

LOWER CHURCHILL HYDROELECTRIC GENERATION PROJECT  
**JOINT REVIEW PANEL**

PROJET DE CENTRALE DE PRODUCTION D'ÉNERGIE HYDROÉLECTRIQUE DANS  
LA PARTIE INFÉRIEURE DU FLEUVE CHURCHILL  
**COMMISSION D'EXAMEN CONJOINT**

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Volume 13

**JOINT REVIEW PANEL**

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1 DR. SCHMELZER: Six inches, is it?

2 CHAIRPERSON GRIFFITHS: Or

3 whatever you can do.

4 DR. SCHMELZER: Okay.

5 --- PRESENTATION BY THE GOVERNMENT OF NEWFOUNDLAND

6 AND LABRADOR, DEPARTMENT OF ENVIRONMENT AND

7 CONSERVATION, DR. ISABELLE SCHMELZER AND MR.

8 SHANNON CROWLEY:

9 DR. SCHMELZER: I am here today to  
10 talk to you about our -- to give you an overview of  
11 our review of the EIS pertaining to caribou and the  
12 associated documents.

13 Just to give you a little bit of  
14 background, I've had the great privilege over the  
15 last 12 years to work alongside many other  
16 biologists and conservation officers in the study  
17 of primarily the sedentary, that is, the forest  
18 dwelling populations of caribou here in Labrador,  
19 and have no doubt bored to tears countless people  
20 with my long-winded recollections of my latest  
21 discovery.

22 However, I also hold a Doctorate  
23 in Wildlife Ecology. In particular, I focused on  
24 the relationship between changes in landscape and  
25 environmental conditions and their expression in

1 the population ecology of wildlife.

2 I'm the current Chair of the  
3 Labrador Woodland Caribou Recovery Team, and I've  
4 also participated on several national scientific  
5 technical committees pertaining to caribou ecology  
6 and identification of critical habitat.

7 CHAIRPERSON GRIFFITHS: Oh,  
8 Dr. Schmelzer, I'm sorry. I think -- if you can  
9 slow down just a fraction for the interpreters?  
10 Sorry about that.

11 DR. SCHMELZER: There are several  
12 pieces of legislation that govern wildlife  
13 management in the province, and caribou in  
14 particular.

15 The Committee on the Status of  
16 Endangered Wildlife in Canada, known as COSEWIC,  
17 has twice assessed woodland caribou across Canada,  
18 and each time the designation has been that of a  
19 threatened population.

20 Correspondingly, caribou have been  
21 listed as threatened species under the *Provincial*  
22 *Endangered Species Act*, in 2002, and a year later  
23 under the *Federal Species At Risk Act*.

24 A recovery team was established in  
25 2001 and published a recovery plan which was -- in

1 July of 2004. That strategy is currently being  
2 updated, and just for -- because this question has  
3 come up over the intervening couple of hours, that  
4 recovery strategy is available freely online and  
5 can be downloaded and reviewed.

6 The recovery goal for all three  
7 sedentary populations, not just the Red Wine  
8 Mountain population, is that of self-sustaining  
9 wild population distributed throughout their  
10 natural ranges.

11 The Environmental Impact  
12 Statement, which I will be referring to as the EIS  
13 from here on in, has selected several key  
14 indicators, including two woodland caribou  
15 populations; the George River Herd and the Red Wine  
16 Mountain Herd.

17 I will be focusing my presentation  
18 today primarily on the second of these, given its  
19 year-round proximity to the project area, and its  
20 threatened status.

21 Just for -- I'm sure you're all  
22 aware of this, but just so the audience is aware,  
23 I'll be primarily referring to the documents,  
24 Volume 2, Part A and B, which is the Biophysical  
25 Assessment, and also Component -- or, sorry,

1 Report 4 of the Large Mammal Component Studies.

2 I felt that, in general, the EIS  
3 does provide a good overview of caribou populations  
4 in central Labrador, and discusses the potential  
5 impacts of the Lower Churchill development, which  
6 include the Muskrat Falls and the Gull Island dams,  
7 but not the transmission quarters associated with  
8 these developments.

