

A SURVEY OF  
YELLOW-BELLIED MARMOT COLONIES  
IN THE BIG CREEK RIVER DRAINAGE  
WITH A SPECIAL REFERENCE TO BEHAVIOR

Lisa Lombardi  
College of Forestry, Wildlife  
& Range  
University of Idaho  
May 18, 1979

Abstract

Five colonies of yellow-bellied marmots were documented in the Big Creek drainage of the Idaho Primitive Area. These colonies consisted of from 9-27 (Marmota flaviventris). The colonies were widely spaced, between the Big Creek Ranger Station and the Taylor Ranch.

Behavioral patterns most often observed were the alarm call and aggressive interaction between juveniles and adults. It is hypothesized that these interactions promote dispersal by young from native areas to new sites.

Yellow-bellied marmots, (Marmota flaviventris), have been established in the Big Creek drainage for at least a century, (Arlo Lewis; pers. comm.) occurring in widely separated colonies of from eleven to twenty-seven individuals. Although there seems to be no direct connection between these and other colonies outside the study area, it seems that (based on evidence . . . ) the marmots have migrated downstream from the head of Big Creek in the Idaho Primitive Area. This area is an ideal place for studying populations of various animals which are relatively uninfluenced by man. However, some effects of man's presence, (e.g., the clearing and irrigating of field and pastures around homesteads) have been exploited by the marmots. In the summer of 1978, I conducted a survey of marmots in the drainage to: (1) establish the size and location of all colonies; (2) observe the behaviour of a colonial species; and (3) assess conditions that influence the presence or absence of marmots in relatively pristine conditions.

#### Methods

From July 20, 1978 until August 16, 1978, I surveyed the Big Creek drainage for marmot colonies. Marmots had been reported to me for 4 locations: at Big Creek Ranger Station, at Werdenhoff mine on Smith Creek, Snowshoe mine on Crooked Creek, and the Taylor Ranch on the lower end of Big Creek. I traveled to each of these places on horseback,

and conducted visual surveys of the colonies. In addition, random sightings of marmots were made along the trail.

I selected the colony at Taylor Ranch for observation for several reasons. First the colony was large and located in (irrigated) habitat with few visual obstructions. I observed the marmots for a total of 79 hours, from prior to sunrise until darkness. At half-hour intervals I took temperature, wind and weather readings, counted the marmots above ground and separated them by age (adult or juvenile), and location. In addition, at three-hour intervals I would continuously monitor one individual for 1 hour.

## Results

### Distribution

I located five colonies or groups of colonies: one at the Big Creek Ranger Station and in the talus along the runway; one group of colonies along the lower 3 km. of Crooked Creek, which because of the interaction between the animals, and the almost continual talus slope in which they were found, I treated as a unit; a colony in the Taylor Ranch pasture; and two sightings of individuals, one at the confluence of Smith and Big Creeks, and one in a talus slope slightly upstream of Cave Creek (Fig. 1). Previously there had been a colony of marmots at Werdenhoff mine, but these were apparently exterminated by target-shooters from the Big Creek lodge (Roxanne Midder; pers. comm.)

The colony at Big Creek stretched along a 1 km. west-

facing slope of discontinuous talus beside the runway, behind the barns, and the pasture. Although the pasture is irrigated, the density of animals was low, perhaps because of dogs, and incidental shootings by tourists and hunters staying at the lodge. I counted 17 marmots, 9 adults and 8 juveniles, along the slope. The animals moved freely from one stretch of talus to another, which led me to conclude the discontinuous talus slope was a single unit.

The Crooked Creek colony, stretching for 3 km. from this stream's confluence with Big Creek, was by far the most sparsely populated colony, probably due to the poverty of food resources. In several areas the talus slopes extended down to the water, and the only areas of food were in the creek bottom and along the road to Snowshoe mine, which paralleled Crooked Creek. I counted 11 marmots (4 adults and 7 juveniles), along Crooked Creek.

The Taylor Ranch colony was unique for several reasons: (1) the superabundance of food stimulated by irrigation; (2) the lack of talus slopes for cover; and (3) an absence of predators. Because of the ranch's status as a biological field station, the marmots were unmolested by man, and shared the pasture with the ranch's four horses.

I counted 27 marmots (19 adults and 8 juveniles) in approximately 12 hectares. This age ratio differs significantly ( $\chi^2 = 4.37$ ) from that observed in the other colonies, but I believe that this estimate is the most accurate, be-

cause visibility at the site was good. I spent a greater amount of time at this colony. In addition, there was a small colony of marmots at the edge of the hayfield, across the river from the pasture. This colony consisted of 4 adults and 5 juveniles. No interaction was observed between the two groups, although the smaller group probably had emigrated from the larger via the nearby U.S. Forest Service path bridge.

