



# 3RD INTERNATIONAL BEAR- PEOPLE CONFLICTS WORKSHOP SUMMARY

NOVEMBER 15-17 2009  
CANMORE, ALBERTA

**ABSTRACT:** This document is a synopsis of the presentations and discussions at the Third International Bear/Human Conflict and Polar Bear Focus Day. Topics include bear behavior, bear/human conflict updates, bear management, people management, attractant management, education and training, deterrent and detection tools, community-based programs, and risk and liability. A separate summary of the Polar Bear Focus Day (November 18 in Canmore) is published separately by World Wildlife Fund and Polar Bear International.

*Summarized by Colleen Matt  
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Missoula, MT*

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NOVEMBER 15-18, 2009

CANMORE, ALBERTA, CANADA

## WORKSHOP INTRODUCTION

### **Hal Morrison, Parks Canada**

Welcome to the 3<sup>rd</sup> International Bear-People Conflicts Workshop. My name is Hal Morrison and I chaired the Organizing Committee. Other members of the Organizing Committee are Terry DeBruyn, John Hechtel, Larry Van Daele, Sandra MacDougall, Dick Shideler, Craig Perham, and Colleen Matt. The first Workshop was in Yellowknife (there seems to be some dispute, but we think it was in 1987) followed 10 years later with the second one in Canmore, and here we are 12 years later in Canmore once again. I remember in Canmore in '97 it was discussed that we should hold this every two to five years. We didn't do so good on that part. I hope it isn't 12 years until the next one, otherwise see you in 2021.

The design and the intent of the workshop is to keep things interactive. We're striving to have discussion equal to or greater than presentation. To make this work with a large group, we're going to need questions and comments to be brief and concise. There's a lot of experience in the audience, not just up on the stage. We hope to hear from as many as we can.

This was initially intended as a small workshop, but it got larger and larger. Right now, there are about 192 people registered and, even then, we weren't able to accommodate everyone. Seven months ago we worried that we weren't going to have enough people attend due to the economic climate and travel restrictions. We sent out a little poll to see if people were going to attend and all of a sudden, it took off. We knew the interest was there; but we were surprised by the effort. Thank you to the folks that came here on their own dime, and that includes lots of agency folks, because travel authorities were difficult to come by.

We were able to give out ten travel grants, but once again, we weren't able to accommodate everyone who applied. There is an international contingent, not only from the states but also from far away as well. Thanks to those folks for making the effort and I hope they have a good time.

In your packet, you'll notice there are some working terms and definitions; we provided these so that we're speaking the same lingo.

Through the contributions of our sponsors, we were able to subsidize the first group of registrations:

- Government of Alberta (Alberta Fish and Wildlife and Alberta Parks)
- World Wildlife Fund
- Safety in Bear Country Society
- U.S. Fish and Wildlife Service
- Canadian Pacific Railroad
- Friends of Yoho
- Alberta Association of Colleges and Technical Institutes
- World Society for the Protection of Animals

- Parks Canada

## SESSION 1: BEAR BEHAVIOR

### Session Outline

- Describe and interpret bear behaviors that are relevant to bear-human interactions and management – focus on the practical.
- Obtain consensus on a bear behavior message to send to general public
- Provide additional insights to managers
- Dispel myths
- How we interact with bears will determine their future.

### FACILITATOR

**Terry D. DeBruyn, U.S. Fish and Wildlife Service, Anchorage AK**

### CONTRIBUTORS

#### **Barrie Gilbert, Utah State University Professor Emeritus**

Dr. Barrie Gilbert, trained ethologist started by saying that we still need systematic behavior studies at the graduate level, not just studying behavior while you're doing something else. He recommended Philip N. Lehner's *Handbook of Ethological Methods* for students interested in fieldwork.

The public needs introduction to the subtleties to bear interactions. People have a hard time reading bear signals, especially when they are giving them at 100 or 200 yards away. In addition, bears do not tend to disengage interactions in an obvious way, and this appears to humans as delayed responses. Observers make assumptions about the causes of bear behaviors and they need to adjust their perceptions with the aid of scientific studies.

#### **Lori Homstol, University of Alberta-Whistler**

Lori Homstol is currently working on a master's project assessing the efficacy of aversive conditioning. She presented responses to the question "Why do bears react the way they do and how can we use these observations to make aversive conditioning more effective?"

Aversive conditioning can be considered a form of punishment, and we can use learning theory to try to make the punishment more effective. 1) Aversive conditioning needs to be consistent; 2) aversive conditioning needs to be immediate; 3) The conditioning should initially be very intense. For example, if you escalate punishment with escalating unwanted behavior (like we tend to do with hazing), the animal may habituate to punishment; 4) The *method* in which punishment is delivered needs to be inconsistent so that bears don't recognize the punishment before it is delivered; 5) Reward alternative behavior whenever possible; 6) The aversive conditioning should be evolutionarily relevant as is illustrated by the Garcia Principle. The Garcia Principle suggests that bears will never learn to avoid food by being hit with rubber bullets since physical blows associated with food don't have any evolutionarily negative context for them.

For her study, Homstol had two objectives: 1) Try an emetic in a conditioned taste aversion experiment; and 2) Test whether bears can be taught to associate a blast from a whistle with pain. She recommended the use of taste aversion on specific, difficult-to-secure attractants that cause conflicts such as apple orchards. The animal must receive a sufficient dose and the emetic must be undetectable. In addition, the emetic should cause nausea 1 to 12 hours after ingestion.

**Martyn Obbard, Ontario Ministry of Natural Resources, Ontario**

Obbard has worked with black bears for the past 21 years and he presented slides illustrating black bear behavioral displays. A bear's behavior communicates the animal's stress level in a bear-human encounter. Black bears give many signals varying from low intensity to very high intensity, and people have many opportunities to defuse tense situations if they are able to observe and understand the various signals. These signals are related to the bear's comfort level and may vary with inter-individual distance tolerance whether between another bear or human, and to the bear's perception of threat.

**John Hechtel, Retired Alaska Department of Fish and Game, Consultant**

Hechtel discussed how important it is to recognize some of the different behaviors in sex and age classes of brown/grizzly bears because much of the risk involved in bear-human interactions is credited to females with cubs. The message about what to do in the event of a charge by a female with cubs has been generalized, in the public's mind, to apply to all bears. For example, while backing away from a defensive female with cubs is advisable, the same action with a subadult bear may encourage assertive behavior from the bear.

In the social hierarchy of brown bears, offspring have a relatively high status conferred on them by their defensive mother. However, when they separate from their mother and start to disperse, subadults have very low status and are chased and displaced by all other age and sex classes. Their evolutionary appropriate exploitive and curious behavior gets them into trouble with people in the backcountry and with front country homes and facilities. They may even seek out human developments because they are de-facto "zones of avoidance" for other age classes of bears.

**Nikita Ovsyanikov, Wrangel Island Nature Reserve**

Ovsyanikov has lived with polar bears on Wrangel Island Nature Reserve where he is the senior research scientist. He has lived on the island for parts of each year since 1990. Over 200 bears may use the island while they wait for the freezing of the sea ice. There are field workers, visitors, and villagers on the island and polar bear encounters are inevitable. All field workers and visitors receive instruction about polar bear encounters and their avoidance.

Polar bears on Wrangel Island roam the shoreline looking for food. They, like other bears, have a social order and consistent behavioral patterns are exhibited during encounters with one another. Polar bears are very specialized carnivores that are 1) well-equipped for predation; and 2) very cautious about the risk of getting wounded. Severe wounds for such a specialized predator keep them from hunting, and are likely to be fatal. In contrast, omnivorous brown bears can survive on vegetable matter when they are wounded in an act of predation. In addition, polar bears have *behavioral inertia*; when they get a mindset such as hunting or breeding, it is difficult to interrupt their focus. Polar bears are inclined to investigate (and begin to hunt) dark images that are still, and to avoid things that move fast and act confidently.

Because Wrangel Island is a reserve for the bears, the philosophy toward polar bear-human encounters shifts most of the responsibility onto people. Visitors are instructed to avoid affecting polar bear behavior by traveling outside of the bears' movement corridors and by maintaining their distance. On Wrangel Island, managers balance between keeping bears away from humans and keeping humans away from bears, while allowing bears to use the island as they have for thousands of years.

The polar bears will investigate cabins and construction sites. It is important to prevent them from feeling comfortable around dwellings so they don't become habituated, thereby increasing the chance of more bear-human encounters.

Though Ovsyanikov has tried cracker shells, flares, and other aversive conditioning tools, he has found that the most useful tool is a long wooden stick and/or anything that makes artificial or strange noises.

Sticks resemble walrus tusks, and Ovsyanikov has observed polar bears going to great lengths to avoid being struck by tusks since any injury could be fatal. Polar bears will avoid sticks from a great distance. If a bear approaches, Ovsyanikov strikes the ground with the stick first, if the bear is not deterred, he waves the stick in its face as if to strike the bear. Actually striking a bear may invoke a defensive reaction, so he avoids touching them with the stick.

Ovsyanikov has observed that polar bears become confused and aggressive when flares are wielded as a deterrent. He finds pepper spray is effective, though only in close proximity. Spray may also work best as a psychological support; people tend to act more confident when they have spray, enabling them to stand their ground. Unfortunately, people often make the mistake of exhibiting weakness and fear in encounters. As predators, polar bears can understand signs of fear and weakness, such as backing away or even reticence.

The key to successful polar bear encounters is maintaining and displaying confidence. Ovsyanikov recommends a spectrum of interaction behaviors: 1) Avoid conflict; 2) If you inadvertently encounter conflict, don't escalate it with your behavior; and 3) If the conflict escalates and becomes dangerous, be as active and as aggressive as you can.

Polar bears are straightforward thinkers, for example, they consider anything large as fearsome, and anything exhibiting a confident demeanor as dangerous. Humans are tall, and this gives them a size advantage in the polar bear's mind. When Ovsyanikov encounters an unknown polar bear he observes their level of confidence; a very confident bear may approach humans, where most polar bears will run away.

Ovsyanikov observed that dogs can be both useful and hazardous during polar bear encounters. They will alert you when you are sleeping in a tent and may draw a bear's attention away from you. On the other hand, dogs may provoke aggression. Ovsyanikov had his dog with him one season and had more polar bear conflicts that year than in the previous 10 years combined.

## DISCUSSION

In his research, Lynn Rogers found that it was useful to think of encounters in terms of a bear's fear level and not his (or the person's) fear level. He found that most black bear signals were harmless bluster during which they had not made up their mind whether to fight or flee. He thinks it would be helpful to include these observations in our bear safety messages.

Hechtel clarified that his recommendations for interactions with subadult brown bears are consistent with the non-defensive/defensive dichotomy currently recommended for bear-human interactions. As with other non-defensive bears people should be confident and assertive.

Gilbert pointed out that interactions between people and bears, as with interactions between bears, is a lot about bravado, which is often why sticks and pepper spray work to boost the persons confidence and decrease the risk of a negative encounter.

Darryl Hedman observed that, at Churchill, polar bears will become habituated to hazing and require escalated methods. He wondered if they had the same experience at Wrangel Island. Ovsyanikov responded, saying that they started with either avoiding encounters altogether or with very low levels of aversive actions such as waving sticks. As long as people remain confident and don't escalate their behavior and the polar bear's stress, situations seem to be manageable.

Panelists discussed several bear behavior myths that professionals need to dispel:

- That direct eye contact provokes aggression. Hechtel recommended confidence and assertiveness when dealing with a non-defensive bear, so maintaining eye contact is best. Barrie Gilbert offered a

slightly different take: when bears encounter one another, the more dominant bear may look away, thereby allowing the less dominant bear to move away.

- That bears have poor eyesight. Gilbert said that bears seem to have good movement detection at great distance, but not necessarily good pattern recognition.
- That bears raise their hackles when frightened or angry. This has been proven physiologically impossible.

#### SUMMARY

- We hold the future of bear conservation in our hands—when interacting with bears we should react out of understanding, not fear.
- A management interaction with a bear is something you do WITH the bear, not TO the bear.
- In interactions with bears, bears give many signals. A better understanding of bear behavior and the ability to interpret these signals will help ensure a positive outcome.

## SESSION 2: BEAR-HUMAN CONFLICTS UPDATE

### Session Outline

- Case Histories – Selected conflict program successes and non-successes
- Public input in conflict reduction programs – Gaining public acceptance
- Habituation - Risks and benefits in the front country and backcountry

#### FACILITATOR

**Hal Morrison, Parks Canada**

### Case Histories

#### CONTRIBUTORS

#### **Jim Wilder, U.S. Fish and Wildlife Service**

In 1999, Wrangell-St. Elias National Park staff wanted to build a campground at the toe of a glacier near some cabins and the small town of McCarthy. Wilder was hired to assess the incidence of bear-human conflicts in the area. Genetic evidence revealed that most of the bears in the area were male. He also found that virtually all of the bear-human conflicts involved local residents. Wilder conjectured that the high rate of bear removal from the area allowed young males to occupy niches in the developed area. After delivering an education program, the community went from killing 9 bears/year to killing 0 bears/year. He suggested to the residents that they conserve and “educate” the existing bear population rather than removing bears and allowing new sub adults to take their place. During this project, Wilder also developed and used bear-conflict database, (the Bear/Human Information Management System) that is now used in other parks.

#### **Sarah Medill, Department of Environment, Government of Nunavut**

In Nunavut, many Inuit live subsistence lifestyles. Polar bear killed in defense of life or property are divided between incidents while hunting and incidents occurring in and around communities. Sled dog teams and their stored food seem to attract bears, leading to defense kills. Economic barriers keep people from bear proofing their possessions. Recent efforts include educational materials, polar bear guards for industry, and bear safety classes that are co-instructed by elders. Public acceptance is mixed, sometimes due to cultural fear of polar bears. When the government cut back the polar bear hunting bag



limit to zero, they removed incentives for people to avoid polar bear conflicts since defense kills are now the only way to harvest polar bears.

**Dave Hannah, Alberta Parks**

Hannah is the human-wildlife conflict prevention coordinator in the Bow Valley. He spoke about natural food source control as a tool for managing bears. His research focused on *Shepherdia Canadensis* removal in and around campgrounds and popular trailheads, areas where they couldn't apply other tools like group size management or area closures. Natural food source removal can help deter bears from an area for two weeks up to two years. This tool seems to significantly reduce the need for closures, warnings and other management actions significantly. However, it should only be applied where unnatural food sources are under control. This is a tool that can involve local communities in bear management.

**Martyn Obbard, Ontario Ministry of Natural Resources**

Obbard spoke about Bearwise, an ambitious bear management program that Ontario initiated in 2004. The program was designed to reduce problem bear encounters. It is currently funded by \$4.5 million/year. There are four cornerstones to Bearwise: 1) education and awareness; 2) prevention; 3) reporting; and 4) response. The prevention portion is used to help communities perform risk assessments and purchase infrastructure that will help them reduce conflicts. Bearwise has a memorandum of understanding with police directing which agency will respond to different circumstances. In addition, Bearwise has a 24/7 hotline with trained staff who also gather information and enter it into database. Early in development of Bearwise, major hunting groups opposed this program because they viewed it as a step toward eliminating bear hunting. Despite this early opposition, Bearwise has made significant progress in reducing negative bear-human encounters.

### Conflict Reduction Programs

**Larry Van Daele, Alaska Department of Fish & Game**

Kodiak has a \$5 million bear-hunting industry and a large Native population. In 2002, ADF&G convened a group of stakeholders to develop a bear management plan. The group agreed that bears need respect and conservation. They identified conflicts and made 270 recommendations, including the electrification of village dump fences. Since then, several villages have reduced dump conflicts significantly thanks to electrification. The stakeholder/planning group established that the community owned the bear conflict problem-not the agencies.

**Kim Titchner, Wildsmart, Canmore**

Canmore Wildsmart began 2005 after a fatal mauling. The program hired an education director and produced many education and advertising products as well as attended many public events. Several business owners heard about the trail education program, and offered to make WildSmart chocolate bars to reward hikers who were being WildSmart. Another business donated 700 cans of bear spray. Wildsmart measures success by the number of website hits, public event audience numbers, distribution of materials, phone calls, emails, partners, programs, and volunteers.

#### DISCUSSION

***When a community is developed around a critical bear food source like a fish-spawning channel, how can bear-human conflicts be reduced?***

Van Daele says that it is critical to get the people involved and owning the problems. The public must also value the bears.

***What are the best measures of success for managing people?***

Obbard thinks tracking conflict calls would be a good measure. Titchner referred to Doug MacKenzie Mohr's book *Fostering Sustainable Behavior; Community-Based Socialmarketing*, which is published on the website <http://www.cbsm.com/public/world>.

The goal of Wilder's database is to track conflicts over time. It also provides trend information and identifies bear hot spots for managers. However, the most valid measure is before/after treatment surveys of people's behavior.

## Habituation benefits and risks, in front and backcountry

### **Barrie Gilbert, Utah State Univ. Professor Emeritus**

Gilbert stated the case for the benefits of backcountry habituation, though he restricted his comments to salmon streams and brown bears. He conjectured that brown bears are historically habituated to aboriginal people. Today, bears in several parks and sanctuaries are habituated to guided and unguided viewers. It is possible that brown bears are more easily habituated to people because they are habituated to being in close proximity to each other and to other scavengers in order to get the high caloric input that comes from feeding on salmon. It is best to either educate people or require them to hire a guide. It's inadvisable to allow bear hunting of habituated populations on salmon streams because bears are highly concentrated and may be up to 30 times as dense as in non-riparian areas. Maintenance of bear populations on salmon streams is also essential because bears are essential for distributing nutrients from the streams to other parts of the watershed.

### **Larry Lewis, Alaska Department of Fish and Game**

Lewis stated the case for the risks of backcountry habituation. Close interactions between people and bears fosters the inaccurate "Animal Planet view" of wild animals, and people lose their fear. Interactions that cause bears to tolerate people at close range will affect their future encounters with other people. In an uncontrolled situation where people are not guided or properly educated, and bears have multiple encounters with different people, habituation is bad.

### **Kerry Gunther, Yellowstone National Park**

Gunther stated the case for the benefits of front country habituation. With very limited tools in a highly visited park, Yellowstone managers started managing people at bear jams. Last year there were over 900 bear jams requiring the assistance of three or four rangers per bear jam. Benefits from this kind of management include: bear viewing and visitor enjoyment; public education opportunities; economic benefits (states, gateway communities, park concessionaires, wildlife tour industry); appreciation of bears and support for bear conservation and habitat protection; bears have access to natural food sources adjacent to areas of human activity such as roadside corridors; habituated bears are less likely to exhibit defensive aggression during surprise encounters with people.

### **Steve Herrero, University of Calgary Professor Emeritus**

Stated the case for the risks of front country habituation. Herrero referred to the Herrero et. al. paper "Brown/Grizzly bear habituation to people: safety, risks, and benefits." The paper established that Overt Reaction Distance (ORD) is influenced by tolerance. It is important to note the differences between habituation, which is a process, and tolerance, which is the outcome of the process along with other variations. The term "habituated" is the end point of the process of habituation. There are costs (risks) primarily to humans. Habituation is not appropriate in all contexts; e.g., it may conflict with sport fishing and hunting. Close proximity of habituated bears may encourage ignorant, even illegal acts. More close range interactions with habituated bears may increase cumulative odds of injury (Note that on a per capita basis, habituation decreases the incidence of injuries). Habituated brown bears, especially sub-adults, have the greatest tendency to approach people and people may respond inappropriately and

dangerously. Habituated bears near roads may encourage traffic jams and serious vehicle collision injuries. There are also costs (risks) to the bears. Habituated bears near roadsides or railways are more likely to be injured or killed. Habituated bears are more likely to be killed outside of protected areas. Habituated bears near roads are more likely to be fed by people or get people's food and become food-conditioned. Habituated bears are more likely to be approached by people for better photographs, despite regulations, resulting in greater risk of human injury and bear harassment or removal.

It is imperative to manage people's behavior and risk of injury around tolerant brown bears. In each specific situation, the costs (risks) and benefits should be identified and considered. Clear mission and goals related to bear viewing are needed as are measurable objectives such as viewing benefits, low human-caused bear mortality rates, little handling of bears, and acceptable financial costs

#### QUESTIONS FOR THE PANEL

***In a park with high visitation rates such as Banff, is it possible to influence the amount or rate of bear habituation to people?***

Herrero thinks that you have to manage the people and not the bears, e.g., by removing the attractant. Gunther says Yellowstone managers remove carcasses near road to reduce the likelihood of habituation. Their experience has shown it is not practical to haze bears away from roads.

***What are the differences in behavior between well-fed bears and food-stressed bears?***

Herrero and Smith think that bears in high-density populations seem to habituate to each other more easily than bears in low-density populations as is shown by the differences in ORD and the rate of human injuries. Gunther thinks there is a front and backcountry difference in ORD.

***Are tolerant bears habituated only in certain situations or at certain times?***

Gunther thinks that bears habituate to a specific situation or location. Gilbert thinks this is still a researchable question. Herrero believes that tolerance is the word to use, not the process of habituation.

## SESSION 3: MANAGING BEARS

### Session Outline

- Contributor summaries of non-lethal management programs/projects
- Hazing, aversive conditioning, conditioned taste aversion
- Other non-lethal (e.g., diversionary feeding, relocation, translocation, on-site release, management programs or projects)
- Criteria for non-lethal treatment or lethal removal

#### FACILITATOR

**Dick Shideler, Alaska Department of Fish & Game, Fairbanks**

Non-lethal management of bears was still somewhat in its infancy at the time of the 2<sup>nd</sup> Bear-People Conflicts Workshop. Twelve years later, it has become common. The focus of this session was on the considerable experience and knowledge we have accumulated about non-lethal management programs and techniques in the last 12 years.

Contributors on this panel represented all three species of bear and many geographic areas of North America. Each contributor discussed their project or program, followed by responses to specific questions

from the facilitator as well as questions/comments from the audience. Discussion about candidate bears for non-lethal vs. lethal removal was taken up in Session 11: Risk and Liability.

## CONTRIBUTORS

### **Larry Van Daele, Alaska Department of Fish & Game, Kodiak**

Van Daele summarized the behavioral approach to training captive bears at the Washington State University Bear Center, a captive bear facility. He noted that most hazing and aversive conditioning programs have been conducted in a very command-oriented way that does not necessarily take advantage of the way bears learn. If ineffective methods are used to punish a bear, they will find ways to avoid the punishment, sometimes very creatively. Ineffective punishment may stop a behavior for an instant, but if it's not grounded in knowledge of why the bear is behaving the way he is, we could be creating more problems.

