



Report Title: Review of Ungulate Inventory, Game Harvest, and Trapline Catch Data for Lands Surrounding the Site C Project

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Date: June 14, 1991

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During Stage 2 of the Site C Project, studies are underway to update many of the historical studies and information known about the project.

The potential Site C project, as originally conceived, will be updated to reflect current information and to incorporate new ideas brought forward by communities, First Nations, regulatory agencies and stakeholders. Today's approach to Site C will consider environmental concerns, impacts to land, and opportunities for community benefits, and will update design, financial and technical work.

Review of Ungulate Inventory, Game Harvest,
And Trapline Catch Data for Lands
Surrounding the Site C Project

by
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SECOND DRAFT
June 14, 1991

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EXECUTIVE SUMMARY

1.0. INTRODUCTION

This report reviews Ministry of Environment ungulate inventory, hunter harvest, and trapline catch statistics for lands surrounding the proposed Site C Reservoir and Site One to Site C Transmission Line. The review provides data for assessment of population changes since earlier Site C studies, for planning and interpretation of the results of current inventory programs, for input into biophysical capability ratings, and for assessment of economic values attributable to hunting and trapping.

2.0 UNGULATE INVENTORY DATA

Information is from MOE aerial surveys in M.U.'s 7-32, 7-34 and 7-35, plus earlier Site C reports (Thurber 1976; Blood 1979; MOE 1981). MOE surveys were of the reconnaissance/classification, lineal transect, and sample block types. Where possible, survey data were used to assess trends in abundance (animals seen per survey hour) and population density.

Deer numbers appear to have been high in the early 1960's, to have declined to a low about 1973/74 and remained low through 1976/77, and then to have increased steadily to the present. Populations have varied at least 6 to 8-fold over the past 25 years. Winter densities in the Peace River valley were about 1/km² in the mid 1970's and 6/km² in the late 1980's. Densities are higher if only the south-facing breaks are considered. Winter weather severity is the major factor influencing long-term trends in deer abundance.

Data on moose seen per hour, and stratified counts in M.U. 7-32, suggest that moose populations may have varied 2 to 3-fold in size in recent years. Variations in abundance can probably be attributed to effects of the most severe winters together with hunter harvests. Population densities over the entire area of M.U.'s 7-32, 7-34 and 7-35 appear to vary from about 0.5 to 2.0 per km². Densities may reach 3.5 per km² in the Peace River valley when large numbers of moose move into it to avoid deep snow on the plateau.

The elk population in M.U.'s 7-32, 7-34 and 7-35 has increased dramatically since 1965, from virtually none to at least 275. These are distributed on 3 discrete winter ranges along the lower Halfway, Moberly, and Pine/Septimus valleys. The increase is probably due to recent mild winters, expansion into vacant habitat, negligible hunting mortality prior to 1989, and immigration from outside of the 3 M.U.'s under review.

3.0 WILDLIFE HARVEST DATA

Harvest statistics are from the MOE Hunter Sample for the 14-year period 1976 through 1989. Data for 10 M.U.'s surrounding the Site C Project are given for big game animals; data for gamebirds are confined to the 3 M.U.'s which border the proposed reservoir. Deer harvests have varied 15-fold over the 1976-89 period, and have increased steadily from 1983 to peak levels in 1989. This reflects a real increase in deer abundance, probably promoted by a series of mild winters. Elk harvests were negligible until 1989 when 62 were taken during a liberalized hunting season made possible by increasing populations. The moose harvest has varied only about 2-fold, but like deer has increased steadily since 1983 in response to population growth and regulation changes. Black bear, wolf, duck, and goose harvests do not show any obvious long-term trends. Ruffed grouse harvests have been strongly cyclic, with the most recent peak during 1987-89.

The 3 M.U.'s bordering the proposed Site C reservoir (7-32, 7-34, and 7-35) make up only 17% of the land area of the larger sample of 10 M.U.'s used in this analysis, but have provided 42% of the deer harvest, 38% of the moose harvest, 50% of the elk harvest, and 40% of the black bear harvest during 1976-89. This is largely due to their high biophysical capability for those species.

