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THE VANCOUVER ISLAND MARMOT

FIVE-YEAR PLAN, 1981-1986

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INTRODUCTION

The Vancouver Island Marmot was first discovered in the summer of 1910 by Harry Schewald Swarth, a field collector working for the University of California. In 1911 Swarth described the new species naming it Marmota vancouverensis. The type locality is Mount Douglas near Port Alberni. It is believed that the ancestral Vancouver Island marmots first colonized Vancouver Island during or before the Illinoian Glaciation, about 100,000 years B.P.

In total there are about sixteen living species of marmot in the world. All are confined to the northern hemisphere. Four species, the woodchuck (Marmota monax), the yellow-bellied marmot (Marmota flaviventris), the hoary marmot (Marmota caligata) and the Vancouver Island marmot occur in British Columbia. The marmots are the largest members of the squirrel family (Sciuridae).

The Vancouver Island marmot is the only marmot species found on Vancouver Island. It differs from the other British Columbia species in new pelage by its dark chocolate brown colour. The old faded pelage is nearer cinnamon brown (Cowan and Guiguet, 1965). The sharply contrasting white muzzle (Figure 1), white forehead spot and white mid ventral markings are also distinctive.

The skull of the Vancouver Island marmot is smaller and relatively wider than that of the hoary marmot. Unlike the other British Columbia species the nasal bones are deeply emarginate posteriorly while the frontals project forward forming a "V" between the nasals (Howell, 1915). The large incisor teeth are pale yellowish white, which further separates the species.

Genetic studies indicate that the karyotype of M. vancouverensis is very similar to that of M. caligata (Rausch and Rausch, 1971) and that the two species are closely related. Other species in this association include M. olympus the Olympic marmot and M. broweri of Alaska. These species share similar ecological niches, frequent subalpine areas and have similar behaviour. Their ectoparasites also reflect this close evolutionary relationship (Heard, 1973).

OTHER STUDIES

The original description of the species was completed early in the 20th century (Swarth, 1911) followed by a report of the field work (Swarth, 1912). In 1915, Howell revised the systematics of the North American marmots and included M. vancouverensis in the M. caligata super group.

Further description of the species was conducted by Carl 1944 and Hardy 1955. Between 1955 and 1970, the B. C. Fish And Wildlife Branch checked colonies periodically, plotted locations and gathered sighting reports. In addition, the B. C. Fish And Wildlife Branch and the Nanaimo Fish And Game Protective Association began negotiations with MacMillan Bloedel and Crown Zellerbach in order to protect two colonies on the companies' private lands. This resulted in delineation of boundaries of areas protected from logging. Renewed interest allowed Heard (1973) to complete his behavioural study and Darling and Finkelstein (1973) reported on seven known marmot areas.

The Vancouver Island marmot has special significance to Canada because of its restricted range and its small numbers. It is one of only two species whose entire population is within Canada and is the only mammal endemic to British Columbia. The other species is the Ungava collared lemming (Dicrostonyx hudsonius) confined to the Ungava-Labrador Peninsula.

Carson (1978, unpub.) attempted to prepare a summary of all known information. Concomitantly, the Vancouver Island Marmot Preservation Committee (B. C. Federation of Naturalists) with support from the B. C. Fish And Wildlife Branch, the Public Conservation Trust Fund and the

Federal Youth Program, examined known marmot areas and potential marmot habitat (Routledge and Merilees, 1980). A partial bibliography was produced (Merilees and Boboslowik, 1980) as a result of this field work. A report on the 1980 field work is in progress (Routledge and Merilees, in prep.).

CURRENT STATUS AND RANGE

CURRENT STATUS

Historical and current information suggests that populations of the Vancouver Island marmot were never very large. However, observations gathered between 1970 and 1980 (Smith, pers. comm.) suggest that populations may fluctuate quite markedly.

Current field studies (Routledge and Merilees, 1980) indicate that at least 45 marmots were present in eight of the known colonies examined. Approximately marmots were observed in a single colony area (Smith, pers. comm.) with approximately of them being young of the year. Examination of 92 discrete areas, located only two areas of use in addition to the known colonies. Apparently active burrows were observed, but no animals were seen. The low frequency of occurrence (2.1%), combined with fluctuations in population numbers suggests that the total population is low in number.

During 1980 (Routledge & Merilees, in prep.) only two additional colonies were discovered while searching areas. Approximately five animals were observed in the two colonies.