Operant conditioning uses both negative and a positive reinforcement, allowing bears to make decisions. The physiology of learning supports the use of operant conditioning and learning theory. It turns out that "positive feeling" compounds like dopamine are 3 or 4 times more powerful than the chemicals that result in a "negative" feeling. A neurophysiologist at WSU places a bear's capability to learn ("intelligence") above that of than dogs but below that of primates. By combining lower-order learning techniques of positive and negative reinforcement with a bears' capacity for higher-order learning (e.g., to learn from observing, to learn from trial and error, to learn from a rule), managers may have many more management tools.

In the real world, applying techniques such as "clicker training" to wild situations is complicated but possible. Van Daele and colleagues have begun an experiment on Kodiak Island to apply the techniques developed with captive bears to a field situation. On Kodiak Island ADF&G Commercial Fisheries biologists use salmon weirs that temporarily impede the progress of salmon upstream in order to count them. The salmon aggregate below the weir, the fisheries technicians count them, and salmon are allowed to move on. This aggregation attracts both bears and anglers. However, the bears can destroy the weirs, endanger the technicians and disrupt the counting and movement of the fish. The usual response of technicians at such sites all over Alaska is to haze the bears, so that the bears learn to recognize the hazer and avoid the weir only when they were present, which is during the day (i.e., "learned sneakiness").

The goal of the experiment was to keep the bears off the weir at all times. The objective was to communicate to the bears what ADF&G biologists wanted them to do. This involved consistent protocols for the technicians and signals for the bears that indicated both positive and negative rewards. A nearby alternate fishing site was their positive reinforcement. If the bears didn't enter an area below the weir visually defined by flags on the stream banks, they weren't hassled. If they came close to the flagged zone, in a warning buffer zone, the technicians would yell at the bear. As the bear got closer to the weir the negative reinforcement would escalate, and if they got onto the weir, the technicians would shoot cracker shells. As soon as they moved outside the no-bear zone, all hazing would stop. The key was a remote and definable negative reinforcement that was unique to that situation. At night, an electronic fence shocked bears too close to the weir, thereby reinforcing the message that the weir, not just the personnel, was to be avoided. Van Daele and his colleagues learned that if hazing was consistent the bears learned very quickly and retained the knowledge. Three years later, bears rarely came close to the weir. Occasionally, some resident bears seemed to "teach" transient bears. If a new bear approached the no-bear zone, resident bears would woof at them, causing alarm in the transient bear. Training the technicians more difficult than training the bears. If the staff did not deliver the hazing in an

effective and timely manner, the bear training didn't work. However, the project was successful enough that managers should consider applying learning theory to other, more complex situations.

**Lori Homstol, University of Alberta**

Working with Colleen St. Clair at University of Alberta, Homstol studied the efficacy of aversive conditioning (AC) on black bears at Whistler, B.C. as part of her M.S. thesis at the University of Alberta. She divided radio-collared bears into three treatment groups: 1) no AC; 2) "traditional" AC; and 3) AC with the addition of a sound stimulus. Each bear in the treatment group was subjected to a 3 to 5 day AC program. The second group was hit with rubber bullets. The third group was hit with marble from slingshot accompanied by a whistle blast, and when the bear moved into appropriate security cover, a bell would ring as positive reinforcement. The first group (control) became habituated to the presence of humans, while the other two groups exhibited increased wariness. The third group made the connection between sound and pain pairing quickly. The control bears didn't respond to whistle sounds. Homstol is currently analyzing GPS collar data to see if the bears treated with aversive conditioning avoided humans and development over longer periods of time.

In addition, Homstol tested Conditioned Taste Aversion (CTA) in black bears. She used a variety of baits, some treated with Thiabendazole (TBZ), in two protocols. The first year Homstol put TBZ in the baits she discovered that the bears could detect the emetic and avoid it. The next year, she put two baits side-by-side at each site, one treated and one untreated. This apparently confused the bears and they took the treated bait. After eating the TBZ treated bait, the bears avoided the site. She concluded that CTA can make bears wary, and that TBZ is detectable by some bears in some baits, but if you hang treated and untreated baits together, you can create successful taste aversion

**Jay Honeyman, Alberta Fish & Wildlife, Canmore**

Honeyman reviewed southern Alberta management techniques, focusing primarily on the Bow Valley, a human-intensive area where the Trans-Canada Highway and the Canadian Pacific Railway both pass through en route to the west coast. In the past 10 years, there has been reduced collision mortality by creating wildlife corridors and fencing along the highway. Bears may go over or under fences, but the fences can guide them to the underpasses to cross the multilane highway. Managers are also collaring resident bears in the valley and using AC on them, and hazing non-marked bears that approach humans and developed areas. The community of Canmore is bear-proof in both the front and backcountry. There is a nascent provincial bear conflict program to address problems in the rest of western Alberta. The main challenge in the Bow Valley/Kananaskis Country now comes from the natural bear food sources thriving in and around campgrounds and the community. Prior land management changes that created improved growing conditions for preferred bear foods. Managers have responded by removing natural foods from inhabited areas to keep bear-human interactions to a minimum. Managers are also creating growth enhancement sites in the backcountry away from human influence. It is unknown whether subadults and females with cubs will continue to use "safe zones" around human habitation areas after the attractants have been removed and backcountry sites are enhanced. Managers still occasionally move bears that are much habituated, and shepherd bears that enter certain areas well used by humans are shepherded to areas with better coverage. Managers evaluate the likely success of AC for each grizzly bear, using a system devised by the Wind River Bear Institute. When it comes to bear-human interactions, people are the wild card. Habituated bears mix with people from all over the world in the Bow Valley. Honeyman suggests that, since conflicts are largely a people problem, the social aspects need to be examined.

**Hal Morrison, Parks Canada, Rocky Mountain National Parks**

Morrison described the Parks Canada program for hazing, AC, and diversionary feeding in the Rocky Mountain national parks. Parks Canada uses hazing as an immediate response to defuse a conflict. For

example if a bear is in close proximity to people and people control is not effective or possible, the intent is to get the bear out of the situation as soon as possible. After hazing, it is imperative to understand the reasons for the interaction and if applicable remove the attractants.

This approach to hazing has changed over the years. Parks Canada staff used to escalate their hazing techniques with every “infraction” by a bear, e.g., cracker shells for the first incident, cracker shells and screamers for the second incident, etc. [Ed. note: see “force continuum” discussion in later section]. However, they observed what they thought to be habituation that slowly led the bears to ignore the deterrents. Now when they choose to use projectile deterrents they use a “bearmageddon” approach with as many deterrents as possible until the bear is in cover. They’ve found the most effective cue for previously hazed bears is the sound of a shotgun action closing. Parks Canada staff have also used projectile deterrents as the main component of structured aversive conditioning programs, over a seven-day treatment period for each bear. They have conducted structured aversive conditioning programs on 19 black and grizzly bears since 1991.

Parks Canada removes natural and introduced food source plants around human use areas. They also reduce vegetation along trails that would impede the detection of bears along the trail, and require that hikers in certain areas stay in groups of greater than four. At Lake Louise, they installed an electric fence around one of the major campgrounds and the ski hill summer-use facility, resulting in reduced conflicts with bears.

Parks Canada also started a Living with Wildlife/Bear Guardian program to assist in bear-people conflict management. “Bear guardians” (paid students who help disseminate bear safety information and manage the public at bear jams) help defuse “bear jams” along park roads. Management of bears at bear jams depends on the distance the bear is from the roadside. At 30 meters or less, bears are usually hazed away because of the potential for traffic accidents and bear vehicle collisions. Between 30 and 100 meters, managers may or may not haze the bear away depending on the potential for traffic hazards. At over 100 meters, they seldom haze the bear unless the potential for traffic accidents is extremely high. The protocol is mitigated by common sense. For example, if it’s 7 a.m. and commuter traffic is moving along without stopping to watch, they allow the bear to take advantage of critical natural foods that happen to grow near roadsides regardless of distance.

One of the major issues in the Bow Valley and the national parks is grain spilled along the railroad line that attracts bears and results in collision mortality. Morrison and his staff usually don’t haze bears for eating spilled grain on the tracks since the attractant is widespread, chronic and the bears return in minutes. Exceptions would include tracks adjacent to busy highways and tracks that go through town. Most resident bears tend to be “track-savvy” and avoid being hit by trains. Train-killed bears tend to be transients with little experience around trains or a bear that eventually makes a mistake.

Parks Canada managers use diversionary feeding to help food-stressed bears stay away from the Lake Louise valley bottom (where the highway, village, campgrounds, etc are located) when there is little else to eat shortly after emergence from the den. Typically, they save up carcasses of ungulates killed in vehicle collisions during the winter resulting in 2,000+ kilos of road-killed meat flown up to three specific sites. While the effects of diversionary feeding on bear demographics haven’t been formally evaluated, it has reduced conflict mortality by keeping bears out of the crowded valley bottom until natural foods are more available in the backcountry.

### **Daryll Hedman, Manitoba Conservation, Thompson**

Hedman described several programs used to minimize conflicts between people and polar bears in the Churchill area.

*Polar Bear Alert Program*

Prior to 1982, polar bear management was simple: when polar bears came into town conservation officers shot them. The “Polar Bear Alert” program began in 1982. The area around Churchill is divided into three priority zones according to the density of the human population.

Prior to 1996 polar bears visited the Churchill dump. After 1996, polar bears that enter the dump are captured every few days, drugged and marked. They (and other bears captured in Zone 1) are put in “time-out” jail for 30 days. The time-out program keeps bears from harming people and it keeps people from harming problem bears. They are then released. If they come back, they are captured and taken 40 miles north. If they return from the north, they are jailed until the ice comes in. They rarely return from the north because it is closer to the developing sea ice. In 2005, the dump was closed and the number of problem bears decreased. They found that after polar bears reach 6 years old, they generally don’t come near Zone 1 anymore.

Conservation officers handled 33 bears in 2008, compared to 76 in 2003 when the ice was extremely late and the dump was still open. They concentrated their management efforts in Zone 1 where every bear was captured or hazed. In Zone 2, they responded only to individual situations where conflicts occur. Generally, the Churchill management hazing protocol subscribes to the same concept as the police “force continuum.” In the force continuum, officers’ degree of response force is dictated by the situation. At each level, the officer uses just enough force to mitigate the situation.

An emerging issue is the carcass dumps associated with guided goose hunting camps. Such dumps sites have attracted polar bears that subsequently come into conflict with the hunting camps. Methods to mitigate this are currently being developed.

**Mike Badry, British Columbia Ministry of Environment**

Every community in British Columbia has potential for black bear conflicts. In 2008, British Columbia conservation officers killed 600 black bears and 50 grizzlies. Badry concentrates his efforts on pro-active attractant management, conflict reductions, and working with communities. British Columbia conservation officers now use onsite release and relocation, rather than long-distance translocation, as a management response to conflict bears. The effective of long-distance translocations showed poor success. Ultimately, unless attractants are under control, translocation will not work. For example, onsite release of non-assertive but food-conditioned black bears on the west coast of Vancouver Island did work after the dump was closed. However, success was most likely facilitated by abundant natural food at the time.

BC policy limits non-lethal management options to those communities that have achieved a “Bear Smart” designation. Once communities have met the Bear Smart requirements, non-lethal management will be applied to each bear on a case-by-case basis. BC has recently developed and is evaluating a matrix of criteria that includes the particular bear’s behavior, habitat use (e.g., use of natural vs. human-altered), and food habits (e.g., natural vs. non-natural). Community tolerance for bears is also a consideration in the type of management applied. Province-wide, they have not had much success with hazing. They found that bears become “trap-wise.” Some hazing makes bears move away from hazers (“learned sneakiness”) but this fear is not carried over to the the situation.

Overall, BC has a poor system for tracking bears after a management action. BC conservation officers occasionally can find out if the bear returns, or if it shows up in the harvest. Evaluation of the effectiveness of non-lethal management requires specific research that has not been conducted in BC.

**Mike Madel, Montana Department of Fish, Wildlife and Parks, Choteau**

Madel started working in the Rocky Mountain Front (RMF) of Montana in 1986. Bear conflicts were increasing at that time due to increases in the grizzly population and extension of their previous range further and further east on to the prairies and plains. Recent population estimates conclude that 765

grizzly bears live in the Northern Continental Divide Ecosystem, of which the RMF is part. Research has shown that almost all of the RMF bears spend their foraging time in and around agricultural areas in the valley bottoms and den in the mountains. They follow favorite foods such as chokecherry and buffalo berry. Bears are thought to be at least somewhat habituated to human activity even though they're seldom observed while they feed at night or in the dusk hours on stubble fields. They travel among dense brush cover associated with riparian areas.

The majority of grizzly bear conflicts in the RMF are on private land, and more specifically, on land that is grazed by sheep and cattle. Prior to the mid-80s, few landowners accepted the burgeoning grizzly bear population. Now, after 2-3,000 personal contacts by MFWP personnel with landowners, many ranchers are willing to accept and even enjoy grizzly bears. A summary report is available from the website <http://fwp.mt.gov/wildthings/tande/monitoring.html>.

Conflicts vary from beehive damage by females with young and subadults, to autumn feeding on livestock feed and shed damage. Sheep are most vulnerable to livestock depredations, although grizzlies do kill a few calves each year. Direct encounters with bears in dense cover by bird and big game hunters are increasing.

Although cattle are the most abundant livestock in the RMF, there are few depredation on adult cattle but several each year on calves. Control actions are taken on bears involved with potential and actual conflicts with cattle because they are difficult to protect. Translocation, relocation and occasional lethal removals are all techniques that MFWP employs. MFWP occasionally translocates calf-killing bears out of their home range to other ecosystems. More commonly, they relocate bears and assume it will move back. However, if timed correctly, the bear will not return until calves have either grown or been shipped. If they relocate subadults to ripe huckleberry areas, they are effectively gone for a period of time that is useful to managers.

Management actions include funding and helping to install electric fences around sheep bedding grounds, homes, and beehives. MFWP also encourages bear-resistant food containers wherever possible. They deploy remote propane "scare-guns" near potential depredation sites. The guns give off an explosive sound like high power rifle and can be fired on a random schedule to prevent bears from anticipating the sound. They have also used Karelian bear dogs to haze radio-collared bears out of inhabited areas. Because most of the bears are night-active, opportunities for hazing or aversive conditioning are limited but relatively effective if the bear is not already food-conditioned.

One of the most successful MFWP programs is to redistributes livestock carcasses out of ranch bone yards during spring to divert emerging bears. They assume that every grizzly in the RMF feeds on dead livestock sometime in their lifetime, and feeding in bone yards increases unwanted habituation. The carcasses are distributed randomly to areas closed to the public in the spring. This program now averages 64 carcasses per year. They've found that redistribution reduces springtime conflicts by 78%. There is no evidence that bears that feed on livestock carcasses are more prone to livestock depredations.

An emerging issue is the continued expansion of the range of grizzly bears eastward into areas where they have been absent for a century or more. This is creating a management problem in that a new segment of the public now has to deal with grizzly bears. Fortunately, lessons learned since the 1980's can be applied to inhabitants of these new areas, and RMF residents that have adapted to bear presence can assist with education efforts.

**Neil Barten, Alaska Department of Fish & Game, Juneau**

ADF&G in Juneau receives hundreds of bear nuisance calls each year, and one bear can incite 20 calls in a single day. The department has employed a variety of responses. While lethal removal is sometimes



used, it is unpopular both with the public because of concerns about animal cruelty and with managers because it doesn't solve the problem of attractants. Between 1981 and 2009, ADF&G lethally removed up to 14 bears per year. ADF&G occasionally translocates bears. Radio-collar data reveal that bears that are translocated on the road system often return to become nuisances again. There is much higher success rate when they translocate bears by boat or airplane across the inland waterway to islands. However, translocating bears gives the public the impression that it is up to ADF&G to move nuisance bears and the public is absolved from their responsibility. ADF&G shares radio-tracking data with the public and this has inspired interest and a sense of community responsibility. When forced to kill bears, they use the event to educate the public about food-conditioning.

## DISCUSSION

### ***Do we need individually identifiable animals for aversive conditioning?***

Homstol answered in the affirmative, saying that identification is crucial for measuring success.

Honeyman said he believes an aversive conditioning program on all grizzly bears in the population over 20 years has instilled more wariness in the entire population, not just in collared bears. Madel said that a systematic program required by aversive conditioning is not usually possible on private land, so they are forced to haze bears even when the bears are eating natural foods. They try to forestall human habitation before food-conditioning occurs.

### ***Can we condition bears to avoid specific conflict areas? Can we condition bears to generalize from one conflict situation to another?***

Homstol said that the purpose of her whistle conditioning was to give the public a tool that could modify a bear's behavior before conservation officers appear. Van Daele believes that if there is an attractant present, managers have to continually train bears. Honeyman said that the "no go" zones in campgrounds and picnic areas are being avoided by 2<sup>nd</sup> and 3<sup>rd</sup> generation bears without direct conditioning. Honeyman also wonders whether managers should construct bear trails to ease bears' transit through developed areas. Hedman said that polar bears rarely go through Churchill any more, and they wonder if it is a result of persistent hazing there.

### ***What are the advantages/disadvantages of the escalating force continuum vs. the "shock and awe" approach?***

Morrison tried the hazing force continuum for five years, albeit under inconsistent conditions. The bears moved only so much as they had to in order to avoid the next round. Now when projectile deterrents are used he uses "shock and awe" hazing, which produces many different stimuli all at once. Homstol added that learning theory supports Morrison's experience; animals are likely to habituate to escalating punishment. She added that inconsistent hazing effectively puts an animal on an intermittent food reward system, which reinforces the food-conditioning, rather than deters it. Hedman said that Churchill managers start on the bottom of the force continuum and escalate as needed. However, they are not trying to extinguish food-conditioning, only changing routes of transit. Honeyman said his objective is for the bears to be wary enough to walk into cover when they see people. Homstol added that bears in Whistler became more wary from aversive conditioning with slingshots rather than shotguns, probably because the slingshots were harder to detect.

### ***Keeping in mind there are three different ways to move bears: on-site release, relocation and translocation, what are some successful characteristics?***

Madel said they found that translocation effectively protects sheep bedding grounds long enough for landowners to erect electric fences. Barten works almost completely with food-conditioned black bears, so no onsite releases are used. However, it is increasingly difficult to move bears to a new location where there is no available human food and garbage.

**Have biologists adequately studied the effects of moving bears on bear populations at the release sites?**

The contributors unanimously answered “no.”

**Is capture/handling a form of aversive conditioning?**

Madel questions whether trapping, capture and handling act as aversive conditioning treatments. When GPS collars are installed on captured and relocated bears, they avoid the site where they were captured. However, However, is just an observation and needs to be tested. Morrison added that he has seen a capture/avoidance effect on some bears, and not on other bears.

**How do we define success with regard to moving bears?**

Badry said that most biologists/managers are usually interested in solving the immediate problem. Madel co-authored a paper referring to relocation and translocation successes. They defined success as a bear not coming into conflict for 2 years after being moved. If bears return to their capture site, yet don't come into conflict, this is also counted as a success. Hedman marked every released polar bear. They found that bears relocated to the north generally didn't return. Homstol suggested that there should be several measures of success depending on criteria.

**What are the conditions for success in diversionary feeding?**

Madel said that success depends on feeding program objectives. He uses the number of overall conflicts in a season as a measure of success. Morrison said that natural bear movement and fluctuating populations confound their ability to measure success.

**Does diversionary feeding lead to population demographic changes?**

Madel believes that the RMF carcass redistribution program has both changed the movement patterns and supported population growth, but does not yet have enough data to support this assumption.

**Over multiple years, do bears “anticipate” carcass disposal and congregate at sites?**

Morrison said that he reuses the same three sites at the bottom of avalanche slopes. He thinks emerging bears go directly to these sites. Madel hopes that bears go directly to the feeding sites and avoid homes and livestock. He also hopes that GPS collar data will help confirm this.

**Is it possible to extend bear habitat by translocating bears to the edges of their current habitat?**

Madel said that the fringes of bear habitat in his area are on private land and that bears can get in trouble there.

**Should the population be capped in areas as developed as Bow Valley?**

Honeyman said that he makes decisions to move bears on an individual basis, according to the behavior of the bear and its ability to live in a high-density human population.

**How can managers apply hazing and aversive conditioning more judiciously?**

Morrison chooses his approach based a number of criteria involving the individual bear as well as available resources. Aversive conditioning is very time intensive and expensive (overtime), whereas hazing buys short term relief. However, a bear that has been hazed is less susceptible to AC. Homstol added whether or not to use AC depends on the level of food-conditioning of the bear and the availability of attractants.

**Are there biological reasons not to use lethal action?**

Van Daele tells Kodiak villagers that shooting bears creates a population vacuum (i.e., empty niche) that will be filled by other bears. He suggests that it's better to “teach” resident bears to avoid trouble and allow them to stay in the niches around the village.

**What is your obligation to educate the public about the fate of translocated bears?**

Barten shares what information he has with the public but would like to have more data. Honeyman hopes that GPS collars will provide more data. Mike Proctor co-authored a paper about the fate of

translocated bears near Revelstoke and Robin Munro from B.C. wrote a similar report. Perhaps translocation information could be collated and communicated.

***Is it reasonable to expect a bear to learn to avoid specific situations as well as specific places?***

Homstol is optimistic, though a well-planned and consistently delivered program of AC is vital. Shideler reported that bears at the North Slope oil fields successfully learned to avoid buildings and roads when workers were present. Honeyman reported that Bow Valley managers are trying to generalize avoidance behavior so that bears avoid all hikers on all backcountry trails. Morrison added that aversively conditioning bears to avoid “ring roads” around campgrounds does not condition them to avoid roads in general. Barten mentioned that Lori Craig (sp?) and John Neary (USFS, Juneau, AK) have taught bears to avoid developments at Mendenhall Glacier Visitor Center.

## SESSION 4: POSTER SESSION AND EVENING ICEBREAKER

Appendix IV of this document contains abstracts for the following posters. The posters are available on the Red Deer College 3<sup>rd</sup> International Bear-People Conflict Workshop website <http://www.rdscience.ca/bear/bear.html>.