4.0 TRAPLINE CATCH DATA

Data were provided by MOE, Fort St. John, and included Historical Harvest Summary Coding Sheets (1983 and earlier) and Wild Fur Harvest Summary Reports (1984-1990). Within M.U.'s 7-32, 7-34 and 7-35, 1985/86 through 1989/90, 23 Registered Trappers took about 74% of the catch and 52 Private Property Trappers took 26%. Squirrels are most abundant in the catch, followed by beaver, marten, muskrat, weasel, coyote, mink, and 6 other species. Species composition of the catch in recent years was similar to that reported in previous Site C studies. The lynx catch is strongly cyclic here, the most recent peak being in 1982/83. Mean annual catches in the Site C area have been about 20 to 24 pelts per 100 km² in recent years. Catch data are given for 9 Registered Traplines which border the proposed reservoir or would be crossed by the Transmission line. Little or no catch information is available for 3 other Native Indian traplines which could be affected by the Site C development.

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1.0 . INTRODUCTION

1.1 Study Scope

This report brings together big game inventory and wildlife harvest statistics for lands surrounding the proposed Site C Dam on the Peace River, and the proposed Site One to Site C transmission line. Only species-groups subject to human harvest are reviewed - that is, big game mammals, gamebirds, and furbearers. The report addresses item B.1.a. and item 3. of the B.C. Hydro Terms of Reference (Appendix 1). The review was prepared by Mr. D. Blood for Keystone Bio-Research.

The land area under review is shown in Figure 1.

1.2 Objectives

The major objective was to compile, synthesize and interpret available inventory and harvest data for game species in the region. This is meant to serve the following purposes:

- 1). Assessment of population changes which may have occurred since the previous Site C studies, and reasons for such changes,
- 2). To aid in planning and interpretation of the results of current inventory programs,
- 3). To assist in the application of realistic biophysical capability ratings,
- 4). To provide background for assessment of recreational and economic values attributable to the wildlife resource.

1.3 Presentation of Information

This review has generated a great deal of tabular data. Rather than trying to separate this into tables and appendices, the statistical information is all presented as a series of tables. Because of the large number of tables involved, these are presented following the text.

1.4 Acknowledgements

Thanks are extended to Dr. S. Hirst, B.C. Hydro, and Keith Simpson, Keystone Bio-Research, for guidance and administrative support. Ministry of Environment personnel Brian Churchill and Rob Woods in Fort St. John and John Thornton, Ian Hatter, and Ralph Archibald in Victoria were most helpful. Mr. Rod Backmeyer retrieved important file data.

2.0 UNGULATE INVENTORY DATA

2.1 Methods and Information Sources

This information is from 3 major sources:

- 1). MOE files in Fort St. John.

These are primarily "Flight Summary" or "Classified Aerial Count Summary" sheets for the period 1963/64-1982/83 (Appendix 2).

- 2). The MOE computerized Ungulate Inventory Data Base (UIDB).

This involves inventory information entered primarily from 1986-1990, retrieved by Ian Hatter MOE, Victoria, and provided to us in the form of computer print-outs.

- 3). Miscellaneous reports prepared for the Site C project or other purposes, i.e. Thurber (1976); Blood (1979); Ministry of Environment (1981); Harper (1985).

Other than some relevant deer statistics for part of M.U. 7-33, the analysis of inventory information is restricted to M.U.'s 7-32, 7-34, and 7-35. Almost all of the inventory information is from aerial surveys, and these were almost entirely by helicopter, however some recent ground surveys of mule deer (spring carry-over counts) are included. All surveys except the carry-over counts were carried out in winter, i.e. between mid-November and mid-March.

The surveys reviewed here have been of 3 major kinds, as follows:

- 1). Classification Surveys

These generally followed irregular routes such as river valleys and the main purpose was to obtain sex/age ratios for harvest management purposes. Animals seen per hour also provide an index of abundance. These were the commonly flown surveys from 1963/64 to 1982/83.

