SUMMARY OF THE LIARD EAST EARLY-WINTER 2006 MOOSE SURVEY

4-12 NOVEMBER 2006

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Yukon
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Summary of the Liard East Early-Winter 2006 Moose Survey 4-12 November 2006

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SUMMARY

- We conducted an early-winter survey of moose in the Liard East area between November 4 and12, 2006. The main purpose of this survey was to estimate abundance, distribution, and age and sex composition of the moose population.

- The Liard East survey area is an important hunting region for residents of the Watson Lake area. Hunter access into this area increased as a result of logging roads built in the 1990's. Forest planning for the area, currently being undertaken by the Kaska Forest Resources Stewardship Council, may result in additional access in the future.

- We counted moose in survey blocks covering about 34% of the entire survey area, and found a total of 364 moose, of which 89 were adult bulls, 180 were adult and yearling cows, 25 were yearling bulls, and 70 were calves.

- We calculated a total population estimate of 891 ± 20% moose for the area. This represents an average density of about 228 per 1,000 km^2 of suitable moose habitat.

- Moose abundance was significantly greater in the western portion of the survey area (Game Management Subzone 11-28 and 11-29) in 2006 than when the area was last surveyed in 1986.

- We estimated that there were about 44 calves and 25 yearlings for every 100 adult cows in the survey area. This suggests that survival of calves was very good in the summer and fall of 2006.

- We estimated that there were about 52 bulls for every 100 adult cows in the survey area, which is lower than the Yukon average of 69 bulls for every 100 cows but sufficient to ensure that all cows are successfully bred during the rut.

- The adult bull to adult cow ratio was significantly lower in the western portion of the survey area in 2006 than was estimated in 1986, and considerably lower than the Yukon average.

- Harvest of moose in the Liard East area is within recommended allowable harvest rates.

INTRODUCTION

This report summarizes the results of the early-winter survey of moose in the Liard East survey area (see Map 1), conducted between November 4 and12, 2006. The main purpose of the survey was to estimate abundance, distribution, and age and sex composition of the local moose population.

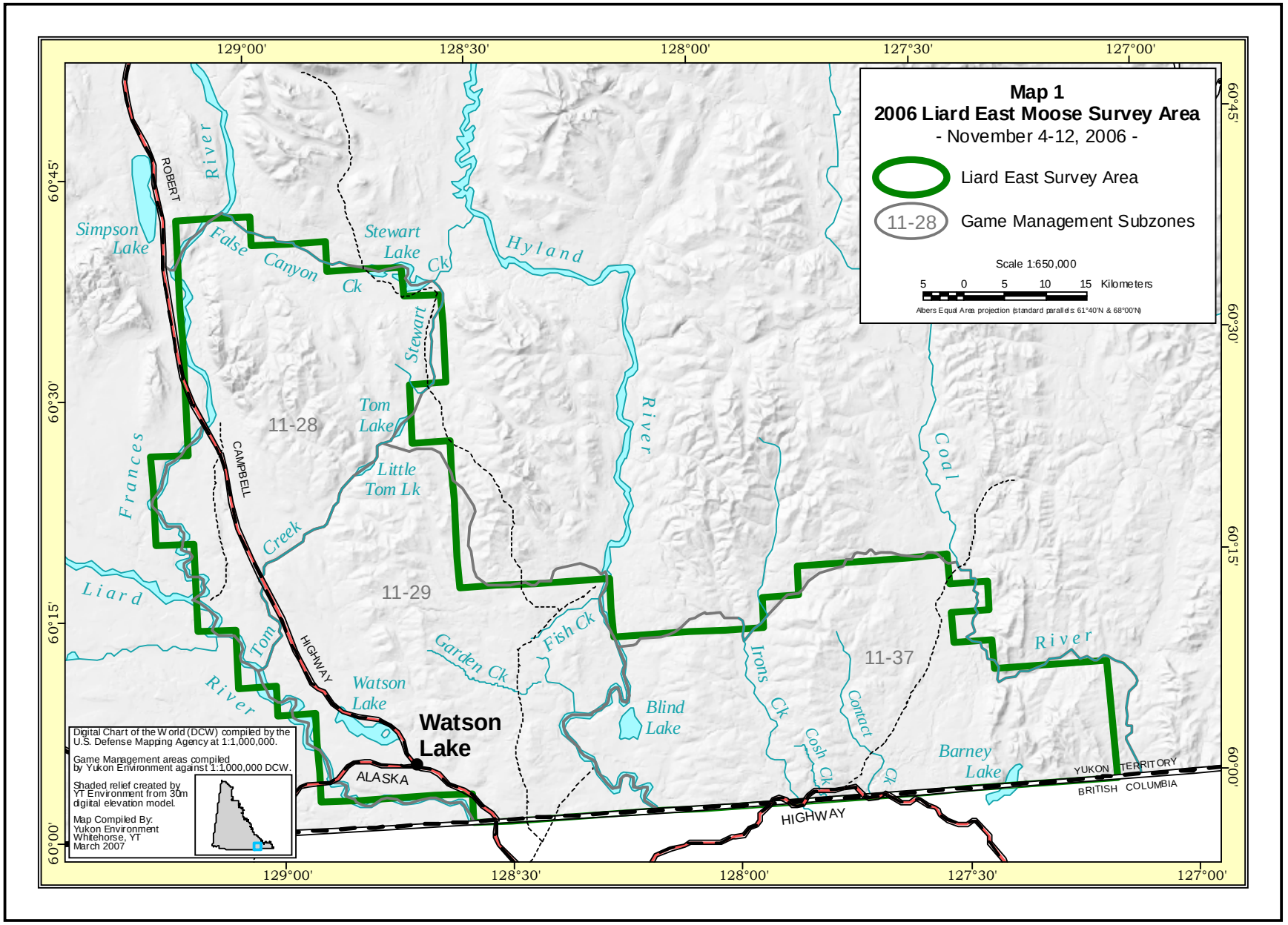
Timber Harvest and Forest Management Planning

A number of small watersheds east of Watson Lake (Garden Creek, Irons Creek, Cosh Creek, Contact Creek, and along the Hyland River) were logged via small clear-cuts in the 1990's or earlier (Map 1). Forest management planning under the Kaska Forest Resources Stewardship Council (KFRSC) began in 2003. The KFRSC is a co-management body with three Kaska representatives and three non-First Nations representatives appointed by the Yukon government. The KFRSC identified the Cosh and Contact creek areas as the primary source of interim wood supply in the southeast Yukon, as well as having potential for further logging under a broader regional plan. The potential for increased hunter harvest rates with greater access, the importance of the area to forest planning, and the possibility of higher moose productivity and densities in logged landscapes were all reasons for the 2006 moose survey in this area.