- 1) Report on behavior and management of the Scandinavian brown bear
- 2) The history of bear-human conflict management in Denali National Park and Preserve
- 3) Applications of learning theory to bears in conflict with humans
- 4) The influence of habitat, gender, and reproductive status on the spatial distributions of Human-black bear conflict in Whistler, BC
- 5) Thiabendazol induces limited conditioned taste aversion to grain in black bears
- 6) Active fans and grizzly bears: reducing risks for wilderness campers
- 7) Spatial patterns of grizzly-bear human conflicts in Southwest Alberta
- 8) Communicating across species boundaries: how community knowledge and public attitude affect human and bear interspecies relations in Alberta's Bow Valley
- 9) Increasing community capacity in support of polar bear safety in Sirmilik National Park by combining Inuit knowledge and bear management practices
- 10) Can the use of a bear-proof waste collection system to minimize bear/human conflict also be cost-effective?
- 11) Bear Guardians in Banff National Park
- 12) Talking bear: media discourse and human-bear conflict in Alberta
- 13) Bragg Creek Bearsmart Program
- 14) Nass Bear Education Program, 2001-2009: looking back, reaching out, and moving forward
- 15) Prince George urban Bear Smart research project: pilot phase year 1 preliminary results
- 16) Effects of vessel-based bear viewing on the behavior of brown bears in Glacier Bay, Alaska: preliminary results
- 17) Building a reliable snare cable for capturing grizzly and American black bears
- 18) A concept design for radio-tracking male polar bears
- 19) Bear spray and bullets – a comprehensive analysis of the Alaska record
- 20) Brown bear mitigation using electronic control devices – a pilot study
- 21) Lake Louise Campground electric fence

22) International collaborative management of bear-human interactions on the Tatshenshini and Alsek Rivers, Canada and United States

## SESSION 5 : MANAGING PEOPLE

### Session Outline

- Is there a multi faceted, comprehensive approach to people management?
- What is the role of regulation?
- How effective is regulating behavior with specific prescriptions for all locations, e.g. “store your food 100 yards from your campsite?”
- How effective are different methods of front and backcountry area closures?
- How and when is facility siting effective?
- What is the role of social science in modifying attitudes?

### FACILITATOR

**Colleen Matt, Conservation Planning & Facilitation**

### CONTRIBUTORS

#### **Kerry Gunther, Yellowstone National Park**

In Yellowstone, managers apply different methods to three different zones. In the front country, they manage in favor of people and safety; at roadsides they manage in favor of tolerant bears; and in the backcountry they manage in favor of wild bears. The designated backcountry campsites with food storage sites make management easier. There are bear management areas that are closed to the public seasonally. There are also some off-trail areas that are closed, and some crepuscular and nocturnal closures.

#### **Steve Michel, Banff National Park**

Banff has 3-4 million visitors and 5 million people driving through each year. Bear management is complicated by highly developed recreation areas like golf courses and paved trails. In addition, the new Banff draft management plan will add 200,000 visitors over the next three years, while managers strive to maintain habitat security for bears. Managers close areas seasonally, proactively and reactively. Social science research has shown that visitors only retain fragments of the messages they hear. Conventional warning signs don't appear to change people's behavior. Recently Banff managers have enacted group size restrictions for two high conflict hiking areas during buffaloberry season. They tried voluntary group size restrictions and had very poor compliance. Dealing with new recreational uses/activities is challenging, especially mountain biking. Michel would like to see more discussion of new recreational conflicts.

#### **Mark Brusino, Wyoming Game and Fish**

Wyoming managers instigated a Bear Wise program in northwestern Wyoming agricultural, hunting, and fishing counties. Bear Wise tools include the following: 1) *Education* (focusing on property protection and safety elk camps); 2) *Land Use Planning* (from region-wide bear conflict management plan to subdivisions plans); 3) *Community Buy-In and Sense of Responsibility* (i.e., creating a social norm); 4) *Infrastructure* (e.g. bearproof products and product testing); and 5) *Agency Programs*; 6) *Laws and Regulations* (aimed at catching the percentage of people who won't change their behavior even when they receive education)

**Craig Perham, U.S. Fish and Wildlife Service**

Perham administers the Incidental and Intentional Take Program for polar bears. Polar bears are listed under Marine Mammal Protection Act and the Endangered Species Act. North Slope industries rely on the USFWS to keep them from conflicting with federal laws. USFWS requires every commercial site to create a “polar bear plan.” USFWS provides safety and bear hazing training, advice on infrastructure placement and construction, and mitigation measures.

**Mike Badry, Ministry of Environment, B.C.**

In B.C., Bear Smart communities tackle the root causes of bear-human conflicts. Reducing bear-human conflicts is only possible with shared stewardship. Bear Smart communities are required to come up with 50/50 matching funds (can be in-kind services) to compete for Ministry funding each year. This buy-in makes Bearwise communities more resilient than 100% government-run programs. Each community is unique and has its own unique solutions.

**Sylvia Dolson, Get Bear Smart Society, Whistler**

Get Bear Smart Society (GBSS) promotes coexistence with bears. Dolson observed that while necessary, tools like bylaws and ordinances need to be phased in gently. She recommends the techniques promoted by Doug MacKenzie Mohr’s book *Fostering Sustainable Behavior; Community-Based Socialmarketing*. Mohr’s research has demonstrated that behavior change is effectively delivered through initiatives at the community level. People need to know 1) what they need to do; 2) the consequences of their actions for bears; and 3) the consequences of their actions for themselves. Managers should focus on removing barriers to an activity while at the same time enhancing the activity’s benefits. GBSS organized focus groups to research barriers and benefits of three behaviors: garbage management, closing doors and windows, and feeding birds. They found that people will not close their doors and windows on a hot day. For die-hard bird feeders, they offered “bear smart” bird feeding methods. GBSS discovered they needed to develop better garbage pick-up for seasonal workers without vehicles to transport their garbage. GBSS offers reports and methods for managers on their website <http://www.bearsmart.com/>.

**Larry L. Lewis, Alaska Department of Fish and Game**

Lewis manages bear-human conflicts for ADF&G on Kenai Peninsula. The salmon-rich watersheds of the Peninsula attract both anglers and bears in large numbers. It is difficult to manage the conflicts when streams and access points are managed by multiple agencies with different mandates, strategies and levels of enforcement.

## DISCUSSION

***Are there examples of regional or county by-laws?***

Bruscino said that one of his counties has wildlife feeding and garbage storage ordinances. Other counties have failed to pass similar ordinances.

***Are recommendations for no camping vs. mandatory camping closure effective?***

Gunther said that recommendations generally have low compliance. Proactive closures were controversial at first, but are now accepted in Yellowstone. When managers impose emergency backcountry closures, hikers go to other areas of the park. John Neary added that he doesn’t think voluntary closures work. He has had success by working with stakeholder planning groups who generate their own suggestions for management.

***In February, people will be allowed to carry firearms in National Parks. Will this force a change in management strategies?***

Gunther wonders if the new law will generate more self-defense killings. Yellowstone may heavily promote bear spray. Mark Wagner said that Glacier National Park will promote bear spray more.

**How can the growing popularity of geocaching be managed?**

Jeff Brune (U.S. Bureau of Land Management) researched on the internet and found there were over 100 geocaches within a mile of Campbell Creek, an urban salmon stream in Anchorage, Alaska. Managers sent a map showing riparian area closures to the local geocache club, and asked them to avoid putting food into the caches. Parks Canada developed a national geocaching policy disallowing food attractants. Glacier National Park has prohibited geocaching objects, while allowing visitors to geocache favorite places or views.

**Is there an effective campaign that would convince hunters to carry bear spray?**

Bruscino agreed with Madel that generally, hunters trust guns and they don't trust bear spray. To the hunters, it doesn't make sense for them to carry bear spray when they have a gun in their hand. Neary pointed out that carrying a gun and having a bear spray in a holster on your hip is confusing in a bear encounter. He suggests that managers develop training for hunters. Wilder pointed out it is not an either/or situation between guns and bear spray. Bear spray is a tool that both educates a bear and deescalates a situation. Bears do not generally learn from gun encounters, unless they are being hazed by professionals.

**Why can't the BC government do more to support community Bear Smart programs?**

Badry says that B.C. doesn't have enough Bear Smart funding to go to all interested communities. They attempt to address this overwhelming need by using criteria to award money. Funding only went to southern B.C. communities this year, so the Ministry may need to change criteria so that funds can be spread over the entire province.

**What is the role of social science in managing human-bear conflicts?**

Doug Clark, University of Saskatchewan, said that social scientists can offer new tools to bear-human conflict managers: 1) social science can test whether communication/education is effective; 2) social science can suggest what might work better (reference: Frances Westley, *Getting to Maybe: How the World Is Changed*); and 3) social science questions assumptions. For example, Clark evaluated Klane bear management efforts and found that the community resented the management tools and objected to the planning process. With extensive interviews and focus groups, they gained insight. Clark published a paper in *Ecology and Society* and other publications based on related work.

Kathryn Mazaika, Institute for Conflict Analysis at George Mason University, said the literature about evaluating environmental conflict resolution is extensive. (See the Udall Foundations "U.S. Institute for Environmental Conflict Resolution" website: <http://www.ecr.gov>.) The materials produced by the Foundation offer a roadmap for process design, e.g., what elements should this process include? Another great reference is *Braving the Currents: Evaluating Environmental Conflict Resolution in the River Basins of the American West*, by Tamra Pearson d'Estree and Bonnie Colby.

Jennifer Reed, USFWS, mentioned previous success in applying the Bleicker Method for public participation and informed consent. The Bleicker Life Jacket allows you to frame your issues 1) we have a problem; 2) we are the right people to be dealing with this problem; 3) we understand that problem solutions will hurt you; and 4) in order to do our jobs as stewards, we have to do this. Madel concurred, saying that he successfully used the Bleicker method for his grizzly management program.

**How effective is the Bear Guardian program in Banff?**

Michel said the bear guardian program has helped build relationships with visitors, especially at bear jams when the visitors are "teachable." Personal connections with visitors increase their information retention. The guardian program's biggest challenge is the overwhelming number of visitors.

**How can we manage new recreational trends that create bear-human conflicts?**

Honeyman reported that competitive orienteering brings hundreds of people to Kananaskis Country in the spring. The concern is that competitors run while looking down at their map and compass. He is

also concerned about competitive mountain biking which brings urban people who seldom carry bear spray into bear territory. Elizabeth Manning (ADF&G) said after there were four maulings in Anchorage in one season, the Anchorage Bear Committee education subgroup targeted recreationists by going to equipment swaps and sporting events. Agencies also installed trail cameras and caught mountain bikers on a closed trail. Publicity from the cameras embarrassed the mountain biking community and encourage compliance.

## SESSION 6: ATTRACTANT MANAGEMENT

### Session Outline

- Introduction and completion of questionnaire
- Tools to keep bears away from concentrated anthropogenic foods
- Challenges associated with keeping bears away from dispersed anthropogenic foods
- Diversionary feeding as a tool to minimize bear conflicts

### FACILITATOR

**Larry Van Daele, Alaska Department of Fish and Game**

### CONTRIBUTORS

#### **Patti Sowka, Living with Wildlife Foundation**

Sowka offered an overview of some of the options for managing bear attractants. One of the most common, easily used, and effective tools is electric fencing. Electric fencing can be used to deter bears from a most attractants as long as it is properly installed and operated correctly. Another common tool for keeping bears away from human food and garbage are physical barriers. New and innovative designs are being developed constantly, and today communities have more choices than ever. Some of these include Polycart “Holsters,” dumpster “cages,” structures for dumpsters and trash containers, and ocean freight containers. Bear-Resistant Containers (BRCs) include Polycarts, fully-automated dumpsters, trash bag receptacles, automated roll-offs, grease traps, and backpacking containers. BRCs can be fairly expensive to purchase, must be compatible with hauler’s equipment, require some maintenance and monitoring, and may be expensive to distribute when purchased in small quantities. Most importantly, all products require monitoring and maintenance and not all products are equally bear-resistant. The captive bear testing program was initiated to help address these issues. Over 30 bear specialists in North America developed and supported a peer-reviewed testing protocol. While the testing protocol does not evaluate the field effectiveness of the products, it does provide a means for evaluating the relative “bear-resistance” of products and helps improve quality over time. Manufacturers have subjected their products to testing and changed their design in response to results. Details of the program can be found on the Living with Wildlife website: <http://www.lwwf.org/Bear-resistant%20products%20testing.htm>. Some other tools that have been very effective in certain communities are community lending programs for BRC’s (Montana), municipal cost-share programs (New Jersey), and Living with Predators Resource Guides which can be found at [http://www.lwwf.org/Living%20with%20Predators\\_resource\\_guides.htm](http://www.lwwf.org/Living%20with%20Predators_resource_guides.htm).

#### **Jeff Marley, Margo Supplies, Limited**

Electric fencing has been used since the 1930s to keep bears away from attractants, but it must be installed properly to work. Marley reviewed mechanical principles that must be applied correctly for fences to be effective. Tight wiring is essential to keep bears out, and it requires proper bracing. Two hundred/strand is ideal. As a rule-of-thumb, wire that twitches as the electricity pulses through it is a good indicator of proper tension. There is a need to brace at every direction change. Recognize that

bears will use outside braces as ladders if they are not designed properly and that bears (especially juveniles) will dig under to try to get inside. Electric fencing is just the first tool to keeping bears away from human food and garbage, conflict control requires proper waste management inside the fence. Attractants must be covered to reduce smells and to keep ravens and other avian scavengers from picking up garbage and dropping it outside the fence. This causes bears to hang around. Grounding the electricity is another issue that needs to be addressed correctly, e.g., negative connections have to be metal to metal, the number of ground rods depends on soil conditions, and when using ground clamps they need to be built for such a purpose.

### **Breanne Feigel, Canadian Pacific Railroad**

The Canadian Pacific Railroad (CPR) is the primary transportation mode for grain going from the Prairie Provinces to the ports on the Pacific coast. Up to eighty trains run through Canmore and Banff each week, 23 of which are grain carriers. The trains traverse challenging routes and many of the gates on the grain cars leak or there is spillage over the sills. CPR has worked to remove or reduce attractants such as grain spillage in order to reduce the number of wildlife-train collisions. They currently operate two vacuum trucks, and an employee education program. CPR is spending \$20 million to inspect and fix grain cars with faulty gates. They have also implemented a program prohibiting parking of grain cars on tracks within national parks.

### **Lynn Rogers, North American Bear Center**

Diversionary feeding is controversial, though has been oversimplified and demonized. Dr. Rogers says it is important to keep an open mind and evaluate each preconceived concept about bear behavior and the causes of bear-human conflicts very carefully. Most bear conflicts are a result of fear and misunderstanding. He studied diversionary feeding for eight years when he worked for the U.S. Forest Service and found that it kept the bears from conflicts and reduced bear removals to zero. More recently, he joined forces with a dozen households who had been feeding bears for 30+ years. When the surrounding area is experiencing bear food shortages, the community diversionary feeding relieves hunger, and hunger is directly responsible for most nuisance behavior. Compared to the rest of Minnesota, nuisance bear complaints are drastically reduced. What bears will eat depends on the alternative food source. When food is very abundant, aversive conditioning and attractant reduction are barely needed. When food is moderately abundant, aversive conditioning and attractant reduction can work well, but some aversive conditioning can cause bears to become sneakier. When food is scarce, the only thing that deters bears from nuisance behavior is diversionary feeding. Detailed information on the diversionary feeding program is available on the Wildlife Research Institute website:

<http://www.bearstudy.org/website/education/should-we-feed.html>

## DISCUSSION

***Many waste management companies are moving towards automation and away from manual Polycarts. Are there automated bear-resistant carts that can be used? In addition, bear-resistant Polycarts are often damaged by hauling equipment. Are there any ways to alleviate this?***

Sowka said there are many different types of trucks that haul Polycarts and no one, to her knowledge, has developed a cart that works well with all of them. There are different management groups working on these problems. There is one Polycart that she certifies, and Bart Rouns of Bear Solutions in Missoula manufactures it. Rouns has one version of the automated Polycart, though Sowka does not yet have enough data to determine whether the automated Polycart will last. However, there are two fully automated dumpsters being used successfully. Regarding maintenance, communities have volunteers inspect and repair carts. She also knows of haulers that donate maintenance as a part of their service.



***What are the liability issues for electric fences at unattended sites such as garbage transfer sites?***

Marley said that all of the power units used for fencing must pass safety standards. However, battery units do not necessarily have to pass standards, though most of the American ones are UL. If a transfer station has bear-resistant lids on its receptacles, there is no need for electric fencing. Gates are a problem because people tend not to close gates, so automation is required. According to Sowka, in Seeley Lake, Montana there is a transfer site that is electrified. It is staffed during open hours, and the gate is closed after hours. This setup has been very effective at reducing problems. The site “Seeley Lake Bear Aware Program” may offer more information.

***How do anthropogenic foods affect bears’ health?***

Rogers said that bears gain more fat when eating human food, mature sooner, and reproduce more. However, bear physiology is naturally adapted to large weight gains and losses.

***How do you set up electric fencing on uneven terrain over bedrock?***

Marley said that setting up the fence line is critical. It is important to use earth-moving equipment to maintain a layer of material in which to place posts. If that’s not possible, drilling and grouting holes is the best option. Marley likes to make the bottom wire negative, so that it doesn’t matter if it touches the ground. If the bottom wire is too high, bears and other smaller animals will find a way under the fence. Obbard added that he has tried using electrified mats at gates and dips, and found them to be successful.

***In a diversionary feeding program, what are the limits for the amounts of food and what effects are seen on bear populations?***

Rogers responded that bears usually prefer natural foods. As soon as there’s better food available they abandon the feeding stations. Diversionary feeding keeps bears from becoming nuisances. In his study, the population did not increase. In another treatment, he fed the bears the highest caloric food possible. They still abandoned the feeding sites for traditional foods when they became available. Social organization, he believes, kept the population similar to the rest of the state at one bear/1.5 miles<sup>2</sup>. Young males dispersed per usual. Bear hunting drove the bears away from the feeding areas and controlled their populations.

***Has anyone studied the minimum power required for electric fencing for bears?***

Marley said that poor grounding requires higher power output. He believes that lower power units are fine for non-food-conditioned bears; however, for food-conditioned bears, deterrence may take more power.

## SESSION 7: EDUCATION AND TRAINING

### Education

#### Session Outline

- What are some methods for communicating with kids?
- What are some methods for getting our messages across beyond brochures?
- How do we define success in bear safety education
- How can we combat sensationalism?
- How do we reach transitory audiences that pass through bear country?

The Education Session consisted of short background presentations by contributors on educational efforts followed by small group discussions at focused on one of five topics. Audience members had the

opportunity to sit at a table discussing a topic of interest to them. At the end of the session, summaries from some of the small groups were presented to the entire audience.

#### FACILITATOR

##### **Steve Herrero, University of Calgary Professor Emeritus**

Managers often think that an educator will be able to change people's behavior completely, but that is seldom the case. Education is not indoctrination; it is providing information and knowledge from which people can make their own decisions. Managers have an interest in finding out what kind of information is retained and measuring how well it is maintained.

#### CONTRIBUTORS

##### **Colleen Matt, Conservation Planning and Facilitation**

Matt was part of the Alaska Interagency Bear Safety Education Committee (AIBSEC). Their original bear safety brochure was "Bear Facts," an Alaska interagency bear safety pamphlet that reflected state and federal collaboration. In 2000, the Committee compiled a list of consistent messages that were acceptable to all of the agencies. These messages were revised in 2004 based on new information. A copy of these interagency messages are available through her.

##### **Andy McMullen, Bearwise; President, Safety in Bear Country Society**

The Safety in Bear Country Society (SIBCS) organized in 1998 to produce a bear safety video with the most up-to-date information regarding bear encounters. SIBCS raised funds and produced the video "Staying Safe in Bear Country" to answer that need. It was reviewed by 45 experts. Later SIBCS produced modules for Working in Bear Country, Living in Bear Country, and Polar Bear Safety. McMullen said that the products are not perfect, but they are a good start. He encouraged others to improve and extend the number of tools for available for education.

##### **Sylvia Dolson, Whistler Bear Smart**

Dolson and others developed a website that is a source for bear safety, recreating in bear country, living in bear country, working in bear country, developing bear smart communities, and managing bears. Bear Smart.com now has around 100 pages of information, dozens of links and easy navigation. One of the features is a searchable database of scientific reports and papers. New features include a Get Bear Smart channel on YouTube, photos on Flickr, and an RSS feed. The Bear Smart Facebook page allows them to collect donations as a registered charity. Website content is consistent with the International Association for Bear Research and Management recommendations as well as the Safety in Bear Country Society. Video clips, games, and quizzes are provided for people with different learning styles. NGOs can have web pages for Bear Smart communities without having to build their own website. In the future they will provide advertising space for bear smart products.

##### **Linda Masterson, Author Living with Bears: a Practical Guide to Bear County**

Masterson gathered current knowledge about bear behavior, causes of conflict and conflict prevention and wrote this easy-to-use handbook. Her research for the book showed that many people who live in bear country know very little about bears, and what they think they know is usually wrong. The language used by biologists confuses "lay" people: e.g., when you say "bear-human conflicts" they think that the problem lies with the bear. This and many other terms put the problem emphasis on bears and not on people. People expect bear managers to solve bear-human conflicts. What works in bear-human conflict education? People want to hear success stories; they want to know that their actions will keep them safe. Masterson recommended that bear managers of all types change the phrase bear-human conflicts to human-bear conflicts so that people understand that their role in conflicts is primary, not secondary.

**Daryll Hedman, Manitoba Regional Biologist**

Hedman's program offers bear safety presentations to all types of community organizations and meetings. They collaborate with Parks Canada in a working group to ensure the messages are consistent. Annually they meet with townspeople, hunting camp guides and operators. They communicate regularly with First Nations and trappers in the coastal area and have established good collaboration to prevent bear-human conflicts. This year they're building a kiosk outside of the polar bear holding compound.

## SMALL GROUP PRESENTATIONS AND DISCUSSION

After the brief contributor presentations, participants discussed five breakout topics.

