

ALASKA MARMOT

Marmota broweri Hall and Gilmore, 1934
(Sciuridae)

Global rank G4 (7Apr1997)

State rank S4 (7Apr1997, reviewed 3Mar2006)

State rank reasons

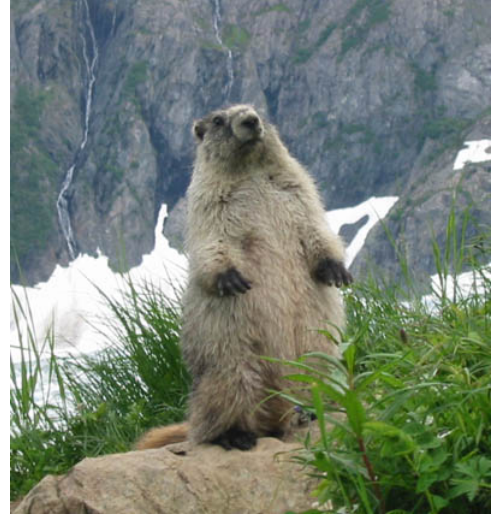
Alaskan endemic; species is unique genetically, morphologically, and evolutionarily compared to other marmots worldwide. Wide ranging but patchily distributed across the Brooks Range and southward into the Ray Mountains and Kokrines Hills. Overall abundance and trends unknown. Potential concerns over the retreat of alpine habitats and the northerly expansion of treeline as a result of climate change.

Taxonomy

Marmota broweri was regarded as a synonym of *M. caligata*, the hoary marmot of western North America, by Hall and Gilmore (1934), but Rausch and Rausch (1965), followed by Hoffmann et al. (1979), provided evidence that *broweri* is a distinct species. Since then, most authors (e.g., Hoffmann and Nadler 1968) believed this Alaska endemic to be most closely related to the black-capped marmot, *M. camtschatica*, of northeastern Asia, representing a late Pleistocene migrant to Alaska and subsequent speciation. However, this view has been recently challenged by a molecular study comparing cytochrome *b* sequences (Steppan et al. 1999) that found no close sister species relationship to either *M. camtschatica* or *M. caligata*, and suggests that the ancestry of the Alaska marmot dates back earlier in the Pleistocene, a view also put forward by Rausch and Rausch (1971). These and other studies (e.g., Cardini 2003, Polly 2003, Cardini et al. 2005) have so far failed in their attempts to reject hypotheses of either a Nearctic or Palearctic origin for this enigmatic marmot.

General description

The Alaska marmot has a heavy body with short neck and bushy tail, powerful legs and feet, and claws well-suited to digging. Adult pelage is solid black on the dorsal surface of the head and nose, dark brown elsewhere on the body. Incisors are sharp and chisel-like and grow indefinitely throughout life; thumbs of the front limbs have a flat nail, whereas other digits have claws. Distinguished from hoary marmot by its darker face and rump and much softer fur; it also lacks the light patch on the snout (Alaska Geographic Society 1996). In addition, dorsal guard hairs have a tri-colored banding pattern, feet are lighter



in color, and ventral color appears dark gray (Hoffmann et al. 1979). The Alaska marmot produces a slurred, low-pitched warning call rather than the loud whistle of both the hoary marmot and woodchuck (*M. monax*) (Curby 1989).

Body size fluctuates during the year because of hibernation. A marmot leaves its winter sleep very thin but quickly gains weight, with fat stored for hibernation making up 20% of its body weight at the end of summer. This species displays slight sexual dimorphism: average adult male total length is 605 (582-605) mm and weight is 3.63 (3-4) kg, while average adult female total length is 579 (539-599) mm and weight is 3.18 (2.5-3.5) kg (Hoffmann 1999).

Length (mm) 605 (male average), 579 (female average)

Weight (kg) 3.63 (male average), 3.18 (female average)

Reproduction

Individuals reach sexual maturity at 3 years. Males mate with one or more females living in their territory, once per year, usually in early spring while still in the den. Litter size is 3-8; offspring born in late spring to early summer; female gives birth after a gestation period of roughly 5 weeks in an underground, excavated den. Pups are born naked, toothless, and helpless with their eyes closed. Around six weeks of age, the young have dense, soft fur, and are independent enough to explore outside the den. Offspring live and hibernate with parents for two years (MacDonald 1999).

