Nordenskiold River Moose Management Unit

Summary of Early-Winter Moose Survey

Prepared by:
Mark O'Donoghue & Vince Fraser

Yukon
Environment

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NORDENSKIOLD RIVER MOOSE MANAGEMENT UNIT

SUMMARY OF EARLY-WINTER MOOSE SURVEY

Fish and Wildlife Branch
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Copies available from:
Yukon Department of Environment
Fish and Wildlife Branch, V-5A
Box 2703, Whitehorse, Yukon Y1A 2C6
Phone (867) 667-5721, Fax (867) 393-6263
E-mail: environmentyukon@gov.yk.ca

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SUMMARY

- We conducted an early-winter survey of moose southwest of Carmacks along the lower Nordenskiold River on 14-28 November 2005, using fixed-wing aircraft. The main purposes of this survey were to estimate the abundance, distribution and population composition of the moose population.

- We were only able to complete the first part of the survey, flying over the entire survey area to divide it into survey blocks of high and low expected numbers of moose in preparation for a subsequent census. We were unable to complete the census because of poor weather and snow conditions.

- Most moose seen were in subalpine habitats or open scrubby spruce in hilly terrain in the northwestern part of the survey area.

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

INTRODUCTION

This report summarises the results of the early-winter survey of moose in the Nordenskiold River Moose Management Unit (see Map 1), conducted on November 14-28, 2005. The main purposes of the survey were to estimate the abundance, distribution and population composition of the local moose population.

Previous Surveys

The Yukon Fish and Wildlife Branch has not previously conducted any other surveys of moose in this area.

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 km^2, 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 trails used mostly by bison hunters in winter in the northern half of the area.

METHODS

We have adopted a relatively new survey technique to survey moose, developed by Jay Ver Hoef with the Alaska Department of Fish and Game (Kellie & DeLong 2006). The field sampling is similar to the way we conducted our moose surveys in the past, except that we count moose in rectangular rather than irregularly shaped survey units. The technique involves six steps:

1. The survey area is divided into uniform rectangular blocks 15-16 km^2 in size.

2. Observers in fixed-wing aircraft fly over all the blocks quickly, and classify (or "stratify") 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 called the "stratification" part of the survey.

3. We combine these categories of blocks into high and low "strata", and then randomly select a sample of each stratum for our census.

4. We try to count every moose within the selected blocks (the "census" part of our survey) using helicopters. We classify all moose seen by

age (adult, yearling, or calf) and sex. Yearling cows are often difficult to distinguish from adults, so we classify all cows as adults, and later estimate the number of yearling cows that were present among the older cows based on the number of yearling bulls we saw.

5. We repeat our counts at double the search intensity in a portion of our survey blocks to estimate the number of moose that we missed at our typical search intensity.

6. We estimate the total number of moose by age and sex in the entire survey area based on the numbers of moose we see in the blocks during the census, the distribution of these blocks; how we classified the blocks we didn't count, and the "sightability correction factor" to account for moose that we overlooked. Generally, the more blocks that are searched during the census part of the survey, the more precise and reliable is the resulting population estimate.

WEATHER AND SNOW CONDITIONS

Weather and snow conditions were very poor for this survey and ultimately delayed it long enough that we were only able to complete the stratification part of the survey. We started trying to fly by bringing the plane to Carmacks on November 14th, but we were unable to do any surveying because of adverse weather conditions and lack of snow until November 26th. Weather conditions on November 26-28 were favourable, with mostly clear skies, temperatures ranging from -25°C to -7°C, and little wind, and we were able to fly over the whole survey area and stratify the survey blocks. However, snow depths were very low, especially in the eastern, lower altitude part of the survey area, and the patchy snow cover in forested habitats made it difficult to spot moose. This remained the case through mid-December, at which time we cancelled the census part of the survey because of difficulties in working in cold, low-light conditions and concerns that moose would be moving out of their early-winter distribution.

RESULTS AND DISCUSSION

Identification of High and Low-Density Blocks

We flew over the whole survey area in a 4-seat Cessna 206 with the pilot and 3 observers. It took us about 9.4 hours to cover the survey area, for a search intensity of 0.17 minutes per km^2. We needed an additional 6.9 hours to ferry to and from the survey area and fuel supplies in Carmacks. The time devoted to ferrying was about 42% of

the total flight time, which is high partly because of our unsuccessful flights to try to start the survey in mid-November.

