

Interactions between brown bears and humans in Scandinavia

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Abstract We have analyzed 114 meetings between brown bears (*Ursus arctos*) and personnel in bear research projects in Sweden and Norway, reviewed the Scandinavian literature, 1750-1962, regarding people injured and killed by bears, and analyzed instances of human injuries relating to bear attacks during the more recent period, 1976-1995. The last time people were killed by bears was in 1902 in Sweden and in 1906 in Norway. However, most meetings between bears and humans result in the bear leaving. We observed no direct attacks, but bluff charges occurred in 4% of the meetings. Blowing and growling were apparently warning behaviors associated with the presence of cubs or carcasses. Seven people have been injured in Scandinavia in the past 20 years; 6 were hunters, and in five cases the bear was wounded or possibly wounded. We conclude that the most dangerous situation is when a bear is wounded. In addition, we identified several situations that contributed to increased levels of aggressiveness among bears. They are, in decreasing importance: the presence of cubs, proximity to a carcass, proximity to a den, and the presence of a dog. Our results showed that the Scandinavian brown bear is not particularly dangerous. A relatively high proportion of wounded bears may have contributed to the apparently higher levels of fatalities in the last century.

Key words: brown bear, *Ursus arctos*, Scandinavia, danger to humans

INTRODUCTION

The brown bear (*Ursus arctos*) is a powerful carnivore that has hurt and killed people (Herrero 1985). In Scandinavia the brown bear population is both increasing rapidly and spreading, and many people at the periphery of the bear's range are uneasy about having this new, unknown, and potentially dangerous carnivore in their midst (Swenson et al. 1998).

Because some people are afraid of meeting wild bears (Norling et al. 1981, Dahle et al. 1987), it is important to document just how dangerous bears are

and to determine exactly which situations are most dangerous. Here we address these questions using current and historical information from Sweden and Norway. Similar studies and reviews have been made before, especially in North America (Herrero 1985) and Russia (Chestin 1992), but we feel it is important to report data from Scandinavia for two reasons: 1) people relate better to information from their own area, and 2) brown bear aggressiveness appears to vary geographically (Shevchenko 1990, Bibikov 1990, Vaisfeld and Pazhetnov 1992, Chestin 1993, Swenson et al. 1996). Here we present the results of a study that has

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previously only been reported in more detail in an unpublished report in Norwegian (Swenson et al. 1996).

METHODS

Twenty-seven people, who have worked on bear research projects in Scandinavia, were interviewed about their encounters with bears. The original questionnaire was rather detailed (Swenson et al. 1996), but here we report only on the answers to the following six questions: 1) What was the bear's behavior after discovering that a person was present? 2) Did you regard the bear to be aggressive? 3) Did the bear vocalize or stand on its hind legs? 4) Did the bear leave the area after discovering you? 5) Were dependent young bears (referred to as "cubs"), a carcass, or a dog present? 6) If a bluff charge occurred, at what distance did it start and stop?

In all, 114 encounters with bears were described. It is important to point out that, as the people interviewed were used to working with bears, and as many of the bears were radio-marked, the interviewees were able to approach the bears much more closely without being discovered than is normal during bear - human encounters. In addition, as the interviews were conducted sometime after the bear meetings, often several years later, the least dramatic encounters were probably under-represented, having been forgotten.

All available information about people killed or injured by brown bears in Scandinavia, during the period 1750-1962, was summarized from five sources

(Zetterberg 1951, Haglund 1964, Elsrud 1977, Hohle 1977, Myrberget 1978).

We were interested in the activity of the person and the presence of factors that may have influenced the probability of injury. Information for the last 20 years, 1976-1995, was also summarized based on a report by Østmoe (1995) and a review of hunting magazines and newspapers. All reports were accepted as true.

We tested for differences in frequencies using a χ^2 test, with a correction for continuity when a 2×2 contingency table was used.

