

Appendix J

Mainland Moose Search Study (2007)

Assessment of Impact of Dalhousie Mountain Wind Turbine Field on Mainland Moose (*Alces alces americana*)

Ross Hall, Wildlife Biologist
August, 2007

A review of Nova Scotia wildlife with red or yellow status within a 100 km radius of the proposed Nuttby Mountain wind turbine site identifies mainland moose (*Alces alces americana*). A listing process for rarity of wildlife species in Nova Scotia places mainland moose in a red category, meaning endangered; and in 2003 the mainland portion of Nova Scotia moose population was legislated protected as an endangered species by the Nova Scotia Endangered Species Act.

Mark Elderkin, Nova Scotia Department of Natural Resources Species at Risk biologist, has expressed special concern for this species. Several proponents for wind power have expressed an interest in elevated locations along the Cobequid Hills. The interest in these elevated locations is because wind velocities are determined higher. The Cobequid Hills over the past 40 years has comprised the better moose habitat through northern Nova Scotia. While the impact of one wind power development might have only small effect, there is the potential cumulative degradation of moose habitat following several developments.

In 2007 the Nova Scotia Department of Natural Resources released a Recovery Plan for mainland moose. The document describes a decline in mainland moose numbers from 2500 – 4000 in the 1960's to a present estimated population near 1000 animals. In explaining the decline the Recovery Plan states “ The decline is not well understood but may involve a complex of threats including: historic excessive hunting, poaching, climate change, parasitic brainworm, increased road access to moose habitat, spread of white-tailed deer, possible high levels of cadmium and dietary deficiencies (e.g. cobalt), unknown viral disease, and disturbance.”

Of the above threats, wind turbine fields will result in increased or improved road access and disturbance. Disturbance would result from an increased human presence and vehicle traffic. Whether moose will additionally avoid wind turbine sites because of the actual physical presence of the towers, turbine generated noise or possibly shadow affect of rotating blades is unknown.

Historically the Dalhousie Mountain area had a good population of moose. The Nova Scotia Department of Natural Resources Significant Species and Habitat Mapping places a polygon for mainland moose to include elevated habitats near Dalhousie Mountain in western Pictou County. In the late 1960's and 1970's moose were in sufficient numbers to allow a hunting season in the Cobequid Hills area of Pictou County. There was a very significant decline in moose numbers in the 1980's coincidental to very high white-tailed deer numbers at that time. Forest access roads on the Cobequid Hills have greatly increased and improved over the years and there is a great proliferation of off highway vehicle traffic and trails. The Snowmobile Association of Nova Scotia (SANS) has an extensive network of groomed snowmobile trails through the Cobequid Hills.

White-tailed deer are carriers of a parasitic brainworm (*Parelaphostrongylus tenuis*). The parasite remains clinically silent in deer but infection of moose is often fatal. Both moose and deer become infected after ingesting gastropods, an intermediate host. Gastropods become infective after feeding on deer faeces. Changes in forest practices and increased roads perhaps have encouraged more deer onto the Cobequid Hills, thus increasing a likelihood of moose infection. Remoteness of moose habitat has diminished. It is believed that a greater access into forests has increased the opportunity for illegal hunting and this activity suppresses a recovery of low moose populations suffering from other mortality factors.

(1) Present status of moose population near Dalhousie Mountain

An initial question for an assessment is what is the present status of moose near the proposed Dalhousie Mountain Wind Farm site? Is there a present population immediately to be affected by the construction phase of the wind farm and the subsequent presence of the turbines?

There are two methods for surveying moose population numbers. One is an aerial survey in winter looking for moose tracks and animals on the snow. There are various quantitative designs to carry out aerial surveys. Another method is to search the forest floor following winter and using a plot system count the number of moose fecal pellet groups deposited on fall leaf litter, usually over a time period starting November 1 to a date of survey in May. A number used in this survey and calculations is that over a 200 day winter interval one moose will deposit 3400 pellet groups. The number, if not totally accurate, at least allows comparisons to other surveys. A pellet group survey was chosen to measure present status of moose near the Dalhousie Mountain area and done in May, 2007.

Fifteen transects, each 1 kilometre long, were located in expected good moose habitats within and surrounding the Dalhousie site. Plot locations were chosen by Ross Hall, Wildlife Biologist. Plots were done by Jody Hamper, Technician Forest Resources. The technique for the survey involves following a straight compass direction through the forest and laying a line of thin string from a hip chain box a distance of one kilometre. Then returning along the string and counting moose pellet groups near the string, the string being the centre of the plot. For this survey the ground was searched 1 metre distant on each side of the string for moose pellet groups. As a result of the fifteen plots, a total distance of 15 kilometres and 3 hectare of forest floor was searched for moose pellet groups. The dispersed plot locations and long layout of plots allowed a sampling of different habitats and increased the likelihood of encountering moose sign if moose occupied habitats in a clumped fashion.

