

# The Canadian Field-Naturalist

## SUPPLEMENTARY MATERIALS:

### Estimated effects of clear-cuts and burns associated with habitat use by female Newfoundland Caribou (*Rangifer tarandus*)

DANIELLA J. DEKELAITA, PAUL R. KRAUSMAN, and SHANE P. MAHONEY

**TABLE S1.** Radio-collar sample sizes and associated location data from Caribou (*Rangifer tarandus*) in three herds (i.e., Middle Ridge, Pot Hill, Gaff Topsails) during the calving season (1 May to 30 June) in Newfoundland, Canada, 1987–1996 and 2007–2010.

Herd	Period	Sample	Collar type*	Locations/individual
Middle Ridge	May–June 2009–2010	11 females	GPS	1077–1078
		12 females	GPS	490–929
		1 female	GPS	54
	May–June 1987–1996	24 females	VHF	1–10
		21 females	VHF	12–30
		4 females	VHF	32–47
		75 calves	VHF	1–7
Pot Hill	May–June 2007–2009	11 females	GPS	2054–2193
		3 females	GPS	1450–1464
Gaff Topsails	May–June 2007–2009	10 females	GPS	2148–2193
		3 females	GPS	1456–1462
		7 females	GPS	587–731

\*Global positioning system (GPS); very high frequency (VHF).

**TABLE S2.** Yearly location data from global positioning system collars on adult female Caribou (*Rangifer tarandus*) in three herds (i.e., Middle Ridge, Pot Hill, Gaff Topsails) during the calving season (1 May to 30 June) in Newfoundland, Canada, 1987–1996 and 2007–2010, used for resource selection modelling.

Herd	Year	No. of locations
Middle Ridge	2009	11 158
	2010	7922
Pot Hill	2007	10 192
	2008	10 186
	2009	7890
Gaff Topsails	2007	11 536
	2008	9488
	2009	10 169

**TABLE S3.** Parameter estimates from mixed effects resource selection models analyzing relative use of cover types by adult female Caribou (*Rangifer tarandus*) in three herds (i.e., Middle Ridge, Pot Hill, Gaff Topsails) during the calving season (1 May to 30 June) in Newfoundland, Canada, 2007–2010. We included random intercepts to account for individual variation within herds and estimated low to no variance among individuals (Middle Ridge:  $\sigma_u^2 = 0.016$ ; Pot Hill:  $\sigma_u^2 = 0.00$ ; Gaff Topsails:  $\sigma_u^2 = 3.25 \times 10^{-17}$ ). Dashes denote missing values for cover types that were not available, not used, or were otherwise nonconverging.

Parameter	Middle Ridge			Pot Hill			Gaff Topsails		
	$\beta$	SE	95% CI	$\beta$	SE	95% CI	$\beta$	SE	95% CI
Intercept (fixed)	-3.62	0.09	-3.80–-3.44	-3.54	0.08	-3.69–-3.40	-3.93	0.08	-4.09–-3.76
Barrenland	—	—	—	2.45	0.67	1.13–3.76	—	—	—
10-year burn	—	—	—	—	—	—	2.89	0.16	2.58–3.21
20-year burn	4.83	0.09	4.65–5.01	-0.01	0.13	-0.26–0.23	1.12	0.43	0.28–1.96
Mixed forest	-0.68	0.17	-1.01–-0.35	1.57	0.09	1.39–1.74	0.87	0.10	0.67–1.07
≤10-year clear-cut	—	—	—	2.98	0.11	2.77–3.19	2.35	0.10	2.16–2.55
>10-year clear-cut	—	—	—	-0.50	0.59	-1.66–0.65	2.53	0.12	2.31–2.76
Lichen–moss barren	0.54	0.58	-0.59–1.67	—	—	—	1.09	0.60	-0.08–2.27
Lichen–moss grassland	-0.49	0.25	-0.99–0.01	1.76	0.16	1.45–2.07	2.65	0.10	2.46–2.84
Broadleaf deciduous forest	0.72	0.12	0.49–0.95	1.85	0.09	1.67–2.04	2.34	0.09	2.16–2.51
Subpolar grassland	0.12	0.93	-1.70–1.95	2.78	0.46	1.87–3.69	1.87	0.22	1.43–2.30
Needleleaf forest	0.20	0.11	-0.01–0.42	2.29	0.08	2.14–2.44	2.24	0.09	2.07–2.41
Subpolar shrubland	0.72	0.10	0.53–0.92	2.05	0.08	1.89–2.20	2.90	0.09	2.73–3.07
Wetland	1.19	0.11	0.98–1.39	2.04	0.08	1.88–2.21	2.89	0.09	2.71–3.07