RESULTS

Analyses of encounters with brown bears

In 80% of the 114 encounters with brown bears, the bears were not judged to be aggressive by research personnel, and in 60% of the cases the bear(s) simply left, avoiding human interaction (Table 1). No cases of direct attack or physical contact were recorded, but bluff charges were made towards people in 4% of the encounters. Observers reported their impressions that bears were acting in a threatening manner in 21% of the encounters. Of the 24 cases regarded as aggressive encounters, 83% involved cubs, carcasses, and/or dogs. When such factors were not present, bears were only recorded as acting aggressively in 8% of the meetings (Table 2).

Bears were judged to be threatening in 44% of 18 encounters when young were present, compared with 27% when a dog was present ($N = 20$), and 27% when a carcass was present ($N = 33$). In five of the 24 (21%)

Table 1. The behavior of brown bears after detection by people.

Behavior	n	%
Leaves	68	60
Stays without seeming threatening	10	9
Approaches a person without appearing threatening	12	11
Seems threatening but is not aggressive	15	13
Attacks a dog	4	4
Charges a person	5	4
Attacks a person and makes contact	0	0
Total	114	101

Table 2. The frequency of threat behavior, bluff charges, and vocalizations by brown bears in relation to factors that may increase their aggressiveness.

Factor	Number	Threatening behavior	Bluff charge	Vocalization
Cub	13	46%	8%	46%
Dog	11	27%	0%	0%
Cub and dog	4	50%	25%	50%
Carcass	27	26%	7%	22%
Cub and carcass	1	0%	0%	0%
Carcass and dog	5	40%	0%	40%
None	53	8%	2%*	8%
Total	114	21%	4%	18%

*This bluff charge was towards a person on a snowmobile.

instances where bears appeared aggressive, a bluff charge was made toward the person, although physical contact was never made. In four of these cases, one or more of the factors mentioned above was involved. In the fifth case, a man was following the bear on a snowmobile.

Bluff charges were started at distances of 30-40 m and ended at distances of 3-15 m, except in the case involving the snowmobile, when the attack began at 4 m and stopped at 1 m from the snowmobile. Vocalizations were heard in 18% of the bear encounters. Understandably, this was typically experienced as threatening. In 80% of the cases when bears vocalized, cubs (44% of 18 cases), carcasses (24% of 33 cases) or dogs (20% of 20 cases) were present.

When dogs were present, however, bear vocalizations were only heard when cubs and/or carcasses also were involved (Table 2). Vocalizations were relatively

uncommon (8%) when none of these factors were involved.

When bears vocalized while acting aggressively, 14 huffing sounds were heard and only one loud growl. Vocalizations preceded two bluff charges, but were also heard when bears appeared to be startled just before they left the area of the encounter. Bears were observed standing on their hind legs nine times, however, none of these were judged to be acting aggressively and all moved away from the observer after returning to all four legs.

The presence of cubs, carcasses and dogs also appeared to influence the bears' inclination to remain in the area (Table 3). When cubs were present, 44% (18 cases) of bears remained in the area of the encounter, compared with 21% when a carcass was involved (33 cases) and 15% when a dog was present (20 cases). When none of these factors was involved, only 6% of

Table 3. The direction in which a brown bear moved in relation to factors that may increase aggression.

Factor	Movement away from person	Movement towards person	Remained
Cub	7	0	6
Dog	10	0	1
Cub and dog	2	0	2
Carcass	19	1	7
Cub and carcass	1	0	0
Carcass and dog	5	0	0
None	50	1	2
Total	94	2	18

the bears remained in the area of an encounter (53 cases, Table 3).

People injured and killed by brown bears in Sweden and Norway, 1750-1962

It has been a long time since anyone was killed by a brown bear in Scandinavia. The last was a 13-year-old Norwegian shepherd boy who surprised a bear lying near a sheep carcass in dense brush in 1906. He was injured and died a month later of infection (Hohle 1977). The last bear hunter killed in Norway was in 1881. He was killed by a bear that was flushed from its den and wounded, but he was also shot in the chest by another hunter during the confusion of the attack (Hohle 1977). In Sweden, the last fatality was a bear hunter who was killed by a wounded bear in 1902, and the last unarmed person killed by a bear was a girl that surprised a female with cubs at a den in the beginning of the 1800s (Haglund 1964).

