

## BEAR–HUMAN ENCOUNTERS IN AUSTRIA

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**Abstract:** I analyzed 515 reliable reports of bear (*Ursus arctos*) observations and encounters in Austria during 1990–96 with respect to season, time of day, profession and activity of the observer, distance to the bear, reaction of the bear, and reaction of humans. Most commonly, bears were observed by hunters or foresters at dawn or dusk, when observers were driving a car on a forest road or hunting from a blind. Tourists and mushroompickers seldom met bears. Bears normally fled or slowly withdrew when they encountered humans, but in about 25% of the cases bears acted indifferent or curious. Ten percent of the encounters were potentially dangerous. Three females with cubs, surprised at close distance, and 2 subadult bears, harassed at a feeding site, started false attacks. Two radiocollared females were seen more often when they had cubs than when they had not, and a higher percent of sightings with cubs were during the day.

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**Key words:** Austria, bear–human interactions, brown bear, habituation, *Ursus arctos*

In the 10 years since 1986, the number of brown bears in Austria has risen from a few migrant visitors to a small population of about 20–25 individuals (Fig. 1). This was due to intensified natural recolonization of southern parts of Austria by bears from Slovenia and the restocking program of WWF (World Wide Fund for Nature) Austria in the northern Limestone Alps of Styria and Lower Austria. Two females and 1 male were released in 1989, 1992, and 1993 in an area where an old male lived since 1972. The released females produced a total of 10 offspring by 1996, and 1–2 female immigrants in Carinthia might have had cubs also. If both the productivity of females in Austria and the expansion of the Slovenian population continues, the size the Austrian population is expected to further increase in the near future.

The escapades of a strikingly bold nuisance bear in 1993 and 1994 focused public debate on bear conservation on the danger to humans from bears. The notion that bears were shy and evasive was no longer convincing and the idea that bears and humans can live together in an exploited landscape like Austria was called into question. Discussions were dominated by exceptional stories of bear encounters reported in newspapers. Sound arguments against this exaggerations were hampered by the lack of information on how often and under what sort of circumstances bears were encountered in the newly re-established bear areas.

Studies on bear–human interactions often focus on encounters, as information on these events is more readily available (Hell and Bevilacqua 1988, Cicinjak and Ruff

