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Notes and comments

Ground-dwelling birds near the Qinghai-Tibet highway and railway

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ABSTRACT

The Qinghai-Tibet highway and railway cross desolate habitat at elevations of over 4600 m. We assess specie richness and abundance of ground-dwelling birds using strip transects located at a variety of altitudes perpendicular to this transportation corridor. Bird richness, bird abundance, and abundance of rufous-necked snowfinch, were higher adjacent to the roadway than further way.

1. Introduction

Many studies assessing road effects on bird diversity have found a negative impact on bird richness and abundance that can be attribute to such things as increased noise, road mortality, and air pollution.[1] Other research, however, has found a positive or insignificant association between bird presence and roadways.

The Qinghai-Tibet highway and railway constitute the main transportation corridor through the Qinghai-Tibet Plateau. The highway was originally constructed in the early 1950s with the Golmud to Lhasa section completed in 2006. Two, mostly parallel roadways, begin in Xining, Qinghai Province, cross the Kunlun Mountains, Hoh Xil and Tanggula Mountains, and end in Lhasa, Tibet. Work evaluating the effects of these roadways on mammals, and especially the Tibetan antelope (*Pantholops hodgsonii*), have found that ungulates were habituating to the presence of the railway (e.g. Yang and Xia, 2008). Little is known, however, regarding the road effects on bird diversity in the region.

2. Methods

We surveyed birds along the parallel Qinghai-Tibet highway and railway in Hoh-Xil National Nature Reserve, Qinghai Province, China during July 2009. The elevations involved ranged from 4200 m to 6860 m above sea level. Dry, cold, and long winters, strong winds, and high levels of solar radiation characterize the local climate. The mean annual temperature is −8 °C with an extreme recorded low temperature of −46 °C. The main vegetation type is alpine grassland and meadow, entirely devoid of trees and shrubs. Because this region is sparsely populated, it is locally referred to as ‘no man’s land’.

We counted ground-dwelling birds along strip transects during July 2009. Before the census, we pre-observed the bird population and decided to only record birds within 25 m of each side of the transect center. Because of the sparse vegetation, this represents any almost a complete census of birds present. At each of 15 selected locations along the railway, we counted birds at five, 150 m long transects that paralleled the railway at distances of 0 m, 300 m, 600 m, 900 m, 1200 m (Fig. 1). Along

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[1] Trombulak and Frissell (2000) for example talk of roads as being ‘ecological traps’.

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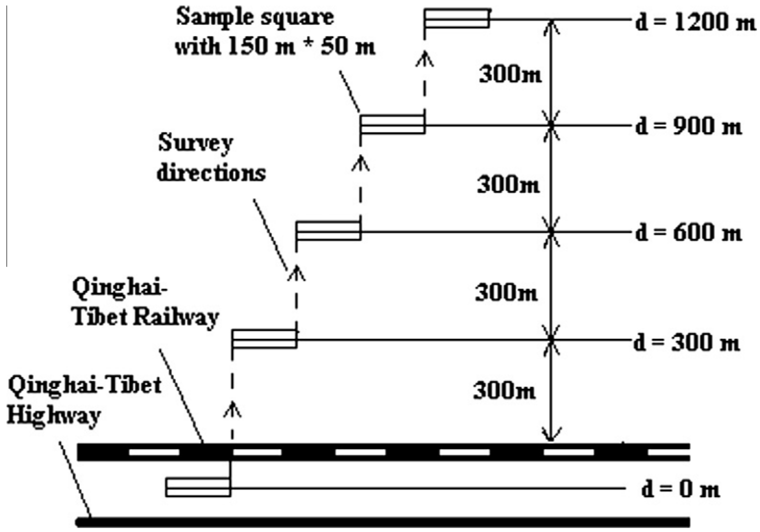

Fig. 1. Field bird censuses during the summer 2009.

each transect, we recorded species, number, behavior, and, where possible, sex and age of the birds. On the transect, we also recorded the number of pica holes that are considered shared shelters for ground-dwelling birds (MacKinnon et al., 2000). The censuses of each transect took no more than 15 min. A range finder and handheld global positioning system were used to estimate distances. Occasionally the censuses were halted due to inclement weather. In all we collected data from 68 transects.

Because the avian species composition was simple and abundance was low, we calculated 'species richness' as the number of species detected and 'abundance' as the number of bird individuals for each sample transect (150 m × 50 m). We did not use distance to analyze bird abundance, because the censuses of the sample transects represents a virtually complete picture of bird abundance. Bird abundance was normally distributed based on a one-sample Kolmogorov–Smirnov test, so we compared distances with analysis of covariance, using distance as a fixed factor and picas holes as the covariate. Because the species richness and the abundance of rufous-necked snowfinch were not normally distributed, we used a Kruskal–Wallis test to compare among distances making comparisons at a 5% significance level.

