

Diurnal and Nocturnal Behavior of Black Bears, *Ursus americanus*, on Bear Trails

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Well-used and possibly ancient bear trails occur in different regions of the home range of bears (*Ursus*) and are suspected of functioning in intraspecific communication. I monitored Black Bears (*U. americanus*) in a riparian habitat of an old growth forest on the Queen Charlotte Islands during daylight and also during darkness with the use of light-enhancing night-viewing goggles. During daylight, bears regularly moved off the trails on first visual detection of my presence (>20 m). However, during darkness, bears maintained high fidelity to these trails even during my close approaches (1 m), suggesting these trails act as nocturnal sensory corridors.

Key Words. American Black Bear, *Ursus americanus*, nocturnal behaviour, bear-human interactions, bear trails, scent marking, Queen Charlotte Islands.

Bear (*Ursus* spp.) trails with individual foot impressions in the substrate occur in a diversity of habitats and represent ancient or at least long-term evidence of activity (Murie 1981; summary in LeFranc et al. 1987*). In habitats with dense ground vegetation or obstructions, these old trails may represent natural corridors of least resistance. However, in open forests and meadows the trails could provide visual and tactile information for intraspecific signalling (Burst and Pelton 1979; Hamilton and Archibald 1986*). Scent-marking occurs along these trails resulting in a potential olfactory map of the habitat (Nikolaenko *in press*).

Most behavioural observations of Black Bear (*U. americanus*) and Brown Bear (*U. arctos*) have been made during daylight (Herrero 1985; Powell et al. 1997) and, accordingly, the ecological role of trails and scent marking has only been addressed in context of daylight activity. Bears can also be active during darkness (Frame 1974; Matchutson et al. *in press*; Olson et al. *in press*). Recent development of high resolution night-viewing glasses now provides an opportunity to study directly nocturnal bear activity (Reimchen 1994*) such as their foraging behavior (Reimchen 1988). As part of this investigation, I also recorded differences in the behaviour and movement of bears during daylight and darkness which I describe in this note.

The observations were made at Bag Harbour in the southern region of Haida Gwaii (formerly Queen

Charlotte Islands), some 80 km off the coast of central British Columbia. The old growth forests beside the estuary and stream have well-worn bear trails in moss substrata and include distinct foot depressions. These trails extend from the stream several hundred metres into the forest. Trails occur adjacent to areas of high salmon spawning density and as "short-cuts" through the forest between adjacent bays of the estuary. During my daily surveys for bear foraging activity in the watershed (in October 1992 and October 1993), I always attempted to move quietly with minimum disturbance. When encountering a bear, I recorded its general responses and visually estimated its distance from me. During darkness, I used head-mounted full-face goggles (Model AN/PVF5, USA, light amplification 110 000×, resolution 270 000 pixels); these provided average viewing conditions approximately equivalent to mid-day light levels during overcast conditions. Bears congregated in prime foraging areas during darkness and there were a maximum of six during these congregations (Reimchen 1994*). All bears were adult size and I could not reliably differentiate sex or age of individuals.

Results show consistent differences in bear movement between daylight and darkness. During daylight, bears retreated farther into the forest when encountering other bears or myself. Bears detected me at distances up to 100 m if I was moving but at distances of 10–20 m when I was stationary. When I was behind an obstruction and not visible to the bear, the directed sniffing in my direction indicated detection. They did not retreat in these situations until

*See Documents Cited section

they detected me visually. On five occasions when I was moving through the forest on bear trails away from the stream, I encountered solitary adult bears moving along the trails towards the stream. When I was first detected visually (ca 10-25 m), bears immediately moved off the trail in a broad arc just outside of visual contact with me and rejoined the trail and continued to the stream. Extending from 38 days of observations on the bears (1992, 1993), it was evident that visual cues were a dominant factor in agonistic responses among bears during daylight as evasive responses of bears occurred on initial visual detection of other bears rather than on auditory or olfactory detection.

During darkness, responses of bears to me were substantially different than those during daylight. On the intertidal regions of the estuary, at least four different bear would pass by me at close distance (1-6 m) if I was positioned near any of the routes that bears regularly used in transit from the forest to the tideline. Bears were aware of my presence as they sniffed in my direction when passing me. However, they did not appear to detect me visually because when I motioned silently with my arms, the bears did not respond; comparable action during daylight evoked an immediate evasive response of the bear. On two occasions during darkness, when I was moving through the forest on a bear trail, I encountered an adult bear walking in my direction on the trail. The bear did not exhibit obvious awareness of my presence until it was within 20 m when it began extensive sniffing in my direction. It continued the approach to within 5 m and remained at this distance and appeared unwilling to move around me. Only when I moved several paces off the trail did the bear cautiously and slowly move past me but even during the point of closest approach, it maintained fidelity to the trail. The reluctance of the bear to move off the trail during darkness was puzzling as they readily moved off the trail during daylight. There were no physical barriers or obstructions on either side of where I stood which would have restricted its movement.

The most plausible interpretation for the close proximity with which bears would pass me during darkness without leaving the established trails is that movement off the trail would leave the bear with inadequate tactile or olfactory input for movement on novel terrain. If so, I suggest that these established trails have an important ecological role facilitating bi-directional movement in darkness. When these trails are used as communal corridors, then they may also serve to impart sensory cues of home range and individual identification (Burst and Pelton

1982; Herrero 1985; Hamilton and Archibald 1986*; Nikolaenko *in press*).

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