

*State of Alaska
Epidemiology*



Bulletin

**Recommendations
and
Reports**

Department of Health and Social Services

Adam Crum, MSPH, Commissioner

Anne Zink, MD, Chief Medical Officer

3601 C Street, Suite 540

Anchorage, Alaska 99503 <http://dhss.alaska.gov/dph/Epi>

Division of Public Health

Heidi Hedberg, Director

Local (907) 269-8000

24 Hour Emergency 1-800-478-0084

Editors:

Joe McLaughlin, MD, MPH

Louisa Castrodale, DVM, MPH

Volume No. 21 Number 2

Hospitalizations and Deaths Resulting from Bear Attacks — Alaska, 2000–2017

Contributed by Laura Coughlin and Deborah Hull-Jilly,
Alaska Section of Epidemiology

August 13, 2019

Acknowledgements: We thank Scott Saxon, Kaleb Johnson and Anna Frick, Alaska Section of Epidemiology; Richard Raines, Alaska Health Analytics and Vital Records Section; and David Battle, Alaska Department of Fish and Game for their important contributions to this report.

Background

The frequency of bear attacks on humans appears to be increasing globally.¹ This increase has been attributed to a number of factors, including increased habitat overlap due to the growth of human populations and increased human engagement in outdoor recreation.¹⁻³

While the incidence of bear attacks may be increasing globally, they remain uncommon events. However, because each attack tends to generate extensive media coverage, this can inflate public perception of the frequency and risk of attacks.³ Characterizing the epidemiology of bear attacks in Alaska provides the public and other stakeholders with objective knowledge that can be used to help reduce the frequency of attacks and to put the risk of their occurrence into perspective.

This report describes the recent epidemiology of bear attack injuries in Alaska resulting in hospitalizations and deaths, occurrences for which reliable databases are available that have been in place for many years.

Methodology

Data used for this report were obtained from multiple surveillance systems and databases. For consistency with other literature, the term *bear attack* is used throughout the report to describe contact by a bear that results in human injury; a single bear attack can involve multiple persons and thus result in multiple bear attack injuries/fatalities. All bear attack injuries that occurred in Alaska were included in the analysis, regardless of the residency of the victim.

Bear attack hospitalization data during 2000–2017 were obtained from the Alaska Trauma Registry (ATR), a data system containing injury and treatment information for patients hospitalized (inpatient care) in Alaska for select injuries. Due to the time required to receive and process data from Alaska hospitals, 2017 is the most recent year for which ATR data were available. Bear attack hospitalizations were defined as hospitalizations with an external cause of injury ICD-9-CM code of E906 – ‘Other injury caused by animals’, an external cause of injury ICD-10-CM code of W55 – ‘Contact with other mammal’, or language in the injury description text fields to suggest an animal attack (e.g., ‘attack’, ‘maul’, ‘bite’), in combination with a bear cited in the injury description text fields. Injury mechanism fields of ATR records were used to identify hospitalizations of other injury causes (e.g., dog bites, bicycle accidents, and motor vehicle accidents) in order to help put the risk of bear attack hospitalization into perspective. Registrars and hospital coders assigned mechanism of injury codes using the ICD-9-CM and ICD-10-CM Official

Guidelines for Coding and Reporting (ICD-10-CM coding replaced ICD-9-CM coding effective October 1, 2015).^{4,5} Injury description text fields of ATR records and investigative reports from law enforcement agencies and the National Park Service (NPS) were examined when available to determine the circumstances surrounding bear attacks resulting in hospitalization. The average annual rate of bear attack non-fatal hospitalizations during 2000–2017 was calculated by dividing the number of bear attack hospitalizations identified in the ATR during this time period by the total number of hospitalizations collected in the ATR during this time period.

Death certificates from the Alaska Health Analytics and Vital Records Section were reviewed to determine bear attack mortality during 2000–2017. Bear attack mortality was defined as deaths with an underlying cause ICD-10 code of W55 (‘Contact with other mammal’) in which bear attack was cited in one of the following fields of the death certificate: the underlying or contributing cause of death description, the injury description, or the “other significant conditions” description. Law enforcement, National Park Service, and medical examiner reports were examined when available to identify relevant circumstances surrounding fatal bear attacks. Information was also gathered from the Alaska Fatality Assessment and Control Evaluation surveillance database for work-related deaths.

