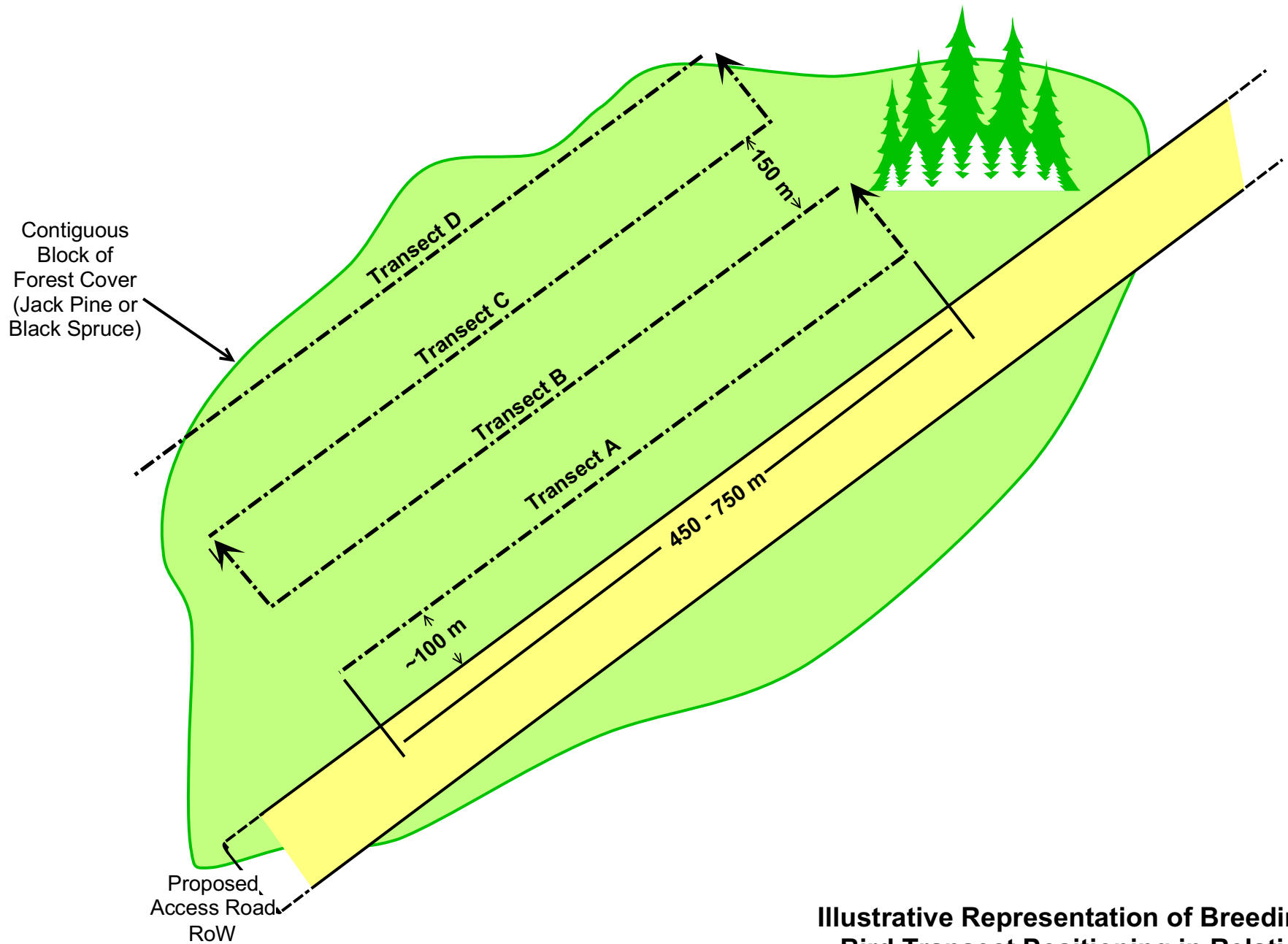


Figure B3-2



**Illustrative Representation of Breeding
Bird Transect Positioning in Relation
to Access Road Right-of-Way**
Figure B4-2

