

**MOOSE SURVEY**

**LITTLE SALMON AND MAGUNDY  
RIVERS**

**LATE-WINTER 2007**



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LITTLE SALMON AND MAGUNDY RIVERS  
LATE-WINTER 2007**

**Yukon Department of Environment  
Fish and Wildlife Branch  
TR-13-10**

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## Summary

- We conducted a late-winter survey of moose along the Little Salmon and Magundy rivers on 1-8 March 2007, 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 0.66 minutes per km<sup>2</sup> searching for moose. We found a total of 114 moose, of which 99 were adults and 15 were calves.
- Moose were widely distributed across the survey area. Most were seen in willow-rich habitats in recently burned areas in the northwest part of the survey area, and relatively few were in the main Little Salmon and Magundy river valleys. The biggest concentration of moose was in the southern Tatchun Hills area which burned in a fire in 1998.
- About 13% of moose seen in the survey were calves. This may be negatively biased because of lower sightability of cows with calves, but it is about average compared to other late-winter surveys, so recruitment appears to have been average this year in this area.

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## Introduction

This report summarises the results of the late-winter survey of moose along the Little Salmon and Magundy rivers (see Map 1), conducted 1-8 March 2007. The survey included parts of the Tatchun, Big Salmon, and Glenlyons/Lower Tay River Moose Management Units. The main purpose of the survey was to map the distribution and late-winter habitats of moose in this area.

### **Previous Surveys**

Environment Yukon has not previously surveyed moose in most of the 2007 survey area. There have been 2 surveys in previous years in areas that overlapped with the northern part of this survey area (see Map 2). In November and December 2000, Environment Yukon and Selkirk First Nation conducted an early-winter survey of moose over a very large area up the Pelly and Macmillan rivers that included a small overlapping area south of Drury Lake (results in Environment Yukon 2003). We also conducted an early-winter census of moose in the Faro area in November 2004 which overlapped with the northeastern part of the 2007 survey area (results in Environment Yukon 2007).

### **Community Involvement**

This survey was conducted largely because the riparian habitat along the Little Salmon and Magundy rivers was identified as regionally important moose habitat by residents of the Carmacks area during planning sessions for

developing the *Community-based Fish and Wildlife Management Plan for the Little Salmon/Carmacks First Nation Traditional Territory, 2004-2009*. Interest in mapping seasonally important habitats has also been expressed at annual Northern Tutchone May Gatherings. The river is an important hunting area for the Little Salmon/Carmacks First Nation.

## Study Area

The survey area was located to cover the Little Salmon and Magundy river valleys, east to about 7 km from Faro. North and south boundaries generally followed the height of land on either side of the 2 rivers. The survey area was about 2,322 km<sup>2</sup>, and included parts of Game Management Subzones 4-14, 4-15, 4-42, 4-52, 8-02, 8-03, 8-05, 8-18, and 8-19 (see Map 1)

The study area was centered on the Little Salmon and Magundy river valleys (including Little Salmon Lake), which are mostly vegetated with dense spruce forest with numerous sloughs and riparian willow flats. The terrain is mostly rolling hills and plateaus, dissected by numerous creeks, with high alpine peaks to the north and south of Little Salmon Lake and on the southern flanks of the Glenlyon Range. Most of the upland area is forest-covered with black and white spruce, lodgepole pine, aspen, and paper birch. Willows and dwarf birch are the main shrub species, and are especially dense along river and creek valleys and in recent burns.

There are open subalpine ridges at higher altitudes spread throughout most of the survey area.

Most of the area is unburned, but there are several old and recent burns in the west and east (see Map 3), and these vary in quality as moose habitat. The largest fires were the 407 km<sup>2</sup> 1998 burn and the 443 km<sup>2</sup> 1969 burn in the western part of the survey area. Areas east of Little Salmon Lake burned back in the early 1950s.

