Ensemble Habitat Suitability Modeling to Guide Conservation of Black-Backed Woodpeckers

Quresh S. Latif*, Rocky Mountain Research Station, U.S.F.S., Montana State University Campus, Bozeman, Montana 59717

Victoria A Saab, Rocky Mountain Research Station, USDA Forest Service, Montana State University Campus, Bozeman, Montana 59717

Jonathan G. Dudley, Rocky Mountain Research Station, USDA Forest Service, Boise, Idaho 83702

Jodie E. Canfield, Gallatin National Forest, USDA Forest Service, Bozeman, Montana 59771

Conservation of black-backed woodpecker (*Picoides arcticus*), a burned-forest specialist, is challenged by the unpredictable availability of suitable habitat. Habitat models calibrated with data from previous wildfires can be used to predict habitat suitability in newly fire-affected areas. Predictive accuracy of habitat models depends on how well statistical relationships reflect actual ecological relationships. We predicted habitat suitability for Black-backed Woodpecker at Montana post-wildfire forests (≤ 6 years postfire) east of the continental divide using models calibrated with nest location data from wildlfire locations in Idaho, Oregon, and Washington. We developed 6 habitat models, including one partitioned Mahalanobis model, two Maxent models, and 3 weighted logistic regression models with combinations of seven environmental variables describing burn severity, topography, and pre-fire canopy cover. We converted continuous habitat suitability indices (HSIs) into binary predictions (suitable or unsuitable) and combined predictions using and ensemble approach; we compiled the number of models (0–6) predicting locations (30×30-m pixels) as suitable. Habitat models represented different hypotheses regarding true ecological relationships, making inferences from ensemble predictions robust to uncertainties in the form of these relationships. Thirty-five percent of the area burned by eastside Montana wildfires was predicted suitable by either all seven habitat models or none of them (i.e. complete agreement among models). We recommend conservation of areas (e.g., exclusion of post-fire salvage logging) that were consistently predicted suitable by most models, e.g., 32 percent of burned areas predicted suitable by ≥ 5 models. Additionally, we recommend surveying areas where models disagree to help validate and refine models.