



Vancouver Island Marmot

*Restricted to the
mountains of
Vancouver Island, this
endangered species
is one of the
rarest animals
in North America.*



Ministry of Environment, Lands and Parks





Why are Vancouver Island Marmots at risk?

The Vancouver Island Marmot exists nowhere in the world except Vancouver Island. Low numbers and extremely localized distribution put them at risk. Human activities, bad weather, predators, disease or sheer bad luck could drive this unique animal to extinction in the blink of an eye.

For thousands of years, Vancouver Island Marmots have been restricted to small patches of suitable subalpine meadow habitat that are distributed like islands in an otherwise inhospitable “sea” of forest and rocky mountain-tops. Because these habitat patches are small, marmot colonies are also small. Most colonies contain fewer than five adults. Some marmots are killed by predators such as Cougars, Wolves and Golden Eagles. Others die during winter hibernation, possibly because they have been unable to build up sufficient reserves of body fat to sustain them during their long winter sleep. Disease, parasites and poor nutrition can also weaken or kill individuals and family groups.

In response to these harsh natural limitations, Vancouver Island Marmots have evolved an interesting strategy. Some sub-adult marmots leave their home colonies, usually at two or three years of age, and go in search of a new place to live. These dispersing individuals are important because they allow “rescue” of colonies that are in decline, and recolonization of sites where marmots have disappeared. Because dispersal is so critical, changes in the ability of marmots to

move between colonies can have a profound impact on the entire population.

Vancouver Island Marmots have disappeared from about two-thirds of their historical natural range within the past several decades and their numbers have declined by about 70 percent in the last 10 years. The 1998 population consisted of fewer than 100 individuals, making this one of the rarest mammals in North America. Most of the current population is concentrated on fewer than a dozen mountains in a small area of about 150 square kilometres on southern Vancouver Island.

Causes of marmot disappearances from northern Vancouver Island remain mysterious. Disease outbreaks, climate change and chance may have been contributing factors. Habitat destruction does not appear to have been a factor. Few sites have been subject to influences such as ski-hill development, and many of the historically occupied colonies are located within Strathcona Provincial Park, which is fully protected. Direct disturbance by humans also appears to be irrelevant since these remote areas are inaccessible to off-road vehicles and, therefore, few people visit them.

On southern Vancouver Island, on the other hand, humans have greatly modified the landscape in which marmots live, mostly through forestry and road construction. Marmots can live and reproduce in high-elevation clearcuts, which resemble natural marmot habitat in many respects. In fact, populations expanded during the early 1980s and marmots still inhabit some logged areas. The most significant impact of logging may have been to alter dispersal patterns and, consequently, population structure. Forestry does not disrupt the marmot's natural subalpine meadow habitat, but may concentrate all the members of this species in a small area. This makes them more vulnerable to predators, disease or the effects of local weather. This “eggs in

one basket” situation puts the Vancouver Island Marmot at considerable risk of extinction.

What is their status?

Surveys of known and potential colony sites from 1982 through 1986 resulted in counts of up to 235 marmots. Counts repeated from 1994 through 1998 turned up only 71 to 103 animals in exactly the same areas. At least 12 colony extinctions have occurred since the 1980s. Only two new colonies were identified during the 1990s.

Estimating marmot numbers is an imprecise science since counts undoubtedly underestimate true abundance. Differences in weather, observer experience and count effort make direct year-to-year comparisons difficult. Taking these factors into consideration, researchers believe there were at least 300 to 350 marmots alive during the mid-1980s. Approximately 40 percent lived in clearcuts in a small area (40 square km) near the headwaters of the Nanaimo River. This estimate does not include marmots that probably lived in Strathcona Provincial Park at that time, as suggested by the presence of abandoned burrows in several locations.

In contrast, the 1998 population contained fewer than 100 animals, with 90 percent found in the Nanaimo Lakes area and 10 percent on Mount Washington. A few colonies probably remain undiscovered but it is unlikely that large new populations will be found. Approximately half of the world's Vancouver Island Marmots live in clearcuts that will eventually become unsuitable as forest regeneration occurs.

The vast majority of Vancouver Island Marmots live on private land owned by forest companies. Two areas occupied by marmots are legally protected and these contain about five percent of the current population.

