CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Bear Hazard Assessment for Haines Junction and Kathleen Lake, Yukon Territory

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We would like to thank the many individuals who spent time with us during our stays in June and October of 2011, for sharing with us their knowledge of local human-bear conflict issues both historically and at the present time.

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Disclaimer

This document was prepared in accordance with the Bear Smart guidelines for conducting a bear hazard assessment (Davis *et al.* 2002). This document uses expert knowledge to assess current and potential risks of human-bear conflict in the community of Haines Junction and the Kathleen Lake campground in Kluane National Park. Input was also provided by Parks Canada, the Champagne and Aishihik First Nation, Yukon Conservation Officer Service, Environment Yukon and private individuals. The data used for this assessment is the most current and accurate data available; however, bears are wild animals that can occur in Haines Junction and anywhere in Kluane National Park at any time, and the authors assume no liability for others' use and application of the information contained herein.

Executive Summary

A bear hazard assessment is a document intended to both quantify and qualify human-bear conflict in a given region in order to rank hazards (high, medium, and low) as well as provide recommendations for reducing human-bear conflict. Lindsay Rear and Lori Homstol of Cascade Environmental conducted two site visits, one in June and one in October of 2011 to Kathleen Lake campground and day use in Kluane National Park and Haines Junction, Yukon to meet with residents for interviews and community input on the assessment.

We interviewed representatives from Environment Yukon; Parks Canada; Champagne and Aishihik First Nations; Renewable Resources Council; Yukon Energy, Mines and Resources; Wildland Fire; and various community members. In October, we held a community meeting where interested residents provided their knowledge and input on bear issues in their community, ranked hazards according to their opinion and provided feedback on recommendations. We then compiled the data from the community into a document and added data provided from occurrence reports, radio collared bears and forage layers.

Our results indicate that reported human-bear conflict at Kathleen Lake campground and day use is quite low. Potential for conflict exists around the campground due to grey water disposal, soapberry shrubs and the lack of fish cleaning facilities in the day use.

Human-bear conflict in Haines Junction is located mostly around the community itself, with a couple of satellite locations where bears, when present, are highly visible (agricultural fields north of town). The most common complaint was of bears displaying a high tolerance toward humans in the community; this could result from either repeated exposure to humans with no negative consequences over time (habituation) or from bears overcoming their wariness in anticipation of a significant food reward. Most complaints for black bears occurred in the month of July, when soapberries are ripening, while grizzly bear complaints were more spread throughout May to October. The bear attractants of biggest concern are soapberry in the community in the summer, residential and commercial garbage availability, and hanging meat in residential areas following hunting season. Occurrence report data indicated that installing an electric fence at the landfill did result in a drop in the frequency of bears accessing garbage from the dump. Interviewees also indicated that following the electrification of the landfill, human-bear conflict seemed to be less severe with fewer bears in the community; however, this observation was not verified with the occurrence reports. Installation of an electric fence at the landfill did not translate into a drop in human-bear conflict in the community (by occurrence report data). This may be due to the coarse nature of the database, or due to the availability of other attractants.

Attractant availability influences how hazardous human-bear conflict is; as such, most of our recommendations address securing or eliminating bear attractants in high human-use areas. Both Kathleen lake campground and day use area and the Village of Haines Junction have already begun some programs designed to reduce human-bear conflict.

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1.0 INTRODUCTION

Conflicts between humans and wildlife occur any time the requirements of humans and wildlife overlap and create costs to both (Conover 2002). Human-wildlife conflict can be economically costly to humans, and create risks to human safety. Wildlife, especially carnivores, are usually removed (killed or translocated) when they become too accustomed to human presence, or if they learn to associate humans with sources of food. This is particularly common with black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos*). Conflicts that result in the deaths or removals of adult bears may also create attractive sinks, where high quality bear habitat attracts bears into areas where mortality is more likely. Increased mortality in adult animals may also increase the population density, at least with black bears (Kemp 1974, Czetwertynski *et al.* 2007), which may inadvertently exacerbate human-bear conflict issues. For grizzly bears, which are more sensitive to human disturbance than black bears, management removals may hinder conservation efforts in some populations. As such, wildlife managers have much incentive to improve human-wildlife conflict mitigation efforts.

Municipal policies around waste management, bylaws and Territorial policies all have the potential to impact human-bear conflict within communities. Therefore, successfully addressing human-bear conflict usually requires partnerships between the two levels of government including educators, policy-makers, waste management operations, scientists, and community members. The Province of British Columbia has developed a process of human-bear conflict mitigation (Bear Smart Community status) that several communities voluntarily use to address issues specific to their jurisdictions. A bear hazard assessment is one of the steps outlined in this methodology.

1.1 BEAR SMART COMMUNITY STATUS

The Province of British Columbia established the Bear Smart program to facilitate greater partnership and cooperation between municipalities and provincial government in reducing conflicts with black and grizzly bears. The Bear Smart program is a voluntary program jointly funded by communities desiring to reduce human-bear conflict locally and the British Columbia Conservation Foundation. The goal of the Bear Smart program is to encourage proactive, as opposed to reactive, bear management by anticipating human-bear conflicts and taking steps to resolve them before wildlife management action is required. That is, emphasis is on human management and attractant management, rather than bear management. To achieve Bear Smart status, a community must complete the following steps:

- Conduct a bear hazard assessment that qualitatively or quantitatively identifies existing and potential hazards in and around the community
- Implement “bear smart” bylaws prohibiting the provision of food to bears as a result of intent, neglect or irresponsible management of attractants
- Create a human-bear conflict management plan designed to address the bear hazards identified in the bear hazard assessment
- Implement an ongoing education program directed at all sectors of the community
- Revise planning and decision-making documents to be consistent with the human-bear conflict management plan
- Develop and maintain a bear-resistant municipal solid waste management system

The completion of the above steps significantly reduces the risk of human-bear conflict in participating communities, for the benefit of residents, visitors and local wildlife.

1.2 OBJECTIVES OF BEAR HAZARD ASSESSMENTS

A bear hazard assessment is intended to be a document that:

- Identifies areas of high use by species within the community and surrounding area
- Maps anthropogenic attractants in the community and surrounding area
- Maps historic patterns of human-bear conflict based on complaint records
- Maps human use areas that may overlap with bear habitats

- Identifies and ranks hazards with a ranking scheme of high, medium and low

A community that has conducted a bear hazard assessment is then able to address the next steps in Bear Smart Status based on identified bear hazards and mitigation recommendations from the bear hazard assessment (Davis *et al.* 2002).

1.3 STUDY AREA

The southwestern Yukon is an interior subalpine climate in the spruce-willow-birch biogeoclimatic zone which extends from approximately 57 degrees N latitude to between 60 and 70 degrees N latitude (BC Ministry of Forests and Range 2008). Lower elevation forests are open white spruce and subalpine fir, while upper elevations are comprised mostly of several species of deciduous shrubs including several willow species, small aspens and balsam poplars. Subzones have not been studied in detail. The most common ungulates are moose, although mountain goat, Dall sheep, elk, bison and mule deer are also present. Predators include wolves and bears, with grizzly bear somewhat more common than black bear.

The village of Haines Junction is located approximately 150 km west of Whitehorse in the southwest Yukon, in a wide valley (the Shakwak Trench) at the junction of the Haines Highway and the Alaska Highway at Kilometre 1,632. To the east are the hills of the Interior Plateau; to the west lie the St. Elias Mountains of Kluane National Park.

Kluane National Park and Reserve, Tatshenshini-Alsek Provincial Park in British Columbia, and Glacier Bay & Wrangell-St. Elias National Parks and Preserves in Alaska together form the largest protected area in the world. Kathleen Lake Campground and Day Use is approximately 27 km southwest of Haines Junction, in Kluane National Park. The campground contains 39 campsites, 4 of which are open during the fall and winter. The day use area has a picnic area, boat launch and trailheads for hiking opportunities.

1.4 HISTORY

Haines Junction is home to 589 people (Statistics Canada 2007), about half of whom are members of the Champagne and Ashihik First Nation, of the Southern Tutchone language and culture group. The area around Haines Junction has been occupied by First Nations for thousands of years. Runs of chinook, coho and sockeye salmon in the Tatshenshini River, berry-picking, and subsistence hunting were and still are important resources for local people. Champagne and Aishihik First Nations in Haines Junction as a group have historically had varying opinions and policies surrounding bears. Champagne and Aishihik people generally did not go out of their way to kill bears, but would do so periodically if bears were thought to be killing too many ungulate calves, or if a particular bear was deemed a risk to human safety.

During the gold rush of the late 1800s, the first Europeans moved east over Chilkat Pass from Alaska. Trading posts were established and eventually abandoned when the railway was built from Skagway to Whitehorse. When gold was discovered east of Kluane Lake, more than 2,000 people moved into the area, establishing a mining town at Silver City and prompting the construction of a wagon road from Whitehorse. The wagon road was improved in 1942 and became the Alaska Highway, while in 1943 portions of ancient travel routes from Chilkat Pass were built up for vehicle traffic. The junction of the two roads (Haines Junction) became a supply and service centre for highway construction, and the administrative centre for the newly established Kluane Game Sanctuary (which became Kluane National Park in 1972).

2.0 METHODOLOGY

The information in this document has been compiled based on occurrence reports (phone calls and emails from the general public to the government), past studies that documented vegetation or radio-collared bears, interviews with individuals in both Haines Junction and who work at Kathleen Lake campground

and day use, as well as information provided by the general public at a community meeting held on October 12, 2011. Interviewees were representatives from the Renewable Resources Council; Environment Yukon staff in Haines Junction; local Conservation Officers (past and present); Yukon Energy, Mines and Resources; Champagne and Aishihik First Nations; and Haines Junction Fire smart. At the community meeting, residents sat in groups of 3-6 people at a round table with an aerial photo of Haines Junction in front of them. They were asked to mark: 1) where they are seeing bears, 2) why they think the bears are there (attractants), and 3) if there are any places on the map where it is acceptable to have bears.

Habitat analysis

We divided habitat into two seasons with emphasis on grizzly bears: spring and summer. Environment Yukon provided us with forage layers from remote sensing data for spring foods: horsetail (*Equisetum sp*.), vetches (*Hedysarum sp*.), and locoweed (*Oxytropis sp.*). We also mapped summer food: soapberry (*Shepherdia canadensis*) in ArcGIS 10.1 (Redlands, CA. USA). Recognizing that green-up and berry ripening change year to year depending on climatic factors such as precipitation and weather, we chose approximate dates that roughly correspond to spring green-up (March 1 – July 15), and summer berry season (July 16 – September 30). We did not have data for forage layers after berry season.

We scaled each of the four forage layers provided to a common data value range of 0 to 1 to allow for equal weighting between the layers when performing spatial analysis geoprocessing functions. Layer by layer we subtracted the minimum value in the layer from the entire grid. Subsequently we divided the layer by the resultant maximum value effectively creating a data range of 0-1. We performed these calculations using the Map Algebra/Raster Calculator tool in the Spatial Analyst extension for ArcGIS. For the spring green up analysis, we treated the forage layers for horsetail, vetches, and locoweed as equal bear attractants and so no individual weighting was applied. As such we combined the three spring forage layers by summing the values across the three layers using the Raster Calculator. We then rescaled the resulting layer to a data range of 0-1 for the purpose of presenting common symbology. With only one summer forage layer to contend with, no geoprocessing steps were required; however, we rescaled the summer layer from 0-1 as above.

