



Presentation to the Joint Panel on the topic of Reservoir Preparation, Filling, Operation and Decommissioning for the Lower Churchill Hydroelectric Generation Project:

March 10, 2011

Grand Riverkeeper Labrador, Inc.

Box 569, Station B

Happy Valley-Goose Bay, Labrador

NL AOP 1E0

Thank you for the opportunity to bring our concerns forward today.

Reservoir Clearing:

Old Growth Forest:

The clearing, whether partial or full of old-growth forest in the Grand River valley is troublesome. Agencies and organizations across the boreal region around the world have been advocating for preservation of old-growth forests for decades. Our own Newfoundland and Labrador Forestry Department has had a

moratorium on cutting within the river valley for decades due to the “pristine” nature of the forest.

Grand Riverkeeper considers the loss of thousands of cubic meters of old-growth forests as “adverse” and “significant”.

A literature review conducted for Ontario Hydro informed SNC-Lavalin for their 2007 report which states: “...if the reservoir area is large, especially if it includes numerous bays and peninsulas, or if no leisure activities are anticipated, only select areas are cleared...Full clearing is considered practical only where the reservoir area is small and reservoir depth is small (less than 30m)”

That report was the basis for Nalcor’s decision to choose the partial clearing option, even though higher methyl-mercury levels can be expected.

Only approximately 48% of the total timber in the Gull and Muskrat reservoirs are slated for removal. (see Table 1, Volume Summary for Full versus Partial Clearing, p.8, JRP.148)

Nalcor states the reason for this decision is that this is the least cost that meets operational, environmental, and safety requirements of the Project.

Grand Riverkeeper feels that costs, not environmental concerns are highest on the list of reasons for Nalcor’s decision as we feel leaving almost 50% of the timber in the reservoirs can only

contribute up to twice the amount of methyl-mercury which is a major concern of most people in the area.

The Proponent gives an estimate of 43% of total volume of timber in ice, stick-up and flood zones in Gull and 73% of total volume of timber in ice, stick-up and flood zones in Muskrat to be removed as a result of Partial Clearing. (Executive Summary Appendix A, Reservoir Preparation Plan 2009) And goes on to say on page 15, that “clearing of the reservoir has the potential to modestly reduce peak mercury levels in fish”... and “...regardless of whether full or partial clearing is implemented, reservoir clearing will result in effectively the same modest reductions (**within the level of accuracy possible for predictions**)(emphasis added) in peak fish mercury concentrations (as compared to peak mercury levels calculated for a no clearing scenario), on the order of 10% for full or partial clearing.”

Grand Riverkeeper Labrador is concerned with the statement “**within the level of accuracy possible for predictions**”. We find it difficult to understand how removing only 43% of the total volume of timber in the Gull Island reservoir and 73% in the Muskrat reservoir could result in only “MODEST” reductions in peak mercury concentrations as compared with the full clearing scenario. How can it be that leaving 57% of the timber in Gull and 27% of the timber in Muskrat results in “effectively the same modest reductions” as fully clearing the reservoirs? We are asking that the Proponent be required to prepare a more rigorous analysis or calculation of the full clearing scenario and use a

“higher level of accuracy model” to predict the differences between full clearing and effectively leaving up to 48% of biomass within the two reservoirs.

In JRP.33 the Proponent replies to the Panel’s request to provide an evaluation of alternative strategies for reservoir preparation to reduce the uptake of mercury, as required by the EIS Guidelines by listing various mitigation measures.

Selenium additions:

According to the Proponent this idea needs additional research!

Intensive fishing:

According to the Proponent, “New reservoirs already experience accelerated fish growth without intensive fishing, and the additional benefit of intensive fishing in reservoirs is unclear”.

Nutrient additions:

The Proponent states “Given the state of knowledge on this topic, and the uncertain benefits in a reservoir situation (which typically already involves a trophic surge without the addition of nutrients), this mitigation option is not sufficiently understood or quantified for full scale applications.”

Sediment additions or capping with low Hg material: “has not been tested in a reservoir environment.”

Increasing the pH:

“The benefits of adding lime to a system with a nearly neutral pH is not clear.”

Enhanced demethylation:

“The options of altering ecological conditions to favor demethylation biologically or photo-chemically remain at the idea stage rather than demonstrated technologies ready for practical applications in reservoirs.”