We classified 31 (16%) of the 198 survey blocks as high, 56 (28%) as medium, 12 (6%) as low, and 99 (50%) as very low expected abundance of moose (see Map 3), based on our observations from the air. Most of the blocks with higher expected numbers of moose were located in the subalpine and hilly open forested areas in the western part of the survey area. For the purpose of selecting blocks for the census, we grouped the blocks classified as expected high and medium numbers of moose into a High stratum with 87 blocks, and considered the 111 blocks with low and very low expected numbers of moose to make up the Low stratum.

Observations of Moose

We spotted 47 moose (12 bulls, 28 cows, 3 unclassified adults, and 3 calves; see Table 1) plus another 6 moose outside the survey area during our stratification flights. We spent 562 minutes searching the survey blocks for moose, so we saw an average of 0.08 moose per minute of survey time.

Table 1. Observations of moose during the November 2005 survey in the Nordenskiold River Moose Management Unit.

	Number Observed	Percentage of Moose Observed
Adult and Yearling Bulls	12	26
Adult and Yearling Cows*	28	60
Calves	4	9
Unclassified Adults	3	6

Distribution of Moose

Moose were widely distributed in the survey area, with the most observations in the northwestern portion (see Map 4). 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. The 1996 burn in the northwestern corner of the survey area had good numbers of moose, but other burned areas did not seem as productive. We saw few moose or tracks of moose in areas of dense lowland black spruce and aspen forest that had little shrub cover.

Ages and Sexes of Moose

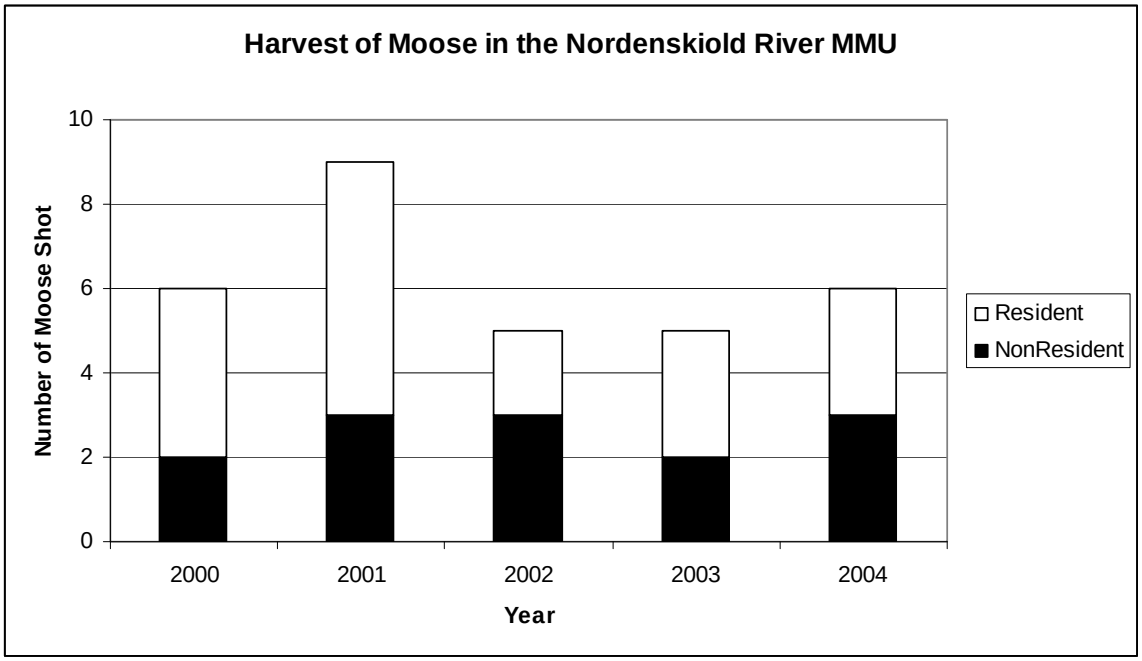
We classified most of the moose we saw by age and sex, but we cannot translate these directly into estimates of the composition of the moose population in the study area. Stratification surveys such as this are aimed mostly at determining the distribution of moose in the survey area. The data are valuable 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 and sexes 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. Early-winter low-density blocks also typically have lower sightability, because forest canopies are, on average, denser. As a result of these differences in sightability of bulls and cows, we likely miss seeing more cows than we do bulls when we search over all habitats with the same intensity, so our observations will be biased towards bulls. 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.

