Studying Boat-Based Bear Viewing: Methodological Challenges and Solutions

Sarah Elmeligi

Abstract—Wildlife viewing, a growing industry throughout North America, holds much potential for increased revenue and public awareness regarding species conservation. In Alaska and British Columbia, grizzly bear (Ursus arctos) viewing is becoming more popular, attracting tourists from around the world. Viewing is typically done from a land-based observation platform that forces tourists into a centralized location. Studies addressing the impacts of tourism on grizzly bear population fitness have based data collection from similar platforms or towers that overlook the entire viewing area. In larger study areas, this may not be possible. In the K'tzim-a-deen Valley, all viewing is done from boats, thus changing the dynamics of tourism. The impacts of boat-based tourism are likely different than those of land-based tourism; therefore, this research attempted to quantify the former so that the two can be compared. Data collection that focused on grizzly bear behavior was accomplished from a small boat. With this new methodological approach different challenges arose that required innovative solutions in the field. This paper outlines a new boat-based methodology and its associated challenges, for studying the impacts of boat-based viewing on grizzly bears.

Introduction

In parts of southern Alaska and western British Columbia, grizzly bear (*Ursus arctos*) viewing is an increasing form of tourism (Nevin and others 2001). Wildlife viewing can impact grizzly bears in the short-term at the individual level, and in the long-term at the population level, as impacts become cumulative (Green and Geise 2004). Potential short-term impacts resulting from increased human presence in grizzly bear habitat include habituation of individuals (Government of British Columbia 1993; Nevin and others 2001; Swenson 1999), habitat displacement (Gibeau and others 2002; Nevin and Gilbert 2005; Olson and others 1997), and adjustments in behavioral patterns (Klinka and Reimchen 2002; Naves and others 2001; Reimchen 1998; Smith 2002). Regardless of what the exact impacts and their intensities are in a particular area, population reproductive rates can be negatively impacted over the long-term (Smith 2002).

Visual effects such as habitat displacement or a decrease in foraging rate are relatively easy to record (Gauthier 1993), and results are usually extrapolated to the population level for management implications (Chi and Gilbert 1999; Dyck and Baydack 2004). Using focal animal sampling, scan sampling, or a combination of the two (Altmann 1974) time budgets that compare a bear's behavior with and without disturbance can be created to quantify behavioral alterations (Chi and Gilbert 1999; Himmer 1996; Nevin and Gilbert 2005; Olson and others 1997; Smith 2002; Smith and Partridge 2004). Because no significant differences between the results of scan and focal animal sampling have been found (Nevin and Gilbert 2005), the approach chosen will depend upon the specific attributes of a location, species distribution, and duration of behaviors.

Previous studies addressing the impacts of tourism viewing on grizzly bear behavior have used a viewing platform or research tower for data collection (Fagen and Fagen 1994; Nevin and Gilbert 2005; Olson and Gilbert 1994; Olson and others 1997). Unlike land based viewing, tourists in boats can easily follow bears up or down stream; bears cannot, therefore, moderate their interactions with humans. Studies investigating water based viewing have focused on the K'tzim-a-deen Grizzly Bear Sanctuary (hereafter K'tzim-a-deen Sanctuary) and have not found a significant impact of boat tourism on grizzly bear behavior (Himmer 1996; Pitts 2001). Although the Sanctuary itself falls under the jurisdiction of British Columbia's Ministry of the Environment (MOE), the inlet outside of Sanctuary boundaries is unprotected, and facing increasing levels of tourism. Since negotiations are currently underway to extend the boundary, research was required to investigate potential impacts of tourism along the inlet's shores.

Due to the size and topography of the research area, this study used a small boat for data collection. The use of a mobile research station substantially altered the methodological approach, resulting in several unique challenges as yet unexplored in the literature. The purpose of this manuscript is to discuss these challenges and resulting solutions that were put into place during the 2005 field season. The research conducted is unique and innovative in that it is the first study in Canada to assess the potential impacts of unregulated water-based wildlife viewing activities on grizzly bears outside of protected area boundaries.