All of which have been dismissed for one reason or another by the Proponent.

Since the Proponent seems to see no alternative strategies for reservoir preparation to reduce the uptake of mercury, Grand Riverkeeper steadfastly believes that the “full clearing” option is the only strategy to achieve the best outcome.

Also within the Executive Summary of the Preparation Plan, p. vii, The Proponent states, *“The sole economic benefit of reservoir clearing will be the operations efficiency of the generating facility; not the recovery of marketable volumes of timber or other biomass.”* AND *“The economic feasibility for secondary wood processors to obtain the merchantable timber and biomass cleared for the Project or to clear additional areas within the flood zone would require a separate analysis on the part of the secondary wood processor.”*

Grand Riverkeeper disagrees with these statements and points out that fully clearing the reservoir to reduce methyl mercury levels is the responsibility of the Proponent and it has been stated over and over again by past Premiers of the Province that we could expect nothing less. It is a direct cost of the project and should be internalized as that. If full clearing of the reservoir is not economically feasible, then the Project itself is obviously NOT ECONOMICALLY FEASIBLE as this is an integral part of the project.

In Section 6.2 of Appendix A, Review of Other Developments, p.19, it states:

“A primary source of historic data was a literature review conducted for Ontario Hydro in 1981 by Acres Consulting Limited (Acres, 1981).” and based on this review, SNC, 2007 report states “...However, if the reservoir area is large, especially if it includes numerous bays and peninsulas, or if no leisure activities are anticipated, only select areas are cleared.....Full clearing is considered practical only where the reservoir area is small and reservoir depth is small (less than 30m).”

Nalcor’s reservoir clearing task force has summarized in Table 1, and is used in SNC’s 2007 report to support the partial clearing strategy due to least cost that meets operational, environmental, and safety requirements of the Project.

Grand Riverkeeper disagrees with this report and Nalcor’s reasoning, again, because it is the responsibility of the Proponent to mitigate to the fullest extent possible, the effects of methyl-mercury on fish and other wildlife.

In conclusion, Grand Riverkeeper feels the only option for mitigation of methyl-mercury accumulation is the full clearing option.

Fibre Utilization:

Currently, secondary processing activities are not available where merchantable timber and slash could be utilized. Over 390,000 cubic metres are contained with just the Muskrat reservoir alone.

Grand Riverkeeper feels that should this project get sanctioned, no clearing should take place until a viable forestry group comes forward that is willing and capable of handling the entire amount of merchantable timber and non-merchantable timber from this project. No timber should be stock piled. Experience with linerboard in the past and piles of wood along the stretches of the Trans Labrador Highway tell us that once cut, the Proponents of these project have little care or concern with what finally happens to the saw logs and wood fibre that is now out of their way so their project can proceed.

As well, since there is no clear indication of “if” or “when” the Gull Island portion of the Project will proceed, the Proponent should be clearly instructed to clear only within the Muskrat area and not beyond.

Fish passages/Fish kills:

There are no apparent plans for any type of fish passage for either Gull or Muskrat.

Information regarding whitefish illness and eventual death at Lobstick control structure should be reviewed. (Stress-related changes in lake whitefish(*Coregonus clupeaformis*) associated with a hydroelectric

control structure, Barnes, M.A.; Power, G.; Downer, R.G.H., Waterloo University, Ontario, 1984, Oct. 01, Journal name Can.J. Fish.Aquat.Sci.; Vol: 41:10)

Fish will be damaged and killed in the Francis turbines at Muskrat as well as the Kaplan turbines at Gull.

The estimated number of fish kills below both dams should be studied and reported to determine as closely as possible, the loss of fish stocks to fish kills.

Mercury laden fish being ground into bits by the turbines at Muskrat will likely be a favourite food of the seals. Seals live a long life and will therefore likely accumulate a toxic amount of methyl-mercury in their flesh. Many people in the area enjoy seal meat as a country food. Studies need to be done to determine the extent of toxicity in seals who feed for several seasons at the tailrace of Muskrat Falls.

