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- Sustainable Development and Strategic Science Division 1
- Sustainable Development and Strategic Science Division 2
- Sustainable Development and Strategic Science Division 3
- Wildlife Division 1
- Wildlife Division 2
- Wildlife Division 3
- Wildlife Division 4



Requesting Organization: Department of Environment and Conservation

Information Request No.: DEC, Sustainable Development and Strategic Science Division – 1

Reference: Caribou and Their Predators Component Study; Volume 2B, Section 12.3 Caribou

Information Requested: Incorporate temporal aspects of Newfoundland caribou distribution into the environmental assessment

SDSS provided (on 5 October 2012) 100% and 66% kernel shape files of caribou telemetry data from 1979-2011 for Newfoundland. These files are organized temporally by four seasons – spring, summer, fall and winter. Using the current (15 October 2012) ROW routing, Nalcor proposes to:

- calculate the amount of 66% and 100% kernel distribution by each of the four seasons for the Northern Peninsula and the Central and Eastern Newfoundland Study Areas for the area of the 60 m wide ROW to estimate direct habitat loss, plus a 500 m buffer on either side (i.e., 1.06 km wide assessment area), 2.06 km wide assessment area, and 4.06 km wide assessment area to examine potential indirect effects of the Project on caribou habitat;
- present values in tabular format for the 60 m wide ROW and for the 1.06 km wide assessment area, 2.06 km wide assessment area, and 4.06 km wide assessment area also indicating the percentage of each kernel for each of the regions (i.e., Northern Peninsula Study Area and the Central and Eastern Newfoundland Study Area);
- create a separate figure showing the 66% and 100% kernels for each season overlapping with the 60 m wide ROW and for the 1.06 km wide assessment area, 2.06 km wide assessment area, and 4.06 km wide assessment area and;
- the amount of kernel distribution will be calculated for kernels which represent areas of important habitat that are used year round (such as on the Northern Peninsula), in addition to specific seasonal use.
- describe implications of this additional information on the environmental assessment predictions for Newfoundland caribou in the EA.

Response:

To examine recent woodland caribou activity in Newfoundland, Nalcor completed the analyses requested by SDSS by using both the 1979-2011 and the 2005-2011 telemetry datasets. The comparison is presented in each relevant analysis below.

Table 1 (Northern Peninsula) and Table 2 (Central and Eastern Newfoundland) examines the direct disturbance (i.e., Project footprint) resulting from the construction of the 60 m wide right-of-way only.

	100% Kernel			66% Kernel			
Dataset	Total in Region (km ²)	Total in Right- of-Way (km ²)	% in Right- of-Way	Total in Region (km²)	Total in Right-of- Way (km ²)	% in Right- of-Way	
			Winter				
1979-2011	10,319	8.2	0.08	2,111	3.4	0.16	
2005-2011	9,806	8.5	0.09	1,978	3.2	0.16	
Spring							
1979-2011	8,808	8.1	0.09	1,867	3.4	0.18	
2005-2011	8,582	8.2	0.10	1,558	3.5	0.22	
Summer							
1979-2011	7,914	7.0	0.09	1,738	2.0	0.12	
2005-2011	6,734	7.0	0.10	1,562	2.1	0.13	
Fall							
1979-2011	8,685	8.6	0.10	2,051	2.1	0.10	
2005-2011	8,188	8.7	0.11	1,713	1.8	0.11	

Table 1. Seasonal caribou occurrence in the Northern Peninsula Region – Direct Habitat Alteration/Loss associated with the 60 m wide Right-of-way (reference Figure SDSS1-1 to SDSS1-4).





Winter caribou occurrence in the Northern Peninsula Region and assessment area buffers (1979-2011)





Spring caribou occurrence in the Northern Peninsula Region and assessment area buffers (1979-2011)





Summer caribou occurrence in the Northern Peninsula Region and assessment area buffers (1979-2011)





Fall caribou occurrence in the Northern Peninsula Region and assessment area buffers (1979-2011)

Table 2. Seasonal caribou occurrence in the Central and Eastern Newfoundland Region – Direct
Habitat Alteration/Loss associated with 60 m wide Right-of-way (reference Figure SDSS1-5 to
Figure SDSS1-8).

