

ANDEAN BEAR–CATTLE INTERACTIONS AND TREE NEST USE IN BOLIVIA AND VENEZUELA

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Ursus 13:369–372(2002)

Key words: Andean bear, Apolobamba, bear–cattle interactions, Bolivia, corn field raiding, feeding behavior, national parks, spectacled bear, tree nests, *Tremarctos ornatus*, Venezuela

Andean (spectacled) bears (*Tremarctos ornatus*) have been reported as livestock predators throughout their range (Peyton 1980, Suarez 1988, Mondolfi 1989, Goldstein 1991a). In Peru, Peyton (1980) reported that in order to kill cattle, bears pursue the animals on steep slopes or near cliffs to make them fall. Peyton (1980) also acknowledged reports that a bear may carry livestock kills up a tree to consume it in seclusion and protect the kill from other animals. Even though cattle remains were found in Andean bear scats in Peru (Peyton 1980) and Ecuador (Suarez 1988), no field evidence was gathered to discriminate between predation and consumption of carrion by Andean bears.

The use of tree nests (nest-like platforms) by Andean bears has been reported by several authors (Osgood 1914, Tate 1931, Bridges 1948, Mondolfi 1989, Goldstein 1991b). They described tree nests as ordered assemblages of bent or broken branches positioned in forked branches, resembling large nests and used as resting places. Peyton (1980) found 5 tree nests in Peru associated with fruit feeding. Based on his observations in Peru, Peyton (1980) suggested that the platforms were used for feeding purposes rather than for resting, as had been reported. Although the use of tree nests in relation to fruit feeding is widely reported anecdotally by locals in Venezuela, field investigations have found that tree nests were strongly associated with cattle carcass feeding sites (Goldstein 1991b).

No direct evidence of predation on cattle by Andean bears was gathered during the Andean bear surveys done between 1985 and 1987 in Venezuela. However, some evidence supports cattle predation by Andean bears (Goldstein 1991a), including signs of struggle (deep and long hoof marks on the ground, uprooted vegetation, cattle with claw marks), the number of cattle lost at each site, the absence of sign from other possible predators, and the cessation of cattle losses after the killing of bears. This work reports new information on Andean bear–livestock predation claims, carcass feeding behavior, and tree nest use by Andean bear gathered from 1996 to 2000 in the Venezuelan Andes and in August 2000 at the Apolobamba National Park and surrounding areas in Bolivia.

METHODS

From August 1996 to December 2000, I surveyed settlements surrounding the wilderness areas present in the Venezuelan Andes, with the exception of the Perija region. I defined wilderness area as any tract of forest or páramo (high altitude treeless ecosystems, characteristic of the tropical areas of the Andes) bigger than 5,000 ha with no human disturbance. Reports on bear–cattle interactions occurring within 2 months of my visit were investigated. I documented the history of prior Andean bear–cattle interactions, number of cattle lost, and location of each event. At each reported bear–cattle interaction site, the carcass remains and signs of predator or scavenger activity (beds, tree nests, scats, trails) were described and mapped. The state of the carcass was categorized as fresh (little or no feeding, no decomposition) or decomposing (from partially eaten kill to bones and hide). The above methodology was also used in Bolivia at the Apolobamba National Park and surrounding areas during a Andean bear survey, August 2000.

RESULTS

Venezuela

Andean bear–cattle conflicts in Venezuela were reported at 7 locations within the states of Mérida, Táchira, Trujillo, Barinas, and Lara. All but 1 location (Quebrada El Molino) were inside national parks. Five of the 7 locations (Páramo La Fiera, Quebrada El Molino, Páramo Los Angelitos, La Ciénaga, and Santa Ana) reported predation events within the last year. Cattle predation was reported within the 2 months prior to my arrival at 4 of these 5 locations (excepting La Ciénaga). A total of 47 cattle from all locations were reportedly lost to bear predation during the previous 2 years (1999–2000).

Quebrada El Molino.—Of the 9 cattle reported dead or missing, the remains of 5 decomposing carcasses were located. No fresh kills were found. Seven tree nests and 3 ground beds were associated with 4 of the carcass remains found. All the tree nests were found in very steep terrain (>70% slope) with extremely difficult access. Skin remains, bone fragments, leg bones, vertebrae, and a skull were found inside 5 of the tree nests. On a later visit, 1 of the tree nests showed signs of recent use. A cattle skull and a partially eaten leg were found inside the nest, and a trail leading from a páramo area to the tree nest was clearly visible.

