

**MOOSE SURVEY**

**UPPER KLONDIKE HIGHWAY**

**LATE WINTER 2010**



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**Yukon Fish and Wildlife Branch  
TR-12-30**

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## Summary

- We conducted a late-winter survey of moose in the area southwest of Mayo and north of Pelly Crossing on 3 – 8 March 2010, using fixed-wing aircraft. The main purpose of this survey was to map the distribution and late-winter habitats of moose in this area.
- We flew over the entire survey area and spent about half a minute per km<sup>2</sup> searching for moose. We found a total of 71 moose, of which 69 were adults and 2 were calves. We also mapped all observations of fresh moose tracks.
- Moose were widely distributed across the survey area. Most were seen in willow-rich habitats in recently burned areas, open forest, and along creeks; relatively few remained in the main river valleys. The biggest concentrations of moose were in the hills southwest of Stewart Crossing, which were mostly burned in fires in 1998 and 1982, and unburned open ridges northwest of Pelly Crossing. Moose were also concentrated on ridges northeast of Diamain Lake and west of the McArthur Range, some of which were unburned and others burned in 1998 and 2004 fires.
- Only 3% of moose seen in the survey were calves. Although this may be negatively biased because of lower sightability of cows with calves, it is still low compared to other late-winter surveys, so recruitment appears to have been low in 2009/2010 in this area.
- Harvest of moose in this area appears to be slightly below maximum sustainable levels.

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## Introduction

This report summarises the results of the late-winter survey of moose in a part of the Upper Klondike Highway Moose Management Unit (Map 1), conducted on 3 – 8 March 2010. The main purpose of the survey was to determine the distribution and late-winter habitats of moose in this area.

### **Previous Surveys**

The Yukon Fish and Wildlife Branch has previously conducted 2 other surveys in the same area as this survey: a full census in November 2002 (results in O'Donoghue et al. 2003), and an early-winter habitat-survey in November 2006 (results in O'Donoghue 2010). There have also been other surveys in previous years in areas that overlapped with this survey area (Map 2). We conducted early-winter surveys that included areas south and west of Mayo in 1988, 1993, and 1998 (results in Larsen et al. 1989, Ward and Larsen 1994, and Yukon Fish and Wildlife Branch file reports), and in the Pelly Crossing area in 1995 (results in Yukon Fish and Wildlife Branch file reports). We have monitored over-winter survival of moose calves with late-winter surveys in the Mayo area, including the northern part of this year's survey area, from 1993 to 1999 and in 2003 (results in O'Donoghue and Sinnott 2003 and Yukon Fish and Wildlife Branch file reports). In March 2001, we also flew over all but the northern-most portion of this year's survey area to map late-winter distribution of moose (O'Donoghue 2005).