	100% Kernel			66% Kernel			
Dataset	Total in Region (km ²)	Total in Right- of-Way (km²)	% in Right- of-Way	Total in Region (km²)	Total in Right-of- Way (km²)	% in Right- of-Way	
			Winter				
1979-2011	36,678	6.7	0.02	5,765	0.8	0.01	
2005-2011	33,253	6.7	0.02	5,172	0.8	0.02	
Spring							
1979-2011	35,845	8.4	0.02	6,251	1.5	0.02	
2005-2011	29,989	7.4	0.02	4,435	1.5	0.03	
			Summer				
1979-2011	34,024	8.1	0.02	5,407	2.1	0.04	
2005-2011	33,933	6.5	0.02	5,262	2.2	0.04	
Fall							
1979-2011	31,426	6.7	0.02	5,560	1.1	0.02	
2005-2011	24,817	6.4	0.03	4,264	1.1	0.03	

Analyses of the data indicate that the direct seasonal habitat altered/lost for either kernel is less than 0.3% for the Northern Peninsula and less than 0.05% for the Central and Eastern Newfoundland Regions. The term altered/lost is used, as not all of the right-of-way will need to be cleared of taller woody vegetation (e.g., wetlands) and the majority of the right-of-way will remain vegetated. Only the tower sites and the access trail will remain permanently disturbed; the remainder of the right-of-way will be allowed to support a native species vegetation cover comprised of species or individual plants that do not exceed 2 m in height at maturity (i.e., vegetation management required for safety).

Table 3 (Northern Peninsula) and Table 4 (Central and Eastern Newfoundland) examines an assessment area with a 500 m buffer that is consistent with the findings of Dyer et al. (2001) for the avoidance of roads by caribou in open habitat and the Recovery Strategy for Woodland Caribou, Boreal Population (Environment Canada 2012). Environment Canada (2012) defines 'undisturbed habitat' as that outside of burns 40 years old or younger and beyond 500 m from disturbances. For this scenario, the assessment area would be 1.06 km wide, including the 60 m wide right-of-way and a 500 m buffer on each side.





Winter caribou occurrence in the Central and Eastern Newfoundland Region and assessment area buffers (1979-2011)



Figure SDSS1-6

Spring caribou occurrence in the Central and Eastern Newfoundland Region and assessment area buffers (1979-2011)



 Figure SDSS1-7

Summer caribou occurrence in the Central and Eastern Newfoundland Region and assessment area buffers (1979-2011)





Fall caribou occurrence in the Central and Eastern Newfoundland Region and assessment area buffers (1979-2011)

Dataset	100% Kernel			66% Kernel			
	Total in Region (km ²)	Total in Assessment Area (km²)	% in Assessment Area	Total in Region (km ²)	Total in Assessment Area (km ²)	% in Assessment Area	
			Winter				
1979-2011	10,319	145	1.4	2,111	61	2.9	
2005-2011	9,806	149	1.5	1,978	58	2.9	
Spring							
1979-2011	8,808	142	1.6	1,867	61	3.3	
2005-2011	8,582	144	1.7	1,558	62	4.0	
			Summer				
1979-2011	7,914	122	1.5	1,738	37	2.1	
2005-2011	6,734	121	1.8	1,562	38	2.4	
Fall							
1979-2011	8,685	153	1.8	2,051	37	1.8	
2005-2011	8,188	153	1.9	1,713	34	2.0	

Table 3. Seasonal caribou occurrence in the Northern Peninsula Region – Assessment Area for the60 m RoW + 500 m buffer (reference Figure SDSS1-1 to Figure SDSS-4).

Table 4. Seasonal caribou occurrence in the Central and Eastern Newfoundland Region – AssessmentArea for the 60 m RoW + 500 m buffer (reference Figure SDSS1-5 to Figure SDSS1-8).

