

MOOSE SURVEY

**LOWER STEWART RIVER-
WHITE GOLD AREA**

LATE-WINTER 2012



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**Yukon Department of Environment
Fish and Wildlife Branch
TR-13-09**

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Summary

- We conducted a late-winter survey of moose and caribou using fixed-wing aircraft in the area between the Stewart and Yukon rivers west of the Klondike Highway and Lake Creek, and west to the White River, on 20 February-6 March 2012. 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 0.46 minutes per km² searching for moose. We found a total of 622 moose, of which 440 were adults of unknown sex, 87 were adult cows, and 95 were calves. We also mapped all observations of fresh moose tracks.
- Moose were widely distributed across the survey area, and more were seen in the western half. Most were seen in willow-rich habitats in recently burned areas, open forest, and along creeks and rivers. The biggest concentrations of moose were in habitat burned between 1989 and 2004, especially between the Yukon and White rivers, the Mount Stewart area, and east of Pyroxene Mountain. Moose were distributed over a wider range of elevations in the western part of the survey area than in the east, where they were more abundant at lower elevations. This was likely related to greater snow depths in the east.
- Fifteen percent of moose seen in the survey were calves. Although this may be negatively biased because of lower sightability of cows with calves, it is slightly higher than the average found in other late-winter surveys, so recruitment appears to have been fairly good this year in this area.

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Introduction

This report summarises the results of the late-winter survey of moose in the area between the lower Stewart River west of Lake Creek and the Yukon River, and west to the White River (see Map 1), conducted 20 February to 6 March 2012. The main purpose of the survey was to map the distribution and late-winter habitats of moose in this area, which is experiencing high levels of mineral exploration and the proposed development of several new mines and associated all-season access roads.

Previous Surveys

Environment Yukon has conducted several other moose surveys in previous years in areas that overlapped substantially with this survey area (see Map 2). We conducted an early-winter census in the eastern part of the survey area in 2001 (this survey was only partially completed due to poor weather; results in O'Donoghue 2013). The far southeastern part of the survey area was also covered in a 1995 census (results in Ward et al. 1998). Finally, the southwestern part of the survey area was covered in an early-winter survey in 1997 out of Beaver Creek to gather data on the sex and age composition of the moose population (results in Yukon Fish and Wildlife Branch files).

Community Involvement

This survey was conducted largely because of the high level of mining exploration and development in this area. Mapping key wildlife habitats in areas with concentrated industrial activity was recommended

in the *Community-based Fish and Wildlife Management Work Plan for the Na-Cho Nyäk Dun Traditional Territory* for 2008-2013, which was developed cooperatively by the Mayo District Renewable Resources Council, the First Nation of Na-Cho Nyäk Dun, and Environment Yukon. Mapping seasonally important habitats in this area has also been recommended at annual Northern Tutchone May Gatherings. Selkirk First Nation co-funded this survey, and Selkirk First Nation and the First Nation of Na- Cho Nyäk Dun provided staff to help conduct it.

Study Area

The survey area boundaries were delineated to cover an area with high levels of recent mineral staking and where we have few data on moose distribution (see Map 1). This included all of the Lower Stewart River Moose Management Unit (Game Management Subzones 3-13, 3-14, 3-15, 3-16, and 3-19), the northwestern part of the Tatchun Moose Management Unit (Game Management Subzone 3-20), Game Management Subzones 5-02 and 5-03 in the White River Moose Management Unit, and the southern part of Game Management Subzone 3-06 in the Matson Creek Moose Management Unit (to fill in an area not surveyed in late winter during moose distribution surveys for Dawson regional land use planning). The survey area was about 11,490 km². The study area consists mostly of rolling hills and plateaus, dissected by numerous creeks, in the drainages of the Stewart, Yukon, and White rivers. Much of the area is forest-covered with black and

white spruce, aspen, paper birch, and lesser amounts of lodgepole pine; balsam poplar also grows along the Yukon River. Forest cover varies from dense mature white spruce and poplar in the main river valleys, to dense younger spruce in many lowlands, to more open mixed spruce, birch and aspen on slopes. Many of the creek valleys have shrubby willow flats along them. Willow and dwarf birch shrub habitats, alpine tundra, and unvegetated rocky areas typify the higher plateaus and peaks of the Dawson Range southwest of the Yukon River, and the Klondike Plateau to the north.

