

**REPORT OF THE JOINT REVIEW PANEL**

**LOWER CHURCHILL HYDROELECTRIC GENERATION PROJECT  
NALCOR ENERGY  
NEWFOUNDLAND AND LABRADOR**

**EXECUTIVE SUMMARY AND RECOMMENDATIONS**

**August 2011**



# EXECUTIVE SUMMARY

## INTRODUCTION

Nalcor Energy is proposing to develop two hydroelectric generation facilities on the lower Churchill River in central Labrador with a combined capacity of 3,074 megawatts (MW) and at a cost of approximately \$6.4 billion. The Project would consist of two dams located at Muskrat Falls (824 MW) and Gull Island (2,250 MW), two reservoirs, and transmission lines connecting Muskrat Falls, Gull Island and the existing Churchill Falls hydroelectric facility. Additional facilities would include access roads, temporary bridges, construction camps, borrow pits and quarry sites, diversion facilities and spoil areas. For the purposes of this assessment, transmission lines to carry the power to markets were not included in the Project.

The provincial and federal governments agreed to a joint review panel to ensure that the environmental assessment satisfied their respective legislative requirements – the Newfoundland and Labrador *Environmental Protection Act* and the *Canadian Environmental Assessment Act* – in an effective and efficient manner. The provincial and federal governments will make the final decisions regarding Project approval. The joint review panel is providing advice to the governments by means of this report.

The joint review panel (“the Panel”) was appointed by the Newfoundland and Labrador Minister of Environment and Conservation and the Minister for Intergovernmental Affairs, and the federal Minister of the Environment. The Terms of Reference issued by the Ministers required the Panel to assess the environmental effects of the Project, including:

- consideration of the need for and purpose of the Project;
- alternatives to the Project and alternative means of carrying out the Project;
- the environmental effects of the Project, including accidents and malfunctions and cumulative effects, and the significance of these effects;
- measures to reduce adverse effects and enhance beneficial effects; and
- monitoring and follow-up.

The Panel reviewed extensive information provided by Nalcor and other participants during the course of the review, and held a 30-day public hearing in nine locations in Newfoundland and Labrador and in Quebec from March 3 to April 15, 2011. The public hearing provided the Panel with an opportunity to gather information relating to its Terms of Reference, and to hear from Aboriginal persons and groups, the public, governments and other interested parties about their ideas, interests, positions and concerns associated with the Project.

The Panel reviewed the information and views provided by Nalcor and other participants and then applied criteria according to guidance published by the Canadian Environmental Assessment Agency to determine the significance of adverse environmental effects after all reasonable mitigation measures, including those recommended by the Panel, had been applied. The Panel also identified likely Project benefits.

The Panel received information about potential and established Aboriginal rights or title in the Project area and about whether the Project might adversely impact them. This information is included in Chapter 10 of the report. Aboriginal groups involved in the review process included Innu, Inuit and Inuit-Metis living in Labrador, and Innu and Naskapis living in Quebec. Innu Nation has negotiated an Impacts and Benefits Agreement with Nalcor and Newfoundland and

Labrador in order to support its involvement in the Project during construction and to implement a royalty regime.

## **THIS SUMMARY**

This summary highlights some of the recommendations made by the Panel, to be applied if the Project is approved. The Panel made no assumption about whether or not the Project would proceed. The reader is encouraged to consult the full list of recommendations.

The Panel has determined that the Project would have several significant adverse environmental effects on the aquatic and terrestrial environments, culture and heritage and, should consumption advisories be required in Lake Melville, on land and resource uses. The Panel does not make the final decision about the Project. Government decision makers will now have to weigh all effects, risks and uncertainties in order to decide whether the Project is justified in the circumstances and should proceed in light of the significant adverse environmental effects identified. Therefore, the Panel has provided further advice to help answer the question of whether and how the Project would contribute to sustainability.

## **PROJECT NEED AND ALTERNATIVES**

### *Need, Purpose and Rationale*

Nalcor stated that the Project was needed to address the future demand for electricity in Newfoundland and Labrador, develop the province's hydroelectric resources in accordance with the provincial energy policy, secure a renewable future, and generate long-term revenues for the Province. Many participants questioned why the hydroelectric resources of the Churchill River had to be developed, arguing that there were other, more economically and environmentally beneficial ways of meeting domestic energy demand. Questions were also raised about how Nalcor would gain transmission access to export markets and the ability of the Project to deliver the projected long-term financial benefits.

For the purposes of this review, the Panel did not accept that developing the hydroelectric potential of the lower Churchill River was a "need", and that therefore the Project should be compared to reasonable alternatives that addressed the future demand for electricity, and delivered a renewable energy future and long-term revenues for the Province. The Panel further concluded that because Muskrat Falls and Gull Island are subject to separate sanction decisions, the Panel would assess them separately with respect to alternatives, justification in energy and economic terms, and where possible, with respect to other considerations.

Nalcor's position was that up to 800 MW of energy from the Project would be required to meet provincial demand, and that there are market opportunities for energy export that would exceed the output of the Project by a factor of eight during the Project's planning horizon. Opportunities exist in Ontario, the Maritime Provinces and New England, based primarily on the need in those markets to replace aging infrastructure and to displace higher greenhouse gas emitting sources such as coal. Nalcor presented cash flow analysis and financial statements showing a projected return on equity for the Project as a whole in the order of 14 percent, and projected annual net financial benefits to the Province in the order of \$1.1 billion by 2050.

In light of the separate sanction decisions, the Panel considered the Project as a whole and as separate generating facilities. The Panel questioned whether the Project would be the best alternative to meet domestic demand and whether timely transmission access would be available to deliver energy to unknown export markets. Nalcor's proposal includes exporting part

of the power generated at Muskrat Falls via a planned subsea transmission line towards the Maritime Provinces; however, it was uncertain how and when the much larger energy output from Gull Island could be transmitted to markets.

Because of this, the Panel concluded that Nalcor had not demonstrated the justification of the Project as a whole in energy and economic terms, and that there are outstanding questions related to both Muskrat Falls and Gull Island regarding their ability to deliver the projected long-term financial benefits to the Province, even if other sanctioning requirements were met. The Panel therefore recommended that the Government of Newfoundland and Labrador carry out separate formal financial reviews before sanctioning either Muskrat Falls or Gull Island to confirm whether the component being considered for sanction would in fact deliver the projected long-term financial benefits.

#### Alternatives to the Project

Nalcor considered a list of potential alternatives and concluded that none were economically or technically feasible compared to the Project and none could meet the stated need to develop the hydroelectric potential of the Churchill River. Nalcor also said that Muskrat Falls was the best way to meet domestic demand and, compared to continuing to burn oil at the Holyrood thermal generating facility, the Muskrat Falls option would save \$2.2 billion over a 50-year period (2017 to 2067).

However, the Panel concluded that Nalcor's analysis, showing Muskrat Falls to be the best and least-cost way to meet domestic demand requirements, was inadequate and recommended a new, independent analysis based on economic, energy and environmental considerations. The analysis would address domestic demand projections, conservation and demand management, alternate on-Island energy sources, the role of power from Churchill Falls, Nalcor's cost estimates and assumptions with respect to its no-Project thermal option, the possible use of offshore gas as a fuel for the Holyrood thermal generating facility, cash flow projections for Muskrat Falls, and the implications for the province's ratepayers and regulatory systems.

The Panel also recommended consideration of Integrated Resource Planning as a better planning approach compared to the traditional approach of forecasting loads and then finding the lowest cost solution for meeting them.

#### Alternative Means – Construction Sequence and Pace, and Reservoir Preparation

Nalcor considered a number of alternate means of carrying out the Project; the Panel focused on construction sequence and pace, and reservoir preparation.

Nalcor's preferred option is to construct the Muskrat Falls generating facility and related interconnecting transmission lines first, followed by the Gull Island generating facility with an overlap in construction periods. However, because there are separate sanction decisions, there could be a delay in constructing Gull Island. The Panel considered this uncertainty when carrying out its review and in some cases recommended that lessons learned from the construction of Muskrat Falls be specifically factored into decisions regarding Gull Island. If for any reason Gull Island were to be constructed first, the same principle should apply.

Nalcor evaluated several options for reservoir preparation – minimal clearing, partial clearing and full clearing. Nalcor's 'partial clearing' alternative would involve clearing trees in only the ice and stick-up zones around the perimeter of the reservoirs and only where this could be carried out within Nalcor's safety, economic, and environmental operating parameters. Otherwise, the

trees would be left standing. Nalcor's 'full clearing' alternative also involved clearing wood in the flood zone but again only where this could be carried out within those same parameters.

The stated purpose for the reservoir preparation plan was to reduce the amount of trash and debris that could affect turbine operation after impoundment. Nalcor maintained that, since most of the trash and debris would come from the ice and stick-up zones, there would be no difference between the 'full' and 'partial' clearing options in that regard. It also stated there would be little difference between the two options in terms of navigation hazards, the amount of mercury released, or greenhouse gas emissions. However, there would be huge differences in costs and 'full clearing' would delay the construction schedule, costing Nalcor at least \$200 million. Therefore Nalcor preferred the 'partial clearing' option.

Many participants recommended that more timber be cleared from the reservoir areas, in order to reduce methylmercury and greenhouse gas emissions or not to waste the resource. They suggested that technologies such as manual harvesting with chainsaws and cable-logging could harvest larger volumes.

The Panel concluded that for reservoir preparation purposes, the two reservoirs should be considered differently because of their different characteristics. The Panel recommended applying the 'full clearing' option to the Muskrat Falls reservoir because it would be technically and economically feasible and would not negatively affect the construction schedule.

The Gull Island situation is different because the reservoir area is much larger, the terrain more difficult and the stands of timber less dense, and therefore less economic to harvest. Therefore, the Panel recommended that Nalcor learn from its experience in clearing the Muskrat Falls reservoir and endeavor to maximize clearing in the Gull Island reservoir. The Panel also recommended that Nalcor be responsible for ensuring that all timber harvested from the reservoirs, together with all merchantable timber salvaged by the trash and debris removal program, be utilized because of the socio-economic and environmental benefits.

## **ATMOSPHERIC ENVIRONMENT**

The Project would affect air quality because of emissions from quarry operations, concrete work, and related construction activities. The Project would produce greenhouse gases related to construction activities and deforestation associated with reservoir clearing and impoundment, but would also have the potential to reduce a much larger quantity of greenhouse gases provided the power produced is used to shut down greenhouse gas intensive generation facilities elsewhere.

The Panel concluded that with appropriate mitigation, including use of best available technology, air pollution and noise would be localized and temporary in nature. While the exact markets for much of the power are not yet known, the power produced by the Project would very likely displace more greenhouse gas emissions than the Project would cause. Moreover, the Panel recommended that Nalcor make all reasonable efforts to ensure that power from the Project would be used (a) to back-up wind power and other intermittent renewable sources of energy, (b) to displace energy from high greenhouse gas emission sources, and (c) not to displace conservation and demand management or power from renewable sources.

## **AQUATIC ENVIRONMENT**

The main focus of the assessment for the aquatic environment was on fish and fish habitat. Issues of concern included how and when filling of the reservoirs would occur, changes in water

quality during the long period of time it would take for the new shorelines to stabilize, damaging effects on fish that might go through the turbines, how methylmercury – a by-product of new reservoirs – would accumulate in fish, loss of fish habitat through flooding and to what extent it could be replaced successfully, and the effects of all these on the fish community that would inhabit the new reservoirs and the river below them.

In addition, there was considerable debate over how far the effects of the Project, including mercury, would travel downstream – not everyone agreed with Nalcor that the effects would not be measurable past the mouth of the river into Goose Bay and Lake Melville.

#### Reservoir Impoundment and Operating Regime

To fill each reservoir, Nalcor would need to reduce flows downstream of the dams for a few weeks. Nalcor indicated that it would plan to fill each reservoir in the late summer to early fall – the best time because it would avoid the spawning period for most fish species. Nalcor would ensure that the downstream flow was at least 30 percent of the mean annual flow and would rescue and relocate any fish that would become stranded as a result of the lower flows. However, Nalcor also stated that it needed flexibility to fill the reservoirs at a different time if demanded by the construction schedule. Other participants told the Panel that the risks of filling at a different time were too great because this could harm the most vulnerable life stages of a number of fish species. The Panel concluded that these risks should be avoided and recommended that Nalcor be required to fill the reservoirs between mid-July and the end of September.

In order to operate the reservoirs as efficiently as possible, Nalcor would keep the water levels at a fixed level for most of the year, avoiding the big changes that people have been used to seeing in the Smallwood Reservoir. Natural rivers however, show much more flow variability and this can play an important role in maintaining healthy ecosystems. The idea behind “environmental flows” is that when there are competing uses of a river system, water should be formally allocated for ecosystem purposes. The Panel recommended that the Province develop environmental flow standards to be applied to the Lower Churchill Project.

#### Water Quality Effects in the Reservoirs

Water quality in the reservoirs, and to a lesser extent, downstream from them, would go through a long transition. Nalcor predicted 20 years for water quality to return to its original condition; Fisheries and Oceans Canada said it could take longer. Flooded soils and new, eroding shorelines would increase the amount of sediment suspended in the water. Suspended solids can decrease the amount of light that penetrates the water, and also smother fish habitat when they settle. This effect would likely be much more pronounced in the Muskrat Falls reservoir, and the increase in suspended solids would greatly exceed water quality guidelines intended to protect aquatic life. However, Nalcor stated that turbidity in the Churchill River is already very variable and fish have adapted to this situation. Underwater decomposing vegetation would also add additional nutrients which could promote fish growth.