During the period 1800-1906, when records were kept more accurately, 73% of 15 people reported as killed by brown bears in Scandinavia were killed in Norway. In all, we found reports of 48 injuries and 27 fatalities caused by bears in Scandinavia during the period 1750-1962, however, it is possible that injuries may have been under-reported, compared with fatalities. Among the records involving 58 men and one boy, 71% were injured and 29% were killed, which

differs significantly from the records involving six women and 10 girls, 38% of whom were injured and 62% killed ($\chi^2 = 4.82$, $df = 1$, $p = 0.03$). This difference may have been due to the different activities carried out by men and women and because encounters involving men were perhaps more likely to have involved those carrying guns. The women/girls that were killed were all shepherds or milkmaids out in the forest ($N = 10$), whereas the men/boys killed were hunting ($N = 10$) or gathering berries, birch bark or nuts ($N = 5$).

There was a clear difference in the activities being performed by people who were killed and injured by bears (Table 4). Most of those who were injured, were hunting (79%), whereas most of those who were killed were shepherding or gathering berries, nuts or bark in the forest (56%, $\chi^2 = 19.3$, $df = 1$, $p < 0.0001$). The most common factor associated with injuries was a wounded bear; for deaths the most important factors were either the presence of a carcass, or of a wounded bear (Table 5). In a large proportion of the cases, however, there was no information about extenuating circumstances, particularly for the fatalities. It was particularly surprising that relatively few injuries and fatalities were reported involving encounters with female bears with cubs, non-injured bears at their dens, or when dogs were present. It was also interesting to find that 7% of the injuries/deaths occurred after a man

Table 4. The activities that people were engaged in when they were injured or killed by a bear. (data from Norway and Sweden combined; 1750-1962)

Activity	Number of cases (%)		
	Injuries (N=48)	Deaths (N=27)	Total (N=75)
Bear hunting	26 (54%)	6 (22%)	32 (43%)
Driving bears	7 (15%)	0 -	7 (9%)
Herding livestock	3 (6%)	10 (37%)	13 (17%)
Gathering berries, etc. in forest	0 -	5 (19%)	5 (7%)
Unspecified hunting	4 (8%)	0 -	4 (5%)
Small game hunting	0 -	1 (4%)	1 (1%)
Big game hunting	1 (2%)	0 -	1 (1%)
Photographing bears	1 (2%)	0 -	1 (1%)
Walking (while drunk)	1 (2%)	0 -	1 (1%)
Unknown	5 (10%)	5 (19%)	10 (13%)

Table 5. The factors that may have increased bear aggression, in cases where people were injured or killed by bears in Norway and Sweden, 1750-1962^a.

Factor ^b	Number of cases (%)		
	Injuries (N=48)	Deaths (N=27)	Total (N=75)
Wounded bear	34 (71%)	4 (15%)	38 (51%)
Carcass	8 (17%)	6 (22%)	14 (19%)
Den	10 ^c (21%)	1 (4%)	11 (15%)
Cubs	2 (4%)	3 (11%)	5 (7%)
Person hit bear	4 (8%)	1 (4%)	5 (7%)
Bear hunting (unspecified)	1 (2%)	3 (11%)	4 (5%)
Dog present	1 (2%)	0 -	1 (1%)
Totally unknown	8 (17%)	11 (41%)	19 (25%)

^a Except one case in which a bear tipped over a boat and two people drowned.

^b Several factors can be involved in one incident.

^c All these bears were wounded while being hunted at their dens.