Reservoir Filling:

(Reservoir-induced Seismicity)

“With the exception of nuclear power plants, no man-made structure has a greater potential for killing a large number of people than a dam.” (Joseph Ellam, Pennsylvania State Director of Dam Safety, 1987),

“Today there is evidence linking earth tremors and reservoir operation for more than 70 dams.” C.Maloney, Environmental and

Project Displacement of Population in India, UFSI Field Staff Reports, No. 14, 1990)

“Isostatic pressure generated by impounding a reservoir can cause seismic events such as earthquakes.” (International Energy Agency, Implementing Agreement for Hydropower Technologies and Programmes, Subtask 5 report, Annex III. Hydropower and the Environment, Present Context and Guidelines for Future Action, May 2000).

The International Energy Agency report goes on to state **“induced seismicity** caused by reservoir impounding is a **temporary phenomenon**. In most cases, the most severe tremors takes place soon after impounding and their intensity gradually decreases thereafter.”

Faults exist on both the north and south banks of the Grand River, near Gull Island. Filling of the reservoir there could result in “reservoir induced seismic activity.” (Reservoir-induced earthquakes at Sainte-Marguerite-3, Quebec, Canada (1), www.highbeam.com/doc/1G1-148277521.html)

Nalcor states they will have an Emergency Preparedness Plan in place. However, this EPP does not cover the actual evacuation of the community. That responsibility lies with the Municipalities.

As per Nalcor’s Dam Break analysis, the communities of Mudlake and Happy Valley-Goose Bay would have approximately 2 hours to get to higher ground. Mayor Abbass suggested as an evacuation plan, another road out of town. Grand Riverkeeper feels that depending on a road system only will be even more catastrophic than the inundation,

since vehicles will likely be jammed up in their hurry to get away from flood waters. This idea is not accepted by Grand Riverkeeper as a viable evacuation plan. And, as of this date, no viable evacuation plan has been put in place. As well, the community of Mudlake will not have access to the extra road scenario?

Also, another confusing situation with the inundation issue is the amounts and methods used to determine economic losses resulting from main dam failure.

The information provided in the original Dam Break Analysis, Final Report, in Volume II Appendices, May 2010 lists totals only in the damage estimate column with no description of actual numbers of houses, businesses etc. that make up those figures. (Table 3.2-Summary of Total Incremental Economic Damage Estimates)

Then again, in it's answer to the Panel's Information Supplement # 12, January 31, 2011, Nalcor appears to have an entirely different set of figures. (see Page 19)

Nalcor's estimates are not at all clear and they should be required to provide details of exactly how each of these totals were arrived at.

Nalcor's inundation maps are small and do not provide street names etc. so that residents can clearly see where the flood waters might come. Grand Riverkeeper asked a GIS expert to overlay one of the maps for Happy Valley-Goose Bay with a Google Map of the same section of town in order to show exactly where the inundation from a main dam break would occur within HV-GB town limits.

That map is now on the screen above.

We firmly believe that a larger map should be provided by Nalcor, depicting all of the infrastructure within the possible flood area and that each and every home, business and other infrastructure within that zone should be quantified in the economic estimates. Only then will Grand Riverkeeper feel that due diligence has been done to provide the communities with the information they need to accept or reject this particular associated risk.

Reservoir Operation:

“Storage dams are intended to alter the natural distribution and timing of stream-flow. They compromise the dynamic aspects of rivers that are fundamental to maintaining the character of aquatic ecosystems.”

“Flow regimes are the key driving variable for downstream aquatic ecosystems. Flood timing, duration and frequency are all critical for the survival of communities of plants and animals living downstream.”

(World Commission on Dams, Dams and Development, p. 77 & 78)

“The reduction in sediment and nutrient transport in rivers downstream of dams has impacts on channel, floodplain and coastal delta morphology and causes the loss of aquatic habitat for fish and other species. Changes in river water turbidity may affect biota directly.”

(WCD, Dams and Development, p. 81)

The Millennium Ecosystem Assessment states **“that physical modification of rivers creating habitat change is among the most**

important direct drivers of biodiversity loss globally.” (Millennium Ecosystem Assessment, 2005, Luttermann, A.M. Historical Changes in the Riparian Habitats of Labrador’s Churchill River, Dalhousie University, July 2007, p. 6)

Even Nalcor’s consultants agree with at least some of the statements above. **“Dams have a profound influence on fluvial processes and morphology. Reservoirs formed by dams slow the flow of water and trap sediment behind the dam.”** (HATCH, Decommissioning Overview Final Report, p.9)

The EIS Guidelines for this Project state on page 35;

“The Proponent shall identify and assess the Project’s cumulative environmental effects. Cumulative effects are defined as changes to the environment due to the Project where those overlap, combine or interact with the environmental effects of other existing, past or reasonably foreseeable projects or activities.”