**1) What are some methods for communicating with kids?**

- Use local children's art to decorate educational and other products (e.g., calendars and totes)
- Keep in mind, when you present to children, you are presenting to parents
- Best messages for children should be age and context appropriate
- We need to talk about encounters as well as preventative measures; if we do not talk about encounters, kids will learn misinformation from other, less-reputable sources.
- Obtain peer-reviewed information for guidelines and messages to children
- Use focus group discussions with younger children to reveal what they want to know and what is appropriate for their age-level
- Reinstate and reinvigorate Project WILD

**2) What are some methods for getting our messages across /beyond brochures?**

- In static venues such as visitor centers, use technology such as touch screen and audio players
- Visitors in cars can use CDs or podcasts
- Use existing channels of communications in rural communities, such as pivotal places or characters
- Communities can form a calling tree for sightings and attractant management
- Many parks and refuges have high use by locals, signage needs to change to impact this group
- Use DVDs to reach non-English speaking visitors
- Use press journalists as partners (e.g., TV, print, and bloggers) to improve message distribution
- Require a test for backcountry camping reservations

**3) How do we define success in bear safety education?**

- Need to clarify goals and outcomes first before deciding what parameter to measure for success. These goals should be adaptive.
- Use an iterative process when developing measures to ensure correct methods and measures are being developed
- After presentations, provide a self-addressed envelope so that people can reply later with higher response quality
- Should we be targeting kids, or are they just easier to reach because of formal education?
- Should have a long-term plan for formative and summative evaluation; too many quantitative strictures can kill nascent education programs
- The goal of all programs should be enduring, healthy populations of bears
- Tools for making better goals can be found in other disciplines, especially social sciences
- Use media outlets that cover subject in more depth than the usual sound bites

**4) How can we combat sensationalism?**

- Sensationalism comes from our primordial fears and will not go away; sensationalism makes money, e.g., "Snakes on a Plane" movie, we need to embrace it and use it for our messages
- Sensational events are communicated by new technology almost immediately, including graphic photographs

- Managers' messages must be consistent, truthful, and believable
- There should be consistent messages in all agency responses
- Agency spokespersons should cultivate relationships with NGOs that give media viewpoints
- Every community should have a bear expert who is a media contact. Cultivate relationships with the media
- Popular culture, as molded by the entertainment industry, is more interested in sensational experiences than ever.
- There are sensational stories to tell about wildlife that don't involve mauling (e.g., a bear peeling a hazelnut).
- We need to resist anthropomorphism, and talk about populations whenever possible
- Agencies should need to become more involved in the business of providing information rather than reacting to events
- Use sensational events to launch bear smart communities and promote better information

#### 5) *How do we reach transitory audiences that pass through bear country?*

- Identify audiences before developing educational products
- Look for bottlenecks where you can reach the most people with the least expense
- Try to work with trip organizers to get information to people before they arrive on site
- Welcome letters to new residents in bear communities; offer free bear safety DVD rentals
- Try to produce non-English materials
- For backcountry visitors, require bear safety DVD viewing
- Trailhead interpreters provide immediately useful information to hikers and campers
- Messages should focus on *avoidance* of conflicts
- Message should focus on what "you" can do

## Training

### Session Outline

- General bear safety training: how much is occurring in various jurisdictions (e.g., agency, industry, public) and how good is it?
- Training trainers
- Training for "bear guards"
- Set minimum standards, i.e. "certification"
- "Privatizing" conflict response: pros and cons

### FACILITATOR

#### **John Hechtel, Retired Alaska Department of Fish and Game, Consultant**

How can we promote better Bear Guard training standards? The quality of training depends upon the quality of the instructor. Typically, firearms instructors are also bear safety instructors because of the common use of firearms as tools. These instructors may not have adequate knowledge of bear behavior, or have misconceptions they pass on to students. There is an increasing interest in industry for hiring bear guards. Industry managers in oil production, mining exploration, and tourism are more interested in "certifying" their employees to guard camps and people. However, currently no professionally recognized certification exists. Hechtel encouraged participants to establish basic training standards after this workshop because many of the participants are working on the same problem separately, and they could save time, money and energy by working together.

## CONTRIBUTORS

**Mark Bruscano, Wyoming Game and Fish**

Wyoming Game and Fish put together a training program for the Wyoming Outfitters and Guides Association. The agency found that Wyoming averages about two human injuries/year and as many as 12 grizzly bear deaths due to encounters and conflicts. Most of these incidences occur during hunting season, with 33% involving guides and outfitters. The course includes a workbook that is available to Workshop participants as a PDF. A group of outfitters teaches the course once every year. Over the past ten years, they've educated about 1,000 guides. The training builds ownership for bear-human conflicts in the guiding industry.

**John Neary, US Forest Service, Juneau**

Prior to 2002, Neary and other biologists noticed that the bear safety training required by the U.S. Forest Service focused on rifles and bullets, and not on preventing encounters. Training varied from district to district, e.g., FS personnel in Admiralty killed no bears in defense of life and property in 26 years, while employees in other districts killed 10 bears in 12 years. In 2002, Neary and others developed a "Train the Trainers" program featuring knowledgeable instructors from within and outside the agency.

**Dick Shideler, Alaska Department of Fish and Game**

Shideler developed a Grizzly Bear Hazing Training program for security officers charged with protecting facilities and workers at the North Slope oilfields. Industry participation is voluntary. Security officers typically have law enforcement backgrounds. Because the oilfield is in a vast wetland, the facilities and roads are all built on gravel pads. Security officers patrol in vehicles and most of their hazing is using the vehicle (e.g., horn, siren, lights) deploying repellents from the vehicle. The training lasts from half to a full day and emphasizes the following elements: bear biology/behavior; hazing objectives (differentiating objectives for grizzly bear hazing vs. polar bear hazing); advantages/disadvantages of deterrents; scenarios; practice with deterrents; and outcome reporting. Since 1992, they've trained over 900 people with very good success, which is measured by the decrease in the number of bears killed. As a result of this program the Security officers generally understand bear behavior and become advocates for non-lethal hazing.

**Craig Perham, US Fish and Wildlife Service, Polar Bear Management**

The USFWS hazing training is similar to ADF&G program. Federal law requires companies to get "intentional take" permits. For training, they use the Staying Safe in Bear Country videos and "Guidelines for Oil and Gas Operations in Polar Bear Habitat" as well as individual modules that Perham developed. Modules include natural history, behavior, legal aspects of polar bears, camp conditions, and tools. The USFWS is currently overwhelmed by the need for training, so they are currently working on training the trainers.

**Mike Pederson, North Slope Borough, Alaska**

The North Slope Borough employs patrollers to haze and deter polar bears in Barrow and surrounding villages. Their goal is to protect both people and bears. The program has no dedicated funding or vehicles, but works cooperatively with other Borough functions. Experienced patrollers train new patrollers. If there are no certified firearm instructors, gun training is provided by local law enforcement. Typically, patrollers use noise, lights, cracker shells, and beanbags to haze bears. Occasionally a polar bear is transported north, away from villages.

**Andy McMullen, Bearwise**

McMullen developed the Polar Bear Guard Training Program for Parks Canada to educate researchers needing guidance and protection in the far northern parks. The purposes of the training program include

increasing safety for people and bears; integrating traditional knowledge and science; providing guards with the skills they need to be safe; and establishing standards for training in Nunavut national parks. They use the Polar Bear Safety video that was produced with the collaboration of elders and biologists. It is particularly important to communicate to researchers and guards that they need to maintain their separate tasks in order to be effective. Local hunting and guiding organizations select guard candidates and deliver training.

## DISCUSSION

### ***Are there any organizations that currently have bear safety training standards?***

Sheldon Kowalchuk said that Parks Canada has interim firearms guidelines to issue firearms to certain guides, researchers, indigenous people, etc. Many park managers would like to require bear behavior training for the gun permits. However, they would rather have a third party deliver the training.

Get Bear Smart Society produced a bear aversion training background manual for the RCMP and B.C. Conservation Officer Service. The manual does not yet include specific training recommendations and has not been adopted. The generic version (without RCMP or CO policies) is available from the Society.

The B.C. Commercial Bear Viewing Association has produced a certification and training program for bear viewing guides. The course requires an apprenticeship with an experience guide. See their website for more information at <http://www.bearviewing.ca/index.htm>.

Dan LeGrandeur teaches basic bear safety and non-lethal bear management to conservation officers, industry and law enforcement officers. In Canada, the Workers' Compensation Board (WCB) determines whether training is required, however WCB has been inconsistent and has not set standards for training. Morrison said that he researched WCB requirements and found that the Workers' Compensation Board requires bear safety training but gave no further description. Debbie Wellwood added that the WCB seemed to want to put the responsibility on contractors rather than make new or more stringent requirements.

Morrison developed a 2.5 hour training session based on *Staying Safe in Bear Country* for Park employees, but is unsure whether this is effective.

Ken Higgins, BLM Alaska, is also frustrated by the lack of behavior and non-lethal aversive techniques taught in the courses within BLM. When new employees have little to no firearms experience, most of the courses focus on practical firearms training and safety.

Barrie Gilbert reported on online course at the University of Alaska Southeast that covered bear biology, behavior and safety. This is a low-cost solution because it would not require travel by either instructors or students. However, firearms and non-lethal tools would still need to be taught as a practical workshop.

Another participant cautioned that course materials should include more than a list of topics. When USFWS Alaska Region tried this approach, they found that instructors' messages varied widely. They developed a more "canned" approach. McMullen said that the *Staying Safe in Bear Country* video was never intended to be the sole source of bear safety training. That being said, he mentioned that digital versions of the video are available for agencies to post on their intranet sites.

McMullen strongly encouraged the building of standards from the "ground up" rather than from agency headquarters. He is concerned that practical field knowledge will be undervalued and lost. Hechtel volunteered to organize an internet group to explore training standards.

Roger Bean, Metro Vancouver Parks, developed a training program for seasonal employees. They hired Wayne McCrory to assess the bear hazards and used his results to improve the training program. Their training program has been well received and other agencies are interested.

## SESSION 8: EVENING PRESENTATIONS

***Bear Spray and Bullets, Tom Smith and Steve Herrero (facilitated by Colleen Matt)***

***Diversionary Feeding, Lynn Rogers and Sue Mansfield (facilitated by John Neary)***

## SESSION 9: DETERRENT & DETECTION TOOLS

### Session Outline

- Successes and failures with the current toolbox – what we’ve learned about the “bread and butter” detection and deterrence tools since the last workshop and how have they have evolved.
- New applications or promising technologies that could be applied
- Using natural features (e.g., terrain, vegetation) to enhance deterrence or detection
- Who is hazing? Public or private? What models are currently being employed?
- How are deterrent/detection programs used in conjunction with one another to produce a positive effect?

### FACILITATOR

#### **Craig Perham, US Fish and Wildlife Service**

Perham presented some of the 1997 detection and deterrent recommendations from the second Bear-Human Conflicts Workshop including recommendations for bear dogs, electric fencing, and firearms. He encouraged participants to examine and update the earlier recommendations during the session discussion period.

### CONTRIBUTORS

#### **Jay Honeyman, Alberta Fish & Wildlife**

Honeyman worked with the Wind River Bear Institute in Alberta and Montana to aversion condition bears. Honeyman uses Karelian Bear Dogs (KBDs) as one of the tools to move bears out of campgrounds, townsites and other developed areas. When conditioning an unknown bear, safety is the key consideration. In this situation, multiple KBDs and people are often used to ensure the correct response is achieved, e.g., the bear retreats to cover. With known bears who have been regular recipients of conditioning, a single barking dog and handler can often move them safely to cover. Typically, the KBDs are on leash in developed areas but can be worked off leash when necessary. The dogs have also been used at mauling sites to assist in identifying clues related to a bear’s activities before, during and after the event. They are used regularly to locate carcasses, injured animals and the entry and exit points of bears at conflict sites. Shideler has used KBDs in conflict work and to find grizzly bear and polar bear dens. Some dogs of other breeds have also been used for bear work. Based on Honeyman’s experience, KBDs will stand their ground against grizzlies.

#### **Larry L. Lewis, Alaska Department of Fish and Game**

Lewis considers anything fired from a shotgun as “less lethal,” due to the number of known lethal events using the supposedly non-lethal rounds. He is currently exploring the use of electronic control devices (ECD) for deterring bears and other wildlife. He was introduced to this technique when he watched a

state trooper use a TASER ECD on an aggressive moose and use of the device modified the moose's behavior. Lewis later embarked on a research project at ADF&G's Moose Research Center. They used an ECD on a captive moose and analyzed the blood. Tests showed that the physiological reaction to the ECD is no more stressful than darting. The Research Center moose also showed less aggression after the ECD was used. Lewis, Mooney, Barten and Taser Int. research and development staff then used ECDs on brown bears in the Yakutat Alaska dump. The highly food-conditioned and human-habituated bears returned to the dump within a day of ECD exposure, however, they avoided people to a much greater degree. Lewis has attended TASER instructor courses, armorer and master instructor courses. Various types of TASER units are available; and some can be used with duty shotguns or on their own dedicated platform. Some are even equipped with cameras and recording equipment. When the ECD is fired and connects with a subject, there is a 5-second or longer stimulation skeletal muscle and the sensory nervous system. This causes some short-term pain to the subject.

#### **Patti Sowka, Living with Wildlife Foundation**

Patti reviewed the *Living with Predators* Resource guides. These guides are an annually updated resource for bear managers and community bear aware groups and are available for download from the Living with Wildlife Foundation web site at [www.lwwf.org](http://www.lwwf.org). Sowka is the only source for the link to the professional's document, the Bear Management Guide and those interested in obtaining a copy should contact her. Sowka encouraged participants to submit new deterrent experience and information to update the guides. For example, Jamie Jonkel developed homemade wax cartridges for shotguns. Alter Enterprises developed a culvert trap with a remote link satellite system. Tim Manley (Montana Fish Wildlife and Parks) uses this system and can check the traps from his home or office. He can also remotely open and close the culvert door.

#### **Brianna Burley, Parks Canada**

Burley reviewed two deterrence and detection techniques used by Parks Canada. The first, sightline improvements, is currently being used around Lake Louise on heavily traversed trails, especially at switchbacks. The treatment includes cutting back heavy vegetation up to 5 meters on each side of the trail to improve sightlines for hikers and bears. The second treatment, Lake Louise Campground electric fence, was installed in 2003 around a tenting-only facility. The fence is 2.8 kilometers long, and encloses an area of 26.6 ha with 10 pedestrian gates, 5 wildlife chase-out gates, and 5 cattle guards. A low voltage alarm sounds at the dispatch center if there is a problem or a fence intrusion. So far there has only been one incident since the fence was installed, when a grizzly cub went through the fence. Managers discovered that the wires too far apart because of a particular landscape feature at that particular site, and they corrected the problem. The estimated cost to install the fence is \$15-\$20 per meter.

#### **Sheldon Kowalchuk, Parks Canada**

Kowalchuk is a Resource Conservation Manager with Parks Canada in Churchill. For smaller sites where regularly scheduled (i.e. daily) work occurs they use polar bear monitoring teams to check sites prior to disembarking, visiting, or setting up camp, etc. They often close Prince of Wales Fort National Historic Site (located across the mouth of the Churchill River) if, for example, it is too foggy to sight bears from a distance or if a bear cannot be deterred from the site. Whenever possible they avoid encounters with polar bears, but when hazing is necessary, they use the minimum force required. The presence or sound of an ATV is often enough to cause bears to move away. At Wapusk National Park, the first line of defense is avoiding bears by either working in other areas or by moving around bears. Most hazing is conducted with shotguns and cracker shells but they may use helicopters to haze bears if necessary. An elevated platform at a research compound allows researchers to check for bears before they leave the fenced compound and this will be standard at all future research camps.



## DISCUSSION

### ***What sorts of research is being done on detection, deterrents and management techniques?***

Honeyman said that their aversive conditioning data, collected since 1997, has been analyzed and the data indicate that many bears, both uncollared and radio-collared, become more wary when conditioned over time. A radio-collared grizzly bear's level of developed site use can significantly be decreased. Human caused mortality rates can be reduced when programs such as conditioning, garbage management and education programs can be delivered together. Data also shows that conditioning can reduce the frequency of facility closures, for example, trails, or campgrounds. Wind River Bear Institute has been using standardized data sheets to collect data since 1997, and the confidence level in data collection has improved since.

Lewis said that standardized data collection is impractical for his situation. However, he is developing and will be administering a policy for ADF&G TASER use that includes data collection and a centralized database.

Perham said the oil and gas industry on the North Slope of Alaska is required to record information on a datasheet when they use deterrence on polar or grizzly bears.

Kowalchuk concurred that Parks Canada also uses a standardized datasheet.

### ***Are there any other dog breeds used to haze bears?***

Honeyman mentioned that Italian biologists have used Laikas. Other breeds can be used if they are trained.

Wayne McCrory he used bear dogs for many years when assessing bear hazards. The dogs were trained to walk ahead and to bark when they detected bears. He found them to be very trainable and effective.

### ***Various comments about deterrents from participants***

Marley reminded participants that cracker shells are intended to be shot into the air and not at animals. They were never intended to hit anything and can be lethal. He concurred with Lewis that ANY projectile can be and has proven to be deadly, including rubber slugs. The term "slugs" can refer to many different projectiles that have different potential for harm. Shideler pointed out that the Workshop packets contain the paper "Use of Projectiles to Deter Bears," by Dick Shideler and Craig Perham as a resource (also posted at <http://www.rdsience.ca/bear/bear.html>). Marley also reminded everyone that the term is "bear spray" and not "pepper spray."

Mark Wagner told a story about using a life-size silhouette of a large male brown bear to deter a female and cubs from using a visitor access point at Brooks Camp in Katmai National Park.

John Murphy, security consultant for Exxon Mobil in Point Thompson, is starting to use a some new products. He has not yet tested but has purchased a focused noisemaker beam to deter polar bears. They have also purchased ground-based radar to track bears, and thermal imaging cameras to detect polar bears in darkness.

Jim Pissot asked if any of the participants had experience with radio activated guard boxes (RAG boxes). USFWS out of Boise have used them to deter wolves. Set off by the approaching animal, it plays loud noises and flashes lights. However, wolves can habituate to these devices.

John Paczkowski worked in the Russian Far East with bears and tigers. In Russia, people use marine signal flares as deterrents. They cost \$3-10, ignite within two seconds and burn for one or two minutes depending on the model. He knows of two instances where flares were used to drive off tigers that had recently attacked people.

Gillian knows of collared African elephants with transmitters that alert wildlife officials when they have crossed into "no-go zones." The official can then haze the animal away. Perhaps R and D

scientists could develop a method to administer electric shocks through the collar. She also wondered if Karelian bear dogs could sensitize habituated bears to the sounds of residential dog barking. Shideler thinks that a bear would learn to avoid that particular Karelian and not all dogs. Honeyman said that it would take many events with several different dogs to get a food-conditioned bear to generalize to any dog barking.

Charlie Russell wondered if hazing and aversive conditioning might be making bears more dangerous in future encounters with humans. In a litigious world, this is a serious question. Honeyman responded, saying that he knows of individual grizzly bears including females with and without cubs that have been conditioned over 10 years. These bears do not respond aggressively even in situations where people are behaving poorly. However, he concurred that it is possible to teach bears to become aggressive if hazing and aversive conditioning are done incorrectly. A bear must be given the option to leave otherwise it has no choice but to stand its ground and defend itself. These types of management actions have to be planned and should be standardized. Lewis added that in all management actions, the manager has to consider what the bear will likely encounter when it next meets people. Homstol added that she has data on black bears before and after aversive conditioning.

Hechtel mentioned that there are talcum-ball rounds that can be used to deter bears.

One commentator was disturbed by the death rate of animals from rubber bullets. Perhaps these standards should be reestablished to prevent these deaths.

## SESSION 10: COMMUNITY-BASED PROGRAMS

### Session Outline

- Questionnaire (please complete before session begins)
- Successes and failures of certain programs
- Identify common threads that were effective
- Improvements for future programs
- How to integrate agency and public programs to be most effective

### FACILITATOR

#### **Sandra MacDougall, Red Deer College, Alberta**

The participants assorted themselves into table discussions at which they discussed each of the following questions. Their responses are reported below each question.

#### **1) How do you define the term community? What does the term “community-based program” mean to you?**

Common interests or shared goals	A town or a watershed
Geographical and virtual communities are different	Different people communities with differing interests, neighborhoods
Human and animal cultures encompassing shared resources	Can be large but with subparts
They may not share interests but do share problems and they bring them together	Transient perhaps such as resorts
People and species sharing a space	

#### **2) What aspects of the community-based program that you are most familiar with have been the most functional/successful?**

Canmore case study WildSmart sprung from a tragic event brought people together; traditional	Traditional knowledge from elders involving respect for the animal
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combatants started talking to each other, finding mutual benefits, better understanding of living with wildlife, less conflict	
Buy-in, vested interest, credibility of leaders, attainable goal, accurate communications, willing to change to meet goals	Unresolved issues: missed stakeholders, language and cultural barriers, no measurement of community success
Shared burden for program, diverse interests with a common goal, shared responsibility and accountability	Unresolved issues: individual rights in America
Science knowledge sharing and active involvement of science	Political will and funding are unresolved

**3) What issues remain unresolved with your program?**

Need to incorporate more traditional knowledge, especially as regards respect for animals	Need information in more than one language
Lack of buy-in from one stakeholder group, e.g. waste management providers, hunting groups	The will of the majority doesn't trump the rights of individuals, so single individuals can be obstacles to success
Lack of success measurements	Lack of political will
Lack of funding	

**4) What are the cornerstones or key elements of your program (e.g. Education, prevention, etc)?**

Need for civil dialogue, create a platform for it, milestones and appropriate measurements, accept different views	Find a common denominator that all can agree on, such as increasing safety
Education, workshops, & safety training	Core volunteer support staff reduces burnout
Infrastructure – phone contacts, waste mgt.	

**5) What are the elements of an effective enforcement program?**

Considered and effective compliance enforcement continuum, from education through the heavy hammer	Multi-part view, Engineering to develops tools, Encouragement, Educate, Enforcement, 4 e's
Social norm attained through education, enforce as last result to avoid alienation, neighbourhood helpers	Education prevention compliance are parts of a triangle that depend on each other for success, credibility counts
Coordinated effort of all responding agencies	Changing the social norm is the ultimate
Legislation effective and enforceable	Call it compliance not enforcement
One contact number, one-window approach	Proper training for compliance officers
Enforce compliance for those who do the right thing, chocolate rewards, doggie treats, be positive	Enforce the rules of polite engagement and working toward consensus within community committees.
Significant fines are important	

CONTRIBUTORS

**Susi Miller, US Fish and Wildlife Service**

Miller works with the residents in Kaktovik, a village of 300 mostly Inupiat residents on the north coast of Alaska. Polar bears aggregate nearby annually while waiting for ice formation. Every year, residents hunt bowhead whales and distribute the whale meat in the village while leaving the carcasses in a bone pile a few kilometers from town. The USFWS began a study of the polar bears in 2002 and documented many interactions between bears and people, including growing bear-viewing tourism. In 2007, the tribal government received a grant to implement bear-human management. The grant has three elements: 1) minimize attractants; 2) implement a polar bear patrol program; and 3) perform education and outreach. The village government hired a local coordinator who organized a committee of volunteers to

identify issues that were important to the residents. Whaling captains were asked to minimize attractants when distributing whale meat and several local people began a polar bear patrol program. They are currently developing viewing guidelines. Miller thinks that community input from the beginning of the process helped to identify issues and tailor their methods so that the program was acceptable to Kaktovik residents. The best methods included refraining from handling bears in studies, offering study results, gathering local opinions through open houses, and educating local children. Unresolved issues include moving the whale bone pile further away from town; oil and gas development pressures on bears; and the need for permanent polar bear patrol funding.

#### **Larry Van Daele, Alaska Department of Fish and Game**

In 2001 a Citizens Advisory Committee was established to work with the Alaska Department of Fish and Game (ADF&G) to develop a management plan addressing the wide variety of issues that affect bears, including hunting, habitat, and viewing. Over several months, this group of representatives from 12 diverse user groups crafted the *Kodiak Archipelago Bear Conservation and Management Plan*. After hearing from a variety of experts and receiving extensive public input, the group developed more than 270 recommendations for Kodiak bear management and conservation. Most impressively, in spite of the diversity of viewpoints expressed by different members of the group, all of the recommendations were agreed upon by consensus.