Only two species were observed to share the talus slopes with the marmots and neither competed directly for resources. The golden-mantled ground squirrel (Citellus lateralis), is a seed-eater and not in competition for the grass food source. The pika, Ochotona princeps, was found only at the Big Creek ranger stations, and although both animals utilized grass as a food source, the availability of forage was not a limiting factor. The marmot seemed to effectively out-compete the Colombian ground squirrel (Citellus columbianus), for the most productive or optimum grazing habitat, especially along Crooked Creek, where forage was probably a limiting factor. The Colombian ground squirrel only appeared upstream of the marmots, where the streambed was more narrow and rocky and less vegetation was present. The Colombian ground squirrel can apparently exist in a dryer habitat than the yellow-bellied marmot (Lambeth, 1977) and was found in abundance in this type of site along Big Creek. Likewise, the Colombian ground squirrel occurs in the dryer

areas above the Taylor Ranch pasture, but none were observed in dry parts of the pasture where the marmots lived.

### Behavior

Observations of the social behavior in marmots were made at the Taylor Ranch colony because the density was high, the visibility was good, and access to the colony was convenient. From a vantage point on a hillside above the pasture, I could observe the whole colony.

There were 12 visible groups of burrows located on the periphery of the irrigated areas in distinct rock outcrops. Burrow systems averaged 58 m. between them.

There were two types of burrow systems: home burrows and auxiliary burrows. The marmots emerged in the morning from home burrows and preferred to retreat there in response to danger. Auxiliary burrows were used in response to an alarm call when the home burrow was too far for a safe retreat. Many of these auxiliary burrows appeared to be blind cul-de-sacs, with only one entrance. Clearly visible trails were present between burrows, apparently because they were regularly used. Crouch, (1930), also recorded these trails between burrows.

The animals appeared separately in the morning and acted independently throughout the day. The juveniles spent most of their above-ground time feeding; the adults in comparison spent more time sunning in the rockpiles (table 1).

Dominance displays (chasing, tail elevation and tail

wagging; (Armitage, 1965) were rare between adults, but adults were frequently observed chasing juveniles. Although the juveniles were only chased from the immediate vicinity of the rockpiles, this form of agonistic behavior might be a mechanism for inducing emigration (Armitage (1962)).

Other interactions observed were a greeting ceremony, primarily olfactory, and the alarm call system (Hanney, 1975).

The alarm call, a high, clear whistle, was sounded at the presence of humans, at any rapid approach of the horses to the animals, and most noticeably at frequent passes of raptorial predators. A golden eagle appeared approximately three times a week and was successful in capturing a marmot at least once. I also heard the alarm call when coyotes were barking nearby. The call was emitted by any animal perceiving danger, and nearby marmots responded by immediately taking refuge in a nearby burrow.



### Conclusions

The distribution of marmots in the Big Creek Drainage seems to be limited by two factors: lack of suitable forage in areas in close proximity to good denning sites, and the distance between suitable sites.

Man's presence has had a great influence on the marmot colonies in the Big Creek Drainage. The Big Creek and Taylor Ranch colonies have benefitted by man's irrigation practices, and the colony on Smith Creek was exterminated by him.

Logging the slopes will not have a direct impact on the marmots. It could cause an increase in other species, notably the Columbian ground squirrel, on the dryer, open sites, which would depress the marmot's status as a prey item for predators.

If more settlement was allowed in the drainage, irrigation would probably increase, and the marmots also. If no control of predators was initiated, marmots would probably increase as a prey item for coyotes and raptors. The marmots would almost certainly be considered pests by the settlers.

The behavioral patterns observed in the Taylor Ranch colony were much in accordance with previous work (Armitage, 1962, 1965, and Couch, 1930). It would be interesting to observe, as the colony grows more crowded, what changes occur in agonistic behavior, and how those behaviors affect emigration.

Table 1. Behavioral distribution patterns of marmots in the Taylor Ranch colony.