9 However, I would like to bring to  
10 the panel's attention some sources of uncertainty  
11 in the analyses and the predictions.

12 In particular, I believe there is  
13 still uncertainty with respect to habitat  
14 preferences at the range level for Red Wine  
15 Mountain caribou. There is an absence of a more  
16 comprehensive view of the direct and indirect  
17 impacts of the project on caribou that extend  
18 beyond the physical footprint of the inundation per  
19 se.

20 There may be a change in  
21 ecological conditions that might lead to additional  
22 wolf mortality, and the fact that wintering George  
23 River caribou were not explicitly addressed in the  
24 analyses.

25 Project effects or the footprint

1 were described in relation to their occurrence on  
2 preferred caribou habitats, so the first step here  
3 is to create a caribou habitat model, which the  
4 Proponent did.

5                                 These, known as Resource Selection  
6 Functions, are statistical models which relate  
7 caribou location information often collected via  
8 radio telemetry to underlying properties of the  
9 landscape.

10                                There are two general conditions  
11 that should be met in order for these predictions  
12 from these models to be valid. The first is that  
13 the landscape information used in the model should  
14 be representative of what a caribou might actually  
15 be exposed to throughout its range. The second  
16 condition is that the radio telemetry data used  
17 should be of as long a time series as possible and  
18 cover all of the seasonal ranges of caribou.

19                                If you turn your attention to the  
20 graphic on the slide, you'll see that the  
21 assessment area boundary was set as the outer range  
22 of the Red Wine Mountain Herd, which is given in  
23 orange.

24                                However, the assessment area used  
25 to determine habitat preferences is the area shaded

1 in black, which corresponds to the Forest Resource  
2 District 19.

3                   As a consequence, the habitat  
4 information used occurs over only about a third of  
5 the population's range. Now, this might not be a  
6 problem if the ecological information is  
7 representative of what a caribou might experience  
8 throughout the rest of its range.

9                   So let's address that assumption.  
10 Lopoukhine, who wrote a very detailed overview of  
11 the ecological communities available in Labrador,  
12 indicated that there are seven ecological  
13 communities that occur throughout the Red Wine  
14 Mountain range. However, only two of these occur  
15 within the forest inventory district used to define  
16 habitat preferences.

17                   If you'll take a look at the two  
18 series of photographs shown on the slide, the top  
19 two photographs correspond to habitats that one  
20 might frequently find within the forest inventory  
21 extent.

22                   You'll note that they are  
23 characterized by fairly dense number -- a high  
24 number of trees, fairly closed canopies. Whereas  
25 the bottom two pictures correspond to habitats that

1 caribou frequently experience but were not included  
2 in the analysis, and they are much more open, like  
3 in woodlands, eskers, et cetera. They are  
4 generally not commercially productive areas.

5                   Unfortunately, this means that  
6 irrespective of how well the model might have  
7 predicted preferences within the forest management  
8 area, and it did predict them quite well within  
9 that area, these results cannot be extrapolated  
10 outside that region. In fact, the model results  
11 might change significantly if the full suite of  
12 available habitats had been considered.

13                   We can now have a look at the  
14 caribou data. If you'll turn your attention to the  
15 bottom graphic shown in this slide, you'll see a  
16 mass of dots super-imposed by a pinkish-yellow  
17 blob. That pinkish-yellow blob corresponds to the  
18 extent of the forest inventory, which was used to  
19 determine preferences. So all of the green dots  
20 that occurred within that pink blob were  
21 incorporated into the analyses. However, as you'll  
22 see, unfortunately, this excludes a significant  
23 portion of the data. Some consequences of that  
24 decision are the fact that a lot of the winter  
25 ranges used by caribou were excluded, including



1 wintering George River caribou.

2                                 If you look at the graphic on the  
3 top of this slide, you'll see that green blob.  
4 You're going to think ecologists only deal with  
5 blobs, but that green blob corresponds to areas  
6 that Red Wine Mountain caribou have used  
7 consistently between many years. So you will see  
8 that many of them do occur outside the area used to  
9 define preferences.

10                                Unfortunately, this means that the  
11 assertion by the Proponent, that the data used to  
12 model habitat preferences is strongly  
13 representative, cannot be upheld.

