



Dispersal of a Red Squirrel Across an Alpine Divide in Southwestern British Columbia

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Knowledge about dispersal is vital for understanding population dynamics and degree of genetic mixing for any species (Gaines and McClenaghan 1980, Greenwood 1980, Stenseth and Lidicker 1992). Estimating rates of dispersal is problematic because dispersing individuals are less likely to be detected than non-dispersing individuals within a study area (Koenig et al. 1996). This is a

common problem confounding survival estimates in mark-recapture studies (Clobert and Lebreton 1991) and may bias estimates of the frequency of certain behaviours such as divorce (Rodway 2013) because dispersing individuals that are not recaptured or resighted are generally assumed to be dead.

Red Squirrels (*Tamiasciurus hudsonicus*) are a familiar denizen of forested habitats throughout much



Figure 1. Red Squirrel on the alpine divide between the Noel and Cadwallader creek watersheds, British Columbia, 17 August 2014.

of North America where their vocal and industrious behaviour make them conspicuous to the most casual naturalist (Nagorsen 2005, Naughton 2012). They are highly territorial year round and individuals of both sexes defend small and stable areas of generally less than one hectare centred around a food midden (Steele 1998). Dispersing offspring typically move short distances from their natal territory and establish their own territories often immediately adjacent to, or at most a few hundred metres from, their mother's territory (Larsen and Boutin 1994, Sun 1997, Haughland and Larsen 2004). Many mothers bequeath part or all of their territory to offspring and in those cases the females rather than their offspring disperse short distances (Price and Boutin 1993, Berteaux

and Boutin 2000). Records of dispersal movements up to 5.6 km (Nagorsen 2005), and recovery of a road-killed juvenile female 5.5 miles from the study area where it was marked (Linduska 1950), indicate that long-distance movements do occur, but these are considered rare (McAdam et al. 2007). We know of no previous records of Red Squirrels dispersing across open alpine habitat kilometres from their typical forest abode.

On 17 August 2014 we were sitting on a narrow ridge crest (50° 39' 54"N, 122° 43' 38"W) at 2,269 m elevation in the saddle that forms a divide between Noel Creek and Cadwallader Creek watersheds in the Bridge River valley, about 160 km northeast of Vancouver, British Columbia. At 13:05 we saw a Red



Figure 2. Alpine habitat on the divide between the Noel and Cadwallader creek watersheds, British Columbia, where a Red Squirrel was observed on 17 August 2014. (note the four Mountain Goats in the centre of the photo).

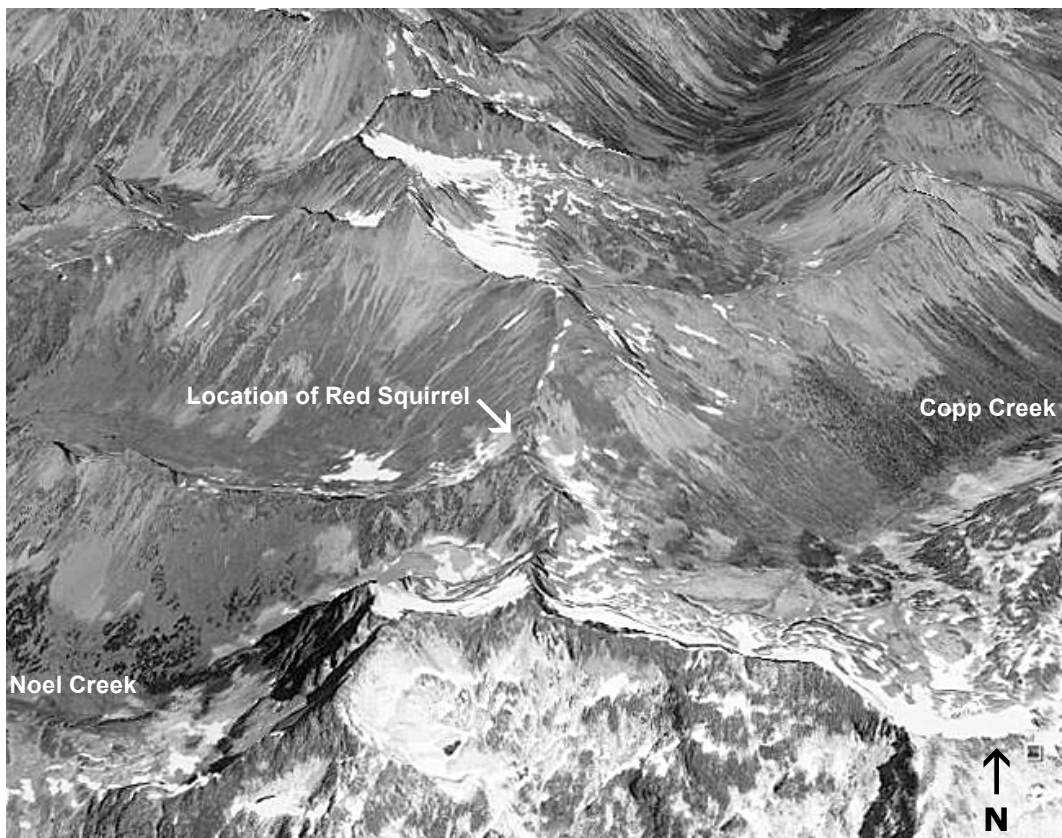


Figure 3. Image from Google Earth showing extent of alpine habitat that was traversed by a Red Squirrel moving between forested habitats in the Noel watershed to Copp Creek that drains into the Cadwallader watershed.

Squirrel emerge from the west side of the ridge that ascends from the Noel valley and sit on the lichen-covered rocks on the ridge crest for about 15 minutes (Figures 1 and 2). The squirrel then crossed the crest of the ridge and headed down the steep scree slope on the east side of the ridge into the Copp Creek valley in the upper Cadwallader drainage. We quickly lost sight of it as it descended. The extent of alpine habitat in the area indicated that the squirrel must have travelled a minimum of 4-5 km across open alpine habitat between forested patches on either side of the ridge (Figure 3).

Our observation demonstrates that, although infrequent, Red Squirrels do move longer distances and thus incur the risks of crossing extensive alpine

habitat to travel from one watershed to another. This behaviour has important implications for gene flow and meta-population structuring and for the colonization of patchy habitat. A few long-range migrants can greatly enhance the heterozygosity of populations and the evolutionary effect of gene flow (Slatkin 1985). The Red Squirrel's willingness to make long-distance forays across open, non-forested habitat explains, and is implicated by, their occupation of isolated pockets of trees in prairie habitat (K. Larsen pers. comm.) and likely affects genetic connectivity among fragmented populations (Kiesow 2012). Determining the relative frequency and success of long-distance dispersal will likely require large-scale studies using radio or satellite tracking of marked individuals. †

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