At 1 site, the bone remains of cattle were found below a rocky cliff in an open páramo area. At 3 spots on ledges at the cliff I found bone and skin remains as well as several bear scats. One site contained a ground bed supported

on one side by a small shrub. At this site, the bear had evidently brought branches to build the nest (there were no other shrubs or trees within 50 m of the site).

Páramo Los Angelitos.—A decomposing carcass had been dragged downhill, leaving a clear trail through the páramo vegetation leading to 3 feeding sites and 3 ground beds. The ground beds were within 2 m of each other, and I found cattle bones and cattle and bear hair around the beds. Two old scats containing cattle bone fragments were found just outside 1 of the beds. The beds were built on the highest portion of a very steep slope overlooking the creek bed.

Páramo La Fiera.—Sixteen cattle were reported lost during the 6 months prior to my visit at this location. Although I found much sign of Andean bear activity (e.g., trails, scats, and claw marks on trees), I found no carcasses in the forest below the páramo. The only signs I encountered that suggested bear feeding on cattle carcasses were 4 bear scats containing cattle remains found below a recently made tree nest (the branches and leaves that made up the nest interior were still green).

Santa Ana and La Cienaga.—I visited these locations after a landowner reported repeated attacks on his cattle by bears. At both locations, the landowner recalled yearly losses of cattle to bear predation for the past 30 years. Cattle losses occurred during September and October. Losses varied between years with up to 14 cattle lost annually. However, during 2000, cattle losses started at the end of June and continue through August. The owner reported a total of 21 animals lost during 2000. During my visit, we located 18 ground nests and 4 tree nests associated with 4 decomposing carcasses. All ground nests were found in steep terrain (70% slope) at the edge of a ravine. The tree and ground nests had easy access from the paramo above and from the creek below. All the nests were connected by trails that in most cases ran perpendicular to the slope. The entire area, including 22 tree and ground nests, trails, and terrestrial bromeliad feeding sites, covered approximately 200 m². Most of the ground nests were adjacent to a shrub and were neatly constructed with branches, fern leaves, and other plant debris.

Although mountain lion (*Felis concolor*) scats were a common sign in all the wilderness areas visited, particularly at rocky outcrops and along human trails, Quebrada El Molino was the only site where mountain lion scat was found near a cattle carcass visited by bears. Only bear sign was found associated with cattle carcasses at all the other locations.

Tree nests associated with fruit feeding were observed at El Carrizal, Mérida. Although many fruit-bearing trees at El Carrizal showed bear climbing signs, I distinguished tree nest type platforms on only 2 occasions. Both were built on forked branches high in the canopy of fruiting

trees 12 to 15 m above ground.

Bolivia

Cattle predation by Andean bears was widely reported in ranching areas around the town of Pelechuco in the Apolobamba National Park. On my visit I attended a meeting where the cattle owners asked national park representatives for compensation for >70 cattle reported lost to bear predation in the last 3 years. Cattle losses within the last 2 months were reported at Uyuni, Pasto Grande, and Tojoloque.

Although recent bear sign was found at all these sites, inspections failed to document evidence of carcass feeding or predation by bears within the last year. Only one very old and deteriorated scat with bone remains was found beside a very old ground nest at Pasto Grande, indicating a cattle carcass feeding event by bears.

Bear–cattle conflicts in Cerro Toana occurred 2 months prior to my visit. Several cattle were reported missing. Cattle owners found the remains of 1 cow associated with bear sign, and a bear was shot a week before my visit.

I found some signs of recent bear–cattle interactions. An area on the ground with cattle hide remains was visible in an open páramo 15 m above the forest edge, and a trail on the páramo vegetation led downslope toward the forest edge into a ravine. The trail continued along the ravine floor, occasionally dipping into a stream. Along the bear trail I found scattered cattle ribs, 3 sites with bone fragments, 5 tree nests, 8 terrestrial bromeliad (*Greigia* sp.) feeding sites, 2 epiphytic bromeliad (*Tillandsia superba*) feeding sites, and 3 bear scats (1 with bone fragments inside a tree nest and the other 2 with bromeliad remains). Although cattle owners reported permanent presence of Andean bears in the area, predation events were reported as uncommon.

