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BIPOLE III TRANSMISSION PROJECT

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Brian Kaplan - Member
Ken Gibbons - Member
Wayne Motheral - Member
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Cathy Johnson - Commission Secretary

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Aimee Craft - Counsel

MANITOBA METIS FEDERATION
Jason Madden - Counsel

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PINE CREEK FIRST NATION
Charlie Boucher
Warren Mills
John Stockwell

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Wednesday, October 31, 2012

Upon commencing at 9:00 a.m.

THE CHAIRMAN: Good morning, ladies and gentlemen. Welcome on this all hallow's eve. I had hoped that at least one of you might show up in costume, but I guess it will be just another dry day. We're looking to -- we have the day devoted to caribou and moose, so it probably won't be so dry after all, it will be an interesting day, I'm sure.

I don't believe we have any preliminary matters. There is one, I should note there might be some confusion as to tomorrow. Tomorrow we do not have morning sittings. We will start at 1:00 o'clock, go till 5:00, and then reconvene from 7:00 to 9:00 in the evening. That's to make time available for members of the public in Winnipeg to come and say their piece.

Mr. Madden?

MR. MADDEN: I just want to follow up on a concern that I raised yesterday, and it's an increasing concern in relation to whether we're going to actually be able to cross today. I had asked Mr. Bedford if we could receive a shape file from the new revised route. And Manitoba Hydro's

response to that was they can't provide that until they hear back from the TAC. And so it becomes -- as you know, our case has largely been around the moose issue, but now our experts are having to -- we don't have the shape file to even understand what the new proposed route in differential impacts may be on moose. And so they are having to eyeball a Powerpoint presentation rather than having an assessment.

So we don't think that's fair, and we actually think it's prejudicial for us to have to cross-examine on issues that are of extreme importance to our client, but we don't really know what the route in those areas are. So we would ask that we have the ability to cross-examine once we, one, have the shape file to actually know what this new route is in relation to moose habitat, and two, we hear back from the TAC on whether this is actually the project we're now reviewing, as opposed to the final preferred route, which our experts have been preparing for over the past four to five months.

THE CHAIRMAN: I don't see the concern. I said yesterday that we would expect, following the TAC's response, which is due this

Friday, that following that Manitoba Hydro would make some Environmental Impact Statement available for those new spaces within a reasonable amount of time. And I think that might be at most a week, and then you will have an opportunity to cross-examine on that.

MR. MADDEN: On moose and caribou at that time? Because here's our issue. We aren't in a position to start our cross based upon, we don't really know what we're crossing on, what the exact project is. So we would like to be able to at least have that information so we're making the most effective use of our cross-examination in relation to moose and caribou.

THE CHAIRMAN: I would think that most of the moose and caribou issues can be addressed from today's presentation, irrespective of the specifics of the line. There may be some subtle changes that you will be allowed an opportunity to question on at a later date.

MR. MADDEN: Mr. Chair, we object. We think this is unfair to the participants who have prepared for something, and then 72 hours before, it's a bait and switch of, no, it's actually this line. And that we don't have the ability to go

back, talk with our experts, actually see what the line is so we can adequately prepare for our cross-examination. All we're asking for is the leeway that we be able to cross after we actually have the shape files and are able to have a comprehensive response.

I'm sure that others are able to move forward on their cross-examination today. For us, it's a part of how we actually do the analysis. Because one of the issues are, well, if we move it over here, well, what's the impacts of that? And we want to be able to do that in one cross, not in piecemeal, where quite honestly as of Friday the TAC may come back and say, well, no, we don't agree.

THE CHAIRMAN: They may very well.

MR. MADDEN: So I just think that we should be allowed -- we're going to know at least by Friday. My understanding is Manitoba Hydro, if the TAC does agree with them, will then provide us the shape file with the actual route, so our experts can at least do somewhat of an analysis, rather than us crossing on what we aren't quite sure about.

THE CHAIRMAN: I repeat what I said

earlier, that I would expect that most of the caribou and moose issues can be addressed out of today's presentation. And that you will be allowed an opportunity to pursue other issues specific to the changes in the line that are proposed. And you may see it as prejudicial, but at this point I don't agree.

MR. MADDEN: Well, we'd like to object on the record. We think that it is prejudicial. It's unfair to participants that -- we don't even, in most environmental assessments when there's changes to the project there needs to be supplemental filings to the EIS based upon those changes, and the participants have to have the opportunity to comment on those.

THE CHAIRMAN: You will have that opportunity. I stated that yesterday and I repeat that this morning.

MR. MADDEN: But we would request that we are able to do our cross-examination after we actually understand what the project is. And we don't understand how that would be prejudicial to others. We would be able to do it quickly, in a position to do it next week. But today, to start a cross-examination when we aren't quite sure --

and this has been the issue that the Manitoba Metis Federation has been on since the beginning of the hearings, it is what the Commission actually provided us funding in order to do. So I think in order to do that, adequately and fully explore and prepare for our cross-examination, we should at least know what the final line is.

THE CHAIRMAN: As long as your cross-examination is restricted to the route changes, you can do it next week. If next week you start pursuing general caribou issues that aren't related to the route changes, I won't allow it.

MR. MADDEN: So, we formally object to it. We don't believe that it's fair for participants to not actually know what project we are reviewing in order to ask the cross-examination, but if that's your ruling, that's fine.

THE CHAIRMAN: That's it.

Please come to the mic?

MR. STOCKWELL: John Stockwell, representing Pine Creek, unfunded participants. We'd just like to -- I spoke with Chief Boucher and we would like to express our support for

Mr. Madden's position, just for the record. That's all, sir.

THE CHAIRMAN: Okay, thank you.

We will now hopefully turn to the presentation. Ms. Mayor?

MS. MAYOR: Just one very brief filing. I have provided to madam secretary the Fox Lake ISA agreement that Mr. Madden asked to be filed by on the record. So that has been provided and there are copies in the blue box there for everyone.

THE CHAIRMAN: Thank you. Now, I believe -- have both of you been sworn in?

MR. RETTIE: No, I have not.

THE CHAIRMAN: I didn't think so.

James Rettie: Sworn.

THE CHAIRMAN: You may proceed.

MR. RETTIE: All right, thank you. Good morning, Mr. Chairman, Commissioners, ladies and gentlemen.

I have been asked to introduce myself this morning. My name is Jim Rettie. I'm a senior ecologist with Golder Associates here in Winnipeg. That is a relevantly recent position for me, I have only been there for about a month

and a half.

My areas of expertise related to this hearing are, first of all, wildlife population ecology, specifically in study design and analysis of data and in population modeling. Secondly, in wildlife behavioural ecology, particularly the relationship between wildlife and habitat. And finally, I have an overall expertise in the ecology of boreal woodland caribou.

My education includes a Bachelors degree in Zoology from the University of Manitoba and a Doctorate in biology from the University of Saskatchewan. Related to this hearing, my relevant experience includes having conducted my doctoral research on woodland caribou in the boreal forest in Saskatchewan, and addressing the same questions as the analyses I conducted for the Supplemental Caribou Technical Report.

From 1998 until 2005, I worked as the Provincial Wildlife Populations specialist for the Ontario Ministry of Natural Resources. And there my roles included being the project manager for woodland caribou research project in Northeastern Ontario, including advising two graduate students working on the project. Being the Ontario

Ministry of Natural Resources expert for study, design and analysis for the Ontario Provincial moose aerial survey program, being a member and co-chairman of the Ontario woodland caribou recovery team. I acted as a science adviser for the OMNR provincial wildlife assessment program, and as a science adviser to provincial, regional and district biologists for allocating and setting moose hunting seasons.

From 2005 until the end of August this year, I worked as a monitoring ecologist for Parks Canada. And there my work included population modeling of elk in the Riding Mountain National Park region, including the predictive effects of animal removal for disease control on the elk population; population modeling of moose in GrosMorne National Park in Newfoundland, particularly the predicted effects of licensed hunting on the moose population. I was a co-chairman of Parks Canada's chronic wasting disease task team, where I was one of the authors of the national chronic wasting disease strategy for Parks Canada, as well as the chronic wasting disease strategy for Elk Island National Park in Alberta.

I also acted as a researcher on the effects of giant liver fluke on moose populations in Elk Island National Park, and the effects of hunting on moose populations in GrosMorne National Park. I have a dozen publications in peer review journals on woodland caribou ecology.

My personal involvement in the Bipole III transmission line project included, in 2007 I was a member of an expert panel convened by Manitoba Hydro to assess the potential threats of the Bipole III transmission line to woodland caribou. And I became involved in the project again in January 2012, when I was approached to assist with the data analysis and writing of the supplemental technical report on woodland caribou. I analysed the woodland caribou data and wrote the methods and results sections of the supplemental caribou technical report. Specifically, I analyzed population data for each caribou herd. Those are sections 2.6 and 3.6 in the supplemental report. I created resource selection function models for The Bog and Wabowden herds for both the calving area selection and winter habitat selection. And those appear as sections at 2.4 and 3.4 in the supplemental caribou technical

report. I assisted in preparing responses to information requests and I helped to prepare the presentations on woodland caribou and moose that we will present today.

So I'd like to begin now with our first presentation. Mr. Schindler and I have two rather lengthy presentations for you this morning. One is on caribou, the other is on moose. Because our presentations will highlight contrasting attributes of the two species, we have prepared a brief presentation to highlight some of the key differences right up front.

First, you will notice there is a considerable overlap in the ranges of the two species. So we have moose here on the left, and they go down right to the southeast corner of the province and right up to the northern limits up here. Woodland caribou occupy much of the same range, though they don't go quite as far south, nor do they go quite as far north. The northern portions of this range are occupied by barren ground caribou and coastal caribou populations. Despite the range overlap, they inhabit very different parts of the landscape.

So beginning with the top line here,

caribou have much larger home ranges than do moose. Typically a caribou's home range is in excess of 400 square kilometres. Moose are typically less than a hundred square kilometres, and it's not uncommon in the literature to see home ranges for individuals listed in the area of 25 to 50 square kilometres. So the areas that each individual occupies are quite different between the two species. Moose are more sedentary, they remain in one area for most of their life, whereas caribou range over a much broader area.

The habitats are also quite different. Moose prefer young deciduous and mixed forest. They like riparian areas, areas along waterways, and they like shrub lands. Their diet matches the habitat that they select. They prefer to eat woody browse, they eat deciduous shrubs and also aquatic plants.

Boreal woodland caribou inhabit mature coniferous forest and peatlands, and their diet is primarily herbaceous vegetation and lichens.

The density of the two species also differ quite markedly. The numbers that I'm presenting here are for populations that are

existing on the same landscape with predators. There are island populations of both of these species where the densities get considerably higher than those I show on this slide. But for mainland populations where predators are present, these numbers are more representative of what we might expect to see.

So while moose might be found in densities of up to two animals per square kilometre, and it's not uncommon for them to be in the range of up to .8 animals per square kilometre, in hunted populations commonly values are seen up to .4 moose per square kilometre. So for those of us more familiar with Southern Manitoba, if you consider a township, which is about 100 square kilometres, .4 moose per square kilometre would put 40 animals in that township.

For woodland caribou, they are much more difficult to survey, and consequently we have far poorer estimates of their density. Generally, numbers in the literature might range as high as .15 caribou per square kilometre. Most often it's less than .1. So in that same township, rather than 40, which we'd like to see for moose and caribou, you'd see fewer than 10.

The other thing I'd like to note here as I go through the information on density is that in the areas where there is a healthy wolf population, it's not uncommon, in fact it would be expected for us to find that moose densities are in the range of .2 to .4 per square kilometre.

I'm going to work this slide from the top to the bottom. For moose, the age of maturity is about two and a half years. So essentially, because these animals are seasonal breeders, and this is true for both moose and caribou, most births will occur in a ten day to two week period, and it's the same period year after year after year. So a normal moose female would be giving birth on her third birthday, or about her third birthday, for the first time.

Woodland caribou, that's probably the most common time for her as well, though there are certainly reported instances, and it's reasonably common for pregnancies to be reported that would have a caribou giving birth at the point at which they turn two rather than three. So they can become reproductively mature slightly earlier than moose.

Pregnancy rates are almost universally

high. They are typically in the high 80s and low 90s for both these species. So reported rates in the literature go up to almost 100 percent for both moose and for caribou.

One of the things quite different between the two is the twinning rate. Caribou do not twin. That significantly compromises their ability to have their populations grow at an advanced rate. I'm going to touch on that in a moment. Twinning rate for moose can be up to 80 percent, and more typically it is in the 25 to 50 percent range. So what that means is the fecundity rate, the calves born per female each year, for moose it can be up to one and a half calves per female. Normal numbers would have something in excess of probably in the 1.2 to 1.3 range.

For woodland caribou because we have a pregnancy rate up to 96 percent and no twinning, essentially the pregnancy rate is fecundity rate. And I want to note, on the handouts that you got today, there is a key number that's missing and that's in the annual recruitment rate. I believe in the handouts you have it says calves surviving per female, and it should say calves surviving per

hundred females.

So typically when you have a moose population, you can see recruitment, in other words, offspring that survive through their first year of life. And that's normally measured in late winter, and that's considered to be an accurate representation of those that would survive through to the spring, the time at which they would have been born. You can see rates as high as a hundred calves per hundred females, so in other words, each animal having a calf survive through a year. Commonly the numbers are around 30 to 60. So if you keep in mind that you might have -- you probably have anywhere from two to four times that many calves being born in a year, and this is the proportion of them that survive.

For woodland caribou, the highest rates I've seen in the literature and in datasets that I have had an opportunity to review are close to 60 calves per hundred cows being recruited into a population. However, it's far more common for the numbers to be in the 15 to 30 range. So if you look at these numbers here, the ability for these populations to recruit new individuals, essentially it's about twice as high for moose as

it is for caribou.

Adult female survival in both species is quite high. For moose, typically the numbers are around 90 percent, and for caribou, up to 90 percent, perhaps slightly lower. And this is fairly common for all large herbivores. Essentially, what you see is that adult survival is quite high, and it's quite high in most circumstances in most populations. The thing that does vary more considerably is recruitment.

So when we combine adult survival, 90 out of every hundred animals surviving from one year to the next, and adding in recruitment, keeping in mind that we're looking at replacing our adult female proportion here, so half of these will be males, we then wind up with a potential population growth rate of up to 1.4. What that means is there will be a 40 percent increase from one year to the next.

More commonly, however, we would expect to see values in the 1.1 to 1.2 range. So a 10 to 20 percent increase from year to year. Those are very common numbers reported in the literature.

For woodland caribou, using the

numbers that we have for recruitment here and adult female survival rates, we're probably looking at a maximum reproductive rate, I have calculated 1.17 here, but somewhere between 1.15 and 1.17. However, the numbers that we see in the literature commonly report that maximum rates may be around 5 percent increase, 1.05 lambda rate. And more commonly in the literature is populations in decline. And that's not because caribou are inherently incapable of reproducing and replacing themselves, but because most research goes on in areas that are highly disturbed and consequently their survival and their recruitment rates decline. And we are actually watching populations in decline being studied more commonly than populations that are healthy and in unaffected range.

So what I have done here is I have plotted a variety of lamda rates, these are population growth rates. First I want to draw your attention to the yellow line. That's a lambda of one. That's replacement. So if in year zero we started out with a hundred animals, in year ten we would have a hundred animals. Now actually no population actually grows smoothly

like this, there would be a lot of ups and downs. But if we projected over time, if we had an average recruitment rate, as we might see for caribou -- sorry, an average lambda as we might see for caribou of .95, what that means is that over the course of a ten year period, you would see a decline from a hundred animals to a number down around 65. And if you remember the numbers that I showed you for likely lambda rates for each of these two species, for caribou I showed a number of 1.05 as being probably a reasonable number that we might expect to see in nature. Although I wouldn't be surprised to see a number of around 1.1. So that means at 1.1, if you start off with a hundred animals, ten years later your population has increased at a factor of about two and a half. So we're approaching a population that has tripled.

Moose populations on the other hand have a much greater capacity for growth. If we were looking at 20 percent growth over an extended period of time, which can certainly happen, that would mean a population of a hundred could shoot up to a population of 600 over a ten year period. So there is a significantly greater ability for

moose populations to increase than there is for caribou populations to do the same.

So in summary, there seems to be a somewhat different susceptibility to predation, and that is borne out in the recruitment rates and, to a certain extent, in the slightly lower adult survival rates. There is also a different ability to recover from population decline. So that potential population growth that I showed you on the previous slide shows a moose population that's driven down to a lower number is much more resilient, much more likely to rebound and return to where it began, or perhaps even increase.

As a consequence of those different characteristics, the status in Manitoba for caribou is that they are a species at risk, they are a threatened species, and they are protected from hunting. Moose on the other hand are a game species.

So those characteristics of the two species are things that we'd like you to keep in mind as we go through the other two presentations we have for this morning.

MR. SCHINDLER: Good morning, Chairman, Commissioners, participants, ladies and

gentlemen. I introduced myself yesterday, but for those of you -- my name is Doug Schindler, I'm the president of Joro Consultants. I am a wildlife biologist, senior biologist with that company.

My areas of expertise relate to 30 years of experience with the Province of Manitoba as a wildlife biologist and as a consulting biologist with Joro Consultants. I have got extensive experience working with both moose and caribou as a resource manager, and as a researcher, and as a consultant doing environmental assessment work and assessing the effects of various developments on caribou and moose, working closely with government agencies, First Nations and Aboriginal peoples, and industry, in terms of developing management strategies in areas such as eastern Manitoba as part of the eastern Manitoba caribou integrated strategy that was developed and is implemented today.

I have a fair bit of related experience in transmission line, environmental assessment work, Stall Lake to Flin Flon transmission line in the north. I worked on transmission lines in the Interlake and in the

southeast part of Manitoba.

So anyway, I think we will go to the next slide show here. Okay. We have a fairly lengthy presentation on caribou for Bipole III. I'll just give you a bit of an outline of the project, of our presentation. I'm going to introduce to you caribou in Manitoba, the different species that exist and what we assessed as part of the Bipole III project, to give you a little bit of a background on both the barren ground caribou and the coastal caribou that exist in the northern part of the project area. Obviously, boreal woodland caribou will be discussed at length. We're going to discuss the conservation status. And very importantly a process that we embarked upon beginning some time ago, working with a number of notable experts on boreal caribou across the country, to guide us through the process of doing the research and monitoring for Bipole III. And Jim will take you through that particular process and how it relates to the actual monitoring studies that were conducted and the objectives that were reached in terms of our proposed monitoring that we conducted.

We're going to show you some of the approach to the key studies that were carried out as far as doing the assessment approach and also the assessing of alternative routes, and the assessment of evaluation ranges in terms of the areas of caribou that we defined and did explicit assessment on.

I am going to be discussing our cumulative effects assessment for boreal caribou that was conducted, and walk you through that process as to how we looked at the cumulative effects of the project and other activities on boreal caribou.

We are going to discuss the Wabowden re-route that has been proposed and that is being reviewed by the TAC. And we're going to give you a summary of predicted effects of the final preferred route, and we will provide you with some conclusions based on our presentation and research.

In Manitoba we have three types of caribou within the project study area. Essentially, we have the boreal woodland caribou ecotype that Jim has discussed the differences between caribou and moose. We also have coastal

caribou that exist in the area, and they are genetically similar to boreal caribou, however they are differentiated by their calving behaviour, that they calve en masse typically close to the coast line, whereas opposed to boreal caribou which calve very solitary in the forest environment. So they really spread out.

And then we also have barren ground caribou that do occasionally come into the area, and we did address that in terms of assessing if and when those animals come into this study area.

It is important to note that barren ground and coastal caribou are not listed as protected. They are not protected, they are hunted species. And boreal woodland caribou are a threatened, and listed under the both the Species at Risk Act and the Manitoba Endangered Species Act.

So barren ground caribou are typified by body type to some degree. They have larger antlers, and again they calve en masse in specific calving areas in the northern and the Arctic Tundra.

The northern portion of the project study area includes habitat that is occasionally

occupied by barren ground caribou, and the potential effects of the project on barren ground caribou were evaluated based on historical range data, government documents, information from the Beverly and Qamanirjuaq Caribou Management Board, and also some information that we got through some of the ATK results of interviews and reports.

This is a slide from the BQ management board, and you can see the project study area, you can see the Nelson River. And the range extends, here is these mass calving areas for the Beverly and Qamanirjuaq range. You can see that they extend, this is an older image of where the range extends just to the south almost hitting the Nelson River. They are not known to cross the Nelson River. And these are very occasional migrations that do occur.

The population of the Qamanirjuaq range, I thought I would show you this from a publication that was recently by Gunn in 2008. But you can see the population was quite low in the early '70s, and these migratory populations are known to fluctuate periodically and they go through significant cycles. And you can see in this example that the population really increased

in 1984, and there was some decline in 1988, and it bounced up again. And now there seems to be a slight decline in the Qamanirjuaq population. And subsequently, some of these migrations in towards the Nelson River sort of coincide with these high population cycles that they do migrate occasionally into the project study area. But as of late, there has not been notable migrations.

Again, just from a general perspective on barren ground type populations and coastal populations, this is sort of a trend of migratory caribou ranges that was published in 2010, and it illustrates that some of the populations notably are in decline. And it appears to be an intrinsic cycle and there's not a lot of explanation from the biologists that manage these herds to explain the reason why these populations decline, in some cases, decline quite rapidly.

I'm going to be talking a little bit about the Cape Churchill coastal range, and as well the Pen Island's population as well that do come into our project study area.

We evaluated the coastal caribou through a limited collaring and telemetry program that was funded by Manitoba Hydro. And I'll talk

a little bit about that in detail.

Reviewing historical data, information and documents, there's not a lot of -- these populations have not been studied extensively. And we also conducted a cumulative effects assessment on a particular portion of that population, which I'll explain.

And part of our review also included ATK information, particularly some good information that came out of Fox Lake First Nation, relative to describing these particular animals and their use of the area, which was actually quite similar to the results of our studies.

So here is the Gillam area and we can see the final preferred route. And we have the two populations here, we've got the Cape Churchill population and we've got the Manitoba component of the Pen Island herd. The Pen Island herd extends and is known to occupy a much larger area. What I'm showing you here is the animals that were collared by Manitoba Conservation. This is the extent that goes beyond Ontario. So you can see that it's a very, very large area.

In terms of the Cape Churchill

population, surprisingly enough in the early '60s there was very well little known about this particular range, and it was known to be very, very small. It wasn't until about the '90s that Manitoba Conservation and others determined that there was a specific group of animals. There seem to be some tremendous growth of the population through the '80s and into the '90s, and today the population seem to be somewhat stable at 3,000 to 3,500 animals.

And again in the Pen Island's population, it wasn't really until about the '70s that this population was deemed to be a population of animals that calved in the Pen Island and along the coast of Hudson's Bay. And to this day, there is still a fair bit of lacking information as to the specifics of the population in terms of their calving areas, and there are some trends that they are -- there is less use of calving areas along the coast. Nevertheless, we see a similar trend in the Pen Island's population relative to their population growth through the '70s and into the '90s.

And the Pen Island animals are known to move into Gillam and the area of the Bipole III

study area on a fairly regular basis. And again, as of recent in a publication by Abraham in 2012, they are really finding a lot fewer animals calving on the cost of Hudson's Bay.

So just quickly here, the collaring was conducted through the Northern Resource Management Board and Manitoba Conservation, and there were a number of animals that were collared in both the Cape Churchill and Pen Islands area.

So this is just a snapshot, and we've got a lot of information in the supplemental report, illustrated in red dots being the Pen Island animals, and the Cape Churchill being the blue dots. But you can see the blue dots don't come south of the Nelson River. They have a very distinct use of the areas along the coast for calving, and during the winter time they do migrate occasionally into the project study area, particularly during early to mid winter, and eventually a lot of the wintering areas that occur are north of the project study area.

The Pen Island animals are quite interesting. There is a lot more variability of movement of animals. We do know there are some animals that hang around the Gillam area. They

have very large home ranges relative to boreal caribou actually, but you can see that these movements are far ranging and quite unpredictable.

Again the Cape Churchill area is more defined, but what we found was that eight of the 22 Pen Island animals that were collared illustrated some fairly significant use of the Gillam area during the summer time. And that supports some of the observations of Abraham, that there seems to be more in-land calving of those animals.

They have got much larger home ranges than boreal caribou. And Jim mentioned some of the numbers for boreal woodland caribou ranges. And their movements are quite variable from year to year.

This is just a quick summation of what we call MCPs, or minimum convex polygon of a range. And basically that's drawing a circle around all of the location points that we have. Here is some examples of home range sizes for the Harding Lake boreal caribou and the Wabowden evaluation range, and another Wimapedi-Wapisu MCP. If we look at the summer range of those Pen Island summer residents, we see that it's in fact

quite -- much larger than the actual total MCP of the boreal ranges. If we look at the MCP of the animals during their entire lifecycle in terms of the annual cycle, they've got very, very large home ranges, so they are exhibiting this coastal behaviour.

Aboriginal traditional knowledge up in the area, including some literature, data and maps, were incorporated and considered into the environmental effects assessment on coastal caribou and barren ground caribou in our environmental assessment.

So I'm going to turn it back over to Jim to discuss components of boreal caribou.

MR. RETTIE: Thank you, Doug. All right, to begin with as Doug mentioned, caribou are officially a threatened species under both the Species At Risk Act, Federally, and the Manitoba Endangered Species Act. There was a national recovery strategy that's just completed, I believe the beginning of this month, a revised version. There is a conservation recovery strategy provincially. It's currently being updated. And there are presently action plans for boreal woodland caribou ranges in Manitoba under review.

Manitoba's strategy identifies a shared responsibility for the conservation of boreal woodland caribou in Manitoba. This text is paraphrased from the provincial recovery strategy. One of the groups that's identified explicitly is industry. And Manitoba Hydro has accepted its responsibility and it currently participates on three regional caribou committees. And I am about to tell you about some of the other research that they have conducted as part of this project that will contribute greatly to caribou conservation in the province.

So with respect to the threats posed by the Bipole III transmission line, Manitoba Hydro began with a formal risk assessment. The assessment process followed guidelines developed by Environment Canada. The assessment was conducted well in advance of the project to aid in the development of mitigation strategies and for research and monitoring. Manitoba Hydro brought a number of experts together and went through a formal process to identify key threats to boreal woodland caribou. And prior to this year, this had been my only involvement with this project.

The experts included in this list, all

have I believe 20 years or more experience in woodland caribou research and/or management, and their backgrounds span the country. We have people here who have done research in Alberta, Saskatchewan, Manitoba, Ontario, Newfoundland and Labrador. I think we have skipped over Quebec, but basically throughout the boreal woodland caribou range in the country. The people who are on this list have worked with animals in most of their distribution in the country.

So overall, the workshop participants assess the potential threats to woodland caribou from the transmission line construction and operation, and works to identify approaches and site selection and environmental assessment, and to make recommendations about long-term monitoring and research.

The assessment categories were identified and they show up in this column on the left, forage loss and degradation, range fragmentation, predation, pathogens, and direct mortality from humans. The categories were cross referenced against electro transmission planning, construction, and operation. And there were monitoring and mitigation recommendations made.

Sorry, there was also, probably most importantly, there was an overall level of concern assigned to each one of these threat assessments. And you can see here the full name spectrum of the options that this panel had to work with from unknown, to low, to medium, to high. Those were the categories that they placed their concerns into.

So the broad conclusions of this panel were those that appear on this table. I'm not going to go through them all right now because we're going to come back to it as we go through the process step by step.

All right. So these were the key recommendations of the expert panel. The first was that most issues related to construction and operation can be mitigated through routing to avoid the majority of boreal woodland caribou ranges.

The second was that Manitoba Hydro should undertake pre-project radio collaring and monitoring to identify critical local range components, particularly calving and winter use areas to avoid in their route selection process.

And third, that they should initiate monitoring on local populations to determine the

effects of disturbance on predation rates, on movements and on range occupation.

So the second point here relates to a number of things that appear on that table. It relates to fragmentation, to predation, to survival recruitment, and to the definition of ranges. The final point also relates to fragmentation and predation.

This is how the recommendations were implemented by Manitoba Hydro. To begin with, there was an assessment of historical and known provincial distributions of boreal woodland caribou. Following that there was a pre-project radio collaring and telemetry study to identify ranges for evaluation purposes, essentially population ranges, and to identify calving and winter use areas. They undertook aerial surveys to detect other caribou groups. The provincial ranges that were obtained in step one were refined using the information acquired in aerial surveys and through telemetry studies, to yield the evaluation ranges that you're going to hear a fair bit about as I go through this presentation today.

There was a preliminary assessment of habitat selection to model calving and winter

habitat across the range, and to make it useful and available for the evaluation of alternative routes. And the end goal is that there will be clearly delineated ranges with clearly delineated seasonal habitats within each that will enable Manitoba Hydro to mitigate the majority of the effects of the Bipole III transmission line through routing.

