

## POPULATION AND COMPARATIVE BEHAVIOUR OF *OCHOTONA ROYLEI* AND *OCHOTONA MACROTIS* IN GOSAINKUNDA AREA, LANGTANG NATIONAL PARK, NEPAL

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### ABSTRACT

Study on the behavior of pika (*Ochotona roylei* and *O. macrotis*) was carried out during the months of July and August 2011 in Gosainkunda, Langtang National Park (LNP), Nepal. Pika inhabits in the talus habitats of the alpine area. Tharepati (3651 m asl), Phedi (3825 m asl), Gosainkunda (4436 m asl), and Laurebina (3903 m asl) were selected for behavior recording. Quadrates of 50 m × 50 m were randomly plotted at each site except in Phedi. Only two species of pika were recorded in those areas: *Ochotona macrotis* was 75 individuals and *Ochotona roylei* 49 individuals. The ratio of age group adult and infant in *O. macrotis* was 29:46 and *O. roylei* 16:33 population with density 21/ha and 14/ha, respectively. Eleven pikas were observed for 455 min to record their behaviour from 5:30 AM to 19:30 PM in each day. Feeding, foraging, musing, grooming, chasing each other (playing) were the recorded behavior. They were active at dawn and dusk but were not observed during rainy period. They spent their 26% of time in feeding, 24% in musing, 16% in foraging, and 11% in grooming. Pikas were observed digging soft rocks, soil and mosses on the rock before discharging pellets.

**Key words:** *Ochotona macrotis*, *Ochotona roylei*, behavior, Nepal.

### INTRODUCTION

Pikas are small mammals related to rabbit and hare that inhabit in rocky talus of alpine areas. There are 30 species of Pikas (*Ochotona* spp.) distributed throughout the world (Hoffmann and Smith 2005). Five species of Pikas have been reported from Nepal viz. *Ochotona curzoniae*, *O. nubrica*, *O. thibetana*, *O. macrotis*, *O. roylei* (IUCN 2011). The Himalayan pika resides between 2500 m and 5000 m (Tak and Lamba 1985). They are reported from Sagarmatha National Park, Langtang National Park, Rara National Park, Annapurna Conservation Area and Makalu Barun Conservation Area (Shrestha 2003).

Only large ear pika (*Ochotona macrotis*) and Royle's pika (*Ochotona roylei*) are found in Langtang National Park. They both have similar structure and habitat. Molecular study concluded that *O. macrotis* is a sister species of *O. roylei* (IUCN 2011). They have reddish brown fur with pale band over the nape, the winter coat is similar, but may show traces of rufous coloration. Its body length range from 15-20 cm and the diameter of head is 7 cm, its weights 100–150 g (Smith *et al.* 1990). Although, pika shows external activities at night they are frequently active during hours of dawn and dusk (Kawamichi 1971).

## STUDY AREA

Langtang National Park is located in the central Himalaya of Nepal between 85°15' E to 86°0'E and 28°20' North. It is at road distance of 132.2 km from Kathmandu. The park covers 1710 sq km. The shortest highway that connects India and China through Nepal, Pasang Lhamu Highway passes through this National Park. Langtang Lirung (7245 m) is the highest point in the park. Langtang National Park was officially established in March 1976. Its land area includes three districts, Rasuwa, Nuwakot, and Sindhupalchowk (DNPWC 2012). The observation was concentrated into four spots of Gosainkunda complex viz Tharepati (N28°00'47.6" E85°29'31.4"), Phedi (N28°03'29.9" E85°27'29.8"), Gosainkunda (N28°05'38.9" E85°24' 22.6") and Laurebina (N28°05' 47.1" E85°23' 36.1").

## MATERIALS AND METHODS

Following methods were applied to acquire information on the species.

- a) Interview: To acquire the initial information of pika habitat, informal discussion with local people and herders was conducted.
- b) Quadrature method: Total fourteen quadrates of 50 m × 50 m were randomly plotted. Four in Tharepati, two in Phedi (as this is very steep slope with many waterfalls), four in Gosainkunda and four in Laurebina. All the quadrates were plotted above 3500 m in talus area. The population of pika (direct observation) was recorded thoroughly and behavior was observed within the quadrate. Special morphological features in individual pika like scratch or tears in ears, wart in body, colour and size were taken in account for the continuous recording of individual pika behavior to prohibit repetition in population count and mixed up of individuals' behavior.

Photographs of all observed pika were taken from different angle for identification.

- c) Scan sampling: To calculate behavior scan sampling method was applied (Altmann 1974). Behavior of pikas which were not continuously active for less than 15 min was omitted.

