# Denning Behavior of Black Bears, *Ursus americanus*, in Western Manitoba

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Denning habits of Black Bears, *Ursus americanus*, were studied in western Manitoba from May 1979 to April 1981. Of 25 dens examined, 23 were excavated and all but one contained nesting material. Black Bears constructed dens in all major habitat types found in the study area. Females constructed dens within the confines of their summer range. Subadult males often utilized den sites in the Duck Mountain Provincial Forest after an abrupt move of 20-42 km away from their summer activity center.

Key Words: Black Bear, *Ursus americanus*, denning behavior, western Manitoba.

Black Bears (*Ursus americanus*) utilize dens during winter dormancy across much of their range in North America. Den sites have included open ground nests, enlarged tree cavities and excavated burrows (Beecham et al. 1983; Erickson et al. 1964; Pelton et al. 1980; Tietje and Ruff 1980). Selection of specific habitats in which to construct dens has not been widely reported. LeCount (1983) noted that Black Bears in Arizona selected Chaparral, while Beecham et al. (1983) noted that concealment appeared to be a factor in the selection of den sites in Idaho. Undisturbed dens are important since harassment may lead to increased overwinter weight loss and abandonment of cubs (Smith 1946; Tietje and Ruff 1980). We compared the types and location of dens used by male and female Black Bears in an area of mixed deciduous-coniferous forest and agricultural lands.

## Study Area

The study was conducted from May 1979 to April 1981 in west-central Manitoba (51° 37′N, 100° 35′W) along the eastern boundary of the Duck Mountain Provincial Forest. Wide seasonal fluctuations in temperature occur with mean January and July temperatures of -19 and +19°C respectively. Mean annual snowfall is 120 cm and the 1 November to 15 April period usually has snow accumulations exceeding 10 cm (Environment Canada; Dauphin, Manitoba).

Vegetation in the Duck Mountain Provincial Forest is primarily mixed coniferous-deciduous forest with Aspen (*Populus tremuloides*), Balsam Poplar (*P. balsamifera*), White spruce (*Picea glauca*), and Balsam Fir (*Abies balsamea*) forming the dominant overstory associations. Jack Pine (*Pinus banksiana*) and Black Spruce (*P. mariana*) occur in sandy uplands and poorly drained areas, respectively. Common mast producing shrubs include Beaked Hazel (*Corylus cornuta*), Highbush Cranberry (*Viburnum opulus*), Serviceberry (*Amelanchier alnifolia*), and several cherry species (*Prunus* spp.).

Where undisturbed, vegetation in the agricultural area was similar to that in the adjacent Provincial Forest. The amount of cleared farmland was highly variable on individual farms, ranging from 90% to less than 5% on farms used as woodlots. Predominant agricultural practices include the production of livestock and raising of forage and cereal crops.

## Methods

Bears were captured with Aldrich leg snares using techniques similar to those outlined by Johnson and Pelton (1980). Bears were immobilized with a combination of ketamine hydrochloride (Ketaset, Rogar-STB) and xylazine hydrochloride (Rompun, Bayvet) in a 2:1 ratio administered intramuscularly by a jab-pole syringe (Addison and Kolenosky 1979). Animals were classified as yearlings (1-2 years), subadults (2-4 years) and adults (> 4 years) based on counts of cementum annuli. Twenty-five bears were equipped with radio-transmitters (Model 5B, Telonics, Mesa, Arizona).

Den sites of radio-collared bears were located after they became inactive in October or early November. Habitat characteristics of the area surrounding the den site were evaluated in winter and dens were examined after bears had departed in spring.

The summer range was estimated by the minimum convex polygon (Mohr 1947) after 10% of the outermost locations were deleted. Summer (11 July-15 September 1979, 16 June-31 August 1980) was characterized by the presence of ripe

mast and berries. The geometric center of summer location data was used to estimate the activity center of the summer range. An average of 14 locations was used to delineate the summer range and activity center in 1979. Increased monitoring effort in 1980 allowed us to estimate the summer range and activity center with an average of 59 locations. To reduce bias in the estimate of summer range size and dimensions, all animals were located when searched for in 1980.

## Results

During the two years of observation, 27 dens were located, of which 25 were examined. Of 16 female and 6 male bears fitted with radio transmitters, the dens of only 5 (3 female, 2 male) were examined during both years because of a high mortality rate (due to hunting and trapping) of the animals being monitored. Of the 16 bears fitted with radio-collars in 1979, 50% of the animals had been killed by September 1980 (3 of 6 males, 5 of 10 females).