Methods

Study Area

The K'tzim-a-deen River valley is approximately 376 km^2 (145 square miles), located 45 km (28 miles) northeast of Prince Rupert, British Columbia, Canada (longitude: 129-56-8, latitude 54-36-28). The K'tzim-a-deen Sanctuary, co-managed between MOE and the Tsimshian First Nations,

Sarah Elmeligi, Candidate for a Masters Degree in Natural Resources and Environmental Studies, University of Northern British Columbia, Outdoor Recreation and Tourism Management Program, British Columbia, Canada.

In: Watson, Alan; Sproull, Janet, Dean, Liese, comps. 2007. Science and stewardship to protect and sustain wilderness values: eighth World Wilderness Congress symposium: September 30–October 6, 2005; Anchorage, AK. Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

covers 445 km^2 (172 square miles) (Government of British Columbia 1993). This area has been designated a class "A" provincial park with the primary purpose of protecting grizzly bears and their habitat; all human use takes secondary priority (Government of British Columbia 1994). The sanctuary itself is located at the end of a 25 km (16 miles) long inlet and is only accessible by boat, floatplane, or helicopter (Government of British Columbia 1993). This study focused on the inlet, which meanders and undulates to the estuary, and is on average approximately 700 m (766 yards) wide.

The K'tzim-a-deen Sanctuary is home to an estimated 50 individual grizzly bears (MacHutchon and others 1992) that move down to the valley bottom to forage on Lyngbye's sedge (*Carex lyngbyei*) and skunk cabbage (*Lynsichiton americanum*) from mid-April to early-July (MacHutchon and others 1992). The high protein content and abundance of this vegetation makes this area critical grizzly bear habitat (Government of British Columbia 1993).

Due to the concentration of grizzlies along the inlet and estuary and their high degree of visibility, this time of year is also ideal for wildlife viewing activities (Government of British Columbia 1993). Since 1987, two principal operators have been conducting viewing tours within the K'tzim-a-deen Sanctuary's boundaries, but there are an additional three operators conducting tours in the inlet. Although tourism to the K'tzim-a-deen Sanctuary has increased by 42 percent since 1995 (Jamie Hahn, K'tzim-a-deen Area Supervisor, MOE, personal communication, September 2004), no data currently exist for areas beyond the boundary. With Prince Rupert being designated a port of call for cruise ships (bringing 94,206 passengers from May 2005 to September 2005), and the increased media coverage regarding wildlife viewing in BC, day trips from Prince Rupert to the K'tzim-a-deen inlet are becoming more popular.

Methodological Approach

Data collection, which coincided with peak tourist season, took place from May 7 to July 31, 2005 and focused on the actions and reactions of grizzly bears. For the months of May and June, data were collected nearly everyday, and always on days when cruise ships docked in Prince Rupert. By mid-July, tourism decreased substantially as did the number of bears frequenting the inlet. For these reasons, data were only collected for the first 2 weeks and the last week of July. The day was divided into three data collection segments: morning (0730 hrs–1130 hrs), afternoon (1200 hrs–1700 hrs), and evening (1800 hrs–2200 hrs), two of which were investigated each day. Research was always conducted during the afternoon timeframe, as that was when tour boats were most likely to be active in the area. Morning and evening data collection times were alternated every 2 days to ensure that a roughly equal amount of data were gathered from each of these timeframes. Control data were collected when no boats were in the inlet, typically during the early evening.