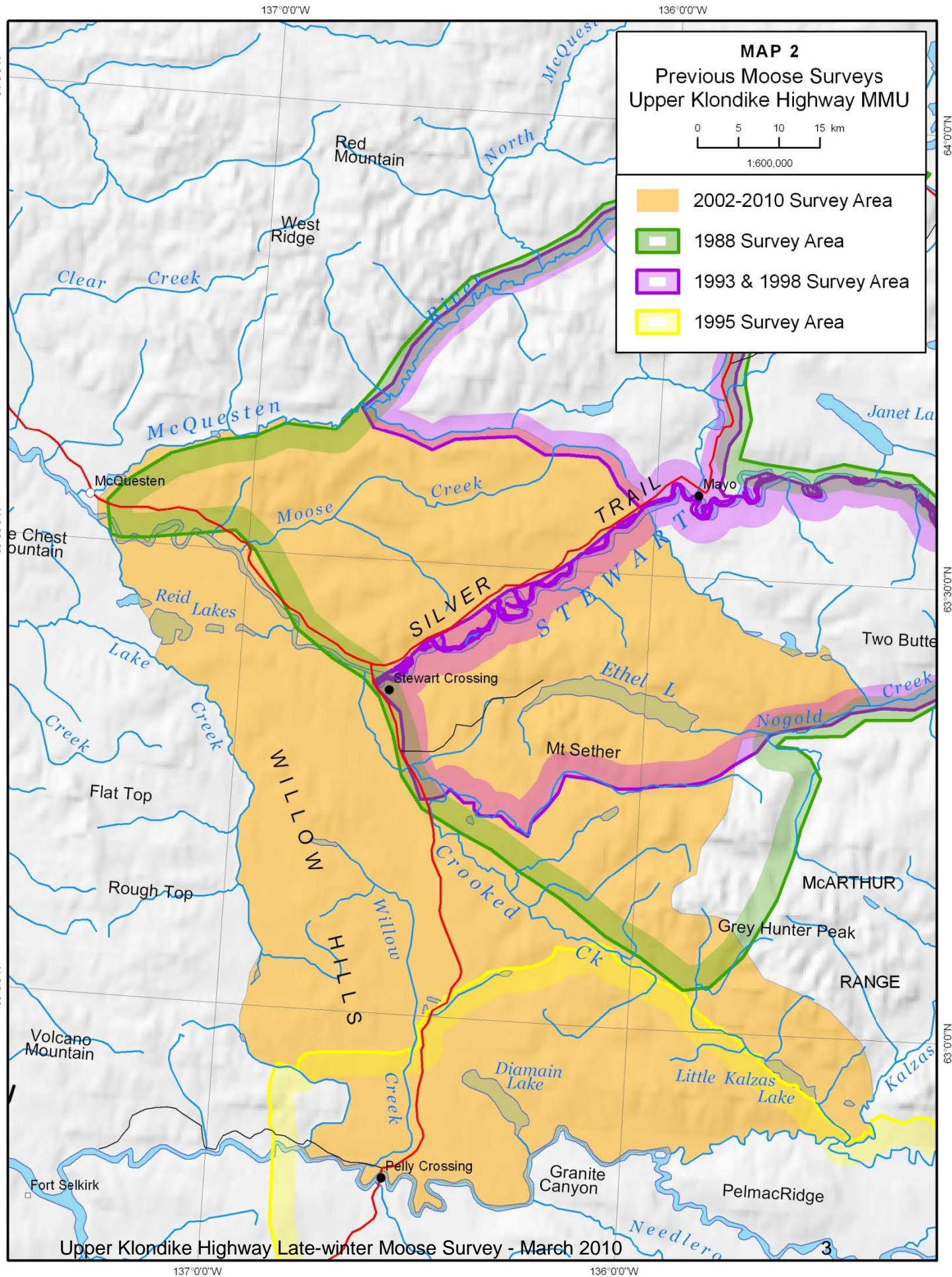
### **Community Involvement**

Residents of the Pelly Crossing and Mayo areas have consistently placed a high priority on monitoring the health of local moose populations. Concerns about high hunting pressure and fewer moose seen in this area, which is an important hunting area for both the Selkirk First Nation and First Nation of Na-Cho Nyäk Dun, have been expressed at Northern Tutchone May Gatherings. The need to monitor moose in this area is also noted in the *Community-based Fish and Wildlife Work Plan for the Na-Cho Nyäk Dun Traditional Territory, 2008-2013*. Selkirk First Nation co-funded the survey, and both the Selkirk First Nation and the First Nation of Na-Cho Nyäk Dun provided staff to help conduct it.

### **Study Area**

The Upper Klondike Highway survey area was situated to cover the areas most accessible and used by hunters, and to conform to the boundaries of Yukon Moose Management Units. The survey area also includes the western portion of the Ddhaw Ghro Moose Management Unit (Game Management Subzone 4-03; Map 1). These Moose Management Units were developed to help us more consistently monitor and manage moose in all areas throughout





Yukon. We plan to monitor the health of moose populations in priority moose management units on a regular basis, using both aerial and ground-based surveys.

The Upper Klondike Highway Moose Management Unit is about 8,690 km<sup>2</sup>, and includes Game Management Subzones (GMS) 2-52, 2-53, 2-57, 3-09, 3-17, 3-18, 4-01, and 4-02 (Map 1). The survey area within this Moose Management Unit is about 5,956 km<sup>2</sup>. The north border runs east along the McQuesten River and Bear Creek. The eastern border is Talbot Creek, south to Nogold Creek, and along the western flank of the McArthur Range, south to the Macmillan River. The Macmillan and Pelly rivers are the southern border, and Lake Creek and Reid Lakes make up the western border.

