

Figure 9.2-24
Grizzly Bear DNA Survey Grid and Capture Frequency in 2011

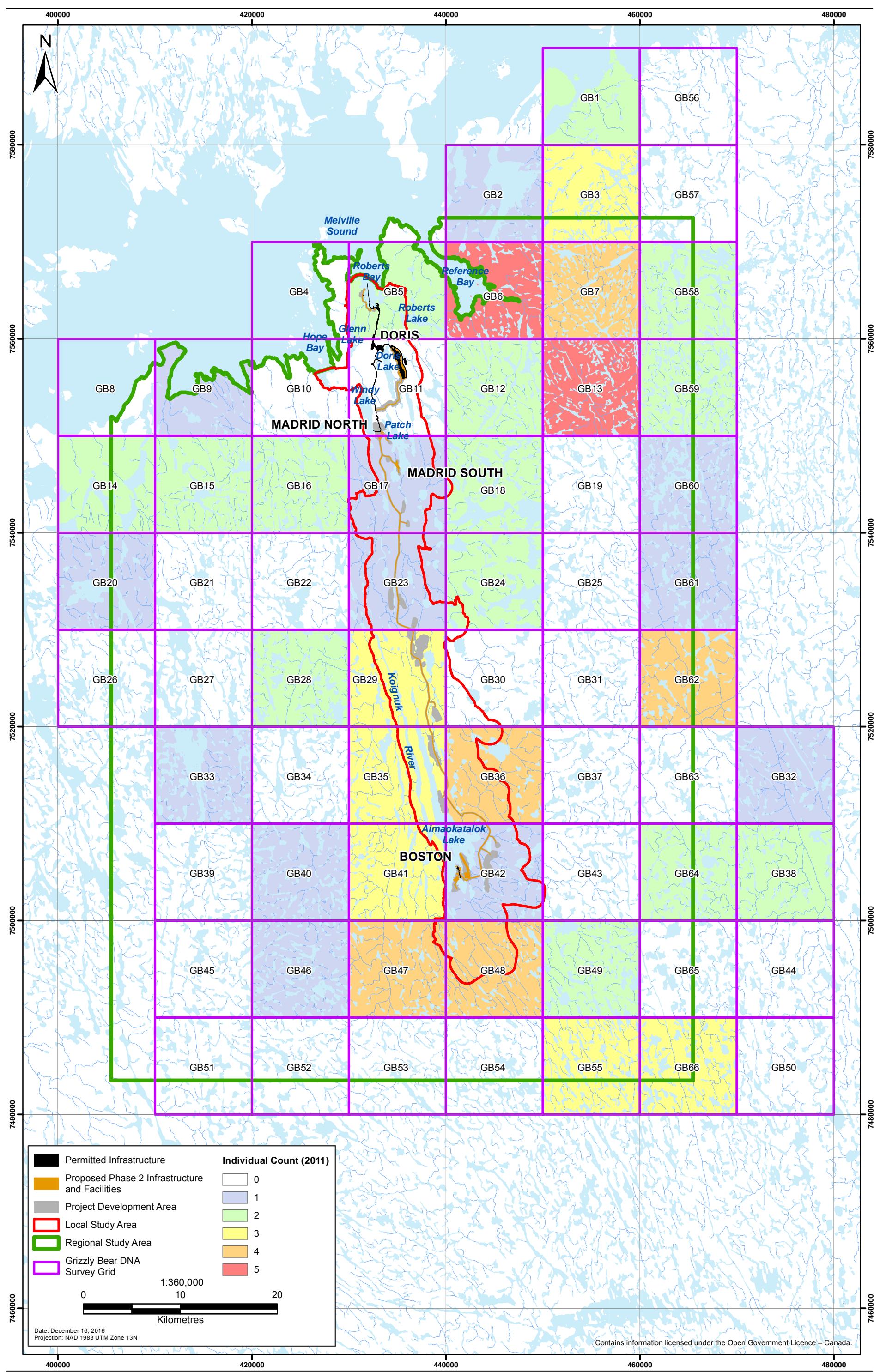


Table 9.2-21. Grizzly Detection Summary across All Cameras, September 2012 to August 2015

