

Risk and deterministic factors effecting bear train collisions along the Canadian Pacific Railroad

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Train collisions are the largest source of human caused grizzly bear (*Ursus arctos*) mortality in the Canadian Mountain parks and make up 5% of total mortality in Alberta based on long term monitoring data over the past eighteen years. The spatial distribution of train collisions with grizzly and black bear (*Ursus americanus*) were compared to that expected based on relative abundance and historic data. Ratios of observed to expected mortality were calculated to reveal non-constant risk and spatial clustering along 133 kilometers of the Canadian Pacific Railroad in Banff and Yoho National parks. These results were used to identify high risk rail segments and analyze a set of spatially varying risk factors including: train speed, track curvature, and track grade. Akaike Information Criterion was used to assess the model which best described mortality risk from an *a priori* model set. Analyses were repeated at four spatial scales (0.25, 1.6, 3.2, and 16.0 km). These analyses indicated that a single predictor model, which included track curvature, best explained bear-train collision risk. These results may aid in planning and design of railroad twinning and construction as many countries move to more sustainable transportation systems.