The underlying themes of the recommendations included continued conservation of the bear population at its current level, increased education programs to teach people how to live with bears on Kodiak, and protection of bear habitat with allowances for continued human use of the Archipelago. Although the group was advisory in nature, government management agencies expressed a commitment to implement all of the regulations that were feasible and within their legal jurisdictions. One of the most evident products of the bear management plan was the creation and operation of the Kodiak Unified Bear Subcommittee (KUBS). This group includes members from various stakeholder groups, as well as ADF&G and Kodiak NWR staff. It meets regularly to share information and to address bear-related issues in the area. KUBS has worked with ADF&G and other agencies to implement plan recommendations, including development of public outreach materials on bear safety and life history, review of bear research and hunting proposals, and improvement of village landfills.

Development of the plan was a successful endeavor that reiterated the importance of the bear population to a wide variety of people. The group took the best available biological information, along with extensive public testimony, and deliberated to develop mutually acceptable recommendations. The common ground that unified these diverse members of the citizen's advisory committee was their desire to maintain a healthy population of bears on the Archipelago, even if it meant alteration of some human behaviors.

#### **Jacques Drisdelle, British Columbia Bear Aware Program**

The British Columbia Conservation Foundation (BCCF) took over the Bear Aware program from the British Columbia Conservation Officers in 1998. BCCF created a program that had the potential to be established in any community. Since then, 148 Bear Aware programs have been started. Programs are community driven and buy-in is critical. Communities must show they will direct and financially support a Bear Aware program. To launch new programs, BCCF hires and trains a program delivery specialist that works with a community for 6 months. The program is designed to be easily tailored to each community's needs. The Bear Aware Program has been very effective in reducing bear-human conflict, reducing bear mortality and promoting a stewardship ethics in communities. Bear Aware is not in the business of saving bears; rather the focus is on promoting public safety, and recognizing that human behaviour is at the core of why bears are needlessly destroyed, usually due to the poor attractant management.

**Lana Ciarniello, Northern Bear Awareness Society**

Ciarniello spoke about research and community activism regarding bears in Prince George, BC. Her presentation focused on how to determine when it becomes appropriate to engage in Bear Smart research that involves handling animals. Bear Smart research is appropriate when: a) the problem is larger than the current solutions; b) the results will be used to improve our understanding of the issue(s) to such an extent that the possible injury or loss of an animal during research activities is an acceptable risk; and c) the results will aid us in developing new and innovative ways of managing a problem. Since 1998, initiatives of the Northern Bear Awareness Society (NBA) and Omineca Human-Bear Conflict Committee include the following: school presentations, summer camps, display booth at public events, door-to-door canvassing, brochure mail outs, fruit exchange program, radio, TV and newspaper coverage, bear-resistant garbage receptacles; and beginning in 2009 the development of a Urban Bear Smart Research Project. The research project was initiated because despite NBA's and Omineca's efforts, the number of complaints and the number of bears killed were not reduced by 2008. They completed a hazard assessment (Ciarniello 2008) and a management plan (Ciarniello 2009), both of which can be downloaded from their website <http://www.northernbearawareness.com/>). The hazard assessment identified that the layout of Prince George appears to funnel bears into residential neighbourhoods. Ciarniello is continuing her research with the ultimate goal of reducing bear deaths by continuing to reduce attractants within the city, working with the City to implement Bear Smart garbage bylaws, severing trail access points for bears, and identifying, maintaining and/or enhancing critical movement corridors in an effort to encourage bears to use critical habitat outside of the city.

**Lori Homstol, University of Alberta, and Sylvia Dolson, Get Bear Smart Society**

Dolson spoke about building a movement towards bear smart communities. Usually there's an event that creates impetus, and a dedicated individual who builds a team of stakeholders. It is important that stakeholders move forward on 90% of the issues where they share consensus. If the committee is temporary, it is important to create bylaws to leave behind. Learn more about creating Bear Smart communities at <http://www.bearsmart.com/becoming-bear-smart/community>. GBSS is committed to creating an online discussion forum and network community for bear smart community advocates to share their successes and challenges. Email [info@bearsmart.com](mailto:info@bearsmart.com) to join the forum.

Homstol talked about the challenges and successes with bears at Whistler. The most challenging aspect is the unwillingness of either the provincial or the municipal government to own bear problems. Successes include removal of mountain ash as attractants and creation of guidelines for building bear-resistant garbage sheds by the Whistler black bear working group. Recently, the Vancouver Olympic Committee and Municipality of Whistler built the 2010 Olympic village on the old landfill site. Black bears wandered into buildings and found garbage laying around the site and food in construction worker's vehicles and in partially constructed buildings. The research team relayed information to the Conservation Officer Service, who contacted Worksafe BC who threatened to shut down construction if bear safe behavior wasn't observed. By removing attractants, the problem was solved.

**Larry Lewis, Alaska Department of Fish and Game**

Using a grant from USFWS administered by Alaska Audubon, Lewis facilitated a pilot project within the City of Kenai Alaska to test the effectiveness of bear-resistant garbage cans in a residential area plagued by bear-human conflicts. Lewis went house to house visiting with 60 homeowners and organized community meetings to inform and encourage the residents of the semi-rural subdivision to participate in the pilot project. Through the project, residents were offered free residential garbage pickup for two years if they used the provided bear-resistant garbage containers. Throughout the two years of the pilot project, the subdivision experienced no bear problems although bears were frequently seen in and around the area. Due to the demonstrated success of the project, Lewis asked the Kenai City Council and

other community leaders to consider expanding the pilot project into a community-wide effort. They agreed to greater participation if outside funding could be secured. Lewis sought and received financial and in-kind help from government, businesses, nonprofit organizations, and the community. Lewis found it imperative to stick to an unassailable message. Community involvement and wildlife management planning leads to 1) safer neighborhoods and surrounding areas for people and wildlife; 2) better stewardship of public resources; and 3) less enforcement agency time spent dealing with nuisance wildlife. Inspired by the success of the program, the Kenai Peninsula communities of Homer, Seward, Soldotna, Cooper landing, Moose Pass and Hope have since agreed to participate in the program and become Wildlife Conservation Communities. There are now over 1,800 Bear-Saver residential garbage containers in circulation, also retrofitted bear-resistant, public-use dumpsters have been installed by the Kenai Peninsula Borough at community waste transfer sites. Participating municipalities have enacted waste management ordinances which are enforceable by their respective police agencies. The Alaska Junior Wildlife Ranger Program empowers school children to make effective changes around their homes by teaching them about the increased wildlife-related risks associated with improper storage of attractants. The program then sends them home with a checklist for identification of wildlife risks. The Kenai Peninsula Borough government has instituted local zoning requiring proper waste management on new borough land developments and many private land developers have instituted covenants within new residential subdivisions requiring the same. Borough and municipal long-range plans now include wildlife and habitat management considerations and recognition of the intrinsic and economic value of wildlife and habitat to Alaska's residents and visitors.

#### DISCUSSION

Mike Gibeau mentioned that he is looking for community conservation program presentations for both next IBA conference in the Republic of Georgia in 2010, and for the IBA conference in Ottawa in July 2011.

Debbie Wellwood and her colleagues created a Circle of Responsibility chart that describes the roles of government and communities to solve bear-human conflicts. She observed that the Circle of Responsibility seems to be shifting away from state and federal governments onto communities, and that this represents a cultural change. Perhaps the IBA could examine the options for community-based program support in this changing paradigm.

Ciarniello added that her program in Prince George lost funding and became staffed almost entirely by volunteers. Due to this they lost consistency and were less able to plan and carry out educational events. Prior to achieving bear smart community status, provincial conservation officers killed all nuisance bears, regardless of the level of their nuisance behavior.

Jim Wilder asked Lewis what ADF&G is doing to dispel the myth that bear problems are the result of overpopulation and not human attractants. Lewis cited several committees that work on brown bear issues, including the Kenai Brown Bear Education Committee.

## SESSION 11: RISK AND LIABILITY

### Risk and Liability

#### FACILITATOR

**John Hechtel, Retired, Alaska Department of Fish and Game, Consultant**

## CONTRIBUTORS

**Kirk N. Lambrecht, Q.C. Edmonton, Alberta**

Managers have to do what is reasonable to assure safety. Liability comes in two forms: common law (called “negligence”) and statute law. Research that supports “reasonable” efforts is beneficial. However, the individuality of judges confounds the legal process; a judge’s prior experience with wildlife and wildlife issues can have a defining bearing on his/her decisions. For example, when an injured person brings a suit against the government, it is sometimes viewed as a “David and Goliath” situation by the courts. In the U.S., judges will award huge monetary decisions against the government as a penalty or deterrent against future negligence.

What is reasonable is often referred to as the “standard of care” for avoiding conflicts. In the Bow Valley, that means people who enter the park receive a brochure and the visitor center posts grizzly bear sightings. Research on bear movement is also considered reasonable.

Case 1: An experienced outdoorsman went into the wilderness and borrowed a truck from an outfitter. The truck broke down and the outdoorsman walked through a dump at night to get back to camp. A grizzly mauled him. He sued the outfitter but the judge dismissed the case because the outfitter could not have known that the truck would break down. The judge also ruled that the outdoorsman was competent enough to have known better than to walk through the dump at night.

Case 2: A game farm owner hired a young person to clean wild animals’ compounds. The owner gave the employee keys to all the cages but warned him not to go near the tiger pens. The employee opened the tiger compound to retrieve his friend’s hat and the tiger attacked him. The case focused on the issue of whether or not it was reasonable for the game farm owner to give the tiger compound keys to the employee. Ultimately, the judge found that the owner was not liable.

Case 3: Tobler filed a case against Banff National Park because park staff used a helicopter to shoot a nuisance bear, and then allowed visitors to return to the area where the bear was shot. At this locations a grizzly bear mauled Tobler. At the trial, the helicopter pilot testified that told the park staff they were shooting the wrong bear, however they didn’t listen to him. The judge held Parks Canada partially responsible.

Case 4: A young woman and her boyfriend visited a “safari” type game farm near Ontario. They drove employees picked up some tiger cubs and placed them in their game farm vehicle. At a later point, the couple opened their windows and adult tigers attacked and drug them out of the car. The judge decided against the game farm.

**Kevin Saxby, Alaska Department of Law (via teleconference)**

Most civil liability depends on state law. However, some generalities apply to all states. Even on federal lands, most cases will rely on state laws to determine whether or not harm has occurred. Most suits regarding wild animals are based on claims of negligence.

In order to assess liability under a negligence theory, the plaintiff must be able prove four elements:

1. The existence of a duty by the person being sued to the person who is doing the suing; and
2. That the duty was breached; and
3. That the breach caused injury (i.e., but for the breach, no harm would have occurred); and
4. That the existing damages are harm (the typical damages are monetary, as is the typical remedy).

The principle of governmental or sovereign immunity applies to a greater or lesser extent in most states and in the federal government. If sovereign immunity applies to a particular set of facts, then the elements of the case are not even considered. Establishing sovereign immunity can resolve a claim at the outset. To determine whether sovereign immunity applies, it must be established whether the case is

dealing with a policy decision or whether it's an implementation of policy. *Generally, policy-level decisions are immune while the implementation of that policy is not.* However, in Alaska, the courts are inconsistent when it comes to labeling policy or implementation.

It behooves managers to preserve the ability to argue, in any case, where their actions are based on policy-level decisions. Courts will look for the hallmarks such as whether the decision-maker had the discretion to act or not act. By specifically allowing discretion in a policy document, decisions will look like policy. Conversely, one of the hallmarks of a "ministerial" or implementation decision is the lack of discretion.

Plaintiffs can prove that an action is ministerial if the agency has a checklist that the actor must follow. Therefore, to the extent that an agency constrains managers' decision-making, they make it difficult to prove that sovereign immunity applies. *Natural resource agencies should preserve discretion and characterize managers' decisions as policy-level.*

The doctrine of *Ferae Naturae* (unowned property; refers to tangible, physical things which are capable of being reduced to property owned by an individual, but are not), applies in liability cases. This is an old common law principle that states that a landowner cannot be held responsible for the acts of indigenous wild animals on their property, unless they introduced them to the area or the animals are in the landowner's possession. Therefore, this doctrine would not apply if a person was injured by a captive bear or in situations where an animal has been recently introduced. The doctrine treats wild animals as a natural condition of public land. In addition, if the doctrine applies, there would most likely be no duty to warn visitors. For example, in an Alaskan case, the plaintiff's lawyers did not sue the state as a landowner because they feared the state would invoke the doctrine. However, they dodged the doctrine and instead argued that the state attracted bears into the area by leaving garbage in barrels next to a bus stop.

Warning signs and pamphlets help show that, if a duty exists, the duty has not been breached. Managers have asked Saxby, "Doesn't a warning sign show that the agency has knowledge of a problem, and doesn't that knowledge prove the case for liability?" Saxby replied that willful ignorance and/or ignoring public safety concerns are never good legal strategies. If the agency does have knowledge of a particular danger, the plaintiff will usually be able to prove it with or without warning signs and brochures. In cases where signs warned the public, courts ruled that no duty has been breached.

Another generality is that bad cases make bad law. In one state, the department of transportation installed elk crossing warning signs on a section of highway. Despite these warnings, an accident victim successfully sued the state. In this case, the court cited a long record of elk-vehicle collisions along the same stretch that had resulted in significant injuries. This case became a precedent, i.e., "bad law" that other courts can use in wildlife damage cases. *In any case, acting reasonably is always the best defense. In other words, if managers treat the public as they would treat their loved ones, it is unlikely they'll be held liable.*

### **Ramona Maraj, Yukon Territory**

Maraj described two cases. In the first case, a grizzly was killed at a mining camp in the Ross River Area in 2007. The camp had unmaintained electric fencing around a waste disposal site that was not operating. On multiple occasions, a family group (female and COY) obtained garbage from the waste disposal site. The food-conditioned family group entered the camp cooking area, and employees killed them, invoking defense of life and property. However, the territory successfully sued the company by citing Yukon Occupational Health and Safety Regulations that required the implementation of precautions such as electric fencing before lawful removal of problem bears.



In the second case, the Yukon compensation board accused Aurora Geosciences of safety regulation violations in the April 2006 grizzly bear mauling death of Jean-François Pagé. Pagé was staking mining claims within five meters of a grizzly den when a sow with two cubs attacked him. The Yukon compensation board alleged Aurora Geosciences did not properly train or equip Pagé for the job--an allegation the company denied. Pagé carried a handheld radio but no deterrents. The court determined that the company did not adequately train the worker to deal with bear encounters. Other inadequate measures included a lack of safety reconnaissance by helicopter prior to leaving Pagé, and sending him to work alone. There was no contingency plan or safety plan in place for bear encounters. However, the case was “stayed” because of new evidence that was never revealed. The case did result in changes to industrial safety precautions. Companies reacted by increasing the demand for safety training from Environment Yukon, which does not charge for this training. In addition, the Yukon government has produced several publications as an indirect and direct result of this incident.

## DISCUSSION

Tania Lewis, Glacier Bay National Park, asked whether agencies are liable when a visitor is mauled just outside the boundaries of a temporary closure. Saxby replied that Glacier Bay has sovereign immunity. The state considers the discretion to close an area to be a policy-level decision and closing an area is a reasonable response to remove public danger. Whether or not a closure is large enough to protect everyone is a fact mitigated by the pressure upon the agency to provide access to public land.

Jim Pissot, Defenders of Wildlife, asked Lambrecht and Saxby to cite agency immunity references for wildlife cases. Lambrecht referred Pissot to Herrero’s list of references in his book. Saxby said that case law is the best reference; however, courts tend to complain about the lack of applicable precedents.

Elizabeth Manning, Alaska Department of Fish and Game, asked how liability affects agency volunteers who give out information about wildlife risks and conflicts. Saxby said that in the U.S., a person (or “actor”) is usually personally liable if they act negligently. However, the plaintiff’s attorney will always sue the government because of their deep pockets. The government will not be able to avoid liability because the actor is volunteering. Lambrecht said the law is basically the same in Canada.

Ron Leavey, of Canmore, asked two questions. First, what is the statute of limitations on liability for mauling injuries? Lambrecht responded that each province’s statute of limitations is usually about two years. However, the clock starts when the victim realizes whether he could sue, rather than when the actual attack occurred. Saxby concurred, though the period of limitations may vary from state to state. Second, when does liability end for bears that have been handled or hazed? Once managers have touched animals, do they own them? Lambrecht said that he doesn’t think wild animals can ever be “owned.” This situation would probably be a question of the experience and discretion of the manager in the particular case. Saxby concurred.

Danny Gammons, U.S. National Park Service said that his agency has strict criteria for bear behavior that might justify destruction of the bear. Do these criteria increase the chances of liability? Saxby responded, by quoting the lawyer’s prayer: “I pray that my enemy has written a book.” By writing down every detail of criteria, it is possible for a plaintiff’s attorney to prove that the agency has acted inconsistent to the written criteria. However, in some situations, managers must establish criteria in order to function effectively. The more an agency prescribes specific actions, the easier it is for a plaintiff to establish liability. However, failing to prescribe actions can also incur liability in some situations. The best action would be to consult your agency solicitor and work out a compromise. Lambrecht added that in Canada, policy is also defined very clearly.

Ken Higgins, BLM, asked Saxby to name the Alaska case he mentioned. Saxby responded saying that the case was 1979 Carlson vs. Alaska.

## Criteria for lethal control of bears

### **Dick Shideler, Alaska Department of Fish and Game**

In the oilfields, the criteria calls for lethal removal of predatory behavior toward humans, a *pattern* of aggressive behavior toward humans, breaking into inhabited buildings and severe food-conditioning. Shideler has applied a new technique for assessing the level of food-conditioning. Stable isotope analysis shows that food-conditioned bears have different carbon and nitrogen isotope signatures than bears who eat natural foods. Another development that may be helpful is a measure of trans-fat levels in bears, although the information hasn't yet been used to make management decisions. The ability to identify food-conditioned bears without having to spend days observing each individual allows more efficient decision-making about treatments such as aversive conditioning or lethal removal.

### **Mike Madel, Montana Fish Wildlife and Parks**

In the Lower 48 states, the International Grizzly Bear Committee provides criteria for lethal control (these can be found on the IGBC website). The guidelines provide consistency so that landowners, while they may not agree, know what to expect from bear managers. MFWP tries to avoid expensive captures by preventing problems.

### **Darryl Hedman, Manitoba Conservation, Thompson**

Hedman outlined the criteria for permanent removal of polar bears in the control area at Churchill. Permanent removal can mean lethal removal or sending the bear to a zoo. During the 1970s, bears were lethally removed at an average of 10 bears/ year. There were three dumps in the Churchill area at that time. In the 1980's there was a shift from a control program to an alert program. They began a "3 strike" program for bears that wandered into Zone 1 or Zone 2. The alert program focused more on detection and deterrents. In 2003, Hedman revised the Polar Bear Alert program. Now bears in town are moved, and if they come back within 30 days, they are kept in the holding compound for the rest of the season until the ice returns.

### **John Waller, Glacier National Park, Montana (via teleconference)**

Waller reviewed a case of lethal removal in Glacier Park. In 2005, a tolerant female grizzly with two yearlings began walking through campgrounds and coming into close proximity of people without moving away. She followed a ranger down a trail. Waller and park staff radio-collared her and applied aversive conditioning at least six times over the next two years. There were few reports of her in 2007-2008. In 2009, she and her new yearling cubs hung out near and around campgrounds. Early in summer 2009, Waller put a GPS collar on the grizzly with the idea of continuing aversive conditioning. However, under Glacier National Park's bear management plan, a bear that is behaving in a dangerous manner must be removed. This behavior includes food-conditioning and approaching people in a nondefensive manner. The park managers weighed the risks and liability of the female's behavior and decided it was best to lethally remove her and send her two yearlings to the Bronx Zoo. When she was shot, one of the cubs died and the other was sent to the zoo. Waller added that the 13-year-old female was in good condition, and that she may have been slightly food-conditioned.

Waller commented that he had underestimated the amount of controversy this action caused. Many park staff and the public disagreed with managers' decision to remove a bear that was not food-conditioned or aggressive. Waller requested some professional discourse about when it is the right time to remove a bear.

## DISCUSSION

Jay Honeyman said Wind River Bear Institute developed a step-by-step index to help managers determine when aversive conditioning or other treatments are appropriate, and what amount of effort should be invested to change bear behavior.

Shideler asked Waller to describe the behavior of the yearling cubs in the incident. Waller said that the yearlings likely affected the female's behavior because in both 2005 and 2009, she had yearling cubs, and this was when she hung around people. When she strolled through campgrounds, the cubs would linger behind her and sniff objects.

Mark Bruscano commented that in Wyoming, they are using body fat calculations to compare between "normal" bears and food-conditioned bears. If they capture a bear that seems to have body fat levels appropriate for natural foraging, they are more likely to treat them non-lethally.

John Neary asked what would have defined success for a habituated bear in the zone described by Waller. Waller said that their decision was based on the high cost of the resources they had already used for aversive conditioning of this bear and they were reluctant to incur more costs.

Linda Masterson asked Waller why the grizzly was attracted to the area. Waller said that the bear didn't have to be in campgrounds; it appeared to him that she could take other routes. He cited an incident in which the family of bears walked around a lake to enter a campground, and in doing so, forced two rangers to back up, waving their arms. In the rangers' opinion, she repeatedly approached people in a nondefensive manner, which was a criterion for removal.

Charlie Russell asked Waller about a quote in the *Missoulian* newspaper that stated that the decision to remove the bear in Glacier was made with the best possible science. Waller responded by saying there isn't really a body of scientific evidence that could direct their actions either way. However, he had read Herrero's descriptions of the behaviors of a few bears prior to maulings, and these descriptions paralleled the behavior of the female that was removed.

Tania Lewis noted that in Glacier Bay National Park, they try hard to teach visitors not to back down from bears. Glacier Bay encourages some habituation, because tolerant bears seem to be less likely to act defensively towards people. She asked Waller about Glacier's policy regarding habituation in the backcountry. Waller said that he recommends managing for a mid-level amount of habituation. Too little habituation and a bear can be nervous; too much tolerance and a bear can be vulnerable to food-conditioning. Managers must account for the variability of human behaviors in bear encounters; some people may throw rocks at a bear, others may throw food. Glacier National Park staff manage the level of habituation with as much precision as possible.

Hal Morrison said that Parks Canada deals with similar issues as Glacier. They chase bears out of campgrounds, though they allow the bears to stay in the proximity. Banff staff have moved or removed bears in the past that foraged in proximity to townsites or campgrounds. Eventually, they realized they'd have to remove every bear from the valley bottom under those criteria. Morrison added that he was concerned that the Glacier case might cause the public to expect other managers to act the same in the same situation.

Waller asked Morrison how Banff managers make removal decisions. Morrison responded that removal was prescribed for aggressive bears, bears with unrecoverable injuries, and bears that, despite relocation efforts and aversive conditioning, would not stay out of human development.