Nalcor would be able to take steps to avoid erosion and siltation during the construction period but once the reservoirs are filled, no further mitigation would be possible. The Panel considered these probable changes in water quality when considering how all aspects of the Project would affect fish and fish habitat, and the potential for conditions to favour some fish species and stress others, possibly changing the composition of the final fish community.

### Entrainment Effects on Fish Populations

Fish going through turbines (entrainment) or down spillways could be killed or injured. The rate at which this would happen depends on the size of the fish (smaller fish would be less vulnerable), the distance the water drops, and the turbine design. Nalcor predicted higher rates of mortality and injury at the Gull Island turbines because of the larger drop and the type of turbine proposed. However, as fish surveys had shown that there were no large-scale movements of fish in this area, Nalcor estimated that overall, not many fish would be affected and also committed to manage water flows to minimize use of spillways and to use adaptive management techniques to deter fish from approaching intakes.

The Panel noted that even if fish losses due to entrainment were not high, they would continue through the life of the Project. Also, killed or injured fish contribute to the transfer of methylmercury from the reservoirs to the river downstream, as they are eaten by other fish. Fisheries and Oceans Canada indicated that there were some possible measures to keep fish away from the turbine intakes but these would be specific to a given fish species. This means they could not be applied until monitoring showed which species were more likely to be killed or injured by entrainment. Some participants stated that they were uncertain about the number of fish that might pass through the turbines and the potential effects on fish populations.

The Panel recommended that Nalcor carry out additional sampling before the Gull Island dam sanction decision to confirm the low numbers of fish movements and develop a detailed adaptive management strategy.

### Fate of Mercury in the Reservoirs

There was general agreement that Nalcor's predictions for the amount of methylmercury that would be released, and how it would concentrate through the different levels of the food web in the reservoirs, were reasonable. The Panel heard no evidence that suggested that the health of the fish themselves would be harmed by the mercury in their bodies. Nalcor's position was that there was no feasible way to substantially reduce the formation of mercury in the reservoirs and that any risks to people who might eat the fish could be handled through consumption advisories. Natural Resources Canada challenged this, and recommended that Nalcor consider removing both vegetation and part of the soil layer around the new shorelines of the reservoirs. The Panel recognized that there were still many questions about this proposed mitigation measure but agreed that hydroelectric developers have a responsibility to find ways to reduce mercury at source if at all possible, and recommended that Natural Resources Canada and Nalcor collaborate to pilot test this approach.

### Fish Habitat Loss, Alteration and Compensation

Nalcor told the Panel that while a large area of fish habitat (740 hectares in the Muskrat Falls reservoir, 4,300 hectares at Gull Island) would be destroyed or altered by flooding when the reservoirs were filled, this habitat would be replaced, either by constructing new habitat areas or simply through the creation of much larger water bodies. Nalcor proposed to create or enhance delta areas, re-vegetate disturbed shoreline areas, remove vegetation and grade access roads around the edge of reservoirs in preparation for flooding, enhance spawning shoals at Gull Lake, and create the Gull Island plateau. However, the Panel noted that Nalcor's proposed compensation works would only be able to create slow velocity habitat leading to a net loss of faster flowing habitats, especially in the tributaries.

Nalcor analyzed the types of habitat that would be lost in terms of how they were used by certain life stages of certain fish species. The design of the proposed habitat compensation works would then focus on making sure that there was adequate habitat available for these particular fish. Nalcor's analysis showed that very high percentages of habitat, over 90 percent in some cases, would be removed for one or more life stages of some species, particularly in the Muskrat Falls reservoir. Other participants expressed concern that so much would be riding on the success of Nalcor's compensation strategy and indicated that it was very difficult to engineer new habitat that would be as productive and complex as habitat formed naturally over many years. They also questioned the track record of habitat replacement and of its monitoring and government oversight.

In the event compensation proved ineffective, Nalcor would consider habitat enhancement sites outside the flood zone in consultation with Fisheries and Oceans Canada.

The Panel concluded that Nalcor's compensation strategy, if successful, would likely address most of the habitat needs of the resident fish species; however, many uncertainties remain, particularly with respect to how the different species would interact and whether the new habitats would stabilize. The Panel noted that Nalcor agreed that repairing or reconstructing the habitats would be difficult after the reservoirs were filled.

#### Final Fish Assemblage

Nalcor described how the combined effects of reservoir filling and operation, water quality changes, and habitat alteration and replacement would affect the fish community, both during the transitional stage and after the reservoirs had stabilized. Nalcor estimated that the existing species would all survive and in more or less the same proportions. Other participants were less certain, given the extent of the changes that would occur in transforming a river into two reservoirs.

The Panel concluded that the make-up of the final fish community could not be predicted with certainty and that there would be a risk that one or more species, particularly valued from community and Aboriginal perspectives, could be lost or considerably reduced in numbers, because of the wide scale water quality and habitat changes and inherent uncertainties.

Therefore the Panel concluded that the Project would result in significant adverse environmental effects to fish habitat and the final fish assemblage in both reservoirs.

#### Effects Downstream of Muskrat Falls

Based on studies in Lake Melville carried out for an earlier version of the Project and the fact that, unlike some other hydroelectric projects, the Project would not reduce the amount of water flowing downstream from Muskrat Falls, Nalcor had concluded that the Project would not have effects on the downstream environment past the mouth of the Churchill River and consequently did not extend the Assessment area beyond this point. This was challenged by a number of participants, and particularly the Nunatsiavut Government. The possibility of mercury moving downstream in sufficient quantities to contaminate fish and seal, and eventually require consumption advisories, was a particular concern. Participants also questioned whether subtle changes in suspended solids, nutrients or water temperature might, over the long-term, change the productivity of the river's estuary.

Fisheries and Oceans Canada presented some recently released research showing that mercury from the Churchill Falls project was measured in several fish species in Lake Melville

over 300 kilometres away, but Nalcor maintained that mercury and other Project effects would be “not measurable” and within natural variability.

The Panel acknowledged that it is difficult to accurately predict downstream effects because there are very few long-term ecological studies of hydroelectric projects in northern environments. However, this underscores the need for a precautionary approach, particularly because Nalcor did not identify any feasible way to reverse either long-term adverse ecological changes or mercury contamination in the ecosystem.

The Panel concluded that Nalcor did not carry out a full assessment of the fate of mercury in the downstream environment, including the potential pathways that could lead to mercury bioaccumulation in seal and the potential for cumulative effects of the Project together with the effects of other sources of mercury. The Panel also concluded that downstream effects would likely be observed in Goose Bay over the long term, caused by changes in sediment, nutrient supply and water temperatures. Therefore, the Panel recommended that Nalcor carry out a comprehensive assessment, with third-party review, of downstream effects before impoundment begins. The Panel also noted that, while Nalcor has committed to make its monitoring data public, often lessons learned from environmental effects monitoring of large projects are obscured because the results are not fully analyzed and remain difficult to access in the “gray literature”. Therefore the Panel recommended that Nalcor undertake to publish what it learns about possible long-term downstream effects.

#### Monitoring, Follow-up, Adaptive Management

Nalcor committed to carry out an extensive aquatic monitoring program to verify its predictions and identify whether adaptive management would be needed. The Panel concluded that effective monitoring would be challenging because of the need for good baseline data, enough resources to support the needed level of effort over many years, and setting appropriate thresholds to trigger further action. The Panel recommended involving Aboriginal groups, stakeholders and independent experts in designing the program.

### **TERRESTRIAL ENVIRONMENT**

The assessment addressed Project effects on upland, riparian, wetland and ashkui ecosystems, rare plants, caribou, birds and other wildlife. Seismic and geotechnical effects were also addressed. Many of the terrestrial species were noted to be of particular importance to Aboriginal communities, including various caribou herds, small game, medicinal plants and berries.

Nalcor stated that Project construction and the creation of the two reservoirs would physically disturb 161 square kilometres of land, but predicted that the loss of habitat would not affect the sustainability of key indicator species at the population level. However, the Panel concluded that in light of the scale of terrestrial habitat that would be inundated by the Project and the permanence of the effect, the overall loss of terrestrial habitat would be a significant adverse effect. The Panel also observed that the effects to the terrestrial ecosystem might be further compounded by future resource extraction projects and shifting climate change patterns.

#### Riparian and Wetland Habitat

Nalcor noted the importance of wetland habitat, including riparian marsh, for several key indicator species by providing foraging, nesting and breeding habitat for several types of large mammals, furbearers, herpetiles and birds. Wetlands were noted as widespread and common in

the lower Churchill River watershed. Nalcor indicated that approximately 60 percent of riparian habitat in the Project area would be inundated and that 98 percent of this habitat would be the riparian marsh ecotype.

Participants were concerned about how this loss would affect a number of species, particularly wetland sparrows. Nalcor committed to re-create lost riparian habitat through a compensation strategy and cited successful habitat compensation in other projects in North America. However, there were concerns that Nalcor had underestimated the challenges involved in engineering ecosystems and that there would be a net loss of riparian habitat. The Panel noted that wetland and riparian habitat play important roles in ecosystem health and agreed that compensation plans are vital. However, the Panel questioned Nalcor's certainty that riparian and wetland habitat would re-establish and concluded that the residual adverse effect of the Project on these habitats, even with the proposed compensation strategy, would be significant.

### Rare Plants

No listed plant species under federal or provincial regulations were found within the footprint of the Project, although the Panel noted that information on rare plants in Labrador is limited. Eight regionally uncommon plant species were found in the Project area and several participants noted the importance of these species. During the public hearing, participants and Aboriginal groups stated that they were concerned about rare plants in the inundated area, especially common wood sorrel and mountain maple, and medicinal plants such as the Canada yew. Nalcor stated that if sufficient numbers of these species were not identified outside of the footprint, any plants found inside the flooded zone would be relocated.

The Panel concluded that, with appropriate mitigation, the adverse effects of the Project on rare plant species would not likely be significant.

### Wildlife

The EIS assessed effects of the Project on selected species, including moose, black bear, beaver, marten, porcupine, caribou and birds. Nalcor chose these key indicator species based on their sensitivity to Project interactions, their ability to indicate effects on larger components of the environment, their economic, recreational or cultural importance to stakeholders, and population status and vulnerability.

Nalcor did not predict significant adverse effects for most species because the Project would not flood a large percentage of their primary habitat. Participants were particularly concerned about the six species of wildlife designated as being at risk. The federal and provincial governments are required to develop recovery strategies for these species that must identify critical habitat. The Panel concluded that the Project would not be likely to have significant effects on listed species other than the Red Wine Mountain caribou herd. However, the lack of recovery strategies and identification of critical habitat for some of these species makes a final significance determination premature. The Panel recommended that governments make all reasonable efforts to put recovery strategies in place before making final decisions about the effects of the Project on listed species.

The timing of impoundment recommended for the protection of fish would also be optimal for most terrestrial species, and therefore, with this mitigation, the Panel concluded that the recommended timing of impoundment would not have significant adverse effects on terrestrial species.

### Caribou

The Red Wine Mountain caribou herd is considered threatened under the provincial *Endangered Species Act* and the Canadian *Species at Risk Act*. The George River caribou herd is in decline but not considered threatened and hunting is legal within permitted seasons. The Lac Joseph caribou herd is also known to occur in the Project area; however, Nalcor did not include this herd in its assessment.

Nalcor concluded that there would be significant cumulative effects on the Red Wine Mountain herd because some caribou habitat would be lost. However, Nalcor stated that hunting and predation have been identified as limiting factors for this herd, rather than habitat. Therefore, the herd would likely continue to decline with or without the Project and the effects from the Project alone would not be significant.

Participants noted that development affects caribou both directly and indirectly and that indirect effects, such as the presence of roads and changes in predator-prey dynamics, were not adequately assessed.

The Panel agreed that the recovery of the Red Wine Mountain caribou herd would be uncertain with or without the Project but concluded that any adverse effect of the Project on individual animals within the Red Wine Mountain caribou herd would result in significant adverse effects.

Nalcor stated that the Project would not adversely affect the George River and Lac Joseph caribou herds because the Project footprint would only overlap with a small portion of their ranges. Participants noted that the George River herd is in rapid decline but there was very limited information available about the possible causes. The Panel concluded that the effects of the Project on the George River caribou herd in isolation would not likely be significant, but could not make a determination about cumulative significance because a proper cumulative effects assessment for the herd was not carried out. The Panel recommended that the provinces of Quebec and Newfoundland and Labrador, together with Environment Canada and interested Aboriginal communities, initiate a joint management program for the George River caribou herd.

### Birds

Nalcor assessed Project effects on Canada goose, surf scoter, osprey, ruffed grouse, wetland sparrows, harlequin duck and other species of concern such as the rusty blackbird, grey-cheeked thrush, olive-sided flycatcher and the common nighthawk. Several listed bird species were found in the Churchill River valley. Nalcor stated some primary habitat of birds in the Project area would be flooded but enough habitat was available outside the impoundment area. Government experts agreed. Nalcor noted that the wetland sparrow was an exception because of its dependence on riparian habitat but habitat compensation plans would reduce the impact.

The Panel concluded that adequate alternate primary habitat would still be available and that there would likely not be significant adverse effects on birds, although no final determination could be made for the listed bird species because recovery strategies were not in place.

