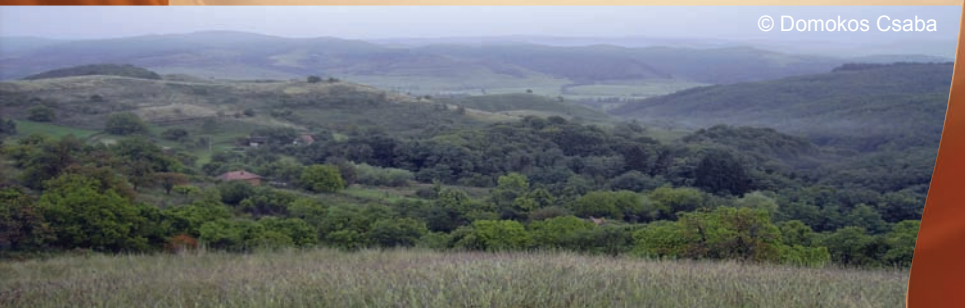
The Brown bear

MILVUS group

Mammal Conservation WG

Distribution and status:

The range of the Brown bear (Ursus arctos, Linneaus, 1758) is the widest of any species of bear in the world. Historically, it inhabited most of the Northern Hemisphere: North America (from the Arctic Ocean to Central Mexico), Europe, North Africa, Central and North Asia, as well as Japan. Due to various human activities and direct persecution, the species has been restricted to a fraction of its former range. This regrettable process continues even today due to habitat loss linked with encroaching human settlement and activities, hunting and poaching, as well as many other reasons. Today, the European brown bear population – except the North eastern population, linked to the Russian one – consists mostly of small, isolated populations that in many cases face an almost certain extinction. The Carpathian population is the second largest in Europe, and thus one of the few that can play a crucial role in the survival of the species on the continent. According to official estimations, approximately 40% of the European Brown bears live in Romania. Today, the species is strictly protected worldwide (in Romania as well) by international agreements and national legislations alike.



General characters:

Brown bears have a robust head with a prominent nose and small, rounded ears. The eyes are small, tail is short, and the body is of great size with a powerful build and prominent shoulder hump. The feet present 5 digits each, ending in long, slightly curved claws (non-retractile, reaching 5-6 cm in length). Claws on the forefeet can be about twice as long as on the hind feet.

Body length of adult individuals varies from 1.0 to 2.8 m, shoulder height is up to 1.5 m, and length of tail is 65-210 mm. Adult males on average are larger and more heavily built than females. Body mass varies from 80 to 600 kg – bears in Romania weigh an average of 135-390 kg in the case of males, respectively 95-205 kg in the case of females. Body mass depends on the quantity and quality of available food, as well as on the given season. The largest individuals are found along coastal Alaska, on the Kodiak islands, in Kam-

chatka and coastal Siberia.

Color encompasses all shades of brown, to almost black. Generally, head and shoulders are paler in color, with darker sides, belly, and legs. Color depends largely on the given habitat. Pelage consists of a layer of dense, shorter inner fur and long outer guard hair.

The dentition is made up of 36 teeth, but some individuals present an incomplete dentition.

Potential longevity of wild brown bears is 20-30 years. In captivity, they can reach even 30-50 years of age. Natural mortality may be attributed to severe winters, malnutrition, various diseases, age, in some cases infanticide (the killing of cubs by adult male bears) and rarely to cannibalism.

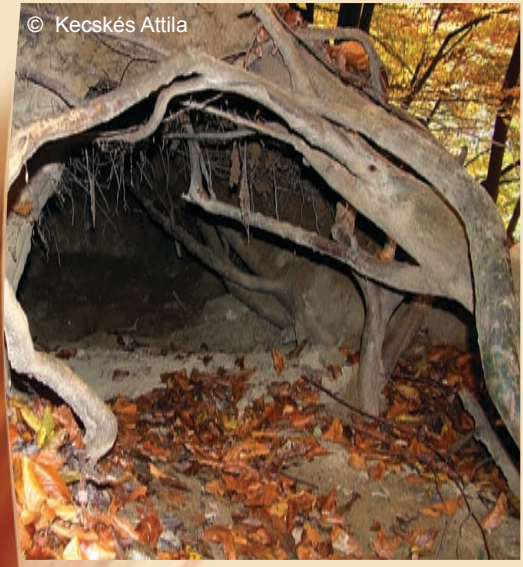
Lifestyle:

Adult brown bears are solitary except during the breeding season, but home ranges overlap with no territorial defense. Adults forage and den alone, while females forage and den with their young. Sizes of home ranges are largely determined by the abundance of food, but are also influenced by age, sex, social status, physical condition of the animal, foraging habits, habitat topography, presence of suitable hiding places and dens, as well as the intensity of human disturbance (in some cases). A strict hierarchy exists between brown bears: the highest ranking animals are the dominant adult males, then females with young, followed by subadults.

