

## **Chapter 5**

### **CONSERVATION STATUS AND RECOMMENDATIONS**

**by**

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## CURRENT DESIGNATIONS

Three systems (see Alvo and Oldham 2000) have been used to designate British Columbian mammals at risk. Internationally the World Conservation Union (IUCN) ranks species and subspecies using criteria based on the probability of extinction. Threatened taxa are classified as either Critically Endangered, Endangered, or Vulnerable by the IUCN system. The Rodent Specialist Group of the Species Survival Commission of the IUCN recently assessed the status of all North American rodents in a conservation action plan (Hafner et al. 1998). Twelve species and 73 subspecies of rodents were listed in the IUCN threatened categories. Of the four chipmunk subspecies considered at risk in our study, only *T. m. selkirki* was considered of conservation concern by the IUCN (Table 5-1) with Sullivan and Nagorsen (1998) ranking it as Vulnerable D2.

The Committee on the Status of Endangered Species in Canada (COSEWIC) ranks species and nationally significant populations at a national scale. Ranks are based on status reports. Its Endangered and Threatened categories are based on criteria modified from the IUCN system and these two categories will have legislative implications if the proposed national species at risk act is passed. Special Concern is a non-quantitative rank used by COSEWIC to identify species of concern because of rarity, limited range, or specialized life history traits. To date, none of the chipmunks assessed in our study have been evaluated by COSEWIC, although *T. ruficaudus* has been recently listed as a candidate species by the Terrestrial Mammals Specialist Group.

Provincially, the BC Ministry of Environment, Lands and Parks (MELP) through its associated Conservation Data Centre (CDC) assigns S (subnational) ranks to the province's vertebrates at risk using a system developed by The Nature Conservancy (Harcombe 2000). S ranks for the four chipmunk taxa in British Columbia were summarized in Cannings et al. (1999). *T. r. ruficaudus* and *T. r. simulans* were designated as S2 (imperilled) and assigned to the province's Red List because of their small range and few occurrences. *T. m. oreocetes* and *T. m. selkirki* were designated S1S3 and assigned to the province's Blue List. Based largely on data from our study, in 2000 the CDC downlisted *T. r. simulans* to S3S4 (Blue List) and *T. m. oreocetes* to S2S3 (Blue List) (Table 5-1).

## STATUS ASSESSMENTS

Assessment data currently available for each of the chipmunk subspecies are summarized in Appendix 5-1.

### *T. m. oreocetes*

Although the validity of this subspecies is questionable, we recommend that it continue to be treated as a separate unit for conservation until more taxonomic research is done. Although there are no reliable data on population numbers or trends, this species clearly is not at risk provincially or nationally. Size of its distributional area, its presumed continuous range along the continental divide, and potential rescue effects from populations in Montana and across the continental divide between British Columbia and Alberta precludes an Endangered or Threatened designation. Most important there are no known threats other than habitat loss from open pit coal mines. Any impacts from open pit mining are probably offset by the protection of much of its range in British Columbia and Alberta in the national and provincial park systems of the southern Rocky Mountains.

Although its limited range and few occurrences contribute to its provincial designation as S2S3 (Blue List) by the CDC, it is unlikely that this taxon would qualify as a COSEWIC candidate for Special Concern. This subspecies has not been listed by the Natural Heritage Information Centres of Alberta or Montana.

*T. m. selkirki*

Genetic studies are essential to confirm the validity of this subspecies but the morphological data and its isolated range endemic to the Purcell Mountains suggest that it is distinct from populations of *T. minimus* in the Rocky Mountains. Sullivan and Nagorsen (1998) ranked this taxon as Vulnerable D2 with the IUCN criteria based on its restricted range and an area of occupancy less than 100 km<sup>2</sup>. When Sullivan and Nagorsen (1998) did their assessment, *T. m. selkirki* was known only from historical museum records collected from the type locality at the Paradise Mine. However, even with new data from our field studies this subspecies would still be ranked as Vulnerable D2 with the IUCN criteria. It is known from only two general locations in the Purcell Mountains, has an area of occupancy less than 100 km<sup>2</sup>, consists of fewer than 1,000 animals, and is isolated with no potential for rescue. These same criteria would qualify *T. m. selkirki* as a candidate for Threatened under the COSEWIC criteria. Nevertheless, no threats have been identified other than stochastic extinction events associated with small isolated populations.

