NINA Norsk institutt for naturforskning

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A LARGE CARNIVORE INITIATIVE FOR EUROPE

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Foreword

This report was financed by the Ministry of the Environment with the purpose of providing a foundation for the process of reducing people's fear of wolves, and to make some management recommendations to reduce the risks of attacks. The goal was to compile existing literature and knowledge on wolf attacks on people from Scandinavia, continental Europe, Asia and North America, and to look for patterns in these cases.

In order to cover such a wide geographic area a number of colleagues from Europe were recruited as coauthors to summarise data from their country or region. We concentrated on areas where wolf populations have remained relatively abundant during the 20th century, i.e. the Baltic countries, Poland, Romania, Spain and Italy. Unfortunately we were not able to recruit a Russian expert as a coauthor, however our colleagues from Poland and the Baltics were able to provide assistance with Russian literature and we have had email discussions with Russian colleagues. Because this report was orginally intended to be used in Norway, we also focused heavily on the Fennoscandian countries, despite the fact that they have relatively small wolf populations. In addition to recruiting coauthors we have availed of our combined contact network through the world, and had a large number of documents translated from their orginal languages. The result is not a full summary of all wolf attacks on people, and neither can we vouch for the accuracy of all historical records. However, we believe this is a good overview of the most reliable records that exist, and is at least sufficient to draw general patterns and conclusions. The authors are grateful to the many people and organisations that have made contributions to this report (many are listed in **Appendix 1**). In addition, Kristelle Fiche, Luigi Maiorano and Barbara Zimmermann provided helpful translation of documents. We are especially grateful to our colleagues in the Large Carnivore Initiative for Europe. Some of the results presented in this report may be controversial. However, we firmly believe that solid and objective facts should always form the basis for any long-term conservation activity, especially with species that come into conflict with human activities or human safety. As so much depends on mutual trust when dealing with conflicting interests, the old adage that "honesty is always the best policy" is especially true.

John Linnell
Project leader

Contents

Summary

Because of the large scales at which large carnivores live, their conservation cannot occur only within protected areas. They must therefore be conserved within multi-use landscapes where conflicts with humans occur. Conflicts are diverse and include depredation on livestock and competition for wild ungulates. However, one of the most serious is the fear of being injured or killed by a large carnivore. Man-killing by tigers, lions, leopards, pumas and bears (brown bear, black bear, polar bear and sloth bear) occurs on a regular basis with hundreds of people being killed annually on a worldwide basis. Although the danger that wolves pose to human safety remains controversial, many people that live in wolf range report that they are afraid of wolves. This report attempts to examine the existing data about wolf attacks on humans during the last few hundred years around the world.

To locate data about wolf attacks we have examined the ecological, medical, veterinary and historical literature, and utilised a wide contact network of people that have worked with wolves throughout the world to try and identify unpublished cases from recent times. For historical cases we have only used episodes for which there is some form of contemporary written documentation, this excludes cases that only arise from the oral tradition. We have only included cases where there has been contact, injury or death resulting from a wolf-human encounter. Data concerning wolf attacks on humans is highly fragmented and of very variable quality. As a result it has been impossible to provide a total summary of the numbers of people killed by wolves during any given period. Rather we have compiled a set of case studies that we have judged to be reliable from various parts of North America and Eurasia. Because of the nature of the data, many records need to be treated with caution. We have looked for broad patterns associated with wolf attacks on people. From the data collected there appears to be no doubt that wolves have on rare occasions attacked and killed people. We identified three types of wolf attack, (1) attacks by rabid wolves, (2) predatory attacks where wolves appear to have regarded humans as prey, and (3) defensive attacks where a wolf has bitten a person in response to being cornered or provoked.

The majority of attacks concern wolves with rabies. Although wolves do not serve as a reservoir for rabies, they can catch it from other species. It appears that wolves develop an exceptionally severe "furious" phase and can bite a large number of people (>30) in a single attack. We have found records from Italy, France, Finland, Germany, Poland, Slovakia, Spain, the Baltic States, Russia, Iran, Kazakstan, Afghanistan, China, India and North America. The earliest record we found of such an attack was from 1557 in Germany, and the most recent was from Latvia in 2001. Up until the development of post-exposure treatments (first developed by Pasteur in the 1890's and refined in the 1950's) bites from rabid wolves were almost always fatal. Treatments are presently so good that the majority of victims now survive. However, the severity of attacks by rabid wolves is such that some victims are killed outright, or are bitten in the head so that post-exposure treatments do not have time to act

before the disease develops. As the incidence of rabies has been greatly reduced in both domestic dogs and wildlife throughout western Europe and North America, the incidence of attacks by rabid wolves has dropped. In the Middle East and Asia, there are still attacks each year.

The literature contains many examples of wolves being provoked (trapped, cornered, people entering their dens) without attacking humans. However, we have found a number of cases where provoked wolves have bitten people in an attempt to get away. In most cases these concerned shepherds attempting to defend their sheep and trying to kill wolves with a stick. In no case have the wolves directly killed anybody in such situations.

Unprovoked attacks by non-rabid wolves on people are very rare, and the vast majority of wolves do not regard people as being prey. However, we have found a number of incidents where predatory attacks have occurred. In Europe, the largest numbers of records come from pre 20th century France, Estonia and northern Italy, where historians have looked systematically for records of such events. The most famous event is from the Gevaudan area in France where historical records indicate that over 100 people were killed in the period 1764-1767. The wolves responsible were believed to be hybrids between wild wolves and large shepherd dogs. From these three regions several hundred people appear to have been killed from 1750 until 1900.

Additional records from the pre 20th century period come from Sweden, Finland and Norway. In Norway, there is a single record of a 6-year-old girl being killed in 1800. From Sweden there are records of 4 children being killed between 1727 and 1763, and 12 (11 children and one woman) being killed in 1820-1821. This latter episode (Gysinge episode) was believed to be due to a single wolf that had been raised in captivity before escaping. In Finland (and Russian Karelia) there have been a number of episodes during the 19th century where people have been killed. Most of these events occurred in 5 clusters Kaukola (1831 – 8 children and 1 woman killed), Kemio (1836 – 3 children killed), Kivennapa (1839-1859 – 20 children and 1 adult killed), Tammerfors (1877 – 9 children killed) and Åbo (1879-1882 between 22 and 35 children killed).

Predatory attacks from the 20th century are much rarer. There are reports of 5 children being killed in Poland (1937) and 4 children being killed in Spain (1957-1974). There are also controversial reports of 36 children being killed in the Kirov region of Russia (1944-1953). While these events remain unconfirmed, the details provided in the accounts make them credible. There are no documented cases of people being killed in predatory attacks by wolves in North America during the 20th century. However, there have been eight well-documented attacks, mainly in protected areas, where non-rabid wolves have injured people during the last 20 years.

People killed by wolves have been recorded in India since the 19th century. In the last 20 years there have been a number of scientific investigations in three regions, Uttar Pradesh, Bihar, and Andhra Pradesh. In these three regions there have a number of episodes where at least 273 children are believed to have been killed by wolves.

The victims of predatory attacks tend to be mainly children, and to a lesser extent adult women, indicating that wolves are being selective. In contrast, victims of attacks by rabid wolves tended to be mainly adults, indicating that rabid wolves bite people at random. Attacks by rabid wolves cluster in the winter and spring, whereas predatory attacks are concentrated in the late summer.

We identified four factors that are associated with wolf attacks on humans.

(1) **Rabies**. Rabies is involved in the majority of wolf attacks on people.
(2) **Habituation**. When wolves loose their fear of humans, for example in some protected areas, there is an increased risk of attacks on humans occurring.
(3) **Provocation**. This includes situations such as trying to kill a trapped or cornered wolf or entering a den with pups.
(4) **Highly modified environments**. The majority of predatory attacks (pre 20th century Europe and present day India) have occurred in very artificial environments where a number of circumstances have occurred. These include; little or no natural prey, heavy use of garbage and livestock as food by wolves, children often unattended or used as shepherds, poverty among the human population, and limited availability of weapons among people so wolves might not be very shy. We do not believe that there was so little prey that wolves had to feed on children, it is just that the ecology of wolves in these situations brings them into very close contact with people, setting the scene for these rare predation events to occur. Once individual wolves become man-eaters, they tend to continue this behaviour until they are removed. In addition, we believe that the intensive persecution of wolves during the last few centuries may well have selected against wolves that were aggressive or were not shy of people.

In conclusion, we believe that there is good evidence that people have been killed by both healthy and rabid wolves during the last centuries. The incidence of attacks appears to have dropped dramatically during the 20th century. A fair summary of our results would be "*in those extremely rare cases where wolves have killed people, most attacks have been by rabid wolves, predatory attacks are aimed mainly children, attacks in general are unusual but episodic, and humans are not part of their normal prey*". When the frequency of wolf attacks on people is compared to that from other large carnivores or wildlife in general it is obvious that wolves are among the least dangerous species for their size and predatory potential. Given the fact that wolves have posed a threat to human safety it is easy to understand why we have a "cultural fear" of wolves, which is reinforced through stories and mythology.

The risks of wolf attacks in Europe / Scandinavia (and also North America) today appear to be very low, as recent cases are rare, despite increasing numbers of wolves. There are currently an es-

timated 10,000 – 20,000 wolves in Europe, 40,000 in Russia and 60,000 in North America. Even with these numbers of wolves we have managed to only find records of 4 people being killed in Europe, 4 in Russia and none in North America by non-rabid wolves during the last 50 years. Respective figures for rabies cases are 5, greater than 4 and zero. Clearly, the risks of wolf attacks under present circumstances are very, very low throughout Europe and North America. These low rates of attacks are probably due to the fact that the factors most often associated with wolf attacks are no longer common.

However, even if the risks of attacks are very low, we have made a number of management recommendations that should help to reduce the actual risks of wolf attacks occurring even further. (1) **Keep wolves wild**. Any wolves that appear to loose their fear for humans or act in an aggressive manner should be removed from the population. Carefully regulated hunting may be useful in maintaining shyness in some situations, and will in addition provide a feeling of local empowerment and control over the wolf situation. (2) **Prey**. The prey base available for wolves in most parts of Europe today can be described as very good. It will be important for game managers to ensure it remains this way even when they have to include wolf predation into management plans. (3) **Reaction planning**. Wildlife management agencies should establish reaction plans as to how to respond to wolves that act in an aggressive manner or lose their shyness. These plans should be co-ordinated with those for brown bears. (4) **Rabies**. Large parts of Western Europe are presently rabies free and the risks of it occurring appear to be very low. In other areas rabies control plans are underway. Reducing its incidence in domestic dogs and wildlife further will decrease the risk of attacks by rabid wolves.

Although the vast majority of wolves will probably never show any aggressive behaviour towards people, it is important to prepare management plans that cover wolves in *toto*, including the rabid, sick, fearless, hybrids and otherwise abnormal.
There is little doubt that a large part of the "fear of wolves" is a direct fear for personal safety, and the results reported above indicate that this is justified to some extent. It is therefore logical that we have developed an inbuilt genetic fear of large carnivores during our evolutionary past. However, it is apparent that much of the fear of wolves is also dependent on a person's social and cultural situation. In other words, it is a fear of the wolf as a symbol of negative outside influences on local issues. Therefore, there is a clear need to consider the human-dimension as well as actual risk assessment in management planning.

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1 Introduction

Experience during recent decades has shown that the management, conservation and restoration of large carnivores in our modern world is as much a matter of solving and reducing conflicts with humans than of ecology (Mech 1995, 1996; Mech et al. 1996). The scales that large carnivores operate on (at both individual and population levels) are so large than there are no wilderness parks or reserves that can maintain significant populations without consideration of the surrounding areas (Woodroffe & Ginsberg 1998, 2000). In many parts of the world, such as Europe, the landscape is so modified, and human densities are so high, that large carnivores must be conserved in the multi-use landscape surrounding houses, farms, villages, and cities (Linnell et al. 2001a,b).

One of the main conflicts associated with large carnivores is due to their depredation on domestic livestock (Kaczensky 1996). During the 1990's there was much research focused on this conflict, which can be greatly reduced through careful management planning and the use of suitable husbandry practices (Linnell et al. 1996). Additional conflicts over perceived, and real, competition between hunters and carnivores for wild ungulates have been ongoing for decades (Orians et al. 1997; Mech & Nelson 2000). A great deal of research on this topic has been conducted during the last decades, and much is still ongoing. The result is an ever improving understanding of exactly how much wild predators impact their prey populations from many ecosystems around the world.

However, during the late 1990's much research focus has moved away from the ecology of the carnivores and their prey to the social aspects concerning human attitudes and behaviour. The emerging field of human dimensions has been increasingly focused on questions concerning conservation and natural resource management, including large carnivores (Bath 1996). The social issues concerning large carnivore conflicts are complex, and range from fundamental aspects of value systems and human rights, through loss of control, to the most visceral of all – fear for personal safety (Næss & Mysterud 1987; Kaltenborn et al. 1998, 1999; Bjerke et al. 2000, 2001). The importance of fear has become highlighted during recent years as wolf (*Canis lupus*) populations have begun to recover in Scandinavia (Wabakken et al. 2001; Zimmerman et al. 2001).

Fear of wolves has been widespread throughout European history. While historically a good deal of this fear appears to have been focused on the supernatural associations that surround wolves (were wolves as the symbol of the devil) (Boitani 1995; Pluskowski 2001; Pluskowski pers. comm.), there is little doubt that at least some of this fear has also been focused on the wolf as a real animal. Attitudes towards wolves have changed dramatically during the last 20-30 years, and conservation rather than extermination lies at the heart of national and international management programs (Boitani 2000; Linnell et al. 2001). However, even though the public apparently favours the wolf's right to exist, it appears that people are still afraid of it.

Studies throughout Europe (Norway, Spain, Croatia, United Kingdom), Asia (Japan) and North America have confirmed that significant numbers of people are afraid of wolves, and would adjust there behaviour if they knew wolves were present in an area (e.g. Kanzaki et al. 1996; Lohr et al. 1996; Bjerke & Kaltenborn 2000; Bath 2001; Bath & Farmer 2000; Bath & Madjic 2001).

The existence of this fear has ensured that public debates about wolf management and conservation have become highly emotional. Although bears (*Ursus* sp.) have long been known to kill and injure people on a regular basis (Swenson et al. 1996, 1999), the level of public fear is far less hysterical than that about wolves. At present there is no accessible overview of wolf attacks on humans. In the absence of knowledge, interest groups have been able to fill the vacuum with images of the wolf as a harmless, godlike animal on one side, and as a ferocious beast on the other. In a climate of denial and accusation there is little room for the informed debate that is necessary for rational wolf management to be achieved through democratic institutions (Schlickeisen 2001). This report aims to summarise what is known about wolf attacks on humans from both North America and Eurasia, from modern times and the last few centuries.

This project never aimed to quantify the total number of wolf attacks on people in Eurasia and North America. Neither is there any form of statistical sampling behind the data collection. Such a task would be clearly impossible. The data therefore consists of a potentially biased series of examples of varying quality. From these we can only draw the broadest of patterns. Our specific research questions have been;

(1) Have wolf attacks on people occurred?
(2) Are there any obvious patterns to wolf attacks?
(3) Under what circumstances do wolf attacks occur?
(4) Compare the relative frequency of wolf attacks to those from other large carnivores (assumes reporting bias is equal for all species).
(5) What management procedures should be used to reduce the risks of attack, and what responses are appropriate

2 The data

2.1 Data sources

The oral traditions and written folk-tales of Eurasia and North America contain many accounts of wolves attacking and killing people. Some tales go back as far as Aristotle. However, the reliability of many of these stories is very questionable. For example, "Little Red Riding Hood" has existed in written formats since 1697, and has parallels in an Asian version of the story in which the role of the wolf is taken by a tiger (Dundes 1969). Nobody today believes that the story is actually based on a true event involving a talking wolf. However, many other folk tales are not so fantastic. For example, in Leksvik, Norway there is the tale of Anders Solli, a soldier. According to the story he was attacked by wolves on Christmas Eve, 1612. He killed one wolf with his sword and kept travelling. As soon as the pack had eaten their dead pack-mate they followed the soldier. When he tried to draw his sword he found that the blood from the dead wolf had frozen the blade into the scabbard. The wolves killed and ate him, leaving just the sword, skis and his right hand. This story was cited as a credible example of a wolf attack by Norwegian zoologist Sigurd Johnsen in 1957. The event is even marked with a monument and a poem. However, there are also versions of the exact same story from several other locations in Norway, Sweden and Finland (Melin 1992; Snerte 2000). Another common folk tale in Scandinavia, Finland and Russia refers to a family being chased by a pack of wolves while travelling on a horse-drawn sled in winter. In order to delay the wolves so they can escape to safety, they toss their youngest child out of the sled so the wolves stop to feed on it (Melin 1992; Snerte 2000). The fact that each fantastic tale is recounted detail for detail in many locations makes it very unlikely that all are true, although it cannot be ruled out that there is some real event at the origin of the story.

During the last 200 years a large number of stories concerning hunters and trappers from both Europe and North America have appeared in various magazines. These tales often contain accounts of the storyteller (or somebody he knew) being followed and attacked by bloodthirsty wolves. In most accounts the hero is lucky enough to have a gun and shoots his way out of the situation. Young & Goldmann (1944) recount several of the genre from North America, but were never able to substantiate them. The internet is also full of such stories.

Separating fact from fiction has been among the greatest challenges that this project has faced. We have not investigated wolf attacks in the field, and many of the reports come from times and places where modern forensic methods and standards of documentation do not exist. Neither have we checked original historical documents reporting wolf attacks. Many of the accounts have been filtered through several layers of recording and interpretation before we have found them. There is therefore always a certain degree of uncertainty around many of the cases presented here, especially for the cases from the 17th, 18th and 19th centuries. However, we have tried to retain those cases for which there are claims of some form of contemporary, written documentation. In some few cases we also report events for which there is no written documentation, but where either we have directly interviewed people familiar with events, or where other authors have indicated that the events appear to be credible.

Because of the highly variable quality of data presented here it is difficult to rank each given case with a quality index. As an indication of quality we believe that it is most productive to consider cases according to the sources of information. Each source has its own associated problems and advantages. For each case it is important to consider two questions, (1) was the person actually attacked or killed, and (2) was it really a wolf that was responsible?

The main sources that we have examined include;

(1) **Scientific, medical, and veterinary**. These cases that have been described by ecological, medical or veterinary professionals are those regarded as having the highest level of creditability. Such data is largely only available from the 20th century. In this category we include cases that are published, those that exist in official records and those that come from personal communications.

(2) **Historical and administrative records**. Cause of death is generally recorded in parish registers kept by churches (extending back until at least the 16th century), and other administrative records. The parish registers are a particularly rich source of data that on a European basis include many cases of where "wolf attack" is written as the source of death. Examples include;

Villacortese [Northern Italy] 6th May 1654 "Pietro Maria, son of Giovanni Scazoso called Farè, aged 9 years and a half, killed by a wolf while returning from pasture with the cattle in the evening of the 17th, was buried the following day".

Gastrickland [Sweden] 1821 "Pehr, son of farmer Eric Pehrsson from Kräbäck, savaged by a wolf on the 28/1, buried 4/2, 6 ½ years old".

Given that being killed by a wolf is a very unusual event it is unlikely that it would be used in cases where the true cause of death was trying to be hidden (e.g. a suicide). In other words, priests and administrators would have little to gain by claiming that somebody was killed by a wolf when they weren't. These data sources are regarded as being relatively reliable. The only problem is that in some situations authors present summaries of their searches of administrative documents for periods covering several hundred years. This makes it difficult to evaluate the individual cases.

(3) **Other sources**. Some cases are only reported in newspapers, non-technical literature and from interviews or personal communications. Some of these need to be treated with caution, because many that we have tried to find support for have proven to be impossible to verify. However, some cases are so well described from several independent

sources that they appear to be reliable. In many cases we have had to make a subjective evaluation of quality.

Only data from the first two categories should be regarded as being relatively secure. In order to make our task easier to manage we have defined attacks as cases in which there is violent contact (knocked over, scratched, bitten, killed) between a wolf and a person. These cases should be the most dramatic, and are also those for which there should be some physical evidence and documentation. The criteria of contact also makes interpretation less biased by the observer / victim. Close visual contact or an encounter with a wolf can be perceived in many ways (aggressive or benign), depending on the observer's personality and experience with wolves.

2.2 Sources of error

In any such study based on summarising historical records, newspaper and magazine accounts, traditional literature etc, there are many potential sources of error that appear. These errors can result from problems with translation, recording error, exaggeration ("journalistic license"), ignorance, or wilful distortion of the truth to cover up events. We illustrate some of these below.

Case 1. **Problems with the oral tradition.** There are many problems with using the oral tradition, as errors often enter the record, as the following examples illustrate.

(1) In Alba village in Romania, villagers told interviewers a story about a postman being killed by wolves. It turns out that the postman in question is still alive and had merely once seen two wolves following him.

(2) In Scotland a story was recorded in the 1800's about an attack that led to the deaths of two children in 1743. The problem is that wolves had been extinct in Britain since the 1660's (Yalden 1999).

(3) Eles (1986) investigated two incidents of wolves killing children in southern Sweden in the 18th and 19th that were widely believed to be true locally. He could find no records of either event in parish registers for the period, indicating that it was unlikely that they had ever occurred.

Case 2. **Faking an attack**. In Poland in the 1950's there was a case of a young female teacher who was reported as being killed by wolves. Her shoes and purse were found with bite marks, together with fragments of her dress and lots of blood. Forty years later she returned to Poland, alive and well. It appears that her boyfriend had managed to smuggle her out of the country to Sweden, and they had used the ruse of being killed by wolves to prevent the government from punishing her family.

It is possible that murderers could try and cover their tracks by making it look like the victim had been killed by a large carnivore. In a recent case in British Columbia, Canada, a murder victim was initially believed to have been killed by a cougar (Corbett pers. comm.). The result was that the murder site was not treated as a crime scene and the hunters and hounds that began the hunt for the non-existent cougar destroyed any evidence from the location. The autopsy documented that the victim had in fact been stabbed with a knife. The controversy surrounding the Chamberlin dingo case at Ayer's rock in Australia in the 1980's also illustrates the complexities or separating murder from a real carnivore attack (see **section 10.1**). However, because of the rarity of wolves killing people, this would only be possible during a period when real wolf attacks had occurred in the area.

Case 3. Confusion about names. In our questionnaire survey in Romania, 325 of 366 replies could be immediately discarded as they concerned dog bites. The confusion occurs because German Shepherd dogs are called "caine lup" (wolf dog) in Romanian, whereas wolves are called "lup".

Case 4. Direct and indirect mechanisms. In Iran, a scientist investigated a case of a shepherd who had been "killed by wolves". It turned out that wolves had attacked the shepherd's flock, but that the shepherds and their dogs had successfully defended their sheep without any of the shepherds being attacked. Immediately after the incident, one elderly shepherd sat down and died, perhaps from a heart attack. The event was recorded as a person killed by a wolf, even though the wolves never touched the shepherd (Joslin 1982).