Home ranges of mature males encompass home ranges of several females, which may lessen the female's chance of encountering aggressive males, which could threaten herself or her cubs. Young adult females tend to stay near the maternal home range, while young adult males can disperse as far as several hundreds of kilometers from it.

A certain area's bear population density is varying throughout a year. It is affected by the area's topography and the abundance of food available in the given season.

Generally, bears mutually avoid each other, thus minimizing the chance of an encounter that could end



with injuries or even death. Nevertheless, periodically, close to abundant food sources (carrion, areas rich in wild berries or fruits, agricultural fields, garbage dumps) brown bears can congregate in great numbers. In these cases, aggressive and dominant individuals have priority, while subordinate animals feed in the absence of dominant individuals. Occasionally, fights may result in the deaths of smaller bears.

Brown bears often construct day beds in sheltered, dry spots, with good visibility over the surroundings.

Activity varies with environmental conditions, abundance of food, and in some cases, the intensity of human disturbance. In areas with intensive human disturbance, bears often become nocturnal and secretive, whereas elsewhere they can be active at all hours.

Individuals communicate primarily by olfactory markings, different postures, easily noticeable markings (for example, clawing on tree barks), as well as vocalizations. Generally, when two bears meet, one adopts a dominant posture, while the other a subordinate one. Threats and fighting occur between animals of similar social status, sex and age.

Denning is an adaptation due to the scarce food availability during winter. It also plays an important role in the survival of cubs – these are born during winter, and at first are incapable of thermoregulation, thus needing shelter. Brown bears may dig their own dens, or use

natural caves and rock splits. Occasionally, they can spend the winter between the roots of fallen trees, or even under the canopy of a tree.

During winter sleep (considered by many not to be hibernation in the true sense), body temperature is reduced by 4-5°C, while heart rate decreases from a normal 40-50 beats / min to 8-10 beats / min. Bears do not eat, drink, urinate or defecate during this period, and live from the adipose tissue gained prior to the winter. Winter sleep begins between October and December, and spring arousal occurs between March and April, depending on the severity of winter. In the meanwhile, bears can loose a significant percentage of their body mass: an average of 22% in the case of males and 40% in the case of females (this latter is due to the large energy expenditure during reproduction). In some areas, during years with abundant food or mild winters, bears can stay active all year long. Interruption of winter sleep or den abandonment (for example, due to human disturbance), can be risky for adults, but often is fatal for the young. In spring, males leave their dens first, while females with new young are last to emerge.

Feeding behavior and diet:

The omnivorous diet of brown bears is reflected by their dentition and adaptations in the digestive tract. They have large canines, which may be used for defense, killing prey, and dismembering carcasses, but the molars with large grinding areas are associated with a diet consisting largely of vegetarian foods and invertebrates. The digestive tract is basically a carnivore tract that has been lengthened, to allow better digestion and absorption of plant material. Because brown bears don't possess the specialized

organs of herbivores (for example, the caecum), they can not digest the structural parts of plants, but they can, however, digest about half of the protein present in plants and most of the starch and sugar.

Brown bears pass through three physiological stages in their active period from spring to autumn: hypophagia (low food intake, during spring), a stage of normal activity in summer, and hyperphagia (high food intake, during autumn). During autumn, it is essential that bears find nutritive, high energy foods since this when they accumulate adipose tissue, crucial for hibernation.

Brown bears may cache food to hide it from other animals. By doing this, they also slow the food's decomposition. After covering food with branches, leafs and soil, they often remain in the proximity, guarding it.

