NORDENSKIOLD RIVER
MOOSE MANAGEMENT UNIT

Summary of Late-Winter 2009 Moose Survey

7-12 MARCH 2009

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SUMMARY

- We conducted a late-winter survey of moose southwest of Carmacks along the lower Nordenskiold River on 7-12 March 2009, 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 0.5 minutes per km² searching for moose. We found a total of 63 moose, of which 60 were adults and 3 were calves.

- Most moose seen were in open scrubby spruce in hilly terrain or subalpine habitats associated with good willow abundance and in the wetlands along the lower Nordenskiold River.

- Only 5% 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 this year in this area.

- Harvest of moose in this area appears to be sustainable at present levels.

INTRODUCTION

This report summarises the results of the late-winter survey of moose in the Nordenskiold River Moose Management Unit (see Map 1), conducted on March 7-12, 2009. The main purpose of the survey was to map the distribution and late winter habitats of moose in this area.

Previous Surveys

The Yukon Fish and Wildlife Branch has previously conducted only one other survey of moose in this area, and this was only partially completed. In November 2005, the same survey area was overflown at a low intensity (about 0.17 minutes per km^2) to divide it into survey blocks of high and low expected numbers of moose in preparation for a planned census (results in O'Donoghue & Fraser 2009). This "stratification" part of the survey was completed, but the subsequent planned census of the area could not be conducted because of poor snow and weather conditions. A one-day follow-up flight over the same survey area was conducted on 30 January 2006 to check on snow conditions; 70 moose and 43 bison were seen during this flight, but there was no attempt at systematic coverage. There have been no previous surveys of moose in this area in late winter.

Community Involvement

Residents of the Carmacks area have consistently placed a high priority on monitoring the health of local moose populations. Concerns about low abundance of moose and our lack of recent information about moose populations in this area led to a recommendation that we conduct this survey in the 2004-2009 Community-based Fish and Wildlife Management Plan for the Little Salmon/Carmacks First Nation Traditional Territory. Community members participated in this survey as observers on all of the flights.

STUDY AREA

The Nordenskiold River survey area was delineated in 2001 to cover the areas most accessible and used by hunters, and to conform to the boundaries of Yukon moose management units. Moose management units were developed to help us more consistently monitor and manage moose in all areas throughout the Yukon. We plan to monitor the health of moose populations in priority moose management units using both aerial and ground-based surveys.

The Nordenskiold River Moose Management Unit is about 3,235 km², and includes Game Management Sub-zones 543 and 544 (see Map 1). The survey area covers the whole moose management unit. The border of the survey area follows Rowlinson Creek and headwaters of the Nisling River in the north, Mackintosh Creek and headwaters of Kirkland Creek in the west, Klusha Creek in the south, and the Klondike Highway in the east.

Most (about 3,210 km²) of the study area is considered suitable moose habitat, except for approximately 1% of the area, which includes large water bodies (0.5 km² or greater in size) 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 drainage of the Nordenskiold River. Much of the area is forest-covered with black and white spruce, aspen, and lesser amounts of lodgepole pine and paper birch. Forest cover varies from dense mature white spruce and aspen in the main river and creek valleys, to dense black spruce in many lowlands, to more open scrubby spruce on slopes. Willow and dwarf birch shrub habitats and alpine tundra typify the higher plateaus, mostly in the western part of the study area. There are extensive wetlands along the lower Nordenskiold River and Klusha Creek on the eastern border of the survey area. Forest cover in part of the survey area has burned during the past 50 years (see Map 2). The most recent forest fires occurred in the western part of the study area in 1995 and 1996, covering about 450 km², partly outside the survey area. Large parts of the southeastern and southern survey area burned in 1958 and are now mostly forested again with dense aspen, spruce, and pine.

The survey area has access from the Klondike Highway in the east and off of the Mount Nansen road in the north. There are also numerous mining exploration roads in the southern part of the survey area and an expanding network of trails used mostly by bison hunters in winter.

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^2 in size. We used the same survey blocks as those used in the 2005 survey.