Results

Hospitalizations

During 2000–2017, 68 people were hospitalized for injuries sustained during 66 unique bear attacks, averaging 3.8 bear attack hospitalizations per year. At least one bear attack hospitalization occurred every year during 2000–2017, with the greatest number of hospitalizations occurring in 2016 (9 hospitalizations; Figure 1). The average annual rate of bear attack hospitalizations during 2000–2017 was 8.6 bear attack hospitalizations per 10,000 hospitalizations.

Bear attack hospitalizations occurred most frequently during June through September (n=46, 70%; Figure 2) and were most common among males, Whites, and persons aged 50–59 years (Table 1). Nearly half (n=29, 43%) of bear attack hospitalizations were the result of bear attacks that took place in the Gulf Coast region of Alaska (Table 1). Of the 29 hospitalized bear attack injuries that occurred in the Gulf Coast region, 20 (69%) occurred on the Kenai Peninsula (Figure 3). Most (n=54, 79%) patients hospitalized for a bear attack injury were Alaska residents (Table 1).

The length of hospital stay for bear attack injuries ranged from 1–45 days (median: 4 days), and the cost of hospitalization ranged from \$1,340–\$403,965 (median: \$43,345; note: one ATR record indicated a length of stay of 6 days and a total cost of \$425; this record was excluded from cost of hospitalization analysis as it likely represents a data entry error). All hospitalized bear attack injuries were nonfatal and most (56, 82%) patients were discharged to their homes. The remaining patients were discharged to another hospital (10, 15%), a skilled nursing facility (1, 1%), or left against medical advice (1, 1%).

Of the 66 bear attacks that resulted in one or more hospitalizations, 13 (20%) were work-related. About half (6/13, 46%) of the victims were employed in outdoor protection and service-related industries such as a ranger, safety officer, or guide. Other occupations included geologist (2, 15%), laborer (2, 15%), lodge worker (2, 15%), and military personnel (1, 8%). The remaining 53 incidents were non-occupational and the activity that the victims were engaged in at the time of the attack was known for 46 (87%) incidents. Of these 46 incidents, the most common activities that victims were engaged in prior to attack were hunting (15, 33%), hiking (8, 17%), running/jogging (6, 13%), and walking (6, 13%; Table 2).

The type of bear involved in each attack was recorded in the ATR and supplemental investigative reports for 49/66 (74%) bear attacks. Of these, 47 (96%) attacks involved brown bears and 2 (4%) involved black bears. The presence of one or more cubs was noted in 21 (32%) incidents; of which, 18 (86%) involved brown bears and 3 (14%) involved bears of unknown type. The size of the victim's group when attacked was known for only 20 (30%) incidents; of these, the victim was alone or effectively alone (for instance, hiking in a group in which members were spread widely apart) in 11 (55%) incidents and in a group of two in 9 (45%) incidents (Table 2).

Information speculating the cause of the attack was available in text fields of the ATR and supplemental investigative reports for 25/66 (38%) attacks. Of these, 7 (28%) attacks resulted from surprise encounters (i.e., the bear was startled, perceived a threat, and reacted defensively by attacking the victim); 7 (28%) attacks were thought to be food-motivated (e.g., the bear was guarding or attempting to access a food source, such as an animal carcass or food items stored in a tent); 5 (20%) resulted from situations in which a sow reacted defensively to protect her cub(s); 2 (8%) involved a victim's off-leash dog capturing the attention of a bear and leading the bear back to the victim; 2 (8%) resulted from victims coming in close proximity to a bear den;

and 2 (8%) involved bears that attacked in response to being non-fatally shot as part of a planned hunt.

For contextual reference, during 2000–2017, bear attack hospitalizations (n=68) were substantially less common than dog bite hospitalizations (n=467), bicycle accident hospitalizations (n=1,825), and motor vehicle accident hospitalizations (n=8,283; Table 3).

Fatalities

During 2000–2017, there were 10 bear-related fatalities resulting from 8 unique bear attacks (Figure 1). Half of the attacks occurred in June and all occurred during June through October (Figure 2). Of the 10 fatal bear attack victims, 6 (60%) were Alaska residents, 7 (70%) were male, and 9 (90%) were White (Table 1). Bear attack mortality was variable across age groups and regions of Alaska (Table 1; Figure 3).