The brown bear's vegetal diet is very rich: graminoids and forbs are consumed primarily in their most nutritious preflowering stages in spring and early summer; later they switch to berries and fruits (apple, pear, plum, blackthorn, sorb, raspberry, blackberry, cranberry, etc.). In autumn (but sometimes also during winter and early spring), bears consume large amounts of acorns, beechnuts, chestnuts,

hazelnuts and walnuts. If there is a possibility, they pilfer oat, corn, melon, potato and sugar-beet plantations. A major part of their diet (in many habitats up to as much as 85%) consists of vegetal origin food.

Due to its high digestibility and high nutritional value, meat is preferred. Nevertheless, meat can be accessed only occasionally, through: active hunting, searching for carcasses (either died from natural causes or the prey of other carnivores), or as baits. Contrary to popular belief, a bear that occasionally consumes meat, will not become a "blood bear" (Hungarian expression, denoting individuals with an exclusively carnivore diet). Domestic animals, having been bread, amongst others, for easy manageability, have become virtually defenseless against bears (and other large carnivores). Nevertheless, in areas where traditional livestock guarding techniques (shepherds, shepherd dogs and fenced shepherd camps) are still practiced, bears rarely succeed to prey on domestic animals. Therefore, on a European level, domestic animals are not important food for brown bears.

Seasonally, insects, their eggs and larvae may constitute important protein sources for bears including ants, bees and wasps, as well as their eggs, larvae and pupas. Brown bears also gladly consume honey.

Ontogeny and reproduction:

Brown bears exhibit a long life span, late sexual maturity, protracted reproductive cycles and a low reproductive rate. Female brown bears exhibit 2-, 3- or 4-year reproductive cycles. Duration of estrus is 10-30 days, depending on the individual. Neither male nor female bears show sexual interest during pre- or post-estrus periods.

Breeding occurs from mid-May to July. In this period, females may mate with two, or even more males. After successful fertilization, embryos develop to the blastocyst stage, but these do not implant into the uterus, as in the case of most mammals (including humans). Instead, they remain free in the uterus; their development is halted and only starts again approximately 5 months later, when the female enters her winter-time shelter. Around November, the blastocyst implants and the active gestation period – of only 6-8 weeks – begins.

Young are born from January to March. Litter size varies between 1 and 4, but most often is of 2-3. At birth, cubs weigh approximately 500 g, are sightless and totally dependant upon their mother. By 3 months, they weigh 15 kg and have fully developed milk teeth. At first, they have circular-shaped skulls, which later lengthen. During the first summer, young often exhibit a whitish V-shaped neck patch, which usually fades by the 2nd year.

Lactation lasts 1.5-2.5 years and young usually remain with the female for 2-3 years. In the meanwhile, the mother bear intensely protects her cubs, even against adult males or humans. Male cubs usually reach puberty at 4.5 years of age and their reproductive period begins before, and extends beyond, that of females.

Bear attacks on humans:

Brown bear behavior is unpredictable, and because of their size and great strength, a bite or swipe with a paw can cause a major, perhaps fatal injury to humans. A female with young should always be avoided, as should brown bears that are eating or defending food. Animals conditioned by feeding (especially hand-feeding) or accessible garbage associate people with food sources, loose their natural fear from man and occasionally may become directly aggressive. Nevertheless, attacks against humans are not predatory attacks, but mostly happen out of self-defense, protecting cubs or carrion (or other food sources) from people. Several factors may contribute to increase the level of a bear's aggression. They are, in decreasing importance: the presence of cubs, presence of a carcass (food source), sudden encounters (surprise – the bear considers he cannot flee and thus will charge), a bear at its den, and presence of a dog.

From the summer of 2004 to the spring of 2007 we investigated a total number of 8 bear attacks on humans. Out of these, 2 were fatal (2 of the cases happened before the mentioned period, in 2001, respectively in 2003). In 2 cases, nobody got hurt – these incidents took place in the autumn of 2006, during wild boar hunts (hunts with beaters). In both cases, bears approaching the

hunters were shot, considering that they were preparing to attack. In 4 cases, there is evidence that the attacks were committed by females with cubs, while in 2 more cases it can be presumed, that they were also caused by female bears protecting their cubs. In one case, a dog accompanying the victim attacked the bear cubs, and the mother bear responded with an attack; 3 attacks happened during the guarding of cornfields (see: protection of food and cubs). In another case it can be presumed (according to improvable information) that beforehand, unknown people, using dogs, tried to take away the cubs from the female – the bears came upon the victim working the field while they were fleeing, and the female killed him.