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 four times the intensity 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 in 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

Overall, the weather and snow conditions were good for this survey. Temperatures ranged from -30°C to -10°C. Skies were mostly clear on three of the six survey days and cloudy on the others; there was light snow on two days. We encountered very little wind during this survey. We were able to fly some hours on all six consecutive days of the survey. Light conditions ranged from flat to bright and snow coverage was complete with fresh snowfalls on the 6th, 10th and 12th of March, so visibility was generally good for spotting moose.

Snow depths at the two snow stations in and next to the survey area were 66-75 cm; snow accumulation (as measured by equivalent water content) was about 20-30% above the average for this area compared to the previous 22-34 years (Yukon Department of Environment 2009).

RESULTS AND DISCUSSION

Coverage

It took us about 26.5 hours to count moose in the 198 blocks in our survey area, for a search intensity of 0.49 minutes per km^2. This matched well with our target search intensity of 0.5 minutes per km^2, and corresponded with flying through each block about four times and circling at animal observations when needed to verify them. We needed an additional 7.1 hours to ferry to and from the survey area and fuel supplies in Carmacks and Braeburn. The time devoted to ferrying was about 21% of the total flight time.

Some creeks flowing into the Nordenskiold River have steep-walled canyons which we could not search effectively for moose with fixed-wing aircraft during this survey.

Observations of Moose

We counted a total of 63 moose, 60 of them adults and 3 of them calves (see Table 1). We spent 1589 minutes searching the survey blocks for moose, so we saw an average of 0.04 moose per minute of survey time.

Table 1. Observations of moose during the March 2009 survey in the Nordenskiold River Moose Management Unit.

	Number Observed	Percentage of Moose Observed
Adults	60	95
Calves	3	5

Distribution of Moose

Moose were widely distributed in the survey area, with the most observations in the northwestern portion (see Map 3). Habitat in this area is a mix of open subalpine, alpine, and scrubby spruce on rolling hills. Most moose seen during the survey were in these open habitats, usually associated with abundant willows along creeks or in broad open valleys. There was also abundant sign of moose and some animals seen in the wetlands along the lower Nordenskiold River, but visibility was obscured here by dense vegetation. Relatively few moose were seen in the 13-14-year old burned areas along the western border of the survey area or in the 51-year old burns in the southeast. 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, with the exception of wetland areas, 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, O'Donoghue & Westover 2001; O'Donoghue 2005). Snowfall was above normal in the survey area this winter, but snow depths (< 75 cm) were still lower than those that would negatively affect moose. Distribution of willows likely affected habitat use by moose in this area more than did snow depths.

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 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.

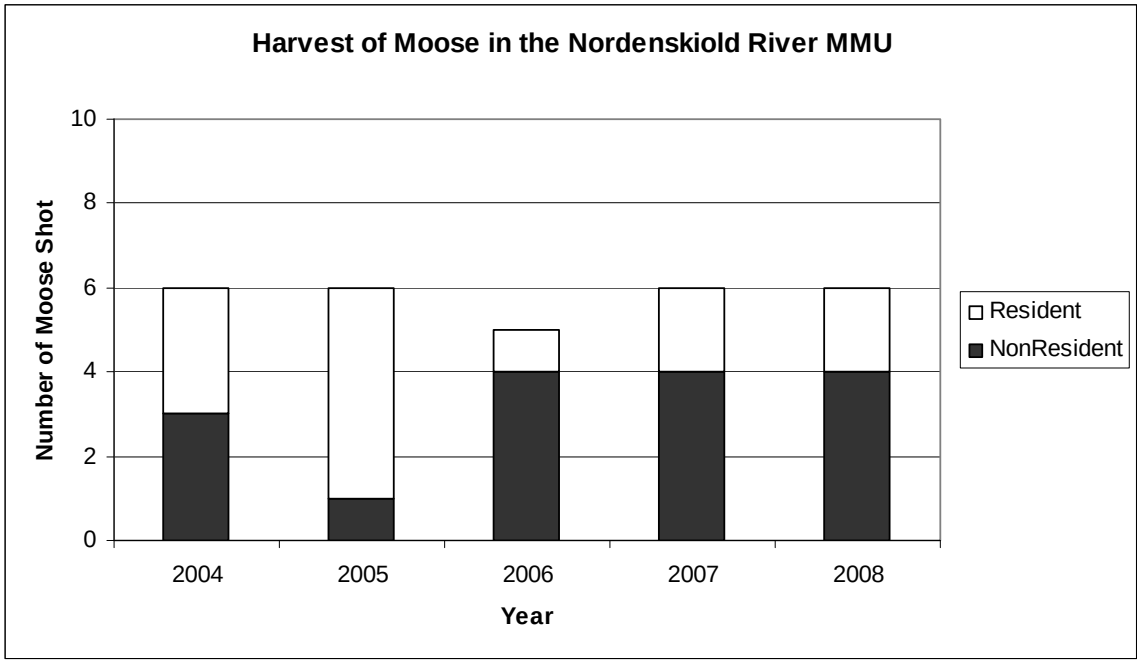
The age classifications observed in this survey can be compared directly with the results from similar surveys in the future so, for that purpose, our observed composition index was 5% calves in the population. Although likely biased low, 5% calves is also low compared to that found in other late-winter 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 four categories of expected moose density, for use in future censuses of the survey area. We classified 11 (6%) of the 198 survey blocks as high, 55 (28%) as medium, 92 (46%) as low, and 40 (20%) as very low expected abundance of moose (see Map 4), based on our observations from the air. Most of the blocks with higher expected numbers of moose were located in the more open forested and subalpine habitats in the western part of the survey area and along the lower Nordenskiold River wetlands. For the purpose of selecting blocks for future censuses, we can group the blocks classified as expected high and medium numbers of moose into a High stratum with 66 blocks, and consider the 132 blocks with low and very low expected numbers of moose to make up the Low stratum.