Bear Distribution Mapping

We used intensity of use to illustrate bear distribution on the landscape near Haines Junction and Kathleen Lake Campground and Day Use area. Using radio-telemetry data from Maraj (2007), we pooled grizzly bears by sex and season as described in the habitat analysis, and plotted utilization distributions for bears that had spent any time within a 10 km radius of Haines Junction. We used a kernel density estimator with a 1 km search radius using Home Range Tools from ArcGIS. We converted the resulting layers to integer surfaces using the Math/Int tool in the Spatial Analyst extension. No scaling or normalization was applied. We did the same for Kathleen Lake campground and day use area.

Existing human-bear conflict

We described existing human-bear conflict in both Kathleen Lake Campground and Day Use and the Village of Haines Junction using the occurrence reports provided by Environment Yukon and Parks Canada, as well as from interviews with community members. When it was included in the narrative, we noted common issues and attractants and summarized this data in column charts. Environment Yukon divides occurrence reports by type (sighting, encounter, and incident), and we summarized and mapped these occurrences from 1980, when record-keeping began, to 2010. We also mapped the density of human-bear conflict based on incidents in the occurrence report record to illustrate “hot spots” on the landscape.

Potential Human-Bear Conflict

Human-bear conflict has the potential to occur wherever human use and bear use overlap. By combining data from occurrence report mapping, bear habitat mapping and where human-bear conflict already exists, we illustrated where human-bear conflict is most likely to occur.

Current Strategies to Reduce Human-Bear Conflict
Both the community of Haines Junction and Parks Canada have undertaken impressive efforts already to reduce human-bear conflict in this area. Those efforts are mentioned throughout the document, but we list and describe them comprehensively here.

Recommendations
We detail specific actions based on the situation unique to Haines Junction that are the most likely to reduce human-bear conflict in the short-term and the long-term.

3.0 RESULTS AND DISCUSSION

3.1 HAZARD ANALYSIS

3.1.1 BEAR HABITAT

During spring, bears in this ecosystem are utilizing green-up forage: locoweed, horsetails, dandelions (*Taraxacum sp*.) and vetches, as well as hunting ungulate calves. In July, the soapberry ripens and when the berry crop is good, berries are one of the primary food sources (as well as salmon) that bears use to gain weight in preparation for winter denning (McLellan and Hovey 1995, Welch *et al.* 1997). As the berries drop in fall, bears go back to relying on whatever green vegetation is still available, which is typically in the same areas as spring green-up. This pattern generally results in bears using lower elevations early in the season and following green-up forage as it moves up in elevation as temperatures increase, and descending to use soapberries in the valley bottoms if berries are plentiful.

As a primary food source for bears, the annual berry crop is known to correlate with human-bear conflict. Berry production is mostly driven by forest canopy cover, with ideal conditions in partial sun and shade as is often found at forest edges, trails and in places where thinning has opened the canopy (Vassal *et al.* 2003, Nielsen *et al.* 2004). The other primary summer food for bears in this area is the salmon run, at Klukshu Creek 70 km away and at Sockeye Lake in Kluane National Park. There are no salmon-bearing streams that run directly through either Kathleen Lake campground and day use or the community of Haines Junction.

<u>Kathleen Lake Campground and Day Use Area</u>
Some bear food is available in the habitat surrounding the campground and day use area (Photo 1). Noted bear food included: kinnikinnick *(Arctostaphylos uva-ursi)* (Photo 2), soapberry and cranberry (*Vaccinium oxycoccos*). However, kinnikinnick and cranberry appeared to occur in low densities, while soapberry was more prevalent inside and immediately adjacent to the campground and day-use area (Figure 1). Fire smart activities, involving thinning out vegetation and removing trees to open the habitat up, are likely to allow remaining soapberry shrubs to receive more sun, which provides optimal growing conditions and may increase berry production (Hamer 1986). Soapberry production during the summer months does appear to be highest along the highway, near the campground and along the shoreline (Figure 2).

The trail between the day use area and campground is an easy hike approximately 0.8 km (Photo 3). Visibility is excellent as the trail is wide, trees are naturally widely spaced and soapberry shrubs are low. We saw no evidence of high bear activity (e.g. rub trees, nursery trees).

The Cottonwood Trail along the south side of the lake begins at the day-use area and is a popular day hike where hikers have encountered bears. Bears also use the trail as it is the path of least resistance through the valley, which is believed to be a bear travel corridor into and out of the Park.

Photo 1: Open forest near Kathleen Lake day-use, Kluane National Park, Yukon.

Photo 2: *Arctostaphylos uva-ursi*, near Kathleen Lake campground, Kluane National Park, Yukon.

Photo 3: The trail between the campground and day-use area, Kathleen Lake, Kluane National Park, Yukon.

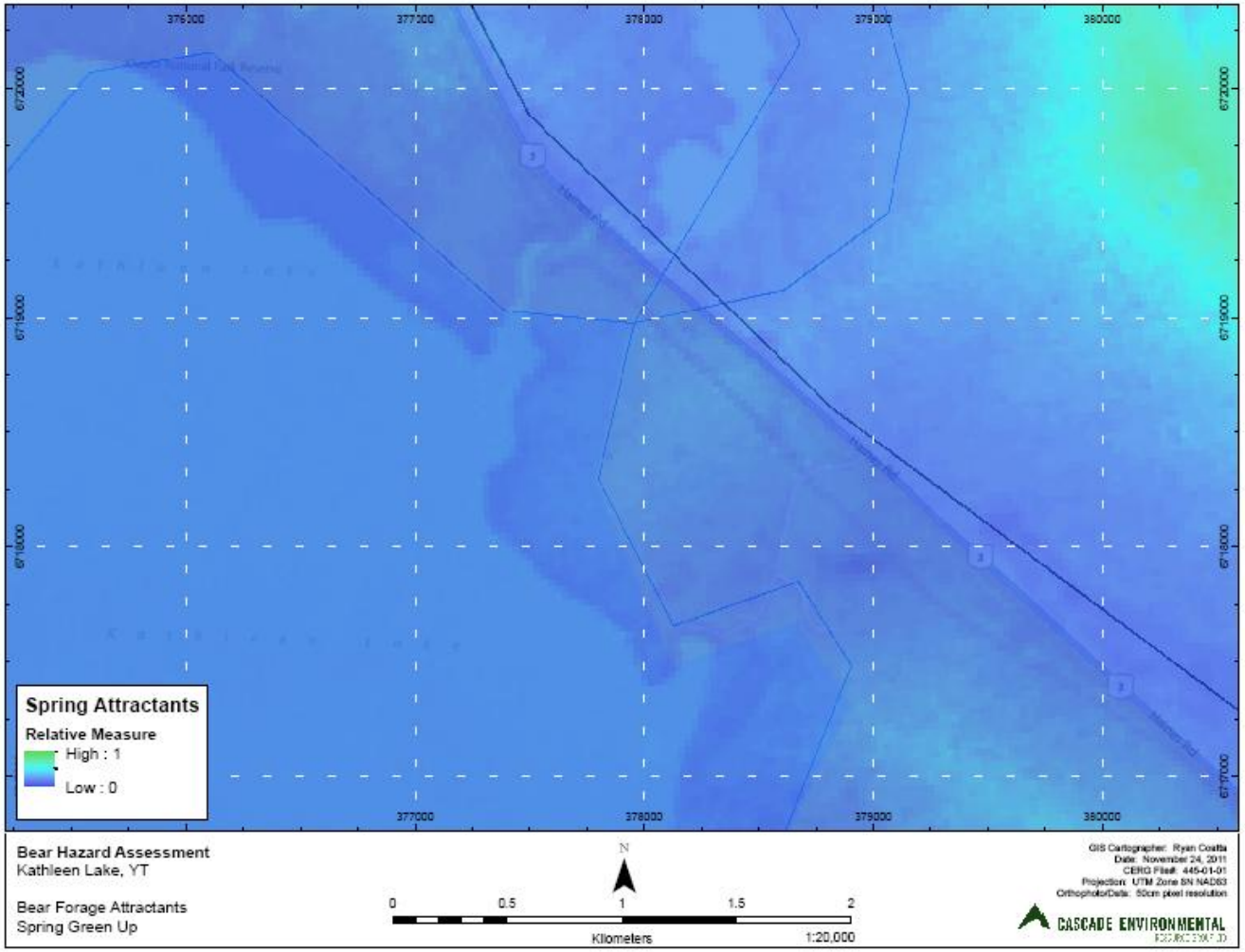

Figure 1. Kathleen Lake Campground and day use area spring forage. Note that the aerial photo layer does not match perfectly with the map layer, but points are based on the aerial photo layer. The map layer is inserted for clarity.

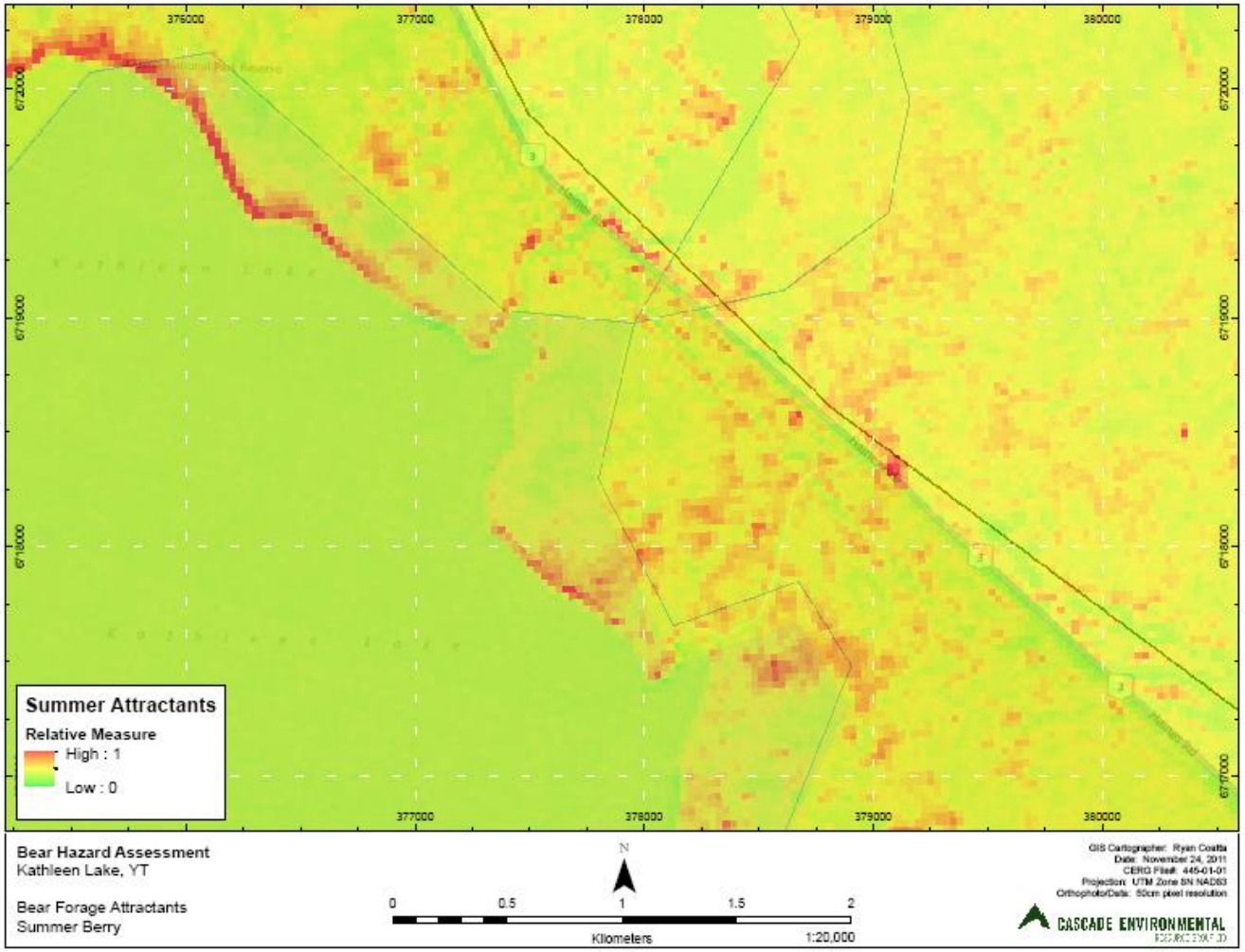

Figure 2. Kathleen Lake Campground and day use area summer forage. Note that the aerial photo layer does not match perfectly with the map layer, but points are based on the aerial photo layer. The map layer is inserted for clarity.

