

Spray Lake Sawmills (1980) Ltd
Headwaters Management in the Bow River Basin
Presented to the Bow River Basin Council Science Forum by: Gord Lehn
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1) Concern

Water and land management issues as it relates to water supply has received a growing amount of attention in recent years. During development of the South Saskatchewan Regional Plan (SSRP) Regional Advisory Council (RAC) recommendation package the focus was on future water supply shortages for the Region and meeting provincial apportionment agreements. After the June, 2013 flood attention shifted to what could be done to mitigate damages from future flooding events. It has generally been accepted that headwaters management is an important consideration in managing for water supply issues, be it flood or drought.

We have concerns about over-simplification of headwaters management recommendations and the perceived benefits which may accrue from simple “headwaters protection”.

2) What Caused the Flood / Finding Perspective

How might a change in headwaters management practices have changed the flood of 2013?

Answer – NOT AT ALL

- Over a three day period between June 19 and the 22nd headwaters to Calgary and High River had a storm event which ranged from 75 to 325 mm of precipitation. The mid-range is about 200 mm. Source: Alberta Environment and Sustainable Resource Development.
- Compare this to the normal Kananaskis Weather Station June rainfall of 88.8 mm and the normal annual rainfall of 383.1 mm. The headwaters received about half a years’ worth of precipitation in three days.
- Areas where logging had occurred were largely snow free at this time, however higher elevations were still snow covered. This rain-on-snow event magnified the volume of water running off of the landscape.
- “the deluge might have caused fewer problems had there been less rainfall in the days leading up to it. The 40 mm of rain that fell at the beginning of June meant that the ground was unable to absorb the up to 200 mm that fell starting June 20. Others are blaming the slow mountain snow melt for the ground’s saturation. But, like most storms, it was a combination of factors that made this one so overwhelming – factors like heavy rainfall, unusual wind patterns and high-pressure systems”. Source: Scientific American, July 17, 2013, by Arielle Duhaime-Ross
- The 2013 peak water flow in Calgary was 1740 m³/second. It was the highest in the City’s recorded history. Until this year, Calgary’s eight worst floods in history had all occurred before 1933. Source: The Weather Network
- Note: There was very little logging in the headwaters pre-1933. We can therefore assume that 8 of the City’s 9 worst floods had no association with logging the headwaters.
- The Highwood watershed, headwaters to the Highwood River and the Town of High River, contains a mix of protected areas, private land, Indian Reserves and FMA. Only 7% of the

watershed is Forest Reserve available for timber harvesting over a 100 year period. This averages only 322 ha/year which will be followed by an ongoing reforestation program. To date Spray Lake Sawmills (SLS) has harvested 1659 ha or .34% of the total area of the watershed, the last being 10+ years ago.

- Other areas that experienced heavy flooding such as Cougar Creek in Canmore, Exshaw and the Sheep River do not have any logging upstream. Anecdotally, there is no linkage between harvesting in the headwaters and downstream flooding.

Another way to try to assess potential impacts of land management practices (timber harvesting) on water yield can be made through examination of the ECA (Equivalent Clearcut Area) modelling outputs.

- Spray Lake Sawmills conducted Equivalent Clearcut Area (ECA) Modelling as part of the company's Detailed Forest Management Plan which was approved on 2007. This model was used to predict the potential change in water yield following forest harvesting and the associated rate of hydrologic recovery over time. This allowed disentangling the variability in stream flow generation due to climate from that produced solely by the disturbance and recovery due to logging. The model output was interpreted by Dr. Uldis Silins, Forest Hydrologist, of the University of Alberta.
- Within the 25 year modelling period we are currently in there is a projected 1.6-2.7% range in increase to baseline stream flows. When applied against the average hydrometric station data south of the Bow this would yield an estimated 8 mm of stream flow over the course of a year, minimal to the 200 mm of precipitation received by the same area over a three day period.
- NOTE: the ECA model was not designed to be applied to a flood situation

The take home message is that the flood would have occurred in any event. It was a weather related event. That is not to say that headwaters landuse management practices aren't important. They are, but don't look to this as a silver bullet to solve weather related events of this magnitude.