Previous Surveys

Past moose population survey information for this area are limited. The western portion of our 2006 survey area was previously surveyed using similar methods in 1986 (see Map 2: results in Jingfors and Markel 1987). The eastern part of our 2006 survey area was stratified in 1986 (Map 2) to gather preliminary information on moose distribution and abundance, but a complete census of moose was not done in this portion of the area.

Late-winter surveys were also conducted in 1997 and 1999 to obtain information on relative moose abundance and distribution over five major habitat types between the west side of the Garden Creek watershed and east side of the Coal River watershed (see Map 2: results in Foos 1997 and Westover 1999).


Map 1
2006 Liard East Moose Survey Area
- November 4-12, 2006 -
Liard East Survey Area
11-28
Game Management Subzones
Scale 1:650,000
5 0 5 10 15 Kilometers
Albers Equal Area projection (standard parallels 61°40'N & 68°00'N)
129°00'
128°30'
128°00'
127°30'
127°00'
60°45'
60°30'
60°15'
60°00'
Simpson Lake
ROBERT
River
False Canyon Ck
Stewart Lake Ck
Hyland
Stewart
Tom Lake
Little Tom Lk
11-28
11-29
11-37
Frances
CAMPBELL
Creek
Liard
Tom
HIGHWAY
River
Watson Lake
Garden Ck
Fish Ck
River
Coal
River
Irons Ck
Blind Lake
Contact Ck
Cosh Ck
Barney Lake
Watson Lake
ALASKA
HIGHWAY
YUKON TERRITORY
BRITISH COLUMBIA
Digital Chart of the World (DCW) compiled by the U.S. Defense Mapping Agency at 1:1,000,000.
Game Management areas compiled by Yukon Environment against 1:1,000,000 DCW.
Shaded relief created by YT Environment from 30m digital elevation model.
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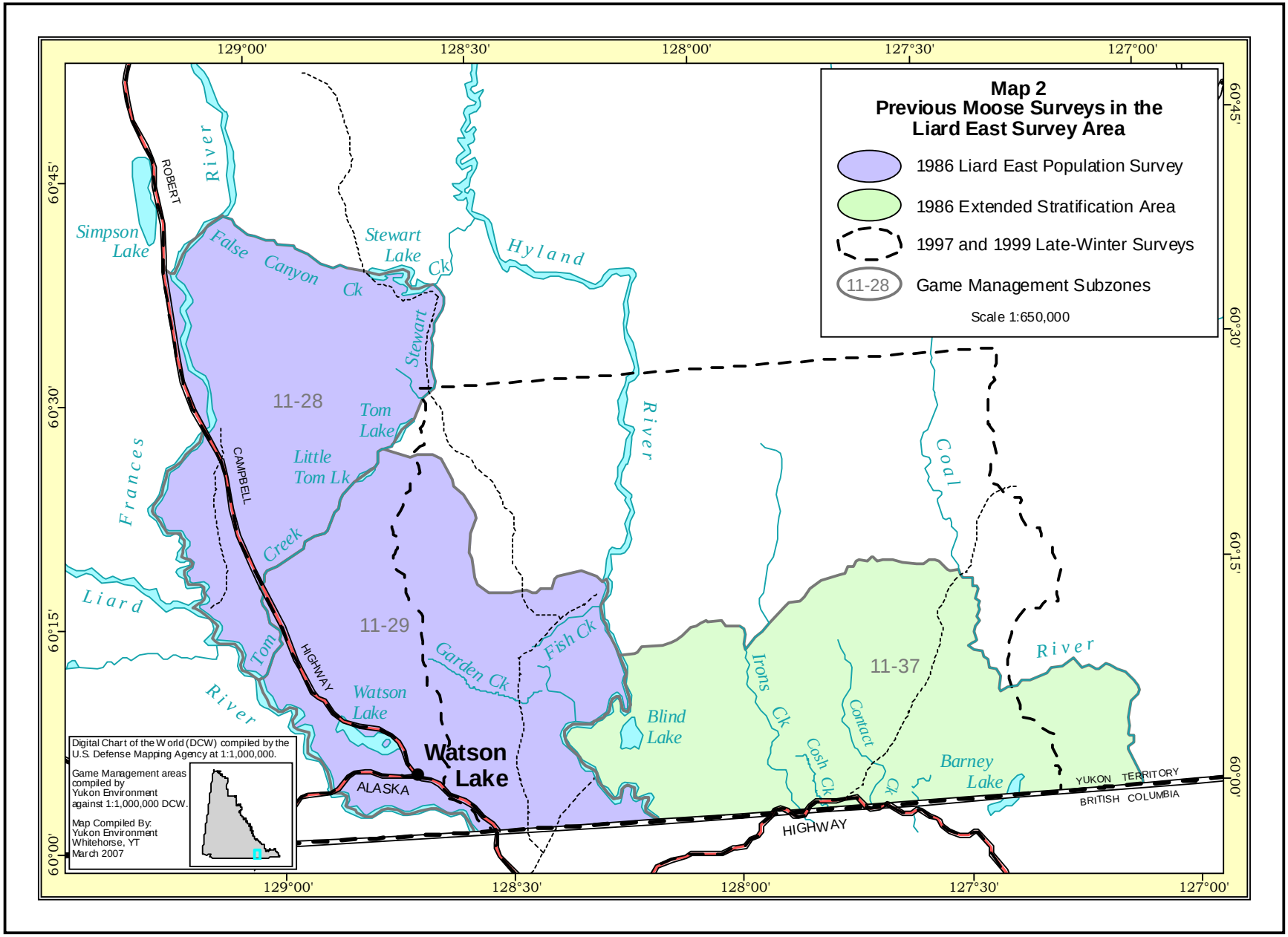
March 2007


