

**Table 5-1-1: Summary of Population Structure, Winter Calf Recruitment and Kaplan-Meier (K-M) Adult Female Survival Estimates for Boreal Woodland Caribou from Mid-winter Aerial Surveys and Telemetry Study**

Caribou Range	Year	Number of Caribou Observed					Bulls /100 Cows	Calves /100 Cows	Calves /100 Adults	% Calves	K-M Adult Female Survival Rate (%)	Population Trend ***
		Bulls	Cows	Calves	Unkn*	Total						
<b>P-Bog</b>	23-29 Jan 2015	12	53	13	4	82	22.6	24.5	20.0	16.7	90.0	Stable
	25-26 Feb 2016	5	49	11	1	66 **	10.2	22.4	20.4	16.9	88.0	Stable **
	20-24 Jan 2017	6	49	11	0	66 **	12.2	22.4	20.0	16.7	90.2	Stable **
	27-29 Jan 2018	22	55	14	1	92	40.0	25.5	18.2	15.4	88.7	Stable
<b>N-Reed</b> (Boreal Plain portion of population)	29 Jan -1 Feb 2015	15	52	11	5	81	28.8	21.2	16.4	14.1	82.9	Declining
	14-15 Jan 2016	1	25	11	0	37 **	4.0	44.0	42.3	29.7	86.7	Stable **
	25-27 Jan 2017	13	50	13	0	76	26.0	26.0	20.6	17.1	88.6	Stable to Increasing
	2-3 Feb 2018	23	35	13	0	71	65.7	37.1	22.4	18.3	88.6	Stable to Increasing
<b>Wabowden</b> (Boreal Plain portion of population)	19-22 Jan 2015	17	61	15	7	100	27.9	24.6	19.2	16.1	84.4	Stable
	12-13 Jan 2016	24	68	14	1	107	35.3	20.6	15.2	13.2	81.5	Stable
	17-18 Jan 2017	10	44	9	0	63 **	22.7	20.5	16.7	14.3	87.0	Stable **
	29 Jan-1 Feb 2018	18	55	11	1	85	32.7	20.0	15.1	13.1	85.5	Stable
<b>Charron Lk</b>	3-6 Feb 2015	19	50	16	2	87	38.0	32.0	22.5	18.8	91.7	Increasing
	17-19 Jan 2016	58	131	23	0	212	44.3	17.6	12.2	10.8	90.6	Stable
	1-5 Feb 2017	39	108	17	11	175	36.1	15.7	10.8	10.4	90.9	Stable
	22-24 Jan 2018	55	114	20	1	190	48.2	17.5	11.8	10.6	90.9	Stable

Notes:

\* Not classified to age or sex.

\*\* Small sample size for caribou observations; interpret with caution.

\*\*\* Demographic Indicators of Population Trend:

- Assuming annual adult survival is >85%, if the proportion of calves (% Calves) in winter is >15% the population is likely growing, stable if 12 to 15%, or in decline if <10%.
- Calf recruitment rates >28.9 calves/100 cows indicates a stable to increasing population (assuming annual adult female survival is  $\geq$ 85%). If calf recruitment drops below this threshold and/or annual female survival rates are <85%, the population is likely declining

**Table 5-1-2: Population Abundance Estimates of Monitored Boreal Woodland Caribou Winter Ranges**

Caribou Range	Survey Area Size (km <sup>2</sup> )	Survey Year	Survey Area				Range			
			# Unique Genotypes (from CMR Sampling)	Min. Count (From Winter Calf Recruitment Survey)	CMR Population Estimate $\pm$ 95% CI	CMR Density Estimate (Caribou /km <sup>2</sup> )	100% MCP Size (km <sup>2</sup> )	Projected Population Size	Projected Population Density Estimate (Caribou/km <sup>2</sup> )	MB Gov's Caribou Population Size Estimate (as of 2015)
P-Bog	2,224	2015	88	82	120 $\pm$ 3.5	0.0542	5,476	147	0.0268	175-200
		2016	---	66	---	---		---	---	
		2017	97	66	230 $\pm$ 9.3	0.1032		230	0.0419	
		2018	---	92	---	---		---	---	
N-Reed (Boreal Plain Portion)	1,822	2015	109	81	294 $\pm$ 11.6	0.1614	6,329	343	0.0542	250-300
		2016	---	37	---	---		---	---	
		2017	143	76	358 $\pm$ 11.0	0.1964		358	0.0565	
		2018	---	71	---	---		---	---	
Wabowden (Boreal Plain Portion)	2,130	2015	107	100	108 $\pm$ 1.8	0.0504	3,919	128	0.0327	150-200
		2016	---	107	---	---		---	---	
		2017	101	63	170 $\pm$ 5.2	0.0798		201	0.0513	
		2018	---	85	---	---		---	---	
Charron Lk (MB Portion)	2,032	2015	130	87	832 $\pm$ 40.7	0.3514	15,777	1164	0.0738	300-500
		2016	---	212	---	---		---	---	
		2017	178	175	880 $\pm$ 31.2	0.4332		1232	0.0781	
		2018	---	190	---	---		---	---	

Notes:

Range abundance estimates for P-Bog, N-Reed and Wabowden were proportionately calculated based on the amount of winter core area of occupation estimated from a 70% kernel probability isopleth estimator within each study area, relative to the amount occurring within the Boreal Plain Ecozone for each respective caribou range. A 20% correction factor was then applied to account for potential caribou occurrence on the remaining unaccounted portion of non-core winter range occurring within the Boreal Plain Ecozone for each respective caribou range. This yields a projected population estimate for the portion of each caribou range occurring on the Boreal Plain Ecozone (i.e., excludes the portion of range occurring on the Boreal Shield).

The range abundance estimate for Charron Lake range (portion within Manitoba) was proportionately calculated based on the amount of winter core area of occupation estimated from a 70% kernel probability isopleth estimator within the area sampled relative to total amount within the caribou range, all of which occurs on the Boreal Shield Ecozone.

**Table 5-1-3: Average Annual and Seasonal Home Range Sizes for each Woodland Caribou Range by Project Phase**

Range	Annual Home range (km <sup>2</sup> )*	Overwintering Areas (km <sup>2</sup> )*	Calving Areas (km <sup>2</sup> )*
<b>Pre-construction Phase</b>			
Wabowden	512.2 +/- 360.6 (n = 44)	103.4 +/- 67.7 (n = 25)	25.4 +/- 49.9 (n = 94)
N-Reed	384.9 +/- 428.5 (n = 30)	110.35 +/- 121.8 (n = 20)	28.1 +/- 63.4 (n = 38)
P-Bog	469.7 +/- 278.4 (n = 52)	62.02 +/- 60.1 (n = 44)	24.7 +/- 30.4 (n = 111)
Charron Lake	1166.9 +/- 890.01 (n =34)**	152.17 +/- 91.2 (n = 61)**	29.4 +/-38.6 (n =76)
<b>Construction Phase</b>			
Wabowden	766.8 +/- 412.1 (n=19)	123.5 +/- 55.6 (n=15)	30.9 +/- 59.1 (n=9)
N-Reed	623.4 +/- 417.2 (n=14)	111.9 +/- 47.4 (n=7)	4.3 +/- 2.1 (n = 11)
P-Bog	498.6 +/- 371.2 (n=19)	81.1 +/- 51.5 (n=15)	14.8 +/- 19.9 (n=14)
Charron Lake	1097.8 +/- 596.9 (n=21)**	204.4 +/- 86.2(n=19)**	38.1 +/-75.9 (n=16)

Notes:

\* Annual home range estimates based on 90% kernel estimates, overwintering and calving areas based on 70% kernel estimates

\*\* Significantly different from all of the other ranges (P <0.05)

**Table 5-2-1: Summary of Winter Calf Recruitment Results for Forest-tundra Caribou Populations, 2012 to 2018**

Caribou Range	Year	Active Telemetry Collars		Adults	Calves	Unclassified	Total	Calves/100 Adults
		Deployed	Relocated					
Cape Churchill	2012	19	18	311	64	0	375	20.6
	2013	17	17	238	33	0	271	13.9
	2014	17	17	300	35	0	335	11.7
	2015	Not Surveyed						
	2016	Not Surveyed						
	2017	Not Surveyed						
	2018	Not Surveyed						
	Mean							15.4
Pen Islands	2012	21	17	228	49	0	277	21.5
	2013	20	20	354	56	0	410	15.8
	2014	20	20	406	58	0	464	14.3
	2015	Not Surveyed						
	2016	20	17	257	41	0	298	16.0
	2017	Not Surveyed						
	2018	Not Surveyed						
	Mean							16.9

**Table 5-3-1: Comparison of Long-term Mean Population Metrics and Recent ( $\geq 2010$ ) Survey Results for Modeled Moose Populations Intersected by the Bipole III Transmission Project ROW**

Moose Population	Year	Winter Population ( $\pm 90\%$ CI)	Winter Density (#/km <sup>2</sup> )	Adult Sex Ratio (M/100F)	Calf Recruitment (calves/100F)
<b>Monitored / Sensitive Moose Populations</b>					
Tom Lamb WMA (GHA 8)	<b>Long Term Mean (1971-2018)</b>	<b>634</b>	<b>0.201</b>	<b>61.3</b>	<b>58.8</b>
	January 2012	317 $\pm 32.0\%$	0.101	84.5	46.6
	January 2016	339 $\pm 18.5\%$	0.107	57.7	52.1
Moose Meadows (portion of GHA 14)*	<b>Long Term Mean (1971-2018)</b>	<b>79</b>	<b>0.423</b>	<b>35.7</b>	<b>56.0</b>
	January 2011	7	0.040	72.7	52.3
Pine River (GHA 14A/19A)	<b>Long Term Mean (1971-2018)</b>	<b>526</b>	<b>0.169</b>	<b>53.4</b>	<b>52.0</b>
	January 2013	104 $\pm 12.8\%$	0.033	37.5	87.5
	January 2014	100 $\pm 19.0\%$	0.032	138.5	76.9
Split Lake (Keeyask GS 2015 Survey Area)	<b>Long Term Mean (1971-2018)</b>	<b>1,106</b>	<b>0.066</b>	<b>90.8</b>	<b>52.9</b>
	January 2010	961 $\pm 21.0\%$	0.057	118.3	35.5
	January 2015	1,349 $\pm 22.6\%$	0.080	50.0	51.4
	January 2018	1,159 $\pm 26.9\%$	0.069	28.8	44.7
<b>Regional Reference Moose Populations in Manitoba</b>					
Upper SK Delta (GHA 6/6A)	<b>Long Term Mean (1971-2018)</b>	<b>354</b>	<b>0.191</b>	<b>48.2</b>	<b>47.4</b>
	January 2010	255 (100% census)	0.141	---	---
Red Deer Bog (GHA11/12)	<b>Long Term Mean (1971-2018)</b>	<b>493</b>	<b>0.103</b>	<b>48.3</b>	<b>58.5</b>
	January 2013	199 $\pm 24.6\%$	0.042	31.6	34.2
	January 2016	100 $\pm 46.7\%$	0.043	66.7	66.7
Swan-Pelican (GHA14/14A)	<b>Long Term Mean (1971-2018)</b>	<b>1,509</b>	<b>0.264</b>	<b>40.1</b>	<b>54.4</b>
	January 2011	144 $\pm 12.8\%$	0.029	72.7	52.3
	February 2014	150 $\pm 18.9\%$	0.030	---	---
Porcupine Hills (GHA 13/13A)	<b>Long Term Mean (1971-2018)</b>	<b>813</b>	<b>0.314</b>	<b>47.8</b>	<b>42.0</b>
	February 2011	817 $\pm 17.8\%$	0.315	32.3	30.5
	February 2017	1,057 $\pm 16.4\%$	0.408	63.6	48.7
Duck Mountains (GHA 18/18A/18B/18C)	<b>Long Term Mean (1971-2018)</b>	<b>2,225</b>	<b>0.398</b>	<b>65.1</b>	<b>45.4</b>
	February 2011	1,466 $\pm 12.4\%$	0.257	63.0	45.0
	February 2017	1,958 $\pm 15.1\%$	0.344	69.3	34.7

Note:

\* Estimates for Moose Meadows were projected (based on proportion of habitat area) from the Swan-Pelican moose population model using GHA 14 data only to calculate relative population size and trend.

