Wildlife Session

Social Organization Among White-tailed Deer During Rut

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Abstract: Visual observations on group composition of white-tailed deer (*Odocoileus virginianus*) on the Fred T. Stimpson Wildlife Sanctuary, Alabama, were conducted from November 1975 through March 1976. Group composition was divided into 3 periods (pre-rut, 6 Nov - 6 Jan; rut, 7 Jan - 29 Feb; post-rut, March) to determine effects of reproductive behavior. During the study, 937 groups containing 2,391 deer were sighted. Sightings of single males and single females increased during the rut, and mean group size decreased. Data suggest a temporary dissociation of adult does from family groups as a result of reproductive activities. Based on observation of 2 radiotagged does the dissociation occurs primarily between adult deer or yearlings and not fawn-doe associations. The temporary dissociation of a doe from the family unit could facilitate breeding encounters without disrupting the movements and feeding activities of her social group.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 42:266–271

Groups of male white-tailed deer typically break up during the mating season and bucks travel alone in search of receptive females (Hawkins and Klimstra 1970, Hirth 1977, Michaels 1970, Thomas et al. 1965). However, data are inconclusive concerning the effect of mating season on social organization. Montgomery (1959) detected no apparent disruption in female-fawn associations during rut. Michaels (1970) reported only a slight increase in occurrence of solitary females during rut and Hirth (1977) found the mating season had little effect on social behavior of females, except for the brief period when does were receptive to bucks.

As part of an intensive study into changes in movement, activity, and behavior of relatively undisturbed white-tailed deer during the mating season (Ivey and Causey 1981), we investigated breeding season effects upon the social organization of male and female groups.

We thank the Alabama Department of Conservation and Natural Resources,

Division of Game and Fish, for allowing use of the Fred T. Stimpson Wildlife Sanctuary for this study. This study was funded by the Alabama Agricultural Experiment Station through the Department of Zoology and Wildlife Science, Auburn University. Statistical advice and assistance were supplied by P. M. Estes and M. J. Zivojnovich.

Methods

Our study was conducted on the 2,226-ha Fred T. Stimpson Sanctuary in southern Clarke County, Alabama. The topography is steeply rolling, with deep hollows alternating between ridges lying along the Tombigbee River. Elevation varies from approximately 5 to 109 m above sea level and the area is dominated by mature forest. The sanctuary has been unhunted since the early 1940s and is not open to the public, thus deer have been less influenced by human disturbance than many other populations. White-tailed deer were extremely abundant during the study. Historically the population has been well above carrying capacity at 1 deer per 3 ha (W. J. Hamrick, pers. commun.) as evidenced by a distinct browse line in many localities. Management on the sanctuary involves planting and maintaining approximately 61 winter and summer food plots which comprise 6% of the area and range from 0.1 to 6 ha in size.

Visual observations of unmarked deer and 3 radio-tagged females were used to obtain data on group composition. Observations were made daily from vehicles driven along a network of more than 87 km of roads and from 2 stationary observation blinds in fields. Observation periods generally included all daylight hours. Antler-class was determined by counting visible tines. Group composition, time, and location were recorded for each observation made during 150 days of general observation from roads and 65 hours of observation from stationary blinds. Sex determination, based on presence of antlers, was possible from June through the second week in March.

Social groups were categorized as antlerless, antlered, and mixed groups. Solitary animals were recorded as "groups" of 1 and were included in the antlerless or antlered groups because they represented units important to social organization on the sanctuary.

Group composition was studied in 1975–1976 during 3 periods (pre-rut: 6 Nov - 6 Jan; rut: 7 Jan - 28 Feb; post-rut: March). These periods were based on observations of white-tailed deer behavior on the study area (Ivey and Causey 1981) and conception dates (Leuth 1970). Analysis using paired t-tests with pooled means was performed to test for differences ($P \leq 0.05$) among study periods regarding occurrence of solitary animals, antlerless group size, mean group size (all groups), and occurrence of groups of 3 or more individuals.