It is not uncommon for people that receive a minor bite from domestic dogs to develop serious complications that can result in death. Examples include diverse infections and septicemia, rhabdomyolysis with renal failure, and pulmonary thromboembolism (Anveden et al. 1986; Holter et al. 1989; Hantson et al. 1991; Smith et al. 1991; Garcia 1997; Saab et al. 1998; Falconieri et al. 1999). Presumably such complications are also associated with wolf bites. It is therefore difficult to know if all historical cases of "death by wolf" actually involved the person being killed outright by the wolf, or involved subsequent death due to complications from a relatively minor bite.

Case 5. Killing vs scavenging. In many cases, the remains of people that have gone missing in the forest are found later, in a decomposed or partially consumed condition. Often wolves may have fed on the body, along with other scavengers. Although there is rarely any proof that wolves actually killed the person, they are often blamed for it in the press. These stories occur in many countries (e.g. Romania, Greece, Russia), and are especially frequent during times of war. One classic example comes from Alaska in 1933. A 60-year-old trapper, John Millovich from Fairbanks, failed to return to town when expected in May 1933. Some of his friends went to look for him, and found his partially consumed body and torn clothing lying 15m from his cabin. Wolf tracks were visible in the snow. In such a case it is impossible to determine if he was killed by the wolves, or if they had simply scavenged his body after he died of a stroke or heart attack while fetching water (Young & Goldman 1944).

Case 6. Euphemisms and superstition. In much of the older historical literature there is the risk of the expression "killed by

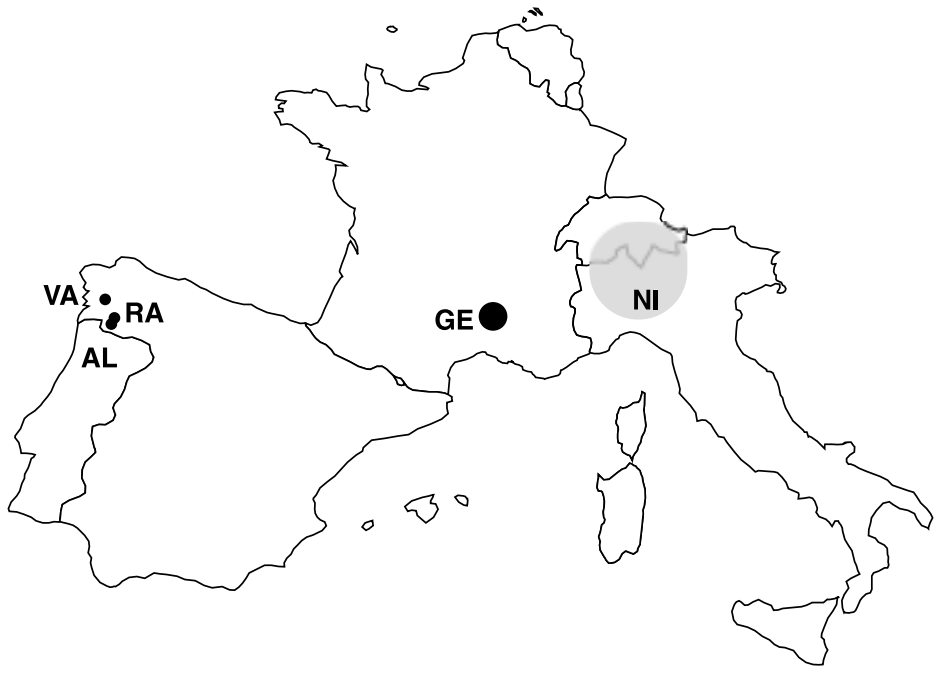


***Figure 1 (top)**. Geographic distribution of areas covered by the report in relation to the types of wolf attacks found.*
***Figure 2 (lowest)**. Areas mentioned in the text where predatory attacks by wolves on humans have occurred in Spain, France and Italy. VI = Vimanzo, RA = Rante, AL = Allariz, GE = Gevaudan, NI = Northern Italy.*

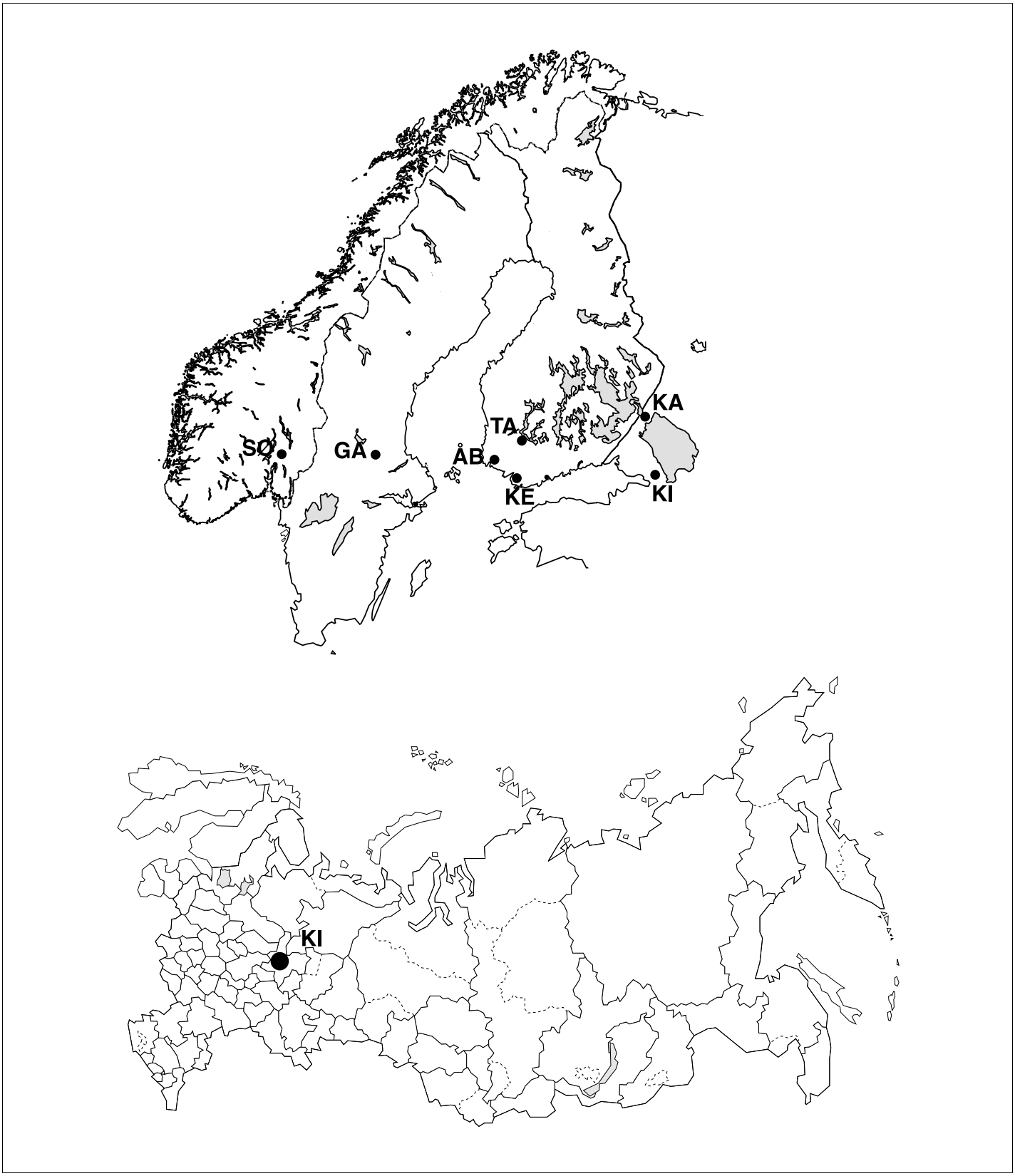
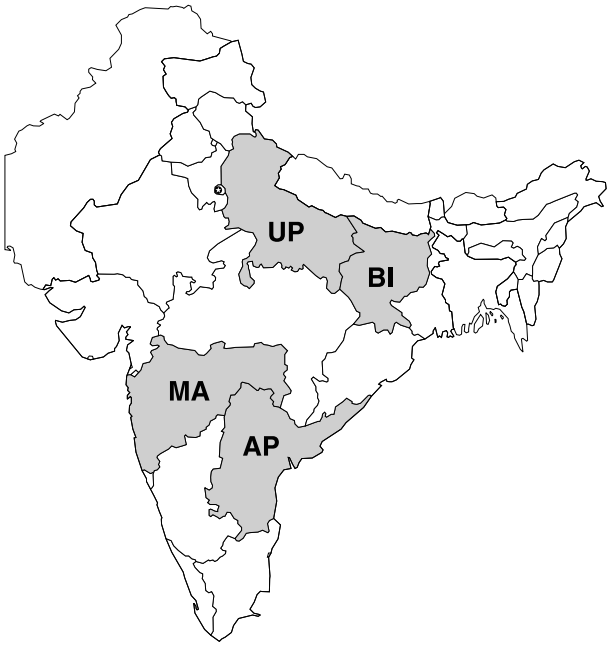


***Figure 3 (top)**. Areas mentioned in the text where predatory attacks by wolves on humans have occurred in Fennoscandia (1800-1882). SØ = Sørum, Akershus, GA = Gastrikland / Dalarna, ÅB = Åbo, KA = Kaukola, KI = Kivennapa, KE = Kemiö, TA = Tammerfors.*
***Figure 4 (lowest)**. Location of Kirov (KI) in central Russia where a number of predatory attacks on people are reported from the period 1944-1953.*



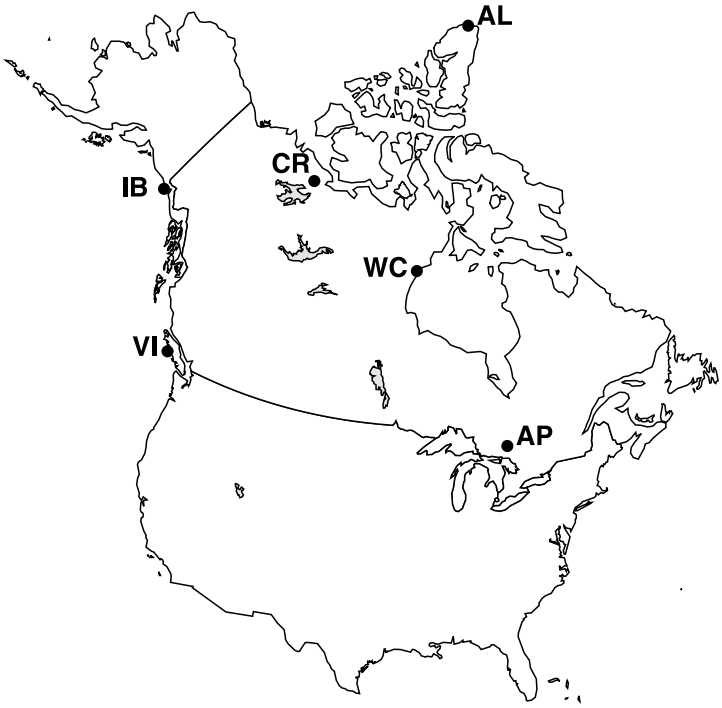


Figure 5 (top). *Location of 3 states in India where predatory attacks on children have been reported and 1 where attacks by rabid wolves have been reported. BI = Bihar, UP = Uttar Pradesh, AP = Andhra Pradesh, MA = Maharashtra.*
Figure 6 (lowest). *Locations in North America where several attacks on people by rabid and non-rabid wolves have occurred during the 20th century. IB = Ice Bay (Yakutat), VI = Vargas Island, AP = Algonquin Provincial Park, AL = Alert, Ellesmere Island, WC = Whale Cove, CR = Coppermine River.*

wolves" being used as a euphemism for other causes of death. For example in Germanic and Anglo-Saxon the words warg, warc and verag (wolf) were also used for outlaws, bandits and evil spirits. A similar situation existed in Sweden where the word "varg" (also used for everything that was wrong, including criminals) replaced the original term "ulv". During the middle centuries of the last millennium it is important to remember that werewolves were believed to exist, and many murders may have been blamed on wolves or their supernatural incarnation. In addition, a large number of animals, including wolves, were tried in religious courts and executed for their "crimes" up until the late medieval period.

Case 7. Mistaken identity. It is also highly possible that a number of attacks attributed to wolves could be due to domestic or feral dogs, wolf-dog hybrids or similar species like jackals (*Canis aureus*) or coyotes (*Canis latrans*). The ability of people to identify the animal attacking them during the stress and shock of an attack may not always be accurate. Attacks by domestic dogs (both rabid and non-rabid) are far more common than attacks by wolves. Many dog races (German Shepherds, huskies, malamutes etc.) also resemble wolves. The existence of free-living hybrids between wolves and dogs further complicates the issue. Such hybrids have been described in several places in Norway, Eastern Europe and Russia (e.g. Rjabov 1980, 1985; Vila & Wayne 1999; Randi et al. 2000; Andersone et al. 2001). This potential error exists throughout the entire literature, and is impossible to correct for, with the exception of cases where the wolf has been shot or captured during, or following, the attack.

In Norway (in 2000), Finland (1990's), and France (in 2001) there have been cases reported in the media where people claimed to have been bitten by "a wolf". In all these cases there were many details that were inconsistent, and the most likely explanation is that they were bitten by dogs.

Case 9. Rabies vaccination procedures. In many cases large numbers of people are given post-exposure treatment following exposure to a rabid wolf. However, in may cases this includes many people that may have handled or touched the dead wolf, and not just those that were attacked or bitten. Therefore, when this is reported as the number of people exposed to wolf rabies, it is not automatic that all were actually attacked by the wolf.

2.3 Coverage

In order to locate data for this report we have relied heavily on the contact networks of the authors. The authors of this report have many decades of accumulated experience working with wolves and other large carnivores throughout Europe, Asia (**Figure 1**) and North America. In addition, we have contacted many other wildlife professionals (scientists, wildlife managers) that have worked with wolves, other large carnivores, or in wolf range in North America and Eurasia. Furthermore, all the authors and their contacts have during their work been in contact with many hunters, foresters and other people that live in wolf range. In addition to this network, we have also written to a wide range of organisations (conservation, hunting, historical etc.) and used a number of email discussion groups asking for records of wolf attacks. Through this wide contact net it is highly likely that unrecorded wolf attacks would have been mentioned had they occurred. We have a high degree of confidence in the extent to which we have covered the last 20-40 years – so that this is the period for which we believe that our coverage is relatively complete (at least for Europe and North America). In addition, we have conducted literature searches of technical literature databases and read through much literature not covered by databases. We have placed extra emphasis on countries in Europe where wolves are relatively abundant – this includes Italy, Spain, the three Baltic States, Poland and Romania. In Romania we sent students from a University wildlife management course to their homes with questionnaire surveys in an attempt to collect further unrecorded attacks.

It is quite possible that we have missed some cases of wolf attacks on people – that either have not been recorded, or where we have not found the records. The incidents described here are therefore just those examples of wolf attacks that we have been able to find, and believe are credible. However, we believe that we have not overlooked many from modern times given;

(1) The sensational nature of a wolf attack.
(2) The fact that large numbers of attacks by other carnivores such as tigers (*Panthera tigris*), bears (*Ursus* sp.) and cougars (*Puma concolor*) are extensively recorded from areas and periods where we have not found records of wolf attacks.
(3) The large number of experienced people involved in the report.
(4) The intense interest in wolf management issues among wildlife professionals and the public alike.

3 Rabies

3.1 The disease

The word rabies comes from the Sanskrit word *rabhar* – "to do violence" (MacDonald 1980). Rabies is a viral infection of the central nervous system. The primary mode of infection is from an animal's bite and occasionally by way of saliva contaminating mucous surfaces. Although rabies is highly infectious, not all bites from rabid animals automatically lead to the development of rabies, presumably because there is not enough virus transferred, or the bite was too shallow. The bite leads to a local infection with a very limited virus replication and a subsequent slow spread through the peripheral nerves to the central nervous system. The period of incubation can last from two weeks to several months. During the clinical phase of the disease, many victims develop the "furious" type, which consists of alternating bouts of hyperexcitability and lucid periods. Classical symptoms include excessive salivation and hydrophobia. Victims typically enter a coma and suffer multiple organ failure. Once the disease becomes established it is 100% fatal (King & Turner 1993; Jackson 2000). However, if treated immediately after exposure it is possible to prevent the development of the disease in most cases. The post-exposure treatment was first developed by Pasteur at the end of the 19th century and has been considerably improved during the 20th century (Baltazard & Ghodssi 1954, Bahmanyar et al. 1976, Selimov et al. 1978). The present treatment consists of a single injection of immunoglobulin (rabies antibodies grown in tissue culture) and multiple injections of rabies vaccine (Jackson 2000). Survival of patients treated is high, except in some cases where bites have been inflicted directly on the head and neck (Shah & Jaswal 1976; Fangtao et al. 1988). The result of these developments in treatment is that a disease that was invariably fatal before the 20th century is now mainly treatable.

Despite the development of effective post-exposure treatment, rabies is estimated to kill up to 50,000 people each year, worldwide. The main source of rabies infections in humans is the domestic dog, although wildlife reservoirs exist in all areas (MacDonald 1980). The main species serving as primary vectors varies from region to region. Arctic foxes (*Alopex lagopus*) are most common in arctic areas, jackals in Africa, red foxes (*Vulpes vulpes*) and racoon dogs (*Nyctereutes procyonoides*) in eastern Europe, and skunks (*Mephitis mephitis*) and racoons (*Procyon lotor*) in some parts of the United States (Linhart et al. 1997; Hanlon et al. 1999; Jackson 2000, Mørk & Prestrud 2001). However, in Western Europe and North America, rabies has been virtually eliminated in domestic dogs through widespread vaccination and dog control laws. The number of human cases has dramatically dropped accordingly. In these areas the wildlife reservoirs have taken on increased importance. Large-scale vaccination programs in Western Europe have been very successful at eradicating rabies in red foxes, with Switzerland becoming rabies free in 1998.

3.2 Rabies in wolves

Wolves appear to have always been involved in transmitting rabies to humans in Europe and Asia, with the earliest reports stemming from the 13th century (e.g. Butzeck 1987; Beran 1994). Rabies still occurs in wolves throughout North America, eastern Europe and Asia, however the number of cases is very low compared to other wildlife species (**Tables 1 & 2**). In most areas it is unlikely that wolves serve as a reservoir or primary host for the disease. It rather tends to appear as isolated incidents where a single wolf (McTaggart Cowan 1949), or a pack (Chapman 1978), become infected in a form of "spillover" from another animal species in which rabies is more common (Johnson 1995). In temperate and arctic areas this is likely to be either the red fox or arctic fox, while in more southern regions this is likely to be the golden jackal or domestic dogs. At least in northern North America it appears that rabies epidemics in arctic foxes appear periodically, and that the wolf cases tend to appear during a peak in the epidemic. When the large size of the North American wolf populations is taken into account, the number of rabies cases in wolves is remarkably low (review in Johnson 1995, **Table 2**) in comparison with Eurasia. In the eastern Mediterranean, Middle East, and central Asian region (especially Iran) wolf rabies appears to be far more common than elsewhere, reflecting the very high number of diagnosed cases and resultant large numbers of people being bitten. The exact reasons for this high regional prevalence of wolf rabies are unclear, but it may be due to the existence of jackals in the region. At least in Africa, where jackal rabies has been more widely studied, jackals are regarded as being a primary host for the disease (Linhart et al. 1997, Bingham et al. 1999, Loveridge & Macdonald 2001). In addition, rabies is widespread in domestic dogs in the region. It is therefore likely that wolf rabies was much more common in Europe before rabies was virtually eliminated from domestic dogs during the 19th and 20th centuries, and because wolves were more abundant in the past.

Wolves appear to develop the "furious" phase of rabies to a very high degree (Beran 1994). This results in the large numbers of people and livestock that are bitten in each attack, and in the distances that these wolves can travel during this short-lived phase of the disease. When the physical size, strength and speed of a wolf is considered, it is clear that a rabid wolf is probably the most dangerous rabid animal of all.

Table 1. *Numbers of laboratory diagnosed cases of rabies in wolves in various Eurasian countries, 1990-99. Data are mainly from the WHO RabNet internet pages. No data was available from Ukraine, Armenia, China, Mongolia, the former Soviet Central Asian republics, Pakistan, India or Afghanistan. Rabies is not present in other wolf range states like Spain, Portugal, Italy, Switzerland, Norway, Sweden, Albania or Greece.*

Country	1999	1998	1997	1996	1995	1994	1993	1992	1990
Belarus		1		0	0		0		
Bulgaria	0	0	0	0		0		0	
Croatia	0		1	1	0	0	0	1	0
Czech Rep.	0	0	0	0	0	0	0	0	0
Estonia	0	0	0	0	0	0	0	0	
Eygpt		1	1	0					
Finland	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0
Iran	16		19	21	29	16	11	15	
Israel	1	1	6	9	9	2	0	0	0
Jordan	0	0	0	1	0	0	0	1	
Kazakstan					17				
Latvia		0	1	2	0	0	1	1	0
Lithuania	0	0	0	0	0	0	1	0	0
Moldova	0	0	0	0	0	0	0	0	0
Oman		1	0	0	0	0	0	3	0
Poland	1	0	0	0	0	1	2	1	0
Romania	1	1		0	0	1	2	1	
Russia	7	13	0	0	2	0	0		
Saudi Arabia					0	1	2		
Serbia	0						0		
Slovakia	1	1	0	0	0	1	0	0	0
Slovenia		0	0	0	0	0	0	0	
Syria			0						
Turkey	1		0					0	
Yugoslavia	0	0	0	0	0	0	0	0	0
Total	28	19	28	34	57	22	19	23	0

Table 2. *Occurrence of rabies in wolves in North America.*

Area	Cases	Reference
Canada	16 cases diagnosed in 1990-99	Rabnet
	70 cases diagnosed in 1982-1992	Johnson 1995
	3 cases diagnosed 1978-1984	Prins & Yates 1986
	6 of 57 radio-collared wolves died of rabies, 1987-1991	Theberge et al. 1994
	3 cases diagnosed in 1947	McTaggart Cowan 1949
Alaska	1 case diagnosed in 1990-99	Rabnet
	12 cases in Alaska 1981-1991	Johnson 1995
	1 of 88 wolves tested from 1975-1982	Zarnke & Ballard 1987
	5 of 26 radio-collared wolves died from rabies 1984-1985	Weller et al. 1995
	4 (perhaps 11) of 86 radio-collared wolves died of rabies, 1987-1992	Ballard & Krausman 1997
	2 cases diagnosed, 1949-1957	Rausch 1958

4 Types of wolf attack

Herrero (1985) separated between two types of bear attacks on humans. The first and most common category was when a bear was surprised or felt threatened and attacked as a defensive action. The second category consists of predatory attacks where the bear perceives of the victim as prey. Separating between these two forms of attacks still forms the basis for the appropriate response recommended by North American national parks and management agencies.

In the case of wild wolves, it is necessary to differentiate between three different types of attack, (1) rabid, (2) defensive / investigative, and (3) predatory. The difference between attacks by rabid and non-rabid wolves appears to have been clearly recognised both by ordinary people in the areas where wolves occur (Baltazard & Ghodssi 1954) and by the historians that have summarised historical cases (de Beaufort 1987; Cagnolaro et al. 1992; Comincini et al. 1996; Rootsi 2001). However, it is not always possible to attribute single cases to one category or the other, especially in older literature. Today, classification is far easier when wolves can actually be tested in the laboratory for rabies.