**Table 5-5-1: Comparison of Pre-construction (5-year Mean; 2009/10 – 2013/14) Annual Harvest to Construction (3-year Mean; 2014/15 – 2016/17), by Construction Segment and Species**

Species	Project Phase	N1 (n = 11 RTLs)	N2 (n = 16 RTLs)	N3 (n = 13 RTLs)	N4 (n = 2 RTLs)	Total (n = 42 RTLs)
<b>Beaver</b>	<b>Pre-Construction</b>	<b>42.2 ±25.8</b>	<b>37.4 ±24.7</b>	<b>63.6 ±31.8</b>	<b>545.6 ±211.2</b>	<b>688.8 ±201.5</b>
	<b>Construction</b>	<b>4.5 ±4.1</b>	<b>3.5 ±3.4</b>	<b>4.3 ±3.6</b>	<b>110.0 ±100.0</b>	<b>122.3 ±99.6</b>
Coyote	Pre-Construction	--NR--	--NR--	11.8 ±12.9	28.2 ±11.8	40.0 ±11.0
	Construction	--NR--	0.3 ±0.5	4.0 ±2.9	26.0 ±32.2	30.3 ±32.4
Fisher	Pre-Construction	0.4 ±0.8	1.4 ±1.8	18.8 ±12.7	42.2 ±12.9	62.8 ±19.7
	Construction	--NR--	1.8 ±2.0	15.0 ±11.9	24.5 ±17.5	41.3 ±29.4
Fox Cross	Pre-Construction	3.4 ±0.8	3.2 ±2.1	0.2 ±0.4	0.6 ±0.8	7.4 ±1.6
	Construction	1.5 ±1.7	0.3 ±0.5	0.3 ±0.5	0.3 ±0.5	2.3 ±2.6
Fox Red	Pre-Construction	6.8 ±2.3	3.0 ±2.1	14.2 ±6.7	5.4 ±2.6	29.4 ±5.8
	Construction	5.0 ±2.5	2.5 ±2.8	6.3 ±2.6	2.3 ±2.8	16.0 ±1.4
Fox Sliver	Pre-Construction	1.2 ±1.1	0.6 ±0.8	1.0 ±1.2	--NR--	2.8 ±1.9
	Construction	0.5 ±0.6	--NR--	0.3 ±0.5	--NR--	0.8 ±0.9
Fox White	Pre-Construction	5.4 ±7.3	--NR--	--NR--	--NR--	5.4 ±7.3
	Construction	1.8 ±3.4	0.5 ±0.6	--NR--	--NR--	2.3 ±3.8
Lynx	Pre-Construction	6.8 ±3.6	27.0 ±28.4	23.6 ±7.9	13.2 ±9.3	70.8 ±34.6
	Construction	3.8 ±2.2	10.3 ±7.3	10.5 ±9.1	7.5 ±5.5	32.0 ±18.7
<b>Marten</b>	<b>Pre-Construction</b>	<b>373.4 ±110.2</b>	<b>140.2 ±104.9</b>	<b>79.2 ±28.0</b>	<b>323.0 ±74.9</b>	<b>915.8 ±156.1</b>
	<b>Construction</b>	<b>88.8 ±82.7</b>	<b>78.8 ±56.1</b>	<b>86.8 ±47.3</b>	<b>127.8 ±70.0</b>	<b>382.0 ±218.1</b>
Mink	Pre-Construction	14.4 ±6.9	36.2 ±19.1	27.8 ±14.5	59.8 ±36.4	138.2 ±48.6
	Construction	9.0 ±14.5	37.5 ±26.9	12.3 ±7.6	31.8 ±30.2	90.5 ±46.6
Muskrat	Pre-Construction	8.0 ±11.5	27.2 ±49.9	564.8 ±743.0	434.0 ±276.6	1034.0 ±1013.1
	Construction	2.3 ±4.4	24.5 ±25.4	54.3 ±64.5	76.5 ±99.2	157.5 ±102.8
Otter	Pre-Construction	4.2 ±2.1	10.0 ±7.1	12.4 ±12.7	27.6 ±14.4	54.2 ±14.9
	Construction	1.8 ±1.7	10.5 ±7.5	7.0 ±3.2	6.0 ±2.9	25.3 ±10.4
Squirrel	Pre-Construction	--NR--	0.4 ±0.5	11.2 ±10.4	126.6 ±53.6	138.2 ±55.4
	Construction	--NR--	--NR--	1.8 ±2.8	82.3 ±51.4	44.0 ±53.6
Weasel	Pre-Construction	0.4 ±0.5	19.2 ±9.7	24.4 ±14.5	133.0 ±42.6	177.0 ±41.7
	Construction	0.8 ±0.9	16.5 ±20.4	9.3 ±7.4	42.5 ±47.6	69.0 ±69.7
<b>Wolf</b>	<b>Pre-Construction</b>	<b>1.0 ±0.9</b>	<b>6.0 ±1.2</b>	<b>1.8 ±1.9</b>	<b>7.0 ±4.0</b>	<b>15.8 ±3.2</b>
	<b>Construction</b>	<b>0.3 ±0.5</b>	<b>1.8 ±2.3</b>	<b>2.5 ±1.3</b>	<b>7.0 ±4.9</b>	<b>11.5 ±3.7</b>
<b>Wolverine</b>	<b>Pre-Construction</b>	<b>1.8 ±1.7</b>	<b>2.8 ±2.0</b>	<b>1.0 ±0.9</b>	<b>--NR--</b>	<b>5.6 ±1.8</b>
	<b>Construction</b>	<b>1.3 ±1.2</b>	<b>2.5 ±1.3</b>	<b>--NR--</b>	<b>--NR--</b>	<b>3.8 ±1.9</b>

Notes:

RTL = Registered Trap Line

--NR-- = no reported harvest for the period assessed

Highlighted cells indicate significant difference between project phases for that species

**Table 5-5-2: Comparison of Pre-Construction (5-year Mean; 2009/10 - 2013/14) Annual Harvest Rate (#/license) to Construction (3-year Mean; 2014/15 - 2016/17), by Construction Segment and Species**

Species	Project Phase	N1 (n = 11 RTLs)	N2 (n = 16 RTLs)	N3 (n = 13 RTLs)	N4 (n = 2 RTLs)	Total (n = 42 RTLs)
<b>Beaver</b>	<b>Pre-construction</b>	<b>0.641 ±0.345</b>	<b>0.642 ±0.244</b>	<b>0.804 ±0.187</b>	<b>2.299 ±0.608</b>	<b>1.515 ±0.352</b>
	<b>Construction</b>	<b>0.087 ±0.074</b>	<b>0.102 ±0.114</b>	<b>0.119 ±0.087</b>	<b>1.074 ±0.527</b>	<b>0.493 ±0.268</b>
Coyote	Pre-construction	--NR--	--NR--	0.135 ±0.092	0.125 ±0.059	0.087 ±0.017
	Construction	--NR--	0.009 ±0.018	0.075 ±0.049	0.316 ±0.253	0.113 ±0.070
Fisher	Pre-construction	0.003 ±0.006	0.023 ±0.023	0.241 ±0.109	0.189 ±0.072	0.143 ±0.055
	Construction	--NR--	0.037 ±0.042	0.342 ±0.190	0.271 ±0.054	0.176 ±0.036
Fox Cross	Pre-construction	0.059 ±0.038	0.062 ±0.025	0.002 ±0.003	0.002 ±0.003	0.016 ±0.004
	Construction	0.036 ±0.037	0.006 ±0.011	0.005 ±0.009	0.003 ±0.006	0.013 ±0.014
Fox Red	Pre-construction	0.146 ±0.158	0.052 ±0.018	0.181 ±0.069	0.023 ±0.010	0.066 ±0.014
	Construction	0.143 ±0.113	0.074 ±0.087	0.183 ±0.149	0.016 ±0.019	0.088 ±0.037
Fox Sliver	Pre-construction	0.024 ±0.024	0.012 ±0.014	0.019 ±0.027	--NR--	0.006 ±0.004
	Construction	0.016 ±0.025	--NR--	0.004 ±0.007	--NR--	0.003 ±0.004
Fox White	Pre-construction	0.047 ±0.060	--NR--	--NR--	--NR--	0.011 ±0.015
	Construction	0.020 ±0.039	0.014 ±0.017	--NR--	--NR--	0.006 ±0.008
Lynx	Pre-construction	0.074 ±0.048	0.482 ±0.364	0.334 ±0.128	0.049 ±0.028	0.150 ±0.054
	Construction	0.092 ±0.049	0.257 ±0.124	0.199 ±0.127	0.068 ±0.052	0.154 ±0.062
<b>Marten</b>	<b>Pre-construction</b>	<b>8.166 ±8.191</b>	<b>2.412 ±1.170</b>	<b>1.120 ±0.449</b>	<b>1.368 ±0.170</b>	<b>2.054 ±0.455</b>
	<b>Construction</b>	<b>1.814 ±0.460</b>	<b>2.201 ±0.687</b>	<b>2.015 ±0.911</b>	<b>1.679 ±0.666</b>	<b>1.731 ±0.214</b>
Mink	Pre-construction	0.326 ±0.316	0.671 ±0.100	0.363 ±0.168	0.236 ±0.085	0.306 ±0.091
	Construction	0.119 ±0.156	1.088 ±0.484	0.247 ±0.072	0.279 ±0.133	0.449 ±0.212
Muskrat	Pre-construction	0.104 ±0.154	0.395 ±0.685	5.502 ±6.205	1.748 ±1.077	2.059 ±1.773
	Construction	0.046 ±0.090	0.581 ±0.574	0.902 ±0.865	0.785 ±1.278	0.787 ±0.520
Otter	Pre-construction	0.076 ±0.063	0.175 ±0.088	0.141 ±0.120	0.107 ±0.031	0.119 ±0.029
	Construction	0.035 ±0.023	0.286 ±0.099	0.160 ±0.046	0.064 ±0.047	0.129 ±0.061
Squirrel	Pre-construction	--NR--	0.010 ±0.015	0.125 ±0.080	0.527 ±0.159	0.296 ±0.086
	Construction	--NR--	--NR--	0.042 ±0.083	0.619 ±0.281	0.145 ±0.161
Weasel	Pre-construction	0.003 ±0.004	0.550 ±0.446	0.315 ±0.120	0.570 ±0.130	0.389 ±0.066
	Construction	0.016 ±0.020	0.350 ±0.380	0.034 ±0.040	0.331 ±0.382	0.259 ±0.154
<b>Wolf</b>	<b>Pre-construction</b>	<b>0.009 ±0.007</b>	<b>0.142 ±0.072</b>	<b>0.019 ±0.016</b>	<b>0.032 ±0.025</b>	<b>0.036 ±0.010</b>
	<b>Construction</b>	<b>0.003 ±0.006</b>	<b>0.056 ±0.083</b>	<b>0.083 ±0.081</b>	<b>0.078 ±0.032</b>	<b>0.060 ±0.025</b>
<b>Wolverine</b>	<b>Pre-construction</b>	<b>0.031 ±0.029</b>	<b>0.054 ±0.030</b>	<b>0.015 ±0.017</b>	--NR--	<b>0.012 ±0.003</b>
	<b>Construction</b>	<b>0.032 ±0.022</b>	<b>0.081 ±0.043</b>	--NR--	--NR--	<b>0.021 ±0.015</b>
<b>Number of Trappers</b>	<b>Pre-construction</b>	<b>83.8 ±40.9</b>	<b>51.4 ±22.3</b>	<b>78.0 ±31.3</b>	<b>242.6 ±73.4</b>	<b>455.8 ±74.1</b>
	<b>Construction</b>	<b>45.0 ±14.1</b>	<b>34.3 ±16.4</b>	<b>45.5 ±21.3</b>	<b>100.0 ±88.3</b>	<b>224.8 ±81.6</b>