Map 2
Previous Moose Surveys in the
Liard East Survey Area
1986 Liard East Population Survey
1986 Extended Stratification Area
1997 and 1999 Late-Winter Surveys
11-28
Game Management Subzones
Scale 1:650,000
129°00'
128°30'
128°00'
127°30'
127°00'
60°45'
60°30'
60°15'
60°00'
Simpson Lake
ROBERT
River
False
Canyon
Ck
Stewart
Lake
Ck
Hyland
River
Stewart
11-28
Tom
Lake
Little
Tom Lk
Frances
CAMPBELL
Creek
Liard
River
Tom
HIGHWAY
11-29
Garden Ck
Fish Ck
Watson
Lake
Watson
Lake
ALASKA
Blind
Lake
Irons Ck
Cosh Ck
Contact
Ck
11-37
Coal
River
Barney
Lake
YUKON TERRITORY
BRITISH COLUMBIA
HIGHWAY
Digital Chart of the World (DCW) compiled by the U.S. Defense Mapping Agency at 1:1,000,000.
Game Management areas compiled by Yukon Environment against 1:1,000,000 DCW.
Map Compiled By:
Yukon Environment
Whitehorse, YT
March 2007

STUDY AREA

The 2006 Liard East survey area covers about 3,977 km². It includes Game Management Subzones (GMSs) 11-28, 11-29, previously surveyed in 1986, and GMS 11-37 (see Map 1). The survey area was expanded to include GMS 11-37 in 2006 because it contains most of the logged landscapes from the 1990's and is important to forest planning. Increased access and potentially high harvest is also a management concern in this area. The 2006 survey boundary is L-shaped, running north from False Canyon and Stewart creeks south to the B.C. border, and from the Frances River and Robert Campbell Highway east to the Coal River (Map 1).

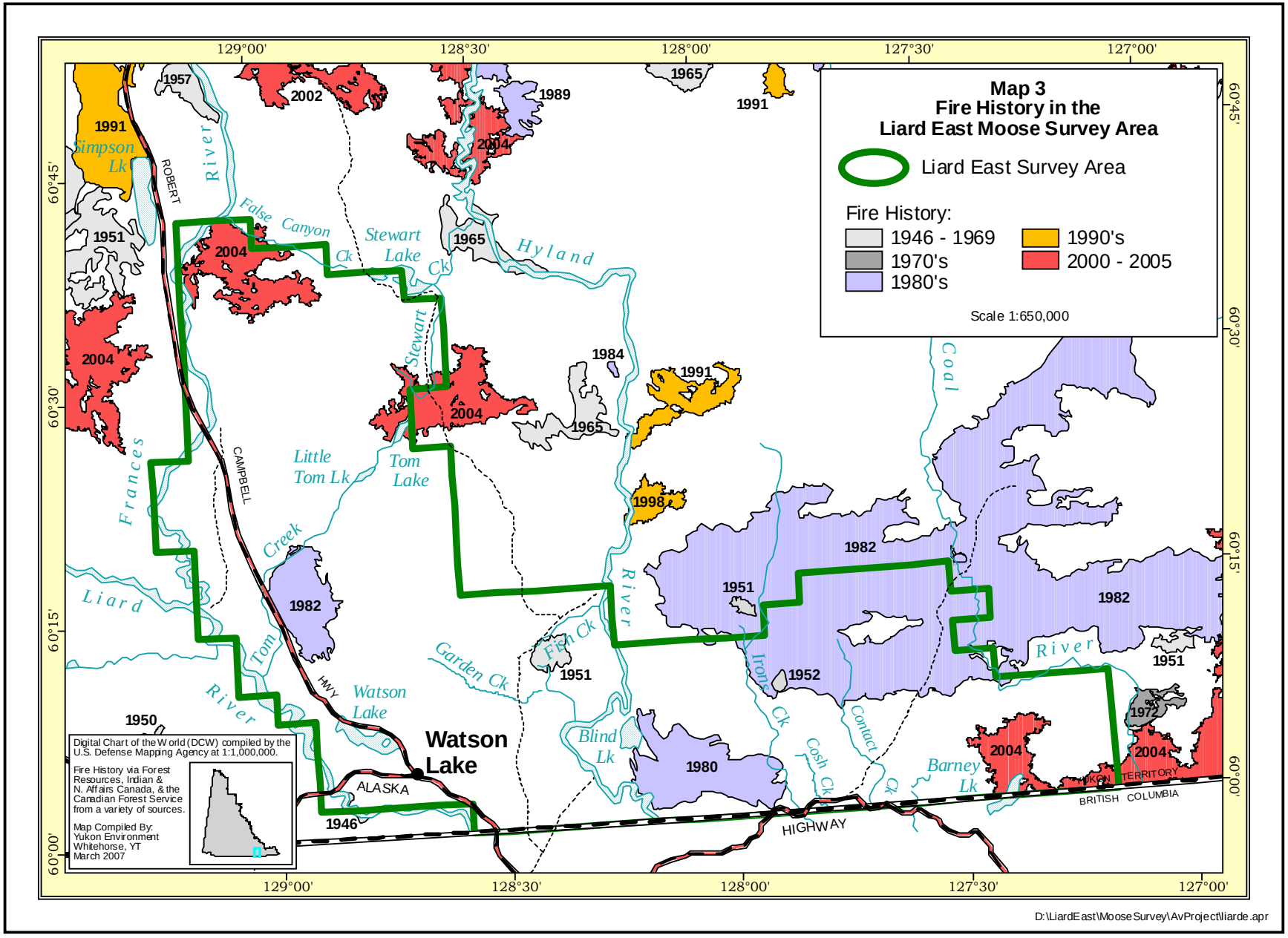
Most of the study area (about 3,911 km²) is considered suitable moose habitat, except for approximately 2% of the area, which is made up of large water bodies (0.5 km² or greater in size) and land over 1,524 m (5,000 feet) in altitude. The study area, as described in the 1986 report (Jingfors and Markel 1987) consists primarily of rolling hills with extensive stands of mature black and white spruce, and mixed spruce and aspen forest on south-facing slopes. A number of older burns from the early 1950s and 1980s, and more recent forest fires in 2004 have occurred throughout the study area (see Map 3). Large fires that occurred in 2004 include a 96 km² burn southwest of False Canyon Creek; a 100 km² burn in the Tom Lake area, and a 201 km² burn north and east of Barney Lake.

METHODS

We have adopted a relatively new survey technique, developed by Jay Ver Hoef with the Alaska Department of Fish and Game (Kellie and DeLong 2006), to survey moose. Field sampling portions of this new technique are similar to those used prior to 1999, except that we count moose in square rather than irregularly shaped survey blocks. This new technique employs more current population estimation procedures.

