



## **A Time-Step Nonlinear Model of Cattle Site Preference in Northeastern Oregon and Western Idaho**

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Cattle producers of Oregon and Idaho are interested in ensuring the long-term health and productivity of their lands while producing livestock products and maintaining important environmental benefits such as healthy watersheds. In order to do this, producers must know the areas that are preferred by cattle, relative amount of time spend on various range sites, and routes animals use when going from site to site. The objective of our study was to identify range sites that were preferred by free-roaming cows and to develop a predictive model of livestock site preference. Sixty cows were collared with store-on-board GPS receivers set to collect a location every 5 minutes. Animals represented numerous ranches and herds but all grazed summer ranges typified by remote and rugged landscapes throughout Wallowa, Union and Baker Counties, Oregon and Adams and Washington Counties, Idaho. Lands were classified into range sites based on plant communities and topography. A series of time-step non-linear multi-criteria models were developed in the KRESS modeler software package using topographic variables, relative greenness from satellite imagery, and distance from water, among other variables to indicate relative site preference. Track logs from 30 animals were used to build and refine models while the remaining track logs were used to evaluate and test the derived models. We used the area under the Receiver Operating Characteristic (ROC) curve in the evaluation of models and to rate relative accuracy. Cooperating producers were provided maps that indentified sites on the landscape with high preference for free-roaming cattle.

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