14                                Let's put these reservations aside  
15 for a moment and just have a look at what the model  
16 presented does tell us, and it does tell us several  
17 things.

18                                For your reference, all caribou  
19 habitat preferences were grouped into three  
20 categories; primary, secondary, and tertiary, where  
21 primary habitats are the most attractive and  
22 tertiary habitats the least attractive.

23                                Based on some of the outputs of  
24 the model provided, we see that there is little to  
25 no selection for secondary or tertiary habitats,

1 that is they are marginal at best. And, from a  
2 reviewer's perspective, that means we should focus  
3 on loss of primary habitats.

4                   Secondly, we see that disturbance  
5 was a significant -- and by that I mean a  
6 statistically significant -- predictor of caribou  
7 habitat preferences. That is, caribou chose to  
8 avoid areas that were disturbed, and disturbance in  
9 this case was defined as regions with roads,  
10 transmission corridors, cutblocks, and cultural  
11 areas which concentrate human activities.

12                   Thirdly, we see from the output  
13 that the footprint will double during the  
14 construction phase of the proposed development and  
15 that most of this doubling is due to a change on  
16 the winter ranges, and that brings me to my final  
17 point.

18                   If you compare all of the primary  
19 available -- yes, primary quality winter habitat to  
20 the total available, you'll see that approximately  
21 a third of the primary winter habitats within the  
22 region assessed will be affected.

23                   So why are winter ranges important  
24 to caribou, you might ask. Well, anybody who's  
25 spent some time here knows that winters here are

1 long, and caribou spend up to six months per year  
2 on their winter ranges.

3                   During this time, they have very  
4 specific habitat requirements. They will select  
5 areas that are very rich in terrestrial lichens, in  
6 particular. They have evolved a unique ability  
7 among all ungulates, through a symbiotic  
8 relationship with a bacteria, to digest lichens.

9                   While on their winter ranges  
10 caribou greatly restrict their movements  
11 conceivably to reduce their energetic expenditures.  
12 They also dig craters right down through the snow,  
13 and you'll see an example of that on the slide  
14 there where a caribou has dug right down through  
15 about a metre of snow to the ground to access the  
16 lichens beneath. They are also sensitive to  
17 disturbance during this time.

18                   The reason why we are concerned  
19 about winter ranges is because they occur in close  
20 proximity to the project area and to the Trans-  
21 Labrador Highway which will be indirectly affected  
22 by an increase in traffic associated with the  
23 proposed development.

24                   The majority of individual Red  
25 Wine Mountain caribou ranges are bisected by the

1 Trans-Labrador Highway and the transmission  
2 corridor.

3 Other studies have indicated that  
4 caribou avoid roads perhaps because wolves use them  
5 as travel corridors, perhaps because they  
6 concentrate human activity or perhaps because they  
7 tend to be characterized by early successional  
8 forests, which are not attractive to caribou.

9 The proposed development includes  
10 construction of 316 kilometres of new road and an  
11 additional 80-metre right-of-way to the existing  
12 transmission corridor which often parallels the  
13 road.

14 A prior study in Alberta has  
15 indicated that even a gravel road with even  
16 moderate traffic can result in a reluctance to  
17 cross by caribou.

18 Given this information, it is  
19 critical that we evaluate the extent to which  
20 caribou perceive the road and, secondarily, the  
21 transmission line and river as barriers in order to  
22 avoid fragmentation of the range.

23 In particular, I think also we  
24 need to evaluate the Proponent's prediction that  
25 regional movements are expected to be maintained

1 under these circumstances.

2 I wanted to comment briefly on  
3 direct versus indirect effects. Direct effects are  
4 those which result in immediate mortality or loss  
5 of habitat. For example, the calculation of the  
6 total inundated area might be an example of a  
7 direct effect, and those are often the focus of  
8 impact assessments.

9 Indirect effects are those that  
10 don't immediately result in loss of habitat or  
11 mortality, but they're much more insidious. They  
12 tend to occur over longer timeframes and involve  
13 changes in ecological conditions.