Harvest

The reported harvest of moose by licensed hunters in the Nordenskiold River Moose Management Unit during the last 5 years for which we have complete records (2000 to 2004) 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), we estimate that the annual harvest is presently less than 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. 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 6 groups of caribou (exact locations were recorded for only 3 of these) totalling 66 animals, all in the northern half of the survey area (see Map 5); these were likely from the Aishihik herd. We saw 4 groups of bison with 16 animals, near Kirkland and Klusha creeks. We spotted two groups of sheep with 29 animals just west of and in the southern end of the survey area. We also saw 2 mule deer, 1 wild horse, 3 wolves, and 1 wolverine (no exact locations recorded).

CONCLUSIONS AND RECOMMENDATIONS

- The most important early-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.
- 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 try to complete a census of moose in this area and then continue to monitor moose populations using aerial and ground-based monitoring.

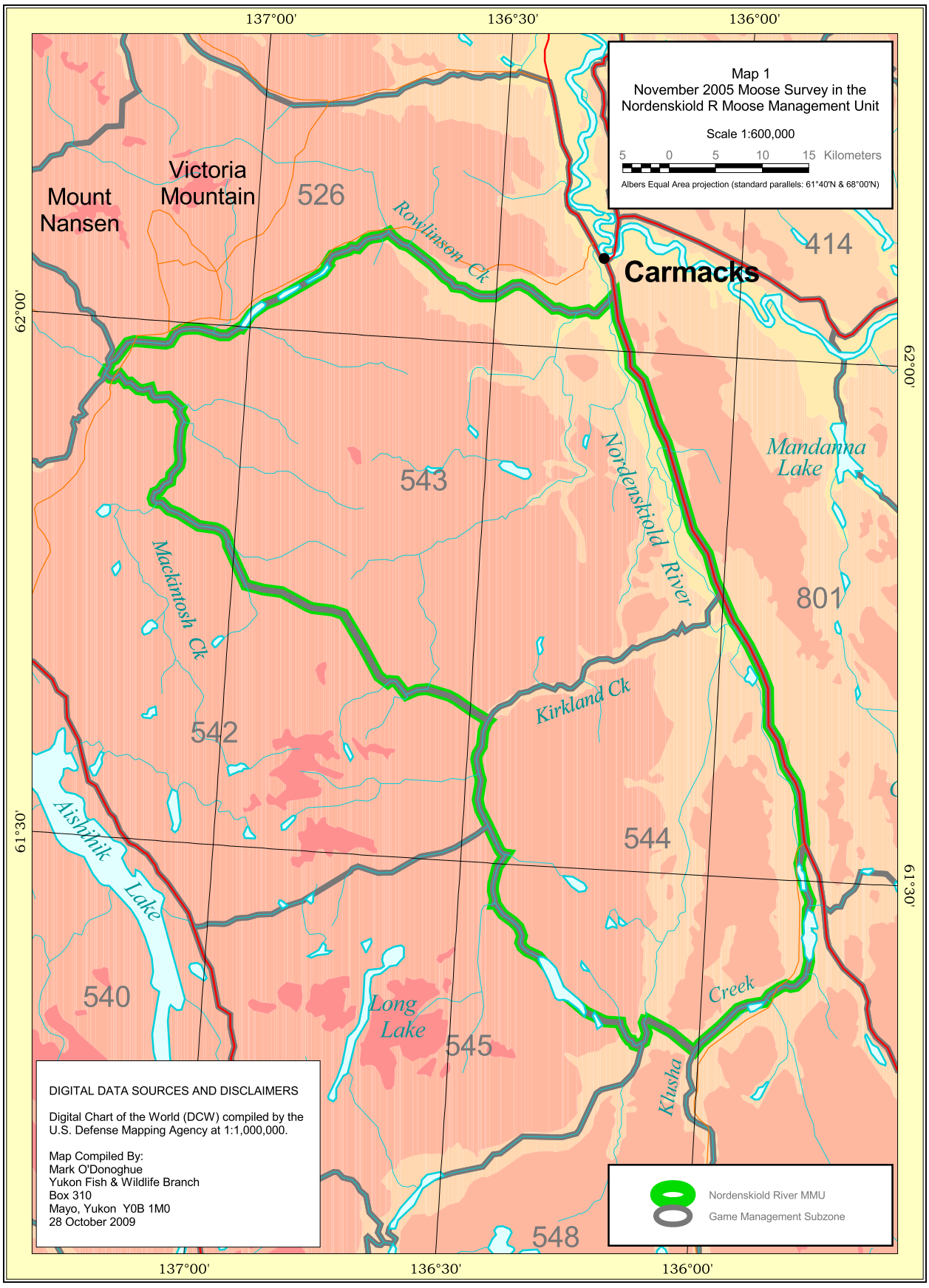
Acknowledgments

The Yukon Fish & Wildlife Branch provided funding and staff for this survey. We thank Jim Healy for safe, efficient flying in often difficult conditions. We also thank Ted Fairclough and Mike Cashin for providing their keen eyesight and knowledge of the area as observers on the aerial survey crews.

Literature Cited

Kellie, K. A., & R. A. DeLong. 2006. Geospatial survey operations manual. Division of Wildlife Conservation, Alaska Department of Fish and Game, Fairbanks, Alaska, USA.