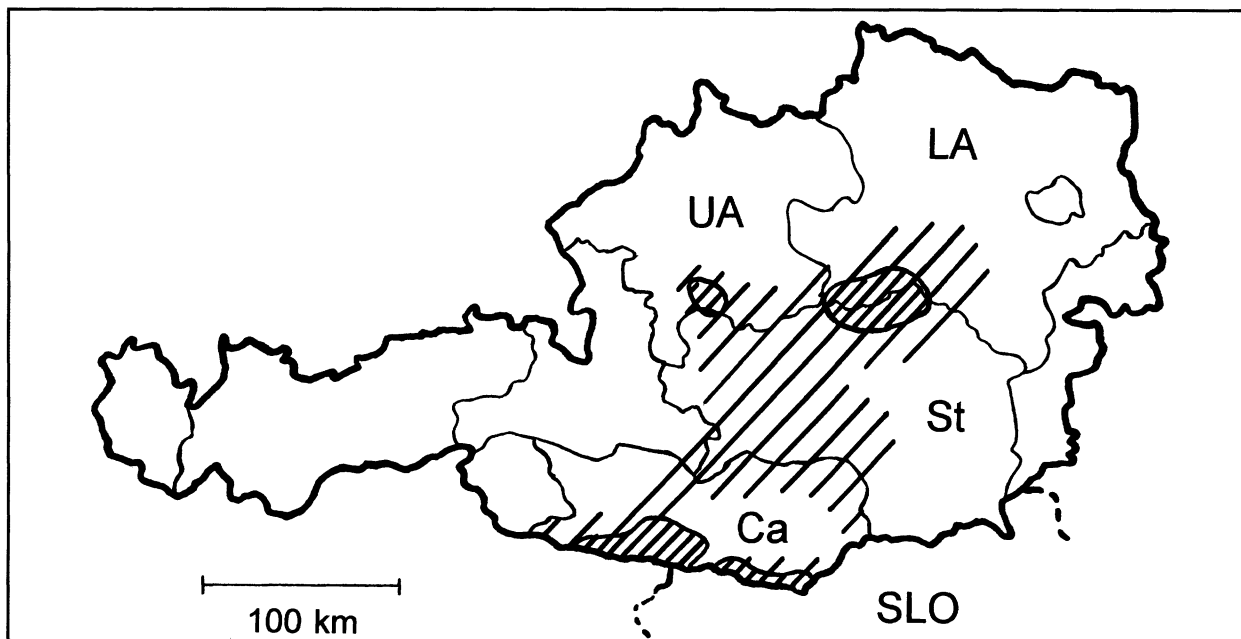


Fig.1. The distribution of brown bears in Austria, 1990–96. Areas of permanent and sporadic occurrence are shown closely and widely hatched, respectively. LA: Lower Austria, UA: Upper Austria, St: Styria, Ca: Carinthia, SLO: Slovenia.

1990). Investigations of bear–human encounters in a broader perspective are mostly confined to members of professional groups like foresters or bear researchers (Swenson et al. 1996). The aim of this study was to document the scope of bear observations and encounters in Austria during 1990–1996 to provide basic knowledge for the future management of bears in Austria.

## STUDY AREA

The study area was Austria's bear range: the Alps of Carinthia, Styria, and Lower and Upper Austria (46°20'–48°10'N, 12°30'–15°50'E; Fig. 1). The area is mountainous, with valley bottoms at 400–600 m, mountain ridges at 2,000–2,500 m in the northern, eastern, and southern parts of the range and altitudes up to 3,300 m in the west. Forest cover is about 60%, with spruce (*Picea abies*) forests in the central parts and mixed forests of spruce, fir (*Abies alba*) and beech (*Fagus sylvatica*) in the north and south. The climate is influenced by the oceanic, Mediterranean, and continental climate; mean temperature in January is about -3°C and in July about 16°C. Annual precipitation is 1,200–1,800 mm and snow cover lasts 80–160 days/year (Becherer et al. 1976). The density of the human population is 45 inhabitants/km<sup>2</sup>, concentrated in the major valleys. Cattle breeding and milk production is the main income for local farmers, although use of alpine pastures is declining. Forest exploitation is very important for the local economy. The high density of forest roads (about 2.5 km/km<sup>2</sup>) makes the forests more accessible for hunting and recreation even if the roads are, in general, closed for public traffic. Tourism is important, especially in Carinthia (Arbeitsgemeinschaft Braunbär Life 1997).

## METHODS

The study is based on 515 reported bear observations made by people throughout Austria's bear range from 1990 to 1996. In 227 cases I interviewed the observer. Data on 257 cases used second-hand reports of foresters (83), colleagues (46), hunting organizations (37), forest managers (35), hunters (19), newspapers (15), or other sources (22); I made the remaining 31 observations. An additional 111 reports were discarded because of low reliability or poor documentation.

The recorded observations were analysed with respect to date, time of day, distance to the bear, type and activity of the observer, reaction of the observer, and reaction of the bear. The type and activity of the observer were divided as follows:

Type of observer:

1. Hunters (professional hunters, leasees of a hunting area, invited hunters).
2. Woodsmen (foresters, forest managers, woodcutters etc.).
3. Farmers (and Alpine herdsman).
4. Locals (other than hunters, woodsmen, and farmers).
5. Tourists.
6. Researchers.
7. Others (gendarmes, reporters).

Activity of observer:

1. Hunting (usually from a raised blind, but including stalking red deer [*Cervus elaphus*], tending a feeding site, searching for or carrying shot deer).
2. Driving (a car, bus, tractor, van, motorcycle, bicycle).
3. Housework (working at or close to a house, hut, stable).
4. Hiking (or mushroom-picking, jogging, skiing).
5. Forestry (all work related to forest exploitation).
6. Farming (tending cattle or sheep at pasture, maintaining a fence).
7. Research (radiotracking, searching for bear signs, aversive conditioning).
8. Bear watching (non-researchers going to or hiding at attractive sites such as feeding sites or kills).
9. Other (in a boat, in a tent, etc.).