Harvest

The reported harvest of moose by licenced hunters in the Nordenskiold River Moose Management Unit during the last 5 years for which we have complete records (2004 to 2008), averaged about 6 moose per year (see Figure 1). This does not include harvest data from First Nation hunters, which are reported annually at Northern Tutchone May Gatherings. Using our best estimates of moose density (based only on local knowledge and habitat quality; there has never been a census of moose in this area) and total harvest by all hunters, we estimate that the annual harvest is presently at about 2% of the total moose population in the Nordenskiold River Moose Management Unit. This is below the recommended maximum sustainable harvest rate of 3% for this area. This is an area that is close to Carmacks with increasing accessibility due to the creation of trails and mining exploration roads. Bison have expanded their range into the Nordenskiold watershed and higher levels of activity and opening up of trails by hunters have followed. 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 moose survey, we also recorded other notable observations of wildlife besides moose. We saw 13 groups of caribou (plus one repeat sighting) totalling 140 animals, mostly near Little Buffalo Lake in the north central and Mackintosh Creek in the northwestern parts of the survey area (see Map 5); these were likely from the Aishihik herd. We saw 30 groups of bison (plus one repeat sighting) with 81 animals, concentrated along the Nordenskiold River and Kirkland Creek valleys. We spotted two elk and one mule deer on the open slopes just to the east of the survey area, and two wild horses near the Nordenskiold River west of Twin Lakes. We also saw three wolves, one of them at a kill site of a horse.

CONCLUSIONS AND RECOMMENDATIONS

- The most important late-winter habitats for moose in this area are the higher altitude open forests and subalpine habitats with abundant willows in the northwestern part of the survey area and the wetlands along the lower Nordenskiold River.
- Recruitment of moose appears to have been low in this area during the past year.
- Present levels of harvest of moose in the Nordenskiold River Moose Management Unit seem sustainable. This area is regularly hunted and access is increasing.
- We should continue to monitor moose populations in this area using aerial and ground-based monitoring.

Acknowledgments

The Yukon Fish & Wildlife Branch provided funding and staff for this survey. We thank Marcel Dulac for safe, efficient flying. We also thank Bill Johnnie and Gary Sam for providing their keen eyesight and knowledge of the area as observers on the aerial survey crews.