3) Potential Impacts put to Scale

Before looking at specific recommendations related to headwaters management let's look at the scale of what we are talking about

- Spray Lake Sawmills' Forest Management Agreement (FMA) area is 8% of the total land mass of the Bow River basin
- Of this 1/3 has been netted out of the active landbase destined for harvesting. (A portion of this was specific for riparian/watershed protection). This leaves 5.2%
- The 5.2% planned for harvest will be spread out over 100 years. This means, on average, .052% will be harvested in any given year.
- Of this, only a portion will have site and stand characteristics suitable for water supply mitigation management activities
- The percent of the landbase eligible for this kind of management activity isn't known as we haven't yet managed with this objective in mind
- Of the landbase which is suitable to manage for water supply objectives what is the potential impact? As of yet this is also largely unknown.

The take home message is that the overall landbase within the basin is very small and the impacts will likely be of a small incremental scale, not a quantum scale which might have an impact on a large weather related event such as June of 2013.

4) Reaction to Recommendations

Protected status

- 8 of Calgary's 9 worst floods occurred pre-1933, pre-industrial development and commercialization of the headwaters
- Fire regime studies for the basin have shown that forest renewal prior to 1930 occurred largely through wildfire events. The average fire size for sub-alpine natural regions was 537 ha. Upper foothills and montane natural regions were found to average 1454 ha.
- Wildfires do not recognize or respect our needs for riparian buffers or other social/economic values we place on the headwaters landscape
- We currently have an un-natural forest composition compared to pre-industrial conditions (PIC). They are older forests with large fuel build-ups
- Forests must be managed for a diversity of values and uses (habitat values for wildlife, range/forage, recreation, aesthetics, water). An overly singular focus on one value will undoubtedly miss the mark on others
- Forests need periodic "renewal events" in order to stay healthy and maintain an ecological diversity; to provide us with all of the ecological goods and services we value so much
- A "protected" status will exacerbate the problem by reducing/eliminating renewal events.
- We need to "manage" the headwaters in order to meet our objectives
- The real discussion should be around the question of "how"

Partial canopy removal

- Forest management strategies will vary depending on the objectives.
- Forest management strategies to enhance snow capture and increase water yield will not be the same as for flood mitigation
- Stand density manipulation is one tool but cannot be used in isolation of consideration of other stand and site characteristics (aspect, soils, moisture regime, topography, elevation, slope, stand age and species composition)
- What do we want to see in terms of impacts on evapotranspiration losses, sublimation losses, canopy interception, timing and synchronization of run-off, or impacts on the watertable
- Do we still want to manage the forests in a sustainable manner? (Reforestation to pine requires sunlight to hit the forest floor)
- How do we build in a balance and recognition of other resource values (W/L habitat values, biodiversity)

- Partial canopy removal, as a recommendation on its own, grossly over simplifies the practice of forest management and will not likely provide the desired results.

Less Roads & Better/More Reclamation

- No specific reference was made to SLS in terms of roads or harvest practices, however, given that 88% of the timber harvesting is SLS's I will assume that we are the focus of the comments and will address them accordingly.
- Here are a few stats for consideration
 - ✓ SLS does not build or maintain a permanent road system.
 - ✓ Over the last six years 95% of the roads built were reclaimed. When balanced over a longer time frame the reclaimed roads is expected to approach 100%
 - ✓ 10% of the total roads within the FMA belong to SLS. The remainder belong to other resource sectors or are part of the public road system
 - ✓ The total FMA open road density is .37 km/km²
 - ✓ The total open road density attributable to SLS is .035 km/km²
 - ✓ Open road density has decreased by 10% over the last six years (largely due to access controls)
 - ✓ SLS average in-block roads and landings = 3.98% compared to the provincial allowable standard of 5%
 - ✓ SLS uses bridge structures on all drainages with defined channels (not culverts)
 - ✓ As part of the companies Forest Stewardship Council (FSC) audit it was noted that "crossings and standards of reclamation were to be commended"
 - ✓ Roads are built and reclaimed according to approved plans and inspected/monitored on an ongoing basis.
- We will need more information on the nature of the concern behind the recommendation in order to address further. We believe we have already been heading in the right direction.

