A Model for Outdoor Recreation Use with Applications to Evaluating Survey Estimators

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The model ORUS (Outdoor Recreation Used Simulator) has been developed to simulate survey data currently being collected by the National Visitor Use Monitoring (NVUM) Project's survey of the National Forests of the U.S. Statistical distributions are presented to represent the various behaviors of recreationists during their visit to a recreation site. Four distinct types of recreationists are defined, depending on the type of site that is being surveyed. This includes developed day use sites (DUDS), overnight use developed sites (OUDS), general forested area sites (GFA) and wilderness sites (WILD). The beta distribution is used to model arriving times and last exiting times for recreationists from each of these site types. The number of out/in movements from the site is determined by the Poisson distribution while their times are selected randomly according to the uniform distribution defined over each individual recreationist's length of stay. Finally, three trap shy behaviors are assigned to the recreationists to quantify their probability of capture by the interviewer. This reflects their diminishing probability of being voluntarily interviewed by the survey crew upon exiting the site with each successive capture. An example of typical data generated under a hypothetical simulated site is presented and explained. In addition, the site visit estimator is evaluated for bias and variance properties under several different scenario sites to illustrate the theoretical aspects of the model. Then, to represent a more realistic situation, the simulation model is fitted to the first two years of the NVUM survey data. The parameters of the beta distribution for arriving and last exiting times are estimated by the method of moments for recreationists from each of the four site types. Arriving and departing times from approximately 33,000 interviewed recreationists were used in the estimating procedure. Site visitation estimates from a cross section of the first two years of surveyed sites were selected and the bias and variance properties of the estimates evaluated with the ORUS simulator.

Key Words: National Visitor Use Monitoring, NVUM, trap shy, last exiting recreationist, ORUS, simulation