A further category of attacks resulting from captive, and pet wolves or pet wolf-dog hybrids also exists. Although we briefly mention some of these cases in **section 9**, our primary focus is on wolves under free-ranging conditions. Likewise, we do not include cases of researchers handling drugged wolves in connection with radio-collaring, although we are aware of at least one case of a wolf biting a researcher in the leg (Victor Van Ballenberghe pers. comm.).

4.1 Rabid attacks

Throughout history there are accounts from Eurasia of single wolves rushing into a farmyard or village, biting wildly at people or livestock that stand in the way, before rushing off to the next village. Such stories span at least 400 years of recorded history.

The following example from Aurangabad District, India on the 3rd February 1973) is typical. Between 05:00 and 17:00 a rabid wolf ran through 6 villages, covering a distance of at least 23 km, biting 12 people, 2 pigs, 3 bulls and a dog. All three of the victims that were bitten on the head or face died of rabies, despite two of them receiving post-exposure treatment. The other victims that were bitten received post exposure treatment, and none died. One of the pigs died directly from his wounds, the second died from rabies 28 days later. A dog that fed on the body of the rabid pig also died of rabies. Two of the bulls that were bitten also died of rabies. A medical team (Shah & Jaswal 1976) investigated this event.

The pattern of rabid wolf attacks is remarkably consistent, with a single wolf often travelling over large distances, often biting a large number of people and domestic animals if it gets the chance. Some victims only receive a small bite to the hand or arm, while in other cases the attack can be sustained and the victim can even be killed outright. An important aspect is that victims are not eaten, and that the attacks generally only occur on a single day (two at most).

4.2 Defensive / investigative attacks

There are historical and contemporary records of shepherds being bitten on the hand, arm or foot when they corner or confront a wolf trying to kill livestock or dogs, and try to kill it with a stick or hay fork. Other records exist of hunters digging out wolf pups from a den and being bitten by an adult wolf trying to defend the pups. These attacks can be interpreted as defensive bites by a scared and cornered animal. They generally consist of a single bite, usually to an extremity, and the wolf does not press the attack, but simply escapes if possible.

A number of cases exist from North America where wolves with no fear of humans (either from naivety or habituation) have bitten people after approaching them closely. In some cases it has been suspected that the wolves are "testing" or investigating the person as potential prey, which can result in close approach, being knocked over, or bites. In other cases it appears that the wolf has been trying to seize an object (in two cases the sleeping bag that the victim is sleeping in) and panics when the victim wakes up or surprises the wolf. This panic is often expressed as a bite or series of quick bites. As in defensive attacks, the wolf does not press the attack, and is easily scared away.

4.3 Predatory

Predatory attacks appear to usually involve single wolves, or single packs, that learn to exploit humans as prey. In these cases the victims are usually directly attacked around the neck and face in a sustained manner. The bodies are often dragged away and consumed unless the wolves are disturbed. Although single incidents have occurred, these predatory attacks tend to cluster in space and time, and continue until the wolf is killed.

5 Europe

5.1 European wolf populations

Wolves were once distributed across the entire European continent, from the Mediterranean to the Arctic, including Britain and Ireland. From the earliest times it appears that people strove to exterminate wolves. Records of royal decrees and bounties to stimulate hunting stretch back to before the medieval period. These efforts were most successful in western and northern Europe. Intensive hunting pressure plus the indirect effects of habitat clearance and destruction of the prey base soon took a toll on the populations. Britain exterminated its last wolves in the 17th century, with Ireland following in the 18th century. The pressure continued right through until the 1960's, resulting in either extinction or an all time low in population density and distribution (Boitani 1996, 2000; Yalden 1999; Linnell et al. 2001).

During the last 30-40 years, as the attitude towards wolves has gradually changed, the declines have stopped, and even been reversed in many countries. For example, reproductive units have re-established themselves in France and Scandinavia during the 1990's, with dispersing individuals arriving in Switzerland and Germany. **Table 3** summarises the approximate changes in wolf status in Europe through recent centuries.

Central and northern Europe exterminated their wolf populations in the 18th and 19th centuries. However, wolves have been continuously present in eastern and southern Europe, although their populations have often been reduced for shorter or longer periods (Blanco et al. 1992; Boitani 1992, 2000; Jedrzejewska et al. 1996). A common occurrence has been the recovery of wolf populations during wars, and other periods of social strife when control efforts were reduced or suspended. Therefore, Europeans have had plenty of experience of wolves (at least as much as North Americans), at various densities, throughout historic times extending to the present day.

It is important to note that the reduction or local extinction in wild prey populations, such as red deer, roe deer, moose and wild boar often preceded the reduction of wolf populations. Unregulated hunting from an increasing human population, widespread clearance of forest for farmland, very heavy grazing by domestic ungulates, and the ever increasing availability of weapons and firearms reduced most European wild ungulate populations to very low levels in the 18th and 19th centuries (Wotschikowsky 1998; Breitenmoser 1998; Yalden 1999). After the wild prey were gone, wolf populations apparently were able to persist for long periods on livestock and garbage – as the still do today in many areas (Meriggi et al. 1991; Meriggi & Lovari 1996; Vos 2000). The present wide distribution of wild ungulate populations (Gill 1990) is unprecedented in recent European history.

5.1 Bulgaria

There are two unconfirmed reports of wolves feeding on humans during world war two, although it is impossible to know if the wolves killed the people first, or fed on their bodies after they died of starvation or hypothermia. In early summer 2001, newspapers carried a story about two people (an old lady and a shepherd) being bitten by a wolf that apparently had rabies. It has been impossible to verify the truth of this report (Elena Tsingarska pers. comm.).

5.2 Croatia

There have been no substantiated reports of non-rabid wolves attacking people in Croatia during the post WW2 period (Djuro Huber pers. comm.). The European Wolf Newsletter carried an account of a farmer being bitten by a rabid wolf while he tried to kill it with a stick on April 13th, 1997.

5.3 Estonia

There are reports of rabid wolves attacking people during the period since 1980 – in one case in 1980 elederly woman died directly from her wounds, and several other people needed post-exposure vaccination (Kaal 1983). Otherwise there are no reported attacks during recent decades. During the same period there have been at least 6 documented cases of bears attacking people.

Historically there are a number of records of wolf attacks, especially during the 19th century. Rootsi (2001) has examined church and administrative records, correspondence and historical literature from Estonia for the 18th and 19th centuries. From this material he found 82 cases of people bitten by rabid wolves and 136 people killed in predatory attacks. The rabies cases occurred over a large area of Estonia. In contrast, the predatory attacks occurred in a very clumped pattern in space (85% of all cases occurred in Tartumaa county, in eastern Estonia) and time (several attacks occurring in a limited area during a short space of time), summarised in **Appendix 3**. It is believed that a combination of hybrids (both wild and captive born) and tame wolves that escaped from captivity were responsible for a proportion of these cases. In at least 2 cases wolves responsible for killing children were found to be wearing a collar when shot. Apparently it was common to keep wild wolves as exotic pets at the time, and some hybrids were produced to use as hunting dogs. Because the majority of cases occurred during late summer months, Rootsi (2001) believed that female wolves trying to feed their pups were also responsible for a number of the cases. However, the fact that children were generally working as shepherds during this season may also explain the seasonal peak.

5.4 France

Since wolves recolonised France in the late 1980's after almost a century of absence there have been no documented attacks on humans. However, the historical ecology of wolves in France has

Table 3. *Changes in distribution and status of wolf populations in western Europe and North America during recent centuries. Data from Hayes & Gunson 1995, Stephenson et al. 1995, International Wolf Foundation, Boitani 2000, Iliopoulos 2000, Linnell et al. 2001.*

	Wolf population status			
Country	18th century	19th century	20th century	c. 2000
Albania	present	present	present	250
Austria	present	ext. 1880		0
Belarus	present	present	present	2000-2500
Belgium	present	ext. late 18th century		0
Bosnia-Herzegovina	present	present	present	400?
Bulgaria	present	present	present	800-1000
Croatia	present	present	present	100-150
Czech Rep.	present	present	present	<20
Denmark	ext. 1772			0
Estonia	present	present	present	<100-300
Finland	present	present	present	100
France	present	present	ext. 1927 recolonised 1992	30-40
FYROM	present	present	present	1000
Germany	present	ext. between 1847 and 1899	recolonised late 1990's	1 pack
Georgia	present	present	present	2000
Greece	present	present	present	600-700
Hungary	present	present	ext. 1900 recolonised 1990's	15-25
Ireland	ext. 1770			0
Italy	present	present	present	400-500
Latvia	present	present	present	300-500
Lithuania	present	present	present	600
Moldova	present	present	present	<20
Netherlands	present	ext. 18th century		0
Norway	present	present	functionally ext. early 20th century – recolonised 1998	c. 30
Poland	present	present	present	600-700
Portugal	present	present	present	200-300
Romania	present	present	present	2500
Russia	present	present	present	40000
SFR – Yugoslavia	present	present	present	1000
Slovakia	present	present	present	350-400
Slovenia	present	present	present	30-50
Spain	present	present	present	2000
Sweden	present	present	functionally extinct mid 20th century – recolonised 1980's	c. 70
Switzerland	present	extinction between 1850 and 1899		Transients
Ukraine	present	present	present	2000
United Kingdom	extinct since 1680's			0
Alaska	present	present	present	6000
Canada	present	present	present	52000
Minnesota	present	present	present	2500
Michigan	present	present	extinct recolonised 1970's	112
Wisconsin	present	present	extinct recolonised 1970's	148
NW Montana	present	present	extinct recolonised 1986	63
Idaho	present	present	extinct reintroduced 1995	>118
Yellowstone	present	present	extinct reintroduced 1995	177

been well researched, and records from the 18th and 19th centuries contain many references to people being attacked and killed by wolves. This includes both those with rabies and those that were predatory by nature.

The beast of Gévaudan. Between June 1764 and June 1767, wolves were reported to have killed over 100 people, many of which were partly eaten, in the Gévaudan region of southern France (**Figure 2**) (Carbone 1991). The exact number killed depends on the source, but de Beaufort (1987) tallied 210 attacks, resulting in 49 people wounded and 113 killed. Of those killed, 98 were at least partially consumed. The case has been documented by a range of authors including two abbots (Pourcher in 1889 and Fabré in 1901) and by historians de Bayac and de Beaufort (1987). These authors have examined a wide range of documents, including parish and church records, death certificates, official reports and private letters. Clarke (1971) has summarised the results in English. As a result this remains one of the best-documented historical episodes of wolf predation on humans.

It appears that the local population was familiar with rabid wolves attacking people, but from the outset of this episode it was clear that the wolves were not rabid, as the attacks persisted over a long period, and most of the victims were consumed. In addition, a number of people were bitten during attacks, but managed to drive the wolves away. None of these victims later died of rabies. If the wolves had been rabid it would have been inevitable that most of the victims would have gone on to develop rabies. Enormous resources were used to try and kill the wolves – including the army, several nobles and royal huntsmen. A large proportion of the local population was conscripted to take part in the hunt. Many wolves were killed, but the attacks continued until a wolf was killed in autumn 1765. This wolf was very large, and was identified as being that responsible for attacking people from a series of scars inflicted by people that had defended themselves. However, after a brief pause the attacks resumed again and continued until June 1767 when a second especially large wolf was killed, this time with human remains in the stomach. Both of the wolves that were believed to be responsible for the attacks were exceptionally large and had unusual coat coloration, leading several later authors to speculate that they were hybrids between wolves and some of the large shepherd dogs found in the region. Both of the wolves had mates, and one at least was part of a pack – however, only the two "exceptional" wolves were ever implicated in attacks by witnesses or survivors. No attack was suspected as being due to the whole pack acting in a co-ordinated manner. The attacks occurred within an area of 90 x 80 km.

There has always been controversy about the identity of the "beast", especially if it was really wolves that were responsible for all the deaths. Alternative hypotheses have been raised that it was the work of a serial killer or another animal, perhaps a hyena that had escaped from a zoo. Many works of fiction, in both literature and film, (most recently the French film "Brotherhood of the wolf") have embellished the tale. From our point of view it is impossible to be 100% certain. However, even if some of the cases may have been due to other agents than a wolf, the historians that have examined the case believe there is a very high chance that a wolf or wolves were involved in many of the deaths.

Foret de Longechamp. Between 16th June 1817 and 26th June 1818 a number of attacks occurred in the Longechamp forest (Cote d'Or, near Lyon). A total of 17 people were attacked (1 adult women, 16 children). Of these 9 children were killed. These attacks occurred within an area of 250 km^2. In most attacks it was believed that a single wolf was responsible, but in several attacks, 2 and 3 wolves were observed to take part. The wolf that was responsible was finally killed, and was noted as being an exceptionally large individual.

Lorges Forest, France 25th April 1851. In 7 hours a rabid wolf travelled 45 km through 9 villages biting 41 people (10 adult men, 12 adult women and 19 children) and 96 animals (64 cattle, 14 horses, 8 sheep, 6 pigs, 3 goats and 1 dog). The deaths of 14 of the people from rabies was confirmed in records during the following 2 months, although it is highly likely that most died in view of the fact that rabies is highly infectious and 100% fatal. The account is based on historical records written by the mayor of Pleisdy, a statement from the local hospital, a police report and a letter from one of the government ministries (de Beaufort 1987).

Salernes, France. 31st July 1756 A rabid wolf ran into a village – during the course of the day it bit 12 people (mainly adults) and 1 pig. The bites ranged from a single bite on the ankle to "having all the face, head and neck torn off". During the next 3 months at least 6 of those bitten were recorded as dying from rabies. Describing the death of two children the priest wrote, "The circumstances of these two children's death are awful. Joseph Dauphin began to refuse eating and hate water, having occasional fits and tried to bite people, he warned them however and died in this state with no cure. Marie Anne Boudou was more furious, she also hated water, she was locked alone in her room where she broke her head and body while falling from time to time, and in these excitements, died with no remedy". The town priest wrote this account after the event.

Other attacks. Several additional episodes where a sequence of predatory attacks occurred on more than 1 person within a limited area are summarised in **Appendix 3**. In addition, de Beaufort has found reports of many more isolated cases of wolves killing people from throughout France up until the 1920's (**Table 4**). Many of these were described in detail as being due to rabid wolves. The possibility also exists that many of those not explicitly attributed to rabid wolves may have been due to rabid wolves. However, there appears little doubt that there were many other cases of human deaths in France being attributed to non-rabid wolves. The two most recent cases listed are an 8 year old girl and an old lady killed in 1914 and 1918 respectively (Teruelo & Valverde 1992). There are independent reports of two attacks by rabid wolves in France in the Spanish literature (Teruelo & Valverde 1992). In 1878, one of these resulted in 6 people being bitten and in 1839, another resulted in 18 people being bitten (12 of them died). Another describes 46 people being bitten by a rabid wolf in a single day in 1851 in Hue-an-

Gal (MacDonald 1980). MacDonald also reports 38 deaths of people after being bitten by rabid wolves in France in the period 1851-1877. In the same period 707 died after being bitten by rabid dogs.

Table 4. *Numbers of cases of wolf attacks on people in France tabulated by de Beaufort (1987) from historical records. Note: the percentage of deaths resulting from attacks by rabid wolves is an underestimate because of a reporting bias against cases where a long time period occurred between being bitten by a rabid wolf and death. The discrepancy between total number of victims and numbers injured plus those killed is for cases where the fate of the victim was not given.*

Period	Rabies				Non-rabies			
	Cases	Victims	Injury	Death	Cases	Victims	Injury	Death
20th century	0	0			6	6	2	2
1875-1899	5	24	21	3	12	33	4	20
1850-1874	4	55	34	21	7	8	6	2
1825-1849	8	41	23	10	24	29	5	10
1800-1824	28	225	115	84	146	295	76	72
1775-1799	38	142	55	40	23	38	2	15
1750-1774	35	364	183	150	11	196	1	154
before 1750	18	187	69	118	52	477	54	408
Total	136	838	500	426	281	1082	150	683

5.5 Georgia

Our informant in Georgia was not aware of any cases of either rabid or non-rabid wolves attacking people in the recent past (Iamze Khutsishvili pers. comm.).

5.6 Germany / Austria

During the 17th centuries, after the 30-years war (1618-1648), there are a number of accounts in parish registers and historical documents of attacks by wolves in the eastern part of present day Germany (Butzeck 1987). Most of these appeared to mention attacks by rabid wolves (**Appendix 4**).

In a review of historical documents, books, old hunting magazines, hunting statistics and museum materials from Austria, Zedrosser (1996) found 92 mentions of wolf occurrence from 1800 to 1996. None of these were in association with aggressive interactions between people and wolves.

5.7 Greece

There are no confirmed cases of attacks by wolves in recent history. In winter 1999 there was a case of a young women being killed by wolves mentioned in the newspapers and TV. However, it turned out that she had frozen to death while attempting to illegally cross the border with Bulgaria, and her body had been scavenged by shepherd dogs. A further two unconfirmed reports describe a shepherd being bitten on his hand while defending his sheep from a wolf attack, and a young man who was bitten when he stumbled upon a den with pups (Yorgos Ilopoulos pers. comm.).

5.8 Italy

There are no documented cases of wolves attacking or killing humans in Italy in the period after world war two. Italy has been free of dog rabies since c.1960, and has not had rabies in wildlife populations during recent centuries, so rabid wolves would not be expected to occur in recent times.

There is no complete overview of the historical situation in all Italy – however, a group of historians have summarised the historical data from the central Padania region of northern Italy (also includes part of present day Switzerland; **Figure 2**). The authors have examined both administrative and church records from the region. For the period covering the 15th to 19th centuries they found 440 attacks on people, distributed as follows 15th century = 40, 16th century = 30, 17th century = 167, 18th century = 103, 19th century = 112. The 19th century is the period with the most complete data. In effect this covers the period 1801 to June 1825, when the last documented attack on humans occurred in the region. During this period they found records of 112 attacks on humans, with 77 resulting in the death of the victim. Of these only 5 deaths were judged as being due to rabid wolves, the other 72 deaths were categorised as being predatory attacks. Of the victims of predatory attacks for which the age was known, all but 3 were children (mainly working as shepherds with their livestock during the summer). About half of the victims were reported as being consumed. In at least one incident it appears that a single wolf might have been responsible for a sequence of episodes in Pragelato municipality when 20 attacks occurred between 1710 and 1711. No more attacks where documented for the next 100 years in that area.

During this period, the landscapes of central Padania was being rapidly converted to agricultural land, with associated clearance of the forest and over-harvest of the wild ungulates. Wolves were being intensively hunted, with the encouragement of a high bounty, resulting in the local extinction during the 19th century. From the accounts and their knowledge of administrative procedures, the authors conclude that record keepers at the time were able to differentiate between wolves and feral dogs, and between rabid wolves and non-rabid wolves. In addition, because cases were generally described by multiple documents the cases are regarded as being authentic. (Cagnolaro et al. 1992; Comincini et al. 1996).

5.9 Latvia

Attacks by rabid wolves on people are known from the period spanning the last 200 years in Latvia. References exist to 10 people being killed in 1875 in Kurland (former administrative unit in western Latvia) and to 21 people being killed in the 19th century in Livland (former administrative unit of northern Latvia and southern Estonia) (Sabanejev 1988, Korytin 1990). Rabies is still widespread in Latvia (mainly in red foxes and racoon dogs, in addition to domestic dogs). Systematic data on rabid wolf attacks are not stored for more than 2 years by the National Veterinary Laboratory, however **Appendix 4** contains a number of episodes from the last few decades that were remembered or described in other sources. Data from the National Environmental Health Centre record that 72 people received post exposure treatment following attacks by rabid wolves in the period from 1992-2000. Not all of these people may have been actually attacked by the wolf, as it is normal to treat people that also had contact with the dead wolf and with livestock that the wolf had attacked.

Three recent attacks by non-rabid wolves had also been reported to the National Veterinary Laboratory.

Incident 1. Bauska district, southern Latvia, 5th December 2000. A wolf attacked an adult man walking along a forest road. Neighbours came to help and managed to kill the wolf, that tested negative for rabies.

Incident 2. Ludza district, eastern Latvia, 7th December 1998. An adult man heard his dogs barking and went to investigate. He saw a wolf and tried to scare it away, but the wolf attacked him biting his arm and ear. Another man came to his assistance and managed to kill the wolf with an axe. The wolf was tested and found to be negative for rabies.

Incident 3. Rezekne district, eastern Latvia, April 1998. No details exist beyond the fact that a wolf that did not have rabies attacked somebody.

5.10 Lithuania

Historical works make frequent reference to the problems that wolves caused for livestock and people in pre 20th century Lithuania, although no details of specific incidents are available. However, some data are available for the periods 1900-1937 and 1989-2001.

In the period 1900-1937 there were many accounts and rumours of people having narrow escapes after being "attacked" or chased by wolves. In many cases the victims were rumoured to have escaped harm, by shouting, climbing trees, or shooting. Many of these stories were just based on rumour and may have an uncertain basis. However, there are also a number of specific cases where people were rumoured to have been bitten or killed by wolves, both with and without rabies. Eleven cases of people being killed and 5 of people being injured by wolves were mentioned with specific details allowing tabulation, without stating whether rabies was involved or not (**Appendix 4**). In addition, 19 people were specifically mentioned as being bitten by wolves with rabies. Of these it is not known how many survived or died. Finally there were a number of references to people being "attacked" without sufficient details to determine if they were killed, injured or merely threatened.

Attacks by rabid wolves on people have continued to the present day. From 1989 up until May 2001 there were reports of 22 people having been bitten by rabid wolves.

5.11 Poland (and Belarus)

The geographic borders of Poland have changed frequently during the last few centuries; so much of the historical information on wolf attacks corresponds to the area occupied by present-day Poland, Belarus and Lithuania. This turbulent history has also lead to a severe fragmentation of historical records. The existing data report cases of wolf attacks on people during the 19th and early 20th century. For example in Wagrow county 19 people were reported as being killed by wolves in 1819 alone. Between 1897 and 1914, 130 people were recorded by the Pasteur Department in Wilno (present day Vilnius) as being bitten by rabid wolves in seven counties in Poland. Of these 130 people, 25 died of rabies (Krawczak 1969). In addition, there is a written record of a 6-year-old boy being killed by a wolf in the village of Mszaniec in the Bieszczady Mountains of south-eastern Poland on 31st May 1824 (Roman Gula pers. comm.).

Hunter magazines from the period between the world wars contain many accounts of attacks by wolves on humans, but the accuracy of these is questionable. However, in 1937 there appears to have been a series of predation attacks on children in the villages of Tymoszewicze and Hryniewicze (in present day Belarus). During July and August 1937, a total of 10 children were attacked by at least 2 wolves. The attacks occurred during daylight hours, on fields or close to houses. Of the 10 attacks, 5 resulted in the death of the children. These incidents are apparently well documented in police reports from the period (Kossak 1999).

In the period following the WW2 there are no known cases of people being killed by wolves within the present day borders of Poland (Okarma 1992). During this period wolf populations fluctuated widely, having increased during the war, government sponsored control actions led to a decrease during the 1950's

and 1960's (Jedrzejewska et al. 1996). There are presently estimated to be 600-700 wolves in Poland.

