

**RUFFED GROUSE
ECOLOGY AND MANAGEMENT
IN THE APPALACHIAN REGION**



**Final Project Report of the
Appalachian Cooperative Grouse Research Project**

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RUFFED GROUSE ECOLOGY AND MANAGEMENT IN THE APPALACHIAN REGION

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EXECUTIVE SUMMARY



Ruffed grouse populations have been declining throughout the Appalachian region for several decades. The Appalachian Cooperative Grouse Research Project (ACGRP) was established in 1996 by state natural resources agencies in the region to investigate potential factors limiting ruffed grouse populations. Hunting, particularly late season impacts, has been suggested as a potential cause of declining grouse numbers. Additionally, wildlife managers have suggested that the quantity and quality of ruffed grouse habitats have declined in recent decades.

Initial study sites and cooperators included Ohio, Kentucky, West Virginia, Maryland, and Virginia. Subsequently, sites and cooperators were added in Pennsylvania, North Carolina, and Rhode Island. Cooperators included state natural resource agencies and university wildlife programs from each state. Regular meetings were held to ensure that data were collected consistently across all study sites; the synergistic

nature of the project ensured that the overall findings resulting from 12 study sites in 8 states would be greater than what could have resulted from any individual study area. The objectives of the ACGRP were to:

1. estimate survival rates and identify limiting factors for ruffed grouse populations,
2. estimate reproductive rates and identify limiting factors to reproduction,
3. determine if harvest mortality is compensatory or additive, and
4. evaluate habitat selection and quality.

Data were collected on 3,118 ruffed grouse captured on the 12 study sites from September 1996 through October 2002. Our general results indicated that the ecology of Appalachian ruffed grouse differs from northern ruffed grouse populations (i.e., Great Lake States) where aspen offers good food and aspen forest management creates an abundance of cover. Adult survival tended to be higher in the Appalachians, but

reproductive success was lower. Within the Appalachians, we found that grouse populations differed between areas dominated by mixed-mesophytic cover types and oak-hickory dominated sites. Specific, significant findings of the ACGRP include:

- Spring pre-breeding diets in Great Lake States ruffed grouse were dominated by aspen buds whereas in the Appalachians diets were more variable, with oak mast, herbaceous and evergreen leaves, and flowers being most prevalent. Appalachian diets tended to be of lower nutritional quality than that of northern birds feeding on aspen.
- The nutritional condition of females in the Appalachians prior to nesting was quite variable, and body fat levels showed a strong relationship to acorn availability, with higher body fat being found where acorns were available. When female body fat was less than 11% chick survival was lower.
- Cameras set on nests documented 5 nest depredation events by 3 species of mammals, and nest predation may impact overall nesting success.
- Nest success ranged from 52% to 87% across the sites and years studied. Successful nests tended to be over 100 m from openings in pole-size timber stands with dense understories.
- Chick survival was extremely low compared to studies from other areas. Chick survival to 35 days averaged 22%. Chick survival was higher on mixed-mesophytic sites (35%) than on oak-hickory dominated sites (21%).
- A radio-telemetry study of chick survival found that mortality of 118 chicks was evenly distributed between exposure (44%) and predation (44%).
- Nest and re-nest rates were lower in oak-hickory areas (86% and 3.2%, respectively) than in mixed-mesophytic sites (100% and 45%, respectively).
- Overall adult survival was 43% across all sites and years. Annual survival rates were higher on oak-hickory sites (50%) than mixed-mesophytic sites (39%). Survival was higher in the spring-summer period and lower in fall-winter, and did not differ between age or sex classes.
- We conducted a hunting experiment on 7 sites over the 6-year study. On 3 treatment sites hunting was closed the last 3 years of the study. These 3 sites had the highest hunting mortality rates during the first 3 years of the project. The other 4 sites served as control sites where hunting occurred throughout the study. Survival generally increased during the last 3 years of the experiment on both treatment and control study sites. However, we did not find evidence of an interaction effect or larger than expected increases in the treatment sites where hunting had been closed. We concluded that hunting mortality on these sites was compensatory. Hunting

was only 12% of all mortality on average, and ranged from 0% to 35% across sites and years; we cannot conclude or infer that hunting would be compensatory at higher harvest rates.

- The primary cause of adult mortality was avian predation (44%) followed by mammalian predation (26%). A wide diversity of predators was observed on the study sites; only owls and Cooper's hawks sightings showed a relationship to predation rates of ruffed grouse.
- Ruffed grouse generally selected early successional habitats, or sites that had the high stem densities characteristic of early successional habitats. Females with broods selected sites that had higher than average herbaceous cover and greater arthropod abundance than random sites.
- Home ranges were calculated for 1,054 grouse based on 67,814 telemetry locations. Adult and juvenile females and juvenile males had larger home ranges than adult males. Females with broods had larger home ranges (39 ha) than females whose broods failed (15 ha). In oak-hickory sites, both female and male home ranges increased following years of acorn failure (20 ha to 52 ha in females and 7 to 27 ha in males).

Management suggestions include:

- Maintain current harvest levels and seasons; populations are not limited by current hunting levels.
- Increases in populations are most likely to come from habitat management. In mixed-mesophytic areas "traditional" early successional grouse management will likely be successful. This should emphasize using timber harvest techniques that will provide a diversity of young-aged stands interspersed among mature forests.
- In oak-hickory dominated sites, forest management should strive to provide both food (acorns) and cover (early successional habitat) needs of grouse in close proximity. Clearcutting, shelterwood, two-age, and group selection silviculture offers managers alternatives to create these contrasting needs of acorns from mature oak trees in association of cover from young stands.
- Roads can be managed by gating and planting preferred herbaceous foods to supplement existing natural foods.

ACGRP Cooperators