## Methods

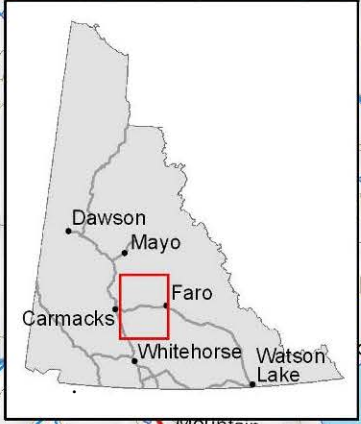
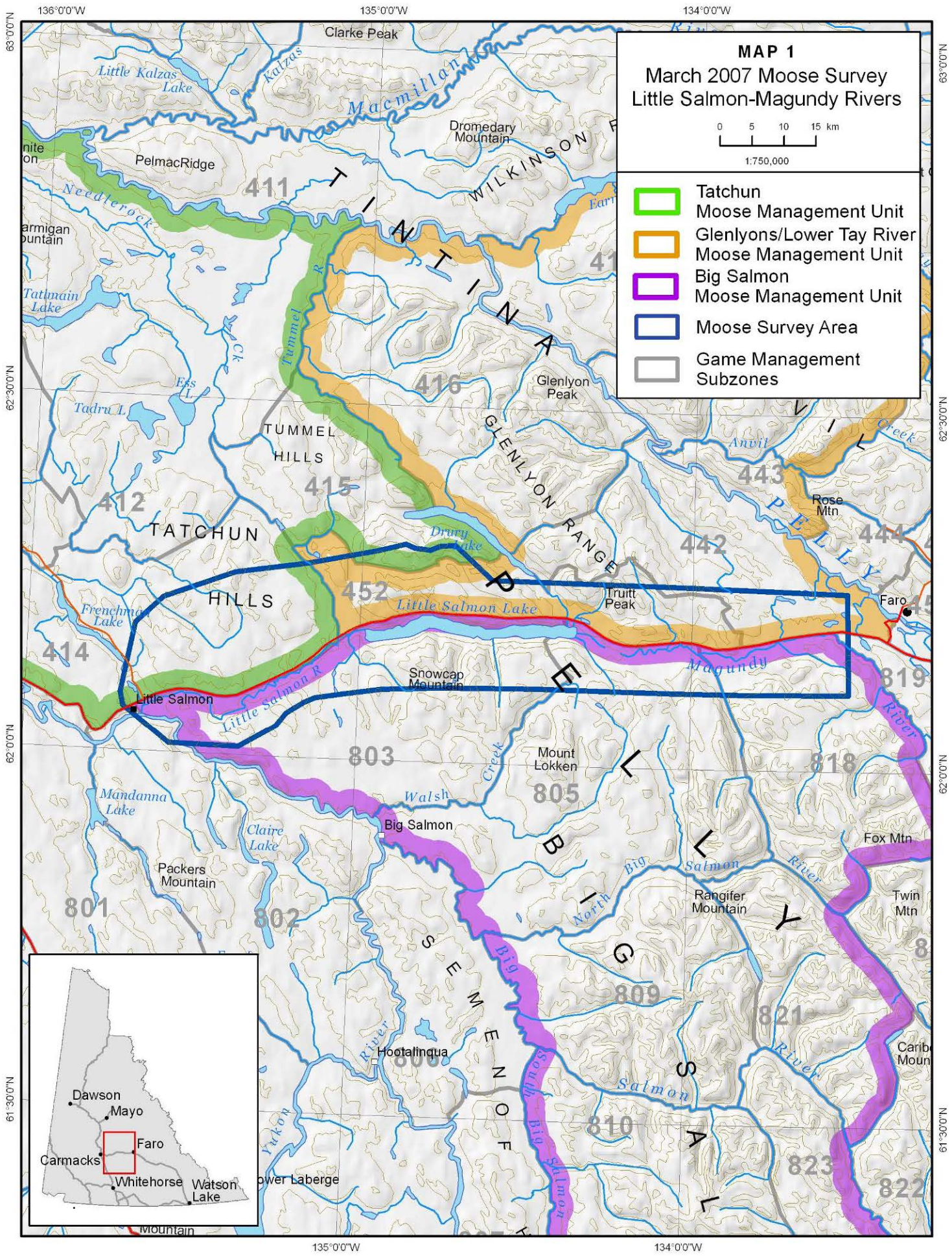
We used a survey method called “intensive stratification”, which gives us good information about the distribution and areas of concentration of moose over the entire survey area. The technique involves the following steps:

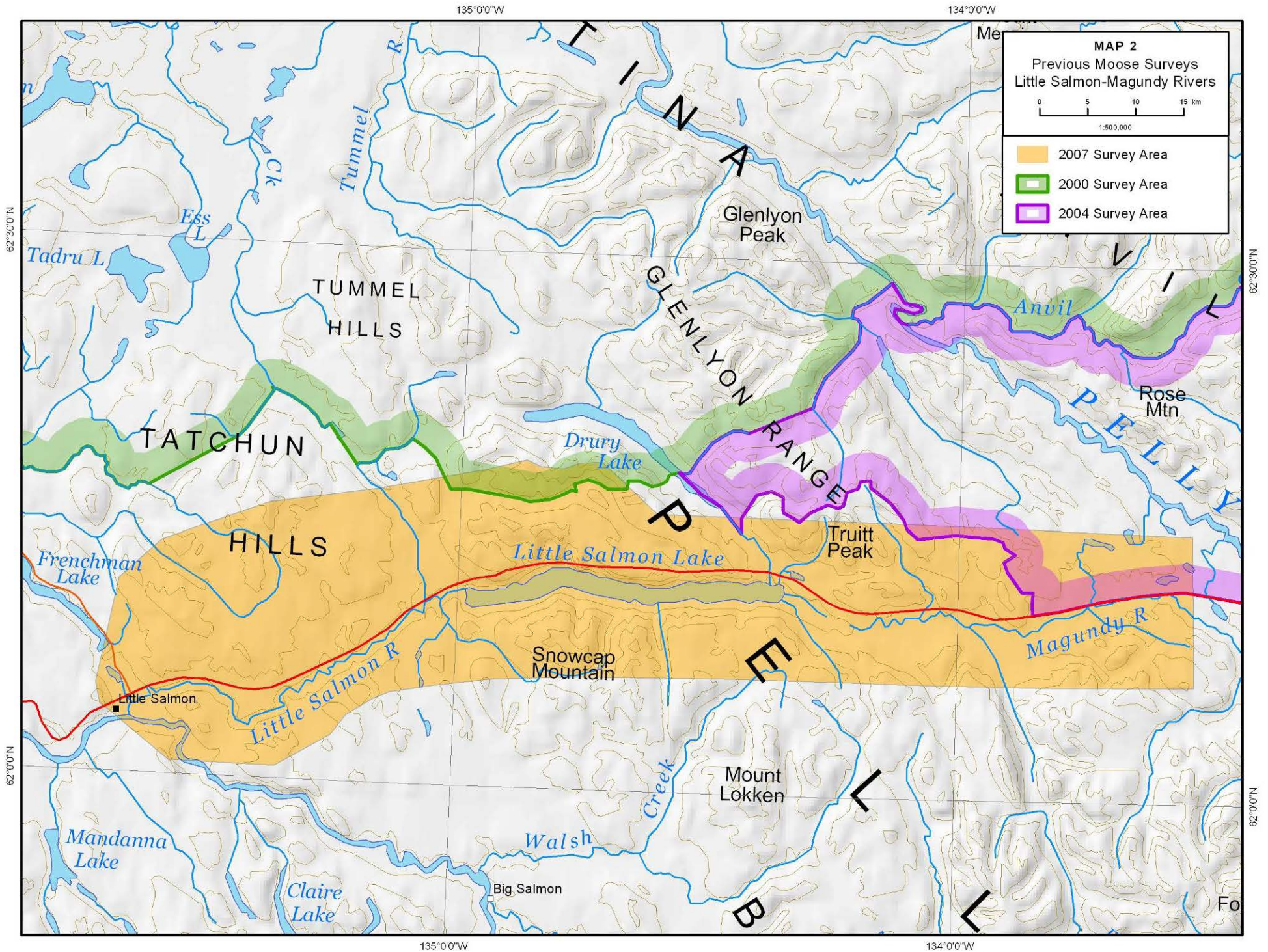
1. The survey area is divided into uniform rectangular blocks 15-16 km<sup>2</sup> (2' latitude x 5' longitude) in size.
2. Observers in fixed-wing aircraft fly over all the blocks, making about 4 passes through each block and classifying (or “stratifying”) them as having either high, medium, low, or 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 moose census survey, except that we cover the area at about four times the intensity (0.5 minutes per km<sup>2</sup>) to get more complete information.

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 sexes of moose.