In 1979, three subadult males moved abruptly ($\bar{x}$ = 33.3 km, SE = 6.8) away from the summer activity center between 3 and 16 October (Figure 1). Before this move, we located these animals once or twice a week and they had not made wide-ranging movements. During early October, we

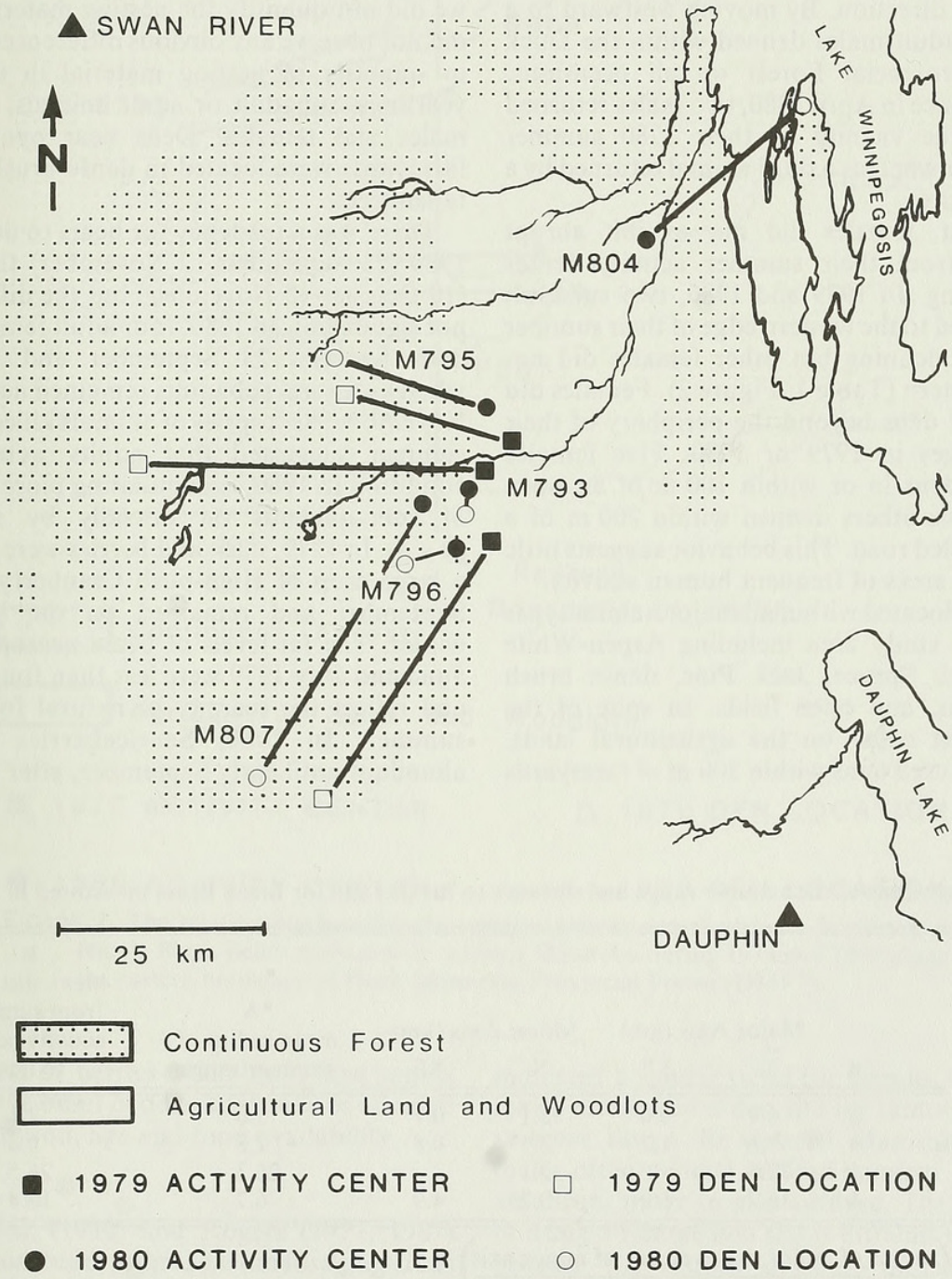


FIGURE 1. The relationship between the summer activity center and den locations of subadult male Black Bears monitored in western Manitoba during 1979 and 1980.

were unable to locate these animals and an aerial search was used to locate the den sites. A yearling male used a den within 0.5 km of its summer activity center and the adult male being monitored moved 7.3 km to the west of its summer activity center to construct a den. One subadult male which moved 19.8 km away from its summer activity center to a den site in 1979 followed a similar pattern in 1980. Two other subadult males denned close (1.4 and 5.8 km) to their summer activity center in 1980 (Figure 1). A fourth subadult male, monitored since June 1980, denned 38.5 km from its summer activity center after an abrupt move during the first week of October. Subadult males always used den sites to the west of their summer activity center but females showed no preference for a specific direction. By moving westward to a den site, subadult males denned within the Duck Mountain Provincial Forest on all occasions. Upon emergence in April 1980, two males returned directly to the vicinity of their 1980 summer activity center whereas a third animal returned by a circuitous route.

