Through the eyes of bear: Toward an increase of umwelt knowledge

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Previous studies:

Since the late eighties, animal borne video systems have seen an improvement of their technical specifications (Moll 2007) and were applied to more species (Rutz et al. 2007, Lavelle et al. 2012, Thomson et al. 2012). American brown bears *Ursus arctos horribilis* (Grizzly) have been equipped with video camera (Woodford 2011) in the Nelchina brown bear project. No studies was never done on *Ursus arctos arctos i*n Europe, although it may be the most problematic area concerning human activities.

Goals of this study:

A first goal was to show to the public and scientific community a short film on the "umwelt" of a bear in the wild. Although the highest activity level in bears occurs during the night in Europe, this video sampling was scheduled for the public and gave priority to diurnal phases. This knowledge-sharing is one of the missions of a Museum in its nature awareness campaign.

The second goal was to test the animal borne video system as a valuable tool to increase the scientific knowledge of the umwelt of bear, in terms of fine scale habitat use and detailed activity budgets.

Material and methods:

The animal borne video system we used (Lotek, Canada) consists of a collar equiped with a GPS transmitter, an accelerometer, and a video camera with a clock to be scheduled for the release of shots (5 min every hour, 12 h per day) during October 2013. The video camera lies on the front part of the neck. A 5 years old female bear called Tolosa was captured by the employees of Slovenia Forest Service on October 6, 2013, in State Hunting Ground Jelen in the area of Javorniki (SW part of Slovenia) (Fig.1).

Figure 1 : Video camera collar with accelerometer on wild female bear "Tolosa"

The collar drop off released the video camera on November 4. Recorded sequences were analysed at the Natural History Museum of Toulouse (NHMT) and at the laboratory "Comportement et Ecologie de la Faune Sauvage » (CEFS/INRA).

20h of video record 264 shots of 5mn sequences were analysed for motor activity, diurnal activity budget and habitat use.

Since the size of video shots was positively correlated with the global activity by minute, we used this proxy to address activity patterns.

Results

The GPS transmitter was scheduled for emeting every 30 min. GPS trajectory allowing home range calculation for female bear Tolosa during October 2013 which reached to 300 Km² although 90% are included in an area of 50 km² (Fig. 2).

Figure 2 : home range of female bear "Tolosa" during October 2013

Activities mainly took place early in the morning before 10 am, then after resting, motor acts increase at 16 pm (Fig. 3) which is in aggrement with the literature (Kaczensky et al. 2006). Activity decreased in late October (red line) before the time of coming into hibernation (Fig. 4).

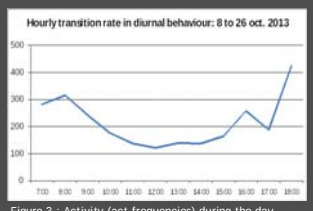

Figure 3 : Activity (act frequencies) during the day

Figure 4 : Activiy during October

Behaviours are listed on Fig. 5 and illustrated on Fig. 6. Feeding activities focused on beech nuts and whitebeam berries (Fig. 7)

Figure 6: Antropic environment, survey, locomotion and postures
A) watching a car, B) a hut, C) a road, D) the valley bellow,
E) a bird, F) ticking out the tongue

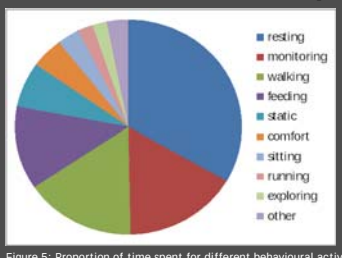

Figure 5: Proportion of time spent for different behavioural activities

Figure 7: Feeding activities: blackthorns (sloes) *Prunella spinosa*
B) whitebeam berries *Sorbus aria*, C) wasp nest, D) beech nuts *Fagus sylvatica*,
E) *Teucrium scorodonia*, F) ant nymphs and beetle larva

Conclusions

This study illustrates the effectiveness of an animal borne video system for increasing our knowledge of bears. Although restricted to the diurnal phases, these video records provide valuable data, in particular the rate of activity before hibernation, alimentary diet and interactions with the anthropic environment.

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