Ashkui are areas in rivers and lakes where open water appears earlier in the spring than elsewhere, and they are important habitat for several bird species. Nalcor predicted that existing ashkui on the lower Churchill River would re-form at a higher elevation after the reservoirs are created. Participants challenged this prediction but Environment Canada stated that if the ashkui did not reappear, there would be sufficient open water habitat elsewhere to support

waterfowl such as surf scoter. The Panel concluded that loss of ashkui would be a loss in habitat for waterfowl, but would likely not be significant given the abundance of alternate habitat.

Environment Canada stated that under the *Migratory Birds Convention Act*, no disturbance of eggs, nests and young may occur between May 1 and July 31 of any given year and that this would mean that Nalcor should not carry out reservoir clearing during this period. Nalcor committed to comply with the Act but also said that it would need to harvest timber throughout the summer season. The Panel recommended that Nalcor and Environment Canada negotiate an agreement to ensure that harvesting activities would be carried out in a manner consistent with the Act, and compliance with the Act would not unnecessarily delay clearing.

### Vegetation

Nalcor stated that vegetation management of the transmission lines' right-of-way would include removal of trees and control of fast-growing shrubs. Vegetation management would begin three to four years after construction and would occur every 8 to 10 years thereafter. The quantities of chemicals used would depend largely on terrain, as well as quantity and type of vegetation. Vegetation management would comply with provincial regulations.

Participants were concerned about the use of chemical herbicides and their impacts on humans and animals. While the Panel concluded that there is a reasonable regulatory process in place for the use of herbicides, it recommended that all non-chemical vegetation control alternatives be explored first and their use maximized before use of herbicides would be approved.

## **LAND AND RESOURCE USE**

Land and resource use topics included Project effects on harvesting activities (hunting, trapping, fishing, and berry picking), cabins, winter travel, navigation and forestry and other resource-based activities (mining, agriculture and ecotourism).

### Harvesting Activities

Nalcor indicated that the area to be affected by the Project was not a prime destination for harvesting activities. Nalcor also did not expect the Project to increase harvesting activities in the area because employees would not be allowed to harvest anything, most of the roads needed for construction would be made inaccessible afterwards, and Nalcor would build construction camps and implement transportation policies.

Because of the loss of riparian, wetland and upland habitat, and possibly ashkui, there would likely be some adverse effects on moose, small game and migratory birds. However, potential loss of wildlife would be balanced to a certain extent if mitigation measures to replace riparian and wetland habitat were successful.

Construction activities could temporarily disturb the George River caribou herd, which might lead some animals to avoid certain areas and cause hunters to adapt their hunting strategies, but no further disturbances would occur during the operation period. However, the future of the herd could be threatened by the possible cumulative effects of a large number of small changes in the herd's total range and caribou hunting could be adversely affected as a result. Therefore, it would be important to monitor how the herd interacts with the Project and any changes caused by the Project to the way in which caribou are hunted in the area.

Because of the various changes the Project would cause in the Churchill River's main stem, some species preferred for fishing could be less abundant in the reservoirs while others might increase in numbers. In addition, consumption advisories would likely be required because of methylmercury accumulation in fish. However, the Panel concluded effects on fishing in the Churchill River would not be significant because most people already prefer to fish in other locations. Nalcor also committed to investigate remediation of the saltwater intrusion in Grand Lake as part of its fish compensation strategy and this could provide additional fishing opportunities outside of the area that would be affected by methylmercury contamination.

In Goose Bay and Lake Melville, the Panel concluded that it was still uncertain whether methylmercury would bioaccumulate in fish and seal to levels that would require consumption advisories, especially considering the lack of baseline information. Recognizing the dietary and cultural importance of fishing and seal hunting in this area, the Panel concluded that there would be significant adverse effects on fishing and seal hunting in Goose Bay and Lake Melville should consumption advisories be required for that area.

Nalcor indicated that most trapping now occurs close to home communities rather than in the Project area. To the extent that the riparian habitat compensation program would be successful, this could provide some replacement trapping opportunities. The Panel concluded that the Project would not have significant adverse effects on trapping, but recommended that Nalcor modify its proposed trapping compensation program to reduce the requirement for proof of ten years' continuous use.

Conditions of the leases of cabins located in the flood zone enable the Province to cancel them without compensation. However, the Panel was not provided with enough information to conclude whether any legitimate cabin owners outside the flood zone would be unfairly inconvenienced during either the construction or the operations period. Any aggrieved owner would, however, be able to access a complaints resolution process recommended by the Panel.

#### Winter Travel

Nalcor predicted that thickness and stability of the ice below Muskrat Falls would not change as a result of the Project, but freeze-up would be delayed by two weeks, or up to three weeks under climate change scenarios. Nalcor would provide alternate transportation to Mud Lake residents, but only if adverse changes to winter travel conditions could be directly attributed to the Project. The Panel concluded that uncertainty about how adverse changes to the ice bridge would be mitigated would be a destabilizing and stressful factor for the community of Mud Lake, especially since these changes would be permanent. The Panel recommended that Nalcor and the Province negotiate an agreement with the Mud Lake Improvement Committee and that Nalcor assume responsibility for providing alternate transportation if the time the residents are unable to cross the river during freeze-up or break-up exceeds two weeks, without requiring proof that the Project has caused the problem.

The Panel concluded that ice on Lake Melville would be unlikely to be adversely affected by the Project, however ice conditions and the timing of freeze-up and break-up should be monitored by Nalcor.

#### Navigation

Restricted river travel during the impoundment period could present a temporary problem for Mud Lake residents needing to cross the river by boat. Nalcor committed to provide alternative transportation during this period if required. Trees remaining in the reservoirs' stick-up zones

would be a navigational hazard and would make access to the shorelines problematic, particularly for those travelling by canoe. The Panel was not confident that all of the trees in the stick-up zones would be sheared off by ice or waves as quickly as predicted. It was also not possible to determine whether the Project would cause navigational hazards downstream of Muskrat Falls. The Panel recommended that Nalcor develop a navigation monitoring and mitigation plan for both reservoirs, involving river users, and addressing issues such as management of the stick-up zones, boat launches and portages, and navigational hazards.

### Forestry

The Panel concluded that allocating the Allowable Annual Cut of Forest Management District 19A to the Project's flood zone would minimize competition with other forestry operations. The Panel's recommendations to maximize utilization of the wood cut in the flood zone and allow local forestry operators free access to areas that would not otherwise be cleared could also help to develop a more viable forestry industry in Labrador.

## **CURRENT ABORIGINAL LAND AND RESOURCE USE FOR TRADITIONAL PURPOSES**

The Panel was required to specifically consider Project effects on current use of lands and resources for traditional purposes by Aboriginal persons. Information available to Nalcor, submissions by Aboriginal groups and testimony during the public hearing suggested that current use of the Project area (deemed by the Panel to be within the last 20 years) for traditional purposes is generally intermittent and sporadic relative to use of other areas that would not be affected by the Project.

Some Aboriginal persons suggested that there has been some decline in the intensity and extent of traditional land and resource use activities in recent time due to societal and economic changes. Nevertheless, the Panel recognized the importance, common to all Aboriginal persons, of practicing traditional activities within the entire extent of their traditional territory and the fact that for many groups, any effect from the Project on their practice of traditional activities would act cumulatively with impacts caused by the development of the earlier Churchill Falls project.

### Labrador Innu

The Panel observed that the Project would have an adverse impact on the land and resource use activities of the Labrador Innu by flooding harvesting and camping areas, including three ashkui locations in the proposed Muskrat Falls reservoir, as well as others in the vicinity of the Gull Island site. However, the Project area covers only a small portion of the traditional territory of the Labrador Innu and traditional activities currently practiced by Labrador Innu do not seem to be confined to the Churchill River valley. Furthermore, the Panel expected Innu Nation's interests regarding land and resource use to have been considered in the *Tshash Petapen* Agreement. Therefore, the Project effects on Labrador Innu land and resource users would likely not be significant, though the Panel recognized that some individual members might still experience negative effects. The Panel recommended mitigation to address noise and dust effects on Innu cabins and camps, and collaborative measures to address the relocation of Canada yew medicinal plants.

### Inuit

The Nunatsiavut Government and Inuit participants stated that the Project would adversely affect their traditional land and resource use activities in Lake Melville and on land and water

within the Labrador Inuit Settlement Area as well as land and water identified in Schedule 12-E of the Labrador Inuit Land Claim Agreement. They were particularly concerned about the potential for methylmercury contamination because of the importance of harvesting activities in that area for the continuation of their traditional lifestyle. Should consumption advisories be required in Goose Bay and Lake Melville, the Panel concluded that the Project would have significant adverse effects on the pursuit of traditional harvesting activities by Labrador Inuit, including the harvesting of country food.

### Inuit-Metis

The NunatuKavut Community Council indicated that it was only able to provide limited information about current land and resource use activities for traditional purposes by Inuit-Metis because of its injunction application and the lack of time and financial resources to provide detailed hearing submissions. Most information was received from individual Inuit-Metis participants, rather than from the organization, and affiliation of participants could not always be confirmed.

The Panel concluded that, based on information identified through the environmental assessment process, there were uncertainties regarding the extent and locations of current land and resource use by the Inuit-Metis in the Project area. The Panel recognized that additional information could be forthcoming during government consultations. To the extent that there are current uses in the Project area, the Panel concluded that the Project's impact on Inuit-Metis land and resource uses, after implementation of the mitigation measures proposed by Nalcor and those recommended by the Panel, would be adverse but not significant.

The Panel also observed that many land and resource use locations reported to be frequented by Inuit-Metis are outside of the Project area and would remain unaffected and accessible. Measures considered to mitigate the effects of the Project on trapping activities and to compensate for losses of trapping income, property or equipment attributed to the Project may also be particularly relevant for Inuit-Metis.

### Quebec Aboriginal Groups

Limited information was received regarding current land and resource use activities for traditional purposes in the Project area by Aboriginal persons living in Quebec due, in part, to unsuccessful attempts by Nalcor and most groups to sign consultation agreements to gather information. Time constraints during the public hearing did not allow the Panel to visit each community and therefore community representatives had to attend community hearing sessions held in Sept-Îles. They informed the Panel that the information provided was incomplete, and that insufficient time and resources were available to provide a more complete picture. The accuracy and completeness of the information provided by Nalcor was also challenged. Beside caribou hunting, any other current land and resource use activities for traditional purposes in the Project area by Aboriginal persons living in Quebec appear to be seasonal, sporadic and of short duration, including incidental harvesting along the Trans Labrador Highway.

The Panel concluded that, based on information identified through the environmental assessment process, there were uncertainties regarding the extent and locations of current land and resource use by Quebec Aboriginal groups in the Project area. The Panel recognized that additional information could be forthcoming during government consultations. To the extent that there are current uses in the Project area, the Panel concluded that the Project's impact on Quebec Aboriginal land and resource uses, after implementation of the mitigation measures

proposed by Nalcor and those recommended by the Panel, would be adverse but not significant.

The Panel also observed that many land and resource use locations reported to be frequented by Aboriginal persons living in Quebec are outside of the Project area and would remain unaffected and accessible.

The Panel recommended that Nalcor involve all Aboriginal groups in the design and implementation of its proposed community land and resource use monitoring program and include Traditional Knowledge.

## **CULTURE AND HERITAGE**

Nalcor assessed Project effects on historical and archaeological resources, sites of spiritual and cultural importance and changes to the river landscape.

Nalcor assessed effects of the Project in those areas where Project components would cause physical disturbance. Nalcor developed its archaeological program and proposed mitigation measures in compliance with the provincial *Historic Resources Act*. All historic and archaeological sites identified to date that could potentially be disturbed or lost as a result of the Project would be excavated or documented before any ground disturbance activities occur. Measures would also be implemented to address the discovery of previously unknown sites and artifacts during construction. Nalcor committed to make use of best practice archaeological interpretation and analysis methods and to engage local communities in the development of commemoration initiatives.

Participants recommended that investigation, documentation and commemoration of historic and archaeological resources be undertaken before flooding begins so that irreversible losses might be offset and ancestors of all origins and their harvesting heritage recognized and honoured. Participants also requested that Nalcor's commemoration commitment ensure that intangible resources – trails, portages, customs and stories – be recorded. They also indicated that local heritage organizations could benefit by receiving funding to undertake part of this work and to implement youth education programs.

The Panel acknowledged that Nalcor has been proactive in surveying historic and archaeological potential, and has worked extensively with Innu Elders to address their cultural concerns. The resources Nalcor has and would apply to studying, identifying and documenting historic and archaeological sites and artifacts would enable considerable investigation in the history of the region that might otherwise not happen. The Project would also provide opportunities for Aboriginal persons to obtain training and experience in archaeology. However, it would be unlikely that all sites and artifacts of cultural importance or meaning would be located. The Panel recommended that Nalcor involve all affected groups in searching for, documenting and commemorating historic and archaeological resources.

The Panel noted in particular that the creation of the Smallwood Reservoir resulted in losses of culturally and historically important sites and artifacts, with no consultation, acknowledgement or commemoration.

Three sites of spiritual and cultural importance to the Labrador Innu would be lost because of flooding. Nalcor's mitigation measures consisted of documenting their significance and minimizing disturbances through alternate facility layout and construction methods. Nevertheless, Innu Elders felt that animal spirits could retaliate in response to being disturbed

and that efforts should be made to appease them. The Panel acknowledged the importance of recognizing, accepting and respecting the cultural beliefs of the communities to be affected. The Panel also recommended that the Province develop an approach to assign place names in consultation with Aboriginal communities for any new Project-related landscape features.

