# Draft Quill Creek Timber Harvest Plan

Champagne and Aishihik First Nations
Traditional Territory

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# Table of Contents

# List of Tables



# List of Figures

# EXECUTIVE SUMMARY

The Quill Creek Timber Harvest Plan has been prepared to meet the requirements of the *Forest Resources Act* and associated *Forest Resources Regulation* [1]. Under Section 20(3) of the *Forest Resources Act*, a timber harvest plan is required prior to the issuance of any timber harvesting licence or forest resources permit that authorizes harvesting in an amount greater than 25 cubic metres. The Quill Creek Timber Harvest Plan is guided by the Champagne and Aishihik Traditional Territory Strategic Forest Management Plan and the Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory .

The Quill Creek timber harvest planning area is located within the Haines Road North Landscape Unit of the Strategic Forest Management Plan which is designated a high planning priority. Supported by the Strategic Forest Management Plan, the Integrated Landscape Plan is the guiding document for developing timber harvesting projects and identifies this area in the forest resource management zone, where harvest planning and development may occur (Integrated Landscape Plan for the Champage and Aishihik Traditional Territory, page 9).

The forest resource management zone has a primary focus of harvesting stands with over 30% spruce beetle mortality, which is the focus of this timber harvest plan. The north half of the timber harvest planning area is also within the *fuel abatement zones* of the Integrated Landscape Plan, where timber harvest planning must consider fuel management objectives during timber harvesting.

The purpose of the Quill Creek Timber Harvest Plan is to set the framework for commercial timber harvesting activities within the Quill Creek area with the objectives of creating economic opportunities, reducing the wildfire hazard, supporting the supply of firewood to communities throughout Yukon, all within the context of sustainable forest resources management. This timber harvest plan includes mapping of all previous timber harvesting as well as all new harvest areas proposed in this timber harvest plan.

Comments received from stakeholders during the development of the timber harvest plan provides guidance in developing a plan that addresses public values and concerns. The Quill Creek timber harvest planning area is 11,596 hectares in size, of which 372 hectares (3.2%) has been previously harvested, and 1,823 hectares (15.7%) is proposed for additional harvesting under this timber harvest plan.  The proposed timber harvest plan will utilize up to 9 km of existing forest resources roads and 19.8 kilometres of existing public roads in the area.  The

[1] Forest Resources Act and Regulation are at: http://www.gov.yk.ca/legislation/legislation/page_f.html.

timber harvest plan also identifies that up to 52.4 kilometres of new forest resources roads may be required to facilitate the timber harvest.

A heritage resources overview assessment was completed in conjunction with the development of the timber harvest plan, and a field heritage resources impact assessment will be completed prior to any development occurring under this plan. Identified high wildlife values areas in the Integrated Landscape Planare taken into account through partial cutting of most areas, and through the sequencing of harvest areas to leave large undisturbed areas during the period when other areas are being harvested. Connectivity corridors have also been retained as per the Habitat Connectivity Planning Recommendations (Connectivity Planning Sub-Group 2007).

Harvest blocks are not located near any streams or waterbodies, although stream crossings may be required for access. All streams are assumed to be fish bearing unless a stream assessment shows otherwise. General biodiversity wildlife values have been accommodated by retention of 20-40% of live trees (aspen and spruce) within the harvest blocks, and retaining over 75% of the timber harvest planning area without roads or timber harvest areas.

Thirty-one harvest blocks have been identified and mapped based on areas with large amounts of beetle-killed spruce, which is targeted primarily for fuel wood use. The total volume of merchantable dead spruce is estimated to be 136,740 $m^3$ and the total volume of merchantable spruce (green and dead) is estimated to be 222,142 cubic metres. These volumes reference the estimated merchantable volume, actual timber volumes available for harvest will be influenced by factors such as retention requirements, market conditions, fuel abatement objectives and other site specific factors. The total volume of timber available for timber harvest is estimated to be 163,185 $m^3$.

# 1. Introduction

## 1.1. Plan purpose and direction

The Quill Creek Timber Harvest Plan has been prepared to meet the requirements of the *Forest Resources Act* and associated *Forest Resources Regulation* [2]. Under Section 20(3) of the *Forest Resources Act*, a timber harvest plan is required prior to issuing timber harvesting licence or forest resources permit that authorizes harvesting in an amount greater than 25 cubic metres. The Quill Creek Timber Harvest Plan is guided by the Champagne and Aishihik Traditional Territory Strategic Forest Management Plan (ARRC 2005) as the highest-level plan for the area, and the Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory (Resource Assessment Technical Working Group 2006). Comments received from stakeholders during the development of the THP provided guidance in developing a plan that addressed public concerns.

Commercial operators in the Strategic Forest Management Planning area have harvested an average of 12,600 cubic metres of timber per year over the past 15 years (2004-2018), of which approximately 95% of the reported harvest has been dead spruce for fuelwood. From 2011-2018 there was an average of 34 licencees per year, with 20 to 26 licencees active in any given year. The majority of Licencees are small volume operators who harvest less than 100 cubic metres of timber per year and another 5-10 operators who will harvest between 100-500 cubic metres of timber per year. These small volume operators account for approximately 15-20% of the annual timber harvest. For larger operations, there are usually 2-4 operators harvesting between 500-2000 cubic metres of timber per year and 1-3 operators harvesting between 2000-7000 cubic metres of timber per year. These larger operators account for approximately 80-85% of the annual timber harvest.

The Quill Creek Timber Harvest Plan is the successor to the Forest Development Project for the Quill Creek Bench Harvest Planning Area in the Haines Junction Area (Yukon Government 2006). The Quill Creek timber harvest planning area is the same as the Quill Creek Bench Harvest Planning Area of Yukon Government (2006). The timber harvest plan is consistent with the Haines Junction Community Fuel Abatement Plan (Yukon Government 2008) within the interface fuel abatement zone and addresses its objectives within the timber harvest plan.

The Quill Creek Timber Harvest Plan is located south of the community of Haines Junction (Figure 1), along the Haines Highway, which is Yukon Highway 3. The timber harvest plan covers approximately 11,596 hectares of largely spruce forest, with some aspen and mixed aspen/spruce stands. The mature spruce stands include numerous spruce beetle killed trees

[2] *Forest Resources Act* and Regulation are at: http://www.gov.yk.ca/legislation/legislation/page_f.html.

resulting from an epidemic that occurred from approximately 1990 to 2007, with low levels of infestation continuing to this date (Yukon Government 2008). The Quill Creek timber harvest planning area is within the Traditional Territory of the Champagne Aishihik First Nations. The timber harvest planning area is located immediately east of the Kluane National Park boundary and a large block of Champagne and Aishihik First Nations Settlement Land, with the Haines Highway separating the timber harvest planning area from the Park and Champagne and Aishihik First Nations Settlement Land. The south, east, and north boundaries are defined by the Kathleen River and Dezadeash River (Figure 1). The timber harvest planning area generally consists of level to gently sloping terrain punctuated by knolls and breaks-in-slope, with cliffs along some parts of the Kathleen River.

Throughout Yukon, including the Haines Junction area, there is a strong demand for dry dead wood that can be harvested as fuel wood, typically used for home heating. The Quill Creek timber harvest planning area is relatively easy to access containing large volumes of merchantable standing dead timber which is in high demand as firewood in Yukon communities. There is also a small local demand for whole logs for log building construction, and a potential demand for saw logs for lumber. The purpose of the Quill Creek Timber Harvest Plan is to set the framework for commercial harvesting activities within the Quill Creek harvest area, create economic opportunities for other harvesting activities, reduce the wildfire risk to the south of Haines Junction, and support the supply of firewood to communities throughout Yukon. This timber harvest plan includes mapping of previously harvested areas and all harvest areas proposed for the next 10 or more years. The Quill Creek timber harvest planning area is 11,596 hectares, of which 372 ha (3.2%) has been harvested, and 1823 hectares (15.7%) is proposed for additional harvesting under this timber harvest plan.

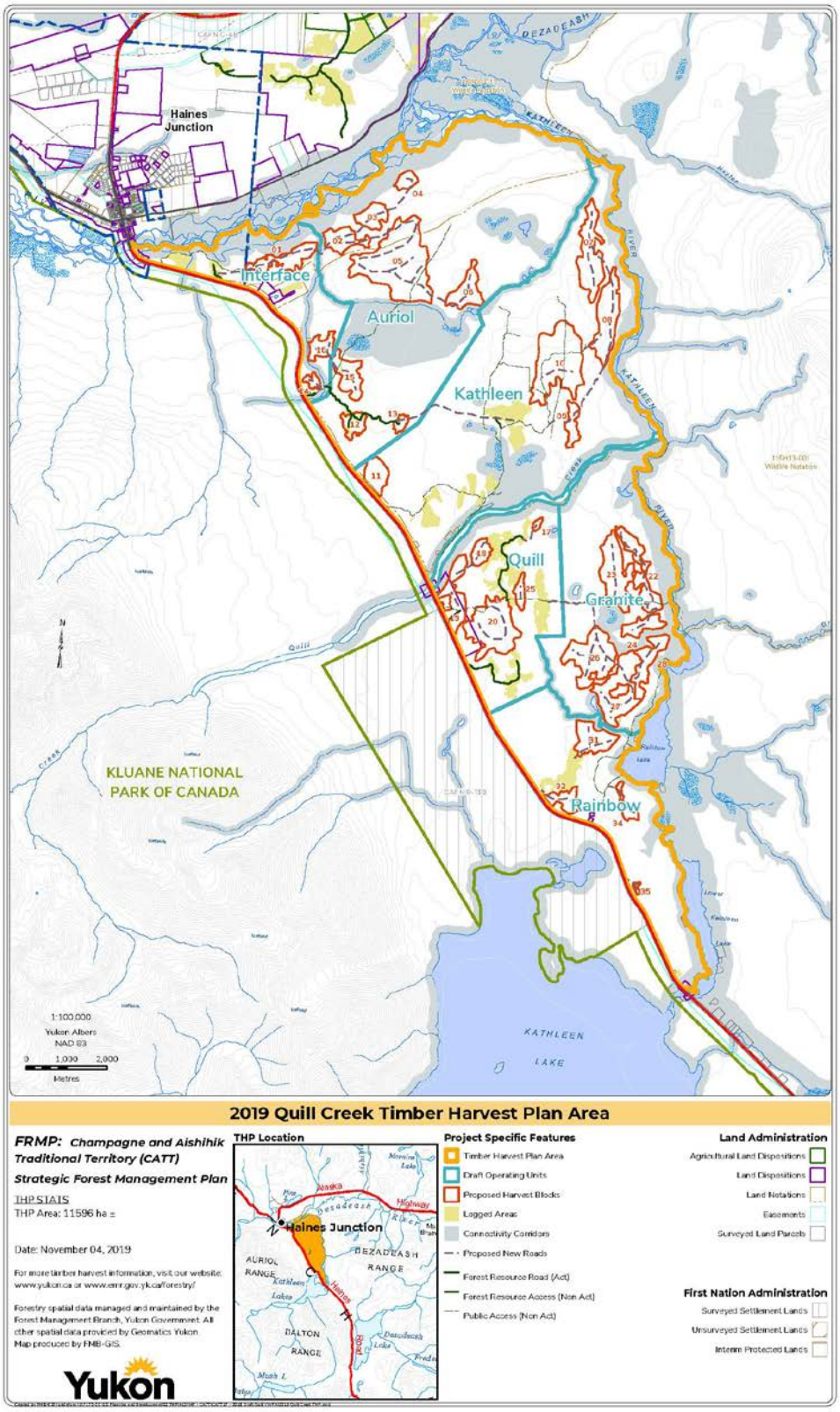
## 1.2. Champagne and Aishihik First Nations Final Agreement

The Champagne and Aishihik First Nations Final Agreement sets the framework for forest resources management in the Champagne and Aishihik First Nations Traditional Territory. The Strategic Forest Management Plan for the Champagne and Aishihik Territory was developed in accordance with the provisions of Chapter 17 of the Final Agreement. This timber harvest plan was developed to fulfill the sustainable forest management objectives in Chapter 17 by being consistent with the *Forest Resources Act* and *Regulation*, the Strategic Forest Management Plan and the Integrated Landscape Plan.

While Chapter 17 sets out forest resources management in the Champagne and Aishihik First Nations Final Agreement, the entire Final Agreement applies to the timber harvest planning area. Other applicable chapters in the Final Agreement may include Chapter 6 Access, Chapter 13

Heritage, Chapter 14 Water Management, Chapter 16 Fish and Wildlife and Chapter 18 Non-renewable Resources.

Figure 1:. Quill Creek Timber Harvest Plan Area



## 1.3. Champagne and Aishihik traditional territory Strategic Forest Management Plan

The Strategic Forest Management Plan is a joint plan between Champagne and Aishihik First Nations and the Government of Yukon. This plan was the outcome of nearly 10 years of community input coordinated by the Alsek Renewable Resources Council. It states that "The development of this plan has led to a strong working relationship and cooperative approach to forest management in this traditional territory".

The Champagne and Aishihik Traditional Territory Strategic Forest Management Plan (Alsek Renewable Resources Council 2005) is the highest-level forest management plan for the area. The Quill Creek Timber Harvest Planning area is within the Haines Road North Landscape Unit, which is identified as a high planning priority within the Strategic Forest Management planning area. The Strategic Forest Management Plan notes that one purpose of developing forest management plans, such as the Quill Creek Timber Harvest Plan, is to encourage developing the economic potential of forest resources in the region. The Dezadeash River on the north edge of the timber harvest planning area is a main tributary of the Alsek River, which is a designated heritage river.

The Quill Creek Timber Harvest Plan represents Stage 3,harvest development planning of the Strategic Forest Management Plan that designs the general harvest activities consistent with the outcome of landscape planning, which is described in the next section. Harvest development planning includes identifying main road and harvest block locations. Stage 4 is site planning, which is administered by the Forest Management Branch through the issuance of licences and cutting permits consistent with the Quill Creek Timber Harvest Plan.