## Weather and Snow Conditions

Weather conditions for this survey were generally good. Temperatures ranged from -43°C to -14°C. Skies were mostly clear at the beginning and end of the survey, and cloudy with some light snow on 4 days of flying. Winds were fairly light at 0-19 kph. Light conditions ranged from flat to bright and snow coverage was complete, so visibility was generally good for spotting moose. Visibility was limited by light snow on 2 days.







135°0'0"W

134°0'0"W

**MAP 3**  
Little Salmon-Magundy Rivers  
Fire History

0 5 10 15 km  
1:500,000

Moose Survey Area

**Fire History**

- 1946 - 1949
- 1950 - 1959
- 1960 - 1969
- 1970 - 1979
- 1980 - 1989
- 1990 - 1999
- 2000 - 2006

62°30'0"N

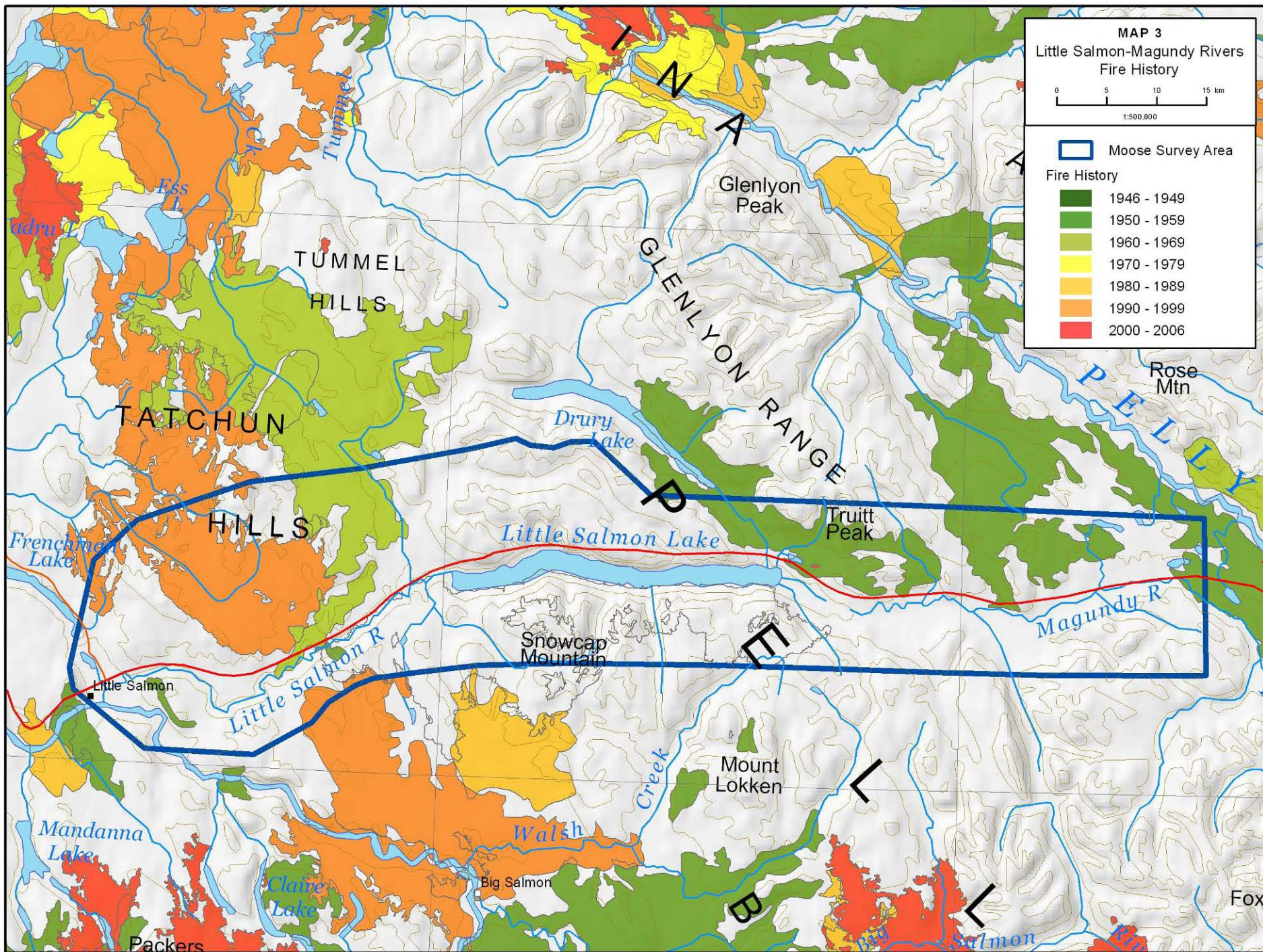
62°30'0"N

62°00'0"N

62°00'0"N

135°0'0"W

134°0'0"W



## Results and Discussion

### Coverage

It took us about 25.6 hours to count moose in the 144 blocks in the survey area, for a search intensity of 0.66 minutes per km<sup>2</sup>. This is higher than our target search intensity of 0.5 minutes per km<sup>2</sup>, and corresponded with flying through each block about 4 or 5 times and circling animals when needed to verify sightings. We needed an additional 9.0 hours to ferry to and from the survey area and fuel supplies in Carmacks and Faro. The time devoted to ferrying was about 26% of the total flight time.

### Observations of Moose

We counted a total of 114 moose; 99 of them were adults and 15 were calves (see Table 1). We spent 1,538 minutes (25.6 hours) searching the survey blocks for moose, so we saw an average of 0.07 moose per minute of survey time.