Survey Period	Camera Location	No. Events	No. Events/camera/day	No. Ind. Recorded On Events ¹
Winter 2012/2013	On-site	2	0.0002	3
	Off-site	6	0.0016	8
	All Cameras	8	0.0007	11
Summer 2013	On-site	36	0.0147	46
	Off-site	93	0.0288	139
	All Cameras	129	0.0227	185
Winter 2013/2014	On-site	0	0	0
	Off-site	18	0.0022	24
	All Cameras	18	0.0013	24
Summer 2014	On-site	41	0.0200	42
	Off-site	53	0.0208	55
	All Cameras	94	0.0205	97
Winter 2014/2015	On-site	12	0.0018	12
	Off-site	23	0.0026	24
	All Cameras	35	0.0023	36
Summer 2015	On-site	17	0.0083	19
	Off-site	31	0.0136	36
	All Cameras	48	0.0227	55

Seasonal Differences

The general time period when grizzly bear events were recorded across all cameras in all years and seasonal periods was mid-May (May 10) through mid to late-October (October 25). Outside of October 25 to May 10, no grizzly bears were recorded in any year. These dates provide valuable local information on the times when grizzly bear enter and emerge from hibernation within the RSA.

Carnivore Den Surveys

Carnivore den surveys were conducted in 2014 in the area surrounding the Boston and the proposed all-weather road. Surveys were flown by helicopter at an altitude of 50 to 100 m above ground level and at speeds between 30 to 80 km/h. Additionally, all eskers within the LSA between Doris and Boston Site were flown by helicopter in 2010 to survey for active or carnivore dens.

Grizzly bear dens were not observed during carnivore den surveys conducted near Boston in 2014 (ERM, unpublished data). However, grizzly bear dens are often difficult to find as they can be shallowly dug into the tundra and show little evidence of their presence after the snow melts. Inuit TK indicates that grizzly bears in the Hope Bay Project area build their dens in slopes of river banks and around the coast. Most of the denning habitat indicated by TK occurs just south of the Elu Peninsula, as well as areas close to the Perry River and Omingmaktok (Banci and Spicker 2016).

Habitat Plot Survey

Methods

Vegetation plots were monitored from 2005 to 2008 to examine habitat use by grizzly bears in the RSA. Vegetation plots were randomly located within sedge wetland and riparian habitats, because these habitats are preferred foraging areas by grizzly bears (Gau et al. 2002; McLoughlin et al. 2002). Sedge wetland habitats were surveyed in the spring when newly growing shoots of sedges and grasses appear, and riparian plots were surveyed in late summer (Table 9.2-22). Habitat use was quantified as the proportion of vegetation plots used by grizzly bears during each year.

Table 9.2-22. Survey Dates for Grizzly Bear Habitat Use Plot Surveys, 2005 to 2008

Year	Sedge Wetland Plots		Riparian Plots	
	Survey Dates	Number of Plots	Survey Dates	Number of Plots
2006	June 15 to July 3	43	August 8 to 18	43
2007	June 19 to 26	43	August 3 to 8	43
2008	June 27 to July 4	42	July 24 to 31	43

Each plot encompassed a 500 by 500 m area and included at least 20% cover of preferred vegetation types. Bear sign searches were initiated from the center point of each plot and were standardized to one hour in length. All bear sign, including beds, digs, tracks, scat, hair, and feeding sites, was recorded. Only fresh sign from bear activity that had occurred in the year of the survey (since den emergence) was included in the data reporting for any given year.

Results

The presence of grizzly bear sign varied among the four survey years and ranged from 30 to 60% in sedge wetland habitats, and 49 and 75% in riparian shrub habitats (Table 9.2-23). The occurrence of bear sign in sedge wetlands was greatest in 2005 but within the 95% confidence limits of all other years. In general, the percentage of fresh sign per plot surveyed was comparable in riparian shrub habitats relative to sedge wetland habitats (Table 9.2-23). These surveys were discontinued after 2008 due to safety concerns for field technicians.