	100% Kernel			66% Kernel			
Dataset	Total in Region (km ²)	Total in Assessment Area (km²)	% in Assessment Area	Total in Region (km²)	Total in Assessment Area (km²)	% in Assessment Area	
			Winter				
1979-2011	36,678	120	0.3	5,765	14	0.2	
2005-2011	33,253	119	0.4	5,172	14	0.3	
Spring							
1979-2011	35,845	148	0.4	6,251	26	0.4	
2005-2011	29,989	132	0.4	4,435	26	0.6	
			Summer				
1979-2011	34,024	144	0.4	5,407	39	0.7	
2005-2011	33,933	115	0.3	5,262	40	0.8	
Fall							
1979-2011	31,426	118	0.4	5,560	20	0.4	
2005-2011	24,817	113	0.5	4,264	18	0.4	

Table 5 (Northern Peninsula) and Table 6 (Central and Eastern Newfoundland) show the assessment area if the buffer is 1,000 m on both sides of the right-of-way (i.e., 2.06 km wide).

	100% Kernel			66% Kernel		
Dataset	Total in Region (km ²)	Total in Assessment Area (km²)	% in Assessment Area	Total in Region (km²)	Total in Assessment Area (km²)	% in Assessment Area
			Winter			
1979-2011	10,319	282	2.7	2,111	115	5.4
2005-2011	9,806	290	3.0	1,979	111	5.6
Spring						
1979-2011	8,808	272	3.1	1,867	118	6.3
2005-2011	8,582	277	3.2	1,558	120	7.7
Summer						
1979-2011	7,194	236	3.3	1,738	70	4.0
2005-2011	6,734	231	3.4	1,562	73	4.7
Fall						
1979-2011	8,685	292	3.4	2,051	76	3.7
2005-2011	8,188	291	3.6	1,713	69	4.0

Table 5. Seasonal caribou occurrence in the Northern Peninsula Region – Assessment Area for the60 m RoW + 1,000 m buffer (reference Figure SDSS1-1 to Figure SDSS1-4).

Table 6. Seasonal caribou occurrence in the Central and Eastern Newfoundland Region – AssessmentArea of 60 m RoW + 1,000m buffer (reference Figure SDSS1-5 to Figure SDSS1-8).

	100% Kernel			66% Kernel		
Dataset	Total in Region (km ²)	Total in Assessment Area (km²)	% in Assessment Area	Total in Region (km²)	Total in Assessment Area (km²)	% in Assessment Area
			Winter			
1979-2011	36,678	232	0.6	5,765	28	0.5
2005-2011	33,253	231	0.7	5,172	27	0.5
Spring						
1979-2011	35,845	288	0.8	6,251	48	0.8
2005-2011	29,989	256	0.9	4,435	49	1.1
Summer						
1979-2011	34,025	281	0.8	5,407	75	1.4
2005-2011	33,933	222	0.7	5,252	77	1.5
Fall						
1979-2011	31,426	228	0.7	5,650	37	0.67
2005-2011	24,817	218	0.9	4,264	33	0.8

Table 7 (Northern Peninsula) and Table 8 (Central and Eastern Newfoundland) show the implications on the assessment area if the potential buffer is 2,000 m on both sides of the right-of-way (i.e., 4.06 km).

	100% Kernel			66% Kernel			
Dataset	Total in Region (km ²)	Total in Assessment Area (km²)	% in Assessment Area	Total in Region (km²)	Total in Assessment Area (km ²)	% in Assessment Area	
			Winter				
1979-2011	10,319	851	8.2	2,111	293	13.9	
2005-2011	9,806	856	8.7	1,978	288	14.6	
Spring							
1979-2011	8,808	812	9.2	1,867	313	16.8	
2005-2011	8,582	825	9.6	1,558	318	20.4	
			Summer				
1979-2011	7,194	609	8.5	1,738	231	13.3	
2005-2011	6,734	606	9.0	1,562	234	15.0	
Fall							
1979-2011	8,685	788	9.1	2,051	269	13.1	
2005-2011	8,188	777	9.5	1,713	249	14.5	

Table 7. Seasonal caribou occurrence in the Northern Peninsula Region – Assessment Area for the60 m RoW + 2,000 m buffer (reference Figure SDSS1-1 to SDSS1-4).

Table 8. Seasonal caribou occurrence in the Central and Eastern Newfoundland Region – AssessmentArea for the 60 m RoW + 2,000m buffer (reference Figure SDSS1-5 to SDSS1-8).