## 1.4. Integrated Landscape Plan

The Integrated Landscape Plan was developed as a supplementary plan to the Strategic Forest Management Plan and provides a technical assessment of resources, management priorities and guidelines for timber harvest project planning. The Quill Creek timber harvest planning area is within the forest resource management zone, where timber harvesting is to occur with a primary focus of harvesting stands with over 30% spruce beetle mortality. The northwest corner of the timber harvest planning area is within the interface fuel abatement zone, where timber harvest planning must include forest fuel management as a primary objective.

The remaining area north of Quill Creek is within the landscape fuel abatement zone, where all timber harvest must consider fuel as a priority. Harvesting should be planned so that the size, shape and location of developments will enhance fuel discontinuity and silvicultural activities should reduce fire hazard.

About half of the timber harvest planning area is mapped as having high wildlife values (Figure 1); this area corresponds to the key wildlife areas discussed in Section 5.9.4 with the addition of an area along Quill Creek that is focussed on the stream's riparian area and a wetland complex. Timber harvesting within this area should emphasize the management of wildlife values, with integration of fuel management objectives where the fuel abatement zone overlaps areas with high wildlife values. High wildlife areas should average 25% retention of stand structure, and the range of retention can be 10-30% stand structure depending on site characteristics.

Harvest blocks should have the size and shape of their boundaries designed to emulate the natural disturbance patterns of the area, with harvest block areas up to 200 hectares. Retention strategies for harvest blocks inside high wildlife areas will be targeted at an average of 25% of the stem count or volume, as deemed most appropriate. The retention strategy should specify the type, amount and spatial configuration of the structure to be retained. The retention can be in groups of mature trees or in single trees. Where windthrow risk is high, group retention may be prescribed. As the dead and dying forest is opened up through timber harvesting, significant blow-down of timber may occur; therefore, the configuration of cut-blocks must consider wind-firmness as one of the forest development plan objectives. Efforts should be made to salvage and utilize blown-down timber; with the first priority being protection of riparian values and water quality. The timing of harvest within a season will be influenced by site specific wildlife concerns (for example, calving season), or other land use activities (for example, tourism use, recreational use or cultural use).

Once areas have been selected for harvesting, consideration for heritage and cultural values must become part of the planning process. This includes a pre-harvest field assessment of cultural and heritage values in snow and frost-free conditions by qualified personnel from the Champagne and Aishihik First Nations Heritage Department and the Heritage Unit of Yukon Government. This should be coordinated by forest planners in order to allow sufficient time in advance of harvesting operations for the heritage assessment to be completed. Identified heritage sites must be protected, with no timber harvesting allowed in the immediate site area. Winter timber harvest operations on frozen ground may be permitted if the site(s) of concern consist solely of sub-surface archaeological deposits.

Traditional hunting and/or trapping areas for each trapper and outfitter should be referenced by forest planners. Champagne and Aishihik First Nations and Yukon Government will provide these maps, ensuring that confidentiality requirements are met. Management for suitable habitat of important game and fur-bearing species during forest harvesting activities must occur.

The above is a brief summary of the requirements of key points in the Integrated Landscape Plan; additional guidance from the plan is incorporated into the remainder of the timber harvest plan.

The Integrated Landscape Plan should be consulted for more details or to clarify aspects of this timber harvest plan.

### 1.5. Connectivity corridor planning

The Integrated Landscape Plan identified the need to provide appropriate wildlife movement corridors between important habitats and key landscape features. The Connectivity Planning Sub-Group (2008) developed a riparian habitat and connectivity corridor map based on riparian habitats and local and traditional knowledge of important wildlife use areas. The map includes primary and secondary wildlife habitat and movement corridors. The primary corridors are generally along significant watercourses and include riparian corridors enhanced by key topographic features and other ecologically significant features such as known areas of animal concentration and important habitat. Secondary corridors were identified to facilitate upland habitat connectivity and as corridor alternatives around known areas of high disturbance related to development. This network represents a core area throughout the forest resource management zone to address landscape scale wildlife movement issues (Connectivity Planning Sub-Group 2008).

In this timber harvest plan, cut blocks and access roads within the planning area have been strategically located to minimize impacts to the connectivity corridors. This resulted in only one new road crossing and no new harvesting within the connectivity corridors. There are a few pre-existing roads across the corridors in the Quill Creek area, which are under the authority of the Government of Yukon, Department of Highways and Public Works and are outside the boundary of this timber harvest plan, however, there has been a small amount of previous timber harvesting in these areas.

## 2. Environmental setting

### 2.1. Climate

The Quill Creek timber harvest planning area is located within the Ruby Ranges Ecoregion, in the shadow of the St. Elias Mountains. The ecoregion is characteristically dry and cool. Annual precipitation is 25-30 centimetres, which predominantly occurs during the summer months as rain. Snow cover occurs from late October to mid-April in the valleys and a month longer on higher elevations, with frost occurring year-round. Mean annual temperatures are -3 to -7°C. Mean January temperatures are -30 to -35°C, while mean July temperatures range from 7 – 12°C. Extreme temperature ranges occur in the lower valleys from -62 to 32°C. Southern gale force winds are common, and strong northwesterly winds can also occur during the winter (Smith et al. 2004: 182).

## 2.2. Physiography

The Ruby Ranges Ecoregion is a large area of rounded summits and broad valleys, and contains Kluane Lake, the largest lake in Yukon. A distinguishing characteristic of the ecoregion is the Shakwak Trench, a valley demarcating the Denali Fault, which separates the western active mountains from the low mountains and wide valleys to the east. The elevation ranges from 575 to 2745 metres, with a mean elevation of 1200 metres (Smith et al. 2004).

The ecoregion includes the Kluane Plateau, the Shakwak Trench, and the Kluane Ranges. In general, its topography varies from the wide, undulating upland of the Kluane Plateau to the major valley of the Shakwak Trench, and the steep sided mountains of the Kluane Ranges (Smith et al. 2004: 180). This topography was shaped by the glacial ice flows of the McConnell Glaciation (Bostock 1966; Hughes 1969), which covered lowland areas by sometime after 26,000 BP and had receded prior to 9,000 BP (Jackson et al. 1991). In the postglacial period, rivers and streams cut into the thick deposits of till, glaciofluvial gravels, and glaciolacustrine clay and silt deposited during the McConnell Glaciation creating steep-sided canyons and flights of terraces (Smith et al. 2004). The highest points in the ecoregion are the summits of Mount Cairnes and Mount Vulcan which surpass 2700 metres. Numerous other peaks are over 2200 m. The Aishihik area generally lies below 1400 metres, with the lowest elevation at 600 metres (Smith et al. 2004: 180).

## 2.3. Hydrology

The Ruby Ranges Ecoregion primarily drains northward through rivers such as the Yukon River and Takhini River and their tributaries. The southwestern portion of the ecoregion, including the Kluane Ranges, falls within the Western Hydrologic Region. The Dezadeash River and its tributaries are representative of the western hydrologic region drainage (Smith et al. 2004: 183).

## 2.4. Bedrock and surficial geology

The bedrock geology of the Ruby Ranges Ecoregion is composed primarily of metamorphosed sedimentary and granitic rocks. There are three distinct geological terranes within the ecoregion separated by two north-west trending faults. In the southwestern portion of the ecoregion, the seismically active Duke River Fault, separates the Alexander Terrain (dominated by Paleozoic graywacke, argillite, and limestone), from the Gravina-Nutzotin Belt. This belt includes the Mesozoic Dezadeash Formation, which includes biotite schist, granitic gneiss, quartzite, and marble. Further northeast of the Shakwak Valley, the bedrock is dominated by a broad zone of metamorphosed rocks including foliated granodiorite and biotite quartz diorite (Smith et al. 2004: 180-181).

The surficial geology is dominated by steep bedrock exposures at high elevations, while mid-elevation slopes are generally covered in moraine ridges, ice deposits, and meltwater channels. The ecoregion has been affected by the Cordilleran Ice Sheet and the glaciers from the St. Elias Mountains. Ice caps dominated the higher elevation terrain, while the valleys were affected by a complex series of ice tongues. Various glaciers covered 50-90% of the ecoregion, causing drainages to divert and the formation of glacial lakes. Glacial Lake Alsek is the most recent example, with Haines Junction and the northern edge of the Quill Creek timber harvest planning area having been inundated a few hundred years ago when the current route of the river through the mountains to the Pacific Ocean was blocked by glaciation (Smith et al. 2004: 181-182). The glaciolacustrine clay and silt cliffs along the Kathleen River, along the east edge of the timber harvest planning area, may have been formed when post-glacial Lake Champagne drained and the river cut down through the sediments of the lake bottom.

## 2.5. Vegetation

The soils of the ecoregion are generally formed on glacial parent material within the semi-arid climate conditions characteristic of the ecoregion; the resulting soils are alkaline and support mixed forests of aspen, pine, and spruce (Smith et al. 2004: 35). The Ruby Ranges ecoregion is mainly boreal forest, dominated by white spruce below the treeline, and subalpine meadows above 1400 metres. The most common cover of the ecoregion is white spruce and willow with a groundcover of moss and shrubs. Drier sites also include soapberry and grasses, while wetter sites contain willow, shrub birch, and sedges (Smith et al. 2004: 184). Trembling aspen is common within the Quill Creek timber harvest planning area. Of note, is that black spruce is absent and lodgepole pine is rare within the timber harvest planning area.

## 2.6. Wildlife

The ecoregion is home to a wide diversity and abundance of wildlife, including the Aishihik caribou herd; caribou presently seldom occur within the Quill Creek timber harvest planning area. The ecoregion also sustains large Dall's sheep populations as well as mountain goats. The highest populations in Yukon of coyote, wolf, and wolverine are within the ecoregion. Moose and grizzly bear occur throughout the region. The Shakwak Trench serves as a migration corridor for various birds, including swans, geese, and ducks. Common waterbirds include Pacific loon, grebes, trumpeter swan, Canada goose, American widgeon, mallard, shorebirds, and songbirds (Smith et al. 2004:186).

## 2.7. Fish

The smaller tributaries of the upper Dezadeash River drainage, such as occur within the Quill Creek timber harvest planning area may support dolly varden (*Salvelinus malma*), rainbow trout (*Onchorhynchus mykiss*), arctic grayling (*Thymallus arcticus*) and slimy sculpin (*Cottus cognatus*)

(Environmental Dynamics Inc., 2005). There are four mapped drainages within the timber harvest planning area, three of which have not been specifically assessed to determine whether they are fish-bearing. Environmental Dynamics Inc. (2005) has completed an assessment of the streams in one watershed within the northern part of the timber harvest planning area, with one dolly varden captured during fish inventory. It is important to recognize that some fish, especially rainbow trout, may spawn in seasonal spring flows that may dry up in the late summer. It is assumed all drainages are fish bearing unless specifically assessed by a fish biologist and determined that the stream is not fish bearing. The mapped streams and stream classifications from the data in the stream assessment are summarized on the maps in Appendix 1.

# 3. Cultural Setting

## 3.1. Cultural History

The earliest archaeologically recorded occupation in southwest Yukon is a site located near Beaver Creek, dated to 10,670 radiocarbon years before present (Heffner 2002); hence human occupation of the area has occurred for over 10,000 years. Champagne and Aishihik First Nations, a Southern Tutchone/Athapaskan population, assert their ancestors have lived in southwest Yukon for over 8,000 years. A great deal of information concerning the Tutchone people was recorded in oral traditions passed on through generations and recorded by various researchers (Cruikshank 1974, 1975, Johnson and Raup 1964, McClellan 1981, 2007, McClellan et al., 1987, Glave 1892). Caribou served an important role for the Southern Tutchone people, with large caribou herds in the Champagne and Aishihik First Nations Traditional Territory; hence the inhabitants focused on caribou hunting and supplemented this with the occasional moose (Green and Strand 2012).

The first non-First Nations goods, other early trade items, and foreign (western or eastern) influences occurred in the 1700s to 1840s, with some earlier interactions on the Coast with Russian traders. Trade routes, controlled by the Pacific Coast Tlingit and inland Tutchone people, were established over the mountains into Athabaskan territory, providing inland groups access to Russian and English trade goods. News of early non-First Nations explorers and traders travelled inland along with foreign items such as metals, cloths, glass beads, and later tobacco and other goods. Trade with coastal neighbours became increasingly important in the 18$^{th}$ century, as trading furs inland took on importance due to declining sea otter populations on the coast. This resulted in enhanced relationships between the Tlingit and Tutchone, and some Tlingit clans moved north and established villages in the Chilkat and Chilkoot valleys, to the south of the Quill Creek timber harvest planning area. Tutchone society remained sovereign up to about 1920 (Legros 2007), although Euro-Canadian socio-cultural pressures were exerted upon the Tutchone, and other Yukon First Nations.

The Alaska Highway commenced construction early in 1942 and was completed on November 20, 1942. The following year the Haines Highway was built from Haines, Alaska over Chilkat Pass to join the Alaska Highway; this is the highway used to access the Quill Creek timber harvest planning area. The construction of the Alaska and Haines Highways significantly affected the First Nations inhabitants of the landscape. The construction impacted the subsistence patterns and social institutions of First Nations, and brought increased exposure to diseases, a wage economy, and enforced limitations on the First Nations use of the natural resources within their traditional territories. The construction of the highways also resulted in many wildlife species being overhunted to provide sustenance for the workers, and construction debris littered the landscape. In the years during and following construction, irreversible changes occurred in the lives of indigenous people living along the route. The construction of the Alaska and Haines Highways changed how Champagne and Aishihik First Nations citizens relate to the land, it brought outsiders (resulting in competing interests), and outside authorities, completely ending the sovereignty of Champagne and Aishihik people (Cruikshank 1985).

