

From: Pickett, Paul [mailto:PPic461@ECY.WA.GOV]
Sent: Monday, May 16, 2005 5:09 PM
To: SCHINNELL, LAURA
Cc: Cornett, Deborah
Subject: RE: Comments on Interim Water Temperature Report for 2004

Laura,
Deborah Cornett asked me to review this report, so my comments are below. Let me know if you have any questions.

Paul

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Page 2, 3rd paragraph summarizes the state standards. The following language should be added: "At no time shall temperature increases from human activities exceed $t=23/(T+5)$, where "t" represents that maximum permissible temperature increase and "T" represents background temperatures unaffected by human activities." The standard language refers to point sources, but court decisions have determined that hydroelectric projects are point sources not subject to NPDES permitting. My proposed language reflects how the standards would be applied to this project.

Page 3, second paragraph: Under the 1997 standards Lake Class requires no measurable change from natural conditions.

Tables and Figures are comprehensive and well done.

Page 15: I still disagree with the definitions in this section. The criterion of 1 deg C per meter has been used to define the location of the thermocline, but I am unfamiliar with it's use as a definition of stratification. A truly unstratified lake would be isothermal, and temperature ranges of 14 deg C from top to bottom is in no way isothermal. The degree of stratification can be measured by the change in density per unit depth, which could be calculated for this lake. The discussion appears to be self-contradictory - even given the definition of 1 deg C/m, Figure 4-3 shows a maximum temperature change of greater than this value, which contradicts the statement that the lake was unstratified in April. Also, the change in over 2 degrees in one meter in September does not qualify as "without stratification". What is striking to me about the lake is that other than in October there is in essence no epilimnion, and the thermocline effectively extends from the surface to about 15 meters depth. This is a significant feature that could either be explained by hydraulic changes from the power operations or by extreme wind sheltering in the lake basin. The latter explanation seems unlikely, and the former is supported by the water column temperature structure near the outlet. More investigation is needed to explain this phenomenon.

Page 17: "Since the lake is held at natural levels during the summer months, these longitudinal differences in lake surface temperatures are likely similar for both the natural condition and with the project in place." This statement raises intriguing questions, which I am unable to evaluate not knowing the outlet configuration. What is the depth of the powerhouse outlet compared to the creek outlet and compared to the natural lake outlet? What were "natural levels" and how are they known? This statement may be premature before the complete effects of the project have been evaluated.

Page 28, on-going monitoring. Multiple years of monitoring would be valuable to determine the response of the system to varying seasonal climatic differences. In particular, the 2005 summer is shaping up to be an extreme low flow year for snowmelt-dominated systems. I would recommend that monitoring at all locations be continued through the upcoming summer and fall season.

Snyder Creek appears to have been significantly modified by the project. Additional monitoring should continue until the effect of the project on the stream is evaluated.