Boat-Based Research. Due to its meandering shape and length of over 20 km (12 miles), there is no one location that provides a complete view of the K'tzim-a-deen Inlet. Foraging areas frequented by grizzly bears are interspersed along the entire length of the inlet. At most, a researcher could view three of these areas at one time, but there are over ten regularly used foraging areas. Therefore, using a land-based observation platform that would limit the researcher's view of the area would drastically affect sample size. In addition, the logistics required for research tower construction in a rugged rainforest where no other land-based structures exist were prohibitive. The purpose of this research was to investigate interactions between tourist vessels and bears, thus it was imperative to have the same mobility as tourists who often followed bears from one foraging area to another. For these reasons, data were collected from a 4.2 m (14 ft) aluminum skiff with a 4-stroke engine (fig. 1).

Bear Behavior. Focal animal sampling, recording the time of behavioral transitions and the behavior before and after (Altmann 1974), was used for data collection. All observations were made with a pair of 8x36 Bushnell Image Stabilizing binoculars. At the start of each data collection session, the researchers cruised the inlet until a bear was spotted. Data collection commenced as soon as the researchers could distinguish the bear's activity (~ 600 m [656 yards] away), and continued until 30 to 45 minutes after the bear became unobservable; this ensured that the bear had left the foraging area and was not merely hidden. In the event that a bear commenced traveling along the shores of the inlet, the research vessel attempted to follow it while maintaining a maximum distance that did not compromise data collection.

For each bear observation a variety of information regarding weather, wind, temperature, inlet section, and bear identification was recorded. Although previous literature has used urination pattern, and direct observation of genitals to distinguish sex (Klinka and Reimchen 2002; Nevin and Gilbert 2005), this approach was rarely viable in the K'tzim-a-deen. Instead, bear sex was mainly determined based on relations to conspecifics during the mating season, and the presence of cubs. If sex was uncertain, it was clearly marked as such. For females with cubs, the number of cubs and their ages were recorded, even though all behavioral observations were based upon the female's activity. Bear age, whether subadult or mature adult, was determined based on the presence of cubs (mature female), or size. Bears that were traveling solo, and estimated to be larger than 250 kg (551 lbs) were classified as adult, and bears that were smaller but alone were classified as subadult (fig. 2) (Klinka and Reimchen 2002). Individual identification of bears was attempted based on prominent markings, reproductive status, and scarring. All bears were recorded with a Canon digital video camera with 100x zoom to assist with individual recognition. In addition, a detailed description of each bear, including diagrams, was included in field notes. Bear behavior was assigned based on generated behavior codes (table 1), which were independent of each other (that is a bear could only be classified as doing one behavior). Bear distance from the researcher, and distance to cover was measured using a Bushnell alignment adjusting range finder, which was most efficient at distances of less than 400 m (437 yards). Bearing from the researcher to the bear was taken with a standard compass.

Boat and Tourist Behavior. For all boats involved in data collection, the vessel name, approximate boat size, and style was recorded on the data sheet. Boat and tourist behavior were classified in a similar way as bear behavior

Figure 1—Data was typically collected approximately 300-400m from shore with the use of image stabilizing binoculars (photo by Kim McLean).

Figure 2—Cataloging and identifying individual bears was done at closer distance (<50m). This subadult was observed in the Khutzeymateen estuary in mid-June 2005 (photo by Sarah Elmeligi).

Table 1—Behavior codes for bear behavior.

Course	Fine	Description
00 Unobservable		Known to be present but not visible
1 locomotion[a]	10 stop	Cease movement
	11 walking	Normal gait
	12 running	Gallop or sprint
	13 slow run	Trot or jog
	14 standing	On all four feet
	15 sitting	On haunches
	16 lying down	Prostrate
	17 swimming	Note direction on data sheet
2 vigilance	21 watch	Passive scan of area
	23 stare	Focus on one point, ears forward
	24 head shake	Lateral head movement in medial plane
	25 standing investigative	On hind legs
3 foraging	31 herbivory	Grazing herbaceous forage
	32 carnivory	Foraging on non-herbaceous species
	33 intertidal	Foraging in intertidal area
	34 unknown	Foraging on unknown food source
4 social	42 social, non-antagonisitc	Amicable physical contact
	44 non-aggressive vocalization	Towards person or bear
	45 female attention	Female waiting for/going to/looking at cubs
99 other	Specify in comments section	

[a] Adapted from Fagen and Fagen (1994) and Nevin and Gilbert (2005).

