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**CHRISTOPHER M. PAPOUCHIS - EFFECTS OF INCREASING RECREATIONAL ACTIVITY ON DESERT BIGHORN SHEEP IN CANYONLANDS NATIONAL PARK, UTAH**

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**Abstract:** The deserts of the southwestern U.S. have experienced a staggering growth in human visitation in recent years, with National Parks bearing a significant portion of the increase, including Canyonlands National Park, Utah, where recreational visitation increased 325% from 1979 to 1994. To gauge the impacts of this increase on desert bighorn sheep (*Ovis canadensis nelsonii*) in the Canyonlands NP, we compared their behavioral responses to recreational activity between a heavily-visited area and a lightly-visited area during 1993 and 1994. We found hikers caused more severe responses in desert bighorn sheep (animals fled in 61% of encounters) than vehicles (17% fled) or mountain bikers (6% fled) ( $P < 0.0001$ ), apparently because hikers were more likely to be in unpredictable locations and sometimes approached sheep. Our findings suggested bighorn sheep in the heavily-visited area were habituating, to some degree, to road traffic as evidenced by a lower average response times to vehicles ( $P = 0.039$ ), lower frequency of visible responses to bicycles ( $P = 0.054$ ), and lower frequency of responses by ewe groups in the spring ( $P = 0.062$ ) when compared to the lightly-visited area. We speculated the reduced responsiveness resulted from an increased avoidance of the road corridor by sheep; bighorn sheep groups in the heavily-visited area were found, on average, 39% farther from the roads than in the lightly-visited area ( $489 \pm 19\text{m}$  versus  $353 \pm 36\text{m}$ ,  $P = 0.001$ ). This avoidance of the road corridor in the heavily-used area represents a 15% increase in loss of suitable habitat over the lightly-used area. We observed an increased responsiveness to hikers in the heavily-used area by ewes and ram groups during critical spring and fall seasons ( $P < 0.05$ ). Other factors determining behavioral responses to disturbance are discussed.

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