Development of a Deterrent Sound for the Prevention of Deer-Train Collisions

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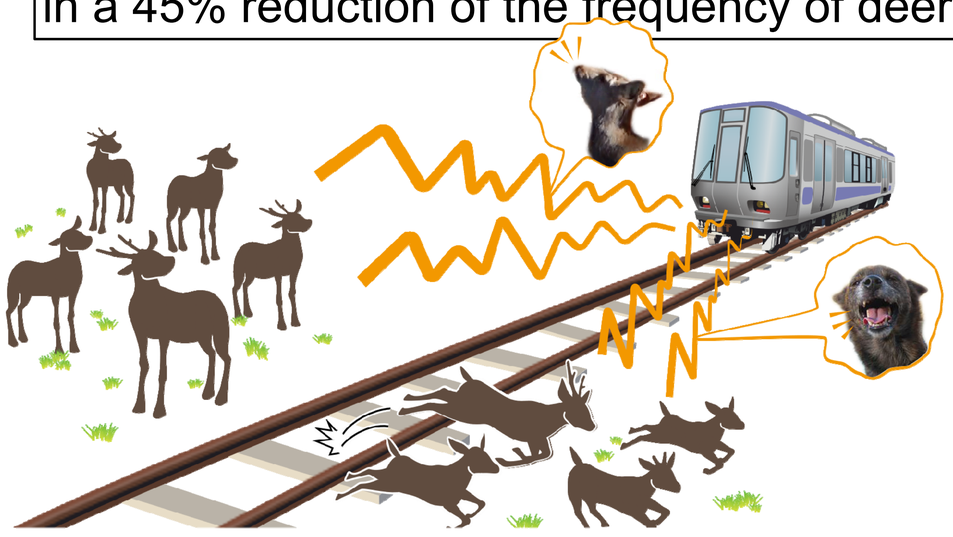
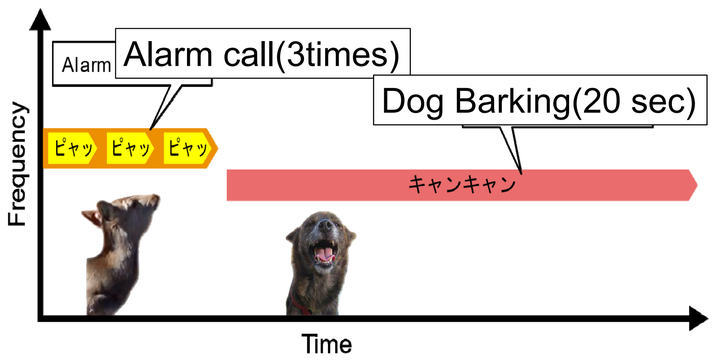
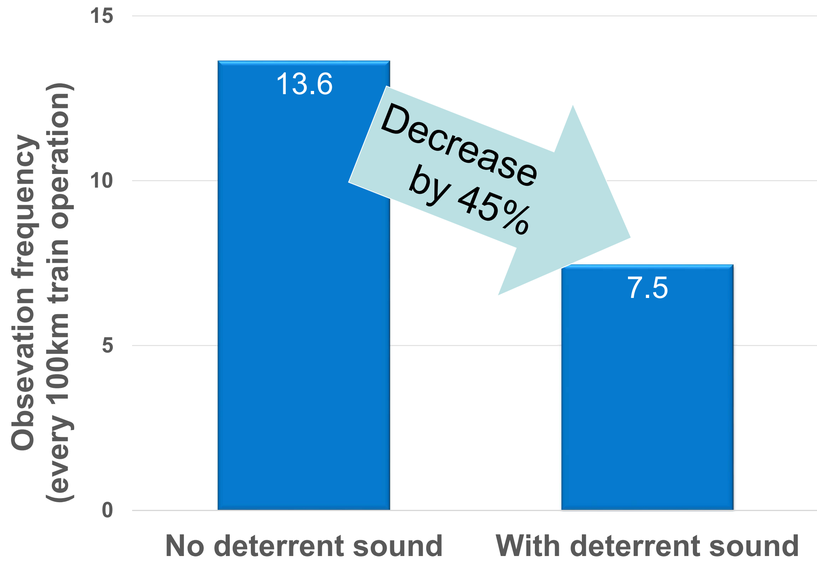
Deer-train collisions have become a serious problem in Japan. To keep deer away from tracks, we have invented a deterrent sound and investigated its effectiveness. It consists of a deer alarm call and vocalization of a dog. It is observed that playing the deterrent sound at deer being around a track made them run away immediately. According to a survey on the frequency of the observation of deer, playing the deterrent sound from a train resulted in a 45% reduction of the frequency of deer that were observed every 100 km track.