(table 2). Although no similar codes in the literature have attempted to quantify boat behavior in such detail, other works have identified important factors to consider such as the navigation and speed of the vessel (Lusseau and Higgam 2004), and the distance of the vessel to the animal (Galicia and Baldassarre 1997; Rodgers and Schwikert 2002). Noise level of both the boats and the tourists within them were also accounted for. The range finder was used to determine the distance between the research boat and the tourist boat and a standard compass used to determine bearing. Through statistical analysis, this information will be combined with the bear behavior data to determine threshold distances of disturbance. UTM coordinates for the research vessel were also recorded using a GPS unit.

Community Involvement. For ecotourism projects to be sustainable, involving the local community in their creation and management is essential (Drake 1991; Woodley 1993). Without the support of local communities and indigenous groups, tourism development ventures may be met with opposition (Woodley 1993). With the support of all stakeholders involved (local communities, MOE, tour operators), this research aims to make realistic management suggestions that take a variety of attitudes and values into consideration. By sharing a field camp with the two Tsimshian Sanctuary rangers, researchers could provide continual project updates, and the rangers could share their vast knowledge of the area and its bears. Also, through the hiring of two Tsimshian liaisons, one from Metlakatla and the other from Lax Kw'Alaams, this project created a direct link between researchers and the Tsimshian First Nation. Both liaisons were responsible for organizing and creating a formal presentation for their respective communities. These efforts ensured that all interested members from the two different communities could be involved.

Before entering the field, UNBC researchers met with all tour operators to discuss the objectives of the project. This allowed for any initial concerns regarding the researchers' presence in the inlet to be addressed. Throughout the field season regular, informal, one-on-one meetings with all tour operators served as a forum for information sharing. Upon project completion, a final stakeholders meeting will take place and the full report outlining study results and management suggestions will be presented.

Methodological Challenges and Solutions

Bear Observation Challenges

1. Learning the Best Technique of Approach. Depending on the water current, wind direction, and topography of a particular foraging area, the angle and speed of approach that would elicit the least disruptive reaction from a bear varied. Although a thorough knowledge of tide heights and times, and shoreline topography was critical, learning which approaches scared bears away and which allowed successful data collection was mostly acquired through trial and error. For example, if a bear was aware of the research vessel's approach, it was more likely to stay than if it was suddenly surprised by the vessel's proximity. Since most data were collected with the boat motor off, researchers had to consider in which direction the vessel would move and how quickly, particularly since restarting the motor to reposition the boat could elicit a reaction from the bear being observed.

2. Individual Variation in Levels of Habituation. Habituation of grizzly bears to disturbance has been shown

Table 2—Behavior codes for boat and tourists behaviors.

Course	Fine	Description
7 speed [a]	70 no movement	Engine off, drift with current
	71 idle	Engine on, drift with current
	72 slow movement	Not directed towards bear
	73 medium movement	Not directed towards bear
	74 fast movement	Not directed towards bear
8 approach	81 slow movement	Directed towards bear
	82 medium movement	Directed towards bear
	83 fast movement	Directed towards bear
9 noise level [b]	90 none	No audible noise
	91 boat	Boat motor is only audible noise
	92 people—quiet	Tourists communicate- not audible
	93 people—noisy	Tourists communicate- audible
	94 boat—noisy	Boat-created sound, in addition to motor
	95 aircraft	Aircraft flies overhead- note type and length of time
10 tourists	100 nothing	Have not seen bear—no movement
	101 little overt movement	Sitting, photography
	102 standing	Standing still, photography
	103 moving on boat	Movement within boat
	104 calling	Loud communication toward bear
	105 change vessels	Specify time and type on data sheet

