Appendix A: Additional information on study area and species

We studied adult female caribou (*Rangifer tarandus*) from six herds (Buchans, Grey River, La Poile, Middle Ridge, Pot Hill, and Topsails) on the Island of Newfoundland, Canada (Figure A1: 47°44'N, 52°38'W to 51°44'N, 59°28'W) between 2007–2013 (Table A1). Caribou (n = 129 individuals) were immobilized by a dart fired from a helicopter and outfitted with global positioning system (GPS) collars (Lotek Wireless Inc., Newmarket, ON, Canada, GPS4400M collars, 1,250 g). Collars were deployed on individual caribou for one to three years, but collars were often re-deployed on the same individuals for up to seven years (Table A1). The Newfoundland and Labrador Department of Environment and Conservation captured and immobilized caribou by aerial darting from a helicopter with a mixture of carfentanil (12 mg/kg) and xylazine (0.2 mg/kg) or a mixture of ketamine (2 mg/kg) and xylazine (6 mg/kg) administered intramuscularly with a CO2-powered pistol (Palmer Cap-Chur Inc., Power Springs, Georgia). All collars were programmed to record locations every 1, 2, or 4 hours, depending on herd, season, and year. Prior to analyses we screened telemetry data and removed all erroneous fixes (Bjørneraas et al. 2010). Animal capture and handling procedures conformed to guidelines established by the American Society of Mammalogists (Sikes and Gannon 2011).

For all analyses, we restricted the dataset to only include GPS fixes collected between June 10–July 29, which represents post-parturition and early summer for caribou in Newfoundland. We selected these dates because the peak of vegetation green-up in Newfoundland occurs in late May (Laforge and Vander Wal unpublished data) and calving occurs in late May/early June throughout our study area (Mahoney et al. 2016). After parturition, adult female caribou and their calves select the safest, but most nutrient abundant habitats, to promote rapid growth and survival of calves (Viejou et al. 2018). In the context of social aggregation, adult female caribou vary in their aggregation patterns during calving, with some females aggregating in large groups on a calving ground, while others

remain solitary (Bonar 2017). By contrast, during the summer caribou in Newfoundland tend to be relatively solitary (Peignier et al. 2019), suggesting that movement-related foraging behavior at the individual-level is not influenced by attraction to conspecifics. In contrast, during autumn and winter, caribou tend to aggregate in large groups and disentangling movement-related foraging behavior from conspecific attraction would be difficult. We therefore assumed that foraging opportunities are readily available for caribou during late calving and early summer.

Caribou ranges in Newfoundland are composed of coniferous and mixed forest dominated by balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), and white birch (*Betula papyrifera*) as well as bogs with stunted black spruce and tamarack (*Larix laricina*). Barren rock, lakes, and ponds are also common land features in Newfoundland. Caribou in Newfoundland have undergone drastic changes in abundance over the last 50 years, with low abundance from the 1950s to 1970s, followed by rapid growth in the 1980s and 1990s, and precipitous declines in the 2000s that persists to the present (Bastille-Rousseau et al. 2013). These changes in population abundance are consistent across herds. We calculated 1879 unique individuals across all 10-day time-windows and years (hereafter, unique IDs). We employed two data censoring techniques:

1. we only included individuals with greater than 90 fixes per 10-day window (after screening: median 120, range = 91-241 fixes per 10-day time-window);
2. we only included individuals with at least six fixes per day (after screening: median 12, range = 6-25 fixes per day) within each 10-day time-window.

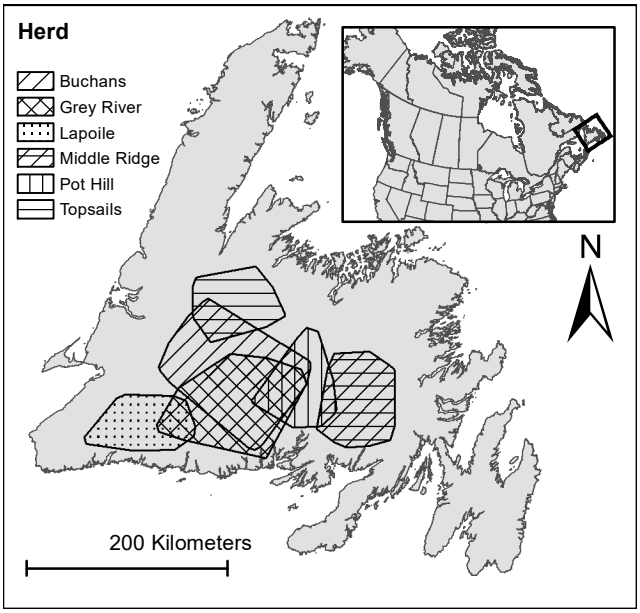

Figure A1: Map of study area in Newfoundland, Canada, with the locations of six caribou (*Rangifer tarandus*) herds used for data collection between 2006–2013.

Table A1: Summary of herd-by-year data used for analyses, including number of individuals (IDs) from each herd-year combination and the total number of GPS-telemetry fixes generated within each herd-year combination. Values in totals row indicate number of unique individuals per herd and values in the totals column indicate number of collared individuals per year. Note, in total, there were 129 uniquely collared individuals between 2006 and 2013 across all herds.

