Red squirrel

Tamiasciurus hudsonicus

Class: Mammalia
Order: Rodentia

Review Status: Peer-reviewed **Version Date:** 10 December 2018

Conservation Status

NatureServe:	*Agency:*		
G Rank: G5	ADF&G: Species of Greatest Conservation Need	IUCN: Least Concern	Audubon AK:
S Rank: S5	USFWS:	BLM:	

Final Rank

Conservation category: **VIII. Blue**

unknown status and low biological vulnerability and action need

Category	Range	Score
Status	-20 to 20	0
Biological	-50 to 50	-30
Action	-40 to 40	0

Higher numerical scores denote greater concern

Status - variables measure the trend in a taxon's population status or distribution. Higher status scores denote taxa with known declining trends. Status scores range from -20 (increasing) to 20 (decreasing). **Score**

Population Trend in Alaska (-10 to 10) 0

Unknown.

Distribution Trend in Alaska (-10 to 10) 0

Trends over the last 50 years are unknown. Models suggest that the distribution of red squirrels in Alaska has increased since the Last Glacial Maximum (~21,500 years ago; Hope et al. 2015) and this trend is expected to continue (Hope et al. 2015; Marcot et al. 2015).

Status Total: 0

Biological - variables measure aspects of a taxon's distribution, abundance and life history. Higher biological scores suggest greater vulnerability to extirpation. Biological scores range from -50 (least vulnerable) to 50 (most vulnerable). **Score**

Population Size in Alaska (-10 to 10) -6

Unknown, but suspected large. Red squirrels are widely distributed throughout Alaska and are common at the core of their range (MacDonald and Cook 2009).

Range Size in Alaska (-10 to 10) -10

Occurs throughout forested habitat from southeast Alaska north to the Brooks Range and from western Alaska east to the Canadian border (MacDonald and Cook 2009; ACCS 2017a). Estimated range size is >400,000 sq. km.

Population Concentration in Alaska (-10 to 10) -10

Does not concentrate.

Reproductive Potential in Alaska

Age of First Reproduction (-5 to 5) -5

Females breed at 1 year of age (Krasnowski 1969).

Number of Young (-5 to 5) 1

Females produce one litter per year with 3-5 young per litter (Smith 1968; Krasnowski 1969; Steele 1998). In interior Alaska, average litter size was 3.92 pups/female/year (Krasnowski 1969).

Ecological Specialization in Alaska

Dietary (-5 to 5) 5

Spruce cones, especially from white spruce, are squirrels' main food source (Brink and Dean 1966; Smith 1968; Grodzinski 1971b; Steele 1998). Population numbers are highly responsive to the abundance of spruce cones (Smith 1968; Sullivan 1990; Krebs et al. 2014b), though squirrels do eat mushrooms and spruce buds when cones are unavailable (Smith 1968; Steele 1998). Small birds (Sieving and Willson 1998; Willson et al. 2003), seeds, berries, and insects are occasionally consumed (Smith 1968; Grodzinski 1971; Steele 1998). O'Donoghue (1994) noted that red squirrels were important predators of snowshoe hare leverets, accounting for 20% of leveret mortality in his study. Given that population dynamics are closely linked to the abundance of a single, pulsed resource (reviewed in Krebs et al. 2014b), we rank this species as A- Not adaptable.

Habitat (-5 to 5) -5

Found in a variety of forest types including coniferous, deciduous, mixedwood, and shrub thickets (Smith 1968; Krasnowski 1969; Steele 1998; Willson et al. 2003; Bakker and Van Vuren 2004; Cook and MacDonald 2006; MacDonald and Cook 2009). Red squirrels nest in tree cavities or in self-constructed nest made of twigs, grass, moss, and leaves (Dice 1921; MacDonald and Cook 2009).

Biological Total: -30

Action - variables measure current state of knowledge or extent of conservation efforts directed toward a given taxon. Higher action scores denote greater information needs due of lack of knowledge or conservation action. Action scores range from -40 (lower needs) to 40 (greater needs). **Score**

Management Plans and Regulations in Alaska (-10 to 10) 10

Squirrels can be hunted and trapped in Alaska with no closed season or bag limits (ADFG 2020a; ADFG 2020b).

Knowledge of Distribution and Habitat in Alaska (-10 to 10) -10

Distribution and habitat associations are well-known throughout the core of their range in Alaska (reviewed in MacDonald and Cook 2009; see Habitat section above). Additional specimens are needed to validate subspecies designations, of which four have been described from Alaska (MacDonald and Cook 2009).

Knowledge of Population Trends in Alaska (-10 to 10) 10

Not currently monitored.

Knowledge of Factors Limiting Populations in Alaska (-10 to 10) -10

The population dynamics of red squirrels have been well-studied in the Yukon. Dynamics are tightly linked to the abundance of white spruce cones (Smith 1968; Sullivan 1990; Boutin et al. 2006), which cycle between being overabundant in mast years, while in other years little to no cone

production occurs (Boutin et al. 2006). Population numbers are highest when cones are abundant (Smith 1968; Sullivan 1990; Krebs et al. 2014b) likely because of higher recruitment (Krebs et al. 2014b). In anticipation of masting events, females give birth to larger litters and are more likely to breed earlier, have two litters per year, and to reproduce when they are yearlings (Sullivan 1990; Boutin et al. 2006; Williams et al. 2014a). Juvenile growth rates and juvenile survival also increase when cone production is high (McAdam and Boutin 2003; Boutin et al. 2006; Williams et al. 2014a), and females born during mast years have higher lifetime reproductive success ("silver-spoon effect") (Descamps et al. 2008). Predation seems to have little effect on population dynamics (Stuart-Smith and Boutin 1995).

In the 1960s, several studies were conducted on the population dynamics of red squirrels in interior Alaska (Smith 1968; Streubel 1968; Krasnowski 1969). Streubel (1968) proposed that territoriality may limit population densities in years where cone production is abundant. Density-dependent effects on survival have also been observed in Yukon populations (Descamps et al. 2008; Williams et al. 2014a). Habitat disturbance (e.g. timber harvesting and infestations of spruce bark beetle) is suspected to affect red squirrel populations (Wolff and Zasada 1975; Matsuoka et al. 2001; Bakker and Van Vuren 2004; Bakker 2006), and red squirrels may compete with northern flying squirrels for nesting cavities (Smith 2007; Smith 2012), but additional research is needed on these topics. Distribution models by Marcot et al. (2015) and Hope et al. (2015) predict increased suitable habitat due to climate change by the end of this century.

Action Total: 0

Supplemental Information - variables do not receive numerical scores. Instead, they are used to sort taxa to answer specific biological or management questions.

Harvest:	Not substantial
Seasonal Occurrence:	Year-round
Taxonomic Significance:	Monotypic species
% Global Range in Alaska:	<10%
% Global Population in Alaska:	<25%
Peripheral:	No

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