As shown by the above, most incidents can be prevented by simply avoiding the bear, leaving it alone. Usually, bears try to avoid meeting with a human. Even if it comes to an attack, in most cases, bears abandon the human they attacked and flee the scene.

Damages in livestock and human crops:

In many cases, living in the vicinity of livestock, bears learn to exploit the chance for an easy prey. Domestic animals are virtually defenseless against large carnivores (see: Feeding behavior and diet). Cattle are bitten on the neck, back and head, the abdominal cavity sometimes is opened, and the stomach and intestines are removed. Predation targets mostly calves and yearlings, and happens more often in forested, bushy areas rather than in open ranges. A bear feeding on a carcass is not proof that the prey was killed by the bear. Sheep are taken when they graze, or spend the night on prime bear feeding habitats. Most of the attacks occur in September-October, during hyperphagia (high food intake, in preparation for the coming winter) – this is also proved by the cases investigated by us in the period of summer 2004 – spring 2007.

Traditional herding and livestock guarding techniques, still commonly used in Romania, proved to be – in most cases – sufficient to prevent bear attacks on livestock. In the case of adequately guarded flocks (with shepherds and dogs, and with animals fenced in for the night), most bears are chased away in time from the flock. In many cases, even animals that have been taken by a bear are recuperated, although this can be a risky venture, if the bear will try to defend its prey.

Damages in human crops occur mainly on oat, corn, melon, potato and sugar-beet fields, as well as in orchards and sometimes in vineyards. In most cases, damages are caused not exclusively by bears, but also by wild boar (damages caused by the two species are relatively difficult to tell apart). Often, not the quantity eaten, but rather the trampled plants (in the case of fruit trees, broken branch-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es) make up most of the damages. As mentioned before, guarding crops with traditional methods (dogs, making noise) is often efficient to prevent damages, but demands a lot of time and energy, and can sometimes create dangerous situations for the guards themselves.

Generally, damages in livestock and human crops alike rise in numbers and gravitate in years when bears don't have enough natural food available, especially during autumn.

Damage prevention:

Traditional damage prevention methods were already mentioned above. Another remarkably efficient method is the electric fence, known and used by relatively few people in Romania. It can be used to prevent damages caused by bears in livestock and human crops alike (in the case of crops, it is also adequate to prevent damages caused by wild boar).

In the following, we will present the electric fence, as well as its functioning and correct use.

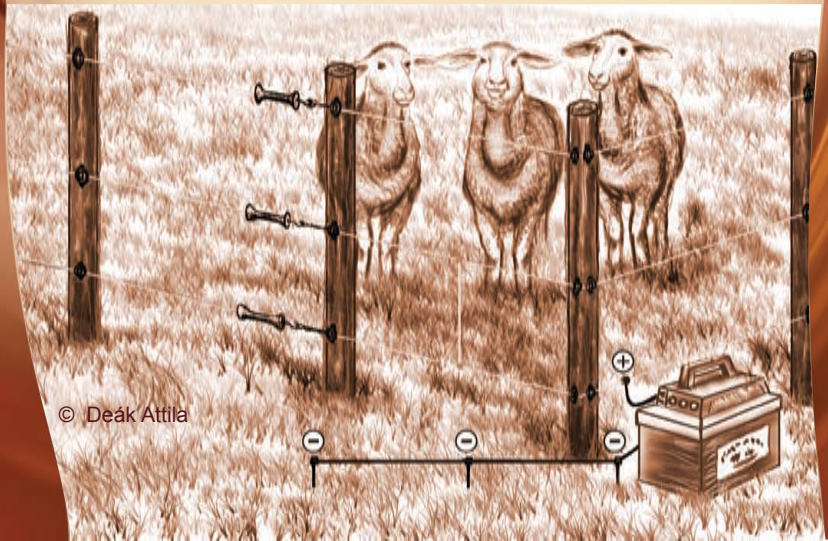
The electric fence:

It consists of several wires stretched in line with each other and powered with 5000-10000 V electricity. The electricity is provided by a dry cell, a battery, or by a network source and is converted into high voltage pulses by an energizer. The wires are used for fencing the targeted area (pasture, shepherd camp, agricultural field, or an orchard). The advantage of the electric fence lies in the fact that it can be easily and quickly mounted and relocated and that it is also suitable for fencing in large areas.