Results and Discussion

Repeated observations yielded 937 groups containing 2,813 deer; group size, averaged 3 (1–9) deer. Observations by social group for each study period are presented in Table 1. Anterless group size decreased from an average 3.44 during pre-rut to 2.94 during rut ($P \leq 0.05$) and was attributable to an increase in occurrence of solitary females. Anterless group size did not differ between pre-rut and post-rut periods. Also there were significantly ($P \leq 0.05$) fewer anterless groups containing 3 or more deer during rut than during pre-rut or post-rut. Solitary females were most common during February (Fig. 1), and accounted for 9% of antlerless groups observed during pre-rut, 18% during rut, and 7% during post-rut periods.

Antlered groups averaged 1.7 individuals during the pre-rut period, and usually consisted of 2 individuals; 3 was the largest number of deer observed. Antlered groups containing at least 2 individuals become rare by mid-January (Fig. 2). Hawkins and Klimstra (1970) believed that the occurrence of solitary bucks reflected antagonism during the mating season and an apparent preference for traveling alone while seeking receptive females.

During rut, 93% of antlered groups were singles. When 2 males were together they often consisted of an 8-point buck and a spike buck or combinations of smaller and presumably younger bucks. These groups appeared to be temporary associations and had few similarities to male groups observed during pre-rut and post-rut that typically contained 2 adult males. In most cases, the spike bucks appeared to be "tagging along" with the larger males. Only once were 2 large bucks observed together during the rut and this association was temporary, lasting less than 6 hours.

During post-rut, antlered males began regrouping, with mean group size in-

Table 1. Number of white-tailed deer groups and individuals seen in antlerless, antlered, or mixed social groups on Fred T. Stimpson Sanctuary, Clarke County, Alabama, November through March 1975–76.

Social organization	Pre-rut		Rut		Post-rut	
	N Groups	*N* Deer	*N* Groups	*N* Deer	*N* Groups	*N* Deer
Antlerless	208	764	313	1,039	109	466
Solitary	21	21	70	70	8	8
Total	229	785	383	1,109	117	374
Antlered	14	33	3	6	4	8
Solitary	15	15	36	36	13	13
Total	29	48	39	42	17	21
Mixed	44		58		11	
Antlerless		135		122		37
Antlered		59		66		15
Total		194		188		52
All Groups	302	1,027	480	1,339	145	447

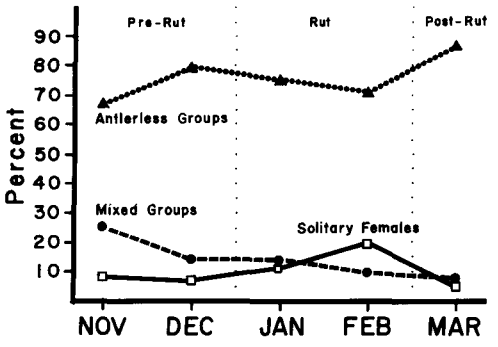

Figure 1. Relative frequency of white-tailed deer antlerless groups (females and fawns), mixed groups (males and females), and solitary females observed on Fred T. Stimpson Sanctuary, Clarke County, Alabama, November through March 1975–76.

creasing to 1.24. However, antler shedding made recognition of antlered groups difficult; mean size during post-rut probably underestimates actual male group size.

Small groups of 2–4 individuals were most commonly observed during the study. Mean group size (antlerless, antlered, and mixed groups) decreased ($P \leq 0.05$) during the rut with 54% of all groups containing 2 or less individuals (Fig. 3). There was no difference in group size between pre-rut and post-rut. Groups of 3 were more common than singles except during the rut when 23% of all groups observed were singles. Singles accounted for 12% and 15% of the groups recorded during the pre-rut and post-rut periods, respectively. Occurrence of solitary deer on the sanctuary was considerably lower than on the George Reserve in Michigan (Hirth 1977), where 30% of the deer occurred as solitary animals; although Hirth's study utilized annual data including the parturition and fawn rearing period which indicated an increase of solitary individuals during this period.