Village of Haines Junction

The community lies adjacent to the Dezadeash River at 599 m (1965 feet) elevation. The area around the community and roads are the first to green-up in spring and last to senesce in fall. Spring bear food, including vetches, locoweed, dandelions and horsetails are mostly available adjacent to the community to the northeast, and between the First Nations Village and the agricultural fields just north of town (Figure 3). Summer foods (soapberries) are more available and dispersed throughout the entire community (Figure 4).

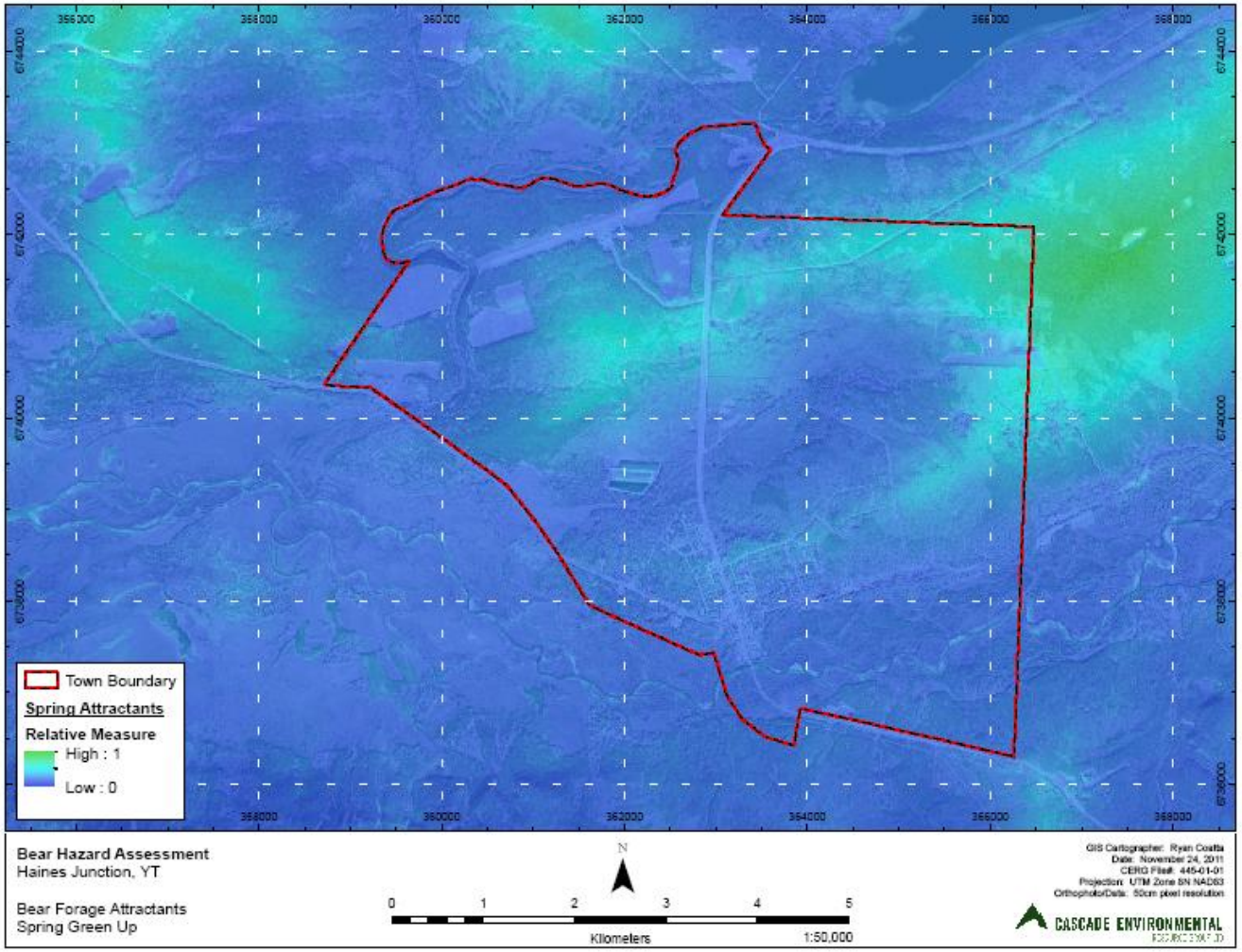

Figure 3. Spring Bear Forage of *Equisetum, Hedysarum* and *Oxytropis* at Haines Junction, Yukon.

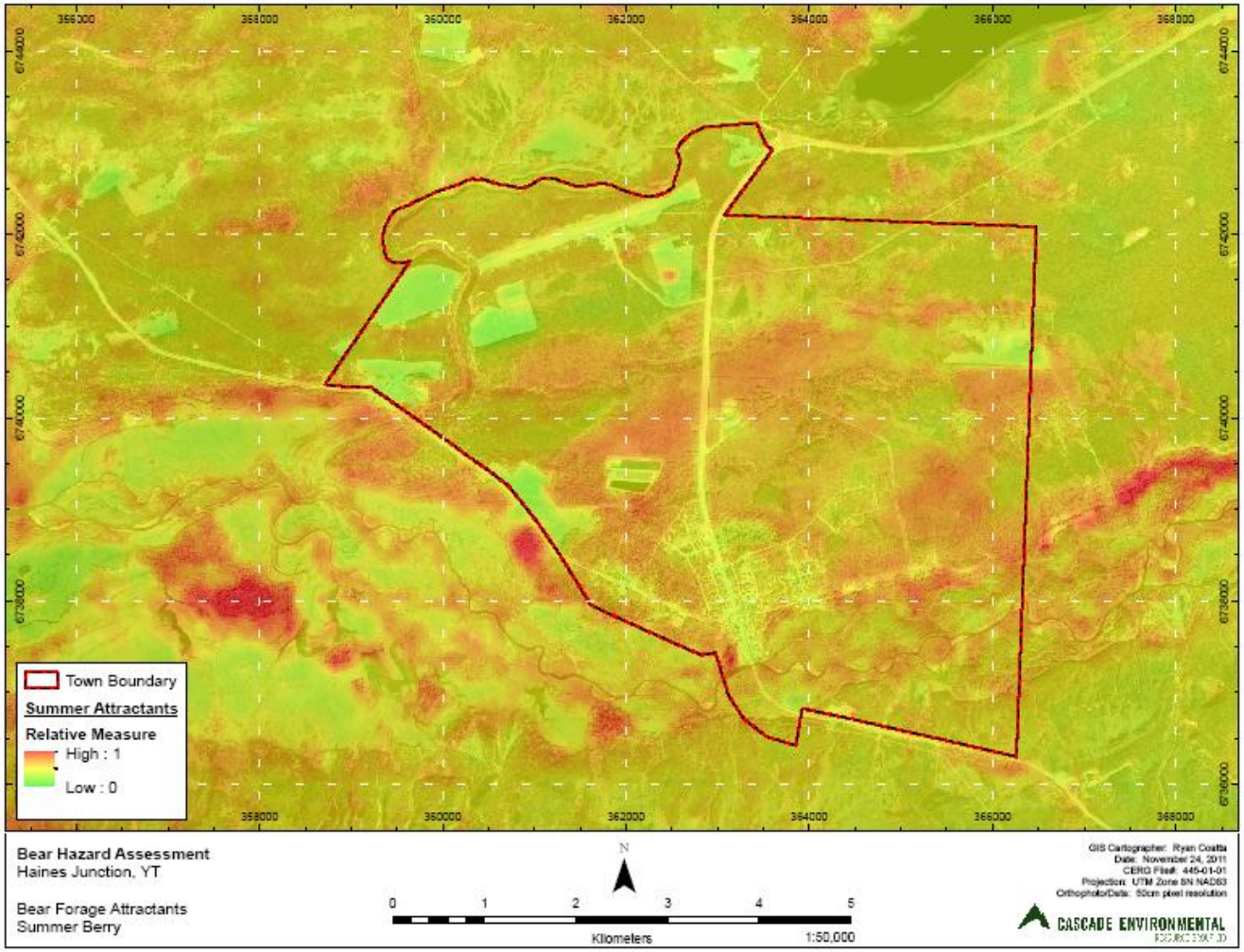

Figure 4. Summer Bear Forage of *Shepherdia* at Haines Junction, Yukon.

3.1.2 BEAR DISTRIBUTION

Kathleen Lake Campground and Day Use

We illustrated how bears were distributed on the landscape near Kathleen Lake Campground and Day Use by using grizzly bear telemetry data provided by R. Maraj and from input from Kluane National Park employees. Interviewees indicated that the Cottonwood Trail is used by bears and that bears appear to travel into and out of Kluane National Park regularly, especially along the Dezadeash River (closer to Haines Junction).

Village of Haines Junction

We illustrated grizzly bear intensity of use around Haines Junction using grizzly bear telemetry data from bears radio-collared in Kluane National Park that also spend time near Haines Junction. Telemetry data was provided by R. Maraj and additional information was provided from input from residents at the community meeting. We illustrated intensity of use based on 38 telemetry relocations from 12 male bears in spring (Figure 5), 115 telemetry relocations on 12 male bears in summer (Figure 6), 177 telemetry relocations from 7 female bears in spring (Figure 7), and 277 telemetry relocations from 7 female bears in summer (Figure 8) that spent time within 10 km of Haines Junction. Spring distribution for both sexes of grizzly bears appears to be highest along the Dezadeash River, where bears are likely taking advantage of green-up vegetation and newborn ungulate calves. It is interesting to note that collared bears using the town site were more likely to be males in summer (Figure 6). With fewer than 10 telemetry relocations within 10 km of Haines Junction for both sexes of bears combined, we did not have enough telemetry locations to illustrate fall bear densities.