The Upper Churchill or Churchill Falls project is certainly no mystery to the Proponent. It constitutes both a “past” as well as an “existing” project with which the Lower Churchill Project will “interact”!

Yet, Nalcor ignores the effects of the Upper Churchill Project and the cumulative effects of this project on stream-flow, sedimentation, flood timing, reduction in nutrient transport, and turbidity stating they take their baseline from the condition of the river as it is today. This is unacceptable to Grand Riverkeeper Labrador and the Proponent should be required to re-assess each and every Valued Ecosystem Component

within the project area and report the cumulative effects on each of the Churchill Falls project AND the Lower Churchill Project.

Mitigation of some Reservoir Operation Issues:

First the Proponent must be required to properly assess the cumulative effects of the Upper Churchill along with the Lower Churchill Projects to determine the overall effects of both projects on stream-flow, sedimentation, flood timing, nutrient supply, turbidity, fish habitat, loss of wetlands, loss of ashqui, etc. etc.

Then, there should be a concerted effort to mitigate where possible, the effects of both projects by reviewing the changes in flow patterns on the river from before the Upper Churchill to the possible addition of this current project and determine how those flow patterns could be reversed to better mimic the natural flows that existed before the impoundment of the Smallwood Reservoir. Releasing tailor-made environmental flows that mimic natural flows can help maintain downstream ecosystem. Environmental Flow Requirements that meet pre-determined ecosystem maintenance objectives should be sought.

According to the World Commission on Dams, (Box, 3.4, p. 82)

“At least 29 countries seek to minimise ecosystem impacts from large dams by using an EFR.”

However, Nalcor states their mitigation will be to create new wetlands, create fish habitat, create ashqui that will work, and if it doesn't they may install large fans to break up the ice, or move sediment up to the area where they THINK new ashqui will form.

This all sounds way too far fetched to even be thinkable let alone achievable.

If the Proponent was truly interested in mitigating downstream effects and if they were truly interested sustainable development, they might do some studies on how they could institute environmental flow requirements into the planning and engineering of the Project.

Decommissioning:

The Proponent states in their decommissioning study:

“Past history indicates that it is very unlikely for large hydroelectric developments to be decommissioned after the 50 to 100 year life of the hydropower generating facilities.....and with advances in steel and concrete materials and restoration methods it is conceivable that the economic life for new hydroelectric developments could be extended indefinitely....”*

The World Commission on Dams states:

“A total of 467 dams have been removed in the US and 28 of these are large dams higher than 15 m. Reasons include, dam safety, restoration of riverine fisheries, financial considerations etc.....”

It is conceivable that any one or more of these reasons could warrant removal/decommissioning of the Gull Island, Muskrat, or even the Churchill Falls dams at some point far in the future. For example, other, more environmentally sources of energy may emerge (or already have for that matter) and future generations may wish to avail of those. Also, it is possible that problems could evolve with the structures. It is not well known that the Churchill Falls project suffered leaks for several

years in one or two of the penstocks which several attempts by them and others were unable to stop. A company from the Halifax, Nova Scotia was eventually called in to affect the repairs. So, the point is, nothing man-made is fail proof and it is conceivable that one or more of the dams could fail at some point in the future.

A Cost-Benefit analysis should be done on this project, as soon as the proper financial information is provided. Analysis should be done over the life of the Project and should include dollar amounts for all ecosystem services provided by the river plus the cost of decommissioning that will accrue to future generations in 50-100 years from now.

- Cost to decommission both dams is reported in the Decommissioning study as follows... Muskrat Dam-Complete Removal \$2.2B Gull Island Dam-Complete Removal \$3.1B (Total over 5 billion)

It is not clear whether the \$5 billion is in today's dollars or in dollars 100 years hence?

