226

Integrated population models for focal wildlife species inform landscape-scale forest restoration

Human activity has disrupted the dynamics of environments across the globe, altering ecosystem function in the face of global change. In the USA, landscape-scale forest restoration efforts on public lands aim to create more resilient ecosystems by re-introducing processes (e.g., fire) altered by human activity. These programs track the outcomes of restoration using population trends of focal wildlife species that serve as one proxy for forest ecosystem recovery. However, landscape-scale restoration efforts are in their infancy, with many beginning in the last decade, and have just begun to generate enough data to address whether these efforts lead to restored ecosystem states. The data collected for these projects usually includes information on landscape conditions and on the populations of focal wildlife species, often birds. Combined, these data sources can tell a more complete picture of focal species' trends than any single data source; thus, creating integrated population models (IPMs), informed by multiple habitat and wildlife data sources, may be key to more informed management decisions. In this project, we evaluate the efficacy of three landscape-scale restoration projects located in Oregon and Idaho, USA. We compiled 10 years of data from multiple sources (nest survival, productivity, habitat use, and adult occupancy) to understand the effects of forest restoration efforts (e.g., tree harvesting, prescribed burning) on a focal species, the white-headed woodpecker (Dryobates albolarvatus). Using a Bayesian framework, we fit an IPM to multiple habitat and bird population data sources generated under a Before-After-Control-Impact (BACI) monitoring framework. We find that restoration efforts have an impact on key demographic states, including egg and nestling survival, and that these impacts depend on restoration effort type (tree harvesting or burning). We use the results from this Bayesian IPM to examine the effects of landscape restoration efforts on population trends of the white-headed woodpecker. The outcome of this study provides evidence of the efficacy of the restoration efforts in question and identifies population parameter thresholds for management decisions. This study also provides a model for data analysis and integration for landscape-scale restoration efforts that rely on focal species to evaluate the effectiveness of forest restoration activities.