[a] Boat speed: slow movement < 5 km/hour (3 miles/hour), medium movement 6–15 km/hour (4–9 miles/hour), fast movement >15 km/hour (9 miles/hour)
[b] Noise level as perceived by researcher.

to impact individual behavioral responses (Olson and Gilbert 1994; Olson and others 1997); acknowledging this inherent individual variation can lend robustness to analysis and increase confidence in subsequent conclusions. All bears were classified as tolerant or non-tolerant, and this classification was included in their general description on data sheets. Bears who allowed boats to come within 200 m (219 yards) without displaying any flight or overt vigilance behaviors were recorded as tolerant (fig. 3); all others were non-tolerant. For example, one tolerant adult female would not even raise her head from foraging until boats were within 200 m (219 yards) from shore, whereas one subadult would completely cease foraging and stare at approaching vessels that were over 700 m (766 yards) away.

Data collection typically commenced at ~600 m (656 yards) away, at which point the researcher could either turn the

Figure 3—This adult female is well known within the Khutzeymateen for being very tolerant of boat traffic (photo by Sarah Elmeligi).

boat motor off and let the current carry the vessel closer, or slowly maneuver the boat to a distance of ~ 400 m (437 yards). As soon as a bear started staring at the boat any approach would cease, thus allowing data collection of non-tolerant bears or bears whose tolerance levels were unknown.

3. Limited Visibility of Foraging Area. The forests of the K'tzim-a-deen Valley are very thick with vegetation and the landscape itself is very rugged. The combination of shorelines littered with forest debris and a naturally undulating topography meant that bears could easily become hidden during observation. This became particularly challenging by July when the vegetation along the shoreline had grown to such heights that it easily concealed an adult bear. On these occasions, the research vessel would have to be maneuvered to a position where the bear once again became visible. If no such vantage point could be found, the bear's behavior would be classified as "known to be present but unobservable," and the researcher would wait for a minimum of 30 minutes to see if the bear would re-emerge.

Logistical Challenges

1. Data Could Not Be Collected Solo. Although researchers had a marine VHF radio at all times, being in the boat alone on a continual basis was a safety concern. During times of high winds or strong currents, the research vessel would need constant adjustment for safety purposes and to maintain a good viewing angle. Even during times of calm waters, watching and recording activities of the bear and boat simultaneously was impossible. On several occasions, a scan sampling approach to data collection was attempted. Scans were conducted at 30 second intervals, alternating between the bear and the tourist vessel, thus a subject's behavior was only recorded once every 60 seconds. Using scan sampling prohibited observation of more than one tourist vessel, and was not conducive to the observation of finer detailed behaviors. Using this methodology meant that a researcher could turn her head and the bear could be gone without ever knowing the events that led to its departure. Once a field assistant was hired, this concern was alleviated as one researcher could observe the bear while the other observed the tourist vessel and controlled the research boat.

2. Boat Completely Exposed. The boat used in data collection had no cover, therefore researchers were continually exposed to the elements, whether extreme sunshine and heat or continuous rain and cold. Although this did not impact data collection, it did impact field researcher morale. On sunny days there was a risk of over-exposure to heat, and during extended periods of rain, binoculars got foggy impeding their usefulness. Although there was an umbrella on-board, it was difficult to hold an umbrella, binoculars, and data sheets simultaneously. Constructing a temporary, but durable cover over the boat would alleviate this concern.

3. Rough Waters. On several occasions the waters of the inlet became rough enough that safety took precedence over data collection. The larger challenge arose, however, when the water was rough, but not enough to impede safety. Watching a bear through a bouncing pair of binoculars proved to be challenging. Positioning the boat closer to shore, where the waters were not as rough, alleviated this concern but distance could still be impacted by the bear's tolerance level. Image stabilizing binoculars were a must in this situation. On occasion, data collection sessions were canceled or postponed.