Notes:

RTL = Registered Trap Line

--NR-- = no reported harvest for the period assessed

Highlighted cells indicate significant difference between project phases for that species

**Table 5-5-13: Summary of Remote IR Camera Trap Deployments for Bipole III**

Constr. Segment	Monitoring Year of Deployment	Number of Active Cameras Deployed			Comments
		Near ROW	1.5 km from ROW	Total	
N1	1	---	---	---	No access / not sampled in 2015
	2	10	10	20	Cameras deployed on 10 transects
	3	6	5	11	4 additional cameras deployed but inactive (not serviced in Feb 2017); 3 deployed in 2016 were missing/stolen and not replaced; 2 from 2016 were retrieved for servicing and not replaced
	4	4	4	8	9 additional cameras deployed but inactive (not accessed/serviced in Feb 2018))
N2	1	8	10	18	Cameras deployed on 10 transects
	2	10	9	19	2 additional cameras deployed; 1 camera deployed in 2015 was stolen and not replaced
	3	9	8	17	2 cameras deployed in 2016 were retrieved for servicing but not replaced
	4	3	3	6	11 additional cameras deployed but inactive (not accessed/serviced in Feb 2018)
N3	1	10	9	19	Cameras deployed on 10 transects
	2	9	9	18	1 camera deployed in 2015 was missing (trees cleared) and not found/replaced
	3	8	7	15	3 additional cameras deployed but inactive (not serviced in Feb 2017)
	4	10	8	18	
N4	1	---	---	---	No access / not sampled in 2015
	2	---	---	---	No access / not sampled in 2016
	3	10	10	20	Cameras deployed on 10 transects
	4	7	7	14	6 additional cameras deployed but inactive (not accessed/serviced in Feb 2018)
Total	1 (Mar 2015)	18	19	37	
	2 (Feb 2016)	29	28	57	
	3 (Feb 2017)	33	30	63	4 additional cameras on N1 and 3 cameras on N3 are deployed but not active (for logistical reasons were not accessed for servicing in Year 3)
	4 (Feb 2018)	24	22	46	26 cameras were not accessed or serviced because of line stringing or no helicopter or vehicle access availability

**Table 5-5-14: Comparison of Furbearer Observations from Camera Trap Data, near ROW vs 1.5 km from ROW during Construction Phase (February 2015 to February 2018)**

Mammal Species	Number of Observations		Number of Transects Species was Detected (n)	Mean Number of Observations *		z-Test Two Sample for Means		Annual Occurrence Relative to ROW
	ROW	1.5 km		ROW	1.5 km	z Stat	p (1-tail)	
Black Bear	84	97	18	2.76	3.31	-0.3871	0.3493	No significant difference
Wolf	46	20	18	1.56	0.83	1.6456	<b>0.0499</b>	<b>Significantly closer</b>
Coyote	17	14	5	2.13	2.00	0.0934	0.4628	No significant difference
Fox	36	9	17	1.44	0.47	3.0807	<b>0.0010</b>	<b>Significantly closer</b>
Wolverine	1	5	3	0.20	1.25	-3.2796	<b>0.0005</b>	<b>Significantly further **</b>
Marten	4	7	5	0.67	1.86	-1.0208	0.1537	No significant difference **
Fisher	6	1	2	2.00	0.25	2.7815	<b>0.0027</b>	<b>Significantly closer **</b>
Ermine	2	1	3	---	---	---	---	Insufficient data for analysis
Lynx	23	115	14	0.92	5.00	-1.7742	<b>0.0380</b>	<b>Significantly further</b>
Hare	61	147	13	2.90	6.68	-1.3920	0.0820	Trend further from ROW
Squirrel	2	11	5	0.50	2.75	-1.5993	0.0549	Trend further from ROW **
Beaver	0	1	1	---	---	---	---	Insufficient data for analysis

Notes:

\* Mean Number of Observations was calculated using only transects and years where the species occurred in the camera trap data (either at the ROW camera trap station, or 1.5 km camera trap station, or both, on a particular transect)

\*\* Small sample size; interpret with caution

**Table 5-6-1: Summary Mortality Source for Collared Adult Female Boreal Woodland Caribou**

Boreal Woodland Caribou Range	Telemetry Study Duration	# of Collared Caribou		Mortality Investigations / Source					
			Project Phase	Natural Cause	Wolf	Bear	Vehicle	Unknown	Total
P-Bog	Feb 2010 – Aug 2018	68	Pre-construction	3	9	---	---	3	15
			Construction	---	5	1	1	1	8
N-Reed	Jul 2010 – Aug 2018	55	Pre-construction	2	4	1	---	4	11
			Construction	---	---	---	---	1	1
Wabowden	Jan 2010 – Aug 2018	66	Pre-construction	---	10	---	---	6	16
			Construction	---	8	---	1	1	10
Charron Lk	Jan 2011 – Aug 2018	60	2011-2014	1	2	---	---	5	8
			2015-2018	---	1	1	---	1	3
Total		249		6	39	3	2	22	72

**Table 5-6-2: Comparison of Wolf Distance to Ungulate Prey in the Monitored Boreal Caribou Survey Areas in Mid-Winter during All Years of Construction Phase**

Woodland Caribou Survey Area	Construction Year	Mean Distance (km) from Wolf $\pm 95\%CI$		Pearson Correlation Coefficient *	Paired 2-sample t-Test for Means			
		Woodland Caribou	Moose		t-Stat	P (2-tailed)	df	Predator Encounter Risk
P-Bog	Year 1 (2014/15)	9.9 $\pm 2.62$	12.4 $\pm 8.45$	-0.303	0.506	0.634	5	No significant difference
	Year 2 (2015/16)	4.4 $\pm 1.70$	3.0 $\pm 1.26$	0.154	-1.420	0.172	19	No significant difference
	Year 3 (2016/17)	3.9 $\pm 1.10$	4.1 $\pm 1.10$	0.001	0.322	0.749	39	No significant difference
	Year 4 (2017/18)	11.6 $\pm 3.05$	4.1 $\pm 0.86$	0.576	-1.313	<b>&lt;0.001</b>	29	<b>Significantly greater for Moose</b>
Wabowden	Year 1	11.2 $\pm 3.06$	8.2 $\pm 1.28$	0.046	-1.786	0.085	27	Greater for Moose; not significant
	Year 2	4.6 $\pm 1.11$	3.4 $\pm 0.94$	0.522	-2.381	<b>0.025</b>	25	<b>Significantly greater for Moose</b>
	Year 3	5.0 $\pm 1.38$	5.2 $\pm 0.93$	0.110	0.232	0.818	38	No significant difference
	Year 4	11.6 $\pm 3.05$	4.1 $\pm 0.86$	-0.503	-4.147	<b>&lt;0.001</b>	29	<b>Significantly greater for Moose</b>
N-Reed	Year 1	4.9 $\pm 1.34$	7.6 $\pm 2.68$	0.479	2.248	<b>0.041</b>	14	<b>Significantly greater for W Caribou</b>
	Year 2	2.2 $\pm 0.37$	5.6 $\pm 1.02$	0.134	6.447	<b>&lt;0.001</b>	61	<b>Significantly greater for W Caribou</b>
	Year 3	2.9 $\pm 0.38$	11.4 $\pm 1.66$	-0.175	9.474	<b>&lt;0.001</b>	61	<b>Significantly greater for W Caribou</b>
	Year 4	3.0 $\pm 1.02$	3.2 $\pm 1.22$	-0.038	0.332	0.747	9	No significant difference
Charron Lk	Year 1	6.9 $\pm 1.30$	24.9 $\pm 3.10$	0.558	13.470	<b>&lt;0.001</b>	16	<b>Significantly greater for W Caribou</b>
	Year 2	2.7 $\pm 0.46$	5.7 $\pm 0.82$	-0.098	6.353	<b>&lt;0.001</b>	71	<b>Significantly greater for W Caribou</b>
	Year 3	3.5 $\pm 0.82$	6.5 $\pm 1.67$	0.316	3.674	<b>0.001</b>	22	<b>Significantly greater for W Caribou</b>
	Year 4	3.2 $\pm 0.82$	8.2 $\pm 3.23$	-0.248	6.626	<b>&lt;0.001</b>	36	<b>Significantly greater for W Caribou</b>

Notes:

No other ungulate species (i.e., white-tailed deer or elk) were detected during aerial surveys in any of the woodland caribou survey areas in any monitoring year sampled during the Construction Phase.

