

## Habitat Utilization of the Golden Takin During Later Autumn and Winter in Foping National Nature Reserve

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### ABSTRACT

Total 275 quadrats with 400m<sup>2</sup> each in size were set up in the central area of Foping National Nature Reserve with elevation ranged between 1250~2400m to collect data on habitat use of the Golden takins in 1991. Two checks were made on these quadrats in October 1991 and February 1992. Two hundred and seventy four quadrats were sampled in October 1991. 133 of the quadrats with tracks of the Golden takin. In February 1992, 245 quadrats were checked and only 102 were marked by takin tracks. The takins preferred both mixed coniferous and broadleaf deciduous forest and subalpine coniferous forest during later autumn and winter. The favored slope degree of habitat for the takin was about 30~60° in the study sites. The elevations preferred by takin in mixed evergreen and deciduous broadleaf forest and coniferous forest varied from 1500 to 1900m and in coniferous forest from 1900 to 2400m in later autumn and winter, respectively. In the mixed coniferous and broadleaf deciduous forest, the preferred elevations changed from 1900~2400m to 1500~1900m between October to February of next year. The slope aspect also influenced the habitat use by the golden takins.

*Key words* habitat utilization, golden takin, Foping National Nature Reserve

### INTRODUCTION

The golden takins *Budorcas taxicolor bedfordi* are wholly confined to Qinling Mountain Areas of China, and they have been listed as Class I species to be protected by the Chinese Government. Data available on their habitat use is scant because they distribute in the mountainous areas where is hard to access. Efforts on research have been made in their ecological habits, food habits, and group size (Wu et al; 1966) since the 1960's. Between 1991~1992, a research project on the habitat use was conducted for the purpose of habitat management in the Foping National Nature Reserve, Shaanxi, and the effort was made in the field to obtain information on the habitat selection of golden takins during later autumn and winter from October 1991 to February 1992.

### THE STUDY AREA

The study area was located in the central area of Foping National Nature Reserve which is geographically situated between  $107^{\circ}30' \sim 109^{\circ}0'$  in longitude, and  $32^{\circ}30' \sim 33^{\circ}50'$  in latitude, the local names of the study area are Sanguanmiao and Zhongzui. The area of the study site is about 7724 ha and is between 1350~2400m in elevation. The vegetation in the study area shows a vertical zonation. A mixed evergreen and deciduous broadleaf forest can be found between 1100~2000m. Depending on the slopes, trees such as *Castanopsis*, *Fagus*, *Quercus*, *Castanea*, *Acer*, *Juglanus*, *Platycarya*, and *Salix* can be found. A bamboo species, *Bashania fargesii*, together with other shrubs, forms the understory of this forest. Between 1400~2400m, a mixed coniferous and broadleaf deciduous forest predominates. *Pinus*, *Abies*, and *Tsuga* are the main species of conifers, and *Quercus*, *Fraxinus*, *Betula*, and *Rhododendron* are conspicuous among broadleaf trees and shrubs. Bamboo, *Sinarundinaria nitida*, also occurs in this type of forest. A subalpine coniferous forest occurs from 1800 to 2400m, predominated by *Larix* and *Abies*. *Butula*, *Rhododendron*, and the bamboo, *Fargesia spathacege* form the understory within coniferous forest.