Table 9.2-23. Number of Wetland and Riparian Plots Containing Grizzly Bear Sign, 2005 to 2008

Habitat Type	Sedge Wetland				Riparian Shrub			
Year	2005	2006	2007	2008	2005	2006	2007	2008
Number of plots surveyed	10	43	43	42	4	43	43	43
Number of plots with sign	6	16	13	22	3	24	21	25
% plots with sign	60%	37%	30%	52%	75%	56%	49%	58%
95% confidence interval ¹	26-88%	23-54%	17-46%	41-66%	19-99%	40-70%	33-65%	41-71%

¹95% confidence interval based on the binomial distribution

Incidental Observations

Methods

Methods for incidental collection of wildlife are identical to those for caribou and are discussed in Section 9.2.6.2. Incidental observations of grizzly bear were recorded when:

1. observed by site personnel near the Doris Project Site from 2009 and 2015 and recorded in the Wildlife Sighting Log for the Doris Project; and
2. observed by field personnel (wildlife biologists and other environmental personnel) recorded spatially or temporally outside of targeted VEC studies when conducting baseline and monitoring program surveys in the RSA between 2006 and 2015.

Results

Incidental Observations of Grizzly Bear by Site Personnel

Grizzly bears were recorded in the wildlife sightings log in all years between 2009 and 2015 (Table 9.2-24). When all years are combined, grizzly bears have been observed by site personnel in all months between April and October. From 2009 to 2015, the majority of grizzly bears have been reported in July and August but are comparable amongst months when corrected for the number of personnel on site with spikes of observations detected in July and August of some years (e.g., 2009, and 2013; Table 9.2-24). Overall, observations of bears by on-site personnel in the wildlife sightings log peaked in 2009 and 2013. In 2009, multiple bears were attracted to the recently closed Windy camp, leading Newmont (the operator at the time) to conduct a cleanup of the camp and revise the site waste management practices, after which bear presence dropped substantially. Most observations were of single bears, with infrequent observations of mothers with cubs (Rescan 2010, 2011c, 2011f, 2013e; ERM Rescan 2014a; ERM 2016a). As explained in the caribou section 9.2.6.2, incidental observations by site staff may include multiple reports of the same individual(s), and for this and numerous other reasons outlined previously, incidental data cannot be used for reliable density or abundance estimation.

Table 9.2-24. Grizzly Bear Observations from the Wildlife Sightings Log Standardized by Personnel on Site, 2009 to 2015

Year	Month	Number of Observations from Raw Data*		Monthly Average of Personnel on Site**	Number of Observations per Personnel	
		No. Individuals	No. Records		No. Individuals	No. Records
2009	Jan	0	0	69	0	0
	Feb	0	0	84	0	0
	Mar	0	0	94	0	0
	Apr	0	0	102	0	0
	May	11	5	102	0.11	0.05
	Jun	4	4	103	0.04	0.04
	Jul	18	10	113	0.16	0.09
	Aug	18	17	109	0.17	0.16
	Sep	6	6	98	0.06	0.06
	Oct	0	0	66	0	0
	Nov	0	0	16	0	0
	Dec	0	0	14	0	0

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Year	Month	Number of Observations from Raw Data*		Monthly Average of Personnel on Site**	Number of Observations per Personnel	
		No. Individuals	No. Records		No. Individuals	No. Records
2010	Jan	0	0	83	0	0
	Feb	0	0	106	0	0
	Mar	0	0	131	0	0
	Apr	0	0	172	0	0
	May	6	6	182	0.03	0.03
	Jun	2	1	200	0.01	0.01
	Jul	7	7	220	0.03	0.03
	Aug	4	4	205	0.02	0.02
	Sep	7	5	484	0.01	0.01
	Oct	0	0	332	0	0
	Nov	0	0	147	0	0
	Dec	0	0	108	0	0
2011	Jan	0	0	214	0	0
	Feb	0	0	250	0	0
	Mar	0	0	265	0	0
	Apr	0	0	278	0	0
	May	3	3	274	0.01	0.01
	Jun	0	0	280	0	0
	Jul	3	1	284	0.01	0
	Aug	10	5	277	0.04	0.02
	Sep	3	1	277	0.01	0
	Oct	3	1	270	0.01	0
	Nov	0	0	252	0	0
2012	Jan	0	0	183	0	0
	Feb	0	0	193	0	0
	Mar	0	0	180	0	0
	Apr	1	1	127	0.01	0.01
	May	2	2	90	0.02	0.02
	Jun	1	1	103	0.01	0.01
	Jul	3	1	90	0.03	0.01
	Aug	6	2	93	0.06	0.02
2013	Mar	0	0	3	0	0
	Apr	0	0	13	0	0
	May	0	0	20	0	0
	Jun	0	0	44	0	0
	Jul	9	3	61	0.15	0.05
	Aug	8	3	59	0.14	0.05
	Sep	3	1	54	0.06	0.02
	Oct	1	1	49	0.02	0.02
	Nov	0	0	19	0	0

