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Breeding Season Movements and Habitat Use of Female Sharp-tailed Grouse

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DONALD A. SEXTON

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BREEDING SEASON MOVEMENTS AND HABITAT USE OF FEMALE SHARP-TAILED GROUSE

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ABSTRACT

Movements, home ranges and habitats used by 24 female Sharp-tailed Grouse (Pedioecetes phasianellus (Linnaeus)) were determined using radio telemetry during the breeding seasons of 1976 and 1977, near Chatfield, Manitoba.

During the pre-incubation period some females moved long distances ($\bar{x}$ = 1.51 km) from capture arenas and visited other arenas. These females had significantly larger home ranges than presumed non-dispersing birds. Habitats were not used at this time relative to their availability. Forest and shrub habitats were used most often. Nest sites had taller, denser shrub cover than randomly sampled sites in the same habitat type. Incubating females moved short distances (<150 m) from nests to feed and used the same feeding sites repeatedly. Home ranges of brood-rearing females were significantly larger than broodless females. Females with broods used mainly grasslands or grass-shrub areas. Broodless females used shrub and forest areas most often. Habitats were not used in proportion to their availability by either group. There was a significant difference in the density of cover used during the day by brood-rearing females. Open areas were used in mornings and evenings,

dense cover at mid-day and moderately dense cover at night roosts. Brood sites seemed to be selected in relation to cover and site temperature.

Dispersal, home range overlap and the effects of weather on home range, movements, and cover and habitat selection are also discussed.

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INTRODUCTION

Animals seek optimal environmental conditions. This behaviour has been equated to shelter seeking and is associated with selection of particular cover or habitat types for different activities (see Leopold 1933). Studies of habitat use in birds indicate selection is based on the structure or physiognamy of the habitat (MacArthur and MacArthur 1961, Hilden 1965). Therefore, knowledge of the height, form and spatial distribution of the vegetation is essential in understanding the ecological requirements of a species.

Plasticity in habitat requirements has been illustrated in several species of birds (Lack 1972). The Sharp-tailed Grouse (Pedioecetes phasianellus) is considered an inhabitant of the grasslands, forest-prairie ecotone, and deciduous forests (Aldrich 1963, Johnsgard and Wood 1968). Work over the last 30 years has provided general information on the habitat requirements of this species in various parts of its range (Aldous 1943, Grange 1948, Hart et al. 1953, Amman 1957 and others). Evans (1968), in reviewing Sharp-tailed Grouse habitat requirements, noted that habitats selected vary with season, age, and sex of the individuals examined.

In the Canadian Prairie Provinces Sharp-tailed Grouse are abundant, permanent residents (Aldrich and Duvall 1955, Aldrich 1963). Most studies of this species in Canada have been of the behaviour of males (Lumsden 1965, Evans 1969, Rippin and Boag 1974 a, b). Little information is available on spring and summer habitat requirements (Pepper 1972). Pepper (op. cit.) provided data on habitat requirements of Sharp-tailed Grouse in a grazed and farmed area of Saskatchewan which he considered lacked sufficient optimal habitat.

Information on pre-nesting habitat requirements of females is virtually non-existant (but see Marshall and Jensen 1937). Further, no published information relates habitat use to availability in an area. Post-nesting habitat used by broods has been described (Amman 1957, Peterle 1954, Hamerstrom 1963) although the data may be somewhat biased due to searching techniques and behaviour of broods (see Baumgartner 1939).

The early studies of Sharp-tailed Grouse movements relied on banding, colour-marking and recapture, or re-sightings (Hamserstrom and Hamerstrom 1951, Jackson and Henderson 1965, Schwilling 1961, Robel et al. 1972). These studies provided limited data and were most useful in determining dispersal patterns of particular individuals. Hamerstrom and Hamerstrom (1951) noted that summer movements of Sharp-tailed Grouse are essentially unknown.

