A Research Project Launched to Study the Synergistic Effect of Qinghai-Tibet Highway and Railway on Wildlife in Tibetan Plateau

By Yun Wang, Lei Guan, Xinjun Wang, Jiding Chen, and Yaping Kong, China Academy of Transportation Sciences

Qinghai-Tibet highway is a low-volume, narrow highway connecting Golmud and Lhasa that was built in 1950. This highway runs along the western boundary of Kekexili National Nature Reserve and the eastern boundary of Sanjiangyuan National Nature Reserve in the Tibetan plateau, which is home to a large variety of endemic species under Chinese state protection, such as Tibetan antelope (*Pantholops hodgsoni)*, Tibetan gazelle (*Procapra picticaudata*), Wild Yak (*Poephagus grunniens*), and Kiang (*Equus kiang*). The Tibetan antelope is of particular concern because it migrates annually between the Kekexili and Sanjiangyuan National Nature Reserves, crossing this highway at least twice within a year. With the economic development of Tibet in recent years, the traffic volume has been growing gradually, so the effect of the highway on Tibetan antelope and other species has become a concern.

In July 2006, a railway was constructed almost in parallel with Qinghai-Tibet highway. The distance between them is variable, but is less than 3km in most sections. Whether there has been a synergistic effect of the railway and highway on wildlife is unclear. According to the expressway network planning documents released by Ministry of Transport of China, a Qinghai-Tibet expressway will be built in the future. Therefore, it is of pressing importance to understand the synergistic effects of the existing railway and highway on wildlife in order to inform the Government's scientific decision-making and protective measures. Our institute initiated a research project granted by Chinese Ministry of Transport and Ministry of Science and Technology in 2014. Here, we present this year's preliminary results.

Tibetan antelope migrate westward in May and move eastward in August, so field investigations along highway were carried out during this time period. In winter, large amounts of snow cause wildlife to move away from the mountains and closer to the highway and railway. Therefore, we elected to investigate wildlife in December as well. Thus, three field investigations were done in 2014. We focused on the 100 km section of highway from Kunlunshankou to Wudaoliang where most wildlife live and are easy to observe while driving. We recorded the species richness, abundance, and frequency of emergence of the four main ungulates. The results showed that Kiang, Wild Yak and Tibetan antelope occur less frequently in the area between the highway and railway than on the roadside (Figures 1, 3). This was especially true of Tibetan antelope, which only once were recorded on the location between highway and railway (Figures 2, 3). However, the frequency of emergence of Tibetan gazelle showed no significant difference between the two locations (Figure 3). In terms of abundance, the number of emerging individuals of the four ungulates at the highway roadside was much higher than the location between highway and railway (Figure 4).

Figure 1. Kiang browsing in the area between Qinghai-Tibet highway and railway

By the monitoring at bridges and culverts along the railway with infra-red cameras from August to December in 2014, Wolf (*Canis lupus*), Grey-tailed rabbit (*Lepus oiostolus*), Corsac fox (*Vulpes corsac*), Tibetan fox (*Vulpes ferrilata*), Tibetan gazelle, and Mustelidae species (undefined) were recorded when crossing the railway by culverts, and Wild Yak, Kiang, Tibetan antelope, Tibetan gazelle, Wolf, Grey-tailed rabbit, Corsac fox, Tibetan fox, Mustelidae species (undefined) and lynx *(Felis lynx*) were observed crossing the railway by bridges (Figure 5). In addition, by visiting the Kekexili Nature Reserve offices and interviewing some of the drivers or workers who maintain the highway, we discovered that dozens of wildlife were killed by vehicles in the highway in 2014, including brown bear (*Ursus arctos*), Kiang, Tibetan antelope, Tibetan gazelle, Corsac fox, Tibetan fox, etc. The collisions mainly happened at dusk, dawn or night.

This is an ongoing research project and we look forward to making more progress in the next year.

Figure 2. Tibetan Antelopes crossing Qinghai-Tibet highway

RESEARCH continued on page 5

RESEARCH continued from page 4

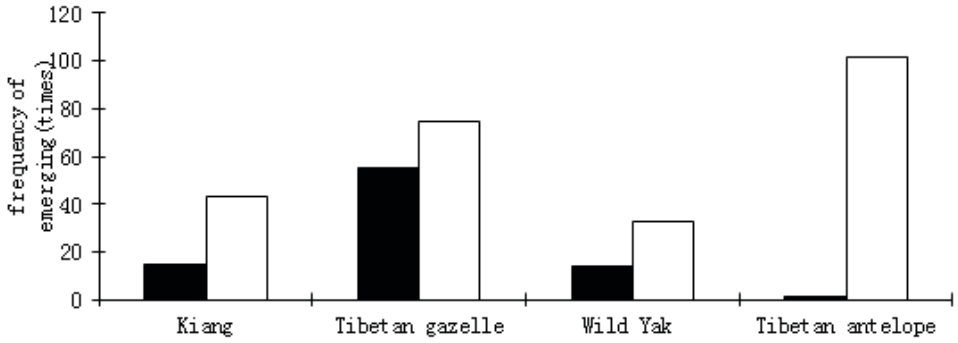

Figure 3. Emergence frequency of four large-sized mammals along Qinghai-Tibet highway and railway (black column indicates emerging location between highway and railway, white column indicates number emerging on highway roadside)

Figure 4. Number of individual emergences of four large-sized mammals along Qinghai-Tibet highway and railway (black column indicates emerging location between highway and railway, white column indicates emerging on roadside of highway)column indicates number emerging on highway roadside)

Figure 5. Wolf crossing the bridge along Qinghai-Tibet railway