(N = 1) or woman (N = 4) had hit the bear with an object, often a stick, in response to the bear having killed livestock. Such actions are clearly extremely unwise, if bears are so dangerous, unless the livestock was considered so important as to mean life or death to the people concerned. Such behavior has been reported many times from previous centuries, yet the bears often abandoned the livestock carcass without injuring the person (Zetterberg 1951, Elsrud 1977, Hohle 1977).

There are relatively few recorded cases of brown bears killing and eating people in Scandinavia. We found two reports from Norway, involving one that killed five people in 1775-1776 and one (?) that killed three people in 1852-1856 (Elsrud 1977). The first bear is known to have been shot, and the killing stopped. Only one instance is known from Sweden, probably from the 1800s, where a milkmaid who had struck a bear at a carcass and chased it with a stick was killed and devoured (Zetterberg 1951). It seems, therefore, that perhaps just two abnormal bears in Norway caused the death of 30% of the 27 people reported as killed by bears during a 213-year period in all of Scandinavia.

Recent injuries caused by brown bears, 1976-1995

During the past 20 years (1976-1995), seven people have been injured by brown bears in Scandinavia, all

of them in Sweden. Six of the seven were hunters, and the seventh was a forestry worker who surprised a female with cubs in dense vegetation at short range. Of the six injured hunters, five had already wounded the attacking bear, or shot at it and possibly wounded it. Of these five bears, two had been wounded previously and attacked the hunters that were following them, and three were shot at during an attack. One case involved a female with cubs, another was at a moose carcass, and the other was surprised with neither young nor carcass nearby, as far as is known, though a dog was present. The final case involved a hunter with two dogs who had not shot at the bear, but was attacked and bitten by a female with three cubs that were at a den. Thus, dogs were present in two of the seven cases.

DISCUSSION

Attacks resulting in injury to people appear to be very rare among Eurasian brown bears. Despite five bluff charges, and several instances of what was judged to be aggressive behavior, no injuries were reported amongst the 114 encounters summarized during this study. No personal injuries were recorded in 818 encounters by research personnel with bears in four studies (including ours) (Zavatskii 1987, Loskutov 1991, Revenko 1994). However, bluff charges were recorded

in 1.5% of the meetings, and in one instance (a female with cubs surprised at short range) the bear destroyed the person's backpack though without hurting him (Revenko 1994).

Studies based on interviews with the public give a significantly different picture. Of three such studies in Europe, injury to people was reported in 8% of 341 encounters with brown bears (Hell and Bevilaqua 1988, Spiridonov and Spassov 1990, Loskutov et al. 1993). The rates of injury differ significantly between these two types of study ($\chi^2 = 66.3$, $df = 1$, $p = 0.0001$), with interview studies appearing to inflate the actual injury rate. We advise the use of caution when evaluating such studies.

When our studies were ranked using the various factors involved in relation to bear aggression, the results were quite consistent (Table 6). We consider only one situation to be truly dangerous, and that is the presence of a wounded bear. Other factors (listed in Table 6), especially the presence of cubs or a carcass, appear to increase the level of aggressiveness of the bears, but only very rarely did a full attack and injury result from such increased aggressiveness. Dogs ranked last among the factors considered, and did not appear to be a particularly important factor in exacerbating bear aggressiveness. When dogs were involved, the bears usually focused their attentions on the dog and not the person.

It is for that reason that dogs are often used in bear hunting; 59% of 296 bears shot in Sweden in 1981-1989, and 14% of 654 bears shot in Russian Karelia

in 1955-1959 and 1973-1983 were shot with the accompaniment of dogs (Dahlström 1990, Danilov 1990). A dog that runs from a bear towards the owner, however, may cause a dangerous situation.

During the period 1800-1906, 73% of the deaths due to bears occurred in Norway, whereas all seven injuries caused by bears during the period 1976-1995 occurred in Sweden. This difference reflects the occurrence of bears. Around 1850, about 65% of the bears in Scandinavia were located in Norway (Swenson et al. 1995), which may explain the greater frequency of deaths there (one-way χ^2 test, $\chi^2 = 0.53$, $df = 1$, $p = 0.47$). Now, however, about 98% of Scandinavian bears are in Sweden (Swenson et al. 1995).