So to go through those items in a little bit of detail as to how they were implemented. This is the map of boreal woodland caribou ranges that was provided by Manitoba Conservation in 2006. So you can see there are a number of ranges, they overlap. In some cases they are contiguous. I suspect where you've got one sort of showing an incursion on the other, there's probably some uncertainty as to where the border between the two exists. But there are quite a number of boreal woodland caribou ranges identified in this part of the province.

In addition to the provision of ranges as delineated by Manitoba Conservation, there was also some data from some historical radio telemetry studies that was available in the Neosap range here, in the study that took place in the

late '90s and early 2000s, and in the Wabowden area in a study that took place in the late 1990s.

So this slide shows the Bipole III study area in yellow. So that's -- it's underlying the other objects that you see here, and it comes all the way down here and down over the Saskatchewan border. And it shows all the woodland caribou ranges that it intersects.

Now, there are some of these, particularly in this area here, that did not show up on the earlier slide that I showed you. And that was because they weren't identified initially by Manitoba Conservation, and they were subsequently identified as areas where they thought there were woodland caribou ranges in some of the gaps that the earlier figure showed.

So we began by deploying radio collars in 2007, and continued collaring animals until 2011. I believe there's been some more go out in 2012 as well, but for the evaluation that we're going to discuss today, it deals only with animals up to those collared in 2011.

Well over a hundred radio collars were placed throughout the evaluation ranges. There is about a three year life to each one of those radio

collars. And I'm going to come back to that a little bit later when I'm discussing adult survival rates, because what's known now is that when you have animals that are radio collared for multiple years, it actually affects your assessment of survival rate. So I'm going to touch on that again later on in the talk.

All right. The results of the radio telemetry work gave us a much better picture of ranges in the area. Now, this map shows points from all of the radio collared individuals, and there are close to half a million data points plotted here. So you can see that it's giving a much better perspective, half a million data points from -- I can't remember what the exact number is -- about 140 different animals. So this shows a detailed description of the habitat and the areas used by each of those animals.

So just to go back here, this is The Bog range down here, right on the Saskatchewan border. And the next slide that I'm going to show you is more close-up view of that range.

When we looked at the ranges used by study animals and compared them with the ranges identified by Manitoba Conservation, we found that

there were some variations, which is what you might expect. So this polygon, this solid line that you are seeing in pink here, is the range that's identified by Manitoba Conservation. So you can see that it's a reasonably good approximation of the area that's used by animals. However, there are some gaps in it, areas that don't appear to be used anymore, and there are some other areas where animals from the study area are outside that range. I mean, one of the obvious points is that the ranges identified by the Provincial Government stop at the border and the animals don't.

So in addition to radio collaring animals in known ranges, there were aerial surveys flown. These were for multiple species, but one of the objectives was to determine if there were animals in areas other than those in which we already had animals radio collared, to determine if there were ranges that were perhaps being missed.

And these solid lines here, there are three larger survey blocks delineated by solid lines, one down around The Bog range, and then two up here, one to the east and one to the west. And

those are the extent, those are the boundaries of the extent of the surveys.

So what's plotted here in green are concentrations of woodland caribou observations. And so those were used to help us enhance future radio collared deployment and help to identify ranges occupied by boreal woodland caribou.

So from the preceding work, new range maps for caribou in the study area were created. The coloured shapes, these were on the maps that I showed you before, those are the ones that were provided by the province -- sorry, the ones that were added later on fit in this space here. Again, this yellowish area in the background is the study area. And the solid polygons that you see here. So for example around The Bog area here, that solid line represents the ranges as delineated with a minimum convex polygon around the points from the radio collared animals. So we have defined ranges occupied by woodland caribou from our radio collared animals, and those are what have been used for the evaluation of the alternative routes.

So study area in yellow, and those polygons represent the evaluation ranges.

Beyond range delineation, the telemetry data were also used to generate a course description of calving and winter core area potential across the study area. So those two sets of analyses were conducted independently, looking first for calving habitat, second for winter ranges. And those were based on an assessment of areas being used by our study animals at those times of year, and the attributes of the areas that they were using, and then projecting outward to other areas where we perhaps did not have radio collared animals, and assessing the value of the additional habitat by looking at the characteristics of the habitat that was there.

So the results of these analyses were to be used in the route selection process. So this is a broad scale map of calving habitat prepared last year for the 2011 caribou technical report. What you can't see here is this is actually broken up into tiny hexagons. They occupy two square kilometre each. It is not apparent here, it has sort of a smooth appearance to it from our perspective here, but there are actually tiny hexagons covering this entire landscape. All of the study animals pooled for

analyses, and the attribute values that were consistent with their locations were then used to assign a calving habitat value across the entire study range.

So the darker areas on this map are those that are presumed to have higher potential for calving, and that's based on what we see in study animals actually used for calving, and how well the attributes of those areas match up with actual use.

So I want you to note how extensive the distribution of calving habitat is under this analysis. So all of these coloured blocks here are showing up as calving habitat, the darker ones are considered to have greater potential.

So I'm going to move now to a winter habitat assessment, and what I want you to note is that the map that I'm going to show you on the next slide is exactly the same as this map, only I'm going from two square kilometre hexagons to 170 square kilometre hexagons, and I'll toggle back and forth a couple of times.

So you can see this is exactly the same area if you look at, you know, perhaps look at the southern boundary when I switch back, this

is the same map only evaluated at a much coarser scale.

The much larger hexagons reflect the difference in range use in winter compared with calving. So these are more representative of the scale at which animals are using habitat in winter, whereas the previous ones represent the scale in which they use habitat during calving. The objective here was to identify large blocks of contiguous winter habitat and to attempt to mitigate the effect of the transmission line through routing. So to avoid cutting through any of these large dark blocks with the transmission line.

So to go back to the activities and methods recommended to Manitoba Hydro by the expert panel, we began with the assessment of historical and known provincial distributions. We conducted pre-project radio collaring and telemetry studies to identify ranges and to identify calving and winter use areas. We conducted aerial surveys to detect other caribou groups and fill in gaps with those that we began with. We refined the provincial ranges to yield evaluation ranges. Those are the polygons I

showed you on the earlier maps. We made a preliminary assessment of habitat selection, looking at both calving and winter habitat. And then the next step is to attempt to mitigate the majority of the effects of the Bipole III transmission line through routing.

So we have completed the tasks that are shown here, and the results were used in the route evaluation process. And Mr. Schindler is going to lead you through that right now.

MR. SCHINDLER: In terms of the evaluation of alternative routes, Jim provided you a summary of the types of information that was used in the ranking of the various segments to come up with, from a boreal caribou perspective, which of those areas ranked of highest concern versus those that were of less concern.

We have seen this in a number of presentations, the evaluation of the routes. And again, in terms of what was conducted for a caribou, which one of those main criteria that were part of the evaluation matrix, we utilized all of the information. You know, we utilized information from aerial surveys, the historic data. We used the information from telemetry.

All of those components went into evaluating each and every segment.

So the fundamental goals were to avoid entire ranges where possible, and to look at the assessment of core winter areas as defined, not only by telemetry data, but also some of the initial course predictive model that was used, to again go above and beyond to try to find areas where maybe we did not know where caribou was, but there was some provincial habitat there, and also known calving areas, calving habitat. And to the extent there were segments that paralleled linear features, we would give them a more preferable rank as opposed to a segment that would be occupied in a very remote area that had caribou activity.

So any one of those criteria that would come up would ultimately relate to a ranking of a segment that would have high concern for caribou. So it was very much a precautionary approach in terms of ranking those segments for boreal caribou.

This does not show all of the model data that Jim had mentioned, but this shows an overview of the core areas that were defined

through some of the collaring studies that were conducted. And you can see that in some sections of the study area, these segments would have been ranked extremely high in terms of concern. So there was obviously some areas down through the Wabowden area, et cetera, but we looked at it from a broad perspective and ranked all of those segments accordingly.

So the outcome, when all of the elements were incorporated, of course, boreal caribou were one of many, it would have included mammals and all of the socioeconomic aspects. In the end the final preferred route ended up being very much a preferred overall alternative in terms of the objective of avoiding many of the ranges and much of the core habitat within the project study area.

We have also included the re-routing here to show you. There has been some concern expressed, and some uncertainty relative to the original FPR. And I will discuss in more detail the revised route. But you can see that it now skirts more on the periphery of the Wabowden range, but nonetheless you can see the overall objective of avoidance of the majority of caribou

ranges within this project study area was achieved.

MR. RETTIE: All right. The top part of this list, the part that is grayed out, it is the set of recommendations that I have already covered. I sort of included them here just to show that there was a flow to how the process was undertaken, but we have gone through them already.

So the majority of the effect of the transmission line and the mitigation of it through routing culminated with the selection of the final preferred route. And beyond the mitigation through routing, the expert group made a number of other recommendations, and we addressed these specifically as they relate to the final preferred route. I'm going to go through each of them further.

The first on the list is an assessment of habitat selection. This is its second appearance on the list. A few moments ago I talked to you about the preliminary assessment of habitat selection and the generation of a study area wide assessment of both calving areas and winter core areas. And what I'm going to discuss now is the habitat selection analysis that was

done within the ranges that are intersected by the final preferred route.

I want to note that techniques were not specified by the expert group, and we chose resource selection function modeling for the second round of analysis.

So the resource selection function analysis appears in the supplemental caribou technical report completed in August 2012. Linear effects analysis also presented in the August 2012 technical report, and that addresses the next point that's on this line, using existing data to examine the effect of transmission line rights-of-way on caribou behaviour.

And the panel recommendation to conduct long-term monitoring of recruitment and mortality in affected and controlled ranges through radio telemetry studies, aerial surveys and subsequent analyses, those data were collected and they were used to assess population dynamics which were presented in the August 2012 supplemental report. So we're going to go through these sets of analyses now.

First up on the list is resource selection function modeling. So using the data

from the radio collared caribou and the land cover class data, an assessment was made to determine what attributes were consistent with areas used by caribou for calving. So the assessment was completed separately for each evaluation range, and when the criteria were established, the formula was applied to the entire evaluation range to give the relative value of each hexagon as calving hexagons. Again, we are back to the two square kilometre hexagons. This map is zoomed in a little bit more than the entire study area map that I showed earlier, but we're dealing with the same sized cells here.

So essentially what happens in this process is there's a comparison made between occupied cells at the time of calving. So when we have point data from radio collared woodland caribou, we look at the attributes of the cell that they are occupying. And that is then compared with a random selection of other cells from within this evaluation range. And the attributes are identified, which are more common to the occupied cells than to those that are obtained at random. And then there is a best fit to use the attributes associated with each one of

these cells to identify what attributes are most important to caribou for calving. And then those attributes are used in a formula and projected out to determine how valuable each other patch of habitat within this evaluation range is potentially for woodland caribou.

We used the worst value amongst actual calving ranges, so we looked at all -- when we calculated the final value for each habitat patch, we looked at the lowest value that was associated with an area actually used by woodland caribou. And all areas worse than that we gave a value of zero, and those show up as white spaces on this map. So those are considered to have low potential for caribou calving.

And the rest of them are projected out in a gradient. And this is proportional, it's a relative value, this isn't absolute value. This isn't saying that there is going to be 90 percent probability of a dark brown patch being used as opposed to a light brown patch, but instead the darker ones are more likely to have value as calving habitat than the later ones.

So moving forward, this is the assessment that we made of the Wabowden range, and

the process was completed independently for The Bog range. So in The Bog range we found that caribou were attracted to wetland habitat types, wet shrub and wet treed areas. And that's a reinforcing preference. This is an area that is already very rich in wetlands, and yet within that area they are still preferentially using wetlands as they occur. And they are also further than expected from young forests.

So again I just want to reiterate that the hexagon values are relative rather than absolute. So we don't see quite the same gradient here, we don't see as much light versus dark as we do in the Wabowden range. What we see is a lot of habitat here. In fact, the majority of the land base is acceptable as calving habitat and it seems to be more evenly distributed in terms of its value, or its potential value.

All right. So considering the final preferred route, it was overlaid on the calving value layer, and the intersection of the final preferred route and the calving hexagons, those that had a value greater than zero, so those ones that are not shown up as white space here, was evaluated.

So if we look at the table at the top here, in The Bog range more than 70 percent of the evaluation range was identified as calving habitat. I'm not certain, but I believe that the evaluation range, that's including area that's occupied by water, and also this area that's unclassified in Saskatchewan. So the vast majority of The Bog range is acceptable calving habitat.

And if we move across we'll see that that out of almost 6,000 square kilometres in this evaluation range, more than 4,000 of it in Manitoba is considered to be acceptable or good quality calving habitat. And out of that, only 3 percent of the area is intersected by the final preferred route. So the vast majority of the area is good calving habitat, and 3 percent of it is intersected by the final preferred route.

Similarly in Wabowden, where the evaluation range is nearly 6,000 square kilometres, there is a lower proportion that came up as having value as calving habitat than in The Bog range. So we had just over 50 percent of the evaluation range was considered to be good calving habitat. And out of that which is considered to

be good calving habitat, 3.4 percent was intersected by the final preferred route.

Now, I know that there was a presentation on Monday on the revised Wabowden route. And so just for the purposes of this discussion, we also calculated the amount of the final preferred route that intersected calving habitat in the Wabowden range, and there was a decline from 3.4 percent intersected by the final preferred route to -- if the revised route goes ahead, that will decline to just over 3 percent.

All right. When I looked at the resource selection functions for winter, what we determined was that there was little or no habitat preferences in winter at all within the evaluation area in the Wabowden range. And I'm going to come back to that in a moment.

Within The Bog range there was a general tendency for animals to be closer to major roads and to select wetland habitat. The thing that I want to note here is that the much larger scale of ranges used in winter affects the ability of animals to show selective preference. We have -- our evaluation range is defined as the minimum convex polygon around all points for all

animals during the course of our studies. That evaluation range, in and of itself, is a very important behavioural decision. Those animals have chosen to be in that range from a much broader landscape, and so there is already a considerable amount of habitat selection that has gone on when that evaluation range, that population range has been selected by that group of animals. And because the amount of that, of an individual's home range that gets used in winter is quite considerable, what we can often find is that there may not appear to be a lot of selection that's occurring. And so consequently the assessment that we would come up with is that these animals are not being selective about how they use the evaluation range in winter, but that doesn't mean they are not exhibiting some selective preferences, it's just that they have already made a much larger scale.

MR. SCHINDLER: Okay. We take you back to the threat assessment that was conducted in conjunction with our experts. The issue of range fragmentation as a result of the effects of a linear development were assessed. It's interesting to note that we also took our experts

out on an actual field trip to the area and we inspected the Wuskwatim transmission line, looked at the area. The gut feeling was that, you know, it was intuitively low, the overall concern. However, there is this need to understand the effects of linear development in caribou range much better. So the telemetry, the objectives of the telemetry to do pre-construction monitoring also provided opportunities to look at the effects of various linear development on caribou movement patterns, whether there are obstacles or barriers to their movement across the range.

Prior to the actual commencement of the Bipole III project, there was some monitoring that was already being undertaken by Manitoba Conservation and Manitoba Hydro as part of the Wuskwatim monitoring project. So there was eight GPS collars that were placed on areas that were identified within the corridor prior to the actual construction and clearing of the Wuskwatim transmission line. It's a relatively low sample to the sample that we have now, but the one thing -- from the data we looked at pre-construction, this is before there's any right-of-way, and then post construction, in terms

of the locations of core wintering areas within -- this is summer, pre and post, pardon me. And you can see there's a lot less animals being collared, but we do see some hot spots along areas.

And just recognize that that line is not really there, but it does show the location of the route that will be cleared. So this was in about 2007. So we move forward in time and carried on with the monitoring that was conducted. Obviously, we've got a lot more information on calving sites and the location areas. But we do see that there is, in the same areas that they were before, we are actually seeing a lot of activities during the summer period concentrated along the Wuskwatim transmission line post construction.

Monitoring is continuing on this particular project, and we'll also show you the results of winter, because the density that we have here, of course, caribou congregate during the winter time. So the groups of caribou, if we've got one collared animal, it could be representative of a number of, it could be five, 10 to 30 within that particular group.

We can see Wuskwatim Lake on the

right, Wuskwatim Lake here, the pre-construction distribution of winter range, and compare that to post construction. We don't need to get hung up on the exact location of those dark green dots, but generally speaking, we are finding these locations to have not changed post construction in terms of the winter distribution.

We are also in the process of -- data is still being collected, but we did provide a linear features effect analysis in the supplemental report. We used point and path trajectory data from the GPS preliminary points connecting the dots. And we looked at both the Wuskwatim transmission line as a case study, and we also assessed various features.

Within the Bipole III project study area there are many, many different features in terms of linear development near boreal woodland caribou range. There are features like number 6 highway that have Bipoles I and II paralleling. There are other areas like the Wuskwatim transmission line that are essentially out in the -- in areas that are not fragmented or have no other linear development, and areas like The Bog where we have sections that are transmission

lines, as well as areas that transmission lines paralleled highways.

So we looked at assessing caribou movement patterns, looking at things like crossing speeds, are they moving much quicker and faster across these developments? We looked at the number of crossing events, and also looking at numbers of locational fixes within our buffers that we created, which I'll show you.

Now, here's an example of the type of analysis that was conducted using 500 metre buffers, which was based on some previous work that was conducted in Alberta, as well as some work that I had conducted in Eastern Manitoba looking at the effects of a major logging road on boreal woodland caribou range.

So the yellow line here represents the Wuskwatim transmission line, and all of these points represent the position data that we acquired through the GPS telemetry.

Now, for the purpose of illustration, we are showing -- this gray band through there shows the area with the highest degree of use and number of locational fixes within those boundaries.

Again, just going back to some of the -- looking at the number of animals per square kilometre within those buffers was one of our attributes we looked at, and the number of fixes. It's important to note that conducting this analysis, again, we did not have as good a sample before construction as after construction. But, again -- I'll kind of also just bring to your attention, there is a lot of differences within the habitat types found within each of these buffers.

And the one thing that we do have, as a characteristic of the populations that we studied in terms of linear effects analysis, is the fact that we don't have a nice polygon of a core wintering area with a linear feature going right down the middle. Most of the time these features are right on the edge of a core area, or they might just overlap slightly. So unlike areas in Alberta, where perhaps size of the lines are integrated over a very large land base where they have done similar types of analysis, we're finding that there's significant degrees of difference in habitat within each of these various buffers. And lots of times these features are built on

geographic features, you know, ridges, marines, eskers, or what have you, but you find that there is a significant difference in the patchiness of where the caribou are occurring on the landscape.

Here is an example of up in the Wabowden area, the number 6 highway, this is within the Wabowden range. And again you can see the purple colours and the different colour types or the different habitat types that exist on the land base. The purple areas, the lighter purple ones are more wetland, and these are more peatlands, the lighter, they are basically all peatlands, but they are much wetter, these areas, and darker green areas represent more mature coniferous habitat.

These are some examples of the areas that we looked at. We tried to select areas that were sort of representative of animals that were moving in and out of those areas, looking at crossings. And in this particular case we are looking at a crossing event where there is a highway and a transmission line, a double feature.

So you can see there is some difference in terms of some of the, you know, staging near areas, and you can see the crossing

events that are occurring between some of these core patches.

So essentially the results of the linear features effects, we were trying to support what information was in the literature, and there is some papers that suggest, you know, a 500 metre difference -- or response. And some of the work that I did looks at responses on logging roads up to one to two kilometres. So we found that we did notice response within that area, that there certainly is some level of effect, but there was a high degree of the variance of all our measured variables. Although animals are spending long amounts of time adjacent to features -- and just in your presentation I think that says "adjust," just so you know that. They do spend a lot of time adjacent to those features on one side or the other. But some of those results are very confounded by the difference in habitat types, because there is such significant gradient in the amount and type of vegetation on either side of the road plus within the buffers.

And I think another thing to consider as well is that looking at the resource selection function in terms of the availability of calving

habitat, the availability of winter range, these animals are typically not constrained by forage areas. And unlike say an elk or a deer that may have to go from a cover patch into a food patch, in many cases there is not -- if we examine foraging theory or how animals will expend energy to get to a food source, they have got food equally on both sides of the road. So a lot of times we are probably seeing some effect of animals not having a real desire to cross the road because they have plenty of resources on that side of the feature. It's somewhat confounding but, again, the results are confounded by a major difference in that habitat.

MR. RETTIE: Okay. The next threat that we are going to address is the threat of predation. Of all the threats to woodland caribou that our expert panel reviewed, they rated this one the greatest concern. It got a medium to high rating.

The effects of predation should initially be revealed through population decline. And so that's consequently why the recommendations were for telemetry studies looking at female mortality, looking at population dynamics. And

the threat of predation should also relate to habitat changes that alter the abundance and distribution of predators. And again, so that brings in the points on disturbance regime assessments, and to a lesser extent on wolf collaring. So if we have disturbance that's associated with increase in predator abundance and distribution, and if we have population decline, then predation becomes a concern.

So looking at the effects of human disturbance on caribou populations, how do we consider those effects to have occurred? Well, we began with a focus study on radio collared animals, including studies of recruitment and mortality, and we made a comparison amongst the evaluation ranges. This is an ongoing process. We are still in the pre-construction phase here, and we have -- we are in the process of getting the third solid year of data.

So we began with the evaluation ranges outlined earlier, so these are the same ones that showed up on a slide earlier as a consequence of these radio collaring studies. And to that we added a caribou population, and radio collars were deployed in an area in Eastern Manitoba that is

relatively unaffected by human development. And this shows up on the tables that I'm going to show you in a moment as the Charron Lake population. So we went outside the study area, looked at an area that we were hoping we could consider as a control population.

So the long-term objectives were to understand the effects of disturbance on populations. A sample of a minimum of 20 animals was radio collared in each of several evaluation ranges. Amongst other things, these animals were all used to determine adult survival rate.

We also determined recruitment rates, the second bullet point there, by flying aerial surveys and counting the number of calves and adult females. And that was done at two different points in the year. In the fall we looked at radio collar individuals and the calves that they had accompanying them. And then there were independent surveys conducted, not using radio telemetered animals, over those ranges in the winter, where all animals observed were classified by sex and by age. And from the survival and recruitment data, we determined population growth rates, lambda.

All right. So this is a complicated table, and I'm going to ask you to draw your attention for purposes of explanation to the row labelled The Bog.

What this table shows is annual adult survival. And so for the 2010 year, adult survival was 94 percent. Now, the numbers in brackets indicate the confidence interval around that, so that we have confidence that -- while the best estimate that we've got is 94 percent survival, our confidence interval spans values down to only 84 percent survival and up to 100 percent survival which, of course, is unrealistic. No population has 100 percent of its animals survive on an ongoing basis.

In 2011 for The Bog population, the assessment we have for adult survival is only 77 percent. Contrast that with 94 percent. So that looks like there's a much lower rate of survival. However, the confidence interval around this is actually somewhat wider, so we're less certain about that value.

We pooled together the numbers from each of those two years for this population, and over a two-year period we came up with an estimate

of 85 percent annual survival. So that's not surviving two years, that's an annual survival rate using two independent years worth of data.

And I am not going to suggest that you do this right now, but you can screen the variety of values that show up for the different years and the different evaluation ranges. But what I'd like to draw your attention to is the final column in the pooled values. We have a fairly narrow range of survival rates. We have survival rates as low as 85 percent and as high as 91 percent, most of them in the high 80s.

I mentioned to you when I introduced the radio collaring studies the fact that animals were collared for a three-year period. One of the things that's come to light recently, I think it was always suspected but there's been a recent publication that's demonstrated the effects of following the same animals for multiple years. And we can probably add one to two percent to these survival rates because these animals have been followed for multiple years, it's not the same as having a new set of animals to follow each year. So these are slight underestimates. So, again, we're in the high 80s, approaching

90 percent for survival for most of our evaluation ranges.

The Charron Lake population, which we added in Eastern Manitoba as a control, fits right into the middle of that grouping in terms of the annual adult survival rate.

For comparison, I have numbers down at the bottom of the slide here for a long-term study that was conducted in Alberta, where annual adult survival was 88 percent. That was an average across six different populations, and some of my own work conducted in Saskatchewan in the 1990s, where adult survival across six populations was only 84 percent. So the numbers here are reasonably high, and they are certainly as high as those seen elsewhere, and perhaps higher.

So here is annual recruitment. And again, I want you to focus on The Bog, just because it's simpler to deal with one example. There are two separate years, there's winter of 2010/2011, and the winter of 2011/2012, and there are two separate assessments for each of these. So in September of 2010, on The Bog population, on a survey to look at radio collared individuals, we found there were 13 calves for every hundred cows,

or a recruitment rate of .13. Later in the winter when an independent survey was undertaken, that number was .1. Now there's error associated with each one of these numbers, so they could actually be representing exactly the same value here, or it could be that there were some slight population decline through the winter. However, we do know that most calf mortality occurs during the summer. In 2011, again the numbers for The Bog, in September we were at six calves per 100 cows or 6 percent recruitment. And later in that winter, the number was slightly higher.

Now, these rates are very low. The thing to note, and this is one of the things that I showed in that first presentation I did comparing the reproductive abilities of moose and caribou, is the pregnancy rates in these animals are high. For the study animals that were captured and radio collared as part of this study, the overall pregnancy rate was 87 percent. So 87 percent of the animals, of the adult females in these populations gave birth in May. And yet by September, we are down to numbers, if you look across these ranges, we are down to numbers that are often in the single digits, and not more than

about 20 per 100 in the higher values.

So just by point of comparison, that 87 percent pregnancy rate, that's consistent with values obtained elsewhere. In BC published results shows pregnancy rates up to 92 percent. The Alberta study pregnancy that I mentioned earlier had pregnancy rates of 70 to 96 percent. In Saskatchewan, 94 percent. Another study in Alberta was at 86 percent. So pregnancy rates are universally high for caribou everywhere.

And when we look at these overall recruitment rates for either of these two years, we've got numbers that are incredibly small. By comparison, the Alberta study that I cited earlier across six ranges in multiple years had an overall recruitment rate of .17. My own work in Saskatchewan showed a recruitment rate of .28.

Interestingly, in a study just into Ontario, just sort of where the Manitoba/Ontario border takes that northeastern bend, the results for 2011 showed recruitment down at .05. So this seems to be something that's occurring broadly across range at this point in time.

So this is the annual rate of increase, and this is obtained by combining

information on adult survival and annual recruitment rates. So what these numbers show, again, let's go back to The Bog, is these are the lambda rates. So for every animal alive at the beginning of 2010 year, on average there was one animal alive a year later. So that's replacement. That population that year was sustaining itself.

The following year we show a lambda value of .79, and that's largely due to the difference in recruitment.

So these numbers essentially show whether or not these populations were increasing or decreasing in each of those years. Again, our confidence in those numbers is represented by the values in parentheses. You can see that most of them do have a possibility of being greater than one, but most of the initially calculated values are less than one, which suggests that these populations were in decline at this point for this study.

So, again, if we go back to studies conducted elsewhere, the study done in Alberta in the 1990s showed lambda values that were at or near one. My own work in Saskatchewan in the same period of time showed an overall lambda value of

.95. Again, none of these values have a correction added to them for what's recently become evident about the effect of having animals tracked for multiple years. So you can probably add about .2 to .3 to these values and bump them up.

Essentially, we had sustainable populations in Alberta and nearly sustainable ones in Saskatchewan, certainly within a margin of error those populations were sustaining themselves. That doesn't appear apparent presently for these populations, but that's largely due to the very low values for recruitment.

So the notes that I have to conclude this section are that adult survival is expected to be relatively high and stable across years and across populations. And that's exactly what was found, is that we have adult survival that's approaching 90 percent annually, and that seems to be consistent across the populations that we're looking at.

Recruitment is expected to be more variable year to year. And that's consistent for large herbivores, that's a known feature of large

herbivore dynamics, is that you can get years where recruitment is excellent, and you can get years where recruitment is close to zero.

And the national recovery strategy for boreal woodland caribou, and I would agree with its conclusion, is that there's a recommendation that population trends should be measured over a period of at least five years to confirm trend. All we need is a couple of years where you have recruitment rates of .3 or so, and that's going to pull those lambda values back up to a sustainable or an increasing population.

So, overall, the adult survival rates appear good, and additional study will determine what we can say about recruitment and whether or not those two years that we have data for presently are an aberration or whether or not they are part of a longer term trend.

So the final threat that I'm going to address --

THE CHAIRMAN: I think perhaps we might take a break at this point and come back in about 12 or 15 minutes. Thank you.

(Proceedings recessed at 10:34 a.m. and reconvened at 10:48 a.m.)

THE CHAIRMAN: It appears that Hydro counsel missed my admonition about showing up on time.

We do have -- Mr. Rettie, just a definition question one of the Commissioners has that might help us as you carry on. Pat.

MS. MacKAY: Yes. A question about the way you use the term evaluation range. I'm wondering why the term range needs to be qualified by that? What does evaluation mean in that context?