Maps



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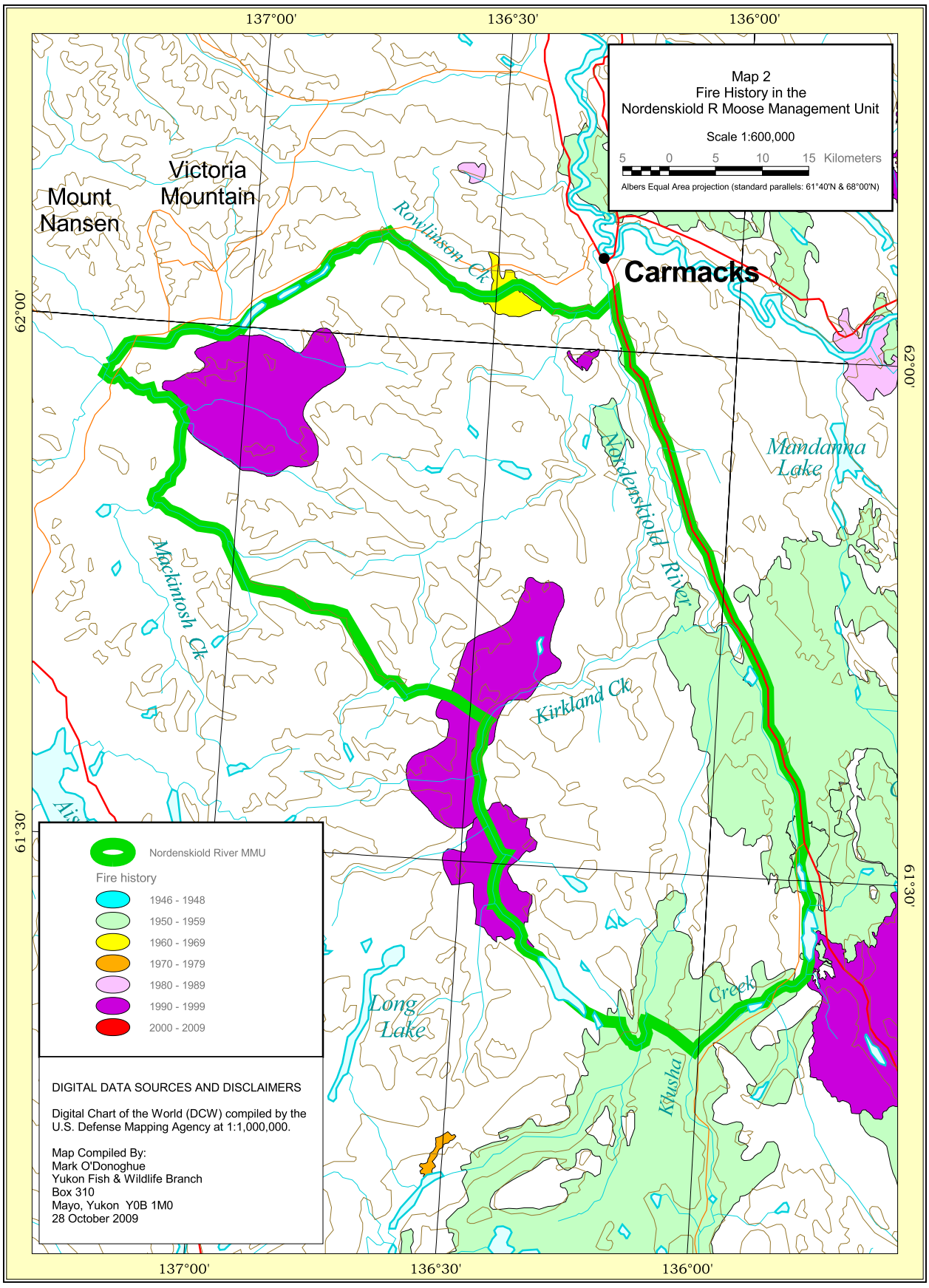
Map 2
Fire History in the
Nordenskiold R Moose Management Unit
Scale 1:600,000
5 0 5 10 15 Kilometers
Albers Equal Area projection (standard parallels: 61°40'N & 68°00'N)
137°00'
136°30'
136°00'
62°00'
61°30'
Mount Nansen
Victoria Mountain
Rowlinson Ck
Carmacks
Mandanna Lake