Our conclusion, based on recent data, that the brown bear very rarely attacks and injures people, does not seem to be consistent with records of deaths from previous centuries. These records are, of course, less reliable the farther back in time one goes. During the almost 200 years since 1800, we have found records of 15 people having been killed by brown bears in Norway and Sweden. These records must be seen in the context of the population of around 4000-5000 bears that was present in Scandinavia around 1850 (although the population was declining rapidly; Swenson et al. 1995), and that a large numbers of pre-confirmation age children (< 15 years old; down to 7-8 years of age) and milkmaids spent time in the forests tending livestock in both countries at that time (Zetterberg 1951, Hohle 1977).

Eles (1986) found three fatalities resulting from bear

Table 6. The significance of each of the factors leading to brown bear aggression during encounters with humans (rank 1 is the highest, and 5 the lowest).

Factor	Literature studies		Field study			Overall rank
	Historical	1976-95	Aggressive behavior	Vocalization	Staying	
Wounded bear	1	1	-	-	-	1
Cubs	4	2	1	1	1	2
Carcass	2	3	2 ^a	2	2	3
Den	3	4	-	-	-	4
Dog	5	5	2 ^a	3	3	5

^a Carcass and dogs shared second place.

attacks during a study of church records from 21 parishes in central Sweden covering the 111 years from 1749 to 1859. In contrast, the animals causing most deaths were horses (kicking), cattle (goring), and the adder (*Vipera berus*), which killed five people.

During this century, the brown bear population has increased rapidly and there were about 1000 bears in Scandinavia in 1996 (Swenson et al. 1999). In addition, outdoor activities in the forest, such as hiking, berry and mushroom picking, camping, fishing and hunting are extremely popular.

Were bears more aggressive previously? This is an important question when we try to evaluate the probability of fatalities due to bears with an increasing bear population. It is entirely possible that the chances of being hurt by a bear were greater in previous centuries than they are today. Today, in spite of the fact that hunters form a minority of the people using the forest, and that the hunting season is a very short proportion of the time bears are active, six out of the seven people injured during the last 20 years were hunters. Five of these were hurt by bears that they had either wounded or were at least shot at.

Bears are hunted in Sweden now using high-powered and highly effective weapons and the law requires that injured animals be found and killed as soon as possible. In former centuries, the situation was very different. Then bear hunting was an extremely dangerous activity (see Table 4). In the early 1600s, Bishop Clausson Friis wrote that hunters killed while hunting bears were not buried in the church cemetery because the activity was considered to be a form of suicide (Elsrud 1977). Bears were hunted with primitive weapons, yet many bears were shot. For example, during the 38-year period, 1856-1893, bounties were paid for 7,769 bears in Norway and Sweden (Swenson et al. 1995). This no doubt resulted in the wounding of many bears.

Collett (1912) wrote that many of the bears shot in Norway during the early 1900s bore wounds from having been shot previously, and Hohle (1977) found an account of a bear shot in 1850 that had 29 bullets in its body, even though the hunters had only shot it four

times. Another bear shot in the late 1500s or early 1600s carried 14 bullets from earlier wounds (Elsrud 1977). The use of primitive weapons was not the only cause of wounding, the use of set guns was also widespread. The technique of installing a set gun at a carcass killed by a bear or at a bait was developed early in the 1700s and was widespread in both Norway and Sweden (Aaseth 1934, 1935, Zetterberg 1951, Elsrud 1977). It was the method of killing reported most often in bounty records from south-eastern Norway during the period 1733-1845 (Elgmork in press) and Hohle (1977) concluded that, in Norway, the number of people killed by unknowingly triggering set guns was higher than the number of bear hunters killed by bears. We conclude, therefore, that an important factor contributing to the seemingly higher loss of human life to bears in former centuries could be the presence of a relatively high proportion of wounded bears resulting from less effective hunting techniques.