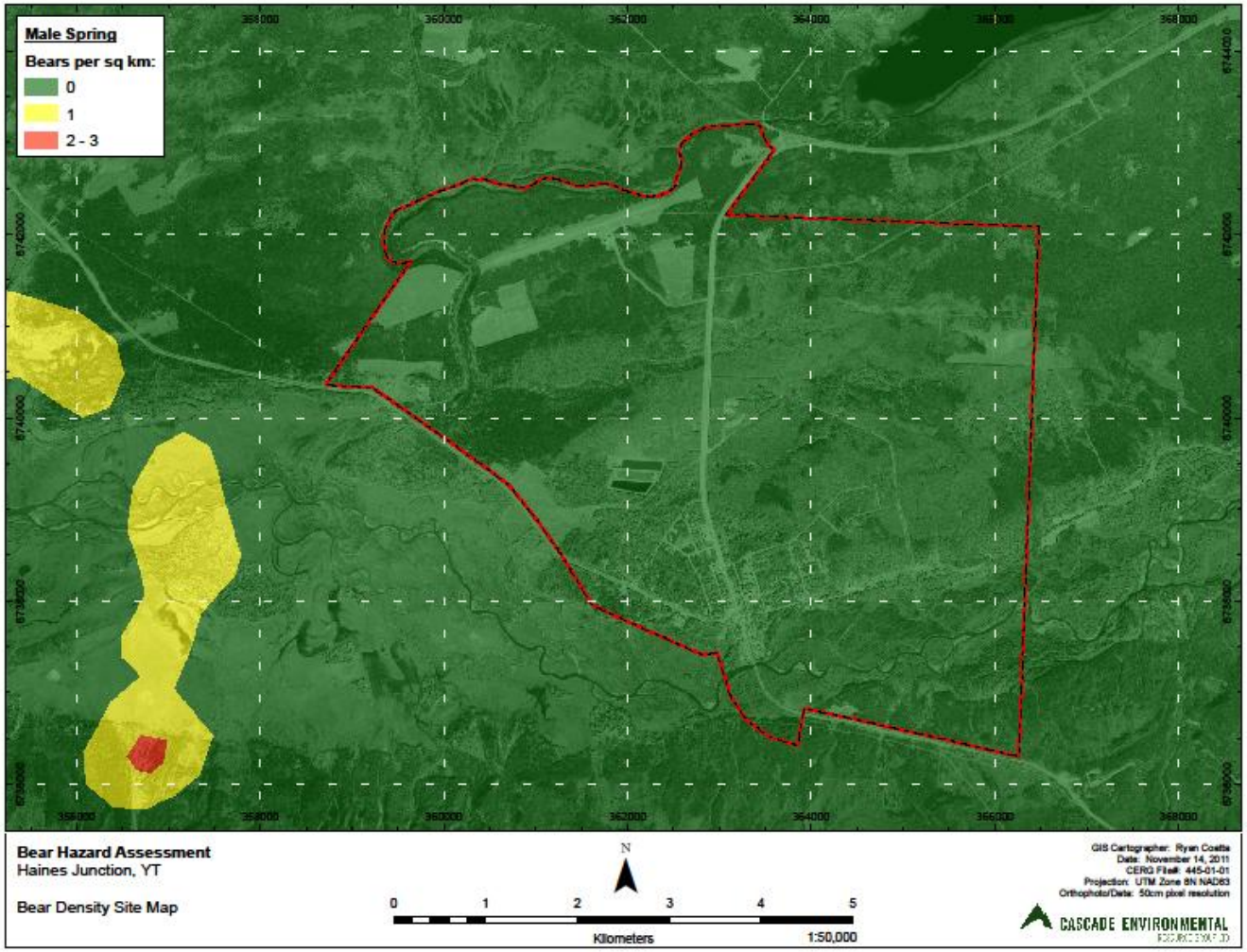

Figure 5. Male grizzly bear intensity of use near Haines Junction, Yukon from March 1 – July 15 based on radio-telemetry locations from 12 radio-collared male grizzly bears from 1989 – 2004.

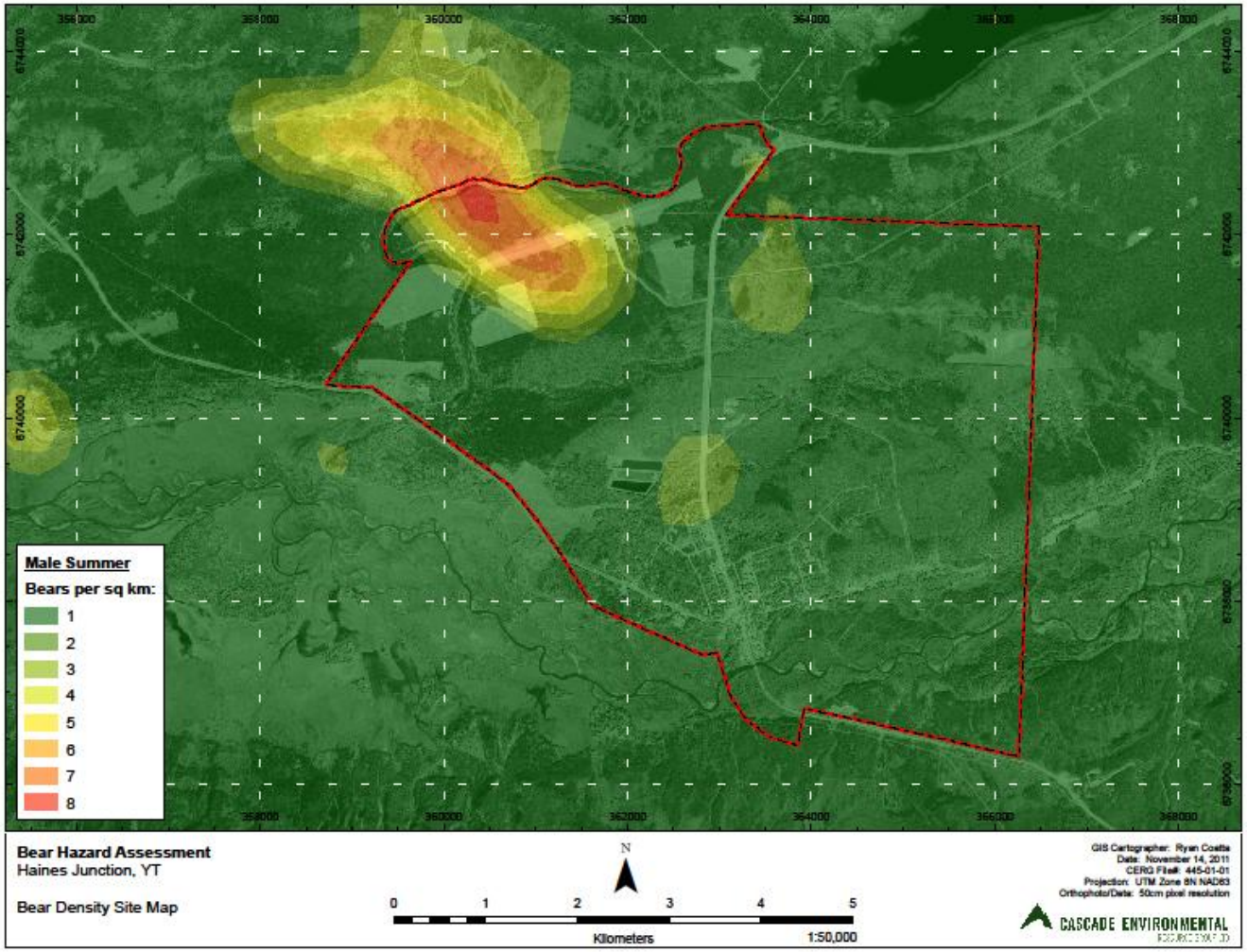

Figure 6. Male grizzly bear intensity of use near Haines Junction, Yukon from July 16– September 30 based on radio-telemetry locations from 12 radio-collared male grizzly bears from 1989 – 2004.

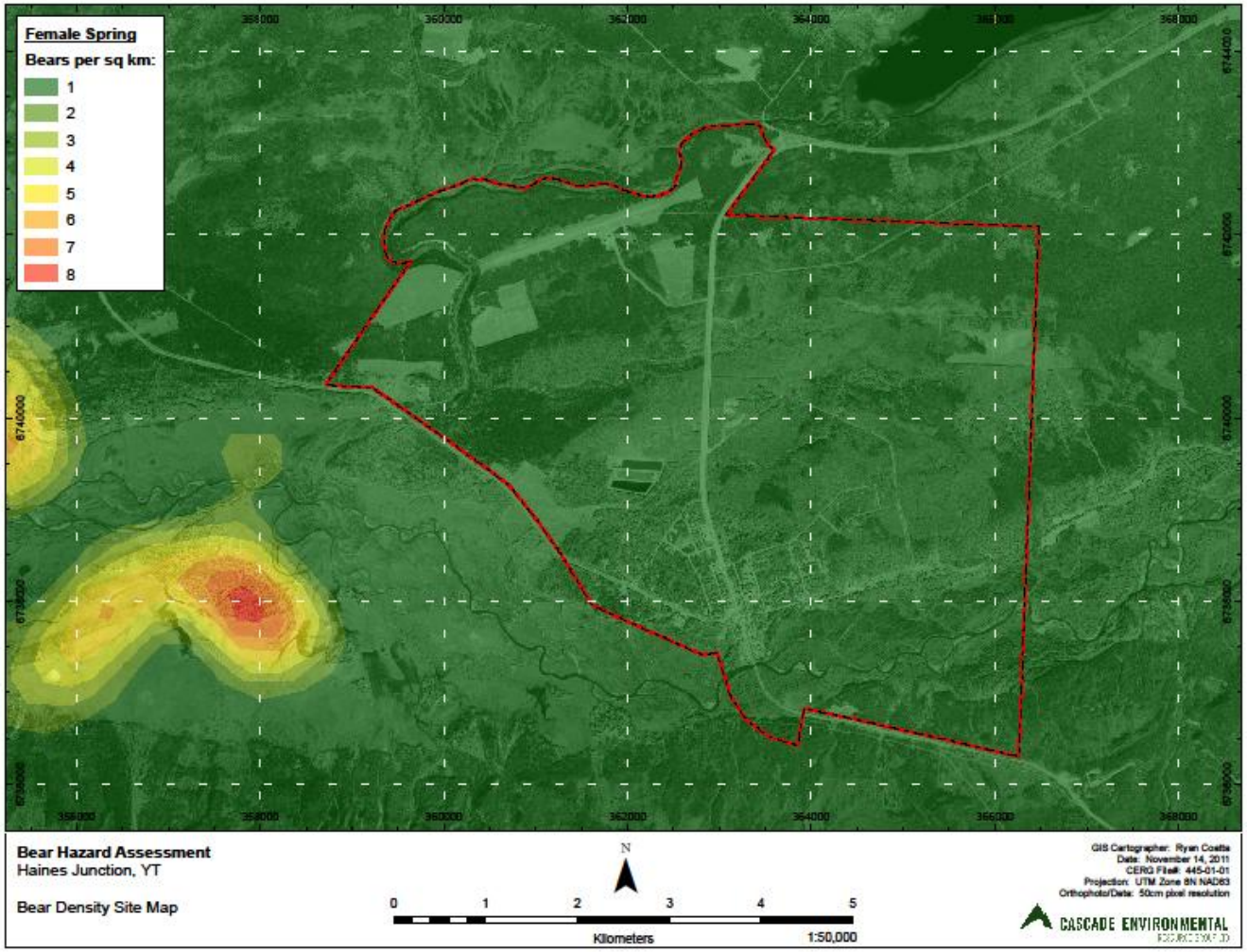

Figure 7. Female grizzly bear intensity of use near Haines Junction, Yukon from March 1 – July 15 based on radio-telemetry locations from 7 radio-collared female grizzly bears from 1989 - 2004.