The reaction of observers was classified as (1) flight, (2) retreat, (3) moving on, (4) staying, (5) approaching (stalking or open approach), (6) scaring away (talking, shouting, whistling, clapping hands, throwing cracker shells by hand, shooting into the air), (7) chasing (following by car a fleeing bear on a forest road), and (8) shooting.

The reaction of the bear was classified as (1) flight, (2) retreat, (3) crossing the road (bear either fleeing or indifferent to people), (4) passing by (bear continues its way after noticing the observer), (5) staying, (6) circling (to reach a downwind position), (7) approaching (including bears unaware that the object of their curiosity is a human observer), and (8) false attacks.

Observations that involved risk of attack for the observer were classified as encounters. I discerned 6, not mutually exclusive, categories of encounters: (1) bear very close (unexpected encounter at a distance <10 m); (2) female with cubs (encounter with a female with cubs at a distance <40 m); (3) bear at carcass (surprise encounter with a bear at a winter kill or a game animal shot a few hours ago); (4) surprise at damage (close encounter with

a bear raiding a rabbit-hutch or sheep-fold); (5) habituated bear (bear indifferent to people approaching the observer to <10 m); (6) provocation by observer (observer stalks, approaches or harasses the bear at close distance).

## RESULTS

The number of observations registered/year was unevenly distributed, peaking in 1994 (Table 1). Most (66.4%) observations occurred between June and September; less than 1% occurred December to February (Table 2). Diel observations peaked in the evening and in the morning: 38.2% were between 1600 and 2000 hours and 20.6% between 0400 and 0800 hours (Table 3).

Hunters were by far the most likely to observe a bear (39% of observations) followed by locals, woodsmen, and farmers (50% combined; Table 4). Hunting also was the most common observer activity (Table 5). Hunters were

**Table 1. Number of reported bear observations in Austria, 1990–96 (N = 515).**

| Year | Observations | %    |
|------|--------------|------|
| 1990 | 11           | 2.1  |
| 1991 | 21           | 4.1  |
| 1992 | 50           | 9.7  |
| 1993 | 128          | 24.8 |
| 1994 | 191          | 37.1 |
| 1995 | 78           | 15.1 |
| 1996 | 36           | 7.0  |

**Table 2. Monthly distribution of reported bear observations in Austria, 1990–96 (N = 515).**

| Month     | Observations | %    |
|-----------|--------------|------|
| January   | 0            | 0    |
| February  | 3            | 0.5  |
| March     | 12           | 2.3  |
| April     | 42           | 8.2  |
| May       | 49           | 9.5  |
| June      | 78           | 15.1 |
| July      | 90           | 17.5 |
| August    | 88           | 17.1 |
| September | 86           | 16.7 |
| October   | 47           | 9.1  |
| November  | 18           | 3.5  |
| December  | 2            | 0.4  |

**Table 3. Diurnal distribution of reported bear observations in Austria, 1990–96 (N = 238).**

| Time of day (hours) | Observations | %    |
|---------------------|--------------|------|
| 0001–0400           | 9            | 3.8  |
| 0401–0800           | 49           | 20.6 |
| 0801–1200           | 33           | 13.9 |
| 1201–1600           | 30           | 12.6 |
| 1601–2000           | 91           | 38.2 |
| 2001–2400           | 26           | 10.9 |

not necessarily hunting when they encountered a bear; rather many of them were driving on forest roads. Likewise locals, foresters, and farmers often were hunting when they observed bears. Most of the observations when driving a vehicle occurred on forest roads (75%), but bears were also seen crossing minor and main roads (15% and 10%, respectively). The percent of observations from a building was unexpectedly high (14%), whereas hiking was only a small portion of the observations (8%). Three percent of observations were people—mostly hunters—out looking to watch bears at attractive sites.