Most of the study area (about 5,764 km<sup>2</sup>) is considered suitable moose habitat, except for approximately 3% of the area, which includes large water bodies (more than 0.5 km<sup>2</sup>) and land over 1,524 m (5,000 feet) in altitude. The study area consists mostly of rolling hills and plateaus, dissected by numerous creeks, in the drainages of the Stewart and Pelly Rivers. Most of the area is forest-covered with black and white spruce, lodgepole pine, aspen, and paper birch. Willow and dwarf birch shrub habitats, alpine tundra, and unvegetated rocky areas typify the higher plateaus, scattered throughout the study area, especially around Ethel Lake, the west flank of the McArthur Range, and the ranges north of the Macmillan River. Old and recent

burns occur throughout the study area (Map 3), and these vary in quality as moose habitat. The most recent fires were a 503 km<sup>2</sup> burn northeast of Diamain Lake in 2004, an 804 km<sup>2</sup> burn southwest of Stewart Crossing, and a 90 km<sup>2</sup> burn in the north of the survey area along Bear Creek, both in 1998.

## Methods

We used a survey method called “intensive stratification”, which gives us good information about the distribution and areas of concentration of moose over the whole survey area. The technique involves the following steps:

1. The survey area is divided into uniform rectangular blocks 15-16 km<sup>2</sup> in size. We used the same survey blocks as those used in the 2002 and 2006 surveys.
2. Observers in fixed-wing aircraft fly over all the blocks, making about 4 passes through each block and classifying (or “stratifying”) them as having either high, medium, low, or very low expected moose abundance, based on local knowledge, number of moose seen, tracks, and habitat. This is the same as the “stratification” part of a full census survey, except that we cover the area at about 4 times the intensity to get more complete information.