No moose pellet groups were observed. In fact no moose sign was observed. On softer shoulders of wood roads or softer ground, either while on plot or preparing to begin plots, no moose tracks were observed. For quantitative purposes the plots for this survey were 2 metres wide for moose. However at many locations the observer's eye can see further outside the 2 metres and at times plots would lead through small openings in advanced regeneration where moose would tend to walk or bed but no moose sign was seen. Jody Hamper remarks "I walked through softwood stands, hardwood stands, young plantations and cutovers. The terrain varied from flat lying areas, hills, even some gorges were encountered. There was no sign of moose scat on any transects. I also observed lots of striped maple on transects which had no evidence of moose browse."

The absence of moose is further substantiated by observations of landowners and long time residents. Mr. J. W. Sinclair, a retired forest technician from Natural Resources in Pictou County, writes (correspondence attached) " up to the mid 1970's it was common to observe moose, or several of them in the above mentioned area (Mount Thom, Mount Ephriam, Dalhousie Mountain, and Loganville). However as time advanced the population appeared to decline and I did not see nor hear of as many sightings as before. To be more specific, I cannot recall seeing a moose, nor signs-i.e. tracks, manure, yards, scraping of soil nor tree damage for probably twenty to twenty-five years, nor have I heard of others making contact with them." The MacKinnon family (correspondence attached) that frequently works on their woodlot on Dalhousie Mountain echoes similar observation.

The conclusion from the survey and resident testimonials is that no moose presently occupy the area near the proposed Dalhousie Mountain wind farm.

(2) If moose do not occur presently, will they return to occupy this area?

This is a difficult, if impossible, question to answer. Nova Scotians who appreciate this fine animal wish to remain optimistic that a turn around will occur in the mainland moose decline.

The decline of mainland moose has been more severe over the eastern range of the Cobequid Hills. Populations are stronger in west Cumberland County but weaker through Colchester and Pictou Counties. Should a recovery occur, the author anticipates the repopulation will spread from the west and be slow to reach Dalhousie Mountain.

The Moose Recovery Plan suggests a complex of factors cumulatively depressing moose numbers. There are many research needs. Apart from management initiatives to control poaching and control human access into remaining moose refugia, many factors are without control. If parasitic brain worm, spread by white-tailed deer, is the leading reason for moose decline and deer population numbers are given momentum by climate warming, then the recovery outlook for mainland moose is not encouraging. There is a declining demography of persons that hunt deer and future populations of deer will only be controlled in wide fluctuations of overpopulations and declines caused by severe winters. On an encouraging note there are a few locations in eastern North America where both deer and moose populations have increased. Parker (2003) in a literature review refers to one hypothesis that on some ranges because of subtle differences in feeding behavior, moose ingestion of infective larvae even in heavily contaminated areas may be reduced or absent. High fines and public education will it is hoped eliminate illegal hunting of moose.

Whether moose repopulate this area depends as well on the present and progress of other land uses, as well as the additional presence of a wind farm. West Pictou County, including Dalhousie Mountain, is an area of many human influences. The proposed Dalhousie wind farm is situated on the northeast corner of the Cobequid Hill Ecodistrict. To the north and east the land elevation drops down onto the Northumberland Lowlands where there is a greater density of agricultural and residential land use. At Mount Thom highways 104 and 4 pass on the south of Dalhousie Mountain. On the Lower Mount Thom side of Dalhousie Mountain at elevation 457 metres are radio and cell telephone towers. Nova Scotia Natural Resources has a fire tower on Dalhousie Mountain. There are large rock, sand and gravel quarries on all sides of Dalhousie Mountain. The rock quarry has single rock blasts of 30 to 80 tons and crushed rock is transported by several large trucks. The Gully Lake Wilderness Area occurs on the west side of Dalhousie Mountain and remains one area of calm in an otherwise busy landscape. Over Dalhousie Mountain and Mount Ephraim, forestry is the present major land use. In the project area there are over 30 roads of various qualities. Some are the result of recent forestry. There are also old and abandoned government roads that once served old Dalhousie Mountain settlements. Much of the road network is part of organized snowmobile and ATV trails. One property on Dalhousie Mountain is a large sugar woods.

Forestry use has been intensive. There is probably an equal amount of both large industrial and small private land ownership. The wind farm at present is only sited for small private ownerships and along ridges of higher elevations. There are steep ravines, inaccessible to forestry. From a traditional definition of habitat which describes food, cover and water, Dalhousie Mountain offers what appears good moose habitat. There is excellent browse and sufficient cover opportunities. The habitat is also excellent for white-tailed deer although deer would move to locations of lower elevation during winters of deep snow. Obviously at Dalhousie Mountain there are poorly understood threats which have not allowed mainland moose to persist.