Literature Cited

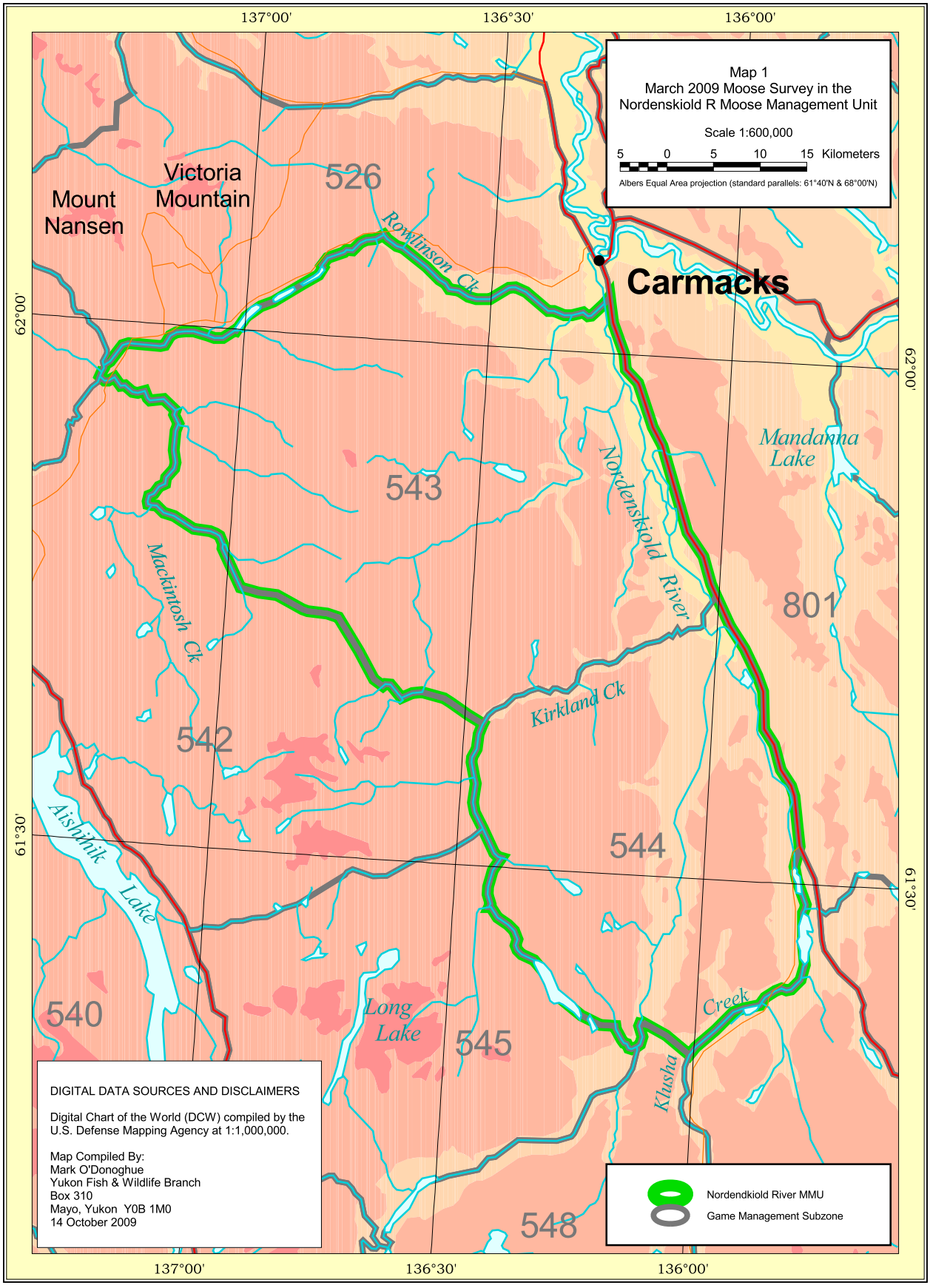
Fraser, V., M. O'Donoghue, & S. Westover. 2001. Mayo Moose Management Unit. Summary of late-winter 2001 moose survey. 2-5 March 2001. File Report, Yukon Fish & Wildlife Branch.

O'Donoghue, M. 2005. Survey of late winter habitat use by moose in the Pelly and Macmillan River areas, March 2001. File Report, Yukon Fish & Wildlife Branch.

O'Donoghue, M., & V. Fraser. 2009. Nordenskiold River Moose Management Unit. Summary of early-winter 2005 moose survey. 14-28 November 2005. File Report, Yukon Fish & Wildlife Branch.