Nesting studies indicated that females moved only short distances from arenas to nest (Hamerstrom 1939, Symington and Harper 1957). This prompted Blus and Walker (1965) to suggest that females must use available habitat close to arenas for nesting even if it was poor in quality. Robel et al. (1970) showed that female Greater Prairie Chicken (Tympanachus cupido) made inter-arena movements and are therefore not limited to nesting around a specific arena. Since Hamerstrom and Hamerstrom's (1951) important study on movements, Artmann (1970) and Christenson (1971) have provided limited data on home ranges and movements of female Sharp-tailed Grouse, but Johnsgard (1973) reported that information on these aspects is still inadequate.

Animals' home ranges and movement patterns depend on both behavioural responses to their own or other species and on characteristics of the available habitat (Moen 1973). In tetraonids, knowledge of habitat requirements, home range and movements is essential to understanding the ecology of the species and to permit their management (Archibald 1975).

Hamerstrom et al. (1952) have indicated that Sharp-tailed Grouse flourish in areas of bushy cover undisturbed by agriculture. With this in mind, it was determined that in an agriculturally undisturbed area of Manitoba studies using radio-telemetry could contribute information on many aspects of Sharp-tailed Grouse biology.

The objectives of this study were to determine for female Sharp-tailed Grouse: (1) dispersal patterns from arenas to nest sites, (2) habitat use prior to, during and after nesting, and (3) daily and seasonal home ranges and movements during the breeding season.

STUDY AREA

Location and Physiography

The study was conducted in a 27 km^2 portion of the Narcisse Wildlife Management Area near Chatfield, Manitoba (50°47' N, 97°34' W), in the Interlake Region, 90 km north of Winnipeg (Fig. 1). Agricultural history and development of the wildlife management area are described by Collins (1974).

The central Interlake is a relatively flat remnant basin of glacial Lake Agassiz (Weir 1960). The study area lies along the central ridge portion of the region (elevation 275 km) with the land sloping gently east and west towards Lakes Winnipeg and Manitoba, respectively. Lying across the general direction of the landfall is a ridge and swale topography oriented in a north-west and south-east direction resulting in poor drainage (Pratt et al. 1961).

Geology and Soils

The underlying bedrock of the region is Silurian dolomitic limestone of the Interlake Group (Baillie 1951). Near Chatfield exposed outcrops have been assigned to

Figure 1. Study area (outlined with broken line) with insert showing location of Chatfield in southern Manitoba.

the Inwood formation (Stearn 1956). A surface mantle of water-modified glacial till covers the bedrock. Soil coverage is variable; thin and stony on ridgetops and thicker in swales.

Near Chatfield soil types have been assigned to the Garson association and consist of gray wooded, dark gray, or peaty meadow soils (Pratt et al. 1961). Soils are generally thin (8-30 cm), stony, high in lime content and imperfectly drained.

Climate

The Interlake has a sub-humid continental climate with large seasonal temperature ranges (Weir 1960). Average summer temperatures are 15 C for June and 19 C for July. Mean annual precipitation is 50.8 cm, with half of this occurring as rain during spring and summer. The frost free period ranges from 90 to 100 days.

Vegetation

Chatfield is in the Manitoba Lowlands section of the Boreal Forest Region of Canada (Rowe 1973). Mixed forest predominates on undisturbed sites with adequate soil depth. The ridge and swale topography give rise to upland and lowland vegetation communities. The most frequently occurring plant species in the

Narcisse Wildlife Management Area are described by Collins (1974) and Rusch et al. (1976, 1978). Scientific names follow Scoggan (1957).

Trembling aspen (Populus tremuloides) is the dominant tree species. Bur oak (Quercus macrocarpa) and white spruce (Picea glauca) grow in scattered stands on well drained sites or ridgetops. Balsam poplar (Populus balsamifera) is present in low, moist locations. High lime content of soils and repeated fires have resulted in stands of stunted aspen over much of the area (Pratt et al. 1961). The patchy stands of scrubby aspen give the Chatfield area the appearance of aspen parkland (Bossenmaier and Vogel 1974).

Shrub species on upland sites include saskatoon serviceberry (Amelanchier alnifolia), chokecherry (Prunus virginiana), rose (Rosa spp.), shrubby cinquefoil (Potentilla fruticosa), Canada buffaloberry (Shepherdia canadensis), western snowberry (Symphoricarpos occidentalis), creeping juniper (Juniperus horizontalis), and bearberry (Arctostaphylos uva-ursi). In poorly drained areas or swales the common shrubs are willow (Salix spp.), high bush cranberry (Viburnum trilobum), dwarf birch (Betula glandulosa), and red-osier dogwood (Cornus stolonifera).

