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Complete comments form part of appendix A to these proceedings.

Good morning everybody. I am feeling several things in being here, and each one of them that I can think of begins with “h”. The first thing that I am feeling is very happy, happy to be back for the second time in Happy Valley-Goose Bay. I was here in October 1994 for the first time at the environmental assessment hearings related to low-level flying of military jets. I recall at that while I spend 36 hours in this town, I did not see any of it in daylight. I arrived one evening after dark, spent the whole next day in meeting rooms, and left the next morning before daybreak. So I am also very happy that there is a field trip arranged so that I can get out and see the forests of Labrador. The second thing that I am feeling is honoured; honoured that the Government of Newfoundland and Labrador and the Innu Nation would consider it favourable to have me look at the Plan and then to come here and spend two days with you talking about one of the specific aspects of the Plan, the research and monitoring. The third thing that I am feeling is humbled by the previous speaker. When I consider the paltry substance of what I am about to say compared to the very full and rich presentation that Christian Messier put together, I am feeling a little bashful about standing before you. I am also humbled that in his shorter career than mine that he has 65 journal entries, and I only have 20. I am also mad at him for telling me what I am going to tell you a half a dozen times over. Those are the three things that I am feeling, and there is going to be another “h” I am going to feel at the end of this talk and that is hungry, so I don’t want to talk too long.

What I want to do is keep my comments fairly conceptual. I am very glad that Christian went into a quiet a bit of detail on forest ecology and forest management planning which I will wholeheartedly support, and I will go into a little bit more detail on the concepts of adaptive management of Labrador forests.

If nothing else, you people in Newfoundland and Labrador are vocal, very vocal. In 1994, the same time that I was up here with the low-level flying environmental impact assessment, the department was putting out a very fresh view of forest management in this province. In the environmental preview report for yet another Labrador forest, district 20, a landmark shift in the way the folks around here were thinking about forest management. In a chuckling way I described the environmental assessment process in relation to forest management planning at that time as constipated, because there were a lot of planning going in and no decisions coming out, things were not working all that well.

There were three themes in that environmental preview report that the department and others in the province felt were very important to make a turnaround on. One of them is public participation, the second is one is ecosystem concepts of forest management, and the third one is adaptive management. It has been fascinating for me to come to back to the province maybe one or twice a year and keep an eye on what you folks are doing here on those three fronts. I am very happy to observe that on public participation and stakeholder consultation and on moving towards ecosystem concepts of forest management there has been a great deal of progress, and my observation on the District 19 Plan is that on those two counts things are moving along quiet nicely. The snag I am going to share with you this morning is that the concepts of adaptive management I don’t think have been moved along nearly as far, and that is what I want to talk about.

I will start with just outlining a few strengths that I see in this Plan. Then I want to explain for a few moments how I see the concepts of adaptive management. I do want to address the weaknesses in the Plan, starting with adaptive management and then moving on to research and monitoring, which I see as part of adaptive management, and I want to especially say something about the calculation of sustainable harvest levels, which we have already heard reference to as the AAC or the annual allowable cut and then I will conclude.

The Strengths of the Plan. First of all there is a collaborative approach. There may be another example like this in Canada, but I don't know where it is; maybe Cliff Hickey knows where it is because he has been watching what has been going on in Western Canada. I don't think that there is another venture where an aboriginal community or set of communities and the government have collaborated so strongly in putting a Plan together like this. For that, I heartedly commend the folks in this room and others who were involved.

The focus on ecological, social and cultural values is also incredibly refreshing especially since these things come first. My observation about what I have seen in most other instances in this province is that the annual allowable cut calculation happens first and that may extend to the planning team and that is the strength within which these types of topics have to be dealt with. That was reversed in this case, and that is a very commendable change in approach.

The approach to protected areas, not only the abundance of protected areas, but the fact that there are three spatial scales of protected areas being considered is also novel and refreshing.

If I went into detail to the Plan, I would probably find a whole lot more other things that I find commendable; but I will leave the strengths at that.

Let me start now with the concepts of adaptive management. We can be very proud that this concept of adaptive management, which is well known throughout the world now, at least conceptually, was actually born in Canada. Some professors at the University of British Columbia and their colleagues in government and industry in the late 1960's started to think that we needed a fresh approach in dealing with the huge uncertainties that we have in managing renewable resources like forest ecosystems, fishery, agriculture, and others. The central concept here is to treat management itself as an explicit process, that means to apply the principles of science while you manage not having managers throwing research questions to the scientists, universities, and governments labs. Those guys doing their work at whatever scale that they do it throw their answers back at the managers. It is a strong collaboration between the scientific community and the managers applying the concepts of science at the scale at which management occurs. Christian wonderfully reminded us several times in the last hour that it is long term at a landscape scale that we really must be concerned about. We are very good at research in the lab for a couple of years or at a square metre or the hectare, but that is not the scale in which management and big time environmental impacts occur. They occur over decades and centuries across broad landscapes, and that is where we have to get sophisticated with science.