Many participants talked about their deep emotional connection with the Churchill River, which has strong historical, cultural and spiritual significance for them because of their own travels on the river or because of family or community connections. The creation of the two reservoirs would result in the disappearance of valued river features, including fast flowing water, rapids and falls, shallow delta areas, islands, varying water levels and associated river shoreline. The Panel concluded that the Project would cause significant adverse effects on culture and heritage after mitigation, particularly with respect to the “loss of the river” as a highly valued cultural and spiritual landscape. This effect would apply to a large proportion of the river between Churchill Falls and Goose Bay, would be irreversible, and would last for the duration of the Project.

## **ECONOMY, EMPLOYMENT AND BUSINESS**

### *Economic Impacts*

The Project has a capital budget of \$6.4 billion (\$2.5 billion for Muskrat Falls and \$3.9 billion for Gull Island), with construction activities being carried out over a 11 to 12 year period. Nalcor predicted significant benefits to people from construction employment and for businesses from the provision of goods and services. Direct employment was estimated at 15,600 person years, approximately 5,600 person years for Muskrat Falls and 10,000 person years for Gull Island. Nalcor estimated that 65 percent of those requirements can be supplied by the province, 40 percent from the Island of Newfoundland and 25 percent from Labrador. It is also estimated that between \$500 million and \$1 billion would be spent on goods and services from Newfoundland and Labrador.

Many participants questioned, based on their experiences with other projects, whether or not the projected employment and business opportunities would be realized. The Panel noted that Nalcor’s Benefits Strategy addresses a number of these concerns. As well, the Impacts and Benefits Agreement between Nalcor, the Government of Newfoundland and Labrador, and Innu Nation includes specific provisions regarding employment and goods and services. The Panel concluded that during the construction period, there would be substantial potential economic benefits for all areas of the province, especially Labrador and the Upper Lake Melville area.

For the long term, operating employment, though modest, would be a notable benefit, as are the trained and experienced workforce and the strengthened business capability gained during the construction period. Similarly, the availability of power for new industry or general development is a staple of further economic development, benefiting the whole province and the Upper Lake Melville area particularly because of its proximity.

The Panel focused its attention on what Nalcor stated as the principal long-term economic benefit, i.e. the net financial benefits to the economy of the province that would be generated primarily from the sale of power. Those benefits were estimated by Nalcor to be in excess of \$1 billion (in 2010 dollars) annually after debt repayment (2050); of this, \$300 million was attributed to Muskrat Falls and \$700 million to Gull Island. As already indicated, the Panel concluded that considerable uncertainty exists regarding the Project’s ability to deliver financial benefits to the Province in the order of magnitude projected by Nalcor. There are also questions as to how any such benefits might be distributed by the Government of Newfoundland and Labrador.

Many different views were expressed with respect to the extent that high levels of construction activity would result in in-migration to the Upper Lake Melville area. The Panel concluded that, while it did not expect much in-migration of Project workers from outside Labrador, there could be substantial in-migration to Happy Valley-Goose Bay from other Labrador communities.

Some participants expressed concern that the Project would result in some local businesses experiencing adverse impacts in the form of employee retention problems and threats to economic viability because of the necessity to pay higher wage rates. The Panel concluded that any such impacts would occur primarily in Happy Valley-Goose Bay and would not be significant.

The Panel notes that, while the statistical data was separated for Muskrat Falls and Gull Island, most of the benefits discussion was based on the Project as a whole. The fact that Gull Island is a completely separate sanction decision from Muskrat Falls leads to uncertainty regarding the time lag between the two and this has economic implications.

### Enhancing Employment and Business Opportunities

The Panel concluded that Nalcor's Benefits Strategy and monitoring and mitigation commitments would contribute to the enhancement of employment benefits from the Project, ensuring meaningful employment experiences, and enhanced benefits to local and provincial businesses from the supply of goods and services to the Project. However, there are a number of further enhancement measures that should be taken by Nalcor. At the same time, the Panel notes that prospective workers or businesses would also carry some responsibility to ensure that local benefits were realized.

The Panel's recommendations to enhance employment benefits included: early candidate selection and training, workplace attachment for apprenticeship graduates, providing training to 'journeyman' level in community of residence, orientation to assist prospective employees prepare for participation in wage economy, continuation of the Labrador Aboriginal Training Partnership, and an employment outreach program to Aboriginal communities in Quebec.

The Panel's recommendations relating to business opportunities included quantitative targets for goods and services, an enhanced supplier development program, and a transparent bidding process. The Panel also recommended modifying the Benefits Strategy to ensure that the various statistical reports are available publicly and that the established employment and business targets cannot be changed at the Minister's discretion.

## **FAMILY AND COMMUNITY LIFE, AND PUBLIC SERVICES**

### Communities and Families

Nalcor stated that both positive and adverse effects to community life would occur as a result of the Project. The Panel heard many concerns about the health of Upper Lake Melville residents, and particularly in Sheshatshiu, where participants described their community as being particularly vulnerable, citing the numbers of children in care and the high rate of youth suicide as indicators. Project-related risks would include the potential for high incomes from wage employment to increase alcohol and drug use, with subsequent effects on mental health, family well-being, community stability, and loss of the traditional way of life. Without adequate mitigation, the Panel concluded that the Project would cause significant adverse effects on the health and welfare of children and youth, particularly in Sheshatshiu. If the measures recommended by the Panel were applied, these adverse effects could be avoided.

Nalcor noted that the *Tshash Petapen* Agreement would provide resources that could address any increases in community stresses in the Sheshatshiu population. While the Panel observed that the financial security offered by such an agreement would place the community in a better position to address existing social problems, in the absence of detailed information, the Panel cannot assume that these adverse effects would be fully mitigated. The Panel therefore recommended that Innu Nation, the provincial and federal governments and Nalcor develop a Memorandum of Understanding to determine how each party could bring appropriate resources to developing appropriate mitigation of Project-related social effects in Sheshatshiu.

The Panel was told that similar social effects would likely occur in Happy Valley-Goose Bay, but observed that such effects would likely be somewhat less severe. The Panel was not provided with baseline data regarding the existing levels of alcohol and drug abuse and related sexual assault and family violence in Happy Valley-Goose Bay because much of this information was not available. However, women's groups indicated that they already see many unaddressed problems and would expect more if the Project proceeded.

The Panel concluded that there is the potential for adverse effects resulting from high wage employment, including increased substance abuse, and sexual assault, family violence and adverse effects on women and children in Happy Valley-Goose Bay. These effects would be difficult to monitor because of the lack of data and because, by nature, the effects are often hidden. For this reason, the Panel concluded that mitigation must include a research element. The Panel recommended that the provincial Department of Health and Community Services, in consultation with Aboriginal groups, and government and community agencies, conduct a social effects needs assessment, including participatory research, to provide recommendations for social effects mitigation measures and monitoring.

The Panel also made recommendations regarding the provision of substance abuse counselling at the work sites for Project employees, and provision of a variety of work schedules to increase participation in the workforce by women and Aboriginal persons.

The Panel concluded that the Project would also provide family and community benefits in the form of increased employment, higher incomes, opportunities for young people, and resources to support traditional activities.

### Community Services

Nalcor indicated that health and social services in Upper Lake Melville were near or at capacity, but said that the Project would not significantly add to the demand for services because its accommodation and transportation policies would reduce the likelihood of in-migration and Nalcor would provide some health and social services to Project workers at the construction camps.

The Labrador-Grenfell Regional Health Authority stated that the regional health centre in Happy Valley-Goose Bay did not have the resources to address existing health and addictions needs in the communities. Both Nalcor and the Province agreed that it was the provincial government's responsibility to address any service shortfall, though the Panel also heard other views.

Participants also expressed concerns that the Project could result in people moving away permanently from coastal communities because of the challenges associated with travel, new employment opportunities opening up in Happy Valley-Goose Bay, or simply wanting to take advantage of services and recreational opportunities in a larger centre.

The Panel concluded that in-migration levels would exceed Nalcor's predictions as people moved into the community to fill job openings caused by people leaving to take higher-paid employment with the Project. The Panel therefore recommended that the provincial Department of Health and Community Services make a formal commitment to provide the human resources to address any Project-related increase in demand for mental health, addictions and other health and social services, with financial contributions from Nalcor as required.

### Community Infrastructure

Nalcor indicated that the Project would require use of infrastructure within the community of Happy Valley-Goose Bay, mainly during the construction period, including roads, the landfill site, the port, the airport and industrial and commercial land. Nalcor committed to work with the Town of Happy Valley-Goose Bay on planning and infrastructure issues but, since the Project would be located outside town boundaries, it would not be making payments to the Town by way of taxes or grants in lieu. The Town told the Panel that, while there was enough infrastructure capacity to deal with existing demand, Project-related increases would be problematic and the Town's budget was not sufficient to address the issue.

The Panel noted that several provincial government departments have a role in ensuring that the increased need for infrastructure and municipal services is met. The Panel also recommended that the Province and Nalcor negotiate a capacity agreement with the Town to provide financial resources to increase the Town's capacity to respond to additional administrative demand.

Many participants expressed concerns regarding the existing housing shortage in Happy Valley-Goose Bay, and particularly the resulting pressures on low-income families. The private market might not fully respond to what could be a fairly short-term "housing boom". A number of participants suggested that the unused housing stock at 5 Wing Goose Bay Military Base could provide a solution.

The Panel concluded that the Project and higher than predicted levels of in-migration would have adverse effects on the availability of low-income housing in Happy Valley-Goose Bay. The Panel therefore recommended that the Town of Happy Valley-Goose Bay, supported by Nalcor and relevant government departments and housing agencies, develop a low-income housing strategy with measurable targets.

### Human Health, Country Food and Mercury

The consumption of country food contaminated with methylmercury poses risks to human health, particularly in pregnant women and young children. Consumption advisories may effectively mitigate this risk by dissuading people from eating certain food from certain sources, but can also have the effect of reducing confidence in all country food, which can also lead to negative health effects.

Nalcor predicted that consumption advisories would likely apply to fish caught in the main stem of the Churchill River, but not downstream in Goose Bay and Lake Melville. Through the course of the review, the Panel concluded that this prediction was less certain, because of new information regarding the downstream extent of mercury impacts from the Churchill Falls project and concerns raised about the lack of baseline information on existing mercury body burdens. The Panel recommended further assessment of this issue and concluded that consumption advisories, if required in Goose Bay and Lake Melville as a result of elevated mercury in fish or seal, would constitute significant adverse effects on the residents of the Upper Lake Melville

communities and Rigolet. The Panel did not make a similar determination for the main stem of the river because of evidence that few people currently fish there.

As a result, the Panel also recommended that Nalcor be required to enter into negotiations with parties representing resource users in Goose Bay and Lake Melville regarding further mitigation, where possible, or compensation measures, including financial redress if necessary, should consumption advisories be required in this area.

The Panel made related recommendations regarding implementation of consumption advisories, monitoring of human health and mercury, country food dietary surveys and research about mercury in a complete range of country food.

#### Panel Observations on Other Key Community Concerns

The Panel noted a number of additional concerns emerging from evidence provided at community hearings and has made some observations for the information of government decision makers on the following issues:

- electrical power for communities on the coast;
- disparity in financial benefits;
- Churchill Falls redress; and
- consultation with Aboriginal communities.

### **ACCIDENTS AND MALFUNCTIONS**

Participants' main concern was with the possibility and outcome of a major dam failure which could be caused by water overtopping a dam because of an extreme weather event or by a breach in the dam structure.

A dam failure at Muskrat Falls would result in a warning time of approximately two hours, which Nalcor said would be sufficient to avoid loss of life. A dam failure at Gull Island would result in longer warning time and would likely trigger a failure at Muskrat Falls. A failure at the Smallwood Reservoir, which would likely trigger failures of the dams downstream, would have a considerably longer warning time. Dam failure would result in complete inundation of Mud Lake and partial inundation of the lower areas of Happy Valley-Goose Bay. Should that occur, Nalcor predicted economic losses in the order of \$250 million for property in the communities and over \$6 billion for loss of Nalcor's own infrastructure.

Nalcor indicated that the dams would be designed and constructed according to the current standards of the Canadian Dam Association and that it would ensure that the appropriate preventive and mitigation measures, including Emergency Preparedness and Emergency Response Plans, are implemented.

Participants expressed concern about the resources required to prepare effective warning and evacuation strategies, about potential financial losses should a dam failure occur, and the stress of ongoing worry about such an event.

The Panel concluded that dam failure would result in significant adverse effects but would be unlikely to occur. The Panel recommended, however, that Nalcor should assume liability for all personal and financial losses that would be incurred downstream in the unlikely event that one or more dams failed, regardless of the specific cause.

## ENVIRONMENTAL MANAGEMENT

Environmental management issues – mitigation, monitoring, follow-up, adaptive management and community and regulatory oversight – were discussed throughout the EIS and the review process. Nalcor made extensive mitigation and monitoring commitments, as listed in the full report. Participants raised concerns regarding Aboriginal and stakeholder involvement, reporting, financial commitments, both by Nalcor and other parties involved in monitoring, and adherence to terms and conditions attached to release from the environmental assessment.