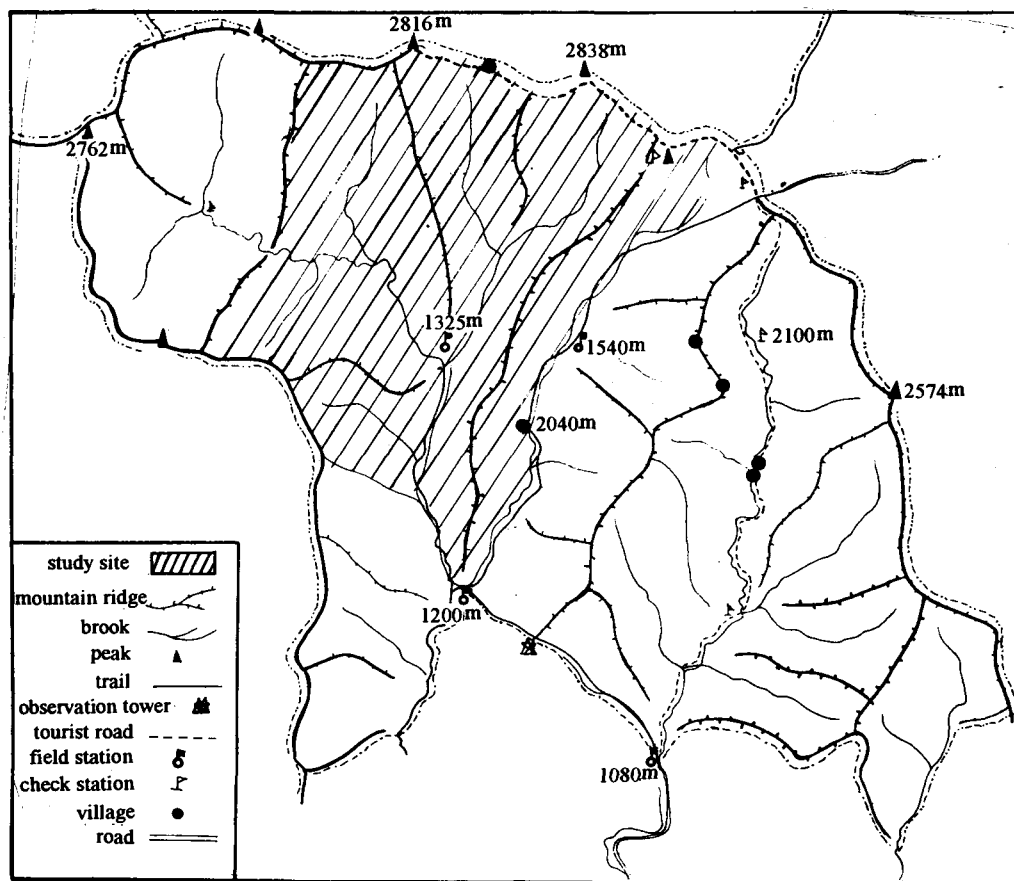


Fig. 1 Study area.

The human activity does not disturb the study area due to the lack of roads. Trails are available for people to travel on foot. The human activity influence that can be

counted in the area was herb collection for traditional Chinese medicine by very few people during the autumn. Neither cultivation activities nor hunting were found in the study area.

The climate is temperate. The mean temperature in the National Nature Reserve is 13°C. January is the coldest month (mean temperature -2°C) and July the warmest month (mean temperature 27°C). The total precipitation is about 950~1200mm, most of which occurs from July to September. The first snow falls in the end of October and is melted soon after. The peak of the mountain is covered by snow all the winter and the snow will not melt until April of next year.

## STUDY METHODS

Observation on the habitat use by golden takins was very difficult to make since they inhabit in forests within very rugged mountain areas. Therefore, takin tracks were selected as the index of habitat use. Total 275 quadrats with 400m<sup>2</sup> in size within the study area were set up during September 1991. Among them, 97 occurred in broadleaf forest, 125 and 53 in mixed coniferous and broadleaved deciduous forest and subalpine coniferous forest respectively. The quadrat was randomly arranged from the map. Each quadrat was separated with either 300m interval in distance or 50m difference in elevation or in both and marked with red flag with numbers. The elevation, slope degree, slope aspect, vegetation type were recorded. Two trips of check for the quadrats were conducted in October 1991 and February 1992 and the tracks, drops and any traces of takin in any quadrats were used as habitat use index of takin in the winter. No efforts were made to identify sex, age and herd size from tracks in the field work.

## RESULTS

Information on quadrats with takin tracks during checks of October 1991 and February 1992 was shown in Table 1 and 2. Data were ranged by habitat types and elevation. Total 274 quadrats were sampled in October 1991, and 133 of them were found with takin tracks. The overall frequency of quadrats used by takin was about 48.5%, the highest value occurred in coniferous forest, about 8.1% higher than overall frequency. The favorest elevation of the habitats used by takins could be found from these data, 1500~1900m in broadleaf forest, 1900~2400m in mixed coniferous and broadleaf deciduous forest, and coniferous forest.