About 30% of the observers reported being within 30 m of a bear; another 30% were 30–60 m or 0–60 m away (Table 6). In 294 cases (57%) the observer reported being seen by the bear, in 158 cases (31%) the observer

**Table 4. Type of people observing bears in Austria, 1990–96 (N = 504).**

| Type of observer | Observations | %    |
|------------------|--------------|------|
| Hunters          | 195          | 38.7 |
| Locals           | 109          | 21.6 |
| Woodsmen         | 90           | 17.9 |
| Farmers          | 51           | 10.1 |
| Researchers      | 37           | 7.3  |
| Tourists         | 15           | 3    |
| Other            | 7            | 1.4  |

**Table 5. Activity of people observing bears in Austria, 1990–96 (N = 492).**

| Activity of observer | Observations | %    |
|----------------------|--------------|------|
| Hunting              | 183          | 37.2 |
| Driving              | 130          | 26.4 |
| Housework            | 67           | 13.6 |
| Hiking               | 40           | 8.1  |
| Research             | 33           | 6.7  |
| Bear watching        | 17           | 3.5  |
| Forestry             | 14           | 2.8  |
| Farming              | 5            | 1    |
| Other                | 3            | 0.6  |

reportedly was not seen by the bear; and in 63 cases (12%) it was not possible to judge the bear's awareness of human presence. The reaction of bear and observer was analyzed for the 286 cases when the bear discovered the person and the reaction of the bear or the observer was known, respectively.

The most common response of people observing a bear nearby was to stay where they were, to stop, or to move on if they were in motion (66%; Table 7). Less than 10% felt compelled to flee or retreat. In a few cases (5%) the observer approached the bear, often to get a better view for a photo, or if the bear was small, not shy, and did not seem dangerous (yearling or 2-year-old bears without mother). Trying to scare or chase away a bear was

**Table 6. Distance between bear and observer as estimated by the observer (N=451) for bear observations in Austria, 1990–96.**

| Distance (m) | Observations | %    |
|--------------|--------------|------|
| 0–30         | 121          | 26.8 |
| 0–60         | 69           | 15.3 |
| 30–60        | 82           | 18.2 |
| 30–120       | 39           | 8.6  |
| 60–120       | 58           | 12.9 |
| >60          | 18           | 4.0  |
| >120         | 64           | 14.2 |

**Table 7. Reaction of observer when encountering a bear in Austria, 1990–96 (N=286). In each case the bear was aware of human presence.**

| Observer reaction | Observations | %    |
|-------------------|--------------|------|
| Flight            | 16           | 5.6  |
| Retreat           | 9            | 3.1  |
| Moving on         | 51           | 17.8 |
| Staying           | 139          | 48.6 |
| Approaching       | 14           | 4.9  |
| Scaring away      | 40           | 14.0 |
| Chasing           | 15           | 5.2  |
| Shooting          | 2            | 0.7  |

chosen more often in situations when the observer felt safe (in a car, close to a house, in an elevated blind; 46 of 55 observations, compared to overall 71% observations in a safe position,  $\chi^2 = 3.9807$ , 1 df,  $P < 0.05$ ). Two bears were shot in 1994, one in self-defence when it approached a hunter on a forest road, one other as a control measure in an area where a problem bear caused many damages.

In contrast to its human observer, the bear's most common response was to flee or to retreat (57%; Table 8). According to the many observations from a vehicle, bears were often seen crossing a road (13.6%). In about a quarter of the cases bears were indifferent to people (passing by or staying, 23%) or curious (circling or approaching, 4.5%). Five false attacks were reported. Three times a

**Table 8. Reaction of bear to bear–human encounters in Austria, 1990–96 (N=286). In each case the bear was aware of human presence.**

| Bear reaction     | Observations | %    |
|-------------------|--------------|------|
| Flight            | 94           | 32.9 |
| Retreat           | 69           | 24.1 |
| Crossing the road | 39           | 13.6 |
| Passing by        | 16           | 5.5  |
| Staying           | 50           | 17.5 |
| Circling          | 3            | 1    |
| Approaching       | 10           | 3.5  |
| False attack      | 5            | 1.7  |

female with cubs was surprised at a distance of about 25 m and she immediately ran toward the observer (twice the observer fled and the bear did not follow; once 2 hunters stood their ground and the female turned a few meters in front of them). Two times people approached a young bear of about 3 years at a roe deer (*Capreolus capreolus*) feeding site while taking pictures (the bear made a few bounds in the direction of the observers).