Grand Riverkeeper believes that the complete removal scenario is the only scenario that can fully mitigate the environmental damage done by the project and we also believe the Upper Churchill Project should be included in the decommissioning studies... as that project is already almost 40 years old. This would likely double or triple the decommissioning costs.

Dams will not last forever. The costs of decommissioning these dams will fall to future generations. These costs **MUST** be included in the

costs and benefits of the project and financing put aside to pay those costs in the future when they do occur.

This is the only way we can be assured that future generations will not suffer because of our short sightedness.

Thank you for listening.



Presentation to the Joint Panel reviewing the Lower Churchill Hydroelectric Generation Project

Topic-specific sessions on Aquatics:

March 16, 2011

Thank you for the opportunity to discuss a few of our concerns with the aquatic issues of the Project.

Seals:

It is the opinion of Grand Riverkeeper Labrador that seals have received very little attention in the Proponent's assessment of deleterious effects from the Project.

Female harbour seals can live from 30 to 35 years, while male harbour seals live from 20 to 25 years. (reference Norwegian Polar Institute) In a recent conversation with a native Labradorian who hunts and consumes seals we were advised that he has hunted seals just below Muskrat Falls on many occasions and over many years.

In the Sikumiut Component Studies "Seal Abundance and Distribution", Jan 2009, they describe how a survey of Lake Melville was flown to determine the number of seals on the Lake. As well, the study states on Page 1,

"In addition, a reconnaissance flight of the Churchill River was flown to assess presence of harbour seals (*Phoca vitulina*). However, No seals were observed in the river. It should be noted that a large portion of the river from Goose Bay to Muskrat Island was virtually ice free at the time the flight was conducted."

It appears then, that effects on seals within the River system and especially with regards to excess consumption of mercury laden fish at the tailrace of Muskrat Falls have been ignored. However, even though there were no seals counted on the one day and one reconnaissance flight flown up the River, Grand Riverkeeper concludes from our conversation with the Native Labradorian that seals do use the area near Muskrat Fall and that more studies should be undertaken to determine the effect of the Project on seals in that area specifically.

Should a dam be built at Muskrat Falls, seals will likely congregate there and consume whatever bits of mercury-laden fish that passes through the turbines, {a “fast food restaurant for seals and large fish”}, and given their longevity it can be expected that these seals bodies and entire systems will eventually reach toxic levels of mercury . As quoted in AMBIO, A Journal of the Human Environment (see attached) “In controlled feeding studies, the consumption of diets that contained Hg (as methylmercury) at environmentally realistic concentrations resulted in a range of toxic effects in fish, birds, and mammals, including behavioral, neurochemical, hormonal, and reproductive changes.” As well, Science Daily, (Oct. 24, 2008) reports “Methylmercury (MeHg), the predominant form of mercury found in the blood of marine mammals and fish-eating communities, could be more damaging to seals than has previously been thought. New research shows that MeHg harms T-lymphocytes, key cells in a seal’s immune system. Similar results were also found for human lymphocytes.”

In another study from Environmental Health Perspectives, in September 2001, Gina Muckle, Pierre Ayotte, Eric Dewailly, Sandra W. Jacobson and Joseph L. Jacobson measured PCBs, Hg, and selenium in maternal blood and Hg was also measured in maternal hair of pregnant Inuit women from Northern Quebec. They examined food items associated with PCBs and mercury body burden in these women and sought to identify maternal characteristics associated with traditional food consumption. The study reports that “Fish and seal meat consumption was associated with increased Hg concentrations in hair.”, and “This study corroborated previous findings relating marine mammal and fish consumption to increased Hg and selenium body burden.”

Couple the effects on the seals themselves with the effects on local people who consume seal meat along with fish on a regular basis and there is reason for concern with regards to methyl mercury accumulation.

Grand Riverkeeper Labrador thereby requests more studies be undertaken to determine the effect of the Project on seals that might frequent the “fast food” area of the proposed Muskrat Falls tail race and on the people that eat the meat of these seals.

Ashkui:

What exactly are ashkui?

Component Studies, Socio Economic SESE06 #6 Current Land and resource use...