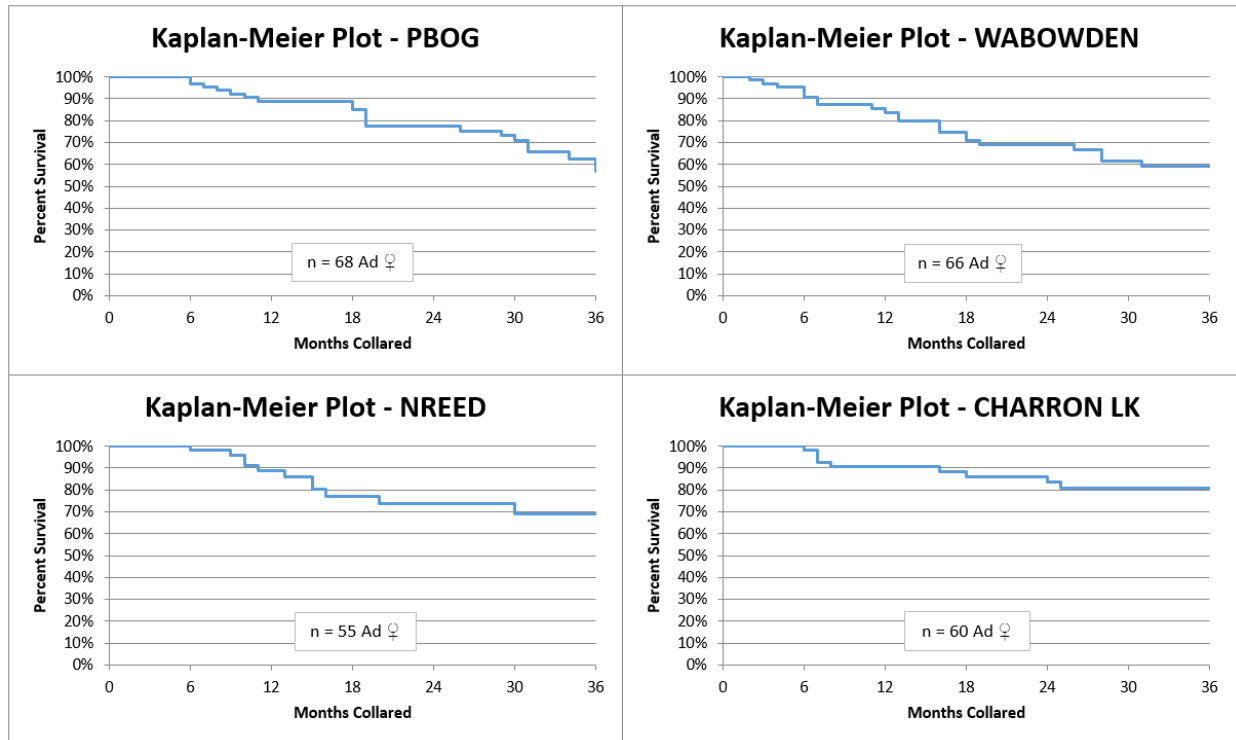
\* High correlation (i.e., values closer to 1.0 or -1.0) corresponds to a strong relationship between moose and caribou mean distance variables. Values of 0 indicate no association between variables. A value >0 indicates a positive association (as the value of one variable increases, so does the value of the other). A value <0 indicates a negative association (as the value of one variable increases, the other decreases).

**Table 5-9-1: Observations of Human Access of ROW during Construction Phase**

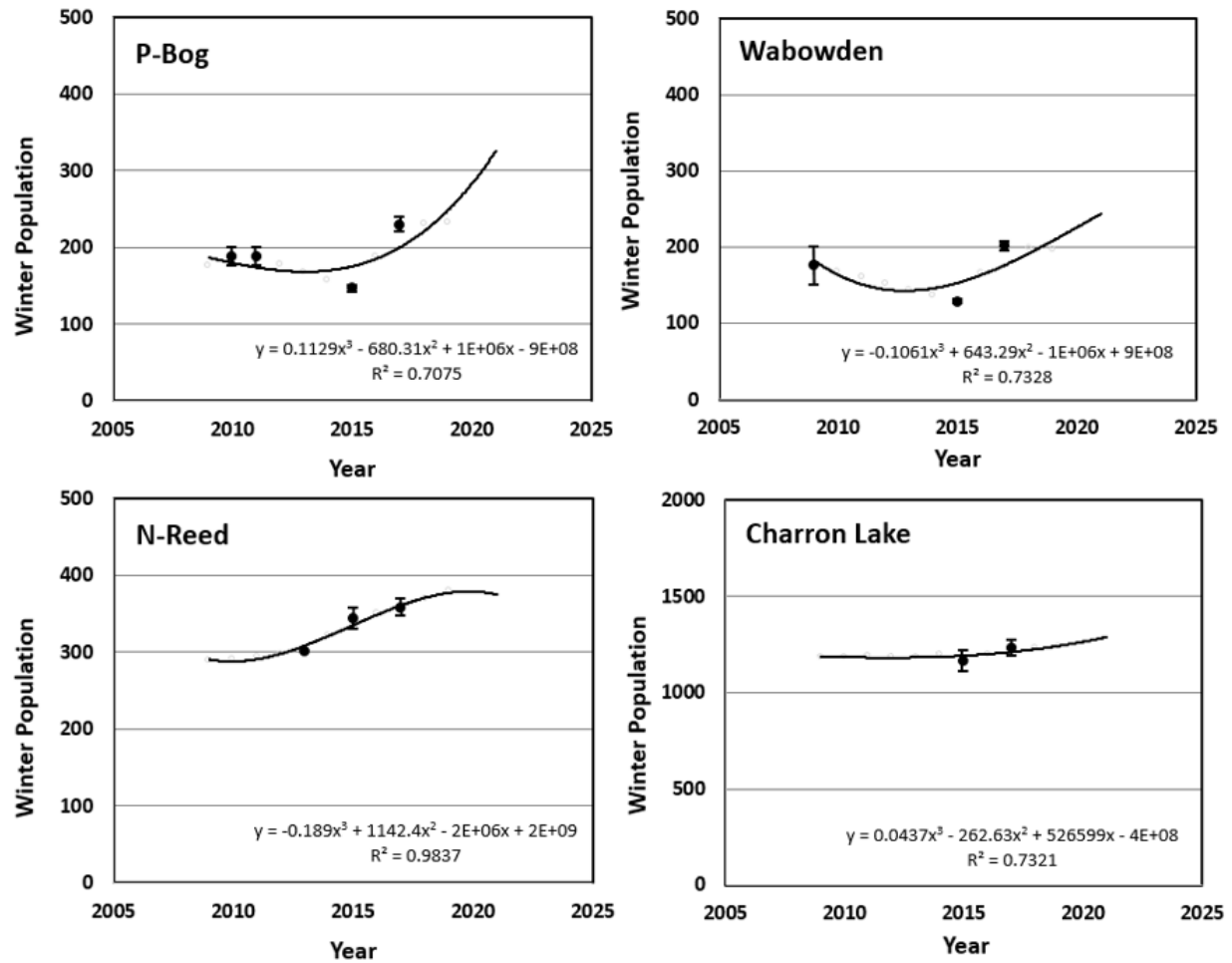
Sample Period	Number of Trail Cameras Deployed	Project-related Access		Public Access		Unknown Purpose of Use	Total Observations
		Observed	Known Use (%)	Observed	Known Use (%)		
Feb 2015-Feb 2016	25	1,584	99.1	14	0.9	9	1,607
Feb 2016-Feb 2017	34	1,974	99.2	15	0.8	96	2,085
Feb 2017-Feb 2018 *	46 *	---	---	---	---	14,583 *	14,583 *

Notes

\* The interpreted trail camera data did not include a breakdown of human access by type or season.

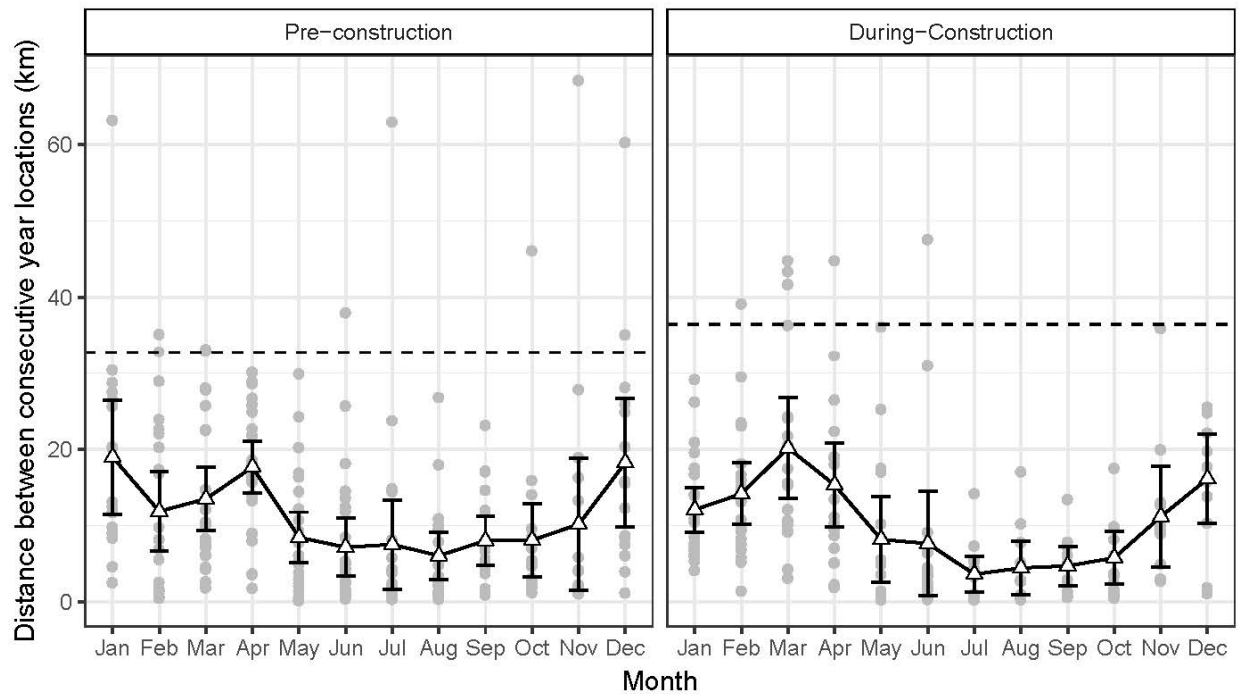


**Figure 5-1-1: Kaplan-Meier Plots of Adult Female Woodland Caribou Monitored using GPS Telemetry Collars, February 2010 to August 2018**



