

Long-range Homing by an Adult Female Black Bear, *Ursus americanus*

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An adult female Black Bear was repeatedly captured and relocated as a result of nuisance behaviour. The relocation distances ranged from 40 km to 389 km (mean = 152 km, $n = 6$). She homed successfully from all relocations, even when accompanied by young-of-the-year. Differential homing ability among bears may depend on first homing from a short relocation, facilitating subsequent responses to longer distance relocations.

Key Words: Black Bear, *Ursus americanus*, homing, distance, relocation, translocation, Ontario.

The ability of animals to return home when removed from familiar territory has been recorded for several different species including: pigeons, *Columba* spp. (Papi 1992); Deer Mice, *Peromyscus maniculatus* (Bovet 1968; Teferi and Millar 1993); Red Squirrels, *Tamiasciurus hudsonicus* (Bovet 1995); Raccoons, *Procyon lotor* (Belant 1992); Wolves, *Canis lupus* (Fritts et al. 1984); and Brown Bears, *Ursus arctos* (Miller and Ballard 1982). The use of relocation as a management tool for nuisance bears has provided researchers with the opportunity to study the homing behaviour of a large mammal. Several studies conducted on Black Bears (*Ursus americanus*) have determined that a high proportion of relocated bears return to the capture area (Harger 1970; Alt et al. 1977; Rutherglen and Herbison 1977; McArthur 1981; Rogers 1986a; Shull 1994), with adult bears more likely to return to the capture area than juveniles (Harger 1970; Rogers 1986a; and Landriault 1998). During a four-year study of relocated nuisance Black Bears in Sudbury, Ontario (46°N, 81°W), one bear was successful in homing over an exceptionally long distance (Landriault 1998). This report describes her relocation and homing history, and briefly discusses factors that may affect homing success in relocated bears.

Animals were captured in large barrel traps or with the use of immobilization agents delivered via a dart gun or jab stick. In accordance with the study protocol, nuisance Black Bears were immobilized using a mixture of ketamine hydrochloride (Ketaset®) and xylazine hydrochloride (Rompun®) at a dosage of 4.4 mg/kg and 2.2 mg/kg, respectively. Captured bears were weighed, various body measurements obtained, and the animals were ear-tagged (Kurl-lock metal tags, Ketchum Manufacturing Inc, Brockville, Ontario). A premolar was extracted for ageing purposes. Some animals were fitted with a very high frequency (VHF) radio-transmitter collar (148 to 152 MHz range, Lotek Inc., Newmarket,

Ontario). If re-captured, most bears were immobilized again to assess changes in condition by means of growth rates for juveniles and changes in weight for adults. The majority of capture and release locations were estimated using topographical maps or a hand-held global positioning system (GPS) unit; however, the only information available for the first and third captures described in this note was the township name. In these cases the center of the township was used to estimate release and homing distances. In the study area, townships were 10 × 10 km such that the center of the township could only be a maximum of 7 km from the true location. Distances presented in this report are straight-line measurements and do not take topographical features into consideration. Returning within 20 km of the capture site was defined as successful homing (Landriault 1998).

Adult female Black Bear LR04 was captured as a nuisance animal and relocated a total of 6 times (Table 1 and Figure 1). In all cases she was captured because she was foraging in improperly stored refuse at residences in suburban areas. She was initially captured as a nuisance animal in June of 1994. At this time, she was estimated to be 9 years of age based on the examination of premolar cementum annuli (Johnston et al. 1987). She was ear-tagged and relocated approximately 40 km south of the capture site. LR04 was recaptured in June of 1995, an estimated 6 km from her first capture location. She was lactating; however, no cubs were found. She was fitted with a radio-collar and relocated a second time, 105 km to the north. LR04 was subsequently recaptured in September of 1995, 7 km from her second capture location, and was accompanied by three cubs. The four bears were relocated as a family unit, approximately 112 km. LR04 was captured again in June of 1996, within 17 km of her previous capture location, accompanied by three yearlings. LR04 and two of the yearlings were relo-

TABLE 1. Relocation history of nuisance Black Bear LR04, including relocation distance, bearing, and proximity of consecutive capture and release sites. All capture locations are in the suburban areas of the City of Sudbury, Ontario. Body weight information has been included as a means to assess the general condition of the animal.