### Distribution of Moose

Moose were widely distributed in the survey area, but most observations were in the southern Tatchun Hills in the northwestern part of the survey area (see Map 4). Most moose were seen in habitats with abundant willows in the area burned in 1998 and, to a lesser extent, in 1969, and

many were on hillsides in the burns. We saw relatively few moose in the denser forested habitats in the Little Salmon and Magundy river valleys. This could partially reflect differences in visibility of moose in the different habitats. Sightability of moose was undoubtedly better in the more open burned areas than in riparian forests, but we did not see evidence from tracks that we were missing any large concentrations of moose in the dense spruce along the rivers.

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 in the Carmacks area was average to above normal during the winter of 2006-2007 (Yukon Department of Environment 2007), but snow depths at nearby snow survey stations (Mount Berdoe and Rose Creek) ranged from 45 cm to 56 cm, which are lower than those that would negatively affect moose (above 70 cm; Peek 1997). Distribution of willows likely affected habitat use by moose in this area in late winter 2007 more than did snow depths.

**Table 1.** Observations of moose during the March 2007 survey along the Little Salmon and Magundy Rivers.

	Number Observed	Percentage of Moose Observed
Adults	99	87
Calves	15	13

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

We classified all of the moose we saw by age, but we cannot translate these 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 mapping 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 late-winter surveys.