MR. SCHINDLER: Manitoba Conservation has ranges, and that's typically the term used within their conservation strategies and at the national strategy level defining a range. Our context of an evaluation range would be that we have basically readjusted it based on the new data to be more representative of the range, but we don't want to call it the official range. We're calling it the evaluation range for the purpose of evaluating the effects of Bipole III. So really the term evaluation is reference to, okay, this is the range we're using to evaluate the effects of Bipole III.

MS. MacKAY: Thank you.

THE CHAIRMAN: Thank you, and you may carry on with the presentation.

MR. RETTIE: Okay. Thank you. So the final threat that I'm going to address is the concern over pathogens: And specifically the parasite or the issue of concern is a parasite called a brainworm. And while we recognize that there is a potential for this to occur in woodland caribou and to have an effect on their populations, we did not feel it was a major concern. And the reason for that is that P tenuis, the brainworm, depends on a healthy white-tailed deer population to act as a host for the parasite. Its normal host is not woodland caribou because it's fatal to them, and it requires healthy white-tailed deer population in order for it to persist in the environment. And what we determined in our studies is that there were very few deer observed during aerial surveys or on trail cameras. So there were not a lot of observations of white-tailed deer made in the area.

Habitat appears limiting for deer north of Red Deer Lake. And perhaps, Doug, you can correct me if I'm wrong, but Red Deer Lake is

near the southern limit of the bog range.

MR. SCHINDLER: That is correct.

MR. RETTIE: Okay. The final preferred route parallels existing linear corridors and caribou range, so there's not an expectation that there's going to be newly disturbed habitat that's going to provide a corridor for deer to travel up into the caribou range. And there are no reports from Manitoba Conservation and Water Stewardship of brainworm in moose or caribou in western Manitoba. So we felt this was not an item of major concern for us.

MR. SCHINDLER: So just in summary before we get to the cumulative effects; the methods that we used, we used the development of RSF models to really fine tune our interpretation of the habitat availability relative to resource selection functions, habitat for calving and for winter. We looked at the analysis of effects of linear development on fragmentation. Do caribou cross the road? We determined, yes, they do cross the road. But there is some effect that likely requires a little bit more research in terms of the context of all of the different types of linear features within the Bipole III area.

We're also going to talk on the cumulative effects about the disturbance effects on population growth, which we'll be presenting, and predation as a result of linear development. There is the notion, and we'll probably hear from people today, that the amount of disturbance within a caribou range changes the dynamics of the predator and prey and wolf, you know, creating habitat for moose and deer and creating a dynamic that leads to increased predation and reduced lambda rates. So we are going to look at lambda rates relative to disturbance regimes of our populations.

Jim has discussed parasites that were included in our evaluation, and we're going to be discussing a little bit more on the Wabowden re-routing resulting in potentially significantly reduced impact on some of the aspects of the Wabowden caribou range.

So we're going to talk about cumulative effects. And if we move the things around here a little bit, I'll just rejig here.

Under the National Recovery Strategy for Boreal Woodland Caribou in Canada, they have established sort of a basis by which to define

sustainability of populations. They have identified a threshold of disturbance within the range. And it kind of goes back to your question about an evaluation range. And they define the range by the MCP or connecting the outer limits of all of the location data for those particular ranges that were assessed. They have evaluated all of the ranges across Canada, boreal woodland caribou, but they have established this threshold of disturbance, that if there's more than 35 percent disturbance both natural, which would include fire and other natural events like blow down or insect and disease, infestations that create damage to the trees or habitat, as well as anthropogenic, which would be all kinds of human development, forestry operations, linear development, flooding and those types of things.

So the reason I put those little question marks in terms of that 35 percent self-sustaining, 35 percent disturbance threshold, there are other factors that they have included in their national evaluation such as population size. So, populations that are larger have more resiliency to withstand the effects of disturbance. So I just put that in question. And

there's also a number of jurisdictions that have populations that are beyond that threshold that are self-sustaining, and it's quite complex as you go across the landscape.

And a lot depends on how you define, you know -- and actually I'll just bring this point up now, but in terms of Jim mentioned overlap of ranges, and we see a lot of that in Manitoba. And when you look across the country how different provinces have identified their ranges for evaluation, I think the simple way to put it is you have lumbers and splitters, and so that's kind of this whole issue of changing the range size, can it reflect in terms of the amount of disturbance that's calculated. So there is some discussion nationally and among agencies provincially, what does this 35 percent threshold mean. But having said that, we chose for the Bipole III project to assess cumulative effects on boreal woodland caribou using this principle of the threshold of disturbance. And not only looking at current but looking at future disturbance regimes that were assessed against this 65 percent threshold.

So within our evaluation ranges, we

looked at things like fire disturbance within the MCP's or within our evaluation ranges, and we looked at things like current and future forestry development. We obtained data from Tolko and the Province of Manitoba looking at long-term forestry plans within the areas of these caribou ranges to determine not only what the current effect is, but what is the potential.

We looked at mining development as well. And we not only took mining footprint, but there is a lot of drilling activity that occurs in some of these caribou ranges. There's areas where there is a lot of helicopter drill sites, a lot of exploration. And there was data available on all of that mining exploration activity that we utilized in our assessment as well.

We also included the current and future linear development, particularly we will touch a little bit on some of the cumulative effects later on regarding the areas up near Gillam in terms of those local residents. However, linear development includes roads, winter roads, trails and new transmission lines. So within these areas, there are -- it's pretty much current. We don't have a lot of information on

future roads being developed, but really the big ones would be the forestry development and some of the mining activity.

I must also indicate that the time frame that we looked was established with Manitoba Hydro in discussions with what we could project into the immediate future in terms of what the definition of cumulative effects was and how far you can go out. So we went out to a period of five years in terms of the time frame by which we assessed.

Now, I don't want you to get all hung up on all of this detail down here, but essentially that shows the MCP of the Wabowden range, and we've got all of the data analyzed for each of the ranges within the supplemental report. But you'll see that the red represents natural disturbance areas, fires and so on. And all of these other features include linear development, forestry, roads. There is some forestry patches in through this.

And one of the criteria that Environment Canada uses, they don't just use the footprint of the actual linear development or disturbance or mine site, they buffer it by 500

metres. Within their national standards they have kind of come up with the distance of effect of linear development or other anthropogenic disturbance is that you have a feature, you say 500 metres is contributory to your disturbance. So that is the threshold that Environment Canada uses, and that is the same criteria we used in terms of looking at the effects of disturbance within the range.

So, we use the current disturbance regime. And then we look at future disturbance. And again bringing in all of the -- you will notice things like these mine sites, we also buffer them. We use a 500 metre radius around those to account for disturbed areas that could potentially contribute to the disturbance regime within those ranges.

And again not to get hung up on these details. Again, we're looking at five years down the road.

We did not model -- we looked at fire history within some of these areas as well. And fire I can tell you has a dramatic effect on the amount of disturbance that can suddenly encompass a total range. And there are several examples.

All across boreal woodland caribou range where, you know, a forest fire has been a major factor in terms of changing the habitat within these caribou ranges.

So we look at current disturbance within the range, and we look at the -- we have included the Reed Lake range in terms -- and you can see here for the Reed Lake range, it has a very high percentage of disturbance. It's already past that threshold. A lot of this is to do with a major fire that occurred in the Neosap area that engulfed a major portion of the Reed Lake range. So, the majority of that is natural disturbance. 32 percent of that particular range is due to natural disturbance.

If we look at the Wabowden range, total linear features with no overlap. We're looking at about 6 percent. But this line here is what's very interesting, it is the net effect of the FPR on the disturbance regime within that range, the current disturbance. And the Wabowden range we are looking at 1.1 percent. .86 percent in the bog range, and .04 percent within the Reed Lake range, simply because the FPR skirts the eastern edge of that particular population.

We look at future disturbance in terms of all of the added activities that I have described and discussed, and we look at these percentages, and we look at the 42, and we can look at the 43 percent, so there's slight increases in the amount of expected disturbance on this range from all of those other activities as known to us as planned through forestry, mining, additional development, et cetera.

And then this is just a summary of those results. It's a little easier to read. Looking at the current disturbance levels within those evaluation ranges, the cumulative disturbance and the total increase. So you can see the total increase cumulatively within these ranges in absence of fire is quite minimal. And maintaining them within those thresholds, with the exception of the Reed Lake.

Now what is interesting here, and if we tie back to some of the premise about the level of disturbance as it relates to the introduction, and it relates to that threshold of 35 percent, that you create an environment of disturbance that you now are bringing in more moose, more deer, it's a disturbance level that will all of a sudden

have more wolves, and it starts to upset the predator/prey balance. That is one of the inherent assumptions of that particular threshold. More disturbance, more alternate prey, primary prey, more predation. But Jim explained very well the lambda rates that we have for these various ranges. And although there's some very good scientific evidence for the lambda rates relative to disturbance that Environment Canada has outlined, we are not seeing those same trends in Manitoba on these populations being studied.

MR. RETTIE: If I might add something, it is just to follow up on what I mentioned earlier, is that these lambda rates are almost exclusively low owing to very poor recruitment over a couple of years -- so that over a longer study we may actually see some differences in those values.

MR. SCHINDLER: And they are relatively within a similar value where there's not a great deal of variation, there's some variation, and there is really no correlation between the lambda rates and the total disturbance, recognizing that we are indicating that lambda should be evaluated over a longer

period of time. We're not seeing striking differences in lambda rates relative to the disturbance regime.

So if we look at, for example, 14 percent disturbance within the Bog area, that is relatively low lambda rates, whereas compared to Charron Lake, there is a higher level of disturbance, a lot of fire up in that area, higher rate. But we have looked at these data and can't come up with any real statistical correlation suggesting that lambda is related to disturbance at the levels we see here within the Bipole study area.

We talked a little bit about an interesting component of looking at the project relative to those caribou ranges. By paralleling existing features, we see that as a significant opportunity of something that the experts told us, that would assist in reducing the effects. We consider that 500 metre buffer along existing linear features as a disturbed area. By placing the Bipole III line within those disturbed areas, it's very beneficial from our perspective in terms of assessing the effects.

So the percentage of the FPR

paralleling existing linear features is quite high in all ranges. Within the bog, it's about 63 percent, and this is within that MCP area, that evaluation area. So it includes areas not only of intensive use, but areas of less use within the MCP. Within the Wabowden range, it was 41.63 percent. Within Reed Lake, it was 85.78 percent. This is a number I really like, within the Wabowden reroute area that we really, really decreased the amount of new right-of-way within that range, paralleling existing infrastructure.

So here is just a shot of the FPR, which was affectionately known as the fish hook by Manitoba Conservation, and you can probably see why. But given the constraints that we had with other uses in the area, it was originally routed to avoid the majority of those core, core areas. But nevertheless, there was still transecting through areas, and there was a fair degree of uncertainty in some regards to and dependence upon effectiveness of mitigation.

Now, if we look at the revised route that's parallelling existing features from the majority of the area, and I'll show you a bit of a

picture of this highway, 373. You can see in that section there, unfortunately it doesn't show up, but you can see, for example, in this particular area, before we get to number 6, that there is a fair bit of disturbance. There has been forestry operations. There is actually a buffer along the road, like a little buffer zone that was left from some of the forestry prescriptions. So this offers a tremendous opportunity to reduce the overall effects of Bipole within this particular area.

So, on the revised Wabowden route, the length of new linear disturbance created under the FPR, this is brand new right-of-way going through caribou habitat in and near the core use areas. So really we're talking the revised route does not require any new right-of-way. It's paralleling existing. The total length, and I believe this is information that Pat McGarry presented a couple of days ago, but the total length of the right-of-way has been reduced by 11 kilometres. And the real benefit from my perspective and my colleagues here is the fact that some of the mitigation that was initially described with the FPR being where it was included some access control, issues relative

to maintaining habitat underneath the transmission line, and some of the uncertainties regarding mitigation and requirements for monitoring and adaptive management. Well, the revised route really eliminates some of the need for much of that type of mitigation, and it reduces the uncertainty in terms of having to monitor and evaluate the effectiveness of mitigation of the original route compared to the revised route.

So I'm going to turn it over to Jim here.

MR. RETTIE: So in terms of conclusions for boreal woodland caribou: The pre-project monitoring assisted in route selection that enabled us to mitigate the majority of potential effects on regional boreal woodland caribou populations.

In so doing, the FPR avoided the majority of important unfragmented caribou range within the Bipole III study area. And as Doug has just discussed, the FPR maintains -- mainly parallels existing infrastructure. Consequently there is little calving habitat and core winter range disturbed. And with respect to the evaluation ranges, the final preferred route is on

the fringe of the Reed Lake and Wabowden ranges. It does go through the core of the Bog range.

So to go back to the table that we got from our expert group in our threat assessment workshop, initially the concern over forest loss and degradation was low, and our conclusions are that that's accurate. That the net effect, given a 500 metre buffer along the final preferred route in the Wabowden evaluation range, it affects 1.1 percent of the evaluation range. In Reed Lake, it's a fraction of 1 percent. And in the Bog it's also less than 1 percent.

In terms of range fragmentation, the feeling of our expert group was that the level of concern was intuitively low. And the results of the linear effects analysis illustrate that there's a high amount of variance, and that seems to be affected by the fact that there's differences in habitat on either side of the transmission line, on either side of the rights-of-way being examined. And in the end it would only be relevant in the Bog and Wabowden areas. And the routing for the final preferred route avoids the core areas and follows existing linear development in all three evaluation ranges

that are intersected by the final preferred route.

So the predation, we're looking at predation as a threat, and the overall level of concern given by our expert group was medium to the high. We found that mortality rates of adult females are consistent with stable populations. So, the adult female survival seems to be adequate. Presently, however, there is high calf mortality and consequently there are low population growth rates. In fact, we're showing population decline in most of the ranges.

The other link with predation is that the expert group indicated that predation should be expected to increase when there are disturbances to habitat that allow for a change in the distribution and abundance of predators. And we have shown through the assessment of habitat that that's not expected to occur here. So there will be continued observation on recruitment and adult mortality, but given the absence of effects on habitat, we don't expect there to be a population decline as a consequence of increased predation that is related to the Bipole III transmission line.

Pathogens, specifically the brainworm,

P Tenius, we don't feel is a concern due to the absence of white-tailed deer and an expectation there won't be an increase in white-tailed deer on the new transmission line right-of-way. And direct mortality from humans should not be a factor. I believe hunting is restricted for all people. Is that not correct, Doug?

MR. SCHINDLER: Yeah. The boreal woodland caribou are protected under the Manitoba Endangered Species Act.

And just concluding on the barren ground and coastal caribou populations, just for flow, a similar range assessment was done within the summer range of those coastal animals. And the disturbance within those areas as a result of all of the infrastructure that is proposed up in those areas was very low. And without going through all of the detail, I just wanted to illustrate to you that we also conducted that cumulative effects analysis for the coastal population, Pen Islands population in the north.

THE CHAIRMAN: At this time we'll move to the moose presentation. We'll turn to questions after lunch.

MR. SCHINDLER: Okay. Moose. Jim had

provided you with a very good description between caribou and moose. I'm going to delve into the world of moose and how it relates to Bipole III.

The outline, we're going to discuss moose as a VEC, the importance of moose obviously to society and a number of matters. I'm going to discuss a little bit about the life history of moose just to kind of go through to get a good understanding of the life requisites of moose and how they utilize their habitat. And I believe it's important for you to understand what our knowledge was of the moose regime within the Bipole III project study area, our knowledge of management, our knowledge of population dynamics, and the resiliency of moose within Manitoba. We're going to look at the alternate route evaluation relative to moose. We'll talk about the evaluation of the FPR and our conclusions.

So moose as a VEC are obviously very important for rights-based hunting and recreational hunting. Moose are really important to First Nations and Metis communities and people for personal community sustenance and cultural enhancement. We recognize the importance of moose to those people.

Moose also play an ecological role. Moose habitat, as we talked about yesterday, reflects the habitat needs for, you know, and it varies throughout the literature, but a very high percentage of the boreal forest species that lives. So if you've got good moose habitat, you're covering off a lot of habitat for other species.

So Jim showed you this moose range in Manitoba. They have habitat that extends from the southeastern corner right to the northern fringe of the province.

Moose have a variety of habitat requirements over their home range. And again, variable information in the literature, but typically 10 to 40 kilometres squared would be -- and home ranges could exceed that. Within their home range, they require a diverse number of habitat components to complete their life cycle. They need good winter and summer cover. And they also need good food during winter and summer. And habitats often don't contain all of that in one particular place or one particular forest stand. They require habitat for reproduction, for calving, and there's also other important sites

such as mineral licks that provide opportunities for them to replenish their mineral requirements after long periods of winter.

So just going through their winter and summer food; moose as far as cover goes, they prefer dense coniferous and deciduous forest as a cover component providing protection from elements and predators, for escape cover. Late winter cover is often important as well. During late winters, moose have a thermal regulation system that, you know, when it gets springy out and we're starting to enjoy the weather, in March when things are starting to warm up, actually moose don't like that that much. They start to get overheated and they seek cover during that period of time. And during summer, lowland, wetland, peatland areas are very important during summer for cooling and keeping them away from the summer heat.

So, we'll talk about food. In the summer aquatics are very important. But throughout the year, young deciduous and mixed wood forest provides high quality and abundant browse, things like Aspen, willow, hazel, dogwood, maple, et cetera, those nutritious succulent

growth from young vegetation such as that is very good nutritional value to the moose. Some people call redwood or dogwood as moose ice cream, and they really seek out that and they really prefer those types of habitats for feeding.

Aquatic feeding sites are very important. They feed on emergent aquatic vegetation. They get a lot of minerals that helps them in lactating females, as well as helping male moose produce antlers which require a lot of mineral source, and helping them build reserves for winter. And, of course, aquatic feeding areas provide cooling and relief from insects.

Reproductive habitat would be dense habitat with escape routes, when they have their little calves, whether it is one or two calves, often islands and peninsulas offer good refugia for calving females in order to protect their young and to escape predators. And mineral licks, where found, they are not common, but they are out there, depending on the terrain and the types of soils. When mineral licks are found, they are often used very extensively to supplement the mineral needs, as I have described.

So what factors affect moose

populations? There's habitat, the location, and distribution of these habitat types that I have described across the landscape, how are young forests in relation to aquatic feeding areas, it's all of these things that make moose habitat over a landscape. It is not a particular piece, but they are habitat generalists that make use of large areas and bits and pieces of that home range that has the habitat requirements that they need to fulfill their annual cycle.

Hunting, of course, we'll discuss hunting, predation. As we talked about caribou predation is also a factor in the maintenance of populations. It can be a controlling -- it can be a limiting factor, or it can be also maybe a controlling factor on occasion.

I'm going to go through all of these. Habitat, again, I talked about interspersion, quality and abundance of browse is very important. Moose prefer disturbed habitats, and they do very well in areas that have been burnt as a result of forest fire. They have also been known to respond well in areas of forest harvest and disturbance and blow down, because you get that succulent growth of new material.

Response from fire, you know, based on information and literature, often you'll see a positive response for a period of 20 or plus years, because as the forest burns, you've got all of that lush growth, succulents that flush. And as succession progresses, trees get older and the amount of browse becomes less and less through time. So disturbance relative to moose, fires, you see that positive response in the early years after the disturbance.

Typically mature forests, if they are straight conifer type forests over large areas, will not provide adequate forage for moose because of the shade. If you have ever walked through a pine stand, and it's kind of park-like and there is not a lot of browse under there, what you do find in some areas like in the Duck Mountains and other areas where there are mature white spruce, which kind of tend to grow in mixed wood stands, and interspersed with riparian areas, you can often get a very nice mosaic of food in proximity to cover, and all of those life requisites can be very proximal to each other, creating sort of a mature climax phased forest that is actually really, really good for moose. I've seen these

types of forests on the east side of Lake Winnipeg as well where they provide very good year round habitat in those types of areas.

Hunting moose population to harvest strategies can be both positive and negative in terms of a population response to a particular hunting regime. For example, if we look at areas like Ontario and even in Manitoba where Manitoba Conservation has bull only seasons, which is only to protect the female cohort of the population. Unfortunately in the wildlife world the male kind of gets the bad end of the stick. But bulls only protects the cows, which everybody agrees you have to protect that breeding population. Similarly with bull calf type seasons, they have used those in Ontario to increase populations. Any moose seasons, as far as licence seasons, I don't believe there's any moose seasons left in Manitoba because of the need to protect the cohort of the population.

Historically, there's been from a regulatory perspective, from Manitoba's perspective, Conservation has regulated licensed harvesting through licensing and seasons and regulating the number of licences and tags that

can be taken in any particular area, or regulating through the length of season or by bull only or the such. Rights based hunting is not regulated by the Province of Manitoba. However, there are many, many examples of situations where I know that closures have been undertaken as part of a collective committee, a concern for the resource, which has happened in the west side of the province in the Bipole III study area. And these closures are endorsed by First Nations and Metis communities and they are working together. Manitoba Hydro is not part of that, but we expect that those closures are being conducted jointly by those groups.

Access density is a concern linked to moose decline. And it's been particularly noted that access density, particularly in the areas where intensive forest harvesting has occurred, where you've got a lot of access associated with core moose areas, people having access to roads, and it is very difficult for Conservation to close roads, and I know there's a lot of that activity that is going on in terms of regulating access, retiring roads, those types of things.

I have had a lot of experience as a

wildlife manager working with forest industry, and as a wildlife manager looking at the effects of access and managing roads and working with First Nations people. So roads and access certainly is an issue, and we realize that in terms of our assessment of Bipole.

Predation can affect adult calf survival in combination with high hunting pressure can further impact populations. We know that habitat fragmentation can increase predation. But there's a lot of factors in terms of the landscape effect of fragmentation, you know, over that large moose habitat area that I described, how many roads, how many trails, how many linear developments, patches are occurring within there that allows perhaps the predation to have some type of an effect.

Predation by wolves and bears can also result in low calf recruitment. So by looking at the calf survival during winter surveys, you can get a bit of an indication in terms of what the predation effects are in a particular population.

In terms of weather in Manitoba, unlike areas in the mountains and I believe in areas in southern Ontario and Quebec where they

have very, very high snow accumulations, we don't see that as much in Manitoba. But in areas such as the Duck and Porcupine mountains, certainly snow accumulations have some effects on the distribution of moose within those areas.

I think Jim kind of covered off the disease and parasites component. And it's a similar conclusion relative to the moose in the western part of the province. Manitoba conservation is pretty within -- there is no reports of chronic wasting disease in Manitoba and there has been no reports of brainworm in moose that have been reported to us or Conservation in that western part of the province. It does not seem to be an issue with the white-tailed deer and the moose. I will tell you that there's a lot of overlap between the white-tailed deer and moose range in these areas as well. So if it was going to show up, it would definitely show up in these areas because of the linkage with brainworm and moose, and there is definitely overlap between these species within these areas.

Other things that, things like giant liver fluke, which is a parasite that is fatal to moose, is of concern. That could be another

source of mortality.

There has been years where winter ticks, unlike the wood tick that you find on your dog, these are ticks that attach in the fall, and the numbers of ticks that can be attached is in the hundreds and hundreds or maybe millions of ticks on moose that can actually make that moose succumb to the fact that it's got these winter ticks. And it really depends on -- winter tick infestations are typically associated with late falls with no snow, because within the adult ticks fall -- or pardon me, I stand corrected, it's when there is early melt and the ticks, engorged ticks, fall off into the -- if they fall on the snow there's less survival of ticks, but if you've got an early spring, those ticks will hatch and emerge and you can create a significant tick infestation from year to year with early springs.

So Manitoba Conservation moose management, they are the responsible authority for managing moose on the landscape. And through the various hunting seasons and closures, they are the responsible authority.

Manitoba has an allocation policy, I'm sure you are familiar with it. The conservation

of moose is the number one priority for Manitoba. Rights based hunting is the top allocation in terms of the allocation of the resource beyond conservation concerns.

And the next one down the list would be resident hunters if there is surplus resource and residents of Manitoba. And then we should also say that in the northern portions of the project area where moose are quite plentiful there is opportunities for outfitting, where non-residents of Canada are allowed to hunt through a licensed outfitter.

And I think the other major aspect of moose management would probably fall under forest management guidelines that the province uses for the protection and management of moose habitat for logging areas. And some of the guidelines would be -- a good example would be distance to cover. Cutovers should not exceed 200 metres from cover. So, that's sort of a standard distance that is being used in terms of -- that's partially based on some more research that was done in Ontario relative to how far moose will extend into cutovers to use them as a food source. So that 200 metres to cover is an example.

And another one would be line of sight protection at 400 metres to provide some level of safety for animals from being harvested out in open areas. So that's an example of the type of things in terms of moose management that is being conducted.

Here is the map of Manitoba relative to the Bipole III transmission line. And you can see the project study area, and within the red zones, these are all game hunting areas. And these are all -- in each game hunting area there would be a particular season that would be identified for moose. Each game hunting area has a set of regulations for all different species that are hunted, including game birds, and deer, elk and moose.

So you can see the red areas here now are currently closed. They have conservation closures that exist because there is concern by Conservation, First Nations, Metis, as well as other stakeholders regarding the status of these populations. There are some partial closures up in The Pas area, in and around some forestry areas, and on the east side of Lake Winnipeg, there are some additional areas that are closed --

currently closed to all hunting.

So we know, as conducting our assessment of the area, we know that Manitoba Conservation conducts moose surveys periodically. There's consultation ongoing with rights based communities with moose hunting closures, we are aware of that. And there is a listing of the areas within the western part of the province within the Bipole study area, they have been temporarily closed to all hunting, including rights based hunting. We know that the province has increased enforcement efforts in these areas. The information provided in their brochure indicates that they have hired some natural resource officers. There is some increased signage indicating the hunting closures are in existence.

And they are embarking upon some predator management programs within these areas of concern, extending wolf seasons province-wide, and increasing bag limits on wolves in some of those game hunting areas where moose are concerned. And there has also been some trapper incentives for trappers to go out and actually harvest wolves.

There's been a fair bit of work done

as well by Conservation in restricting access and retiring roads, trying to limit the amount of fragmentation and access within some of these game hunting areas.

And again, they are working with the committees, and Manitoba Hydro is aware of these committees and the issues that surround moose management. And these committees are involved in long term moose recovery strategies with rights based hunters and stakeholders, so we know that that is ongoing.

We just want to draw your attention to about -- in context of understanding what's going on with moose, we know that this is the Duck mountain area, for example. In 1961 there was a fairly large fire right in the heart of the Duck Mountain. And on the left, and I apologize for the different shadings, but you can see sort of a mottled pattern in through here, where it shows some of the harvesting areas that occurred through time, through the '90s and into the 2000s. So there's a fair bit of a, kind of a patchwork of disturbance that has occurred within those areas.

In assessing moose populations, we just draw your attention to the data that we were

able to acquire looking at the long-term trends of moose within the Duck Mountain Provincial Park, which is very close to the FPR. You can see that in 1993, there was an estimated population in and around 3,000. Interestingly enough, that's about 30 years after that major fire. We can see that from about the late 90's onward, you know, there was a lot of forestry activity, a lot of things that were happening on the landscape that we got this apparent decline in population. I am not sure there is a direct cause or effect. We do not have data to suggest that, but I would indicate that is the fact of the disturbance regime that occurred within those areas.

In 2007 we had a population of about 2,000. Surveys conducted in '10 and '12, you can see that these populations have actually bounced up a little bit since the previous survey.

Looking at the calves per 100 cows in the province, or pardon me, in the Duck Mountains, we plotted the cow/calf ratios, and Jim talked about the cow production rates and the averages. These are actual numbers from Provincial surveys showing the cow/calf ratios through time. And I plotted the average of 38 calves, and based on the

2012 survey, we're a little bit above that average. And this might indicate some indication of the amount of predation. These are very good calf numbers, correct, Jim, in terms of calf production?

MR. RETTIE: Yes, they are. I would think anything over about 25 per 100 should account for natural mortality.

MR. SCHINDLER: Let's look at the Porcupine Mountains. Here we can see that -- we've got a major fire in the '80s. And you can see that it impacted a fairly large component of the Porcupine hills. So in terms of the forest development, you can see the metric or the patchwork of disturbance.

Now again here, we looked at the information that was available to us, and looking at the Porcupine hills, you can see just looking at the trends of population. Jim, I don't know if you'd like to provide some comments on this estimate and what this really means in terms of -- from 1997 to today in terms of trend and these confidence intervals?

MR. RETTIE: Without having done a formal assessment of it, I would suggest that the

confidence intervals that we're seeing on the left, and the one that we are seeing in the middle, these are -- if we allow for the fact that we may have a higher assessment of the population here and a lower one here, our trend here may be a slight decline, but it seems to be reasonably stable. And this survey here is pulling this line back up again, but it has a very wide margin of error. So I would say it appears to me, just at a glance, that over the last decade or so the population numbers are reasonably stable in the 800 to 1000 range.