137°0'0"W

136°0'0"W

64°0'0"N

64°0'0"N

63°30'0"N

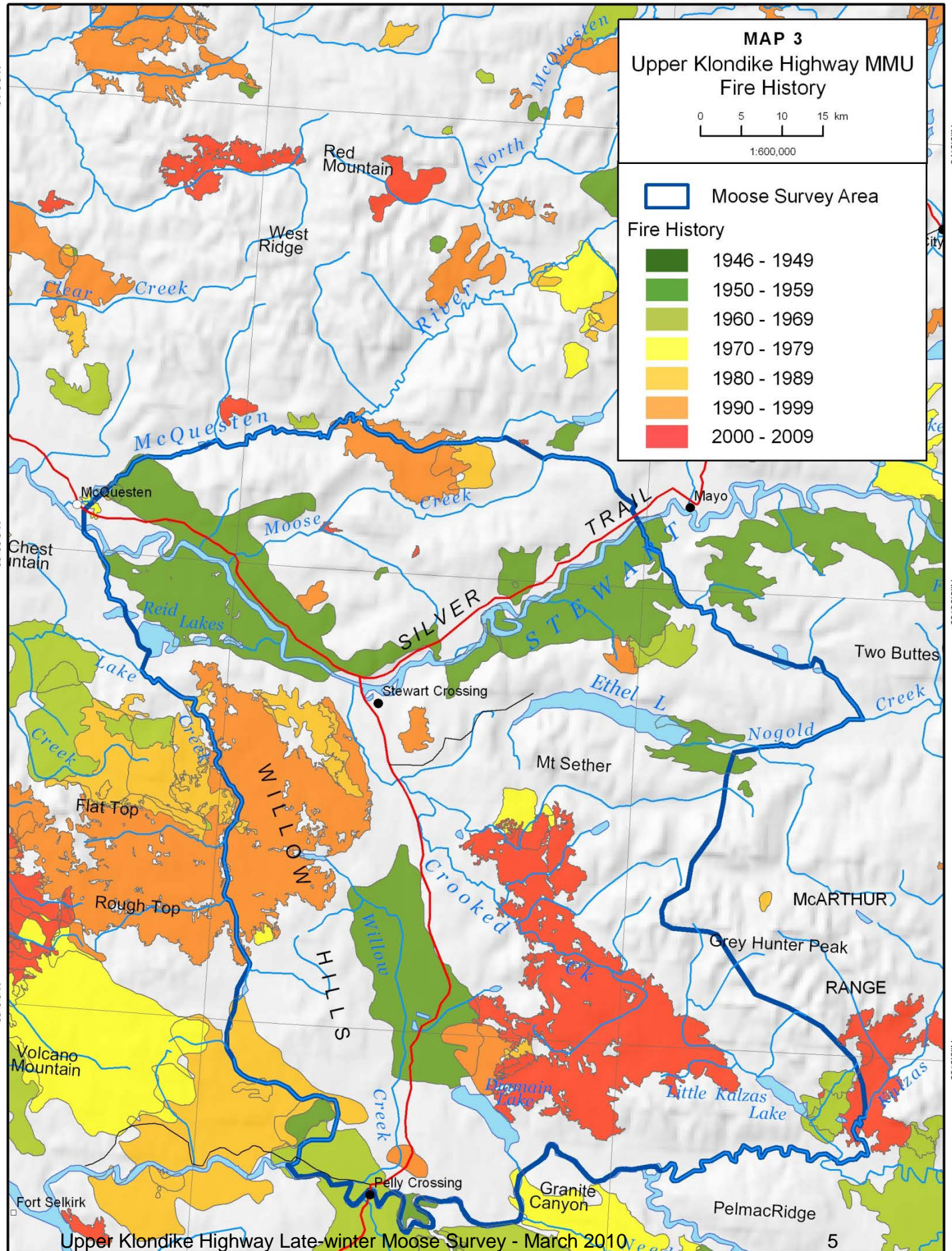
63°30'0"N

63°0'0"N

63°0'0"N

137°0'0"W

136°0'0"W



**MAP 3**  
**Upper Klondike Highway MMU**  
**Fire History**

0 5 10 15 km  
 1:600,000

Moose Survey Area

**Fire History**

- 1946 - 1949
- 1950 - 1959
- 1960 - 1969
- 1970 - 1979
- 1980 - 1989
- 1990 - 1999
- 2000 - 2009

Upper Klondike Highway Late-winter Moose Survey - March 2010

3. We count and get a GPS location of each moose or group of moose we see. We classify all moose seen by age (adult or calf) when possible, but we do not put as much effort into this as we do during censuses when we are making estimates of population composition. Except for cows with calves, we do not try to determine the sex of moose. For this survey, we also recorded a GPS location for each sighting of fresh moose tracks, in order to supplement our data from animal observations.

## **Weather and Snow Conditions**

Weather conditions for this survey were challenging because of strong south winds on all but one day of flying. Temperatures ranged from -15°C to +4°C. Skies were a mostly a mix of sun and clouds; we were unable to fly on one day because of low clouds and snow. We had to abandon flights during the afternoon on another day because of high winds. Light conditions ranged from flat to bright and snow coverage was complete, so visibility was generally good for spotting moose.

## **Results and Discussion**

### ***Coverage***

It took us about 43.1 hours to count moose in the 383 blocks in our survey area, for a search intensity of 0.43 minutes per km<sup>2</sup>. This is slightly lower than our target search

intensity of 0.5 minutes per km<sup>2</sup>, and corresponded with flying through each block about four times and circling animals when needed to verify sightings. High winds limited our ability to completely cover some of the alpine blocks, and this partially contributed to our lower sampling intensity. We needed an additional 14.6 hours to ferry to and from the survey area and fuel supplies in Mayo and Pelly Crossing. The time devoted to ferrying was about 25% of the total flight time.

### ***Observations of Moose***

We counted a total of 71 moose; 69 of them were adults and 2 were calves (see Table 1). We spent 2583 minutes (43.1 hours) searching the survey blocks for moose, so we saw an average of 0.03 moose per minute of survey time. The number of moose seen in this survey is only about 10% of the total (711) seen in a similar survey in early winter 2006 (O'Donoghue 2010)—this reflects the higher visibility of moose in early winter when many are grouped up in open subalpine habitats. In addition to moose seen, we also noted fresh moose tracks at 307 locations (locations of moose tracks were not recorded in one area in the southeast part of the survey area; Map 4).