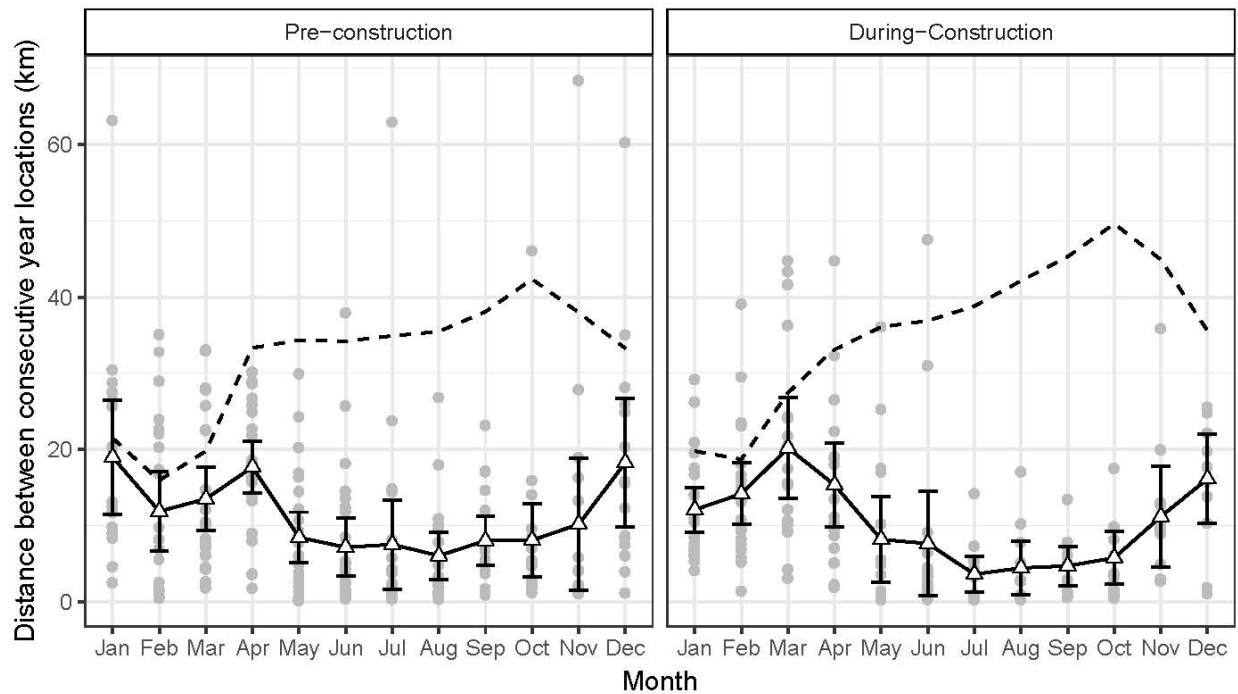
**Figure 5-1-2: Preliminary Abundance Trend Models of Woodland Caribou based on Genetic Capture-Mark-Recapture (CMR) Genotyping Analyses and Historical Population Estimates, 2009 to 2018**

Figures 5-1-3 to 5-1.14 are redacted



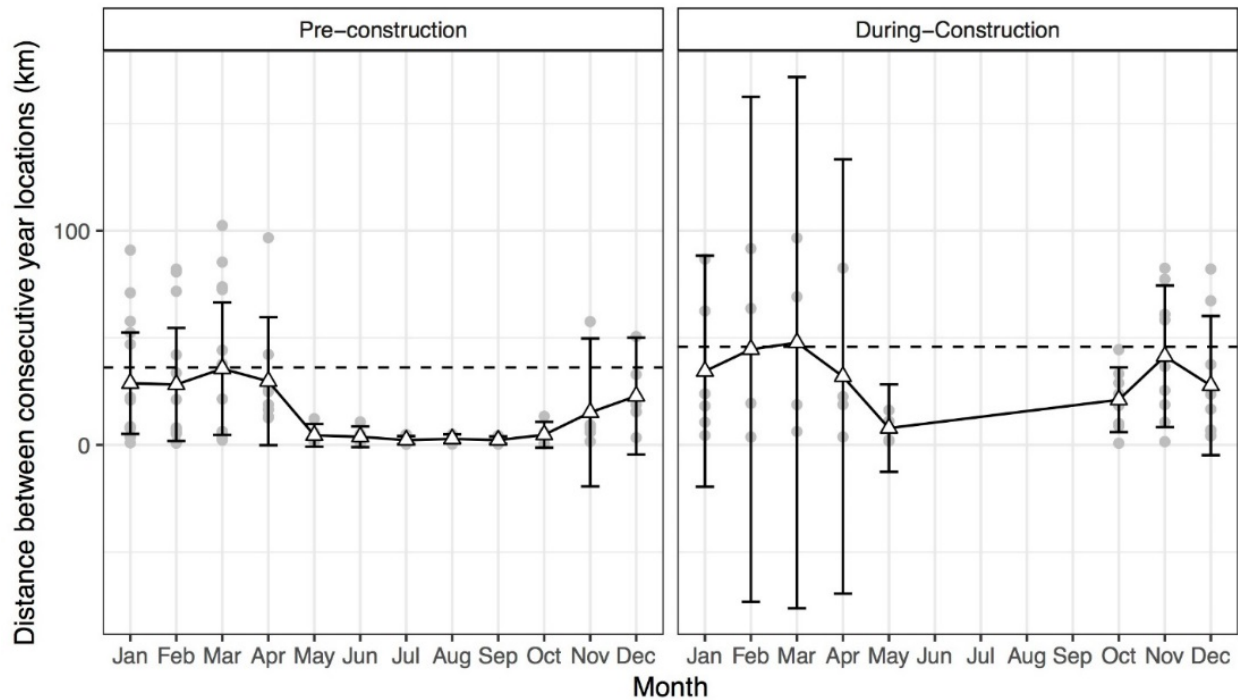
**Figure 5-1-15: Population Scale Site Fidelity Dynamics Observed in the Wabowden Range during Pre-construction (2010 – 2014) and Construction Project (2014 – 2018) Phases**

The population scale includes the entire range boundaries as defined by all satellite collared cows in Wabowden range across all months; therefore fidelity (or lack thereof) at this scale is assessed for seasonal core areas within a larger range. As confidence intervals do not encompass the null expectation, strong fidelity to calving areas occurred during all Project phases. Weaker but significant fidelity to wintering areas also occurred. Patterns in site fidelity have not changed from pre-construction through to the end of the construction phase at this scale.



**Figure 5-1-16: Seasonal Scale (Local) Site Fidelity Dynamics observed in the Wabowden Range during the Pre-construction and Construction Project Phases**

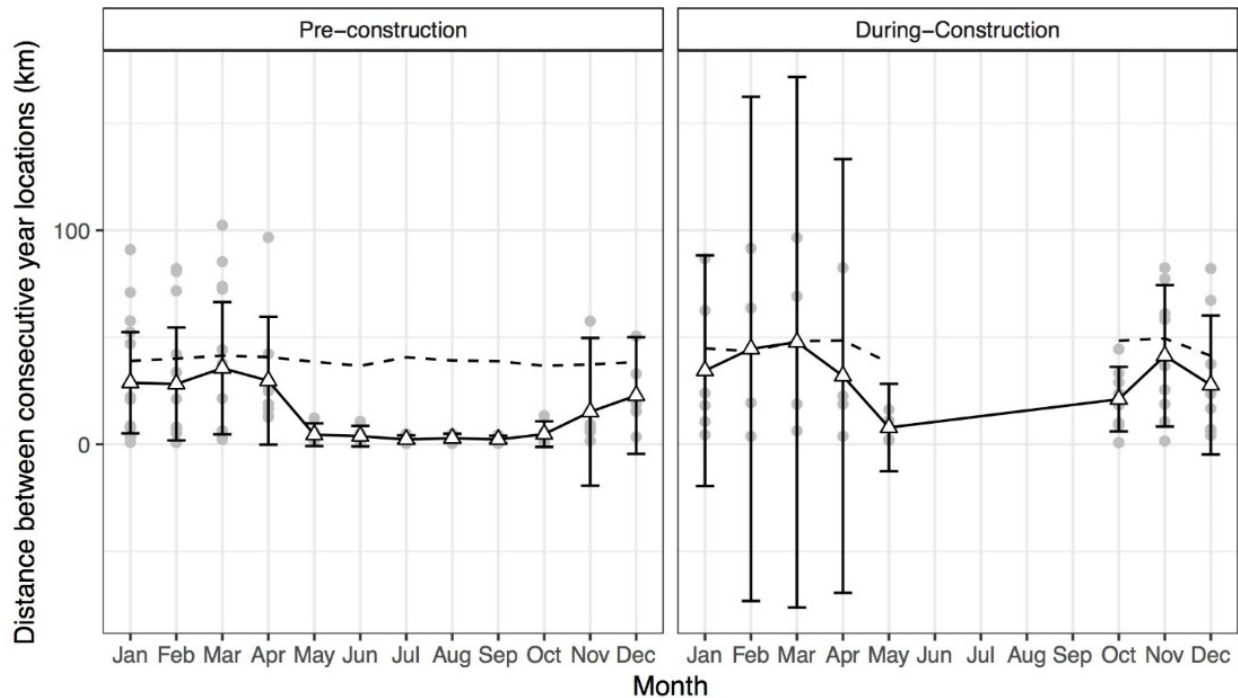
The seasonal scale includes boundaries as defined by all satellite collared cows in Wabowden range within a given month; therefore fidelity (or lack thereof) at this scale, is assessed for local sites within seasonal core use areas for a given month. As confidence intervals do not encompass the null expectation during the calving period, strong site fidelity is occurring during all Project phases. As confidence intervals within the monthly ranges encompass the null expectation from January to February in the pre-construction phase, fidelity was absent during the winter. However, during the construction phase fidelity to these ranges was displayed. This suggests that construction activities did not weaken fidelity to over wintering areas in this range.



**Figure 5-1-17: Population Scale Site Fidelity Dynamics observed in the N-Reed Range during the Pre-construction (2010 – 2014) and Construction (2014 – 2018) Project Phases**

The population scale includes the entire range boundaries as defined by all satellite collared cows in the N-Reed range across all months; therefore fidelity (or lack thereof) at this scale is assessed for seasonal core areas within a larger range. As confidence intervals do not encompass the null expectation during the calving period strong site fidelity is occurring during all Project phases. As confidence intervals within the winter monthly ranges encompass the null November to April, fidelity is absent during both Project phases.