Year	Month	Number of Observations from Raw Data*		Monthly Average of Personnel on Site**	Number of Observations per Personnel	
		No. Individuals	No. Records		No. Individuals	No. Records
	Dec	0	0	8	0	0
2014	Jan	0	0	7	0	0
	Feb	0	0	7	0	0
	Mar	0	0	8	0	0
	Apr	0	0	14	0	0
	May	0	0	63	0	0
	Jun	2	2	71	0.03	0.03
	Jul	2	2	77	0.03	0.03
	Aug	1	1	79	0.01	0.01
	Sep	0	0	73	0	0
	Oct	1	1	79	0.01	0.01
	Nov	0	0	44	0	0
	Dec	0	0	7	0	0
2015	Jan	0	0	13	0	0
	Feb	0	0	16	0	0
	Mar	0	0	30	0	0
	Apr	0	0	28	0	0
	May	1	1	32	0.03	0.03
	Jun	3	3	41	0.07	0.07
	Jul	1	1	46	0.02	0.02
	Aug	17	11	84	0.2	0.13
	Sep	2	2	105	0.02	0.02
	Oct	0	0	114	0	0
	Nov	0	0	93	0	0
	Dec	0	0	89	0	0

*Whether or not wildlife are recorded can vary by factors other than number of personnel on site, e.g.; the type of animal, multiple reporting of same individuals by different observers, work activities (indoor vs outdoor; site-based vs field-based), number of daylight hours, visibility, novelty of the sighting, observer reporting enthusiasm, ability to identify animal, etc. **Personnel were on site in all months between 2009 and December 2015 except October - December 2012. Personnel totals do not include personnel at Boston Site.

Incidental Observations of Grizzly Bear by Field Personnel

Field personnel observed bears incidentally in the RSA in all years 2006-2015 and observations ranged from one to three bears. No general trends were detected in these observations (Rescan 2010, 2011c, 2011f, 2013e; ERM Rescan 2014a; ERM 2015b, 2016a).

Habitat Suitability Modeling

Methods

Habitat selection by grizzly bears mainly reflects spatial and temporal patterns in forage availability and abundance (McLoughlin et al. 2002). Grizzly bears target a variety of vegetation, but are strongly influenced by the availability of caribou, and in specific areas, Arctic char and lake trout. Habitat selection has been measured at two spatial scales; landscape and home range. At the landscape scale,

grizzly bears select home ranges that have a higher proportion of eskers, tussock/hummock tundra, lichen veneer, birch seep, and riparian tall shrub habitat than surrounding areas. For the home range of an individual, habitat selection varies by season, sex and reproductive status (McLoughlin et al. 2002).

Research on the dietary patterns of barren-ground grizzly bears indicates that five time periods correlate with seasonal changes in resource selection (Table 9.2-25; Gau et al. 2002): spring, summer, late summer, fall and denning.

Table 9.2-25. Seasonal Periods for Grizzly Bear

Season	Start Date	End Date
Spring	May 14	June 20
Summer	June 21	July 31
Late Summer	August 1	September 9
Autumn	September 10	October 15
Denning	October 16	May 15

Note: Dates used in habitat suitability modeling by Johnson et al. (2005). Dates reflect shifts in grizzly bear diet throughout the season.