**Table 1.** Observations of moose during the March 2010 survey in the Upper Klondike Highway Moose Management Unit.

	<b>Number Observed</b>	<b>Percentage of Moose Observed</b>
Adults	69	97
Calves	2	3

### ***Distribution of Moose***

Moose were widely distributed in the survey area (Map 4). The biggest concentrations of moose were in the hills southwest of Stewart Crossing (the Willow Hills), mostly in the areas burned in 1998 and 1982; in mostly unburned open forest in the hilly terrain northwest of Pelly Crossing; and on the ridges northeast of Diamain Lake and west of the McArthur Range, which are a mix of areas burned in 1998 and 2004 fires and unburned open forest. We saw smaller concentrations on the open forest ridges north of Ethel Lake and on ridges burned in 1998 between Bear Creek and Moose Creek in the northern part of the survey area. This distribution is similar to that seen in our November 2006 survey, with the exception that more moose were seen in the 2004 burned area in late winter this year than in early winter 2006.

Moose were mostly in habitats—open ridges, along creeks, and in recent burns—with abundant willow growth. Relatively few moose or tracks were seen in the main valleys of the Stewart, Pelly, and McQuesten rivers. Likewise, we saw few moose or tracks of moose in

areas of dense lowland black spruce, except where associated with willows along creeks. Sightability of moose was undoubtedly better in more open habitats but we did not see evidence from tracks that we were missing any concentrations of moose in the dense spruce and aspen forests that had little shrub cover.

Moose typically concentrate in river valleys in the central Yukon during winters of deep snow, moving down from their preferred early-winter subalpine habitats when snow depths get too deep as the winter progresses (Fraser et al. 2001, O'Donoghue 2005). Snowfall was well below normal in the Mayo area during the winter of 2009-2010 (50-70% of normal in March; Yukon Department of Environment 2010), and snow depths were lower than those that would negatively affect moose. Distribution of willows likely affected habitat use by moose in this area in late winter 2010 more than did snow depths.

137°0'0"W

136°0'0"W

64°0'0"N

63°30'0"N

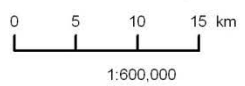
63°0'0"N

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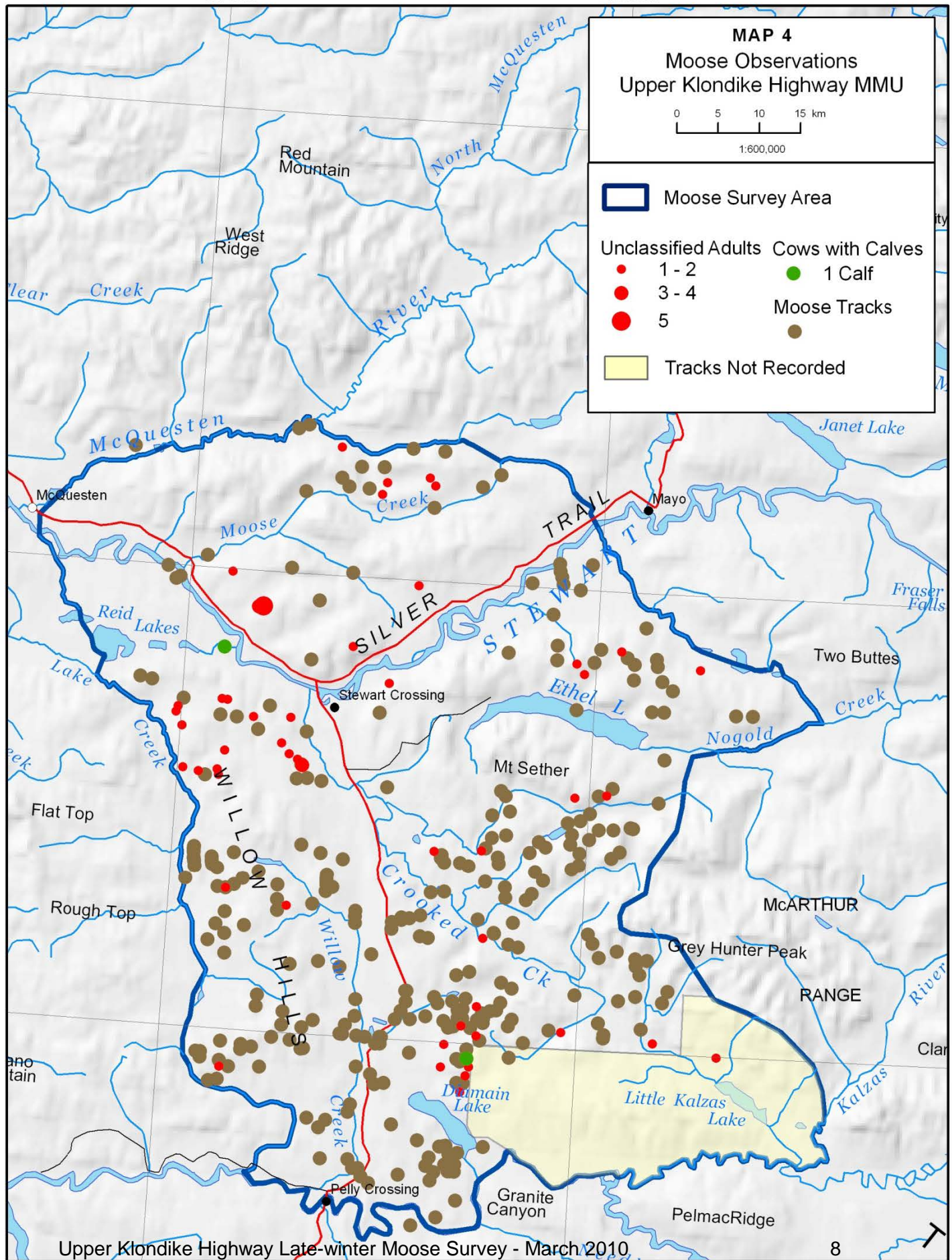
63°30'0"N