14 An example of an indirect effect  
15 would be changes in the prevalence of disease or  
16 parasites, changes in the ecology, abundance or  
17 distribution of predators, or even in the types of  
18 vegetative communities that follow removal of  
19 different kinds of habitat.

20 Unfortunately, caribou have shown  
21 themselves to be very susceptible to indirect  
22 effects.

23 For example, a study in Alberta  
24 indicated that caribou were much more likely to die  
25 than chance alone by simply being near a road, much

1 less on the road.

2 Taken collectively, the  
3 combination of direct and indirect impacts suggests  
4 that the project effects can be expected to extend  
5 beyond the footprint of the development per se.

6 There is often a very small margin  
7 between growth and decline in caribou populations  
8 and the same is true here. Caribou don't produce  
9 young often until they are at least two years old,  
10 and then only one young, and maybe not every year,  
11 and those young often don't survive very well  
12 either.

13 Survival of adult female animals  
14 is critical to growth of woodland caribou  
15 populations. The Wildlife Division has been  
16 monitoring survival of radio-collared females for  
17 close to 30 years and we have some good information  
18 on causes of mortality.

19 If you turn your attention to the  
20 table provided in the graph, you'll see causes of  
21 known mortality; that is, where we have  
22 investigated animals shortly after their death and  
23 have been able to determine the cause of death.

24 In 18 confirmed cases over the  
25 last 10 years, what you'll see is that predation by

1 wolves accounts for the majority of all deaths.

2                                 Note that the proportion of deaths  
3 is quite similar to that that was observed during  
4 the 1980s for this population and virtually  
5 identical to that observed over the same time  
6 period for an adjacent population within Labrador  
7 or the Lac Joseph herd.

8                                 Bear predation is surprisingly  
9 important also. It's known that bears take calves,  
10 but to have documented deaths of adults is rather  
11 unusual and has not been observed in the other  
12 population studied.

13                                 Mortality is not distributed  
14 equally throughout the year. Controlling for the  
15 length of season, we see that caribou deaths are  
16 more likely to occur when they travel, for example,  
17 when they travel from their winter ranges to their  
18 calving areas and vice versa and also during the  
19 month of August.

20                                 During this time, wolves with pups  
21 are often much more mobile and bears are trying to  
22 put on as much weight as possible. So perhaps they  
23 are experiencing higher predation during that time.

24                                 There have been five formal  
25 surveys of the Red Wine Mountain population since

1 1983. The figure shown in the graph here  
2 summarizes these. What you'll see is that there's  
3 been a fairly catastrophic decline in this  
4 population, a decline of close to 85 percent.

5                   Numbers were seen to be relatively  
6 stable in the area of about 700 individuals.  
7 However, since 1989, the population has been --  
8 well, actually, I should say since 1997, because  
9 that's the last survey that we had -- the first  
10 survey we had on that low number, the population  
11 has been in the magnitude of approximately 100  
12 individuals.

13                   Because wintering George River  
14 caribou also intermingle with wintering Red Wine  
15 caribou, at least over the last several years, we  
16 have not been able to conduct a survey that would  
17 count only Red Wine Mountain caribou.

18                   However, prior to winter  
19 incursions of George River caribou, we have gone  
20 out and counted the number of individuals  
21 associated with all collared animals to get an idea  
22 of the minimum population size that might be in  
23 this population and those counts suggest that the  
24 population is still within that range.

25                   We feel that the significance of



1 project effects should be considered in light of  
2 the small population size of this herd.

3                   The EIS guidelines stipulated that  
4 effects of the development on George River caribou  
5 should also be discussed. Unfortunately, this herd  
6 also has undergone a fairly significant decline  
7 over the last 10 years.

8                   In correspondence with this  
9 decline has been a decrease in the body condition  
10 of these animals. Several studies have suggested  
11 that surprisingly, these caribou appear to be  
12 gaining weight during the winter.

13                   Now, it doesn't make any sense for  
14 a herbivore to be gaining weight during winter, but  
15 nonetheless it has been documented, and one of the  
16 explanations for this is the poor condition of the  
17 summer range of this herd, potentially, and the  
18 fact that caribou may actually use lichen-rich  
19 winter ranges to compensate for the poor condition  
20 of the summer range under some conditions.