Spring: Grizzly bears show the greatest preference for esker habitat during the spring, perhaps because ground squirrel burrows are abundant and more easily accessible in spring (McLoughlin et al. 2002; Johnson C. et al. 2005). Male grizzly bears also show a preference for tussock/hummock tundra, while females without cubs show a preference for riparian tall shrub habitat (McLoughlin et al. 2002; Johnson C. et al. 2005).

Summer: Female grizzly bears (with and without cubs) show preference for eskers and riparian tall shrub habitat (McLoughlin et al. 2002). Females with young also prefer heath tundra. Males continue to show preference for tussock/hummock tundra in the summer (McLoughlin et al. 2002).

Late Summer: Grizzly bears prefer eskers and riparian tall shrub habitat (McLoughlin et al. 2002; Johnson C. et al. 2005). These habitats provide an abundance of fresh berries and caribou. Differences in habitat use among males, females with cubs and females without cubs are pronounced in late summer. Females with cubs select heath bedrock and tussock/hummock tundra, while males and females without cubs avoid these habitats preferring eskers (McLoughlin et al. 2002).

Autumn: Important grizzly bear habitat in autumn includes riparian tall shrub, lichen veneers and heath tundra habitats. Habitat selection is strongly influenced by the occurrence of caribou during fall (Johnson C. et al. 2005). However, females with cubs select bedrock habitat which is avoided by males and avoid riparian tall shrub habitat. Females without young continue to prefer eskers in autumn (McLoughlin et al. 2002).

Denning: Dens have been found in a wide variety of habitat types. In the West Kitikmeot region, research indicates that most grizzly bear dens found were located in heath tundra and heath boulder habitats, with the majority of remaining dens located in riparian tall shrub and birch seep habitats (McLoughlin et al. 2002). Although eskers accounted for only seven of 56 den sites in this study, this habitat type was selected more than expected, given its low availability in the central Arctic (McLoughlin et al. 2002). Grizzly bear den sites most commonly face south (Reynolds, Curatalo, and Quimby 1976a; Rescan 1997; McLoughlin et al. 2002), likely for the benefit of insulation as the accumulation of an insulating layer of snow resulting from the prevailing northerly winds. The substrates

of den sites are typically well-drained and contain a large amount of sand and coarse materials, including cobblestones and boulders. The structural integrity of den sites is maintained through root mats from dwarf birch and other shrubby vegetation located in the ceilings of dens. Often grizzly bear dens in the Arctic do not last long; by mid-summer, most will partially or completely collapse (McLoughlin, Cluff, and Messier 2002). Thus, it appears that bears usually dig new dens each year.

Grizzly bears are omnivorous and opportunistic feeders that select habitat largely based on seasonal availability of forage (McLellan et al. 1999; Wellwood 2003). Habitat suitability ratings (HSR) focused on living requisites for spring, summer, and fall seasons based on an assessment of forage capacity in each respective ecosystem unit (Table 9.2-26). Early summer and late summer habitat types were combined for the analysis of habitat availability in the LSA and RSA. Vegetation phenology was used to rate ecosystem units for target forage species for a given season (e.g., blueberries are absent in the spring, ripen during the summer, and die off during the fall). Prey sources, mainly Arctic ground squirrel (*Spermophilus parryii*), that are strongly associated with specific ecosystem units were included in the ecosystem unit HSRs.

Table 9.2-26. Seasonal Life Requisites of Grizzly Bear

Season	Date	Life Requisite	Habitat Preference
Spring	May - June	Living	Esker, crowberry, blueberry, sedge, riparian shrub, caribou, ground squirrel
Summer	June - September	Living	Esker, blueberry, sedge, riparian shrub, ground squirrel
Fall	September - October	Living	Esker, blueberry, sedge, riparian shrub, caribou, ground squirrel, streams that provide fish

Further details of the distribution, movement, habitat, and demographics of grizzly bears in the RSA and how they relate to the suitability modelling assumptions are provided in Appendix V4-9A (Rescan 2011e).

