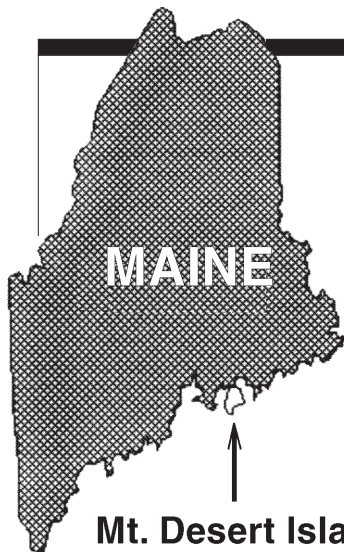




Mt. Desert Island

By ALLAN F. O'CONNELL, JR., FREDERICK A. SERVELLO, AND SCOTT D. WHITCOMB

National Park Service managers need reliable scientific data to protect park resources. Yet information needs often extend beyond NPS boundaries and include other public and private lands. Increasingly fragmented landscapes and a scarcity of current inventory and monitoring data increase the difficulty of protecting and managing park natural resources. These circumstances are particularly true in the northeastern United States where park areas are typically small and often within an urban or suburban setting and landscapes are characterized by diverse land-ownership. Even Acadia National Park (the only national park in the northeastern United States) has a highly fragmented boundary. Located mostly on Mount Desert Island (see locator map), the park can be affected by adjacent land use practices, because 56% of Mount Desert Island does not lie within the park boundaries.

Spruce grouse (*Dendrapagus canadensis*), a common gallinaceous bird of the North American boreal forest, reach their southeastern range limit on Mount Desert Island (fig. 1). Once believed common on the island, this species was thought to have been extirpated in the late 1800s due to land use changes and human impacts. Throughout the 1980s, however, park visitors filed approximately a dozen unverified reports of the bird.

In that Acadia National Park comprises less than half of Mount Desert Island's area, potential spruce grouse habitat reaches beyond park boundaries. As a result, park spruce grouse demographics

SPRUCE GROUSE ON MT. DESERT ISLAND

Fragmented habitat complicates species management

are likely influenced by the grouse population outside the park. Uncertainty over the status of the population resulted in a park request for funds to document the bird and gather current local ecological information. In this study, we attempted first to document the existence of spruce grouse on Mount Desert Island; later we estimated population size, distribution, and productivity, and evaluated habitat occupancy and dispersal.

METHODS

Spruce grouse are conifer specialists and inhabit different conifer types depending on locality and latitude. Researchers in the Adirondacks of northern New York (also along the southeastern edge of spruce grouse range) found that this grouse is restricted to patches of low-land conifer habitat (black spruce and tamarack [*Picea mariana* and *Larix laricina*, respectively]) (Fritz 1979). We delineated all black spruce-tamarack habitat on Mount Desert Island using aerial photographs and vegetation maps. Although mature spruce-fir upland is considered marginal habitat for spruce grouse,

we also selected 22 spruce-fir sites in order to fully evaluate local occupancy of all conifer habitat.

We conducted *call-back surveys* (listened for vocal responses to broadcast tape recorded grouse calls) along transects to locate grouse and estimate population size. We captured individuals with telescoping noose poles, marked each with colored, numbered leg bands, and outfitted females and juveniles with radio transmitters (fig. 2). We grouped potential habitat patches into three categories: large (> 26 ha or 64.2 acres), medium (10-26 ha or 24.7-64.2 acres), and small (4-10 ha or 9.9-24.7 acres). We used a minimum of 4 ha (9.9 acres) to evaluate patch occupancy based on known spruce grouse home range requirements. Finally, we determined spatial characteristics of patch occupancy by using digital data produced from vegetation maps and a personal computer version of Arc-Info software.

RESULTS AND DISCUSSION

Minimum breeding population estimates for spruce grouse on the island were 72 in 1992 and 56 in 1993. During our



Figure 1. Believed extirpated on the island since the late 1800s, the spruce grouse has been reported occasionally within Acadia National Park since 1980. The study estimated a minimum 1993 breeding population of 56 of the forest dwelling individuals living both within the national park and on nearby private lands.