“5.6.2 Ashkui

Ashkui, or “open water”, are areas of early or permanent open water on rivers, lakes and estuaries and are often sites of contemporary Innu family camps and tend to occur at the confluences of rivers. In the Study Area they are known to exist at the mouths of Cache River and Pinus River and at Muskrat Falls. Oral history and archeological evidence suggest that this has been the case for several generations. Ashkui are also important habitats for

migratory birds, fish and other animals (Environment Canada 2002). Concentrations of fish and wildlife can be found at the sites due to the presence of light and open water. Ashkui have been described by the Innu as “supermarkets and pharmacies”. For the Innu, the importance of the ashkui is in the overall relationship between the site and the surrounding environment (Gorsebrook Research Institute 2001). Ashkui have special importance in the spring, but appear to have limited importance during the rest of the year (Environment Canada 2002).”

Also: Section 7.5.2 of the Wetlands Environmental Baseline Report, Jacques Whitford, Feb. 2008 describes ashkui this way.

“Ashkui (areas of open water) are an important landscape component of the Survey Area. These localized areas of the lower Churchill River are ice-free early (or year-round), and provide critical productive (underlining added for emphasis) staging habitat that are used by high concentrations of waterfowl prior to migrating to breeding areas. Ashkui are also used by river otters as haul out sites in winter; however, they are of primary importance to waterfowl. (p.28)

It can be said then, that ashkui are important areas for migratory birds, fish and other animals due to 1. the fact that they are ice-free all winter, or become ice-free early in spring, and 2. because they obviously have an abundance of food, either vegetation, or organisms in the substrate which can be taken up by waterfowl, fish and other animals. Or, as stated in the Proponent’s response to JRP.48 (a) “Ashkui are areas of water that tend to remain open year-round, thereby providing “abundant food and habitat both in and out of water” (M. Penashue, pers.com.). Such areas may exhibit relatively high levels of aquatic productivity that can extend to the surrounding riparian habitats. Ashkui sustain fish, plants and insects which sustain “wildlife such as otter, mink, geese, ducks, muskrats, rabbits, partridge, beaver, marten, owls, fish hawks, eagles, caribou, moose, black bear, and porcupine.”

Loss of current ashkui:

Currently HATCH, (2007) estimates that approximately one-quarter (i.e. 60km²) of the Churchill River from Happy Valley-Goose Bay to Churchill Falls is ice free annually.

If the project proceeds, most of the current ashkui will be flooded and HATCH (2008) states that “the total area of open water in the post-project conditions is expected to be less than a few kilometres, depending on the size and number of ashkui and the climate condition of the winter (...) There is no model available at this time to predict when an ice cover will form on a reservoir” (p.3-8)

However, in their answer to JRP.48 (b), the Proponent states “Given that in the post-Project case tributaries will still have higher velocities and higher temperatures than the receiving reservoir, there is confidence in the EIS prediction that ashkui will develop at these new confluences.”

Concerns from Environment Canada re ashkui:

Environment Canada states in their submission (CEAR# 292, p.5) that “the ecological function of the new ashkui may not be the same as those that are lost. Hence, new ashkui may not replace habitat lost when natural ashkui are flooded.”

Also, “EC-CWS is not convinced that new ashkui will occur at inflow points as early as the traditional existing ashkui due to the impounded nature of the reservoirs versus the current flow of the watershed. As stated in our comments, we are concerned not only with the direct loss of these habitats, but also the alteration of ecological function of these areas. If they are lost, it is not as simple as birds switching to other sites outside the impacted area as these sites may already be fully utilized.” (EC’s response to JRP 154, p.2)

Current knowledge about the use of ashkui by waterfowl is limited due to the lack of surveys within years and across several years to clearly establish variations in use. For example, there is really no economical or practical way to determine just how many waterfowl use each ashkui area during a season. There is no physical way to accurately “count” the birds. Usually field studies at a particular area or ashkui consist of flying over the area with either a helicopter or fixed wing airplane, both of which can frighten birds away from the site effectively obscuring the count. Also counts are done only once a year and it is impossible to tell whether some of the birds might leave and return to the same site later or how long this group stays before perhaps moving on north while another group from further south shows up to take their place. So, replication or mark/re-sighting is needed to better estimate the numbers of birds using ashkui, and determine whether these numbers will overwhelm the available resources on other sites after impoundment.