## RESULTS

**Habitat and ecology:** Pikas in Langtang were observed in talus alpine area and forest of *Rhododendron*, *juniper* and *Abies*. *O. roylei* and *O. macrotis*, both species of pika were recorded in alpine talus area and *O. roylei* were also recorded in forest. The Royle's pika in forest (forest dweller) was comparatively darker in colour and lives in burrow formed in stones and gap formed by roots of tree. Pika in alpine area inhabited in burrow formed naturally in the gap of rocks. They were found to be herbivorous feeding on different species of the plants and their parts. The leaves, flower and fruits of *Fragaria* spp and *Potentilla* spp were consumed. Different plants species under the family Graminae (*Poa* spp., *Dentonia* spp. *Juncus* spp), Primulaceae (*Primula* spp.) and Polygonaceae (*Rumex nepalensis*) were common food for them. Some of the pikas were observed feeding in moss and fern.

## Population

In all the studied sites of LNP only two species of pika *Ochotona macrotis* and *Ochotona roylei* were recorded (Figs. 1, 2 and 3). Total number of 124 pikas was head counted in which 75 were *O. macrotis* and 49 were *O. roylei* (Table 1). The ratio of age group adult and infant in *O. macrotis* is 29:46 and *O. roylei* 16:33 population with density 21 individuals per ha and 14 individuals per ha, respectively. Among 14 quadrates, no pika were observed in three quadrates; they were one each in Tharepati, Gosainkunda (South of the lake, north facing) and Laurebina (Odar Kharka).

**Table 1. Total population of pika in different quadrates.**

Quadrat no.	Population Pika observed			Coordinate Location	Elevation	Area/Place
	<i>O. macrotis</i>	<i>O. roylei</i>	Total			
Q1	3(2+1+0)	2(0+2+0)	5	N28°00'47.6" E085°29'31.4"	3636 m	Tharepati
Q2	1(1+0+0)	2(0+2+0)	3	N28°00'48.4" E085°29'32.6"	3605 m	
Q3)	2(1+0+1)	5(2+1+2)	7	N28°02'05.2" E085°28'53.0"	3524 m	
Q4	0	0	0	N28°03'06.1" E085°28'02.7"	3634 m	
Q5	9(4+3+2)	8(5+3+0)	17	N28°03'29.9" E085°27'29.8"	3764 m	Phedi
Q6	5(3+0+2)	4(1+2+1)	9	N28°03'31.2" E085°27'53.8"	3764 m	
Q7	19(4+9+6)	14(4+8+2)	33	N28°05'38.9" E085°24'22.6"	4423 m	Gosainkunda
Q8	6(3+2+1)	1(0+1+0)	7	N28°05'02.2" E085°24'37.6"	4436 m	
Q9	9(4+0+5)	5(2+1+2)	14	N28°06'04.7" E085°24'42.8"	4404 m	
Q10	0	0	0	N28°06'54.7" E085°22'42.8"	4324 m	
Q11	13(4+6+3)	5(2+1+2)	18	N28°05'23.1" E085°22'56.9"	3951 m	Laurebina
Q12	5(1+4+0)	3(0+2+1)	8	N28°05'47.1" E085°23'36.1"	3916 m	
Q13	only old pellets of unidentified species of pika were observed			N28°05'12.3" E085°23'25.2"	3951 m	Odhar Khark
Q14	3(2+1+0)	0	3	N28°05'48.9" E085°23'0.5"	3879 m	Barna goath
<b>Total</b>	<b>75</b>	<b>49</b>	<b>124</b>			

**General behavior**

Behavior recorded during this study includes Musing: Motionless or just resting on the big stone for shorter or longer time; Feeding: Eating grass, flower or other parts of plant; Foraging: the movement for searching and selecting food; Groom: the process of cleaning body and fur; Calling: Making sound; Galloping: Jumping from one rock to other rock or in the ground; Chasing: playing behavior recorded among infants at evening time; Inside burrow: Pika enters burrow and use number of burrows for short time while foraging and feeding were recorded.

Behavior of pika was observed from 5:30 am to 19:30 pm for ten days. It took 103 h and 35 min field work to acquire behavioral data of eleven pikas (six *O. macrotis* and five *O. roylei*). The total contact time for the observation was 455 min that was seven hour and thirty five min. They were one (*O. roylei*) in Tharepati (3651 m), three (one *O. macrotis* and two *O. roylei*) in Phedi (3825 m), four *O. macrotis* in Gosainkunda (4436 m), two *O. roylei* in Laurebiana 3903 m and one *O. macrotis* in Barna Goth 3879 m. Pikas were active during dawn and dusk. They were not active outside and even not seen in rainy period. Very few infants

were seen at the day time. They were active and fast moving. They use numbers of burrows while foraging and feeding. Behavior of pika was recorded in the interval of one min.