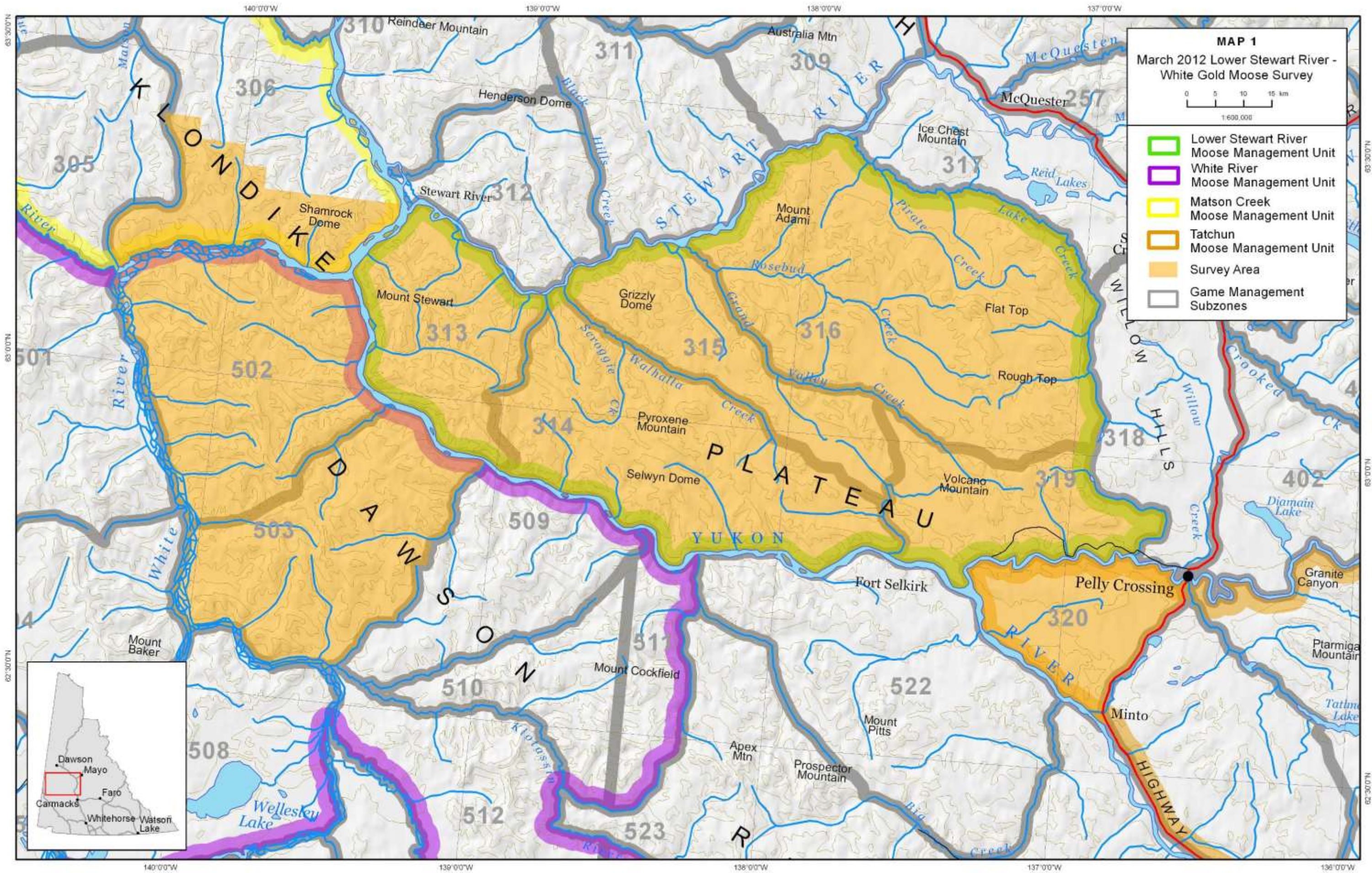
Old and recent burns occur throughout the study area (see Map 3), and these vary in quality as moose habitat. The most recent large fires, from east to west in the survey area, were a 745 km² 1998 burn in the Willow Hills, a total of 504 km² of burns in 2002 and 2004 around Rosebud and Grand Valley creeks, a 438 km² 2009 burn around and northwest of Mount Adami, a total of 410 km² of burns from 2003 to 2009 to the west of Grizzly Dome and Pyroxene Mountain, a 255 km² 2004 burn near Mount Stewart, a 168 km² 2010 burn and a 274 km² 2004 burn southwest of the Yukon-White River confluence, and a 408 km² 1998 burn along the White River.