Results

Habitat suitability modeling for grizzly bears based on EM mapping within the LSA indicated that the majority of the LSA provides low (53.9%) and moderate (39.9%) value as spring habitat (Table 9.2-27). The low and moderate spring ratings are largely due to a lack of caribou calving grounds in the LSA. Higher value spring habitat, which comprises only 3.3% of the LSA in spring, primarily consists of eskers and ecosystem units that support overwintered berries or Arctic ground squirrel. Summer suitability of the LSA is more evenly distributed in quality, with moderate (39%) and high (29.5%) value habitat being most prevalent (Table 9.2-27) and related to the abundance of forage and post-calving caribou movements. Fall suitability of the LSA is similar to spring, with 57.4% considered moderate value and 15.5% rated as high value (Table 9.2-27). The reduction in available higher value fall habitat is related to reduced forage opportunities and a higher reliance on caribou and Arctic ground squirrel.

Other important grizzly bear habitat features in the LSA included a total of 606 hectares of buffered (100 meters on each side of the stream) streams and rivers that are known to have substantial seasonal migration movements of Arctic char and/or lake trout, including Roberts Creek and Koignuk River (Rescan 2011h). The total areas ranked as moderate and/or high value habitat during summer and fall habitat were adjusted upwards if they included creeks that supported Arctic char and/or lake trout (Table 9.2-27).

Table 9.2-27. Area and Percentage of Seasonal Habitat within the Local Study Area and Regional Study Area for Grizzly Bear

Season	Suitability Rating	Local Study Area ¹		Regional Study Area ²	
		Area (ha)	Percent (%)	Area (ha)	Percent (%)
Spring					
	High	1,846.4	3.3%	1,234.5	0.3%
	Moderate	22,440.3	39.9%	279,925.4	56.9%
	Low	30,325.8	53.9%	148,096.8	30.1%
	Nil	1,664.5	3.0%	57,723.5	11.7%
Summer					
	High	16,577.5	29.5%	27,575.9	5.6%
	Moderate	21,939.4	39.0%	194,438.6	39.5%
	Low	6,772.4	12.0%	207,242.2	42.1%
	Nil	10,987.7	19.5%	57,723.5	11.7%
Fall					
	High	8,731.5	15.5%	1,234.5	0.3%
	Moderate	32,276.0	57.4%	220,780.0	44.9%
	Low	5,616.9	10.0%	207,242.2	42.1%
	Nil	9,652.6	17.2%	57,723.5	11.7%

¹ LSA = 56,277 ha. Habitat Suitability data in the LSA is based on the EM data (see Section 9.2.3.10).

² RSA = 491,823.9 ha. Habitat Suitability data in the RSA is based on the WKSS ecosystem mapping data (see Section 9.2.3.10). A total of 4,843.7 ha were categorized as unclassified likely due to coverage of the imagery by cloud cover.

Within the RSA, habitat suitability modeling based on the WKSS ecosystem classification indicated that the majority of ecosystem units within the RSA provide low or moderate value habitat across all seasons (Table 9.2-27). Approximately 5.6% of the RSA was classified as high value summer habitat, and only 0.3% of the RSA contained high value spring and fall habitat for grizzly bears (Table 9.2-27). Small areas of high value grizzly bear spring (Figure 9.2-25) and fall (Figure 9.2-27) habitat was indicated southeast of Boston camp and this habitat category became more prevalent east and southeast of Boston in summer (Figure 9.2-26).

9.2.8.3 The Doris Project

Between 1996 and 2004, exploration occurred in the Hope Bay Belt. In 2006, a project certificate was issued for the Doris Project and construction began in 2009, but was put into care and maintenance following changes in market conditions in 2010, and was re-opened for additional construction and resource exploration in 2015.

The WMMP for the Doris Project included monitoring of grizzly bear for habitat loss (measured as the area of the Doris Project footprint), possible sensory disturbance (avoidance of the Doris Project), attraction to the Doris Project, and possible direct mortality through collisions with vehicles or aircraft. Changes to environmental media quality due to the Doris Project were also modeled as part of the EIS. Monitoring has occurred during the Pre-construction, Construction, and Care and Maintenance phases since 2006. This section summarizes the results of these monitoring activities for grizzly bear.

Figure 9.2-25

Grizzly Bear Spring Habitat Suitability in the Local Study Area and Regional Study Area