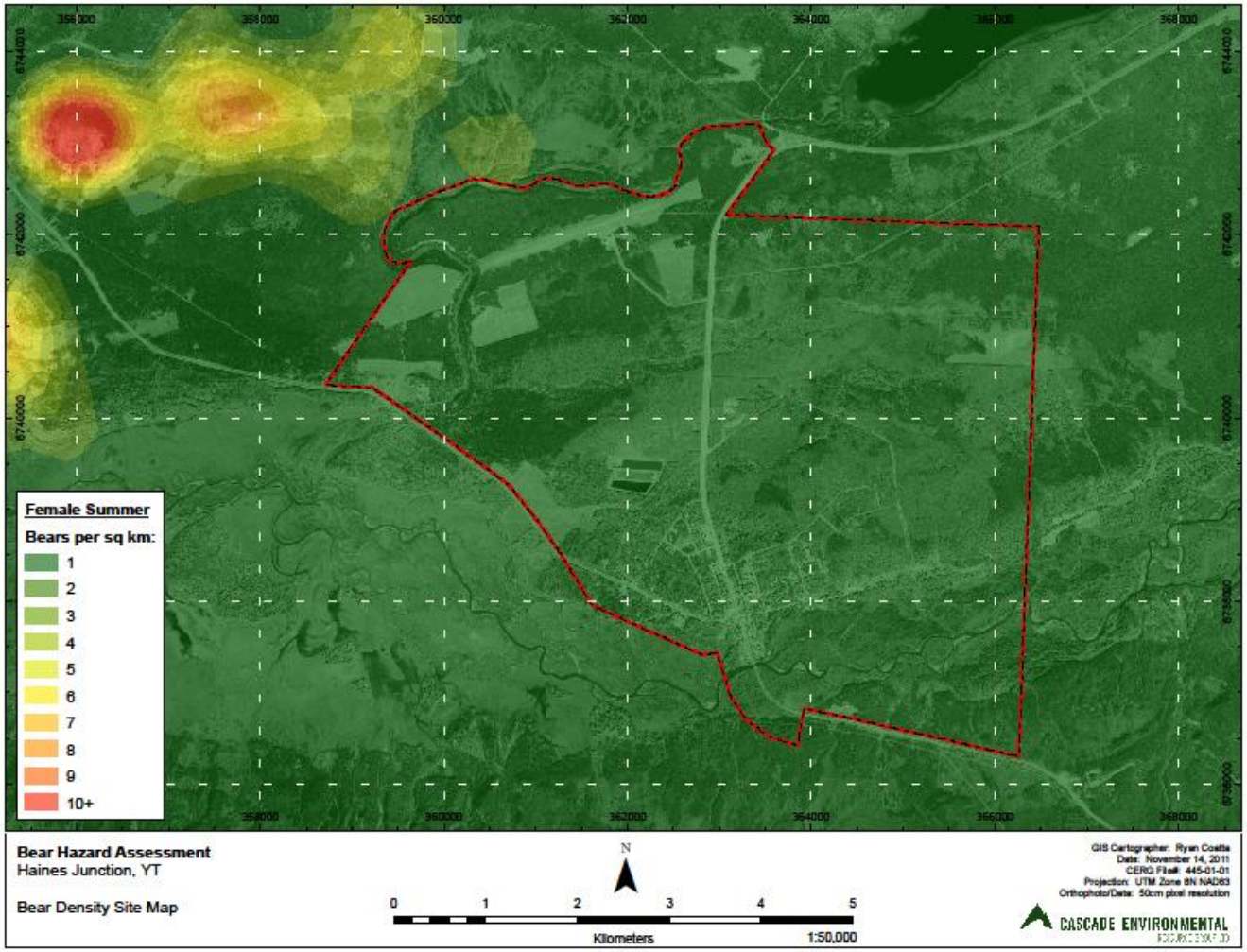

Figure 8. Female grizzly bear intensity of use near Haines Junction, Yukon from July 16– September 30 based on radio-telemetry locations from 7 radio-collared female grizzly bears from 1989 – 2004.

The radio-telemetry data is complemented by the information residents provided at the community meeting when asked how they saw bears moving across the landscape (Figure 9). Interviewees indicated bears were often in the Dezadeash River corridor and in agricultural fields in spring, and came into town mostly for soapberry in the summer and for hanging meat in the fall.

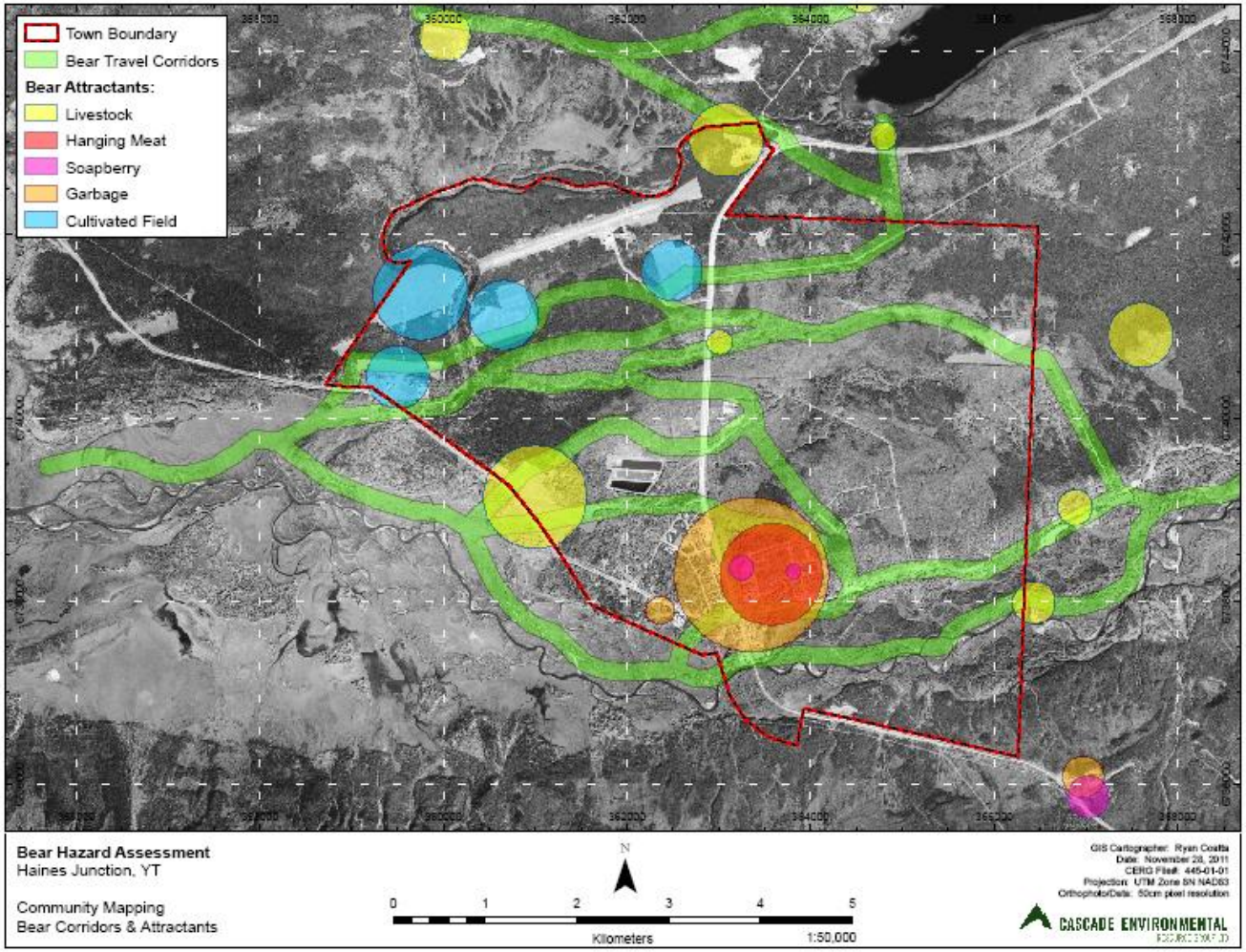

Figure 9: Community mapping exercise, bear travel corridors and attractants in Haines Junction, Yukon. Residents were asked to identify wildlife corridors and locations of attractants. This map is a compilation of approximately 20 residents' opinions from five separate maps.

3.1.3 EXISTING HUMAN-BEAR CONFLICT

Much of the data outlining existing human-bear conflict were in the form of occurrence reports. Since about 1980, regional complaints from the public about problem wildlife have been added to a database that can be queried in order to sort records and illustrate where and how human-bear conflict are occurring. By the end of 2011, there were 783 records for the Haines Junction region, and 121 (approximately 15%) of those records fell within the town boundaries of Haines Junction.

Occurrence reports were grouped by type: sightings, encounters, and incidents. A sighting involved a person observing a bear that is unaware of the presence of the observer, and an encounter occurred when the observer and the bear were mutually aware of each other. Records that were not sightings or encounters were classified as incidents, and may or may not have resulted in bear mortality. Incidents and mortalities involving grizzly bears are concerning due to the higher potential for human injury with grizzly bears (Herrero 1989, Gunther 1994), and the more sensitive nature of grizzly bear populations to high human-caused mortality (particularly when mortalities are adult females; McLellan *et al.* 1999).

Using occurrence reports as data is not without problems. Many residents are likely to avoid reporting conflicts with bears for fear that either the bear will be shot or that they will be prosecuted for having shot a bear or otherwise broken the law. Some people simply do not think to report sightings, or only report sightings at are, in their opinion, concerning. The likelihood of a person to report a sighting, encounter or incident may change from year to year or even during the same year. These biases aside, occurrence reports are useful to examine the human-bear conflict that is reported.

<u>Kathleen Lake Campground and Day Use</u>
Human-bear conflict was currently quite low at Kathleen campground and day use area. This was likely primarily due to efforts by Parks Canada to control both natural and anthropogenic bear attractants in areas where bears are likely to encounter people.

Anthropogenic Attractants
At the campground, bear-resistant food-lockers and garbage containers have virtually eliminated bears' access to human food and refuse. Food scraps at campsites (in fire pits) or left unattended were the main potential non-natural attractants. The campground had no host or attendant; a kiosk at the campground entrance provided signage, payment envelopes and brochures to educate visitors about campground policies including preventing conflicts with bears. Compliance staff can remove human food or garbage and place in a locked bear-resistant container behind the food containers. Additional educational signage made of heat-resistant materials was secured to picnic tables at each site.

Natural Attractants
The most concerning natural attractant that contributes to human-bear conflict is soapberry in and near the campground. There are also sporadic issues with black bears and cranberries in the day-use area.

There have been no reports of humans being mauled or attacked by bears at Kathleen Lake campground and day use area, and no bears have been removed (killed or translocated elsewhere). Most of the bear records were sightings and encounters, although one person was charged by a bear in the fall of 2009. The closest bear mortalities appeared to have occurred on and near the Alaska Highway (Figure 10).

