LOTIC ENVIRONMENTAL
SPECIALISTS IN FRESHWATER ECOSYSTEMS

LOTIC ENVIRONMENTAL LTD
2193 MAZUR ROAD
CRANBROOK BC, V1C 6V9
WWW.LOTIC.CO

Canadian Forest Products Ltd.
Kari Stuart-Smith, Ph.D., R.P.Bio.
1000 Industrial Road #1, Box 2200
Cranbrook, BC, V1C 4J7

November 24, 2014

Subject: Review of: Reassessment of High Conservation Value (3) Forests For Canadian Forest Product's Operating Area in the Rocky Mountain and Kootenay Lake TSA. Prepared by Dr. Kim Green, Apex Geoscience Consultants Ltd (Green, 2014).

Canadian Forest Products Ltd. (Canfor) has requested that Lotic Environmental Ltd. (Lotic) conduct a peer review of the 2014 Reassessment of High Conservation Value (3) Forests for Canadian Forest Product's Operating Area in the Rocky Mountain and Kootenay Lake TSA (Green, 2014). This peer review was intended to provide feedback on the report in terms of scientific rigour and content.

Overall comments

Overall, the Green (2014) report was well written and clearly addressed the primary goals of the project:

1. Review existing HCVF3 polygons in the East Kootenay to determine if polygon boundaries require adjustment, based on new information obtained since the last assessment,

2. undertake an HCVF3 assessment within TFL 14,

3. review and update the management strategies for the HCVF3 polygons, linking them to new information and other forestry requirements and assessments such as ECA assessments, and

4. compile the results from the above 3 components into a single report and single shape-file covering all of Canfor's operating area in the East Kootenay.

The report provided a good overview of key hydrological and geomorphological functions that are important from a forest harvest perspective. Minor edits are suggested below to further build on this well presented document. This review was not intended to provide detailed typographical edits.

Specific comments on the HCVF3 Report

Scientific Rationale:

The section on how forests protect from soil erosion and terrain instability reads as though it discounts roads as a substantial contributor to sedimentation of streams (even though they are mentioned as contributing to landslide risk). Studies in other jurisdictions have demonstrated that roads are in fact important to consider when assessing erosion potential. The report would benefit from having one or two sentences describing this risk at the beginning of the section, rather than discounting this as unimportant. Earlier work by Beschta (1978) and Luce and Black (1999) are good references. The discussion on landslides is good overall.

The section on how forests protect streams from changes in quantity, quality, and timing of flows has very limited description of how forests can protect streams from changes in low flow conditions. Winkler et al. (2014) is cited, and it is acknowledged that there is relatively little literature on this topic. However, better characterization of how low flows are affected by timber harvest would be beneficial. Smerdon *et al*. (2009) and Pike and Scherer (2003) would be good references to add. This would also benefit the reader by providing an understanding of the entire flow regime rather than focusing on high flow periods.

There is also limited discussion on how forests protect streams from changes in water quality. This should be improved in the final version of this document given that it is mentioned in the heading of this section. There has been substantial work done in this area; therefore, it should be simple to include at least a broad overview of the interactions between physical and chemical water quality and forests. For example, stream temperatures can be altered as a function of riparian harvest and changes in the timing/volume of spring streamflow (Moore *et al*. 2005; MacDonald *et al*. 2014), this type of link should be made more clearly in the report.

The value judgement on the "primary service of nature" representing the greatest risk to human life is logical. However, this is a value judgement and may not be perceived as objective. I wonder if the wording "primary service of nature" is better described as "primary service to human life" or something similar. For example, one could argue that the value of westslope cutthroat trout spawning habitat is higher than the risk of flooding.

Polygon Identification:

Datasets used to derive the HCVF3 polygons were appropriate, and it appears as though the best available information was used. However, it is difficult to determine how the polygons were delineated. The second paragraph of Page 5 indicates that the polygons were visually delineated; there is no description of what this means. Further description of how this visual delineation was conducted would benefit this report. For example, it appears as though some polygons (where entire watersheds are represented) do not follow topographic divides. Further explanation is required to describe why this is the case, or polygons should be derived to include watershed boundaries.

The polygons are often only portions of a watershed where terrain instability and spawning function are considered. Is the threshold set for the polygon, or the watershed area? The later makes more sense, if this is the case then the polygon files associated with terrain instability (those less than 100 km^2) should be revised to reflect watershed area rather than only portions of the watersheds. Alternatively, a better description of why this was not done for these particular polygons that is similar to the description given for fish spawning and water supply polygons would be adequate.

Management Strategies:

The discussion on management practices is good and the appendices provide good reference information. The field assessments recommended for determining catchment boundaries could be conducted through a desktop GIS exercise of delineating catchments for specific streams. There are well-founded methods to do this.

The wording in Table 2 around watershed assessment, hydrological assessment, and hydrogeomorphic risk assessment should be standardized or described somewhere in the text. Examples of this are Matthew Creek (watershed assessment) and Lladnar Face (hydrological assessment). There is mention of the HRA in the Req. Assess column but no mention in the management strategies column. Perhaps just clarify that watershed assessment and hydrological assessments were conducted in the past and tha the HRA should be conducted moving forward.

Consideration of the Forest and Range Evaluation Program (FREP) would be beneficial, as these documents provide a useful resource for riparian and stream indicators that could be used (https://www.for.gov.bc.ca/hfp/frep/values/fish.htm).

References

Beschta, R.L. 1978. Long-term patterns of sediment production following road construction and logging in the Oregon Coast Range. Water Resources Research 14(6): 1011-1016.

Luce, C.H., and Black, T.A. 1999. Sediment production from forest roads in western Oregon. Water Resources Research 35(8): 2561-2570.

MacDonald, R.J., Boon, S., Byrne, J.M., and Silins, U. 2014. A comparison of surface and subsurface controls on summer temperature in a headwater stream. Hydrological Processes 28: 2338-2347.

Moore, R.D., Sutherland, P., Gomi, T., Dhakal ,A.. 2005. Thermal regime of a headwater stream within a clear-cut, coastal British Columbia, Canada. Hydrological Processes 19: 2591–2608.

Pike, R.G., Scherer, R. 2003. Overview of the potential effects of forest management on low flows in snowmelt-dominated hydrologic regimes. BC Journal of Ecosystems and Management 3(1):44–60.

Smerdon, B.D., T.E., Redding., Beckers,. J. 2009. An overview of the effects of forest management on groundwater hydrology. BC Journal of Ecosystems and Management 10(1):22–44.

Closure

Thank you for the opportunity to conduct this review. This is a well written document that is clear and concise. I hope that the author of this report and Canfor find the review constructive. Please do not hesitate to contact me with any questions or comments.

Sincerely,

Ryan MacDonald, Ph.D.
Senior Hydrologist
778-517-4375
ryan.macdonald@lotic.co