63°0'0"N

**MAP 4**  
**Moose Observations**  
**Upper Klondike Highway MMU**



- Moose Survey Area
- Unclassified Adults
  - 1 - 2
  - 3 - 4
  - 5
- Cows with Calves
  - 1 Calf
- Moose Tracks
  -
- Tracks Not Recorded



Upper Klondike Highway Late-winter Moose Survey - March 2010

137°0'0"W

136°0'0"W

### ***Ages and Sexes of Moose***

We classified all of the moose we saw by age, but we cannot translate these observations directly into estimates of the composition of the moose population in the study area. Stratification surveys such as this are aimed mostly at determining the distribution of moose in the survey area. The data are valuable for important habitats and also for dividing up the survey blocks covering the area into “strata” or categories of high and low expected densities of moose for future censuses.

The observed proportions of moose of different ages that we saw were likely biased compared to those of the actual population. Previous surveys have shown that cow moose, particularly cows with calves, tend to space themselves away from other moose more than bulls do, so that there is a higher proportion of cows in low-density survey blocks than there is in high-density blocks. Low-density blocks also typically have lower sightability, because forest canopies are, on average, denser. As a result of these differences in sightability, we likely miss seeing more cows and calves than we do bulls when we search over all habitats with the same intensity, so our observations will be biased. Census surveys, in which survey blocks are searched very intensively and counts are corrected for sightability, are more appropriate for estimating population composition than are intensive stratification surveys.

The age classifications observed in this survey can be compared directly with the results from similar late-winter surveys in the future. Our observed composition index was 3% calves in the population. Although likely biased low, 3% calves is also low compared to that found in other late-winter surveys elsewhere in the Yukon, so it is likely that survival of calves to 10 months of age was low in this area during the last year.

### ***Identification of High and Low-Density Blocks***

We divided the survey blocks into 4 categories of expected moose density, for use in future censuses of the survey area. We classified 10 (3%) of the 383 survey blocks as high, 52 (14%) as medium, 114 (30%) as low, and 207 (54%) as very low expected abundance of moose (Map 5), based on our observations from the air and from previous surveys. Most of the blocks with higher expected numbers of moose were located in the burns where we observed highest numbers of moose in this survey, in open hilly areas, and in areas with dense willows along creeks. For the purpose of selecting blocks for future late-winter censuses, we could group the blocks classified as expected high, medium, and low numbers of moose into a High stratum with 176 blocks, and consider the 207 blocks with very low expected numbers of moose to make up the Low stratum.