The Panel made a number of recommendations regarding:

- an authorizing regulation that would list all environmental management commitments and require Nalcor and relevant provincial government departments to implement them;
- a joint federal-provincial regulatory plan, with annual reporting on compliance;
- long-term funding commitments for environmental management from Nalcor and the provincial and federal governments;
- a monitoring and community liaison committee, appointed by the Province, with sufficient resources to provide oversight of mitigation and monitoring;
- how monitoring and adaptive management should be carried out; and
- a complaints resolution process.

In addition, the Panel recommended that, should construction of the second generation facility be delayed beyond a certain length of time, the environmental release should expire, and an additional environmental review be required.

### Decommissioning

Nalcor stated that it had no plans to decommission the Project; components would be refurbished as required to continue operation. Should decommissioning be required at some point in the future, the environmental impacts and mitigation requirements would be assessed at that time. Nalcor noted that decommissioning would have substantial environmental implications, particularly relating to the possible release of sediments downstream and reconfiguration of the river shorelines.

The Panel concluded that Nalcor should take responsibility for the possibility of decommissioning and recommended that Nalcor be required to demonstrate how it would do this – this could include insurance, a bond or creation of a dedicated fund.

## CUMULATIVE EFFECTS

The Panel concluded that Nalcor's approach to cumulative effects assessment was less than comprehensive and that participants had raised valid concerns that contributed to a broader understanding of the potential cumulative effects of the Project. The Panel recognized the challenges involved, including limited information about past projects such as the Churchill Falls project, and the built-in disincentive for proponents to identify adverse cumulative effects when they are perceived as a potential threat to project approval.

The Panel recommended that government agencies support regional processes to ensure a broader based, more integrated approach to cumulative effects assessment, and also that the Province move ahead with the Protected Areas Strategy to increase the percentage of land under protection in Labrador, with the goal of eventually reaching 10 to 15 percent of Labrador's total area, defined by the Strategy as the desirable amount for adequate conservation purposes.

## PANEL'S CONCLUDING COMMENTS

The Panel offered concluding comments to help government decision makers with the task of determining whether the Project would make an overall contribution to sustainability. The Panel was guided by the following principle:

**The effects, risks and uncertainties of the Project should be fairly distributed among affected communities, jurisdictions and generations, and the Project should result in net environmental, social and economic benefits.**

When trying to determine if there would be net benefits, the Panel looked at the residual adverse effects and the predicted Project benefits separately for biophysical issues and socio-economic issues. In other words, the Panel did not make the assumption that adverse biophysical effects could be automatically compensated by economic benefits.

The Panel asked seven questions:

### Would there be net economic benefits?

Positive benefits would include employment and business benefits, particularly during construction, and – for Innu Nation – the revenues and business opportunities associated with the *Tshash Petapen* Agreement. Other long-term economic opportunities would include those related to increased business capacity, a training legacy, additional lower-cost power in Labrador, energy security and price stability, and provincial revenues for the life of the Project. Uncertainties and risks related to the viability of the Muskrat Falls component and market access uncertainties for Gull Island and the effect of both on long-term benefits. The Panel made recommendations to address and resolve these uncertainties. Once the required further financial assessments have been carried out, decision makers would be able to determine whether the Project, under the various scenarios contemplated by Nalcor, would have a net economic benefit and at what scale. If the whole Project proceeds, the Panel had reasonable confidence that the adverse economic effects and risks would be outweighed by the potential for large-scale economic benefits.

### Would there be net social and cultural benefits?

Benefits would include training, employment and increased incomes during construction. Adverse effects would include the risk of increased drug and alcohol problems and their effects on families, the effects of the housing shortage, possible inflation of the cost of goods and services, changes to country food and traditional activities, and loss of valued cultural sites, including the “loss of the river”. The Panel noted that information on current land and resource use by some Aboriginal groups is not yet complete. Other uncertainties included whether and how mitigation would be carried out, and how individuals and community leaders choose to respond to the Project. The Panel concluded that it is possible but uncertain whether the Project as proposed by Nalcor would result in net social benefits. However, there are clearly opportunities to enhance this possibility.

### Would there be net biophysical benefits?

Biophysical benefits would mainly derive from the greenhouse gases displaced by sale of the Project's renewable power. The Panel did not have sufficient information to know exactly how large this effect would be but made recommendations as to how it could be maximized. The adverse biophysical effects would include – among others – the loss of fish, riparian, wetland

and terrestrial habitat, and the risk to the Red Wine Mountain caribou herd. The Panel acknowledged the difficulty of comparing a benefit that accrues at a much wider, North American (and potentially global) scale with adverse effects that are experienced locally in Labrador. The Panel concluded the Project would not result in net biophysical benefits, although it is possible that the adverse effects could be offset to a certain extent by a commitment to permanently protect other land and rivers in Labrador.

*Would there be net benefits to future generations?*

Future benefits would include energy security (although in the context of Newfoundland and Labrador, this is already assured by the availability of Churchill Falls power in 2041), and potentially long-term provincial revenues. Innu Nation would also realize long-term financial benefits. Adverse future effects would include the “loss of the river” and cultural sites, and also the risk that some of the predictions about Project effects may turn out to be inaccurate. The Panel concluded that there is uncertainty regarding this question.

*Would there be net benefits to Newfoundland and Labrador?*

The Panel concluded that the Project might deliver net economic benefits to the Province as a whole, depending on the results of the recommended studies regarding long-term benefits and alternatives. The residual environmental effect for Labrador would likely be adverse. Whether there would be net social and economic benefits for Labrador would depend on whether enough of the revenues generated by the Project were re-invested in Labrador.

*Would there be net benefits beyond Newfoundland and Labrador?*

Overall, the Panel believed that there would be net benefits beyond the province in the form of employment and business opportunities, greenhouse gas reduction, and energy stability. Adverse effects might be experienced to a certain degree by Aboriginal communities in Quebec.

*Would there be net benefits to individual communities?*

Happy Valley-Goose Bay would experience a range of effects, positive and negative. On balance, with appropriate mitigation, the Panel concluded that net benefits would result.

In Sheshatshiu, the situation would be complex and uncertain. The *Tshash Petapen* Agreement would clearly deliver many resources and opportunities, including increased self-government. On the other hand, the Panel was told of the many social and cultural challenges in the community. On balance, the Panel believed net benefits are possible in Sheshatshiu.

In Mud Lake, North West River and Rigolet, net benefits appear less likely. Whether the overall effect would be neutral or adverse, would depend on the degree to which residents obtain employment and whether downstream consumption advisories are required. Mud Lake would also be more vulnerable to adverse Project effects on transportation across the river, and the risk of a dam failure event, even if very unlikely. The Panel concluded the effect in Nain and Cartwright would likely be neutral, with some opportunities but also some risk of out-migration.

The Panel concluded that the Project would be unlikely to deliver benefits to Aboriginal communities in Quebec. The Panel was unable to determine whether there would be adverse effects on land and resource use or rights and title. This should be addressed through ongoing government consultation.

### *Concluding Thoughts on the Final Project Decision*

The Panel concluded that if the recommended economic and alternatives studies show that there are alternative ways of meeting the electricity demands of the Island over the medium term in a manner that is economically viable and environmentally and socially responsible, the Muskrat Falls portion of the Project should likely not be permitted to proceed for purposes of meeting Island demand.

If market access for Gull Island were resolved based on reasonable transmission costs and the Gull Island facility were to be developed first, or a joint sanction decision were to be made, the Panel believed the situation would be different. The Gull Island facility would produce more power at a lower unit cost and therefore would offer much greater potential to provide lower cost power to Newfoundland and Labrador and generate revenues for the Province.

The effect of the Project on Aboriginal rights and title as well as the effect on current land and resource use by Aboriginal communities has yet to be fully understood and agreements have yet to be reached with affected communities on how any impacts would be addressed. These issues could be addressed together in the context of the *Federal Aboriginal Consultation Framework for the Lower Churchill Hydroelectric Generation Project*.

Finally, the Panel wants to thank everyone who participated in the review process, including individuals, organizations, government representatives, and Nalcor. Your hard work, persistence, and willingness to share experience, knowledge, ideas and aspirations with the Panel was invaluable. The Panel writes the report but the environmental assessment as a whole is truly a collective effort. It is our hope that all participants in this environmental assessment feel that they have both contributed to the conclusions and recommendations reached and have learned from other participants during the course of the process.

## RECOMMENDATIONS

### **RECOMMENDATION 4.1 Government confirmation of projected long-term returns**

The Panel recommends that, if the Project is approved, before making the sanction decision for each of Muskrat Falls and Gull Island, the Government of Newfoundland and Labrador undertake a separate and formal review of the projected cash flow of the Project component being considered for sanctioning (either Muskrat Falls or Gull Island) to confirm whether that component would in fact provide significant long-term financial returns to Government for the benefit of the people of the Province. Such financial returns must be over and above revenues required to cover operating costs, expenditures for monitoring, mitigation and adaptive management, and financial obligations to Innu Nation. The Panel further recommends that the Government of Newfoundland and Labrador base these reviews on information on energy sales, costs and market returns that have been updated at the time of sanction decision, and make the results of the reviews public at that time. The financial reviews should also take into account the results of the independent alternatives assessment recommended in Recommendation 4.2.

### **RECOMMENDATION 4.2 Independent analysis of alternatives to meeting domestic demand**

The Panel recommends that, before governments make their decision on the Project, the Government of Newfoundland and Labrador and Nalcor commission an independent analysis to address the question "What would be the best way to meet domestic demand under the 'No Project' option, including the possibility of a Labrador-Island interconnection no later than 2041 to access Churchill Falls power at that time, or earlier, based on available recall?" The analysis should address the following considerations:

- why Nalcor's least cost alternative to meet domestic demand to 2067 does not include Churchill Falls power which would be available in large quantities from 2041, or any recall power in excess of Labrador's needs prior to that date, especially since both would be available at near zero generation cost (recognizing that there would be transmission costs involved);
- the use of Gull Island power when and if it becomes available since it has a lower per unit generation cost than Muskrat Falls;
- the extent to which Nalcor's analysis looked only at current technology and systems versus factoring in developing technology;
- a review of Nalcor's assumptions regarding the price of oil till 2067, since the analysis provided was particularly sensitive to this variable;
- a review of Nalcor's estimates of domestic demand growth (including the various projections to 2027 in the EIS (2007, 2008, 2009 and the 0.8 percent annual growth to 2067 provided at the hearing);
- Nalcor's assumptions and analysis with respect to demand management programs (compare Nalcor's conservative targets to targets and objectives of similar programs in other jurisdictions and consider the specific recommendations, including the use of incentives to curtail electric base board heating, from Helios Corporation, among others);
- the suggestion made by the Helios Corporation that an 800 MW wind farm on the Avalon Peninsula would be equivalent to Muskrat Falls in terms of supplying domestic needs, could be constructed with a capital cost of \$2.5 billion, and would have an annual operating cost of \$50 million and a levelized cost of power of 7.5 cents per kilowatt-hour;
- whether natural gas could be a lower cost option for Holyrood than oil; and

- potential for renewable energy sources on the Island (wind, small scale hydro, tidal) to supply a portion of Island demand.

**RECOMMENDATION 4.3 Integrated Resource Planning**

The Panel recommends that the Government of Newfoundland and Labrador and Nalcor consider using Integrated Resource Planning, a concept successfully used in other jurisdictions. Such an approach would involve interested stakeholders and look simultaneously at demand and supply solutions and alternative uses of resources over the medium and long term.

**Recommendation 4.4 Project sequencing and applying lessons learned**

The Panel recommends that, if the Project is approved, and if for any reason construction of the Gull Island portion of the Project occurs before Muskrat Falls, Nalcor should be expected to apply the lessons learned from the construction of Gull Island to the construction of Muskrat Falls.

**RECOMMENDATION 4.5 Full clearing of the Muskrat Falls reservoir**

The Panel recommends that, if the Project is approved, Nalcor be required to apply its 'full clearing' reservoir preparation option to the Muskrat Falls reservoir.

**RECOMMENDATION 4.6 Preparation approach for Gull Island reservoir**

The Panel recommends that, if the Project is approved, the reservoir preparation approach for the Gull Island reservoir be finalized and approved by the provincial Department of Natural Resources at the time of the sanction decision for Gull Island. The approach should take into account lessons learned from the preparation of the Muskrat Falls reservoir and should make all reasonable effort to increase harvested volumes above those currently projected by Nalcor under its 'partial clearing' option for the Gull Island reservoir.

**RECOMMENDATION 4.7 Utilization of merchantable timber**

The Panel recommends that, if the Project is approved, Nalcor be required to ensure utilization of both the harvested timber from reservoir preparation and the merchantable wood taken from the reservoir as part of its 'trash and debris' removal program after impoundment. Nalcor would retain the right to determine how this would be achieved, but should work with relevant Provincial Government departments and third party commercial interests to identify options.

**RECOMMENDATION 5.1 Use of best available technology**

The Panel recommends that, if the Project is approved, Nalcor be required to implement its mitigation commitments to minimize air pollution, noise and greenhouse gas emissions resulting from the Project. In addition, Nalcor should be required to use best available technology for any new construction and harvesting equipment purchased for the Project. This means that any new equipment purchased after Project approval should be required to meet the highest current emissions standards for such equipment, even if such standards are above current regulatory requirements.

**RECOMMENDATION 5.2 Backing up intermittent renewable energy**

The Panel recommends that, if the Project is approved, Nalcor be required to make all reasonable efforts to maximize the potential to utilize power from the Project to back-up wind power and other intermittent renewable sources of electricity. The results of Nalcor's efforts should be reported to the public through its annual report.