Four of the 10 (40%) fatal bear attacks victims were working at the time of the attack. Two victims were employed in the video production industry. Other occupations were biologist (1), and laborer (1). Non-occupational bear attacks involved victims who were hiking/walking in wooded areas (3, 30%), camping (2, 20%), or doing another activity (1, 10%; Table 2).

Seven (70%) of the fatalities involved brown bears and three (30%) involved black bears (Table 2). One (10%) fatality involved a brown bear sow with cubs. In 4 of the 8 (50%) incidents, the victim was alone at the time of the attack. The remaining four incidents involved groups of two people. Two of the four incidents resulted in the death of both group members and two incidents resulted in one fatality with little or no physical injury to the second group member. In the instances involving a second group member who was not seriously injured in the attack, the second group member either successfully used a bear deterrent or was able to retreat to a building or other structure for protection against the attacking bear. At least five (50%) of the 10 fatal bear attack victims either did not possess any bear deterrents or possessed a bear deterrent that was not readily accessible at the time of the attack (i.e., the deterrent was out-of-reach).

Discussion

This review of bear attacks resulting in hospitalizations and deaths in Alaska reveals a number of important findings and underscores the fact that human-bear conflicts continue to represent an infrequent but nonetheless important cause of morbidity and mortality in Alaska. While the annual number of bear attack hospitalizations in Alaska does not appear to have changed considerably over the study period (Figure 1), many of the factors

precipitating increases in human-bear interactions worldwide also hold true in Alaska.

A study of human-bear conflicts in Alaska during 1880–2015 found that bear attacks increased in frequency in accordance with the increasing human population.⁶ Another study noted that a rise in the number of people who engage in recreational activities such as hiking and camping in Alaska likely contributed to an increase in the frequency of bear attacks during 1900–1985.⁷ Alaskans have been estimated to be about 1.5 times more likely than the average U.S. citizen to engage in outdoor recreational activities.⁸

During the study period (2000–2017), Alaska’s human population increased 17% and Alaska’s population of brown bears (the type of bear most commonly involved in bear attacks identified here) remained healthy and productive, reaching densities as high as one bear per square mile in some regions of the state (e.g., the Alaska Peninsula, Kodiak, and Admiralty Island).^{9,10} Additionally, an increasing number of Alaskans and Alaska visitors have been taking advantage of the State’s numerous opportunities for outdoor recreation. During 2000–2017, the annual number of recreational visitors at Denali National Park and Preserve and Lake Clark National Park and Preserve, both of which were locations of bear attacks identified here, had increased substantially.¹¹ Additionally, in 2017, an estimated 1 in 10 jobs in Alaska were related to the outdoor recreation industry, creating increased opportunities for human-wildlife encounters for persons in both recreational and occupational capacities.⁸

During the study period, bear attacks were most numerous in the Gulf Coast region and in the summer months; however, bear attacks occurred in every region of Alaska and during all but 2 months of the year (Table 1; Figure 2). Consistent with other studies of human injury from bear attacks, attack victims in Alaska were most commonly adult men engaged in outdoor recreational activities. It is important to note that a substantial proportion of injuries involved persons who were not Alaska residents, underscoring the need for educational outreach to both Alaska residents and visitors.

For the purpose of putting the risk of bear attacks into perspective, it is important to highlight that bear attacks are far less common than many other outdoor causes of injury hospitalization and mortality in Alaska. For example, during 2000–2017, people in Alaska were 27 times more likely to be hospitalized for a bicycle accident injury and 71 times more likely

to be hospitalized for an all-terrain vehicle (ATV) or snow machine accident injury than for a bear attack injury. Likewise, during 2000–2017, there were 500 fatalities due to drowning and 246 fatalities due to exposure to cold temperatures in Alaska compared to 10 fatalities due to bear attacks.¹² It is also imperative to note, however, that there is differential exposure to the various hazards used for this comparison. For example, the general public may spend more time on a bicycle in a given year than in bear habitat.

This analysis also underscores the fact that many bear attacks in Alaska occur in occupational settings, accounting for approximately 20% of bear attack hospitalizations and 40% of bear attack deaths during the study period. As such, employers of workers at risk for bear encounters while on the job should ensure that they have effective policies and procedures in place to help prevent encounters, deter attacks, and respond rapidly to injuries sustained in the field.

