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Dispersal of a Yearling Male Black-tailed Deer

Abstract

A male black-tailed deer (*Odocoileus hemionus columbianus*) inhabited a home range of 11.1 ha during May and June while 10 to 11 months old. In late June, near its first birthday, it dispersed 16.8 km in 8 days to occupy a new home range of 8.7 ha in similar habitat. Its movements were non-random and highly directional (Rayleigh test, $P < 0.05$).

Introduction

Dispersal is defined by Howard (1960) as the movement an animal makes from its point of origin to the place where it reproduces or would have reproduced had it survived and found a mate. Caughley (1977) noted both the importance of dispersal to population processes and the difficulties associated with documenting dispersal. The short duration of dispersive movements makes detailed observations fortuitous. Although there are many studies of deer movements (Zwickle *et al.* 1953, Carlsen and Farnes 1957, Brown 1961, Zalunardo 1965, Robinette 1966, Alexander 1968, Hawkins *et al.* 1971, Harestad 1979) few report the movements of individuals during dispersal (Sparrowe and Springer 1970). Documented accounts of dispersal are equally rare for other mammals (Shirer and Downhower 1968, Storm *et al.* 1976). Herein we report observations of post-juvenile dispersal by a yearling, male black-tailed deer (*Odocoileus hemionus columbianus*).

Study Area and Methods

Observations were made in the Nimpkish River drainage of Vancouver Island, B.C. (15°13'N, 126°36'). The area is mountainous, with valley bottoms at 160-400 m in elevation and many peaks reaching over 1500 m. Biogeoclimatic zones represented in the study area are the Coastal Western Hemlock Zone at lower elevations (200-900 m), the Subalpine-Mountain Hemlock Zone at upper elevations (800-1500 m), and the Alpine Zone near mountain tops (above 1500 m) (Krajina 1965). Forest harvesting began in the study area about 1945. Logging has resulted in a forest ecosystem containing a mixture of recently cut trees (cutovers), second-growth stands, and old-growth stands. Nineteen black-tailed deer were immobilized and fitted with radio-collars during the study (see Harestad (1979) for details regarding equipment and

drugs). Most deer were adult, and detailed observations on dispersal were obtained for only a single individual. On 4 May 1975 a male (OFL59), less than one year old, was immobilized and fitted with a radio collar. Because births in the study area are concentrated between 1 June and 1 July, its age was estimated as between 10 and 11 months. Its movements were followed from 4 May to 17 September 1975. Three to five bearings were used to estimate transmitter locations. Some locations were visual. Home range was calculated using the minimum home range method (Dalke and Sime 1938).

Results and Discussion

During the period 5 May through 21 June 1975 the home range of OFL59 extended over 11.1 ha ($n=23$). This area is within the range of home range sizes exhibited by non-parturient, adult black-tailed deer within the study area (Harestad 1979). The home range centered in a patch of small conifers and had a standard distance deviation of 178 m. Habitat consisted of three recently logged areas ranging in age between 1 and 12 years, and a stand of old-growth timber.

The open cutovers were used primarily during the night and crepuscular periods, whereas the old-growth timber was used during the day. A residual strip, 18 m wide, between two cutovers was frequently used as bedding habitat during the day. This residual strip contained unburned debris and small residual conifers remaining from logging operations, most between 1-4 m high.

Farther south on Vancouver Island at Northwest Bay ($49^{\circ} 13'N$, $124^{\circ} 18'W$), only one of 18 deer (5.6 percent) moved out of its natal area during its first year of life (Bunnell and Harestad, unpubl.). The home range documented for OFL59 during the period 5 May through 21 June probably was its natal home range. Documented home ranges of black-tailed deer in the study area were no greater than 2.3 km in diameter, and migratory movements did not exceed 5 km (Harestad 1979). On 24 June, OFL59 was sighted crossing a road 9.5 km southwest of his former home range. Locations were made daily during the next week. His route crossed the Davie River, the Nimpkish River, and then halted briefly near the north end of Woss Lake (Fig. 1).

At 0820 on 25 June, he was located 12.4 km from his former (likely natal) home range in a 15-year-old conifer plantation near Woss Lake. Later that day (1200 hrs) he was sighted walking along the road 0.9 km south along the eastern shore of the lake. At 1310 on 26 June, he was back near his early morning location of 25 June and in a small patch of old-growth forest surrounded by conifer plantations.