	Buchans		Grey		Lapoile		Midridge		Pothill		Topsails		Total	
Year	Fixes	IDs	Fixes	IDs	Fixes	IDs	Fixes	IDs	Fixes	IDs	Fixes	IDs	Fixes	IDs
2006	1772	5	1630	5	-	-	-	-	1516	4	716	2	5634	16
2007	7132	12	9520	16	8949	15	-	-	8336	14	10866	19	44803	76
2008	5960	10	7919	14	5385	9	-	-	8193	14	8360	14	35817	61
2009	6324	11	5919	10	6570	11	11423	20	6528	11	9868	17	46632	80
2010	4973	9	5192	9	6333	11	11515	20	4940	9	8933	15	41886	73
2011	4178	7	3537	6	2985	5	23490	23	3329	6	3929	7	41448	54
2012	3562	6	2373	4	2992	5	14367	14	1168	2	1792	3	26254	34
2013	-	-	-	-	-	-	11360	15	-	-	-	-	11360	15
Total	33901	15	36090	16	33214	18	72155	39	34010	15	44464	26	253834	129

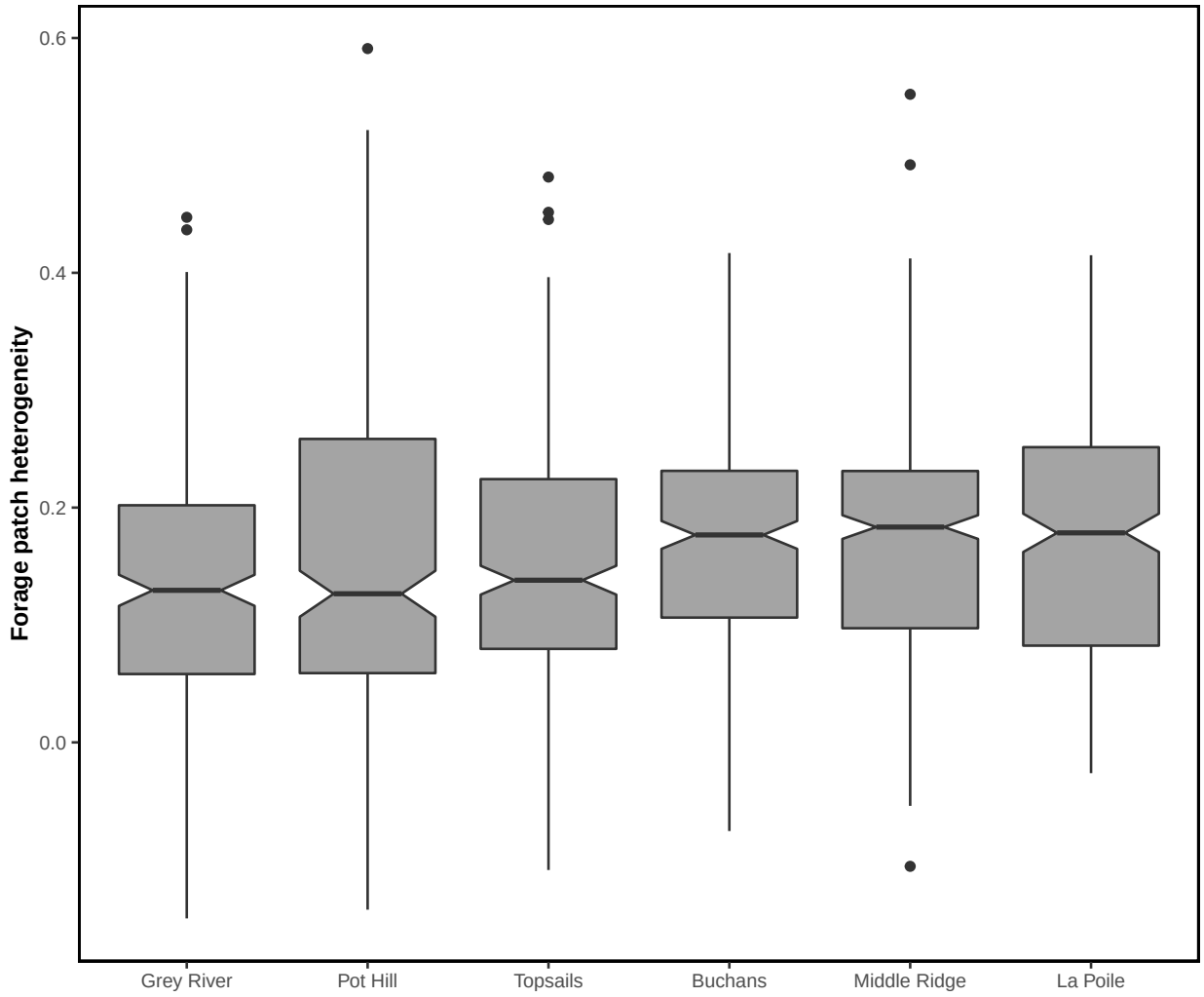

Figure A2: Spatial distribution of forage patch heterogeneity (i.e., Moran's I) values across six caribou herds in Newfoundland. Herds are ordered from lowest to highest mean forage patch heterogeneity values, where negative values reflect habitats where foraging resources are uniformly distributed, while positive values represent habitats where foraging resources are heterogeneously distributed. We observed differences in Moran's I across herds ($F_{5,1873}$ = 6.13, $p < 0.001$), however, results of pairwise comparisons adjusted using Tukey's post-hoc test suggested significant differences between La Poile–Grey River, Middle Ridge–Grey River, and Pot Hill–La Poile.

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