In other words, without tagging some of the birds and tracking them in some way, the estimates of how many waterfowl use these areas is a “guess” at best.

Nalcor’s confidence level re new ashkui:

In their answer to JRP.48 (b), the Proponent states “Given that in the post-Project case tributaries will still have higher velocities and higher temperatures than the receiving reservoir, there is confidence in the EIS prediction that ashkui will develop at these new confluences.”

Grand Riverkeeper Labrador would like to have this prediction explained in detail as it is our belief, that current productivity at ashkui is a result of many years, or even eons of sediment trapping and vegetation growth that will not necessarily take place fast enough after impoundment or as Environment Canada states, may not replace the habitat lost at all, even if new areas of open water form. That said, displaced birds might be able to

use other sites, if they were available, but these sites may not have sufficient resources to support the increased numbers.

Baillie, Wilkerson and Newbury, (Ashkui, a Vernal Ice-cover Phenomena and Their Ecological Role in Southern Labrador) state, "The temporal existence, number and distribution of ashkui, in southern Labrador during spring may influence spatial and temporal distribution of piscivorous predators and migratory waterfowl by limiting the availability of open water feeding and resting areas. Migratory waterfowl arriving from southern destinations must accumulate in greater concentrations when ashkui openings are limited."

Level of Certainty:

Again in their answer to IR JRP .48 (c), the Proponent states "There is a high degree of confidence that ashkui will form at confluences with tributaries in the reservoirs."

Grand Riverkeeper Labrador again asks for an explanation of how the Proponent arrived at this "high degree of confidence". Show us!

Also: "While, for example, there is a lower level of certainty associated with predicting the size of ashkui and their use by wildlife, appropriate monitoring will be incorporated into the Project Follow-up and Monitoring Program (...). Additionally, other areas of open water during spring are available in the lower Churchill River watershed and were considered during the completion of the EIS. (...).

Grand Riverkeeper Labrador reiterates that the Proponent appears to compare any areas of open water with ashkui which as we have already seen above is not necessarily the case.

With regards to IR JRP.48 (e) on the question of how the Precautionary Principle was applied to the predictions and significance assessment related to ashkui, the Proponent states "other areas of open water exist elsewhere in the Assessment Area" which presumably they assume could be used by waterfowl. However as we mentioned above, it is possible that due to huge numbers of migrating birds on certain days, these other areas of open water, if they actually are ashkui, could be overwhelmed. Again, we repeat, these areas of open water, whether they are newly formed after the impoundment or not, in our opinion, would NOT constitute ashkui.

Grand Riverkeeper Labrador feels this is not the proper use of the precautionary principle as the Proponent is only "assuming" waterfowl "might" use these other areas and is making no effort to ensure that productive ashkui will be available.

In one particular statement in the EIS, it states that "ashkui (such as that which occurs at the confluences of the Metchin River, Elizabeth River, Upper Brook and Lower Brook)

will move upstream into the tributary at the interface with the new shoreline (...). Topographic profiles indicate that these confluences will be at least as steep as under existing conditions, and therefore, continue to enhance ashkui formation.: (Volume IIB, p. 5-62)

Since it appears that productivity; (food source), along with being ice-free, are reasons why waterfowl use ashkui, (see Proponent's response to IR JRP.48, (a)- "Such areas may exhibit relatively high levels of aquatic productivity that can extend to the surrounding riparian habitats." and since it is likely that this productivity has formed over decades, possibly even eons in some cases, it is difficult to see how the Proponent determines that simply by moving the water column up the tributary a new "ashkui" will form. We question what the substrate will be at the higher level, i.e. what exactly was there on the forest floor before it flooded and is this the food needed by waterfowl and fish? Also the Proponent considers that since the topographic profiles indicate that these confluences will be at least as steep as under existing conditions, therefore, (they will) continue to enhance ashkui formation.