Growing concern over the status of Vancouver Island Marmots led to their being legally designated as Endangered under the British Columbia *Wildlife Act*. They are on the provincial Red List, and are also listed as Endangered by the Committee on the Status of Endangered

Only by greatly increasing population size and distribution can the future of this engaging rodent be secured.



Wildlife in Canada (COSEWIC), and by the International Union for the Conservation of Nature (IUCN).

What do they look like?

Marmots are the largest members of the squirrel family and are about the size of a large house cat or small dog. An adult Vancouver Island Marmot (*Marmota vancouverensis*) typically measures 65 to 70 centimetres from its nose to the tip of its bushy tail. Weights show tremendous seasonal variation. An adult female that weighs 3 kilograms when she emerges from hibernation in late April can weigh 4.5 to 5.5 kg by the onset of hibernation in mid September. Adult males can be even larger, reaching weights of up to 7 kg. In general, marmots lose about one-third of their body mass during winter hibernation.

The most striking feature of the Vancouver Island Marmot is its rich chocolate-brown coat with contrasting patches of

white fur on the nose, chin, forehead and chest. Newborn pups have uniformly dark, almost black, coats. As summer progresses, their fur fades to a more rusty colour. Unlike most mammals, Vancouver Island Marmots do not complete their molt every year. For this reason, yearlings are typically a uniform faded rufous colour. Older animals can take on a decidedly mottled appearance, with patches of old, faded fur contrasting with new, dark fur. This is a useful characteristic for researchers because pups, yearlings and adults can be readily distinguished in the field. Seen up close, Vancouver Island Marmots have large, beaver-like incisors, sharp claws and very powerful shoulder and leg muscles.

Typical Vancouver Island Marmot behaviour involves spending much of the day sprawling or sitting on boulders, logs or stumps. Relatively little time is spent feeding. Marmots are more likely to be seen in early morning or late afternoon than during

the middle of the day. When moving about, they bound like squirrels rather than walking like cats. They are good climbers and are often seen ascending or perched atop precipitous cliffs. When alarmed, they give a piercingly loud whistle that sounds very much like a police whistle.

Marmot droppings are about 4 to 6 cm long, 1 to 1.5 cm wide and pinched at both ends. Their colour ranges from brilliant green when fresh to “baked-potato-chip-brown” when aged. Marmots seem to use particular spots as “latrines” and it is more common to find several scats than just one.

Burrow entrances are typically 30 to 45 cm in diameter and generally located on the downhill side of boulders or, in clearcut habitats, below stumps. Burrows used as hibernation or birth sites will almost always have some dirt mounded on the low side of the burrow entrance. Lounging spots are identifiable by mud stains on rocks or stumps. Finding these

is how most Vancouver Island Marmot colonies are detected.

Why are they unique?

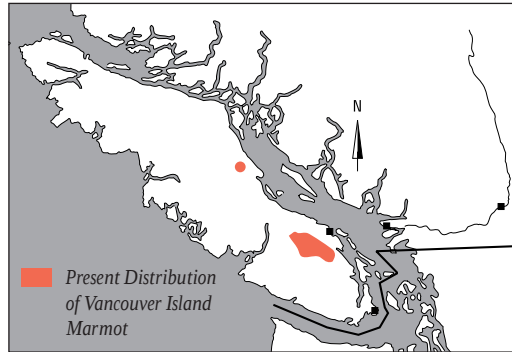
The Vancouver Island Marmot is one of five species of mammals entirely confined to Canada, and the only one of these that is endangered. It is one of 14 marmot species found around the world, 6 of them in North America. Its closest relatives are the Olympic Marmot of the Olympic Peninsula in Washington State and the Hoary Marmot, which is widespread throughout the mountains of western North America. The Vancouver Island Marmot's mainland cousins are generally grizzled grey or tawny brown. The Vancouver Island species can also be distinguished from other marmots by skull structure, vocalizations and behaviour.

The Vancouver Island Marmot's unique ecological and behavioural attributes are partly a result of evolving in small patches of suitable habitat. Most colonies contain only a single family group, consisting of one adult male, one or two adult females and a variable number of two-year-olds, yearlings and young of the year. A few habitat patches are large enough to contain several family groups. Vancouver Island Marmots are gregarious and social interactions between individuals are frequent. Nose-touching ("greeting") and boxing ("play fighting") are common and entertaining to watch. Adult males are the dominant animals in a colony, followed by reproductive females and then younger animals.