MR. SCHINDLER: Thank you. Again, you are looking at the historical calves per 100 cows. We seem to be maintaining some level of average relative to the calves per 100 cows within the Porcupine forest.

Let's move onto an area of concern. Here we have game hunting area 14 and 14 A, and we show the preferred route and the route changes up in the Moose Meadows -- just trying to put things into perspective here to some degree. Here is the Moose Meadows that we'll discuss in a little bit. And that reroute, that is avoiding Moose Meadows. But you can see some of the fire history that has

occurred within the game hunting area 14 and 14 A area.

And looking at the historical data for game hunting area 14, we can see that there certainly has been, in 1992, a population high of 2450 animals, that had increased, which in some ways corresponds with the fire history of the area. Then we see this decline and there was not a survey done until 2002. And between 2002 and 2011, which indicates pretty much a steady decline from 1992.

Here's the calves per 100 cows. The calves per 100 cows in area 14 is up there in that 50 plus category.

So I think just to illustrate the resilience of moose to management regimes, we got this information from Kent Whaley from Conservation looking at populations in game hunting area 8 relative to moose closures. And you can see in '75 that the population was at 642, and there was some concern raised by First Nations and Conservation and resource users and Aboriginal peoples, and they instituted a full closure. This interestingly enough was a voluntary closure, a self-regulating closure. And you can see that the

population responded quite quickly and it rebounded in a relatively short period of time. And then after the closure was open, there was continued decline again, sort of like a pulse hunting type situation, that there was a partial closure, and then it bottomed out at 466, and then there was another full closure that was instituted and it bounced up again. So this demonstrates the effectiveness of managing moose populations through the hunting regimes that are prescribed.

I threw this one in. This comes out of a paper that Dr. Creigton, and I was a co-author on, in terms of looking at the effects of access closures and hunting closures in a suppressed population in eastern Manitoba. This area was an extremely disturbed area with a high amount of fragmentation, and at the onset of the controlled population of 37 moose, and after five years through access prescriptions and no hunting, that bounced back quite well. And that coincides with what Jim was talking about in terms of this productivity rates relative to moose populations.

And again, with increased survivorship and high rates of lambda, you can expect moose populations to increase and rebound. They are

very resilient. That is the point we wanted to make, the resiliency of moose populations.

This is a chart that I threw in just for general information. This is used in Ontario in their moose information book. It just sort of demonstrates the effectiveness of hunting prescriptions in terms of managing moose populations.

So in summary, moose have large home ranges compared to the area that is affected by Bipole III in terms of the right-of-way. They have many habitat components that exist. They fall well outside the area of the right-of-way. So you need the large areas of expansive habitat that have all of those many components; summer foods, summer cover, winter food, winter cover, aquatic areas. Those are all very important components to moose habitat. And moose do respond to disturbance. This has been reflected, and it's well known in the literature that disturbed habitats in absence of hunting and mortality from predators, they will respond very positively.

So just quickly in terms of our knowledge, there is a five year increase in the moose population in the Duck Mountain area. We

saw a slight increase, and Jim indicated that it's pretty much a minor decline, but when you average it out, it's pretty much somewhat stable -- or pardon me, that's for the Porcupine. In the Duck Mountain, we do see a decline from 20 years. We've got a slight decrease in the Porcupine moose population, with a slightly lower stable population in recent years. Cow/calf ratios are within historic averages, which would suggest to us that females are in good condition and there is adequate numbers of bulls that are breeding the females. So it demonstrates potential for quick population response if hunting closures are successful. Game hunting area 14-14A, we certainly recognize that there's significant decline in that particular area, and the concern, the recent concern that was expressed to us and, I think Pat McGarry described that adequately in terms of the identification of the critical nature within the Moose Meadows area. And subsequently there is a major portion of the remnant population of area 14 appears to be in that Moose Meadows area. So the re-routing of the line has been discussed, and we will look at that in some detail.

So in terms of the potential effects used in the evaluation of alternative routes, we looked at habitat loss, and hunting was one of the things we looked at, that's why we spent some time looking at the hunting aspects, and the effects of access as a result of Bipole III in terms of over-harvest of populations. We also assessed predation and, as discussed, the increase in parasites and disease.

So in terms of our evaluation of alternative routes, we used field data, desktop studies that included, you know, looking at the literature, looking at the historical records that I just showed you in terms of the surveys, habitat model that was developed for the project, as well as some specific aerial surveys.

So evaluation of habitat loss was looked at through habitat modelling. And we developed a model that looked at habitat for moose at a level that would predict high quality habitat using shrub lands and stands of early succession up to about 60 years of age. So not looking at all of the life requisites of moose, but kind of looking at the primary areas where you might find moose during the winter time to identify high

quality habitat.

We assessed that on an eco district basis, but also on a segment basis. Winter was the most critical period of time due to that access and hunting concerns. We did not want to run Bipole III through areas that were known to have high concentrations of moose. So we modelled habitat within the three mile local study area, and it assisted us in determining the environmental effects and focusing mitigation efforts as well.

So here is an example, just at the high level, looking at the model habitat, and you can see through the north the fire history really dictates some of the high quality habitat that exists, where we might find wintering areas that might have high moose densities. We can see the various routes, the alternative routes on the map.

We also conducted aerial surveys to identify routes of concern. The northern project of the study area, we had much less detailed information from Manitoba Conservation. We knew that the Duck and the Porcupine mountains in particular were of high value to moose and that there was some survey data available for those

areas.

So south of Red Deer Lake, in the known information the surveys focused on the north areas. I also mention too that at the onset in the early parts of the research that we had had some concerns expressed by Manitoba Conservation relative to woodland caribou, a remnant population in the Swan-Pelican Lake areas within game hunting area 14. So we did fly intensive surveys within some of those areas looking for caribou, which we never ever found any.

Here is just an example of some of the surveys relative to alternate routes, using track and actual total counts that we did conduct an aerial to create little density kernels looking at route segments within areas of high quality habitat to determine whether or not those areas would be of concern. So you can see within some of these areas the conglomeration of routes within certain areas would have ranked obviously a higher concern based on the results of those surveys.

So routing considerations, we wanted to minimize the effect as much as possible through avoidance, the avoidance of known moose concentration areas, parallel existing features

where possible, avoid core habitat, high quality habitat areas that I have outlined, avoid known wintering areas.

And the ranking of the sections, you have seen this slide several times now in terms of the various components that were put into the matrix. And moose were considered as part of the overall mammals ranking. So we talked yesterday about the mammals. Moose was a component of the mammals ranking. So evaluating the FPR, we know that the amount of habitat alteration is small in comparison to the overall range or availability of habitat that's available to moose.

We used the moose model to assess the amount of high quality habitat within the FPR. And the study area contains, according to our model that looks at that component of habitat, less than 2 percent of the total habitat within the project study area would be affected by the Bipole III project.

Now Moose Meadows, game hunting area 14, section 7. This route was originally intended to avoid the high moose populations within the Porcupine Provincial Forest, and the Duck Mountain Forest. And as a result of the August 31, 2002,

changes have been suggested by EAB for sections within the Moose Meadows area. And again I believe Pat McGarry has given you the details on that particular reroute.

So the new route was developed in cooperation with Manitoba Conservation in these areas, and from what I'm hearing it's being reviewed by the TAC and we are awaiting some decision.

So again here just to show you the presence of the Moose Meadows in relation to the game hunting area, it's a unique yet small portion of the area.

One of the questions that has come up is why did this area not come up as high quality moose habitat? We looked at the forest resource inventory, we looked at the land cover developed for land cover classification maps developed for Bipole III, and essentially it's showing this area as a major wetland bog area which would not necessarily -- did not necessarily fit the criteria of our classification of high quality winter type foraging habitat where you'd expect a lot of browse. There's obviously something quite different about this area, very different and

unique which we have since learned since the Manitoba Conservation has provided us with that information.

Essentially there's some confirmation there is some unique aspect to this area. There's discussion whether some of these animals, with the Conservation staff, that these areas could possibly be -- during years of deep snow, that moose could come off the Porcupine hills and migrate into these areas. I must say that we did do surveys within this area in the FPR, and did not see the concentrations of moose that were observed during Conservation survey of the area.

So here's the reroutes as we know them. And we are looking at and perhaps Pat McGarry talked about this, but this is the effect of the Moose Meadows relative to the final preferred route and the proposed reroute. And we are in the process of assessing that.

There is the 14-A and 19 route as well which were concerns, and I will again reiterate what Pat McGarry was talking about, and John Dyck, in relation to some concerns about fragmentation within this particular complex. And the reroute follows some existing agricultural areas along a

road allowance, and there's actually a road under there that does not show up on this map.

So overall, the routing provided the majority of -- if we look at the Bipole III line from north to south, the routing following existing linear features, avoiding some of those areas as much as possible in The Pas, Snow Lake and some areas up near Gillam, near Limestone Lake, provided good mitigation, avoiding known areas of concentration. And also I should suggest that avoiding routing through the Duck Mountains and Porcupine Mountains was also a significant avoidance factor.

For the most part it parallels existing linear features across the extent of the project area. And then it minimized, again on a broader scale across the project study area, it minimized the amount of unfragmented habitat. That was one of our criteria, was not to -- in the criteria for ranking, to minimize the amount of these contiguous blocks in areas -- and you really see that in the northern portions of the project study area where we -- those areas would have ranked high if they were going through new areas that were kind of out in the more remote. So you

get a better ranking if you are following existing linear development, because that disturbance is already being experienced along the existing linear feature. So by paralleling those, you really minimize that amount of unfragmented habitat.

So habitat loss, based again on the total life requirement, an area for moose, the FPR represents a very small proportion of the annual requirements that it -- on its annual home range. So, it's a very small proportion of its habitat.

And in some ways, depending on the location or the type of environment, we talked yesterday about how some of the habitat regenerates under transmission lines. And habitat under a transmission line is not lost, it's not destroyed, it's altered. The one thing about transmission lines, it keeps the vegetation in an altered state, at perhaps a younger stage of regeneration. And if the area is -- if access is -- particularly in the summer time when these areas are going through boggy areas and access is somewhat limited to those areas, it will get used quite heavily by moose. But it's a very site specific situation. But definitely habitat is not

lost, and in some ways it's converted from cover to food, depending on the location of the line.

And the other thing, like the forest management guidelines for wildlife also suggests minimum distance to cover of 200 metres, well, with a 60 metre right-of-way you've got food adjacent to cover, so in some cases it can be a bit of a benefit.

Protection of riparian areas as part of the environmental protection plan, we'll also protect riparian habitats. These areas are used for cooling and aquatic feeding, that may occur along the transmission line, and we would expect that the riparian area prescriptions that Manitoba Hydro comes up with will provide some protection and provide some opportunity for these areas to be used by moose.

So again, just in terms of the project study area, two percent of the FPR is within the high quality habitat as defined by our model.

In terms of sensory disturbance during construction, during winter we would expect that moose would be displaced by the activity, by the clearing and construction and disturbance that is associated with construction. We would expect

that this would be a temporary displacement. Things that could occur if, you know, there is higher energy demands by moose as a result of having to move away from an area would be quite minor because of the availability of habitat within the area.

Displacement of moose into poorer habitats would not be expected, again because habitat is not typically limiting along the area, that displacement of moose permanently to other habitats would not likely occur.

Now if we look at increased harvest of moose outside of closed areas as a result of hunting closure, i.e. the notion of, okay, areas are closed or even in areas where there's new access being developed, concern was expressed regarding the Red Deer Lake to The Pas, FPR. In this particular area from Red Deer Lake to The Pas it parallels existing linear development. In fact, there's a major section of the line south of The Pas of the Bipole III route that parallels an existing transmission line that has a groomed snowmobile trail on it. So people have a lot of access to that area currently. And north of The Pas, we're paralleling the Wuskwatim transmission

line and the rail line all the way up through the Wabowden range. So the paralleling of the existing features where people already have access to has been considered.

So, increased pressure on moose in adjacent areas due to hunt closures we feel will have little effect, as areas are currently accessible.

So effects of increased predation as a result of linear effects: As we discussed yesterday, there is limited evidence in the literature of increased predator effects as a result of transmission line right-of-ways. There is various literature relating to boreal caribou in industrial environments in Alberta. And however we recognize that this is a potential effect, but there is limited evidence of that.

Wolf use of linear corridors. From some of the preliminary information that we're getting off wolf collaring in the north, indicates that wolves are kind of associated with young forest which are associated with moose. A lot of use of frozen lakes and rivers as some of the preliminary evidence. And monitoring of wolves is continuing by Manitoba Hydro to assess this

effect.

So parasites and disease; I think we have said it a number of times. Jim has indicated that the abundance of white-tailed deer are south of Red Deer Lake, so the occurrence of brainworm into moose populations north of that area would be under a similar description to what Jim said about the amount of deer north of Red Deer Lake and the poor habitat condition. So introducing brainworm into moose populations further north would not be expected.

And again the effect of disturbance on those corridors north of Red Deer Lake where perhaps white-tailed deer could follow those corridors, those corridors already exist. So, if white-tailed deer were going to use those corridors, they would have already done so. And they may have done so, but as Jim indicated you need high concentrations or high densities of white-tailed deer within moose range to create the opportunity for brainworm to be transmitted. We already have that south in the Duck Mountain, Porcupine areas, and the occurrence of brainworm is not expected.

We did find in reviewing of the ATK

information that there was a lot of overlap of the traditional areas that were being hunted and broad delineations of moose hunting areas, gathering areas, areas of concern really coincided with what we saw in our models. And so in some ways, although it was very broad, within these areas that are delineated there would be a number of all types of habitat. If you can imagine a map that has got all of these small polygons of habitat, by drawing a large boundary over it, it's basically identifying all types of habitat. But it did correspond with things like the Duck Mountains, the Porcupine Mountains and game hunting area 14. So there is information there that certainly supported. And the importance of moose is obviously evident throughout the entire project area. It's a major, major species of concern and importance to society. The north populations are healthy, and the western populations are of concern.

Mitigation; again we feel that during the planning process for the majority of the areas, the negative effects on moose habitat and populations were mitigated in the planning and routing process.

Access management is going to be key. And Manitoba Hydro is in the process of developing access management plans. And in order to minimize the amount of access associated with the construction of the project, and things like retirement and decommissioning of access roads, so that is a process that we have indicated that has to be paid attention to.

The construction during winter for the most part will avoid the critical calving period. So when the cow moose are having their young, the disturbance will not be occurring during that time.

Riparian management; looking after these aquatic feeding areas, creeks and rivers is also going to be very important in terms of mitigating for moose. And if found, establish buffers around important sites such as mineral licks would be very appropriate.

And again, allowing natural regeneration. A lot of these sites, I think Manitoba Hydro has indicated that in these types of environments there is not a need for planting trees the way that the clearing is conducted, you will get this flush of growth. So the best thing

that you can do is sort of allow natural regeneration to take place as quickly as possible. And to provide, you know, forage in the right-of-way and opportunities for moose to utilize that habitat moving into the future.

So just quickly, we did fly surveys along the FPR, and we looked at densities of, for example, we flew two kilometres on each side of the FPR and down the middle, and we flew a pattern to try to determine areas that, identified areas of high concentrations of moose. This information is hopefully going to be used as part of the environmental protection planning to identify areas. My goodness, we have a really good moose area in here, let's look at the riparian habitat, how can we perhaps make sure that those mitigation measures get effectively put into place in those areas. So this type of information was done to identify potential sites for enhanced mitigation.

So looking at cumulative effects, and I think by looking at -- recognition of other projects now and into the future, there is forestry activities, not so much mining, but there's mining activities in the north, there's transmission generation, roads, all of those types

of things. We recognize that they add to the habitat matrix and the disturbance regime and access regime for moose.

So we know that there will be additional habitat alteration and minor loss in the long part. And access is a major component of moose management. And it seems that Manitoba Conservation, First Nations and the Metis Federation are really on the right track with their management of the resource in terms of the hunting closures. And obviously these things are going to require monitoring, and monitoring the effects part of the environmental protection plan which is being developed.

So revise the routes in the Wabowden 14 A; we have conducted a preliminary assessment of the revised route. We are in the process of doing some spatial analysis in terms of looking at the different habitats that are associated with these route revisions. At this point we feel that the conclusions have not changed. But as I said yesterday, this is tempered with the fact that this is a preliminary assessment, and more detailed examination will be occurring in the next few days.

So I would like to conclude that we want to understand that moose habitat requirements are diverse; winter, summer, food, cover, calving habitat, all over a large home range compared to the area that will be impacted by the FPR. We know that they like young forests, and to some extent disturbed and fragmented areas can be preferred, but the caveat on that would be the degree of access and obviously the amount of hunting that would occur in those areas.

The area of right-of-way is small, part of that annual life requirement. Moose will forage near the right-of-way, given the circumstances if undisturbed. Summer use would be of less concern due to the fact that a lot of the areas are inaccessible, swampy and it would be extremely difficult to traverse. And for the most part the FPR avoided known important wintering areas with the exception of that Moose Meadows area, which is being addressed.

Just to conclude that we suspect that the effects from the increased hunting to -- the effects from the increased hunting is not strictly due to the FPR paralleling. There is existing linear developments where access already exists.

The predicted residual effects of the EIS are based on the results of our studies, the mitigation that I have described, monitoring and to some degree adaptive management that may be required in terms of tying in the monitoring to mitigation techniques and to the future.

So the residual effects were considered not significant on a project-wide basis for Bipole III.

THE CHAIRMAN: Thank you, Mr. Schindler. We will break now for one hour. We'll come back at 1:15, and we will start with cross-examination immediately after lunch.

(Proceedings recessed at 12:15 p.m. and reconvened at 1:15)

THE CHAIRMAN: Okay. This afternoon, we're going to commence with cross-examination of Manitoba Hydro officials only on the caribou and moose reports that we heard this morning. We have an order of questioning. I'll repeat it for your information: Tataskweyak Cree Nation, Pine Creek First Nation, Manitoba Metis Federation, Bipole III Coalition, Consumers Association of Canada, Sapotaweyak Cree Nation, Peguis First Nation, Manitoba Wildlands, and Green Party of Manitoba.

Tataskweyak Cree Nation is the first up. I spoke with Mr. Keating a moment ago. He doesn't have any questions. Pine Creek First Nations, do you have any questions on caribou moose?

MR. STOCKWELL: John Stockwell representing Pine Creek First Nation. I have a few, I'll call them broad spectrum questions.

THE CHAIRMAN: Speak more closely into the mic, please.

MR. STOCKWELL: And afterwards I believe Chief Boucher has some questions as well.

THE CHAIRMAN: Okay. We're limiting to questions now, not statements.

MR. STOCKWELL: Pardon me?

THE CHAIRMAN: We're limiting to questions, not statements.

MR. STOCKWELL: Yes.

THE CHAIRMAN: You said broad matters.

MR. STOCKWELL: Broad spectrum, broad matters. The questions I have, have to do with the nature of the study, and actually the quality of the studies that go on with moose and caribou in Manitoba. And then following that, I have just short questions, but not too many.

And the main question that I wanted to ask was, how do you gather this information? Do you gather the information on your own studies, or do you rely on information that has already been gathered from say, Manitoba Conservation studies?

MR. SCHINDLER: Are you talking in regards to moose, caribou, or both generally?

MR. STOCKWELL: Both?

MR. SCHINDLER: When conducting environmental assessment work, we depend on existing literature. When we are looking at effects, we will often assess literature to determine what people have learned from other studies as part of effects. That's one component of conducting the environmental assessment and site selection. It is a component, but not the main component. For Bipole III, the caribou research and studies and monitoring were very, very extensive. We relied very heavily on field data and analysis of real data. And in relation to other types of research and studies that had been conducted to look at the effects that were predicted in the literature, the types of things that could affect caribou populations, a lot of that was based on a lot of surveys, the collaring,

a lot of the discussion about the looking at calf recruitment, adult female mortality, all real field data collection, real structured type field work studies that were conducted for caribou.

For moose similarly, there is obviously desk top studies that we rely upon looking at the effects from literature, as well as acquiring habitat data using data from various sources such as the land classification of Canada, forest resource inventory, digital sources of information, developing models that helped us do desk top exercises, assessing the various alternative routes. And there was other field work that was conducted on the actual final preferred route that included actual track surveys, trail camera surveys, aerial surveys of the final preferred route, actual field data, and field monitoring that was conducted.

MR. STOCKWELL: The data that was collected, was it collected by yourselves?

MR. SCHINDLER: Yes. And I should mention some of the data for moose and caribou, obviously, some of that data did come from government sources, but we also collected and conducted aerial surveys and data on our own as

the consulting team. So the data was a mix of, in some cases for caribou it was historical data, historical information from records from other studies that had been conducted on caribou. And we did have access to the Provincial Government surveys that are readily available in the Province of Manitoba library, as well as survey data that was provided to us from the various regions that we were dealing with throughout the project area, which would have included the northeast region out of Thompson and the northwest region out of The Pas, and the western region out of Dauphin and Swan River.

MR. STOCKWELL: I see. I guess what I'm getting at is, you gentlemen seem to have done a good, a very good job as far as collecting data and doing the study and planning the study and whatnot. But what I'm concerned about is, have you been contracted, or is there a plan in place to continue the study once Bipole is completed if Bipole has the licence?

MR. SCHINDLER: Well, I'm probably not the person to ask that question. I know there's a limited time frame on the work that we are conducting for Bipole, as our company. And I

assume that they are monitoring plans that are in place, and it would probably be someone like Pat McGarry or --

MS. MAYOR: Mr. Sargeant, there is a presentation next week that will be coming on environmental monitoring, the protection plans, all of those issues. So perhaps that's a better time to be asking that particular question in terms of future monitoring.

THE CHAIRMAN: Thank you.

MR. STOCKWELL: Okay. In your estimation, do we in Manitoba, say apart from your company, do we possess the necessary expertise in order to complete these studies, in order to carry out these studies on an annual or biannual basis, or however they would be completed?

MR. SCHINDLER: Oh, I certainly believe that the availability of resources in terms of consultants, biologists, researchers, the pool is certainly there to conduct the types of surveys and monitoring that would likely be proposed by Manitoba Hydro.

MR. STOCKWELL: Did you say through Manitoba Hydro?

MR. SCHINDLER: Well, the types of

research that would be proposed by Manitoba Hydro or conducted, as was indicated, is part of the presentation that will be forthcoming on monitoring, that the resources are out there generally, if I understood your question correctly, to conduct those types of surveys and monitoring and research.

MR. STOCKWELL: Okay, good. This kind of requires a subjective answer, I believe, but we can evaluate that on our own. How would you -- I mean, caribou and moose have been studied extensively throughout Canada, and I would imagine with various provincial jurisdictions and various degrees of quality, I would say, of study. And how does the Manitoba, how does our Conservation Department compare with other Conservation Departments, as far as the quality of studies, the details, the amount of data that they can collect and so on. The reason I ask that is that I'm assuming that Manitoba Conservation and Water Stewardship will be the policing agency for the licence, if the licence is granted. And I would just like to have some comfort that there is expertise, enough expertise, and that we have very good quality expertise in order to conduct studies

and so on.

MR. RETTIE: I know when I reviewed some of the results from the moose surveys that the provincial government had done, the techniques that they applied and the analyses that they did were all done very capably. When I looked at the frequency with which those surveys were conducted, having been in a position of some level of responsibility with the Ontario Government, they are done far more frequently. There they have a three year cycle for every wildlife management unit, the equivalent of a game hunting area here. Here it seems to be a little more hit and miss and there are longer periods of time between surveys.

So from looking at the quality of the work that they did, that they have done in Manitoba, I have no qualms about it at all. I would suggest that the frequency probably relates to their budget. And so I can't speak to how that's going to look in the future.

MR. STOCKWELL: Thank you. I think the frequency is probably a very important issue, and I appreciate your response, but I think it gives us something to watch in the future to make sure that things are happening the way they should

happen, as far as the studies and understanding these resources.

I just have a few, actually just one question, one additional question. And that is that there are reports of woodland caribou being sighted in Cowan, Manitoba, which is I think somewhat north of area 19A. Do you have any comments on that? I mean, I don't think it's an unusual thing to have animals meander around and get out of their normal area, but if things like that are occurring, and if caribou are coming into, say an area that's inhabited by white-tailed deer, that there is perhaps a trend and perhaps a risk with that trend of the brain parasite you were mentioning.

MR. RETTIE: I think that if the brain worm is present in the deer in the area, then I think that caribou that come into that area would be at risk. I don't know if brain worm is present in that area. I couldn't even put it on a map, and I apologize for that. But it's not as if the caribou are going to then carry it out of that area to infect their own population. I would say the animals that migrate into an area with a high density of white-tailed deer may be susceptible,

but I don't think that would imperil their population.

MR. STOCKWELL: There is one other question that just occurs to me, is that you had mentioned a study, it was either in the Duck or Porcupine, about a birthing rate, or an increase in population, that it should be between 10 and 20 percent, and that was in moose I believe, but the actual numbers are somewhat less than 10. If I can find it here -- sorry, it was an increase in population. It was historical data, Duck Mountain Provincial Park, and the numbers were 1137, and they rose to 1248, which is just slightly under 10 percent, which is within the area that we're looking at. I'm sorry, I don't have a page number.

MR. RETTIE: Sorry, this was Duck Mountains or the Porcupine Mountains?

MR. STOCKWELL: Historical data from Duck Mountain Provincial Park.

MR. RETTIE: That's the one that shows a population graph from 1993 to 2011?

MR. STOCKWELL: Just at the top of the page where it says historical moose population estimates for Duck Mountain Provincial Park.

MR. RETTIE: Okay, I think I have the right figure in front of me.

MR. SCHINDLER: Is that on the summary or the chart?

MR. STOCKWELL: It says long-term decline, recent stability.

MR. RETTIE: Okay. We have got the figure here, I believe.

MR. STOCKWELL: It's not a big deal, but I wondered if you have an explanation for this? I mean, I understand there was a closure during this period, a complete closure, and there was only an increase in population of 9 percent. But I would expect that with a closure, there should be a larger increase, it should be closer to an optimal increase.

MR. RETTIE: And that's between 2010 and 2011, or 2012?

MR. STOCKWELL: 2011 and 2012, I believe.

MR. RETTIE: Okay. Got it.

MR. STOCKWELL: Would you have an explanation for that?

MR. RETTIE: I'm sorry, I don't. It's a relatively short period of time. I would think

if I had a data set that spent a few more years, it might be easier to tell.

MR. STOCKWELL: So a couple more years would probably yield different figures?

MR. RETTIE: I'm not familiar enough with what the other limiting factors are in the area.

MR. SCHINDLER: Well, that's assuming -- and we don't have information in terms of the effectiveness of the closure, is the closure effective? There would be predation, potential predation issues as well. Without knowing the exact dynamics or what was happening there, it would be hard for us to explain why the increase is not more than it is.

MR. RETTIE: I would agree with you, though, with the closure, and particularly with the recruitment rates that appear in the figure below where we're looking at 39 and 45 calves per 100 cows for those survey years, you would expect to see a population increase. So it's possible that that just could be a consequence of survey results. One of the things that you do find is that in an aerial survey, depending on the conditions, a survey result can be off what the

long-term trend suggests was actually present at the time. So it could be one or both of those years didn't have excellent survey conditions, and that another survey will reveal better information about where the population is headed. But you're right, given those numbers, in the absence of hunting, I think you should be seeing an increase there.

MR. STOCKWELL: Sorry, I said there was one last question, but I have another last question. On the page proceeding that, you have the fire and forestry slide at the bottom of that page before.

MR. SCHINDLER: Yes.

MR. STOCKWELL: And you had mentioned that there was a forestry patchwork?

MR. SCHINDLER: Yes. It shows forestry harvesting throughout the area, and you can see there's little blocks and patches that are occurring throughout the area, by decade, and probably on the slide and scale that you've got here, it's very difficult to see. But this just illustrates that there has been activity in that area during those decades.

MR. STOCKWELL: Activity during the

decades?

MR. SCHINDLER: Or the years.

MR. STOCKWELL: The patchwork is a forestry patchwork, which means I would assume that there's a certain amount of harvesting in these lighter areas?

MR. SCHINDLER: Yes.

MR. STOCKWELL: What does that harvesting of forest mean to the moose in the Duck Mountain?

MR. SCHINDLER: Well, from a basic ecology perspective, in describing the habitat requirements and the way that moose use their habitat, the disturbance associated with forest harvest can improve habitat quality in terms of providing nutritious browse, but sometimes, and a lot of the time what happens, it's offset by the effects of access into those blocks and subsequent harvesting of animals.

MR. RETTIE: That change in habitat following forestry activity, typically there would be a lag of perhaps five to 10 years before the browse in those areas would come on line as being excellent moose habitat. And then from that period of, let's say 10 years to 30 years, that

would be ideal moose habitat. And then as the forest matures later on, it would sort of go off line as moose habitat. But that sort of adolescent age forest, that 10 to 30 year span, is probably the best period following disturbance for moose.