Capture date	Body weight (kg)	Proximity of capture site to previous capture site (km)	Relocation distance (km)	Proximity of release site to previous release site (km)	Bearing to relocation site
20 June 1994	65		40		166°
14 June 1995	76	6	105	141	325°
18 September 1995	147	7	112	6	325°
8 June 1996	67	13	166	76	343°
5 July 1996	82	10	389	222	330°
1 October 1997	140	< 1	100	290	323°

cated 169 km. LR04 was subsequently captured a fifth time in July of 1996, within 11 km of her previous capture site. She was not accompanied by any offspring. On this fifth relocation she was transported 389 km to the northwest and was recaptured in October of 1997, within 7 km of her previous capture location. At this time she weighed approximately 140 kg and was relocated 100 km.

From 1994 to 1997, adult female LR04 was relocated a total of six times, with relocation distances ranging from 40 to 389 km. She homed successfully in all cases and the maximum distance between any two capture sites was 10 km. The longest homing distance observed for this animal (389 km) appears to be a record distance for Black Bears. The true distance travelled by bear LR04 to return to her home range is expected to be much greater than 389 km, due to variations in topography and the probable deviations from straight-line homing as a result of landscape features, human habitation, foraging, and interactions with other animals. Other observations of long-range homing in relocated Black Bears include animals returning from distances of 99 km (Rutherglen and Herbison 1977) and 229 km (Harger 1970) on the Upper Peninsula in Michigan, 103 km in the Rocky Mountains of British Columbia (Erickson and Petrides 1964), and 182 km in Central Ontario (Landriault 1998). Although all of these observations are from adult animals, in some instances juveniles can home from long distances. As part of the same study, a juvenile female homed from a relocation distance of 92 km (Landriault 1998). The differential homing ability of adults versus juveniles has been attributed to an established home range and to experience gained during seasonal foraging excursions (Anderson et al. 1977; Rogers 1986b, Rogers 1987a).

Juvenile male Black Bears generally disperse between 2 and 4 years of age, prior to establishing home ranges. In contrast, juvenile females generally take up residence in their maternal home range (Rogers 1987b; Schwartz and Franzmann 1992). It has been hypothesized that bears without established home ranges have limited homing success due to a lack of effort rather

than ability (Anderson et al. 1977; Rogers 1986b). As predicted by this hypothesis, lower homing success has been observed in juvenile males than in adults and juvenile females (Harger 1970; Rogers 1986a; and Landriault 1998). Adult females would benefit from a strong desire to return to their established home range where they have been able to meet the nutritional requirements necessary for reproduction (Rogers 1976; LeCount 1982; Elowe and Dodge 1989; Kolenosky 1990) and have successfully avoided fatal conflicts for them and/or their young, with local conspecifics (Jonkel and Cowan 1971; Tietje et al. 1986).

Experience would also be expected to increase an animal's homing success. Many Black Bears cover extensive area during yearly foraging excursions (Rogers 1987a) and these foraging excursions may allow bears to develop orientation and homing skills, resulting in increased homing success with age. Many young bears may not have gained enough experience to home successfully from significant distances.

It is unknown whether bear LR04 would have homed from 389 km had she been relocated that distance after her initial capture. It is possible that repeated relocations result in training individual bears to home from long distances. Black Bears that home successfully after the first relocation are likely to be successful after all subsequent relocations of increasing distance (Blanchard and Knight 1995; Landriault 1998), suggesting that homing ability in bears is enhanced with experience. Homing pigeons are commonly trained by gradually increasing the displacement distance from the home loft, and young birds displaced too far early in their training do not home successfully (Papi 1992). The successful return from a relatively short distance appears to enhance homing effort and/or skill, and increases the chance of success from longer distances.