Adult marmots mark their territories by rubbing the scent glands located on their cheeks against rocks and stumps. This species appears to be more socially tolerant than other marmots, and aggressive territorial behaviour is rarely seen. This is probably a result of evolutionary influences that

made it advantageous to behave nicely to immigrating strangers.

Marmots living in colonies seldom travel far, but dispersing sub-adults can



move considerable distances (5 to 30 km). Marmots have turned up in some strange places over the years, including a woodshed in Youbou, a horse stable in Nanaimo, a new subdivision at Bell's Bay on the west coast of Vancouver Island and a boat dock at Lake Cowichan.

To avoid the long subalpine winter when food is not available, Vancouver Island Marmots hibernate for six months or more, usually from late September until late April or early May. Family groups hibernate together in a deep burrow called a *hibernaculum*, which is re-used in successive years. These burrows can be quite elaborate. One burrow on Mount McQuillan measured five metres in length, with the sleeping quarters located one metre underground. Before winter, the entrance is plugged with rocks and soil from the inside. Marmots also construct numerous secondary burrows, which are used for sleeping and refuge from predators. Marmots are frequently seen carrying dead grass into burrows, presumably for bedding.

How do they reproduce?

The reproductive biology of the Vancouver Island Marmot is difficult to study because most activity occurs below ground, but appears to be similar to that of other alpine-dwelling marmots. Mating probably occurs during the first three weeks

after emergence from hibernation. The gestation period is probably about one month and pups are thought to be born in early June. The abundance of females and the results of



genetic studies suggest that males occasionally sire more than one litter in a given year. Most pairings, however, are monogamous.

Although female Vancouver Island Marmots are capable of reproducing at three years of age, most do not breed until they are four or five years old. The interval between litters is usually two years, with a small number of females producing young in consecutive years. Females continue to reproduce as long as they live. Some tagged marmots have lived to be as old as 10 years, and based on the longevity of other species of marmots, it is likely that the maximum age for this species is about 12 to 15 years. Marmots inhabiting clearcuts are less successful because survival rates are reduced in these habitats. Compared to her counterpart in a natural subalpine meadow, the average female living in a clearcut produces half as many offspring over her lifetime, simply because she is unlikely to survive as long. In general, males have lower survival rates than females, so the sex ratio of older animals within a colony is usually skewed towards females.

Most litters contain three or four pups, although litters of five have been confirmed. The sex ratio at birth appears to be equal. Newborn pups first emerge from their burrows in late June or early July. Most mortality of pups in their first year appears to occur during winter hibernation, with only about half the pups surviving their first year. As with adults, probability of survival is reduced if

Family groups
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the animal lives in a clearcut habitat. Most mortality apparently involves the loss of an entire litter.

What do they eat?

Vancouver Island Marmots eat a wide assortment of plants. Scat analysis has identified at least 50 species in their diet, some of which are of greater importance than others. In spring, grasses and grass-like plants, including oatgrass, sedges and woodrush, are major food items. Herbs such as spreading phlox and lupines are also important where available.

In natural subalpine meadows, Vancouver Island Marmots generally switch from grasses in early spring to forbs (broad-leaved herbs) in late summer. Lupines and peavine make up a high proportion of the summer diet and may be selected because of their high nitrogen content. Other summer favourites include paintbrush, meadowrue, cow parsnip and woolly sunflower. Marmots selectively consume particular parts of some plants, including blueberry fruits, the blossoms of tiger lily and Sitka valerian, and bracken fern fiddleheads.

The diet of Vancouver Island Marmots living in clearcuts appears to be quite different, although scat analysis has not been done. Some of the plants mentioned above are unavailable and marmots are thought to concentrate their foraging efforts on forbs such as pearly everlasting. It is possible that nutrition considerations might partially explain some of the observed differences between survival rates in natural and clearcut habitats.

Where do they live?

The Vancouver Island Marmot's current range is very restricted. Most colonies inhabit mountains south of Alberni Inlet, near the headwaters of the Nanaimo, Chemainus, Nitinat and Cowichan rivers. A small population is found on Mount Washington, near Courtenay.

Intriguing finds of marmot bones in eight locations on west-central Vancouver Island, where marmot colonies are

not known to presently occur, suggest that this species may have been more widespread and abundant in prehistoric times. At four sites, these marmot bones showed signs of tool markings, providing clear evidence that First Nations people



AN ADULT MARMOT SHOWING TYPICAL "ALERT" POSTURE.