Appendix B4

Mammals Information

MAMMALS APPROACH AND METHODS

Studies focused on priority mammal species that were selected using the following criteria; the importance of a species to local peoples, regulatory requirement, role in ecosystem function, whether it can be used as an indicator, whether there are sufficient scientific data, whether the animal is common or rare, and whether there is the potential for substantial effects from the project. Priority mammal selections included beaver, caribou (with descriptions of barren-ground, coastal and potential woodland ecotypes), moose, wolverine, raccoon, and porcupine. Other mammals of interest in the study area include muskrat, river otter, meadow vole, American marten, red fox, snowshoe hare, red-backed vole, gray wolf, coyote, black bear, and mink. Refer to Appendix B4-1, Table B4-1 for a list of scientific names and of those mammal species potentially using the Keeyask region.

Studies completed focused on the local and regional habitat-based scales near the proposed road. Studies included comparison areas. Some studies conducted in 2001 were suspended in 2002 due to poor conditions (i.e. aerial surveys). These studies were renewed in 2003 and continued until the end of the study in 2006.

Aerial Surveys

Aerial surveys were conducted to determine the presence, distribution, and relative abundance of certain mammal species across the landscape using representative habitat types and to identify and measure priority species and its habitats in focused areas of interest. Beaver lodges and food caches, muskrat push-up counts, moose counts and caribou counts were also used in some cases to index local and regional populations.

Ungulate Studies

Aerial surveys for ungulates (moose and caribou) were conducted in the winters of 2002 to 2006 (Figure B4-1). Ungulate counts included observations of individuals as well as signs of their presence (e.g. tracks and feeding craters) (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005). Surveys typically consisted of both reconnaissance trajectories and township-sized flight blocks. The reconnaissance trajectories were designed to locate ungulate populations, particularly caribou using a random flight pattern towards or bisecting expected movement patterns. The township flight blocks were designed to determine ungulate densities throughout the surveyed areas and consisted of linear transects flowing from north to south, covering 15 to 100% of the block. The line of sight was estimated at 200 m on either side of the aircraft.

Ungulate observations were calculated as linear frequencies (individuals/km) for both types of ungulate surveys. Densities were also calculated for township block portions as individuals/km². Overall density was calculated from the mean density across each block sampled in a given survey period, then averaged across all survey periods. Summary results are reported for caribou and moose in Table B4-2 and Table B4-3, respectively.

Aquatic Furbearer Studies

Aerial surveys for aquatic furbearers (beaver and muskrat) were conducted along watercourses and water bodies in the spring and fall of 2001 and 2003, and in the spring of 2006. The number of beaver lodges, food caches, and dams and muskrat push-ups along water bodies of varying sizes were counted, positions were marked using a GPS, and were classed as either active or inactive (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005). This information was then analyzed using a geographical information system (GIS), where waterbodies greater than 0.5 km² were considered lakes while those less than 0.5 km² were considered ponds. The Assean, Split, Clark, and Stephens lakes were classified as one type of water body. Rivers were depicted by a dual polyline on a 1:50,000 topographic map; creeks were depicted by a single line. The Nelson River was the only river named in the study. Summary results are reported for beaver in Table B4-4. Survey locations, beaver lodges and muskrat push-ups are presented in Figure B4-2.

Mammal Sign (Tracking) Surveys

Mammal sign surveys were conducted to determine the presence, distribution, and relative abundance of mammal species across the landscape using representative habitat types and to identify rare species in the area, particularly those listed as threatened or endangered under *The Endangered Species Act* (Manitoba) or the Federal *Species at Risk Act* (SARA).

Sign survey studies (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005) were conducted in the summers of 2001 to 2005 in the areas around Gull Lake and Stephen's Lake (Figure B4-3). Most studies conducted in the Local Study Area from 2003 to 2005 replicated or expanded upon those conducted in 2001 and 2002. These surveys were conducted in summer, fall and winter. Mammal observations and signs were recorded by local and experienced trackers, and an estimate of relative abundance of the species in various habitat types and locations throughout the study area was generated.