I found tree nests in Bolivia at Pasto Grande, Pajan, and Cerro Toana. The Cerro Toana nests were clearly associated with cattle carcass feeding. Six tree nests and 1 ground bed were found at Pajan in a small forest patch (about 4 ha), 200 m from the Pajan cornfields on the opposite bank of the Disiyakha river. Two nests were observed at Pasto Grande on a *Prunus* sp. tree at 5 and 7 m above the ground.

DISCUSSION

Bear–cattle conflicts in Bolivia and Venezuela occur at remote cattle herding grounds in open grassland areas, near large tracks of cloud forest. In Venezuela, all but 1 location with bear–cattle conflicts were inside national parks. The paucity of information on bear–cattle conflicts is due to the lack of monitoring by national park authorities. Livestock owners take it upon themselves to

deal with bear predation without notifying the authorities, usually by hunting the “problem” bears and all other bears that happen to be in the area.

Conflicts in Venezuela were localized at sites with a long history of bear–cattle interactions where they seem to happen at intervals of up to 10 years. Five of the 12 Venezuelan locations reported by Goldstein (1991a) as having bear–cattle conflicts had conflicts during our survey. At the 2 newly reported locations, investigation revealed that both had a long history of cattle predation by bears. Santa Ana was the only location where bear–cattle conflicts were reported annually. The concentration of conflicts in relatively few locations will allow close monitoring and aid in developing a program aimed at preventing cattle loss and conserving bears.

As reported for brown bears (*Ursus arctos*) in Spain (Clevenger et al. 1994) and Norway (Mysterud 1973), Andean bears leave many signs around carcass sites. At carcass sites in Venezuela, the bears often used ground resting sites as well as ground and tree nests while spending several days feeding on a single carcass.

In Bolivia and Venezuela, cattle carcasses were dragged downslope from open paramo areas toward forested creek beds. Once at the creek, the carcass was dragged to different feeding sites several times, confirming the reported general feeding behavior on cattle carcasses (Goldstein 1991a). The only difference I encountered during the latest cattle carcass feeding episodes was that a proportion of tree and ground nests were clearly used as feeding sites. All ground and tree nests found in and around carcass areas were found on strategic ledges or hillsides with steep slopes, difficult access, and a panoramic view of the whole area—a perfect site for observation and defense purposes.

Tree nests found associated with fruit feeding at El Carrizal correspond to Peyton’s (1980) description of tree nests associated with fruit feeding. However, I found some differences with tree nests described by Peyton (1980) as feeding sites. First, platforms encountered in Venezuela were located at the highest part of the canopy with no other branches above, indicating that the purpose of the platforms was not to reach other branches further up. Second, many trees exhibited fruit feeding sign, such as pruning of branches, near tree nests but had no signs of tree nests in their canopies. This suggests that platforms are neither necessary nor habitually used in fruit feeding in Venezuela.

The pruning of branches and the building of tree nests appear to be a common Andean bear behavior, not necessarily associated with feeding higher up in the trees. A bear cub (approximately 7 kg) captured in the wild and brought to the Badarida Zoological Park in Barquisimeto, Venezuela, was released in a new open enclosure with

natural trees. The cub immediately climbed up the highest branch, pruned several branches, and made a rustic nest in which he spent 1 week, only climbing down at night to feed. Other zoo bears were later released in the same enclosure, where they also climbed the highest and thinnest branches and pruned all the trees in the exhibit (Jose Pernalet, Badarida Zoological Park, Barquisimeto, Venezuela, personal communication, 2000). This supports the concept that platforms serve multiple behavioral purposes for Andean bears, such as feeding, resting, or guarding posts at feeding sites (Goldstein 1991b).

We noted that Andean bears hauled parts of carcasses up trees, and not the whole carcass as commonly reported (Peyton 1980). At Quebrada El Molino, the bear or bears that fed on cattle carcasses used the same general area while feeding on the carcasses, and even used the same tree nest to cache remains from different cattle carcass.

Because cattle predation ended after 1 bear was killed, I assumed only 1 bear was preying on cattle at each location (Goldstein 1991a). This was supported by anecdotal information from cattle owners. However, evidence from Santa Ana suggests that more than 1 bear fed on carcasses. There, 2 carcasses were consumed simultaneously and a number of beds or nests were found at the feeding site.