21                   Because George River caribou occur  
22 in much greater numbers, they actually have quite  
23 an impact on the winter ranges themselves. If you  
24 look at the photograph shown on these slides, the  
25 photograph on the left is one where a caribou range

1 has been recently -- and you'll see that the  
2 effects of trampling and foraging have removed a  
3 great deal of the surface vegetation, including the  
4 lichens.

5                   The photograph immediately  
6 adjacent to it is actually not of snow. That is of  
7 a very lichen-rich winter habitat. It's in a  
8 climax, sort of old growth, open lichen woodland.

9                   George River caribou are known to  
10 have to switch their winter ranges from year to  
11 year because of the impacts they actually have on  
12 their winter ranges when they're on them.

13                   And over the last 10 years or so,  
14 they have been using the area within the Red Wine  
15 Mountain Range increasingly frequently and we can't  
16 rule out the possibility that they'll continue to  
17 do so in the future, which would bring them into  
18 contact with the project area.

19                   Just to pull some of that  
20 information together for you a little bit, it is  
21 vital that predictions of the impact and their  
22 significance be evaluated if the project proceeds.

23                   There are several uncertainties  
24 that remain. In particular, the direct and  
25 indirect effects of habitat loss and alteration,

1 the influence of roads, traffics and increased  
2 access and possible changes to the predator/prey  
3 dynamics.

4                                 While the literature does provide  
5 some guidance with respect to possible impacts, in  
6 order to address these we need strong empirically-  
7 based research and we need to move away from  
8 assumptions based on expert opinion or  
9 extrapolation from small study areas or other parts  
10 of the country.

11                                 Currently, proposed mitigations  
12 for caribou listed in Table 7-3 include  
13 participation on the recovery team and a cessation  
14 of blasting within three kilometres of a sighted  
15 animal.

16                                 We feel that additional monitoring  
17 and research is required to implement effective  
18 mitigation. In particular, we suggest it be  
19 targeted to the following four areas: a reduction  
20 of disturbance during construction and operation;  
21 the identification of high value seasonal habitats  
22 and their connectivity throughout the range; and an  
23 evaluation of predator/prey interactions.

24                                 Results of these efforts can be  
25 used to better mitigate for Phase 2; for example,

1 the Gull Island phase of this project, as well as  
2 other types of developments and, in fact, data  
3 collected under other environmental impact  
4 assessment processes has been used to inform this  
5 assessment to a large degree.

6                   Monitoring should be structured in  
7 a manner that will allow biologists to detect  
8 changes in distribution, movement and demography  
9 between baseline construction and post-construction  
10 periods.

11                   In order to do so, there should be  
12 a good representation of collared animals; that is  
13 both males and females over different age classes.

14                   The relocation interval should be  
15 frequent enough -- that is the interval with which  
16 the collar collects locations and transmits those  
17 locations to biologists, should be frequent enough  
18 to allow for mitigation based on presence.

19                   The collar should include activity  
20 sensors, which allow one to gain some insights into  
21 decisions a caribou might be making regarding road  
22 and river crossings.

23                   And finally, additional measures  
24 may be required, for example, inventories within  
25 certain sensitive areas or other non-invasive

1 sampling methods near construction sites.

2                   There are several actions that  
3 could be taken to mitigate for disturbance and some  
4 of these have already been covered.

5                   Most obviously, the timing of  
6 activities should be structured to minimize impact  
7 during the most sensitive periods; for example,  
8 perhaps during calving or during late winter.

9                   With respect to roads, the  
10 identification of areas where access can be  
11 adjusted or minimized to reduce disturbance or  
12 promote crossings, we should ensure that there  
13 suitable areas for animals to continue to cross.

14                   We need to gain more information  
15 about preferences regarding crosses from caribou  
16 and we can always do things like lower speed limits  
17 and erect additional signage to prevent road-  
18 related mortality.

19                   Several references have been made  
20 today regarding possible changes to predator-prey  
21 interactions and in Labrador's case, these are  
22 primarily the wolf, moose, caribou interaction.