Seven general types of mammal sign surveys were conducted in the Gull Lake area including 500 m transect surveys, north and south trail surveys, rare community surveys, access road surveys, riparian shoreline surveys, lake perimeter surveys, and island reconnaissance surveys. Mammal signs were recorded along the length of each transect and included scat, tracks, trails, browse and feeding sites, and shelters. Transects were selected to be representative of broad habitat types in the local and regional areas of interest. Of the 33 identified broad habitat types, seven types composed greater than 96% of the landscape. Twenty seven habitat types were sampled during the ground tracking surveys while seven broad habitat types were not surveyed as they were very rare in the study area and did not occur in the specific areas of interest for mammal tracking. Riparian shoreline and lake perimeter surveys were excluded from this assessment.

Sign abundance was the basis for which mammal community composition and relative abundance were assessed and was measured using sign frequency and proportion of transects. Sign frequency was calculated as the mean number of sign per 100 m² on each transect, averaged across all transects sampled for any given species or study area unit and was used for transect-based surveys. Proportion of transects was calculated as the number of transects on which a species was detected and was used

to measure species distribution. Island reconnaissance surveys collected presence/absence data for caribou and moose.

Results of tracking surveys are summarized by habitat type in Tables B4-5, B4-6 and B4-7. Locations of summer caribou observations in the Habitat Mapping Area are presented by transect in Figure B4-4. Locations of summer moose observations in the Habitat Mapping Area are presented by transect in Figure B4-5.

Small Mammal Trapping Program

Small mammal trapping blocks were established in the Local Study Area and surrounding region in 2001, and were trapped until 2004. Small mammals captured were weighed, measured, and positively identified by dental characteristics (Schemnitz 1980, Elzinga *et al.* 2001, Braun 2005). The small mammal trapping program was designed to estimate the occurrence, abundance, and distribution of small mammals and to compare small mammal abundance between riparian and terrestrial habitats. Summaries of small mammal species and numbers are reported in Table B4-8.

Trap blocks were established in Stephens Lake and Gull Lake, each consisting of 100 traps, typically divided into two groups of 50 traps of equal numbers of Victor and Museum Special snap-traps. Trapping locations included riparian and upland habitats. Approximately 300 m separated habitat trap blocks from riparian areas. Traps were set and checked and reset daily of over a four day period, with some exceptions due to weather.

The skulls of captured animals were collected and processed using insect digestion and enzyme bath defleshing methods and then identified to *species* when possible, or to *genus* when not possible. Captured mammals were weighed (within 0.1 g), tail and body length (mm) were measured, and sex was recorded. Deer mice were not measured or handled due to the potential risk of exposure to Hantavirus.

Other Data

Licensed moose harvest data returns (Manitoba Conservation 1993-2007 unpubl. data) are presented in Table B4-9 by Game Hunting Area (GHA). The distribution of GHA in proximity to the Regional Study Area is presented in Figure B4-6.

Trapline return summary data (Manitoba Conservation 1961-1984 unpubl. data) are presented in Table B4-10.

Table B4-1: Mammal Species Potentially Using the Local Study Area						
Common Name	Scientific Name	Aerial Surveys	Ground Surveys	Mammal Trapping	Provincial Trapping Records	Incidental Observations
Masked Shrew	<i>Sorex cinereus</i>			✓		
Water Shrew	<i>Sorex palustris</i>			✓		
Arctic Shrew	<i>Sorex arcticus</i>			✓		
Pygmy Shrew	<i>Sorex boyi</i>			✓		
Snowshoe Hare	<i>Lepus americanus</i>		✓			
Least Chipmunk	<i>Tamias minimus</i>		✓	✓		
Woodchuck	<i>Marmota monax</i>					✓
Red Squirrel	<i>Tamiasciurus budsonicus</i>		✓	✓	✓	
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>					✓
Beaver	<i>Castor canadensis</i>	✓	✓		✓	
Deer Mouse	<i>Peromyscus maniculatus</i>			✓		
Gappers Red-backed Vole	<i>Clethrionomys gapperi</i>			✓		
Northern Bog Lemming	<i>Synaptomys borealis</i>			✓		
Heather Vole	<i>Phenacomys intermedius</i>			✓		
Muskrat	<i>Ondatra zibethicus</i>	✓	✓		✓	
Meadow Vole	<i>Microtus pennsylvanicus</i>			✓		
Meadow Jumping Mouse	<i>Zapus hudsonius</i>			✓		
Coyote	<i>Canis latrans</i>		✓		✓	
Gray Wolf	<i>Canis lupus</i>	✓	✓		✓	
Arctic Fox	<i>Alopex lagopus</i>				✓	
Red Fox	<i>Vulpes vulpes</i>		✓		✓	
Black Bear	<i>Ursus americanus</i>		✓		✓	
Raccoon	<i>Procyon lotor</i>		✓		✓	
Pine Marten	<i>Martes americana</i>		✓		✓	
Fisher	<i>Martes pennanti</i>		✓		✓	
Mink	<i>Mustela vison</i>		✓		✓	
Wolverine	<i>Gulo gulo</i>		✓		✓	
River Otter	<i>Lontra canadensis</i>		✓		✓	
Lynx	<i>Lynx lynx</i>		✓		✓	
Ermine	<i>Mustela erminea</i>				✓	
Weasel	<i>Mustela spp.</i>		✓		✓	
Caribou	<i>Rangifer tarandus</i>	✓	✓			
Moose	<i>Alces alces</i>	✓	✓			