MR. STOCKWELL: All right. I think that concludes for me. And I believe Chief Boucher has some questions.

THE CHAIRMAN: Chief Boucher, this afternoon we're restricted to questions, not statements. You'll have plenty of other time for that. Go ahead, sir.

CHIEF BOUCHER: Thank you very much, Mr. Chair, panel. I thank everybody in the room.

Certainly I question the outcome, the results. I think time frame is the question we need to answer. We need more time frame. You are only talking about -- you're only talking about what your finds are. Okay. And what about when the actual power line is existing? Okay. How many mineral licks are going to be destroyed, right from the south to the north?

MR. SCHINDLER: Would you like me to answer that, about the mineral licks?

CHIEF BOUCHER: No, not yet.

Today I am 51 years old. I've been chief for two years. My back door is my traditional ways. My dependency is the moose, the fishery, the berries. I don't need no vehicle or ATVs or skidoo to go and look for a moose. In my time just recently, the species, the big mammal, the moose has been slowly disappearing. And as a First Nations leader, who am I protected under the Canadian Constitution under section 35 of the Indian Act. And most important, protecting what's existing, sustainabilities, as you say that you are part of the licence regimes. If you are in it for the moose and the caribou, and you are one of the people recognized by the government and the management regimes, all disturbances should be eliminated, 50 percent immediately. The impacts, the effects are disappearing, aquatic life, the dependency of food sources on moose and caribou.

You say that there is an adult rate that's good. What about the calving rate? These animals are being pushed and pushed, same as we are as First Nations original people of this land. We ignore the moose. We ignore Mother Earth. And that's why I question the aquatic life and the

plants that the moose depend on. The water quality, I have been fortunate to commercial fish in the Churchill River, in the Nelson House River. Fish disappearing, fish filled with scabs by the gills in their cheeks, algae blooms.

THE CHAIRMAN: Chief Boucher, do you have questions in there?

CHIEF BOUCHER: These are concerns, Mr. Chair, that we need to -- I'll make one more question. The wood ticks, as you say yourself, millions in one moose, the winter wood ticks, that causes effects in calving. There has to be more focus and more studies there. I believe they are reminders of our elders. It's not specific questions. I need to somehow reach out to you guys, as I recognize you as experts as Manitoba Conservations. The Treaty is not even being said here. As you said, you had no answers about Treaty rights, hunting, you have no answers.

I offered tobacco, Mr. Chair, when I harvest the moose, when I take each body part of that moose, the nose, the tongue, the Bible is in that body, it's in the gut, the kidney, the heart. The heart is the biggest one for me. And my people depend on that moose. Why is it in the

south there is no moose, just in the Riding Mountains and the Turtle Mountains? But what about in the farmlands in the south, in the central where I live in, and the Ducks and the Porcupine slowly disappearing.

I'm here to work together. I'm sorry, as a leader I want to be part of the answer. We need to make sustainable movements with all industry, mainly Manitoba Hydro. You say there's minimal effects. No, there's not. The effects is underlying. It is an effect.

THE CHAIRMAN: Chief Boucher.

CHIEF BOUCHER: Thank you very much.

THE CHAIRMAN: You're welcome. And you will get plenty of opportunities to make statements on future dates, but this afternoon is for questions.

Mr. Madden, do you have any questions at this time?

MR. MADDEN: I didn't write down either of your names and all the reports just say your company. Just so I have them, can you say the names again?

MR. RETTIE: Sure. My name is Jim Rettie, my last name is spelled R-E-T-T-I-E.

MR. SCHINDLER: And Doug Schindler, S-C-H-I-N-D-L-E-R.

MR. MADDEN: Great, thank you.

Mr. Schindler, I just want to confirm, you were the author of the mammals technical report?

MR. SCHINDLER: It was myself and my colleague, Robert Berger from Wildlife Resource Consulting Services.

MR. MADDEN: But you agree with everything that's in the report? It's your report.

MR. SCHINDLER: It's our report.

MR. MADDEN: Were you a part of responding to the interrogatories from the Manitoba Metis Federation in relation to mammals? It begins with IR 200 to about 238.

MR. SCHINDLER: I'll have to check.

THE CHAIRMAN: We're dealing with caribou and moose this afternoon.

MR. MADDEN: Those are moose questions.

THE CHAIRMAN: Okay. There were so many IRs we can't keep track of them.

MR. SCHINDLER: Yeah, there were many

IRs and some of them were shared about. What were those numbers again?

MR. MADDEN: Starting with IR 200 to 238, it's in batch five, the October 15th responses from Manitoba Hydro.

MR. SCHINDLER: I have got some here, yeah.

MR. MADDEN: So you agree with those responses?

MS. MAYOR: Excuse me, if Mr. Madden would like Mr. Schindler to look through all from 200 to 238 and indicate if he agrees with all of those, then we will need some time for him to look at them.

MR. MADDEN: My question is, I don't want to begin questioning on the IR responses and then have Mr. Schindler say, I don't know what you're talking about. So I would appreciate just knowing whether he was a part of responding in those IRs.

THE CHAIRMAN: Why don't you ask the questions and see if he has the answers?

MR. MADDEN: Well, I'm doing cross-examination, I don't want to get to the point where he says, well, that's not my response.

Were you a part, are you familiar with those IRs, sir?

MR. SCHINDLER: Yes, I am familiar with them. There were many of them that were worded, were very similar in nature but worded quite differently. So the interpretation of the answer would have some bearing on the question. Some of the questions are quite similar. Many of them are.

MR. MADDEN: In particular, let's focus on IR response 201.

MR. SCHINDLER: And that would be high quality moose habitat aerial surveys?

MR. MADDEN: Yes.

MR. SCHINDLER: I believe on that one Mr. Berger and I, we worked on that one together.

MR. MADDEN: So you are in agreement with that IR response?

MR. SCHINDLER: There's a lot of information in there, but it seems reasonable.

MR. MADDEN: I guess my question is, you provided the technical report on mammals and in particular on moose. These are moose questions. Those are Manitoba Hydro's responses. They quote parts in the response of your, the

technical report. I just want to make sure that you are in agreement. Were you not a part of those responses, or your company?

MR. SCHINDLER: Yes. Again, Mr. Berger and myself, we looked at these and provided responses, and they were reviewed by Manitoba Hydro and forwarded.

MR. MADDEN: Okay. So let's move on. The moose surveys that you were talking, in your technical report, you refer to them as they are qualitative. Can you explain why you would define them as qualitative?

MR. SCHINDLER: We did not conduct moose surveys similar to what the province would conduct in terms of doing actual population estimates, or to try to get defined numbers of animals per square kilometre, or come up with estimates with plus or minus statistics indicating that -- because it's such a huge and broad area. The purpose of surveys was to look at the relative abundance of moose within the project area, and areas of high quality habitat, to enable us to evaluate the various alternative routes. If you can imagine such a large study area, it would have been infeasible to conduct, you know, population

type estimates, point estimates for game hunting area boundaries that did not fall within the boundaries of the project study area. So they were qualitative in effect to provide information to add as one factor in terms of ranking those routes and coming up with a route with the least effect.

MR. MADDEN: So to actually understand exactly what it was, you flew over the route and someone looked out the window?

MR. SCHINDLER: That would be the final preferred route flight. We did other flights as well looking at alternative routes.

MR. MADDEN: So it's essentially someone is -- you are in a plane, someone is looking out the window and they are making notes, or just bes guesstimate of what they see along the route. And of course, the route's not drawn so people are eyeballing it?

MR. SCHINDLER: No. We use navigation grade GPS within the aircraft and the pilots are very well trained in keeping on line. And you can plot out your flights ahead of time, and the pilots can concentrate on flying, and there's generally an observer on either side of the

aircraft.

MR. MADDEN: So you aren't counting, like as you already indicated, what Manitoba Conservation would do, you're just taking notes of where during the flight you would see numbers, or where densities would be seen?

MR. SCHINDLER: No. Observation techniques would be identical with those for other types of aerial surveys, looking for observations of tracks, looking for observations of animals, taking very accurate GPS locations, and documenting, you know, aggregations, age and sex of animals where possible.

MR. MADDEN: So what would be the difference between -- why wouldn't you count? If you're doing that at the same time, why wouldn't you do counts? Is it more intensive? Not as cost effective?

MR. SCHINDLER: It depends what you mean by counts. Like you're talking a count in regards --

MR. MADDEN: You began by saying, what we did was different than what Manitoba Conservation does. So can you explain what those differences would be?

MR. RETTIE: If I can add something here? A typical aerial survey to evaluate a wildlife population and come up with a population estimate, and this includes the ones that Manitoba Conservation flies for moose, actually is a two-stage survey. And the initial stage of their survey they fly coarsely and they do, from what I understand although I wasn't part of the surveys done for this project, work very similar to what Mr. Berger and Mr. Schindler had done, which is noting observations of concentrations.

From that first stage, they then go back and they redraw the map of their game hunting area, and they colour in areas where they think there is a high density of animals. Then they randomly select plots and they go back and fly plots very intensively. So the first step in their survey is a very course scale to allow them to stratify, to determine which areas likely contain more moose. And then what will happen is, in the areas that are likely to contain fewer, they get far less effort when the final survey is done. So the focus is then concentrated on areas where that initial course scale, qualitative rather than quantitative, it's sort of somewhere

in between, a survey was done. And as I understand it, that was what was done here.

MR. MADDEN: So the second flight, or the second time around would be somewhat of the validation or --

MR. RETTIE: No, it's when the actual enumeration goes on. So it is essentially determining, okay, in this part of the game hunting area we are likely to find a high density of moose in these two or three hot spots, and the remainder of it, to the best of our ability to determine from habitat maps and from our course survey, we think there are going to be fewer moose. So when we go back to doing our survey, the most cost effective method is to then go and focus the effort on the area where the highest density of animals is expected. It's a very low return on investment to go and further survey the areas where fewer animals are expected.

MR. MADDEN: So Manitoba Hydro did the aerial surveys in 2010?

MR. SCHINDLER: Yes, we did aerial surveys of the final preferred route as well. Surveys were conducted in '10 and '11, I believe.

MR. MADDEN: And your initial surveys

on the preliminary preferred route were done previously, prior to that?

MR. SCHINDLER: We did surveys on the final preferred route. We looked at those segments. The surveys were not designed, as Mr. Rettie indicated, looking at broad areas. We did not want to survey, or the objective was not to get population estimates in game hunting areas, rather to look at the potential for effect on moose with each of those alternative routes. So there was some broad transect surveys that were done very similar in nature, as conducting a stratification flight for doing a population estimate. Those types of flights were conducted, which were very similar to the types of surveys that Manitoba Conservation would do in terms of a preliminary population estimate.

What we did on the final preferred route was a survey down the centre line and a kilometre on each side, to get some indication of relative abundance of animals within those areas, to help us look at the effects. Okay, here is the final look at the final preferred route. Are there any hot spots along here that we have to identify that may require additional mitigation,

or areas that cause concern? So that was a separate flight designed for environmental assessment purposes, not for game management purposes.

MR. MADDEN: And the goal was to identify areas of habitat and areas of, as you said, kind of red zones or areas of interest along the route?

MR. SCHINDLER: No, the objective was not to assess habitat, the objective was to look for concentrations of animals vis-a-vis observations, or observations of sign and track within those areas, to locate areas -- looking at it from more of a precautionary principle, if we saw a lot of moose tracks, we wanted to document that, knowing there is some moose activity in this area.

MR. MADDEN: Can you explain the modeling that you did based upon those surveys?

MR. SCHINDLER: We didn't do modeling based on those surveys. Our modeling was based on, they were generated from existing information, literature, using the land cover classification data that we had. And I explained it in the slide show in terms of looking at what we deemed to be

high quality habitat, based on a broad body of literature, looking at that component of, you know, good browse availability, looking at shrub, stands of shrub, as well as stands up to 60 years old. The definition of that particular model is incorporated into the -- you can find that in the technical report. And I think we have indicated that in some of these IRs, where the description of that model came from.

MR. MADDEN: So you're saying the moose model wasn't statistically validated?

MR. SCHINDLER: It was not statistically validated, no.

MR. MADDEN: Can we go to page 29 -- sorry, can you go on?

MR. SCHINDLER: I was just saying it was a tool to look at to predict winter habitat. And it's important to understand that models are not a predictor of actual animal abundance. And I have done a lot of work with the development of HSI models, for example, where there's a lot of factors that contribute to whether or not a species occupies that particular habitat. There could be things like disturbance. You can have high quality moose habitat along a road, for

example along PTH number 6, or whatever. It's really good habitat, but there's no moose in it.

So assuming that a model will predict the abundance, or vice versa, you can get into problems by trying to validate model by using information. You can have animals in sub marginal habitat because of their remoteness or some other factor. So you got to be really careful, and so we tried to use both techniques in terms of looking at model habitat, as well as looking at observational data, to assess along the final preferred route, okay, where are these areas where these moose concentrations exist, if they exist?

MR. MADDEN: And of those two models, neither one was statistically validated, was based upon the information you had?

MR. SCHINDLER: Some of the models were validated -- there was some data that was used to sort of validate the presence of species within high quality habitat, that was modelled. So there was some data, field data that was incorporated to raise the -- or to validate and to raise the expectation that these were predicting good quality habitat for those species.

MR. MADDEN: Validated based on what?

MR. SCHINDLER: Various track surveys and some information from trail cameras, field observations.

MR. MADDEN: So you did use the track surveys and the field cameras?

MR. SCHINDLER: For the moose model, we did not use specific validation procedures, but there is enough known about moose habitat and the quality and how to predict habitat within the literature, and with other existing models that exist, to simply state that, you know, these younger stands, these mixed wood stands, these are areas that moose would prefer during winter.

MR. MADDEN: So you're validating based upon secondary literature, not based upon actual numbers?

MR. SCHINDLER: I'd say primary literature and a great body of information. There's a lot of knowledge known about moose. There are models that have been developed for moose.

MR. MADDEN: So you're basing it upon primary literature, you're not basing it upon actual numbers to validate?

MR. SCHINDLER: In some cases, for

example, the habitat suitability index model that was developed for Manitoba on the east side of Lake Winnipeg --

MR. MADDEN: I'm talking about Bipole III, I'm trying to understand what aspects, did you validate the moose model and what did you use to validate it?

MR. SCHINDLER: We assumed the model to be a predictor of high quality habitat, and the areas that we used to identify blocks in the northern portion of the study area, we used the model to identify high quality habitat.

MR. MADDEN: But when you explained it, you only did that in the north. South of Red Deer Lake you didn't do that, correct?

MR. SCHINDLER: That is correct.

MR. MADDEN: Okay. So let's focus on south. So south of Red Deer Lake, you didn't validate based upon actual -- you didn't have that information for south of Red Deer Lake?

MR. SCHINDLER: The validation process, and I think I showed it on our maps there, when we modelled high quality moose habitat within the Duck and Riding Mountains, I mean, those areas that we know have abundant moose

populations like the Duck mountains, the Riding Mountains, and the Porcupine Hills, the maps really illustrated the presence of high quality moose habitat. So we felt comfortable as a team that this is one of the indications that this model is predicting, you know, at the scale necessary to evaluate alternative routes, that this is good habitat. And there was also some good habitat that showed up in game hunting area 14 as well.

MR. MADDEN: Okay. I am still confused. And maybe I'm going to -- if we can go to page 29 of your report, and I'm going to hand this out, your mammals report. So if you go to page 29 of your report, and then go to interrogatory response 201, batch five, pages five and six?

And so maybe you can -- and I have clipped them because we're trying to understand if these things are saying the same thing or if they are saying differently, I'm not quite sure.

So in the IR response it says:

"The moose model was not statistically validated."

And then in the technical report, section 343, it

says:

"Habitat models were verified based on an analysis of field data from various sources including aerial and field tracking surveys through the use of statistical chi-squared tests such as McNemar's test for paired sample nominal scale data."

And a cite there for Zar, 2010.

Can you explain, maybe we're talking about apples and oranges here, so can you explain, those seem to contradict each other?

MR. SCHINDLER: Yes, I can verify that those tests were not specifically conducted for moose. So some models, some bird models, perhaps where that test was done, but that particular test was not done for moose, as indicated in our IR.

MR. MADDEN: But this is in your mammals report, I'm not -- it's not the birds report.

MR. SCHINDLER: Could you ask that question again, and I'll answer it for you?

MR. MADDEN: Sure. So are we talking about the same -- are these contradictory statements?

MR. SCHINDLER: The moose model was not validated statistically, as indicated in 343 of the model validation.

MR. MADDEN: It wasn't?

MR. SCHINDLER: However --

MR. MADDEN: I just want to make this clear. When you are talking about habitat models, that's coming from somewhere elsewhere where you actually validate it. But in relation to moose, the IR response is correct, the moose model wasn't statistically --

MR. SCHINDLER: Yeah, that's very correct. The IR response is the correct response.

MR. MADDEN: So that part of your report is incorrect?

MR. SCHINDLER: Some models were validated but the moose model was not.

MR. MADDEN: That's all I wanted to know.

So you would agree with me, because you have done it in the bird model and others, that it probably would have been preferable to validate the moose model as well, correct?

MR. SCHINDLER: My experience with assessing moose, I would suggest that the

validation of a model would be a very long and arduous process in terms of trying to validate the predictions of the model. The model was developed in such a way to just look at those components of habitat that we would expect. For the first component would be, you know, winter concentrations of moose, running a transmission line through an area, we would predict that these types of habitats would have moose during that time. When we conducted surveys on predicted blocks, particularly in the north, we found a great deal of correlation between the prediction of those types of habitats relative to moose abundance in remote areas in particular. So we felt very comfortable that the model was a tool and a part of the small piece of evaluation of the puzzle in terms of assessing alternative routes.

I think it's important to note that the results of the modeling, whether there is some type of error within there would not really change the overall results of whether we selected routes one from another, because there are other aspects that we utilized as well as modeling. We looked at observations of moose in some of those areas and tried to parallel, where possible, existing

linear features.

So I think there's enough information from the literature and from the information that these models were deemed to be tools to help us look at the various attributes of the various alternative routes and try to avoid areas that had, you know, simply a lot of good habitat on them from what we could indicate from this professionally developed model, based on professional opinion. And that is not uncommon to have judgment type models in terms of trying to assess habitat for planning.

And so really we feel that those models did provide some very good information in terms of identifying high quality moose habitat. And again, if we look at the areas that were identified, such as the Duck and the Porcupines and some of these blocks in the north, it appeared that it was providing very good information in terms of how to -- where the high quality habitat existed.

MR. MADDEN: But you did miss some, because your presentation points to one, you missed Moose Meadows. Can we go to actually map ten that you had up -- it was in your Powerpoint

presentation. It's map ten, the attachment to the mammals report.

MR. SCHINDLER: I've got the Moose Meadows slide and the presentation --

MR. MADDEN: No, I'd like to see the -- because I think you have now updated and said, oh, yes, we have all reviewed, and I think the CEC has all reviewed -- it was in your PowerPoint presentation. It's the one with the orange dots where you are identifying all of the moose habitat?

THE CHAIRMAN: So the one that he has on his Powerpoint presentation this morning is sufficient?

MR. MADDEN: Yes.

THE CHAIRMAN: Okay.

MR. MADDEN: And just for the record, the one that was in his Powerpoint presentation that I saw this morning is map ten as an attachment to the mammals technical report.

MR. SCHINDLER: Well, the slide shows a good close-up of the Moose Meadows, if you want to look at that.

MR. MADDEN: Pardon?

MR. SCHINDLER: The slide in the

presentation has a pretty good close-up of the Moose Meadows.

MR. MADDEN: No. What I want to see is where your -- that orange map doesn't identify Moose Meadows. It's map 10 attached to the technical report, it's the map with all the orange dots for the moose habitat.

MR. SCHINDLER: Okay.

MR. MADDEN: This is why I put my glasses on. But you would agree with me, though, that map doesn't identify Moose Meadows. So I guess my point here is, and I'm not going to belabour it, but you said look we're pretty confident, but you missed Moose Meadows based opinion your modeling?

MR. SCHINDLER: I would agree that Moose Meadows was not seen as high quality habitat. And it seems to me that the Moose Meadows is quite a unique area, and I think what I'd like to do --

MR. MADDEN: Sorry, are you saying that's the only area that has been missed in relation to habitat? You can say it-- are you saying Moose Meadows is the anomaly, there is no other potential areas that there could be other

areas where moose habitat could have been missed?

MR. SCHINDLER: Oh, I mean, there is a significant difference between the Moose Meadows, from what we have learned with current and new information, that there's something very unique about that area. And if I could be allowed to just scan down to one of my other slides.

And Jim, feel free to comment on the habitat descriptions in here as they relate to what you would typify moose habitat. I may get Jim to help me articulate this. But the purple area here, we also looked at this on forest resource inventory, which is sort of the typical inventory used for forestry planning, and we also used our land cover data, and it pretty much gave the same indication. When we look at typical moose habitats across the study area into the Duck Mountains and so on, these wetland areas, based on the information and based on the resolution of the imagery, and the camera that's used to capture this information, the area shows up as a floating fen. And we know that from some of the information that we got from Conservation, it's a large peatland, and it's not typical where you would find wintering moose populations in areas

throughout our study in terms of areas that are, like I described in the slide show, some of those areas of high quality, young browse shrub lands, interspersed with coniferous forest. There's obviously something very unique about the Moose Meadows.

MR. MADDEN: But I guess in getting back to my point on it, though, but if you had validated, you would have caught that. Because it's not as if this was unknown to the Aboriginal people or unknown to Manitoba Conservation. The reality is that validation means that you take the model and you apply it to, you test it against facts on the ground. So, for example, you mentioned there was camera data available, those sorts of things, that's how you validate, correct?

MR. SCHINDLER: It was a combination of validation from on the ground information as well as survey --

MR. MADDEN: But you just said that you didn't, for south you didn't validate. And just so you know, for this part of my questioning I am only talking about south of Red Deer Lake. I know what was done extensively up, in relation to caribou. But south of Red Deer Lake, you didn't

validate, correct?

You just answered in the IR that you didn't. It says:

"The moose model was not statistically validated."

MR. SCHINDLER: The validation in this particular area, the habitat here appears to be a bit of an anomaly. One of the explanations that we got from Manitoba Conservation, and we did fly an intensive survey down the FPR through this area and we did observe a number of moose within that area, but not to the same extent that Conservation did.

One of the things that we were told is that on occasion, the population of moose within Moose Meadows could perhaps be animals from the Porcupine Mountains that come into the area during periods of heavy snow.

MR. MADDEN: But validation means that you're looking at secondary -- or not secondary -- that you're looking at on the ground factors to validate the model. So, for example, you didn't validate using the camera information that you did have available south of Cedar Lake either, correct?

MR. SCHINDLER: I have indicated that we did not validate the moose model.

MR. MADDEN: And at the time you were doing this, were you aware that the moose populations in this area were collapsing?

MR. SCHINDLER: We had information, and pretty much the information we showed you in our slide show indicates the information that we had, with the exception of the new information, that last survey point that was provided to us, and Pat McGarry indicated, I believe that was May 17th that we were given that information.

MR. MADDEN: May 17th when?

MR. SCHINDLER: Of this year.

MR. MADDEN: So clearly you didn't have that information when you were doing the flyover of the final preferred route or -- so when you did fly over the final preferred route in 2010, you had no knowledge that the moose populations in this area were collapsing?

MR. SCHINDLER: We knew that they were low.

MR. MADDEN: You did? How?

MR. SCHINDLER: Well, because of the area closures and we had information from previous

surveys.

MR. MADDEN: So when you did the flyover, the closures, the initial closures had already happened, or was it just the closure in Riding Mountain?

MR. SCHINDLER: Well, I think Riding Mountain is a national park.

MR. MADDEN: Sorry, what was the first closure in?

MR. SCHINDLER: I think 13, and Porcupine Mountains and Duck Mountains.

MR. MADDEN: Right. So you had that information that it was -- those closures had already taken place?

MR. SCHINDLER: Yeah.

MR. MADDEN: Okay.

MR. SCHINDLER: I'm just trying to find this one slide on the population thing here, just hang on.

MR. MADDEN: So in light of that, do you not think that validating the model would have been prudent?

MR. SCHINDLER: I think any kind of a validation process -- models can be very subjective to some degree, based on information

and literature, in terms of subjective that they are not absolute predicters of animal occurrence. It is acceptable for the purposes of our environmental assessment that we take professional opinion, which is used in terms of looking at models for assessing the various alternative routes.

The model was based on literature, knowledge, from our knowledge of the study area, the types of habitat that we know we would expect to find moose, and it was a tool to look at the assessment of alternative routes, and also to provide some level, along the final preferred route, in combination with aerial surveys which we flew, because we knew there would be areas of high quality habitat where there would not be moose because of different factors. So that is one of the reasons that we flew the final preferred route, is to pay more attention to where the moose actually were as opposed to where the modelled habitat is. And I think it even shows up on one of our slides that the combination of modeling, plus the occurrence of animals, and the wider the circle under indicates the more concentration of track.

So we wanted to identify areas that were not only modelled to high moose habitat, but areas where we observed animals, to identify those for environmental protection planning purposes and to look at what the effects are along those lines.

So using in combination of both methods, it gives us a fairly good picture of where the moose are along the final preferred route at that time.

And you also have to understand the temporal nature of moose occurrence. There can be areas where some years the moose will be in a particular area, and a week later they could be in a different location. So the way moose move around the landscape on a three-mile corridor, there's possibilities -- and maybe Jim could help me with this. But even doing aerial surveys, and I've done a lot of aerial surveys for the Province of Manitoba, conducting those types of surveys relative to doing transects, there has been many occasions where, on stratification survey identifying high blocks, you fly there one day and there's several moose, and you can fly there the next day, or two days later, those moose are no longer there.

MR. RETTIE: Yeah, that's true.

MR. MADDEN: You have answered my question, so I am going to continue to move on.

So if the model hasn't been validated, is it possible that the location of the aerial survey blocks may not be correct?

MR. SCHINDLER: So you're talking about the south area, or the north area, or is it the whole --

MR. MADDEN: The south.

MR. SCHINDLER: Because of the known information relative to the Duck Mountains and the Porcupine Mountains, we felt that conducting intensive surveys, or any type of aerial surveys within those areas would likely yield moose, and we'd know that those areas are of high value. So surveys were not conducted as intensively in the south as they were in the northern areas where they are unknown.

We had good survey data for the Ducks and the Porcupines, and there was some limited information for game hunting area 14. So that data already existed to allow to assess the routes and segments against each other, based on that the knowledge that those were high quality moose

areas.

MR. MADDEN: But the closures don't factor into thinking, well, maybe we should err on the side of caution and actually validate?

MR. SCHINDLER: I'm not so sure that validation would have changed any result whatsoever in terms of the assessment of those particular routes against each other. Because the knowledge of moose habitat, we knew that those routes within the Porcupines and the Ducks and so on, that was very, very high quality sensitive habitat. And looking at those would not have changed, you know, plus or minus whatever in terms of the habitat categories that may have been picked or refined, would not have changed the results of either the assessment or the assessment of alternate routes, or the assessment of the preliminary preferred route.

MR. MADDEN: So it's your opinion you didn't need to validate? There was no benefit in it?

MR. SCHINDLER: Well, we feel there was enough information that we -- again, going back to this particular map here -- I mean, this tells me that this map predicting, based on the

information that we have, that these areas are high quality moose habitat areas.

MR. MADDEN: But if those are high quality moose areas, and we know that they are subject to closures, doesn't it then become -- I guess, the other areas, having more detailed knowledge about the other areas where you are putting the route for -- because the pressures are going to shift, right, to have more additional data, or validate in the areas that are outside of those. Because clearly you aren't going through, and one would not think you would want to put a final preferred route through the Porcupine Hills. So I can appreciate that, I understand that of going, okay, you see those blobs, everyone else sees those blobs, clearly those are probably not places you are going to -- but then in that area that's closer, which is where Moose Meadows was, you would probably want to get a little bit more precision or detail around that because you are making choices in that area; correct?

MR. SCHINDLER: Well, we feel we had information to assess the final preferred route as it was. We did not have the information at the time of the significance of the Moose Meadows area

per se.

MR. MADDEN: But you did have information that those other areas where the blobs are were subject to closures, so people would be going and getting moose elsewhere. That would be logical, correct?

MR. SCHINDLER: Manitoba Conservation manages the moose. We never collected data relative to the people's harvesting preferences or when areas get closed, that type of information. I mean, I would assume that some people may go other places, but there may be -- I know that there's a lot of self-regulating mechanisms in place where people have volunteered to cease harvesting, et cetera, in some of the communities.

MR. MADDEN: So when you are doing this, Manitoba Conservation doesn't make you aware in any way, shape or form of saying, look, we're asking constitutional right holders to suspend exercising their rights in those areas? Maybe, you know, if you're routing in other areas, pay additional attention. There is no conversations going on between Manitoba Conservation and Manitoba Hydro on the pressures that are happening in that bottlenecked area?