The new technique involves six steps:

1. The survey area is divided into uniform rectangular blocks about 17 km² in size.


Map 3
Fire History in the
Liard East Moose Survey Area
Liard East Survey Area
Fire History:
1946 - 1969
1970's
1980's
1990's
2000 - 2005
Scale 1:650,000
129°00'
128°30'
128°00'
127°30'
127°00'
60°45'
60°30'
60°15'
60°00'
Watson Lake
ALASKA
HIGHWAY
BRITISH COLUMBIA
YUKON TERRITORY
Simpson Lk
False Canyon Ck
Stewart Lake Ck
Hyland
Stewart
Coal
Little Tom Lk
Tom Lake
Frances
Liard
Tom
River
Creek
Garden Ck
Fish Ck
Watson Lake
Blind Lk
Iron Ck
Cosh Ck
Contact Ck
Barney Lk
ROBERT
CAMPBELL
HWY
1957
2002
1989
1965
1991
2004
1951
1984
1998
1982
1952
1950
1946
1980
1972
Digital Chart of the World (DCW) compiled by the U.S. Defense Mapping Agency at 1:1,000,000.
Fire History via Forest Resources, Indian & N. Affairs Canada, & the Canadian Forest Service from a variety of sources.
Map Compiled By:
Yukon Environment
Whitehorse, YT
March 2007
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2. Observers in fixed-wing aircraft fly over all the blocks, and classify (or "stratify") each block 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" portion 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 inclusion in the following steps.

4. We try to count every moose within the selected blocks (the "census" part of the survey) using helicopters at a search intensity of about 2 minutes per km^2. 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. To estimate the number of moose that we missed during step 4, we re-fly a portion of some of our selected survey blocks using double the search intensity (about 4 minutes per km^2). This information is used to develop a "sightability correction factor" to be incorporated into our population estimate.

6. We use computer programs to estimate the total number of moose in each age and sex category in the entire survey area based on the numbers of moose counted in the blocks during the census. The "sightability correction factor" is applied to the total number to account for moose that we overlooked.

Generally, the more blocks that are searched during the census portion of the survey (step 4), the more precise and reliable the resulting population estimate.

WEATHER AND SNOW CONDITIONS

We had some poor weather and minimal snow conditions at the beginning of the survey, but both improved over the remainder of the survey period. Temperatures ranged from - 14°C to - 28°C, and winds were generally light, with the exception of some strong turbulence in the north and east end of the study area during the first two days, and high winds in the east portion of the area towards the end of the survey. We were able to fly on all but two days, although we had to work around low-hanging fog in valleys during the early survey period. Light, blowing snow during the first few days and overcast skies on most days of the

survey resulted in flat light conditions, with a few days of mixed sun and cloud during the middle of the survey.

Snow depths were low but adequate (about 7 centimeters) for sighting moose throughout the study area at the start of the survey. Conditions improved steadily, however, as light snow continued to fall and accumulate during at least a part of each day for the remainder of the survey period.

RESULTS AND DISCUSSION

Stratification (Identification of High and Low-Density Blocks)

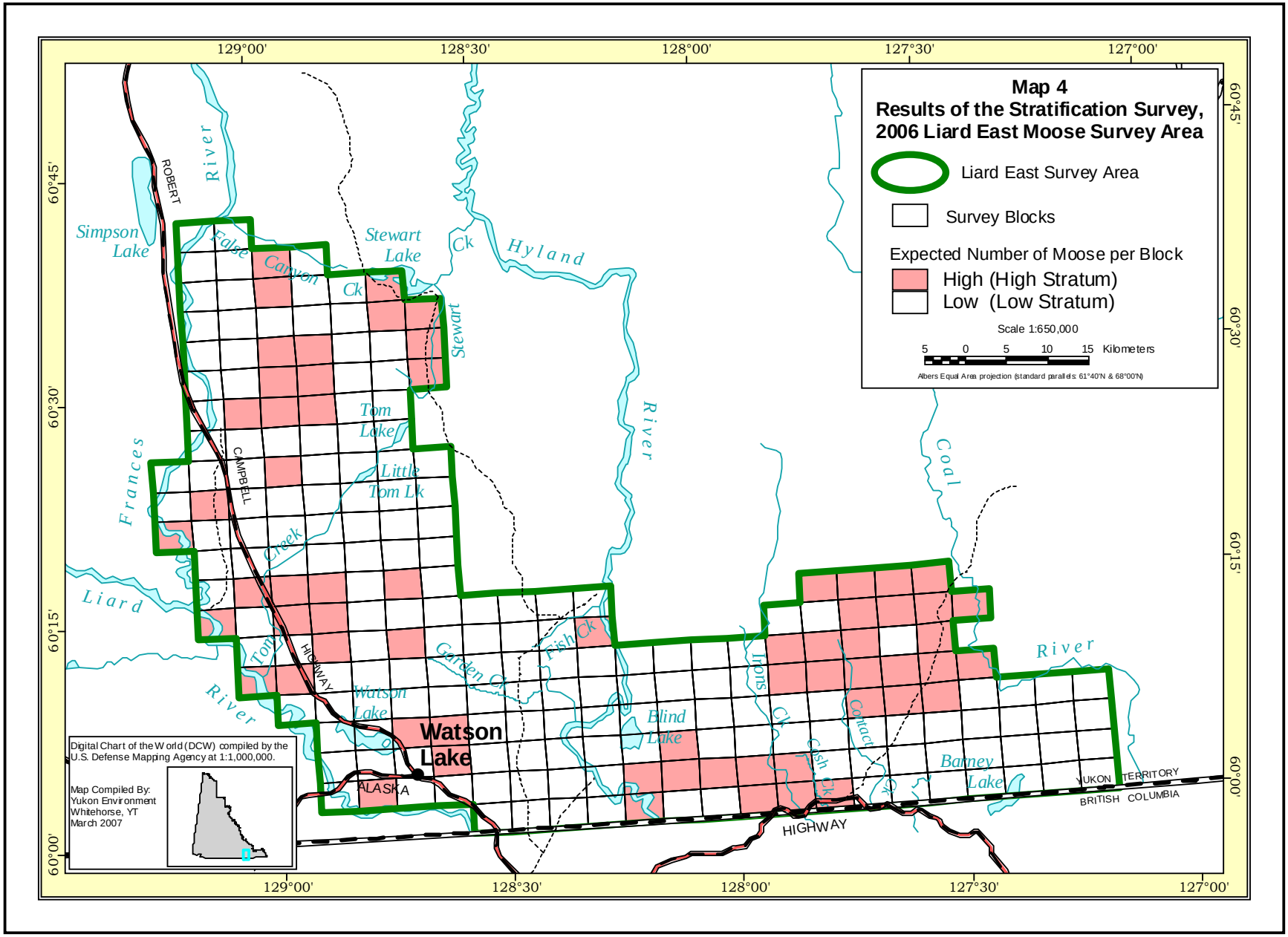
We stratified (or estimated moose abundance in each survey block) in the entire survey area between November 4 and 6, using a 4-seat Found Bushhawk fixed-wing aircraft with the pilot and three observers. An average of 0.12 minutes per km^2 of survey area was used during the stratification flights.