Yukon Department of Environment. 2009. Yukon snow survey bulletin and water supply forecast. March 1, 2009. Yukon Water Resources Branch.

MAPS



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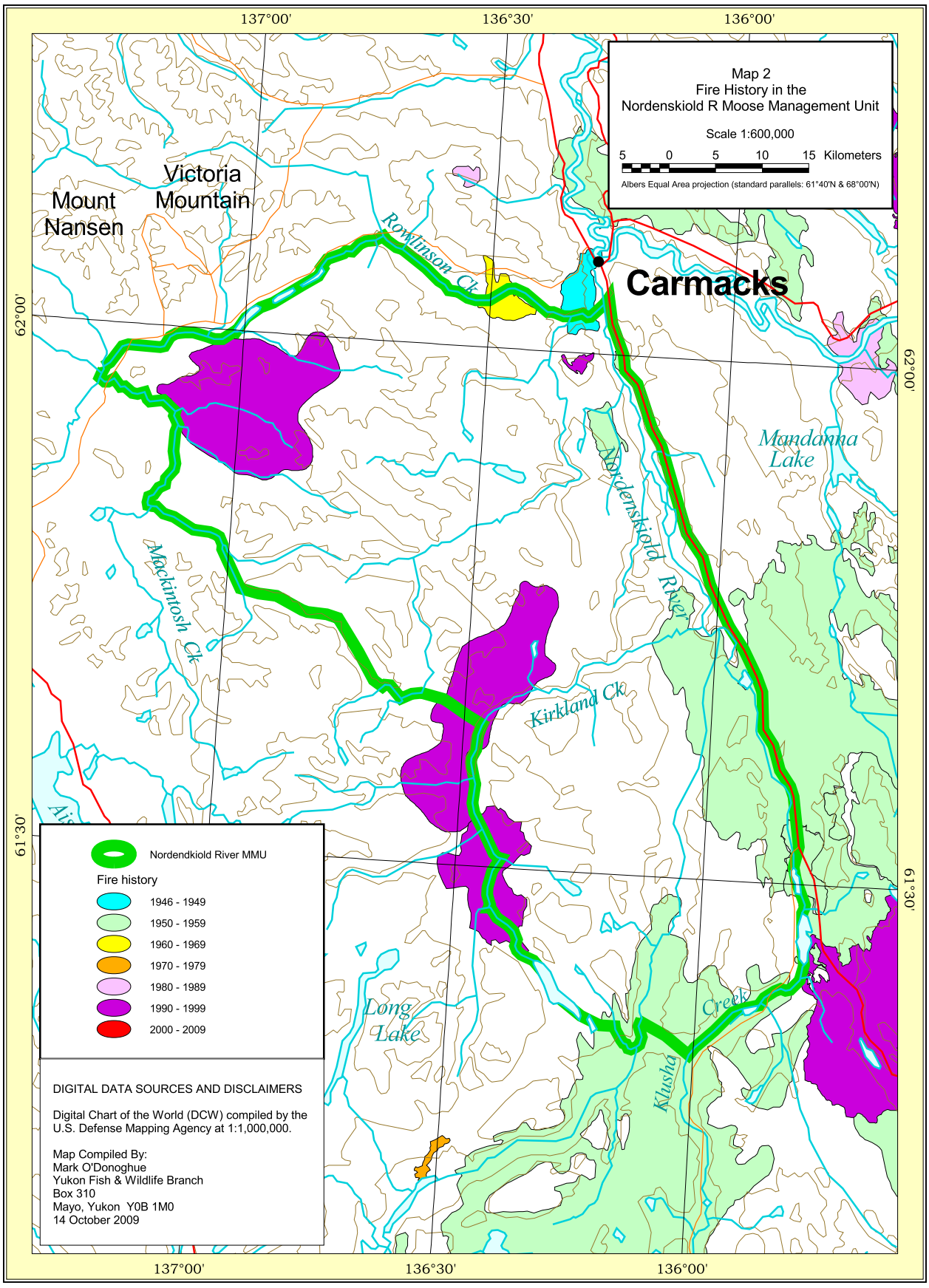
Map 2
Fire History in the
Nordenskiold R Moose Management Unit
Scale 1:600,000
5 0 5 10 15 Kilometers
Albers Equal Area projection (standard parallels: 61°40'N & 68°00'N)
137°00'
136°30'
136°00'
62°00'
61°30'
Mount Nansen
Victoria Mountain
Rowlinson Ck
Carmacks