Much of the survey area has abundant roads, trails, and cut lines associated with past and present mining activities; there are fewer mining roads and trails in the western part of the survey area between the Yukon and White rivers.

Methods

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

1. The survey area is divided into uniform rectangular blocks 15-16 km² in size. We used the same survey blocks as those used in the 2001 survey for the eastern part of the survey area.
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 search intensity to get more complete information.
3. We count each moose or group of animals we see and get a GPS reading of its location. 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. With the exception of 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.



140°00'W

139°00'W

138°00'W

137°00'W

136°00'W

63°30'0"N

63°00'0"N

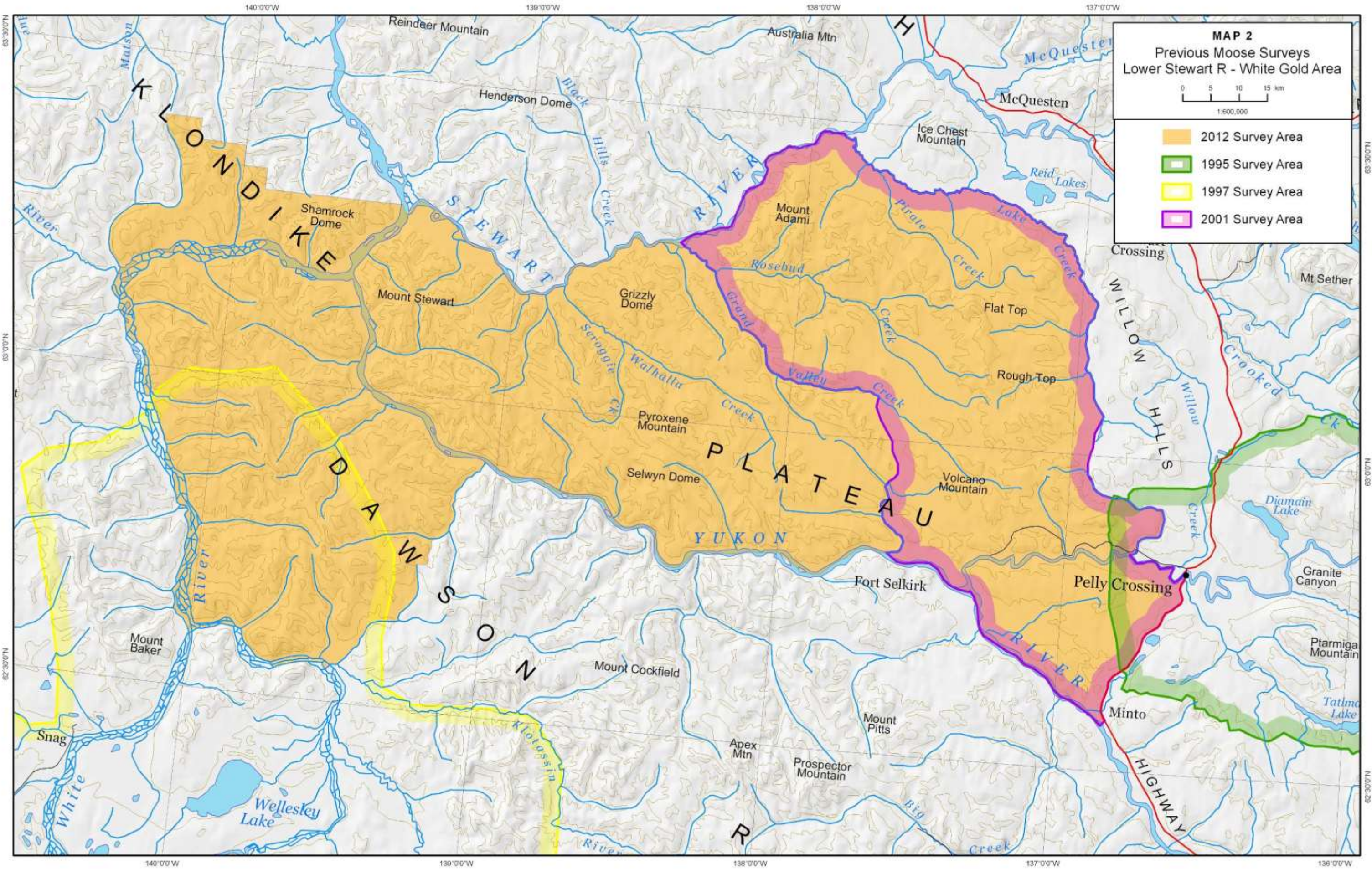
62°30'0"N

63°30'0"N

63°00'0"N

62°30'0"N

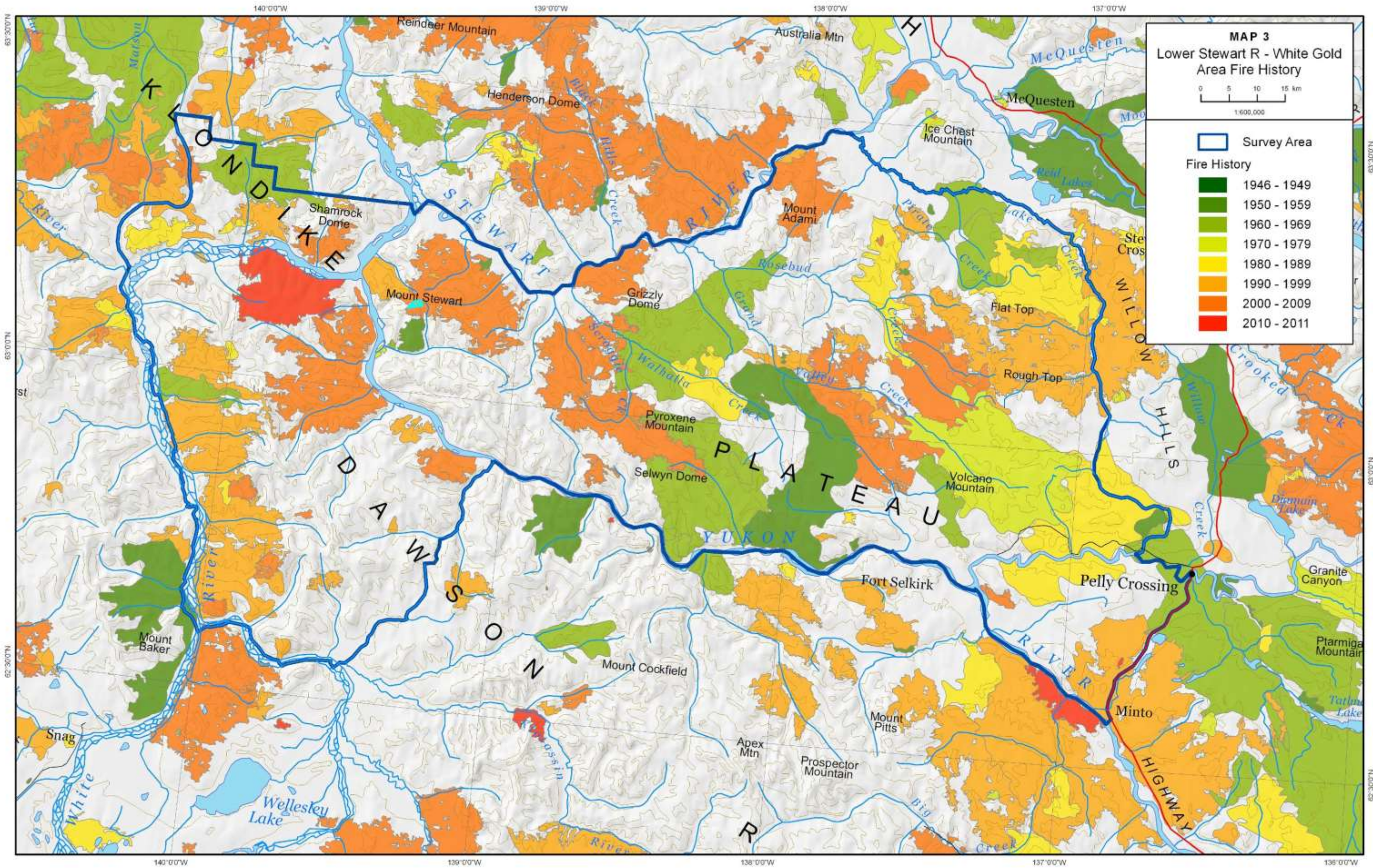
136°00'W



MAP 2
Previous Moose Surveys
Lower Stewart R - White Gold Area

0 5 10 15 km
 1:600,000

- 2012 Survey Area
- 1995 Survey Area
- 1997 Survey Area
- 2001 Survey Area



140°0'0"W

139°0'0"W

138°0'0"W

137°0'0"W

136°0'0"W

63°30'0"N

63°0'0"N

62°30'0"N

63°30'0"N

63°0'0"N

62°30'0"N

Weather and Snow Conditions