Upland grasses are predominantly needlegrass (Stipa spp.), wheat grass (Agropyron spp.), bluegrass (Poa spp.), and big bluestem (Andropogon gerardi). Reed grass (Calamagrostis spp.) and wild rye (Elymus canadensis) were

present in moist meadows and woodlands. Several cultivated hayfields and seeded trails also occur in the study area. They have been planted to sweet clover (Medicago sativa), alsike clover (Trilfolium hybridum) and intermediate wheat grass (Agropyron intermedium). The dominant emergents of marshes are cattails (Typha spp.), and sedges (Carex spp.).

Fauna

The avifauna of the area has been described by Taverner (1919), Norman (1920) and Cuthbert and Sexton (1976). Potential avian predators that occur as migrants or residents include Goshawk (Accipiter gentilis), Cooper's Hawk (A. cooperii), Sharp-shinned Hawk (A. straitus), Marsh Hawk (Circus hudsonius), Rough-legged Hawk (Buteo lagopus), Red-tailed Hawk (B. jamaicensis), Broad-winged Hawk (B. platypterus), Bald Eagle (Haliaeetus leucocephalus), Great Horned Owl (Bubo virginianus), and Snowy Owl (Nyctea scandiaca). Potential egg predators are Crow (Corvus brachyrhynchos) and Black-billed Magpie (Pica pica).

Rusch et al. (1976, 1978) report on some of the predatory mammals in the area. Personal observation and communication with local residents accounted for several others. They include coyote (Canis latrans), fox (Vulpes vulpes), short-tailed weasel (Mustela erminea), mink (Mustela vison), badger (Taxidea taxus), and striped

skunk (Mephitis mephitis). Thirteen-lined ground squirrels (Spermophilis tridecemlineatus) were also present and are known predators on grouse eggs (Patterson 1952).

METHODS

Seasonal Aspects

The study was conducted from early April through mid-August in 1976 and 1977. This period includes much of the breeding season of Sharp-tailed Grouse at this latitude (Artmann 1970). In this study I divided the breeding season into several periods. Pre-incubation is the period from when the females were released following capture at arenas until incubation started. It includes a pre-egg stage, the interval up to laying the first egg, and the egg stage, from laying the first egg to the onset of incubation. These periods were determined for each individual by backdating from the first day of incubation, knowing that eggs are laid approximately each day and allowing two days for days missed. (Artmann 1970, Johnsgard 1973, Maxson 1977). The incubation period extends from the onset of incubation until the last egg of a clutch hatches. Post-nesting is from hatching until late August when broods begin to disperse (Artmann 1970, Christenson 1971).