## 3.2. CHAMPAGNE AND AISHIHIK FIRST NATIONS

The project falls within the traditional territory of the Champagne and Aishihik First Nations, indigenous people whose ancestral language in Dákwanjè (Southern Tutchone) with strong relationships with the Tlingit people of the Pacific Coast. The Champagne and Aishihik First Nations was named after two historic settlements in the area: Champagne, located on the Dezadeash River, and Aishihik, situated at the headwaters of the Aishihik River drainage. Champagne and Aishihik First Nations occupied a number of other settlements in the area, including Kloo Lake, Klukshu, Canyon, Shäwshe and Hutshi.

Traditional subsistence activities typically featured a complex seasonal round of winter hunting and summer fishing, covering vast areas. In summer, families congregated at lakes and rivers, where fish and plants were collected, dried and stored. In late summer, small groups dispersed throughout the uplands and higher valley systems to hunt in territories managed by families and clans. Temporary camp sites, situated within a variety of ecological zones, were often reoccupied year after year in order to exploit seasonally available resources. "Dakwakada", a Southern Tutchone word meaning "high cache", was the original name for the current community of Haines Junction (Haines Junction 2017). It was common for Southern Tutchone people to build raised log caches in order to store food, either year-round or temporarily, while they hunted and fished in the surrounding areas. People returned to good fishing spots year after year and used these spots as trading centers as well, however, no villages were inhabited year-round. Full time village sites and settlements were only occupied permanently after the World War II era. May was the most plentiful month, with migrating waterfowl, ground squirrels, larger and more abundant fish, as well as the arrival of the Coastal Tlingit traders (McClellan 1981). Trade and kin relations with neighboring Nations were vital to First Nations economies. Interior bands traded

hides, furs and obsidian to coastal groups for fish oil, dentalium, woodwork and blankets. Trails were an intrinsic part of this economy and traditional subsistence as a whole.

Today Champagne and Aishihik First Nations are self-governing. The Champagne and Aishihik First Nations Final Agreement was signed in 1993 by Champagne and Aishihik First Nations, the Government of Canada, and the Government of Yukon. This agreement covers the Yukon portion of Champagne and Aishihik First Nations' Traditional Territory. A land claims agreement remains outstanding for the portion of Champagne and Aishihik First Nations' Traditional Territory within British Columbia. The journey to self-governance was initiated in 1973, when Elijah Smith and a group of First Nations leaders presented the document Together Today for Our Children Tomorrow (The Council for Yukon Indians 1973) to Canada's parliament in Ottawa. This began a twenty year negotiation process to establish the Umbrella Final Agreement (UFA 1993), which set out a framework for land claims negotiations between individual First Nations and the Governments of Canada and Yukon. Champagne and Aishihik citizens Elijah Smith, Harry Allen, and Dave Joe were instrumental in these processes.

Champagne and Aishihik First Nations land claim covers approximately 2,427 $km^2$ (Council of Yukon First Nations 2017). Haines Junction, located along the Alaska Highway, is the modern center of the Champagne and Aishihik First Nations. Members live in and around the area and make up about half the population within the community. The Champagne and Aishihik First Nations have their main administrative center in Haines Junction, along with another office in Whitehorse. The Champagne and Aishihik First Nations have signed Final Agreements (land claims) and Self-Government Agreements and have established a co-management role with both federal and territorial governments when addressing the natural and cultural resources within their Traditional Territory (Champagne and Aishihik First Nations 2013).

# 4. Forest Health

## 4.1. Introduction

The Forest Management Branch releases an annual forest health report that summarizes the current state of forest health in Yukon. The Forest Health Report and information relating to forest pests and diseases in Yukon can be found on the Forest Management Branch's web site at http://www.emr.gov.yk.ca/forestry/foresthealth.html. Spruce beetle is the primary concern within the Quill Creek timber harvest planning area; they are currently present at normal or endemic levels.

The most recent spruce bark beetle (dendroctonus rufipennis) outbreak is believed to have started in Kluane National Park and Reserve around 1990, and was first noted in 1994 when the beetles had already killed trees over 32,000 hectares. The beetle outbreak moved into forests north and south of Haines Junction, and continued to kill large areas of spruce within and west of

Kluane National Park. Over half of the mature spruce trees had been killed over an area of 380,000 hectares by 2007; endemic levels of infestation have continued since that time.

Warm summers may have contributed to the outbreak causing desiccation of spruce trees, which then became stressed and attractive to the spruce bark beetles; also, warmer winters resulted in reduced mortality of larvae hibernating under the tree bark. The warmth also allowed the beetles to mature in a single year, rather than the normal 2-3 years in Yukon, which greatly increased the population growth rate. Spruce bark beetles can withstand winter temperatures of around -27°C but die when temperatures below -40°C last for a week or more. The beetles carry a fungus, which results in a blue-grey stain to beetle-killed wood. The beetles prefer to attack larger trees, but trees down to 12 centimetres in diameter at breast height may be killed, especially at high beetle population densities.

Spruce bark beetle outbreaks can occur again, especially if forest management practices are not designed to minimize the risk. Key considerations in the Quill Creek timber harvest planning area are provided below, with additional considerations provided in the publication by Yukon Government (2008).

Spruce bark beetles are attracted to recently killed and stressed spruce or slash; therefore, nearby disturbance in spruce stands increases the likelihood of attack in adjacent spruce stands.

Large diameter spruce trees are more attractive habitat for beetles and a higher proportion of large diameter spruce trees increases the likelihood of attack in a stand.

Spruce bark beetles are attracted to recently killed and stressed spruce; therefore, stands under stress or with recent windthrow of live trees are more likely to host high beetle populations.

During and after a spruce beetle outbreak, wildfire hazard increases in the short term while the dead needles remain on the spruce. It then decreases in the medium term when the needles have dropped. The hazard increases again in the long term when the dead trees fall to the forest floor and contribute large diameter fuels to the regenerating spruce fuel complex.

## 4.2. Spruce Bark Beetle Management Guidelines

Harvesting and silviculture considerations (Yukon Government 2008) to reduce the risk of spruce bark beetle outbreak are:

- Time harvesting operations to occur outside the spring beetle flight period and remove or dispose of logs/debris prior to the next beetle flight period.
- Minimize the amount of large diameter (greater than 20 centimetres) green debris left on site more than one year after harvest. This is best implemented through pile-and-burn or chipping.
- Where green debris is left, leave in full sunlight to dry.

- Minimize windthrow hazard when designing the harvest area. Following harvest, survey windthrow in mid- to late June to determine if it is being attacked. Salvage of green windthrow in the years following harvesting will minimize host material and/or remove broods.
- Minimize stump height, to minimize the amount of host material.
- If possible, debark green logs to be decked so that it does not provide habitat for beetles.
- Minimize site disturbance to ensure hydrology is not impacted (which will stress live trees) and that residual trees are not mechanically damaged or under stress.
- When burning slash piles avoid damaging the roots and boles of leave trees. This will minimize the number of stressed trees on site and decrease the amount of suitable host material.
- Increase stand biodiversity by utilizing a range of preferred and acceptable species for planting, including lodgepole pine (*Pinus contorta*), if ecologically appropriate.

# 5. Forest Resources Management Planning

## 5.1. Sustainability and Integrated Resource Management

Sustainable forest management is a way of using and caring for forests so as to maintain their environmental, social and economic values and benefits over time (Canadian Forest Service, 2018)[3]. The primary activity regulated under this timber harvest plan is salvage harvesting of timber that was beetle-killed in the period 1990 to present, with allowance for other types of harvesting. Spruce beetle epidemics have historically been rare in Yukon due to the cold winters, but may become more frequent due to the warming climate (Yukon Government 2008).

The western portion of the region has been less affected by fire than the central and southern Yukon, with a fire cycle of over 1,000 years in some localized areas in the general region. However, considering the beetle outbreak, a recent warmer weather trend, and increased human-caused fire events, a major fire could occur in the area. There has recently been increased fuel hazard due to a change in the structure of the healthy, live, mature, white spruce forest to abundant dead wood due to the extensive spruce beetle infestation.

Discussions have occurred with various departments of the Yukon Government, the Champagne and Aishihik First Nation, the Alsek Renewable Resources Council, traditional land users, and members of the public during preparation of this plan. The intent of these discussions was to account for the multiple interests and values present in the operating area and to ensure that

[3] https://www.nrcan.gc.ca/forests/canada/sustainable-forest-management/13183.

these values are not negatively impacted by forest resource harvesting operations. These values will be discussed in greater detail further on in this section of the timber harvest plan.

Other forest values in the area include recreational pursuits such as cross-country skiing, biking, wildlife viewing, hiking and camping. Although there are no designated sites for these activities within the timber harvest planning area, there are many features and areas conducive to these types of pursuits. It is not anticipated that timber harvesting will have a negative long term impact on any of these activities. Timber harvesting is temporary in scope and the harvest areas themselves can be good candidates for recreational pursuits.

Some non-timber forest products within the timber harvest planning area include mushrooms, berries and medicinal plants. Timber harvesting activities are focused in areas with a high percentage of dead timber and account for 18.9% of the area. Harvesting will aim to remove the dead timber and most of the green timber will remain. This will make for a more open forested stand. Seventy three percent of the forested area is not proposed for timber harvesting and will continue to support non-timber forest products (Table 1). Other interesting features such as open meadows, wetlands, grassy hills and cliffs are not targeted for harvest and have buffers to protect them where necessary.

All of the values within a given area may not have been specifically identified during the timber harvest planning process, although that was the intent. Many values such as wildlife features are dynamic in nature or difficult to identify during the planning stages of a timber harvest plan. The Forest Management Branch has an extensive suite of standards and guidelines to direct the actions of operators when additional values are identified. All of the standards and guidelines that apply to forest operations in Yukon and within this timber harvest plan can be found on the Forest Management Branch website at http://www.emr.gov.yk.ca/forestry/operational_standards.html.

Table 1: Timber harvest planning area – land status and proposed harvesting area

| | Forested | Harvested | Proposed Harvest | Roads | Wetland | Forested No Harvest | TOTAL (ha) |
|---|---|---|---|---|---|---|---|
| **Area (ha)** | **10,707** | **372** | **1,823** | **48.7** | **639** | **8,463** | **11,596** |
| **% of Area** | **92.3%** | **3.2%** | **15.7%** | **0.4%** | **5.5%** | **73.0%** | **100%** |

## 5.2. Traditional Knowledge

This timber harvest plan is situated within the Traditional Territory of the Champagne and Aishihik First Nation. There were no traditional knowledge concerns brought forward during the planning and information gathering process while this timber harvest plan was being developed.

Any representations received by the Forest Management Branch relating to the traditional knowledge and practices of the Champagne and Aishihik First Nations will be considered at any stage during timber harvest planning or timber harvesting under this timber harvest plan.

## 5.3. Economics of Timber Supply

Historically, much of timber harvesting in Haines Junction has been under small volume permits for personal use, but with considerable commercial fuel wood harvesting as well. The large size of the THP area with significant beetle-killed spruce, the relatively high volume of merchantable timber potentially available for salvage, the presence of considerable existing access, and the proximity to markets in Haines Junction and Whitehorse makes this area ideal for supporting varying degrees of commercial and personal use harvesting activities.

Many residents of Haines Junction and other northern communities have traditionally purchased firewood from operators based out of Haines Junction. This timber harvest plan provides a significant opportunity for economically viable commercial fuel wood harvesting. It creates an opportunity for commercial harvesting operators to benefit economically by supplying nearby communities and other locations within Yukon with firewood. Commercial harvesting activities within this timber harvest planning area may also benefit local consumers by potentially providing a more reliable and affordable wood supply source closer to their community.

## 5.4. Commercial and Personal Use Harvesting

Prior to commencing commercial timber harvesting activities, operators must obtain a licence and cutting permit from the Forest Management Branch as per Sections 22 and 24 of the *Forest Resources Act*. The cutting permit will have terms and conditions, and a site plan which must be followed during harvesting operations.

The site plan will outline the specific harvesting plan to be followed in the permit area and will contain detailed information on the timber resources in the area and the harvesting methods to be applied. Site plan requirements are defined in Section 22 of the *Forest Resources Regulation*.

Applicants submitting proposals to harvest large volumes of timber for commercial purposes may be required to have their proposal undergo an assessment under the *Yukon Environmental and Socio-economic Assessment Act*. More information on the *Yukon Environmental and Socio-economic Assessment Act* and the assessment process can be found on the Yukon Environmental and Socio-economic Assessment Board's website at www.yesab.ca.

All applications for harvesting licences and cutting permits within this timber harvest plan, will be issued in accordance with the allocation procedure  This will ensure that any allocations of timber will be conducted in a transparent, fair, and equitable manner.

Personal use harvesting opportunities are highly sought after by members of the communities in the vicinity of this timber harvest plan. Personal use fuelwood areas will be designated and managed by the Forest Management Branch on an on-going basis. This will help to provide an accessible firewood source for the community. The rate of harvest in the personal use fuel wood areas will be monitored by the Forest Management Branch, with the areas modified over time as required to maintain fuel wood availability.

Personal use fuel wood designated areas are not included in the formal block layout and volume summaries in this timber harvest plan. The intent of this timber harvest plan is to provide for economic development of commercial wood harvesting opportunities. As new access is developed, many kilometres of road will open previously inaccessible areas to the general public for personal firewood harvesting during the short period of time when commercial enterprises will be working their permit areas.

A person wishing to harvest fuel wood for personal use within these personal use fuel wood areas must obtain a permit from the Forest Management Branch. As stated in Section 48(a) of the Forest Resources Regulation a person may harvest up to 25 cubic metres of personal use fuel wood per year under a forest resources permit free of stumpage fees.

## 5.5. Fuel abatement

Harvesting areas were selected based primarily on the incidence of spruce bark beetle-infested and killed timber. Fuel abatement is an objective of the Quill Creek timber harvest plan in the interface and landscape fuel abatement zones. The Integrated Landscape Plan has fuel abatement guidelines which are summarized below:

(1) To reduce canopy cover to an acceptable level so that crown fire potential is significantly reduced.