Andrew Bryant photo

hunted marmots for food, pelts or other uses. Carbon-dating of these bones produced ages of 700 to 2700 years. Other sites produced bones without butcher marks that were carbon-dated at up to 11 000 years before present. Cumulatively, these records indicate that Vancouver Island Marmots once enjoyed a much broader distribution on Vancouver Island.

Typical Vancouver Island Marmot habitat consists of steeply sloped subalpine meadows at 800 to 1500 metres elevation with a south-to west-facing aspect. Slope aspect is important because of snowmelt patterns. Meadows that face north to east may not be free of their deep snow cover until late summer, making food resources unavailable.

Vancouver Island Marmots are restricted to a fairly narrow range of elevations

that provide the right soil types and vegetation. Deep soil development is critical because they must be able to dig burrows down below the frost line. If a site is too high, soil development is usually inadequate to construct burrows. If a site is too low, vegetation and physiological constraints take over. Marmots avoid forests and dense vegetation because their preferred food species do not grow in such habitats and because reduced visibility makes them more vulnerable to predation. Furthermore, marmot physiology dictates that they must have access to places in which they can regulate their body temperature by "lounging" on rocks or stumps. During winter it is essential that hibernacula maintain a stable temperature of about 5°C. Deep snow cover probably assists in doing this.

The best habitats, such as those at Haley Lake or Green Mountain, are created and maintained by avalanches. These sites have good soil for digging, are relatively permanent because of snow patterns. They offer a reasonable assortment of early-spring food on exposed cliffs (such as spreading phlox), and good visibility for avoiding predators.

During the 1980s, marmots colonized about a dozen clearcuts. Most sites were adjacent to existing natural colonies. In a



IDEAL HABITATS ARE LUSH MEADOWS ON STEEP SLOPES IN THE SUBALPINE.

Andrew Bryant photo

few locations, the number of marmots increased substantially, but this did not lead to an expanded geographic range, and in most cases population increases were temporary. Within about 20 years

after logging, forest regeneration generally makes clearcut habitats unsuitable for marmots.

What can we do?

Only by greatly increasing population size and distribution can the future of this engaging rodent be secured. In 1988, representatives of federal and provincial wildlife agencies, universities, forest companies and conservation organizations formed a scientific Recovery Team. The Team's objective is simple: to save the Vancouver Island Marmot from extinction. Since 1988, the team has sponsored extensive population surveys and intensive mark-recapture, radio-telemetry and genetic work. As a result, the Vancouver Island Marmot is now one of the world's most thoroughly studied marmots.

Some important habitats have been protected. These include the 127-hectare Haley Lake Ecological Reserve that was donated by MacMillan-Bloedel Ltd and TimberWest Forest Ltd., and the 300-hectare Green Mountain Critical Wildlife Management Area.

The current five-year Recovery Plan emphasizes captive-breeding combined with reintroductions to formerly occupied habitats. The target is to eventually have 600 to 800 marmots distributed in three discrete areas of Vancouver Island. The Recovery Team conducted its first experimental transplant in 1996 and began a captive-breeding program in 1997. A dedicated marmot breeding facility will be constructed on Vancouver Island by the year 2000, with reintroductions to follow when there is an adequate supply of releasable marmots.

Recently, the team established a registered charity, the Marmot Recovery Foundation, to solicit funds, assist in increasing public awareness and run the day-to-day business aspects of the recovery project. This body has established a unique funding partnership between government, industry and non-government organizations such as the World Wildlife Fund.



SCATTERED BOULDERS AND ROCK LEDGES ARE USED FOR LOAFING SITES AND LOOKOUTS.

Andrew Bryant photo



VANCOUVER ISLAND MARMOT PUPS ARE READILY DISTINGUISHED BY THEIR SMALL SIZE AND DARK FUR.

Andrew Bryant photo

Public support is essential and encouraged. More than 300 people from around the world have already participated in the team's novel "adopt-a-marmot" program.

You can help, too. Throw your support behind the marmot rescue to prevent extinction, and spread the word that the marmot is in danger. 

FOR INFORMATION VISIT THE RECOVERY TEAM'S AWARD-WINNING WEBSITE AT:

www.islandnet.com/~marmot

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