**RECOMMENDATION 5.3 Displacement of high greenhouse gas energy sources**

The Panel recommends that, if the Project is approved, Nalcor be required to take all reasonable steps to ensure that power from the Project is used to displace energy from high

greenhouse gas emission sources and does not displace demand management, conservation, efficiency, and the generation of power from renewable, low greenhouse gas emission energy sources. The results of Nalcor's efforts should be reported to the public through its annual report.

**RECOMMENDATION 5.4 Atmospheric monitoring**

The Panel recommends that, if the Project is approved and in addition to its monitoring commitments, Nalcor should carry out the following monitoring programs using methodologies approved by federal and provincial regulators:

- monitor greenhouse gas emissions related to construction;
- monitor greenhouse gas emissions related to operation;
- track the displacement of greenhouse gas emissions in the various markets for Project power and report annually based on transparent methodologies approved by federal and provincial regulators, taking into account relevant issues identified by the Panel; and
- work with appropriate government agencies to ensure that there are active climate change monitoring programs on appropriate rivers in Labrador not affected by the Project, so that there is a better chance to separate Project impacts from climate change impacts based on local weather data collected within the Project area.

**RECOMMENDATION 6.1 Timing of reservoir impoundment**

The Panel recommends that, if the Project is approved, Fisheries and Oceans Canada require Nalcor to carry out impoundment of both the Muskrat Falls and Gull Island reservoirs during the period mid-July to the end of September, and to prepare a detailed mitigation plan for approval by Fisheries and Oceans Canada. The mitigation plan should include information on how the effects of dewatering would be monitored, thresholds to trigger further mitigation, and identification of specific adaptive management measures and how they would be applied.

**RECOMMENDATION 6.2 Environmental flow standards**

The Panel recommends that, if the Project is approved, the provincial Department of Environment and Conservation, in consultation with Fisheries and Oceans Canada, Nalcor, Churchill Falls (Labrador) Corporation Limited, and Aboriginal groups and stakeholders, develop environmental flow standards for the lower Churchill River with respect to flows (magnitude, frequency, duration, timing, and rate of change) designed to promote the maintenance of ecological functions and the conservation of riparian and fish habitat. The environmental flow standards should be incorporated by regulation under appropriate provincial legislation and acknowledged in the Water Management Agreement. The Panel further suggests that the Department of Environment and Conservation consider developing environmental flow standards for the upper Churchill River, recognizing the importance of addressing the entire watershed as an integrated system.

**RECOMMENDATION 6.3 Erosion and sedimentation prevention**

The Panel recommends that, if the Project is approved, Nalcor be required to prepare an erosion and sedimentation prevention strategy including the use of 15-metre vegetated buffer areas during reservoir preparation, best practices at all construction and cleared areas, and specified adaptive management measures to be applied should these mitigation measures fail.

**RECOMMENDATION 6.4 Mitigating entrainment effects**

The Panel recommends that, if the Project is approved, Fisheries and Oceans Canada require Nalcor to take the following steps before receiving a Section 35(2) authorization with respect to potential entrainment losses: (a) carry out further baseline sampling at Gull Island to verify both juvenile and adult fish movements in this area; and (b) prepare a mitigation and adaptive

management strategy that establishes thresholds for further action, and identifies what adaptive measures would be taken when, and for what species. The strategy should also address compensation measures should it become apparent that high losses of a specific species are inevitable.

**RECOMMENDATION 6.5 Pilot study for methylmercury mitigation through soil removal**

The Panel recommends that Natural Resources Canada, in consultation with Nalcor and, if possible, other hydroelectricity developers in Canada, carry out a pilot study to determine (a) the technical, economic and environmental feasibility of mitigating the production of methylmercury in reservoirs by removing vegetation and soils in the drawdown zone, and (b) the effectiveness of this mitigation measure. The pilot study should take place in a location where the relevant parameters can be effectively controlled (i.e. not in the Lower Churchill watershed) and every effort should be made to complete the pilot before sanction decisions are made for Gull Island. If the results of the pilot study are positive, Nalcor should undertake to employ this mitigation measure in Gull Island to the extent possible and monitor the results.

**RECOMMENDATION 6.6 Fish habitat compensation**

The Panel recommends that, if the Project is approved, Fisheries and Oceans Canada require Nalcor to:

- prepare a detailed fish habitat compensation plan in consultation with stakeholders and Aboriginal groups that addresses to the extent possible the likely interactions between species and life stages, including predator-prey relationships and also the potential to replace tributary-type habitats;
- prepare a habitat monitoring plan including thresholds for further action and identified adaptive management measures;
- implement the proposed plan, documenting the process;
- evaluate the extent to which new, stable habitat has been created, its use and productivity; and
- apply any lessons learned from implementing the Muskrat Falls compensation plan to the proposed Gull Island compensation works.

If, after all feasible adaptive management measures have been applied, Fisheries and Oceans Canada determines that there has been a significant shortfall in the amount of habitat successfully created and maintained, compared to the original proposal, Nalcor should be required to compensate by carrying out habitat compensation works in other watersheds in Labrador. Preference should be given to remediation and enhancement in areas adversely affected by the Churchill Falls project.

**RECOMMENDATION 6.7 Assessment of downstream effects**

The Panel recommends that, if the Project is approved and before Nalcor is permitted to begin impoundment, Fisheries and Oceans Canada require Nalcor to carry out a comprehensive assessment of downstream effects including:

- identifying all possible pathways for mercury throughout the food web, and incorporating lessons learned from the Churchill Falls project;
- baseline mercury data collection in water, sediments and biota, (revised modelling taking into account additional pathways, and particularly mercury accumulation in the benthos) to predict the fate of mercury in the downstream environment;
- quantification of the likely changes to the estuarine environment associated with reduction of sediment and nutrient inputs and temperature changes; and
- identification of any additional mitigation or adaptive management measures.

The results of this assessment should be reviewed by Fisheries and Oceans Canada and by an independent third-party expert or experts, and the revised predictions and review comments discussed at a forum to include participation by Aboriginal groups and stakeholders, in order to provide advice to Fisheries and Oceans Canada on next steps.

**RECOMMENDATION 6.8 Published analysis of downstream effects over time**

The Panel recommends that, if the Project is approved, Nalcor contribute to the overall knowledge about the effects of hydroelectric projects in northern regions by ensuring that a longitudinal analysis of the effects of the Project on the downstream environment (Goose Bay and Lake Melville) over an appropriate time period, including both mercury transport and bioaccumulation and other ecological parameters, is published in a peer-reviewed journal or the equivalent. The Panel suggests that Nalcor consider collaborating with an appropriate independent research organization to carry out this recommendation by providing knowledge, data and financial resources.

**RECOMMENDATION 6.9 Development of the aquatic monitoring program**

The Panel recommends that, if the Project is approved, Fisheries and Oceans Canada require Nalcor to organize a workshop with third-party facilitation and invited participation by Aboriginal groups, stakeholder organizations, knowledgeable local people, and independent experts from academic or equivalent organizations to review and advise on a detailed draft monitoring plan.

**RECOMMENDATION 7.1 Wetland compensation plan**

The Panel recommends that, if the Project is approved, Nalcor be required to develop a detailed wetland compensation plan in consultation with Environment Canada, the provincial Department of Environment and Conservation, Aboriginal groups and appropriate stakeholders. The plan should set appropriate goals for the re-establishment of wetlands taking into account the purpose served by each type of wetland in the context of the surrounding ecosystem.

**RECOMMENDATION 7.2 Riparian compensation plan**

The Panel recommends that, if the Project is approved, Fisheries and Oceans Canada require Nalcor to develop a detailed riparian habitat compensation plan in consultation with Fisheries and Oceans Canada, the provincial Department of Environment and Conservation, Aboriginal groups and appropriate stakeholders, that looks closely at water levels and variations in the levels needed to ensure healthy and resilient riparian habitat and coordinates with the environmental flow standards referenced in Recommendation 6.2.

**RECOMMENDATION 7.3 Recovery strategies for endangered species**

The Panel recommends that, if the Project is approved, federal and provincial governments make all reasonable efforts to ensure that recovery strategies are in place and critical habitat is identified for each listed species found in the assessment area before a final decision is made about the effects of the Project on those species. Compliance with federal and provincial species protection legislation should be seen as a minimum standard. In fairness to Nalcor, this work should be given the priority needed to ensure that the Project decision is not unduly delayed. A final Project decision should only be made once government decisionmakers are satisfied that the recovery of listed species would not be compromised by the Project. Where Environment Canada is relying on provincial efforts to fulfill its obligations under the safety net provisions of the federal *Species at Risk Act*, before a federal decision is made about the Project it should satisfy itself that the provincial efforts for any species at risk are sufficient for its recovery and will not be compromised by the Project.

**RECOMMENDATION 7.4 Compliance with species at risk legislation**

The Panel recommends that, if the Project is approved, Nalcor should work with federal and provincial departments responsible for species at risk legislation to ensure all Project-related activities comply with restrictions and prohibitions against harassment, disturbance, injuring or killing of listed species or destroying and disturbing their residence.

**RECOMMENDATION 7.5 Road construction and decommissioning**

The Panel recommends that, if the Project is approved, the provincial Department of Natural Resources require Nalcor to minimize road construction outside the reservoirs, by locating new roads inside the impoundment area as much as possible. Any new roads proposed by Nalcor to be located outside the impoundment areas should be carefully reviewed by the Forestry Branch of the Department of Natural Resources and only approved if there is no reasonable alternative. In order to ensure that conservation objectives are met, all temporary roads outside the reservoir should be decommissioned as soon as possible to the satisfaction of the provincial Department of Environment and Conservation.

**RECOMMENDATION 7.6 Recovery of the Red Wine Mountain caribou herd**

The Panel recommends that, if the Project is approved, the provincial Department of Environment and Conservation ensure that adequate resources are available so that all reasonable efforts to ensure the recovery of the Red Wine Mountain caribou herd are taken. In addition, the Department should require Nalcor to play an enhanced role in the recovery process for the Red Wine Mountain caribou herd by putting resources into the process for research and recovery efforts and to participate actively in the overall effort to ensure the recovery of the caribou herd.

**RECOMMENDATION 7.7 Management of the George River caribou herd**

The Panel recommends that, if the Project is approved, the provinces of Quebec and Newfoundland and Labrador, Environment Canada and all interested Aboriginal communities initiate a dedicated range-wide joint management program for the George River caribou herd, and through this program cooperatively carry out a comprehensive cumulative effects assessment of the impact of human activities on the herd to be updated periodically as required.

**RECOMMENDATION 7.8 Effect of reservoir preparation activities on migratory birds**

The Panel recommends that, if the Project is approved, Nalcor and Environment Canada negotiate an agreement prior to reservoir preparation regarding whether and how clearing could proceed between May and July without violating the *Migratory Birds Convention Act*. To initiate this process, Nalcor should be required to submit a plan describing how it would carry out clearing activities during this period in compliance with the *Migratory Birds Convention Act*.

**RECOMMENDATION 7.9 Vegetation control**

The Panel recommends that, if the Project is approved, Nalcor be required to restrict the use of chemical herbicides to areas where alternative vegetation control is not reasonably possible. Approval of the use of herbicides should only be granted after Nalcor has submitted an overall vegetation control plan to the provincial Department of Environment and Conservation, demonstrating that all alternatives have been adequately explored and the use of non-chemical approaches maximized.

**RECOMMENDATION 7.10 Monitoring, follow-up and adaptive management for the terrestrial environment**

The Panel recommends that, if the Project is approved and in addition to its monitoring commitments listed in Chapter 7, Terrestrial Environment, Nalcor should carry out the following monitoring programs:

- monitor the effectiveness of riparian and wetland habitat compensation work, including the effect on wetland sparrows;
- monitor the response of the Red Wine Mountain caribou herd including any population changes through the construction phase and in the early part of the operation phase;
- monitor wolf predation of caribou, particularly the Red Wine Mountain herd;
- monitor interactions of the George River caribou herd with Project activities and facilities and identify any impacts;
- monitor ashkui formation in the Project area;
- monitor direct and indirect impacts on waterfowl, such as waterfowl adjustment to changes in riparian habitat, and changes in the location and formation of ashkui;
- confirm the presence of and monitor the impact of the Project on salamanders and spring peepers;
- develop a detailed mitigation and monitoring plan for all listed species for approval by the provincial Department of Environment and Conservation;
- confirm the presence outside the flood zone of the eight plant species identified by Nalcor as unique to the river valley plus the two additional species listed by the Department of Environment and Conservation (marsh horsetail and hidden fruit bladderwort) and develop a detailed mitigation plan for these plant species for approval by the Department;
- monitor the impact of the Project on furbearers, small game, small mammals, and black bears; and
- collaborate with the Department of Environment and Conservation to develop an appropriate approach to monitor pine marten in areas affected by the Project where there is no trapping activity.

#### **RECOMMENDATION 8.1 Trapping compensation program**

The Panel recommends that, if the Project is approved, Nalcor be required to establish a compensation program for all bona fide trappers along the lower Churchill River, without requiring proof of ten years' use as an entry point. Instead, compensation should be commensurate with the total extent of trapping activity during the previous ten years, as shown by the recorded income attributable to the Project area. Compensation should be awarded within six months after an individual trapper has established eligibility.