We conclude that the Scandinavian brown bear is not an aggressive bear as long as it is not wounded. This is the same conclusion that Clausson Friis reached in the early 1600s (Hohle 1977). There is widespread agreement among Scandinavian authors that this bear is not aggressive (Barth 1898, Collett 1912, Lönnberg 1923, Olstad 1945, Zetterberg 1951, Haglund 1964, Elsrud 1977, Hohle 1977, Elgmork 1979, Wikan 1983).

Nevertheless, bears must always be treated with respect, and the situations listed in Table 6 should especially be avoided wherever possible. These situations have previously been identified as factors increasing aggressiveness of bears in bear - human encounters (Herrero 1985, Chestin 1992), but we know of no other study that has ranked their importance.

Our results also showed that when a bear vocalises it is a good indication of the presence of young, or of a carcass, which are also situations to avoid.

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REFERENCES

- Aaseth, A. L. (1934) Våre ville pelsdyr. Norsk Jæger og Fiskerforenings Tidsskrift 63:634-642. (in Norwegian)
- Aaseth, A. L. (1935) Våre ville pelsdyr. Norsk Jæger og Fiskerforenings Tidsskrift 64:17-28, 85-89, 152-158, 183-187. (in Norwegian)
- Barth, A. (1898) De for skog og mark skadelige og nyttige pattedyr. Alb. Cammermeyers Forlag, Kristiania, Norway. (in Norwegian)
- Bibikov, D. I. (1990) Large predators and man in the USSR. Trans. Intern. Union Game Biol. Congr. 19: 558-561.
- Chestin, I. E. (1992) Brown bear - human conflicts in Russia. Unpublished report to U. S. Fish and Wildlife Service.
- Chestin, I. E. (1993) Brown bear aggressiveness towards people in Russia. In: Chestin, I. E. and S. M. Uspensky (eds.); Bears of Russia and Adjacent Countries - State of Populations, vol. 1. Moscow, Russia, pp. 89-94. (in Russian with an English summary)
- Collett, R. (1912) Norges hvirveldyr. Bind I, pattedyr. Aschehough & Co., Kristiania, Norway. (in Norwegian)
- Dahle, L., B. Solberg, and D. P. Sødal (1987) Haldningar til og betalingsvillighet for bjørn, jerv og ulv i Noreg. Rapport nr. 5/1987, Institutt for skogøkonomi, Norges landbrukshogskole, Ås (in Norwegian).
- Dahlström, M. (1990) Licensjakten på björn 1981-89 - en sammanställning. Examensarbete, Stockholms universitet. (in Swedish)
- Danilov, P. I. (1990) The brown bear in Soviet Karelia. Trans. Intern. Union Game Biol. Congr. 19:566-572.
- Eles, H. Vargen i kyrkböckerna. In: Eles, H. (ed.); Vargen. Värmland förr och nu 1986. Årsbok från Värmlands Museum, pp. 155-170. (in Swedish)
- Elgmork, K. (1979) Bjørn i naturen. Gyldendal Norsk Forlag, Oslo. (in Norwegian)
- Elgmork, K. (1996) Bjørn og ulv i sentrale deler av på Østlandet 1733-1845. Fauna 49:134-147. (in Norwegian)
- Elsrud, E. (1977) Bamse brakar. Om bjørnens liv og vaner, bjørner som drepte og bjørnejegere i Norge. Grøndahl & Søn Forlag As. (in Norwegian)
- Haglund, B. (1964) Björn och lo. P. A. Norstedt & Söners Förlag, Stockholm. (in Swedish)
- Hell, P. and F. Bevilaqua (1988) Das Zusammenleben des Menschen mit dem Braunbären (*Ursus arctos*) in den Westkarpaten. Z. f. Jagdwiss 34:153-163.
- Herrero, S. (1985) Bear attacks, their causes and avoidance. Winchester Press, Piscataway, New Jersey.
- Hohle, P. (1977) De møtte bjørnen. Gyldendal Norsk Forlag, Oslo. (in Norwegian)
- Loskutov, A. V. (1991) Behavior of bears encountering people in Baskiria. Medvedi v SSSR, sostoyaniye populatsiy. Proc. All-Union Conf. Spec. Studying Brown Bears in the USSR 4:171-173. (in Russian, cited in Chestin 1992)
- Loskutov, A. V., M. P. Pavlov, and S. V. Puchkovskiy (1993) The Volga-Kama region. In: Vaisfeld, M. A. and I. E. Chestin (eds.); Bears: Brown Bear, Polar Bear, Asian Black Bear; Distribution, Ecology, Use and Protection. Nauka, Moscow, pp. 91-135. (in Russian with an English summary)
- Lönnerberg, E. (1923) Sveriges jaktbara djur. Albert