So we have profound uncertainties about impacts and outcomes of management. You might complain here in Labrador that yours are the most profound because you have complaints of least understanding on forest ecosystems because so little research has gone on here and the history of resource exploitation is short. I would argue that if I went to the coast of B.C. or

Central Ontario or anywhere else, the forest managers would argue that their uncertainty on a broad scale over long periods of time are equally as profound. We are all wading through this with very clouded eyes as we get into forest management in Canada.

Adaptive management admits that normal science can help only part way. The kind of science that we are accustomed to doing where the controls are well in place, where the time frames are short, where the treatments can be strong and experimental. It is clear to a lot of people that type of normal science, ordinary science, can help part way but adaptive management suggests that it can't do the whole thing for us. The focus of adaptive management is trying to learn the time and space scales of management which are different than the time and space scales that scientists are normally working on back at the lab.

We could also talk a little bit about passive versus active adaptive management. If I could put another plug in for the book that Christian was talking about which will be published and released on the 19th of September at the Rural Forestry Congress, please go and buy your copy there. I wrote the chapter in the book on adaptive management and there are other papers that talk about passive versus active. What I am going to talk about mostly today is passive, not that they are sitting back and watching, but it is much less experimental than active adaptive management. So let me speak mostly about passive adaptive management and we will be making great inroads to your lack of understanding.

May I also suggest a very good reference on what passive adaptive management might be forest management in Canada. It is found in the certification standards for sustainable forest management published by the Canadian Standards Association. In that standard there is a diagram that is laid out with a reasonably good interpretation of adaptive management, and I am going to show you that diagram in its entirety right now just to give you a flavour for how I am interpreting the concept.

There are four stages in this adaptive management interpretation: *Planning* is the start, *Implementation and Operation* and we know what that in forest management, *Checking and Corrective Action* would be the third stage and here is where I would be monitoring into the mixture, and then finally having a *Management Review* to see how when you look back at the management things should be different next time. Let's look at each one of those at succession here to see where the major failures of this plan are in my view.

Planning starts with defining the forest, defining the forest area and its present condition. That is fairly straightforward. Dealing with value and objectives which means identifying and selecting values, objectives, indicators, and provisional targets. This is very close to the criteria and indicator business which many of us have become familiar with in the last 5-10 years in forest management in Canada. Inventory, foresters are accustomed to the inventory game regarding maps and other records associated with the indicators that are chosen and reported for management. Now here comes the crunch for adaptive management, explicit preparation of forecasts. This does not mean predicting the future with a high degree of certainty – nobody can do that. It means using the best tools that we have in science to make explicit hypothesis about the outcomes we expect to occur in the terms of the indicators we chose whether we implement management or not. The forest will be still be there behaving over the next couple hundred of years as it will behave if human beings weren't there. Christian also made this point to some extent so I won't additionally, but we have developed lots of substantial tools for making those

kinds of forecasts. In my view, there is no good reason why we should not exercise them in the preparation of this Plan and certainly no good reason why we shouldn't in the next draft for the next five years. Then finally, making decisions. Your planning ended the end of March, or whenever that Plan was finished and submitted to government for approval.

The next piece is *Implementation and Operation*. I won't say much about that. It means taking the actions prescribed in the Plan. The Plan lays out the schedule of what is going to happen with that forest over the next five years that is what needs to happen on the ground.

Now I come to my next point, *Checking and Corrective Action*. We need to take measurements in the field or whatever ways we have. We need to get the real data associated with the indicators over time. We need to compare not only because we implemented the actions that the Plan says we were supposed to implement, but we also need to compare the actual levels of the indicators with the expected level that were in our forecast – the target levels. We need to use those comparisons to find out where the discrepancies are, how different were they. We need to start to investigate why (and here is a bold assumption) why the forecasts were wrong. That is what we are trying to do, learning to how to confess when we discover why our forecasts are wrong so that we can fix those errors the next time we have to make a forecast.

Finally, *Management Review*, which in the context of this Plan means reviewing the overall progress in trying to achieve sustainable forest management and then the deciding begins again. From what I understand of forest management in Newfoundland it might be 2006 when the planning process might start up for a plan in 2008.

Why adaptive Management for Labrador forests? For two very good reasons: as I understand from the Environmental Preview Report (EPR) you have to do it, and secondly as I stated earlier there are profound uncertainties and the less you know about the consequences of management the more you need adaptive management. If our knowledge were near perfect, if it were we would not need adaptive management. The dumber are the more we need adaptive management.