5.12 Romania

From a questionnaire survey in Romania, researchers have collected a total of 41 stories of people being attacked by wolves. Of these, 8 cases could be confirmed as being true. These are listed below.

From these cases, 2 occurred while hunting:
Case 1. In Colibaba (Suceava county), one wolf was wounded by a hunter and a beater tried to stop the wounded wolf with a stick. The wolf bit the beater before another hunter shot it.
Case 2. In Apold (Cluj county), a wolf was caught in a leg-hold trap. The trapper tried to kill the wolf with a stick and was bitten on his hand by the wolf.

The other six were all related to livestock attacks and the attempts of humans to kill the wolf:
Case 3. In Rod (Sibiu county), a wolf entered a barn. The farmer saw the wolf and tried to kill it with a hayfork. When he approached the wolf and tried to kill it, the wolf attacked and wounded the farmer.
Case 4. The same situation happened in Bradesti (Harghita county).
Case 5. In Intorsura (Covasna county), a wolf was cornered by the livestock guarding dogs at a sheep camp. A shepherd tried to kill the wolf with a stick and was bitten by the wolf.
Case 6. The same thing happened in Sfintu Ana (Covasna county).
Case 7. In Turda (Cluj county), a wolf got stuck in a wooden sheep fence. It struggled to free itself and when the shepherds came running and tried to kill it, the wolf bit one of them in the hand.
Case 8. In Vidra (Arges county), a wolf was caught inside a barn and cornered by the livestock guarding dogs and the shepherds. The shepherds tried to kill the wolf, which bit one of the shepherds in the leg.

Romania presently has the largest wolf population in Europe, with an estimated 2500 to 3000 wolves living in the Carpathian Mountains.

5.13 Slovakia

Wolves with rabies have been often documented in Slovakia. There are published accounts of a four people being bitten by rabid wolves during WW2 (2 died), and a man dying from rabies after being bitten by a rabid wolf in 1961 (Matouch & Jaros 1999; Hell 2001). An old shepherd and a horse were also bitten by a rabid wolf in Svidnik, eastern Slovakia in July 1997 (Slavomir Findo pers. comm.). Findo also describes an incidence where a shepherd attempted to chase a wolf that was attacking his cows. The wolf apparently attacked him, although he was finally able to kill the wolf. It tested negative for rabies.

5.14 Slovenia

There are no known cases of wolves attacking people in the post world war two period in Slovenia (Miha Adamic pers. comm.).

5.15 Spain

There are three episodes from Spain where predatory attacks by wolves have occurred on humans. All occurred in Galicia (Northwestern Spain) in an agricultural environment, where there are few wild prey, wolves are abundant, and subsist mainly by feeding on garbage and livestock (**Figure 2**). Details are provided in Teruelo & Valverde (1992) and are based on investigations by Valverde.

Vimianzo episode 1957-1959. In this episode, three children were attacked, two of which died. The first attack occurred on 25th June 1957 in the village of Vilare in Castrelo municipality. A wolf attacked two 5-year-old boys that were walking along a road. One boy escaped, but the wolf killed the other (Luis Vazquez Perez). After killing the first boy, the wolf chased the second boy and approached a 15-year-old girl before being chased away by adults. The body of Luis Perez was located one hour later, hidden in brush with bite marks on his head, chest and legs. People who saw the wolf believe it was a female (they claim to have seen distended teats).

The second attack occurred in the nearby village of Tines during the next summer. On 22nd July 1958. A wolf (again believed to be a lactating female) attacked two boys playing alone. It grabbed 5 year old Manuel Suarez by the head and dragged him 15m, before adults working nearby arrived and chased the wolf away. The child was taken to hospital in critical condition, but survived following treatment.

The third attack occurred in the village of Trasufre on 21st June 1959. A wolf attacked two four-year-old boys playing alone. The wolf bit Manuel Sar Pazos in the back, before chasing the second child. An adult arrived and was able to chase away the wolf. Sar Pazos died soon afterwards.

In August 1959, two wolves were killed in the area and no more attacks occurred.

Rante episode 1974. In this episode four people were attacked, 2 of which died. The first attack occurred on 3rd July 1974 when a wolf approached a 13-year-old girl working beside a 59-year-old woman in a field. The wolf bit the girl in the chest and the woman on the hand before being driven away.

On 4th July 1974 a wolf picked up an 11-month-old boy (Jose Tomas Martinez Perez) from a field where he was lying close to some adults and older children that were working. The adults chased the wolf, and later found the dying baby in some scrub.

On 10th July 1974 a wolf grabbed a 3-year-old boy (Javier Iglesias Balbin) from beside an elderly women. She chased the wolf, but it threatened her, and ran away with the young boy. His dead

body was found in a patch of woodland 250m away. The eye-witness declared that the wolf was a lactating female with obvious teats.

On July 14th the body of a lactating wolf was found where it had died after eating poisoned bait. The attacks had occurred within 6 km of a den containing 2 pups. Scats at the den contained chicken remains, and all attacks had occurred close to chicken farms. The wolf was not rabid, but had a severe parasite infestation. The attacks ceased after the death of this wolf.

Allariz episode 1975. On 2nd June 1975 a 3-year-old boy was grabbed by a wolf from an allotment where he was playing beside his grandfather. The grandfather chased the wolf away, and the boy only suffered some slight wounds to one leg. The attack occurred only 2 km from an active den where two wolves were subsequently killed.

There are a number of cases where wolves have attacked or threatened adults in self-defence.
Case 1. Trabazos, Leon, Spain 1983. A shepherd and 2 dogs were attempting to dig pups out of a wolf den. The dogs attacked and cornered the female wolf. The shepherd tried to kill the wolf by throwing rocks at her, but she jumped at the shepherd, bit him on the cheek and ran away.
Case 2. Palacios del Sil, Leon, Spain 1997. A park ranger was walking past a donkey carcass on which a wolf was feeding. When he was 100m away from the carcass, the wolf walked parallel to the ranger, snarling and did not run when the ranger shouted.

Rabies. Finally, there are a number of reported cases of rabid wolves biting people between 1720 and 1949 (Teruelo & Valverde 1992) summarised in **Appendix 4**. During this period, rabies was only endemic among domestic dogs. Rabies never became established in wildlife in Iberia, and was eradicated in domestic dogs by the 1970's.

5.16 Sweden

Gysinge episode. There is one well-documented episode of wolf predation on humans from central Sweden from the 19th century (Persson & Sand 1998). Pousette (2000) has compiled an enormous amount of documentation, including records of deaths in parish registers, private and administrative correspondence, historical accounts, and diaries concerning a series of wolf attacks on people on the border between Gästrikland and Dalarna counties in the years 1820-1821 (**Figure 3**). The series of attacks started on 30th December 1820 and continued until 27th March 1821. During this 3-month period 31 people were attacked, resulting in 12 deaths and 15 injuries. Most of those killed were children between the ages of 3½ and 15, with the exception of an 19-year-old women. The injured were also mostly children, with the exception of an 18-year-old man. In many of the cases the victim was partially consumed after being killed. The series of attacks stopped when a wolf was killed on 27th April 1821. It appears that the wolf had been captured as a pup in 1817, and held captive for several years before escaping (Pousette 2000).

Other cases. Four other cases where "killed by a wolf" is cited as the cause of death for children in Swedish parish registers have been found (Eles 1986, Håkon Eles pers. comm.).
Case 1. Boda parish, Värmland county, 17th December 1727 – 4.5 year old boy, Jon Svensson – "mauled by wolf and mostly consumed"
Case 2. Boda parish, Värmland county, 6th January 1728 – 9 year old boy Jon Ersson – "mauled by wolf"
Case 3. Steneby parish, Dalsland county, 3rd August 1731- 12 year old girl, Borta Johansdotter was killed by a wolf.
Case 4. Hova parish, Västergotland, January 1763 – 8 year old boy, Nils Nilsson – "bitten to death by a wolf".
Considering the proximity in space and time, it is probable that cases 1 and 2 are due to the same wolf. Only the Värmland cases are due to systematic searching, so it is possible that other cases are written down in parish registers from 18th and 19th century Sweden that have yet to be discovered.

5.17 Finland

A number of episodes of predatory attacks by wolves on people are known from 19th century Finland (note that some parts that were in Finland in the 19th century are presently in the Russian part of Karelia; **Figure 3**). These episodes were extensively described by contemporary scientists, administrators (e.g. Godenhjelm 1891) and newspapers, and were issues of national importance, prompting high bounties and special control operations. There is therefore little doubt that the events actually occurred, and the have been accepted by 20th century scientists (summarised in Pulliainen (1975) and Mäensyrjä (1974)). The exact number of cases may be a little less certain as once a sequence of attacks had begun, it is possible that some cases of children that were lost without being found would be attributed to the wolf attacks. These cases have been recently summarised by Pousette (2000).

Episode 1. Kaukola (presently in the Russian part of Karelia). Between January 1831 and summer 1832 a total of 8 children and 1 adult women were killed by what was presumed to be a single wolf.

Episode 2. Kemiö (southwest Finland). In 1836, 3 children were killed by a wolf or wolves.

Episode 3. Kivennapa (presently in the Russian part of Karelia). Between 1839 and 1850 a total of 20 children and 1 adult were killed by what was presumed to be the same wolf. Full details of most victims are unknown, however for 4 victims for which age is known, all were between 6 and 8 years of age.

Episode 4. Tammerfors (southwest Finland). In 1877, a total of 10 children were attacked by wolves, 9 of which died.

Episode 5. Åbo (southwest Finland). In the period 1879-1882 a pair of wolves killed a large number of children within a limited area covering 11 parishes. Early accounts (Godenhjelm 1891) described 22 children as being killed (**Appendix 3**). However, further examination of records (Pousette 2000) has apparently revealed a further 13 cases, bringing the total to 35. Not all at-

tacks were equally well documented, and some are based on rumours. In addition, the involvement of a wolf was only inferred in some cases (Mäensyrjä 1974). However, there appears to be little doubt that wolves were involved in a majority of the incidents. The victims were apparently all children. As the attacks progressed there was an ever-increasing effort expended on hunting the wolves that were believed to be responsible. The local and national governments became involved, sending for help from Russian and Lithuanian hunters, and even calling for the involvement of the army. In January 1882 an old bitch with worn teeth was shot, and 12 days later an adult male was poisoned. After these two wolves died there were no further attacks.

In addition, there are newspaper reports of 3 other attacks (2 fatal, 1 injured). A 12 year old girl was killed in Eurajoki, southwest Finland in 1859, a 8 year old boy was killed in Uusikrikko, Karelia in 1880, and a boy was attacked in Sortavala, Karelia in 1882. The accuracy of these reports is unknown.

Although there is no direct evidence that these wolves were tame (as in the case of the Gysinge wolf from Sweden), Pousette (2000) indicates that the possibility cannot be ruled out. Apparently during this period the bounty paid for wolf pups during summer was only half that of the bounty paid during winter. Accordingly, many hunters would capture wolf pups in summer at den-sites, and keep them caged until mid-winter. At this time they got the full-bounty and a valuable fur. In this type of situation it is quite possible that a wolf could have escaped, after having lost its fear of people.

Finally, there are additional reports of some few attacks by rabid wolves in 1844, 1856 and 1881, although details are not available (Teperi 1977).

5.18 Norway

There is only a single case of a human being killed by a wolf in Norway where written contemporary documentation exists. This concerns a 6-year-old girl, killed in Sørum, Akershus county (**Figure 3**) on 28th December 1800. This case is reported in both the parish register and a newspaper (Norske Intelligens Sedler). However, there has never been a systematic examination of Norwegian parish registers or administrative documents so it is always possible that there are more records that have not yet been discovered (Unsgård & Vigerstøl 1998).

There are many other stories of people being attacked and even killed by wolves that have been passed down through the oral tradition and have been written down during the 20th century (**Appendix 2**). Snerte (2000) has collected many stories from other written sources (mainly regional historical association annuals). However, there is presently no firm evidence at this time that the stories are true. Searches of the parish registers or other historical documents from these areas and periods would be of great interest, and should confirm or deny the stories.

6 Russia (and the former USSR)

6.1 Russian wolves and attacks on humans

The Russian wolf population is probably the largest in the world. Wolves have been, and still are distributed across most of the land area of both Russia and the former Soviet Union, from the high arctic through to the semi-deserts of the Central Asian Republics. Throughout this area, intensive wolf control has been exercised during the last few centuries, with the size of wolf populations fluctuating in accordance to the control effort. Wars, such as world war two led to reduction in control efforts and short term increases in the wolf populations. There are currently an estimated 40,000 wolves in Russia (Ovsyanikov et al. 1998).

The extent of wolf attacks on people within the former USSR has been much debated, both by Russian and western scientists and conservationists (Bibikov 1990). Central to the controversy has been a book by Michail Pavlov called "The wolf" published in 1982. Several chapters, including one called "The danger wolves pose to humans" were translated into Norwegian in 1978 (Pålsson 1987). For a variety of administrative reasons, the distribution of the report was halted after publication. This provoked a 22-year debate about the quality of Pavlov's work, the truth of the data presented, and whether the Norwegian government was attempting a cover-up (e.g. Ree 2000).

The data presented by Pavlov fall into two categories. Firstly, he cites data from the Russian scientific, game management and historic literature concerning the numbers of people killed by wolves throughout Russia – by his own admission these mainly concern attacks by rabid wolves. Secondly, he describes a series of predatory attacks by wolves on children in the Kirov area (500 km northeast of Moscow) in the period 1944-53.

6.2 The rabies cases

The data presented by Pavlov cover the period 1847 to 1978 and are by no means meant to be exhaustive. Rather they are snap-shots from periods where he found data to present. Some of the numbers from periods like 1849-51, 1875 and 1896-97 appear to be very high (**Appendix 4**). However, when viewed in the context of the other figures from western Europe in the 19th century, and even against 20th century figures for countries where rabies occurs (like Iran or India) they may not be impossible, especially when the size of Russia is considered. Additionally, an independent search of 19th century Russian records has indicated even higher figures for the period 1843 to 1890 (**Appendix 4**; I. Rootsi pers. comm.). For the more recent data, especially in the 1970's, it is possible to calibrate Pavlov's figures against those from the medical literature. The figures of 2 deaths among 33 people being bitten by rabid wolves (1972-78) cited from Kazachstan correspond exactly to those in the original

publication (Yanshin et al. 1982) and are also cited in Cherkasskiy (1988). Although the exact numbers and place names presented by Pavlov for the period 1972-76 do not correspond exactly to those from Selimov et al. (1978, 1982) and Cherkasskiy (1988) for the same period, the differences are minor (**Appendix 4**). From their combined sources it appears at least 69 people were bitten by rabid wolves in the period 1972-78. An example of a rabies case from the medical literature is provided below.

Arkadak, Saratov region, Russia. 23rd May 1974. During a single morning a rabid wolf ran around the streets of the village, biting 10 people. One 77-year-old woman died the next day directly from her injuries (extensive bites to head, face and extremities). The other 9 survived having received post-exposure treatment. A medical team documented the incident. The wolf was shot and rabies was diagnosed in the laboratory (Selimov et al. 1978).

Data available from the World Health Organisation (RabNet) also confirm that rabies occurs among Russian wolves, and that wolves are still an occasional source of contact for humans receiving rabies treatment. Kuzmin (2001) lists 8 cases of human rabies with wolves as the source for the period 1980-1998 within the Russian Federation, during which time 85 cases of rabies in wolves were diagnosed. So at least for the 20th century the figures presented in Pavlov concerning rabid wolves appear to be reasonable (**Appendix 4**).

6.3 Predatory attacks

The most controversial aspects of Pavlov's work concern three post WW2 episodes where wolves were believed to have attacked children in areas around Kirov (**Appendix 3**; **Figure 4**).

Kirov episode. Between 1944 and 1950, 22 children between the ages of 3 and 17 were killed by wolves. Three more children were attacked, but escaped.

Oritji episode. Between 1951 and 1953, 4 children were killed. Four more were attacked but were rescued.

Vladimir episode. Between 1945 and 1947 there were 10 fatal attacks, mainly on children.

Both these latter sequences apparently ended following the shooting of local wolves. For the Kirov and the Oritji sequence Pavlov provides details of the names and ages of the victims, and the place and circumstances where the attacks occurred, making the descriptions credible. However, because of the almost unprecedented nature of these attacks in the wolf literature, many researchers and conservationists have cast doubt on their truth. Pavlov was a hunter / game manager rather than a scientist, and it is obvious from his chapters on the effects of wolves on game populations that his attitude towards wolves was clearly that they were unwanted vermin that had no place in the modern world. The tone of the work is almost one of a personal crusade on his part to tell "the truth about wolves" i.e. that they are dangerous to humans. These factors do not indicate that Pavlov was an objective and unbiased observer. However, Pavlov himself admits that circumstances during this post-war period where unusual with high wolf populations (control exercises where suspended during the war and post war recovery years), low prey populations and extreme social conditions (the war had just ended, and Stalin's pogroms were ongoing). Therefore, even if the events Pavlov relates are true, they are the only such incidents that he was apparently able to find from Russia. This would indicate that they must be regarded as being unusual events, occurring in a limited area, during a limited time period with special socio-economic and ecological conditions (Nikiti Ovysanikov pers. comm.). The fact that they occurred after the war, when wolf hunting was probably greatly reduced (adult men were fighting, firearms were not as available) must also be considered. The potential effect of this is that wolf populations could have increased, and that hunting mediated shyness was not reinforced in several wolf generations.

Other Russian authors of the period also indicate that although they viewed wolves as undesirable, it was rabid individuals that mainly, but not exclusively, posed the danger to humans. For example "The wolf attacks humans very rarely. Rabid wolves are extremely dangerous. Control of wolves is a national duty" (Stroganov 1969) and "The danger of direct attack by even the large carnivores on man is usually greatly exaggerated……Rabid animals which lose all sense of caution are extremely dangerous. Sometimes man-eating tendencies become manifest in individual tigers, wolves, bears and other large predators" (Novikov 1962). Stroganov (1969) and Krusjinskij (1980) have also made similar statements. Korytin (1986) also describes an incident when 2 hunters were attacked by a wolf when they tried to remove pups from a den.

Pavlov (1982) cites historical documents from the 19th century where hundreds of people were reported as being attacked by wolves. However from the citations it is not clear if these cases concerned rabid or non-rabid wolves, and if people died or not. Independently, Korytin (1997) has examined administrative records from Russia from the period 1840-1861. During this period he found reports of 273 attacks by wolves on people, resulting in 169 deaths (162 children and 7 adults). He explicitly states that these were not due to rabid wolves. Judging by the level of detail reported in the documents he believed that the cases were reliable. Rootsi (pers. comm.) has also extended his analysis of the Estonian records from the 19th century (5.3) to Russia. Preliminary results indicate that there are hundreds of reports of people killed or attacked by wolves from this period.

6.4 Mantejfel commission

Pavlov (1982) also states that a government commission investigated reports of wolf attacks on people during the period before and during world war two. Apparently the commission found evidence for 12 events in which up to 80 people (mostly children) were eaten or killed – however it is not clear whether this refers to attacks by rabid wolves, predatory attacks, or simply cases of wolves feeding on human corpses. It is also important to consider that this period was one of massive internal political and social unrest within the former USSR, as it covers the revolution, the civil war and world war two. Given this background, it is impossible to evaluate the quality of the data from this period, and we have not considered the cases further.

7 Asia (excluding the former USSR)

7.1 Asian wolf populations

The status and distribution of wolf populations is very poorly known throughout Asia. Historically their distribution extended from the eastern Mediterranean region (Turkey, Israel, eastern Egypt, Jordan) through the Middle East (Arabian Pennisnula, Iran, Iraq, Afghanistan) and the Indian subcontinent (Pakistan, India) to Mongolia, Tibet, China and Japan. Wolves are still found throughout most of this range, with the exception of Japan where wolves were hunted to extinction around 1900. Their present densities are very poorly known (e.g. Ginsberg & MacDonald 1990; Nader 1996; Wenjun et al. 1996; Li et al. 1996).

7.2 Indian subcontinent

Accounts of wolf attacks on humans in India go back to the official records of the British colonial administration in the late 19th century, and continue throughout most of the 20th century. In these early records it is not possible to differentiate between attacks by rabid or non-rabid wolves. However, in the last 30 years there are more reliable accounts that reliably demonstrate that both types of attacks occur. Rabies is endemic in India with an estimated 25,000 people dying each year from the disease (Dutta & Dutta 1994). Transmission is from bites of both wild and domestic animals, although domestic dogs are by far the most important vector (Mitmoonpitak et al. 2000). Although our review is by no means exhaustive (no figures for animal rabies in India are listed on the WHO internet pages), 2 case studies from Maharashtra State (Figire 5) reported in the medical literature illustrate the extent of the problem (Shah & Jaswal 1976; Rathod et al. 1997). In both these incidents, rabid wolves bit 12-36 people. In the case of the 12 victims, it was clearly a single wolf that bit the people on the same day, requiring that it cover at least 23 km in the process. Post-exposure treatment with vaccine and immunoglobulin saved most of the victim's lives, except for some few who were bitten on the head and face (**Table 5**).

There have also been a large number of predatory attacks on humans by non-rabid wolves in at least 3 Indian states (Figire 5) during the last decades. These situations have been relatively well documented by trained biologists and constitute some of the best records that exist of non-rabid wolf attacks on humans. Evidence of the identity of the animal responsible for the attacks as being a wolf has included; (1) the absence of other large carnivore species, (2) examination of tracks, (3) measurement and examination of bite wounds, (4) electronmicrographs of hairs found at scene, (5) the finding of human remains at wolf densites, and (6) eyewitness and survivors accounts. The extent of events has been greatest in the Hazaribagh region of Bihar state where at least 200 children were reported as being killed, in addition to many more that were attacked by wolves between 1980 and 1995 (Shahi 1982, Rajpurohit 1999). The geographical extent of the attacks and the long time period over which attacks have occurred indicate that it is several packs that have been involved, rather than a single individual. Almost all the victims were children under 16 years of age. Observations also exist of wolves feeding on partially cremated human remains from burial sites in the region (Shahi 1982). This is also a region where reports of wolves killing humans extend back into the early 20th century.

A second well-studied area with attacks is in the eastern region of Utar Pradesh State. In the course of 8 months in 1996, 76 attacks on children (50 of which were fatal) were recorded from 50 villages within a 1390 km^2 area. At the time it was believed that the spate of attacks was due to a single wolf (Jhala & Sharma 1997), however the fact that further attacks have occurred throughout the 1996-99 period indicates that this is unlikely to be the case (Jhala 2000).

A third, but less well documented area is the Anantpur region of Andhra Pradesh state where 9 children were killed and 12 injured within a 750 km^2 area during a 6 month period in 1980-81 (Shahi 1982).

These events are characterised by the fact that they are associated with a relatively clearly defined area for a period of at least several months to several years. Rabid wolf attacks in contrast tend to be single day events as the period of aggressive behaviour ("furious phase") for wolves, like all rabid animals, tends to be very short before paralysis sets in. In addition, all victims were partially or totally consumed which never occurs in the case of rabies attacks.