The information gathered at bear–cattle conflict areas in Bolivia and Venezuela demonstrate that most cattle disappearance is blamed on bear predation, an assumption that is not always true as the experiences at Páramo La Fiera, Venezuela, and Pasto Grande, Bolivia, have shown. At all sites where Andean bear fed on cattle that we visited in Bolivia and Venezuela during this study, we found only very old decomposing cattle carcasses associated with bear activity signs. We also found no field evidence to discriminate between predation and consumption of carrion. For that reason, I have used the term cattle carcass feeding instead of cattle predation.

Knowledge of how many individual bears are involved in a carcass feeding event and the predatory capacity and intensity is of key importance to future management of bears in conflict areas. Bear–cattle conflicts continue to be a problem throughout the distribution of the Andean bear in Venezuela and are important issues where extensive highland herding practices take place in Bolivia.

ACKNOWLEDGMENTS

The Bolivian portion of this research was partially financed by the Center for Environmental Research and Conservation (CERC), through the grant “Biodiversity and Land Use Zoning of the Newly Expanded Apolobamba Integrated Management Area”.

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Received: 28 May 2001.

Accepted: 29 March 2002.

Associate Editor: Immell.

PROBABLE GRIZZLY BEAR PREDATION ON AN AMERICAN BLACK BEAR IN YELLOWSTONE NATIONAL PARK

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Ursus 13:372–374 (2002)

Key words: American black bear, grizzly bear, interspecific killing, predation, *Ursus americanus*, *Ursus arctos*, Yellowstone National Park

Both grizzly bears (*Ursus arctos*) and American black bears (*U. americanus*) live in Yellowstone National Park (YNP), which is located primarily in Wyoming, USA. In areas where grizzly bears and black bears are sympatric, temporal isolation and behavioral differences likely reduce direct competition between the species (Aune 1994). In the Greater Yellowstone Ecosystem (GYE), grizzly bears are generally most active during nocturnal and crepuscular times (Schleyer 1983, Holm et al. 1999), whereas black bears are mostly diurnal (Barnes and Bray 1967, Holm et al. 1999). Grizzly bears evolved to exploit non-forested habitats, whereas black bears are primarily forest adapted (Herrero 1978). Grizzlies are also generally larger than black bears and much more aggressive in defending themselves and their offspring from conspecifics and other predators (Herrero 1978), whereas black bears typically escape predators by running into forest cover or

climbing trees (Herrero 1985).

Due to their larger body size, grizzly bears have a competitive advantage over black bears in large non-forested areas (Herrero 1977). Although displacement of black bears by grizzly bears from high quality habitat has been documented (Shaffer 1971, Kendall 1984, Aune 1994), interspecific killing of black bears by grizzly bears has only occasionally been reported (Arnold 1930, Jonkel and Cowan 1971, Murie 1981, Ross et al. 1988, Mattson et al. 1992).

We documented probable grizzly bear predation on an adult male black bear in Hayden Valley, in central YNP. Hayden Valley is a large (>8,500 ha) non-forested valley surrounded by the forested Central Plateau. Flora in the valley is dominated by sagebrush (*Artemisia* spp.) and a variety of forbs, grasses, and sedges (Meagher 1973). Numerous graminoid-dominated wetlands are present in the valley. Lodgepole pine (*Pinus contorta*) forest types that occur on infertile rhyolite soils dominate the forested plateau surrounding Hayden Valley (Despain 1990). Spruce (*Picea engelmannii*)–fir (*Abies lasiocarpa*) stands are interspersed throughout the lodgepole pine zone in areas of more favorable moisture regimes such as pond margins, north slopes, and drainages (Graham 1978). Grizzly bears are active in both the forested and non-forested areas of Hayden Valley throughout the non-denning season (Gunther et al. 1995). Black bears are mostly observed within and near the edges of the forested portions of the valley and rarely far from forest cover in the non-forested areas (Gunther et al. 1995).

On 2 August 1998 we received a report of a dead black bear on the northeast side of the Yellowstone River in Hayden Valley, across from the Grizzly Overlook interpretive sign along the Grand Loop road. We investigated