In contrast, females did not exhibit abrupt movements from their summer activity center before denning. In 1979 and 1980, two subadult females moved to the western edge of their summer range before denning but other females did not show this pattern (Table 1, Figure 2). Females did not construct dens beyond the periphery of their summer ranges in 1979 or 1980. Five females constructed dens in or within 100 m of an open field and three others denned within 200 m of a heavily travelled road. This behavior suggests little avoidance of areas of frequent human activity.

Dens were located within all major habitat types found in the study area including Aspen-White Spruce, Black Spruce, Jack Pine, dense brush along streams, and open fields. In spite of the reduced forest cover on the agricultural lands, bears readily used dens within 300 m of farmyards and within 25 m of the edge of fields. No instance of den reuse was observed, although local trappers reported that dens were occasionally reoccupied in subsequent years.

Only 2 of 25 dens examined were constructed without excavation. Nine dens were excavated under the roots of standing or partially blown-down trees and six were excavated into hillsides or a riverbank. Seven were dug in areas with no relief. Two dens were located in bulldozed brush piles in fields and one consisted of a shallow grass-lined depression under some shrubs.

All nest chambers except one were lined with grass, moss, leaf litter or twigs. A subadult female that moved to her den site one day before snowfall did not have lining material in the den. Although we did not quantify the nesting material used, we did not observe any obvious differences in the type or quantity of nesting material in the dens of yearlings, subadult or adult animals, or between males and females. Dens near open fields or farmyards were located in dense brush or among fallen trees.

There was a tendency for bears to den earlier in 1980 (23 September-12 November) than in 1979 (10 October-15 November) but the difference was not significant. In 1980, four adult females entered dens between 23 September and 7 October, whereas several subadults remained active until 12 November. Necropsies of animals killed during the summer suggested that adults were in better condition in 1980, accumulating more than 10 cm of subcutaneous fat dorsally by mid-August (n = 4). In 1979, mast and berries were scarce until a large crop of High-bush Cranberry ripened in September and remained on the bushes into winter. The fat levels of bears necropsied in late June and July 1979 were less than four cm (n = 6) and reflect the scarcity of natural food in early summer. In 1980, Serviceberries were very abundant until early September, after which there

TABLE 1. Dimensions of the summer range and distance to the den site for Black Bears monitored in 1980.

| Cohort | n | Major Axis (km) $\bar{X}$ | Major Axis (km) SE | Minor Axis (km) $\bar{X}$ | Minor Axis (km) SE | *A mean radius of summer range | B Mean distance from summer activity center to den | Ratio B:A |
|---|---|---|---|---|---|---|---|---|
| Adult female | 6 | 6.9 | 0.6 | 5.1 | 0.7 | 3.0 | 2.1 | 0.7 |
| Subadult female | 6 | 7.6 | 1.2 | 3.6 | 0.8 | 2.8 | 2.8 | 1.0 |
| Adult male | 1 | 72.8 | | 32.3 | | 26.3 | 26.5 | 1.0 |
| Subadult male | 4 | 16.7 | 6.9 | 10.2 | 4.9 | 6.7 | 16.4 | 2.4 |

*calculated as $\left(\frac{\text{radius of major axis + radius of minor axis}}{2}\right)$