These cases need to be placed into context against the habitat of the area and the general high rates of wild animal mediated deaths in the regions. Most of these areas of India where wolf attacks have been reported are deforested agricultural habitats with a very poor prey base and a very high human population density (>600 km^{-2}) living in poor conditions. In a series of transects in Utar Pradesh, unaccompanied children were the most common potential "prey" available to wolves, as wild prey were very rare and all livestock were guarded by shepherds and dogs (Jhala & Sharma 1997). In the Hazaribagh study, during the 6-year period when 90 children were killed by wolves, another 242 people were killed by wild elephants, 50 by sloth bears, 4 by leopards, 2 by tigers and 2 by hyenas (Rajpurohit 1999).

7.3 Iran

Iran and its wolves are well known in medical circles for the pioneering work conducted there by the WHO in developing post-exposure anti-rabies treatments. Prior to 1955, people bitten by rabid animals received post-exposure treatment in the form of injections of a vaccine. While this method worked well for people receiving minor bites from rabid dogs, it was relatively ineffective in patients that had been bitten by wolves. This was largely due to the fact that rabid wolves often inflict more severe bites, often on the head and neck, which accelerates the progression of the disease. In 1955 attempts were made to combine injections of both vaccine and immunoglobulin – resulting in far better survival of patients (Baltazard & Bahmanyar 1955). Modifications of this approach are still used today.

Table 5. *Records of attacks on humans by rabid and non-rabid wolves in India.*

Period	Area	Details	Reference
< 1890	Dumoh District, Madhya Pradesh	Several children carried off	Blanford 1891 in Shahi 1982 (p498-499)
1910 - 1915	Hazaribagh District, Bihar	115 killed	Lister 1917 in Shahi 1982 (p 499)
1930's	Hazaribagh village, Bihar	"the wolves were notorious for their man-killing propensities"	Pocock 1939 in Shahi 1982 (p499)
1981 (ii to viii)	Hazaribagh village, Bihar	13 children killed (ages 4 to 10 years) plus 13 others were attacked	Shahi 1982 (p499)
1980 (ii 15th)	Hazaribagh village, Bihar	Boy was attacked but was rescued and wolf was killed.	Shahi 1982 (p499)
1981 (xii 21st)	Hazaribagh village, Bihar	7 year old boy (14.5 kg) attacked and carried away (200m), but was rescued	Shahi 1982 (p499)
1981 (vi 4th)	Hazaribagh village, Bihar	Five wolves observed feeding on human remains in cemetry	Shahi 1982 (p498)
1980 (x) to 1981 (iii)	Anantpur, Andhra Pradesh	9 children killed and 12 injured within an area of 25km x 30 km. Ages 8 – 12.	Shahi 1982 (p499)
1973 (ii 3rd)	Aurangabad District, Maharashtra	Rabid (assumed) wolf attacked 12 humans (9 adults and 3 children) and 6 animals (2 pigs, 1 dog, 3 bulls). Attacks were spaced out by 2, 9, 12 km). 3 victims died of rabies (1 untreated) – all had facial injuries.	Shah & Jaswal 1976
1989 (iv) to 1995 (iii)	Hazaribagh & Koderma, Bihar	92 children killed – all lifted from settlements / houses – 78 of killings occurred in a 2 year period – up to 3 packs involved	Rajpurohit 1999
1980-1986	Hazaribagh, Bihar	122 children lifted by wolves	cited in Rajpurohit 1999
1878	Utar Pradesh	624 killed	cited in Rajpurohit 1999
1878	Bengal	14 killed	cited in Rajpurohit 1999
1996 (iii – x)	Utar Pradseh	76 attacks on children (50 lethal) within 1390 km^2 in 50 villages – believed to be one wolf. Ages 4 months to 9 years.	Jhala & Sharma 1996
1997-1999	Utar Pradesh	"Spoardic fatal attacks on children"	Jhala 2000
1995 (x)	Jalgaon District, Maharashtra	28 people treated after being bitten by rabid wolf	Rathod et al. 1997
1996 (vi 15th to 18th)	Jalgaon District, Maharashtra	36 people bitten by rabid wolves (26 adults and 10 children). 2 victims died of rabies (both treated) – all had facial injuries	Rathod et al. 1997
1991	Solapur District, Maharashtra	Shepherd bitten by rabid wolf dies of rabies	Kumar & Rahmani 1997

From the numbers presented in **Appendix 4** it is apparent that wolf attacks are still common. Baltazard & Ghodssi (1954) believed that the pre-1955 numbers represented an underestimate of the true number of people bitten by wolves because people were familiar with the signs of rabies in wolves, and would not bother to seek treatment from bites obviously caused by non-rabid wolves. Just to put the figures into some form of context, in 1996 when 329 were given post-exposure rabies treatment after being bitten by wolves, over 48,000 were given similar treatment after being bitten by dogs.

While we have not found any details of predatory attacks by non-rabid wolves from Iran, Baltazard & Ghodssi (1954) indicate that such attacks have occurred. Joslin (1982) investigated a number of reported attacks and was unable to confirm any. One report of a shepherd being killed by wolves turned out to be a case where immediately after defending a sheep flock from a wolf pack, a shepherd sat down and died (apparently from heart failure) – but was never actually attacked by the wolves. However, a widely circulated newspaper, but unconfirmed, report reported a case of a wolf seizing and consuming a 4-year-old boy in Dushab village in central Iran in December 1997.

7.4 Afghanistan

Due to the last 20 years of political instability it is not surprising that there is no official or scientific data available from Afghanistan. However, we have received one report from a Norwegian health worker, who worked in a clinic in the central Hindu Kush from 1972-74 (Arne Bergsaker pers. comm.). Apparently there was an incident in the autumn of the previous year (1971) when a rabid wolf bit 18 men that were sleeping in fields to guard their crops. All 18 men died of rabies in the clinic because there was no post-exposure treatment available.

7.5 Israel

Despite intensive efforts to vaccinate domestic animals, and trials with wildlife vaccination (Linhart et al. 1997), rabies is still present in Israel, with red foxes and jackals being the main wildlife hosts. Cases of wolf rabies have been diagnosed in recent years (Yakobson et al. 1998; David et al. 2000; **Table 1**). In 1997-98, three people died from rabies after being bitten in their sleep in separate incidents. In some reports the species of animal responsible was stated as "unknown". However, Prof. Mendelssohn (Department of Zoology, Tel Aviv University) stated in a letter to the International Wolf Federation (dated 11th August 1997) that there had been a recent case (July 1997) where "a rabid wolf had bitten several people". It has not been possible to establish if these events are connected.

7.6 The Far East

On the whole there is very little ecological or medical data available from the Far East.

China. In an article on rabies Fangtao et al. (1988) mention 31 people being bitten by rabid wolves in the Ochang region in 1981, and 27 people being bitten by "wolf dogs" in the Fuyang region in 1982. Of the 31 people bitten by wolves, 4 died. Three because of the severe wounds hastening the development of the disease, and 1 because of improper administration of the post exposure vaccine. Li et al. (1996) also mention that wolves attack people, but do not provide any numbers or explain if this is due to rabies wolves only, or if it concerns predatory attacks.

Mongolia. Batsukh (unpublished report) makes passing mention to some attacks on people, but does not elaborate on numbers or the involvement of rabies.

Japan. Although wolves became extinct in Japan at the end of the 19th century, there are some historical records concerning their previous behaviour and distribution. A number of passing references are made to attacks on humans (Maruyama et al. 1996) – although quantification is impossible.

8 North America

8.1 North American wolf populations

Wolves occurred across most of the North American continent when European settlers first arrived (Young & Goldman 1944, Mech 1970). Intensive wolf control was part of the process of settlement, and wolf extermination followed in the wake of the human population as it expanded westwards (Woodroffe 2000). By the mid 20th century wolves were extinct in the continuous lower-48 states of the US with the exception of northeastern Minnesota. They remained widespread in Canada and Alaska. During the last 30 years wolf populations have expanded. The Minnesota population has expanded to most of the state, plus to neighbouring Michigan, Wisconsin and the Dakotas. A natural expansion from Canada had begun into the northern Rocky Mountains of Montana. In addition wolves have been reintroduced into Idaho, Wyoming (Yellowstone), Arizona and New Mexico. There are presently an estimated 60,000 wolves in North America (**Table 3**).

8.2 Wolf attacks in North America in the 20th century

By far the vast majority of global wolf research has occurred in North America, so that it should be expected that wolf attacks on people should be particularly well documented from this region. However, it appears that there have been relatively few wolf attacks. In order to search for previously unreported cases we have gone to great lengths to find new cases. We have taken direct contact with wolf scientists that have worked in the field, and national parks with records stretching for many years. In addition, we have utilised a number of North American wildlife biologist / wildlife management email lists and discussion groups, and contacted people associated with wildlife in the region. The result of this entire enquiry has been the edition of only 1 minor incident (Whale Cove, 1989 incident). The fact that individual aggressive encounters with wolves (even without injury, e.g. Scott et al. 1985) are considered worthy of publication in the scientific literature is an indication of the rarity of such events. In addition, North American scientists have conducted their own reviews of the known events following the Ice Bay attack in Alaska (Mark McNay in prep.). The most persuasive argument for the rarity of wolf attacks on people is that good statistics exist for attacks by black bears, grizzly bears, coyote and mountain lions (Herrero 1985, Carbyn 1989, Beier 1991, Connover 2001, Fitzhugh unpublished). It is unlikely that a high profile species like the wolf will have a greater reporting bias than these other species.

Because of their low numbers, and relatively well-documented nature we will describe each of the North American incidents individually below.

Whale Cove, Northwest Territories, December 1989 (Figure 6).
Robert Mulders, a biologist with the territorial Department of Natural Resources and a technician were radio-collaring a caribou on the tundra that they had just net-gunned from a helicopter. They had just landed and were removing the net from the caribou close to the helicopter, which was parked with the motor running. A single wolf walked within 10m of the helicopter and approached the team. Moulder approached the wolf, waving his arms and shouting. The wolf bit his left leg below the knee and held on, despite Moulder hitting it on the head with his fists. The technician came to help, and knocked the wolf unconscious with a blow from the radio-collar. They killed the wolf with a knife and transported it back to base. Later testing showed that it was a young healthy female, weighing around 27 kg and that it was not rabid. Moulder only received a tear in his clothing and minor bite wounds / abrasions. (Robert Moulder pers. comm.). Inuit hunters hunt, kill and butcher around 10,000 caribou in this region every year and have never heard of a similar incident (Robert Moulder pers. comm., David Kritterlik pers. comm.).

Ellesmere Island, Nunavut, June 1977 (Figure 6).
Two scientists (Mary Dawson and Howard Hutchison) were sitting near a fjord edge when a pack of 6 wolves approached to within 5m. The scientists backed away, shouting and threw some clods of mud at the wolves. The wolves followed and attempted to surround the scientists. One approached to within 2m, and leaped at Dawson who jumped back, the wolf grazed her cheek in passing. The pack of wolves then retreated and allowed the scientists to return to camp. From their behaviour it was assumed that the wolves were not rabid. (Munthe & Hutchison 1978).

Coppermine River, Northwest Territories, February 1915 (Figure 6).
A scientific expedition consisting of 5 people was camped on the tundra. While in the tent eating breakfast they heard their sled dogs growling and snarling. The men rushed out of the tent, saw a wolf close to the dogs and tried to drive it away. The wolf rushed at one member (Diamond Jenness) attempting to bite his leg. Jenness grabbed the wolf by the back of the neck – the wolf turned his head and bit into his right arm. After Jenness attempted to choke it with his left arm, the wolf let go, and was shot. Jenness' arm healed within a week, which would indicate that the wolf was not rabid. The wolf was a healthy adult female. (Jenness 1985).

Poulin, Ontario, December 1942.
A railway worker (Mike Dusiak) was travelling alone on a speeder at about 15 kmph when he was hit from behind by an attacking wolf. The blow knocked both, him and his speeder from the track. The wolf made repeated attacks on him for about 10 minutes. During this time, Dusiak was able to depend himself with two axes, hitting the wolf many times. Finally, a passing train stopped and the two engineers helped him to club the wolf to death. Dusiak was not injured or bitten by the wolf, but this was likely due to his active self-defence, as it appears that the wolf made repeated and persistent attacks. Although rabies was not mentioned in the original account (Peterson 1947), it seems likely that the wolf was rabid when judged from the description of its behaviour (Rutter & Pimlott 1968, cited in Jenness 1985).

Vargas Island, British Columbia, July 2000 (Figure 6).
A group of eight kayakers were camping on Vargas Island (near Vancouver Island). During the night, one camper (Scott Langevin, 23 years old) who was sleeping outside his tent by the campfire awoke to find a wolf dragging him and his sleeping bag away from the fire. He yelled and tried to crawl away. The wolf attacked and began to bite his hand and his head. His shouts awoke his friends who managed to frighten the wolf away. As a result he began to loose blood and was evacuated to hospital. The head wound required 50 stitches. During the previous weeks wolves had been repeatedly seen around the campsite, begging food and apparently showing little fear of humans. In one incident a camper had been chased by one of the wolves, while another had their sleeping mat stolen. Two healthy adult wolves were shot close to the campsite immediately after the attack (Anonymous 2000a,b,c), and were not found to have rabies.

Ice Bay (Yakutat), Alaska, April 2000 (Figure 6).
Two children, John Stenglein (age 6-years) and Keith Thompson (age 9-years) were playing on the edge of the forest close to a logging camp (about 150 m from their trailer home) together with a golden retriever. They observed a wolf approaching them to within a few metres. The boys screamed and ran at the same time as the dog intervened and attacked the wolf. The wolf ran past the dog and attacked the youngest boy, biting him on the back, buttocks and legs, resulting in 15 puncture wounds. The noise attracted the attention of adults who were able to drive the wolf away. The boy's father later shot it. The wolf had been radio-collared 3 years earlier. The wolf was found not to have rabies, and was judged as being in "average" body condition. The wolf had been seen around logging camps in the area during the previous years, may have been exploiting garbage as a food source, and was reported as not being being frightened of humans. The boy received stitches to close the wounds, but later infection required hospitalisation and intravenous delivery of antibiotics.

Algonquin Provincial Park, Ontario 1987-1998 (Figure 6).
Incident 1. 1987. A 16-year-old girl was bitten on the arm by a wolf after shining a torch into its eyes at close range. The bite resulted in two scratches. The wolf did not press the attack and was then chased away. The wolf was shot the next day and tested negative for rabies. The wolf had been seen often in the campsite during previous weeks and was reported as not being frightened of people.
Incidents 2 & 3. 1994. A wolf had been seen repeatedly in and around campsites during the summer, and showed no fear of people. In two separate incidents it bit two people in campsites. One 9-year-old boy received a single puncture wound and a skin tear on August 3rd, and an adult woman received a single bite to her leg on September 1st. The wolf did not press either attack and when shot 8 days later was found to be rabies negative.

Incident 4. 1996. A wolf apparently made an attempt to drag a sleeping bag containing a 12-year-old boy who was sleeping outside a tent in a camp-site. It resulted in the wolf biting the boy on the head and dragging him 2 m. The wolf was driven away by the boy's father. The boy received a broken nose and 6 lacerations on his face that required 80 stitches and plastic surgery. This wolf had also been seen close to, and inside, campsites during the previous weeks, and apparently had made several attempts to grab clothing and camping equipment.
Incident 5. 1998. During the summer, a wolf had been showing a lack of fear of people around campsites. On three occasions it had attacked dogs in campsites. On September 25th it apparently approached and circled a family with a 4-year-old girl. The father sprayed the wolf with pepper spray and carried his daughter back to the car. The next day the wolf attacked a fourth dog. On September 27th it approached a family having a picnic, grabbed their 19-month-old baby that was sitting on the ground 6m from its parents by the chest and tossed him a metre. The family was able to chase the wolf away. It was shot that afternoon and found to be a healthy male wolf that tested negative for rabies. The baby required two stitches. All information from Strickland (1999) and Theberge & Theberge (2000).

It is important to note that there is some discussion about the genetic / taxonomic identity of the wolves inhabiting Algonquin Park. While they are currently regarded as being *Canis lupus*, recent genetic analysis has provided some indication that they should be called *Canis lycaon* (Theberge & Theberge 2000; Wilson et al. 2000).

Alert, Ellesmere Island, Nunavut. 1995 (Figure 6).
The Canadian military maintain a base and weather station at Alert in northeastern Ellesmere Island. Wolves have been resident in the vicinity of the base for at least 30 years and have become habituated to humans, taking food from people and from the base's garbage dump. In extreme cases, wolves approached people to lick their faces. There had been a long series of low intensity interactions where wolves followed people in a threatening manner, or refused to allow people to leave buildings. Attempts to scare wolves resulted in snarling and growling. In one incident a wolf snatched a glove from a worker's hand. In 1994 a British commando unit shot two wolves when they felt they were threatened. On April 15th, 1995 there were three attacks on people. One person was knocked down, but not bitten. Another person received a shallow bite, and a third received a hard bite to the knee. The responsible wolf was shot and tested positive for rabies (Gray 1995).

Minnesota. An adult male logger and his dog saw two wolves attacking a deer. The dog became frightened so the logger picked the dog up. One of the wolves charged at the man, tearing his shirt in the process. The wolf did not press the attack. (Mech 1998).

Minnesota. A 19-year-old hunter, wearing a jacket covered in buck-scent, was knocked over and scratched by a wolf attacking from behind. The hunter fired his gun and the wolf ran away. (Mech 1998).

Spence Bay, Nunavut 1991. A 23-year-old male Inuit hunter (Gideon Nanook) was out with his sled dog team when a wolf began to attack his dogs, and then attacked the hunter, biting into his parka. The hunter managed to knock the wolf out with his rifle butt and kill it with a knife. The wolf tested positive for rabies. (Anonymous 1991; McNay pers. comm.)

Haul road to Prudhoe Bay, Alaska, 1970's. A number of cases have been mentioned of wolves being fed by truckers along the haul road leading to the arctic coast oil-field at Prudhoe Bay. Some of these habituated wolves apparently inflicted minor bites on truckers during the 1970's (Victor Van Ballenberghe pers. comm.).

In addition, there are some other cases of people being attacked, killed or exposed to rabies through wolves.
Noorvik, Alaska, 1942. An Inuit hunter was bitten by a rabid wolf, developed rabies, and died (Rausch 1958).
Wainwright, Alaska, 1943. An Inuit boy was bitten by a rabid wolf, developed rabies, and died (Johnson 1995).
Anaktuvuk Pass, Alaska, 1945. A rabid wolf attacked an Inuit hunter (Rausch 1958).
Canada, 1970-1985. Prins & Yates 1986 list 9 cases of wolves "with human contact" being tested for rabies. Only 2 of the 9 had rabies. They do not explain what "human contact" means. It could mean attacks, or it could also cover cases where trappers had contact with a dead wolf.

8.3 Early stories and other incidents

Young & Goldman (1944) attempted to review wolf attacks on humans from the early days of settlement in North America. They found many tales from trappers and hunters who were "attacked" or had close encounters with wolves acting aggressively – however none of these attacks led to human injury and their accuracy is very hard to determine. In addition, it is hard to determine how many of these attacks were the results of wolves approaching out of curiosity rather than attacking. They did discover one incident from a trapper regarded as being a reliable witness in British Columbia in the early 20th century. The trapper, Ralph Edwards, had been tending to his horses grazing on a winter pasture and was walking home through the forest when four wolves approached him aggressively to within 10m. Edwards judged that they were about to attack him. He shot two and the rest ran away. Other stories included tales of wolves eating the bodies of Indians that died during smallpox outbreaks, and even of wolves killing those that were too weak to depend themselves. Again the accuracy of these tales is impossible to determine. Other reliable cases include;

Snake River, Colorado, 1881. The most reliable account of an attack concerns an 18-year-old woman in Colorado in 1881. She had just left the family cabin to bring the cows in for the evening. She saw a wolf sitting close to the trail and threw a stone at it. The wolf attacked her, biting her on the shoulder, legs and arms. Her screams attracted her brother who shot the wolf, which turned out to be a young animal. The fact that the women survived indicates that the wolf was not rabid (Young & Goldman 1944).

Green River, Wyoming, 1833. A rabid wolf attacked two camps, biting several people. Accounts of the number that were bitten vary, with Allen (1979) reporting 3, and Lopez (1978), Rehnmark (2000) and Pousette (2000) reporting 13 victims.
Fort Larned, Kansas, 1870's. A rabid wolf bit 3 soldiers and a dog. One soldier and the dog died of rabies within 5 weeks of the bite. The wolf's identity was confirmed as it was shot during the attack (Dodge 1876 in Casey and Clark 1996).
The "north". Young & Goldman (1944) report rumours of attacks on Inuit in northern Canada and Alaska, for which no details were available. In more recent studies of traditional ecological knowledge among the Nunamiut hunters of the Brooks Range in northern Alaska it has been confirmed that the hunters were only really afraid of "the occasional rabid animal". However, there were "a few accounts of wolves attacking Nunamiut travelling alone or in small groups prior to the introduction of firearms in the late 1800's" in their oral tradition (Stephenson & Ahgook 1975). In addition, there are a number of cases when rabid wolves have attacked sled dogs in northern Alaska and northern Canada (McTaggart Cowan 1949, Rausch 1958). From our email survey of scientists and wildlife managers in northern Canada we have received a number of unconfirmed rumours of Inuit being attacked by wolves (probably rabid) during recent decades.

For the first half of the 20th century, Young & Goldman (1944) were not able to find any documented attacks of wolves attacking and causing injury to humans. This included the experience of all of the operatives of the US Fish and Wildlife Service that were engaged in wolf control activities during that period. However, they conclude by stating "… the accounts to be found throughout the wolf literature seem to leave little doubt that wolves have at times made unprovoked attacks on humans. The extent to which this has been caused by the disease rabies, or by famine, is difficult to determine."

Silas Calborn Turnbo collected folk tales from Arkansas during his life (1844-1925). These area available both in print, and on the internet (http://198.209.8.166/turnbo/Table%20of%20Contents.html). He describes a number of aggressive encounters between people and wolves, however it is not sure that the wolves he describes are *Canis lupus*, as the area was within the historic range of the red wolf *Canis rufus* (Young and Goldman 1944). Because of the origin of the tales and the taxonomic uncertainty we have not considered these cases in our analysis.

8.4 Threatening behaviour

Such is the rarity of wolf attacks on people in North America that even cases of wolves acting aggressively towards people have entered the scientific literature. For example;

(1) A wolf biologist, Chapman, was apparently charged by an aggressive wolf. He shot it when it approached to within 3m. Later examination showed that it was rabid (cited in Munthe & Hutchison 1978).
(2) Tompa (1983) relates a case of a forest engineer being chased into a tree by a wolf pack.
(3) Scott et al. (1985) relate an incident from Churchill, Manitoba. Three scientists (Peter Scott, Catherin Bentley, Jeffery Warren) were hiking across forested tundra. They stopped to rest and heard something crashing towards them in the vegetation. A wolf was observed rushing towards them, but turned at 6m distance in response to shouting and arm waving. A second wolf rushed to within 1 m, but turned following use of a foghorn. The three men used the pause to climb trees and remained there for 4 hours, with at least three wolves periodically checking them. After a period when they did not see wolves for 15 minutes, the men came down from the trees and left the area. They believed that they had accidentally walked into a rendezvous site close to a den.