*T. r. ruficaudus*

This subspecies is ranked as S2 (Red List) in British Columbia because of its limited range and few known locations. Similarly it is ranked as S2 by the Alberta Natural Heritage Information Centre and is on the province's Blue List (see Bennett 1999). *T. ruficaudus* is not being tracked by Natural Heritage Information Centres of Montana and Idaho. In BC and Alberta this species has small ranges and is limited to a narrow elevational belt. Nonetheless, much of its distributional area falls within the boundaries of Waterton Lakes National Park and Akamina-Kishinena Provincial Park and no threats are known. Moreover, because the Canadian populations are contiguous with populations in adjacent areas of Montana, there is potential for a rescue effect. Although extensive logging is occurring within its elevational range in the Flathead River valley of British Columbia, this species inhabits early and later successional stages. A potential impact from forestry is that *T. amoenus* could invade logged habitats and displace *T. ruficaudus* through interspecific competition. However, no data exists to test this hypothesis. This subspecies clearly is not a COSEWIC candidate for Endangered or Threatened but may qualify as a candidate for Special Concern.

*T. r. simulans*

This taxon is currently ranked as S3S2 (Blue List) in British Columbia largely on the basis of its small distributional area. The Washington State Natural Heritage Information Centre has ranked it as S2?. In contrast to *T. r. ruficaudus*, *T. r. simulans* occupies a wide elevational range and a variety of habitats including the floodplain of the Creston Valley, mid elevation forests (mature and logged), and subalpine habitat in Stagleap Provincial Park. Contiguous with populations in Washington and Idaho, there is

considerable potential for rescue effect. No threats are known. Despite its provincial listing, we suggest that this taxon does not qualify as a COSEWIC candidate for Special Concern.

## RECOMMENDATIONS FOR RESEARCH

Throughout this report we have repeatedly noted three areas for more research: taxonomy, inventory to determine distributional ranges, and detailed habitat studies. The taxonomy of *T. ruficaudus* is largely resolved (see Chapter 3). Our study demonstrates that *T. r. ruficaudus* and *T. r. simulans* are two well-defined subspecies in British Columbia that differ in morphology and ecology. They warrant separate listings and conservation strategies. Molecular studies now being done by Jeff Good at the University of Idaho should resolve the question of the species status of these two forms. Major taxonomic questions, however, remain with *T. minimus*. If *T. m. oreocetes* is not a valid subspecies, it will be synonymized with *T. m. borealis* and will simply disappear from the provincial tracking lists as *T. m. borealis* is widespread and abundant across northern Canada. One of us (DWN) is searching for *T. m. oreocetes* specimens that may be held in US museums to increase the sample sizes and geographic coverage of the morphological analysis. Tissues from voucher specimens of *T. minimus* collected in the Purcell Mountains and Rocky Mountains in 1997 and 1998 potentially could be used in a molecular study with mitochondrial DNA. We are attempting to find a researcher to analyze this material.

Inventory data for the four chipmunk subspecies in British Columbia are inadequate to confidently define their distributional ranges. However, before any inventory is done, the investigator must carefully consider identification and the necessity to take voucher specimens (see Appendix 2-3). The three chipmunk species in the Kootenay region can be positively identified from genital bones prepared from voucher specimens. However, until a technique is developed to age live animals, the keys based on pelage and body size given in Appendix 2-3 cannot be used reliably on live animals. Molecular markers from mitochondrial DNA or microsatellite DNA with non-destructive sampling of tissues such as hair has great potential as a tool for chipmunk field identification. However, given the introgression of *T. ruficaudus* mtDNA into some *T. amoenus* (unpublished data from Jeff Good and John Demboski) in British Columbia, more genetic work has to be done before this method can be applied. Identification problems associated with historical museum specimens, particularly from the Columbia Mountains also limit the use of museum specimen records for mapping distributions (see Chapter 2).

Highest priority is for detailed inventories of *T. m. selkirki*. In addition to surveys in the Purcell Mountains, alpine areas in the Selkirk Mountains should be surveyed for possible *T. minimus*. Although Cowan and Munro (1945) reported that *T. amoenus* was the only chipmunk species present in Revelstoke National Park, no chipmunk collections have been made from alpine areas of the Goat Range, the Valhalla Mountains, or the Kokanee Glacier area. Panian (1996) reported a male *T. minimus* from the Kokanee Glacier area but no voucher specimen was kept to substantiate his identification. Unfortunately the x-ray image in his report is too fuzzy to identify and no diagnostic bacular measurements were taken (see identification keys in Appendix 2-3). Additional inventory also needs to be done for *T. r. ruficaudus* in the southern Rocky Mountains. We hypothesized that it ranges as far north as Crowsnest Pass but this needs to be

confirmed. This species also could inhabit subalpine areas west of the Flathead River in British Columbia.