Mandanna Lake
Nordenskiold River
Mackintosh Ck
Kirkland Ck
Long Lake
Klusha Creek
Nordendkiold River MMU
Fire history
1946 - 1949
1950 - 1959
1960 - 1969
1970 - 1979
1980 - 1989
1990 - 1999
2000 - 2009
DIGITAL DATA SOURCES AND DISCLAIMERS
Digital Chart of the World (DCW) compiled by the U.S. Defense Mapping Agency at 1:1,000,000.
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14 October 2009
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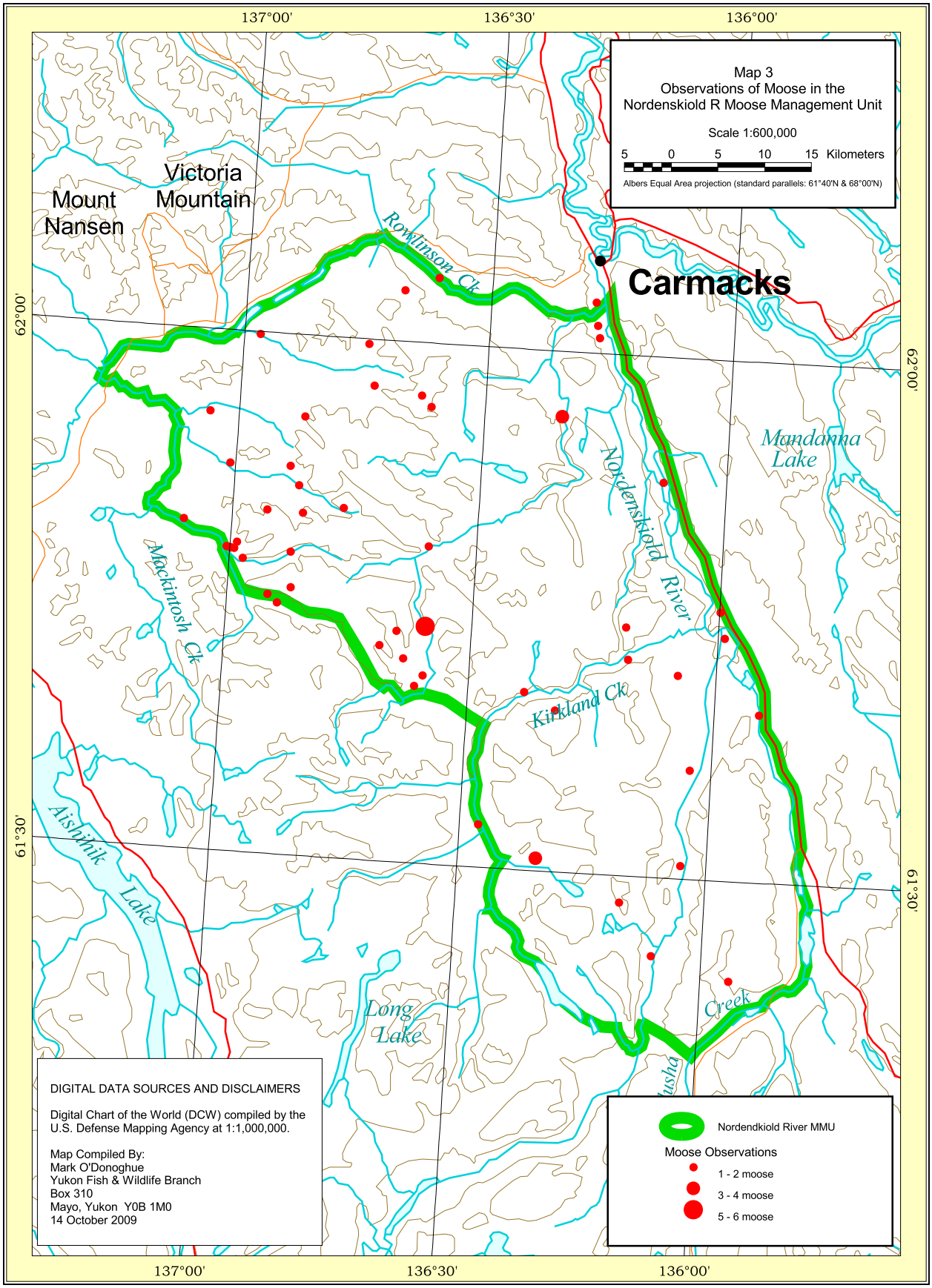