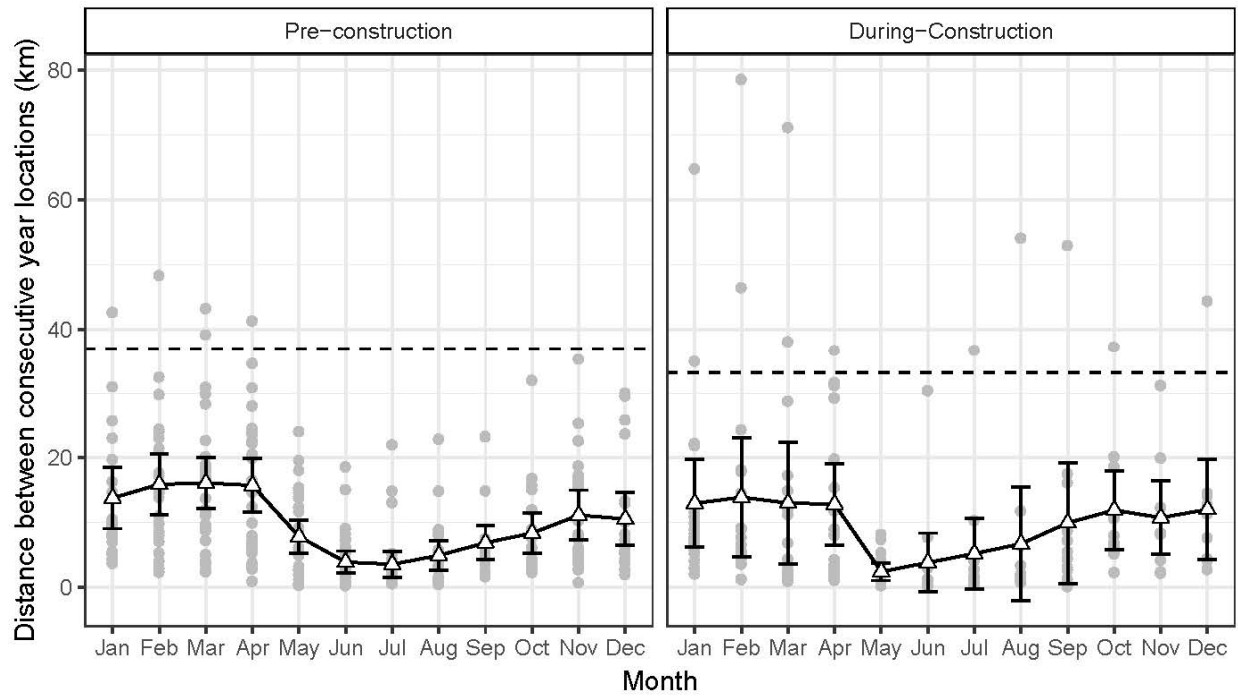
\*\*Currently during the construction phase from June – September there are no caribou who were collared during that period for consecutive years so data is not available. No additional data were available for 2018.



**Figure 5-1-18: Seasonal Scale Site Fidelity Dynamics observed in the N-Reed Range during the Pre-construction and Construction Project Phases**

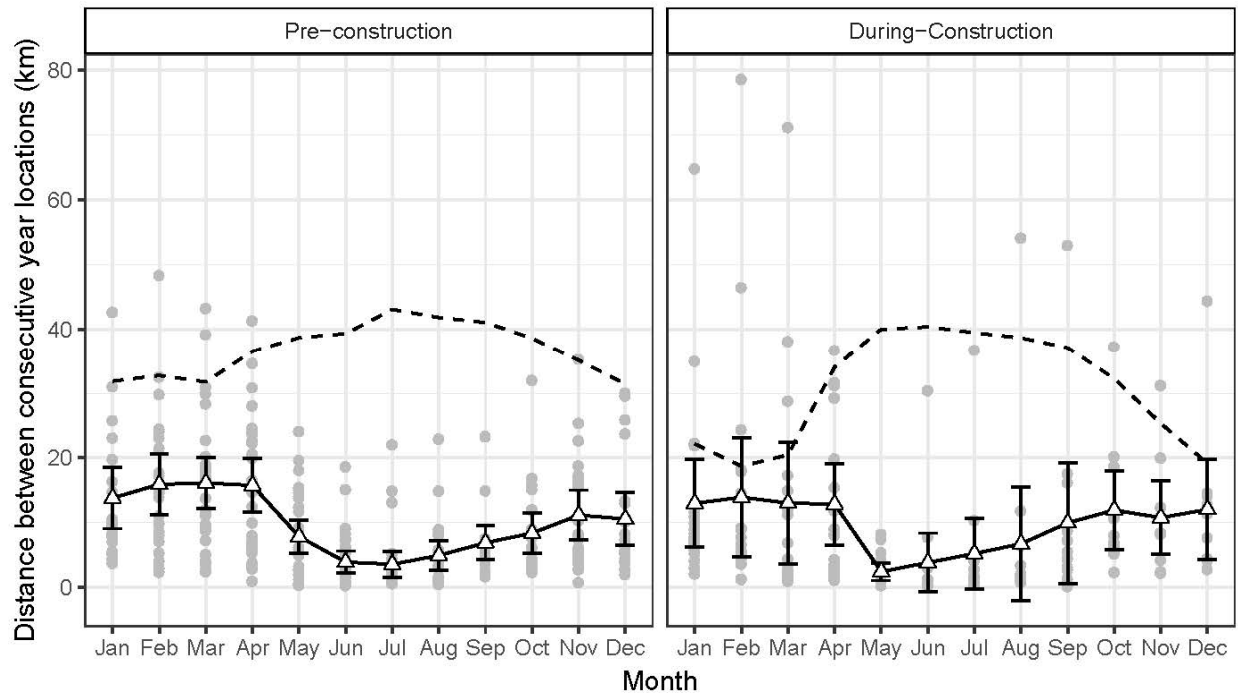
The seasonal scale includes boundaries as defined by all satellite collared cows in the N-Reed range within a given month; therefore fidelity (or lack thereof) at this scale, is assessed for local sites within seasonal core use areas for a given month. Similar to the population scale, as confidence intervals do not encompass the null expectation during the calving period, strong site fidelity is occurring during all Project phases. As confidence intervals within the winter monthly ranges encompass the null November to April, fidelity is absent during both Project phases.

\*\*Currently during the construction phase from June – September there are no caribou who were collared during that period for consecutive years so data is not available. No additional data were available for 2018.



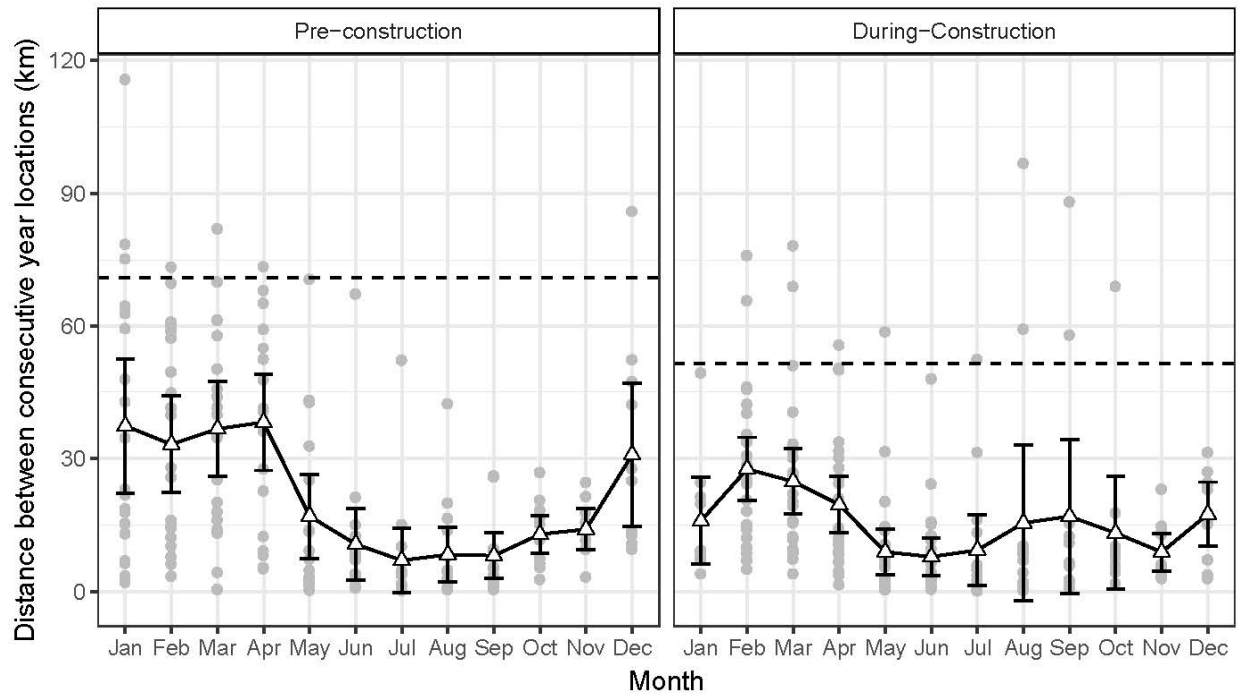
**Figure 5-1-19: Population Scale Site Fidelity Dynamics observed in the P-Bog Range during the Pre-construction and Construction Project Phases**

The population scale includes the entire range boundaries as defined by all satellite collared cows in the P-Bog range across all months; therefore fidelity (or lack thereof) at this scale is assessed for seasonal core areas within a larger range. As confidence intervals encompass the null expectation, site fidelity is occurring throughout the year during the pre-construction and construction phase. Patterns in site fidelity have not changed from pre-construction through to the end of the construction phase at this scale.



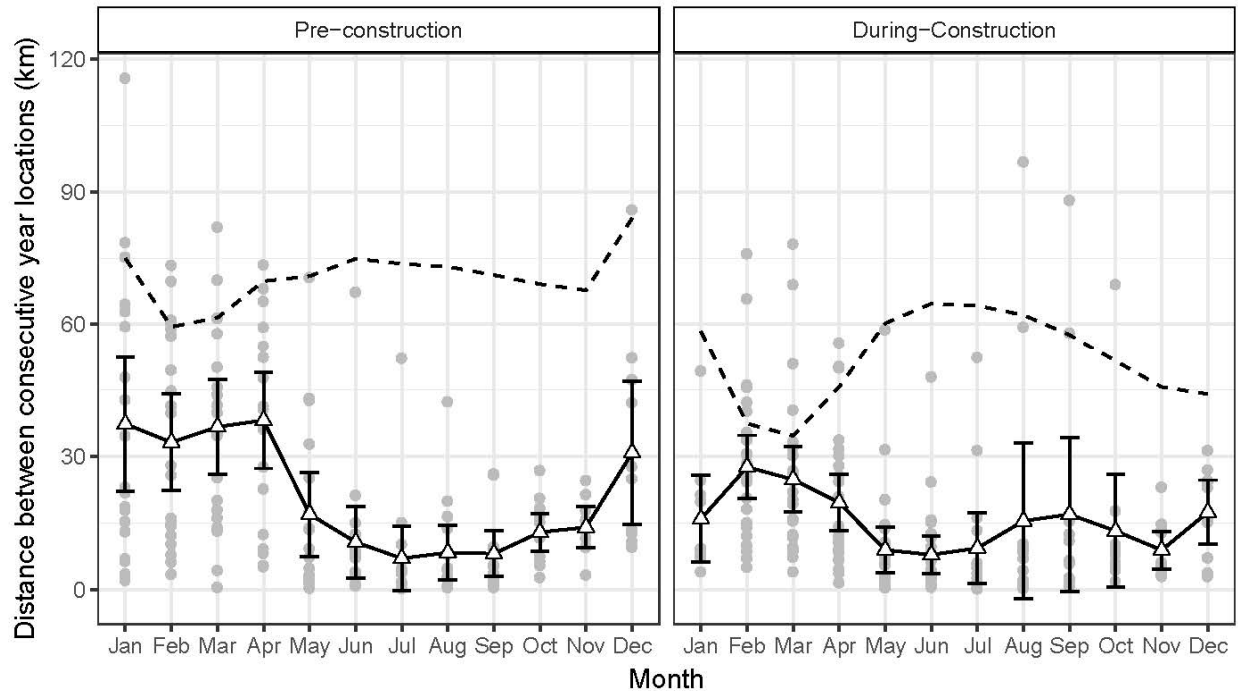
**Figure 5-1-20: Seasonal Scale Site Fidelity Dynamics observed in the P-Bog Range during the Pre-construction and Construction Project phases**

The seasonal scale includes boundaries as defined by all satellite collared cows in the P-Bog range within a given month; therefore fidelity (or lack thereof) at this scale, is assessed for local sites within seasonal core use areas for a given month. Similar to the population scale, as confidence intervals encompass the null expectation, site fidelity is occurring throughout the year during the pre-construction phase. As confidence intervals within the winter monthly ranges encompass the null February to March, fidelity is absent during these winter months during construction phase; however, fidelity to areas within calving ranges remains strong.