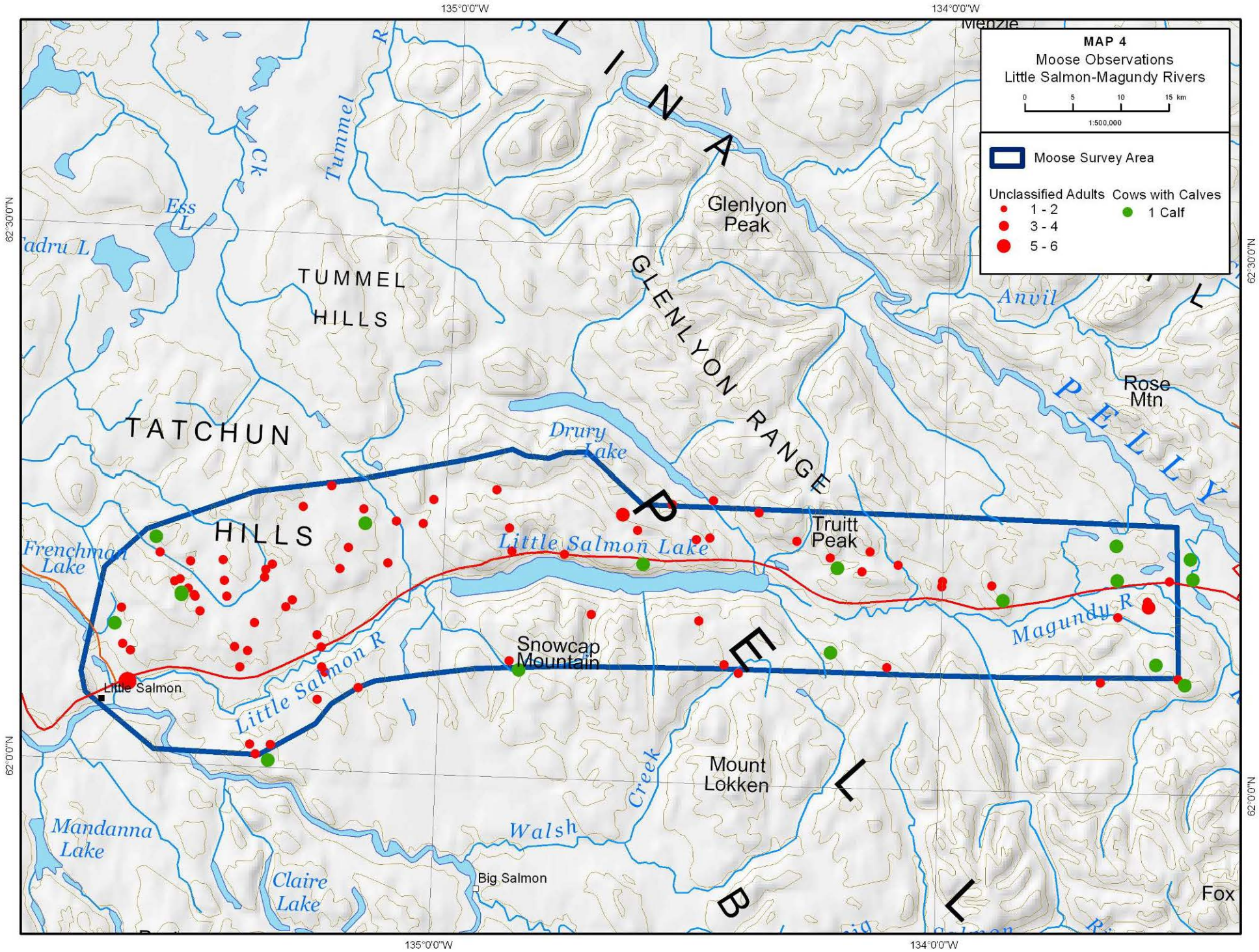
The observed proportions of moose of different ages that we saw were likely biased compared to those of the actual population. Previous surveys have shown that cow moose, particularly cows with calves, tend to space themselves away from other moose more than bulls do, so that there is a higher proportion 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 13% calves in the population. Although likely biased low, 13% calves is about average compared to the percentage found in late-winter surveys elsewhere in the Yukon (average of 12% calves observed), so it is likely that survival of calves to 10 months of age was average 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 late-winter surveys of the area. We classified 14 (10%) of the 144 survey blocks as high, 27 (19%) as medium, 47 (33%) as low, and 56 (39%) as very low expected abundance of moose (see Map 5), based on our observations from the air. Most of the blocks with higher expected numbers of moose were located in the 1998 and 1969 burns in the northwest, where we observed highest numbers of moose in this survey, and in the hilly habitat north and south of the Little Salmon and Magundy rivers. In deep-snow winters, the distribution of moose in the area may be more concentrated into the river valleys.