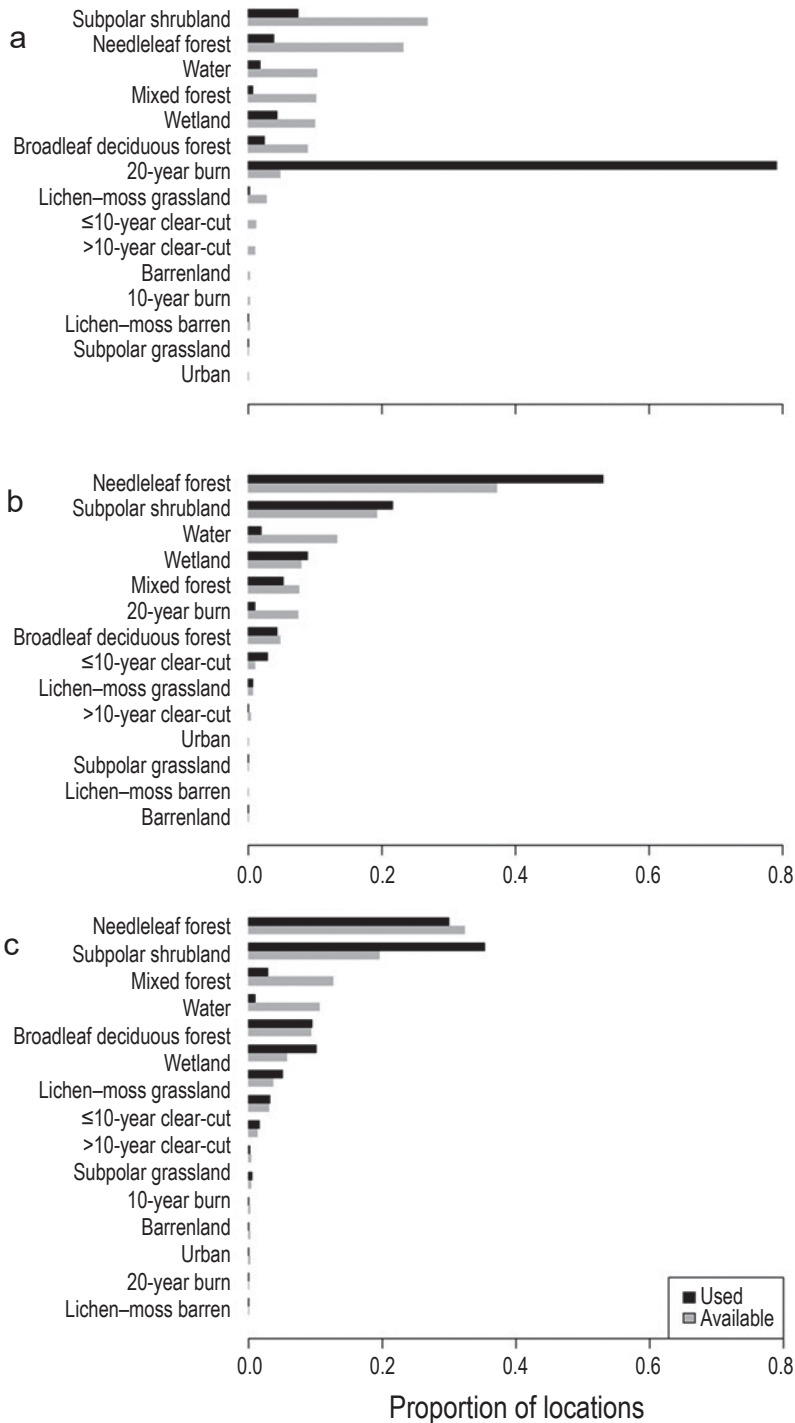
**TABLE S4.** Resource selection model sets evaluating relative use of land cover types by adult female Caribou (*Rangifer tarandus*) in three herds (i.e., Middle Ridge, Pot Hill, Gaff Topsails) during the calving season (1 May to 30 June) in Newfoundland, Canada between 2007–2010. We tested models with and without clear-cut and burn covariates. We included a random intercept for each individual to account for individual variation and unequal sampling among individuals within herds. Land cover types are abbreviated as follows: BaLiMo = lichen–moss barren, Bar = barrenland, Brn10y = 10-year burn, Brn20y = 20-year burn, C<10y = ≤10-year clear-cut, C>10y = >10-year clear-cut, Decid = subpolar broadleaf deciduous forest, Grs = Subpolar grassland, GrLiMo = lichen–moss grassland, Mxd = mixed forest, Ndf = subpolar needleleaf forest, Shb = subpolar shrubland, and Wet = wetland. Cover types are missing from a model set if they were not available, not used, or were otherwise nonconverging. We evaluated relative use of land cover types compared to water and ranked models using AICc.

