Northern collared lemming

Dicrostonyx groenlandicus

Class: Mammalia
Order: Rodentia

Conservation Status

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

Final Rank

Conservation category: **V. Orange**

V = unknown status and either high biological vulnerability or high action need

Category	Range	Score
Status:	-20 to 20	0
Biological:	-50 to 50	-32
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) 0

Trends over the last 50 years are unknown. Modeling studies estimate that the distribution of collared lemmings in Alaska has decreased since the Last Glacial Maximum (~21,500 years ago; Prost et al. 2013; Hope et al. 2015), and this trend is expected to continue as the climate warms (Prost et al. 2013; Baltensperger and Huettmann 2015a; 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 (-10 to 10) -6

Unknown, but suspected large. May be abundant in some years and scarce in others.

Range Size (-10 to 10) -10

Occurs throughout western and northern Alaska from the Alaska Peninsula north to Utqiaġvik and east to the Yukon (Macdonald and Cook 2009). Largely absent from interior Alaska south of the Brooks Range (Macdonald and Cook 2009). Island subspecies are now considered as separate species (D. nelsoni on St. Lawrence Island, D. unalascensis in the western Aleutian Islands). Estimated range size is >400,000 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

Can reproduce within a few months of birth (8-12 weeks; Negus and Berger 1998).

Number of Young (-5 to 5) -3

Litter size can range from 1 to 11, and females can have 2-3 litters per year (Krebs 1964; Brooks and Banks 1973). Average litter sizes in the eastern Canadian Arctic was 5.5 and 5.7 (Fuller et al. 1975; Negus and Berger 1998).

Ecological Specialization

Dietary (-5 to 5) 1

Consumes mosses, herbaceous plants, and woody plants, but there is evidence of dietary specialization (Batzli and Jung 1980; Batzli and Pitelka 1983; Bergman and Krebs 1993; Baltensperger et al. 2015; Soininen et al. 2015). Salix and Dryas species in particular have repeatedly been noted as important food items, often comprising >70% of their diet (Batzli and Jung 1980; Rodgers and Lewis 1986a; Bergman and Krebs 1993; Soininen et al. 2015).

Habitat (-5 to 5) 1

At a broad scale, restricted to high-latitude, arctic regions. At smaller scales, D. groenlandicus is traditionally considered to prefer dry, upland sites such as heath-shrub, tussock tundra, and rocky or sandy ridges (Krebs 1964; Batzli and Jung 1980; Batzli et al. 1983; Rodgers and Lewis 1985; Negus and Berger 1998). However, observed habitat preferences may vary depending on sex, population density, and competition with brown lemmings (Rodgers and Lewis 1985; Morris et al. 2000). Northern collared lemmings have been observed in a variety of habitat types including wet, lowland sites (e.g. sedge hummocks) and moist transitional zones (Rodgers and Lewis 1986; Krebs et al. 1995). Although not well-studied, snow depth may be an important factor determining winter habitat use (Duchesne et al. 2011; Reid et al. 2012).

Biological Total: -32

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

Lemmings are considered unclassified game in Alaska with no closed season or bag limits (ADFG 2018c).

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

Some knowledge of distribution in Alaska, but poorly documented in some regions e.g. southwestern Alaska (Peirce and Peirce 2005). Habitat relationships have been studied in the northern part of its range near Utqiaġvik and Atqasuk (Batzli and Jung 1980; Batzli et al. 1983). Recent modelling efforts predicted collared lemming distribution with moderate accuracy and provided insights into important geographic-scale environmental variables (Baltensperger and Huettmann 2015a; Hope et al. 2015).

Knowledge of Population Trends (-10 to 10) 10

Not currently monitored.

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

The factors limiting populations have been well-studied at the species level, though relatively few studies have been conducted in Alaska. Many populations fluctuate in abundance over several years, but fluctuations may be random rather than cyclical (Pitelka and Batzli 1993; Wilson et al. 1999; Predavec et al. 2001). Predation appears to be the strongest factor regulating both cyclic and non-cyclic populations (Krebs et al. 1995; Reid et al. 1995; Wilson et al. 1999; Gilg 2002; Krebs 2011) and has been identified as the highest cause of mortality across all life stages (Krebs 1964; Krebs et al. 1995; Reid et al. 1995). Other limiting factors that have received less support include food and habitat availability (Krebs et al. 1995; Oksanen et al. 2008). Intraspecific interactions (e.g. infanticide) may be important but have not been well-studied (Krebs 2011).

A summary of major research gaps has been identified by Krebs (2011). Most notably, the winter ecology of collared lemmings remains poorly understood (Korpimäki et al. 2004; Krebs et al. 2011). Winter conditions may play a strong role in affecting survival of adults and juveniles (Reid and Krebs 1996; Reid et al. 2012). Deep

snow provides thermoregulatory benefits and refuge from predators (Reid et al. 2012), and influences food availability (Krebs et al. 2011). Studies suggest that both cyclical and non-cyclical populations persist because winter breeding beneath the snow drives population recoveries (e.g. Stenseth and Ims 1993; Krebs et al. 1995; Reid and Krebs 1996; Millar 2001; Gruyer et al. 2010; Krebs et al. 2011).

Climate change carries implications for population persistence via changes in distribution, precipitation patterns, or increased interspecific competition as species' ranges shift (Kausrud et al. 2008; Oksanen et al. 2008; Krebs et al. 2011; Baltensperger and Huettmann 2015a). Several models predict a loss of suitable habitat in Alaska ranging from 6 to 37% by the end of this century (Baltensperger and Huettmann 2015a; Hope et al. 2015; Marcot et al. 2015), though high elevations in southern Alaska may provide new refuges (Baltensperger and Huettmann 2015a). Studies in Greenland suggest that climate change may have profound impacts on the stability of collared lemmings' population cycles by increasing the length of time between population cycles, decreasing maximum densities, and causing more chaotic population fluctuations (Schmidt et al. 2008; Gilg et al. 2009).

Action Total: 24

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