The small group size observed on the Stimpson Sanctuary is similar to that seen on the George Reserve in Michigan (Hirth 1977). According to Hirth, a smaller group size would optimize feeding efficiency in woodland habitat where restricted sunlight at the forest floor results in vegetation too sparsely distributed to facilitate feeding by large groups. Small group size is maintained through mutual avoidance

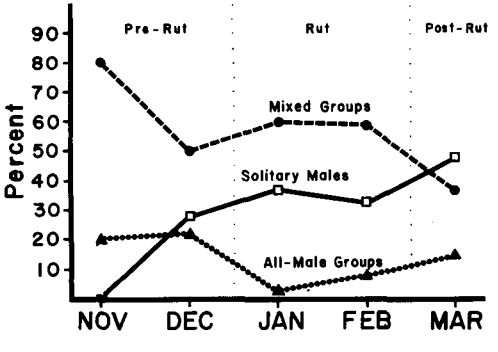

Figure 2. Relative frequency of white-tailed deer groups containing males, observed on Fred T. Stimpson Sanctuary, Clarke County, Alabama, throughout the study period, November through March 1975–76.

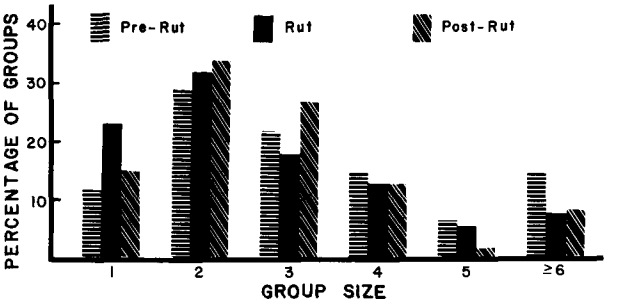

Figure 3. Distribution of group size of white-tailed deer during pre-rut, rut, and post-rut study periods on Fred T. Stimpson Sanctuary, Clarke County, Alabama, 1975–76.

among adult does because of their apparent high degree of intolerance (Hirth 1977). Aggressive interactions between does of presumably different family groups tended to produce and maintain small groups of deer on the Stimpson Sanctuary.

Occurrence of mixed-groups varied from a low of 7% during post-rut to 15% during pre-rut (Fig. 1). Hirth (1977) noted mixed-groups form all year, but were not stable social units. Dasmann and Taber (1956) noted antlered male black-tailed deer (Q. hemionus) joining family groups or solitary does during all seasons and traveling with them from 1 to 2 days; however, these "random associations" had no permanence. Brown (1971) explained that mixed groups resulted from the behavior of males in their first year of separation from the family group of their dam (and possibly the second year) that become "subdominant floaters" and may associate with a variety of groups, both mixed and all-male. Males present in mixed-groups on the Stimpson Sanctuary during pre-rut and post-rut were often smaller, probably younger, animals. In contrast, mixed-groups during the rut contained at least 1 mature buck.

Associations of 3 radio-tagged females during 31 observations throughout the study provided additional insight into female grouping. Doe No. 1 was most often observed in association with a group of 3–4 antlerless deer. During the rut, however, she was observed only with another doe and a fawn or with a fawn only. Does No. 2 and 3 were usually observed with a group of 4 deer each. Both were observed alone only once during the study (during the rut).

Collectively, our data indicate a temporary dissociation of adult does from family groups as a result of reproductive activities. Based upon observations of radio-tagged does, the dissociation occurs primarily between adult deer and yearlings and not fawn-doe associations.

The mating pattern of female white-tailed deer on the sanctuary involved a significant reduction in linear movement by estrous does coupled with increased diel activity (Ivey and Causey 1981). This may result in concentrated scent deposition within a more restricted area (Ivey and Causey 1981). With high deer numbers, restricted movement and increased activity by estrous does could enhance location of receptive females by rutting males. The temporary dissociation of a doe from the

family unit could facilitate breeding encounters without disrupting the movements and feeding activities of her social group.

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