	100% Kernel			66% Kernel			
Dataset	Total in Region (km ²)	Total in Assessment Area (km²)	% in Assessment Area	Total in Region (km²)	Total in Assessment Area (km²)	% in Assessment Area	
			Winter				
1979-2011	36,678	708	1.9	5,765	72	1.2	
2005-2011	33,253	709	2.1	5,172	71	1.4	
Spring							
1979-2011	35,845	808	2.3	6,251	157	2.5	
2005-2011	29,989	703	2.3	4,435	160	3.6	
			Summer				
1979-2011	34,025	857	2.5	5,407	191	3.5	
2005-2011	33,933	666	2.0	5,262	197	3.7	
Fall							
1979-2011	31,426	687	2.2	5,650	88	1.6	
2005-2011	24,817	646	2.6	4,263	78	1.8	

Nalcor focussed the examination of habitat affected within the 66% occupancy kernels, as this is where the collared caribou are concentrating; the 100% kernel represents the total distribution area of the collared caribou.

The amount of directly affected habitat for Newfoundland used to inform the EIS, with the 20% contingency added to be conservative and precautionary, was 5 km² of Primary Core, 11 km² of Secondary Core, and 28 km² of Occupancy areas, as shown in Table 12.3.5-4 of the EIS. Using the 2005 to 2011 data from Table 1 and Table 2, the 100% kernel habitat (i.e., occupancy) directly affected by the Project (i.e., the 60 m wide right-of-way without the 20% contingency) was calculated to be 8.7 km² (fall) for the Northern Peninsula and 7.4 km² (spring) for Central and Eastern Newfoundland. As such, the actual habitat alteration/loss resulting from the Project will be much less than the amount used to inform the assessment in the EIS. This supports the findings of the EIS, which were conservative and precautionary.

Habitat loss due to sensory disturbance of woodland caribou varies with location and disturbance type, as discussed in the EIS (Chapter 12, Section 12.3.5.2, Table 12.3.5-1 and Section 12.3.6.2, Table 12.3.6-1). For example, Dyer et al. (2001) found that avoidance of open habitat was significant only within 250 m from roads in northern Alberta. Polfus et al. (2011) found avoidance by mountain caribou of high-use roads by 2 km and low-use roads by 1 km. However, mountain caribou may respond differently to disturbance than woodland caribou, either due to actual behavioural differences or due to the effects of terrain amplifying sensory disturbance (for example the effects of acoustics and increased visibility on slopes adjacent to valley bottom roads). The actual sensitivity of woodland caribou within the Project area to sensory disturbance is unknown. However, taking all anthropogenic disturbances into account (including industrial facilities, mines and other large sources of sensory disturbance) Environment Canada applied a 500 m buffer to anthropogenic features to represent the combined effects of increased predation and avoidance on woodland caribou at the national scale (Environment Canada 2011). Therefore, as discussed and evaluated in the EIS, the 500 m buffer is likely precautionary and appropriate to determine the extent of disturbance from the Project (i.e., a transmission line) on caribou and their habitat. With increased assessment buffer widths (i.e., from 500 m to 1,000 m and 2,000 m) there is an increase in the size and percentage of each kernel overlapped, as expected. However, the additional information provided by examining the 1,000 m and 2,000 m buffers does not change any of the proposed mitigation or the conclusions of the EIS.

The assessment areas for the 500 m buffer scenario for all the seasons, are less than 5% of the areas of each of the regions delineated in the EIS (i.e., the 15 km wide corridor that corresponds to the ELC habitat map). These values would be even less, if the entire RSA for the Island of Newfoundland was considered in the calculations. Further, the literature indicates that caribou exhibit reduced levels of use of the 500 m buffer, and not complete avoidance, which illustrates the conservativeness of the findings.

The figures prepared from the two telemetry datasets (i.e., 1979-2011 and 2005-2011) exhibit similar characteristics especially for the Northern Peninsula as the routing is through 'core' areas of the range. There are consistent patterns for Central and Eastern Newfoundland as well but the overlap with the range is more on the periphery. Regardless where there is overlap, there appears to be little change.