John Neary noted that the female's behavior was familiar to brown bear viewing area managers. In those areas, tolerant females with cubs are more likely to be near humans. This behavior stems from a female's fear of other bears, and their recognition that there are fewer bears in proximity to humans. In effect, the campground may have been a protective shield for the tolerant female. On Admiralty Island,

tolerant females and cubs in proximity to people are not hazed away. Perhaps if Glacier was more of a bear viewing area, managers might consider adopting policies more akin to bear viewing areas. Neary encouraged the participants to come up with criteria for managing tolerant bears in areas where people's behavior is not controllable.

Steve Herrero said that we are entering a new era in bear management where managers have a deeper knowledge of the subtleties of bear behavior. For example, in Alaskan bear viewing areas, guides and visitors are taught not to approach bears but allow them to approach humans except when the approaching bear (often a subadult) is evidently trying to displace humans. Herrero lists five reasons why a nondefensive bear might approach a person. For example, it could be habituated, food-conditioned, asserting dominance, looking for security relative to bear-bear social situations, or predatory. It is not simple: a bear approaching is not necessarily dangerous. One has to apply knowledge of bear behavior to management.

## BEAR/HUMAN CONFLICTS WORKSHOP WRAP-UP

**SPEAKER: Terry D. Debruyne, U.S. Fish and Wildlife Service, Anchorage AK**

I want to summarize the crux of some of the many important things that were said at this workshop.

As I mentioned at the beginning of the Bear Behavior session, we hold the future of bears in our hands—we are the encephalated species, so we need to act like it. Though a lot of new information was shared, it is clear that we need to have systematic studies of bear behavior.

During the session, several contributors emphasized the differences between the species and between cohorts of bears—particularly subadult bears. Subadult bears, like many folks in the 1960s, test the limits of their environment. Contributors recognized that bears are social animals, have hierarchies, and that they are not unpredictable. They have a repertoire of vocalization and behavior signals that give us plenty of clues to their intent—and sometimes those signals are given to us at great distances. Scale is an important issue when dealing with bears.

Bears are curious by nature. They will investigate nearly any anomaly in the landscape because there is potentially a meal there. But there can be a negative side to their curiosity because it often brings them into contact with humans. As we were admonished by one of our First Nation participants, where there are people, there will be wildlife conflict.

We should remain cognizant that interactions are something we do 'with a bear' and not 'to a bear'. In interactions, we should consider the context of the situation and the bears' motivation. It is best to interpret bear behavior from their point of view and be careful not to interpret it through what is likely our biased filter. We also recognized that we should avoid perpetuation of myths about bears, of which there are still many around.

We also learned that speaking softly in Russian and carrying a big stick is effective in dealing with bears *and* people.

In the Bear-Human Conflicts Update session, we examined a number of case histories, including Jim Wilder's study at McCarthy, Alaska. We talked about Nunavut, Canmore, Alberta Parks and the Bearwise program. One of the obvious conclusions resulting from that session is that we need to focus on proactive measures. We should share our successes *and* our failures, but try to focus on our successes.

The Kodiak Island and Canmore programs offered some good examples of how public input strengthens bear management. Such programs, by and large, need to be led by a highly-motivated individual. In successful programs, usually an enthusiastic “spark plug” motivates others to get involved. Kim Titchener’s enthusiasm was infectious, and it takes that kind of person to carry these programs forward.

We talked about the risks and benefits of habituation. It seems that the pros and cons of habituation are intertwined. While the literature offers some interesting speculation about habituation, we need the professional community to focus on questions like, “Is habituation context-specific?” “Does habituation affect bear-viewing and hunting where these uses occur in proximity?” and “What are the specific risks and benefits of habituation in each context?” A First Nation participant mentioned that bear behavior changes during the mating season. This, too, needs investigation and admission into our body of literature.

We also talked about when it’s appropriate to use the “velvet glove,” and when to haul out the heavy artillery and use “shock and awe.” Both approaches to hazing and aversive conditioning may be appropriate, though in different situations.

In the Bear Management session, we discussed the differences between hazing and aversive conditioning. Larry Van Daele and Lori Homstol both illustrated the effectiveness of applying learning theory and behavioral science to aversive conditioning. This approach allows managers to use the least amount of force and the fewest resources in order to get the results they want. We also discussed the efficacy of translocation, and found that it is useful if used judiciously. If you’re going to translocate a bear, it helps to move them to where they “want” to go. Twenty or twenty-five years ago, Lynn Rogers moved bears in the Upper Peninsula of Michigan and found that male subadults tended to stay where they were moved because they didn’t have an established home range and were not particularly knowledgeable about the resources in the place where they were captured. However, females and adult males will most likely come back because they know about and value the resources in the area where they were captured. Often relocation and translocation decisions are based on the availability of manager’s resources. These tools should probably be used as a last resort, but they do buy us time during critical periods and they are worthy tools.

We also talked about diversionary feeding—from concentrating winterkilled carcasses in remote locations to deliberate feeding. The ultimate impacts of each type of diversionary feeding need to be studied. We heard from managers who said that carcass redistribution can be effective in helping prevent conflicts; however, this tool undoubtedly changes bear movements and demographics. I hope that we’ll have more information about this topic at our next meeting.

The participants added worthwhile advice during the bear management session. One comment was that if managers are unfortunately involved in a bear killing, they should take advantage of media interest in such an event and use the opportunity to explain why and discuss bear management issues. Someone else summed it up saying, “Let’s stop dealing with bears and start dealing with the root of the problem.”

On Sunday evening, I was impressed by the diversity of useful research presented during the poster session. The studies undertaken by many of these young people will improve the practice of bear management.

During the Managing People session, it became obvious that the way we manage people often is a result of the restrictions placed upon us. For example, trail and backcountry closures seem to be the best tools that managers can apply in National Parks where numbers of visitors are unlimited. However, front and backcountry closures are sometimes unpopular; other management tools may be better tolerated such as group size restrictions and backcountry bear safety education requirements.

The use of management zones is a useful concept. One contributor to this session outlined the importance of sitting down and talking with landowners to change attitudes. He illustrated the efficacy of obtaining landowner buy-in and community support for appropriate regulations. We also talked about the necessity to create social norms that discourage bear conflicts and foster community awareness.

Contributors and participants wanted more access to pertinent social science, and in some cases, more research. Managers and researchers need to make greater efforts at sharing methods and results from people management research.

We also learned about increasingly popular recreational pastimes that sometimes conflict with bears, such as geocaching, mountain biking, and backcountry trail races. Recreational trends can be observed by looking at other provinces and states. The earlier we can address these trends, the better it will be for bears and wildlife.

In the Attractant Management session, we discussed bear-resistant food containers, their reliability and their diversity. It became clear that testing bear-resistant products is vital for managers. And that in valid testing, bears should set the standard for approval. We also talked about electric fences and the need to both construct, and ground them properly. We also recognized that are not a panacea and that proper food handling and storage are still key to safely camping in bear country.

The workshop was enriched by the degree of participation during the Education session. Several groups admonished us to use success stories when talking to the public. And in addition, that we should talk about “problems with bears” rather than “problem bears” so that the public isn’t misled about the source of the conflict.

Since our last Canmore gathering, we’ve added the “Safety in Bear Country” training videos. These products have improved our effectiveness as educators tremendously. They’ve been instrumental to the advancement of bear safety.

At the first evening session, Tom Smith, Steve Herrero and Kallie Layton presented us with a chance to discuss the important topic of bear spray vs. bullets as safety tools for bear encounters. We also talked about diversionary feeding after hearing Lynn Rogers’ presentation. At that session, some participants suggested that we discriminate between diversionary feeding and supplemental feeding. In light of climate change and potential trophic cascades, it may not be wise to out-of-hand rule out any potential tool for dealing with bear problems. Diversionary feeding may or may not be the way to go, however its application needs rigorous examination before it is undertaken. In my mind, the major consideration should be its effect on bears.

In the Deterrence and Detection session, we discussed a variety of products and actions including dogs, Tasers, and guidelines. Brianna Burley’s presentation about line-of-sight vegetation removal was important because the technique recognizes bears’ interest in detecting and avoiding humans as well as vice versa. Participants and contributors agreed that we need more deterrent research, and we need to develop better protocols for the deterrents we currently employ. We also need to answer the question “Do these deterrents create any danger for future encounters?”

In the Training session, Mike Pederson spoke powerfully about forging alliances with communities through training. In my experience, even a weeklong training in aversive conditioning isn’t enough time to understand bear behavior well enough to be as effective as we need to be. Aversive conditioning demands in-depth knowledge of bear behavior, weapon limitations, and human behavior, and it requires more than a couple of hours—or even a couple of days to cover the topic adequately. However, bear

guarding is becoming a job class. We, as professionals, need to provide new bear guards with the knowledge and experience they need to protect both bears and humans.

In the Community-Based Programs session, contributors agreed that community input in developing the programs is very important. Susi Miller talked about the importance of incorporating traditional knowledge. We also discussed the necessity to pair education with enforcement, because a certain percentage of folks still need to get caught in order to effect a behavior change.

In our last session, we looked at risk and liability. We learned from solicitors that giving detailed prescriptions to field personnel may actually increase liability; it is better to train your field staff to make good decisions in the field, based on policy. In addition, the solicitors endorsed the practice of giving the public the same bear safety information that we would give to our family and friends.

I want to leave you with a few thoughts. These are things I would like to say perfectly, so let me try. First, all bears are individuals and complex—but not unpredictable. Bears are part of the landscape and neither the landscape nor bears should be considered separately. Most folks can never really see a bear for what it is—their view is obstructed by their vantage point. We must recognize that every second of every day can be a life and death matter to a bear. And, while that may sound trite, nothing I know of is truer.

Second, we need to start thinking about research time scales differently; we often jump in for relatively short time spans and attempt to make predictions based on our limited observations. However, we never really know where we are in the overall trend of things. Two years, five years, even ten years of research is a tiny little fraction in the lifeline of a bear. We need to tell our agencies and foundations that we need longer terms to carry out our research.

Finally, in the areas I've studied bears (and elsewhere for that matter) they face the same major threats—destruction, alteration, and fragmentation of their habitat by humans. The only way to correct that problem is to correct human behavior. And while we're here dealing with bear behavior, I admonish you to spend more time dealing with human behavior.

## APPENDIX 1: TERMS USED IN BEAR-PEOPLE CONFLICT MANAGEMENT

*Note: Working definitions were provided by workshop organizing committee for use at the Third International Bear-People Conflicts Workshop. Some contributors defined these terms somewhat differently. Their definitions can be obtained directly from them or from their presentation documents.*

**Anthropogenic food:** any source of food that derives from humans or human activity, including but not limited to garbage, human food, pets or livestock or their food, apiaries, wild bird food, grain (stored or in the field), hunter-killed carcasses, sanitary waste, cultivated fruit, fish hatcheries or fish food.

**Attack:** intentional contact by a bear resulting in human injury. Bear attacks are a subset of *incidents*.

**Attractant:** anything that draws a bear into an area including natural foods (e.g., berries, fish, hard mast, or ungulate carcasses), *anthropogenic foods*, or items we would consider inedible (e.g. industrial materials such as motor oil, antifreeze, fertilizer, coatings on power cables). Under broadest definition could be anything that bears find interesting.

**Aversive conditioning (AC):** a form of *operant conditioning* in which an aversive agent is systematically applied to an animal as it performs a behavior in order to reduce the frequency or performance of the behavior. In bear conflict management, AC is a structured program to systematically apply an aversive agent (e.g. treating with noisemakers, projectiles, dogs, vehicles) when a bear approaches or has entered an area of human activity followed by removal of the aversive agent when the bear retreats to suitable habitat or area. See also *hazing*.

**Backcountry:** areas accessible primarily by hiking or 4 wheel drive vehicles, quads, skidoos, airplanes or boats.

**Bear human conflict:** includes *interactions*, *encounters* and aggressive interactions which people perceive or experience a threat to life or property.

**Bear-resistant:** describes an object's composition or qualities that help to prevent bears from accessing something. Usually implies some sort of container or device that helps prevent bears' access

**Bear-resistant container (BRC):** containers that are *bear-resistant* but not necessarily bear-proof. In the USA, containers officially designated as BRC's in grizzly bear habitat have successfully passed the Interagency Grizzly Bear Committee's Bear-Resistant Testing Protocol.

**Classical conditioning:** a form of associative learning in which the conditioned stimulus (e.g. ringing bell) is repeatedly paired with and precedes the unconditioned stimulus (e.g. smelly food) until the conditioned stimulus alone is sufficient to elicit the response (e.g. salivation) independent of performance of a behavior. Also called *Pavlovian conditioning*.

**Conditioned Taste Aversion (CTA):** a form of *classical conditioning* in which animals learn to associate the taste of a specific food with an illness that occurs after (up to 12 hours) its consumption. CTA can occur and be resistant to extinction after only one trial.

**Day-active:** management term that refers to bears that approach humans or human activity during daylight, or other periods of frequent human activity.

**Detection systems:** systems capable of recording the presence of a bear and warning people. Used to protect human safety and to preclude the need for harassing or killing a bear.

**Deterrence:** the act of dissuading a bear from reaching a goal that people doesn't want it to reach.

**Diversionary feeding:** supplying alternative food sources to divert bears away from a real or potential conflict location or situation.

**Encounter:** synonymous with *interaction*.



**Food-conditioning:** form of operant conditioning in which bears learn to associate sources of food with humans or their infrastructure.

**Front-country:** areas accessible by vehicle on surfaced roads (pavement or chip seal).

**Generalization:** a potential result of operant conditioning in which the animal no longer discriminates between multiple stimuli. Although undesirable in many animal training situations, it is the goal where we are applying aversive conditioning in order to “train” bears to avoid conflict situations, or using CTA to eliminate conditioning to certain anthropogenic attractants.

**Habituation:** type of learning in which bear no longer responds to presence of a stimulus; “learned indifference.”

**Hard release:** see *On-site Release*.

**Hazing:** application of aversive agents (e.g., noisemakers, projectiles, dogs, vehicles) to a bear that is approaching or has approached a conflict situation. May consist of one or many such events, but, in contrast to *aversive conditioning*, the goal is to remove the bear from the immediate conflict situation and not necessarily to modify the bear’s behavior. Further application is not implied nor necessarily consistently applied every time.

**Incident:** interaction between a bear(s) and a person(s) in which the bear acts aggressively. Bear incidents are a subset of bear–human interactions and have outcomes ranging from benign to injury.

**Interaction:** when a person(s) and bear(s) are mutually aware of one another. Bears may react with seeming indifference, by leaving the area, or approaching the person. Synonymous with *encounter*.

**Intrinsic values:** in relation to ecosystems, means those aspects of ecosystems and their constituent parts which have value in their own right, including: (a) Their biological and genetic diversity; and (b) The essential characteristics that determine an ecosystem’s integrity, form, functioning, and resilience. [From Resource Management (Simplifying and Streamlining) Amendment Act 2009]

**Less-lethal:** a type of deterrent, mostly used in the context of projectiles fired from a firearm, that if used properly will not injure or kill the animal, but has the potential to be lethal or injurious if used improperly.

**Lethal projectile:** firearms ammunition (rounds) composed of a metal projectile for the intent of killing.

**Mauling:** an *attack* resulting in death, or injuries that require medical attention.

**Night-active:** management term that refers to bears that are wary of humans and do not approach human activity or facilities until “night” (or periods of reduced human activity in northern latitudes with near-continuous daylight).

**Non-lethal:** a type of deterrent (e.g., pepper spray or stationary noise-makers such as air horns) that will not injure or kill a bear even if misused.

**On-site release (OSR) or hard release:** capture and release of a management bear in the same location or very near to site of capture, usually with intensive hazing associated with the release. Often, but not necessarily always, includes immobilization and marking individual.

**Operant conditioning:** a type of learning in which the behavior of an animal is affected by consequences of performance of the behavior either by positive reinforcement (e.g. “clicker training”) or by punishment (*aversive conditioning*). Positive reinforcement increases the probability of the behavior or improves its performance. Punishment reduces the probability of the behavior.

**Overt reaction distance (ORD):** replaces terms such as individual distance or personal space. ORD refers to the distance at which a bear overtly reacts to another bear or a person. A bear may react internally before reacting in a manner people can observe.

**Problem bear:** a bear that requires a management action or expenditure of human and/or financial resources. This term covers a broad spectrum, from bears that require periodic monitoring because they are near human infrastructure, to bears that require intensive hazing or lethal removal.

**Relocation:** capture and release of bear at a distance within its home range, if known, or a distance corresponding to the ordinary home range size of bears in the area (also see *translocation*). Often, but not always, the intent is to remove bear temporarily from a conflict situation.

**Repellent:** type of deterrent, most notably capsaicin spray.

**Sighting:** when a person sees a bear, but the bear is apparently unaware of the person.

**Translocation:** capture and release of bear at a distance beyond its home range, if known, otherwise beyond the ordinary home range size of bears in the area. The intent of translocation is to force the bear to establish a new home range far removed from the conflict situation. (Also see *relocation*).

## APPENDIX II: CONTRIBUTORS

**Mike Badry** is British Columbia's first Wildlife Conflicts Prevention Coordinator with the responsibility of implementing the Wildlife-Human Conflict Prevention Strategy. The strategy is a proactive conservation initiative that encourages prevention activities to reduce wildlife-human conflicts through shared stewardship and shared responsibility.

**Neil Barten** has dealt with black and brown bear conflicts with people in urban areas, and bear research projects since 1997 when he became the Juneau area wildlife biologist for the Alaska Department of Fish & Game. He has worked extensively with communities and on research projects aimed at obtaining information about black and brown bear habitat use around communities and at sites where mining, logging, and road building activities have been proposed

**Mark Brusino** is the Bear Management Program Supervisor for Wyoming Game & Fish Department in Cody, Wyoming. Mark has 29 years of experience working with human-large carnivore conflicts in the Greater Yellowstone Area and currently supervises Wyoming Game and Fish Department's Bear Management Program.

**Brianna Burley**

**Lana M. Ciarniello** holds a Ph.D. specializing in Environmental Biology and Ecology from the University of Alberta. Dr. Ciarniello has specialized in bear research and management throughout Canada for the past 16 years (e.g., Parsnip Grizzly Bear Population and Habitat Project, <http://web.unbc.ca/parsnip-grizzly/>). She currently contracts through her company Aklak Wildlife Consulting, and is the project biologist for the Prince George Urban Bear Smart Research Project and Northern Bear Awareness (<http://www.northernbearawareness.com>).

**Terry Debruyn**

**Sylvia Dolson** is the Executive Director of the Get Bear Smart Society, based in Whistler, British Columbia. Sylvia has been involved with the Get Bear Smart Society since 1996. She has been a key player in establishing Whistler as the province's leading Bear Smart community and plans to expand the Society's many educational and training programs throughout British Columbia and beyond. Her new book, BEAR~OLOGY: Fascinating Bear Facts, Tales & Trivia, was released in the spring of 2009.

**Jacques Drisdelle** is the Provincial Program Coordinator for the BC Conservation Foundation Bear Aware Program based in Williams Lake, BC. Bear Aware is a province wide program which focuses on bear/human conflict prevention in residential neighbourhoods. Bear Aware is the lead agency that promotes and develops the provinces Bear Smart Community Accreditation Program. Bear aware is currently engaged with other communities in developing Bear Smart initiatives.

**Barrie Gilbert**

**Kerry Gunther** is the Bear Management Biologist for Yellowstone National Park and a member of the Interagency Grizzly Bear Study Team for the Greater Yellowstone Ecosystem. He has worked in grizzly bear and black bear research and conflict management in Yellowstone National Park for 27 years. His interests include the conservation of bears and finding practical solutions for reducing bear-human conflicts.

**Dave Hanna** is the Human Wildlife Conflict Prevention Coordinator for Alberta Parks.

**John Hechtel** worked for the Alaska Department of Fish and Game from 1980-2008 on grizzly and black bear research and management, human-bear conflict management, bear safety education, bear viewing and refuge management. He also spent 2 years working as the bear biologist for Yukon Territory. He now consults and provides bear safety training, human-bear conflict prevention, and aversive conditioning.

**Daryll Hedman** is Regional Wildlife Manager for Manitoba Conservation. Among other duties, he is responsible for management of the polar bear population in western Hudson Bay, and oversees the Polar Bear Alert program at Churchill. This program has become a model for management of polar bear conflicts where the goal is to balance human and bear safety with the needs of a major commercial bear viewing industry.

**Stephen Herrero** is emeritus professor of environmental design for the University of Calgary. He is the author of *Bear Attacks: Their Causes and Avoidance*. Although Dr. Herrero left university full-time teaching in 1997, he continues research in several research projects on bear-human interactions.

**Lori Homstol** is studying how black bears in British Columbia respond to aversive conditioning and conditioned taste aversion as part of her master's degree at the University of Alberta. Lori has been working with black and grizzly bears for 15 years and has also worked with Asian black bears in Japan and Andean bears in Ecuador.

**Jay Honeyman**

**Stanley Kowalchuk**

**Cali Layton** is a senior Wildlife and Wildlands Conservation undergraduate at Brigham Young University. She has worked with Dr. Smith and the Alaska bear database since Fall 2007.

**Kirk Lambrecht** was called to the Bar in Alberta in 1984 and has been practicing law at the Justice Department since that time in the areas of criminal prosecutions and civil litigation. He has appeared as a barrister in all trial and appellate levels of the courts in Alberta and in Federal Court, and has several appearances before the Supreme Court of Canada. In 1991, the University of Saskatchewan published his book, *The Administration of Dominion Lands 1870-1930*. He was appointed Queen's Counsel in January 2000. Kirk received his General Counsel in 2002.

**Larry L. Lewis** is a Wildlife Technician and a Fish and Game Code commissioned Peace Officer for the Alaska Department of Fish and Game on the Kenai Peninsula. He has extensive experience working with and around brown and black bears, moose, wolves and other Alaskan fish and wildlife and the people who interact with it.

**Sandra MacDougall** has been a biology instructor at Red Deer College since 1996. Sandra's research interests include grizzly bear habitat use, bear-human interaction risk assessment, and on animal-vehicle collision reduction. She has worked with Parks Canada reviewing public bear education programs and bear management policies for a variety of northern protected areas.

**Mike Madel** is the Grizzly Bear Conflict Specialist for Montana Fish, Wildlife & Parks in the Rocky Mountain Front region. He has developed a creative program to deal with grizzly bear conflicts with ranchers, including redistribution of winter-killed livestock carcasses to remove them as attractants around livestock, electric fencing of lambing and calving yards, hazing from areas of human use, and continual personal contacts with ranchers.

**Sue Mansfield** has been doing field research through the Wildlife Research Institute under the direction of Lynn Rogers since 2004 and currently co-teaches the Black Bear Field Study Course. Her research has entailed radio tracking to determine territories and track movements, recording weights of bears coming to the field station, and walking with bears for up to 14 hours at a time to collect detailed information on behaviors and food choices.