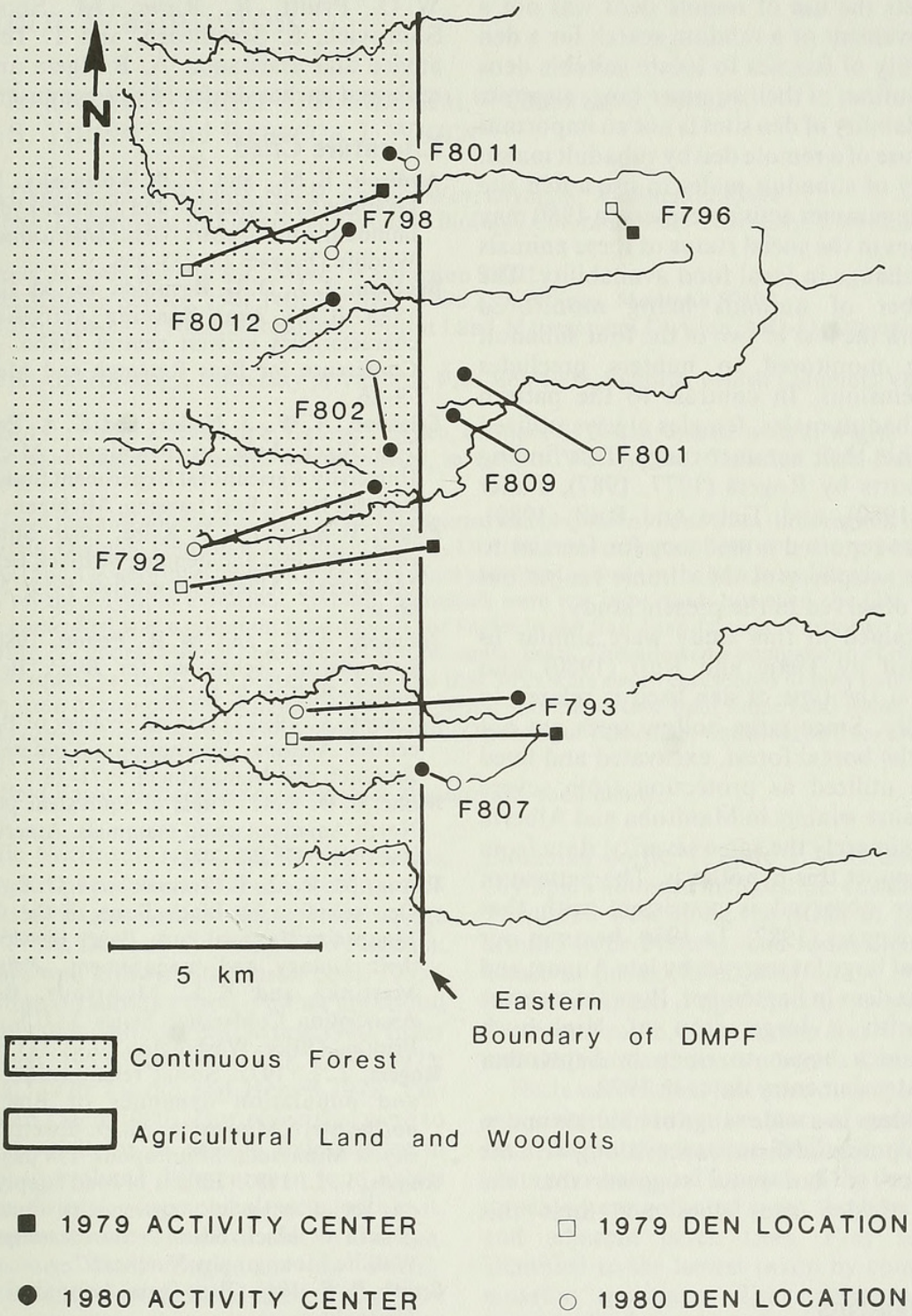


FIGURE 2. The relationship between the summer activity center and den locations of female Black Bears monitored in western Manitoba during 1979 and 1980 along the eastern boundary of Duck Mountain Provincial Forest (DMPF).

was little mast or berries available. These results suggest that the onset of dormancy may be affected by body condition, age and food availability.

## Discussion

Pelton et al. (1980) and Rogers (1977, 1987) noted that most bears returned from foraging areas as far as 174 km away to their mating or summer ranges to construct dens. Tietje and Ruff (1980) indicated a similar trend for females but reported males often used a den site far removed from the summer range. In western Manitoba, subadult males often denned beyond summer ranges after an abrupt move in mid-autumn. The significance of using a remote den site is difficult to determine because the history of these animals was not known. However, the move away from the summer range in autumn and direct return in spring by two

males suggests the use of remote dens was not a dispersal movement or a random search for a den site. The ability of females to locate suitable dens within the confines of their summer range suggests that the availability of den sites is not an important factor in the use of a remote den by subadult males. The tendency of subadult males to use a den site closer to their summer activity centers in 1980 may reflect changes in the social status of these animals or simply a change in local food availability. The small number of animals being monitored combined with the loss of two of the four subadult males being monitored to hunters precludes definite conclusions. In contrast to the pattern shown by subadult males, females always utilized den-sites within their summer range. This finding supports reports by Rogers (1977, 1987), Fuller and Keith (1980), and Tietje and Ruff (1980). These authors reported a tendency for females to den near the periphery of their home ranges but this was not observed in the present study.

Dens examined in this study were similar to those reported by Tietje and Ruff (1980) who suggested that the type of den used is related to winter severity. Since large hollow trees are not common in the boreal forest, excavated and lined burrows are utilized as protection from severe winters. Because winters in Manitoba and Alberta are of approximately the same severity, data from our study support this hypothesis. The pattern of den entry we observed is consistent with that reported by Rogers (1987). In 1980, bears in our study area had large fat reserves by late August and began to enter dens in September. Poor fat reserves combined with a large crop of High-bush Cranberry which began to ripen in September resulted in later den entry dates in 1979.

The use of dens in a wide range of habitats and in areas close to potential disturbances along with the low incidence of den reuse suggests that the availability of den sites does not limit this population.

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