First, it is possible that such sites may remain ice-free during winter or may open up early in spring. However, to say that these open water sites can be called "ashkui is to ignore the description of ashkui as mentioned in the Proponent's response to JRP.48 (a) and we repeat: "Ashkui are areas of water that tend to remain open year-round, thereby providing "abundant food and habitat both in and out of water" (M. Penashue, pers. com.). Such areas may exhibit relatively high levels of aquatic productivity that can extend to the surrounding riparian habitats." , and the understanding of ashkui that has been documented from the "Compilation of Innu Environmental Knowledge on Ashkui in Labrador, by the Gorsebrook Research Institute. (A Compilation of Innu Environmental Knowledge on Ashkui in Labrador, Gorsebrook Research Institute for Atlantic Canada Studies, St. Mary's University, Halifax, NS.. December 2000)

Perhaps open water will occur, but the likelihood of it being productive with the proper sediments etc. is highly questionable and not doing the studies necessary to determine just what the substrate of existing ashkui are and how that substrate will be formed in any new open water does not constitute precaution.

No effects beyond the mouth of the river, etc, etc.

Grand Riverkeeper Labrador is appalled that the Proponent continues to assert there are no effects of this huge project beyond the mouth of the River. As stated by the Canadian Science Advisory Secretariat in their science evaluation of the environmental

impact statement for the Lower Churchill Generation project to identify deficiencies with respect to fish and fish habitat...

"The exclusion of the receiving environment below Muskrat Falls, including Lake Melville from the project description within the EIS was viewed as a "**major deficiency**." (emphasis added)

"The salt water intrusion model is only valid as far as the southern part of Lake Melville. From the magnitude of the effects predicted at the river mouth, it is inferred that there will be no significant transient effects in the Lake Melville-Hamilton Inlet system. **This appears to be a logically unsound conclusion.**" (emphasis added)

Various other comments made by the Secretariat include:

"The magnitude of expected 'Changes to fish habitat' and fish populations needs to be considered relative to the 'Loss of Fish Habitat'. The area of altered habitat is considerably larger than the area of lost habitat, and has the potential to have a more significant impact on the ecology of fishes of the Lower Churchill System."

"A number of the component studies used to describe the aquatic environment had small sample sizes and were limited both in spatial and temporal coverage. These limitations add an increased level of risk and uncertainty of any predictions or analysis based on these data."

"Fish passage was not assessed for Muskrat Falls either through a directed study or other biological indicators of fish movement. Isotopic data in the mercury analysis may be used as a first step."

"The impact of direct fish mortality from turbine operations was not addressed in a population context."

Yet, yesterday, none of these concerns appeared to be relevant when DFO made their presentations.

As well, the Proponent **continues** to downplay all environmental effects of this project and this is evidenced in the number of "not-significant" statements throughout the EIS.

Fish Habitat Compensation:

Grand Riverkeeper Labrador has been involved in two or three workshops on fish habitat compensation over the past couple of years and is surprised and dismayed that the Proponent STILL has not come up with a completed fish habitat compensation package. It was our understanding that before decisions/recommendations on the Environmental Assessment could be made, that the HADD compensation package would be presented in its entirety. After all, the destruction of fish habitat is one of the most significant issues connected with this Project! We expected that before these

Hearings proceeded, a statement on the amount of the “Letter of Credit” that is to be provided to the beneficiary, in this case the Receiver General of Canada on behalf of Fisheries and Oceans Canada, if the conditions related to completing the habitat compensation works and/or follow-up monitoring program are not fulfilled by the Proponent, would be provided. In fact, we were told quite adamantly by the Proponent and the DFO Staff attending one of those HADD workshops that this would be the case. Yet, this Environmental Assessment process appears to be proceeding to its finish before the Public, or likely even the Panel, is provided with this important information. This is unacceptable! We already have little faith in whether DFO or the Proponent will ever be able to fully compensate for or monitor the effects this Project will have on fish habitat and now we are again asked to accept, on faith, that even the HADD Compensation Package will be anything but a watered down document without the benefit of unbiased, outside review.

In the “procedural steps for using letters of credit”, outlined in the Practitioners Guide to Letters of Credit..... it appears that DFO and the Proponent can make whatever arrangements they agree upon with regards to the amount of the Letter of Credit, or even if there will be such a letter. Meanwhile, the Public, specifically those in attendance at the HADD workshops, have been insulted and totally ignored.

These are but a few of the huge numbers of concerns Grand Riverkeeper Labrador has with the aquatic section of this project. Many other concerns have been forwarded throughout this assessment process and we sincerely hope the Panel will consider each and every submission by us and other members of the Public when making their recommendations.

Thank you for listening.