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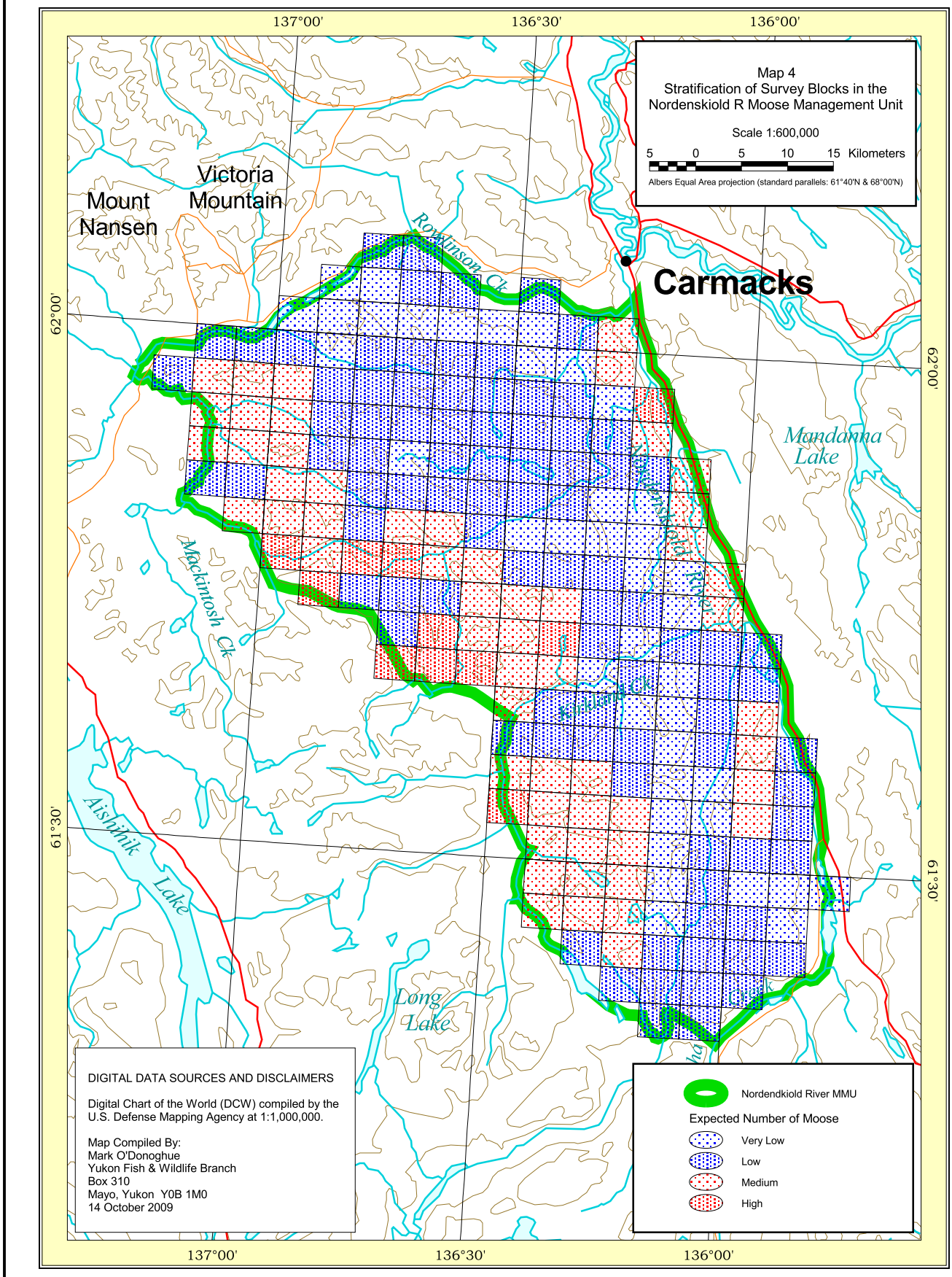