We initially classified 33 (14%) of the 232 survey blocks as having high expected moose abundance, 31 (13%) as medium, 56 (24%) as low, and 112 (48%) as having very low expected abundance of moose. For the purpose of selecting blocks for the census, we then combined the 64 blocks expected to have medium and high numbers of moose into a "High" stratum, and combined the 168 blocks with low and very low expected moose numbers into a "Low" stratum (see Map 4).

The majority of the blocks in the "High" stratum were located in old 1980-1982 burns east of Tom Creek, between Irons Creek and Coal River, and in the Blind Lake and Cosh Creek region (Map 3). Some were also located in high elevation areas northwest of Little Tom and Tom lakes; and in the Stewart Lake and Stewart Creek area (Map 4).

Census Coverage

We counted moose in 78 of the 232 blocks, covering about 34% of the total area (see Map 5). It took 44.1 hours to count moose in these blocks, or about 1.98 minutes per km^2. The survey search intensity was similar in low-abundance (1.95 minutes per km^2) and high-abundance (2.01 minutes per km^2) blocks. We used an additional 4.6 hours re-counting portions of some survey blocks to calculate our sightability correction factor. Another 14.8 hours of helicopter time were used in ferrying back and forth to Watson Lake, to remote fuel caches in the north and east ends of the study area, and flying between survey blocks.


Map 4
Results of the Stratification Survey,
2006 Liard East Moose Survey Area
Liard East Survey Area
Survey Blocks
Expected Number of Moose per Block
High (High Stratum)
Low (Low Stratum)
Scale 1:650,000
5 0 5 10 15 Kilometers
Albers Equal Area projection (standard parallels 61°40'N & 68°00'N)
129°00'
128°30'
128°00'
127°30'
127°00'
60°45'
60°30'
60°15'
60°00'
Simpson Lake
False Canyon Ck
Stewart Lake
Stewart Ck
Hyland River
Robert Campbell Highway
Frances Lake
Tom Lake
Little Tom Lk
Liard River
Tom Creek
Watson Lake
Watson Lake
Garden Ck
Fish Ck
Blind Lake
Irons Ck
Contact Ck
Cash Ck
Barney Lake
Coal River
ALASKA
YUKON TERRITORY
BRITISH COLUMBIA
HIGHWAY
Digital Chart of the World (DCW) compiled by the U.S. Defense Mapping Agency at 1:1,000,000.
Map Compiled By:
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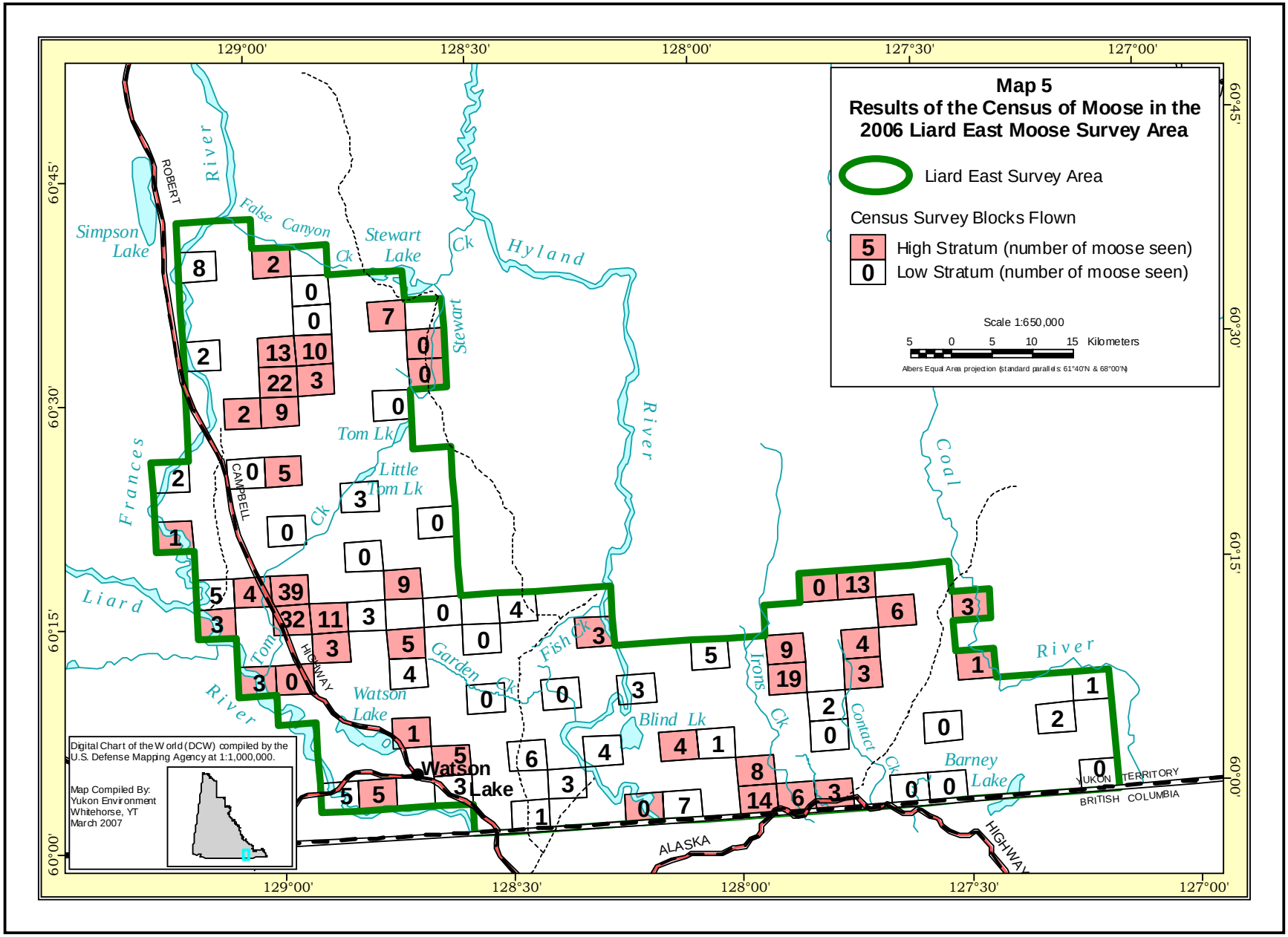
Map 5
Results of the Census of Moose in the 2006 Liard East Moose Survey Area
Liard East Survey Area
Census Survey Blocks Flown
5 High Stratum (number of moose seen)
0 Low Stratum (number of moose seen)
Scale 1:650,000
5 0 5 10 15 Kilometers
Albers Equal Area projection (standard parallels 61°40'N & 68°00'N)
129°00'
128°30'
128°00'
127°30'
127°00'
60°45'
60°30'
60°15'
60°00'
Simpson Lake
False Canyon Ck
Stewart Lake
Hyland River
Stewart River
Tom Lk
Little Tom Lk
Frances River
Liard River
Tom Ck
Garden Ck
Fish Ck
Irons Ck
Contact Ck
Coal River
Blind Lk
Watson Lake
Barney Lake
Watson Lake
ROBERT CAMPBELL HIGHWAY
ALASKA HIGHWAY
YUKON TERRITORY
BRITISH COLUMBIA
Digital Chart of the World (DCW) compiled by the U.S. Defense Mapping Agency at 1:1,000,000.
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March 2007