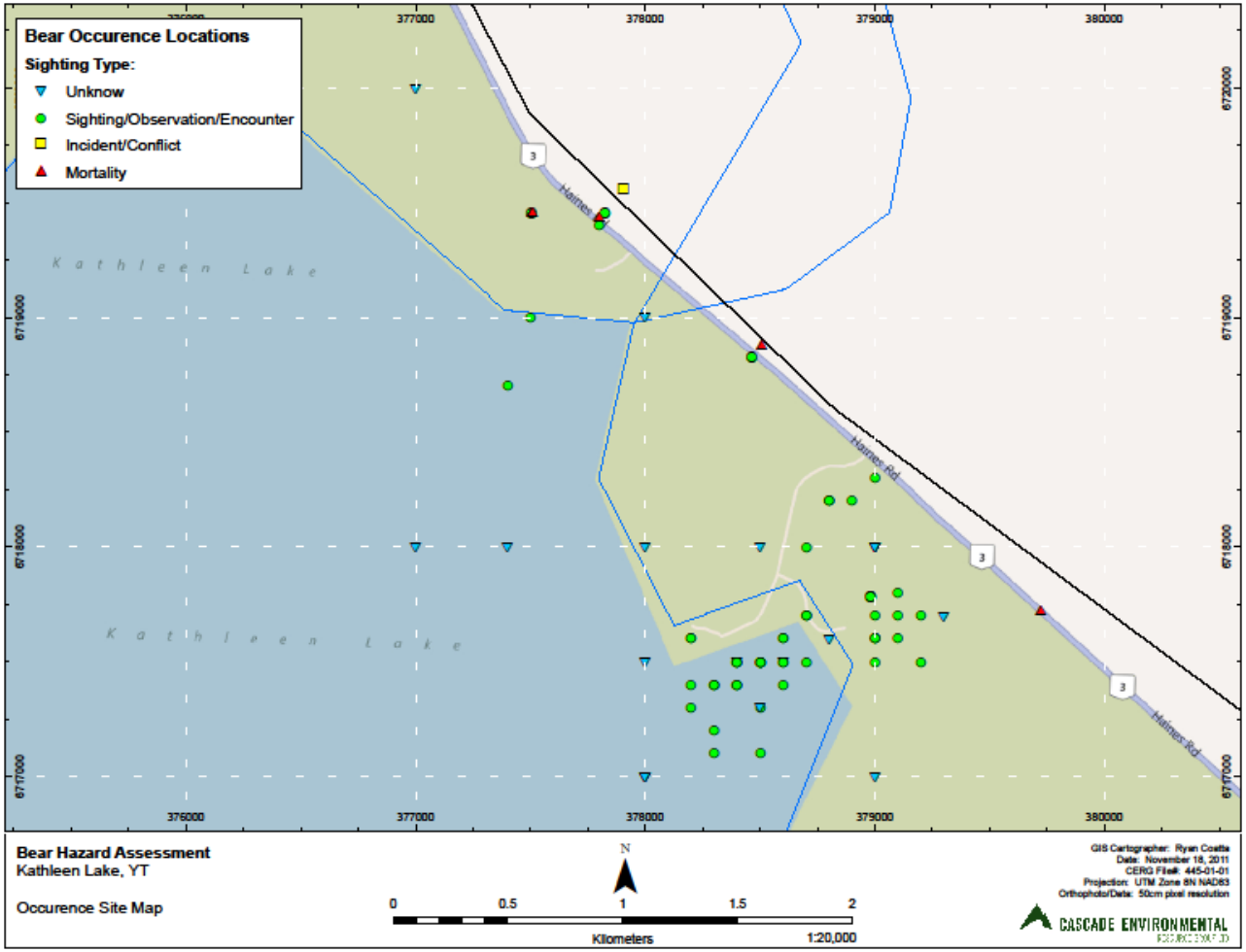

Figure 10. Bear observations recorded from Kathleen Lake campground and day use, Kluane National Park, Yukon. 1987 – 2009.
Note that points are based on an aerial photo layer that is unfocused at this magnification. The less accurate map layer is inserted for clarity.

Village of Haines Junction

Regionally, there have been several incidents with bears that have likely had the greatest impact on local desires to reduce human-bear conflict and improve human safety. In 1976, a woman was mauled by a black bear, and twenty years later in 1996, a couple visiting the Sheep Mountain area was approached by a curious subadult male grizzly bear. The bear mauled the couple, and while the woman died, the man survived with injuries. Additionally, in 2008, a resident was chased, treed and bitten on the foot by a sow grizzly bear with cubs while on a trail adjacent to the village. While none of these incidents occurred within the boundaries of Haines Junction, because two of the attacks appeared to be predatory, a number of residents have expressed concern about bears in close proximity to human developments. Residents also reported that a bumper soapberry crop in 2007 resulted in high numbers of bears sighted in Haines Junction, particularly near the St. Elias School, the Champagne and Aishihik subdivision, and Willow Acres subdivision. Concern for human safety and the proximity of young children influenced how tolerant some residents are toward bears using village lands.

Anthropogenic Attractants

Several sources of anthropogenic attractants in the community of Haines Junction were available to bears. Most interviewees identified soapberries and garbage within the community, hanging meat after hunting season, and parts of carcasses from winter hunting that melt out in the spring as major bear attractants. This opinion was backed by Maraj (2007), who found that the frequency of management kills was most closely correlated to the number of open landfills in the area. Garbage in general is a concern throughout Haines Junction. A few bear-resistant pedestrian garbage bins were available, but most were not bear-resistant. No residential (Photo 4), and no commercial garbage bins were bear-resistant.

The Haines Junction garbage dump was electric fenced in 1992 (Photo 5). Interviews with Environment Yukon employees indicated that after the landfill was fenced, human-caused bear mortalities and bear sightings in Haines Junction increased for a couple of years before dropping to lower levels. However, Maraj (2007) did not find a decrease in bear mortality in the region in the first year or two following closure, as was expected based on results from other regions following landfill closures. From occurrence reports within the community itself, we found no drop in human-caused bear mortality based on occurrence reports. From 1980 to 1992, before the landfill was electrified, human-caused mortality averaged 0.8 bears per year (0.5 grizzly bears per year and 0.3 black bears per year). From 1993 to 2010, after the landfill was electrified, human-caused mortality averaged 1.1 bears per year (0.6 grizzly bears per year and 0.7 black bears per year). However, incidents related to the landfill in Haines Junction dropped from 1.6 incidents per year (19 incidents over 12 years) to 0.2 incidents per year (4 incidents over 17 years). For comparison, the rate of occurrence report generation in Haines Junction over the same time periods remained quite stable. Haines Junction was generating 4.3 reports per year (51 total occurrence reports over 12 years from 1980 to 1992), and 4.0 per year (68 occurrence reports over 17 years from 1992 to 2010).

The occurrence reports do not appear to reflect what Environment Yukon employees reported noting in the field, that human-caused bear mortalities and incidents in Haines Junction spiked and then dropped following electrification of the landfill. One of the reasons may be that the occurrence report database is too coarse. A sightings log is kept on paper, but is not yet electronic, and observations do not have corresponding location coordinates; as such it is not included in this document. The sightings log is likely more detailed and useful for detecting bear activity trends. Additionally, some human-caused mortality may be lost as legal hunting data when residents buy a bear tag and target bears in conflict with humans. Another possibility is that other attractants, both anthropogenic and natural, continue to attract bears into the community.

Photo 4. Typical residential garbage bin, Champagne and Aishihik Village, Haines Junction, Yukon.

Photo 5. Fence around the garbage dump (electrified outside), Haines Junction, Yukon.

Besides garbage, the other major anthropogenic attractant identified in Haines Junction was hanging meat. During the fall hunting season, most hunters hang their meat outside their home while they skin and butcher the animal. Champagne and Aishihik people may also smoke salmon in the summer months in smoke houses in their backyards. Decades ago, Champagne and Aishihik residents maintained that neither of these activities contributed to significant human-bear conflict because most people had several dogs chained around the yard, which deterred bears from accessing their food. Fewer people presently have dogs that could function as bear deterrents at present, however, which has resulted in more bears being able to access meat.

Other attractants included livestock, pet food and bears being intentionally fed by visitors. There were 11 recorded incidents, one of which occurred inside the town boundaries of Haines Junction, where visitors had intentionally fed bears. That bear, a grizzly, was later killed when it began chasing vehicles and acting aggressively to obtain food. Also, three incidents were recorded, one of which was inside the town boundaries of Haines Junction, where bears had accessed unsecured pet food. Two grizzly bears in Haines Junction were also killed for hunting horses. Since records started being kept in 1980, 13 black bear and 15 grizzly bear mortalities have occurred within town boundaries due to human-bear conflict. This is likely under-estimated, however, since some residents have likely killed bears without reporting it, and some conflict mortalities may have been managed using legal hunting tags (categorizing the mortality as a hunted animal rather than a conflict animal).

Natural Attractants

As we noted in the section detailing bear habitat, most residents we interviewed noted that bear activity pattern around town in general seems to be most noticeable in the spring and fall. Residents were most concerned with bears hunting moose calves near town in spring, and with bears eating soapberries in town in summer. Many residents and Environment Yukon employees noted that in years when soapberry production is high, bear activity in town continues throughout the summer.

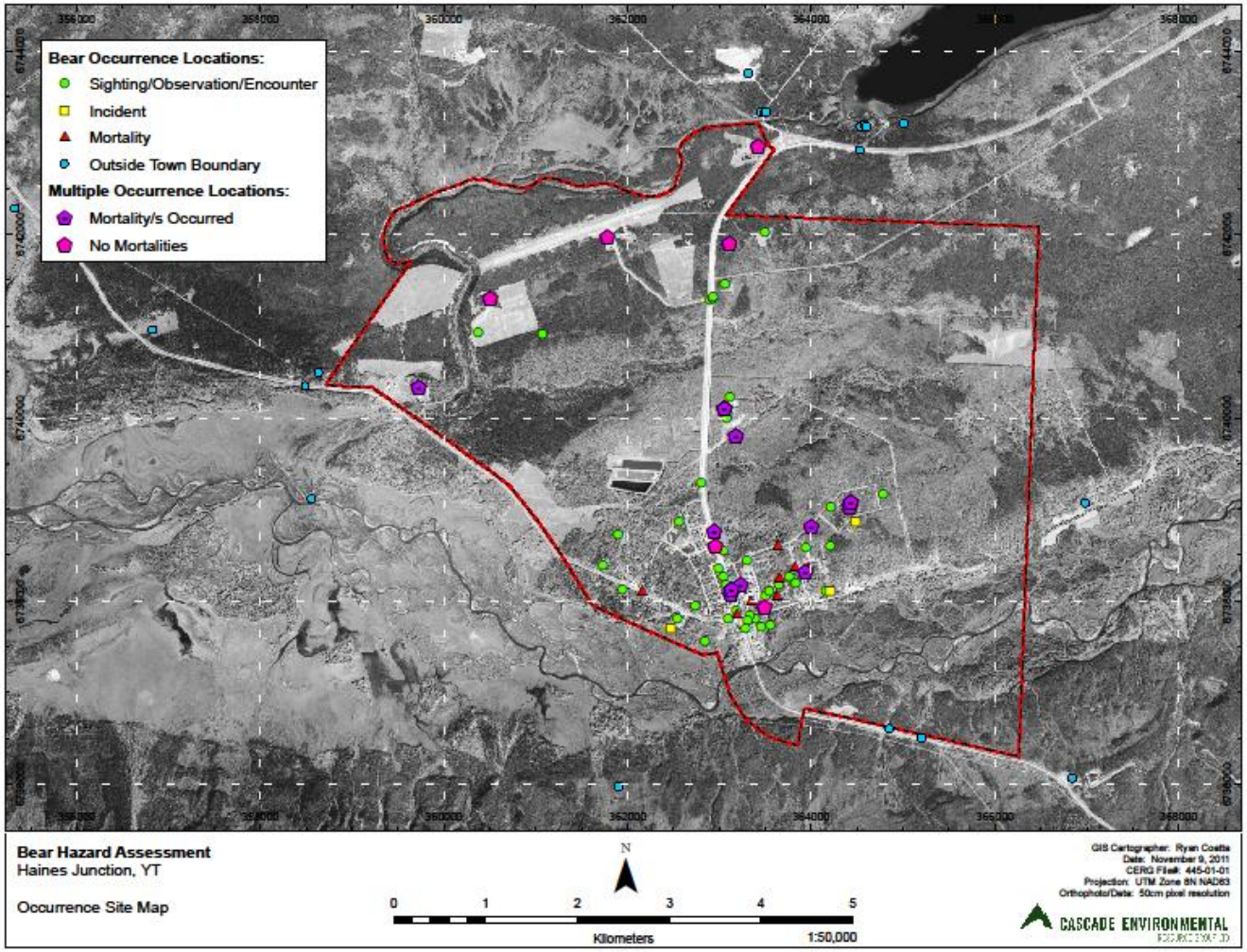

Figure 11. Locations of all bear sightings, encounters, incidents and mortalities in Haines Junction, Yukon, 1980 – 2011.

