The Suitability Of GPS Wildlife Collars For Studying Coastal Habitat Use By Mountain Goats

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Abstract: During winter, mountain goats (*Oreamnos americanus*) in coastal British Columbia and Alaska are known to use lower elevation forests relative to other seasons. While conventional radiotelemetry is one viable method for studying coastal goats, signal reflection, reliance on clear weather, and harassment of goats during critical winter or kidding periods, all present shortcomings. GPS offers a potential solution to these problems, yet introduces others. Some of the most challenging environments for GPS fix acquisition, namely incised, heavily forested valleys, exist within coastal goat habitat. Even in much less demanding environments, fix likelihood bias is known to exist. While habitat researchers have become aware of this, few have corrected for potential bias within their habitat selection studies. I collared 4 mountain goats within the Stafford River Valley on the mainland coast of B.C. as a test of GPS wildlife collar performance in challenging terrain, and to explore the consequences of GPS fix likelihood bias for habitat selection studies. I also tested the repeated fix success of similar collars placed at other sites, varying in forest canopy and topographical relief. After leaving these stationary collars to attempt fix locations over a 24 hour period, I determined the percentages of 2D, 3D and unsuccessful fixes. I combined digital elevation models with an ArcAvenue GIS script to quantify available windows of satellite "sky" that were accessible from each test location. This measure, combined with surveyed and digitized habitat variables, allowed me to calculate multiple regression equations to successfully predict variability in GPS fix likelihood. Using these ground truthing equations in a GIS, I determined the likelihood of obtaining a GPS fix within any portion of the Stafford River study area, and was therefore able to match each individual animal's locations directly to GPS fix probability. Observed GPS fix rates from collared animals were correlated to that predicted from regression equations ($R^2 = 0.60$). I then applied a simple and conservative correction factor to each fix location and conducted an analysis of mountain goat forest habitat selection with corrected and uncorrected 3D data. My results show that researchers must account for GPS fix likelihood bias in mountain environments or erroneous and sometimes opposite selection interpretations can result.