

---

<b>TO:</b>	Todd Shea, KLPD	<b>DATE:</b>	5/3/2016
<b>FROM:</b>	Jon Edgerton, Mike Guethle	<b>PROJECT NO.:</b>	12397L
<b>SUBJECT:</b>	Discussion of Comments from the March Trustees Meeting		

---

**Resulting Action Items:**

**Comment:** Wright-Pierce (W-P) should check the generating efficiencies discussed in Section 1. Much of the information was pulled from the 2011 Hydro Assessment report, but note that some improvements (specifically replacement of the draft tube at Kesslen) have been completed since issuance of that report. W-P will do a little digging to provide context of likely efficiencies. Also, we may want to look at what role varying river flows play in the apparent efficiencies.

**Response:** Power generation at the three hydropower generating facilities fluctuates year to year and is based on a variety of factors, including (1) Stream flow duration and patterns throughout the year, (2) Equipment performance and efficiency and (3) Physical head at the facilities.

As long as the flashboards remain in position, the physical height of the dam is relatively fixed at each of the three facilities. The primary remaining variables controlling generation are operating efficiency and the distribution of stream flows throughout a given year. Studies in 2011 conducted by Wright-Pierce suggested that the older generating equipment at Dane Perkins and Kesslen was operating at efficiencies of 20-25%. The newer equipment at Twine Mill was much more efficient at an estimated 37-47%. Although newer turbine-generator systems can, in ideal conditions, achieve efficiencies on the order of 60%, we estimate that more realistic 50% efficient systems might be possible with upgrades and replacement of the existing equipment. The replacement of the draft tube at Kesslen is an example of a hydraulic improvement that improved energy generation by improving the system efficiency.

The flow duration curve represents the aggregation of daily streamflows throughout the year from lowest flow to highest flow. For the Mousam River, approximately 30% of the annual daily

Memo To: Todd Shea, KLPD

May 3, 2016

Page 2 of 8

flows exceed about 210 cubic feet per minute, the maximum hydraulic capacity of the three installed turbines. When stream flows exceed this value, surplus flows are spilled at the dams.

A simplified analysis was performed to estimate how much additional generation could be expected if the turbine efficiencies at each location could be improved at about 50%. For the estimated days when flows exceed the hydraulic capacity of the equipment (about 30% of the time during any given year) additional electricity could be generated if the equipment at each of the three stations was improved. As noted in Appendix C to the Alternatives Report, in order to achieve this additional generation, substantial investment will be needed (particularly at Kessler and Dane Perkins).

**Comment:** W-P should “dust off” the proposal we sent the KLPD for Bill Clewes in August 2016 to do an updated assessment/report of work to be completed at the three hydro facilities. In our opinion, having Bill Clewes conduct such an assessment is likely to provide good “bang for the buck”, due to his intimate familiarity with the facilities.

**Response:** Bill Clewes has been contacted regarding the assessment of work to be completed at the three hydropower facilities. KLPD to respond if additional information shall be incorporated into the Alternatives Assessment.

**Comment:** Discuss “repair versus refurbishment” as it pertains to Dane Perkins and Kessler.

**Response:** As noted earlier in this memo, additional information regarding the existing facilities has been updated. In general, repairs are considered to consist of remedying broken equipment or ancillary elements, whereas refurbishment consists of replacing or reconditioning components, generally to enhance performance or extend operating life. From a fiscal perspective, repairs are often considered as a part of operating expenses, while refurbishment may be considered a capital investment.

**Comment:** Review options and issues associated with increased generation capacity under Alternative 2.

**Response:** Options for increased generation capacity were reviewed in the initial draft of the Alternatives Analysis. In this review it was determined that capacity increase of many sizes would suit the regulatory requirements for Alternative 2. Due largely to the flow of the river, but also due to other site factors such as high cost of land and upgrades to existing equipment, a micro-turbine was determined to be the most feasible and economical option for the 40-year time period. Additional discussion regarding this item is included in Appendix D of the Alternatives Analysis.

It should be further recognized that, under a scenario where the facilities remain in operation, additional flows are likely to be “diverted” to support the operation of fish passage facilities. While ultimately the amount of diverted flow will be dictated based on agency requirements for passage at each dam, it is highly likely that both up-stream and down-stream fish passage will be required at all three facilities. Based on the flow-duration curve contained in the 2011 report, it appears that flows only exceed the listed hydraulic capacity of the current generating equipment about 30 percent of the time. With proposed conditions diverting fish passage flows away from the amount of water than can be used for power generation, this will further lower the availability of untapped river flows to support additional power generation.