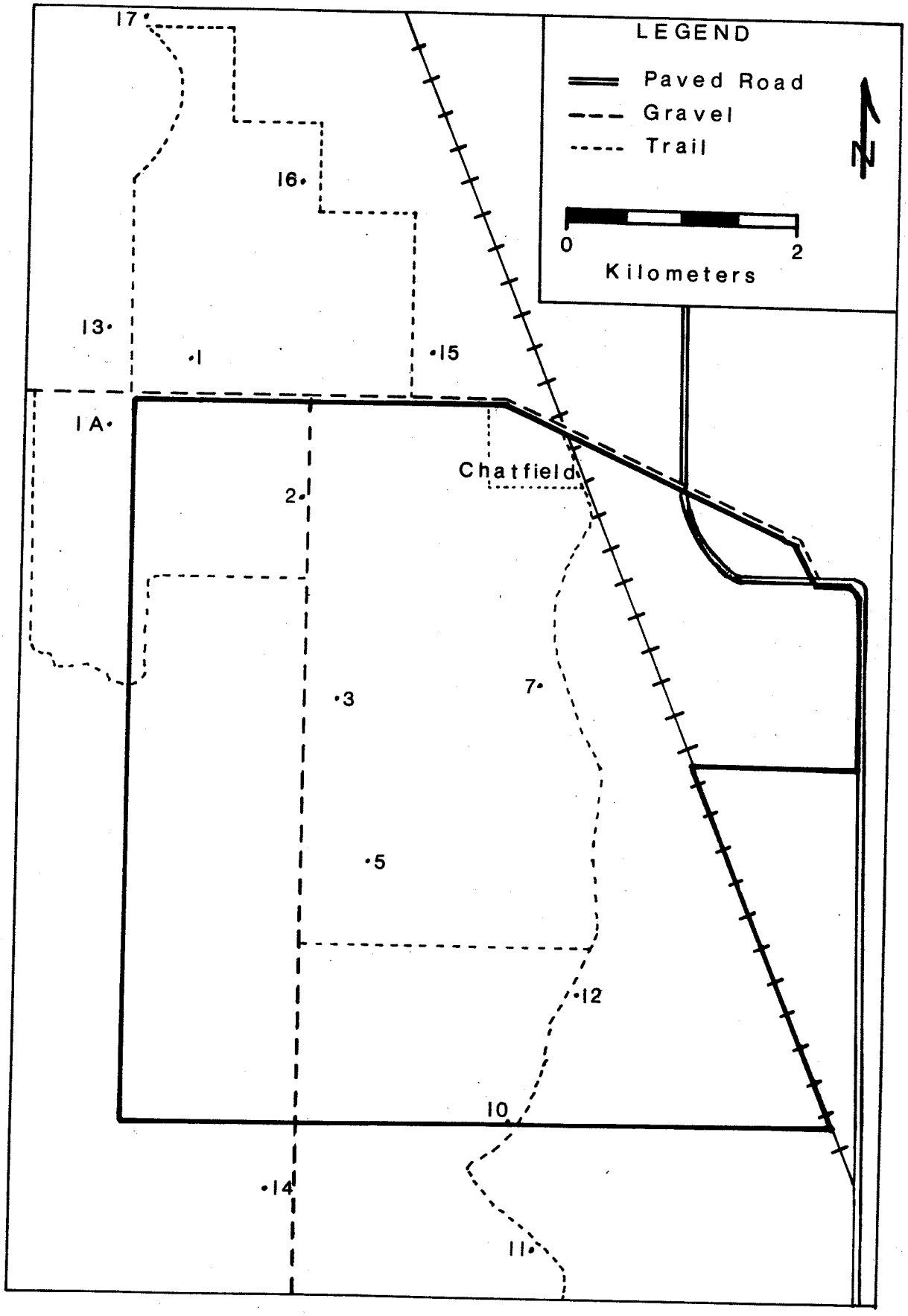
The post-nesting period was divided into two stages for comparative purposes. Young Sharp-tailed Grouse depend on the female for some time after hatching

(Caldwell 1976). Flight is not achieved until they are about 10 days old (Hart et al. 1953). Christenson (1971) suggests the first two weeks of life are critical for young Sharp-tailed Grouse, since most mortality occurs at this time. I examined movements and habitat use during the time when chicks were less than two weeks old to see if they differed from the remainder of the brood rearing period.

Trapping and Banding

Locations of arenas (sensu Hjorth 1970) were known from previous work in the area (Fig. 2) (M. Gillespie, pers. comm., McKay and Carmichael 1970). I observed arenas 2, 3 and 7 for several mornings beginning in early April. Areas where females concentrated, their approaches to arenas, and approximate locations of dominant males' territories on the arenas were recorded. Modified lily-pad or walk-in traps with short leads (< 3 m) were placed across these approaches (Hamerstrom and Traux 1938, Liscinsky and Bailey 1955). Two opposed rocket nets were used on the two largest arenas in the study area. Each net was 18 m by 12 m, propelled by four rockets charged with solid fuel and activated by a 50 cap blasting machine situated in the blind. The nets were placed to cover areas where females concentrated, or the territories of dominant males.

Figure 2. Locations of arenas in the Narcisse Wildlife Management Area. Numbers correspond to those used in text.


LEGEND
Paved Road
Gravel
Trail
N
0
2
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17
16
13
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1A
Chatfield
2
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