Additional episodes of aggressive behaviour have been recorded;

(4) In 2001, a number of campsites in Denali National Park, Alaska were closed because the wolves had begun to demonstrate "fearless" behaviour, approaching people and grabbing objects from campers.
(5) One of this report's authors, Scott Brainerd, together with another biologist, David James, approached a wolf rendezvous site in August on the tundra in northwest Alaska to collect scats. They had crawled close, but when the stood up one of the wolves approached them to within 5 m, snarling and howling. This wolf followed them back to their camp and remained there for a number of hours.

9 Attacks and killings by domestic dogs, captive wolves and wolf-dog hybrids

9.1 Captive wolves and hybrids

A number of cases exist in North America where wolves and wolf-dog hybrids kept as pets or in captivity have attacked and killed people. Although these cases are not the primary focus of this report, a number of points are illustrative.

Between 1981 and 1999 there were 14 killings (13 by hybrids, 1 by a wolf) and 43 severe attacks (38 by hybrids, 5 by wolves). Of these, 3 of the wolf attacks were within zoos or animal parks. All the victims were children, with ages ranging from 1 week to 12 years (Sacks et al. 1996, 2000).

One of the most commonly cited cases involving captive wolves is from Ontario in 1996. An established pack of 5 wolves that had lived their entire lives in captivity was transported from a Michigan reserve to a larger enclosure in Ontario in October 1993. The only contact that the pack had with their human handlers was a brief sighting of people at feeding times, and the wolves were described as being not socialised with humans. On the evening of April 18th 1996 a newly hired 24-year-old female caretaker (Patricia Wyman) entered the enclosure. She was later found dead. The body had been severely bitten and fed upon. The wolves were shot, but tested negative for both rabies and distemper. From the wolves dentition it was possible to reconstruct which wolf had bitten the various parts of the victim. It appeared that it was the alpha pair that had been responsible for most bites, although most of the wolves appeared to have taken part in the killing (Klinghammer 1996; Wong et al. 1999).

In addition, there are a number of newspaper reports of captive wolves escaping from zoos or circuses and biting or killing people. These include a case from Belgium (Reuters 1997) and one from Hungary (Szemethy Laszlo pers. comm.). There are also a number of cases of children being bitten by wolves in zoos. For example, there are at least 3 known cases of captive wolves biting children in Norwegian zoos (2 cases in the Polar Zoo in Bardu and 1 case in Langedrag).

9.2 Domestic dogs

Domestic dogs bite an estimated 1 million people per year in the Unites States, 60-70% of which are children (Mathews & Lattal 1994). Of these bites, approximately 16-18 per year are fatal (Langley & Morrow 1997; Avis 1999), again mainly to children. While over 25 breeds of dog (including wolf-dog hybrids) have been involved in fatal attacks, Rottweilers and pit-bull type dogs are responsible for around 60% of fatal attacks. 59% of attacks involve the family dog on the owner's property (Sacks et al. 1996). 92% of attacks involve single dogs (Sacks et al. 1996), although pack-attacks by multiple dogs do occur, as the following example illustrates.

Newfoundland, **1990's**. A family of four (father 49-years-old, mother 44-years-old, 2 male children ages 10 and 8) visited an island to pick berries. The island was inhabited by 8 husky sled dogs that had been placed there for the summer (in an unsupervised free-ranging state). The mother wandered off alone. When the other 3 found her again the pack of dogs had killed her. The family drove the dogs away, but the eldest child ran back to the boat to get matches so they could build a fire to try and keep the dogs off the mother's body while they went for help. The dogs followed the child, killed him, and began feeding on his body. Eventually the father and surviving child escaped. When they returned with rescuers, they shot the dogs. Four were sent for autopsy, all were found to contain human remains in their stomachs and tested negative for rabies (Avis 1999)

Cases of severe bites and fatal attacks by domestic dogs are not confined to the United States, but appear to be a world-wide phenomena (Gottlieb & Misfeldt 1992; Kneafsey & Condon 1995; Reuhl et al. 1998; Falconieri et al. 1999). For example, 788 dog bites were treated in the casualty departments in Oslo's hospitals during a two-year period (Dahl 1998). Although fatal dog attacks are rare in Norway, husky-type (Greenlandic) dogs killed a 6-year-old boy in 1994, and a 7-year-old boy was recently killed in 2002. There are also cases from Norway and Sweden of people developing lethal infections following dog bites (Anveden et al. 1986; Holter et al. 1989).

It should also be remembered that domestic dogs are by far the single most important vector involved in the transmission of rabies to humans (Ali et al. 1977; Beran 1994; Mitmoonpitak et al. 2000; Moore et al. 2000).

10 Wolf attacks in context

In order to put these wolf attacks into context, it is necessary to consider how they compare to attacks by other large carnivore species. Attacks by bears and cougars on people are somehow more familiar, as they are better known, and better covered in the media than wolf attacks. The magnitude of attacks by other species can also serve as a control on the quality of our wolf data, as we believe that the reporting / documentation bias is likely to be equal for all large carnivore species.

10.1 Dingoes

The taxonomic status of the dingo is somewhat uncertain, with some authors placing it as a subspecies of wolf (*Canis lupus dingo*) while other regard it as being a subspecies of the domestic dog (*Canis familiaris dingo*). Either way, its ecology and behaviour are very similar to that of Eurasian or North American wolves (Corbett 1995). There have been a number of episodes in the last decades that are relevant for this discussion.

The most famous case was that of 10-week old Azaria Chamberlain who was reportedly dragged out of a tent and killed by a dingo on August 17th, 1980 at Uluru (Ayer's Rock) in central Australia. Her remains were never found, and there was debate about if it was really dingoes that had killed the baby or not. The mother was actually charged and found guilty of murdering the baby, but was later released after several appeals.

All other reported attacks are from 1670 km^2 Fraser Island, off the coast of eastern Queensland (Anon 2001). The majority of the island's area is a national park, and dingoes are protected from hunting and control. During the last 10 years the dingoes have become habituated to people and have begun to take food handouts from tourists, and steal from campsites and picnic areas. Feeding dingoes to provide photographers with good views has also become widespread. As a consequence there have been an increasing number of aggressive incidents between dingoes and people. Between 1996 and 2001, there were 224 incidents where people were actually bitten that required some form of medical treatment. During this period over 40 dingoes were shot following these incidents. Events came to a peak on 17th May 2001 when dingoes killed a 9-year-old boy.

Apparently the boy and his 7-year-old brother were walking close to the beach when they were approached by a dingo. The boys became scared and ran away. The oldest boy tripped and the dingo caught up and killed him. The 7-year-old escaped and fetched their father. By the time they reached the oldest boy, he was dead. The father sent the 7-year-old for help, but on his way the boy was attacked and injured by the dingo. It turned out that the dingo had been feeding for weeks on a bait placed out by a guide to aid photographers, and had harassed people during previous days.

10.2 Coyotes

There have been a number of documented coyote attacks on people in North America during recent decades (Carbyn 1989; Bounds & Shaw 1994; Conover et al. 1995; Hsu 1996; Connover 2001). The victims are generally small children under the age of 10, although some adults, including adult men, have also been bitten. Most of the documented cases arise from protected areas or urban settings implying that the individual coyotes have become partly habituated to humans. Carbyn (1989) regarded many of the attacks on small children as being predatory in nature. Very few of the attacks are fatal, although some of the attacks on young children have been so serious that they required up to 200 stitches to close the wounds. None of the cases described appear to be due to coyotes with rabies.

10.3 Cougars

Cougar (also known as puma or mountain lion) attacks on people in North America have been reported and reviewed by a succession of authors (Barnes 1960; Fitzhugh & Gorenzel 1986; Beier 1991; Conrad 1992). This overview is based on unpublished data from Lee Fitzhugh, and extends until early 2001 (**Table 6**).

Rabies does occur in cougars, but rarely. A few of these attacks have been judged as being due to cougars with rabies, but the vast majority appear to have been predatory in nature. Considering only those attacks that have been verified, Fitzhugh's data indicates that from 1890 to 2001 there have been 17 fatal attacks and 72 non-fatal attacks (**Table 6**). The non-fatal attacks counted here are only those where the cougar has caused injury to the victim. The distribution of these attacks in time is; 1890-1970, 4 fatal and 18 non-fatal; 1971-1980, 4 fatal and 11 non-fatal; 1981-1990, 2 fatal and 16 non-fatal; 1991-2000, 6 fatal and 27 non-fatal; 2001, 1 fatal attack. It is not clear if the increasing trend is real, or simply an artifact of improved chances of documentation.

10.4 Brown bears

Swenson et al. (1996, 1999) have summarised data on fatal attacks by brown (and grizzly) bears (*Ursus arctos*) on people from North America and Eurasia up until 1995. Attacks by rabid bears are virtually unknown. Therefore, the vast majority of these cases must be considered as either defensive or predatory in nature (Herrero 1985). Extrapolating from periods (all from the 20th century) for which data exists, Swenson et al. calculated the expected number of deaths per century as being in the order of 950 for Eurasia and North America combined (**Table 6**). This overall figure, hides much regional variation, with European bears being less dangerous than North American or Asian bears ((**Table 6**)). There are some local temporal patterns and clusters caused by changing management regimes (Herrero & Fleck 1990). However, the overall pattern is one with bear attacks widely spread throughout the 20th century. Connover (2001) estimated that there were an average of 4 grizzly bear attacks per year in North America, of which 1 was fatal every second year.

Table 6. *Records of the extent of predation on humans by brown bears, pumas, tigers, lions and leopards.*

Area	Period	People killed	Attacks per annum	Reference
Brown / Grizzly bear				
Europe	20th century	36 (12)[1]	0.12 (0.02)[1]	Swenson et al. 1996
Asia	20th century	206	2.0	Swenson et al. 1996
North America	20th century	71	0.71	Swenson et al. 1996
Tiger				
India	1877	798	798	McDougal 1987
United Provinces, India	1902-1910		851	McDougal 1987
United Provinces, India	1922	1603	1603	McDougal 1987
United Provinces, India	1927	1033	1033	McDougal 1987
Malay	1930	15	15	
Bangladesh Sundarbans	1945-1985	814	20	Khan 1987
Indian Sundarbans	1975-1981	318	45	Sanyal 1987
Bangladeshi & Indian Sunarbans	1912-1939	360	13	Khan 1987
Bangladeshi & Indian Sundarbans	1930-1947	280	16	Khan 1987
Uttar Pradesh, India	1978-1984	128	18	McDougal 1987
Sumatra	1996-1997	8	4	Nyhus et al. 1999
Chitwan, Nepal	1979-2001	52	2.2	McDougal 1987
Bardia, Nepal	1981-2001	7	3	McDougal et al. 2001
Lion				
Gir reserve, India	1901-1904	66	17	Saberwal et al. 1994
Gir reserve, India	1977-1991	28	2	
Uganda	1923-1994	206	3	Treves & Naughton-Treves 1999
Luangwa Valley, Zambia	1991	3	3	Yamazaki & Bwalya 1999
Puma				
North America	1890-2001	17	0.15	Beier 1991; Fitzhugh unpublished
North America	1890-2001	72 (injured)	(0.65)	Beier 1991; Fitzhugh unpublished
Leopard				
Rudraprayag, India	1918-1926	125	15.6	Corbett 1944
Uttar Pradesh, India	1990-1994	16	4	Mohan 1997
Pauri Garhwal, India	1987-2000	158	11.3	Goyal et al. 2000, Goyal 2001
Uganda	1923-1994	37	0.5	Treves & Naughton-Treves 1999

[1] Numbers in parenthesis exclude Romania which is an outlier. Data has been updated after Swenson et al. 1996 to include an extended data set.

10.5 Other bears

Black bears (*Ursus americanus*) are associated with many more injuries than brown / grizzly bears in North America. This is mainly due to the fact that their populations are far larger, and that they inhabit areas with far higher human densities than brown bears. Herreo (1985) documented over 500 attacks on people by black bears from 1960 to 1980. Most of these attacks were minor, although there were 25 documented human deaths between 1900 and 1989 (Herrero & Fleck 1990). Connover (2001) estimated 25 black bear attacks per year with one being fatal every third year.

Polar bears (*Ursus maritimus*) are rarely involved in attacks on humans, but this is not surprising considering their limited overlap with areas of human habitation. On Svalbard, there have been 4 attacks leading to injury and 4 fatal attacks in the period from 1971-1998 (Derocher et al. 1998). In northern Canada, there have been 14 people injured and 6 killed in the period 1965-85 (Fleck & Herrero 1989), while only 1 person appears to have been injured in Alaska in the period 1900-95 (Middaugh 1987; Floyd 1999).

Sloth bears (*Melursus ursinus*) attacks have been studied in the Madhya Pradesh area of India where the bears occupy a highly modifed habitat, with high human density (Rajpurohit & Krausman 2000). During a 5 year period, a total of 735 attacks on people were recorded, 48 of which were fatal. When adding attacks from other regions in central India, an average of 188 sloth bear attacks on people occur every year. Just taking the

Madyhya Pradesh data indicates that 10 deaths per year can be expected from that region alone.

10.6 Tigers

The frequency of tiger attacks on humans varies greatly throughout their range. In areas such as Iran (before their extinction), Burma, Thailand, Malay and Sumatra, attacks occur at a relatively low frequency. However, in areas such as India, South China, and Singapore attacks have been occurring at high frequency during the entire 20th century (McDougal 1987). Data from given periods and areas are presented in **Table 6**. The scale of the attacks on people is clearly far higher than for any other large carnivores. In some years during the early 20th century over 1000 people per year were killed by tigers. Most of the attacks have been predatory in nature, with both habitual "man-eaters" and "opportunistic killers" responsible (Khan 1987; McDougal 1987; Sanyal 1987; McDougal et al. 2001). Some of the most infamous man-eaters appear to have killed an extreme number of people before being killed. For example, the "Champawat tigress" was credited with killing 436 people during an eight year period in the early 20th century (Corbett 1944)

10.7 Lions

Data from lions (*Panthera leo*) has not been so systematically collected, so that we only have access to a few snap-shots from some populations and periods (**Table 6**). Based on the poor data available lions appear to be less dangerous than tigers, with only a few people being killed each year on average (Durrheim & Leggat 1999; Yamazaki & Bwalya 1999). However, there have been some exceptional events such as the "man-eaters of Tsavo" who killed 130 workers on a railway line in Kenya. Lion attacks appear to have occurred for a wide-variety of reasons including predation on people, and lions defending their kills from people trying to steal them (Treves & Naughton-Treves 1999).

10.8 Leopards

Less data exist for leopards (*Panthera pardus*), however, there have been attacks every few years in areas such as Uganda and India (**Table 6**). It appears that most attacks are predatory in nature, and that habitual man-eaters can occur under some circumstances.

10.7 Further perspective – other wildlife

Despite the low numbers of wolf attacks documented in North America, being bitten by wildlife is a relatively common event. Because attacks by smaller animals are not so dramatic, they rarely receive the same media attention. Connover (2001) presents the following annual averages for the US; 27000 bites by rodents, 750 by skunks, and 500 by foxes.

Reptiles are also involved in attacks on humans. Venomous snakes bite 8000 Americans each year, and an estimated 55 Americans die each year from venomous snakes, spiders, scorpions and reactions to bee, wasp and hornet stings (Langley & Morrow 1997). It is estimated that snake-bites kill 40000 people worldwide each year. Of 236 attacks by alligators (*Alligator mississippiensis*) during the 20th century, 8 have been fatal, and there is evidence that the number is increasing. This increase is due to an increase in alligator numbers, better reporting of attacks, and increased habituation to humans following protection in the 1970's (Connover 2001). Shark attacks occur worldwide – with an average of 50 attacks per year, seven of which are fatal (Connover 2001).

Insects are also responsible for the deaths of people on a regular basis. Cases of people being killed by wasp and bee stings are common (for example 20 people in Sweden died in a ten-year period, Johansson et al. 1991). One of the animals that poses a threat to the health of humans that venture outdoors in Europe and North America is the tick (genus *Ixodes*). These can transmit a variety of bacterial and viral diseases, including Lyme disease (borreliosis), human granulocytic ehrlichiosis - HGE, and tick-borne encephalitis (Dickinson & Battle 2000, Granström 2000; Stuen 2001). Although rarely fatal, these can all produce chronic symptoms in some patients. The incidence of all these diseases is increasing, at least in part due to climate change (Steere 1994, Lindgren 1998). In the core of their European distribution their incidence can be very high, for example Germany and Austria have a combined total of over 30,000 cases of Lyme disease per year (data from WHO). The diseases are also expanding their range into new areas, such as Norway, where they have formerly been rare. These diseases are especially dangerous in new areas where people are not used to taking precautions and doctors are not used to recognising the symptoms. The annual number of cases of Lyme disease in Norway has increased to between 100-400 each year during the 1990's (Eldøen et al. 2001). Only 2 cases of tick-borne encephalitis are known from Norway (Ormaasen et al. 2001), although Sweden has over 100 cases per year (Lindgren 1998). In addition, human granulocytic ehrlichiosis has also been diagnosed in Norway for the first time in recent years (Kristiansen et al. 2001).

Finally, we should not forget the attacks by herbivores such as elephants, moose and bison. In Yellowstone National Park the number of injuries due to bison (*Bison bison*) exceed those due to bears – between 1978 and 1992 only 12 people were injured by black and grizzly bears whereas 56 were injured by bison (Conrad & Balison 1994). Many more people are injured and killed by ungulates when they are involved in vehicle collisions. In the US, Connover (2001) estimates that 29000 people are injured, and 200 killed each year in vehicle collisions with deer (genus *Odocoileus*).

11 Patterns and process

11.1 Putting wolf attacks into perspective

Eles (1996) provides a good summary of the wolf attack data "wolves have killed people, it has been mainly children, it is unusual, people are not part of their normal prey". Despite the cases that we have presented here, it must be remembered that wolf attacks on people are, and have always been, a relatively rare and unusual event. We have covered North America and Eurasia over a period of 400 years. During this period billions of people have died from other causes than wolf attacks. It is clear that people do not appear as regular items of wolf prey. The episodes where wolves do prey on people are widely scattered through history. In areas where they have occurred (e.g. India, Finland, France) it is interesting that local people have regarded the events as being due to an evil spirit. This indicates that predatory wolf attacks were not regarded as normal behaviour for wolves. Attacking and preying on humans is much more a part of the "normal" behaviour of other large carnivores (bears, cougars, tigers) than that of wolves. The risks of being attacked by a wolf are not zero, but are clearly so low that they are virtually impossible to quantify, especially when compared to the other background risks associated with living. However, the challenge is to learn as much as possible from these rare past events about the ecology of wolf attacks on humans, and place it into the context of the modern situation.

11.2 Factors associated with wolf attacks

This report has presented a large number of cases (**Table 7**), with a variable quality of documentation, which indicate that wolf attacks on humans have occurred on humans during recent centuries, especially in Eurasia. As we underlined in **section 2**, this is not a full overview, just a summary of those that we were able to find. The experience of different countries, and different centuries indicates a highly variable incidence of wolf attacks. It is therefore logical to look for the factors that explain this variation. We have been able to identify four factors that are associated with the vast majority of the reported cases.

11.2.1 Rabies

The most important factor explaining the incidence of present day, and probably most historic, wolf attacks is the presence of rabies. Although wolves do not serve as a reservoir for the disease, it appears that they are susceptible to spill-over from domestic dogs and jackals (and arctic foxes in northern areas). As the examples indicate, the consequences can be dramatic. Of the cases that we present here, rabies accounts for most of the attacks on humans. This is especially evident for the last 25 years, where rabies explains the vast majority of all attacks outside India.

11.2.2 Habituation

Many of the North American cases (Algonquin, Vargas Island, Ice Bay) were due to wolves that had lost much of their fear of humans, and had even begun to associate humans with food. The dangerous consequences of this habituation in bears are well known (Herrero 1985), and it appears that the same occurs in wolves on rare occasions. The extreme consequences of the loss of fear in wolves appear in the 19th century cases from Sweden and Estonia where wolves that have escaped from captivity have killed many people. The cases of pet and captive wolves killing people further underlines the dangerous potential of habituation / familiarity taken to extreme situations. In addition, it is suspected that free-living hybrids will have less fear of humans than wild wolves (Ryabov 1980, 1985)– circumstances that could have led to the events in Gévaudan in France in the 18th century. However, the evidence for this is somewhat limited.

To set things in perspective, it is important to remember that there are many captive wolf packs in zoos and parks around the world that are totally habituated to humans where there have been no records of people being attacked or killed. The case in the Ontario wolf park from 1996 (**section 9.1**) is an extreme situation. In addition, at any given moment there are thousands of wolves in North American national parks that maintain their shyness of humans. Our data here do not show that habituated wolves will attack people, just that they can do so on rare occasions.

11.2.3 Provocation

The report contains cases where wolves that have been cornered or provoked have attacked people. To put this into perspective it still appears to be a minority of wolves that attack, even when cornered and threatened. The historic literature is full of descriptions of trappers approaching a trapped wolf and killing it with a club to save bullets without being bitten or even attacked. Many authors have also described cases where they have handles or removed wolf pups from dens, without reaction from the parents (Young & Goldman 1944; Mech 1992; Casey & Clark 1996).

11.2.4 Extreme socio-environmental situations

The worst historical episodes of predatory attacks on people (e.g. France, Estonia, northern Italy and Finland during the 19th century) appear to stem from periods and places where landscapes were very heavily modified. These landscapes are characterised by a number of features, making it hard to isolate which is the most important. Firstly, wild prey species were scarce, or even absent after centuries of unregulated hunting, forest clearance, and intensive grazing of domestic ungulates. The only abundant food sources were domestic livestock and garbage. The only barriers between wolves and this livestock were usually children that were commonly used as shepherds throughout Europe during that period. Whether the wolves were feeding on livestock or garbage, they would have become used to exploiting food sources associated with humans. In addition, children would have spent a lot of time in the forest unattended herding

livestock, collecting berries, mushrooms and firewood. Finally, these periods were often associated with relative poverty among the rural population, creating behavioural patterns and situations that would expose people to a greater degree. It is not the fact that the wolves were generally so hungry that they had to feed on children which underlies the mechanisms in these attacks. If this had been the case the number of deaths would have been dramatically higher. It is just that wolf ecology from the period brought them into very close contact with humans and their livestock, setting the scene for these rare incidents to occur.

McDougal (1987) speculated that man-eater tigers in India developed when wild prey became rare, resulting in tigers preying on livestock. This would bring them into close contact with man, with which the tigers would become familiar, up to the point when they became regarded as alternative prey. This process where only certain individuals begin to regard humans as prey is a classic demonstration of the existence of problem individuals (Linnell et al. 1999).

A modern parallel to the wolf situation in pre-20th century Europe still exists in India. Wild prey are rare, and the livestock are often well guarded by adults, leaving unattended young children as a vulnerable "prey". This picture for wolves is also supported by data from other large carnivores. In India, many hundred people are injured or die each year from attacks by wildlife. For example, during a 5 year period in a single Indian state (Madhya Pradesh) the number of attacks (injuries and deaths) was; 735 by sloth bears, 138 by leopards, 121 by tigers, 34 by elephants, 29 by wild boar, 21 by gaur, 13 by wolves and 3 by hyenas (Rajpurohit 1999; Rajpurohit & Krausman 2000). In Africa, the picture is the same, with lions, leopards and hyenas attacking people, and many other being killed by elephants, hippopotami, buffalo, and even chimpanzees and baboons (Treves & Naughton Treves 1999). One other factor common to these situations is the fact that the people in these areas are often poorly armed, implying that they only have a limited potential to kill predators. Thus, the selection against "fearless" individuals is likely to be weak.