Weather conditions for this survey were challenging. Temperatures ranged from -33°C to -4°C, but most days were in the minus teens and -20s so temperatures were comfortable. Skies were mostly cloudy during the survey period, and it snowed on 13 of the 16 days from the start of the survey so we frequently had to work around low clouds. We were unable to fly on 4 days out of Mayo, and on 3 days out of Dawson. Winds were light to moderate on most days, but there were strong winds causing turbulence in the mountains on several days. While snow cover was complete, light conditions were flat on many days, so visibility was often poor for spotting moose tracks.

Results and Discussion

Coverage

We flew this survey with 2 crews, one flying out of Mayo and the other out of Dawson. It took us about 87.7 hours to count moose in the 733 blocks in our survey area, for a search intensity of 0.46 minutes per km². This was slightly lower than our target search intensity of 0.5 minutes per km², and corresponded with flying through each block about 4 times and circling animals when needed to verify sightings. We

needed an additional 33.4 hours to ferry to and from the survey area and fuel supplies in Mayo, Dawson, Pelly Crossing, Beaver Creek, and the McQuesten airstrip. The time devoted to ferrying was about 28% of the total flight time.

Observations of Moose

We counted a total of 622 moose; 440 of them were adults of unknown sex, 87 were adult cows, and 95 were calves (see Table 1). We spent 5,264 minutes searching the survey blocks for moose, so we saw an average of 0.12 moose per minute of survey time. In addition to moose seen, we also noted fresh moose tracks at 400 locations.

Distribution of Moose

Moose were widely distributed in the survey area (see Map 4). Most moose were seen in the western half of the survey area. The biggest concentrations of moose were in the area between the Yukon and White rivers, especially in the habitat burned in 1998 along the White River and in the 2004 burn to the southwest of the confluence of the 2 rivers. The area burned in 2004 around Mount Stewart also had large numbers of moose. In the eastern part of the survey area, the largest number of moose were seen in the 1989 burned area east of Pyroxene Mountain and in the areas burned in 2004 along upper Rosebud Creek.

Table 1. Observations of moose during the March 2012 Lower Stewart River-White Gold survey.

	Number Observed	Percentage of Moose Observed
Unknown Adults	440	71
Adult Cows	87	14
Calves	95	15

In general, moose in the eastern half of the survey area were found at lower elevations near creeks and rivers; there was little sign of moose in willow-rich habitats at higher elevations. Moose were distributed over a wider range of elevations in the western half of the survey area

