

Distribution and habitat associations of forest carnivores and an evaluation of the California Wildlife Habitat Relationships Model for American marten in Sequoia and Kings Canyon National Parks

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Abstract:

Concern for the conservation of American marten (*Martes americana*) and fisher (*Martes pennanti*) in California has increased in recent years and was the impetus for surveys conducted in Sequoia and Kings Canyon National Parks between 2002 and 2004. Track plates and remote cameras were used to detect carnivores at sites ($n = 79$) ranging in elevations from 600 to 3,500 m. Distribution patterns for marten and fisher exhibited similarities to historic records. Martens were detected at 36.7% of sites between 1,800 and 3,340 m across a relatively broad geographic area. Habitat types at sites with martens included Sierran mixed conifer (28%), red fir (24%), lodgepole (21%), montane riparian (10%), subalpine conifer (10%), and barren (7%). Martens were detected most often at sites dominated by trees with ≥ 61.0 cm dbh (59%) and $\geq 40\%$ canopy cover (72%), but a few detections occurred at high elevation sites with boulder cover. Fishers were detected at only 11.4% of sites from 1,000 to 2,870 m in the western half of the Parks. Fishers occurred at sites in Sierran mixed conifer (56%), foothill hardwood-conifer (11%), montane hardwood (11%), white fir (11%), and subalpine conifer (11%) habitat types, with most detections at sites dominated by trees of ≥ 61.0 cm dbh (67%) and $\geq 40\%$ canopy cover (100%). Eight other species of carnivore were detected, but wolverine (*Gulo gulo*) and Sierra Nevada red fox (*Vulpes vulpes necator*) were notably absent from surveys. Conservation plans for marten and fisher in the southern Sierra Nevada should include the Parks within a larger regional network of suitable habitat. Habitat models have become increasingly popular as tools to assist wildlife biologists in predicting species occurrence and identifying habitat for conservation. Numerous models have been created, but few have been evaluated with independent data. Surveys for forest carnivores in Sequoia and Kings Canyon National Parks provided presence-absence data to evaluate the California Wildlife Habitat Relationships model for American marten. Martens were primarily detected in habitat types accurately identified by the model, with the exception of a few detections in barren habitats with boulder cover at high elevations not predicted as suitable. In general, probability of marten occurrence increased with increasing suitability values. Correct classification ranged from 37 to 63% depending on the cut-points and criteria used; it improved up to 71% when suitability of Sierran mixed conifer was increased and optimal cut-points were applied. Association between marten occurrence and suitability values from the model was positive ($r_s = 0.52$, $P = 0.06$), but again improved with increased suitability of Sierran mixed conifer ($r_s = 0.71$, $P = 0.01$). Raising the predicted suitability value of Sierran mixed conifer tree size class 6 (mature, multilayered forest) from medium (0.66) to high (1.0), making adjustments to the barren category, and further incorporating and quantifying habitat elements would likely enhance the accuracy and usefulness of the model for biologists involved in managing lands in this region.

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