(2) To reduce fuels at or near the forest floor to levels that reduce surface fire intensity and interrupt vertical fuel continuity with the forest canopy;

(3) To encourage the development of a stand that is less susceptible to attack from the spruce bark beetle; and

(4) To retain a stand structure and composition that will respect values for wildlife, ecosystem function, aesthetic and cultural aspects as much as possible without compromising public safety.

Harvesting will include no processing at the stump, with disposal of all coarse woody debris at landings to prevent increasing fuel loading for wildfires. Forest regeneration will focus on a new forest that is mixed-wood where possible.

Timber harvesting within the interface zone must prioritize fuel abatement as a primary objective within the site plan. In addition to the generalized fuel abatement treatment options listed below, the site plan must address reducing forest floor fuels. General fuel abatement prescriptions that have been developed in previous fuel abatement plans are:

a) Thinning dense stands of trees: changing the horizontal and vertical structure of the forest stand to a more open condition by removing most of the large trees, including all the dead trees, leaving only the smaller healthy trees. The retained live large trees must have a low risk of windthrow, to minimize the risk of promoting a new beetle outbreak.
b) Patch cutting and thinning: removing all conifers in a selected area, varying in size from 0.2 ha to 10+ hectares, with the objective of breaking up the continuity of canopy cover and leaving small patches of well-spaced trees within these patches.
c) Clear-cutting with reserves: removing a strip of larger trees leaving only small islands of trees so that fire is less likely to jump across the harvested area to start a new fire inside the protected area.

## 5.6. Wildfire Risk

Due to the proximity of the timber harvest plan to the community of Haines Junction and other values in the area, this plan will put into place seasonal restrictions and other requirements to minimize the risk of fire occurrence. The mitigations that must be followed are specified below.

Summer Harvesting Restrictions

- No timber harvesting is to occur from May 1 to August 15, however hauling of timber and processing at landings may occur during this period.
- Any timber harvesting activity or processing occurring during the fire season will require that fire suppression equipment be located on site, as specified in the licence or cutting permit.
- Timber harvesting and processing will be subject to forest closures and fire bans put in place by the forest supervisor as per the *Forest Protection Act* and *Regulation*.
- No burning of piles will occur during the fire season except as authorized by a burn permit.

Winter Burning Requirements

- Burn piles must be located on cleared mineral soil on approved landings as shown in the site plan.
- In snow free conditions burn piles shall have a minimum 5 meter wide mineral soil fireguard located around the burn pile.

- Burn piles will be located the greater of 10 meters or twice the width of the burn pile away from standing timber, whichever is greater.
- Prior to burning the licencee must notify a forest officer and provide coordinates or a map showing the location all burning.
- All burn piles must be fully extinguished prior to the fire season.

## 5.7. Soil Conservation and Hydrology

Protecting the integrity of soils and their hydrological function is essential to maintaining a healthy and productive forest ecosystem. The Forest Management Branch's Soil Conservation Standards and Guidelines have been established to conserve soil productivity and hydrological function during harvesting operations. All activities carried out under this timber harvest plan must adhere to these standards. These standards can be found on the Forest Management Branch web site at http://www.emr.gov.yk.ca/forestry/operational_standards.html.

Site specific soils information and protection measures are outlined in the site plan of commercial cutting permits issued under this timber harvest plan. The Soil Conservation Standards and Guidelines determine the season of harvest based on the hazard ratings of the soil type within the harvest area and clearly state mitigation strategies for the protection of soil properties.

## 5.8. Visual Quality

A desktop assessment of the potential visual quality effects of the proposed harvesting was completed using Google Earth. “Street View” is available for the Haines Highway, and “Ground Level View” was used for the Marshall Creek Road. In general, both the Haines Highway and the Marshall Creek Road have low visual quality impacts due to terrain, tall deciduous and coniferous trees and shrubs, and partial cut techniques

Haines Highway

The following proposed harvest blocks are near the Haines Highway:

QC-14 is not visible from the highway.

QC-16 is not visible from the highway.

QC-19 block is flat to slightly down-sloping extending away from the highway. A high proportion of the forest along the highway edge is aspen and green spruce. The only trees removed near the highway should be dead spruce (leaving dead trees where required to avoid impacts to live trees), which will result in a low initial visual impact that will decline with the regeneration of deciduous tree species. The forest between the highway and the existing borrow pit should have

only dead spruce removed, with harvesting done in a manner that maintains a visual screen between the highway and the borrow pit.

QC-20 is not visible along the highway; the land slopes gently downward from the highway.

QC-32 is partially visible from Haines Hwy, and the block is flat extending away from the highway. A high proportion of the forest along the highway edge is aspen and green spruce. The only trees removed near the highway should be dead spruce (leaving dead trees where required to avoid impacts to live trees), which will result in a low initial visual impact that will decline with the regeneration of deciduous tree species.

QC-35 is mostly not visible from Haines Highway (screened by a forested wetland). The south end is likely partly visible, with broken screening by a wetland and scattered trees and shrubs. The visual quality of the view of the block from the highway will be protected through retention of green spruce and deciduous trees. The proposed access road will have good screening beyond the entrance by curving through tall trees and shrubs.

Kluane National Park – Auriol Trail

Some of the existing logged areas and some of the proposed new blocks may be visible from the Auriol Trail, once the trail steepens beyond about 2 km west of the highway. Due to the irregular block shape, and high retention levels through the targeted removal of deadwood, it is anticipated that the visual impact will be low. Previous harvesting in the area reveals that they are difficult to identify from this vantage point.

Marshall Creek Road

Street View (Google Earth) is not available for the Marshall Creek Road, but "Ground Level View" and a brief drive-through were used. Most of the road is well screened with deciduous and conifer tall shrubs and forest, and the blocks will be viewed at a low angle that will reduce visual impacts. QC-01, -02, -03, -04, -05, and -06 may be visible from some vantage points along the road and from some residences. The closest edge of these blocks to the road is about 1.5 km. Some of these blocks may also be visible at over 3 km distance from some residences in Haines Junction. Consideration will be given to the visual appearance of these blocks from the road, and especially from the residences, during road and harvest planning. The access roads may have the greatest visual impacts, which should be minimized by green tree retention along their north and west sides.

## 5.9. WILDLIFE AND BIODIVERSITY

### 5.9.1 General biodiversity

The Yukon Bioclimate Ecosystem Classification is based on climate and site-level ecosystem classification, with climate considered to be the primary influence on ecosystem development and distribution, providing detailed site-level ecological mapping and interpretation. The Quill Creek timber harvest planning area is in the Boreal Low Zone, with the ecosites described in the field guide of Environment Yukon (2017). Ecosites are the site-specific ecosystems that determine optimal forest practices, and must be assessed and recorded for each harvesting site plan. The timber harvest planning area is on the west edge of the area the field guide applies to; hence there are some differences; for example, black spruce and lodgepole pine are absent or rare in the Quill Creek timber harvest planning area but are common in most of the area covered by the field guide.

Live trees that survived the beetle epidemic will typically be retained and reserved from harvest, to maintain a level of biodiversity within the general harvest area and provide for varying wildlife habitat. Some live aspen and spruce harvesting will occur where it is necessary for access development, and live spruce trees will be removed during harvesting operations where there is a high risk of windthrow. The majority of the total timber harvest planning area will not be harvested in the foreseeable future, because it lacks sufficient numbers of beetle-killed trees and will continue to provide for wildlife habitat and structural diversity. As the areas are regenerated, new habitat niches will emerge, and the area will continue to be used by a wide variety of wildlife species.

### 5.9.2 Salvage harvesting effects on wildlife

Salvage harvested forests in the Haines Junction area (including the Quill Creek timber harvest planning area) do not provide the same habitat function as unlogged beetle-killed areas (Thomas et al. 2019). Some species such as snowshoe hare, lynx, and coyote avoid salvage blocks, regardless of the level of retention of live and/or dead trees. This is due to a loss of cover for hares, resulting in lack of prey for the two predators. Large areas of forest are not proposed for harvesting, to maintain healthy populations of wildlife species even with significant wildlife use reductions within the harvest blocks. This includes but is not limited to the wildlife connectivity corridor discussed in section 1.5, connectivity corridor planning.

Some wildlife species, such as furbearers (for example, marten and weasels) and woodpeckers, are especially dependant on the standing and downed dead trees that are targeted by this timber harvest plan. Most of the dead trees will be removed from the harvest and road areas,

reducing the habitat for such species within the harvested areas. This is an inevitable consequence of forest harvesting. This is not expected to have an impact on the populations as there is a minimum of 73% of the forested area within the timber harvest plan area with no proposed harvesting.

For moose and deer, the harvest areas will have less cover and a corresponding increased risk of predation by wolves, especially when calving. Calving areas will likely concentrate in the unharvested forest with abundant downed trees to impede wolf and coyote movement. The harvesting will result in new growth of shrubs and aspen regeneration which will provide improved winter browse for moose. Late winter habitat for moose has been identified as "high wildlife values" within the timber harvest planning area.

The changes in quality of wildlife habitat will be mitigated over time due to annual new recruits of dead trees as the beetle infestation continues to kill some of the remaining live trees within and outside the harvest blocks. Over time, the browse will decrease as new spruce shades the willows and the aspen regeneration becomes mature. It will take many decades for the harvested areas to regenerate into trees old enough to return the habitat to mature forest. There is currently an abundance of downed and standing dead trees as a result of the mortality from the spruce bark beetle epidemic.

### 5.9.3 Wildlife features

Wildlife features include mineral licks, bear and wolverine dens, nest sites, beaver dams, cavity nests and wildlife trees, game trails, cliff faces, and fish over-wintering or spawning areas. Within the Quill Creek timber harvest planning area, bear dens, cavity nests and wildlife trees, and game trails are the most likely features to be encountered during either planning for harvesting or during harvesting. One possible bear den was identified in 2018 by a crew doing timber cruising. The cliff faces along the Kathleen River have swallow nests, and mineral licks and beaver ponds are possible but will be rarely encountered. The Forest Management Branch's Wildlife Feature Standard[4] provides management guidelines for several wildlife features that may be encountered within the timber harvest planning area. Several raptor species were noted in the area and two nests found during reconnaissance for the previous timber harvesting plan are noted on the maps for this plan and must be avoided if they are still active.

### 5.9.4 Key wildlife habitat areas

Wildlife Key Areas [5] have been mapped by the Department of Environment to highlight known areas that are critical to wildlife populations. Within the timber harvest planning area there is a

[4] Operational Standards http://www.emr.gov.yk.ca/forestry/operational_standards.html.
[5] Wildlife Key Areas http://www.env.gov.yk.ca/maps/view/detail/2/27/318.

grizzly bear wildlife key area (spring, summer and fall range) along the eastern edge of the timber harvest planning area. Three moose wildlife key areas (late winter range) overlap the timber harvest planning area – wildlife key area 4716 for the eastern half of the timber harvest planning area and wildlife key area 4715 and wildlife key area 750 for the north edge of the timber harvest planning area. The moose wildlife key areas are based on aerial survey data; hence, they are reasonably accurately defined. The wildlife key areas have been incorporated into the high wildlife values area of the Integrated Landscape Plan (see Section 1.4).

### 5.9.5 Riparian management and fish habitat

The most significant riparian features within this timber harvest plan are associated with Quill Creek, Kathleen River, Rainbow Lake, Lower Rainbow Lake, and the Dezadeash River. The Forest Management Branch's operational standards on Riparian Management on Streams and Lakes will be implemented to maintain the integrity of riparian features. The buffers placed on the riparian features will meet or exceed the maximum reserve zone width buffers set out in the standards and guidelines. In addition the placement of access roads and harvest areas to avoid the habitat connectivity corridor plan has resulted in protecting most of the riparian area.

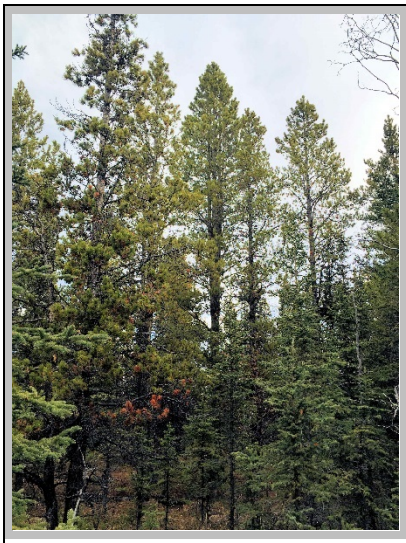
Within this timber harvest planning area, there are four small streams (plus Quill Creek) and many small wetlands. Wherever harvesting operations have the potential to impact riparian features, the Forest Management Branch's operational standards and guidelines must be followed. The Riparian Management on Streams and Lakes and the Wetlands Riparian Management Standards and Guidelines are available at http://www.emr.gov.yk.ca/forestry/operational_standards.html.

One small watershed within the northern part of the timber harvest planning area has been assessed for fish, and the streams classified. The previous timber harvest plan states that Quill Creek is known to have fish in its lower reaches near the Kathleen River, but steep gradients prevent fish from accessing Quill Creek through most of the timber harvest planning area. However, Quill Creek is treated as fish bearing for its entire length within the timber harvest planning area, and no impacts to the stream are proposed.

### 5.9.6 Lodgepole pine

Lodgepole pine is a rare tree species in the Haines Junction area. Pines are known nearby from one tree along the Haines Highway, and a few occur to the south at St. Elias Lake (Yukon Conservation Data Centre, pers. comm.). Pines also naturally occur in the Quill Creek timber harvest planning area; their presence was first documented by the Forest Management Branch in 2018 while doing a timber cruise. The lodgepole pine stands appear to have higher wildlife values than spruce stands; as shown in Figure 2 for one pine stand.

Figure 2. Pine stand with signs of wildlife



Pine stand.

Young pine, about 100 metres from the main pine stand.

Wildlife trail in the pine stand. Note pine seedlings.

Bear mark tree on edge of pine stand. Note pine seedlings and the wildlife trail beside the tree.

