

Alaska marmot*Marmota broweri*

Class: Mammalia

Order: Rodentia

Review Status: Peer-reviewed**Version Date:** 14 November 2018**Conservation Status***NatureServe:**Agency:*

G Rank: G4

ADF&G: Species of Greatest Conservation Need

IUCN: Least Concern

Audubon AK:

S Rank: S3S4

USFWS:

BLM:

Final RankConservation category: **IV. Orange**

unknown status and high biological vulnerability and action need

<u>Category</u>	<u>Range</u>	<u>Score</u>
Status	-20 to 20	0
Biological	-50 to 50	-6
Action	-40 to 40	12

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. May be declining in the Lake Peters area (Gunderson et al. 2009), but additional data are needed to assess statewide trend.

Distribution Trend in Alaska (-10 to 10)

0

Unknown.

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 small. Patchily distributed across their range (Gunderson et al. 2009).

Range Size in Alaska (-10 to 10)

-8

Found in northern and central Alaska, from Cape Lisburne east to Lake Peters, and south to the Ray Mountains (Gunderson et al. 2009; MacDonald and Cook 2009). Estimated range size is between 100,001 and 400,000 sq. km.

Population Concentration in Alaska (-10 to 10)

2

Alaska marmots live in small colonies (Lee et al. 2016) and are known from <20 localities (UAM Mammal Collection, 2018).

*Reproductive Potential in Alaska*Age of First Reproduction (-5 to 5)

-3

Little is known about the reproductive ecology of the Alaska marmot. Likely similar to that of the closely related hoary marmot i.e. attains sexual maturity at 3 years old (Blumstein and Armitage 1999; Kyle et al. 2006; Braun et al. 2011).

Number of Young (-5 to 5)

1

Little is known about the reproductive ecology of the Alaska marmot. Litter size is likely similar to that of the closely related hoary marmot i.e. ranges from 2 to 5 (Braun et al. 2011). Recent studies on the hoary marmot have refuted the traditional assumption that female marmots only breed every second year (Blumstein and Armitage 1999; Kyle et al. 2006; Patil et al. 2015).

*Ecological Specialization in Alaska*Dietary (-5 to 5)

-5

Little is known about the diet of the Alaska marmot. Like other marmots, it likely consumes a variety of tundra vegetation including sedges, grasses, and flowering plants such as legumes (Hansen 1975; Holmes 1984).

Habitat (-5 to 5)

1

Restricted to high-elevation habitats between ~990 and 1220 metres above sea level, where it is patchily distributed in rocky areas such as outcrops, slopes, and talus, and in adjacent alpine meadows (Cook and MacDonald 2006; Gunderson et al. 2009). These habitats are threatened by climate change and shrub expansion (Sturm et al. 2001), but at present these habitats are fairly common within the species' range. The southern extent of its distribution is likely limited by the ecologically similar hoary marmot (Gunderson et al. 2009).

 Biological Total: -6

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

Marmots are classified as furbearers and can be trapped with no closed season or bag limit (ADFG 2018d). However, the meat or hide must be salvaged for human use (ADFG 2018d).

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

2

Distribution is somewhat known, but additional surveys are needed to determine whether this species occurs east into Canada (Gunderson et al. 2009). Recently, the discovery of populations in the Ray Mountains, just north of the Yukon River, extended the known southern extent of this species' range (Gunderson et al. 2009). Habitat associations have been described (Cook and MacDonald 2006; Gunderson et al. 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

Little information available, and most of what we know comes from studies on other alpine or northern marmot species (but see Lee et al. 2016). Overwinter mortality may be a particularly important component of annual survival, especially in juveniles (Patil et al. 2013; Patil et al. 2015; Lee et al. 2016). Winter severity (Patil et al. 2013; Patil et al. 2015), group size (Lee et al. 2016), and body mass (Patil et al. 2013; Zervanos et al. 2014) may all play a role in determining overwinter

survival. The role of social interactions in dispersal and reproductive success has been investigated in other marmot species (e.g. Wasser and Barash 1983; Allainé 2000; Armitage 2014), but to our knowledge no studies have been conducted on the Alaska marmot.

Climate change and associated shrub encroachment is thought to be reducing the amount of suitable habitat, with implications for both distribution and population size (Gunderson et al. 2009; Hope et al. 2015; Lanier et al. 2015a). Low dispersal ability, habitat specialization, and low genetic diversity may further limit their ability to adapt to climate change (Gunderson et al. 2012; Lanier et al. 2015a).