Table 1 The use of habitat on elevation and forest types by golden takins in later autumn 1991.

Elevation	Broad-leaved forest			Mixed coniferous and broadleaved forest			Subalpine coniferous forest			Overall		
	A	B	C	A	B	C	A	B	C	A	B	C
Below 1500m	35	6	0.172	8	4	0.500	—	—	—	43	10	0.233
1501~1900m	59	29	0.492	86	43	0.500	13	7	0.539	158	79	0.500
1901~2400m	3	1	0.333	30	20	0.667	40	23	0.575	73	44	0.603
Total	97	36	0.371	124	67	0.540	53	30	0.566	274	133	0.485

A: No. of quadrats B: Quadrats with tracks C: Frequency

Table 2 The use of habitat on elevation and forest types by golden takins in winter of 1991~1992.

Elevation	Broad leaved forest			Mixed coniferous and broadleaved forest			Alpine coniferous forest			Overall		
	A	B	C	A	B	C	A	B	C	A	B	C
Below 1500m	29	6	0.207	9	2	0.222	—	—	—	38	8	0.211
1501~1900m	55	25	0.455	75	32	0.427	13	5	0.385	143	62	0.434
1901~2400m	3	1	0.333	22	8	0.364	39	23	0.590	64	32	0.500
Total	87	32	0.368	106	42	0.396	52	28	0.528	245	102	0.416

A: No. of quadrats B: Quadrats with tracks C: Frequency

Two hundred and forty five quadrats were relocated in the check of February 1992. Totally, 102 quadrats were marked by takin tracks. The frequency value of quadrat with tracks to total quadrats was 41.6% in overall which was little less than that in October 1991. The favorite elevation of takins in this check was 1500~1900m in the broadleaf forest, and 1900~2400m in coniferous forest the same as in the October, 1991. Difference in elevation between autumn and winter was found in mixed coniferous and deciduous broadleaf forest, the habitat between 1500~1900m in mixed coniferous and broadleaf forest was preferred by the takins during winter.

The slope degree also influenced the habitat use of the takin (Table 3), they preferred to use the habitats located between 31~60° degrees of slope in later autumn, however in winter they were found to use the habitats with gentle slopes. The quadrats with steep slopes were avoided by the takins in our study area.

Table 3 Slope degrees of the habitats used by golden takins.

Degree of slope	Fall			Winter			Overall		
	A	B	C	A	B	C	A	B	C
Below 30°	99	41	0.414	97	41	0.423	196	82	0.418
31~60°	152	84	0.553	140	49	0.350	292	133	0.455
60° above	8	2	0.250	8	2	0.250	16	4	0.250
Total	259	127	0.490	245	92	0.376	504	219	0.435

A: No. of quadrats B: Quadrats with tracks C: Frequency

## DISCUSSION

The golden takin is a species distributing in subalpine forests between 1500~4500m in elevation (Allen 1940; Wu et al 1986a). They inhabit in the mixed coniferous and broadleaf deciduous forest and subalpine coniferous forest (Wu et al 1990). In our study area, the golden takins were first found to use broadleaf deciduous forest that occurred as low as 1200m in altitude in both autumn and winter (Table 1, 2), although they used the mixed coniferous and broadleaf deciduous forest and subalpine coniferous forest more often. In later autumn, the golden takin in our study area preferred both of the mixed coniferous and deciduous broadleaf forest, and coniferous forest. The frequencies of quadrats used by the takins during October check in the mixed coniferous and broadleaf deciduous forest, and coniferous forest were higher than average.

Traditionally, people believe that the takin inhabits on the mixed coniferous and deciduous broadleaf forest, and subalpine coniferous forest, and prefers travelling along slopes which is as steep as 70° degrees. Our observation proved that generally the takin travelled along the mountain ridges with gentle slopes within their habitat. The takin had to make movement in a steep slope only in the case that they tried to escape from any danger. The quadrats with steep slopes were avoided by the takin, no matter what kind of habitats they were located in our study site although they could travel in steep slope without any problem.