Moose antler rub tree – young lodgepole pine in a pine stand.

Aspen within pine stand, with bear claw marks on bark (from climbing).

## 5.10. HERITAGE RESOURCES

Heritage features and historic resources are culturally important to all Yukon people and their preservation is an important consideration when planning any type of development or resource management activity. There is relatively little current data on existing heritage features and archaeological potential within the area encompassed by this timber harvest plan. However, there are areas within this timber harvest planning area that may have significant heritage value

or contain undiscovered archaeological features. In particular, areas near riparian features and the top of slopes may have high heritage potential.

Although the forest has been heavily impacted by beetle-kill of the spruce, there is still the potential for negatively impacting heritage resources during operations. This is especially true for road development activities or other activities that will create significant soil disturbance, such as site preparation for silviculture activities. Heritage inventories or assessments may be required to be completed prior to the approval of these activities.

A heritage resources overview assessment desktop review of the timber harvest planning area was completed separately during the  development of the timber harvest plan. The heritage resources overview assessment identified areas with potential for historic resources and will be used by the Forest Management Branch and the Champagne and Aishihik First Nation to identify, together with local and traditional knowledge, locations where heritage and/or archaeological resources may occur.

A heritage resources impact assessment field review will be completed prior to any new harvesting or road development approvals. The heritage resources impact assessment will assess in the field any areas identified by the heritage resources overview assessment as having the potential for heritage resource values. The Forest Management Branch will likely complete the heritage resources impact assessment in stages, as required for proposed road and timber harvestdevelopments, commencing in the summer of 2020. All operations must comply with the Forest Management Branch's Historic and Archaeological Resources Standards and Guidelines. A copy of these standards and guidelines can be found on the Forest Management Branch's website at http://www.emr.gov.yk.ca/forestry/operationaLstandards.html.

## 5.11. TRAPPING

The Quill Creek timber harvest planning area is overlapped by three trapping concessions[6],numbers 271, 272, and 410. Harvesting should include consideration for the maintenance of the quality of trapping opportunities within the timber harvest planning area. The primary considerations for maintaining the quality of trapping opportunities are:

1. Where appropriate, maintain routes for snowmobile access throughout the timber harvest planning area;
2. To the extent feasible within the context of harvesting and fuel abatement, maintain an abundance of standing dead and old live trees, as denning habitat for marten and other furbearers; and
3. To the extent feasible, maintain an abundance of coarse woody debris on the ground and elevated above the ground, as habitat for rodents and to provide winter shelter and hunting opportunities under the snow for furbearers; and
4. To the extent feasible, maintain an abundance of live spruce and pine trees, to provide cones for food for squirrels, as furbearer prey.

Figure 3. Marten den in dead spruce tree, within the timber harvest planning area.

The harvesting proposed in this timber harvest plan will reduce the number of standing dead trees, old live trees, and course woody debris within the harvest areas and along the access roads. These effects will be partially mitigated by the partial cut or patch cut harvesting. Most of the timber harvest planning area will remain unharvested under this plan, which is anticipated to provide continued trapping opportunities.

[6] Registered Trapping Concessions map. http://www.env.gov.yk.ca/maps/media/uploads/pdf-maps/Registered_Trapping_Concessions_115A.pdf.

# 6. TIMBER HARVESTING

## 6.1 GENERAL CONSIDERATIONS

There is a strong demand for fuel wood in the communities closest to this THP area, especially Haines Junction. As well, all the communities and municipalities within Yukon rely heavily on the use of fuel wood throughout the year, and much of the wood harvested within the Quill Creek timber harvest planning area will likely be used in throughout the territory. In winter 2018-19 some fuel wood was exported to Inuvik, North West Territories. The primary objective of timber harvesting within this timber harvest plan is to create opportunities for fuel wood harvesting that can meet the needs of both local communities and all Yukon people. At this time, fuel wood harvested in the timber harvest planning area is sold in the form of logs, cut-to-length firewood, chips for boilers, and pellets for pellet stoves. Building logs are also harvested in the timber harvest planning area.

The Quill Creek Timber Harvest Plan provides general information regarding timber stands that are suitable for harvesting fuel wood and other products. Specific locations for timber harvesting within the timber harvest planning area may be proposed by clients who submit an application for a commercial harvesting licence or cutting authority. These applications and the proposed harvesting activities and locations for harvesting will be evaluated by the Forest Management Branch. The Forest Management Branch will either authorize the proposed activities subject to terms and conditions, vary the proposed harvesting, or reject the application.

Areas within the timber harvest planning area that have significant ecological value such as riparian areas or areas containing significant wildlife features will be protected from harvesting disturbance in accordance with this timber harvest plan and the Forest Management Branch's operational standards and guidelines. These values and features, and the mitigations or reserve areas created to protect them will be included in the site plan of any commercial cutting permit. As per the Integrated Landscape Plan, high wildlife areas (Figure 1) should average 25% retention of stand structure, and the range of retention can be 10-30% stand structure depending on site characteristics.  It should be noted that retention can be measured as percent of volume or as a percent of stems, for the purposes of this timber harvest plan, retention will be calculated as a percent of volume.

These factors will also be taken into consideration when deciding on the potential issuance of any forest harvesting authorizations such as licenses or cutting permits.

## 6.2 TIMBER CRUISING ND TIMBER TYPES

In 2018, the Forest Management Branch identified and timber cruised areas that had a high proportion of white spruce with a significant component of harvestable dead spruce. White

spruce (SW), trembling aspen (AT) and balsam poplar (AC) were the tree species found during cruising. For the purpose of estimating the available timber, the minimum diameter breast height considered to be utilizable was 17.5 centimetres diameter breast height, top diameter of 10 centimetres, log length of 5 metres, and stump height of 30 centimetres. The detailed cruise data is available upon request from the Forest Management Branch.

The Forest Management Branch and Champagne and Aishihik field crews collected data at the cruise plots to determine the tree composition of those areas, and the characteristics of the timber (stem sizes, volume of wood, quality, etc.). The Forest Management Branch cruise compilation should be referred to for details.

Timber type areas were grouped into three classes with significant potential for harvesting dead spruce. The total merchantable timber cruise volumes are in Table 2, including the volumes of live and dead stems. Dead spruce comprises 62% of the total spruce volume in the identified areas.

Table 2: cruise volume summaries in spruce-leading polygons, by timber type

| Timber Type | Description | Total Area (ha) | Net Spruce Volume ($m^3$/ha)* | Net Spruce Volume (total $m^3$)* | Net Dead Spruce Volume ($m^3$/ha)* | Net Dead Spruce Volume (total $m^3$)* |
|---|---|---|---|---|---|---|
| **1** | 85% white spruce with 60% dead | 932 | 98 | 91,336 | 60 | 55,920 |
| **2** | 100% white spruce with 60% dead | 579 | 130 | 75,270 | 76 | 44,004 |
| **3** | 100% white spruce with 70% dead | 312 | 178 | 55,536 | 118 | 36,816 |
| **Total** | | **1,823** | | **222,142** | | **136,740** |

*The volumes are estimates with an associated cruise error of under 15%.

Harvest blocks have been identified and mapped based on areas with large amounts of beetle-killed spruce, which is targeted for fuel wood use. For the purpose of this timber harvest plan, adjacent forest cover polygons with similar amounts of dead spruce have been lumped together into 31 harvest blocks, 15 blocks south of Quill Creek and 16 blocks north of Quill Creek. Maps are provided in Appendix 1.

The harvest block boundaries were initially drawn as forest timber type boundaries, which were then modified to reduce the complexity of the boundaries. The simpler boundaries will make it

easier to locate and mark harvest area boundaries in the field and provides flexibility in the placement of in-block trails.

All of the proposed harvest blocks are covered by standing living, dead and/or downed white spruce. There are patches of trembling aspen and scattered balsam poplar in some of the harvest blocks and lodgepole pine is rare. Timber harvesting will primarily focus on removing spruce fuel wood of merchantable size, with allowance for harvesting for other purposes such as building logs and saw logs. Harvest of aspen and cottonwood is expected to be avoided other than where necessary for roads, trails and landings. The deciduous species will be retained wherever possible for biodiversity, to maintain forest diversity, and to reduce wildfire risk. The cruise plots are points on the landscape and may or may not reflect the overall characteristics of a cut block.

Harvest blocks with the highest density and volumes of standing dead wood are best used for larger commercial firewood harvesting. Smaller size patches with moderate to high density of dead wood may be better for small commercial firewood harvesting. Many of the stands with higher volumes of dead wood are more economically viable for larger commercial firewood harvesting, given the investments in machinery and access road construction that are required.

Detailed stand descriptions are not provided in this document because that is impractical due to the large areas covered in this plan and the diversity of stand and site conditions within these areas. Detailed stand descriptions should be included in the site plans developed for each commercial cutting permit issued within this timber harvest plan.

General comments on the timber types are provided in the following sections. The total available spruce harvest volume under the THP is estimated to be 163,185m$^3$. All harvest percentages are based on merchantable volume, to allow calculation of the timber volume available for harvest.

### 6.2.1 Timber type 1

Timber type 1 occurs in 15 variably-sized harvest blocks north and south of Quill Creek. These harvest blocks are around 85% white spruce (most of the rest being aspen) and just over 60% of the spruce is dead. The estimated harvest for timber type 1 stands in this timber harvest plan is a harvest rate of 100% of the dead spruce volume, 20% of live spruce and 0% of aspen. A typical harvest block in this timber type should, therefore, have about 60% of the merchantable trees available for harvest. Whether or not the proportions of aspen and live spruce meet the values estimated here, approximately 40% of the merchantable timber volume will be retained in each block for biodiversity, wildlife, visual quality, and other non-timber values.

The presence of a considerable amount of aspen may indicate that they have relatively dry soils, and hence may have the potential for both summer and winter harvesting.

These harvest blocks may be good for small commercial fuel wood harvesters, with small machines that can move around between the aspen and the live spruce. QC-23, QC-24, QC-26, QC-27, QC-31, and QC-34 are within the high wildlife values area, for which the retention level of 40% for timber type 1 harvest blocks more than meets the area objectives.

Several harvest blocks are large in area and may need to be divided between more than one operator.

Table 3: Timber type 1 stand characteristics

| TREE TYPE | LIVE VOLUME ($M^3$/HA) | DEAD VOLUME ($M^3$/HA) | MERCHANTABLE STEMS PER HA | AVERAGE DIAMETER AT BREAST HEIGHT (CM) | UNDERSTORY* (STEMS/HA) |
|---|---|---|---|---|---|
| Spruce | 38 | 60 | 422 | 24.1 | 536 |
| Aspen | 14 | 1 | 112 | 22.7 | 100 |

* Understory was measured as all stems 10 cm to 17.5 centimetres diameter at breast height.

### 6.2.2 Timber type 2

Timber type 2 occurs in 11 harvest blocks in the northern sections of the timber harvest plan. These harvest blocks are almost 100% white spruce, but slightly less than 60% of the spruce is dead. The dead spruce is also uniformly distributed with the live spruce, making a targeted dead removal difficult.

These harvest blocks are around 98% white spruce (most of the rest being aspen) and just under 60% of the spruce is dead. Due to the fuel abatement objectives for these areas the estimated harvest for timber type 2 stands in this timber harvest plan is harvest rate of 100% of the dead spruce volume, 50% of live spruce and 0% of aspen. A typical harvest block in this timber type should, therefore, have about 80% of the merchantable trees available for harvest.

All of the timber type 2 harvest blocks are within the Interface or Landscape fuel abatement zones where fuel abatement is an objective. Many harvest blocks are also in the high wildlife values area which typically requires an average of 25% retention. Due to the fuel abatement objectives of these areas less retention may be prescribed in these blocks, however even with lower retention in these areas, average retention throughout the high wildlife value areas will exceed an average of 20%. Small patch-cuts with grouped retention may be the best harvest method for these areas.

If a market for saw logs develops, then these areas may be good for the larger-scale commercial harvesting, by patch cutting both the dead fuel wood and the live trees. This would be consistent

with the objectives of both the interface fuel abatement area and the fuel abatement area in which all these harvest blocks occur.

Timber type 2 has some potential as personal use fuel wood areas, with the ability to drive motor vehicles such as trucks and ATVs between the many live spruce trees. However, it will be costly to construct roads for personal use fuel wood areasbecause many of the harvest blocks are far from existing access.

All of the timber type 2 cut blocks are a high priority for harvesting (section 6.6); however, they may not be currently economically viable to harvest without a green wood market.

These harvest blocks will also likely be partly visible from the Marshall Creek Road and residences, and perhaps from some residences in Haines Junction. Visual quality impacts must be considered in designing the site plans for these blocks.

Table 4: Timber type 2 stand characteristics

| TREE TYPE | LIVE VOLUME ($M^3$/HA) | DEAD VOLUME ($M^3$/HA) | MERCHANTABLE STEMS PER HA | AVERAGE DIAMETER AT BREAST HEIGHT (CM) | UNDERSTORY* (STEMS/HA) |
|---|---|---|---|---|---|
| Spruce | 54 | 76 | 542 | 23.2 | 575 |
| Aspen | 3 | 0 | 10 | 28.1 | 0 |

* Understory was measured as all stems between 10 centimetres and 17.5 centimetres diameter at breast height.

### 6.2.3 Timber type 3

Timber type 3 occurs in five harvest blocks north and south of Quill Creek (Table 9). These cut blocks are 99% white spruce (with the rest a mix of aspen and balsam) and approximately 66% of the spruce is dead.

The estimated harvest for type 3 stands within this timber harvest plan is set at a harvest rate of 100% of the dead spruce volume, 20% of live spruce and 0% of aspen. A typical harvest block should therefore have 73% of the merchantable trees available for harvest. Approximately 27% of merchantable volume will be retained in each block for biodiversity, wildlife, visual quality, and other non-timber values.

Timber type 3 is the best for larger-scale fuel wood commercial harvesting, because the number, diameter, and volume of dead spruce stems is high. These harvest blocks are also located farthest from existing access and the larger operators have the equipment and capacity to develop the access.