Nordenskiold River
Mackintosh Ck
Kirkland Ck
Long Lake
Klusha Creek
Nordenskiold River MMU
Fire history
1946 - 1948
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.
Map Compiled By:
Mark O'Donoghue
Yukon Fish & Wildlife Branch
Box 310
Mayo, Yukon Y0B 1M0
28 October 2009
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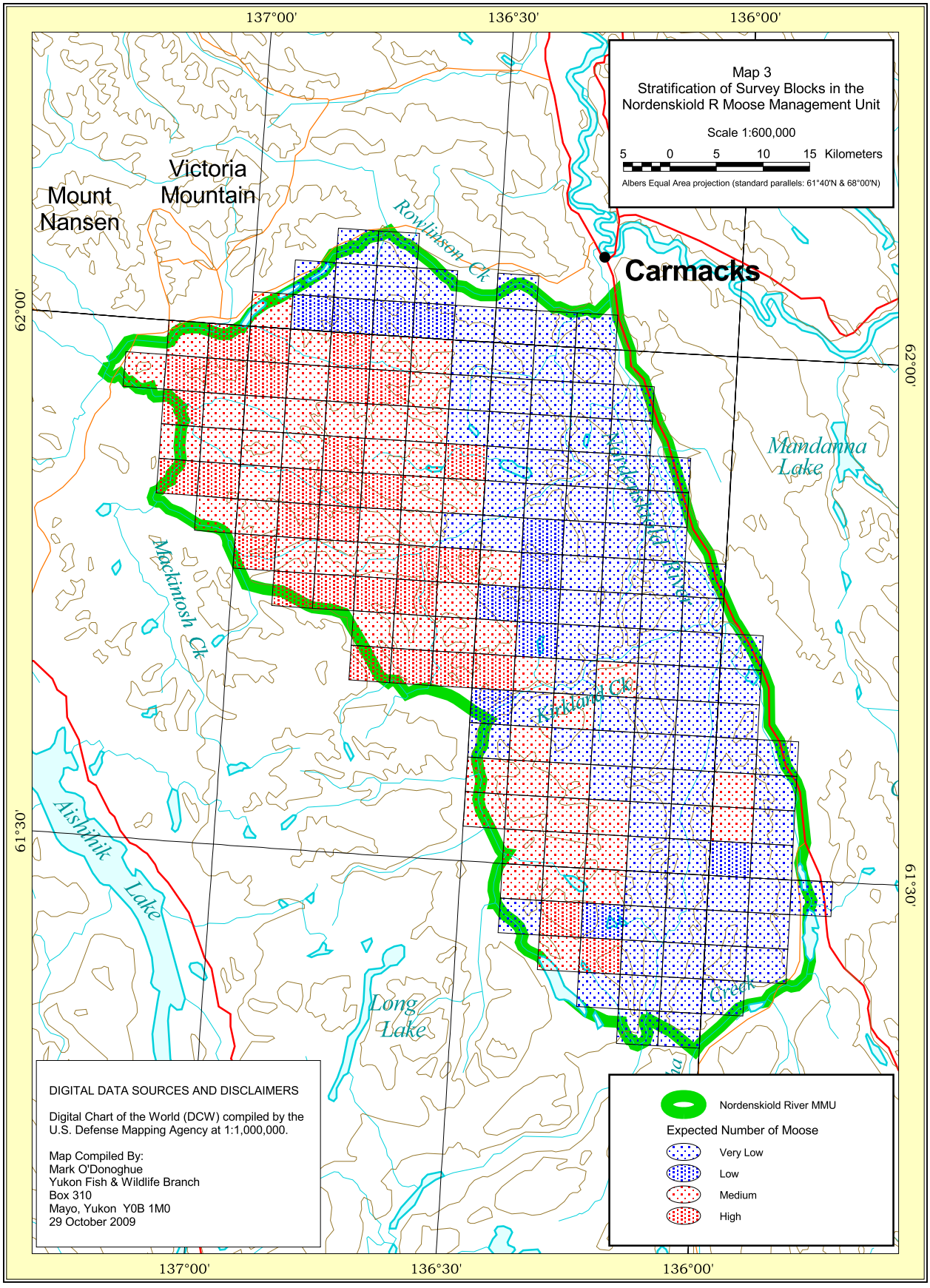