11.2.5 Other factors

Wolves regularly kill domestic dogs. This includes both hunting dogs, sledge dogs and dogs tied up in farmyards. It is therefore possible that the presence of a dog may attract a wolf, and lead the wolf to act in an aggressive manner. Potentially, a human trying to defend a dog may provoke a wolf into making a defensive attack. Surprisingly, the presence of a dog does not appear in many of the cases that we have examined here, apart from a few cases where a wolf attacked sledge dogs. It remains a factor that should be considered.

There are many descriptions of wolves feeding on human bodies, including those that have died on the battlefield, from epidemics, or poorly cremated remains in graveyards (Shahi 1982; Casey & Clark 1996; Snerte 2000). It is often speculated that wolves that have fed on human bodies might make the change to killing people. While the idea is attractive there is little data to support it. Attempts to use aversive conditioning on individual carnivores by creating a negative stimulus when feeding on a livestock carcass have often failed to prevent those individuals from killing live livestock. This indicates that the perception of a live prey is very different from that of a carcass (Smith et al. 2000).

11.2.6 Why are there so few attacks from North America?

There were clear seasonal differences in the occurrence of wolf attacks. However, these differed significantly between attacks by rabid wolves and predatory attacks. **Table 7** only shows data from Europe and Russia, excluding data from central Asia and India because these regions have different patterns of environmental seasonality. Most attacks by rabid wolves occurred during spring, with 45% occurring in the 3 month period from March to May, and a second smaller peak in late autumn. Very few attacks during late summer mid winter. This pattern has also been reported in other studies (Yankin et al. 1982, Rootsi 2001). This seasonal pattern is also seen in studies of red fox rabies in both western Europe and eastern Canada (Macdonald & Voight 1985). Predatory attacks occurred in all months of the year, with a clear peak in June to August (50%). The reasons for these seasonal patterns are not clear, but two different explanations have been raised for the peak of predatory attacks during winter. Firstly, there are more potential victims in the forests during summer, herding livestock and collecting berries, mushrooms and nuts. Secondly, wolves raising pups will be experiencing increased food stress during this period (Rootsi 2001). There is therefore no support for the popular image of hungry wolves attacking people during the depths of winter.

11.4 Patterns – age and sex of victims

There were clear differences between the age of victims attacked by rabid and non-rabid wolves respectively (**Table 8**). The vast majority of those attacked by rabid wolves were adults, and mainly men (also supported by Yankin et al. 1982; Korytin 1997). This reflects the expected pattern of those that work outdoors, in agricultural and forestry activities. Rabid wolves apparently choose their victims at random, just biting the people and animals they encounter during the furious phase. Therefore, it is not expected to find any evidence for selection for any specific age or sex category among the victims. In contrast, the victims of predatory attacks by wolves are mainly (90%) children under the age of 18, and especially under the age of 10. In the rare incidents where adults are killed, they are almost always women. This pattern is consistent with the wolves selecting the weakest, and most easily captured category of prey.

11.5 Patterns – temporal changes in numbers of attacks

There is a clear pattern for the number of documented and reported wolf attacks to decrease in Europe during the 20th century (**Table 9**). This is the opposite of what would be expected

Table 7. *Age and sex specific nature of attacks by rabid wolves and predatory attacks on humans (%). Cases marked with an asterix include both victims that were attacked and survived and those that were killed. Otherwise the data contains fatal attacks only.*

Area	Period	N	Male			Female			Unknown sex		
			0-9	10-18	>18	0-9	10-18	>18	0-9	10-18	>18
Predatory											
Norway / Sweden	1727–1821	16	44	6	0	19	25	6			
Finland	1879-1882	19	48	11	0	32	11	0			
Spain	1957-1974	7	72	0	0	0	14	14			
Russia*	1944-1950	19	11	16	0	26	47	0			
France	1764-1767	65	9	25	0	11	29	26			
France*	1817-1818	18	40	22	0	17	17	6			
Italy	1801-1825	67							43[1]	43[1]	13
Finland	1831-1877	43							48[1]	47[1]	5
Poland	1937	10							50[1]	50[1]	0
Russia*	1840-1861	273							54	27	19
Russia	1945-1953	14							72	28	0
India*	1993-1995	80							71	29	0
India*	1980-1986	118							87	13	0
Estonia	1801-1855	108							49[1]	49[1]	2
Total / mean%		857	37	13	0	18	24	9	60	36	4
Rabies											
France*	1756	13	0	8	38	0	23	31			
France*	1851	41	15[1]	15[1]	24	9[1]	9[1]	29			
Iran*	1975	9	11	11	55	0	0	22			
India*	1996	36	6	6	50	17	6	17			
India*	1973	12	8	0	50	0	25	17			
Germany*	17th century	11	0	0	46	0	8	46			
Spain	1900-1950	15	0	20	67	0	0	13			
USSR*	1972-1976	39							0	5	95
USSR*	1978	25							16	16	68
Total / mean%		201	6	9	47	4	10	25	8	10	82

[1]. Age has only been given as "child". We have therefore allocated ages equally into the two categories.

when the improved record keeping and investigation of recent decades is considered. Clearly, there has been a dramatic reduction in the numbers and distribution of wolves during the last centuries (Mech 1995), together with a mass movement of people from rural to urban areas. These two changes would naturally decrease the chances of wolves and people meeting. But a number of other factors must also be considered.

(1) Children are rarely used as shepherds today.
(2) Wild prey populations have increased dramatically in most areas.
(3) Rabies in domestic dogs has been greatly reduced through vaccination and dog control laws.
(4) The practice of keeping tame wolves and hybrids does not appear to be so common – at least where they occur, the situation is changed and the chances of them escaping are far less.
(5) Wolves have been so heavily persecuted during the last century that it is highly likely that there has been intense selection against "fearless" wolves or those that are not very shy of humans. In countries where wolves are hunted (legally and illegally) it is unlikely that any will live long once they begin to develop "fearless" behaviour. However, in countries where wolves are protected, management may need to consider response actions (see **section 12**).

Despite the centuries of persecution wolves have survived in many areas in large numbers and have begun to return to many places from which they were exterminated. A modern perspective on the rarity of wolf attacks can be provided by examining the number of wolf attacks relative to the numbers of wolves in various countries / states during the last decade (Tables 3 and 7). There are currently an estimated 10,000 – 20,000 wolves in Europe, 40,000 in Russia and 60,000 in North America. Even with these numbers we have managed to only find records of 4 people being killed in Europe, 4 in Russia and none in North America by non-rabid wolves during the last 50 years. Respective figures for rabies cases are 5, 4 and zero. Clearly, the risks of

wolf attacks under present circumstances are very, very low throughout Europe and North America.

11.6 Viewing the wolf as a wolf

This report documents that wolves have killed and attacked people throughout recent centuries. It is easy to see from where our cultural fear of wolves comes from. The records from past and present times of rabid wolves going amok, and of these occasional episodes of wolves preying on children are dramatic. Their dramatic nature is clear even from the perspective of our modern enlightened times. When viewed from the 18th and 19th centuries they must have been terrifying. It is therefore not surprising that the wolf of all the large carnivores became such a negative symbol (Boitani 1995; Rehnmark 2000) throughout European history.

The results of this report may seem surprising to many, given the modern positive image of the wolf as an almost harmless carnivore. Many have read or heard statements such as "…there is no record of an unprovoked, non-rabid wolf in North America seriously injuring a person" (Mech 1991). From our review we cannot disprove this statement, although this depends on how you interpret "seriously injured" and "record". It is also important to underline the conditions in the statement. The "in North America" condition is the most important of all. In North America, people have been killed by rabid wolves, and elsewhere people have been bitten by healthy wolves. North American authors have been aware of stories of wolf attacks from Eurasia – but until recently they have not had access to a review as the language barrier has clearly hindered the flow of information.

Table 8. *Seasonal distribution of wolf attacks on humans, seperated into predatory attacks by healthy wolves and attacks by rabid wolves. Cases show numbers of people killed unless otherwise indicated (* = killed and injured, † = injured only). Some episodes of predatory attacks may include a few rabid cases (‡).*

Area	Period	N	Jan.	Feb	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Predatory														
Norway	1800	1												1
Sweden	1727-1763	4	2							1				1
Sweden*	1820-1821	31	16	9	5									1
Russia*	1840-1861	273	5	6	14	15	36	41	75	55	12	7	4	2
Russia*	1944-1952	33				2	2	1	9	10	5		4	
Estonia	1762-1855	136	5	14	6	10	15	14	28	23	9	2	3	7
Finland (Åbo)	1878-1882	22	1			2	2	2	2	4	1	3	2	3
Finland	1848-1882	10	2			4	1		1	1				1
France*	1764-1767	106	13	6	15	14	15	10	3	4	9	9	2	6
France*	1817-1818	18			1			4	5	5	3			
Latvia†	1998-2000	3				1								2
Poland*	1937	10							5	5				
Poland	1824	1					1							
Spain*	1957-1975	8						3	5					
Italy‡	1500-1825	377	17	22	18	27	24	69	99	31	17	14	28	11
North America†	1977-2000	8				1		1	1	2	2			1
Total		1041	61	57	59	76	96	145	233	141	58	35	43	36
%		100	6	5	5	7	9	14	22	14	5	3	4	3
Rabies														
Germany	1641-1674	6		2	1	2				1				
Latvia	1979-2001	2					1				1			
Lithuania	2001	1					1							
Estonia	1980	1					1							
Spain	1720-1949	5	2		1	1							1	
Russia	1972-1978	9	1		2	2	1	1				1	1	
Iran	1975	2										1	1	
Croatia	1997	1				1								
France	1756/1851	2				1			1					
Slovakia	1997	1							1					
North America	1833-1942	5	1			1			1	1				1
Total		35	4	2	4	8	4	1	3	2	1	2	3	1
%		100	11	6	11	23	11	3	9	6	3	6	9	3

The problem is that in the absence of a full global review many people have attempted to extrapolate the North American experience to the rest of the world. From our review it is clear that the North American experience is not typical and that when considering wolf management and the risk to human safety we need to consider the wolf in *toto*. This means that all attacks by wolves that are rabid, habituated, sick, hybrid, escaped from captivity, or provoked are just as important as those attacks that are made by healthy, wild, unprovoked and non-habituated wolves. The need to look at attacks in *toto* is because wolf management will need to focus on all possible situations that can occur, and the public's attitude will be formed by the sum of experience. In many cases the exceptional events will be even more influential than the normal.

Various interest groups have long held up the wolf as either a devil like symbol, or as that of a benign god like animal. Admitting that wolves have killed people may change the image that

Table 9. *Summary of wolf attacks on humans. Only the most reliable cases have been included in this table. Numbers do not represent total numbers, but merely those for which we have found records. The period and regions covered within each time period vary greatly. The numbers that die following rabies attacks is often underestimated as the long term fates of victims are rarely reported in historic documents. Where authors have only reported numbers killed, we use this number as a minimum estimate of the total number attacked (indicated with a "+").*

Area	18th century		19th century		1900-1949		1950-2000	
	Total attacks	Killed	Total attacks	Killed	Total attacks	Killed	Total attacks	Killed
Rabies								
Croatia							1	0
Estonia			84+	84			1	1
France	693	308	345	118				
Germany								
Italy			5+	5				
Latvia			10+	10			12	3
Lithuania					19	?	22	0
Poland			19+	19	130	25		
Slovakia					4	2	2	1
Spain	40	?	14+	14	29	>10		
Europe total	733		477		182		38	5
India							77	5
Afghanistan							18	10
Iran					325	60	474	22
China							31	4
Russia / USSR			403[1]	?	20	10	159	4
North America			16	?	4	2	2	0
Non-rabies								
Estonia	21+	21	111+	111				
Finland			79	78				
France	711	577	365	104	6	2		
Italy	107	?	112	72				
Latvia							3	0
Lithuania					16	11		
Norway			1	1				
Poland			1	1	10	5		
Slovakia							1	0
Spain							8	4
Sweden	4	4	31	12				
Europe total	839	>602	700	379	32	18	21	4
India			639+	639	115+	115	311	273
Russia / USSR			273[2]	169	35	32	8	4
North America			1	0	1	0	11	0

[1] These cases were reported by Pavlov (1982) from the period 1861-1899 and do not separate between rabies and non rabies.
[2] These cases from 1840-1861 are reported by Korytin (1997) who indicates specifically that they are not from rabid wolves. Because of possible double reporting we do not report figures from Pavlov (1982) cited from this period.

some (many?) people have of the wolf. When we consider that a wolf is a highly adaptable large carnivore found from the Arabian deserts to the arctic tundra, capable of killing adult moose weighting many hundreds of kilograms it should not be surprising that wolves, like most other large carnivores, have on occasion killed humans. In many ways it is surprising that wolves have not killed more people during the course of time. The main symbolic conclusion that comes from this study is that it is time to stop viewing the wolf as a devil or a god. A wolf is a wolf. As a species we cannot expect them to not eat humans (an easy and abundant prey) on principle. We should just be glad that they avoid us as much as they do, and manage them to keep it that way.

12 Management planning

Based on the patterns presented above it appears that the risks of wolf attacks on people are currently very, very low in Europe (and North America) today. The factors associated with increased risks of wolf attacks are not presently common (**section 11.5**), and are unlikely to increase in the future. However, it is important to prepare for all eventualities, even those that are very unlikely.

12.1 Reducing the chances that wolf attacks occur

Based on the analysis of factors associated with wolf attacks there are three ways in which the risk of wolf attacks occurring can be reduced even further.

(1) **Combat rabies**. As rabies is associated with a large proportion of wolf attacks, it would be desirable to reduce the risk of wolves contracting rabies. As domestic dogs appear to have been the main source of rabies in wolves it should be relatively easy to continue the ongoing efforts to vaccinate and control dogs, at least in the western world. Furthermore, the ongoing efforts to vaccinate wildlife populations against rabies that have been successful in western Europe will further reduce the risk of wolves contracting rabies. In Asia this task may be very difficult in the short term.

(2) **Habitat and prey management.** Managing and restoring prey populations and their habitat, and using effective methods to protect livestock so that wolves are not dependent on human food sources will reduce both the wolf-human encounter rate, and the risk of habituation. This should again reduce the chances of wolf attacks on humans.

(3) **Keeping wolves wild**. Habituated wolves have been responsible for a number of attacks, as have habituated dingoes and coyotes. Keeping wolves wild, so that they do not associate humans with food, and maintain a certain level of fear of humans, should greatly reduce the risk of attacks. In areas where wolves are hunted, emphasis should be placed on methods where the packs learn to associate humans with negative consequences. Drive hunts may achieve this goal more than sit-and-wait hunts, for example. Where wolf hunting is not appropriate, efforts should be made to stop wolves from associating humans with food, and the use of harassment measures should be considered where needed.

12.2 Reaction planning

Despite the low probability of wolf attacks on humans occurring, the risk is not zero, and wildlife management reaction procedures should be put in place before such incidents occur, in the

hope that they are never needed. Given that the risk of attacks from other large carnivores (bears, pumas, tigers etc) is much higher, wolf attack response protocols can be incorporated into those for the other species. Two potential situations that require reaction can occur. It is essential that reaction protocols are in place before such events occur.

(1) **"Fearless wolves".** Individual wolves may begin to behave in a way where they are not showing the appropriate level of fear of humans. There should be a management protocol in place to deal with this eventuality. For example, in 2001 Denali National Park in Alaska closed several campsites because the resident wolves had begun to show "fearless" behaviour, approaching campers and stealing food and other objects.

Central to such a protocol is an understanding of what constitutes normal and abnormal wolf behaviour. For example, wolves living in mixed farmland-forest habitats will generally tolerate a very high degree of human activity and human infrastructure. They may even approach houses and kill dogs. Such behaviour must be regarded as "normal" wolf behaviour. Management protocols that define limits for normal behaviour will therefore need to be developed in close consultation with experts on wolf behaviour.

(2) **Wolf attacks**. Management protocols are needed for circumstances where a person claims to have been attacked by wolves, or if a body is found where wolves are suspected to have been involved. In such events it is important to confirm the identity of the attacker as a wolf, because the chances of it having been a dog or other agent are far higher. In British Columbia where fatal attacks from pumas and bears occur, all deaths are treated as crime scenes with the emphasis on preserving evidence. The ability of forensic science to use DNA methodology to identify the identity of the attacking animal should also be investigated (Savolainen & Lundeberg 1999).

12.3 The human dimension

It is important to realise that much of the fear that is expressed towards wolves may be directed at the wolf as a symbol, rather than actual fear for physical risk (Midgley 2001). In the modern context this symbolism is likely to be associated with a loss of control of local affairs in the face of outside intervention by central authorities and large urban populations (Bjerke et al. 2000; Skogen & Haaland 2001). Measures which increase local involvement in wildlife management, and open for dialogue between local people, researchers and managers will also assist. Carefully regulated hunting of wolves in which local people can take part may be an effective step towards local empowerment in some situations (Skogen & Haaland 2001, Bjerke et al. 2001).

The attitude that people have towards wolves is also influenced by their confidence in different sources of knowledge (scientific knowledge versus lay knowledge). Those with confidence in scientific knowledge are likely to be more positive towards wolves, however large segments of rural communities have low confidence in this source of knowledge. There has been a conflict between lay knowledge and scientific knowledge with regards to the danger wolves pose to human safety. Since scientific knowledge holds a hegemonic position to lay knowledge, the contestation of claims that wolves are harmless may be an element in a struggle against the dominance of this form of knowledge. However, the claim that wolves are harmless is not actually a result of scientific investigation as this is the first serious attempt to review the topic. The results of this review that documents that wolves can present risks to human safety under certain conditions should hopefully go a long way to reconciliation between lay and scientific knowledge on this topic (Bjerke et al. 2001). An honest presentation of facts about wolves (including the negative aspects) is vital to build up trust among different interest groups (Schlickeisen 2001).

Finally, it is important that the public receive information on how to act when confronted with a wolf they believe is acting aggressively, in the same manner that visitors to North American national parks are given information about bear safety. An example of the information provided by the British Columbia National Parks Service is provided in **Appendix 5**.

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Appendix 1

List of people who have made direct contributions to the report, by supplying data on attacks by wolves or other carnivores (or the absence of such attacks) from their area of experience.

Name	Affiliation	Area of Experience
Arne Bergsaker	Former aid worker, Norway	Afghanistan
Dick Shideler	Alaska Department of Fish & Game	Alaska
Mark McNay	Alaska Department of Fish and Game	Alaska
Steven Kovach	Yukon Delta National Wildlife Refuge	Alaska
Vic Van Ballenberghe		Alaska
Warren Ballard	Department of Range, Wildlife and Fisheries Management, Texas Tech University	Alaska / Canada
Ian Ross	Arc Wildlife Services Ltd.	Alberta / Canada
R. Watt	Waterton Lakes National Park	Alberta / Canada
Wes Bradford	Jasper National Park	Alberta / Canada
Nobert Gertsl	WWF-Austria	Austria
Jim Corbett	Ministry of Environment, Lands & Parks British Columbia	British Columbia
Matt Austin	Ministry of Environment, Lands & Parks British Columbia	British Columbia
John Flaa	Glacier National Park	Canada
Elena Tsingarska	BALKANI Wildlife Society, Bulgaria	Bulgaria
Damien Joly	Department of Biology, University of Saskatchewan	Canada
Greg Lundie	Wapusk National Park	Canada
Jean Langlois	CPAWS - Ottawa Valley Chapter	Canada
Paul Paquet	Canada	Canada
Rhonda Markel	Vuntut National Park	Canada
Tang Qing	Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine.	China
Dr. Qing Tang	Institute of Epidemiology and Microbiology, Chinese Academy of Preventive Medicine.	China
Djuro Huber	University of Zagreb, Croatia	Croatia / Former Yugoslavia
Francois Van Meulebeke	International Wolf Federation Belgium	Europe
Oliver Matla	German Wolf Association	Europe
Richard Morley	The Wolf Society of Great Britain	Europe
Alistair Bath	Memorial University, Newfoundland	Europe / Canada
Benoit Lequette	Mecantour National Park, France	France
Florent Favier	Programme Life – Loup, France	France
Guillaume Chapron	L'aboratoire d'Ecologie, CNRS, Ecole Normale Supérieure, Paris	France
Christophe Duchamp	Office National de la Chasse et de la Faune, France	France
Michel Raynal		France
François Moutou		France
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Appendix 2

Accounts from the oral tradition of people being killed or injured by wolves in Norway. All of the events were rumoured to have occurred in the pre 20th century era, but were not written down until the 20th century. It is likely that some of the accounts refer to the same event (for example the stories of the soldier killed in Leksvik and that in Randalen are identical). At present there is no evidence that any of these events occurred.

1	c. 1300. An adult women was killed. Between Suldal and Bykle, Aust Agder	Frøstrup & Vigerstøl 1994 p 124. Snerte 2000 p 84.
2	1612 (24 xii). An adult man, Anders Solli, was killed. Leksvik, Nord-Trøndelag	Steen 1973. Johnsen 1957 p 298. Snerte 2000 p 125-127.
4	1789. A 17 year old boy was killed. Høland, Akershus.	Evensen 1992. Snerte 2000 p 14.
5	18th century (xii) A child was killed and eaten. Near Rødnessjøen, Østfold.	Myhrvold 1962 p737. Snerte 2000 p. 11-12.
6	18th century. A boy was killed.Telemark.	Berge 1944 p 386. Snerte, 2000 p 84.
7	c. 1770. Two boys were killed and eaten. Varpet, Valdres, Oppland	NAF Veibok. 1992 p 214.
9	1800. A boy was killed and eaten. Slideråsen, Valdres, Oppland.	Hermunstad 1964. Snerte 2000 p 41-42.
11	1826. A five-year-old girl was killed. Skogsrud, Hedmark	Rautin 1985. Snerte 2000 p 15-16.
12	19th century. A 15 year old boy was killed. Hole, Buskerud.	Myrberget 1967 Snerte 2000 p 17.
13	c. 1850. A girl was killed and eaten. Kile, Hægeland, Vest-Agder.	Myrberget 1967 Barth 1957 p 111-174.
14	19th century. An 11-year-old girl was killed and eaten.	Løken 1909 Snerte 2000 p 125.
15	Adult man was injured. Odnebjørg, Agder.	Woll 1918 p 6-18. Snerte 2000 p 97-104.
16	A child was killed. Herasbygda in Østerdalen, Hedmark.	Fjellstad 1945 p 34-35. Snerte 2000 p 49-50.
17	A girl was killed and eaten. Føsseis-Fuglei, Valdres, Oppland.	Hermundstad 1955 p 163-164. Snerte 2000 p 47-48.
18	A girl was killed. Røn in Valdres, Oppland.	Hermundstad 1955 p 163-164. Snerte 2000 p 47-48.
19	A boy was injured. Between Fossheim and Fasle in Valdres, Oppland.	Hermunstad 1964. Snerte 2000 p 41-42.
20	A man was killed and eaten. Midtre Hegge, Valdres, Oppland.	Hermunstad 1964. Snerte 2000 p41-42.
21	A girl was killed and eaten. Dæli, Valdres, Oppland.	Hermunstad 1964. Snerte 2000 p41-42.
22	A soldier was killed by a wolf. Randalen, Nordland.	Årbok for Helgeland 1981, p 59.
23	A boy was injured. Meløy, Nordland.	Bang 1984 p 101. Snerte 2000 p 140-141.
24	A women was killed. Kjerringdalen, Valdres, Oppland.	Hermundstad 1985 p 114. Snerte 2000 p 61-62.
25	A man was killed. Rausteinhøle, Hallingdal, Buskerud.	Flaten 1994 p 111. Snerte 2000 p 42.
26	A women was killed. Tørsetlin, Hallingdal, Buskerud.	Flaten 1994 p 111. Snerte 2000 p 42.