4. Researcher Can Only Be In One Place at a Time. On several occasions there was a boat and/or a bear in a section of the inlet not visible to the researcher. Through VHF marine radio communication with tour operators and the sanctuary guardians, bear sightings were often shared between parties. Watching boat behavior was another way to locate bears as tourist vessels typically changed speed and direction once a bear was spotted. With a maximum speed of ~6 knots, however, the research vessel could take up to 30 minutes to reach an area by which time the bear may have retreated into the forest. A faster boat that was still equally quiet would have been more efficient.

While collecting control data, researchers would position themselves in areas of the inlet that provided the greatest unobstructed views. If no bears appeared within 45 to 60 minutes, the researchers would relocate to another area. This way, the majority of the study area could be viewed during one sampling session.

5. Open Communication With All Users, Particularly Tour Operators. Researchers were sharing the area with tour operators who in most cases have been conducting business in the K'tzim-a-deen Valley for more than ten years. Through regular non-formal communication with operators, researchers could not only locate more bears, but also gain a higher degree of understanding regarding general bear activity in the whole area.

Building a strong relationship with the tour operators began before entering the field. It was extremely important that all tour operators understood the project's objective was to observe the bears, not to critique their individual businesses. Since any subsequent management plans will attempt to account for all stakeholders' needs and values, it was particularly important that tour operators felt they could approach researchers with their concerns. Throughout the field season, researchers had to remain approachable and diplomatic.

Conclusions

As bear viewing becomes more popular in North America, the means by which tourists engage in this activity will become more diverse. Research programs that investigate the impacts of tourism must become equally diverse in their methodological approaches. Using a boat for data collection presented an array of unique challenges that not only impacted how data on bear behavior was collected, but also the logistics of research practices. The approach presented here proved successful in the K'tzim-a-deen Valley, and could easily be modified to suit other locations where boat-based viewing is present. Most importantly, when investigating an industry that is continually evolving, researchers must create methodologies that are flexible without compromising the validity of the data.

Acknowledgments

The following individuals and organizations provided valuable support of this research project: Jamie Hahn, British Columbia Ministry of Environment–Parks Branch; North Coast Land and Resource Management Plan; Drs. John Shultis, Pam Wright, and Michael Gillingham; Penny Jones, field assistant; Tsimshian Community members Norman Faithful, Allen Maxewll, Shawna Tait, and Tricia Leighton.

References

Altmann, J. 1974. Observational studies of behaviour: sampling methods. Behaviour. 49: 227–267.

Chi, D. K.; Gilbert, B. K. 1999. Habitat security for Alaskan black bears at key foraging sites: are there thresholds for human disturbance? Ursus. 11: 225–238.

Drake, S. P. 1991. Local participation in ecotourism projects. In: Whelan, T. ed. Nature tourism: managing for the environment. Washington, D.C., Island Press. 132–155.

Dyck, M. G.; Baydack, R K. 2004. Vigilance behaviour of polar bears (Ursus maritimus) in the context of wildlife-viewing activities at Churchill, Manitoba, Canada. Biological Conservation. 116: 343–350.

Fagen, J. M.; Fagen, R. 1994. Bear-human interactions at Pack Creek, Alaska. International Conference of Bear Research and Management. 9: 109–114.

Galicia, E.; Baldassarre, G. A. 1997. Effects of motorized tour boats on the behaviour of nonbreeding American flamingos in Yucatan, Mexico. Conservation Biology. 11(5): 1159–1165.

Gauthier, D.A. 1993. Sustainable development, tourism, and wildlife. In: Nelson, J. G.; Butler, R. W., eds. Tourism and sustainable development: monitoring, planning, managing. Department of Geography, University of Waterloo, Ontario, Canada. 134–147.

Gibeau, M. L.; Clevenger, A. P.; Herrero, S.; Wierzchowski, J. 2002. Grizzly bear response to human development and activities in the Bow River Watershed, Alberta, Canada. Biological Conservation. 103: 227–236.

Government of British Columbia. 1993. K'tzim-a-deen wildlife viewing plan. British Columbia Environment Fish and Wildlife Division. Smithers, British Columbia. On file with author.