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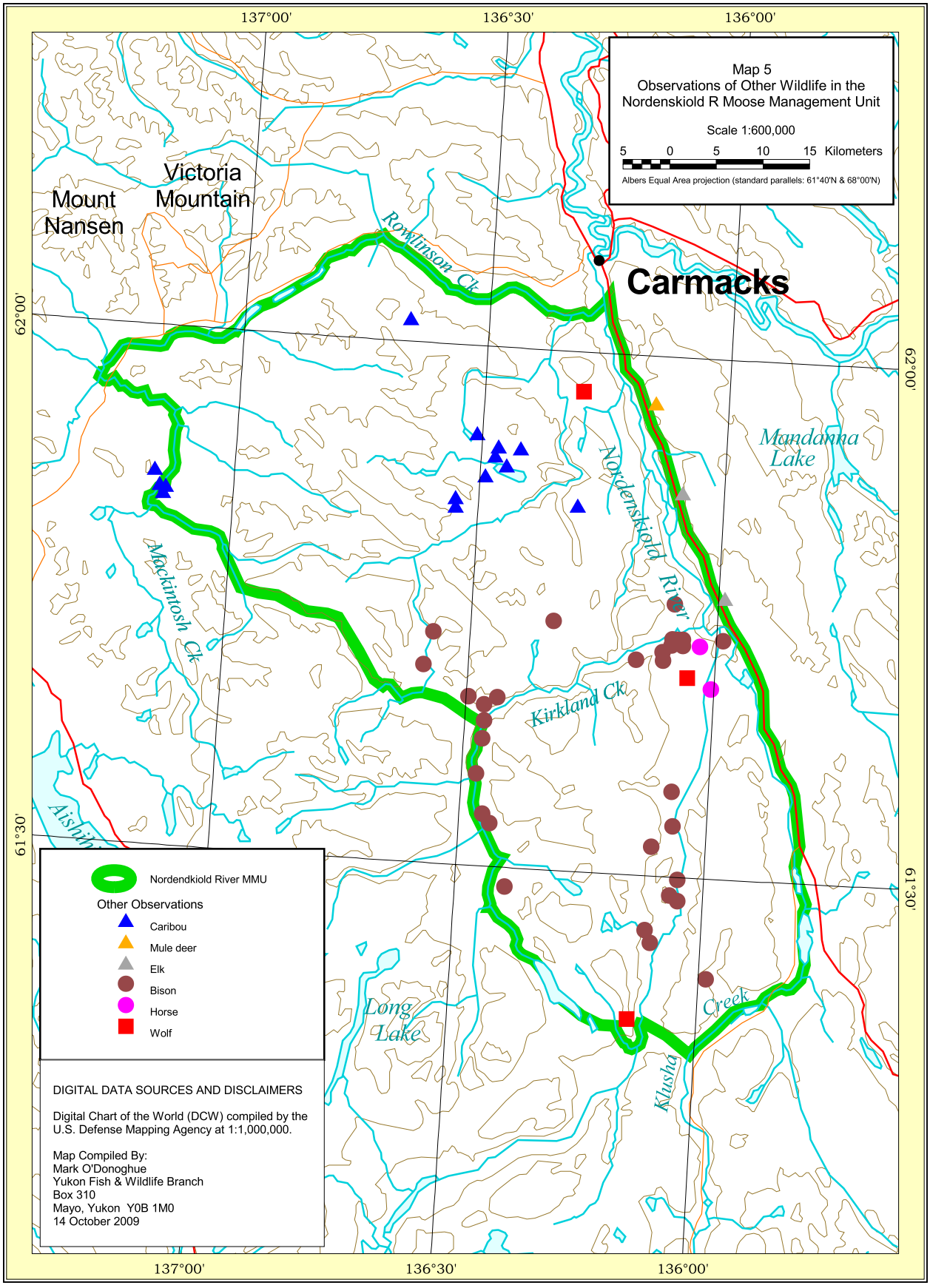

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