Observations of Moose

We counted a total of 364 moose, 89 of them adult bulls, 180 adult and yearling cows, 25 yearling bulls and 70 calves (see Table 1).

Table 1. Observations of moose during the November 2006 survey in the Liard East survey area.

	High Blocks	Low Blocks	Total
Number of Blocks Counted	41	37	78
Number of Adult Bulls Observed	73	16	89
Number of Adult and Yearling Cows Observed*	140	40	180
Number of Yearling Bulls Observed	23	2	25
Number of Calves Observed	54	16	70

* Adult and yearling cows cannot always be reliably distinguished from the air, so they are counted together. Assuming that equal numbers of males and females are born and that they survive about equally well until they are yearlings, the number of yearling cows and bulls observed during the survey should be about equal. Note: we use this assumption to estimate the total number of adult cows in the survey area by subtracting the number of yearling bulls observed from the total number of cows counted; and use 2x the number of yearling bulls counted as the estimated total number of yearlings observed during the survey. This estimate of adult cow and total yearling numbers is used in the calculation of data presented in Table 2 below.

Distribution and Abundance of Moose

Moose were widely distributed in the Liard East survey area. As in 1986, they were often observed in greater numbers along riparian creek drainages and in burned areas, most of which date back to the early 1980s. Burned areas 15-25 years old, with abundant regeneration to willow, birch and aspen are often associated with higher moose densities. Moose association with the more recent 2004 burn areas was less apparent, likely because hardwood browse is still scarce. Small concentrations of moose were found in a number of dispersed forestry

cut-blocks in the region. Although the amount of high elevation and sub-alpine habitat within the study area was low, the willow flats and willow creek draws associated with them also had good numbers of moose.

Based on our census counts, we estimate that there are a total of 891 ± 20% moose in the survey area (see Table 2).

Table 2. Estimated abundance of moose in the Liard East moose survey area in November 2006.

	Best Estimate ± 90% Confidence Interval*	Estimates within 90% Confidence Interval*
Estimated Total Number of Moose**	891 ± 20%	713-1,069
Adult Bulls	211 ± 25%	158-264
Adult Cows	401 ± 23%	310-493
Yearlings	102 ± 36%	65-139
Calves	177 ± 23%	136-218
Density of Moose (per 1,000 km²)		
Whole Area	224 ± 20%	179-269
Moose Habitat Only***	228 ± 20%	183-273
Sightability Correction Factor**	1.13	

* A "90% confidence interval" means that, based on our survey results, we are 90% sure that the true number of moose in the area lies within this range, and that our best estimate is in the middle of this range.

** Estimated numbers provided are based on a pooled "sightability correction factor" or SCF. In this survey, a SCF of 1.13 was applied to correct estimates of moose abundance for animals that were missed by the survey crews (see step 5 of methods section for a description of how the SCF is calculated).

*** Suitable moose habitat is considered all areas at elevations lower than 1,524 m (5,000 ft), including water bodies < 0.5 km² in size.

Estimated average moose density in the survey area is 224 per 1,000 km² of total area, or 228 per 1,000 km² of suitable moose habitat (see Table 2). This is higher than the Yukon-wide average of 156 moose per 1,000 km², and the average density of 191 moose per 1,000 km² of

moose habitat from the most recent data available for previously surveyed areas throughout the Yukon.

Ages and Sexes of Moose

Based on our survey results, calf survival to the early winter was very good in the 2006 survey area. The estimated 44 calves for every 100 adult cows (see Table 3) is well above the 25-30 calves per 100 cows generally considered necessary for maintaining stable moose populations in areas with typical adult mortality rates. Calves made up an estimated 20% of the population in 2006. Eight percent of cow-calf groups contained twins.

Yearlings represented about 11% of the estimated population in the survey area (see Table 3). There were an estimated 25 yearlings per 100 adult cows, or about 14 per 100 adults. Depending on mortality rates, about 10-20 yearlings per 100 adults are required for maintaining stable populations (Yukon Fish & Wildlife Branch 1996).

Overall, calf and yearling recruitment in the Liard East survey area suggests a stable to increasing moose population.

Table 3. Estimated composition of the moose population in the Liard East moose survey area in November 2006.

	Best Estimate	Estimates within 90% Confidence Interval*
% Adult Bulls	24%	20-27%
% Adult Cows	45%	41-49%
% Yearlings	11%	8-15%
% Calves	20%	17-23%
Adult Bulls per 100 Adult Cows	52	41-64
Yearlings per 100 Adult Cows	25	16-34
Calves per 100 Adult Cows	44	37-51
% of Cow-Calf Groups with Twins	8%	3-14%

* A "90% confidence interval" means that, based on our survey results, we are 90% sure that the true number lies within this range of numbers, and that our best estimate is in the middle of this range.

We estimate that there were about 52 adult bulls for every 100 adult cows in the survey area (see Table 3). This is somewhat lower than the Yukon-wide average of 69 bulls per 100 cows in areas that have been surveyed, but well above the minimum level of 30 adult bulls per 100 adult cows set out in our Yukon Moose Management guidelines to ensure that the majority of adult cows are bred during the rut (Yukon Fish & Wildlife Branch 1996).