The most effective means of avoiding a bear attack is to prevent the encounter in the first place. Actions like making noise, traveling in groups with little distance between group members, and avoiding backcountry travel in low visibility situations (e.g., thick brush, dense fog, evening travel) or where sound is obscured (e.g., near loud rivers/streams) can help reduce the likelihood of surprising a bear and thereby prevent subsequent injury. The risk of food-motivated attacks can be reduced by avoiding areas where bear attractants like fish or other carcasses are identified in the area, using bear-resistant containers to properly store food and garbage away from sleeping areas when camping, and using electric fences around campsites and other bear attractants. Hunters should be wary of the potential for freshly-killed game drawing bears to the area and use caution when transporting game meat out of the field. Additionally, those hiking or walking with unleashed dogs should be aware of the potential for pets to attract the attention of bears and potentially draw them back to their owners. Lastly, human-bear encounters around human establishments can be minimized through responsible handling of garbage and other bear attractants. Additional information can be found on the Alaska Department of Fish and Game (ADF&G) website (see: <https://www.adfg.alaska.gov/index.cfm?adfg=livingwithbears.main>).

Unfortunately, avoiding bear encounters is not always possible. Therefore, everyone who is recreating or working in bear country should always carry a bear deterrent for defense and practice accessing and using the deterrent before relying on it for defense in a high-pressure situation. Bear deterrents that cannot be

readily accessed or properly deployed are not deterrents. It remains imperative that people engaged in such activities be prepared for bear encounters and attacks every time they travel in the backcountry. Several studies have demonstrated the efficacy of various deterrents in providing protection against bear attacks.^{13,14}

Limitations

The current study is subject to at least two important limitations. First, injuries that were treated in the field or in emergency departments or other outpatient settings were not captured. As such, this report does not provide an estimate of the overall incidence of bear attacks or overall bear attack-associated morbidity in Alaska over the time period examined. Second, while circumstance information can be obtained from free-text fields of hospital records, the level of detail present in these fields is variable and often incomplete. Moreover, circumstances surrounding fatal injuries can be obtained from medical examiner reports; however, these reports also vary in the level of detail provided, with older reports containing fewer narrative details than more recent reports. Currently, there is no centralized database documenting bear attack information. Efforts were made to obtain investigative reports of each bear attack from agencies involved in the investigations, including the ADF&G, the National Park Service, and various law enforcement agencies across Alaska; however, investigative reports were not available for all incidents.

Conclusion

While substantially less common than other causes of outdoor injury, bear attacks occurred in Alaska every year during 2000–2017 with resulting hospitalizations and fatalities. Learning the best practices for recreating and working safely in bear country can help reduce the risk of bear attacks.

References

1. Bombieri G, et al. Brown bear attacks on humans: a worldwide perspective. *Scientific Reports* 2019;9(8573). doi: 10.1038/s41598-019-44341-w
2. Herrero S, Higgins A. Human injuries inflicted by bears in Alberta: 1960–98. *Ursus* 2003;14(1):44–54.
3. Bombieri G, et al. Content analysis of media reports on predator attacks on humans: Toward an understanding of human risk perception and predator acceptance. *Bioscience* 2018;68(8):577–584. doi: 10.1093/biosci/biy072
4. Centers for Disease Control and Prevention, National Center for Health Statistics. ICD-9-CM Official Guidelines for Coding and Reporting. Available at https://www.cdc.gov/nchs/data/icd/icd9cm_guidelines_2011.pdf
5. Centers for Disease Control and Prevention, National Center for Health Statistics. ICD-10-CM Official Guidelines for Coding and Reporting. Available at: <https://www.cdc.gov/nchs/icd/data/10cmguidelines-FY2019-final.pdf>
6. Smith TS, Herrero S. Human–Bear Conflict in Alaska: 1880–2015. *Wildlife Society Bulletin*. 2018; 42(2):254–63. doi: 10.1002/wsb.870
7. Middaugh JP. Human injury from bear attacks in Alaska, 1900–1985. *Alaska Med* 1987;29(4):121–26.
8. University of Alaska Center for Economic Development. Economic Development in Alaska: Outdoor Recreation Impacts and Opportunities. Released March 2019. Available at: <https://static1.squarespace.com/static/59f6b60bcf81e02892fd0261/t/5c7eff9415fcc0410111212a/1551826896433/Outdoor+Recreation+-+Impacts+and+Opportunities.pdf>
9. Alaska Department of Labor and Workforce Development, Research and Analysis Section. Annual Components of Population Change for Alaska, 1945 to 2018. Vintage 2018. Available at: <http://live.laborstats.alaska.gov/pop/index.cfm>
10. Alaska Department of Fish and Game. Brown Bear Species Profile – Status, Trends, and Threats. Available at: https://www.adfg.alaska.gov/index.cfm?adfg=brownbear_main
11. National Park Service (NPS). NPS Visitor Use Statistics Tool. Available at: <https://irma.nps.gov/Stats/Reports/Park>
12. Alaska Division of Public Health, Health Analytics and Vital Records Section. Alaska Mortality Database Query for Drowning (W65-W74X) and Exposure (X31-X31X) Deaths, Alaska Occurrence, 2000–2017.
13. Smith TS, Herrero S, et al. Efficacy of bear deterrent spray in Alaska. *J Wildlife Manage* 2008;72(3):640–45.
14. Smith TS, Herrero S, et al. Efficacy of firearms for bear deterrence in Alaska. *J Wildlife Manage* 2012;76(5):1021–27.