3. Results

We detected 98 individuals of seven types of ground-dwelling bird species: Tibetan ground tit (*Pseudopodoces humilis*), Tibetan lark (*Melanocorypha maxima*), horned lark (*Eremophila alpestris*), white-winged snowfinch (*Montifringillla nivalis*), plain-backed snowfinch (*M. blandfordi*), white-rumped snowfinch (*M. taczanowskii*), rufous-necked snowfinch (*M. ruficollis*). The rufous-necked snowfinch accounted for 45% of detections.

Both bird species richness and abundance differed with distances from the highway and railway (Fig. 2) with both being significantly higher near the roadways than further away, although the distance effect rapidly dissipated.

We compared the abundance of rufous-necked snowfinch at various distances from the roads. The result was similar, its abundance with close to the road was significant higher than those with other distances (see again Fig. 2) but when removing further away there was no significance difference between locations.

4. Conclusion

Although many studies found bird abundance decreased near roads, attributed to increased traffic noise, road mortality, air pollution, and heavy metal pollution, Laursen (1981) found skylark (*Alauda arvensis*) were more abundant near road edges because, he argued, they could more easily gain nesting sites and foraging opportunities on the verges. Similarly, we found abundance and richness of seven ground-dwelling bird species were greater near the Qinghai-Tibet highway and railway than further from these roadways.

Birds have been classified into two categories, species that are highly habituated to human activities and those with special habitat requirements (Fernandez-Juricic, 2001). Bird habituated to human activities are not afraid of humans, and may be attracted by the altered habitats or food resources provided by humans. Most of the seven ground-dwelling birds we detected appear to have got used to human activities.

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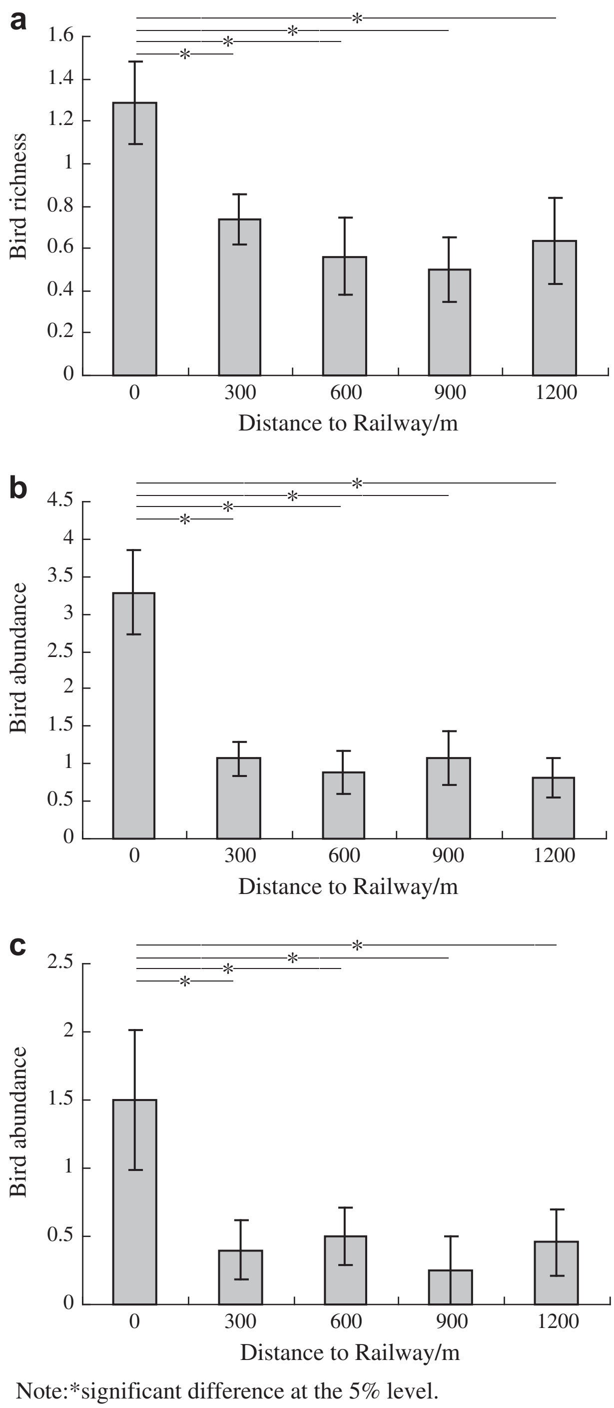

Fig. 2. Bird richness: (a) bird abundance, (b) abundance of rufous-necked snowfinch, (c) gradient distance to Qinghai-Tibet railway.

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