Key weakness number #1 that I pointed out in my review is that there are no long-term forecasts in this plan. Maybe there is one - the calculation of allowable cut which I will refer to in a moment. There is a philosophical difference; there are people that don't believe that adaptive management has much to offer in a situation such with such profound uncertainty as here and there are people who believe that we should be building these predictive models, forecasting models, even without solid data on relationships. This means, build the models early while the other school says "no, no" let's only build the models with solid data meaning 10 to 20 years of good basic field research before we can even start to build the model and identify the problem. I don't belong to the second school; I belong to the first school. I would argue that the learning power and the power to direct field research gains by building models even when we are highly uncertain about those relationships, it makes the exercise worthwhile. So, adaptive management demands building models and using them when the forecasts are needed regardless of the data abundance and quality. You now have a Forest Management Plan for district 19, during the planning is when adaptive management says you should have been doing the predictive models and you weren't. Going back to this you will see that before you can make a decision this adaptive management model, or this approach, says that the forecasting is necessary. Adaptive management says use models to guide data collection. Now if you take this to a serious conclusion or to a very strict interpretation of this, you might argue that before we do any

research we need to engage in some exercises of predictive modelling first. It would be fascinating to see when we are 48 hours through this workshop whether we will come to that conclusion. In my view a weak forecast is more help than no forecast at all, at least you will have some hypothesis as dumb as it might be. It is better to reject that hypothesis than to have no hypothesis at all. The best way is to expose and characterize the uncertainty, and by characterizing the uncertainty what we do is figure out what the research should be.

Key weakness #2 in the plan is that there are no explicit monitoring protocols. As I pointed out, adaptive management cannot happen without proper monitoring of the very same variables that we would need to forecast. That view has been contrasted to one emerging from Quebec where folks have argued that there are planning indicators which should be forecasted and there are measurement indicators that should be monitored. I have a hard time understanding how you make sense of the world when you have two different sets of indicators, one set forecasted and one set monitored. So remember checking and corrective action in the CSA standards view of adaptive management says measure all of the indicators and compare their behaviour as measured to behaviours that were forecast, presuming that the measurements are true to the real world and the forecasts were our best guess of that real world. We cannot learn if we do not check scientifically in what ways the forecasts are wrong. It demands creation of forecasts and it demands measurements in the real world to show how the forecasts are wrong.

Key weakness #3 that I will point out, and my last one, is the trivial calculation of sustainable harvest level. In my view we have an old approach here, a “back of the envelope” approach. Indeed you could write it all on the back of a small envelope all of the equations that were used to calculate the sustainable harvest level. We have good models, and we have good models for probably in the neighbourhood of 20-30 years on how to make these kinds of calculations. The data requirements for those models are substantial, but it is better to create a data poor forecast than no forecast at all. We might have forecasts for how much wood you can cut and a rotation age applied over a certain area with a very rough estimate of productivity over the future, but what we don't have is what Christian was talking about. We don't have the forecasts that should go along with this, and that is how the forests will respond to that type of treatment itself. It is important how much we take away; it is way more important how much we leave. What is our legacy in the woods? We don't have any forecasts about that. The nice thing about these tools is being able to forecast. The advantage of the forest projection models is the possible future forest dynamics that I talked about for use by people who need to assess non-paper values. One of comments is why didn't you make biodiversity assessments for forest management in the forest management plan, I can't do that in what I would call any scientific credible way with the forecast for wood supply that is in the Plan. I need to forecast about the age class structure and the type structure and the spatial layout involved over the long term future, and that is another reason why we want to use those types of models. I would argue that the most important variables to forecast are the forest inventory and wood supply in an explicit way, and I would argue that the technology and basic datasets are in place to do so – even in Labrador.

This has been an excellent start on some plan features, and I think there was a missed opportunity on some others. The neat thing about forest management planning is that it is different from the environmental assessment process in that we get to do it all over again in five years time. Having this forum was a superb idea. I don't know who came up with it, but wherever you are - way to go. This was an excellent idea to get working on what is this Plan's major weaknesses research and monitoring needs. I strongly and urgently recommend moving

forward with a robust implementation of research and monitoring entirely within the context of adaptive management rigorously interpreted. Not figuring that adaptive management is “well we try something and when we figure it might be wrong, we will try something else”. That is not adaptive management. It is not just learning as you go, trial and error. It means really, and pardon me for being perhaps a little casual about this, but I believe it means staying on the wrong road long and far as you have to go. We can be pretty sure that we will be wrong on a lot of things, but let’s be really sure how wrong we are when we draw up the pathway that might lead to something better.

Thanks very much.