A note on daily movement patterns of a female Asiatic black bear (*Ursus thibetanus*) in a suburban area of Iwate Prefecture, northeastern Japan

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As urban areas sprawl and natural environments are modified, human-bear conflicts are becoming increasingly more common and significant management concerns throughout the United States (Peine 2001; Beckmann and Lackey 2008) and other countries (Mattson 1990; Huygens et al. 2004; Sangay and Vernes 2008). In North America, nuisance activities by American black bears (*Ursus americanus*) include raiding crops and orchards, feeding on human food and garbage, and attacking livestock and humans (Herrero 2002). However, management policies for black bears vary according to the status of the species, which ranges from pest to threatened (Pelton 2003).

American black bears are generally crepuscular but may shift to diurnal or nocturnal activities depending on human activity (Pelton 2003). Several studies have reported such behavioral changes of black bears in British Columbia (Reimchen 1998), Nevada (Beckmann and Berger 2003), and California (Ayres et al. 1986; Lyons 2005; Matthews et al. 2006).

Recently, crop damage and human injuries have also been caused by Asiatic black bears (*U. thibetanus*) in Japan (Hazumi 1994). Most of these disturbances occur in suburban landscapes surrounded by forests and farmlands with obscure boundaries (Ozaki and Kudo 2002). In Japan, only a few behavioral studies have addressed such problems with black bears. In Nagano Prefecture, central Japan, Huygens and Hayashi (1999) constructed an electric fence around corn fields to test its effect on crop depredation by black bears. In the Experimental Farm of Tohoku University, northeastern Japan, Deguchi et al. (2003) placed infrared cameras near a corn field to observe nuisance behavior by black bears.

Despite these studies, little is known of the movement patterns of Asiatic black bears in suburban areas of Japan. Detailed monitoring of active Asiatic black bears near suburban areas is required to reduce human-bear interactions. Therefore, to characterize bear movement and resource selection patterns during the crop harvest season, we monitored the movement of a female Asiatic black bear, which was tagged in a forest adjacent to a suburban area, using global positioning system (GPS) technology.

### Study area

The study was conducted over approximately 1000 ha on the outskirts of Morioka (39°42'N, 141°09'E), Iwate Prefecture, northeastern Japan (Fig. 1). This area is located in the cool temperate zone; the mean annual temperature is 10.2°C, and annual precipitation is 1142.5 mm (Japan Meteorological Agency 2007). The elevation of the area ranges from approximately 150 m to 865.5 m at the peak of Mt. Hakogamori along the eastern edge of the Ou Mountains (Fig. 1). The primary vegetation consists of secondary forests dominated by Mongolian oak (*Quercus mongolica* var. *grosse serrata*), Japanese white oak (*Q. serrata*), plantations of Japanese cedar (*Cryptomeria japonica*), Japanese red pine (*Pinus densiflora*), and Japanese larch (*Larix kaempferi*). Natural forests of Japanese beech (*Fagus crenata*) also present, but are sparse above 500 m.

A mosaic of residential areas and agricultural fields is interspersed among the forested mountains. Most of the agricultural fields are occupied by apple (*Malus pumila* var. *domestica*) orchards, which are harvested from...