Table 1. Demographic Characteristics of Bear Attack Victims who were Hospitalized or Died (N=78) — Alaska, 2000–2017

	Hospitalizations (n=68)		Fatalities (n=10)	
<i>Years of Available Data</i>	<i>2000–2017</i>		<i>2000–2017</i>	
Sex	Count	Percent*	Count	Percent
Female (n=18)	15	22%	3	30%
Male (n=60)	53	78%	7	70%
Race	Count	Percent	Count	Percent
American Indian/Alaska Native (n=8)	7	10%	1	10%
White (n=66)	57	84%	9	90%
Other/Unknown (n=4)	4	6%	0	--
Age Group	Count	Percent	Count	Percent
10–19 years (n=7)	6	9%	1	10%
20–29 years (n=9)	8	12%	1	10%
30–39 years (n=14)	13	19%	1	10%
40–49 years (n=15)	12	18%	3	30%
50–59 years (n=23)	21	31%	2	20%
60+ years (n=10)	8	12%	2	20%
Alaska Resident	Count	Percent	Count	Percent
Yes (n=61)	54	79%	7	70%
No (n=17)	14	21%	3	30%
Region of Occurrence	Count	Percent	Count	Percent
Anchorage (n=12)	11	16%	1	10%
Mat-Su (n=4)	4	6%	0	--
Gulf Coast (n=29)	29	43%	0	--
Interior (n=10)	7	10%	3	30%
Northern (n=6)	4	6%	2	20%
Southeast (n=14)	12	18%	2	20%
Southwest (n=3)	1	1%	2	20%

*Percentages may not add to 100% due to rounding.

Figure 1. Number of Persons Injured from a Bear Attack Resulting in an Hospitalization or Fatality, by Year (N=78) — Alaska, 2000–2017