Ecology

Common predators include wolverines, wolves, bears and raptors. Grizzly bears are able to dig marmots out of their dens, hence, construction of dens in boulder fields is important protection. Eagles are principal predators of juveniles (Hoffmann 1999). *M. broweri* have long been hunted by native Alaskans for pelts and sometimes meat (Curby 1989). Life span unknown, but believed to be similar to that of *M. marmota* of Europe, 13-15 years (Nowak 1983). Alaska marmots are social creatures and can live in colonies of up to 50 animals, all sharing an immense burrow system.

Food

Eats grasses, flowering plants, berries, roots, mosses, and lichen (Alaska Geographic Society 1996).

Phenology

Diurnal, hibernates/aestivates in winter. Hibernation in dens begins with first snowfalls in August/September and ends in May/June with the emergence of food plants. Average body temperature of a hibernating marmot is 4.5-7.5°C; hibernation is not continuous and marmots awaken periodically (every 3 or 4 weeks) to urinate and defecate (MacDonald 1999).

Habitat

Dens located in extensive boulder fields, rock outcroppings, or active talus slopes with large rocks adjacent to productive tundra (Bee and Hall 1956, Manville and Young 1965, Cook and MacDonald 2003). Rocks must be large enough and accumulated to a depth sufficient to give subsurface protection. Shallow accumulations of boulders or slides of any depth that have been completely sealed in with vegetation are uncommonly used, nevertheless, stabilized rock fields and lateral moraines in mountain slopes in the later seral stages of succession are inhabited. Dens are often located near an observation post, such as a tall rock or cliff edge, within 10 m of the entrance (Bee and Hall 1956). Dens are created by burrowing into permafrost soil under rocks (Hoffmann 1999). Summer dens have several entrances and are lined with grass. Winter dens have a single entrance on a windswept ridge that becomes snow-free in early spring; Alaska marmots plug the entrance with dirt, vegetation, and feces once all members of the colony are inside the den (usually by September) and hibernate through the winter. No animals leave the den until the following May. Winter dens are

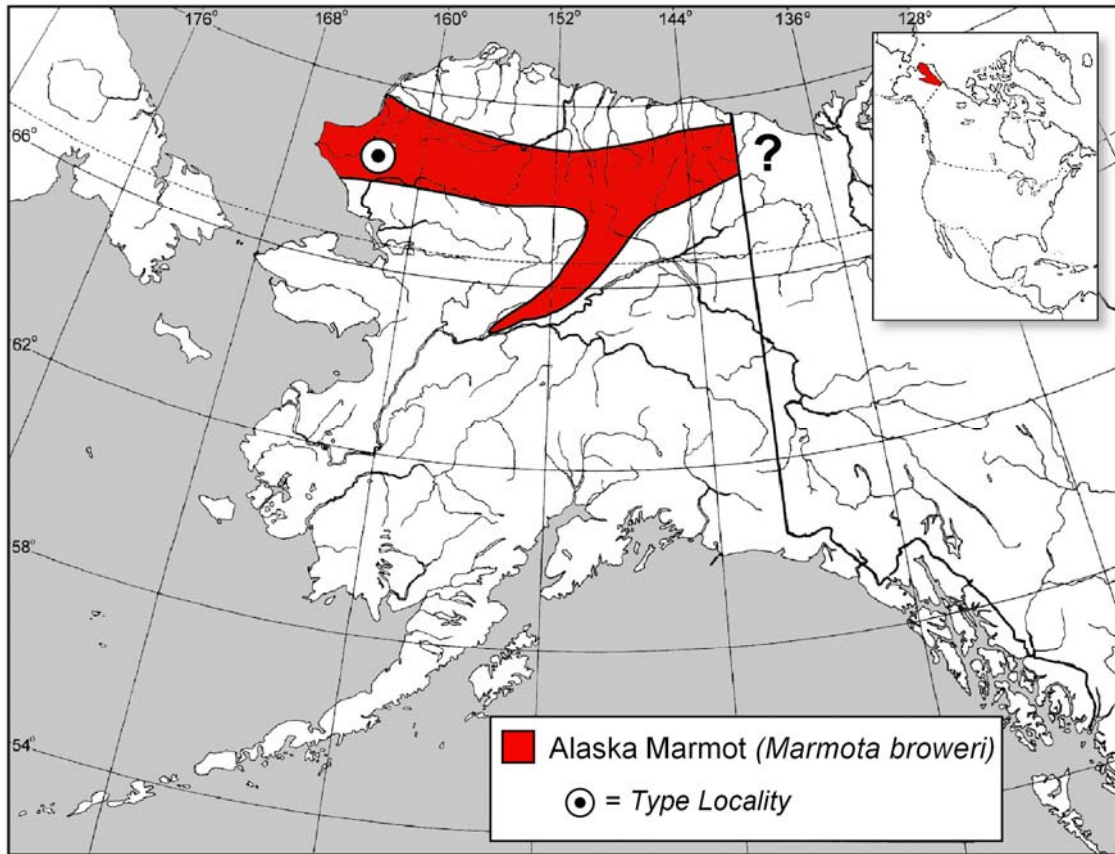
relatively permanent for each colony, and some have been used regularly for at least 20 years (Rausch and Rausch 1971, Alaska Geographic Society 1996).