MR. SCHINDLER: I would have to defer that question to those that were actually involved with those communications between the IRMT and Hydro.

MR. MADDEN: Mr. McGarry has already answered clearly, and it's on the record there were none. So you are operating in that vacuum as well, that Hydro is moving forward on this and there isn't communication from the Crown on it. And so we'll rely on -- Mr. McGarry is an employee of Manitoba Hydro and he has already answered the question. I just wanted to make sure that the people who were doing the work related to moose didn't have additional information. Okay.

So if these habitats haven't been validated for calculation of loss of the moose habitat because of the project -- I guess where I kind of have a question of is, when you are making those choices in the areas that aren't the blob, if you haven't validated -- did you have data on the ground in those areas? So, for example, did you have camera data around Moose Meadows area and south of that area? Was there information actually available?

MR. SCHINDLER: There was field data

available north and south of the actual Moose Meadows, as defined, but nothing within that particular exact area known as Moose Meadows.

MR. MADDEN: But you didn't use it to validate the model? It was available, you just didn't feel it needed to be used?

MR. SCHINDLER: As I indicated, the habitat, the requirements of moose is variable throughout the season, and the fact that they use different types of habitats during different types of the year. Our knowledge of moose and moose habitat allowed us to utilize the habitat data that we had to form a predictive model of high quality habitat. It is not a predicter of animal abundance. That's very clear that we were not trying to predict animal abundance. In any type of wildlife study such as this, animals will surprise you. They could be in habitats that are not typical of what is described in the literature. There are always anomalies. But from the landscape perspective, looking at the area of Bipole III, the enormous study area, the model did provide us with a very good tool, with the exception of Moose Meadows, in terms of predicting areas that are considered high quality habitat.

Now, the area itself may not, you know, obviously it's got some type of special unique feature. There has been some discussion with the salt springs close by, there's some notion that maybe there's something special going on in the soils or whatever that's attracting moose to that area. But it wouldn't be an area that would be typically characterized as, you know, high quality, winter, young cereal type habitat.

MR. MADDEN: Are you of the opinion that there is no other moose habitat areas that were missed along the final preferred route?

MR. SCHINDLER: There is moose everywhere.

MR. MADDEN: I'm talking about habitat. You missed in Moose Meadows, you are saying, but we didn't miss anywhere else?

MR. SCHINDLER: No, I'm not. I'm saying the fact that there is going to be pockets of moose, moose will distribute across the landscape. Their distribution will change through time as habitat is either burnt, or changed, or as it grows. The distribution and abundance of moose typically across these landscapes is -- they are

not necessarily clumped up year-round in these small pockets. There are areas -- their distributions are more general over the landscape and they are evenly distributed pretty much everywhere.i

MR. MADDEN: Well, if they were pretty evenly distributed almost everywhere, I don't think we would have closures, correct?

MR. SCHINDLER: I don't think the closures -- I'm not sure what you said there?

MR. MADDEN: I guess, how you continue to make it sound is, well, this is no problem. And you said it in a few different ways, well, this is only 2 percent of the entire backwards banana, the project study area. But you would agree with me that location is important, that the idea that, you know, where you have -- this probably isn't an issue up in the north because our cup runneth over vis-a-vis moose. But in these other areas, it is significant, it's because of the closures you don't have. So your statements, your broad statements which I think are fair statements on, you know, the backwards banana, which is one-quarter the size of the Province of Manitoba, or close thereto, that's not

the case in the specific, the bottleneck areas south of Red Deer Lake. Would you agree?

MR. SCHINDLER: I'm not so sure.

THE CHAIRMAN: Can I interrupt here? We seem to be beating around a fairly big bush, or maybe a small bush. There's an awful lot of repetition in your questions. There's even more repetition in your responses. I really think that you have probably got what you need out of this line of questioning.

MR. MADDEN: I guess my big question is -- and maybe I'll tie it back to the EIS. The EIS says one of requirements is that Hydro is supposed to provide known habitat of critical areas of woodland caribou and moose, including wintering and calving areas. And so I can just understand, you didn't believe, or you are of the opinion that the moose modeling did not need to be validated in order to meet that requirement?

THE CHAIRMAN: I think he's already answered that a number of times in a number of different ways.

MR. MADDEN: I'm asking specific to the EIS.

THE CHAIRMAN: Okay.

MR. SCHINDLER: I'll ask you to state that one more time just to --

MR. MADDEN: It says in the EIS that, based on available information, the EIS is to include known habitat in critical areas for woodland caribou and moose, including wintering and calving areas. And you have indicated that in order to present what you have done for Manitoba Hydro, you didn't validate the model used in order to come up with that. And you believe that in order to meet the requirements of the EIS, that didn't need to be done, validation?

MR. SCHINDLER: I think I indicated that we did not validate the moose model per se, but I explained a lot of the information that went into the nature of identifying those attributes which predict high quality habitat.

MR. MADDEN: And the reason aerial surveys were done, or what was done north of Red Deer Lake, was in relation to caribou. That's why additional effort was spent in that area?

MR. SCHINDLER: I would suggest that's not the case. However, in doing multi species surveys for caribou, we were able to accommodate multiple objectives in terms of assessing moose

distribution, which allowed us to assess those alternative routes looking for areas that had high concentrations of moose relative to alternative routes. There were also independent block surveys, 100 per cent coverage of a number of moose blocks that were flown in relation to some of the alternative routes to assess whether or not those areas were important to moose.

MR. MADDEN: Would you agree with me that quantitative assessment is better than qualitative assessment?

MR. SCHINDLER: It really depends on the context of what you are assessing.

MR. MADDEN: So if part of mitigation is to essentially monitor the effectiveness of the mitigation, you need to have a baseline or a starting point in order to go, okay, well, five years from now, yeah, our mitigation measures were correct. And isn't quantitative information more helpful to do that than qualitative?

MR. SCHINDLER: There is quite a bit of quantitative data, for example, the survey of the FPR provides actual quantitative data relative to the abundance of moose along the FPR. That survey was done specifically, that is quantitative

in nature, that we have information of locations of animals and tracks in relation to the FPR.

MR. MADDEN: So you're saying that that's what you would use as baseline to measure future mitigation measures?

MR. SCHINDLER: And I think I explained that in the slides presentation, the fact that those areas were flown using qualitative data.

MR. MADDEN: Is that what Manitoba Hydro is going to use as the baseline to effectively measure the mitigation measures?

MR. SCHINDLER: I would not be able to answer that question, because the environmental protection plan and the monitoring plans will be discussed, I believe next week, in terms of long-term monitoring, adaptive management or whatever.

MR. MADDEN: Okay. I'm going to move on to -- the EIS doesn't include details on the locations of the new access roads or what type of habitat would be affected by that. Your presentation earlier on spoke about that those access roads are clearly -- can have an effect on the moose population. In your opinion, don't you

think that those should be provided as a part of the EIS assessment?

MR. SCHINDLER: I believe that the access management plans that are being developed will be very cognizant of the potential effects of access into these areas. And we know that Manitoba Hydro will have access management plans, and that these plans will include restriction during construction of other third party vehicles, and no hunting by project staff.

MR. MADDEN: But it's hard to assess the impacts if you don't actually have that information, isn't it?

MR. SCHINDLER: We believe that the effects that we have described are based on what has been experienced, to some degree, in the past in access control. But we do know that access management plans will be developed, and it might be better talking to somebody from Hydro about the exact nature of those access management plans.

MR. MADDEN: But when you reach a conclusion of saying, we don't think -- it's not going to be significant, you haven't factored in those access roads or plans into that assessment? You're making the assumption that it will be

mitigable, but that hasn't been a part of your work that you've done on getting to the point of saying there's no significant impact on moose?

MR. SCHINDLER: Well, the one key factor that we have to remember, that the main route, the final preferred route from Red Deer Lake north, and as we move south as well, south of Moose Meadows, that it parallels very closely to existing linear development and infrastructure. That access is already in place. And for example, in the area south of The Pas, where the existing transmission line exists where the Bipole III will parallel is an area that has a snowmobile trail, it is an actively groomed snowmobile trail. It parallels roads, existing features. So the amount of extra access that will be required within those areas will not result in increased access into those particular areas associated with Bipole III.

MR. MADDEN: But you don't have that, you don't have that information?

MR. SCHINDLER: Well, we know where the FPR follows, it follows existing infrastructure.

MR. MADDEN: But in some areas it doesn't follow existing infrastructure?

MR. SCHINDLER: There are a few spots, but the majority of them would be in the far north. But as we move through Red Deer Lake north to The Pas, I don't have the exact numbers here, but it parallels existing features for the majority of the route. And as we go north, it parallels the Wuskwatim transmission line. And as we move to towards Ponton, you are following the rail line. So the existing linear effects already exist in those areas.

MR. MADDEN: So can we go to page 17 of your report where you do acknowledge, though, and I think it states map six, and we're halfway down the page. It says, map six illustrates the relationship of reduced moose densities with increased levels of fragmentation which is thought to be a function of increased access for hunting.

MR. SCHINDLER: I am sorry, can you just direct me to that again?

MR. MADDEN: The third paragraph down.

MR. SCHINDLER: Page 16?

MR. MADDEN: Page 17. It says, map six illustrates the relationship of reduced moose densities with increased levels of fragmentation which is thought to be a function of increased

access for hunting.

MR. SCHINDLER: And what is your question?

MR. MADDEN: So is there not going to be increased access south of Red Deer Lake because of Bipole III? Are you saying that all access is already -- it's already on the line?

MR. SCHINDLER: I think what that particular figure provides is that there is -- provided information that in areas that were fragmented, we tended to have less moose, which is supported in the literature and what one would expect if one had a familiarity with these areas along roads and so on, that you can have good habitat. But in areas where we have -- and again I'll reflect back to our little figure here -- you tend to find less, we tend to find less fragmentation in these areas that they are illustrating higher degree of moose presence and tracks. So it's a simple relationship. And I think most people that understand moose and the dynamics of access, and that as you have more trails and so on, that you would have less density, but I think less density of moose. But the point is that the majority of the FPR, there

are --

MR. MADDEN: I'm fine with that answer. But when you don't know what those access points are, you haven't factored that into your EIS evaluation. So we simply don't know, in particular in an area that's already challenged, we don't know, when we don't know where those access points will be -- we clearly say, yes, we'll deal with them in the environmental monitoring plan, but we aren't assessing them right now. You didn't look at them in your assessment of whether this will have an impact, south, and I'm talking south of Red Deer Lake?

MR. SCHINDLER: You know, really, we did include the effects of access as an impact to over hunting.

MR. MADDEN: You just don't know where they are?

MR. SCHINDLER: Yeah. And I think it has to be mitigated through the access management plan. I mean, there's obviously trails that have to be decommissioned, and strategic location using existing infrastructure and trails. So it certainly was factored in.

MR. MADDEN: So I want to go to page

105 of your report, and table 43. And it lists the residual environmental effects for moose and elk as, and I'll quote:

> "...populations maintained with the natural range of variability."

So implicit within that statement, would you not agree that it implies that the natural ranges of variability in Manitoba are known?

MR. SCHINDLER: In terms of moose, natural range of variability in the terms that we have considered would be based on, you know, a wealth of information from Manitoba Conservation, looking at highs and lows of various game hunting area of populations, and recognizing that populations do fluctuate through time and that there are things like large scale forest fires or --

MR. MADDEN: Yes or no? Are you saying that that's actually no -- that you know what that natural range of variability in Manitoba is?

MR. RETTIE: I would say that for game hunting areas where there are survey data, yes. Where there have been multiple surveys over multiple years, that's what I would use as a

natural range of variability.

MR. MADDEN: But you have just testified earlier saying there are some gaps in Manitoba, significant gaps, and Ontario definitely has that data, but Manitoba doesn't in some areas. So clearly you can't get to that conclusion the same way that you can in other jurisdictions?

MR. RETTIE: Well, I think you'll find that I didn't say there were gaps, but rather that I said that the frequency of surveys was longer -- sorry, the period between surveys was longer in Manitoba than in Ontario. So whether or not there are gaps in our knowledge of the range of population variability depends on what happens between those two surveys. And I would suggest that you're not going to see extreme jumps and then a return to a previous level. So if there's been a decline and it is proceeded over a long period of time, it's possibly something that could have been picked up earlier had there been more frequent surveys. But we probably didn't miss an extreme high and an extreme low between surveys. If there are six or eight surveys over a period of 30 or 40 years, that should give us a reasonable perspective on the number of animals in that game

hunting area. And coupled with information on disturbance and how game hunting areas vary in response to disturbance, whether large disturbances like fire, or continued disturbances like forestry, you should be able to then predict, given what had happened in a given game hunting area over a period of time, and what's known from other areas that have suffered the similar levels of disturbance, we should be able to come up with a reasonable expectation of what a natural range of variability is, given the habitat.

MR. MADDEN: Did you write the report as well?

MR. RETTIE: No.

MR. MADDEN: Okay. I want to understand what, because when I read that it says populations maintained within the natural range of variability. So that's a known within Manitoba?

MR. SCHINDLER: I think, as Jim Rettie here has explained already, the fact that there is information that is available, no one has published an actual range of variability for species within Manitoba.

MR. MADDEN: But you're coming to a conclusion, and then you use that conclusion to

get to a point of saying, well, the magnitude isn't significant. So if you don't know that range, how can you make the statement of saying that population is maintained at the natural range of variability?

MR. SCHINDLER: The effects of the population per se, as the transmission line itself, it would be -- what we are saying is that the 66 metre wide transmission line will not limit populations in those game hunting areas that it goes through. There are a whole pile of other factors, myriad of other factors in terms of what we talked about, habitat availability, the harvesting of animals. The extent of one particular transmission line and the associated access that would be attributed to it, given the fact that for the majority of the area it parallels existing features where there already is access, the effects of that transmission line will not have population level effects. And so I think that's what we're saying within the range of variability, the fact that, you know, it's certainly a concern about access associated with transmission lines, increased harvest, but the levels which are expected would not result in game

hunting area population decline.

THE CHAIRMAN: Mr. Madden, I have allowed you quite a bit of latitude, in fact probably too much latitude in your range of questioning. We're not here today to judge whether Manitoba Conservation has properly managed the moose population in the Moose Meadows area, or throughout the province for that matter. We're here to address how this project might impact that. So could you please narrow your questions into that? And perhaps if you could be direct in your questions, and if Mr. Schindler, you can be more direct in your answers, it might be more helpful to all of us.

MR. MADDEN: The reality is that I'm trying to get at how -- Manitoba Hydro has, all of chapter eight says not significant, not significant, not significant. If we don't unpack that -- like this is exactly what he's basing his magnitude on. So I guess maybe I should connect the path. But you can't rely on chapter eight if the underlying fact, if it's a house of cards that it's built upon. So I'm attempting to assess what, when they make these statements, that then he uses that statement to go into, you know, that

the magnitude is not significant -- that's what I'm attempting to do, is to unpack that. Because it's not clear to our experts, and I don't think it's clear to anyone. It's quite fine to be able to say in a nice chart, not significant, but what does that really mean if we don't understand the underlying data that it's based upon? And if they are relying on, if there is a lack of Manitoba Conservation data for the info, then that should be said.

THE CHAIRMAN: I understand what you're trying to do, and it's a valid goal or objective. I'm just asking that you be more direct and, again, that Mr. Schindler in his responses be more direct.

MR. MADDEN: I guess I should ask that these be yes, no, sir, from now on. I had the same thing with Ms. Zebrowski, there's a line, the company line that wants to be said. But when you come to that conclusion, populations maintained within the natural variability, and then you move on to say, you know, the natural ranges are needed, that you don't verify the impact, how do you arrive at that?

MR. SCHINDLER: I think it's actually,

if I can explain it this way, the area that is encompassed by the 66 metre right-of-way within the particular game hunting area, if you want to put it at that unit, or within the moose range itself, or a number of moose ranges that overlap with that particular infrastructure, is an extremely small percentage of the overall range for that moose in terms of its requirements for thermal cover, for food, et cetera, et cetera. It's a small portion of the overall available habitat within the study area, and even within a single moose's range.

The issue of over harvest is one of areas of possibly intersecting the high concentration moose areas, constructing through winter, having incidental harvest. A lot of that has been addressed through the routing, avoiding those areas, paralleling existing features. So clearly, the amount of habitat that is being affected and the amount of access is not going to result in wholesale devastation and decline of moose populations in the Bipole III study area.

MR. MADDEN: Okay. And that's the key. At the end you say in the Bipole III study area, which is the backwards banana. You aren't

segmenting it out in -- this is if I take the whole thing in its entirety, I'm not looking at it for the bottlenecked area south of Red Deer Lake?

MR. SCHINDLER: Yeah. And I believe there are --

MR. MADDEN: Sorry, you said yes, right? Yes? You said yes, okay, let's move on.

So in your response to -- well, I don't know if it's your response -- but in your response to our interrogatory 210, you have stated, or Manitoba Hydro has stated in this IR, it doesn't have sufficient data to outline the natural range of variability and sustainability thresholds for moose and elk populations. That's correct?

MR. SCHINDLER: I think if you read the response in its entirety, you will get a different interpretation.

MR. MADDEN: So you're saying you do have sufficient data to outline the natural range of variability and sustainability thresholds for moose and elk population?

MR. SCHINDLER: I think our point in this particular IR is that Manitoba Conservation, in determining the thresholds for closures, or for

areas to moose is sort of at their discretion. And they set population targets for the various game hunting areas.

MR. MADDEN: So I'm looking at 210, and it's saying, though, there is not sufficient data to outline the natural range of variability and sustainability thresholds for moose. That's what Manitoba Hydro is saying. Now, I recognize you aren't Manitoba Conservation, but you're saying, look it, we don't have that data. You're acknowledging it in the IR? Yes or no?

MR. SCHINDLER: That's what the IR says, yes.

MR. MADDEN: Okay. So let's move on to the definition of magnitude in volume 4, section 4.2.10, pages 4-32 of the EIS. And so what you --

MR. SCHINDLER: Can you read that section again?

MR. MADDEN: Volume 4 of the EIS, and it's section 4.2.10, pages 4-32.

MR. SCHINDLER: Okay, I'm on line here.

MR. MADDEN: Okay. So it goes on to say that magnitude which is used to determine

significance of effect requires a comparison of the effects to established thresholds of acceptable change. So that's the definition that you are using in the analysis to determine magnitude?

MR. SCHINDLER: Now, which line are you on here?

MR. MADDEN: The exact language is, established thresholds of acceptable change. It's page 4-32, and it's the definition of magnitude that's used in the EIS assessment.

MR. SCHINDLER: Magnitude is described that it has small, moderate and large.

MR. MADDEN: Sorry, how do you determine magnitude though? You're determining magnitude based on established thresholds of acceptable change, correct?

MR. SCHINDLER: I'm still not on the same line as you are. I've got magnitude, the predicted degree of disturbance the effect has on the component of the biophysical and socioeconomic environment, magnitude is described as small, moderate or large.

MR. MADDEN: So how do you determine magnitude? In order to determine magnitude, don't

you have to understand what the established thresholds of acceptable change are?

MR. SCHINDLER: The predicted degree of disturbance of the effect on --

MR. MADDEN: No, I'm asking you, you are the one who comes up with the final assessment of it. Wouldn't you, in order to determine the magnitude, have to have an understanding of what the established thresholds of acceptable change are? Yes or no? Do you think you need to have that in order to determine magnitude?

MR. SCHINDLER: No.

MR. MADDEN: You don't think you need to have that?

MR. SCHINDLER: Not specifically.

MR. MADDEN: What is not specifically?

MR. SCHINDLER: I want to be very careful here. Knowing thresholds of all species, what an accepted high and accepted low is --

MR. MADDEN: Let's talk specifically about moose.

MR. SCHINDLER: Well, that would be up to Manitoba Conservation in terms of their closures. In terms of the areas that they decide that they want to open or close, they would

determine those thresholds of acceptance in terms of population, which would be different, that would be in terms of a management action for hunting as opposed to an effect of a project.

MR. MADDEN: So you don't think that you need that information in order to make a determination of whether -- on effect?

MR. SCHINDLER: The magnitude of effect could be described with the information that we had in terms of knowing or understanding of the effects of the project, the right-of-way on moose relative to access.

MR. MADDEN: You have answered that. Let's move on.

So your conclusion is that for the Bipole III project, it's below established thresholds of acceptable change. So in this area, though, in an area that's already subject to closures, can you really come to that conclusion when -- like is any change -- once you're already at a stage where there is a closures, is change acceptable?

MR. SCHINDLER: I guess one question would be in terms of --

MR. MADDEN: No, I get to ask the

questions.

MR. SCHINDLER: Just in terms of the fact that the decline of that population, what has caused the decline? It could very well be habitat deterioration, whereas the population may not be able to rebound if habitat is an issue. There is a lot of habitat within that area 14 that is unfragmented and no access that does not have moose. The moose are located close to the areas where the highway is, within kilometres.

If you explain to me exactly what you want me to answer, I'll try to answer it.

MR. MADDEN: You have acknowledged you don't have that information.

MR. SCHINDLER: Yeah.

MR. MADDEN: When you are already in a stage where, you saw that big red blob where there's all those closures that are happening, is anything within the threshold -- now, I know that your analysis is in respect to the backwards banana, but in those sub areas where you are already at zero, or collapsing stocks, what is the range of acceptable change? Is anything really the range of acceptable change in that when you already have constitutional rights holders, as

well as average Manitobans aren't able to harvest?

MR. SCHINDLER: Well, those populations are resilient.

MR. MADDEN: You keep saying that.

MR. SCHINDLER: The populations are not crashed completely to zero. The game hunting area 14 could be an anomaly of reduced habitat. It seems odd that there's not moose throughout the entire game hunting area, that they seem to be concentrated in one little pocket, that this Moose Meadows is very important. And that is new information that was provided to us. And we are incorporating that into the new route changes and Manitoba Hydro has accepted that. We are looking at it, we are assessing it, and understand the critical nature of that particular little block.

MR. MADDEN: I'm not talking about the particular little block, it's not just that little block where all the moose in the area are. It's the entire area the stocks are collapsing. So the idea of entering, putting in a new linear corridor, is that an acceptable change to add in addition to that?

MR. SCHINDLER: Based on the predicted effects of a transmission line and what can be

mitigated, that the effect of that transmission line will not result in the crash of those other populations, particularly when they are closed at this particular moment. So during the closure period, during the construction period, during that critical time --

MR. MADDEN: So to follow that logic through --

THE CHAIRMAN: Can I interrupt? I think we need a time out. We'll take about 15 minutes, and hopefully many of us will refresh our brains and we can move this particular line of questioning and responses along more quickly. We do have many others who would like to have their piece this afternoon.

(Proceedings recessed at 3:08 p.m. and reconvened at 3:23 p.m.)

THE CHAIRMAN: I'll try once again and ask both Mr. Madden and Mr. Schindler if they could please be very direct in their questioning and answering so that we can continue to move this process along.

Mr. Madden?

MR. MADDEN: I will start with, would you agree with me that the success of the

monitoring and mitigation measures is going to require some baseline data that's quantifiable? Isn't the purpose of an EIS to essentially make predictions and then measure it by --

MR. SCHINDLER: Yes.

MR. MADDEN: So do you have that baseline data for the moose monitoring?

MR. SCHINDLER: There is some baseline data relative to the flight of the FPR, yes. And I think baseline data would be part of pre-construction monitoring.

MR. MADDEN: And that's all Manitoba Hydro is planning on using, is that FPR data?

MR. SCHINDLER: Without seeing the monitoring plan specifically for moose, you'd have to pose that question to Manitoba Hydro. But for VECs, there would be obviously some need to do pre-construction monitoring and get some baseline data for --

MR. MADDEN: So you don't have it right now?

MR. SCHINDLER: Baseline data, we've got some baseline data, but not completely, we've got habitat information, we've got --

MR. MADDEN: Good.

MR. SCHINDLER: Yes.

MR. MADDEN: Okay. Let's move on to, we'll call them snappers. On your moose management, are you aware of any additional areas that are under consideration for closures?

MR. SCHINDLER: I am well aware of the situation -- not well aware, but I realize that on the east side of Lake Winnipeg that there is some temporary closures.

MR. MADDEN: On the west side?

MR. SCHINDLER: I heard rumours of game hunting area 12.

MR. MADDEN: But that hasn't been confirmed?

MR. SCHINDLER: No, I think just in the world, the small world of wildlife professionals there has been discussion about game hunting area 12.

MR. MADDEN: I want to move on to your slide about incorporation of ATK. And I'm a little confused here, because when did you get the ATK in order to --

MR. SCHINDLER: We got the ATK after the -- prior to the assessment of the final preferred route, not during the --

MR. MADDEN: Well, you didn't get all of the ATK prior to the assessment of the final preferred route. You've got Northern Lights' study?

MR. SCHINDLER: Yeah, there was stuff that came in throughout, yeah.

MR. MADDEN: So the statement that it was incorporated was a little misleading?

MR. SCHINDLER: Not at all, it was incorporated into the environmental effects assessment.

MR. MADDEN: The Northern Lights ATK work was. You didn't have the other -- we have already gone through this with other witnesses -- you didn't have all the other self-directed studies by those times?

MR. SCHINDLER: As part of the assessment of the final preferred route?

MR. MADDEN: Yes.

MR. SCHINDLER: Yeah, we had the workshop interviews and a majority of the -- some of the ATK reports. Some of them were in draft, but not all of them.

MR. MADDEN: So how many did you have?

MR. SCHINDLER: Well, there's a number

of them, I'd have to get you a list. I mean, we could give you a list.

MR. MADDEN: Okay. If you can do an undertaking on which self-directed studies you had prior to --

MR. SCHINDLER: It would be the same for all specialists.

MR. MADDEN: Can we just go to your evaluation of the FPR, amount of habitat alteration small in comparison to availability, that slide. It doesn't have page numbers, so --

MR. SCHINDLER: Is it towards the end?

MR. MADDEN: Halfway, a little bit more maybe. That would be one recommendation I would ask for future Manitoba Hydro presentation, is that they actually have page numbers in the slides, because this has been confusing for I think everyone who has been up.

MR. SCHINDLER: Yeah, point taken.

MR. MADDEN: The point around the moose model, the study area contains 1,099 square kilometres of high quality moose habitat, only 22 square kilometres would be affected. And you say this is less than 2 percent. That's based upon the yellow banana, correct? It's not based

upon -- the large overall study area, it's not based upon looking at the bottleneck areas of where there is challenges to moose harvesting?

MR. SCHINDLER: Yeah, that is correct. It's a fairly blanket broad statement looking at the entire area, correct.

MR. MADDEN: And it can be somewhat misconstrued, that it's less than 2 percent is I guess in the eye of the beholder?

MR. SCHINDLER: Yeah, I mean, it would be.

MR. MADDEN: Yes. That's good. I'm done.

THE CHAIRMAN: Thank you very much, Mr. Madden. I understand Mr. Williams from the Consumers Association will be up next. Go ahead.

MR. WILLIAMS: Yes. Good afternoon Mr. Chairman, members of the panel, and Mr. Rettie and -- excuse me, Dr. Rettie and Mr. Schindler, good afternoon to you as well. And if you just want to say yes to all my questions, that would be fine with me as well.

Mr, Chairman, the focus obviously today is caribou and moose, and there will be some cumulative effects, a modest amount of discussion

today. In our cross-examination of subsequent Hydro witnesses, including Mr. Osler, there will be a bit of an overlap for comparative purposes. So I don't want you to think I'm sandbagging or splitting my cross.

Secondly, the panel has been very clear in terms of the preferred routes, or the revisions to the preferred routes, we will have an opportunity to ask questions about that later. But there are a few questions today that we will ask, mindful of the Chair's guidance. I'll let you know when they are coming, I think they will be within the intent of today, but you'll let me know otherwise.

THE CHAIRMAN: Thank you.

MR. WILLIAMS: And Dr. Rettie and Mr. Schindler, most of our discussion is going to be on boreal or woodland caribou. So unless you hear the word moose or white wolf or grey wolf, excuse me, or something like that pop up, or Pen caribou, you can assume that I'm speaking of woodland caribou.

And I just want to start with making sure I understand who did what. And we'll start with you Dr. Rettie. And I want to indicate,

unless I specifically direct a question to one of the witnesses, it's fair game. Whoever wants to answer, feel free.

But Dr. Rettie, in terms of the work that you've done, first of all, there was the work that you did in 2007, as part of the forum of experts prior to the -- in terms of Bipole III. That was one event that you participated in, agreed?

MR. RETTIE: Yes.

MR. WILLIAMS: And then we see you physically, if not spiritually, disappearing from the picture and reappearing to focus on the report that eventually became the August 2012 technical report, agreed?

MR. RETTIE: Correct.

MR. WILLIAMS: And that would be your primary involvement in this project?