To date, subalpine areas dominated by dense low growing shrubs have not been investigated adequately. In addition, large areas of central mountainous Vancouver Island have not been searched. It is apparent that colonies may still remain undetected.

CURRENT RANGE

With the exception of the colony northwest of Courtenay, the remaining 13 colonies occur within 15 kilometers of the Nanaimo River watershed. The south island colonies occur within a 660 square kilometer area (255 sq. miles or 66,000 ha).

FIVE-YEAR PLAN 1981-1986

OBJECTIVES:

Known Colonies:

1. To inventory all known Vancouver Island marmot colonies on a yearly basis. In specific areas, surveys every two years may be adequate.
2. To document population size, fluctuation and distribution, and subsequently determine reproductive rate, recruitment and age-specific mortality rates.
3. To document food habits of the Vancouver Island marmot by comparing food habits in various colonies.
4. To determine the habitat requirements of the species using known colonies and to determine the relationship between colony density and age-specific mortality and food and habitat.
5. To determine the relationship between climate and habitat availability (quantity, quality and distribution) and population dynamic characteristics.
6. To determine the soil type and structure, topography and physiography of each colony.
7. To determine the characteristics of hibernation, burrow construction and burrow site selection. To determine the onset of and emergence of individuals at each colony.

8. To determine the growth characteristics of young marmots, the weight and body characteristic changes of young and adult marmots during the summer and the overwinter weight losses of young and adult marmots.
9. To determine the behavioural attributes of the Vancouver Island marmot, i.e., pair bonding, family unit, dispersal, etc.
10. To determine the extent and type of predation on the Vancouver Island marmot.
11. To determine the impact of logging, ski developments and other forms of human disturbance on the marmot colonies.
12. To determine and utilize enhancement techniques (fertilization, planting, supplemental feeding) for the purpose of increasing marmot numbers.
13. To protect each colony from alienation (through map reserves, agreements with private landholders, return to crown agreements, timber tradeoffs, ecological reserves, purchases, etc.).

Potential Colonies:

14. To survey all potential marmot habitat on Vancouver Island.
15. To compare habitat, food species, topography and climate between known colonies and potential sites.

16. To document soil and topographic features of all potential sites.
17. To develop a suitability index for all marmot habitat sites.

Propagation:

18. To increase the number and distribution of colonies and the total number of marmots within five years.
19. To capture and transplant marmots from existing colonies to the most suitable sites.
20. To establish a captive breeding marmot facility at the Okanagan Game Farm (Penticton) in order to promote reintroduction to the most suitable sites on Vancouver Island.
21. To develop and establish quarantine procedures for marmots reintroduced to suitable sites.
22. To establish a second captive breeding marmot facility at the Morrell Wildlife Sanctuary under the auspices of Malaspina College and the B. C. Fish And Wildlife Branch.

METHODS

Inventory

Seasonal and yearly inventory can be accomplished by observation with binoculars and spotting scopes from fixed locations and blinds. The

best counts can be obtained on sunny days. Adults can be counted between June and October while young of the year may not be visible until mid to late June.

Population Dynamics

Daily counts of several colonies will reveal young to adult ratios and provide indices of reproductive success. Recruitment may be determined if two-year olds can be consistently identified. Marked animals will allow more accurate determination of reproductive success, recruitment and age-specific mortality and determination of alternate year breeding, if it exists. Marking of transplanted or reintroduced individuals will be the most feasible procedure.

Food Habits

Food habits can be determined from:

- a. stomach samples of deceased individuals;
- b. direct observation of feeding behaviour;
- c. microscopic fecal fragment analysis.

Currently, direct observation can provide a gross determination of food habits. Microscopic fecal fragment analysis can be undertaken by Washington State University (Pullman) upon completion of a species key.

Habitat Description & Requirements

Marmot subalpine and alpine habitat description will be based on:

- a. low elevation aerial photography;
- b. high elevation aerial photography;
- c. landsat imagery.

In addition, species lists will be provided and community typing can be derived by discriminant analysis (species and plant height). Frequency of occurrence of important food species will be documented. Biomass yield in the area surrounding each colony can be determined. In addition, yield by habitat type and food species should also be measured. Emergence and vegetation greenup can be obtained from plot measurements, and fixed station photography (colour or infrared).