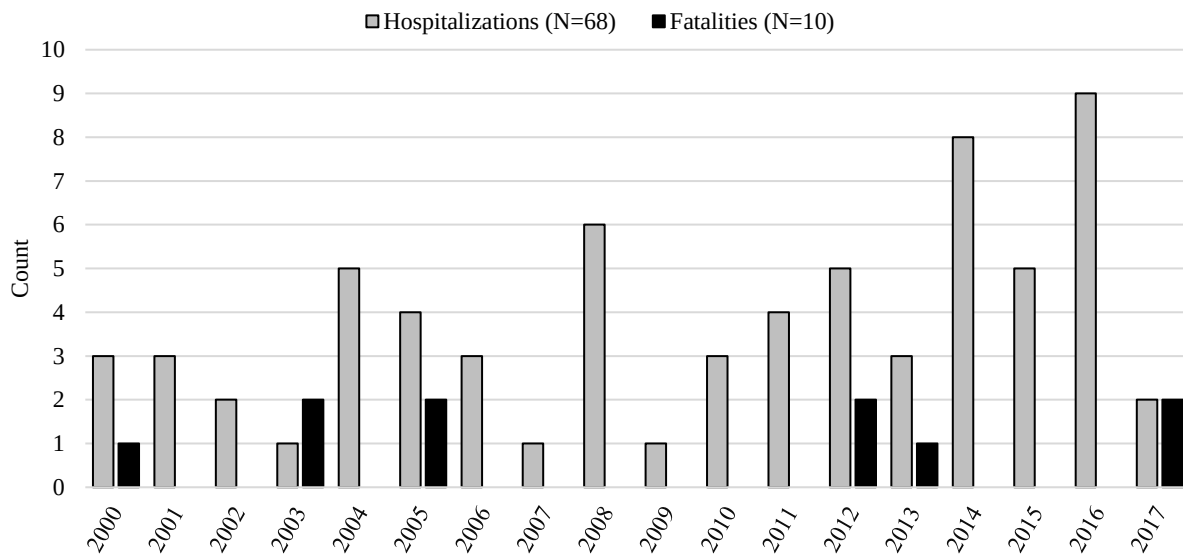
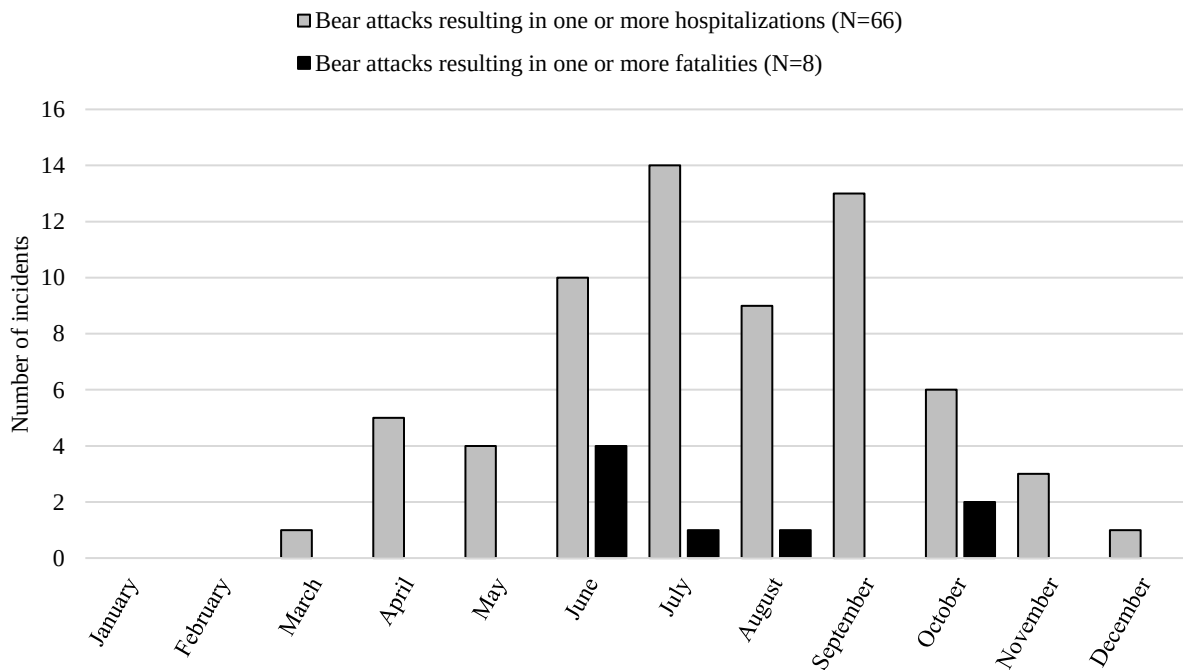


Figure 2. Number of Unique Bear Attacks* Resulting in One or More Hospitalizations or Fatalities, by Month (N=74) — Alaska, 2000–2017



* A single bear attack can involve multiple persons and thus result in multiple bear attack injuries/fatalities.