MR. RETTIE: Correct.

MR. WILLIAMS: Now, Mr. Schindler, in terms of the -- I understand that you would be one of the primary authors of the November 2011 caribou technical report, agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And your team, your

firm has also got its name associated with a document called the Habitat Fragmentation Technical Report, and that would be something that you would also be involved with, sir?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And just in terms of the EIS, I'm focusing on caribou, in terms of chapter six, chapter eight, or chapter nine of the EIS, would you have had a role in the presentation of those matters as they -- of that document as it relates to woodland caribou?

MR. SCHINDLER: Yes.

MR. RETTIE: For me, no. No, I did not.

MR. WILLIAMS: Unless I misspoke, Dr. Rettie, I was addressing that to Mr. Schindler.

Mr. Schindler, just a couple of questions for you. In terms of your professional qualifications, apart from your many years of experience in the field, I understand that you completed your masters in science from the U of W in 2006, agreed?

MR. SCHINDLER: No, that was University of Manitoba.

MR. WILLIAMS: Okay, University of Manitoba. And the thesis that you worked on related to home range and core area determination in terms of the boreal woodland caribou in Eastern Manitoba, agreed?

MR. SCHINDLER: That is agreed, yes.

MR. WILLIAMS: And without going into details at this point in time, one of the -- you studied Happy Lake Road and the impact of that linear development on caribou habitat use, agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And there is a document -- and let me back up. Mr. Chairman, one thing I neglected to do, we have distributed a CAC supporting materials for cross-examination. We may not be going to it right now, but I just wanted to bring that to your attention. It's lengthy, it's double sided, it's intended to primarily do us for both today and tomorrow. I did want to apologize. We generally have a rule in my office that Mr. Williams is not allowed to have originals, but he was allowed to have originals in this case. And you'll see some highlighting and that for -- you'll get an insight into perhaps my chaotic mind. I apologize for the

scribbles that appear there.

Mr. Schindler, we can agree as well that you are a co-author of a document published in Range of Fire, 2012, which was towards a Manitoba Hydro boreal woodland caribou strategy, Outcomes Manitoba Hydro Boreal Woodland Caribou Workshop.

MR. SCHINDLER: Yes.

MR. WILLIAMS: Just in terms of that document, we won't come to it in a few minutes, my understanding is that it flowed from this woodland caribou workshop that Dr. Rettie spoke of, agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: In terms of the report itself, would you characterize it as an expression of your views, or an expression of the consensus of the workshop?

MR. SCHINDLER: I believe, and I would tell you that it's expressedly a reflection of the views of the workshop. There are components in there reflecting back on literature and assumptions, but yes.

MR. WILLIAMS: So in authoring or co-authoring this report, you were attempting to describe the consensus of that group of esteemed

experts that Manitoba Hydro gathered?

MR. SCHINDLER: Yeah, those tables are summaries of what the collective views were, recognizing that in some cases perhaps it was the -- there may have been one dissenting view here or there, but it was the collective view of the experts, yes.

MR. WILLIAMS: Okay. And while you may agree with it, it's really more a statement of the collective view of those experts with a dissent here or there, agreed?

MR. SCHINDLER: It would be something like that, yeah.

MR. WILLIAMS: Is that an accurate statement?

MR. SCHINDLER: Yes, sir.

MR. WILLIAMS: You don't need to call me sir. I'm not sure I am deserving of that respect. I am calling you Mr. though.

Dr. Rettie, we won't come to it yet, but you are a co-author of the 2007 report in Science Direct predicting the impacts of forest management on woodland caribou habitat suitability in Black Spruce Boreal Forest, agreed?

MR. RETTIE: That's correct. That was

in Forest Ecology and Management, yes.

MR. WILLIAMS: And thank you for that slight correction, I appreciate it.

And again this can go to either witness, but more probably, probably to you, Mr. Schindler. There can be no doubt that in preparing your caribou technical report, you conducted an extensive literature review, agreed, sir?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And among the authorities you cite is Vors et al from 207, Woodland Caribou Extirpation and Anthropogenic Landscape Disturbance in Ontario, agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: In fact, sir, that report figures prominently in the EIS, in your fragmentation study and in your technical report. Can we agree on that?

MR. SCHINDLER: As mentioned, I'm not so sure I would agree as a predominant, but, yes, it's referenced.

MR. WILLIAMS: Fairly frequently?

MR. SCHINDLER: I'd have to look exactly. We have referenced a lot of material,

but it's referenced.

MR. WILLIAMS: Okay. And another authority that you site is Corbin, you won't find that in that list of documents, from 209, Landscape Management for Woodland Caribou, The Protection of Forest Block Influences, Wolf Caribou Co-occurrence. Do you recall that, sir?

MR. SCHINDLER: I believe so.

MR. WILLIAMS: Perhaps you'll accept that subject to check, and if at a later date you find that I have misrepresented it, you'll correct the record?

MR. SCHINDLER: Yeah.

MR. WILLIAMS: Dr. Rettie, I thank you for your comparison of moose and caribou that you provided this morning. I don't think panel members need to turn there, but you provided a couple of helpful definitions. I am just going to make sure that we're on the same page in terms of understanding those definitions. And you'll promise not to laugh at me if I mispronounce any of the words. Can we agree to that, sir?

MR. RETTIE: You have my promise.

MR. WILLIAMS: Okay. Can we agree that the term fecundity generally refers to the

ability to reproduce?

MR. RETTIE: No, it's more than that. Fecundity is a measure, it's a quantitative measure of reproduction. So when we're talking about fecundity the way I expressed it in my presentation this morning was the number of offspring per female.

MR. WILLIAMS: So if we are looking at caribou or moose, it's the calves born per female, agreed?

MR. RETTIE: Yes, an average of them, yes.

MR. WILLIAMS: Well, we didn't do so well on the first one, but let's try recruitment. Can we describe in the context of caribou, recruitment is the survival of a juvenile boreal caribou to a point where it is added to the adult population?

MR. RETTIE: Yes.

MR. WILLIAMS: That's better. And would that generally take place, sir, between six to eight months?

MR. RETTIE: At the point -- it becomes independent from its mother at the age of about a year, but typically it's evaluated in late

winter. That's the time when surveys are most convenient. And it's generally accepted that the survival rate of the offspring between the survey period in late winter and the time at which it reaches its own independence would be similar to an adult's rate of survival, so that it's effective to calculate based on winter survivals.

MR. WILLIAMS: Not so much turns on it, sir, but in terms of how it's calculated, winter surveys, how many months out is that on average, generally?

MR. RETTIE: Let me see here, if they are born in mid May and you do a survey in mid March, so nine months.

MR. WILLIAMS: Okay.

MR. RETTIE: Sometimes there are other periods of times used, that happens to be a convenient one just because of weather and ease of which surveys can be conducted.

MR. WILLIAMS: Thank you for that. From time to time one sees in the literature the term extirpation. And am I correct in suggesting to you that that means local extinction, essentially the conditions of a species which ceases to exist in the chosen geographic area of

study, though it still may exist elsewhere?

MR. RETTIE: Yes.

MR. WILLIAMS: Now, Dr. Rettie, are you familiar with the term extinction debt, as it is used by Janzen?

MR. RETTIE: Extinction debt?

MR. WILLIAMS: Yes.

MR. RETTIE: I've seen it but I couldn't define it for you.

MR. WILLIAMS: Maybe this will help. Have you heard that term used in the context, extinction debt, to describe a delay between habitat loss and species disappearance?

MR. RETTIE: Give me a moment? That's starting to ring a bell. I believe it has to do with a time lag effect, so you've got animals that are -- where you are expecting a population decline as a consequence of an action, but it hasn't yet been realized. But I'm not going to hold myself to that definition because, I'm sorry, I don't have it in front of me.

MR. WILLIAMS: Not to worry. And let's move to time lag. And certainly perhaps to Mr. Schindler, but Dr. Rettie, feel free to chip in if you feel the need.

But, Mr. Schindler, in your report towards the Manitoba Hydro boreal woodland caribou strategy, you did comment upon the time lag response. And do you recall that, sir?

MR. SCHINDLER: Yes, I do.

MR. WILLIAMS: And essentially can we agree that by time lag response, focusing on the boreal woodland caribou population, we are speaking of the phenomena that it may take, in terms of caribou population declining in response to natural and cumulative human caused disturbances, it can take years or even decades to detect and/or quantify?

MR. SCHINDLER: Yes, that is correct.

MR. WILLIAMS: That was an answer I was probably hoping you could elaborate on, sir. But let's work with that.

MR. SCHINDLER: Yeah.

MR. WILLIAMS: Just as I understand it, one of the challenges in the area of boreal woodland caribou is that effects that are taking place today may not appear in a measurable context in the environment for years, or even decades.

MR. RETTIE: I would say that actions that take place today, the effects of those

actions may not be seen for years or decades, yes.

MR. WILLIAMS: And thank you for that clarification, that's far better wording.

Now, again, this can go to either Dr. Rettie or Mr. Schindler, but in the CAC book of excerpts, the very first page, numbered in the top right-hand corner, you'll find a reference to the Vors article, Woodland Caribou Extirpation and Anthropogenic Landscape Disturbance in Ontario. Do you see that gentlemen?

MR. SCHINDLER: Yes.

MR. RETTIE: Yes.

MR. WILLIAMS: We did notify your counsel. Is one of you more comfortable talking about this study than the other?

MR. SCHINDLER: We can both talk.

MR. WILLIAMS: Okay. If I can direct your attention in particular to page 6? For those of you working on a double sided copy, obviously it's on the other side of page 7. It might be caught by the staple.

In the bottom right-hand side of page 6 you'll see a heading, Management Implications. Do you see that, Mr. Schindler?

MR. SCHINDLER: Yes.

MR. WILLIAMS: Now, again recognizing that Vors et al were speaking, I want to direct your attention actually to the left hand side of that page, the last full paragraph which starts, "the extinction debt." Do you see that, sir?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And again recognizing that we're talking in the context of forest harvesting for this particular element, but is it your understanding that Vors et al, their study pointed to an approximately two decade lag between forest harvesting and caribou disappearance?

MR. RETTIE: Yes.

MR. WILLIAMS: And as I understand how that phenomena worked, sir, essentially after the action, the first effect was a growing population of moose within an environment increasing over a two to 15 year period after logging?

MR. RETTIE: Correct. Well, if I can add something to that?

MR. WILLIAMS: Absolutely, sir.

MR. RETTIE: The first thing that happens is, following forest harvesting you get a regeneration of the forest yielding early cereal stage forests, which are preferred moose habitat,

and the moose follow the forest.

MR. WILLIAMS: And following the moose, perhaps seven years or so in, in their study anyways, are the wolves?

MR. RETTIE: Correct.

MR. WILLIAMS: And then over time one starts to see the effect of increased prey and increased predators within that particular environment?

MR. RETTIE: That's right.

MR. WILLIAMS: Is that analysis generally well accepted in the literature in terms of this time lag effect?

MR. RETTIE: Yes, it is.

MR. WILLIAMS: Can we agree that in terms of adaptive management, this time lag effect can pose challenges, given that success or failure of habitat interventions may not be evident for years, or even decades?

MR. SCHINDLER: I think there are indicators it could be managed on a shorter period of time in terms of reflecting back on some of the work that has been commenced looking at adult female survivorship, and also the recruitment rates in terms of lambda in that five-year period,

looking at those trends. So, I mean, population decline is a long drawn out process, as you have indicated, but there are probably tools that could be used to assess in a more shorter term. For example, if a transmission line goes in and all of a sudden we find that 50 percent of our caribou have died the first year from wolves, well, you'd be able to adapt fairly quickly, or do something or, you know, working with the management agency say -- you know, I would not expect that, I'm just using that as a very extreme example. But there probably are tools that could be used for a shorter duration.

MR. WILLIAMS: And let's accept that, and I thank you for that helpful answer. But the reality is that given actions taking place today, and effects that may not materialize for a decade or 20 years, that that does pose challenges for adaptive management?

MR. RETTIE: Yes, I would agree it poses challenges for adaptive management. It depends on, given the chronology of events that we discussed moments ago where you see an increase in early cereal stage forest, followed by increase in moose, followed by an increase in wolves, there

are some of those things that, if you are trying to conduct an experiment and you are trying to avoid that end point where you have wolves in caribou range, you can be looking at some of those more proximate changes. So if you can avoid an abundance of early cereal stage forest in the first place, which in part can be avoided by having a very small disturbed area, or if you have that early cereal stage forest and you can avoid a build-up of moose population, then you can nip it in the bud, so to speak, and you don't have to wait for the end point where you have already had those first two steps occur and you now have wolves preying on caribou.

MR. WILLIAMS: Okay. We'll flip to page 7 of Vors and Schaefer's report? And just in this particular case, maybe my circling may have served some utility. You'll agree that certainly these authors are expressing the warning, directing your attention to the last sentence before the acknowledgment -- oh, two sentences -- first of all, that such delays can pose challenges to adaptive management?

MR. RETTIE: Yes.

MR. WILLIAMS: Okay. And they go on

to say that, in particular, issues in terms of assessing the efficacy of buffers will be important for long-term monitoring. Agreed?

MR. RETTIE: Yes, that's what I read here.

MR. WILLIAMS: Now, certainly in your discussion earlier, today you were talking about buffers in the range of 500 metres. Is that correct? I'll let you read that note.

MR. SCHINDLER: The buffers were in relation to Environment Canada's, through the National Recovery Strategy, they are based on a broad range of scientific evidence from papers and research all across Canada looking at the effects of linear development. And they came up with the 500 metres as the zone of influence for linear features, in terms of calculating disturbance on a particular caribou range.

MR. WILLIAMS: Okay. I may come back to that, sir. Thank you for that.

I want to go -- and this can go to either witness. In terms of speaking of the subject of better, we're trying to understand better the vulnerability of the woodland caribou population. Would I be correct in suggesting to

you that among North American -- watch my pronunciation of this one -- ungulates, woodland caribou have the lowest fecundity rates?

Mr. Schindler should know this. This comes from his masters thesis.

MR. SCHINDLER: Do you know how long it's been since I have opened that?

MR. WILLIAMS: Does that sound familiar, sir?

MR. SCHINDLER: They have very low fecundity rates compared to other ungulates such as elk, moose, deer.

MR. WILLIAMS: Dr. Rettie, you pointed out this morning that unlike other ungulates such as moose, woodland caribou rarely produce twins?

MR. RETTIE: Right. They are not unique in that regard though.

MR. WILLIAMS: Would it be fair to say that as compared to other North American ungulates -- among other North American ungulates, the successful, as compared to other North American ungulates, the successful recruitment of calves into the population is quite low?

MR. RETTIE: Yes. Not universally, but, yes, commonly quite low.

MR. WILLIAMS: And certainly this morning your evidence was pointing to the survival of productive adult females as being critical to the conservation and recovery of this species. Agreed?

MR. RETTIE: Yes, adult female survival is critical for any species.

MR. WILLIAMS: Okay. And again, recognizing that Mr. Schindler hasn't reopened his masters thesis, but either one of you can answer this. But would it be fair to say in terms of this species at risk that the herds are sensitive to even small reductions in reproductive potential, such as reduced members of breeding females in the population?

MR. RETTIE: Yes, I think that would be fair to say, particularly in smaller populations.

MR. WILLIAMS: And within smaller populations, the additional loss of a few adult females could lead to a local population decline?

MR. RETTIE: Through time, yes, it could.

MR. WILLIAMS: And in terms of the herds, in the six herds within the Bipole III

range, how would we characterize the relative size of those herds?

MR. SCHINDLER: It's been -- conducting actual population estimates on boreal caribou ranges is extremely difficult. They are not distributed in the way that you can count them as you do moose populations. And so we rely on estimates based on minimum counts during telemetry flights, and also some of the surveys and estimates that are provided by Manitoba Conservation. We have not been able to ascertain the precise populations of those particular evaluations ranges per se. So the estimates are based solely on what Manitoba Conservation -- plus our observations. We kind of work together to determine sort of a relative number. So population estimates for boreal caribou ranges are based on a number of different approaches, you know, professional opinion from those that have done surveys, telemetry flights, minimum counts, those type of things. And I just would add, like across the country, if you look at the national recovery strategy it really shows the variation in terms of the types of estimates and how they are based on things like flights and professional

judgment from biologists in the various areas.

MR. WILLIAMS: Mr. Schindler, just in terms of the record, and I'm sure it's there and this diligent counsel has just missed it, but in terms of the sizes of the six herds in question, can you direct me to where --

MR. SCHINDLER: We have some minimum counts in our report. I would have to pull that out.

MR. WILLIAMS: You don't have to turn there, sir.

MR. SCHINDLER: Yeah. But there are definitely some estimates, yes.

MR. WILLIAMS: And sir, based upon those minimum counts, do you have any observations in terms of the size of the herds as compared to others in Manitoba or elsewhere in Canada?

MR. SCHINDLER: In terms of Manitoba, I can tell you from my experience working across the province that the populations within the Bipole III project study area, in the views of collectively discussing with the regional wildlife managers and biologists, that the populations are, the groups, the aggregations are relatively robust. And in one case, for example, the

provincial strategy estimated The Bog population, I believe in the conservation strategy, I'd have to get the number, I think it was 50 or something like that. I can get you those actual numbers. But after doing some collaring and counting, we had minimum estimates of actually seeing in the neighbourhood of 97 animals in that particular population. So just by gathering more information we were able to ascertain that, in this case The Bog population was much more robust than what was originally thought by Manitoba Conservation.

MR. WILLIAMS: Okay. In terms of, leaving aside the specific populations and focusing on the vulnerability of the species, one of the particular vulnerabilities is calves being vulnerable to predation. Agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And another one relates to their particular vulnerability in terms of winter habitat, is that correct?

MR. RETTIE: I don't know that winter habitat is limiting for populations, so I don't think that would be -- I wouldn't say that was correct. It's important for them, but it's not normally limiting, I don't believe.

MR. WILLIAMS: Let me back up just on that point. I'm not trying to trick you, Dr. Rettie. If you just want to turn to your report which is at page 21 and 22 of the CAC excerpts?

MR. RETTIE: Right.

MR. WILLIAMS: In particular, page 22 on the right-hand side?

Can we agree at least that winter represent a period of reduced metabolic activity and caribou movement rates decline in that period?

MR. RETTIE: I think this is highly dependent on the range in which you are conducting studies. For some areas, this study in particular was conducted in an area with very deep snow, and caribou movement rates do decline. The snow conditions in Manitoba and Saskatchewan are considerably less onerous. And so for the purposes of this study, yes, I would agree. As a general statement, no, I would not.

MR. WILLIAMS: Just so I understand you, sir, you would distinguish this study for the purposes of Manitoba?

MR. RETTIE: I would distinguish this from being characteristic of what we experience

here, yes.

MR. WILLIAMS: Now, in terms of the risk of predation for woodland caribou, we can agree that predation by wolves is typically the main cause of population decline?

MR. RETTIE: No, I would say the predation --

MR. WILLIAMS: My words were predation by wolves, sir.

MR. RETTIE: No.

MR. WILLIAMS: Okay. What would we say is, in terms of predation, is typically the main cause of population decline?

MR. RETTIE: I would say it's a combination of predation by wolves and predation by bears.

MR. WILLIAMS: I was going to get to bears. So if I saw a statement, for example, at page 6-88 of the EIS saying that the predation by wolves is typically the main cause of population decline, you would amend that statement by saying it's wolves and bears?

MR. RETTIE: I would have to know the situation of the particular herd in question.

MR. SCHINDLER: Okay. I think that

particular example relates to perhaps references of Vors and that it relates the whole dynamic of habitat change on the landscape and the predator prey. And even within the national recovery strategy, it's that predation typically by wolves. So it's a statement that -- but there are certain variances among populations as you go across the boreal forest. But where decline has been indicated, the majority of cause, particularly in Ontario and other places, has been from wolves, I believe, and Alberta.

MR. RETTIE: Yeah, it's wolves are known, bears are a great unknown, their predation rate on neonatal animals, juveniles in the first couple of months of life is suspected to be high but it's been very difficult to show.

MR. WILLIAMS: And sir, that was one of the points from your workshop, indeed, was the importance of looking at the impact of bears in terms of their predation rates on young caribou, agreed?

MR. RETTIE: Agreed.

MR. WILLIAMS: And in terms of the August 2012 technical report, you don't need to turn there, sir, I think this is -- but can we

agree that there was not a great deal of analysis in terms of bears?

MR. SCHINDLER: Yeah, we can agree. I think there's some preliminary information relative to some trials, camera trail trials in calving areas and control areas. And we do recognize that there is a high degree of mortality of calves, or to the degree that Dr. Rettie has explained earlier this morning that there is mortality happening to calves.

MR. WILLIAMS: Okay. But as one digs through that August 2012 report, the great unknown of bears do not figure prominently, agreed?

MR. RETTIE: Yes.

MR. SCHINDLER: Yes.

MR. WILLIAMS: Now, I wish to -- just in terms of terrain of the Bipole III boreal herds, and specifically in terms of accessibility today by snowmobile, can we agree that the nature of the terrain, as it relates to the Wabowden bog and Reed ranges is more accessible today by snowmobile than the more dense coniferous habitats occupied by boreal woodland caribou in other ranges?

MR. SCHINDLER: You're referring to

other boreal caribou in dense forests as opposed to open bog areas?

MR. WILLIAMS: In all three ranges, sir. If you want me to break it down --

MR. SCHINDLER: Well, the Reed Lake range has, you know, there is bog and part of its winter -- it is kind of a mix of habitat there.

MR. WILLIAMS: Fair enough. Open and sparsely treed bogs, fair enough, sir.

MR. SCHINDLER: Snowmobile accessibility, just by the nature of terrain, would be easier within bog and open fen environments, for sure.

MR. WILLIAMS: And as compared, focusing on the open and sparsely treed bogs as compared to the more dense coniferous habitats occupied by other boreal woodland caribou, this would make these populations more susceptible to illegal hunting and poaching. Agreed?

MR. RETTIE: I think one of the important things is to note that boreal woodland caribou right across the country are found in areas with large open bogs. It's true in Ontario, it's true in Saskatchewan and Alberta. So that's not a unique feature of these populations. Sorry,

if you want to ask your question again? That's a precursor to my answer. If you ask your question again, I'll be happy to answer it.

MR. WILLIAMS: I think the question was a fairly simple one. Does the nature of the terrain in all three ranges, i.e. open and sparsely treed bogs, make them more susceptible to illegal hunting and poaching as compared to populations in more dense coniferous habitats?

MR. SCHINDLER: I think intuitively yes, but we do not see that in terms of mortality or poaching or events relative to the various populations, that we do have caribou that are in very forested environments, and areas like The Bog, for example, where we are not seeing a high degree of snowmobile activity within those areas, plus they are protected, and there's not a lot of hunting of boreal caribou typically or, you know, the hunting of boreal woodland caribou is relatively not a factor in our knowledge of mortality sources.

MR. WILLIAMS: So we have moved away from our little yes arrangement, which is fine.

MR. SCHINDLER: I am sorry.

MR. WILLIAMS: It is fine, sir. I'm

just teasing you. I think I have an intuitive yes, but that you are alleging that the evidence to date has not borne that out?

MR. SCHINDLER: Yes, that's correct.

MR. WILLIAMS: And in terms of the evidence that you rely upon, how many years is that, sir?

MR. SCHINDLER: I would say I've been working with boreal caribou in different ranges since about 1986, and working on the land, on the ground, flying over areas, and that would be based on that experience.

MR. WILLIAMS: Now, is it fair to say that in your EIS, and I don't think you need to turn here, but if you wish, it's pages 898 and 899.

MR. SCHINDLER: She'll look for it if I need it, but if you want to ask me the question?

MR. WILLIAMS: A concern was raised about, and I'm putting the words potential in quotation marks, for increased movement of grey wolves along the right-of-way following construction with the suggestion that this movement would be facilitated due to the compaction of snow along the right-of-way by

machinery and human movement.

MR. SCHINDLER: Yes, that was identified.

MR. WILLIAMS: And we'll come back to that point a bit later. This can go to either witness but I suspect it more properly goes to Dr. Rettie.

In terms of the sustainability of a local population, you'll agree that it can be encapsulated by lambda, which describes a ratio of recruitment, including calf fecundity and survival against mortality, the number of surviving adult females?

MR. RETTIE: Yes.

MR. WILLIAMS: And if you are a humble lawyer trying to calculate lambda, and you don't have the recruitment data, you can't do the calculation.

MR. RETTIE: That's right.

MR. WILLIAMS: Okay. And we'll come to your August 2012 report a bit later, but it would be accurate to say that the August 2012 report did not explore the recruitment and lambda for Reed Lake, agreed?

MR. RETTIE: Yes, agreed -- no, hang

on, excuse me for a moment. No, I won't agree to that.

MR. WILLIAMS: Well, I think you're going to before too long, sir.

MR. RETTIE: Allow me to check.

MR. WILLIAMS: And sir, you are probably, if the panel is looking for spots, you are referring to slides 58, 59 and 60?

MR. RETTIE: You're right, there's a blank line there, absolutely correct.

MR. WILLIAMS: So when you look at those slides, sir, you've got the annual survival data for Reed Lake, agreed?

MR. RETTIE: Agreed.

MR. WILLIAMS: But we lack the annual recruitment data for Reed Lake, agreed?

MR. RETTIE: Agreed.

MR. WILLIAMS: Therefore we can't calculate the annual rate of increase?

MR. RETTIE: Agreed.

MR. WILLIAMS: Am I correct as well, sir, and we'll come back to that study a fair bit later, in suggesting to you that in terms of altered habitat, it is the Reed Lake habitat which in your August 2012 report is in excess of 40

percent?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And Dr. Rettie, these next questions probably are to you, and relating to your report found at pages 21 or so in the -- 21 and 22 in the CAC Manitoba book of documents.

I think we have already agreed that in terms of the time lag phenomena, in terms of the response of caribou population decline to natural and cumulative human caused disturbances, that can take years or decades to detect and quantify?

MR. RETTIE: Agreed.

MR. WILLIAMS: And would it be accurate to say, sir, that if we are looking for an analysis, empirical analysis of habitat management plans, those empirical evaluations are really rather limited in the literature?

MR. RETTIE: Sorry, could you repeat your question?

MR. WILLIAMS: Yes, and maybe I'll ask it better. If one were to do a literature review and look for long-term empirical evaluations of habitat management plans, can we agree that that literature is fairly scanty?

MR. RETTIE: Yes.

MR. WILLIAMS: And that analysis of, empirical analysis of the success of those management plans is in part a consequence of that time lag effect, essentially that the temporal scale of ecological processes often hinders the long-term monitoring of the outcome of a strategy, agreed?

MR. RETTIE: Agreed.

MR. WILLIAMS: And certainly, sir, in the context of this report, directing your attention to page 22 if you need it, it was your observation, along with your colleagues, that most field studies employed to evaluate management practices are of short duration and are unable to assess the long-term persistence of animal populations that are sensitive to forest harvesting?

MR. RETTIE: Agreed.

MR. WILLIAMS: And in the context of this report, recognizing the dearth of long-term empirical evaluations, you were offering an alternative in terms of a modeling exercise, agreed?

MR. RETTIE: Yes.

MR. WILLIAMS: Now, to your knowledge,

has such a modeling exercise been conducted in terms of Manitoba Hydro's long-term management plans for this population? And that can go to either witness.

MR. SCHINDLER: I believe that the long-term management of the various ranges is the responsibility of the Province of Manitoba. And they are under -- with the new national recovery strategy that was just finalized within the last weeks, that they will be developing range strategies. And in the context of shared responsibility, we would assume that the results of Manitoba Hydro's research and information would be a part of that discussion in terms of looking at the various activities that are happening on these landscapes where caribou exist, there are forestry activities, there are mining operations, and looking at whether or not the province embraces the concept of thresholds of disturbance that have been identified. So Manitoba Hydro wouldn't be doing any kind of range management strategies per se, but --

MR. WILLIAMS: You're not suggesting -- and, sir, if I'm getting outside your evidence, you'll advise me -- but you're not

suggesting that Hydro is not proposing mitigation and management plans for these herds?

MR. SCHINDLER: Your question --

MR. WILLIAMS: Just answer that question first?

MR. SCHINDLER: It's the mitigation and management of the effects of their transmission line on that population.

MR. WILLIAMS: Okay. So we are agreed that they are proposing mitigation and management with regard to the effects?

MR. SCHINDLER: And I think monitoring is a big part of that as well.

MR. WILLIAMS: Okay. And within that context, sir, to your knowledge, has any modeling been done in terms of the potential success of those activities?

MR. SCHINDLER: From Manitoba Hydro's perspective or the research that we had done, no.

MR. WILLIAMS: Thank you. Now, both Dr. Rettie and Mr. Schindler, in your discussion of this morning you will recall that you talked about, without asking you to elaborate, uncertainty related to the literature in certain areas. And we'll get into details in a moment.