Population Status: 1986 and 2006

As noted above, the western portion of our 2006 Liard East survey area (Game Management Subzones 11-28 and 11-29) was previously surveyed in 1986 (see Map 2). Moose information for the 20 years between these two intensive population surveys are limited to two late winter stratification flights conducted in 1997 and 1999 (see Map 2: results in Foos 1997 and Westover 1999). We therefore limit our discussion of moose population dynamics in the area to a summary of the differences and similarities in moose population abundance, composition and distribution between the two survey periods (Table 4).

The mean estimated moose population in the west comparison area increased significantly (2-tailed Z test, Z=2.61, P=0.009) from 329 moose in 1986 to 484 moose in 2006 (Table 4). This represents a 47% increase in abundance and an increase in average density from 140 moose per 1000 km^2 observed in 1986, to 195 moose per 1000 km^2 in 2006 in suitable moose habitat.

The calf to cow ratio was similar in 2006 (46 calves per 100 adult cows) to that estimated in 1986 (51 calves per 100 adult cows). Although the proportion of yearlings appeared lower during the 2006 survey than in 1986 (22 versus 37 per 100 adult cows respectively), the 1986 estimate was relatively imprecise so we cannot say with certainty that there was any real difference in the proportion of yearlings in the population between the two years.

In both 1986 and 2006, overall recruitment rates in the GMS 11-28 and 11-29 comparison area were at or greater than the 25-30 calves and yearlings per 100 adult cows normally associated with stable to increasing moose populations. The significant increase in total moose abundance in the area between 1986 and 2006 suggests that average recruitment was also strong during that period. The estimated twinning rate in 2006 was relatively healthy at 9 percent. We are unable to compare the estimated percent of cow-calf groups that had twins between the two survey periods however, due to the way data was collected in 1986.

Table 4. Results from the 2006 and 1986 Surveys of Game Management Subzone (GMS) 11-28 and 11-29.

	2006*	1986*
Estimated Abundance (± 90% Confidence Interval)**		
Total Moose	484 ± 15% (412-556)	329 ± 21% (260-398)
Adult Bulls	110 ± 23% (85-135)	99 ± 30% (69-129)
Adult Cows	223 ± 16% (188-257)	122 ± 37% (77-167)
Yearlings	49 ± 35% (32-66)	46 ± 46% (24-66)
Calves	104 ± 17% (86-122)	62 ± 26% (46-78)
Adult Bulls per 100 Adult Cows	49 ± 28% (36-63)	81 ± 38% (50-112)
Yearlings per 100 Adult Cows	22 ± 38% (14-30)	37 ± 64% (13-61)
Calves per 100 Adult Cows	46 ± 23% (36-57)	51 ± 36% (32-69)
% of Cow-Calf Groups with Twins***	9% ± 58% (4-14)	-
Density of Moose (per 1,000 km^2)*		
Whole Area	191	~135
Moose Habitat Only****	195	140

* No sightability correction factor (SCF) is available for 1986 survey data. To allow for between year comparisons, 2006 survey data are also presented in Table 4 with no SCF applied. The difference between the total estimated number of moose and the sum of the adult, yearling and calf numbers for the 2006 comparison results is due to the population estimation methods used.

** A "90% confidence interval" means that, based on our survey results, we are 90% sure that the true number lies within this range of numbers, and that our best estimate is in the middle of this range.

*** Calculated as the number of cows with 2 calves divided by the total number of cows with calves. Cow and calf data was recorded separately in 1986 (no cow with 1 or cow with 2 calf group categories existed), so we are unable to provide an estimated twinning rate for the 1986 survey.

**** Suitable moose habitat is considered all areas at elevations lower than 1,524 m (5,000 ft), including water bodies < 0.5 km^2 in size.

The estimated proportion of mature bulls in the GMS 11-28 and 11-29 comparison area decreased significantly (Chi square, $P<0.01$) from 81 bulls per 100 mature cows in 1986 to 49 mature bulls per 100 mature cows in 2006 (Table 4). This is considerably lower than the Yukon-wide average, but above the minimum level of 30 bulls per 100 cows normally considered sufficient to ensure that all cows are bred during the rut (Yukon Fish & Wildlife Branch 1996). Although the low bull ratio observed in 2006 is not of immediate concern, it does highlight the need for ongoing monitoring.

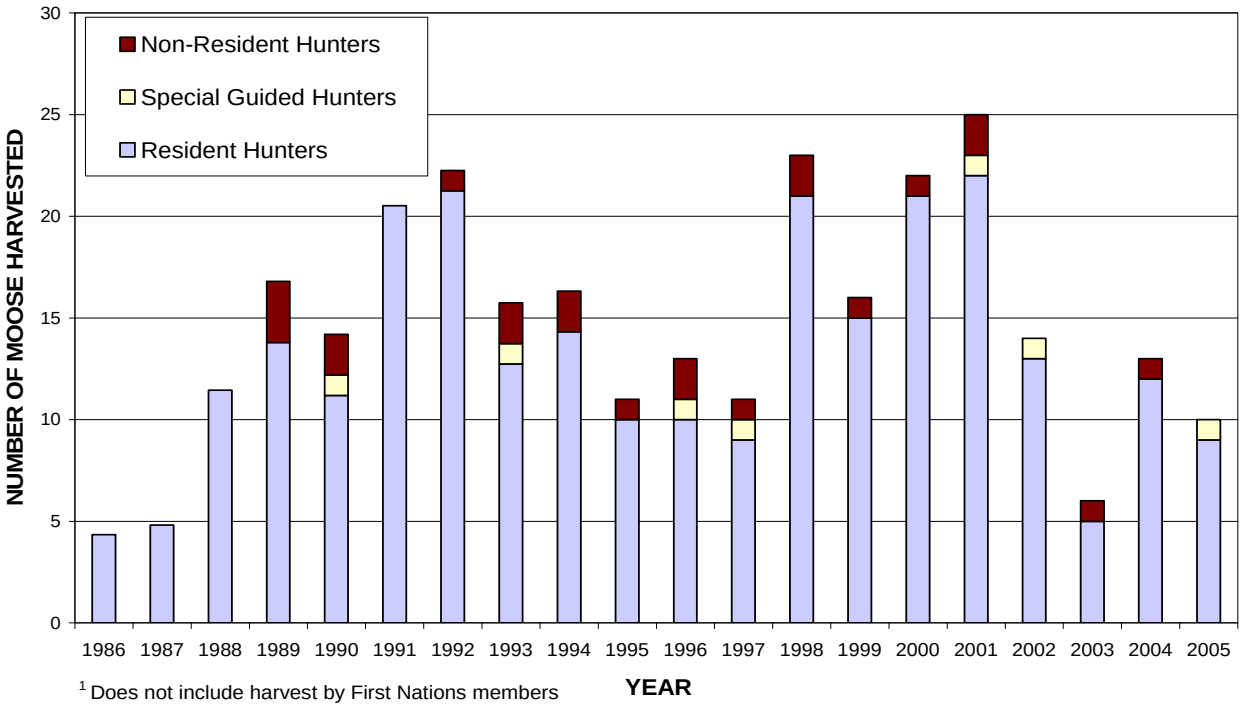
The lack of population composition data and complete harvest information between the 1986 and 2006 surveys makes it difficult to assess the reason for the drop in the bull to cow ratio. One possible explanation is past hunting activity and higher harvest levels related to access. Hunters from Watson Lake area are known to hunt logging roads in GMS 11-29 and 11-37 in the fall. This explanation is not supported, however, by the fact that the total estimated harvest rate (including First Nation hunters) is currently within recommended sustainable levels (see Harvest Section below), and total moose abundance in the area has increased significantly between the 1986 and 2006 surveys. It is also possible that the relatively low snow conditions of the 2006 survey meant that some of the bulls were still widely dispersed and found in higher-elevation areas north of the survey area.