Most of the occurrences of black bears within the town boundary occurred in July, with grizzly bear occurrences at a more moderate level throughout the season (May to October). Black bears may be most attracted to the community for soapberries ripening in July. While grizzly bear use is also highest in July, the peak is much less pronounced (Figure 12), and the extension of grizzly bear use into the fall may be due to the availability of hanging meat.

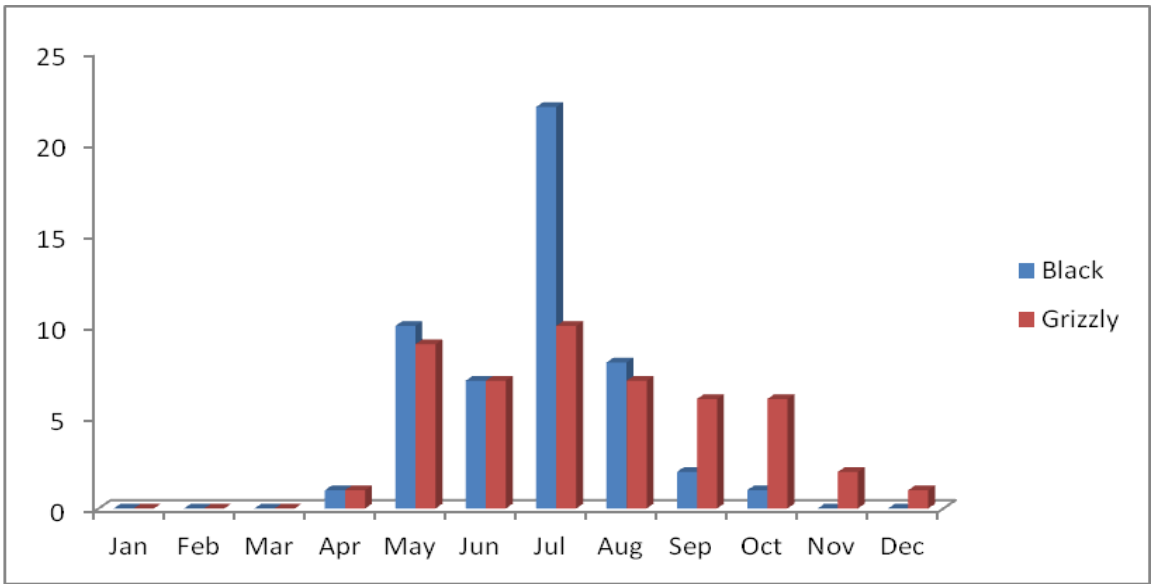

Figure 12. Black and grizzly bear occurrences by month for Haines Junction, Yukon, 1980 – 2011.

The most common occurrence reports related to bears displaying highly human-tolerant behaviour, including a reluctance to leave residential areas for no apparent reason (to the reporting party). These bears may be habituated to humans and human activities due to repeated encounters with no negative outcome, or they may simply be overcoming their wariness of people in anticipation of a food reward (Figure 13). Such bears are more likely to become food-conditioned, even if they are using human developments for natural food sources.

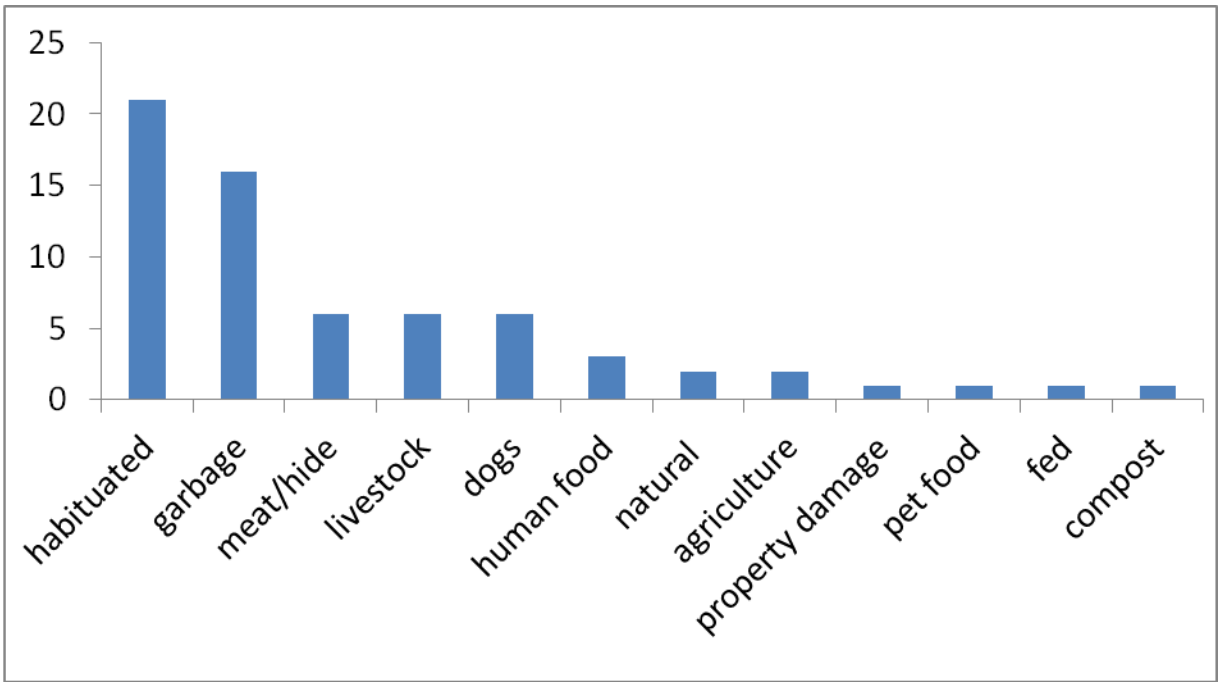

Figure 13. Issues and attractants in occurrence reports within the town boundaries of Haines Junction, Yukon, 1980 – 2011.

Incidents and mortalities involving grizzly bears are clustered directly in the community of Haines Junction, the agricultural areas north of the village and at Pine Lake, just north of the town boundary (Figure 14). This pattern likely reflects that these areas are where more humans are more likely to see and encounter bears.

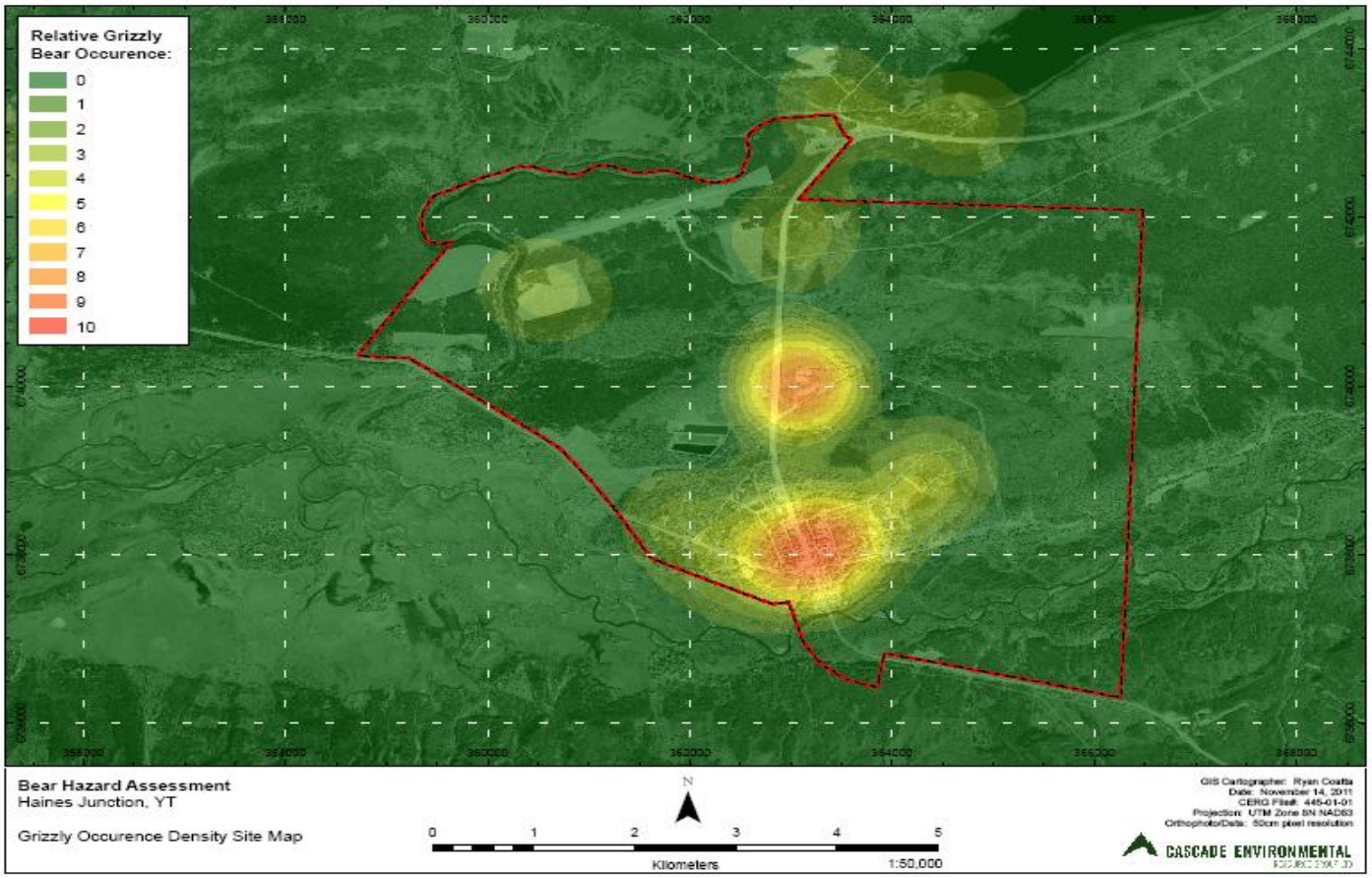

Figure 14. Incidents and mortalities in occurrence reports involving grizzly bears in Haines Junction, Yukon, 1980 – 2011.

3.1.4 POTENTIAL HUMAN-BEAR CONFLICT

The potential for negative encounters between humans and bears exists anywhere that bear habitat and attractants overlap with human use. Bear travel corridors and locations of highly desirable bear food occur in close proximity to human activity in both Haines Junction and Kathleen Lake Campground and Day Use. Maraj (2007) and Lukie (2011) both found that occurrences in the Haines Junction region were most often located in high-use bear habitat in human-developed areas close to water.

While most people easily understand the importance of securing anthropogenic attractants from bears, it is as important to remove natural attractants, particularly if they are of high forage value for bears. It is highly unlikely that bears distinguish between natural and anthropogenic food sources once they know something is edible, and the presence of natural food in close proximity to anthropogenic food gives foraging bears the opportunity to learn to associate humans with high-calorie food sources. Natural food sources for bears which are in close proximity to human use areas carry a higher risk of conflict, as bears spend more time foraging in a smaller area than bears simply travelling through. Bears are also more likely to defend a food source (natural or anthropogenic) in an encounter with humans (Herrero 1985).

Kathleen Lake Campground and Day Use

Anthropogenic Attractants

Conflicts with bears are possible due to fishing activities and fish carcass disposal at the Day Use area. The current system is informal where fishermen simply fillet their catch on the shore at the boat launch and either throw the remains back into the water, or put the remains in a nearby bear-resistant bin.

There are two washrooms in the campground, one of which has grey water disposal in the form of a sink piped into the back of the washroom, with the water piped underground into a storage tank. There is potential for food items to collect in the drain, as was observed during the site visit on June 12, 2011 (Photo 6). Since there were only two occupied campground sites at our June visit, and there was some food in the drain, this may become a more significant issue in peak summer months when more sites are occupied.