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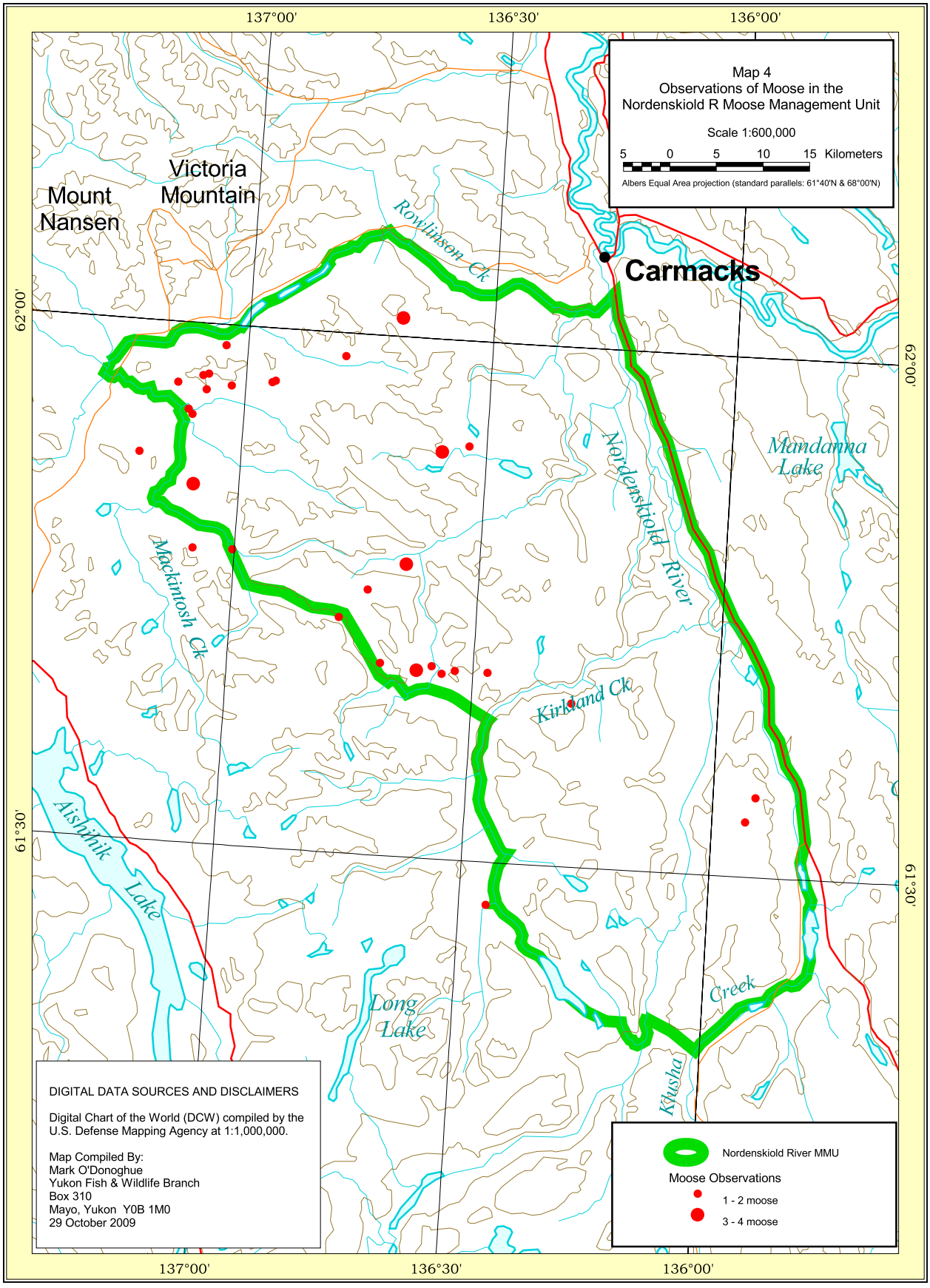