State range

Brooks Range of northern Alaska from near the coast of Chukchi Sea to at least the Alaska-Yukon border (Hoffmann et al. 1993). Records from Cape Thompson, Cape Lisburne, near headwaters of the Kukpowruk River (type locality; Rausch 1953), headwaters of the Utukok River, 50 mi. inland from Wainwright, headwaters of the Colville River, the Kurupa River, the Endicott Mountains, head of Killik, Fortress Mountain, Nunushuk River, Chandalar Lake, Anaktuvuk Pass, 30 to 35 mi. north of Tulugak Lake, the south end of Lake Peters, the mouth of Chamberlin Canyon, Mount Mary, Whistler Creek, the south end of Lake Schrader, the Hulahula River in the foothills south of Barter Island, and near Arctic Village (Bee and Hall 1956, Cook and MacDonald 2003, Slater Museum of Natural History). There are also reports of marmot sign in the northern Baird Mountains near the Nakolik River and Copter Peak in the DeLong Mountains and a sighting in the Mulik Hills on the lower Noatak (MacDonald and Cook 2002) (Figure 1).

This species' range has recently been extended south of the Brooks Range with specimens (held at the University of Alaska Museum of the North) from Spooky Valley in the Ray Mountains northwest of Rampart and in the Kokrines Hills near Horner Hot Springs on the north side of the Yukon River northeast of Ruby.

Figure 1. Distribution of the Alaska marmot, *Marmota broweri*.



Map courtesy of S.O. MacDonald and J.A. Cook, 2006.

State abundance

Patchily distributed and widely scattered as individuals or in loose colonies throughout the Brooks Range but population densities believed to be low and stable within range (Hoffmann 1999). This species' status and abundance south of the Brooks Range in the isolated Ray Mountains and Kokrines Hills is unknown.

State trend

Unknown, although suspected stable (Hoffman 1999).

State protection

Habitat protected where species occurs within the Arctic National Wildlife Refuge (Bee and Hall 1956) and Gates of the Arctic National Park (Cook and MacDonald 2003); thought to occur within Cape Krusenstern National Park (Cook and MacDonald 2004) and Noatak National Park and Preserve (MacDonald and Cook 2002), but presence there has not yet been documented. The apparently isolated populations in the Ray

Mountains and Kokrines Hills are outside the boundaries of any national park or refuge.

State threats

Potential concerns for Alaska marmot populations include vulnerability to natural and anthropogenic perturbation as a result of low population densities and patchy distribution. Although the overall effects are unknown, this species' alpine tundra habitat may be retreating as a result of global climate change.

State research needs

Genetic studies are needed to understand the effects of patchy habitat distribution on marmot population subdivision and genetic isolation. Studies are needed to evaluate the effects of climate change on alpine tundra habitats used by marmots.

State inventory needs

Status and distribution of the Alaska marmot is poorly understood and needs study (Cook and

MacDonald 2003). Baseline data on species' distribution needed. Conduct aerial and ground surveys to identify populations throughout known and suspected range.

State conservation and management needs

Establish a long-term monitoring program to identify marmot population shifts (i.e. in response to climatic warming).

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Acknowledgements

State Conservation Status, Element Ecology & Life History

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Life history and Global level information were obtained from the on-line database, NatureServe Explorer (www.natureserve.org/explorer). In many cases, life history and Global information were updated for this species account by Alaska Natural Heritage Program zoologist, Tracey Gotthardt. All Global level modifications will be sent to NatureServe to update the on-line version.

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