Nearly 10% (50) of all observations (17% of the observations when the bear noticed the observer) were classified as encounters (Table 9). The response pattern of bears in encounters differed from the pattern shown in other types of observations ( $\chi^2 = 13.7275$ , 2 df,  $P < 0.01$ ; comparison of the categories flight or retreat, passing by or staying, and circling or approaching plus false attack for encounters and nonencounters respectively), with the biggest difference in the last category (18.0% and 4.6% for encounters and nonencounters). An observer came very close to a bear 14 times, and the bear always retreated. In 3 of 14 encounters with females with cubs the female charged. Bears at a carcass, even females with cubs, never defended their prey. One female, fitted with a radiotransmitter when she had cubs, apparently searched for the killed deer when she heard a shot nearby. On 3 occasions she was at a kill with her cubs when the hunter arrived, but she always gave way. Habituated bears

**Table 9. Bear responses to various types of bear–human encounters in Austria, 1990–96 (N=50).**

| Type of encounter                             | Bear reaction     |                       |                         |              |
|---|-------------------|-----------------------|-------------------------|--------------|
|   | Flight or retreat | Passing by or staying | Circling or approaching | False attack |
| Bear very close                               | 14                |                       |                         |              |
| Female with cubs                              | 2                 |                       |                         | 3            |
| Female with cubs at carcass                   | 3                 |                       |                         |              |
| Habituated female with cubs                   |                   | 3                     | 1                       |              |
| Female and cubs provoked by obs. <sup>a</sup> | 1                 | 1                     |                         |              |
| Bear at carcass                               | 2                 |                       |                         |              |
| Surprise at damage                            | 2                 | 1                     |                         |              |
| Habituated bear                               | 4                 | 2                     | 3                       |              |
| Provoked by observer                          | 6                 |                       |                         | 2            |
| Total (%)                                     | 34 (68%)          | 7 (14%)               | 4 (8%)                  | 5 (10%)      |

<sup>a</sup> obs. = Observer

retreated when scared by the observer with the exception of one bear, which was shot when a hunter was unable to scare it away. Provoking behavior by the observer usually made a bear retreat, but in 2 of 8 encounters the bear bluff charged (Table 9).

Females with cubs were seen more often than expected ( $\chi^2 = 12.1013$ , 1 df,  $P < 0.001$ ). Individually known females in the area of the restocking program had cubs in 1991 (1 female), 1993 (2 females), and 1996 (1 female); they were observed 80 times in 4 bear-years. In the same area bears other than cubs or females with cubs were seen 325 times in a minimum of 25 bear-years. Two females radiotracked for an approximately equal time with and without cubs (25 and 27 months, respectively) were seen 64 times in the period with cubs and 24 times in the period without cubs; the difference from the expected equal number of observations in the 2 periods was significant  $\chi^2 = 18.1818$ , 1 df,  $P < 0.001$ . For both females, the percent of observations during the day (0800–1600 hours) was higher when with cubs than without cubs (33% versus 12%), although the association was not significant ( $\chi^2 = 3.6309$ , 1 df,  $P = 0.0535$ ).

## DISCUSSION

The number of bear observations each year did not reflect the increase of the bear population in Austria, which is assumed to have grown from <10 bears in 1990 to 20–25 bears in 1996 (Rauer and Gutleb 1997). The reason for the overwhelming peak in observations in 1993 and 1994 was 3-fold: (1) the occurrence of 1–3 nuisance bears at that time (up to 50 observations were of the most active and habituated bear); (2) the occurrence of 3 orphaned cubs in September 1993; without the guidance of their mother they became rather tolerant of people (approximately 80 observations); and (3) the bear-hysteria of 1994: everybody was talking about bears, hence information on observations spread easily and people were more willing to report bear sightings. Today many hunters do not mention their observations because it is no longer out of the ordinary or because they do not want to attract bear lovers, reporters, or researchers to their hunting grounds. The seasonal distribution of observations was determined by the activity pattern of bears (denning from Nov or Dec to Mar or Apr) and the intensity of the activity of people in the forest. Many forest roads are impassable from November–May; hunting starts in the middle of May and is most intense during the rutting season of roe deer and red deer in July and September, respectively. The daily distribution reflected the combination of ursine and human activity patterns, too; diur-

nal humans met the more nocturnal bears in the mornings and in the evenings.