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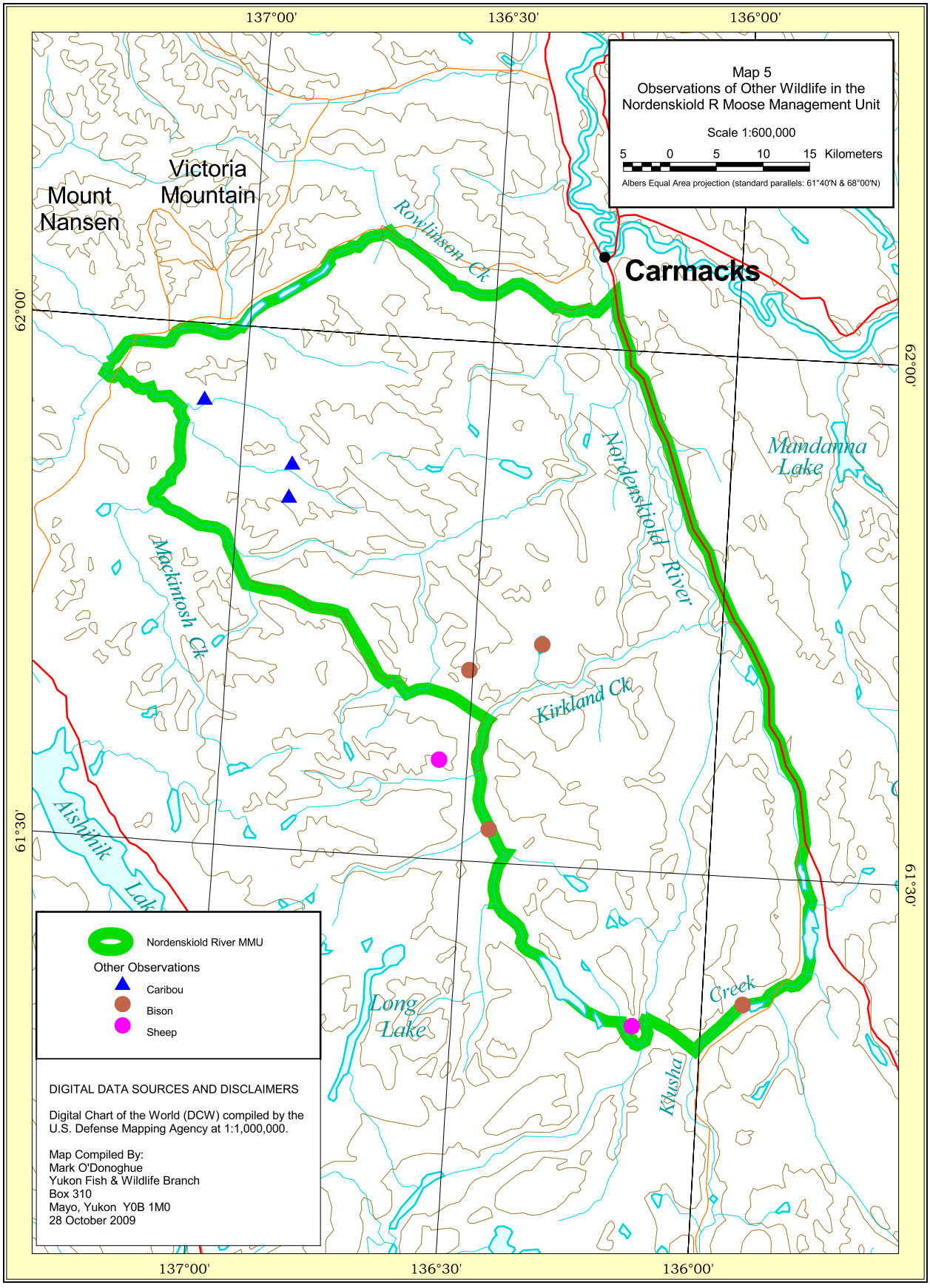

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