#### **RECOMMENDATION 8.2 Mud Lake ice bridge mitigation**

The Panel recommends that, if the Project is approved, Nalcor, the Government of Newfoundland and Labrador and the Mud Lake Improvement Committee negotiate an agreement to address how any future adverse changes to the ice bridge that would lengthen the existing period of time when residents are unable to cross the river by boat or snowmobile would be assessed and mitigated. Alternative transportation options should be provided if travel across the river is prevented during the freeze-up or break-up for periods in excess of two weeks. The selected solution should adequately meet the residents' needs for everyday and emergency travel and should respect the character of the community. Road access should not be imposed on the community as a solution to address ice bridge changes without its consent. The primary onus to cover the costs of this mitigation should be placed on Nalcor. The agreement should also address the role of the Province in mitigating any cumulative effects caused by climate change.

#### **RECOMMENDATION 8.3 Navigation during impoundment**

The Panel recommends that, if the Project is approved, Nalcor be required to develop a mitigation plan in consultation with the Mud Lake Improvement Committee to address temporary transportation difficulties during reservoir impoundment periods. If transportation is impeded,

Nalcor should provide and pay for alternative transportation that minimizes inconvenience to the residents.

**RECOMMENDATION 8.4 Lower Churchill navigation mitigation and monitoring plan**

The Panel recommends that, if the Project is approved, Transport Canada require Nalcor to develop a mitigation and monitoring plan for each reservoir, in consultation with river users, to address navigation issues on the river, including both reservoirs and the downstream portion of the main stem. The plan would address (a) navigation issues during the construction and impoundment periods, (b) provision of boat launches and portages, (c) identification of areas that need to be cleared before impoundment to create safe shoreline access areas for small boats, (d) management of the stick-up zones, including how and when Nalcor would manually remove trees left standing three years after impoundment, (e) management of trash and debris in the reservoirs, (f) charts to show navigational hazards, signage and information, and (g) monitoring and specific adaptive management measures to address any navigational problems downstream from Muskrat Falls.

**RECOMMENDATION 8.5 Allowing local forestry operators to clear additional areas**

The Panel recommends that, if the Project is approved, the provincial Department of Natural Resources require Nalcor to allow local forestry operators to clear timber from areas not otherwise scheduled to be cleared, provided they can demonstrate a safe approach. Nalcor should be required to pay the stumpage fees for the forestry operators salvaging the extra timber.

**RECOMMENDATION 9.1 Noise and dust management**

The Panel recommends that, if the Project is approved, and to avoid disturbance of persons carrying out traditional land and resource use activities, Nalcor be required to monitor and manage construction traffic and borrow pit activities to minimize dust problems, noise and sleeping disturbance for occupants of cabins and camps along the roads.

**RECOMMENDATION 9.2 Relocation of Canada yew**

The Panel recommends that, if the Project is approved, Nalcor be required to collaborate with Innu Elders on where and how to relocate Canada yew plants, conduct regular field visits with Elders for assessment, and employ any adaptive management procedures required to maintain a stable population of the plant.

**RECOMMENDATION 9.3 Community level land and resource use monitoring**

The Panel recommends that, if the Project is approved, Nalcor involve all Aboriginal groups in the design and implementation of its proposed community land and resource use monitoring program for the duration of the construction period to ensure that parameters of importance to these groups and Traditional Knowledge are included.

**RECOMMENDATION 11.1 Involvement of Aboriginal groups in the management and protection of historic and archaeological resources**

The Panel recommends that, if the Project is approved, Nalcor, in collaboration with the Provincial Archaeology Office, establish and support a program to involve all three Labrador Aboriginal groups in (a) the documentation and interpretation of known historic and archaeological sites and artifacts and (b) the process to be followed in the case of inadvertent discoveries of previously unknown sites and artifacts during construction, including notification of the three groups. Nalcor should also give consideration to inviting participation by interested Aboriginal communities in Quebec. Nalcor should share with Aboriginal groups the results of its work on the monitoring of historic and archeological resources to be compiled and provided annually to the Provincial Archaeology Office.

**RECOMMENDATION 11.2 Commemoration initiatives**

The Panel recommends that, if the Project is approved, Nalcor work in collaboration with local communities and Aboriginal groups to (a) identify sites, artifacts and intangible elements (including portages, traplines, trails and personal stories) to be documented and commemorated, (b) determine how commemoration should occur and (c) implement specific commemorative initiatives (such as plaques and story boards) at appropriate locations in communities and throughout the river valley. Local heritage organizations could benefit by receiving funding to undertake part of this work and to implement education and interpretation programs.

**RECOMMENDATION 11.3 – Naming Project-related features**

The Panel recommends that, if the Project is approved, the Government of Newfoundland and Labrador develop an approach to the naming of Project-related features in consultation with local communities and Aboriginal groups that recognizes the importance of place names in Aboriginal cultures.

**RECOMMENDATION 12.1 Early candidate selection and training**

The Panel recommends that, if the Project is approved, Nalcor take a more proactive approach to providing early and specific training programs to certain Labrador candidates. This approach could include measures such as early candidate selection, conditional letters of intended employment, and, on-the-job training at other Nalcor operations or with other entities with which Nalcor has influence.

**RECOMMENDATION 12.2 Workplace attachment for apprenticeship graduates**

The Panel recommends that, if the Project is approved, Nalcor commit to providing workplace attachment for both first and second year graduates of apprenticeship programs to the maximum extent possible.

**RECOMMENDATION 12.3 Training to ‘journey person’ level in community of residence**

The Panel recommends that, if the Project is approved, relevant provincial departments commit to explore with Nalcor, other educational entities and agencies and relevant communities in Labrador, how to implement to the extent practical, training to ‘journey person’ level in the community of residence.

**RECOMMENDATION 12.4 Address wage subsidy stigma**

The Panel recommends that, if the Project is approved, to the extent that wage subsidies might be available and used for new job entrants, Nalcor implement an education and communications program to address and remove the stigma that some might feel is associated with such a practice.

**RECOMMENDATION 12.5 Preparing for participation in wage economy**

The Panel recommends that, if the Project is approved, Nalcor develop and implement, in consultation with Aboriginal groups, an appropriate orientation and information process to assist prospective employees who might have little or no experience of participation in a wage economy. Nalcor should also expand training programs to include, in addition to skills training, training to equip potential Aboriginal employees to deal with various financial, social and cultural challenges as a result of employment in the construction industry. In consultation with Aboriginal groups, Nalcor should also consider providing additional money management programs such as payroll saving schemes.

**RECOMMENDATION 12.6 Continuation of Labrador Aboriginal Training Partnership**

The Panel recommends that, if the Project is approved, Nalcor support the continuation of the Labrador Aboriginal Training Partnership beyond 2012, including making a financial contribution if required to both enable current participants to complete their training and to meet additional training requirements.

**RECOMMENDATION 12.7 Employment outreach to Quebec Aboriginal communities**

The Panel recommends that, if the Project is approved, Nalcor initiate an employment outreach program for interested Aboriginal groups in Quebec; such a program could include among other measures, a specific recruitment program, transportation assistance from Sept-Îles, and measures to address social and cultural issues including any associated language barriers.

**RECOMMENDATION 12.8 Quantitative targets for goods and services**

The Panel recommends that, if the Project is approved, the concept of quantitative objectives or targets be applied to the provision of goods and services, with targets established both for the province as a whole, and for Labrador.

**RECOMMENDATION 12.9 Enhanced supplier development program**

The Panel recommends that, if the Project is approved, Nalcor enhance its supplier development program by implementing the following measures: (a) establish the Labrador Business Opportunities Committee and appoint the full time Coordinator in Happy Valley-Goose Bay as soon as possible, (b) ensure the Coordinator (a Nalcor employee) has sufficient seniority within the organization to influence relevant procurement decisions and has full access to all procurement information and related decision making, (c) release as soon as possible the list of goods and services required by the Project, with specific indications of time frame, approximate volumes and dollar values or ranges as appropriate, and (d) ensure immediately that all engineering management personnel involved in specifications, bidder prequalification, and procurement are fully aware of Nalcor's commitments towards maximizing benefits in this area and act accordingly.

**RECOMMENDATION 12.10 Update quantitative targets at time of sanction**

The Panel recommends that, if the Project is approved, Nalcor update at the time of Muskrat Falls sanction, the quantitative objectives or targets and the detailed list of goods and services required by the Project. Further, that this update be done in consultation with interested parties and the information be provided for Muskrat Falls construction and, to the extent possible, for the Project as a whole.

**RECOMMENDATION 12.11 Transparent bidding process**

The Panel recommends that, if the Project is approved, Nalcor implement a transparent bidding process that ensures that bidders are fully aware of the decision-making process, unsuccessful bidders can find out the reasons why and thereby improve, and Nalcor's commitments and programs apply and are enforced by all its contractors, sub-contractors and suppliers.

**RECOMMENDATION 12.12 Modifications to the Benefits Strategy**

The Panel recommends that, if the Project is approved, Nalcor and the provincial Department of Natural Resources modify two overall provisions of the Benefits Strategy. The first is to ensure that both the monthly reports on employment and goods and services and the quarterly reports on compliance are publically available and not restricted by the confidentiality provisions of Nalcor's legislation. The second is to remove the provision that allows the Minister to modify the benefits targets and other commitments regarding this Project at the Minister's sole discretion.

**RECOMMENDATION 13.1 Sheshatshiu social effects mitigation**

The Panel recommends that, if the Project is approved, Innu Nation, Sheshatshiu Innu Band Council, Nalcor, the provincial Department of Health and Community Services, and relevant federal government departments develop a Memorandum of Understanding with regard to identifying and implementing (a) mechanisms to prevent the exacerbation of existing social problems and (b) mitigation measures such as mental health and addictions services and family support required to address any Project-related increases in social problems. Each party would bring to the table its relevant knowledge and resources. In the case of Innu Nation and Sheshatshiu Innu Band Council, this would include any provisions of the Impacts and Benefits Agreement component of the *Tshash Petapen* Agreement that directly address this issue. In the case of Nalcor, its role would be to adjust hiring, employment and employee assistance arrangements where possible and appropriate to assist or reinforce mitigation. The federal and provincial governments should provide resources to discharge their responsibilities in these areas.

**RECOMMENDATION 13.2 Social effects needs assessment and research**

The Panel recommends that, if the Project is approved, the provincial Department of Health and Community Services, in consultation with Aboriginal groups, and appropriate government and community agencies from the Upper Lake Melville area, conduct a social effects needs assessment, including an appropriately resourced participatory research component, that would determine the parameters to monitor, collect baseline data, and provide recommendations for social effects mitigation measures and an approach to on-going monitoring. It is expected that Innu Nation would be a participant in the research and that the results would inform and enhance the social effects mitigation measures suggested in Recommendation 13.1. The results of the needs assessment would be documented in a public report and, subject to the agreement of participants, the results of the research would be published in a peer-reviewed journal.

**RECOMMENDATION 13.3 Worksite measures to address addictions issues**

The Panel recommends that, if the Project is approved, Nalcor conduct careful monitoring of the effectiveness of the policy of controlled access to alcohol at the accommodation camps and provide professional addictions counselling to employees.

**RECOMMENDATION 13.4 Variety of work schedules**

The Panel recommends that, if the Project is approved, Nalcor offer a variety of work schedules, and require the same of its contractors, to accommodate different groups of workers and to assist in meeting its employment goals, particularly for Aboriginal employees and women.

**RECOMMENDATION 13.5 Health and social services**

The Panel recommends that, if the Project is approved, the provincial Department of Health and Community Services formally commit to provide the human resources required to address any Project-related increases in the demand for mental health, addictions and other health and social services at the Labrador Health Centre, as identified in the needs assessment. Nalcor's contribution to mitigation measures to address this should be clarified through a Memorandum of Understanding with the Labrador-Grenfell Regional Health Authority.

**RECOMMENDATION 13.6 Capacity agreement with Happy Valley-Goose Bay**

The Panel recommends that, if the Project is approved, the Government of Newfoundland and Labrador and Nalcor negotiate a capacity agreement with the Town of Happy Valley-Goose Bay to provide financial resources to increase the Town's capacity to address additional administrative demands related to the Project. The time period for the agreement would be

negotiated by the parties and should relate to the needs expected at different stages of the Project. The resources would be intended to enable the Town to:

- establish baseline data on infrastructure capacity and use prior to the start of construction;
- monitor Project-related infrastructure effects throughout the construction period of the Project and identify needed mitigation;
- prepare, publicize and update on a regular basis, emergency preparedness plans to address the possibility of a catastrophic flood event;
- prepare a low income housing strategy; and
- address issues related to Project-related in-migration and the potential economic downturn at the end of the construction phase, and any other Project-related effects within the Town, not otherwise mitigated.

#### **RECOMMENDATION 13.7 Funding for infrastructure mitigation**

The Panel recommends that, prior to Project sanction, a binding and firm commitment be given by Nalcor and the Government of Newfoundland and Labrador that sufficient funds and resources be made available to fully mitigate Project-related adverse impacts on infrastructure in Happy Valley-Goose Bay.

#### **RECOMMENDATION 13.8 Low-income housing strategy**

The Panel recommends that, if the Project is approved, before construction begins, Nalcor support the efforts of the Town of Happy Valley-Goose Bay, relevant federal and provincial departments, and local low-income housing agencies, to develop and implement a strategy to set measurable targets, address the existing low-income housing needs and mitigate the adverse impacts of Project-related in-migration on low-income housing.