These cut blocks are within the high wildlife values area. While the high volume of dead spruce means that it may not be possible to have high retention of live trees in each harvest block, the average level of retention in this timber type should still exceed 25%.

Table 5: Timber type 3 stand characteristics

| TREE TYPE | LIVE VOLUME ($M^3$/HA) | DEAD VOLUME ($M^3$/HA) | MERCHANTABLE STEMS PER HA | AVERAGE DIAMETER AT BREAST HEIGHT (CM) | UNDERSTORY* (STEMS/HA) |
|---|---|---|---|---|---|
| Spruce | 60 | 118 | 632 | 25.0 | 550 |
| Aspen | 1 | 0 | 7 | 27.6 | 0 |
| Balsam Poplar | 1 | 0 | 2 | 30.4 | 3 |

## 6.3. OPERATING UNITS

Six operating units have been identified, based primarily on the proposed patterns of road access and fuel abatement zones, with the boundaries between operating areas generally corresponding to riparian corridors that will seldom be crossed by roads and will not be harvested. These operating units are numbered from 1 to 6, and a name is assigned to each for operating unit for convenience (Table 5). These operating units are not the same as those defined in the previous timber harvesting plan of the Yukon Government (2006).

The harvesting under this timber harvest plan is anticipated to start after the plan approval, and all harvest operations are anticipated to be completed by the end of 10 years, provided that harvesting is economically feasible and where wood demand is sufficient. If harvesting is slower than expected, or areas are not currently economically viable, harvesting may occur for up to 15 years.

The operating units are ordered by priority, however the priorities assume that all harvest blocks are economically feasible to develop and this may not actually be the case. Lower priority areas may need to be developed before a higher priority area. Some areas have a larger proportion of green wood compared to dead wood, these areas, even when relatively high priority, may not be economically feasible to harvest until there is a green wood market, and the priorities will be shifted accordingly. In the absence of a higher value green wood market, consideration could be given to the economics of harvesting and decking green wood for use as firewood the following year.

In general, small scale operators will tend to work closer to the Haines Highway, and larger scale operators will work further from the highway. This will result in higher quality roads with multiple

users and all season use near the Haines Highway, and lower quality and seasonal use roads (with less footprint) further from the highway.

Table 6: Operating unit names

| No. | Name | Name Reason |
|---|---|---|
| **1** | Interface | Within the Interface Fuel Abatement Zone |
| **2** | Auriol | Access across from Auriol Trail |
| **3** | Kathleen | Near Kathleen River |
| **4** | Granite | Near Granite Creek |
| **5** | Quill | Near Quill Creek |
| **6** | Rainbow | Near Rainbow lake |

Table 7: operating unit summary

| Operating Unit | Harvest block Areas (ha) | Green Spruce Harvest ($m^3$) | Dead Spruce Harvest ($m^3$) | Estimated Total Harvest ($m^3$) |
|---|---|---|---|---|
| **1** | 95.6 | 2,581 | 7,266 | 9,847 |
| **2** | 483.2 | 13,047 | 36,723 | 49,770 |
| **3** | 423.9 | 4,040 | 36,246 | 40,286 |
| **4** | 471 | 4,117 | 35,354 | 39,471 |
| **5** | 240.6 | 1,835 | 14,436 | 16,271 |
| **6** | 108.4 | 839 | 6,701 | 7,540 |
| **Total** | **1822.7** | **26,459** | **136,726** | **163,185** |

### 6.3.1. Operating unit 1 – interface

Operating Unit 1 is the *Interface Fuel Abatement Area*, where timber harvest planning includes fuel management through integrated resource management. This zone has the highest priority for harvesting, to reduce wildfire risk to the community of Haines Junction, under the Integrated Landscape Plan.

These harvest blocks are 100% spruce with approximately 57% beetle killed. The dead timber is also uniformly distributed with the green timber, therefore, in order to harvest most of the dead wood, live spruce will also need to be cut. A market for green wood may be required in order to harvest these blocks; hence the harvest priority may not be achievable. Consideration should be given to using some of the green wood for firewood, where economically feasible, in the absence of a higher value green wood market.

Timber harvesting in this operating unit must consider fuel abatement as a primary objective while also considering high wildlife values and visual quality. The overall restrictions suggest a harvesting design of small patch cut harvesting with the removal of dead spruce in the green tree retention areas, resulting in at least 20% retention within the block. Other designs can also be considered, with an average of at least 20% retention and mitigation of visual impacts, with the reduction in fuel loading being the primary objective for these blocks.

Table 8: Operating unit 1 harvest block summary

| Harvest Block | Timber Type | Area (Ha) | Spruce Volume ($m^3$/ha) | | Estimated Timber Harvest ($m^3$) (Area x Volume x Harvest Level*) | | |
|---|---|---|---|---|---|---|---|
| | | | Live | Dead | Live | Dead | Total |
| **QC-01** | 2 | 56.8 | 54 | 76 | 1,534 | 4,317 | 5,851 |
| **QC-14** | 2 | 10.2 | 54 | 76 | 275 | 775 | 1,050 |
| **QC-16** | 2 | 28.6 | 54 | 76 | 772 | 2,174 | 2,946 |
| **total** | | **95.6** | | | **2,581** | **7,266** | **9,847** |

*Harvest level estimated at 50% green spruce, 100% dead spruce.

### 6.3.2. Operating unit 2 – Auriol

Within the landscape fuel abatement area, all timber harvest must consider fuel management as an objective. The harvest blocks are within the high wildlife values area of the Integrated Landscape Plan. Harvest planning will result in 10-30% retention within each block, depending on site characteristics, with an average of at least 20% in this operating unit to reduce visual impacts. These blocks may also be visible from some residences along Marshall Creek Road and perhaps within Haines Junction. Retention of live trees should be planned so as to minimize residential visual impacts, especially from roads.

These cut blocks are 100% spruce with approximately 57% beetle killed. The dead timber is also uniformly distributed with the green timber, therefore, in order to harvest most of the dead wood, live spruce will also need to be cut. A market for green wood may be required in order to harvest these blocks; hence the harvest priority may not be achievable. Consideration should be given to using the some of the green wood for firewood, where economically feasible, in the absence of a higher value green wood market.

The overall restrictions suggest a harvesting design of small patch cut harvesting with removal of dead spruce in the green tree retention areas, resulting in at least 20% retention within the block. Other designs can also be considered, with an average of at least 20% retention and mitigation of visual impacts, with a reduction in long-term fuel loading being an overall objective for these blocks.

Table 9: Operating unit 2 harvest block summary

| Harvest Block | Timber Type | Area (Ha) | Spruce Volume ($m^3$/ha) | | Estimated Timber Harvest ($m^3$) (Area x Density x Harvest Level) | | |
|---|---|---|---|---|---|---|---|
| | | | Live | Dead | Live | Dead | Total |
| **QC-02** | 2 | 42.8 | 54 | 76 | 1,156 | 3,253 | 4,409 |
| **QC-03** | 2 | 36.0 | 54 | 76 | 972 | 2,736 | 3,708 |
| **QC-04** | 2 | 17.8 | 54 | 76 | 481 | 1,353 | 1,834 |
| **QC-05** | 2 | 246.2 | 54 | 76 | 6,647 | 18,711 | 25,358 |
| **QC-06** | 2 | 49.6 | 54 | 76 | 1,339 | 3,770 | 5,109 |
| **QC-12** | 2 | 28.4 | 54 | 76 | 767 | 2,158 | 2,925 |
| **QC-13** | 2 | 10.9 | 54 | 76 | 294 | 828 | 1,122 |
| **QC-15** | 2 | 51.5 | 54 | 76 | 1,391 | 3,914 | 5,305 |
| **total** | | **483.2** | | | **13,047** | **36,723** | **49,770** |

*Harvest level estimated at 50% green spruce, 100% dead spruce.

### 6.3.3. Operating unit 3 – Kathleen

Operating unit 3 is within the landscape fuel abatementarea, where all timber harvest must consider fuel management as an objective. These harvest blocks are located further from Haines Junction and other values, so this area is a lower priority then operating units 1 and 2, although this area may be more economically feasible. Harvest planning will result in 10-30% retention within each block, depending on site characteristics, with an average of at least 25% in this operating unit to meet biodiversity, wildlife, visual quality, and other non-timber values.

Harvest blocks QC-07 and QC-08 are within the high wildlife values area of the Integrated Landscape Plan, where harvest planning will result in 10-30% retention within each block, depending on site characteristics. Most of the mature spruce are dead, and live mature spruce will be harvested if there is a high risk of windthrow of individual trees. Live spruce in clumps (reduced windthrow risk) will be retained even if there are dead trees within the clump, and damage to regeneration will be avoided by machinery as much as possible. Retention of all trees including aspen will be about 25%.

QC-09 and QC-10 should be harvested at roughly the same time as QC-07 and QC-08, so that the entire road system can be deactivated at the same time. They have no required harvesting restrictions, but, given the lack of a green wood market, they should primarily be harvested for dead spruce. Retention is estimated to be 40%.

QC-11 is located close to the Haines Highway, high retention should be left to minimize visual impacts. Small volume commercial operations or personal use fuelwood cutting should be considered for this block.

Table 10: Operating unit 3 harvest block summary

| Harvest Block | Timber Type | Area (Ha) | Spruce Volume ($m^3$/ha) | | Estimated Timber Harvest ($m^3$) (Area x Volume x Harvest Level) | | |
|---|---|---|---|---|---|---|---|
| | | | Live | Dead | Live | Dead | Total |
| **QC-07** | 3 | 94.2 | 60 | 118 | 1,130 | 11,116 | 12,246 |
| **QC-08** | 3 | 92.2 | 60 | 118 | 1,106 | 10,880 | 11,986 |
| **QC-09** | 1 | 26.4 | 38 | 60 | 201 | 1,584 | 1,785 |
| **QC-10** | 1 | 171.8 | 38 | 60 | 1,306 | 10,308 | 11,614 |
| **QC-11** | 1 | 39.3 | 38 | 60 | 297 | 2,358 | 2,655 |
| **total** | | **423.9** | | | **4,040** | **36,246** | **40,286** |

*Harvest level estimated at 20% green spruce, 100% dead spruce.

### 6.3.4. Operating unit 4 - Granite

This operating unit is mostly within the high wildlife values area of the Integrated Landscape Plan, except for the western parts of harvest blocks QC-23 and QC-26. Most of the mature spruce within QC-22 and QC-28 are dead, and live mature spruce will be harvested together with the dead wood if there is a high risk of windthrow of individual trees. Live spruce in clumps (reduced windthrow risk) will be retained even if there are dead trees within the clump, and damage to regeneration will be avoided by machinery as much as possible. Retention of all trees will be about 25% in these blocks.

The remaining cut blocks will have approximately 30% retention, to bring the average well above 25% retention as required for the high wildlife values area. All harvest blocks within the operating unit should be harvested at roughly the same time so that the entire road system can deactivated at the same time.

There are two road systems within this operating unit. Harvesting will only occur within harvest blocks that are accessible from one road system during a given winter, to provide a refuge area for wildlife (especially moose) when the other road system has active harvesting. This may not be required for summer harvesting because wildlife can more easily move around and have more choices of habitat.

Table 11: Operating unit 4 harvest block summary

| Harvest Block | Timber Type | Area (Ha) | Spruce Volume ($m^3$/ha) | | Estimated Timber Harvest ($m^3$) (Area x Volume x Harvest Level) | | |
|---|---|---|---|---|---|---|---|
| | | | Live | Dead | Live | Dead | Total |
| **QC-22** | 3 | 68.6 | 60 | 118 | 823 | 8,095 | 8,918 |
| **QC-23** | 1 | 96.8 | 38 | 60 | 736 | 5,808 | 6,544 |
| **QC-24** | 1 | 31.8 | 38 | 60 | 242 | 1,908 | 2,150 |
| **QC-26** | 1 | 111.9 | 38 | 60 | 850 | 6,714 | 7,564 |
| **QC-27** | 1 | 108.2 | 38 | 60 | 822 | 6,492 | 7,314 |
| **QC-28** | 3 | 53.7 | 60 | 118 | 644 | 6,337 | 6,981 |
| **total** | | **471** | | | **4,117** | **35,354** | **39,471** |

*Harvest level estimated at 20% green spruce, 100% dead spruce.

### 6.3.5. Operating unit 5 - Quill

There are no specific harvest restrictions for this operating unit. These operating units are higher priority than the operating unit 6 (Rainbow) because Rainbow will provide wildlife habitat while operating unit 4 (Granite) is being harvested. These harvest blocks may be suitable areas to develop for multiple small operators due to their proximity to existing access.

Table 12: Operating unit 5 harvest block summary

| Harvest Block | Timber Type | Area (Ha) | Spruce Volume ($m^3$/ha) | | Estimated Timber Harvest ($m^3$) (Area x Volume x Harvest Level) | | |
|---|---|---|---|---|---|---|---|
| | | | Live | Dead | Live | Dead | Total |
| **QC-17** | 1 | 4.8 | 38 | 60 | 36 | 288 | 324 |
| **QC-18** | 1 | 23.6 | 38 | 60 | 179 | 1,416 | 1,595 |
| **QC-19** | 1 | 68.0 | 38 | 60 | 517 | 4,080 | 4,597 |
| **QC-20** | 1 | 128.0 | 38 | 60 | 980 | 7,680 | 8,660 |
| **QC-25** | 1 | 16.2 | 38 | 60 | 123 | 972 | 1,095 |
| **total** | | **240.6** | | | **1835** | **14,436** | **16,271** |

*Harvest level estimated at 20% green spruce, 100% dead spruce.

### 6.3.6. Operating unit 6 - Rainbow

The area of harvest blocks QC-31, QC-32, QC-34, and QC-35 will provide a large undisturbed area for wildlife to use within the high wildlife values area while operating unit 4 (Granite) is being harvested. Timber harvesting will result in an average of about 40% retention throughout these blocks, depending on site characteristics.