Table 2. Common Circumstances of Unique Bear Attacks* Resulting in One or More Hospitalizations or Fatalities (N=74) — Alaska, 2000–2017

	Attacks Resulting in ≥1 Hospitalizations (N=66)		Attacks Resulting in ≥1 Fatalities (N=8)	
<i>Years of Available Data</i>	<i>2000–2017</i>		<i>2000–2017</i>	
Occupational	Count	Percent [†]	Count	Percent
Yes	13	20%	3	38%
No	53	80%	5	62%
Activity at time of attack [‡]	Count	Percent	Count	Percent
Hunting	17	26%	0	--
Hiking	11	17%	1	13%
Walking/walking a dog	6	9%	2	25%
Running/jogging	6	9%	0	--
Camping	3	5%	4	50%
Fishing	2	3%	0	--
Other recreational	6	9%	1	13%
Other work-related	8	12%	0	0%
Unknown	7	11%	0	--
Group Size	Count	Percent	Count	Percent
Alone or effectively alone [§]	11	17%	6	75%
Group of two	9	14%	2	25%
Unknown	46	70%	0	--
Type of bear(s) involved	Count	Percent	Count	Percent
Brown bear	47	71%	5	63%
Single	26	--	4	50%
With one or more cubs	18	--	1	13%
Unknown number	3	--	0	--
Black bear	2	3%	3	30%
Single	1	--	3	100%
With one or more cubs	0	--	0	--
Unknown number	1	--	0	--
Unknown type of bear	17	26%	0	--
Single	8	--	0	--
With one or more cubs	3	--	0	--
Unknown number	6	--	0	--

*A single bear attack can involve multiple persons and thus result in multiple bear attack injuries/fatalities.

[†]Percentages may not add to 100% due to rounding.

[‡]Occupational injuries were included in overall activity categories when applicable. For instance, if the victim was working as a hunting guide at the time of the attack, the victim was included in the 'hunting' category.

[§]Effectively alone refers to situations in which the victim was engaged in an activity with others but could reasonably be perceived as a single person by a bear (for instance, a victim hiking in a group that was spread widely apart along a trail or camping with others who were asleep in their tent at the time of the attack)

Figure 3. Number of Persons Injured from a Bear Attack Resulting in a Hospitalization or Fatality (N=78), by Location — Alaska, 2000–2017

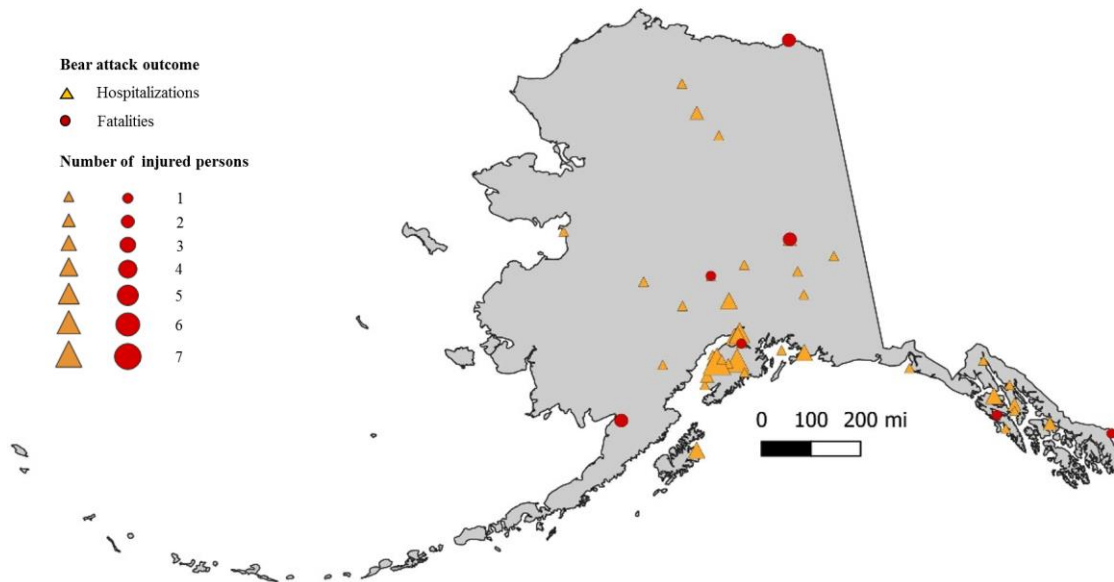


Table 3. Select Alaska Trauma Registry (ATR) Hospitalizations by Injury Cause — Alaska, 2000–2017

Injury cause	Total number of cases	Average number of cases per year	Percent of total ATR cases
Bear attack	68	3.8	<0.1%
Dog bite	467	25.9	0.6%
Bicycle accident	1,825	101.4	2.3%
All-terrain vehicle (ATV) or snow machine accident	4,832	268.4	6.1%
Motor vehicle accident (including motorcycle)	8,283	460.2	10.4%