Table B4-2: Results of Caribou Aerial Surveys in the Region ¹ (2002-2006)					
Study Year	No. Observed	Area Covered (km ²)	Density (km ²)	Minimum	Maximum
2002	24	450	0.05	0	0.14
2003	347	1,022	0.34	0	2.24
2004	146	458	0.32	0	1.72
2005	8	269	0.03	0	0.3
2006	16	189	0.08	0	0.44
Total	541	2,388	0.23	0	2.24

Table B4-3: Results of Moose Aerial Surveys in the Region (2002-2006)					
Study Year	No. Observed	Area Covered (km ²)	Density (km ²)	Minimum	Maximum
2002	12	450	0.03	0	0.09
2003	91	1,022	0.09	0.03	0.26
2004	44	458	0.10	0	0.38
2005	38	269	0.14	0.04	0.77
2006	27	189	0.14	0	0.62
Total	212	2,388	0.09	0	0.77

Table B4-4: Results of Beaver Lodge Aerial Surveys in the Habitat Mapping Area ²			
Water Type	Distance (km)	No. of Lodges	Mean Lodge Density (lodges/km)
Lakes	1,062	175	0.16
Lake- Assean	148	3	0.02
Lake- Clark	68	3	0.04
Lake- Split	3,763	21	0.01
Lake- Stephens	2,561	15	0.01
Ponds	447	215	0.48
Rivers	388	43	0.11
River- Nelson Central	1,430	8	0.01
River- Nelson Downstream	32	1	0.03
River- Nelson Upstream	101	1	0.01
Creeks and Streams	1,547	628	0.41
Total	11,547	1,113	0.10

¹ Figure B4-1 includes a map of sample locations

² Figure B4-2 includes a map of sample locations, beaver lodge and muskrat push-ups

Table B4-5: Results of Ground Tracking Surveys by Common Habitats in the Habitat Mapping Area				
Species	No. of Sign	Mean Frequency (sign/100²)	Standard Deviation	Occurrence by No. of Transects
Red squirrel	1,865	0.79	1.69	87
Snowshoe hare	1,632	0.67	0.98	102
Moose	1,586	0.61	0.57	116 ³
Caribou	1,390	0.57	1.36	105 ⁴
Small mammal	375	0.14	0.80	44
Black bear	115	0.06	0.19	55
Red fox	34	0.02	0.17	21
Beaver	22	0.01	0.15	6
River otter	27	0.01	0.07	10
Mink	10	0.01	0.04	7
Pine marten	16	0.01	0.03	13
Fisher	3	0.01	0.07	2
Gray wolf	8	<0.01	0.02	7
Least chipmunk	2	<0.01	0.01	1
Lynx	1	<0.01	<0.01	1
Muskrat	1	<0.01	0.01	1
Raccoon	1	<0.01	0.01	1
Weasel	1	<0.01	0.01	1
Game trails*	156	0.06	0.25	50
Total/Mean	7,075	0.15	0.64	117**
*Game trails where multiple mammal species may be present.				
**Not all transects were surveyed each year.				