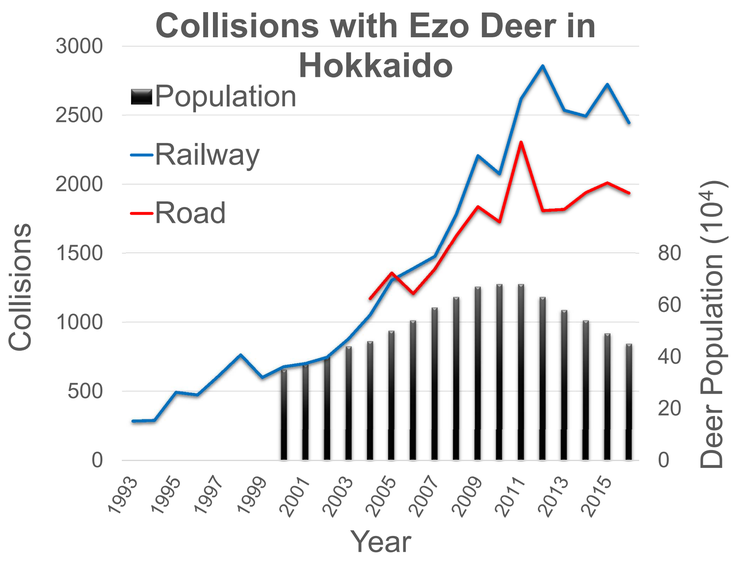




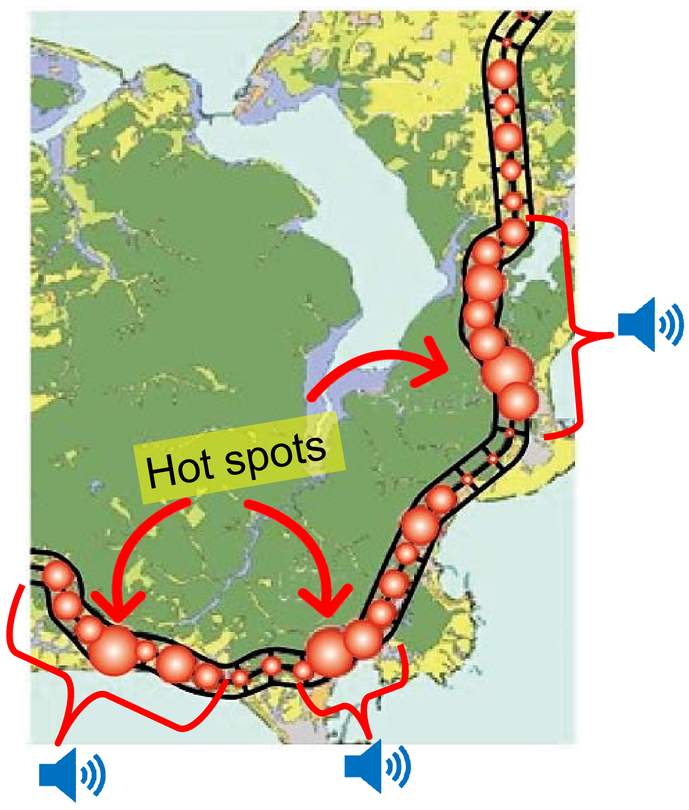


Introduction

The number of deer-train collisions has increased rapidly over the last decade despite multiple measures introduced by railway companies: fence construction, and/or spraying repellents along railway tracks; flashing lights to warn train drivers when a deer has entered the tracks; adjusting train timetables and introducing speed restrictions in the light of collision records, etc. New countermeasures are therefore needed, especially those that take into account deer behavior and movement characteristics.