Composition and functioning:

The fence itself is made up from wires stretched in line with each other, which conduct the electric pulses. These are mounted on wood, plastic, metal or fiberglass posts using plastic insulators. At regular intervals (1-3 seconds), the energizer releases high voltage electric pulses (5000-10000 V) into the fence. Current intensity is so low, that the system is totally harmless for the animal (or human) touching the wires. Nevertheless, it delivers a very unpleasant and memorable electric shock.

As already mentioned, the electric fence can have various power sources, depending on local conditions: dry cell,



battery, network source (plug) or a solar panel, which is best to be combined with a battery.

Mounting and maintenance:

Depending on the terrain, the posts must be mounted at such a distance from each other, that the wires will always stay stretched. The posts themselves can be home-made, of wood, or you can purchase plastic, fiberglass or metal posts, with a sharp lower end (thus they can be easily inserted into the ground).

The negative pole of the energizer must be grounded. A good grounding is essential, and for this you need to insert into the ground at least 3, minimum 1 m long rustproof metal bars, which will be interconnected and also connected to the negative pole of the energizer. With an adequate grounding, the bars won't deliver an electric shock, even when touched.

The number of the wires is optional. The electric fences that we have mounted to prevent damages caused by bears and wild boar were of 3 wires – more precisely, 2 electric fence tapes (upper and lower) and 1 wire (in the middle). The electric fence tape is stronger and more noticeable than the

wire. The lower tape was mounted at a 20-30 cm height from the ground, with the others at distances of further 30-40 cm each. Of course, in this case, it was an important aspect that wild boar piglets don't enter the field.

It's important to remember that an electric fence is a psychological barrier rather than a physical one. Fleeing bears or wild boar cannot stop in front of it unless they can observe the fence in time. This is why you have to visualize the fence. The area surrounding the fence should be clean, with a good visibility.

When the electric fence is used to protect sheep (or other livestock), you have to keep in mind that if the livestock is kept on a small fenced area, they can break through the installation (especially when frightened). This can be prevented by also keeping the traditional corral or by fencing in a larger area. Under high voltage lines, it is recommended to place the wires perpendicular on the high voltage lines, instead of in line with them.

The electric fence requires a minimum maintenance – this means mainly the periodical cutting of grass and other vegetation from under the wires – otherwise it will short-circuit the system, decreasing the voltage and reducing the lifespan of the battery. Otherwise, if used properly, the battery can power the whole system for up to several months.

It is recommended to always keep the electric fence functioning – otherwise carnivores (or wild boar) can learn how to bypass it.

In 2005, we have mounted 2 electric fences at shepherd camps located at the foothills of the Gurghiului Mountains (Bicheș area, Mureș County). The two shepherd camps had previous problems primarily with wolves, but also with brown bears. The activity was carried out in the frame of a project focusing on wolves, with the financial support of the Environmental Partnership Foundation from Miercurea Ciuc. After the electric fences were mounted, the two flocks stopped loosing any more animals (during the time spent by the animals inside the fenced area).

In 2006, we have mounted an electric fence in the vicinity of Solocma village (Ghinești parish, Mureș County), around a cornfield of approximately 6 ha. The territory contained parcels belonging to more, than 30 local farmers. After mounting the electric fence, damages caused by brown bears and wild boar alike seized completely.

In both cases, the electric fences were purchased with project funds and were donated to local farmers (or shepherds), for continuous use in the future. In each case, the electric fences were purchased from AGROM-COM SRL (Sângeorgiu de Mureș, Mureș County).

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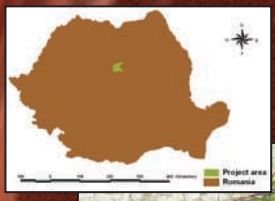
The present brochure was published in the frame of the project "Bear research and conservation in Romania's Călimani and Gurghiului Mountains" (2006-2007). Financial support for the project (and the brochure) was provided by Alertis – Fund for bear and nature conservation (the Netherlands). The project represented the first phase of a long term program, focusing on brown bears. Activities planned for the program's next phase (see also: program target area – map):

- mounting of at least 20 electric fences on agricultural fields damaged by brown bears
- systematic educational activities in local schools
- publishing and distribution of informational-educational materials
- scientific research (home ranges, concentration areas, charting of dens, etc.)
- elaboration and running of ecotourism activities based on brown bears

The program's target area



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