Because our focus was primarily on general inventory, detailed habitat data were not collected in this study. For *T. m. selkirki* and *T. r. ruficaudus*, the only chipmunk taxa that we consider potentially at risk, detailed habitat studies are needed to define critical habitat parameters and the impact of habitat disturbances such as logging, fire, ski developments, or mining. These subjects have the potential for several graduate student theses; we hope our report stimulates such research.

## LITERATURE CITED

- Alvo, R., and M. J. Oldham. 2000. A review of the status Canada's amphibian and reptile species: a comparison of three ranking systems. *The Canadian Field-Naturalist*, 114:520-540.
- Bennett, R. 1999. Status of the red-tailed chipmunk (*Tamias ruficaudus*) in Alberta. Alberta Environmental Protection, Fisheries and Wildlife Division, Alberta Conservation Association, Edmonton. 15 pp.
- Cannings, S. G., L. R. Ramsay, D. F. Fraser, and M. A. Fraker. 1999. Rare amphibians, reptiles, and mammals of British Columbia. BC Ministry of Environment, Lands and Parks; Wildlife Branch and Resources Inventory Branch, Victoria. 198 pp.
- Cowan, M., and J. A. Munro. 1945. Birds and mammals of Revelstoke National Park. *Canadian Alpine Journal*, 29:100-121.
- Hafner, D. J., E. Yensen, and G. L. J. Kirkland. 1998. North American rodents. Status survey and conservation action plan. IUCN/SSC Rodent Specialist Group. IUCN, Gland, Switzerland. 171 pp.
- Harcombe, A. P. 1999. The Conservation Data Centre: For the greatest about the least. P.p. 13-17, *In* L. M. Darling (ed.). Proceedings of a conference on the biology and management of species and habitats at risk, Kamloops, BC, Feb. 1999. Volume 1. Ministry of Environment, Lands and Parks and University College of the Cariboo, Kamloops.
- Panian, M. A. 1996. Chipmunks in the Kootenays: Red-tailed chipmunk subspecies simulans. Columbia Basin Fish and Wildlife Compensation Program, Nelson. 69 pp.
- Sullivan, R. M., and D. W. Nagorsen. 1998. *Tamias minimus*. Pp. 54-55 *In* D. J. Hafner, E. Yensen and G. L. J. Kirkland (eds.). North American rodents. Status survey and conservation action plan. IUCN, Gland, Switzerland. 171 pp.

**Table 5-1. Current provincial and IUCN ranks for four chipmunk subspecies of conservation concern in British Columbia**

Taxon	Provincial Rank <sup>1</sup>	IUCN Rank <sup>2</sup>
<i>Tamias ruficaudus ruficaudus</i>	S2 (Red List)	-
<i>Tamias ruficaudus simulans</i>	S3S4 (Blue List)	-
<i>Tamias minimus oreocetes</i>	S2S3 (Blue List)	-
<i>Tamias minimus selkirki</i>	S1S3 (Red List)	Vulnerable (D2)

<sup>1</sup> see Cannings et al. (1999) and BC CDC web page  
(url: [www.elp.gov.bc.ca/rib/wis/cdc/vertebrates.htm](http://www.elp.gov.bc.ca/rib/wis/cdc/vertebrates.htm))

<sup>2</sup> see Sullivan and Nagorsen (1998)

## APPENDIX 5-1. SUMMARY OF STATUS ASSESSMENT DATA

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### Least Chipmunk *oreocetes* ssp (*Tamias minimus oreocetes*)

**Taxonomy**- taxonomic validity of this subspecies is dubious. It is not differentiated from *T. m. borealis* in skull morphology; sample sizes inadequate to assess divergence in genital bone morphology.

**Population trends**- no data but probably stable.

**Population size**- unknown but in BC could range from 1,000-10,000.

**Distribution**- along the continental divide as far north as Kicking Horse Pass and the south side of the Bow River in Alberta. Extent of occurrence in BC is about 1,000 km<sup>2</sup>. Distribution may be partially fragmented by low passes such as Crowsnest Pass. BC populations contiguous with populations in Alberta and populations in Glacier National Park, Montana.

**Habitat**-open talus and krummholz in alpine areas, recent burns, above 1900 metres. No evidence for habitat loss.

**Occurrences in Protected Areas**- Mount Assiniboine Provincial Park, Yoho National Park, probably in Kootenay National Park, Height of the Rockies Provincial Park, and Akamina-Kishinena Provincial Park but no confirmed records. In Alberta occurs in a number of provincial and national parks adjacent to the BC border (e.g., Waterton Lakes National Park, Banff National Park)

**Threats**- no demonstrated threats; only potential threat is destruction of alpine areas for open pit coal mines. Possible impact from ski developments.