Photo 6. Grey water disposal, Kathleen Lake campground, Kluane National Park, Yukon. June 12, 2011.

Natural Attractants

Because of the importance of soapberry to bears in late summer, and the vulnerability of campers sleeping in tents or soft-sided campers, the presence of soapberry shrubs in and near the campground raises the risk of human-bear conflict. Since the campground underwent forest thinning for fire smart, growing conditions for soapberry production in and adjacent to the campground are now optimized.

Gilbert (2010) also recommended that the campground, in particular the group campground, have soapberry removed.

Village of Haines Junction

The location of Haines Junction, along the Dezadeash River in a wide, relatively warm valley makes its location particularly attractive to both bears and humans. The presence of both anthropogenic and natural attractants inside the community boundaries increases the likelihood of human-bear conflict.

Anthropogenic Attractants

Some of the biggest potential areas for human-bear conflict can be predicted by using the occurrence reports of where human-bear conflict currently exists (Figure 14). Until the attractants are secured or eliminated, or unless new issues are introduced, human-bear conflict is unlikely to take on a new pattern. The current pattern is best explained by areas with high human use (as opposed to bear habitat). New developments, such as the expansion of the Willow Acres subdivision and the First Nations village, are likely to experience the same issues as the rest of the community. Hanging meat and unsecured garbage have the largest potential to attract bears and increase the risk of a negative encounter with bears, particularly grizzly bears in the community in fall.

Natural Attractants

For a relatively small population, Haines Junction and the surrounding residential areas have a large footprint, which continues to expand. Hundreds of kilometres of highway right-of-way, secondary roads, trails, cut lines and cleared property edges provide opportunities for emergent vegetation, enhanced berry growth as well as very attractive successional revegetation. Fire suppression has resulted in a relatively uniform natural habitat of spruce forests, with breaks in vegetation (and therefore the most attractive food for bears) most likely to occur closer to human developments.

The most concerning natural attractant in Haines Junction is soapberry shrubs in summer, particularly in areas that have been fire smarted. Figure 6 illustrates how widespread soapberry shrubs are in the community, particularly in the southwest corner near the Dezadeash River, which bears are known to use. The other major area of concern is Willow Acres, particularly as new residents will be required to fire smart their properties. Many of the areas with high levels of soapberry are in residential areas with significant foot traffic on official trails (e.g. the Dezadeash Trail) or unofficial trails (e.g. near the day care). Soapberry is also quite dense along the highway east of Haines Junction and adjacent to the community.

When berries are plentiful, they are a significant bear attractant. Fire smart activities, requiring workers to thin the forest (figure 15), are useful to open sightlines so that bears and humans are less likely to surprise each other when moving through habitat. However, forest thinning also creates ideal conditions for berry production and this practice has lead to increases in human-bear conflict in other jurisdictions (Vasal *et al.* 2003, Donelon 2004, Honeyman 2007). This means that any area that has been fire smarted may become optimal bear habitat in as few as 5 years (Vasal *et al.* 2003), and that human-bear conflict in Haines Junction could escalate in the next 5-10 years as a result of bears entering the community for soapberries. Managing soapberry has effectively reduced human-bear conflict in other areas (Honeyman 2007), and will be the best strategy the community can embark on to prevent human-bear conflict in Haines Junction from escalating.

Figure 15. Areas that have been Fire smarted (thinned forest) since 2004 in Haines Junction, Yukon.

3.1.5 CURRENT STRATEGIES TO REDUCE HUMAN-BEAR CONFLICT

Kathleen Lake Campground and Day Use

Parks Canada's efforts to educate visitors and control bear attractants date back to 1999 when Parks Canada designated campsites on the Cottonwood Trail. Beginning in 2001, visitors could watch a video: *Safety in Bear Country* and the Park also introduced food storage lockers to Kathleen Lake campground (Photo 7). Bear-resistant garbage bins on the Cottonwood trail and in the day use also limit the non-natural food attractants available to bears (Photo 8). Despite not having a campground host, visitors are educated about bear safety with regular interpretive programs, brochures in several languages, posters, and heat-resistant, laminated signage on picnic tables as part of the BARE campsite initiative (Figure 9).

A group of students from Yukon College worked in conjunction with Kluane National Park staff in 2010 to manually remove soapberry shrubs at Kathleen Lake Campground (photo 10). The group removed 200 kg of biomass over 0.7 acres covered an area of 0.7 hectares within the campground perimeter.

Photo 7: Food storage lockers at Kathleen Lake campground, Kluane National Park, Yukon. June 12, 2011.

Photo 8: Bear-resistant garbage bins in the day use area of Kathleen Lake Campground. June 12, 2011.

Photo 9: Signage on picnic tables at Kathleen Lake campground, Kluane National Park, Yukon. June

Photo 10: Soapberry removal at Kathleen Lake Campground complete August 25-26, 2010 (Gilbert,

12, 2011. 2010).

Village of Haines Junction
Residents of Haines Junction have undertaken impressive activities aimed at reducing human-bear conflict in the community. These efforts include:

- Soapberry removal near the school and daycare
- Installation of some bear-resistant pedestrian bins
- Community meetings to discuss when and how to implement conflict-reducing activities
- Brochures in several languages including English, French, Japanese and German to educate visitors about staying safe in bear country

3.2 HAZARD RANKINGS

We ranked hazards according to the level of risk they pose to both bears and the community. Rankings are based on bear behaviour (e.g. circumstances around negative encounters from local and other areas), the potential of the hazard to contribute to human injury by bears, the potential of the hazard to result in the removal of bears from the population, and on the opinions and experiences of local community members. The hazard ranking scheme is as follows:

High-risk hazards are hazards which are likely to result in removal of several or many bears from the population and/or are likely to contribute to an incident where a bear injures a human.
Moderate-risk hazards are hazards which are likely to result in the removal of some bears from the population and/or contribute to an incident where a bear injures a human.
Low-risk hazards are those which may result in the occasional removal of bears from the population and/or cause human injury.

Results from the community meeting included attendees adding to our list of hazards and then ranking all hazards from high-risk to low-risk according to their own opinion. Our assessment generally agrees with the ranking that community members created, with an addition of number 7 under the Haines Junction list (which was added subsequent to the meeting).

Kathleen Lake Campground and Day Use
High-risk hazards:

1. Soapberry in the campground

Moderate-risk hazards:

2. Fish carcasses on the lakeshore from fish cleaning activity
3. Food in the grey water disposal sink at the campground
4. Cranberries in the parking lot of the day use

Low-risk hazards:

5. Bear travel route through the area, into and out of Kluane National Park (Cottonwood trail)

Village of Haines Junction
High-risk hazards:

1. Presence of soapberry throughout the community
2. Availability of garbage inside the community
3. Hanging meat in residential areas after fall hunting season
4. Bears hunting ungulates in and near the community
5. Intentional feeding of bears

Moderate-risk hazards:

6. Fish smoking in residential areas
7. Electric fence failure at the community dump
8. Residential gardens
9. Bears targeting livestock

10. Unsecured pet food/bird feeders

Low-risk hazards

11. Agricultural areas attracting bears
12. Berries (other than soapberry) in and near the village
13. Barbeques outside residences

4.0 RECOMMENDATIONS

The following list of recommendations was also ranked by participants at the community meeting from highest priority to lowest priority. In ascending order, the recommendations are:

Kathleen Lake Campground and Day Use

1. Remove all soapberry shrubs within 100 m of campsites, especially in fire smarted areas. If this is not possible, we recommend removing all female shrubs within 100 m of campsites. The male shrubs may produce female parts in the future so monitoring is also recommended, but berry densities should be lower than if no removal occurred.
2. Build a bear-resistant fish cleaning facility on the lakeshore next to the boat launch where fishermen usually clean their fish. If this is not possible, at minimum a fish cleaning table should be provided with signage reminding fishermen to dispose of fish carcasses in the bear-resistant container next to the table.
3. Hire a campground host who can both educate visitors about camping in bear country and patrol the campground, removing any food particles that collect in the drain of the grey water disposal sink.
4. Pick the cranberries of the shrub in the day use area as soon as they are ripe, or remove the shrub.
5. Continue with visitor education of how to minimize the chances of encountering bears on the trail and what to do in a bear encounter.
6. Consider prescribed burning or forest thinning in habitats further from human developments to create good growing conditions for both soapberry and vetches.

Village of Haines Junction

1. Monitor and remove soapberry shrubs inside the community, prioritizing areas with the highest human use according to a sub-committee of local experts and Cascade (results in Appendix 1). Make this a landowner requirement for the neighbourhood safety for all new developments (e.g. Willow Acres subdivision).
2. Replace the wooden garbage boxes of the Champagne and Aishihik Village with metal bear-resistant (self-locking) bins. Provide the same service to non-Champagne and Aishihik residents.
3. Meet with community hunters to discuss meat and fish storage solutions that work for hunters but also keep meat secure from bears.
4. Bear safety and ecology education should be added to the curriculum at local schools.
5. Education for residents including reminders not to leave animal carcasses in yards. This could take the form of a newsletter, door-to-door contacts from volunteers and newspaper articles.
6. Provide some training and additional funds for the electric fence contractor at the landfill to check the fence more often.
7. Provide some funding or flexibility and training for either a contractor or current government employee to assist Conservation Officers responding to wildlife calls in town.
8. Identify wildlife corridors and bear activity trends. This may be accomplished by radio-collaring bears, and/or by converting the sightings log into an electronic database, with location coordinates assigned to observations.
9. Higher fencing at playgrounds.
10. Target some specific education to visitors through working with tour bus operators, local hotels, and the visitor centre. There is also potential to work with the Department of Transportation to create some specific messages on highway signs.
11. Periodically cut down roadside vegetation to discourage bears from grazing near the highway, particularly in areas in close proximity to residences or where road visibility is limited (e.g. curves, hills).

Two recommendations brought forth by participants at the community meeting are not included in the recommendations here because as specific bear management issues, they fall outside of the scope of a bear hazard assessment. These recommendations are:

1. Liberalize the bear hunting regulations to allow residents to kill more bears that enter the community (ranked high priority in the community meeting).
2. Use of dogs to manage bears and move them out of the village (ranked low priority in the community meeting).

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APPENDIX 1

Recommendations for prioritizing soapberry removal – Environment Yukon and Champagne Aishihik First Nations

The following list of community priorities for mitigating bear-human conflict within the Village of Haines Junction and Champagne Aishihik Village were recommended through the collaboration of Environment Yukon Biologists, Troy Petzlaw and Lorne LaRocque; Conservation Officer Russel Obourne, and Champagne Aishihik First Nation Resource Manager Linaya Workman. In ascending order, the recommendations are:

Recommendations for prioritizing soapberry removal:

1. The lowest tolerance area for bears and therefore the highest priority for soapberry removal are the St. Elias Community School and surrounding child and youth facilities, including the youth centre, daycare, and playgrounds.
2. Residential and heavily used areas of the town adjacent to green spaces with soapberries present. Implement a monitoring system that will allow monitors to assess berry production, and flag bushes for removal. Bushes may be flagged in summer and removed any time of year.
3. Dezadeash Trail with higher priority given to the trail section closer to the village.
4. Willow Acres subdivision recommended for future soapberry removal considerations as the current clearing and development will eventually lead to greater berry production.

A monitoring program should be put in place that can compliment current fire smart efforts so that areas with berry-producing shrubs can be identified and shrubs removed before they become significant bear attractants.

Appendix 1: Recommendations for prioritizing soapberry removal– Environment Yukon and Champagne Aishihik First Nations.