In order to determine if the takins had specific preference for any aspects of slope, we ranged the data by slope aspect for all the habitat types. The golden takin liked to use habitats located in the east, southeast, southwest and northwest aspects of the slope in our overall calculation (Table 4) during later autumn. But when surveying each habitat type, we found that the takins preferred east slope in broadleaf forest, southeast, west, southwest, northwest slopes in mixed coniferous and broadleaf deciduous forest, and east, southeast, southwest and northwest slopes in coniferous forest. The takin did not use habitats located in south slope more often in autumn.

Table 4 The use of habitat on slope aspects and forest types in later autumn 1991.

Slope aspect	Broad leaved forest			Mixed coniferous and broadleaved forest			Subalpine coniferous forest			Overall		
	A	B	C	A	B	C	A	B	C	A	B	C
East	20	10	0.500	13	6	0.461	5	4	0.800	38	20	0.526
Southeast	8	1	0.125	22	15	0.682	10	3	0.300	40	19	0.463
Northeast	5	1	0.200	15	5	0.333	3	2	0.667	23	8	0.348
West	12	0	0	11	7	0.636	1	1	1.000	24	8	0.333
Southwest	3	1	0.333	35	23	0.657	13	3	0.231	51	27	0.529
Northwest	—	—	—	9	8	0.889	3	2	0.667	12	10	0.833
South	10	2	0.200	13	7	0.538	6	2	0.333	29	11	0.379
North	1	0	0	12	3	0.250	3	0	0	16	3	0.188
Total	59	15	0.254	130	74	0.569	44	17	0.386	233	106	0.455

A: No. of quadrats B: Quadrats with tracks C: Frequency

Like in the autumn, the takins used sites in mixed coniferous and broadleaf deciduous forest and coniferous forest with higher frequencies than in mixed evergreen and deciduous broadleaf forest during winter (Table 5). The takins used east, southeast and northwest slopes more often than any other slope aspects in overall during winter. For each habitat type the takins preferred east, southeast, west slopes in mixed evergreen and deciduous broadleaf forest, southeast, northeast, west and northwest slopes in mixed coniferous and broadleaf deciduous forest, and east, southeast and northwest slopes in coniferous forest. The sites in south slope of mountainous area were not preferred even in the winter. The reason is still unknown.

The vertical movement of the takins was found from season to season in the mixed coniferous and deciduous broadleaf forest, but was not found in evergreen and deciduous broadleaf forest, and subalpine coniferous forest. This result did not agree with observations made by Wu et al (1986). The favored elevation by the takins in winter was ob-

viously lower than that in later autumn in the mixed coniferous and broadleaf deciduous  
Table 5 The use of habitat on slope aspects and forest types by golden takins in winter of 1991~1992.

Slope aspect	Broad leafed forest			Mixed coniferous and broadleafed forest			Subalpine coniferous forest			Overall		
	A	B	C	A	B	C	A	B	C	A	B	C
East	22	17	0.773	9	2	0.222	4	3	0.750	35	22	0.629
Southeast	6	5	0.833	16	8	0.500	11	5	0.455	33	18	0.546
Northeast	6	2	0.333	17	8	0.471	4	2	0.500	27	12	0.444
West	15	1	0.067	4	2	0.500	2	1	0.500	21	4	0.191
Southwest	7	2	0.286	16	5	0.313	12	7	0.583	35	14	0.400
Northwest	2	0	0	7	4	0.571	4	3	0.750	11	9	0.818
South	16	7	0.438	10	4	0.400	6	2	0.333	32	13	0.406
North	9	2	0.222	10	4	0.400	3	0	0	22	6	0.273
Total	81	38	0.469	89	37	0.416	46	23	0.500	216	98	0.454

A: No. of quadrats B: Quadrats with tracks C: Frequency

forest, but in evergreen and deciduous broadleaf forest and coniferous forest the elevation preferred by takins did not change significantly between later autumn and winter. It was understandable that the temperature did not change very much in the mixed evergreen and deciduous broadleaf forest between autumn and winter, but the temperature would vary greatly in the subalpine coniferous forest from season to season since it occurred in elevation in the mountainous areas. The reason why the golden takins did not make a vertical movement between autumn and winter in coniferous forest could not be addressed by this field work.

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