**Data Deficiencies**- more taxonomic research using additional samples of genital bones and molecular studies. Distribution is poorly documented; areas west of the Flathead River and Elk River valleys have not been inventoried.

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### Least Chipmunk *selkirki* ssp (*Tamias minimus selkirki*)

**Taxonomy**- differentiated from Rocky Mountain forms (*T. m. oreocetes*, *T. m. borealis*) in skull and genital bone morphology.

**Population trends**- no data but probably stable.

**Population size**- unknown but probably less than 1,000 individuals for the known range.

**Distribution**- endemic to the Purcell Mountains of BC where it is known from only two areas: Paradise Mine-Bruce Creek-Spring Creek drainage and Mount Brewer. Known extent of occurrence is less than 100 km<sup>2</sup>. Distribution is 80 to 100 km from the nearest *T. minimus* populations in alpine areas of the Rocky Mountains; isolated by the Rocky Mountain Trench, Columbia River, and forested habitats from the Rocky Mountain populations.

**Habitat**-open talus, krummholz in dry alpine, subalpine areas above 2000 metres. No evidence for habitat loss.

**Occurrences in Protected Areas**- None but may occur in the Purcell Wilderness Conservancy.

**Threats**- no demonstrated threats but potential impacts from ski developments and mining; however, has persisted in disturbed habitat at the Paradise Mine for 60 years.

**Data Deficiencies**- taxonomic validity of this subspecies needs to be confirmed with molecular studies. Distribution is poorly documented; inventory needed in adjacent alpine areas of the Purcell Mountains and in the Selkirk Mountains. Habitat requirements not well documented.

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**Red-tailed Chipmunk *ruficaudus* ssp (*Tamias ruficaudus ruficaudus*)**

**Taxonomy**- a strongly differentiated subspecies with Canadian populations differing from the Selkirk Mountain subspecies (*T. r. simulans*) in pelage colour, skull and genital bone morphology.

**Population trends** - unknown.

**Population size** - unknown, possibly less than 1,000 for BC.

**Distribution**- known from only three sites (Wall Lake, Akamina Pass, Middle Kootenay pass) but probably ranges along the continental divide as far north as Crowsnest Pass. Extent of occurrence in BC less than 100 km<sup>2</sup>. Populations in Alberta on the east side of the Rocky Mountains are isolated from BC populations by intervening alpine populations of *T. minimus* but limited contact may occur in a few passes.

**Habitat**-subalpine forest in a narrow elevational belt from 1780-1900 metres. Inhabits recent burns and mature forest. No evidence for habitat loss. Relationship with forest harvesting unknown for BC population.

**Occurrences in Protected Areas**- Akamina-Kishinena Provincial Park; in Alberta occurs in Waterton Lakes National Park adjacent to the BC border.

**Threats**- no demonstrated threats but possible impact from disturbances such as logging that could result in the invasion of *Tamias amoenus* and competitive exclusion.

**Data Deficiencies**- Distribution is poorly documented; the northern and western limits of its range in BC unknown. Subalpine areas west of the Flathead River and north of Middle Kootenay Pass need to be surveyed. Habitat requirements particularly its association with early successional stages needs to be assessed.

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**Red-tailed Chipmunk *simulans* ssp (*Tamias ruficaudus simulans*)**

**Taxonomy**- a strongly differentiated subspecies with Canadian populations differing from the Rocky Mountain subspecies (*T. r. ruficaudus*) in pelage colour, skull and genital bone morphology.

**Population trends** - no data but probably stable.

**Population size**- unknown but in BC may range from 3,000-10,000.

**Distribution**- occupies a small area in the southern Selkirk Mountains south of the Kootenay River, west of Kootenay lake, and east of the Columbia River. Known from 10 sites in BC; extent of occurrence in BC about 4,000 km<sup>2</sup>. BC Populations contiguous with populations in northeastern Washington State and northwestern Idaho.

**Habitat**-occupies various forested habitats in a wide elevational range from 560-1830 meters. No evidence for habitat loss. Inhabits early successional stages from logging.

**Occurrences in Protected Areas**- Stagleap Provincial Park; probably also occurs in Champion Lakes Provincial Park and West Arm Provincial Park.

**Threats**- no known threats. Given the apparent rarity of *Tamias amoenus* in the southern Selkirk Mountains, competitive exclusion is not apparent

**Data Deficiencies-** precise limits of its range in BC unknown. More inventory is required in the southern Purcell Mountains to confirm that it is not found east of the Creston Valley; and north of the Kootenay River and west of the Columbia River in the Monashee Mountains where *T. amoenus* is supposedly the only chipmunk species present.