Nalcor did not compare the 1979 to 2004 with the 2005-to 2011 data, as the quality of the datasets were not comparable, and would have added a source of error that could not be quantified.

The additional information presented by Nalcor in this response supports the predictions and findings of the environmental assessment as it relates to woodland caribou in Newfoundland and the conclusion that "The effects of the Project relative to baseline are not likely to affect the viability or recovery of woodland Caribou populations in Central and Southeastern Labrador and Newfoundland. Therefore, the Project is not likely to result in significant adverse environmental effects on Caribou." As such, the mitigation and follow-up programs proposed in the EIS are considered appropriate and no changes are proposed by Nalcor. However, information in this response does suggest that the amount of habitat in the 66% occupancy kernel that overlaps with the right-of-way with a 500 m buffer is greatest in winter and spring in the Northern Peninsula Region (Table 3) and greatest in summer in the Central and Eastern Newfoundland Region (Table 4). This information can be considered during the scheduling of construction activities to minimize any potential adverse effects of the Project on woodland caribou.

Requesting Organization: Department of Environment and Conservation

Information Request No.: DEC, Sustainable Development and Strategic Science Division – 2

Reference: Caribou and Their Predators Component Study; Volume 2B, Section 12.3 Caribou

Information Requested: Examine validity of Newfoundland caribou habitat quality description

As part of the baseline environment description, Nalcor completed an Ecological Land Classification (ELC) of an approximate 15 km wide by 1,100 km long area at a scale of 1:50,000. Each ecotype identified in the ELC was qualified as to its importance for caribou during winter and during the calving/post-calving period. With these assigned values, Primary, Secondary, and Tertiary classed habitat were mapped so that the various areas of interest in terms of overlap with these different quality habitats could be quantified. To examine the validity of this approach using the new information provided by SDSS, Nalcor proposes to:

- Review all recently received information to ensure assigned habitat quality values for each ecotype are consistent with the latest understanding. Any changes, particularly those dealing with primary quality values, would result in a recalculation of the amount of Primary habitat affected by the proposed Project;
- The analysis will use the same seasons as the kernel analysis: Spring (May and June), Summer (July to Sept.), Autumn (Oct and Nov), and Winter (Dec to April), all dates inclusive.
- Overlay the 66% and 100% kernel shape files on the ELC (with the assigned caribou habitat values for the corresponding winter and calving/post-calving periods) to examine the relationship between distribution and habitat;
- Display, quantify and discuss the amount of 66% and 100% kernel shape files that overlap
 Primary habitat for winter and calving/post-calving periods for the Northern Peninsula AND for
 Central and Eastern Newfoundland regions; and
- Describe implications of this additional information on the environmental assessment predictions in the EA.

Response:

All recently received information from the NLDEC was reviewed by Nalcor to ensure that the assigned habitat quality values for each ecotype were consistent with the latest understanding. Included with this information was the recently prepared ARGOS and GPS telemetry data set for Newfoundland caribou. Through the assistance of the Sustainable Development and Strategic Sciences branch (SDSS; K. Lewis 2012 pers. comm.), inferences of seasonal habitat preference were derived from a use versus availability analysis when the telemetry dataset was overlain on the Ecological Land Classification (ELC) completed for the Labrador-Island Transmission Link EIS). This analysis allows for a direct examination of the importance of each habitat type for a caribou population. Habitats that are used in greater proportion (> 15%) to their availability are considered to be primary quality habitat that is of greatest importance for that season. Those habitats used approximately in proportion (\pm 15%) to their availability are considered to be avoided by caribou for that season and are described as being of tertiary quality.

The results of the use versus availability analysis completed by SDSS led to an adjustment in the seasonal importance or perceived quality of habitat types for caribou within the ELC. The seasonal habitat values were assigned for each region where they overlap the 99.9% and 66% woodland caribou probability of occupancy kernels. All relevant analyses were completed using the ARGOS and GPS telemetry datasets from 1979-2011 (Figure SDSS2-1 to Figure SDSS2-8) and from 2005-2011 (Figure SDSS2-9 to Figure SDSS2-16).