Analysis of Collision statistics



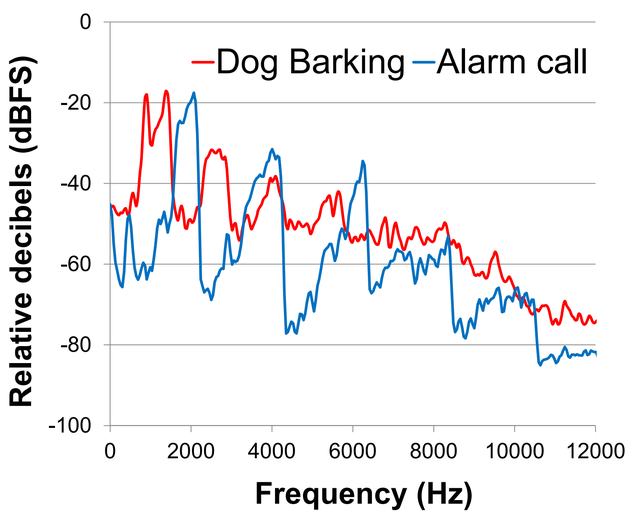
The deterrent sound was designed to be played back from a train. A 55-km-long section was chosen for the test out of the 135-km-long line. For the playback, an audio system was installed in a train and a speaker was settled at both ends of the train.

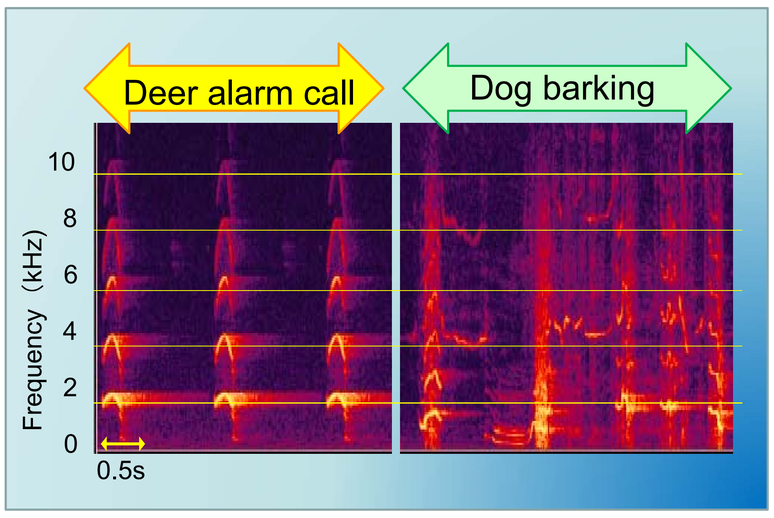
Evaluation of the deterrent sound

The deterrent sound was designed to be played back from a train. During 7 days of train runs with sound being emitted, deer were observed 82 times over the total of 1100 km covered by train runs along the test sections. Deer were seen 90 times over a total of 660 km from trains without the sound being emitted over the 4 days of control experiments. These results confirmed that the frequency in deer sightings (deer sightings/100 km of train operation) fell to 7.4 with the sound emissions from 13.5 without any sound emission

Installation of speaker to a train

Development of acoustic deterrent consisting of deer alarm calls





Some studies suggest that playing back deer alarm calls from a vehicle can alert deer and prevent them from entering roads. Although alarm calls alert deer, they do not necessarily cause the deer to move from and/or leave the roads. To prevent deer – train collisions however, it is necessary for the deer to clear the railway track immediately after becoming aware of the approaching train. It is known that deer fear dogs, and therefore dog barking were added to the deterrent sound after the deer alarm call.

Conclusions

This report describes a new countermeasure to prevent deer-train collisions by means of an acoustic stimulus, “deterrent sound,” consisting of deer alarm calls and dog barking. The acoustic deterrent can therefore serve as a reliable countermeasure to the collisions.

The study was partly performed in collaboration with Hokkaido Development Engineering Center.
(These results were published in QR of RTRI (Vol59, No.3). Download site: https://www.rtri.or.jp/publish/qr/2018/qr1803_J.html)