Harvest

Reported harvest in Game Management Subzones that lie within the 2006 Liard East survey area (GMSs 11-28, 11-29, 11-37; Map 1) has fluctuated since the last survey was conducted in 1986 (Figure 1). Less than 5 moose per year were reported harvested at the time of the 1986 survey, but it began to increase in the late 1980s. An average of 10 moose was harvested per year between 1986 and 1990. The harvest continued to increase to an average of 17 moose per year during the 1990s (1991-2000).

The highest recorded harvest for this area was 25 moose reported in 2001, but harvest has declined since then (Figure 1). The most current 5-year average reported harvest rate (2001-2005) is 14 moose per year.

Figure 1: Annual Reported Moose Harvest (1986-2005) in the Liard East Moose Survey Area[1] (Game Management Subzones: 11-28, 11-29, 11-37)



[1] Does not include harvest by First Nations members

Using our 2006 moose density estimate, the resulting current average annual reported harvest rate (2001 to 2005) for the area is about 1.5% of the 893 moose estimated for these GMSs (Table 5). These numbers do not, however, include harvest by First Nations' hunters for whom we do not have reliable information. In the absence of harvest information for First Nations' hunters, we generally assume that their harvest is about equal to that by licensed resident non-First Nation hunters.

If we make this assumption for the First Nation harvest, then the total estimated average annual harvest rate (including First Nation hunters) increases to about 2.9% of the estimated moose population. This is still within the annual allowable harvest rates of 3% to 4% that we generally set for stable moose populations of average density (Yukon Fish & Wildlife Branch 1996). In the absence of complete and reliable data, however, moose harvest in this area should remain conservative.

Table 5. Average Annual (2001-2005) Reported Moose Harvest and Allowable Harvest Summary for the 2006 Liard East Moose Survey Area, Game Management Subzone (GMS) 11-28, 11-29, and 11-37[1]

GMS	GMS Area (km^2)	Estimated Density[2] (moose/ 1000 km^2)	Total Estimated number of Moose	Average Resident Harvest	Average Non-Resident Harvest	Average (Special Guided) Harvest	Average Reported Harvest[3] (2001-2005)	Current Harvest Rate (% of total population)	2% Allowable Annual Harvest	3% Allowable Annual Harvest	4% Allowable Annual Harvest	5% Allowable Annual Harvest
11-28	1106.5	225	249.0	4.4	0.0	0.2	4.6	1.8	5.0	7.5	10.0	12.4
11-29	1422.8	225	320.1	4.0	0.0	0.2	4.2	1.3	6.4	9.6	12.8	16.0
11-37	1439.8	225	324.0	3.8	0.8	0.2	4.8	1.5	6.5	9.7	13.0	16.2
Total[4]	**3969.1**	**225**	**893.1**	**12.2**	**0.8**	**0.6**	**13.6**	**1.5**	**17.9**	**26.8**	**35.7**	**44.7**

[1] Does not include harvest by First Nations' members.
[2] Based on 2006 Liard East moose survey results.
[3] Includes only reported harvest. Does not include harvest by First Nations' members.
[4] Small differences in total area, average moose density, and total number of moose presented in the report for the Liard East survey area, versus Table 5, are due to slight differences in game management subzone and survey area boundaries (see Map 1).

Other Wildlife Sightings

In addition to the 364 moose we counted during the 2006 survey, we also observed 47 moose outside of the sample units that were surveyed, or just outside of the survey boundary. The total number observed during the entire survey period was 411 moose. Three black wolves were observed along Stewart Creek northeast of Tom Lake, and 1 grey/tan wolf was located at the south end of Tom Creek. Two Red Fox were also seen; one near the Robert Campbell Highway west of Little Tom Lake, and one was spotted on the Liard River southwest of Watson Lake.

CONCLUSIONS AND RECOMMENDATIONS

- We estimate that there are about 891 moose in the 2006 Liard East survey area. The resulting estimated density of about 228 per 1,000 km^2 of suitable moose habitat is higher than the Yukon-wide average. A significantly higher density of moose was estimated in 2006 for the same area flown in 1986.

- There was good survival of calves in this area during the summer and fall of 2006. Survival of calves born in 2005 (yearlings during this survey) was also quite good. Average recruitment since the previous survey in 1986 appears to have been sufficient to result in the observed significant increase in moose abundance in the area. Current recruitment rates in the survey area suggest a stable to increasing moose population.

- The number of adult bulls, compared to the number of adult cows in the entire survey area, was below the Yukon-wide average for areas that have previously been surveyed, but well above the number generally considered sufficient to ensure that adult cows are bred during the rut. The reason for the significantly lower proportion of bulls observed in the west portion of the area is unclear.

- The current harvest of moose in the 2006 Liard East survey area is within the normal annual allowable harvest rate recommended for stable moose populations of average density.

- We should continue to monitor moose population status and harvest rates in the Liard East area due to the access and potential for higher hunter harvest rates.

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