- Bonniers Förlag, Stockholm. (In Swedish)
- Myrberget, S. (1978) Utviklingen i den norske bjørnebestand. *Naturen* 5:219-238. (in Norwegian)
- Norling, I., C. Jägnert, and B. Lundahl (1981) Viltet och allmänheten. I. Ekström, S., red. Vilt och jakt, sociala och ekonomiska värden. Rapport Ds Jo 1981: 5, Jordbruksdepartementet, Stockholm. (in Swedish)
- Olstad, O. (1945) *Jaktzoologi*. J. W. Cappelens Forlag, Oslo. (in Norwegian)
- Østmo, E R. (1995) Er bjørnen i Skandinavia farlig for mennesker? - Upubl. rapport, Høgskolen i Hedmark, Evenstad. (in Norwegian)
- Revenko, I. A. (1994) Brown bear (*Ursus arctos piscator*) reaction to humans on Kamchatka. Intern. Conf. Bear Res. Manage. 9: 107-108.
- Shevchenko, L. S. (1990) The brown bear in the European part of the USSR. *Aquilo, Ser. Zool.* 27:41-46.
- Spiridonov, G. and N. Spassov (1990) Status of the brown bear in Bulgaria. *Aquilo, Ser. Zool.* 27:71-75.
- Swenson, J. E., P. Wabakken, F. Sandegren, A. Bjärvall, R. Franzén, and A. Söderberg (1995) The near extinction and recovery of brown bears in Scandinavia in relation to the bear management policies of Norway and Sweden. *Wildl. Biol.* 1:11-25.
- 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) Is the Scandinavian bear dangerous? Oppdragsmelding 404, Norwegian Institute for Nature Research, Trondheim, Norway. (in Norwegian with an English summary)
- Swenson, J. E., F. Sandegren, A. Bjärvall, and P. Wabakken (1998) Living with success: research needs for an expanding brown bear population. *Ursus* 10:17-23.
- Swenson, J. E., F. Sandegren, A. Bjärvall, R. Franzén, A. Söderberg, and P. Wabakken (1999) Status and management of the brown bear in Sweden. In: Servheen, C., S. Herrero, and B. Peyton (eds.); Status Survey and Conservation Action Plan – Bears. IUCN World Conservation Union, Gland, Switzerland pp. 111-113.
- Vaisfeld, M. A. and V. S. Pazhetnov (1992) Bear - human conflicts in developed landscapes of European Russia. In: Management and Restoration of Small and Relict Bear populations. Natural History Museum, Grenoble, France, pp. 332-337.
- Wikan, S. (1983) *Bjørn, ulv, jerv*. Tiden Norsk Forlag, Oslo. (in Norwegian)
- Zavatskii, B. P. (1987) Behaviour of brown bear on meeting a man. *Ekologiya medvedey. Proc. All-Union Conf. Spec. Studying Bears in the USSR* Nauka, Novosibirsk 3:153-157. (in Russian)
- Zetterberg, H. (1951) *Björnen i sägen och verklighet*. J. A. Lindblads Förlag, Uppsala. (in Swedish)