QC-35 is accessed directly from the Haines Highway in isolation from other harvest blocks. Retention of green trees is a priority, to minimize the visual impacts when viewed from the Haines Highway and to meet the high wildlife values area objective of retention of at least 25% of total merchantable stems (spruce and aspen, live and dead).

Table 13. Operating Unit 6 Harvest Block Summary

| Cut Block | Timber Type | Area (Ha) | Spruce Volume ($m^3$/ha) | | Estimated Timber Harvest ($m^3$) (Area x Volume x Harvest Level) | | |
|---|---|---|---|---|---|---|---|
| | | | Live | Dead | Live | Dead | Total |
| **QC-31** | 1 | 57.2 | 38 | 60 | 435 | 3,432 | 3,867 |
| **QC-32** | 1 | 30.4 | 38 | 60 | 231 | 1,824 | 2,055 |
| **QC-34** | 1 | 17.4 | 38 | 60 | 132 | 1,044 | 1,176 |
| **QC-35** | 3 | 3.4 | 60 | 118 | 41 | 401 | 442 |
| **Sum** | | **108.4** | | | **839** | **6,701** | **7,540** |

## 6.4 ACCESS ROADS

### 6.4.1 Access management

The Quill Creek Timber Harvest Plan area is to be accessed by existing access roads and proposed new roads. The proposed new roads in this plan will be constructed as Forest Resource Roads under the authority of the Forest Resources act.

Forest resources roads will be managed by the Forest Management Branch who has the authority to control access and decommission roads once they are no longer in use. The access control minimizes environmental impacts and damage to the roads by unauthorized vehicles. It can also increase safety to the public and the licencee while limiting timber harvesting to that permitted areas. TheForest Management Branch considers access possibilities for reforestation and deactivation of roads may be delayed until silvicultural activities. Decommissioning of roads can be done by deactivation (restoration of natural drainage; access blocked; but road to be used again) and rehabilitation (possibly ripping; rollback of organic materials and coarse woody debris; access blocked). All forest resources roads developed within this timber harvest plan will follow the applicable operational standards and guidelines of the Forest Management Branch.

Existing access roads within this area are comprised of public roads classified as unmaintained highways and forest resources roads. All existing public roads are managed under the authority of the Department of Highways and Public Works. Unlike forest resources roads, the Forest Management Branch does not have the authority to manage public access or conduct deactivation on these roads. The existing roads range from minimal quality suitable for winter use only, to moderate quality gravel roads suitable for all season use.

Harvesting may require some upgrades to existing roads – widening, re-sloping, and minor changes to the alignment. New access that is developed that connects to the Haines Highway will require an access permit from the Department of Highways and Public Works. Also, any work that is to be done within a highway right of way will require a permit.

The maps in Appendix 1 show existing roads (which may need to be upgraded) and new road alignments. Alternative road alignments can be proposed by the licencee in the site plan, and must be approved by the Forest Management Branch.

Cumulative disturbance from road development must not impact more than 5% of the gross harvest block area as per the Forest Management Branch's Soil Conservation Standards and Guidelines.

### 6.4.2 Access roads

Access roads to each proposed harvest area, and major roads within the harvest areas, are shown in the maps in Appendix 1. Some of the roads are existing roads that may or may not require upgrading. Most of the proposed roads are approximations only. The proposed access routes were generally selected using Google Earth imagery and elevation data (parts of NR-39 and NR-53 were walked). A field heritage review for each road route including a 100 metre buffer on each side should be completed prior to construction, where the heritage resource overview assessment indicates that there is potential for heritage resources to occur. The 100 metre buffer will provide the ability to modify the proposed alignment within the buffer without completing a new heritage review.

All in-block roads are suggested locations only. Final road layout is dependant upon the applicant's equipment to be used for logging and the harvesting system proposed (landings or roadside). The applicant must submit a map, indicating the location of in-block roads, landings and other development particular to their proposed operation. In all cases, site disturbance for in-block roads and landings will be minimized and must be less than 5% of the gross harvest block area.

The proposed gross harvest block area is 1823 hectares and the the in-block road area is 25.7 hectares, which is 1.4% of gross harvest block area. With the addition of landings during site planning, the total road and landing area will be well under the required maximum of 5%. The total road disturbance for all existing and proposed roads in the timber harvest plan area is 0.4%. The lengths and areas of the existing and proposed access roads are provided in Table 14.

Table 14. Access road length and area summary

| | Existing | | Proposed | |
|---|---|---|---|---|
| | Length (km) | Area (ha) | Length (km) | Area (ha) |
| **Roads within blocks** | 4.5 | 2.7 | 38.4 | 23.0 |
| **Roads outside blocks** | 24.3 | 14.6 | 14.0 | 8.4 |
| **Roads total** | **28.8** | **17.3** | **52.4** | **31.4** |

### 6.4.3 Central processing areas

Central processing areas are identified areas where a licencee may temporarily deck and process harvested timber. A central processing area is used as an alternative to conventional landings at the harvest site. The benefits of a central processing area include:

- facilitating year round access to timber harvested in winter only areas;
- reduction in the amount of slash, tops and rotten timber located on-block;
- safer disposal of debris through chipping or burning in a large cleared area;
- Reducing the amount of roads and landings into and within harvest blocks;and
- Disturbace is more concentrated in one area resulting in less overall disturbance.

Central processing areas within this timber harvest plan will be applied for by the licencee prior to harvesting. To be approved the following criteria must be met:

- The cleared area shall not exceed 2 hectares in size;
- There will be a maximum of 3 central processing areas permitted;
- A central processing area will only be considered with cutting permit(s) greater than 5,000 cubic metres;
- The central processing area must be fully reclaimed within two years of the completion of timber harvesting under the cutting permit;
- The central processing area must be adjacent to all season existing access; and
- The central processing area must be on dry level ground.

## 6.5 Timber harvesting methods

Harvesting operations will focus on salvaging merchantable standing dead and downed stems to be utilized as fuel wood. It is expected that a wide range of timber harvesting methods will be used within this timber harvest plan. Applicants that wish to harvest fuel wood within this timber harvest plan must propose the the method they intend to use for harvesting to the Forest Management Branch. The site plan submitted by each applicant under a commercial cutting permit must include the proposed harvesting methodology and must be approved by the Director of the Forest Management Branch.

Considerations of acceptable harvesting methodologies will be based on how the proposed activities meet the following:

- The requirements and intent of this timber harvest plan;
- The requirements of the Integrated Landscape Plan for the Champagne and Aishihik Traditional Territory;
- The requirements of the *Forest Resources Act* and *Forest Resources Regulation;* and
- The requirements of the Forest Management Branch's operational standards and guidelines.

## 6.6 GUIDELINES FOR MANAGEMENT OF NESTING MIGRATORY BIRDS

Most birds are migratory birds. The *Migratory Birds Regulation*[7] states:

> 6 Subject to subsection 5(9), no person shall
>
> (a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or
>
> (b) have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory birdexcept under authority of a permit therefor.

The primary issue with respect to timber harvesting is the potential to "disturb, destroy or take a nest, egg …" of a migratory bird that is located in brush or trees. There is a smaller risk of harming nests that are located on the ground, because few nests will be located there. Most bird species are protected under the *Migratory Birds Regulation*, and many of them will regularly nest in the harvest and road construction areas within the timber harvest planning area. Some bird species at risk (also protected under the *Species at Risk Act*) may nest in the area.

Currently, there is no legal mechanism available to authorize via a permit or exemption the incidental take of nests or eggs of migratory birds in the course of industrial or other activities (forestry, mining, agriculture, development, etc.). In the absence of a regulatory system for authorizing incidental take, the Canadian Wildlife Service provides advice related to the application of the current *Migratory Birds Regulation.*

Generally, Environment and Climate Change Canada provides the following advice:

i. to avoid engaging in potentially destructive activities during key periods in order to reduce the risk of nest destruction (In Yukon, the general breeding season for most, although not all, bird species listed under the *MBCA*, extends from approximately May 1 to July 31).

ii. to develop and implement a management plan to minimize the risk of impacts, and to mitigate any unavoidable impacts on nests using the following measures to protect and conserve

[7] Migratory Birds Regulation https://lois-laws.justice.gc.ca/PDF/C.R.C._c._1035.pdf.

migratory birds: a. ensure awareness of the relevant provisions of the *Migratory Birds Convention Act* and *Migratory Birds Regulation*.

b. monitoring for the presence of migratory birds and nests before activities are carried out and throughout the nesting season, based on scientifically credible surveys or other monitoring/inventory methods

c. adoption of migratory bird protection measures and incorporation of such measures in policies, procedures, plans, directives and compensatory plans relevant to the project or infrastructure

d. active management ensuring best efforts to avoid incidental take through the implementation of migratory bird protection measures

## 6.7 GUIDELINES FOR SENSITIVE AREAS

### 6.7.1 Permafrost areas

There are small areas of near-surface permafrost in saturated soils present on some east-facing and north-facing slopes and hollows. These can be recognized by usually having only white spruce growth(no aspen, and black spruce is absent from the timber harvest planning area), wet soils, and many of the trees not standing vertically but being tilted at various angles because of slope movement and soil settling. There are other indicators of slope movements such as torn vegetation mats that have opened cracks in the surface soil, unusual hummocks and hollows, and intact fallen trees.The temperature of the permafrost is likely only slightly below zero because most of the surrounding area has no surface permafrost. Therefore, only a slight increase in summer soil temperatures may result in the permafrost melting. When the surface permafrost melts the soil may move down-slope, creating a landslide. The size of the landslide will depend on the size

*Figure 4: Permafrost in the forest.*

of the permafrosted area and angle of the slope, but the soil that moves may directly impact other forest areas, wetlands or streams downslope. Mud from the slide may erode and result in sediment entering streams. The slide may leave a visual scar on the landscape, and change the area from a forested landscape to a muddy non-forested landscape. Once a slide has occurred, the soil is exposed to warming from the summer sun and permafrost thaw may continue indefinitely with the impacted area widening, deepening and with deeper erosion.

Permafrost areas with unstable soils must be identified during harvesting site plan development, and then managed so as to prevent permafrost warming and thaw. This should be done by maintaining shade from wind-firm trees and shrubs, and an insulating surface of organic soils, mosses, and debris. No standing or downed trees (alive or dead) should be removed from sensitive permafrost areas. Trees near permafrost areas should be protected from increased risk of windthrow resulting from harvesting nearby areas, usually by reducing or entirely avoiding harvesting within a buffer zone around the permafrost area.

There are also areas of permafrost that occur in rocky and well drained soils. These areas generally remain stable when the permafrost melts, and therefore do not require special management. Winter harvesting under frozen conditions may be preferable, in case there are pockets of frozen mud.

Areas with permafrost are potentially sensitive to road construction and harvesting, and areas that are insensitive to developments. Sensitive areas are those where the frozen ground is composed of soils such as fine silts and organics. These soils generally have high water content, and they may include pockets that are mostly water. The sensitivity of the soils is enhanced if the sites are on slopes, where the thawed muddy soils may flow downhill. Insensitive areas are soils that are sandy, gravelly, rocky, or shallow over bedrock. They tend to have little water content, and when the permafrost thaws there is little change in the character of the soils.

The following are guidelines designed to protect sensitive permafrost areas from impacts that may result in adverse consequences from permafrost thawing.

- Identify and mark the boundaries of sensitive permafrost areas within a cut block prior to access upgrade, construction or harvest.
- Within a 10 metre buffer around a sensitive permafrost area:
    - Avoid constructing new access or landings, and do not upgrade or use access or landings, to avoid soil impacts and to maximize retention of natural regeneration.
    - Avoid harvesting live trees, to reduce the windthrow risk to the trees within the permafrost area.
    - Limit harvesting of dead trees to those trees whose removal will not increase the risk of windthrow within either the 10 metre buffer or the permafrost area.
    - Maximize the retention of natural regeneration.

    - Avoid soil disturbance or disturbance to the surface mosses and debris.
- Within a 10-30 metre distance around a sensitive permafrost area:
    - Avoid constructing or upgrading access or landings that will result in soil disturbance.
    - Manage harvesting to reduce the windthrow risk within the 10 metre buffer, maximizing the retention of natural regeneration and wind-firm standing live trees in areas adjacent to the buffer. This may require the retention of some dead trees to maintain wind firmness of the remaining live trees.
- Avoid directing ditch water into sensitive permafrost areas.

Some permafrost areas, especially those that are insensitive, may be harvested during winter/frozen ground conditions with winter access. Rocky, dry permafrost areas may be suitable for summer harvesting.

The majority of the proposed timber harvest blocks are located on level ground with soils that are not fine textured or saturated. Based on mapping and local knowledge, the presence of permafrost likely occurs on the north facing slope along the Dezadeash River (operating unit 1 - interface and 2 - Auriol) and possibly along the Kathleen River (the east edge of operating Unit 3 - Kathleen and 4 - Granite).

### 6.7.2 Wildlife features

Game trails occur throughout the Quill Creek timber harvest planning area. The harvesting of the dead spruce can generally be assumed to increase the ability of large wildlife (primarily moose and bears) to use these trails, by reducing barriers from existing windthrow and by reducing future windthrow. There are no known 'significant' wildlife migration trails within the timber harvest planning area; generally, 'significant' trails are worn down to mineral soil over many hundreds of meters, although there are exceptions to this rule.

The cliff face along the Kathleen River is discussed below in the section on the Kathleen River Canyon. Management standards[8] for wildlife features are described in the Wildlife Features Standard, which will be referred to for further management guidelines.

### 6.7.3 Wetlands, streams and lakes

Management standards for riparian areas (wetlands, streams and lakes) are described in the Standards[9] for Wetlands Riparian Management and the Riparian Management on Streams and Lakes, which will be followed when planning harvesting near riparian areas. Of note for the Quill

[8] Operational Standards http://www.emr.gov.yk.ca/forestry/operational_standards.html.
[9] Operational Standards http://www.emr.gov.yk.ca/forestry/operational_standards.html.