Government of British Columbia. 1994. K'tzim-a-deen (K'tzim-a-deen) interim protection plan. Ministry of Lands, Parks and Housing. Victoria. On file with author.

Green, R.; Giese, M. 2004. Negative effects of wildlife tourism on wildlife. In: Higginbottom, K., ed. Wildlife Tourism: impacts, management, and planning. Altona, Victoria, AU: Common Ground Publishing. 81–97.

Himmer, S. 1996. A review of wildlife viewing in the Khutzeymateen (K'tzim-a-deen) grizzly bear sanctuary: May 2 to June 8, 1995. Ministry of Environment, Lands and Parks, B.C. Parks: Terrace. 26 p.

Klinka, D. R.; Reimchen, T. E. 2002. Nocturnal and diurnal foraging behavior of brown bears (Ursus arctos) on a salmon stream in coastal British Columbia. Canadian Journal of Zoology. 80: 1317–1322.

Lusseau, D.; Higham, J. E. S. 2004. Managing the impacts of dolphin-based tourism through the definition of critical habitats: the case of bottlenose dolphins (Tursiops spp.) in Doubtful Sound, New Zealand. Tourism Management. 25: 657–667.

MacHutchon, A.G.; Himmer, S.; Bryden, C. A. 1992. K'tzim-a-deen valley grizzly bear study: final report. British Columbia Ministries of Forests and Environment, Lands, and Parks. Victoria, B.C. 139 p.

Naves, J.; Fernandez-Gil, A.; Debibes, M. 2001. Effects of recreational activities on a brown bear family group in Spain. Ursus. 12: 135–140.

Nevin, O. T.; Gilbert, B. K. 2005. Perceived risk, displacement and refuging in brown bears: positive impacts of ecotourism? Biological Conservation. 121: 611–622.

Nevin, O. T.; Gilbert, B. K.; Smith, J. S. 2001. BC bear viewing: an analysis of bear-human interactions, economic, and social dimensions with recommendations for best practices. Department of Fisheries and Wildlife, Utah State University, Utah, USA. On file with author.

Olson, T. L.; Gilbert, B. K. 1994. Variable impacts of people on brown bear use of an Alaskan river. International Conference of Bear Research and Management. 9: 97–106.

Olson, T. L.; Gilbert, B. K.; Squibb, R. C. 1997. The effects of increasing human activity on brown bear use of an Alaskan river. Biological Conservation. 82: 95–99.

Pitts, A. 2001. Effects of wildlife viewing on the behavior of grizzly bear (Ursus arctos) in the Khutzeymateen (K'tzim-a-deen) grizzly bear sanctuary, British Columbia. Unpublished MSc. Thesis. University of British Columbia, Vancouver. Queens Printer: Victoria.

Reimchen. T. E. 1998. Nocturnal foraging behavior of black bears, Ursus americanus, on Moresby Island, British Columbia. Canadian Field Naturalist. 112: 446–450.

Rodgers, J. A.; Schwikert, S. T. 2002. Buffer-zone distances to protect foraging in loafing waterbirds from disturbance by personal watercraft and outboard-powered boats. Conservation Biology. 16(1): 216–224.

Smith, T. S. 2002. Effects of human activity on brown bear use of the Kulik River, Alaska. Ursus. 13: 257–267.

Smith, T. S.; Partridge, S. T. 2004. Dynamics of intertidal foraging by coastal brown bears in southwestern Alaska. Journal of Wildlife Management. 68: 233–240.

Swenson, J. E. 1999. Does hunting affect the behavior of brown nears in Eurasia? Ursus. 11: 157–162.

Woodley, A. 1993. Tourism and sustainable development: the community perspective. In: Nelson, J. G.; Butler, R. W., eds. Tourism and sustainable development: monitoring, planning, managing. Department of Geography, University of Waterloo, Ontario, Canada. 135–147.