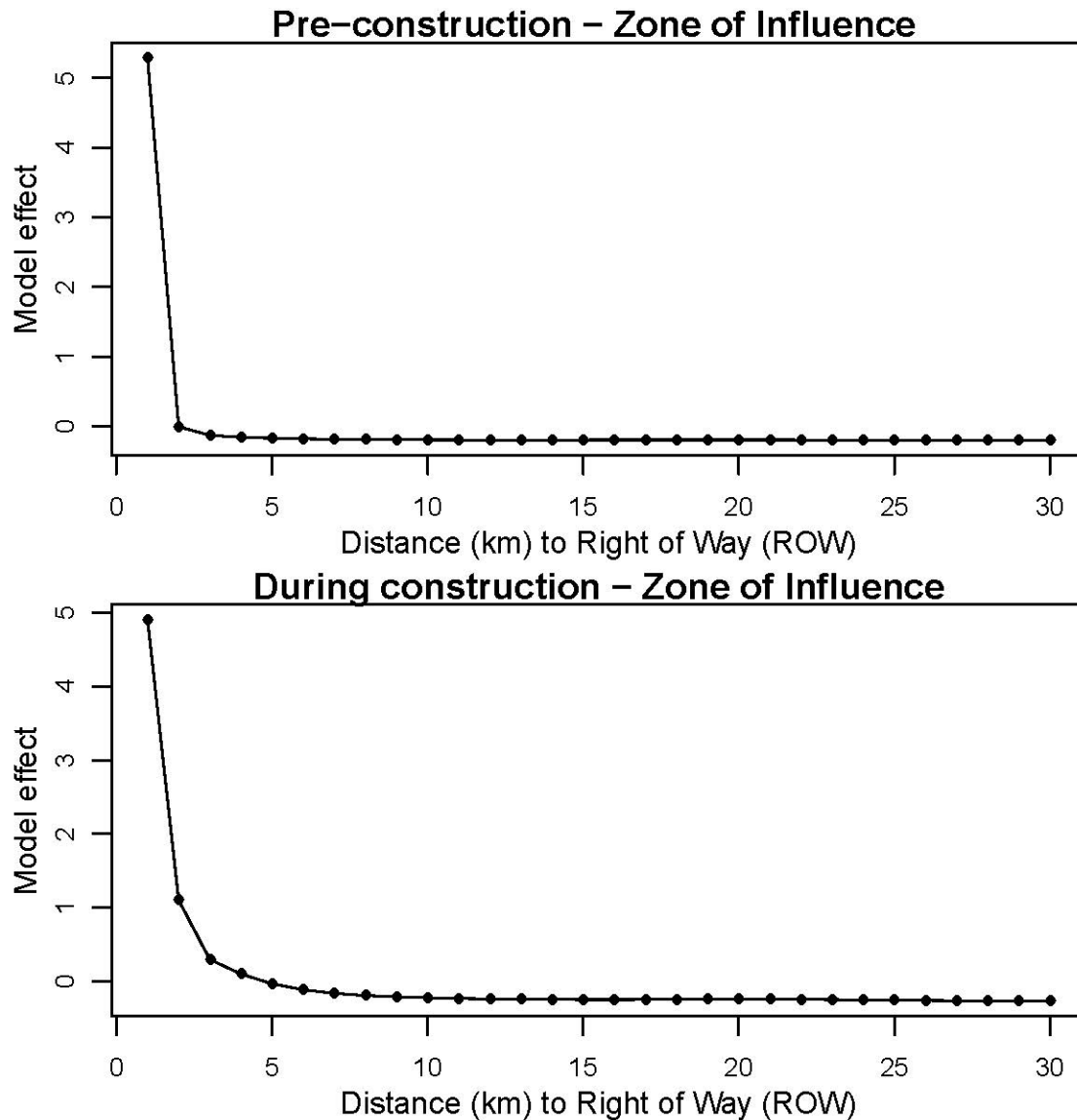
**Figure 5-1-21: Population Scale Site Fidelity Dynamics observed in the Charron Lake Range during the Pre-construction and Construction Project Phases**

The population scale includes the entire range boundaries as defined by all satellite collared cows in the Charron Lake range across all months; therefore fidelity (or lack thereof) at this scale is assessed for seasonal core areas within a larger range. Population scale site fidelity dynamics observed in the Charron Lake range during the pre-construction and construction Project phases. As confidence intervals encompass the null expectation, site fidelity is occurring throughout the year during both Project phases.



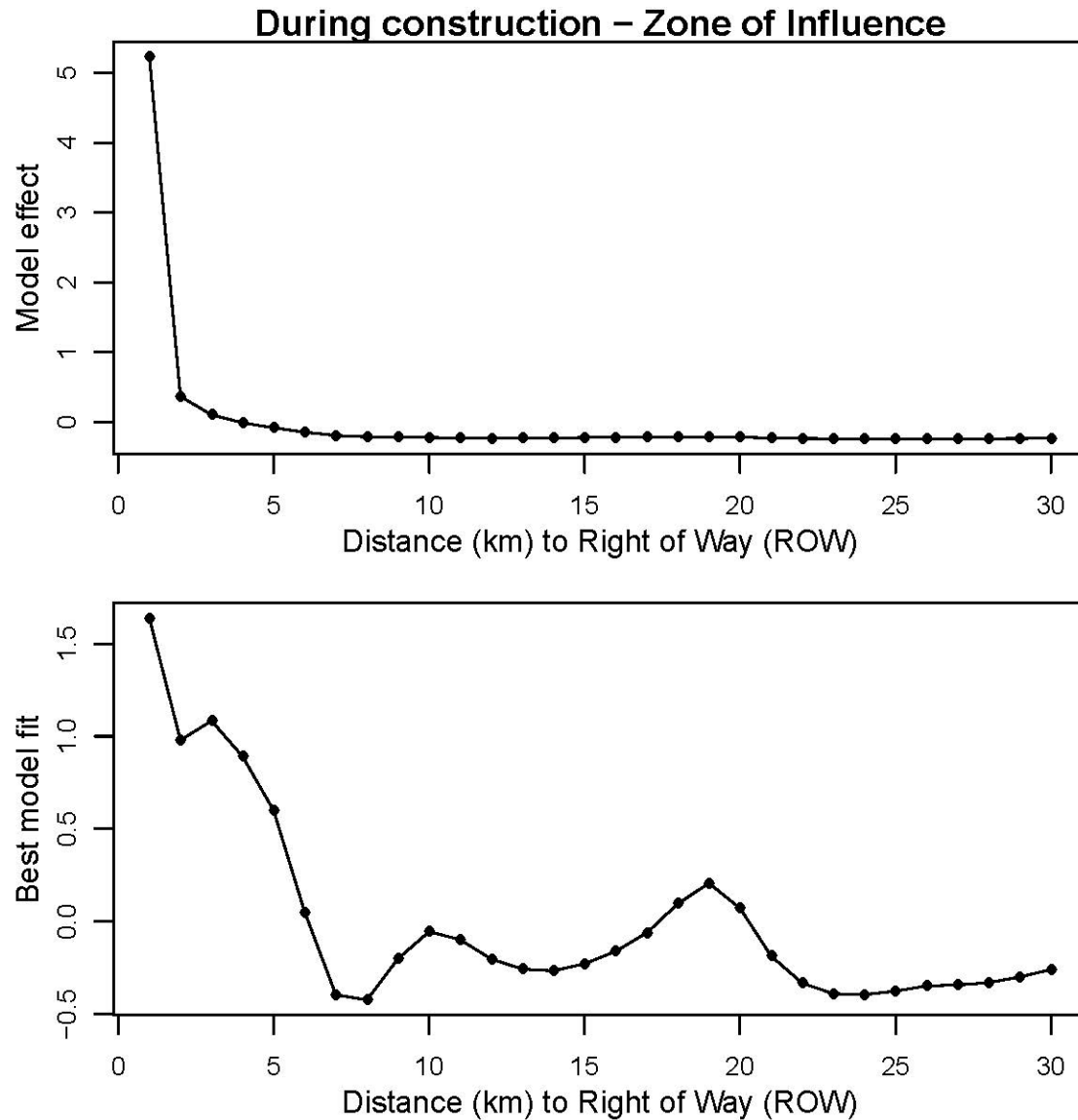
**Figure 5-1-22: Seasonal Scale Site Fidelity Dynamics observed in the Charron Lake Range during the Pre-construction and Construction Project Phases**

The seasonal scale includes boundaries as defined by all satellite collared cows in the Charron Lake range within a given month; therefore fidelity (or lack thereof) at this scale, is assessed for local sites within seasonal core use areas for a given month. Seasonal scale site fidelity dynamics observed in the Charron Lake range during the pre-construction and construction Project phases. As confidence intervals encompass the null expectation, site fidelity is occurring throughout the year during the pre-construction and construction phases.