135°00'W

134°00'W

62°30'0"N

62°00'0"N

N.0.0.23

N.0.0.23

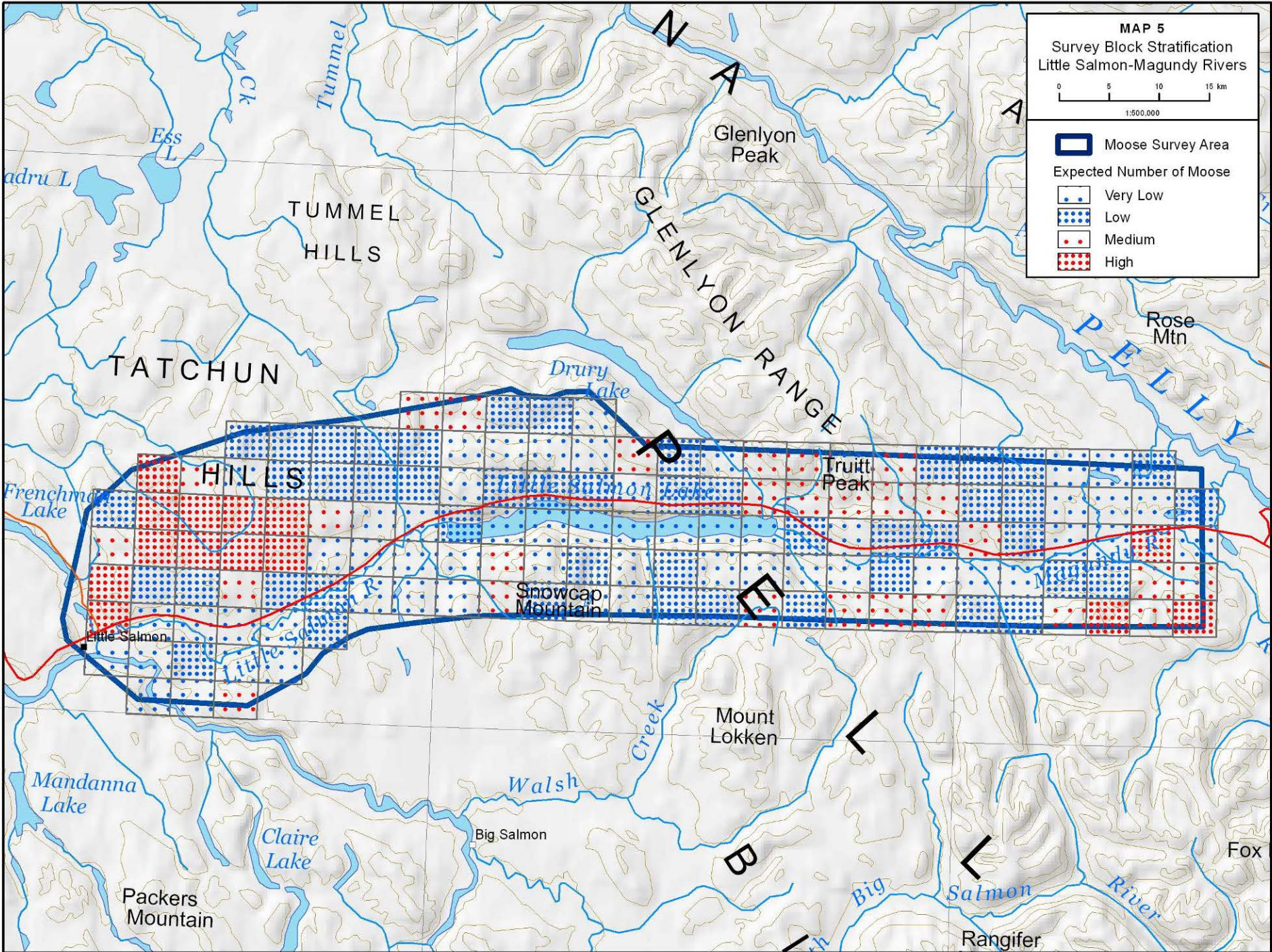
**MAP 5**  
Survey Block Stratification  
Little Salmon-Magundy Rivers

0 5 10 15 km  
1:500,000

**Moose Survey Area**

**Expected Number of Moose**

- Very Low
- Low
- Medium
- High



135°00'W

134°00'W

### ***Other Wildlife Sightings***

In addition to the 114 moose we counted in our survey blocks, we also observed seven moose just outside the survey area boundary (mapped in Map 4).

During the survey, we also recorded sightings of other notable observations of wildlife besides moose. We saw 13 groups of caribou in 2 concentrated areas. Eight groups, totalling 31 animals, were in spruce forest habitat along the Little Salmon River in the usual wintering range of the Tatchun caribou herd. Another 5 groups with 17 caribou were in spruce forest along the Magundy River at the eastern edge of the survey area; this is known winter range of the North Pelly Mountains caribou herd. We saw one group of 6 sheep on a peak just outside the southeast corner of the survey area. We saw 2 mule deer on the south-facing slopes to the north of Little Salmon village. We also observed 4 wolves in 2 groups along the Magundy River

### **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 2007. The 1998 burn in the southern Tatchun Hills had the largest concentration of moose in the area. Snow depths were above normal in this area this winter but still well below those at which we would expect movements of moose to be negatively affected. Local knowledge indicates that moose in this area typically concentrate more in the larger river valleys during winters with deep snow.
- Recruitment of moose appears to have been average in this area during the past year.
- Given the interest in this area for agricultural and residential development, we should map distribution of moose during a winter with deep snow depths to document key late-winter habitats.

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