Improve Harvesting Practices

- As part of an on-going standard of practice SLS harvests using a method known as stumpside processing. Tops and limbs are left scattered throughout the cutovers to aid in reforestation efforts, soil moisture conservation, nutrient recycling, reduced soil compaction, and to reduce potential impacts of surface run-off.
- This is done in conjunction with an irregular block size and a design intended to emulate natural disturbance patterns. This is also done with standing structural retention internal to the blocks
- While the block configuration is designed to emulate natural disturbance patterns, block size has been kept smaller to reflect a more socially acceptable size compared to historical fire sizes (since May 2001 SLS block sizes have

ranged from .4 ha to 204.6 ha with an average of 24.4 ha and a median of 14.9 ha; compare this to the previously noted fire sizes)

- Some of SLS harvest practices are guided by a document commonly known as the ground rules while other practices are driven by the company's own "best management practices", often a step above provincial standards.
- Riparian buffer standards and crossing standards are defined within the ground rules
- All operations are inspected/monitored on an on-going basis
- Company operations have historically been audited and certified under third party certification programs, currently FSC.
- The forest industry is required to follow a regimented planning and approval hierarchy prior to conducting any operations
 - ✓ Detailed Forest Management Plan (which includes ECA modelling)
 - ✓ General Development Plan
 - ✓ Forest Harvest Plan
 - ✓ Annual Operating Plan
 - ✓ Annual monitoring and Five Year Stewardship Report
 - ✓ Reforestation Plan
 - ✓ Road Use and Reclamation Plan
 - ✓ Forest Protection Supplement
- New technologies and inventories (wet areas mapping, lidar, digital terrain modelling, AVI) have provided great assistance in plan development.
- SLS plans and modelling exercises are populated with data specific to the FMA. It is much more site specific and applicable than a generalized literature review.
- Plans are developed, approved, monitored and reported on by Registered Forest Practitioners; specialized expertise in associated disciplines are brought in as required.
- We will need more information on the nature of the concern behind the recommendation in order to address further. We believe we have already been heading in the right direction.

Adaptive Management

- Forest management is a long-term, 100 year proposition.
- It requires well defined resource management objectives and plans designed to move it to that end
- While there will always be ways of improving operational application, in the broader context, Forest management does not lend itself to short notice changes in direction.

5) Alternative Recommendations

- We need well defined resource management objectives that will stand the test of time. They can be defined at a landscape scale or area specific.

- These objectives need to include a balancing of resource values and uses (more than just water)
- As an umbrella objective, I would suggest that we manage for a healthy diverse forest. One that will be sustainable and have the capacity to cope, survive and thrive through a range of nature based influences.
- We need to advocate for landbase stability
- More information/data/research is required on the impacts of land management practices on water related objectives
- Provincial legislation/policy is required to support a more holistic/ecological goods and services (EGS) approach to land and forest management.
- Develop a broad suite of market based instruments to help support EGS management
- Find a way to address the current problems related to provincial silo planning

6) Challenge to the Group

- Lots of information is currently available on existing plans, ground rules and a recent Five Year Stewardship Report. Check out the SLS website or AESRD website as a starting point for further information.
- SLS is in the process of starting a new planning process to update the company's Detailed Forest Management Plan. There is lots of room and opportunities for involvement. Give me a call.

7) Questions