RUFFED GROUSE POPULATION VIABILITY AND HABITAT DISTRIBUTION IN RHODE ISLAND: IMPLICATIONS FOR MANAGEMENT OF A DECLINING POPULATION

BY

ERIK J. BLOMBERG

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTERS OF SCIENCE

IN

ENVIRONMENTAL SCIENCES

UNIVERSITY OF RHODE ISLAND

2007

Abstract

Current land use and management practices in the northeastern U.S. restrict several forms of natural disturbance that were historically important for sustaining early successional habitats. Consequently, many species that depend on early successional forest habitat have declined in response to advanced forest maturation. The ruffed grouse (*Bonasa umbellus*) is an early successional specialist whose populations have declined substantially in response to habitat loss. The need for habitat manipulation to benefit ruffed grouse conservation is apparent, but such management actions are often controversial, and thus require strong justification. In situations where timely support for management is needed, quantitative models are useful tools to assess management options and provide support for decision-making. We used quantitative methods to develop habitat distribution (Chapter 1) and population viability (Chapter 2) models for a declining population of ruffed grouse in southwestern Rhode Island. Our goal was to investigate the influence of habitat availability and distribution on grouse population dynamics in order to support management decisions at a landscape scale. We used radiotelemetry and GIS data to construct a partitioned Mahalanobis D^2 model that identified probable habitat distribution for ruffed grouse. The final model predicted the distribution of ruffed grouse habitat for a 735 km^2 landscape in southwestern Rhode Island. Using this spatial data, and ruffed grouse demographic data derived from the literature, we constructed stochastic simulation models of ruffed grouse population viability that were spatially explicit for southwestern Rhode Island. We used single parameter perturbations to analyze baseline model sensitivity to key parameters, and predicted

population response to habitat manipulation by simulating management in the study area. Baseline models predicted median times to population extinction of <50 years. Perturbation analysis showed that models were sensitive to estimates of survival and recruitment, and variation in adult annual survival had the greatest influence on baseline model results. The rate of external recruitment via juvenile dispersal to managed areas had a large influence on habitat management effectiveness, and the total area of available habitat was more important than habitat configuration in determining population persistence at both patch and landscape scales. Based on our population viability models, we predict that ruffed grouse populations in Rhode Island are likely to continue to decline toward extinction without management intervention. To be most effective, ruffed grouse management in the state should focus on improving ruffed grouse survival and reproduction, and maximizing the exchange of juveniles between patches of high-quality managed habitats. We suggest that managers should follow established forest management guidelines to create large areas of high quality ruffed grouse habitat in order to accomplish these goals.