23                   These types of interactions are at  
24 the heart of declines in other regions. However,  
25 the cause is not as intuitive as it might initially

1 seem.

2                                   For example, one might assume that  
3 a change in the available prey would result in an  
4 increase -- in this case a moose, would result in  
5 an increase in the wolf population, which would  
6 then result in an increase in incidental predation  
7 on caribou as they are more easy to catch than  
8 moose.

9                                   However, there are two competing  
10 hypotheses that could explain the mechanism by  
11 which caribou are affected. The first is the one I  
12 just described and the second is simply that  
13 predators are more efficient when they hunt along  
14 linear features.

15                                   Regardless, there has been a  
16 documented relationship between these types of  
17 interactions and the levels of anthropogenic  
18 disturbance within caribou ranges.

19                                   To address some of these  
20 questions, the province has recently initiated a  
21 study which attempts to gain some insights into  
22 wolf kill rates and hunting patterns within ranges  
23 of sedentary caribou.

24                                   Caribou operate at broad spatial  
25 scales. To give you an idea, the mean range size

1 of an individual Red Wine Mountain Caribou is in  
2 the magnitude of 6,000 to 8,000 sq km. Indeed,  
3 space itself is deemed to be one of the primary  
4 aspects of caribou habitat.

5                   Scientists have recommended that  
6 caribou habitat be managed at the range level and  
7 not at the stand level, and this involves  
8 identifying properties of high value seasonal  
9 habitats across large spatial areas.

10                   Unfortunately, detailed  
11 information is not found universally available  
12 across all ranges, and so what is available, for  
13 example, the Forest Resource Inventory, while it  
14 includes detailed information on things like forest  
15 types, crown closure, stand density, it excludes  
16 information that is quite relevant to wildlife.

17                   For example, it doesn't include  
18 information on any ground cover, such as lichens,  
19 which we know are preferred by caribou during  
20 winter, or wetlands which we know are used by  
21 caribou for calving as well as many other wildlife.  
22 So there are some significant limitations.

23                   To address some of these  
24 deficiencies, the province in conjunction with many  
25 of its partners has been investing a significant

1 amount of effort into understanding caribou habitat  
2 relationships.

3                   We have been undertaking a series  
4 of studies that attempt to integrate remotely  
5 sensitive information with field data to create a  
6 base map of ecological communities relevant to  
7 caribou.

8                   These efforts are very intensive  
9 and they are cooperative ventures that the  
10 Proponent could choose to collaborate with in order  
11 to get a better idea of the range level habitat  
12 preferences.

13                   In summary, we concur with the  
14 Proponent in acknowledging adverse effects of this  
15 development on Red Wine Mountain Caribou, however  
16 cannot agree that the level of certainty regarding  
17 project effects as non-significant is high.

18                   A monitoring program will be  
19 required to verify impact predictions and to ensure  
20 minimal impacts to Red Wine Mountain and wintering  
21 George River caribou during construction and  
22 operation of the proposed development.

23                   Generally, mitigations are  
24 addressed following the impact assessment through  
25 these EMM and EPP -- which Shelley defined



1 previously, and I'm not going to bungle here --  
2 programs. These are plans -- there are other  
3 industrial developments of similar magnitude that  
4 could be used as a model for the development of  
5 sufficient monitoring plans.

6 In closing, I would like to thank  
7 the panel for the opportunity to speak here today,  
8 my colleagues for their assistance in the  
9 development of my presentation, and the Proponent  
10 and the audience for giving me the time.

11 Take care and Happy St. Patrick's  
12 Day!

13 CHAIRPERSON GRIFFITHS: Thank you,  
14 Dr. Schmelzer. What is the -- oh, you've just  
15 taken it off.

16 DR. SCHMELZER: Oh, sorry.

17 CHAIRPERSON GRIFFITHS: Where is  
18 that, the final slide?

19 DR. SCHMELZER: That's Crystal  
20 Falls.

21 CHAIRPERSON GRIFFITHS: Okay.  
22 Thank you very much for your presentation.

23 So Mr. Crowley, is it? You're  
24 going to be presenting on moose, right.

25 Thank you.