Action Total: 12

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:	Endemic
Peripheral:	No

References

- Alaska Department of Fish and Game (ADFG). 2020b. 2020-2021 Alaska trapping regulations. Alaska Department of Fish and Game. Juneau, AK, USA.
- Allainé, D. 2000. Sociality, mating system and reproductive skew in marmots: evidence and hypotheses. *Behavioural Processes* 51(1–3):21–34. DOI: 10.1016/S0376-6357(00)00116-9
- Armitage, K. B. 2014. *Marmot biology: sociality, individual fitness, and population dynamics*. Cambridge University Press, Cambridge, UK.
- Blumstein, D. T., and K. B. Armitage. 1999. Cooperative breeding in marmots. *Oikos* 84(3):369-382. DOI: 10.2307/3546418.
- Braun, J. K., T. S. Eaton, Jr., and M. A. Mares. 2011. *Marmota caligata* (Rodentia: Sciuridae). *Mammalian Species* 43(884):155-171.
- Cook, J. A., and S. O. MacDonald. 2006. Mammal inventory of Alaska's National Parks and Preserves, Arctic Network [...]. Report NPS/AKRARC/NRTR-2004/01. National Park Service, Alaska Region, Anchorage, AK, USA.
- Gunderson, A. M., B. K. Jacobsen, and L. E. Olson. 2009. Revised distribution of the Alaska marmot, *Marmota broweri*, and confirmation of parapatry with hoary marmots. *Journal of Mammalogy* 90(4):859-869. DOI: 10.1644/08-MAMM-A-253.1
- Gunderson, A. M., H. C. Lanier, and L. E. Olson. 2012. Limited phylogeographic structure and genetic variation in Alaska's arctic and alpine endemic, the Alaska marmot. *Journal of Mammalogy* 93(1):66-75. DOI: 10.1644/10-MAMM-A-380.1
- Hansen, R. M. 1975. Foods of the hoary marmot on Kenai Peninsula, Alaska. *American Midland Naturalist* 94(2):348-353. DOI: 10.2307/2424430
- Holmes, W. G. 1984. Predation risk and foraging behavior of the hoary marmot in Alaska. *Behavioral Ecology and Sociobiology* 15(4):293-301. DOI: 10.1007/BF00292992
- Hope, A. G., E. Waltari, J. L. Malaney, D. C. Payer, J. A. Cook, and S. L. Talbot. 2015. Arctic biodiversity: increasing richness accompanies shrinking refugia for a cold-associated tundra fauna. *Ecosphere* 6(9):159. DOI: 10.1890/ES15-00104.1
- Kyle, C. J., T. J. Karels, C. S. Davis, S. Mebs, B. Clark, C. Strobeck, and D. S. Hik. 2007. Social structure and facultative mating systems of hoary marmots (*Marmota caligata*). *Molecular Ecology* 16(6):1245-1255. DOI: 10.1111/j.1365-294X.2006.03211.x

Lanier, H. C., A. M. Gunderson, M. Weksler, V. B. Fedorov, and L. E. Olson. 2015a. Comparative phylogeography highlights the double-edged sword of climate change faced by arctic- and alpine-adapted mammals. *PLoS ONE* 10(3):e0118396. DOI: 10.1371/journal.pone.0118396

Lee, T. N., F. Kohl, C. L. Buck, and B. M. Barnes. 2016. Hibernation strategies and patterns in sympatric arctic species, the Alaska marmot and the Arctic ground squirrel. *Journal of Mammalogy* 97(1):135-144. DOI:10.1093/jmammal/gyv163

MacDonald, S. O., and J. A. Cook. 2009. *Recent mammals of Alaska*. University of Alaska Press, Fairbanks, AK, USA.

Parr, B. L. 2017. 2016 Alaska Trapper Report: 1 July 2016–30 June 2017. Wildlife Management Report ADF&G/DWC/WMR–2017-3. Division of Wildlife Conservation, Alaska Department of Fish and Game, Juneau, AK, USA.

Patil, V. P., S. F. Morrison, T. J. Karels, and D. S. Hik. 2013. Winter weather versus group thermoregulation: what determines survival in hibernating mammals? *Oecologia* 173(1):139-149.

Patil, V. P., T. J. Karels, and D. S. Hik. 2015. Ecological, evolutionary and social constraints on reproductive effort: are hoary marmots really biennial breeders? *PLoS ONE* 10(3): e0119081. DOI: 10.1371/journal.pone.0119081

Sturm, M., C. Racine, and K. Tape. 2001. Increasing shrub abundance in the Arctic. *Nature* 411(6837):546–547. DOI: 10.1038/35079180

Wasser, S. K., and D. P. Barash. 1983. Reproductive suppression among female mammals: implications for biomedicine and sexual selection theory. *Quarterly Review of Biology* 58(4):513–538. DOI: 10.1086/413545

Zervanos, S. M., C. R. Maher, and G. L. Florant. 2014. Effect of body mass on hibernation strategies of woodchucks (*Marmota monax*). *Integrative and Comparative Biology* 54(3):443–451. DOI: 10.1093/icb/ict100

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