Moose were mostly in habitats with abundant willow growth – open ridges, along creeks, and in old burns. Some moose and moose tracks were seen in the main valleys of the Stewart, Yukon, and White rivers where there were abundant willows in sloughs. We saw few moose or tracks of moose in areas with dense lowland black spruce, aspen, or pine, except where associated with willows along creeks in those habitats. 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 forested areas 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 above normal throughout the survey area during the winter of 2011-2012 (Yukon Department of Environment 2012). We recorded snow depths of 71-75 cm in the eastern part of the survey area and depths of 79-88 cm were recorded at Dawson snow stations. These levels could negatively affect movements of moose (above 70 cm; Peek 1997). We do not have snow measurements for the western part of our survey area

but, in general, snow depths typically decrease substantially to the southwest in the snow shadow of the St. Elias Mountains. Our observations from the air confirmed that snow depths were less southwest of the Yukon River. Lower snow depths likely led to moose inhabiting higher elevations with abundant willows in this part of the survey area.

Ages and Sexes of Moose

We classified most 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 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 there is a higher proportion of cows in low-density survey blocks than 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 could 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.

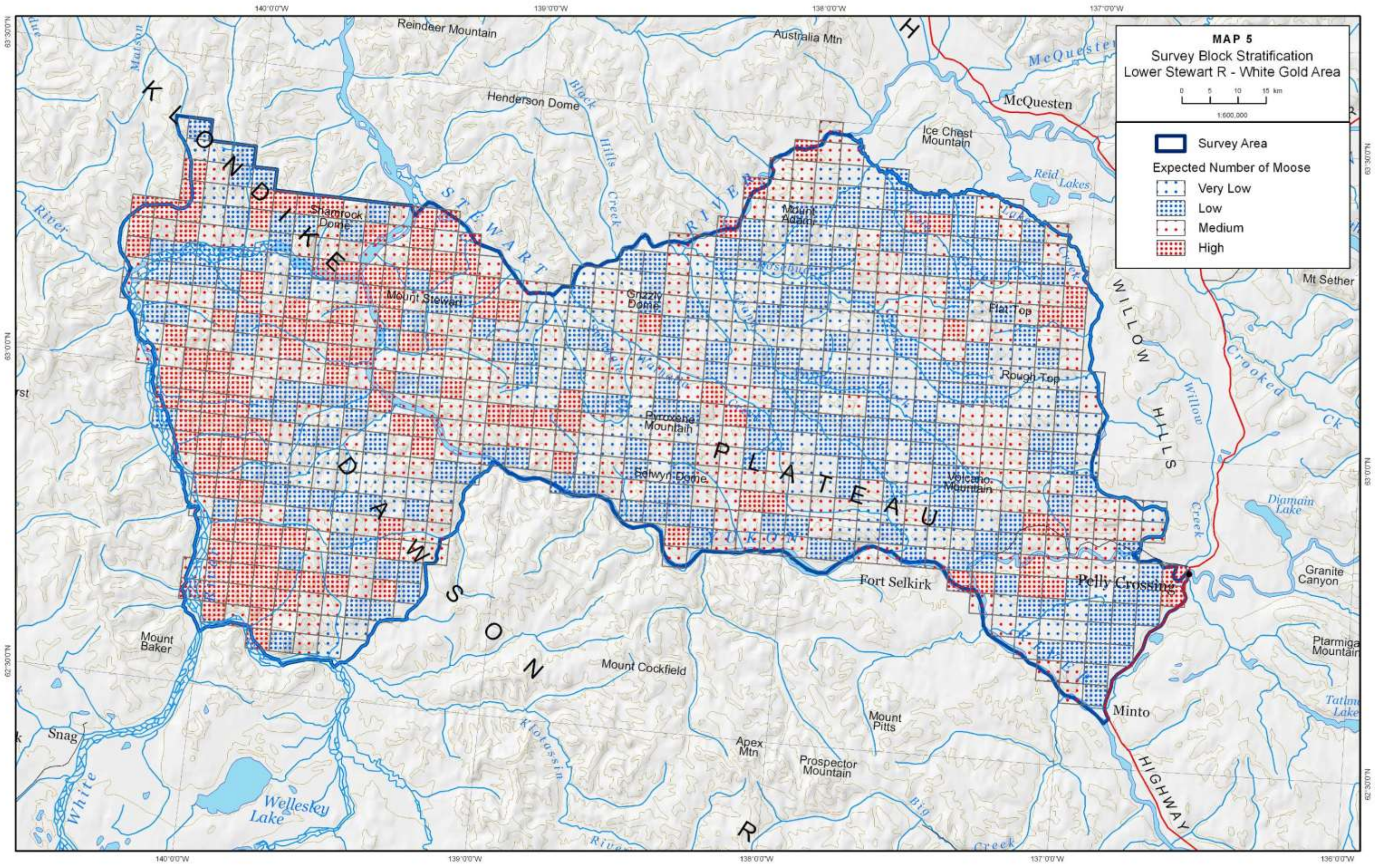
The age classifications observed in this survey can be compared directly with results from similar late-winter surveys in the future. Our observed composition index was 15% calves in the population. Although likely biased low, 15% calves is slightly higher than that found in other similar late-winter surveys elsewhere in the Yukon (average 12% calves observed), so it is likely that survival of calves to 10 months of age was fairly good 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 survey area. We classified 132 (18%) of the 733 survey blocks as high, 231 (32%) as medium, 235 (32%) as low, and 135 (18%) 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 burns where we observed the highest numbers of moose in this survey, in open hilly areas, and in areas with dense willows along creeks and the main rivers.