	# observations	# observations
	feeding	sunning
adult	231	388
juvenile	217	97

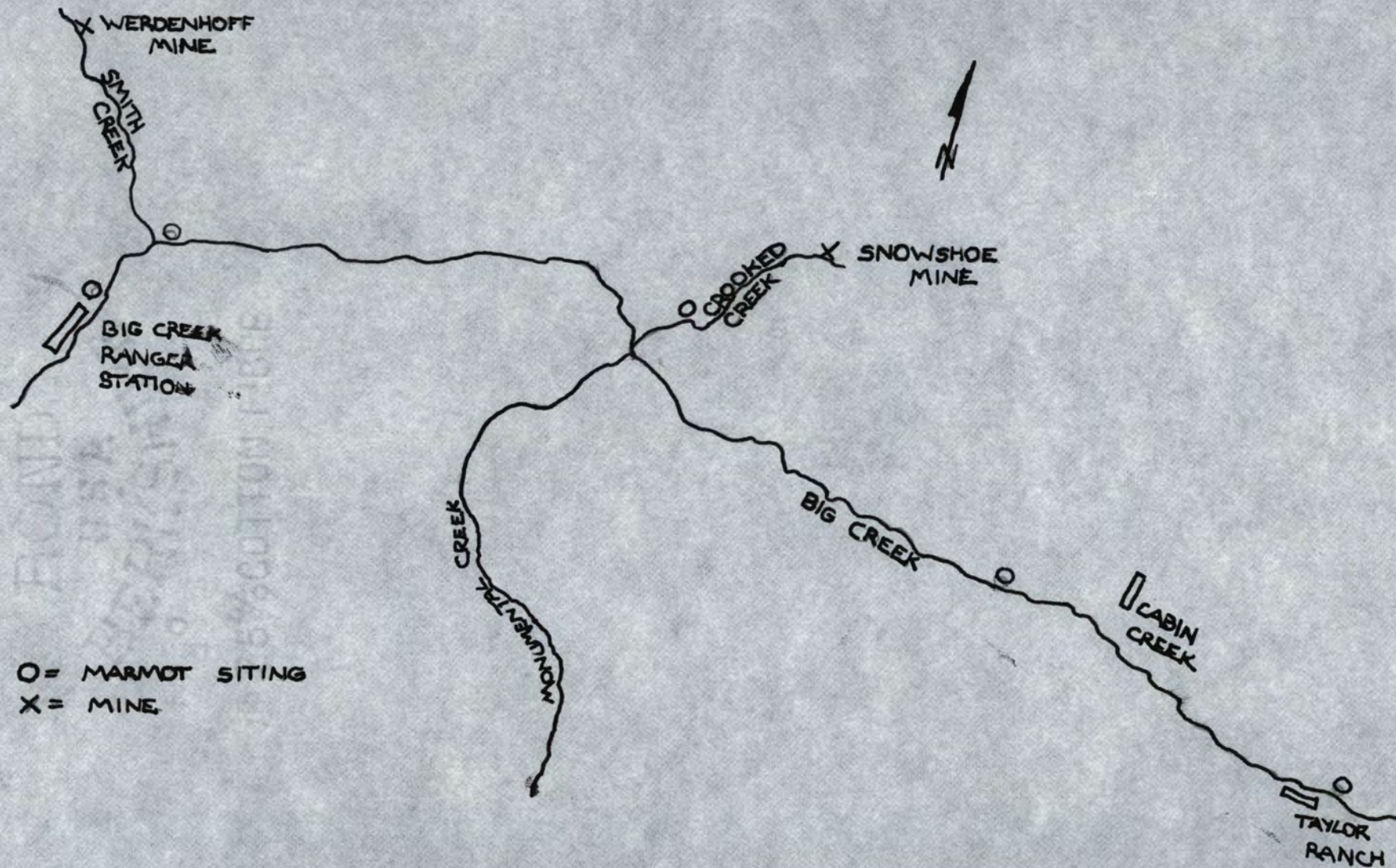


Fig 1 The distribution of marmot colonies in the Big Creek drainage

Literature Cited

- Armitage, K. B. 1962. Social behavior of a colony of the yellow-bellied marmot. *Anim. Behav.* 10(3):319-331.
- \_\_\_\_\_. 1965. Vernal behaviour of the yellow-bellied marmot. *Anim. Behav.* 13(1):59-68.
- Courch, E. K. 1930. Notes on the pallid yellow-bellied marmot. *Murrelet.* 11:3-6.
- Hanney, P. W. 1975. *Rodents, their lives and habits.* Taplinger Publishing Co., N. Y. 307 pp.
- Lambeth, R. E. 1977. The Columbian ground squirrel in sub-alpine forest openings in the Idaho batholith. M. S. Thesis. University of Idaho, Moscow.