The observed activities for both species pika were 455 min. Among them, *O. macrotis* was observed for 205 min and *O. roylei* was 250 min (Table 2). In average they spent more time in feeding (26.37%), musing (23.96%), inside burrow (16.04%) while least time spent in chasing (0.88%) and galloping (1.98%). However, in both pika species difference was observed in different

behaviours. The highest percentage of time spent by *O. roylei* during observation (250 min) was on musing (25.2%) then comes feeding (20.8%) and inside burrow (19.2%) while the least time was spent in chasing (1.6%). The chasing behavior was observed only in five juvenile pikas during the evening period. In *O. macrotis* species the observation recorded highest in feeding (33.17%), then musing (22.44%) and foraging (15.12%). The least time for galloping behavior (1.46%) was observed while there was no record of chasing.



(a) *O. roylei*



(b) *O. macrotis*

Fig. 1. Two species of Pika recorded in the study area.



Fig. 2. Infant *O. roylei*

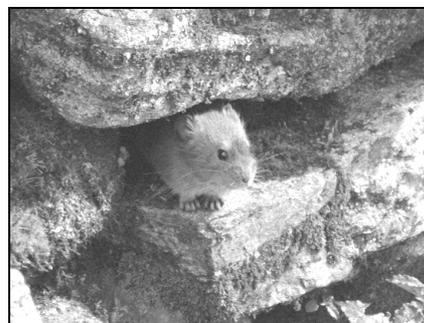


Fig. 3. Infant of *O. macrotis*

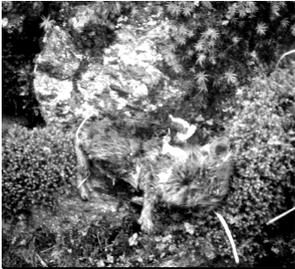
Table 2. Total time budget of two species of pika in Langtang National Park.

SN	Behaviour	Time in mins and respective (%)		Total time (min)
		<i>O. roylei</i>	<i>O. macrotis</i>	
1	Feeding	52 (20.8)	68 (33.17)	120 (26.37)
2	Foraging	41 (16.4)	31 (15.12)	72 (15.82)
3	Inside burrow	48 (19.2)	25 (12.19)	73 (16.04)
4	Grooming	29 (11.6)	22 (10.73)	51 (11.21)
5	Musing	63 (25.2)	46 (22.44)	109 (23.96)
6	Calling	07 (2.8)	10 (4.88)	17 (3.74)
7	Gallop	06 (2.4)	03 (1.46)	9 (1.98)
8	Chasing	04 (1.6)	0	4 (0.88)
	Total	250 (100%)	205 (99.99%)	455 (100%)

Calling behavior is of two types: long call 'Chirr....r' (produced while musing) and short call 'chin chin' (produced during chasing). In the Phedi area only long calling was heard/observed and it was only in *O. macrotis* species. These pikas were feeding on the big stone and exchanging long calls. Musing behavior was observed in all pikas. They performed short musing (less than one min) and long musing (more than five min in a time). They entered burrow for few second to less than five min while feeding and foraging. Pikas groom their bodies and furs with hind limbs, sometime mouth and fore limb are also used. Both species were observed stretching their body after long musing or grooming. Every individual species was observed musing and grooming

Some infant pikas were observed discharging pellets outside the burrow. This behavior was recorded both in morning and evening trips. They dig on soft rock or rock mosses for few min by fore limbs before discharging pellets. Only single pika was observed transporting green plants into its burrow in rainy season. The synanthropic tendency is distinct in *Ochotona roylei*. Two *Ochotona roylei* were observed inside the home of local people in Gosainkunda and a Royle's Pika was also observed stealing green leaf (vegetable) from hotel's kitchen garden in Laurebina.

**Table 3. Information of dead pika.**

Particular	Measurement	Weather: Raining Temperature: 7°C Slope face: NW
Species	<i>O. roylei</i>	
Body length	150 mm	
Head length	51 mm	
Hind limb	67 mm	
Fore limb	54 mm	
Ear (pinna)	26 mm	
Weight	152 gms	
Sex	male	

A dead pika was found in quadrat (Q2) in Tharepati (Table 3). It was about a week of death lying near the burrow. It was a male of *O. roylei* with body length of 150 mm, head length 51 mm and weight 150 gm and was found 72 m west of the hotel building. According to local respondent sometime pika were killed by children for fun. They use stone and catapult for killing purposes.

