam. Unfortunately, they do not respond well to fish ladders, and will likely not make use of them (Wright-Pierce Report 2-5).

Blueback Herring spawn in freshwater rivers and streams, like the Mousam, and they typically respond to fishways well. These fishways would likely provide benefit to populations by allowing access to much more habitat (Wright-Pierce Report 2-5).

American eel are already known to be able to pass upstream of the three dams to some extent. Eels require different fish ladders than finfish. Populations of American eel will likely increase once upstream passage is installed, making it easier for more individuals to reach upstream river sections (Wright-Pierce Report 2-5).

Smelt breed in freshwater habitats, and currently breed below the Kesslen Dam. They would likely benefit from increased habitat and breeding grounds (Wright-Pierce Report 2-5).

17. Would the removal of dams create more breeding grounds for mosquitoes?

Mosquitoes tend to breed in stagnant pools of water, and are completely unable to breed in flowing water. According to Wright-Pierce (Appendix L), the average seasonal low flow rate in the Mousam's dammed condition is 0.1125 feet per second (fps), compared to an estimated free-flowing rate of be 1.2875 fps. With increased velocity, the river will become less suitable for mosquitoes.

18. If the dams were not removed and relicensed and contaminated sediments were discovered, would removal be necessary?

No, as there would be no risk of the sediments washing downstream, unless the dam was breached in a flood. Dams are carefully monitored by the York County Emergency Management Agency to ensure there are no breaches.

Discussion:

While the questions concerning possible job losses, the effect of climate change on the post-dam river, the loss of the dams' historical significance, the lack of disclosure between involved parties, the loss of tax revenue, and the impact on tourism, this was due to a lack of sufficient, relevant, and focused information. With more focused research, the unanswered questions could possibly be answered. As of now, however, there is not enough information to answer these questions quantitatively. Nevertheless, most questions were addressed and answered.

Not only were the majority answered, but they were answered using solely the Wright-Pierce report. The report was commissioned, reviewed, and vetted by the KLPD. The Wright-Pierce report is comprehensive, well-researched, and focused on the specific issues presented by the Mousam River, and is able to answer the vast majority the questions presented by the public.

The majority of the questions and concerns were answered and even refuted, showing the incongruity of some of the concerns and arguments against dam removal. The unanswered questions may be able to be answered using relevant information and new studies.

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