Climate

Food and habitat availability are determined by snow depth, distribution and hardness. Snow stakes should be established on each colony and on suitable sites for reintroduction. Snow density and hardness can be measured at each site. Snow melt and buildup patterns can be measured by information gathered at snow stakes, 35 mm. photography at fixed stations (colour or infrared) or from landsat images.

Soil & Physiography

Soil typing, topography and general physiography can be described for each colony and for high suitability sites.

Hibernation

The onset of and emergence from hibernation can be obtained from direct observation and the occurrence of tracks and scats. The physiological characteristics of hibernation can be determined from individuals in captive facilities. Burrow structure should be determined (tunnel length, type, slope, etc., burrow size and shape, etc.) in order to better develop captive facilities or prepare burrows prior to reintroductions.

Growth

Body growth characteristics (body weight, chest girth, total length, etc.) should be determined for marmots from birth to maturity. Measurement can be obtained from captive individuals at monthly intervals, approximately (spring, summer and fall). Seasonal weight change can be determined from spring to fall for young and adult marmots. Similarly, overwinter weight losses should be determined for various age and sex classes.

Behaviour

Descriptions of the family unit, pair bonding sex-specific behaviour, etc., can be determined from direct observation in the field or from captive colonies. Dispersal of marked or radio collared individuals is essential information. Establishment of new burrows and colonies can also be studied in captive facilities.

Predation

There is little or no evidence of predation on the Vancouver Island marmot; however, predation may be occurring. To date, there are few techniques to measure the occurrence or rate of predation on this species. Random observation of predation may be the method available.

Impacts

Potential impact from logging, ski developments and general human activities are increasing dramatically. Three of thirteen colonies are now threatened by human disturbance. The various forms and extent of each impact must be determined immediately.

Enhancement

It may be possible to enhance marmot habitat quality (fertilization) and quantity (planting and seeding) and enhance populations with supplemental feeding. Similarly, excavation of new burrows and placement of large boulders in strategic locations may encourage colony expansion or development.

Protection

The majority of colonies occur on private forest land; therefore, protection is difficult. Private forest land is being leased to ski development agencies, thereby expanding the potential impact, access and general human disturbance.

Potential Sites

Potential subalpine and alpine marmot habitat should be surveyed and include soil type, topography, physiography, species composition, habitat type, climate, etc. Upon completion, a suitability index should be developed for use in transplants and/or reintroduction.

Propagation

The number and distribution of Vancouver Island marmots can be increased through enhancement procedures, captive colonies and reintroductions and transplants. A captive colony (40 x 90 feet), with two burrows, has

recently been established at the Okanagan Game Farm at Penticton. It presently holds one pair of marmots. Breeding and feeding methodology can be studied and developed in this facility. Adequate quarantine facilities and procedures should be developed prior to reintroduction of Vancouver Island marmots to suitable habitat. A second captive breeding colony should be developed at the Morrell Wildlife Sanctuary by 1983. This will provide a quarantine facility and a second captive breeding colony.

BUDGET

<u>OBJECTIVE</u>	<u>YEAR</u>					<u>TOTAL</u>
	1	2	3	4	5	
1	3,000	3,000	3,000	3,000	3,000	15,000
2	30,000	15,000	30,000	15,000	30,000	120,000
3	4,000	3,000	----	3,000	3,000	13,000
4	12,000	12,000	----	10,000	7,500	41,500
5	3,000	1,500	1,500	1,500	1,500	9,000
6	5,000	----	----	----	----	5,000
7	7,500	1,500	1,500	2,000	2,000	14,500
8	18,000	18,000	7,500	3,000	3,000	49,500
9	7,500	7,500	3,000	----	----	18,000
10	----	----	----	----	----	----
11	3,000	3,000	3,000	3,000	3,000	15,000
12	7,500	7,500	3,000	3,000	3,000	24,000
13	2,000	2,000	2,000	2,000	2,000	10,000
14	30,000	20,000	5,000	----	----	55,000
15	10,000	10,000	15,000	20,000	20,000	75,000
16	12,000	12,000	5,000	----	----	29,000
17	----	----	----	7,000	----	7,000
18	----	----	----	----	----	----
19	----	----	4,000	4,000	4,000	12,000
20	4,000	1,000	1,000	1,000	1,000	8,000
21	3,000	3,000	----	----	----	6,000
22	5,000	1,000	1,000	1,000	1,000	9,000
TOTAL	166,500	121,000	85,500	78,500	84,000	535,500

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