## DISCUSSION

Bhattacharya *et al.* (2009) recorded mean density of royle's pika 15.3 individual per hectare in Uttarkhanda, Western India. Similarly Smith *et al.* (1990) found the density of Royle's pika 12.5 per hectare individuals in Nepal. The population observed in this study is less than Indian population density and more than Smith's report. The population of pika reported by Khatiwada (2004), 350 individuals per hectare in Langtang is very high figure in comparison to other researches. As that research seems to be extra effort during snow leopard study so proper attention of habitat and pika behavior were not taken into consideration. Kawamichi (1968) reported Pika in Gosainkunda do not make high and sharp call. He heard only very weak cries in winter season but in this study of rainy season two types of calling was recorded, calling in *O. rolyei* is less sharp than *O. macrotis* and six among eleven pikas were observed making call. Pikas are famous for their characteristic calls, they make calling for communication.

The synanthropic tendency is distinct in *O. roylei* (Kawamichi 1968). He reported, at Dewche village, they live within native houses, walls of which are made by a heap of rocks. They run through the interspaces of walls and their excrement is found on shelves in the sitting-room. Their daily life is spent in and around the houses, probably rather independent from natural conditions. Such trait was not observed in *O. macrotis* at Periche village. A few natives in

Dingboche, a village within the range of *macrotis*, told to the author that "Thyapo" (local name of pika) carried away potatoes and stalks and grains of wheat stored in their houses (Kawamichi 1971). In our observation *O. roylei* and *O. macrotis* had similar behavior as Kawamichi observed in Dingboche, Sagarmatha National Park but behavior reported by local people about *O. macrotis* was not observed in Gosainkunda route. Abe (1971) reported presence of three species in Gosainkunda region but as other researchers (Bishwas and Khajuria 1955, Deo *et al.* 2009, Kawamichi 1968) and we confirmed only two species currently.

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#### REFERENCES

Abe, H. 1971. Small Mammals of Central Nepal. *J. Fac. Agr. Hokkaido University, Japan, Sapporo*, **56**:403-406.

Altmann, J. 1974. Observational study of behavior: sampling methods. *Behaviour* **49**:227-265.

Bhattacharyya, S., B.S. Adhikari and G.S. Rawat. 2009. Abundance of royale's pika (*Ochotona roylei*) along an altitudinal gradient in Uttarakhand, Western Himalaya. *Hystrix It J. Mamm.* pp. 111-119.

Biswas, B. and H. Khajuria. 1955. Zoological results of the 'Daily Mail' Himalayan expedition, 1954, Four new mammals from Khumbu, eastern Nepal. *Proc. of the Zoological Society of Calcutta* **8**:26-29.

Deo, R.K., H.K. Shrestha, B. Khanal and S. Devkota. 2008. *A Study Vulnerability Assessment and Formulation of Climate Change Adaptation Strategies for Langtang National Park and Buffer Zone*. Socio-economic, Agro-Forestry and Environment (SAFE), Kathmandu, Nepal. pp. 13-53

DNPWC. 2012. <http://www.dnpwc.gov.np/protected-areas/national-parks/7-langtang-national-park.html>, November 27.

Hoffmann, R.S. and A.T. Smith. 2005. Oder lagomorphs. In: *Mammals Species of the World*. (eds.) Wilson, D.E. and D.M. Reeder. Johns Hopkins University Press, Baltimore, USA. pp. 185-211.

IUCN. 2011. *IUCN Red List of Threatened Species*. Version 2011.2. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

Kawamichi, T. 1968. Winter behaviour of the Himalayan Pika (*Ochotona roylei*). *J. Fac. Sci. Hokkaido University, Ser. VI. Zool.* **16**:552-554.

Kawamichi, T. 1971. Daily activities and social pattern of two Himalayan Pikas, *Ochotona macrotis* and *Ochotona roylei* observed at Mt. Everest. *J. Fac. Sci., Hokkaido University, Japan, VI, Zool.* **17**:587-609.

Khatiwada, J.R. 2004. The status of snow leopard and its conflict perception in Langtang National Park. M.Sc. Thesis, Central Department of Zoology, Tribhuvan University, Kirtipur, Kathmandu, Nepal.

Shrestha, T.K. 2003. *Wildlife of Nepal*. Tribhuvan University, Curriculum Center, Kathmandu. pp. 251-253.

Smith, A.T., N. Formozov, R.S. Hoffmann, Z. Changlin and M.A. Erbjajena. 1990. *The Pika Accounts of Genera and Species, Rabbits, Hares and Pikas. Status Survey and Conservation Action Plan*. Chapter 3, IUCN, Gland, Switzerland.

Tak, P.C. and B.S. Lamba. 1985. Nanda Devi National Park: A contribution to its mammalogy. *Indian Journal of Forestry* **8**:219-230.