**Ramona Maraj** is the Carnivore Biologist for Yukon Government, Canada. She has spent the last thirteen years researching and managing bear populations throughout Yukon. She has a Doctorate in Applied Ecology from the University of Calgary, focused on the management of grizzly bears in the Greater Kluane region of southwest Yukon.

**Jeff Marley** started and continues to manage Margo Supplies Ltd. Operating from High River AB and Shelby MT. Since 1980, Margo Supplies has been involved with solutions to a broad range of problem wildlife situations, specializing in bear/human conflicts and the mitigations of bird strike hazards at military and civilian airports.

**Colleen Matt** currently works as a conservation planning and facilitation consultant. She worked as a bear viewing guide, land manager and education specialist for Alaska Department of Fish and Game for 16 years. Colleen also held the position of Chief of Natural Resources for Lake Clark National Park and Preserve. At present, she resides in Missoula, Montana.

**Linda Masterson** wrote *Living with Bears: a Practical Guide to Bear Country* in collaboration with bear biologist Tom Beck. An expert in human communications, Linda wrote *Living with Bears* to give people the information, inspiration and motivation to prevent human-bear conflicts. She is a member of IBA, and has been a panelist at the Western Black Bear Workshop.

**Andy McMullen** is the owner/operator of BEARWISE, a business based in Yellowknife, Northwest Territories that offers consulting, auditing and information/education services in wildlife safety and deterrence. Andy is also chairman of Safety in Bear Country Society and production team member of Safety in Bear Country Video Series including the titles: "Staying Safe in Bear Country," "Working in Bear Country, Living in Bear Country" and "Polar Bears: A Guide to Safety."

**Sarah Medill** is a Wildlife Deterrent Specialist with the Government of Nunavut. Sarah first worked with polar bears during her master's studies with Dr. Andrew Derocher at the University of Alberta.

**Steve Michel** is the Human/Wildlife Conflict Specialist for Banff National Park of Canada. He focuses on conflict reduction between visitors and black bears, grizzly bears, elk, cougars and wolves surrounding the Banff area.

**Susanne (Susi) Miller** has worked as a polar bear biologist for the U.S. Fish and Wildlife Service since 1993. The majority of Susi's work involves reducing human-bear conflicts in Alaska's native communities. She also coordinates co-management activities with Alaska Natives and leads outreach and education efforts for the Service's Polar Bear Program. Her most recent work has focused on monitoring polar bear interactions with humans and other bears (including brown bears), and on developing viewing guidelines for a growing tourism industry in coastal Alaska.

**Hal Morrison** has worked with black and grizzly bears with Parks Canada in the Yukon, NWT, Nova Scotia (black only), B.C and Alberta for the last 29 years. Since 1996, he has been responsible for the Human Wildlife Conflict Management Program in Yoho, Kootenay and half of Banff National Parks

**John Neary** has been a Wilderness Manager for the US Forest Service in Juneau Alaska for 27 years. His work at the Pack Creek bear viewing area on Admiralty Island and the Mendenhall Glacier Visitor Center near Juneau has led to expertise in bear-human interactions for brown and black bears, and he works closely with colleagues on bear safety issues in the community and region. John also consults regularly in Africa on wildlife and ecotourism issues.

**Martyn Obbard** is a Research Scientist with the Ontario Ministry of Natural Resources. He has studied black bear and polar bear populations in Ontario since 1989, with an emphasis on demographics, effects of harvest, and climate change.

**Nikita Ovsyanikov**

**Craig Perham** is the Polar Bear Incidental Take Coordinator for U.S. Fish & Wildlife Service in Alaska. He has studied Arctic polar bears for the last 9 years. Craig is currently the coordinator for the Service's marine mammal incidental and intentional take program, where the majority of his work revolves around bear-human conflicts management and resolution. His most recent work has focused on developing and refining techniques used for detecting maternal polar bear dens near industrial activities.

**Mike Pederson** has worked on subsistence, cultural and wildlife management issues including the co-management since 1991. He coordinates the North Slope Borough's Polar Bear Deterrence Program on Alaska's Arctic Slope in five communities.

**Lynn Rogers** is the director of the North American Bear Center in Ely, MN. He has been conducting black bear research since 1967 for the Michigan Department of Natural Resources, University of Minnesota, US Forest Service, and the Wildlife Research Institute. He has a Doctorate from the University of Minnesota.

**Kevin Saxby** is a senior assistant attorney general, Natural Resources Section, Civil Division, Alaska Department of Law, Anchorage, AK. He received a JD from the University of Wyoming Law School in 1986.

**Dick Shideler** is a bear biologist with the Alaska Department of Fish & Game in Fairbanks, AK. He has been involved in bear conflict research and management since 1988, specializing in grizzly and polar bear interactions with industry, especially North Slope oil development. He was on the organizing committee for the 2<sup>nd</sup> International Bear-People Conflicts Workshop in 1999 and is a member of the IUCN Bear Specialist Group Human-Bear Conflicts Expert Team.

**Tom Smith**

**Patti Sowka** is the founder and executive director of the Living with Wildlife Foundation. She specializes in human-wildlife conflict prevention with emphasis on management of bear attractants. She has a Master's Degree from Arizona State University. She manages an interagency program that objectively tests **bear-resistant** containers and she publishes *Living with Predators Resource Guides*.

**Kim Titchner** is the executive director of Wildsmart in Canmore. She studied environmental education, parks management and leadership at Lakehead University, earning degrees in Education, History and an Honours degree in Outdoor Recreation, Parks and Tourism. Out of the misfortune of seeing so many bears die due to human interface, and the tragedy we deal with when interactions with bears go wrong, she is inspired to dedicate her career to helping communities live smart with wildlife.

**Larry Van Daele** is the Alaska Department of Fish and Game wildlife biologist for Kodiak Island. He has a doctorate from the University of Idaho and has been working in brown bear research and management

since 1982. He is the project leader for the Northern Forum Brown Bear Workgroup and co-chair of the IUCN North Asian Brown Bear Expert Team.”

**John Waller** holds Bachelor and Doctoral degrees in wildlife biology from the University of Montana and a Masters degree in fish and wildlife management from Montana State University. He has been a wildlife biologist at Glacier National Park since 2002. He is an associate editor of *Ursus* and is a faculty affiliate at the University of Montana. Previously, he has held research and technical positions with the Montana Department of Fish, Wildlife and Parks, U.S. Fish and Wildlife Service, U.S. Forest Service, and the Confederated Salish and Kootenai Tribes.

**Jim Wilder** has worked with black, brown, and polar bears in Alaska for the last 10 years with the U.S. National Park Service and the U.S. Fish & Wildlife Service. His primary focus is improving bear-human conflict management techniques. Currently, he works for the U.S. Fish & Wildlife Service Polar Bear Program. One of the projects he is currently working on is the development and implementation of a polar bear-human interaction database for use throughout the polar bear Range States (Canada, Denmark, Norway, Russia, and U.S.).

## APPENDIX III: RESEARCH & MANAGEMENT RECOMMENDATIONS

During presentations and discussions at the 3<sup>rd</sup> International Bear-People Conflicts Workshop, contributors and participants indicated that the following questions needed more research, or that research regarding the questions needed to be collated and shared with professionals and with the public. Some of the suggestions also address the need for standards or criteria for management actions.

### BEHAVIOR RESEARCH

- Are tolerant bears habituated only in certain situations or at certain times?
- We need to collate and evaluate all of the information we have about what happens to bears after aversive conditioning, relocation and translocation. Research gaps may exist.
- Does diversionary feeding lead to changes in population demographics?
- Examine diversionary feeding differing approaches (Lynn Rogers approach vs carcass re-distribution). Do they constitute one strategy and should they be evaluated as such? Are we certain that properly conducted aversive conditioning and hazing do not make bears more dangerous in future encounters with the public?
- Does trapping, capture and handling act as aversive conditioning?

### MANAGEMENT RESEARCH

- Since conflicts are largely a people problem, the social aspects (such as social marketing) need to be examined more closely.
- What are the impacts of new and increasing forms of recreation on bears and bear habitat? (E.g., extreme sports, mountain biking, orienteering, or geocaching).
- Bear injuries and deaths from being struck by the various models of plastic and rubber bullets and other “non-lethal” tools should be reported, analyzed and communicated.
- Managers and biologists need to investigate and publish results from new aversive conditioning tools such as radio activated guard boxes (RAGs).
- Studies of bear-human conflicts and management treatments should include the availability of competing food sources.
- How can we convince hunters to carry bear spray?
- Are firearms less effective than bear spray in all situations?

### STANDARDS, CRITERIA, AND EDUCATION DEVELOPMENT

- What are the best measures of success for managing people?
- A national group of bear biologists should create a standard minimum protocol for labeling management actions as “aversive conditioning. New managers should be able to easily recognize the difference between hazing and aversive conditioning, and understand the repercussions of both.
- Managers should establish criteria for managing tolerant bears in areas where people’s behavior is not controllable (e.g., backcountry hiking and camping).
- Managers need educational criteria and syllabi for training hunters to carry bear spray.
- Managers need to establish national or international bear safety training standards.



## APPENDIX IV: POSTER ABSTRACTS

**1. Report on behavior and management of the Scandinavian brown bear**

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Scandinavian brown bears (*Ursus arctos*) are less aggressive and more nocturnal than North-American brown bears, perhaps because bears and people have shared the same landscape in densely human-populated Europe with an intensive and prolonged persecution of bears than in North-America. Scandinavian brown bears have reestablished themselves over large parts of their former range, after been nearly extirpated around 1930. The management has changed from recovery efforts to stabilizing the population at the present level. Today, the Swedish bear population is estimated to be 3200, with a documented 4.5% yearly growth rate during the last 10 years. Meanwhile, the hunting quotas have increased by a factor of 4 in the last 10 years as a response to an increasing number of bears and corresponded to 8% of the entire bear population in 2009. Depredation on livestock by bears has been quite stable in the last 10 years, at ~20 attacks per year, corresponding to 1 attack per 160 bears in Sweden. In contrast, more than 50 attacks/bear/year occur in Norway on free-ranging unguarded sheep. Occasionally, people have been injured or killed by bears in Scandinavia and incidents have increased in response to a growing bear population and increased hunting. During the last 30 years, 28 bear attacks have been documented in Scandinavia (27 persons injured and 2 persons killed). Forestry is intensive the whole year while berry picking and hunting frequently occur during fall, but the majority of persons attacked were armed men hunting.

Bear(s) observed close to villages are often viewed as a problem and showing “unnatural behavior”. The management response usually is to document availability of food near people, scare away any bear on site using dogs, or to destroy the bear. Bears are never trapped or relocated.

Scandinavian bears are rarely aggressive and do not attack people without being provoked. A wounded bear is the most dangerous situation. We identified and ranked other factors increasing the risk of bear aggression towards people based on documented encounters in Scandinavia. They are, in decreasing importance: presence of cubs, proximity to carcass, surprised bear, proximity to den and presence of dog.

We studied the behavior and reaction of GPS-collared bears to human encounters. Researchers passed within 50 m of bears that are in day beds (n=261). Most bears (76%) left their initial site before or when researchers walked by them, usually when the researchers were about 100 m away, whereas some bears (24%) never left their site at all. Very few bears (11%) were observed and no bear showed any aggressive behavior.

In 2009 we initiated a study on problem bears and the causes behind nuisance behavior in relation to sex, age and social status of bears. In Scandinavia, mostly subadult bears seem to use habitats closer to people, whereas older bears seem to use more remote areas; in addition intraspecific predation has been documented among Scandinavian bears. Besides searching for food, young bears may therefore use habitats close to people in order to avoid larger, dominant, adult bears.

**2. The history of bear-human conflict management in Denali National Park and Preserve**

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Denali National Park and Preserve (Denali) was originally established as Mt McKinley National Park in 1917. For the first 40 years access to the park was accomplished mainly by air or rail. Visitation remained below 6000 people per year. In 1958, the Denali Highway was completed to a location within 30 miles of the park entrance. Even though open garbage pits attracted bears and visitation increased to nearly 45,000 visitors per year, there was very little backcountry use and bear-human conflict remained low; less than one per year. With the completion of the George Parks Highway right past the park entrance in 1972, visitation increased nearly five-fold. Sheer numbers of people in bear habitat coupled with lax camping guidelines and poor food and trash storage resulted in increased bear-human conflicts.

By 1978 the first bear-human conflict management plan was developed. Despite the closure of open dumps three years earlier and the introduction of some visitor education and installation of bear-resistant trash cans, by 1982 Denali still had the highest rate of backcountry bear-human conflict of any United States park with high backcountry use and a significant grizzly bear population. In that year a new management plan was developed and the park began supplying bear-resistant food containers (BRFC's) for backcountry users. The first bear management technician was hired to respond to bear-human conflicts, patrol for food and trash storage violations, provide education, and manage bears. A very successful bear management program has developed with improvements over the years. The current management program is designed to provide for visitor safety, minimize human effects on distribution, abundance, and behavior of bears, and ensure opportunities for visitors to observe, understand, and appreciate bears as part of an intact ecosystem. Three courses of action help to achieve these goals including education, removal on unnatural foods through the use of BRFC's, bear-resistant trash cans, patrols, etc., and management actions in response to bear-human conflicts.

This poster will describe the evolution of bear-human management in Denali and illustrate the program's success in reducing bear-human conflicts over the years.

### **3. Applications of learning theory to bears in conflict with humans**

L. Homstoll, C. St. Clair, N. Brabyn, C.M. Edwards, A.N. Hamilton and M. von der Porten, 1 University of Alberta, Edmonton, AB, T6G 2E9

*Abstract:* Human-wildlife conflict results in lethal management for several species, including many species of bear. In British Columbia, Canada, bear managers kill approximately 800 black bears and 35 grizzly bears annually because of conflicts with humans, typically brought about by habituation to humans and food-conditioning. Bear managers are under increasing pressure, particularly around resort communities, to manage non-lethally, typically using aversive conditioning (AC). To investigate the potential of AC for non-lethal management, we radio-collared black bears, and alternately assigned bears in conflict to one of three treatment groups: one that paired pain with sound (whistles), one with pain alone, and a control group. We paired whistles with pain in one group to capitalize on the ease with which other mammals associate sound with pain. If a whistle alone could subsequently be used to temporarily dissuade bears from attractants, this approach might help to prevent food-conditioning, which is often the precursor of conflict. We also tested the efficacy of thiabendazole (TBZ) for use in Conditioned Taste Aversion (CTA) to specific attractants that are difficult to secure from bears. In the AC experiment, we subjected bears to 3-5 days of AC using both rubber bullets fired from shotguns and marbles fired from a slingshot, and compared pre-treatment measures of wariness to post-treatment measures. Results indicate that bears easily associated a whistle with pain stimuli, and that marbles fired from a slingshot were effective for use as pain stimuli. Control bears permitted closer approaches by humans than bears in either treatment category, and bears in the both AC treatments were significantly more wary post-treatment than in pre-treatment. We also illustrate the extinction of post-treatment

wariness for both AC categories. In the CTA experiment, we present evidence that some bears can detect TBZ but with a new protocol, we successfully induced taste aversions to apples in 4 bears. Our results address the two most common reasons for human-bear conflict and will help bear managers to mitigate some of this conflict non-lethally.

#### **4. The influence of habitat, gender, and reproductive status on the spatial distributions of Human-black bear conflict in Whistler, BC**

von der Porten, M.\*, Brabyn, N., Cooper, A., Hamilton, T., Holmstol, L., Salomon, A. \*Presenter.

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Increasingly, the effect of human disturbance is incorporated as a risk into resource selection studies on carnivores, and this is especially true for bears. Of particular interest are bear populations that forage on human foods while simultaneously negotiating humans as a risk. This study assesses the spatial distribution of black bears (*Ursus americanus*) in Whistler, B.C. and quantifies habitat features that predispose sites to human-bear conflict. Black bears (n=51) were captured, collared and monitored for the period of 2005-2007. All behaviour and conflict activity was recorded. The landscape was parameterized based on relevant bear foraging and travel habitats using spatial modelling of Euclidean distances. Locations of conflict activity were spatialized within the GIS environment and fixed kernel methods were employed to create a probability density surface (utilization function). Multiple models were created to represent different seasons, genders and reproductive states. When results are complete, they will contribute to the understanding of how bears of different life parameters interact with humans when foraging in different seasons, elucidating the importance of the risk-forage trade off.

#### **5. Thiabendazol induces limited conditioned taste aversion to grain in black bears**

Ian Warrington and Colleen Cassady St. Clair, Department of Biological Sciences, University of Alberta, Edmonton, AB. T6G 2E9

Conditioned taste aversion (CTA), a process by which animals learn to avoid particular tastes that they associate with nausea, has been used to reduce wildlife damage to livestock and crops. An additional potential application of CTA is to protect animals from the mortality that can result from seemingly benign attraction to anthropogenic food. Such a situation occurs on railway tracks throughout the mountain parks where bears feed on grain that spills from hopper cars and then are struck by passing trains. Because grain is a specific attractant, it may be possible to treat it with a nauseating agent to induce a CTA and reduce the attraction it provides to bears. We tested this potential with 8 captive black bears by coating grain (1:1 wheat and barley) with Thiabendazole (TBZ) and then determining whether (a) bears would eat untreated grain, (b) bears could detect TBZ on treated grain and (c) if a CTA could be induced when treated grain was consumed. Four bears would not eat untreated grain, even when it was mixed with highly appetitive foods like raspberry jam. Two other bears ate untreated grain only after repeated exposure to it, appeared to discriminate against TBZ-treated grain, and subsequently exhibited an incomplete avoidance of untreated grain. The final two bears ate grain readily, consumed entire doses of treated grain, and exhibited complete avoidance of untreated grain after treatment (successful CTA). Our results indicate that bears vary in their attraction to grain and their ability to detect TBZ. These results suggest that exposing wild bears to TBZ-treated grain could reduce, but probably not eliminate, train-induced mortality caused by attraction to grain on tracks.

## 6. Active Fans and Grizzly Bears: Reducing Risks for Wilderness Campers

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From a bear–human conflict perspective, it is preferable to locate campsites in areas with lower potential for interactions between people and bears. However, where other hazards are also present, the estimation of risk must involve all hazards. This information can be used to inform management decisions about how to reduce overall risk to both people and bears. In this poster we: outline a cross-discipline study of hazards associated with grizzly bears and active geomorphic fans along Slims West Trail in Kluane National Park and Reserve (KNP) in southwestern Yukon Territory, Canada; discuss some of the benefits and challenges associated with reaching across disciplines to explore and address risk-related issues; and present topics for further consideration and discussion. Though rare, some interactions between people and bears in KNP have had serious consequences — for both people and bears. The initial objective was to identify suitable locations for designated campsites to minimize bear–human conflicts. Biologists identified open portions of alluvial fans for potential campsites but sought advice from hydrogeomorphologists because of evidence of major hydrogeomorphic events. Further investigations indicated there were hazards associated with debris flows and floods. We analyzed the combined hydrogeomorphic and bear-related hazard using a risk analysis approach. Developing this framework required the integration of expertise on the hydrogeomorphology of the Slims River valley and its tributaries and the ecology and behaviour of grizzly bears that use the valley. The method includes both landscape and site scales and is based on easily understood and readily available information regarding local weather, vegetation, stream bank conditions, and bear ecology and behaviour. The result of the analysis of multiple hazards is a decision-making framework that can be applied to reduce risks for campers and similarly reduce risks for bears. Educating wilderness campers and providing a method of decision-making to reduce risk supports Parks Canada's public safety program, a program based on the principle of user self-sufficiency. Reducing grizzly bear–human conflicts complements Parks Canada's efforts to ensure a healthy grizzly bear population. Behind the scenes, this study required that we explore and develop a coarse level of understanding of another discipline. We also had to address challenges associated with: the unique elements of each hazard; within and between discipline discrepancies in risk-related terminology and definitions; and fundamental differences in approach to understanding and reducing risk. Based on lessons learned and questions remaining, we present topics for further consideration and discussion within the discipline of bear–human conflict research and management.

## 7. Spatial patterns of grizzly-bear human conflicts in Southwest Alberta

Northrup, J.M.<sup>1</sup>, G.B. Stenhouse<sup>2</sup> and M.S. Boyce<sup>1</sup>, <sup>1</sup>Department of Biological Sciences, University of Alberta, <sup>2</sup>Foothills Research Institute, Hinton, AB

Grizzly bear human conflict is a long standing issue in the agricultural lands of the mountain west. As human populations push further into grizzly bear habitat these conflicts are set to increase. Past studies have examined conflict along the eastern slope of the Rocky Mountains, though few have modelled the probability of conflict based on landscape characteristics, and none have coupled this information with maps of grizzly bear occurrence. We examined the spatial patterns of reported grizzly bear human conflicts around Pincher Creek, AB. We used logistic regression to estimate and map both the probability

of conflict and the probability of grizzly bear occurrence (obtained from GPS radio telemetry) based on landscape characteristics. We coupled these maps to obtain a spatially explicit characterisation of the landscape that indicates areas that are potential conflict sinks, as well as those areas that may be conflict havens for grizzly bears. Such maps can be used in local and individual landowner level planning to minimize grizzly bear human conflict.

### **8. Communicating Across Species Boundaries: how community knowledge and public attitude affect human and bear interspecies relations in Alberta's Bow Valley**

Laura Lynes, Royal Roads University. Master of Arts: Professional Communication, Intercultural & International Communications

This paper addresses what appears to be a gap in communication studies by exploring human-bear communication in Alberta's Bow Valley. Images of bears are pervasive in the history of human cultures (Kellert, Black, Reid-Rush, & Bath, 1996, p.983) and are often associated with a healthy ecosystem, yet humans are the leading cause of bear deaths (Grizzly Bear Alliance, 2006). This study explores the attitudes and knowledge of part- and full-time residents about bears in the Bow Valley, measured by way of survey. Data are reported in context of a greater discussion about interspecies communication and the meanings of the terms "community" and "communication." Outcomes of this study show that by extending the definition of communication to include interspecies, we engage in discourse without the contentious debate about what qualifies a species as worthy of inclusion into human predominant communities. Findings have implications on future human-bear relations, especially bear management strategies.