The desire for adults to return to an established home range, combined with experience acquired in navigating over long distances, appears to explain why adult bears are more adept at homing. The inadvertent training of bear LR04 by gradually increasing the reloca-

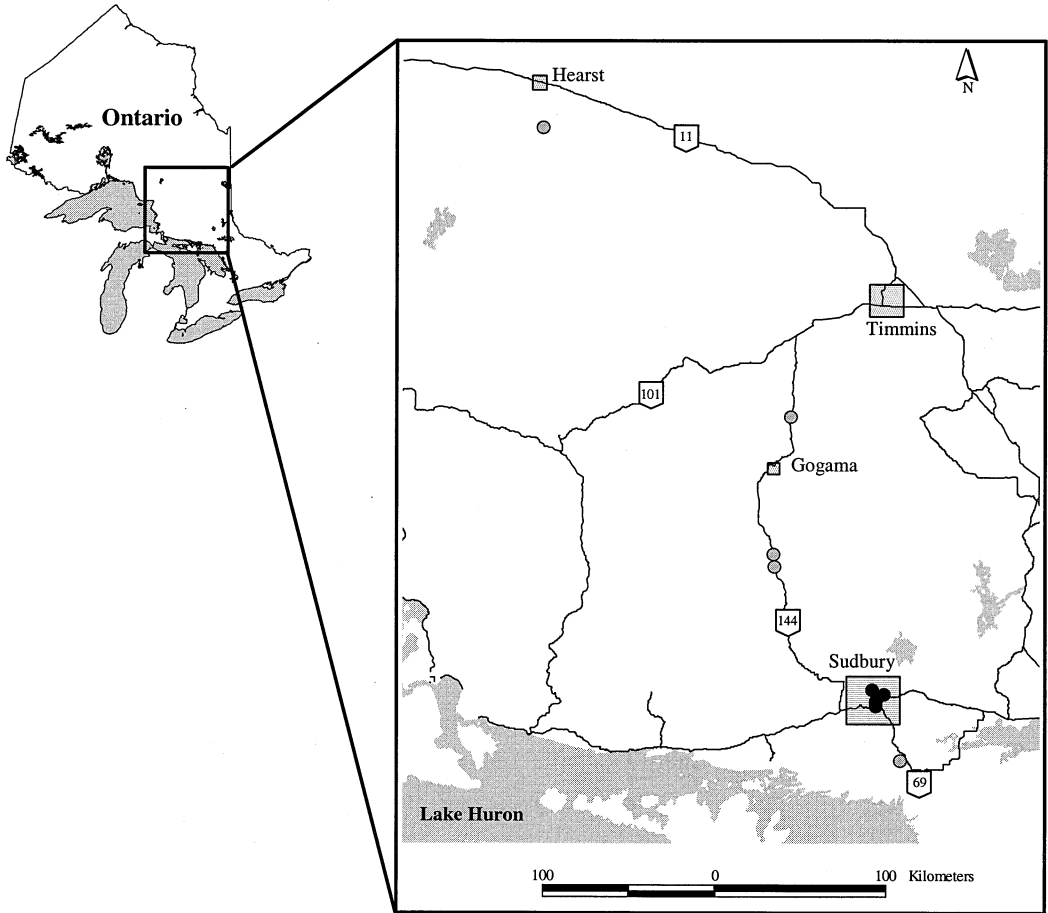


FIGURE 1. Capture and release locations for nuisance Black Bear LR04. Black circles represent the capture locations and grey circles represent release locations. The thin black lines on the map correspond to the two-lane paved provincial highways along the relocation routes, while the shaded squares are cities and small towns along these routes. Irregular shaded areas are lakes.

tion distances may explain how she was able to home successfully over a longer distance than any previously reported for a Black Bear.

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