**Figure 5-1-23: Zone of Influence as Measured by Model Effect Pooled across Seasons for Pre-construction to Construction**

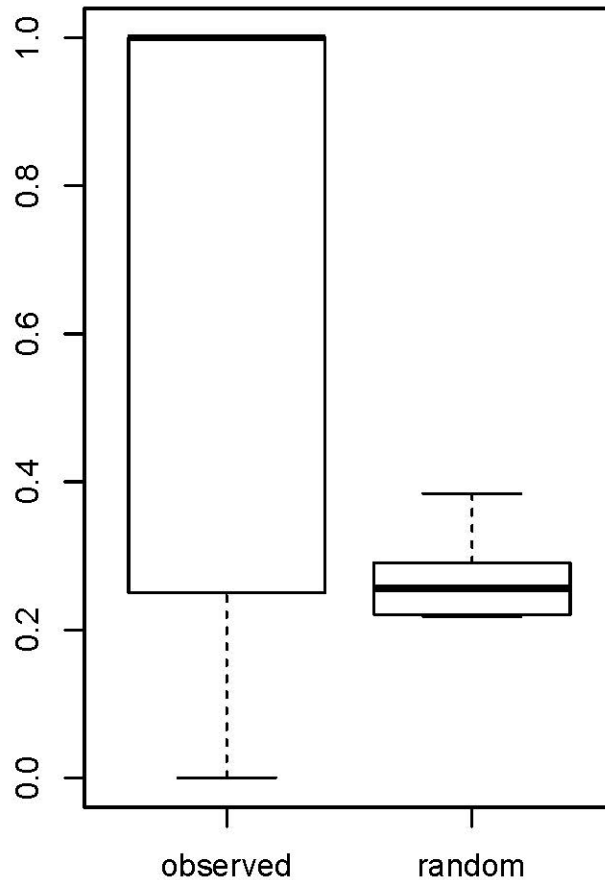
Comparison of the ZOI generated using locations pooled across seasons for each phase in Wabowden range. Caribou avoided the pre-existing linear corridor by 1 to 2 km and this avoidance pattern continued during the construction phase. The ROW was widened for most of this range and avoidance was already occurring on the landscape prior to the Project being installed.



**Figure 5-1-24: Zone of Influence as Measured by Model Effect and Model Fit Pooled across all Seasons during the Construction Phase to Date in the P-Bog Range**

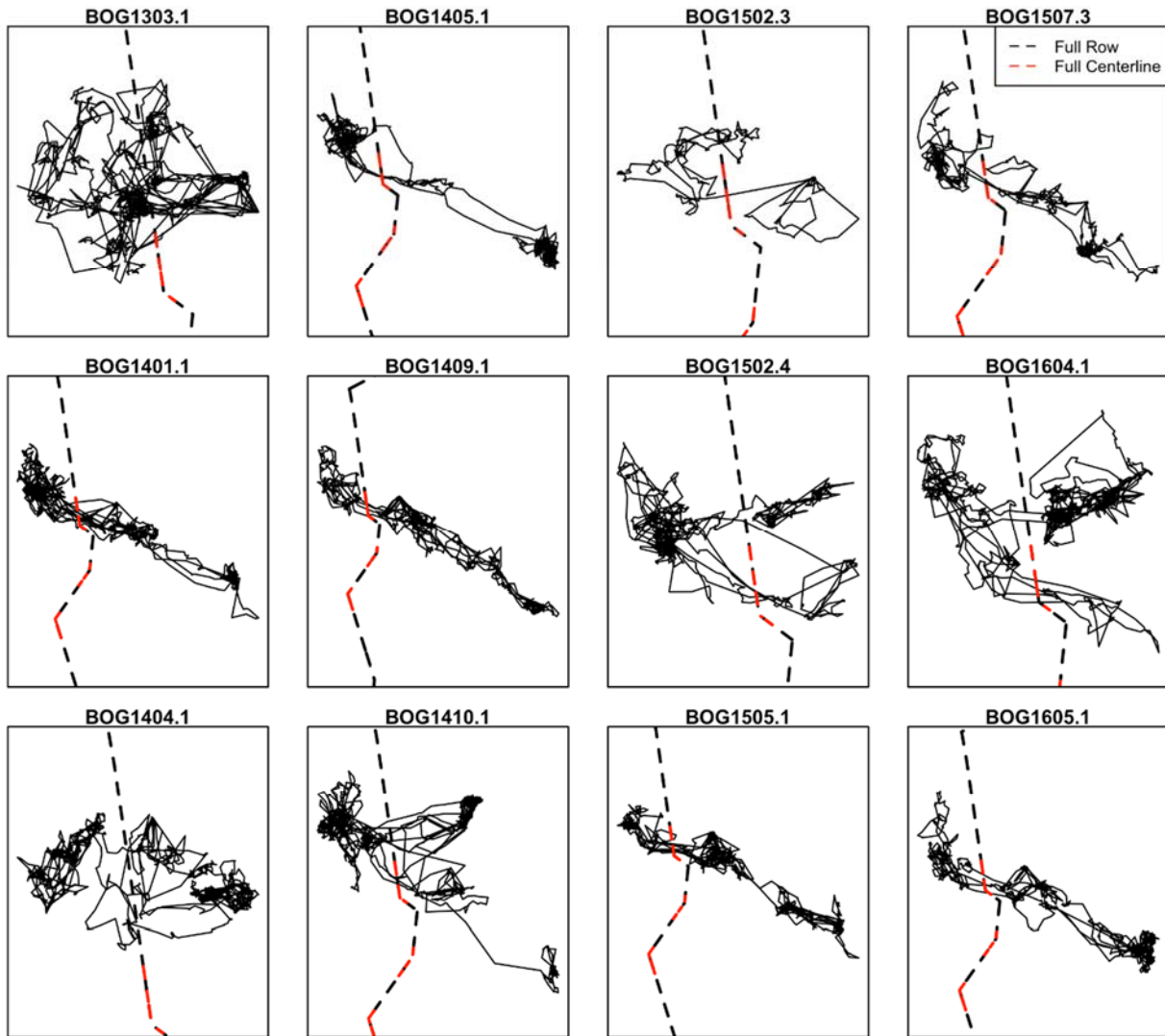
Model effect illustrates that caribou avoid the Project ROW by approximately 1 km during the construction phase. The best model fit also indicates a good fit for avoidance of 1 km.

### Proportion of mitigated crossings



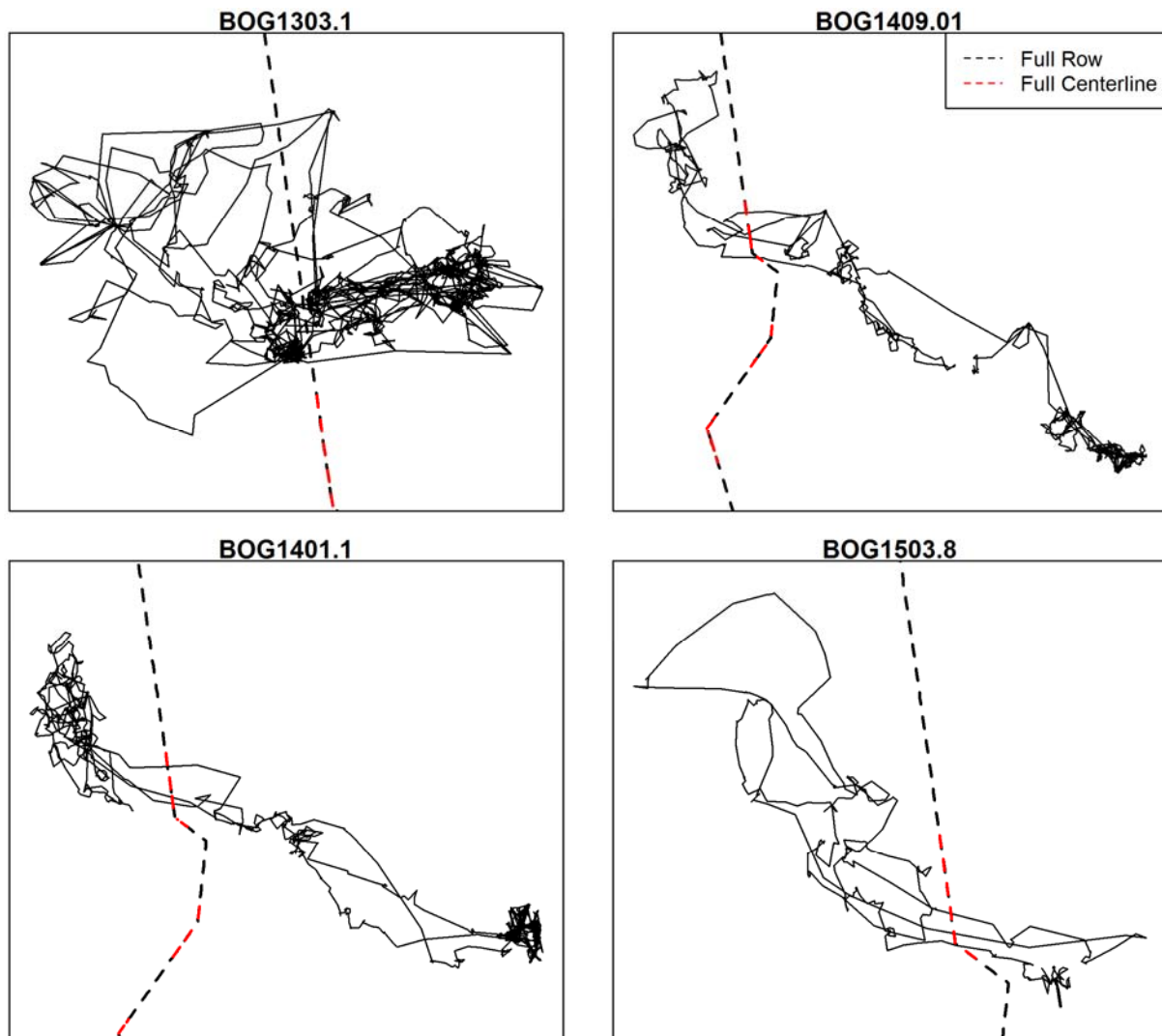
**Figure 5-1-25: The Proportion of Crossings at the Mitigated Areas in the P-Bog Range in 2018.**

Caribou continue to cross the Project ROW in areas with vegetation mitigation applied significantly more frequently than random; suggesting that mitigation was successful in ensuring that caribou continued to move across the landscape. Caribou with a minimum of 2 crossings were included in this figure.



**Figure 5-1-26: Movement Trajectories of Caribou in the Construction Phase using Mitigated Areas to Cross the Project ROW in 2016 - 2017**

This figure demonstrates that caribou were crossing the landscape in areas where mitigation was applied. Some caribou such as BOG1303.1 and BOG 1404.1 do not use the mitigated areas, but the remainder of the collared caribou do appear to prefer these narrower portions of the ROW when they decide to cross. Red lines are the mitigation portions of the ROW and black lines are the non-mitigated areas portions of the ROW. These figures are generated from crossings from 2016 to 2017.



**Figure 5-1-27: Movement Trajectories of Caribou in the Construction Phase using Mitigated Areas to Cross the Project ROW in 2018**

This figure demonstrates that caribou were crossing the landscape in areas where mitigation was applied. Some caribou such as BOG1303.1 do not use the mitigated areas, but the remainder of the collared caribou do appear to prefer these narrower portions of the ROW when they decide to cross. BOG1303.1 did not use the mitigated areas in 2017 (Figure 5-1-16) indicating that individuals may have set locations they each year. Red lines are the mitigation portions of the ROW and black lines are the non-mitigated areas portions of the ROW. These figures are generated from crossings in 2018.

Figure 5-1-28 is redacted