But you'll remember, in terms of the research you talked about some uncertainty in terms of the literature in the research. Let me back up, I'll try it again.

MR. SCHINDLER: I recall talking about the uncertainty of the effects of mitigation in relevance to the Wabowden range, I was discussing that.

MR. WILLIAMS: Okay. Backing up, when we take a big picture view of boreal woodland caribou, would it be fair to say that today there continues to be several key issues and knowledge gaps at both the national and regional scales?

MR. RETTIE: I'm having a hard time answering that, I'm sorry. I don't know that there are several key issues that we are ignorant of. I think there's a lot of -- there are a lot of things for which there is yet to be sufficient empirical evidence, but the burden of evidence from what we do know has pointed us in some pretty clear directions.

MR. WILLIAMS: Okay. Well let's -- and again, Mr. Schindler, if you need to turn to the EIS, I'll give you the references. But it certainly was Hydro's assertion in the EIS at page

8-35, that the long-term effects of fragmentation on caribou movement and persistence are still largely unknown and require study. Agreed?

MR. SCHINDLER: I would agree with that.

MR. WILLIAMS: And if something is still largely unknown and requires study, can we agree that there's an element of uncertainty associated with that?

MR. SCHINDLER: Sure can, yes.

MR. WILLIAMS: And certainly, and again this comes from your, I'll suggest to you from your Toward a Manitoba Hydro Boreal Woodland Caribou Strategy, it has been the suggestion of that report that the cumulative effects of transmission line construction and operation as a factor responsible for a decline are not clearly understood. Can we agree on that, sir?

MR. SCHINDLER: Yes, we can.

MR. WILLIAMS: And if something is not clearly understood, there's an element of uncertainty. Agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And certainly again, recognizing the limited studies that you have done

in your August report, we can agree that there is, in terms of the extent of avoidance of transmission lines by boreal caribou during construction or operation, that extent of avoidance is still not well understood? Agreed?

MR. SCHINDLER: I would agree.

MR. WILLIAMS: And we can agree as well, sir, that in terms of predator density and the use of linear developments in Manitoba, more research is still required?

MR. SCHINDLER: Yes, I can qualify that, that Manitoba Hydro has -- some wolf monitoring has been conducted, preliminary, but there is more research required to determine those effects, definitely.

MR. WILLIAMS: It's preliminary, sir, agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: And in terms of the great unknown of bears, how are we doing? Do you need some work?

MR. SCHINDLER: Yes, there is an unknown about the effects of bears and their effect on populations, particularly the calf cohort component.

MR. WILLIAMS: And can we agree as well that linear development as a cumulative pathway of decline is not clearly understood in the scientific literature?

MR. SCHINDLER: Yeah, the contribution of linear facilities, linear development relates to density of these features on the landscape. And those thresholds or amount of linear disturbance is not understood, well defined within the literature. For example, you can't go to the literature and say, well, a transmission line in this habitat is going to result in this type of mortality, plus or minus this percent. That type of data information does not exist. Although we know, as the expert says, intuitively thought to be low. I think that's what the results of our workshop was, I think everybody thinks this. But again, it's the amount of disturbance. Linear development by itself, you've got to be careful, it's the cumulative effect of many activities that contribute to that decline, as Vors has indicated in her paper.

MR. WILLIAMS: And indeed, sir, in this particular issue in terms of range fragmentation, your panel of experts noted that it

included the unknown effects of linear development and access. Agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: Okay. And certainly Hydro, or through its EIS, pages 8-128 and 129, has asserted that there is scientific uncertainty regarding the residual effects resulting from the project's linear development and how this contributes to the overall cumulative effects from other disturbances within ranges. Agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: Now, Mr. Schindler, if your colleague has your EIS there, it's page 8-101 that I want to direct your attention to. Sir, it's not in my materials. Mr. Schindler, just before you start looking, you may want to just pull up the page number 8-101.

MR. SCHINDLER: That's what I'm looking at.

MR. WILLIAMS: In your EIS at page 8-101, in terms of the species at risk known as boreal woodland caribou, you indicated that there is no known disturbance threshold for boreal woodland caribou sustainability in general, let alone specifically for boreal woodland caribou in

the Wabowden range. Do you recall that statement, sir?

MR. SCHINDLER: Where is it again? I just want to get the context, which paragraph?

MR. WILLIAMS: I can't hear you.

MR. SCHINDLER: I'm sorry, whereabouts is that on this page 8-101?

MR. WILLIAMS: Of your EIS. I don't have it in front of me, sir. Do you recall that statement -- or is that a statement that you recall making, sir?

MR. SCHINDLER: A quote from the EIS?

MR. WILLIAMS: Yes, if you trust me, sir.

MR. SCHINDLER: I do trust you.

MR. WILLIAMS: You'd better consult with Ms. Mayor and Mr. Bedford.

MS. MAYOR: That is contrary to advice.

MR. WILLIAMS: Mr. Schindler, I'm just teasing you.

MR. SCHINDLER: Oh, that's good. You seem like a nice man.

MR. WILLIAMS: I agree.

MR. SCHINDLER: Okay.

MR. WILLIAMS: Especially compared to Mr. Madden.

MR. SCHINDLER: Okay, I'm sorry, if you can just repeat your question?

MR. WILLIAMS: In the EIS, the corporation asserted that there was currently no known disturbance threshold for boreal woodland caribou sustainability in general, let alone specifically for boreal woodland caribou in the Wabowden range.

MR. SCHINDLER: I'd like to see the context of that. I found it.

MR. WILLIAMS: So, sir, that's what you stated in the context of the EIS. Has that changed, that opinion?

MR. SCHINDLER: I believe that statement would be correct in terms of the threshold, for example, that has been determined by Environment Canada at the 35 percent disturbance rate. At the time of writing it was draft. And even to this day that I believe that there is no fixed threshold of disturbance that ultimately decides decline or persistence of a caribou population. I don't think anybody has really determined that as yet. There are

guidelines or targets that are set in the national strategy, and there are other targets of disturbance that have been established for other ranges within Manitoba, such as the amount of disturbance within core area. But there's no real known magic number in terms of once you hit this much disturbance, the scales are tipped. There are certainly regulatory type thresholds such as the national strategy, as it indicates. But I think that statement would be correct, or I know it to be correct.

MR. WILLIAMS: And sir, within that context, is that yet another element of uncertainty?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And if you can't answer this, I'll understand. But in terms of those Federal guidelines and the S curve that flowed from them, would I be correct in suggesting to you that what they were attempting to do with those guidelines was to describe the relationship between habitat disturbance and lambda?

MR. SCHINDLER: I think it would be more related to population persistence.

MR. WILLIAMS: And has the corporation

explored -- let me back up. Recognizing that this is a national standard based upon different populations in different communities, have you in your investigation explored the appropriateness and the applicability of those guidelines for Manitoba?

MR. SCHINDLER: I believe in our presentation, we have in some ways assessed against those standards. And the notion that lambda population persistence, long-term reduced rates of lambda, however you want to put it, when we compare it against the disturbance levels of our evaluation ranges, we didn't see this S curve or linear relationship in terms of disturbance thresholds affecting lambda. And, you know, it's an interesting piece of evidence that you would expect, you know, if the national strategy was a model that would be fulfilled with the hypothesis that with increased disturbance you get reduced lambda, we would see some type of a relationship where, you know, maybe there would be. But it seems that, even looking at the Ontario data, that calf recruitment seems to be down in many areas of the boreal forest throughout -- in these last couple of years. So there could be something

intrinsically going on in the landscape in relation to why calf production is so low. Yet as Dr. Rettie indicated, the adult female survivorship is right up there with normal rates found across Alberta and Saskatchewan.

MR. WILLIAMS: And I thank you for that thoughtful answer, so I'm not chastising you. Let's take that, we'll take that into two parts. And we don't need to pull up slide 60, but certainly in terms of persistence or lambda in terms of the boreal herds, at a general level we have to -- you would agree that with results in the range of one or less than one, those were pretty disappointing results for the two years of analysis you presented. Agreed?

MR. SCHINDLER: Well, as a keen lover of boreal caribou, I would say would be disappointing, yes. However, I would like to qualify that boreal caribou herds across their range tend to remain very static. I mean, our knowledge of large population increases and declines have not been documented in habitats similar to those in Manitoba with the levels of disturbance. If you had positive lambda, high positive lambda, you would see boreal caribou

populations expanding. They seem to control themselves somehow naturally within these areas at populations that seem stable over longer periods of time. So you would expect that the lambda rates, bad years like this would be followed -- and I think Dr. Rettie explained that, that it could be equaled off very quickly with one or two years of good production. Hence even the national strategy would suggest that, you know, you have to monitor lambda for at least a five-year period before you get some kind of true trend.

MR. WILLIAMS: And we recognize that the data is limited, sir, but it's all the data we have, agreed, in terms of these herds?

MR. RETTIE: The data are limited in terms of the number of years. We have good data for the years that we do have, that we have been conducting the study. So I'm comfortable with the numbers that we have and confident in them. But two years worth of data, I wouldn't be hitting the panic button, I'd be looking to extend the study and continue to monitor those populations, particularly the ones that are intersected with the transmission line. And if we have another two or three consecutive years of almost no

recruitment, then I'm going to be worried. But at this point, I'm not worried yet.

MR. WILLIAMS: We'd be a lot happier if that recruitment level was higher, sir, leaving aside your scientific objectivity?

MR. RETTIE: I wouldn't get overly excited by one year of high recruitment either.

MR. WILLIAMS: Fair enough. Going back to Mr. Schindler's very interesting answer of a couple of minutes ago, is the team questioning the utility of that disturbance persistence ratio as a threshold in Manitoba?

MR. SCHINDLER: The team?

MR. WILLIAMS: Well, you two. I've called you a team. It's a small team.

MR. SCHINDLER: We'll have to have a team meeting.

MR. WILLIAMS: Certainly, sir, that was the message I was receiving this morning. You were starting to question the utility of that threshold, based upon your preliminary results?

MR. SCHINDLER: The theory of thresholds, like a blanket number for every boreal caribou range across the country, it's a guideline. And there's obviously huge differences

as you move across the country, across the Province of Manitoba, that the resiliency of populations to disturbance is a factor of things like predator densities. There's some boreal caribou ranges that exist in these areas that do have low predator densities, because they are not moose habitat. If moose -- pardon me, if a pack of wolves were to forage solely on boreal caribou, the boreal caribou populations would cease to exist because there is just not enough biomass to maintain large packs of wolves through time. What you find is that in some areas you can have high disturbance rates if there's low numbers of predators. A lot of the areas in Vors' studies, you know, it's a long term assessment of habitat disturbance. And a lot of that area was probably old forest, and the disturbance patterns resulted in those real changes to the ecological communities creating habitats suitable for moose, and the wolves moving in, and out competing the caribou, resulting in that predation effect.

So the idea of these thresholds is, it's difficult to say that there's one number, one size fits all. It just does not work for the threshold. So I think we would challenge that

particular threshold, as identified by -- I mean, I would personally.

MR. WILLIAMS: Okay. I'll reflect upon that, sir.

Just in terms of one additional element of uncertainty, and sir, it's on the same page that you've got there, page 8-101. Certainly the EIS indicates that there has not been an adaptive management strategy implemented to date for this range, and accordingly, there's no basis today to conclude that such a strategy would be 100 percent effective in maintaining the population. Do you see that, sir?

MR. SCHINDLER: Yes, I do.

MR. WILLIAMS: Do you maintain that position today?

MR. SCHINDLER: Some of these comments were based on the -- some of the uncertainty, and I suggested that in my slide presentation, or our presentation, related to the routing through the Wabowden range and the concern in that particular area, and the effectiveness of mitigation, and the need for adaptive management and integrated solutions to ensure that the project effects would not be felt. So as far as an adaptive management

strategy, I believe that that is something that will evolve from Manitoba Hydro's development of an environmental protection plan and monitoring strategy. And that would likely be posed to Manitoba Hydro. But the need for some form of adaptive management and monitoring, monitoring that feeds into learning from the results of our monitoring would be very, very advantageous.

MR. WILLIAMS: Mr. Schindler, I'm probably getting tired, as are you. I'm going to try and be a little terser in my questioning, and you respond as you see fit. And we're moving to moose, we're going to come back to caribou. For the panel's information, I don't think I'll be done by 5:00 today but --

THE CHAIRMAN: How long do you think you might be?

MR. WILLIAMS: It's a tough question to ask Mr. Williams, he was notorious, but I would guess at least another hour, sir.

THE CHAIRMAN: I think we may go for another half an hour and then we'll call it a day.

MR. WILLIAMS: So I want to talk, Mr. Schindler, about moose for a couple of minutes and then we'll flip back to caribou. But, sir,

generally as I understood your evidence in terms of the response of moose to fire, you indicated this morning that they respond positively in the range of 20 years. Did I get that right?

MR. SCHINDLER: That's what I said, yes.

MR. WILLIAMS: In your mammal technical report, you do not need to turn there, sir, but it's at page 25, I think you make the assertion that the Bipole III line, including its 66 metre right-of-way, impacts an area of roughly 22 square kilometres. Do you recall a statement like that?

MR. SCHINDLER: Yes.

MR. WILLIAMS: Would you agree, sir, that that 66 metre area will serve effectively as a fire break within certain regions of the study area?

MR. SCHINDLER: No.

MR. WILLIAMS: So it's your opinion that it will not act as a fire break within this area?

MR. SCHINDLER: Well, as part of my background, I have also done a lot of fire fighting. And I can tell you that transmission

line corridor would not be an effective fire break during a wild fire. Although I am not a fire expert, that's my opinion. I have seen a lot of fires.

MR. WILLIAMS: Sir, in your analysis, did you examine the literature, if any, in terms of whether a right-of-way of this magnitude, with the clearing associated with it, acted as an effective fire break?

MR. SCHINDLER: I don't believe we did an active literature review on that particular subject, no.

MR. WILLIAMS: Can we agree, sir, that if there is a wild fire within the region of Bipole III, that it is likely to expect that Manitoba Hydro would be actively engaged in fire suppression to protect its multi billion dollar investment?

MR. SCHINDLER: I do not have that information, I would have to defer it to someone in Hydro to answer that question.

MR. WILLIAMS: So in your review of the impact of the line, would it be accurate to say that you did not assess the impact, if any, of fire suppression activities related to the Bipole

III line and right-of-way?

MR. SCHINDLER: Are you referring to Hydro's suppression of fires or -- because there's a --

MR. WILLIAMS: Well, to back up, sir, we have agreed that moose like the aftermath of fires, agreed, in 20 years?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And we could also agree that wildfires perform an important function in terms of the forest and its impact on old growth forest, agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: And what I'm suggesting to you is that in the course of your evaluation of the impacts of the Bipole III transmission line, you did not consider the indirect effects of the Bipole III transmission line acting as a fire break. Agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: And I'm further suggesting to you, sir, that in your investigation of the Bipole III transmission line and its impacts upon mammals and their habitat, you did not investigate the indirect effects of any fire

suppression activities undertaken by Manitoba Hydro in order to protect its very valuable property. Agreed?

MR. SCHINDLER: It's my knowledge that Manitoba Hydro does not conduct fire suppression, and that's the responsibility of Manitoba Conservation. Suppression activities are a function of the Province of Manitoba.

MR. WILLIAMS: And the impact of those activities in terms of the old growth forest habitat was not investigated in the course of your report. Agreed?

MR. SCHINDLER: In that sense, no. However, in the caribou supplemental report there is a section on assessing the fire history within the various eco districts.

MR. WILLIAMS: Let's turn to caribou for a second, sir. And again, I know you haven't opened your thesis for a while.

MR. SCHINDLER: Actually, I have. I was kidding you. See, I can kid too.

MR. WILLIAMS: And you do it well, sir.

In terms of woodland caribou and the impact of fire, would it be fair to say that this

species is well known for its ability to deal with short-term habitat adeptness? Do you want me to ask that again, sir? I didn't ask that very well.

MR. SCHINDLER: Yeah, it would be very nice, thank you.

MR. WILLIAMS: If terms of adjusting to fire within the habitat of woodland caribou, would it be fair to say that the caribou's process of abandonment of a particular habitat may take up to five years?

MR. SCHINDLER: That would be a very accurate statement, yes.

MR. WILLIAMS: And that flows from the species' adeptness in dealing with short-term habitat detriments, agreed?

MR. SCHINDLER: I think it would also be attributed to fidelity, range fidelity, site fidelity as well.

MR. WILLIAMS: So, sir, if you were examining the impacts of a particular herd's movement in response to fire, let's say in 2010, would it be fair to say that we won't know the full effect until probably five years?

MR. RETTIE: I would say that having empirical evidence of the full effects, that would

be correct. But our knowledge from studies done elsewhere will tell us that they will abandon a burned range, so we can anticipate the effect.

MR. WILLIAMS: Okay. Now, am I correct, and we'll come to your report probably tomorrow now, but am I correct in terms of the cumulative -- assessing the prospective cumulative effects on woodland caribou, as found in your August 2012 report, you excluded fires in the prospective time period?

MR. SCHINDLER: Yes, we did.

MR. WILLIAMS: I'm going to ask the witnesses, or the team as I now call you, the team to help me to understand the concept of landscape and regions. And I'm not sure if it will assist or not, but Ms. Johnson I think, who is ever helpful, I'm just going to ask her to cue up a map. And the first one will be 8-1.

Could you make that go back to the one you had before, sir, the size, I think that was --

MR. SCHINDLER: How's that?

MR. WILLIAMS: That's good, thank you.

Just for the record, and we'll come back to this map in a second, but for the record, perhaps you could agree that what we're looking at

right now is map 8-1, which represents the extent of boreal woodland caribou range winter core use areas. Can we agree on that, sir?

MR. SCHINDLER: Yes, we can.

MR. WILLIAMS: And I'm going to come back to that map in just a second, so if you can leave it there. And this again can go to either Dr. Rettie or yourself. But if I were to read the words of a wise man in the Towards Manitoba Hydro Woodland Caribou Strategy, can we agree that the presence of boreal caribou is a function of the ecosystem at a regional or landscape scale? Mr. Schindler, that's from the --

MR. SCHINDLER: That sounds very familiar. It sounds like you are reading from the report.

MR. WILLIAMS: When we talk about an ecosystem at a regional or landscape scale, sir, what do we mean by that?

MR. SCHINDLER: I think the perspective of caribou landscapes could be described as very broad areas going across the region. We often tend to reference eco districts and eco regions. Regional scale might be just a bit smaller scale relative to perhaps the -- in

reference to that would be essentially the range area, kind of a more regional approach as opposed to broad landscapes.

MR. WILLIAMS: Okay. And so when we speak about the regional or landscape scale, we're speaking in a context that is broader than the study project area. Agreed?

MR. SCHINDLER: Yes, I would agree.

MR. WILLIAMS: And I don't know if you have one of those fancy little pointers, but if we were to point to the Wabowden herd winter range, which I believe is the yellow, we can see looking at map 8-1 that that extends beyond the project study area. Agreed?

MR. SCHINDLER: That is correct, yes.

MR. WILLIAMS: And indeed, it extends, you'll agree, really to or beyond the Bipole I and II lines, at least to some degree?

MR. SCHINDLER: Correct.

MR. WILLIAMS: And we can see that effect, again, sir, if we go down to The Bog. And again, their winter range extends beyond the project study range. Agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: And it's not on that

map, we can turn to another map that displays it. But would you agree, subject to check, or we can turn there, that in terms of The Bog there's another transmission range traversing that winter range?

MR. SCHINDLER: A transmission range?

MR. WILLIAMS: Oh, I am getting tired, sir, another transmission line.

MR. SCHINDLER: We both are. Sure. Yeah, you are correct.

MR. WILLIAMS: Okay. That's the 230-kilovolt line. Agreed?

MR. SCHINDLER: Yeah.

MR. WILLIAMS: And sir, in terms of -- I want to just talk about wolves for a second, if you do have map 6-21?

MR. SCHINDLER: Where would you like me to go here?

MR. WILLIAMS: Sir, just for the record, we're referring you to map 6-21, the extent of the wolf pack home ranges intersecting the project study area. Agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And I believe it's the McNeill range that I want to direct -- I can't

tell -- it's the line, the range that is extending to Bipole III. Yeah. So let's focus on that McNeill Lake range. Can we agree again, sir, that the range for that wolf pack again extends beyond the project study range?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And it indeed traverses Bipoles I and II to the east. Agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: I'm going to leave wolves, we'll come back to them tomorrow -- not with you. But when we're trying to understand for boreal forest caribou habitat utilization -- let me back up. When we're trying to extend boreal forest caribou's current and future habitat requirements, there is utility in evaluating the habitat at both the landscape and site levels. Agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And I didn't intend to misdirect you, sir, but can we make that same statement about wolves, or moose?

MR. SCHINDLER: I think for moose, as we discussed, the home ranges are much smaller. Landscapes are important for caribou. They are

important obviously for moose. But moose can -- I think Riding Mountain National Park would be a good example of a constrained habitat where moose thrive quite well and are extremely disconnected from adjacent landscapes and regional ecosystems.

MR. WILLIAMS: How about wolves, sir?

MR. SCHINDLER: I think wolves are pretty much -- I think landscapes in terms of -- just tell me the question again, I'm getting tired as well -- on the wolves. It's been a long day.

MR. WILLIAMS: For the purposes of understanding current and future habitat requirements for wolves, can we gain insight from evaluation of habitat utilization at both the landscape and site level?

MR. RETTIE: Can we gain information, yes.

MR. WILLIAMS: Now, I wish to direct -- and I apologize, Mr. Chairman, I'm becoming a little fatigued -- but I wish to direct the panel's attention to page 34 of the CAC book of excerpts, and specifically to section 2.2, GIS analysis. And this probably goes to you, Mr. Schindler.

MR. SCHINDLER: Okay, I gotcha.

MR. WILLIAMS: And, Mr. Schindler, just to orient the panel in terms of what we're looking at here, sir, this is an excerpt from your fragmentation technical report. Agreed?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And I want to direct your attention, for the purposes of clarification, to the very last sentence towards the bottom of page 34 in the top right corner. You'll see a statement:

"While fragmentation is most often quantified by measuring habitat patch area across the landscape, a linear approach was developed to assess the relative impact of a single feature (the FPR) rather than the more general comparison of landscape disturbance regimes commonly used."

Do you see that statement, sir?

MR. SCHINDLER: Yes, I do.

MR. WILLIAMS: Now, I wonder if you can start by describing to me the more commonly employed methodology for quantifying fragmentation?

MR. SCHINDLER: Fragmentation is

generally a measurement of patch size or contiguous habitat types along the FPR, and an assessment of when the FPR cuts through these contiguous patches, it results in fragmentation.

MR. WILLIAMS: Sir, just to -- that's what you did for this study, right? Agreed?

MR. SCHINDLER: Agreed.

MR. WILLIAMS: Okay. What I'm trying to understand is going back to the previous page.

"While fragmentation is most often quantified by measuring habitat patch area across the landscape..."

Do you see that, sir?

MR. SCHINDLER: Yes, I do.

MR. WILLIAMS: I'm just asking you to explain the difference between the more common method and what you employed?

MR. SCHINDLER: Well, I think we were trying to assess the effects of the FPR, recognizing that in some of these areas that there is huge areas of unfragmented habitat. So relative to the assessment of disturbance from the FPR, we're interested in those patches, those contiguous patches that traverse along the FPR, and in terms of trying to avoid, in terms of some

of the aspects of assessing alternative routes.

MR. WILLIAMS: Okay. Fair enough. Now, in terms of the more common method, i.e. by measuring habitat patch area across the landscape, what would that look like, sir?

MR. SCHINDLER: It would change from eco district to eco district, depending on the amount of disturbance patterns from forestry activities, from roads that are being developed. Fire history would have some implications to that as well.

MR. WILLIAMS: Now, sir, recognizing the time, I want to direct your attention to a statement that you make at page 10, or your team makes at page 10 of this report. And just, I'll get you right reference, in the top right-hand corner. That would be page 42.

MR. SCHINDLER: Okay.

MR. WILLIAMS: At the very top you see the phrase mitigation measures. Do you see that?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And I'm going to read you a quote, and I would like you to finish off the day by helping me to understand it. First of all, mitigation measures for the effect, you

suggest that mitigation measures for the effect of fragmentation are limited, with the majority of mitigation measures existing at the planning and routing stage of the project.

Now, you have already explained that, but we can agree you make that statement, sir?

MR. SCHINDLER: Yes.

MR. WILLIAMS: And then you go on to say, as stated in -- with a couple of, with the reference -- development and disturbance corridors have the greatest effects at the landscape level, thus it is appropriate for the most effective measures to mitigate the effects of these corridors should occur at the same scale.

MR. SCHINDLER: Correct.

MR. WILLIAMS: And then you suggest that regional planning, coordination between industries and projects occurring within eco regions, and cumulative effects addressing habitat fragmentation are the strongest measures to take to avoid/mitigate the effects of fragmentation.

MR. SCHINDLER: That would be correct.

MR. WILLIAMS: Okay. First of all, that's a statement you agree with, sir?

MR. SCHINDLER: Yes.

MR. WILLIAMS: Can you give insight to my client in terms of the state of regional planning as it relates, in this particular area, in terms of addressing habitat fragmentation?

MR. SCHINDLER: I would suggest that the analysis was done at the scale of the FPR to look at the effects of fragmentation on large contiguous habitat. We have to assess fragmentation at a regional scale with other activities that are going on on the landscape and how they add to those. And my knowledge of any regional planning and coordination between industry and projects, there is some coordination with these regional caribou committees, for example, in terms of the development, looking at the cumulative effects. So there is some coordination that is driven by these regional caribou committees that do look at these types of things, and look at the cumulative effects of various developments and the appropriate locations of such.

THE CHAIRMAN: Whenever you have an appropriate point to conclude for the day?

MR. WILLIAMS: Just a couple more questions on this point, sir.

THE CHAIRMAN: Yes.

MR. WILLIAMS: You have spoken of evaluation of the evidence, and if you're not aware, that's fine. But what, if any, knowledge do you have of the coordination between industries and projects, sir?

MR. SCHINDLER: I think the extent of my knowledge would be my understanding of Manitoba Hydro's involvement on regional caribou committees, where various industries such as -- you are holding your hand up like you want me to stop?

MR. WILLIAMS: No, no, keep going. Look to your lawyers, not to me, sir.

MR. SCHINDLER: We know that Manitoba Hydro does participate on regional caribou committees where there are other industries, forestry, mining companies, First Nations, Aboriginal peoples that are involved with those committees, and they do work together in a way, and these things are discussed. But I don't know if it's -- they are specifically this particular regional planning.

MR. WILLIAMS: Okay. And certainly we'll get to Vors tomorrow. But, sir, when we

look at Bipole III and its impacts upon species, whether they are vulnerable species, or species at risk, or otherwise, you'd agree with me that it's important to situate it not only within the effects of the particular project, but within the broader cumulative effects of what's going on within the entire region and/or landscape?

MR. SCHINDLER: I believe we have explained our cumulative effects assessment looking at the range for boreal caribou. Are you asking me a question relative to mammals and other ecological processes.

MR. WILLIAMS: You know what, we'll hold that question for tomorrow, if any. Thank you, Mr. Chairman.

THE CHAIRMAN: Thank you, Mr. Williams. Thank you, gentlemen. You two have had a particularly tough day, or a particularly long day anyway.

Ms. Johnson, do you have some documents to register?

MS. JOHNSON: Yes, I do. MH 71 will be the Fox Lake agreement; 72, the moose versus caribou presentation; 73, the caribou presentation; 74, the moose presentation; and CAC

number 4 are the supporting materials from Mr. Williams.

(EXHIBIT MH 71: Fox Lake agreement)

(EXHIBIT MH 72: Moose versus caribou presentation)

(EXHIBIT MH 73: Caribou presentation)

(EXHIBIT 74: Moose presentation)

(EXHIBIT CAC 4: Supporting materials from Mr. Williams)

THE CHAIRMAN: Thank you. We resume tomorrow at 1:00 p.m. We will pick up with Mr. Williams, and these same two gentlemen are hopefully rested up. And we will hopefully conclude this cross-examination relatively quickly tomorrow, and then we will move into cross-examination of the presentations that Hydro made on Monday and Tuesday of this week.

Tomorrow evening is set aside, not exclusively I want to hasten to add, for members of the public who wish to come in and either make presentations or ask questions of Manitoba Hydro. If there are -- if they don't fill the two hours in the evening slot, we may devote some of that time to cross-examination. We are adjourned.

(Proceedings adjourned at 5:15 p.m.)

OFFICIAL EXAMINER'S CERTIFICATE

I, Debra Kot, a duly appointed Official Examiner in the Province of Manitoba, do hereby certify the foregoing pages are a true and correct transcript of my Stenotype notes as taken by me at the time and place hereinbefore stated.

Debra Kot

Official Examiner, Q.B.