137°0'0"W

136°0'0"W

64°0'0"N

64°0'0"N

63°30'0"N

63°30'0"N

63°0'0"N

63°0'0"N

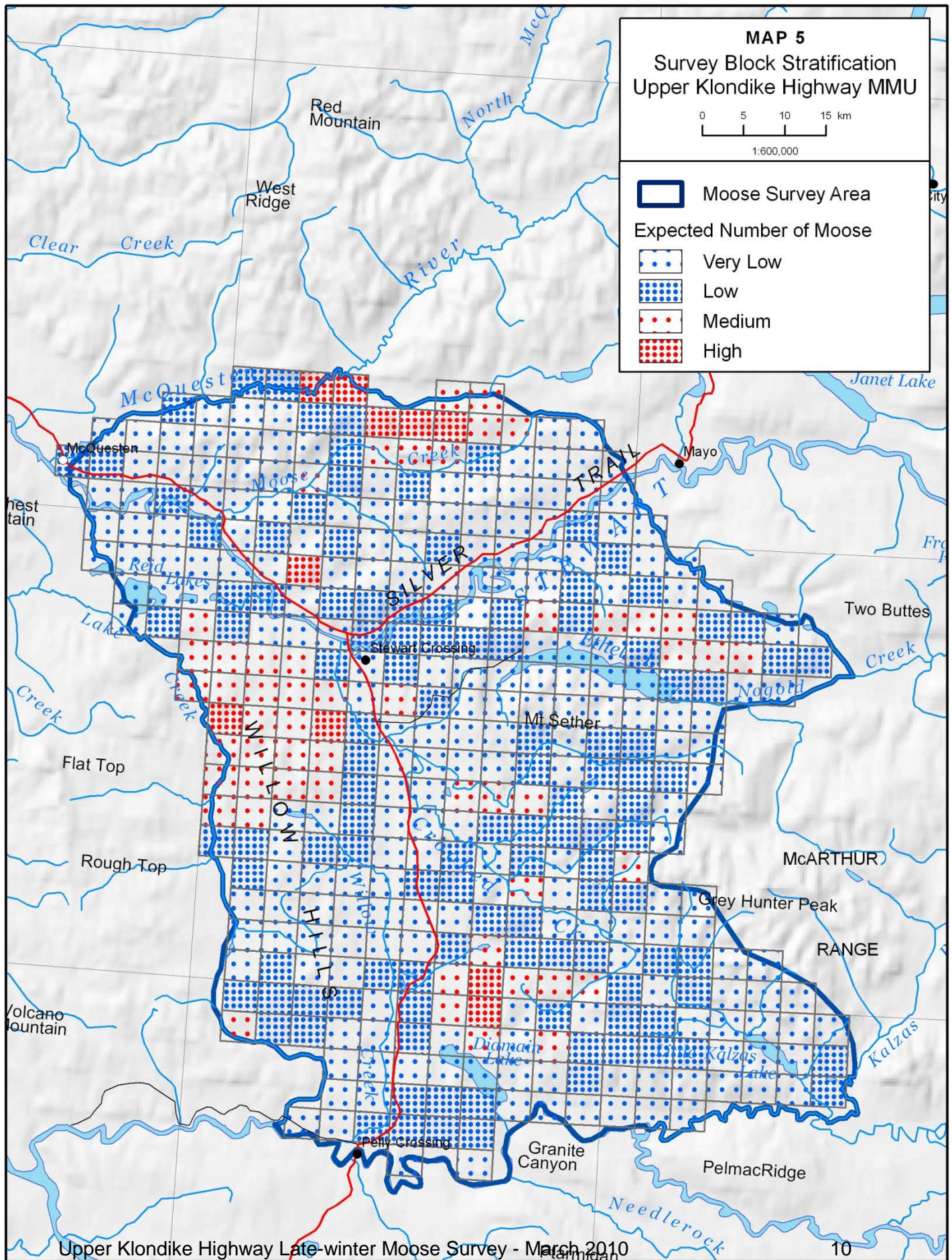
**MAP 5**  
**Survey Block Stratification**  
**Upper Klondike Highway MMU**