Most observers lived in bear country. The number of observers from outside (tourists) presumably was underestimated. More than once it was not possible to confirm bear observations by tourists because they were already gone and no names and addresses were known. Not unexpectedly, bears were most frequently met by people engaged in hunting activities. Many observations from cars on a forest road at dawn or dusk were associated with hunting as well. Observations while hiking were less frequently reported than while staying close to a house or hut. Many of the latter observations refer to the orphaned cubs of 1993 looking for apples in orchards and to the problem bears of 1994 often causing damage close to human buildings. Mushroom pickers creeping silently into thickets are thought to be the most endangered type of hiker; 6 cases of bear observations by mushroom pickers (5 encounters by surprising a bear at short distance) were reported and the bear always ran away. Many hunters believe that mushroom pickers have become more cautious and stay closer to forest roads than they did before bears became re-established. Although hunters fear that disseminating information on the presence of bears may disturb their hunting areas by attracting nature lovers to look for bears, bear watching was done only by hunters. If a bear repeatedly visits a feeding site (mostly roe deer feeding sites with corn, cereals, or pellets) and if hunters learn that it is worth waiting for a bear there, some are tempted to hide there again and again and to invite others to see a bear. This behavior involves considerable risk: as the bear realizes it can safely feed around people, it takes the first step to habituation. There is evidence that 2 female yearlings were habituated this way in 1994. One was aversively conditioned successfully, the other passed on the tolerant behavior to her cubs in 1996.

The behavior of bears in Austria did not differ substantially from the behavior of bears in Slovenia, Scandinavia, or Udmurtia, Russia, upon discovering a human observer. In 211 meetings between bears and personnel from the Slovenian forest service, bears fled in 48% of the cases, acted uninterested in 23%, showed some curiosity in 23%, and responded with aggression in 6% of the meetings; none of the observers were hurt (M. Adamic, Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia, unpublished data). In 114 observations by the Scandinavian bear research personnel, the bear left the scene in 60% of the cases, stayed in 9%, approached without threatening in 11%, threatened without aggressive actions in 13%, attacked a dog in 4%, and made a false attack in another 4% (Swenson et al. 1996). In the Russian province of Udmurtia (Volga–Kama

region) in 77 bear meetings with the bear discovering the observer, the bear responded with flight (42%), recognition (42%), indifference (10%), or aggression (6%; Loskutov et al. 1993). Compared with other European countries, Austria has a small bear population and the same individuals, especially the more conspicuous ones, were observed many times. One argument raised in the discussions since 1994 was that with no regular hunting, bears soon will lose their shyness toward humans. So far the data does not corroborate this notion, although bear behavior could be just starting to trend in this direction. The behavior of the young bears raised in Austria—the orphaned cubs of 1993 and the cubs of 1996—give concern about reduced avoidance. It is also probable that one or both problem bears shot in 1994 at the ages of 2 and 4 years were of Austrian origin, and not migrants from Slovenia.

Ten percent of the observations were classified as encounters. In accordance with the ranking of factors that increase aggression in Swenson et al. (1996), females with cubs were the most risky type of encounters (3 false attacks in 14 encounters with females with cubs). The provocative manner of the observer, a category not considered in Swenson et al. (1996), was equally risky, although the 2 false attacks in 10 encounters of this type were clearly less intense than those of the females with cubs. Only in 1 case was the bear threatening as it approached the observer. Bears never defended carcasses, nor did dogs provoke aggressive behavior in bears. In 5 cases dogs chased away or at least followed the fleeing bear; in another 6 cases the bear ignored the dog (in 4 cases the dog was locked in a car, kennel, or house). Nobody was attacked, hurt, or killed. The experiences in the neighboring countries show that this worst case scenario cannot be excluded in the future. In Slovakia 26 persons were injured in bear attacks in 1985–87; the most in danger were hunters and beaters at wild boar (*Sus scrofa*) hunts (Hell and Bevilaqua 1988). Since 1945, 18 persons in Slovenia were wounded and 3 were killed by a bear (Krže 1988, Swenson et al. 1996). In Austria an injury or fatal attack could have a disastrous effect on the efforts to promote recolonization, as acceptance of bears is not yet well established.