**Comment:** Provide additional information relative to the fishways. This should include: graphics, discussion of options, logistics at Kesslen, etc. Differentiate between passage for eels versus finfish, and upstream versus downstream passage. Also, discuss challenges as they relate to effectiveness for shad.

**Response:** The 2011 Alden Labs report has been included as an Appendix (K) to the updated Alternatives Analysis. Discussion of the incorporation of finfish, eels, and the difference between catadromous and anadromous species has also been expanded within this report. Discussion and graphic information for potential locations of fish passage is also indicated in the Alden Labs Report. The usefulness of fish passage for multiple species, including shad, is included not only in the Alden Labs report, but also throughout Section 2 of the Alternatives Analysis.

Memo To: Todd Shea, KLPD

May 3, 2016

Page 4 of 8

**Comment:** Todd discussing with FERC whether they will make a representative available to advise on process (this could be beneficial in terms of providing a reality check).

**Response:** To be provided by KLPD when a response is available.

**Comment:** W-P should look at shoreline stability and flooding impacts associated with Alternative 4 (dam decommissioning and removal). The effort should include conducting modeling for the segment above Kesslen, particularly where homes exist in close proximity to the river. We expect the HEC-RAS model can be run fairly easily with FEMA 100 year flood flows (also consider using W-P calculated flood hydrology) The resulting effort will likely include a map with reference locations and tabulate elevations and velocities for pre- versus post dam removal conditions). Initial effort should include reviewing where we have cross-section data within this river segment. Note that it may be difficult to obtain further cross-section data within a timeframe that allows for incorporation into the model prior to the anticipated May 11<sup>th</sup> meeting.

**Response:** See Appendix L.

**Comment:** The question was asked whether the financial model contains a placeholder cost for mitigation of shoreline stability issues. We may wish to revisit whether it may be appropriate.

**Response:** See Appendix L.

**Comment:** We should review the report to see if the discussion of stream morphology/factors should be expanded upon.

**Response:** The March 22, 2016 draft of the Alternatives Analysis includes a significant discussion of the stream morphology when compared to previous drafts. A lengthy narrative is included within multiple sections (namely Section 2 and Section 5) that includes discussion on the physical properties such as river banks, water velocity and river beds, as well as the environmental and biological properties such as effects to wetlands, habitat change, and fish passage. Further discussion regarding bank erosion has been added in the context of the review of post-dam removal river flows (elevations and velocities) in Appendix L.

Memo To: Todd Shea, KLPD

May 3, 2016

Page 5 of 8

**Comment:** Check with Todd relative to communication between the KLPD and the Maine Turnpike Authority and Maine DOT (chiefly with regard to potential impact to bridges/culverts).

**Response:** To be provided by KLPD when a response is available.

**Comment:** W-P should confirm the number of (main stem) river miles of habitat that would be “opened up” for diadromous habitat in the event of removal of the three dams.

**Response:** A review of aerial mapping has indicated that the number of main stem river miles has been confirmed to be accurate as stated in the March 22, 2016 draft of the Alternatives Report.

**Comment:** It was requested that Wright-Pierce reformat how we are presenting “decimal cents” for clarity (Section 6)

**Response:** A revision has been made so that all cost values within Section 6 are expressed in units of dollars (e.g., a value of 0.1 cents would now be referred to as \$0.001).

**Comment:** It was requested that we include similar cost paragraphs for Alternatives 2 and 3 in the portion of report (section 6) that discusses the impact of costs associated with the various alternatives on a typical residential ratepayer.

**Response:** A revision has been made that incorporates similar costs per typical residential user for Alternative 2 and 3. In a similar vein, Table 6-4 has likewise been updated to incorporate the cost per generation (In \$/kWh) for Alternative 2 and 3.