Creek timber harvest planning area is that the small grassy or shrubby wetlands throughout the area are of particular importance to wildlife. Wildlife trails associated with the wetlands will be kept as free of debris as possible, to allow wildlife access to the wetlands, and existing natural regeneration and living trees around the wetlands will be retained as much as possible to provide visual cover and shelter from heat and cold. Access will be built as far from wetlands as possible. The Standards will be referred to for further management guidelines.

### 6.7.4 Dry grass, shrub and open aspen slopes

There are a few dry grassy, shrubby or open aspen slopes within the Quill Creek timber harvest planning area, within the area mapped as having high wildlife values in the Integrated Landscape Plan (section 1.3). These warm, south-facing areas are of particularly high ecological value. Wildlife (birds, ungulates, bears) use these areas for feeding, denning, nesting and breeding. They also have a higher probability of being habitat for species at risk, because they are comparatively rare habitat types in the Haines Junction area.

Access roads and landings should not be built in these areas, except when there is no other option, to avoid soil disturbance that may result in the introduction of invasive plants and to avoid long-term disturbance to wildlife using the areas. There are generally few dead spruce associated with these areas, so they are a lower priority for harvesting except when immediately adjacent to better harvest areas.

### 6.7.5 Kathleen River cliffs – bank swallows and Dall's sheep

The Kathleen River has significant cliffs along much of the northeast side of the timber harvest planning area. The cliffs were surveyed in June 2019 by a qualified Registered Professional Biologist to determine the presence or absence of raptors nesting on the cliffs. No raptors, raptor nests or signs of raptors were observed in the survey. The unstable cliffs are formed of sediments making the cliffs generally unsuitable for nesting by raptors.

*Figure 5: Kathleen River cliffs*

During the raptor survey, it was noted that the area has been used by Dall's Sheep. The following recommendations will be followed:

- No harvesting within 300 metres of the cliffs between September 15 and December 15;
- Have environmental monitors check the tops of the cliffs prior to harvesting for recent sheep use;
- Postpone harvesting until sheep have left the area; and
- Maximize retention of live timber within 100 meters of the cliff.

Bank swallows have been observed nesting along southern portions of the cliffs in locations that would not be affected by proposed timber harvesting. If bank swallows are observed nesting closer to the harvest blocks the Wildlife Features Standards and Guidelines will be followed.

### 6.7.6 Lodgepole Pine

The boundary of stands of lodgepole pine will be marked as a reserve prior to timber harvest operations. Known locations of lodgepole pine are given in Table 15. Other live and dead lodgepole pine, outside stands identified prior to harvesting, will also be reserved from harvest. Pine regeneration will be protected, including leaving 'branchy' dead logs over areas of pine regeneration to partially protect their new growth from grazing by snowshoe hares and/or moose. Machinery will not be operated inside pine stands at any time of year, to protect pine regeneration and general biodiversity values.

Table 15: Known lodgepole pine locations

| Harvest Block | Site # | Latitude | Longitude | Comments |
|---|---|---|---|---|
| **Between QC-24 & QC-25** | LP-01 | 60.672666 | 137.281219 | single young pine tree; slope crest |
| | LP-02 | 60.672105 | 137.280432 | mature pine stand; high wildlife; slope crest |
| | LP-03 | 60.671569 | 137.279963 | pine stand |
| **QC-30** | LP-04 | 60.647593 | 137.307507 | pine stand |
| | LP-05 | 60.647104 | 137.315338 | pine tree |

## 6.8 Reforestation

Standards and guidelines for silviculture and reforestation, used to guide forest management activities within Yukon are in the process of being developed. Any applicable silviculture or reforestation standards and guidelines that are developed for Yukon by the Forest Management Branch will be applied to operations within this timber harvest planning area.

It may be desirable to supplement natural reforestation processes some of the harvest blocks within the timber harvest planning area in order to encourage forest stand development. A reforestation plan may be developed to achieve this goal and may propose activities such as tree planting or aerial seeding. Where it may be desirable to supplement natural reforestation of a harvest block, consult with the Forest Management Branch.

## 6.9 Schedule for Timber Harvesting

Detailed schedules for timber harvesting will be provided in the site plan of each cutting permit issued within this timber harvest plan. There appear to be opportunities for both winter and summer harvesting within the timber harvet planning area.

The Integrated Landscape Plan (Resource Assessment Technical Working Group 2006: p.12) provides guidance regarding the season and timing of harvest. It is expected that most harvesting will be on winter frozen ground, but summer harvesting is also possible and desirable to provide employment opportunities. Initial assessments of values such as soil conservation and wildlife habitat within this timber harvest planning area indicate that harvesting operations may be proposed in any season. However, the timing of harvesting operations may be restricted by factors related to soil conservation, nesting migratory birds, wildlife values, heritage values, traditional activities, and other factors as described elsewhere in the timber harvest plan. In particular, the high wildlife values area of the timber harvest plan will be managed for moose late winter range value (especially near wetland, stream and aspen areas), and grizzly bear spring, summer, and fall use (especially associated with the major river riparian areas). All harvesting

schedules will be consistent with the Forest Management Branch's operational standards and guidelines.

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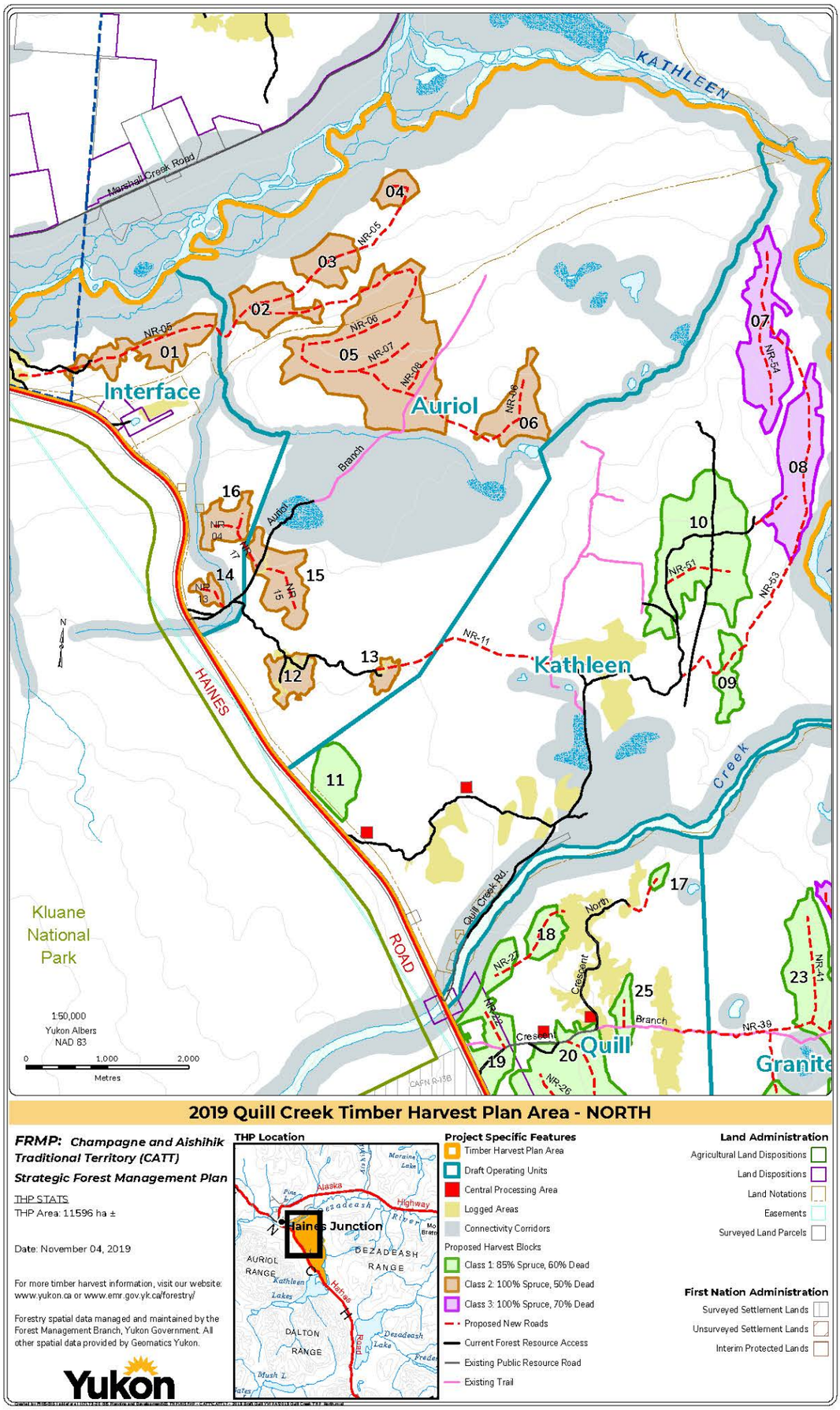
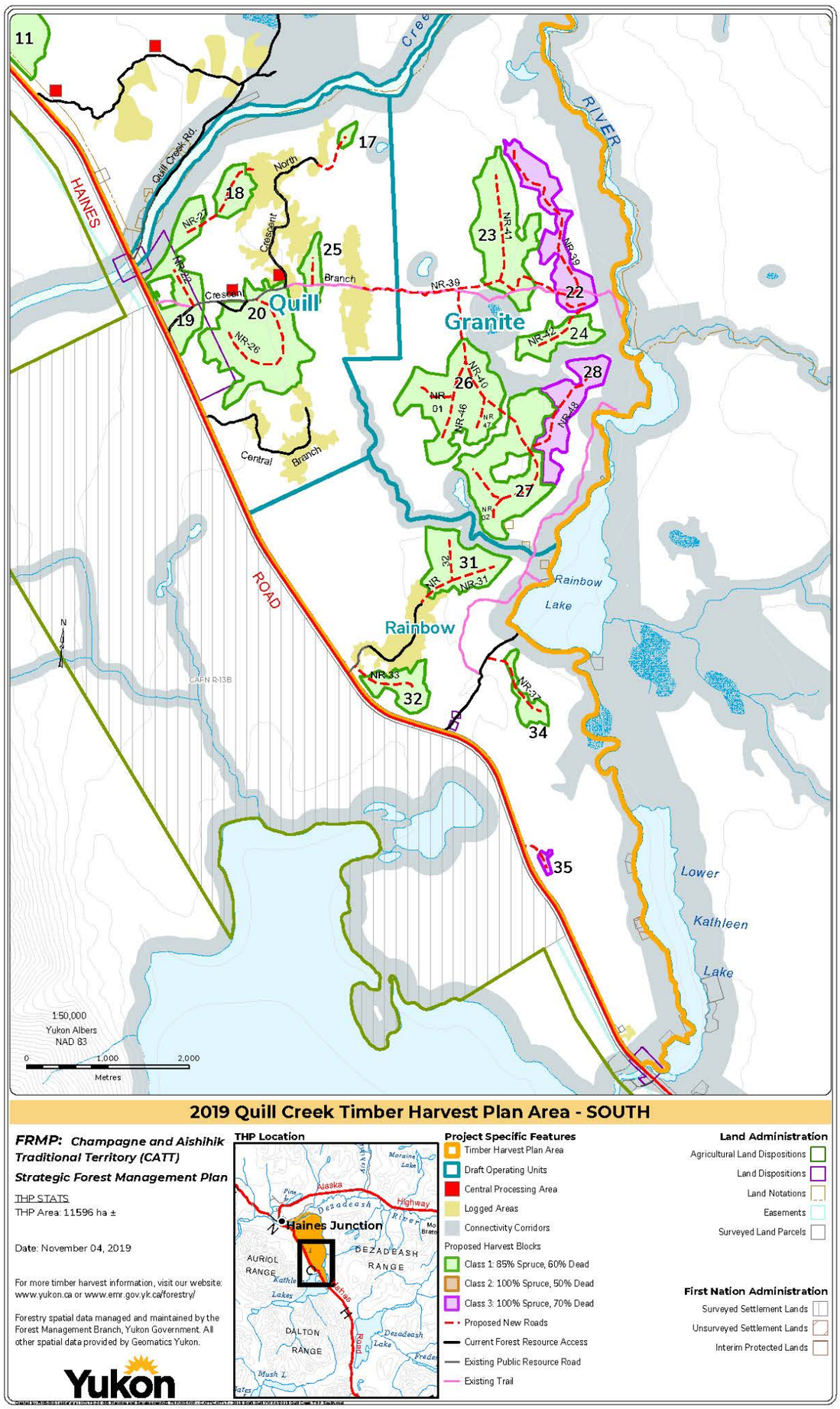
# APPENDIX 1: Harvest block and access road maps






## 2019 Quill Creek Timber Harvest Plan Area - SOUTH

***FRMP:*** ***Champagne and Aishihik Traditional Territory (CATT)***

***Strategic Forest Management Plan***

THP STATS
THP Area: 11596 ha ±

Date: November 04, 2019

For more timber harvest information, visit our website: www.yukon.ca or www.emr.gov.yk.ca/forestry/

Forestry spatial data managed and maintained by the Forest Management Branch, Yukon Government. All other spatial data provided by Geomatics Yukon.

Yukon

**THP Location**




**Project Specific Features**

- Timber Harvest Plan Area
- Draft Operating Units
- Central Processing Area
- Logged Areas
- Connectivity Corridors

Proposed Harvest Blocks

- Class 1: 85% Spruce, 60% Dead
- Class 2: 100% Spruce, 50% Dead
- Class 3: 100% Spruce, 70% Dead
- Proposed New Roads
- Current Forest Resource Access
- Existing Public Resource Road
- Existing Trail

**Land Administration**

- Agricultural Land Dispositions
- Land Dispositions
- Land Notations
- Easements
- Surveyed Land Parcels

**First Nation Administration**

- Surveyed Settlement Lands
- Unsurveyed Settlement Lands
- Interim Protected Lands