The 2 radiocollared females of the WWF restocking program were seen 2.5 times more often when they had cubs than when they did not have cubs. This phenomenon may be linked to the higher energy demand of a lactating female (enhanced foraging), or to increased visibility (3–4 bears are more visible than 1). Additionally, when females had cubs, the percent of the observations during the day was higher indicating, that females with cubs are more active during the day. This was also shown

in the activity measurements during radiotracking: 48% and 19% of the registrations from 0800 to 1600 hours were active for sows with and without cubs, respectively (Rauer and Gutleb 1997). It is somewhat disquieting that the most potentially dangerous segment of the bear population is the most visible during the day in a landscape devoid of wilderness and close to humans.

The special behavior of females with cubs and the trend toward reduced shyness of the bears in general are crucial problems regarding the coexistence of man and bear in the Austrian landscape. Management has to focus (1) on the education of the people, providing information about the appropriate reaction to bears and about the danger of habituation when feeding bears, and (2) on actions to help the bears to maintain their shyness in an un hunted population

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## LITERATURE CITED

- ARBEITSGEMEINSCHAFT BRAUNBÄR LIFE. 1997. Managementplan für Braunbären in Österreich. Report of the Institute for Wildlife Biology and Game Management, University of Agriculture, Vienna, Austria, Munich Wildlife Society, Ettal, Germany, and World Wide Fund for Nature Austria, Vienna, Austria. (In German.)
- BECHERER, K., C. EIBNER, M. FISCHER, G. HILGERS, L. KLETTER, G. PLESKOT, R. SCHÖNMANN, K. TURNOVSKY, AND J. VORNATSCHER. 1976. Naturgeschichte Österreichs. Forum Verlag, Wien, Austria. (In German.)
- CICNJAK, L., AND R.L. RUFF. 1990. Human–bear conflicts in Yugoslavia. Transactions of the International Union of Game Biologists' Congress 19:573–580.
- HELL, P., AND F. BEVILAQUA. 1988. Das Zusammenleben des Menschen mit dem Braunbären (*Ursus arctos*) in den Westkarpaten. Zeitschrift für Jagdwissenschaft 34:153–163. (In German.)
- KRŽE, B. 1988. Rjavi medved. Pages 23–62 in B. Kryštufek, A. Brancelj, B. Krže, and J. Cop, editors. Zveri II. Slovenian Hunting Organization, Ljubljana, Slovenia. (In Slovenian.)
- LOSKUTOV, A.V., M.P. PAVLOV, AND S.V. PUCHKOVSKIY. 1993. The Volga–Kama region. Pages 91–135 in M.A. Vaisfeld and I.E. Chestin, editors. Bears: brown bear, polar bear, Asian

- black bear; distribution, ecology, use and protection. Nauka, Moscow, Russia. (In Russian with English summary.)
- RAUER, G., AND B. GUTLEB. 1997. Der Braunbär in Österreich. Umweltbundesamt Monographie No. 88. Federal Environment Agency — Austria, Vienna, Austria. (In German.)
- SWENSON, J.E., F. SANDEGREN, M. HEIM, S. BRUNBERG, O.J. SØRENSEN, A. SÖDERBERG, A. BJÄRVALL, R. FRANZÉN, S. WIKAN, P. WABAKKEN, AND K. OVERSKAUG. 1996. Er den skandinaviske bjørnen farlig? Oppdragsmelding 404, Norwegian Institute for Nature Research, Trondheim, Norway. (In Norwegian with English summary.)