Infrastructure for the Dalhousie Mountain wind farm will require 8 km of new road and 15 km of improvements to existing roads. Each turbine site will impact about 0.4 ha of area during the

construction stage and 0.2 ha in the following operations stage. The direct impacted area, including roads and turbine footprints, is about 2% of the total forest area. A somewhat positive aspect of improved roads is that it will encourage and allow permanent closure of many poorly directed and superfluous roads and trails used by landowners and OHV traffic.

Will moose avoid the actual area near turbines? Will the turbine appearance, movement, noise and blade shadow alarm moose and cause avoidance? Wildlife does have an ability to acclimate. White-tailed deer eat tulips in yards of urban housing. Crows feed unconcerned at roadsides as traffic passes. Where wind farms occur on agricultural land, livestock continues to feed under the towers. One important consideration at Dalhousie Mountain is as recent forest harvest sites age, they will eventually develop an overstory. Under the forest canopy the turbines become less visible. Wind movement in the tree canopy will muffle turbine noise. A definitive answer for the question of moose avoidance is not possible. With no present moose population no monitoring of moose reaction to the placement of turbines is possible.

There is the possibility to repeat the fifteen moose pellet plots done in 2007 perhaps at 3 or 5 year intervals to reassess moose population. Also of interest and a recommendation is to watch for and keep records of any moose activity close to the towers or on Dalhousie Mountain..

(3) Mitigation

Although no mainland moose presently occur on Dalhousie Mountain, a door should not be shut to their return. Decades might pass but there must be hope that moose will return in numbers to Pictou County and an effort made to safeguard suitable forest conditions for moose in this event.

Mitigation possibilities are limited and maintenance of moose habitat has a reliance on other land uses over the 98% of Dalhousie Mountain for which the wind farm has no control.

Dalhousie Mountain has old government roads and much thoroughfare by off highway vehicles. Closure of this access or this recreational use would be impossible. A mitigation possibility is to redirect OHV and landowner traffic onto wind farm access roads for a net reduced road presence and for a more efficient traffic network. Private landowners should discourage unauthorized OHV traffic at locations away from organized routes. The wind farm operator can work collectively with landowners and municipal trail planners but cannot dictate any outcome.

There are possible mitigative forest harvest practices. Selective harvest methods and promotion of long lived Acadian Forest type tree species should be encouraged in a zone surrounding turbines to maintain a sustained mature forest canopy. On a much broader effort, and more the responsibility of the province, woodland owners in historic and presently occupied moose ranges can learn and implement practices intended to maintain or improve habitat conditions for moose. Both industrial and small private owners of forest land at Dalhousie Mountain are selected audiences for messages on moose habitat stewardship.

References:

Nova Scotia Department of Natural Resources. 2007. Recovery Plan for Moose (*Alces alces americana*) in Mainland Nova Scotia.

Status Report on the Eastern Moose (*Alces alces americana*) in Mainland Nova Scotia by Gerry Parker. June 2003.

Plot start coordinates are provided in the event the plots are repeated in future years.

<u>Plot</u>	<u>UTM Coordinates</u>	<u>Direction (True)</u>
1	20 T 500255 5041001	South
2	20 T 498953 5041744	North
3	20 T 498562 5044317	North
4	20 T 497429 5044727	North
5	20 T 477429 5044727	South
6	20 T 498646 5045951	North
7	20 T 500574 5043044	North
8	20 T 502226 5043487	North
9	20 T 502243 5045266	North
10	20 T 500942 5047314	North
11	20 T 502546 5047338	North
12	20 T 503338 5049326	South
13	20 T 503942 5049718	South
14	20 T 505503 5045407	West
15	20 T 505352 5045888	East

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Mr. Reuben Burge
Greenhill, Pictou County, NS
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Dear Mr. Burge,

In response to your question regarding my observations of moose in the general area of Mount Thom, Mount Ephraim, Dalhousie Mountain, and Loganville.

I was employed in the forest industry, both with the Department of Natural Resources, formerly Lands and Forests, as well as in the private forestry sector and have traveled extensively over the aforementioned areas since the mid 1960's.

I was also a resident of West River Station, an area bordering on the south of the region for sixteen years.

Up to the mid 1970's, it was common to observe a moose, or several of them in the above mentioned area.

Several times there were collisions between a moose and a motor vehicle and reports from motorists of 'near misses' as well as general sightings and reports of illegal hunting or poaching of moose throughout the area.

However, as time advanced the population appeared to decline and I did not see nor hear of as many sightings as before.

To be more specific, I cannot recall seeing a moose, nor signs – i.e. tracks, manure, yards, scraping of soil nor tree damage for probably twenty to twenty-five years, nor have I heard of others making contact with them.

I hope this reply will satisfy your request.

Yours Truly,

J. W. Sinclair