Northern flying squirrel

Glaucomys sabrinus

Class: Mammalia
Order: Rodentia

Conservation Status

NatureServe:	*Agency:*		
G Rank: G5	BLM:	IUCN: Least Concern	Audubon AK:
S Rank: S4	USFWS:	ADF&G: Species of Greatest Conservation Need	

Final Rank

Conservation category: **VIII. Yellow**

VIII = low status and either high biological vulnerability or high action need

Category	Range	Score
Status:	-20 to 20	-5
Biological:	-50 to 50	-27
Action:	-40 to 40	24

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 (-10 to 10) 0

Unknown.

Distribution Trend (-10 to 10) -5

Extensive logging in southeast Alaska over the past 50 years has reduced the amount of old-growth forests in the region (Pyare et al. 2010), but neither den sites nor food resources appear to be limiting current populations of G. sabrinus in southeast Alaska (Bakker and Hastings 2002; Pyare et al. 2010). Distribution trends elsewhere in its range are unknown, but suspected stable. Climate change is expected to increase the amount of suitable habitat by the end of this century (Marcot et al. 2015; Murray et al. 2017).

Status Total: -5

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 (-10 to 10) -6

Unknown, but suspected large. 400 unique individuals were captured over three years in north-central Prince of Wales Island (Smith et al. 2004), which represents only a small portion of this species' range.

Range Size (-10 to 10) -10

Occurs throughout islands and mainland of southeast Alaska (MacDonald and Cook 2009). Distribution elsewhere in the state is poorly known. It has been documented in southcentral and interior Alaska, from Anchorage east to the Canadian border and north to the foothills of the Brooks Range (MacDonald and Cook 2009). Its distribution on the Kenai Peninsula and Prince William Sound needs to be verified (MacDonald and Cook 2009). Estimated range size is ~463,602 sq. km., based on range map from ACCS (2017a).

Population Concentration (-10 to 10) -10

Does not concentrate.

Reproductive Potential

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

<2 years. In the U.S. Pacific Northwest, females 22 months or older were typically reproductively active (Villa et al. 1999). A study on Prince of Wales island reported a maximum lifespan of 30 months, during which time reproduction had already occurred (Smith and Nichols 2003).

Number of Young (-5 to 5) 2

In northern Washington, mean litter size was 2.8 and ranged from 1 to 4 (Villa et al. 1999). Feamles have one litter per year (Villa et al. 1999). We rank this question as 0.5 * B and 0.5 * C.

Ecological Specialization

Dietary (-5 to 5) 1

In Alaska and the northwest U.S., diet consists mainly of epigeous fungi, hypogeous fungi (truffles), lichens, and conifer seeds (Maser et al. 1985; Maser et al. 1986; Pyare et al. 2002; Smith 2007; Flaherty et al. 2010). The importance of these items in the diet varies seasonally and regionally (Maser et al. 1985; Maser et al. 1986; Flaherty et al. 2010). Within this niche, flying squirrels are opportunistic and consume several genera of fungi (Maser et al. 1985; Pyare et al. 2002; Lehmkuhl et al. 2004; Flaherty et al. 2010). To a far lesser extent, soil invertebrates are also consumed (Flaherty et al. 2010).

Habitat (-5 to 5) 1

Inhabits a variety of forest types including temperate spruce-hemlock rainforests, open canopy wetlands, fragmented forests (a mix of logged and old-growth) and mixedwood spruce-birch forests (Mowrey and Zasada 1984; Smith and Nichols 2003; Smith et al. 2004; Pyare et al. 2010). Important habitat features include large trees, snags, and an ericaceous understory; given this, stand age (i.e. old-growth) and intactness are likely important factors (Bakker and Hastings 2002; Smith et al. 2004; Pyare et al. 2010).

G. sabrinus builds dens for resting and to bear young. Maternal dens have not been specifically investigated in Alaska, but studies in Washington suggest that females typically use cavities in live trees (Carey et al. 1997). Meanwhile, the location of "resting" dens is highly variable. In Alaska, they have been found on live trees, snags, under stumps and root wads, both on the outside of trees (e.g. masses of lichen and moss) and in cavities (Mowrey and Zasada 1984; Bakker and Hastings 2002; Pyare et al. 2010). The importance of external versus cavity dens varies regionally, perhaps as a function of availability (Mowrey and Zasada 1984; Bakker and Hastings 2002; Pyare et al. 2010). Tree cavities do not appear limited in southeast Alaska (Bakker and Hastings 2002; Pyare et al. 2010).

Biological Total: -27

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 (-10 to 10) 10

Squirrels, including flying squirrels, can be hunted and trapped in Alaska with no closed season or bag limits (ADFG 2018c; ADFG 2018d).

Knowledge of Distribution and Habitat (-10 to 10) 2

Distribution and habitat associations have been well-studied in southeast Alaska (e.g. Bidlack and Cook 2001; Bakker and Hastings 2002; Smith and Nichols 2003; Smith et al. 2004; Pyare et al. 2010), but little is known about its habitat or distribution elsewhere in Alaska (MacDonald and Cook 2009; but see Mowrey and Zasada 1984).

Knowledge of Population Trends (-10 to 10) 10

Not currently monitored.

Knowledge of Factors Limiting Populations (-10 to 10) 2

Most studies have focused on southeast Alaska and in particular the Prince of Wales subspecies (G. sabrinus griseifrons). Smith and Nichols (2003) described the demography of populations on Prince of Wales island. Body condition and overwinter survival were similar for coniferous and peatland mixedwood populations (Smith and

Nichols 2003) but demographic variability in poorer quality habitat may lead to those habitats acting as sinks (Smith and Person 2007). Population viability models have been built for southeast Alaskan populations (Smith and Person 2007; Smith et al. 2011b). Hypothermia may be a major cause of mortality in regions where individuals are exposed to wet conditions (Smith 2007).

Predation, availability of den sites, and availability of truffles have been proposed as limiting factors (Carey 2002; reviewed in Smith 2007). Tree cavities and food resources may be reduced in logged and fragmented landscapes (Carey et al. 1997; Smith 2007; Flaherty et al. 2010; Holloway and Smith 2011), but neither of these appear to be limiting in southeast Alaska (Bakker and Hastings 2002; Pyare et al. 2010). However, interspecific competition with red squirrels may restrict habitat availability (Smith and Nichols 2003; Smith 2012). A comparison between islands with and without red squirrels found that home ranges were larger and population density and recruitment were lower in areas where red squirrels were present (Smith 2012). The effects of edges and landscape fragmentation is equivocal and requires further study (Pyare et al. 2010; Trapp et al. 2019). Marginal habitats have been linked to lower population densities and lower densities of breeding females (Smith and Nichols 2003; Smith et al. 2004), as well as lower dispersal distances and lower landscape connectivity (Trapp et al. 2019). Predation may be less important in regulating populations in southeast Alaska than elsewhere in the species' range (Smith and Nichols 2003; Lewis et al. 2006), but additional studies are needed. Climate change is expected to increase the amount of suitable habitat by the end of this century (Marcot et al. 2015; Murray et al. 2017). However, climate change could negatively impact the availability of truffles if drought years become more common (K. Mohatt, USFS, pers. comm.). The taxonomy and biogeography of subspecies has been investigated (Demboski et al. 1998; Cook et al. 2001).

Action Total: 24

Supplemental Information - variables do not receive numerical scores. Instead, they that 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:	Unknown
Peripheral:	No

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Review status: Peer-reviewed

Version date: 10 December 2018

Alaska Center for Conservation Science
Alaska Natural Heritage Program
University of Alaska Anchorage
Anchorage, AK