#### **RECOMMENDATION 13.9 Possible requirement for consumption advisories in Goose Bay or Lake Melville.**

The Panel recommends that, if the Project is approved and the outcome of the downstream mercury assessment (Recommendation 6.7) indicates that consumption advisories would be required for Goose Bay or Lake Melville, Nalcor enter into negotiations prior to impoundment with the parties representing – as appropriate – Goose Bay and Lake Melville resource users. Depending on where the consumption advisories would apply, these could include Aboriginal groups, the Town of Happy Valley-Goose Bay, Mud Lake Improvement Committee, the Town of North West River and the community of Rigolet. The purpose of the negotiations would be to reach agreement regarding further mitigation where possible and compensation measures, including financial redress if necessary. This recommendation would also apply later in the process if the downstream mercury assessment indicated that advisories were not likely, but monitoring subsequently required their application.

#### **RECOMMENDATION 13.10 Consumption advisory implementation**

The Panel recommends that, if the Project is approved and fish and seal monitoring indicates that consumption advisories are required, Nalcor:

- follow Health Canada guidelines regarding the establishment of human mercury hazard quotient levels and fish consumption advisories;
- consult with Aboriginal Affairs and Northern Development Canada regarding best practices for the communication of advisories;
- consult with Aboriginal groups and affected communities regarding an effective approach to the communication and implementation of consumption advisories that ensures that affected communities have an understanding of the quantities and types of fish that can be consumed safely and the health benefits of including fish in one's diet;

- ensure that notifications of the consumption advisories are placed at regular intervals in easily visible locations along the shorelines of affected water bodies;
- ensure that consumption advisories are updated as necessary to reflect any changes detected in mercury levels in fish or seal; and
- provide publicly accessible, up-to-date and accurate information through the internet, radio, newspapers and other means regarding the health risks of mercury and the status of the advisories.

**RECOMMENDATION 13.11 Human health and mercury monitoring**

The Panel recommends that, if the Project is approved, Nalcor, in collaboration with Health Canada and the provincial Department of Health and Community Services:

- consult with Aboriginal groups and affected communities regarding the approach to be taken to baseline and follow-up mercury testing and the communication of results for each group; and
- establish baseline human mercury levels in Churchill Falls, Upper Lake Melville communities and Rigolet, with consideration given to offering blood tests as well as hair samples for Innu participants, due to inconsistencies noted in the correlation between hair sample results and dietary consumption.

If consumption advisories are required, it is further recommended that Nalcor ensure that a human health mercury monitoring program is established concurrently with the issuing of consumption advisories. This monitoring would continue until five years after the lifting of consumption advisories, or until such time as determined by Health Canada, and would be overseen by the Monitoring and Community Liaison Committee described in Chapter 15.

**RECOMMENDATION 13.12 Dietary surveys**

The Panel recommends that, if the Project is approved and consumption advisories are required as a result of mercury levels in fish or seal, Nalcor conduct ongoing dietary surveys as an integral part of the mercury monitoring program, including fish, seal, caribou and other country food. Dietary surveys should be conducted concurrently with regular mercury testing in affected communities to determine the effectiveness of the consumption advisories and the overall impact on fish and country food consumption.

**RECOMMENDATION 13.13 Research on mercury in country food**

The Panel recommends that, if the Project is approved, the provincial Department of Labrador and Aboriginal Affairs, in consultation with Health Canada and Aboriginal groups, initiate a study of (a) the extent of country food contamination by mercury and other contaminants and (b) human consumption levels of country food, particularly in areas where people are also exposed to mercury in fish, to identify the potential risks to human health in Labrador.

**RECOMMENDATION 14.1 Emergency preparation for the possibility of a dam failure**

The Panel recommends that, if the Project is approved, Nalcor be required to:

- prepare and provide to affected communities updated maps that more clearly show areas that would be flooded following a dam failure;
- prepare, in consultation with the relevant communities and appropriate authorities, an Emergency Preparedness Plan, for response in the event of catastrophic dam failure, and emergency response procedures and community evacuation procedures related to a dam failure and subsequent flooding; the Plan should be reviewed every five years;
- work with each community that has been identified as being at risk of flooding in the event of a dam failure to develop evacuation plans, to be completed prior to filling of the reservoirs;

- work with emergency response providers and assist as appropriate in the event of an evacuation;
- implement a flood warning system for Mud Lake and Happy Valley-Goose Bay to be approved by the provincial Department of Environment and Conservation; and
- conduct seismographic monitoring in the Project area prior to construction.

**RECOMMENDATION 14.2 Compensation for losses in the event of a dam failure**

The Panel recommends that, if the Project is approved, the Government of Newfoundland and Labrador require Nalcor to assume liability on a 'no fault' basis for any loss of life and financial losses incurred because of the destruction of property and belongings and disruption of activities caused by flooding as a result of one or more dams failing on the lower Churchill River. Nalcor should provide guarantees in the form of insurance, bonds or other appropriate measures that individuals, businesses and institutions suffering damage would receive full compensation, the amount to be determined by a neutral third party, regardless of the cause of the dam failure.

**RECOMMENDATION 14.3 Seismic testing**

The Panel recommends that, if the Project is approved, Nalcor carry out seismic testing during reservoir filling and apply appropriate mitigation measures in the event of a seismic event related to reservoir filling.

**RECOMMENDATION 15.1 Authorizing regulation**

The Panel recommends that, if the Project is approved, the Government of Newfoundland and Labrador issue an authorizing regulation or equivalent mechanism that:

- lists and requires Nalcor to implement all its environmental management commitments in relation to the Project made during the course of the environmental assessment, plus the additional measures recommended by the Panel and accepted by the Government of Newfoundland and Labrador;
- lists and requires provincial departments to implement all their environmental management commitments in relation to the Project made during the course of the environmental assessment, plus the additional measures recommended by the Panel and accepted by the Government of Newfoundland and Labrador;
- includes a mechanism for updates as required to reflect any additions or changes, including adaptive management strategies that may be required and are not yet identified;
- ensures compliance with Environmental Protection Plans, Emergency Response Plans, Contingency Plans, Occupational Health and Safety Plans, and Environmental Effects Monitoring Plans including those that are implemented through another regulatory instrument and those that are unregulated;
- requires Nalcor to prepare and publish on the internet an annual report describing its environmental management activities and results, including mitigation, monitoring and adaptive management as appropriate, and related disbursements;
- establishes a monitoring and community liaison committee; and
- remains in effect for the duration of the construction period and a sufficient period of time thereafter to ensure there is no longer a risk of adverse effects as a result of the Project.

**RECOMMENDATION 15.2 Federal-provincial joint regulatory plan**

The Panel recommends that, if the Project is approved, the federal and provincial governments prepare a joint regulatory plan for the Project which outlines their respective regulatory requirements and includes a coordinated approach to areas where there is overlapping or related jurisdiction, and commit to it by signing a Memorandum of Agreement. The regulatory

plan should address the regulations, guidelines, standards and criteria to be applied to activities. Each government would appoint a coordinating department or agency to prepare the plan and to produce a joint annual report regarding Nalcor's compliance, any issues or problems that were identified and how they were resolved. This report would be made available to the public through the internet.

**RECOMMENDATION 15.3 Long-term funding for environmental management from Nalcor**

The Panel recommends that, if the Project is approved, and to the extent that funds are not committed from other sources, Nalcor identify and allocate in its detailed Project budget, financial support for environmental management for the duration of Project construction. The Panel further recommends that Nalcor make a general commitment with a ten-year forecast, to be updated every five years, until such time as there is no longer evidence of ongoing environmental effects resulting from the Project.

**RECOMMENDATION 15.4 Long-term funding for environmental management from government departments**

The Panel recommends that, if the Project is approved, the governments of Newfoundland and Labrador and Canada make long-term commitments to support annual budget requests by the relevant departments with responsibilities for project-related environmental management including socio-economic mitigation commitments. The Panel further recommends that the governments make general commitments with a ten-year forecast, to be updated every five years, until such time as there is no longer evidence of ongoing environmental effects resulting from the Project.

**RECOMMENDATION 15.5 Lower Churchill Project Monitoring and Community Liaison Committee**

The Panel recommends that, if the Project is approved, prior to the start of construction, the provincial Department of Environment and Conservation appoint a Monitoring and Community Liaison Committee, using a community-based nomination process. Nalcor, through the Department, should provide the Committee with sufficient resources to allow for staff support, expenses and a modest honorarium for non-government participants, acquisition of independent expert advice, and adequate communication with community residents including occasional public forums. The mandate of the Committee would be set out in the Authorizing Regulation and the Federal-Provincial regulatory plan. The Committee would operate throughout the construction period and for the first ten years of the operating period, at which point the continuing need for the Committee should be reassessed by the Department in consultation with the Committee, the communities and Nalcor.

The Committee would:

- provide community feedback and advice to the Department and to Nalcor on relevant issues including Project-specific mitigation, impact monitoring and adaptive management committed to by Nalcor and as recommended by the Panel;
- be empowered as required to establish subcommittees or working groups to address the key areas of biophysical monitoring and follow-up, enhancing employment and business benefits, and health and social issues;
- have representation from communities, community-based agencies and non-government organizations, Aboriginal organizations, relevant federal and provincial government departments and Nalcor (ex-officio); and
- liaise with the public to ensure a transparent approach to addressing public concerns and the communication of monitoring results.

**RECOMMENDATION 15.6 Project-specific effects monitoring programs**

The Panel recommends that, if the Project is approved, all Project-specific effects monitoring programs, whether conducted by Nalcor, governments or in combination, include the following elements:

- identification of monitoring objectives and means of achieving verifiable results capable of guiding remedial action;
- formulation of clearly stated research questions capable of testing impact predictions;
- key measurable indicators linking Project activities to outcomes, and threshold or reference levels to identify Project effects;
- strategies and protocols for data collection and quality control;
- protocols for data compilation, storage, control and access;
- provision for data analysis and assessment; and
- reporting procedures and schedules.

**RECOMMENDATION 15.7 Adaptive management**

The Panel recommends that, if the Project is approved, adaptive management for Project-specific or cumulative effects, whether conducted by Nalcor, governments, or in combination, include the following components:

- commitment to a proactive approach to adaptive management;
- clearly defined impacts thresholds to clarify where and when adaptive responses would be necessary;
- implementation and contingency plans and resources to enable responsive action especially in areas where effect predictions are thought to be uncertain and where predictive errors may have serious consequences;
- transparent process for setting and adjusting monitoring and management priorities; and
- provision for regular review of adaptive management effectiveness, adjustment of related monitoring and responses to focus on significant continuing concerns.

**RECOMMENDATION 15.8 Complaints resolution**

The Panel recommends that, if the Project is approved, before the start of construction, Nalcor develop a complaints resolution process, in consultation with the Monitoring and Community Liaison Committee, to address concerns relating to possible adverse Project effects on individuals, and to be implemented during construction and operations. The process could include the following:

- easy access for individuals to bring concerns or complaints to Nalcor via a toll-free phone number, website and other appropriate means;
- dedicated Nalcor staff support to receive, process and respond to complaints;
- a tracking process with response time targets;
- third-party adjudication in the event that complaints cannot be otherwise resolved to the satisfaction of both Nalcor and the complainant; and
- a system to report on complaints received and how they were resolved.

**RECOMMENDATION 15.9 Environmental review in the event that construction of the second generating facility is delayed**

The Panel recommends that, if the Project is approved and the construction of the second generating facility and reservoir does not start before the first is completed, the environmental release would expire and terms and conditions contained in the original release would be

revisited. The extent of the review required for later release would be the decision of the relevant federal and provincial governments, depending on applicable laws and circumstances at the time.

**RECOMMENDATION 15.10 Local hiring for environmental management work**

The Panel recommends that, if the Project is approved, where possible, Nalcor hire local people to work on environmental monitoring and mitigation projects to benefit from their local knowledge and to develop local skills and experience in the field of environmental management.

**RECOMMENDATION 15.11 Government response to Panel report**

The Panel recommends that the federal and provincial governments provide written responses to the Panel report and that these responses be made available to the general public through the internet.

**RECOMMENDATION 15.12 Decommissioning**

The Panel recommends that Nalcor demonstrate, prior to Project approval and in a manner acceptable to both governments, how it will assume financial responsibility for the potential future decommissioning of the Project to ensure that decommissioning does not become a burden to future generations.

**RECOMMENDATION 16.1 Regionally integrated cumulative effects assessment**

The Panel recommends that, if the Project is approved, the provincial Department of Environment and Conservation, in collaboration with the provincial Department of Labrador and Aboriginal Affairs and other relevant departments, identify regional mechanisms to assess and mitigate the cumulative effects of current and future development in Labrador.

**RECOMMENDATION 16.2 Establishment of protected areas**

The Panel recommends that, if the Project is approved, the provincial Department of Environment and Conservation commit resources to advance the Protected Areas Strategy process by working towards the following goals and reporting annually on progress:

- identify priority candidate areas for provincial protection in Labrador in order to bring the total protected area (federal and provincial) up to the national average (approximately 8.5 percent) before any additional major development is approved in Labrador;
- identify additional candidate areas in Labrador needed to bring the total protected area up to the level identified in the Protected Areas Strategy as desirable for adequate conservation purposes (10 to 15 percent);
- through this process, address preservation of representative areas of all ecozones, mitigation of habitat fragmentation, especially for migratory wildlife, and protection of selected rivers; and
- establish a schedule to ensure that priority candidate areas are protected.