³ FigureB4-5 includes a map of sample locations and demonstrates the presence/absence of moose

⁴ FigureB4-4 includes a map of sample locations and demonstrates the presence/absence of caribou

Table B4-6: Results of Ground Tracking Surveys by Uncommon Habitats in the Habitat Mapping Area				
Species	No. of Sign	Mean Frequency (sign/100²)	Standard Deviation	Occurrence by No. of Transects
Red squirrel	120	0.33	0.46	7
Moose	103	0.33	0.34	13
Small mammal	69	0.17	0.44	5
Caribou	46	0.16	0.28	7
Snowshoe hare	34	0.11	0.20	5
Black bear	21	0.06	0.13	5
Beaver	9	0.02	0.08	1
Unknown mammal	7	0.02	0.04	5
Mink	6	0.02	0.05	2
Red fox	1	<0.01	0.01	1
Gray wolf	1	<0.01	0.02	1
Total/Mean	417	1.24	0.96	14

Table B4-7: Mammal Sign Frequency (signs/100m ²) by Habitat Type in the Habitat Mapping Area.									
Species	Black Spruce Pure	Jack Pine Mixedwood	Young Regen.	Black Spruce Mixture	Black Spruce Pure, Aspen Mixedwood	Black Spruce Pure, Black Spruce Mixture	Young Regen. Mixedwood	Jack Pine Mixture	Total
Black Bear	0.12	0.10	0.08	0.07	0.10	0.02	0.05	0.16	0.09
Beaver	0	0.05	0.04	0	0	0.04	0.04	0.07	0.03
Caribou	0.28	0.29	0.56	0.02	0.10	0.02	0.19	0.05	0.20
Coyote	0	0	0.02	0	0	0	0	0	0.002
Fisher	0	0.05	0	0	0	0	0	0	0.002
Grey Wolf	0	0.29	0.02	0	0	0.10	0	0.02	0.03
L. Chipmunk	0	0	0	0	0	0.06	0	0	0.01
Mink	0	0	0	0.02	0	0	0	0	0.002
Moose	0.47	0.49	0.88	0.50	0.65	0.43	0.68	0.40	0.56
Pine Marten	0	0	0	0	0	0	0	0.05	0.005
Red Fox	0.03	0	0	0	0	0.08	0.03	0.02	0.02
Red Squirrel	0.94	0	0.04	3.49	2.36	0.86	0.23	0.31	0.92
Snowshoe Hare	1.03	0.15	0.27	1.91	1.76	0.16	0.77	0.28	0.78
Mammal sp.	0	0	0	0.02	0	0	0	0	0.002
Wolverine	0	0	0	0	0	0	0	0.02	0.002
No. Species	6	7	8	6	5	9	7	10	15
Coverage (m²)	9,611	2,057	4,781	4,408	1,988	5,145	7,797	4,253	40,039
Total Sign (m²)	2.87	1.41	1.92	6.03	4.98	1.75	1.99	1.39	2.66

Table B4-8: Results of Small Mammal Trapping in the Habitat Mapping Area (2001-2004)		
Study Area	Species	Total
Keeyask	arctic shrew	7
	deer mouse	269
	heather vole	876
	least chipmunk	4
	masked shrew	483
	meadow vole	487
	meadow jumping mouse	52
	northern bog lemming	58
	pygmy shrew	4
	red-backed vole	4,230
	red squirrel	1
	shrew spp.	3
	unknown	26
	water shrew	1
Grand Total		6,501

Table B4-9: Licensed Moose Harvest Data Returns (1997-2003)	
GHA⁵	Average Estimated Kill per Year
1	807
2	661
3	805
3A	693
9	812

Table B4-10: Trapline Returns Reported for Split Lake Resource Management Area (1961-1984)			
Species	No. Trapped	Species	No. Trapped
Arctic Fox	565	Marten	107
Beaver	18,471	Mink	5,765
Black Bear	22	Muskrat	21,787
Coyote	15	Otter	1,640
Ermine	1,877	Raccoon	3
Fisher	620	Red Fox	2,891
Gray Wolf	66	Red Squirrel	1,923
Lynx	1,790	Wolverine	56

⁵ Figure B4-6 includes a map of northern Manitoba Game Hunting Areas