Figure 2. The wildlife study called for marking birds with colored, numbered leg bands and necklace-mounted radio transmitters for subsequent identification. Study grouse preferred larger habitat patches and tended to cluster in those patches that were closest to one another. The study also showed that compared to other eastern U.S. spruce grouse populations reproductive success is low in the Mount Desert Island population.

Mount Desert Island spruce grouse resemble a metapopulation, because of their association with patches of black spruce-tamarack scattered across the island. Although we found birds in eight different patches, they were grouped in two clusters, which suggests the importance of interpatch movement. Spruce grouse are listed as a threatened species in New York where small populations are confined to fragmented patches of habitat. Decline of softwoods (by logging or development) and an unknown number killed by hunters each year (because spruce grouse are exceptionally approachable by humans and resemble ruffed grouse) may reduce populations especially in fragmented habitats (Bouta and Chambers 1990). In view of this, and because several Mount Desert Island black spruce-tamarack patches are privately owned, it may be appropriate to incorporate protection of suitable spruce grouse habitat into the Acadia National Park Land Protection Plan. Long-term protection of critical spruce grouse habitat through the purchase or donation of conservation easements also appears appropriate. National Park Service land protection plans should consider future implications for wildlife species like spruce grouse, and parks should note the connection between park resources and adjacent private lands.

PS

REFERENCES

- Bouta, R.P., and R.E. Chambers. 1990. Status of threatened spruce grouse populations in New York: A historical perspective. Pages 82-91 in R.S. Mitchell, C.J. Sheviak, and D.J. Leopold, editors. *Ecosystem Management: Rare species and significant habitats*. Proceedings of the 15th Annual Natural Areas Conference, Bulletin 471. New York State Museum, Albany, New York.
- Fritz, R.S. 1979. Consequences of insular population structure: Distribution and extinction of spruce grouse populations. *Oecologia* 42:57-65.
- Robinson, W.L. 1980. *Fool hen: The spruce grouse on the Yellow Dog Plains*. University of Wisconsin Press. Madison. 221 pp.

O'Connell is a research Wildlife Biologist with the National Biological Service and serves as the Leader of the CPSU at the University of Maine; (207) 581-2873. Servello is an Associate Professor in the Department of Wildlife Ecology at the University of Maine; (207) 581-2872. Whitcomb is presently a Wildlife Biologist with the Virginia Department of Game and Inland Fisheries. He conducted this spruce grouse study for his M.S. degree at the University of Maine.

study, predators killed seven of 18 radio-tagged female grouse (39%), three during egg-laying, two during incubation, and two with broods. As of August 28, the beginning of the late brood rearing period, only five females (26%) had successfully raised broods. Initial brood size (1-3 days after the hatch) ranged from one to six birds ($\bar{x}=3.4$). Most chick mortality (41%) occurred within the first 9 days posthatch, including four entire broods, and only 11 of 37 (30%) chicks survived until August 28. Grouse productivity (number of chicks produced divided by the number of females) during the first 2 years of this study was low compared to other populations in eastern North America.

The proportion of patches occupied by spruce grouse was related to patch size and distance between patches. Occupied patch size varied greatly (7.7-269 ha or 19.0-664.4 acres). During this study, grouse occupied both large patches, five of six medium-sized patches, and one of 10 small patches, with a significant difference between small- and medium-sized patch occupancy. Unoccupied patches were farther from the nearest occupied

patch ($\bar{x}=2.5$ km or 1.6 mi) than were other occupied patches ($\bar{x}=1.2$ km 0.7 mi), suggesting that patch size and interpatch distance are important in determining patch occupancy. We only observed two spruce grouse on the 22 spruce-fir sites surveyed, and they were at a distance of <500 m away from suitable lowland sites.

Home ranges for broods ranged from 12.8-26.5 ha (31.6-65.5 acres). Nearly all juveniles dispersed from natal habitat patches and exhibited longer dispersal distances on Mount Desert Island than they did in more contiguous habitats. This may be due to the extensive amount of marginal or unsuitable habitat surrounding patches of suitable lowland-conifer. Six of nine juveniles traveled 8 km (5 mi), and only two of nine located other suitable lowland conifer patches. The remaining seven will probably have to move again in the spring to locate breeding habitat. Juveniles moved through deciduous or mixed deciduous-conifer habitats indicating that these cover types were not the barriers to dispersal that some had thought.