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Appendix 3

Details of predatory attacks by wolves on people from Europe and Russia.

Predatory wolf attacks on people in Estonia during the 18th and 19th centuries (Rootsi 2001).

Years	Area	Number of people killed
1762-1767	Kambja parish	12
1792-1793	Sangaste parish	5
1799-1800	Aksi parish	4
1801-1805		3
1806-1810	6 parishes	56 (54 of these occurred in 1809-1810)
1811-1815	6 parishes	10
1816-1820		4
1821-1825		6
1826-1830		1
1831-1835		3
1836-1840		1
1841-1845		1
1846-1850	9 parishes	23 (16 of these occurred in 1846)
1851-1855		3
Totalt		**132**

Episodes in French history where predatory attacks have occurred on more than a single victim. These are presumed to be non-rabid wolves. It is not always clear from the total of victims if they were killed or only wounded. Data are from de Beaufort (1983).

Year	Area	Victims
1450	Paris	"Several children"
1633	Chartres	c. 30 children
1651	Etampes	"Women and children"
1692	Monthlery	"Children"
1692	Orleans	c. 100 women and children
1698	Lyons-la-Foret	3 children
1712	Orleans	c. 100 women and children
1730	Montoire-sur.Loir	"Several women and children"
1731-1734	Auxerre	c. 12 children
1745-1750	Soissons	?
1745-1750	Versailles	?
1751	Foret de l'Epine	c. 30 children and youths
1764-1767	Gevaudan	210 attacked, 113 killed, women and children
1801	Varzy	17 children
1809-1811	Saone-et-Loire	5 children
1809-1812	Gard	>10 victims
1814	Loiret	8 women and children
1817-1818	Foret de Longchamp	17 attacked, 9 killed, children
1824	Charente	3 children

Overview of 22 victims of wolf attacks in the Åbo region of Finland, 1878-1882 (Godenhjelm 1891, Mäensyrjä 1974, Pousette 2000).

Date	Age and sex of victim	Details
1878 (xii 12th)	9 years girl	Walking home from neighbour when a wolf bit her on the neck and dragged her into forest and covered her body snow: Somebody heard her screams but she was dead when found.
1880 (i 19th)	8 years boy	2 wolves attacked at midnight. Only the head, right hand and left foot were found.
1880 (iv)	7 years girl	3 children were walking home when a wolf attacked from forest. A 12 year boy carried the youngest child in his arms, but the wolf grabbed the girl. Found only skirt and shoe.
1880 (iv)	2.5 year girl	The girl was taken while playing with her 6 year sister, close to house around 15:00. Found her head and some bones, clothes and shoes some 100m in forest.
1880 (v 15th)	3 year girl	1 wolf attacked the girl at 18:00 when she was alone close to a house. They found some clothing. A wolf had approached another group of children earlier that night, but was chased away by adults.
1880 (viii)	10 year girl	A wolf attacked 2 girls bringing cattle home from the forest. A 15-year-old girl ran away but the 10-year-old was killed. Found her body the next day.
1880 (x)	small child	Taken from close to house. Searchers found its badly injured body without the feet.
1880 (x)	3-4 year girl	1 wolf had eaten her guts and run away.
1880 (xii)	11 year boy	The boy was walking from the house to an outer building close to the house. A wolf attacked him and dragged him into forest. The boy grabbed a fence post, and screamed. Somebody came from house and wolf released the boy and ran away. But the boy died from injuries.
1881 (v)	5 year girl	Only a story from travelling people about 1 or 2 children being killed by wolves.
1881(vi 20th)	9 year boy	The boy was bring a horse from the forest to the farm, but did not come back. The parents went out to look, and found only a wooden shoe, and some bloody clothing.
1881 (vi 29th)	4 year boy	The boy was with his sister near a house. A wolf came from the forest and grabbed the boy. Searchers later found his body in a swamp.
1881(vii 15th)	7 year boy	While walking towards his mother the boy was attacked. They found his head and torso, and somebody saw a wolf nearby.
1881 (vii 27th)	9 year boy	Boy was picking berries with younger brother.
1881 (viii)	2 year child	Taken from house porch.
1881 (viii 15th)	5 year boy	Taken from front of house from in front of his mother. Found no remains.
1881 (viii 25th)	10 year boy	Rumour of 10 year son vanished when bringing horses back
1881 (ix)	9 year boy	Shepherd boy was taken by a single wolf. His body was found with upper part eaten, and lower part was injured. The killing provoked a debate that people did not value human life enough when they sent such young boys into forest as shepherds.
1881 (x)	8 year boy	Taken close to house, in front of mother's eyes.
1881 (xi 9th)	5 year boy	Body was found in late evening some 100m from house. The mid part of his body was bitten through, but rest was intact. Speculation that shooting and noise scared the wolf away.
1881 (xi 9th)	12 year girl	Wolf attacked a girl but she was saved
1881 (xii)	3 year child	Disappeared same day as wolves were seen nearby.

Details of children reported as being attacked and killed in area around Kirov, Russia in 1944-1953 (Pavlov 1982).

Date	Age and sex of victim	Fate
Kirov District		
1944 (ix)	1.5 year	Rescued
1944 (ix)	12 year, girl	Rescued
1944 (xi 6th)	8 years, girl	Killed
1944 (xi 12th)	14 years, girl	Killed
1944 (xi 19th)	16 years, girl	Killed
1944 (ix 21th)	13 years, girl	Killed
1945 (iv 29th)	17 years, girl	Survived
1945 (v 1st)	7 years, boy	Survived
1945 (v 8th)	5 years, girl	Killed
1948 (vii – viii)	9 children (7 to 12 years)	Killed
1950 (vii – viii)	4 children (3 to 6 years)	Killed
1948 (xi 17th)	8 years, girl	Killed
1947 (viii – ix)	young girl 13 years, boy 16 years, girl	Killed Killed Killed
Oritiji District		
1951 (iv 29th)	10 years, girl	Killed
1952 (vi 12th)	11 and 15 years, girls	Survived
1952 (vii, 11th)	5 years, boy	Killed
1952 (vii)	8 years, girl	Killed
1952 (viii 12th)	6 years, girl	Killed
1952 (viii 17th)	13 years, boy	Survived
1952 (viii 16th)	12 years, boy	Survived
1953 (spring)	girl	Survived
1953 (summer)	boy	Survived
Vladimir Disrict		
1945-47	10 children	Killed

Details of the victims of wolf attacks in Gastrikland & Dalarna, Sweden, 1820-1821.

Date	Age and sex of victim	Fate
1820 (xii 30th)	3.5 years, boy	Killed
1821 (i 7th)	7.5 years, boy	Attacked
1821 (i 7th)	6.5 years, boy	Attacked
1821 (i 12th)	6.5 years, boy	Killed
1821 (i 20th)	9.5 years, girl	Attacked
1821 (i 20th)	12 years, boy	Attacked
1821 (i 28th)	7 years, boy	Killed
1821 (i 29th)	9 years, boy	Attacked
1821 (i)	Child	Arracked
1821 (i)	8 years, boy	Attacked
1821 (i)	Child	Attacked, not injured
1821 (i)	13 years, boy	Attacked
1821 (i 13th)	11 years, girl	Killed
1821 (i 31st)	5 years, boy	Attacked
1821 (i 31st)	10 years, boy	Attacked
1821 (i 31st)	15 years, boy	Attacked
1821 (i)	Adult woman	Attacked
1821 (ii 5th)	8.5 years, girl	Killed
1821 (ii 6th)	9 years, boy	Attacked
1821 (ii 6th)	12 years, boy	Attacked
1821 (ii 10th)	15 years, boy	Killed
1821 (ii 10th)	12 years, girl	Killed
1821 (ii 10th)	Adult woman	Attacked, not injured
1821 (ii 10th)	16 years, boy	Attacked, not injured
1821 (ii 15th)	18 years, boy	Attacked
1821 (ii)	4-5 boys	Attacked, not injured
1821 (iii)	Adult male	Attacked
1821 (iii 9th)	19 years, woman	Killed
1821 (iii 18th)	6.5 years, boy	Killed
1821 (iii 23rd)	3.5 years, girl	Killed
1821 (iii 27th)	10.5 years, girl	Attacked

Appendix 4

Details of attacks by rabid wolves on people from Europe and Russia.

Reported cases of attacks by rabid and non-rabid wolves in Germany in the 16th and 17th century (Butzeck 1987).

Date	Location	Incident
1557 (autumn)	Thueringen	A rabid wolf bit 11 people, some of whom died.
1563	Mecklenburg	A woman was bitten by a wolf and died.
1641 (viii)	Potsdam	A rabid wolf attacked six people and some cattle in a single attack. At least one person and some cattle died of rabies.
mid 17th century	Kienbaum Struassb	"A wolf attacked a man and women, and it also attacked a policeman who came to help. Finally, the wolf was killed by others with axes. The wounded woman and policeman turned mad and were put in irons. They finished their life in a pitiable way."
1638 (ii)		Two people were attacked, one of whom died. The role of rabies was unknown.
1647 (iv 6th)	Thueringen	Two women were killed by a wolf, and a man was able to defend himself. The wolf was killed later that day. The role of rabies was suspected.
1647 (iv 6th)	Winterstein	A 17-year-old woman was attacked and received over 30 bites from a wolf. She apparently recovered from her wounds, but died 5 weeks later, which would suggest rabies.
mid 17th century	Aschershain	"…the son of P. Freidrich in Aschershain was bitten by a mad wolf"
1652	Ovesna / Dobrne	6 people bitten by a rabid wolf
1655 (iv 3rd)	Pritzwalk	2 farm workers were bitten by a rabid wolf, both died of rabies within the next 6 months
1663 (ii 1st)	Hoersingen	An adult women was bitten by a rabid wolf and died of rabies 5 months later.
1674 (iii 27th)		A wolf attacked cattle, children, and adults. At least one women died.

Some case histories of attacks by rabid wolves on people in Latvia.

Year	Area	Case	Source
mid 1950's	Ludza, eastern Latvia	A milkmaid was bitten in the head by a rabid wolf. She did not seek treatment and died of rabies	Maija Kiece pers comm.
1973	Pope forestry district	An adult woman and her livestock were attacked by a rabid wolf that bit her on the neck. She received post-exposure treatment and survived, although one of the calves died of rabies a week later.	Jānis Geste pers. comm.
1979 (ix 27th))	Murmastiene, eastern Latvia	During a single day a rabid wolf attacked 7 people, one of whom died directly from her wounds. The others received treatment and survived.	Vanags 1989
1985 or 1986	Aizkraukle, central Latvia	An old forestry worker was bitten by a rabid wolf. Although he received post-exposure treatment he died after 2 weeks, although it was not clear if hed died from rabies or his wounds.	Maija Kiece pers comm.
2001 (v)	Balvi district, northeast Latvia	A rabid wolf bit 5 dogs, one horse and 2 elderly people. The people and horse received post-exposure treatment, and the dogs were killed. The wolf tested positive for rabies.	Latvian newspaper report

Reported cases of people being physically injured or killed by wolves in Lithuania, 1900-1939. In most cases it was not stated if the wolf had rabies or not. In addition there are a number of cases where details are lacking.

Date	Area	Case
1912	Varenos district	Young man attacked and bitten while gathering firewood
1915 or 1916	Jurgelioniu village, Ukmerge district	Shepherd was bitten in leg while driving 3 wolves away from his sheep using a stick
1922	Juzintai, Rokiskis district	A girl was killed by a wolf
1922	Klaisos village, Rodune	A man was bitten by a rabid wolf. He received treatment and survived
1924	Luokes forest, Siauliai district	A girl shepherdess was killed by wolves.
1924	Tauragnai town	Young girl killed by wolves
1925	Rokiskis district	A soldier found dead beside a wolf, Later a girl and a beggar were also killed.
1925	Kalizbato forest, Alytus	Forest warden was attacked and injured by a wolf. Wolf was not rabid.
1925	Lintupiai, Svencionys district	Polish official was bitten on neck and hands by wolf.
1926	Bruzai forest, Daugailiai	13 year old girl was killed by wolves
1926	Rumsiskes	Man was killed by wolves in forest
1927, spring	Rudnia, Kasetos and Baltupiai villages	A rabid wolf attacked 4 persons in Rudnia village; later, 5 persons were bitten in Kasetos village; next day several persons were attacked in Baltupiai village – total number of victims was 18. Wolf was killed near Marcinkonys. Fate of victims is unknown.
1927 (xii)	Moletai district, near Moletai	In Ulziu forest, wolves attacked a woman with a baby. When they stopped the horse, baby was torn into pieces; woman was also attacked but rescued by farmers
1928	Dalginavo forest, Vilnius district	Farmer Jakstas was killed by a wolf pack in Dalginavo forest. Several more attacks were reported.
1937	Forests of Kazlu Ruda	A man going from Kazlu Ruda was attacked. He defended himself, but his legs and hands were badly bitten.

Reported incidents of rabid wolves biting people in Spain (Teruelo & Valverde 1992).

Date	Area	Incident
1903	La Cabrera, Leon	A rabid wolf attacked 3 shepherds, one eventually killed it with a knife. At least one died from his wounds, the fates of the other two are not reported
1903 (iii 29th)	Castro Hinojo, Ponferrada, Leon	A rabid wolf attacked three shepherds and one hunter from a party that tried to kill it. At least two shepherds (female age 21 and male age 15) died from rabies, the fates of the other two are not reported
1919 (i)	Almadenejos, Ciudad Real	A rabid wolf attacked a sheep flock and two shepherds (male age 15 and an adult male) were bitten. The adult male died from rabies
1918 (xi)	Aldea del Rey, Ciudad Real	A young male shepherd was attacked and injured by a rabid wolf as he left his hut. He killed the wolf with a stick but his fate is unknown.
Before 1930	Marmolejo, Cordoba	A rabid wolf attacked a man in a field, causing extensive injuries to his hands and face, and then entered a hut, biting a second man who managed to kill it with an axe. Their fates are unknown.
1949 (iv)	Portocamba, Verin, Galicia	A 50-year-old man threw a rock at "something moving in a bush". A large wolf attacked him, which he was able to kill with a rock. He was given post-exposure treatment for rabies because "near this point, very recently a woman died after having been bitten by a rabid female wolf"
c. 1900-1905	Zapaton, Extremadura	A rabid wolf attacked two men that were sleeping in a field, one of them received severe wounds to neck and head, and then two donkeys. These men died a few days later in hospital along with 8-10 other people bitten by the same wolf. The wolf attacked another 4 men, all of whom later died from rabies. The wolf was finally shot by a fisherman.
1881	Chantada, Lugo, Galicia	14 people died after being bitten by a rabid wolf, according to a hospital report.
1720 (i 31st)	Calahorra, Aragon	40 people and an unspecified number of domestic animals were bitten by a rabid wolf. The fates of those bitten is not reported

Citations by Pavlov (1982) concerning numbers of people attacked by rabid wolves in Russia

Date	Area	Incident	
1847 (vi – x)	Sjuja	10 people killed by a wolf	Lazarevskij in Pavlov 1982
1849 -51	Russia	266 adults and 110 children killed by wolves	Sjnitnikov in Pavlov 1982
1875	Russia	160 humans killed by wolves	Sjnitnikov in Pavlov 1982; also cited in Mivart 1890 in Mech 1970
1896 -1897	Kirov	205 attacks on people	Turkin in Pavlov 1982
1896 -1897	Vologda	10 attacks on people	Turkin in Pavlov 1982
1896 -1897	Kostroma	18 attacks on people	Turkin in Pavlov1982
1896 -1897	Archangelsk	1 attack on a person	Turkin in Pavlov 1982
1896 -1897	Jaroslavl	9 attacks on people	Turkin in Pavlov 1982
1924	Kirov	Single rabid wolf bit 20 people, 10 died	Pavlov 1982
1954	Kirov	Single rabid wolf bit 3 people.	Pavlov 1982
1957	White Russia	A rabid wolf bit 25 people during 1.5 days	Pavlov 1982
1972 -78	Aktjubinsk, Kazachstan	50 people bitten by wolves – at least 33 of these were by rabid wolves.	Garbuziv & Jansjin in Pavlov 1982
1974 (v)	Charkov	6 people bitten by rabid wolf	Boldenkov in Pavlov 1982
1975	Penza	3 rabid wolves bit 5 people	Pavlov 1982
1975 (summer)	Rovno	2 people bitten by rabid wolf	Boldenkov in Pavlov 1982
1975 -76	Uljanovsk	15 people bitten by rabid wolves	Pavlov 1982
1975 -76	Kaluga	7 people bitten by rabid wolves	Pavlov 1982
1975 -76	Orenburg	6 people bitten by rabid wolves	Pavlov 1982
1975 -76	Orjol	4 people bitten by rabid wolves	Pavlov 1982
1976 (vi)	Volynia	16 people bitten by rabid wolf	Boldenkov in Pavlov 1982
1976 (xii)	Rudnja	1 person biten by rabid wolf	Boldenkov in Pavlov 1982
1978 (i 24th)	Novosibirisk	3 people bitten by rabid wolf	Pavlov 1982
1978 (vi 15th)	Kursk	4 people bitten by rabid wolf	Pavlov 1982
1978 (viii 21st)	Brjansk	6 people bitten by rabid wolf	Pavlov 1982
1979	Brest / Vitebsk	26 people bitten by rabid wolf during 11 hours	Pavlov 1982

Independent sources reporting attacks on people by rabid wolves in the former USSR

Date	Place	Events	
1972 (iii 3rd)	Bagovskaya in Krasnodar	5 people bitten by rabid wolf.	Selimov et al. 1978
1974 (v 23rd)	Arkadak in Saratov	10 people bitten by rabid wolf. One woman died from the attack.	Selimov et al. 1978
1974 (vi 20th)	Egorievka in Saratov	2 people bitten by rabid wolf	Selimov et al. 1978
1975 (iv 12th)	Egensay in Orenburg	3 people scratched by rabid wolf	Selimov et al. 1978
1976 (i 4th)	Tobolsky in Orenburg	4 people bitten by rabid wolf and another 4 scratched	Selimov et al. 1978
1976	Nikolaevka, Ulyanovsk	9 people bitten by rabid wolf	Selimov et al. 1978
1976 (iii 25th)	Kazanla in Saratov	5 people bitten by rabid wolf	Selimov et al. 1978
1976 (iv 12th)	Kozyulino in Kursk	1 person bitten by rabid wolf	Selimov et al. 1978
1976 (x 22nd)	Polyanki in Zhitomir	4 people bitten by rabid wolf	Selimov et al. 1978
1978 (xi 26th)	Vitebsk	26 people bitten by a rabid wolf during 19 hours	Selimov et al. 1981
1972-1978	Kazakstan	50 people attacked by wolves. 12 wolves responsible for attacks on 33 people were confirmed as rabid. 2 people died of rabies. The other wolves may have been rabid.	Yanshin et al. 1982
1975-78	Russia	36 attacks on people by rabid wolves	Cherkasskiy 1988
1980-98	Russia	8 cases of human rabies with wolves as source of exposure	Kuzmin 2001
1999	Russia	1 person bitten by a rabid wolf in Tver province	Kuzmin per. comm.

Records of attacks by wolves (mostly rabid) on people in Iran during the 20th century.

Dates	Area	Event	References
1940-53	All Iran	325 people bitten by wolves treated for rabies at the Institut Pasteur in Tehran. Of these 60 died of rabies. Believed that many people bitten by non-rabid wolves were not sent for treatment.	Baltazard & Ghodssi 1954
c 1952	South Iran	32 people were bitten by a single rabid wolf. They did not receive effective treatment and at least 15 died.	Gremliza 1953, in Baltazard & Ghodssi 1954
1951	Zendjan, Iran	Pack of non-rabid wolves repeatedly attacked a town, killing "several" young children and "wounding more than 40 people".	Baltazard & Ghodssi 1954
1954	Iran	29 people bitten by a single rabid wolf. 4 died.	Baltazard & Bahmanyar 1955
1955	Iran	75 people bitten by rabid wolves. Only 3 died because of development of new improved treatment procedures.	Beran 1994
1975 (x 20th)	Aghbulagh	7 people bitten by a single rabid wolf. All survived following treatment.	Bahmanyar et al. 1976
1975 (xi 27th)	Hossein-Abad & Bagher-Abad,	2 people bitten by a rabid wolf in different villages, assumed to be by same wolf. All survived following treatment.	Bahmanyar et al. 1976
1981	All Iran	98 people attacked by wolves (not specified if rabid or not)	in Cherkasskiy 1988
1996	All Iran	329 people received anti-rabies treatment after being bitten by wolves (not specified if rabid or not)	Zeynali et al. 1999

Appendix 5

Information on website for the BC Parks (Government of British Columbia, Ministry of Environment, Lands and Parks (http://wlapwww.gov.bc.ca/bcparks/explore/misc/wolves/wolfsaf.htm).

Wolf safety

Providing food and/or feeding wolves in parks, and not discouraging them from approaching, results in wolves becoming habituated, i.e. not afraid of people. Normally, wolves are secretive and will run away when they encounter people. Some wolves, however, are losing their fear of humans and may approach camping areas and hikers. It is extremely important to maintain a clean, secure campsite, reduce / eliminate garbage and never provide handouts or feed wildlife. Under the *Park and Recreation Area Regulations* and the *Wildlife Amendment Act*, it is an offence to feed wildlife. Persons observed feeding wildlife will be charged.

If a wolf appears and acts unafraid or aggressive, take the following action as soon as you notice the animal:

- Do not allow the wolf to approach any closer than 100 metres.
- Raise your arms and wave them in the air to make yourself appear larger.
- When in a group, act in unison to send a clear message to the wolves they are not welcome.
- Back away slowly, do not turn your back on the wolf.
- Make noise, throw sticks, rocks and sand at the wolf.
- Do not allow children to play away from camp. Keep them close to adults at all times. Keep pets leashed and under control. Better still, don't bring them at all.
- Keep a clean and orderly camp. Cook and store food away from sleeping areas. Suspend food, toiletries, garbage and other loose objects on a rope between trees, or in secured kayak hatches, out of reach of wildlife. Wolves have been reported removing personal and other non-food items from campsites.
- Do not bury garbage. If you pack it in - pack it out!
- Wash dishes in a container and dispose of grey water at sea.
- Use areas below high tide mark, away from camp, in an area of high tidal exchange for toilets - do not use the upland areas, wolves will feed on human excrement.

Remember, you are a guest in this environment. This is home to the animals that live here.

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