The signal could not be heard near Woss Lake on 28 June, but was located 3.9 km further west in the Eve Creek drainage on 29 June. He remained in this area until 5 September. The new home range covered 8.7 ha and had a standard distance deviation of 246 m. The smaller size of the new home range may be the result of fewer locations ($n=8$). The new home range centered on a patch of conifer residuals and advanced regeneration located along a ridge in a 7-year-old cutover and in habitat similar to his previous home range.

The route followed by OFL59 was directional; using the Rayleigh test (Durand and Greenwood 1958), it is highly unlikely to be a result of random movement ($z=3.32$, $n=8$, $P \leq 0.05$). He moved from his initial home range and occupied his

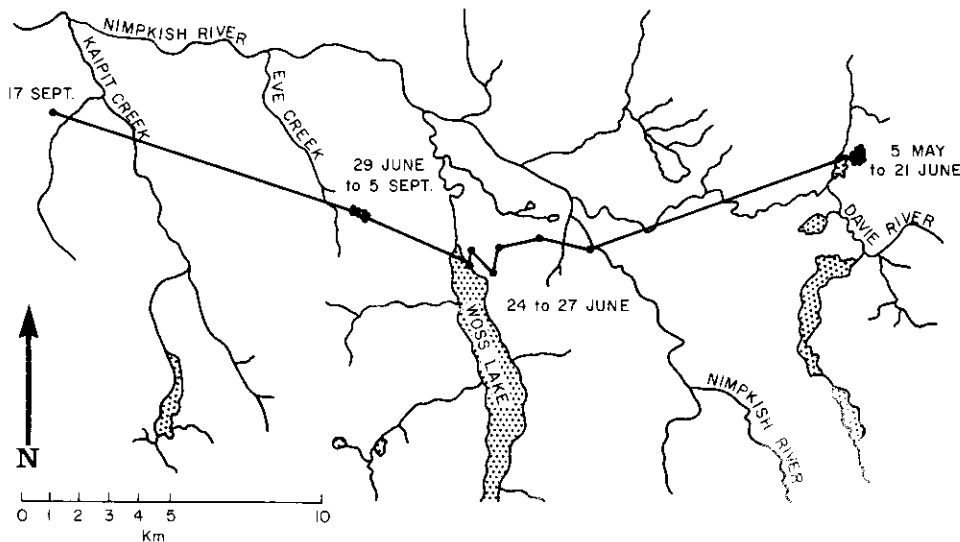


Figure 1. Locations (●) of a dispersing, juvenile black-tailed deer from 5 May to 17 September 1975.

new home range in 8 days, at most. The two home ranges were 16.8 km apart in straight line distance.

After occupying his new home range from 29 June to 5 September, OFL59 moved 11 km westward (Fig. 1). This movement coincided with the opening of hunting season. The new area was remote, and only approximate locations could be obtained. OFL59 was found dead the following year. The marrow in the femur was white and solid, and the antlers were still attached to the skull, suggesting that he died before the end of December 1975. The remains were not scattered and the ribs intact, suggesting death was not from predation. The disappearance of OFL59 from his new home range at the commencement of hunting season and the condition of his remains suggest that OFL59 was wounded, moved from his new home range, and subsequently died. This final movement was probably atypical of a dispersing juvenile deer.

There are few comparable observations of black-tailed deer against which the generality of our findings can be evaluated. Dispersal occurred near the animal's first birthday, was short-lived, and was directional over a distance of 16.8 km. At Northwest Bay, analyses of returns from 62 of 266 marked fawns indicated that dispersal occurred most frequently when deer were 1-2 years old, that dispersal was directional, and that dispersive movements averaged 15.2 km (Bunnell and Harestad, unpubl.). Brown (1961) reported that black-tailed deer in Washington also dispersed most often when 1-2 years old; dispersive movements averaged 9.5 km (our computations from data of Brown (1961: Tables 15 and 16). Hedlund (1975) reported four dispersive movements by *O. b. hemionus* in Washington. All were male. Three of the four were killed as yearlings, the fourth when 2.5 years old. Average distance dispersed was 66 km (Hedlund arbitrarily assumed 16 km as the distance distinguishing local movement from dispersal). Neither Brown (1961) nor Hedlund (1975) provided individual movements so it is unclear whether dispersal was directional. Sparrowe and Springer (1970; Fig. 4) reported movements of a yearling male white-tailed deer (*O. virginianus*),

but indicated that it was harassed by hunters. The deer moved 4 km prior to hunting season and then traveled about 36 km before settling in a new area, where it was shot. There was no apparent directionality to its movements. Kammermeyer and Marchington (1970) provided distances for three breeding-age male *O. virginianus*, but not individual movements. Mean distance dispersed was 4.5 km.

Acknowledgments

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