Herd	Parameters	$K^*$	AICc	$\Delta AICc$	$w^{\dagger}$	Cum. $w^{\ddagger}$
Middle Ridge	Brn20y + Mxd + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	20791.61	0.00	1.00	1.00
	Mxd + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	10	28732.72	7941.12	0.00	1.00
Pot Hill	Bar + Mxd + C<10y + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	47409.72	0.00	0.47	0.47
	Bar + Mxd + C<10y + C>10y + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	47410.87	1.15	0.26	0.73
	Bar + Brn20y + Mxd + C<10y + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	47411.72	2.00	0.17	0.90
	Bar + Brn20y + Mxd + C<10y + C>10y + GrLiMo + Decid + Grs + Ndf + Shb + Wet	13	47412.86	3.13	0.10	1.00
	Bar + Brn20y + Mxd + C>10y + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	48153.54	743.81	0.00	1.00
	Bar + Brn20y + Mxd + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	48159.98	750.25	0.00	1.00
	Bar + Mxd + C>10y + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	48218.73	809.01	0.00	1.00
	Bar + Mxd + GrLiMo + Decid + Grs + Ndf + Shb + Wet	10	48222.21	812.49	0.00	1.00
Gaff Topsails	Brn10y + Brn20y + Mxd + C<10y + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	14	61003.19	0.00	0.82	0.82
	Brn10y + Mxd + C<10y + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	13	61006.28	3.09	0.18	1.00
	Brn20y + Mxd + C<10y + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	13	61229.98	226.79	0.00	1.00
	Mxd + C<10y + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	61230.33	227.14	0.00	1.00
	Brn10y + Mxd + C<10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	61433.79	430.60	0.00	1.00
	Brn10y + Brn20y + Mxd + C<10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	13	61435.25	432.07	0.00	1.00
	Mxd + C<10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	61577.31	574.12	0.00	1.00
	Brn20y + Mxd + C<10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	61579.18	575.99	0.00	1.00
	Brn10y + Mxd + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	61612.08	608.89	0.00	1.00
	Brn10y + Brn20y + Mxd + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	13	61614.08	610.89	0.00	1.00
	Mxd + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	61722.25	719.06	0.00	1.00
	Brn20y + Mxd + C>10y + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	61724.18	720.99	0.00	1.00
	Brn10y + Mxd + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	61806.58	803.39	0.00	1.00
	Brn10y + Brn20y + Mxd + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	12	61808.25	805.06	0.00	1.00
	Mxd + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	10	61894.35	891.17	0.00	1.00
	Brn20y + Mxd + BaLiMo + GrLiMo + Decid + Grs + Ndf + Shb + Wet	11	61895.77	892.58	0.00	1.00

\*Number of model parameters.

†Akaike model weight.

‡Cumulative Akaike model weight.



**Figure S1.** Proportions of used and available cover types estimated from actual and random locations used to analyze habitat use by adult female Caribou (*Rangifer tarandus*) in three herds (i.e., a. Middle Ridge, b. Pot Hill, and c. Gaff Topsails) during the calving season (1 May to 30 June) in Newfoundland, Canada between 2007–2010.