Other Wildlife Sightings

During the survey, we also recorded sightings of other notable observations of wildlife besides moose. We saw a total of 15 sheep, one group of 11 nursery sheep (ewes and yearlings) on Flat Top in the White Mountains and a group of 4 on Shamrock Dome northwest of the Yukon-White river confluence. There was a mule deer buck and 2 does on the open southwest-facing ridges overlooking the Yukon River just downriver from Minto. We also spotted 4 groups of wolves totalling 14 animals, and 1 lynx on the White River.



MAP 5
 Survey Block Stratification
 Lower Stewart R - White Gold Area

0 5 10 15 km
 1:600,000

Survey Area

Expected Number of Moose

- Very Low
- Low
- Medium
- High

140°00'W 139°00'W 138°00'W 137°00'W 136°00'W

63°30'N 63°00'N 62°30'N

140°00'W 139°00'W 138°00'W 137°00'W 136°00'W

Conclusions and Recommendations

- Habitat with abundant willows in hilly terrain, along creeks and rivers, and in recent burns supported the highest densities of moose in this area in late winter 2012. The largest concentrations of moose were between the Yukon and White rivers, the Mount Stewart area, and east of Pyroxene Mountain.
- Recruitment of moose appears to have been fairly good in this area during 2011-2012.
- These data provide a baseline on moose distribution and important habitats for use in environmental assessments and monitoring plans associated with development proposals.
- A second year of baseline data would strengthen our knowledge of variability in late-winter moose distribution among years, and improve our ability to provide sound technical reviews of applications for new access or industrial developments.

Literature Cited

- FRASER, V., M. O'DONOGHUE, AND S. WESTOVER. 2001. Mayo Moose Management Unit. Summary of late-winter 2001 moose survey Yukon Fish and Wildlife Branch Report SR-01-01, Whitehorse, Yukon, Canada
- O'DONOGHUE, M. 2005. Late winter habitat use by moose: Survey of the Pelly and Macmillan river areas March 2001. Yukon Fish and Wildlife Branch Report SR-05-01, Whitehorse, Yukon, Canada.
- O'DONOGHUE, M. 2013. Moose Survey: Lower Stewart River Moose Management Unit, early-winter 2001. Yukon Fish and Wildlife Branch Report TR-13-08. Whitehorse, Yukon, Canada.
- PEEK, J. M. 1997. Habitat relationships. Pages 351-376 in A. W. Franzmann and C. C. Schwartz, editors, *Ecology and management of the North American moose*; Smithsonian Institution Press, Washington D.C.
- WARD, R. M. P., B. MCLEAN, S. WESTOVER, R. FLORKIEWICZ, AND S. P. WITHERS 1998. 1995-1996 moose surveys. Summary. Yukon Fish and Wildlife Branch Progress Report PR-98-1. Whitehorse, Yukon, Canada.
- YUKON DEPARTMENT OF ENVIRONMENT. 2012. Yukon snow survey bulletin and water supply forecast. March 1, 2012. Yukon Water Resources Branch