0 5 10 15 km  
 1:600,000

**Moose Survey Area**

**Expected Number of Moose**

- Very Low
- Low
- Medium
- High



Upper Klondike Highway Late-winter Moose Survey - March 2010

137°0'0"W

136°0'0"W

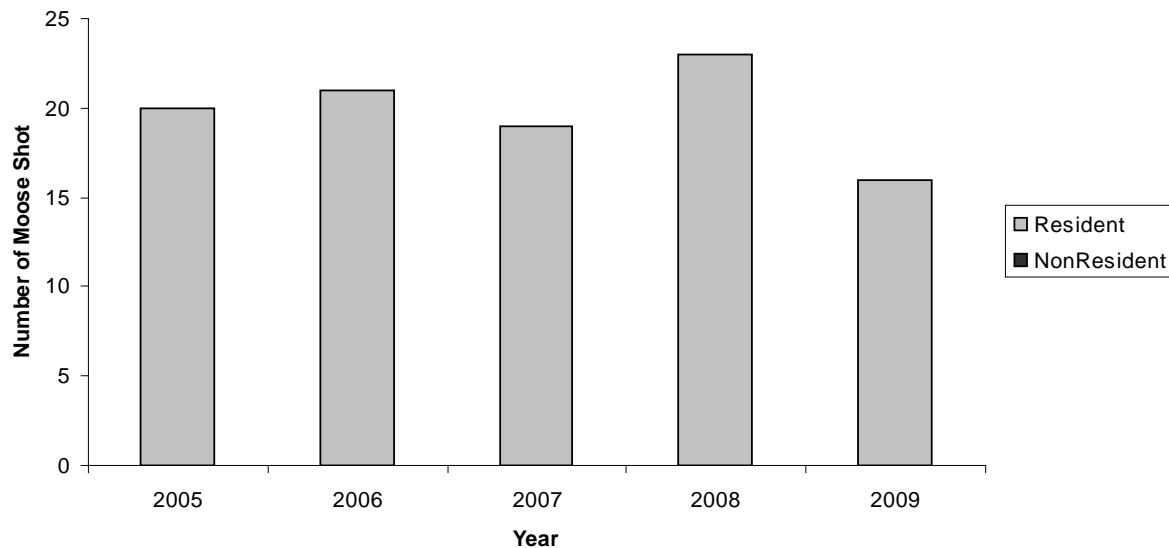
## Harvest

The reported harvest of moose by licensed hunters in the Upper Klondike Highway Moose Management Unit during the last 5 years for which we have completed records (2005 to 2009) averaged about 20 moose per year (see graph below). This does not include harvest data from First Nation hunters, which are reported annually at Northern Tutchone May Gatherings. First Nation harvest rates are similar to those of licensed resident hunters in much of the central Yukon. Using our best estimates of moose density, we estimate that the annual harvest in the Upper Klondike Highway Moose Management Unit is slightly below the recommended maximum sustainable harvest rate of 4% for this area. This area is an important and accessible hunting area for hunters from the Selkirk First Nation, First Nation of Na-Cho Nyäk Dun, and resident licensed hunters.

We need to continue to closely monitor both harvest and the moose population in this area to ensure that the population remains healthy

## Other Wildlife Sightings

During the survey, we also recorded sightings of other notable observations of wildlife besides moose. We saw three groups of caribou from the Ethel Lake herd in groups of 4, 5, and 10 animals, for a total of 19 caribou. These were located on the slopes southeast of Ethel Lake and in the valley west of the McArthur Range. We also saw 3 sheep on Mount Sether.



## Conclusions and Recommendations

- Habitat with abundant willows in hilly terrain and recent burns supported the highest densities of moose in this area in late winter 2010. The hills southwest of Stewart Crossing in the Willow Hills, northwest of Pelly Crossing, and northeast of Diamain Lake had the largest concentrations of moose in the area. Snow depths were very low this winter and, based on previous surveys, moose in this area typically concentrate more in the larger river valleys during winters with deep snow.
- Recruitment of moose appears to have been low in this area during the past year.
- Present levels of harvest of moose in the Upper Klondike Highway Moose Management Unit are likely near maximum sustainable levels. This area is an important and accessible hunting area for First Nation and licensed hunters.
- We should continue to monitor moose populations in this area using aerial and ground-based monitoring.



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