**Comment:** It was requested that Wright-Pierce provide additional correspondence from residents in the Appendices (J).

**Response:** Additional correspondence from residents was obtained and included in Appendix J.

**Public Comments:**

**Nicholas Cabral & Nicholas Berner (Goose River Hydro)** – It was suggested that fish passage and relicensing could be addressed for half of the W-P estimated figures. *Goose River initiated*

Memo To: Todd Shea, KLPD

May 3, 2016

Page 6 of 8

*FERC relicensing in May of 2015, and current license expires 2/29/2020 (i.e. 2 years ahead of KLPD). FERC rep is Julia Kolberg @ 202-502-8261.*

**Response:** It is W-P's understanding that this rationale is flawed – since the March 29, 2016 meeting, W-P has spoken with representatives of federal fisheries agencies who confirmed that comparing agency requirements for fish passage on the Goose River to those that should be anticipated for the Mousam River is “apples and oranges”. Preliminary indications are that the licensee on the Goose River is likely only to be held to provision of eel passage due to natural barriers that predated the dams. This is emphatically not the case for the Mousam, as both anadromous and catadromous passages are anticipated to be required.

**Albert Kolf** – It is Albert's stated opinion that the generation figures in the financial model should use average past generation. Albert also thinks that the model needs to reflect the cost associated with purchasing energy under Alternative 4.

**Response:** From review of the cost estimates, his rationale appears to be flawed. Since future flows would need to be diverted for operation of FERC-dictated fish passage at all times when the dams are not spilling, fish passage flows would take away from average existing flows that are currently being generated. The determined proposed generation figures in the cost-estimate are based on numbers that reflect past generation, while incorporating for additional lost generation from fish passage flows.

Regarding the costs associated with purchasing energy, the rationale again appears to be flawed. For example, in the current financial model, the value associated with energy generation is treated as an avoided cost of purchasing non-generated power beyond year 2022. Alternative 4 indicates zero avoided cost after 2022, while Alternative 1 indicates avoided cost extending to 2062. This way, the model indicates a substantial avoided cost for the 40-year time span under the dam re-licensing scenario and directly compares that to zero avoided cost for dam decommissioning (i.e., no power generation). From the perspective of comparing the two alternatives, this is the same as assuming a corresponding value for power purchased under a scenario where the generation ceases in 2022.

**Peter Ashley** – Suggests we review information on the Section 1 discussion of existing facilities, as well as values for projected dam energy output.

**Response:** It should be noted that previous drafts of Section 1 include information about the existing facilities that was obtained from reports created in 2011. In developing the 2011 reports we did not have access to certain information that is available today due to confidentiality reasons, and therefore these prior reports may contain some inaccuracies. The Alternatives Analysis has been updated to address inaccuracies identified in Peter Ashley's memo.

Ultimately, incorporation of these changes does not change the general premise of the provided information: the hydropower facilities maintained by KLPD are aged facilities that would require a significant investment to operate at a desirable efficiency. The purpose of the Alternatives Analysis draft has been to evaluate a number of alternatives in order to have the existing facilities meet the FERC requirements. At this time, the alternatives being vetted do not include significant upgrades to the facility.

Similarly, it should be noted that the 1982 water quality certification for the facilities does include a yearly kWh allowance of 3,200,000 kWh. However, the value utilized in the cost analysis has been vetted by W-P and KLPD to be 1,400,000 kWh. It should be noted that the certification is based on theoretical outputs and, based on our review of KLPD's operating records, the facilities have never produced 3,200,000 kWh over the course of a calendar year.

**Debbie Robinson** – Suggests sediment upstream should be sampled under the premise it is more contaminated since it is located closer to Sanford, where many industrial contaminants within the Mousam River likely originated.

**Response:** It was explained in the 3/29/16 meeting that the material suspended just upstream of the Kesslen Dam was sampled because the Dane Perkins and Twine Mill facilities had been breached more recently than the Kesslen Dam. It is understood that the breaching of the upstream dams presumably resulted in discharge of the bulk of the sediments that had been accumulated within these two impoundments.

Memo To: Todd Shea, KLPD

May 3, 2016

Page 8 of 8

**Jake Aman** – Suggested a review of agency comments pertaining to the relative value of warmwater versus coldwater species.

**Response:** A review of the letters provided to Wright-Pierce has not indicated any statements relative to values associated with warmwater aquatic species in the Mousam River. The current focus of regulatory correspondences, as indicated within Appendix J, is providing restoration of diadromous habitat through either aquatic passage installation or dam decommissioning.

**Barry Tibbets** – Spoke about the required timing for question to be placed on the June ballot for Kennebunk voters, if the KLPD would prefer to have a straw poll to assist in alternative selection.

**Response:** It was stated at the 3/29/16 meeting that the KLPD would need to provide final wording for any ballot question by April 27<sup>th</sup>. It does not appear that KLPD would prefer to continue that route.