### **9. Increasing community capacity in support of polar bear safety in Sirmilik National Park by combining Inuit knowledge and bear management practices.**

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Polar bears can represent a significant hazard to visitors, researchers, staff, and Inuit who travel in Sirmilik National Park. Since the park's establishment in 2001, staff have worked to educate and manage visitors and researchers in order to reduce conflicts and provide appropriate tools to manage bear encounters in the park. During this time, three limitations have been identified in our human-bear conflict management program: i) limited local availability of safety equipment, ii) limited knowledge transfer from local experts, youth and visitors, and iii) a lack of local training for people interested in working as polar bear guards. Supported by the International Polar Year, staff at Sirmilik National Park have developed a program that increases the availability of bear safety equipment locally, integrates traditional knowledge and technological expertise into a training curriculum, and builds the capacity of local people to assist in all aspects of polar bear safety. In the past 3 years, the park has purchased bear spray, deterrent pistols and rounds, motion sensors, and electric fences for loan to researchers and visitors. At present over 50% of the park visitors and researchers now borrow bear safety equipment from the park. Parks Canada and Andy McMullen's BEARWISE have developed a hands-on curriculum with input from local elders and hunters that includes the role of the polar bear guard, bear ecology and behaviour, client and camp management, deterrence, use of firearms, and electric fencing. To date over 30 polar bear guards have been trained in the communities of Pond Inlet and Arctic Bay, Nunavut, and several trainees have been successful in finding employment in this field both within and outside of the park. Parks Canada is currently working with local and regional partners to develop the potential for long-term employment for polar bear guards in the area and to continue this program after the

completion of the International Polar Year. Important lessons have also been learned in developing this safety program including the importance of local cooperation in all aspects of bear safety programs, the logistical constraints imposed by remote communities, and the limitations of regulations that were developed without a careful consideration of the northern context.

### **10. Can the use of a bear-proof waste collection system to minimize bear / human conflict also be cost-effective?**

Dennis Neufeldt, Haul-All Equipment Systems, Lethbridge, AB, T1H 5G1

Located in the Rocky Mountains west of Calgary, Alberta, and east of Banff National Park, the Town of Canmore has experienced steady population growth over the years. As the town grew into the surrounding wilderness, there came a problem with managing the residential curbside waste collection program specifically, how to limit wildlife, particularly bear, access to the waste.

One of the proposed solutions was a bylaw prohibiting garbage set-out before 5 a.m. This law did not address the fact that a portion of Canmore's population consists of non-permanent residents who may not be in the town on collection day. The town realized further problems when by-law officers began issuing residents tickets for non-compliance at 3 a.m. In addition, it was found that bears adjusted their forage pattern to match the availability of curbside bags/ carts. In the end this method was found to be ineffective at bear-proofing the waste collection system.

In 1996, after tendering a proposal for collection, the municipality made the decision to convert to a semi-automated container system which was not only bear-proof, but was also more cost-effective than the curbside collection system the town was using.

In spite of the savings to be generated, residents of the town had some concerns about the new system:

- It was a new and different solution to the waste collection problem;
- NIMBY – even if they supported the concept, people did not want the containers too close to their homes; and
- Space constraints – containers needed to be set-up in all areas of the town to service single-family and multi-family dwellings.

Through an open and public process, the Waste Management Committee was able to alleviate the concerns of the citizens of Canmore. This process was made easier by the fact the containers would be conveniently located throughout the town allowing 24 hour accessibility. That, and the modular design, enabled aesthetic placement so as to not distract from the natural beauty of Canmore. The committee also promoted the benefits of semi-automated collection which eliminates workers having to lift heavy containers.

In consideration of residents' concerns, it was decided to proceed with a gradual implementation. The first containers were introduced in 1997, and the entire community had access to the new system by May of 1999. The system continues to be a success and is now used for both residential and commercial waste.

In addition to achieving the primary goal of *virtually eliminating waste related bear / human incidents*, the system has also proven to be flexible, aesthetic, accessible, and cost-effective by providing the *Lowest Total Cost of Ownership*.

### **11. Bear Guardians in Banff National Park**

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[www.pc.gc.ca/banff-bears](http://www.pc.gc.ca/banff-bears); Mireille Rousseau, Bear Guardian Program, Banff National Park.

Banff National Park's Bear Guardians reach park visitors "where they are", with relevant, engaging messages and activities. Taking teams of roving park interpreters on the road, the Bear Guardian program is prevention (of unhealthy roadside situations for bears, and unsafe roadside situations for humans) and learning (by drivers and bears!) in equal measure. Bear Guardians spend about half their time patrolling secondary roadways in the park to prevent or manage bear jams, according to protocols and training provided by Resource Conservation staff. At other times they are set up at high-use day use areas along those roadways, with attractive exhibits designed to encourage conversations with about bear ecology, behaviour, and conservation in Banff National Park.

## 12. Talking Bear: Media Discourse and Human-Bear Conflict in Alberta

John Wall. Department of Geography and Environmental Studies, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6

Newspaper coverage does more than report current events. News stories also reflect popular opinion and at the same time help shape that opinion. Differences in sources and story angles between media outlets indicate the different ways that stories can be understood, told and assembled, and changes in coverage over time can indicate shifts in attitudes and politics. This research used a media discourse analysis of the *Canmore Leader*, the *Calgary Herald* and selected regional and national press from 1999 to 2009 to examine human-bear conflict and co-existence, with a focus on how media coverage represents grizzly bears, land use planning related to wildlife, and conflict incidents, and the implications of these representations for policy and practice.

## 13. Bragg Creek BEARSMART Program

Karen Oldershaw, B.Sc, M.E.Des., karen.oldershaw@telus.net

In 2006, the Alberta government initiated a bear awareness and education program in response to the on-going problem of bear-human conflicts in rural areas of the province. In the summer of 2006, a Bragg Creek BearSmart Community Program was created in support of this province-wide initiative. Greater Bragg Creek is identified by the Province as a priority area for proactive bear management, where there is a pressing need to resolve bear-human conflicts. The Bragg Creek BearSmart Community Program was implemented to provide Bragg Creek and surrounding area visitors, residents and businesses with knowledge and tools to reduce the potential for bear-human conflicts.

**Bragg Creek BearSmart Education Initiatives:** As a key first step we assembled a group of community representatives to act as the Bragg Creek Bear Stewardship Committee. The Committee's first task has been to develop awareness of bears, bears attractants, and the potential for bear-human conflicts within our community. Education and outreach initiatives to date have included regular articles in local papers, BearSmart posters and brochures displays, a phone-in service for reporting bear sightings and conflicts, an email notice system reporting to over 60 residents, local presentations, messaging on a prominent local bin board, neighborhood canvassing and several television news reports.

**Bear-Resistant Container Program:** Since 2006, Bragg Creek BearSmart has also offered a Bear-Resistant Container Program to help residents secure garbage, livestock feed and pet food away from bears. Bragg Creek BearSmart and the Karelian Bear Shepherding Institute of Canada (KBSIC) first initiated the container loan program with funding from the Alberta government for the purchase of 12 bear-resistant containers. In 2008, the program gained financial support from the Yellowstone to Yukon Conservation Initiative and, with 9 additional bins, the program was expanded into a

broader area of the Rocky Mountain Foothills. To date, the bear-resistant containers have been used to deter a number of bear conflict situations with positive results.

**Other Program Partnerships:** Key to the long-term success of the Bragg Creek BearSmart program is the development of partnerships with local municipalities, namely the Municipal District (MD) of Rocky View and the Town of Redwood Meadows. In 2007, a motion was carried by the MD of Rocky View Council to support BearSmart and, in particular, to work with us on bear sensitive waste management initiatives. In 2007, the Town of Redwood Meadows also provided their support in principle for the BearSmart program and, in particular the Bear Hazard Assessment. Overall, we anticipate working closely with these municipalities in the development of bear management options that best suite the needs of the greater Bragg Creek community.

**Up-coming Program Activities:** In 2007, Bragg Creek BearSmart initiated a Bear Hazard Assessment for the Greater Bragg Creek Area, including Redwood Meadows. Once completed, we will invite the Greater Bragg Creek community to provide their input on options for managing local sources of bear-human conflict. We hope to then move forward in the development of a Bear-Human Conflict Management Plan involving regular monitoring of the success of conflict management initiatives.

#### 14. Nass Bear Education Program, 2001-2009: Looking back, reaching out, and moving forward.

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The Nisga'a Nation, comprised of the Nisga'a Lisims Government (NLG), four Nisga'a Village governments, and three Nisga'a Urban Locals became self-governing under the Nisga'a Treaty on 11 May 2000. The Nass Bear Education Program (NBEP) was delivered to two of four villages — Laxgalts'ap (Greenville) and Gingolx (Kincolith) — located in north coastal British Columbia from 2002–2006, and to a lesser extent in 2001 and 2007–2009. The NBEP was initiated as one component of a plan to mitigate significant adverse residual impacts to grizzly bears predicted in the environmental assessment for a 30-km highway extension from Laxgalts'ap to Gingolx — a community previously inaccessible by road. The plan was collaboratively directed by the B.C. Ministry of Environment (MOE) and NLG. The Greenville-Kincolith Grizzly Bear Monitoring Project (GKGBMP), another component of the plan, evaluated the effectiveness of mitigation based on a quantitative assessment of the development's effects on grizzly bears, including investigations of sightings, problem wildlife occurrence reports, habitat use, and DNA-identified minimum bear numbers. From ecological, cultural and social perspectives, the lives of “the people of the Nass River” have been closely connected to those of salmon and bears for thousands of years. The NBEP sought to minimize what was anticipated to be a potential increase in grizzly bear-human conflicts following highway construction. Resource materials (e.g., brochures, posters, articles, children's activities) were developed on an on-going basis and information was delivered through several venues (e.g., governments, school and public presentations, one-on-one contact, public events). We are currently reviewing the program's success in response to GKGBMP monitoring results, which indicate that the grizzly bear mortality rate has increased. Preliminary analysis of mortality data suggests that non-hunting grizzly bear mortality in the project area has increased since the road was developed. However, a potential confounding effect of enhanced mortality reporting under the GKGBMP also needs to be acknowledged. Additionally, anecdotal observations by study personnel and conservation officers indicate that garbage and other attractants — notably those associated with fish harvest and preparation activities — persist at times, despite the best efforts of the GKGBMP and NBEP. Because the NBEP was not quantitatively monitored for effectiveness, its actual effectiveness is not known.



Even though information appeared to be positively accepted, we hypothesize that the NBEP has not satisfactorily achieved the critical step of translating knowledge into action for enough community members. Consequently, increased efforts to support application of knowledge, adoption of other Bear Smart Community initiatives and greater connectivity to Nisga'a knowledge and values are seen as important for accomplishing the program's goals. An inter-governmental working group is being established to explore the NBEP's effectiveness to date and to develop a science- and culture-based framework for ongoing program delivery and monitoring. We have identified an opportunity to evaluate effectiveness through comparisons between two villages that have received the program and two villages that have not. We propose that variables influencing and constraints limiting program success be explored to improve the program's effectiveness. Our poster summarizes the program's history, accomplishments and challenges, and proposed next step

### **15. Prince George Urban Bear Smart Research Project: Pilot Phase Year 1 Preliminary Results**

Dr L.M. Ciarniello, the Northern Bear Awareness Society, and the BC Ministry of Environment (Glen Watts and Douglas Heard).

Prince George, BC, Canada has one of the highest records of bear complaints and numbers of bears destroyed in the province (10-year average = 47 bears destroyed per year). Black and grizzly bears inhabit the City and Regional District, although black bears are more frequently encountered. Despite considerable efforts, such as the Northern Bear Awareness Society working with the City to install bear-resistant garbage containers in 21 parks and green-spaces (38 Haul-Alls and 26 Sybertechs), running a yearly fruit exchange program, and continuous extensive public outreach programs, between 2004 and 2007, the number of bear complaints more than doubled and 135 bears were destroyed (i.e., a rate about equal to the 10-yr average). In 2006, the Northern Bear Awareness Society refocused its efforts towards achieving Provincial Bear Smart Status (Davis et al. 2002) for the City by completing a hazard assessment, management plan and conducting research in an effort to further identify ways to reduce the number of bears destroyed and the potential for human-bear conflicts. We present the study design and preliminary results of the pilot phase of the Prince George Urban Bear Smart Research Project initiated in summer 2009 and proposed to run through 2013. The objectives of the project are to quantify the following factors and their influences on the development of 'problem' bear behaviour by: (1) Identifying movement and travel corridors around urban areas with focus on identifying 'critical' linkages; (2) Identifying movement in relationship to new developments in bear habitat; (3) Quantifying reproductive parameters; and, (4) Examining age specific mortality, particularly 'problem' bear mortality. We are in the process of deploying 5 GPS radiocollars on bears captured within the College Heights neighbourhood and aim to deploy 20 GPS collars in 5 other neighbourhoods in 2010. With our first downloads occurring in September 2009 we aim to present a map of bear movements. Developing an understanding of how bears move around and live adjacent to the City will be crucial to the development of sound land management practices consistent with bear conservation and the BC provincial Bear Smart program. This is of particular importance as new developments expand further into bear habitat and current recommendations contained within the management plan are implemented. Success of our project will be measured by the further development of reasonable, sound recommendations that will reduce the number of bears destroyed.

## 16. Effects of vessel-based bear viewing on the behavior of brown bears in Glacier Bay, Alaska: preliminary results.

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Wildlife viewing is a popular recreational activity in Glacier Bay where the vast majority of visitors travel and view wildlife in motorized vessels. In the recently de-glaciated fjords of Glacier Bay where glaciers and steep rock walls predominate, brown bears are particularly dependent on the marine intertidal zone and adjacent strips of beach meadow. Brown bears are of particular management concern because of their reliance on coastal habitats as well as the potential threat they pose to human visitors. A two year study beginning in 2009 examines the effects of vessel based bear-viewing on the behavior of brown bears on the shoreline using controlled experimental vessel approaches to bears. The results of this study will be used to establish bear viewing distances and/or regulations for vessels to minimize bear disturbance and displacement. In the summer of 2009 we conducted 13 experimental vessel approaches of brown bears along the shoreline of Glacier Bay. Bears were disturbed in 8 out of 13 trials (62%) at distances ranging from <20m to 471m. Behavioral results indicate that as bear-viewing vessels approached within 100m, bears exhibited less frequent foraging behavior and more frequent stress behaviors. The mean proportion of time bears spent in energetic gain behaviors (foraging, resting, etc) decreased with vessel distance from 0.58 ( $\pm 0.12$ ) at 101-200m to 0.40 ( $\pm 0.12$ ) at <100m. The mean proportion of time spent in stress behaviors (vigilance, fleeing, etc) increased as vessel distance decreased from 0.09 ( $\pm 0.05$ ) at 101-200m to 0.27 ( $\pm 0.06$ ) at <100m.

## 17. Building a reliable snare cable for capturing grizzly and American black bears

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Wildlife researchers and managers have been using Aldrich foot snares to capture American black bears (*Ursus americanus*) and grizzly bears (*U. arctos*) for decades. Recently, failures have been reported in snare cable assemblies, resulting in escapes of both black and grizzly bears. We tested different configurations of snare cable and hardware using a hydraulic pull machine. Snare foot loops constructed with compression sleeves or Crosby® clips torqued to 20.3 newton-meters (N-m) consistently exceeded minimum strength requirements for use on large bears (>16.8 kilonewton [kN]). In our tests, anchor sections of snares using compression sleeves and 0.794 cm swivels never failed below 30 kN. It is important to use robust, manufacturer-rated hardware and precise methodology when building snare cables to achieve consistent holding strength. The use of substandard components and improper torquing of clamps can result in failure of the snare endangering both bears and capture personnel.

## 18. A concept design for radio-tracking male polar bears

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The advancement of satellite technology has transformed wildlife tracking by overcoming limitations in range, accuracy, and convenience presented by conventional radio telemetry. Presently, GPS and ARGOS units capable of the longest life spans are collars able to support medium to large terrestrial mammals. However, not all large mammals are able to exploit these collars due to a prohibiting physiology: male polar bears are one example. Due to their tapered necks, collars are poorly retained.

Smaller, alternatively attached satellite-enabled devices that might circumvent these collar-related issues have been tested, but are more limited than collars with respect to lifespan. Introducing the potential to reliably track males in addition to females using global technology, would shed more light on important issues such as the effects of global warming and resource development on polar bears, and could have important implications for the management of Canadian populations. I will produce a concept design for radio-tracking male polar bears based on criteria determined from literature and professional biologists; supportive testimony of veterinarians and telemetry experts; and the observation and research of polar bear behaviour, physiology, and ecology.

### **19. Bear spray and bullets – a comprehensive analysis of the Alaska record**

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We present a comprehensive look at a sample of bear-human conflicts involving bear spray and firearms that occurred in Alaska from 1883—2008. We previously analyzed 289 firearm encounters and 83 bear spray incidents involving brown bears (295 cases, 79%), black bears (53 cases, 14%), polar bears (9 cases, 3%), and bears of unknown species (15, 4%). Bear spray incidents involving 175 persons resulted in 3 injuries, all minor (<2% injury rate). Firearms incidents involving 478 persons resulted in 17 fatalities (15%), 25 severe injuries (22%), 42 suffered moderate injury (37%), 29 suffered slight injuries (26%), for a total 113 injuries (24% injury rate). Hence, firearms users experienced 12 times the injury rate of those using bear spray. We discuss causal factors likely responsible for the observed variation in effectiveness. Of the 71 cases where persons sprayed bears to defend themselves, 14% (10 of 71) of users reported the spray having had negative side effects upon themselves, ranging from minor irritation (11%, 8 of 71) to near incapacitation (3%, 2 of 71). Causal firearm failures were identified in 100 firearm cases, where users reported mechanical or physical issues with the use of a firearm, including lack of time (32%), unable to use firearm due to situation (21%), mechanical issues (11%), safety/ holster issues (9%), insufficient caliber/ no bullets left (9%), distance to bear (8%), missed bear (6%), or tripped and fell (4%). No bears were injured in conflicts involving bear spray, however, 23 bears were wounded and 176 killed in incidents involving firearms. We discuss the relative merits of each deterrent option.

### **20. Brown Bear Mitigation Using Electronic Control Devices – A Pilot Study**

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Inappropriate management of anthropogenic food sources can lead to food-conditioned and human habituated wildlife. Increased human-bear interactions can lead to a greater likelihood of human or bear injury or death, property damage and lower public tolerance for co-existence. Mortality outside of natural death and/or regulated harvest can substantially affect the long-term sustainability of a population.

Subject animals were limited in number, but our results, coupled with other field trials, indicate that the devices hold potential for the physical control and/or behavioral change in wildlife. Improvements in the technology may be needed for optimal deployment of the devices. The devices do not appear to cause

serious injury or death but do result in desirable short-term behavioral changes in human habituated, food-conditioned bears.

### **21. Lake Louise Campground Electric Fence**

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In 2003, a 2.8km long permanent electric fence was installed around the tenting portion of the Lake Louise Campground in Banff National Park as a response to increasing bear sightings and public safety concerns in the campground. Bear activity and occurrences in the campground had been increasing since the early 1990's, in 2001 and 2002; the tenting campground was closed for the majority of the summer seasons. A ten-site test section was set up in 2002 to assess feasibility and public perceptions of an electric fence surrounding the tenting area. In consultation with the Lake Louise Community Council a permanent electric fence was installed around the tenting section of the campground, enclosing an area of 26.6 hectares the following year. The results of a social science survey, conducted by Parks Canada, indicated that tent campers were comfortable camping inside the electric fence and their overall impressions were positive. The fence is equipped with 10 pedestrian gates, 4 chase-out gates and an electrified cattle guard, which allow campers and wildlife managers access and egress options to the campground. The fence is maintained at 7000 volts+ with a low current that ensures an unpleasant shock but will not cause lasting effects. The fence is outfitted with a low voltage alarm, notifying staff of a possible malfunction or intrusion. Since 2003, there has been one fence intrusion by a grizzly cub. The cub was cleared from the campground as per bear management guidelines. A habituated female grizzly (#72) has shown increasing comfort in foraging adjacent (<30m) to the electric fence. Number 72 sets the limits of how close her and her cubs come to visitors that are inside the electric fence. Although she is able to access high quality habitat adjacent to the fence and provide safe visitor viewing opportunities, this poses challenges to broad park goals of reducing habituation. This also contradicts current visitor information on safe viewing distances. The electric fence around the Lake Louise tenting campground has enhanced both bear and public safety and facilitates uninterrupted tenting opportunities, while challenging previous approaches to reducing bear habituation to people.

### **22. International Collaborative management of bear-human interactions on the Tatshenshini and Alsek Rivers, Canada and United States**

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The Alsek and Tatshenshini rivers flow through the largest protected terrestrial ecosystem in the world — a UNESCO World Heritage Site encompassing Kluane National Park and Reserve (KNP), Tatshenshini-Alsek Provincial Park (TAPP), Glacier Bay National Park and Preserve (GBNP), and Wrangell-St. Elias National Park and Preserve. The Alsek River, including the lower portion of the Dezadeash River (a major tributary), and the Tatshenshini River provide outstanding wilderness opportunities for river-based

recreation, primarily rafting. Grizzly bears (*Ursus arctos*) and black bears (*U. americanus*) occur along both rivers with the former generally being more common. Four agencies (Parks Canada, B.C. Parks, U.S. National Parks Service [NPS], and Yukon Territorial Government [YTG]), each with their own mandates and priorities, are responsible for conserving grizzly bears and managing bear-human conflicts along these rivers, which flow from outside to within park boundaries. Management of these rivers is challenging due to their remote location, limited access and multiple jurisdictions through which they flow. To manage growing interest in recreational river use on these rivers, collaborative management efforts have been evolving since the late 1980s initially involving GBNP, KNP and commercial rafting operators, and now also including TAPP, YTG & the Champagne and Aishihik First Nations. The process involves periodic interagency meetings and consultation with commercial guiding companies. Between 1992 and 1997, a grizzly bear ecology and viability study was conducted in KNP, and between 1996 and 2000 and a series of studies were conducted on both rivers to assess bear-human interaction risk at campsites. KNP initiated the earliest and most comprehensive efforts to prevent bear-human conflicts because of conservation objectives previously specified for the Alsek/Kaskawulsh Grizzly Bear Protection Area, which encompasses the upper Alsek River within KNP, and the findings of the grizzly bear and bear-human conflict studies. Strategies implemented included: designation of campsites along the upper Alsek River (requiring numerous campsite closures); one-night restrictions for some campsites; a trip departure limit; a revised pre-trip information package; maximum group size limits; food storage requirements (i.e., must not be accessible to bears); mandatory removal of human waste; and a requirement that at least one person remain with boats at all times. In 1994, Parks Canada developed a bear-human interaction database and monitoring program for the Alsek River. In 2000, U.S. NPS independently followed suit. Kluane National Park completed an analysis of 523 reported interactions occurring 1994-2005. In 2006, the Tatshenshini-Alsek Bear Management Group (TABMG) was initiated as a collaborative interagency effort to identify priorities for addressing bear-human conflicts. They worked in consultation with commercial guiding companies to identify bear-resistant food storage options. Park agencies cooperated to standardize a bear-human interaction data collection form, distributed for testing from 2007-2009. In 2007, preliminary investigations were initiated to support the development of an Interagency Bear-Human Conflict Management Plan. Future collaboration priorities include completion of this plan and comprehensive bear-human interaction analyses. We summarize the recommendation implementation and bear-human interaction analysis. We also discuss the accomplishments and challenges of this significant international effort to minimize bear-human conflicts.