- 2). Systematic sample surveys

This includes both linear transects and small sample blocks used to extrapolate densities over larger areas. Sample blocks were flown by Thurber (1976) and more recently by MOE (1979/80-1984/85) to estimate the moose population in M.U. 7-32. Regularly spaced parallel transects have been flown by MOE in parts of M.U.'s 7-32, 7-34, and 7-35 in some winters in the 1980's. Deer carry-over counts, carried out by truck, are also considered to be linear transect surveys, however they are not used for estimation of population size.

3). Sample block surveys

These are complete counts on land units which usually have irregular boundaries comprised of rivers, highways, or topographic features. They have mostly been carried out for deer in the 1980's, in M.U.'s 7-33, 7-34, and 7-35. The objective is to determine absolute population densities for year to year comparison of abundance.

For purposes of the Ungulate Inventory Data Base, these kinds of inventories were coded by MOE as follows:

Inventory Code CL

Census type RE (Reconnaissance)

Census form CL (Classification)

Inventory Code LT

Census type RD (Relative density)

Census form LT (Lineal transect)

Inventory Code SB

Census type AB (Absolute density)

Census form SB (Sample block)

2.2 Limitations of the Inventory Data

Reference here to "limitations" does not imply any criticism of survey techniques or results. However surveys carried out for a particular purpose, i.e. determination of age or sex ratios, may have limited usefulness for another such as population trend analysis. This limitation applies particularly to the reconnaissance surveys. In most cases, maps showing routes flown were not available for the reconnaissance surveys, and written descriptions on the summary sheets were used to determine which areas could be compared from year to year. This involved considerable judgement. Basically, the only reason for reviewing the reconnaissance surveys was to compare year-to-year indices of animals seen per hour, as a guide to assessing population trends. This objective was hindered by a lack of information on hours flown for some surveys, inclusion of variable amounts of ferrying time, and the infrequent use of reconnaissance surveys in the 1980's, as well as the flying of variable routes from year to year.

Many factors such as observer experience, the number of observers, flight speed, and weather conditions may affect survey accuracy. This kind of information was not available for most surveys, and has been omitted from consideration. Surveys are normally only flown under suitable weather conditions, however, when it was explicitly stated that results were poor due to conditions such as hoar frost, the results were omitted.

Based on comparison of data in the MOE Blue Paper (Ministry of Environment 1981) and in files at Fort St. John, some survey results are apparently missing. We were told that the Fort St. John office has moved several times and that some files may have been lost. The review of inventory information may therefore be incomplete.

No attempt has been made to correct survey results for "sightability" or missed animals. All numbers presented are for animals actually counted, and are expected to be conservative estimates of the real population.

2.3 Mule Deer

2.3.1 Reconnaissance/classification surveys (Table 1).

Most of these surveys were for deer, moose, and elk. Frequently flown survey routes are indicated on Figure 2. Additional details on routes followed are given in Table 1 with the survey results. Data from 1963/64 to 1989/90 are available, but there were apparently few surveys of this type after 1982/83.

Data in Table 1 suggest that mule deer numbers were high in 1963/64, with deer/hour figures of 90 to 120. Numbers appear to have declined after 1964/65 and to have reached a low about 1967/68, when about 30/hr were counted in the Peace River Valley. The population apparently increased somewhat from 1967/68 to 1969/70, then generally declined until about 1973/74 when the rate of observation was about 20/hr and only 158 deer were counted along both sides of the Peace, its northern tributaries, and the lower Moberly. Deer numbers appear to have remained low through 1976/77, and to have increased somewhat by 78/79, when about 90 were seen per hour. Numbers increased substantially through 1982/83 (200+ per hour in the Peace R. valley and tributaries), and probably continued to increase through the 1980's, although comparative indices are scarce. Surveys in the Pine and Moberly valleys in 1988/89 recorded more deer there than in any year since 1963/64, and this trend may also apply throughout the Peace River region.

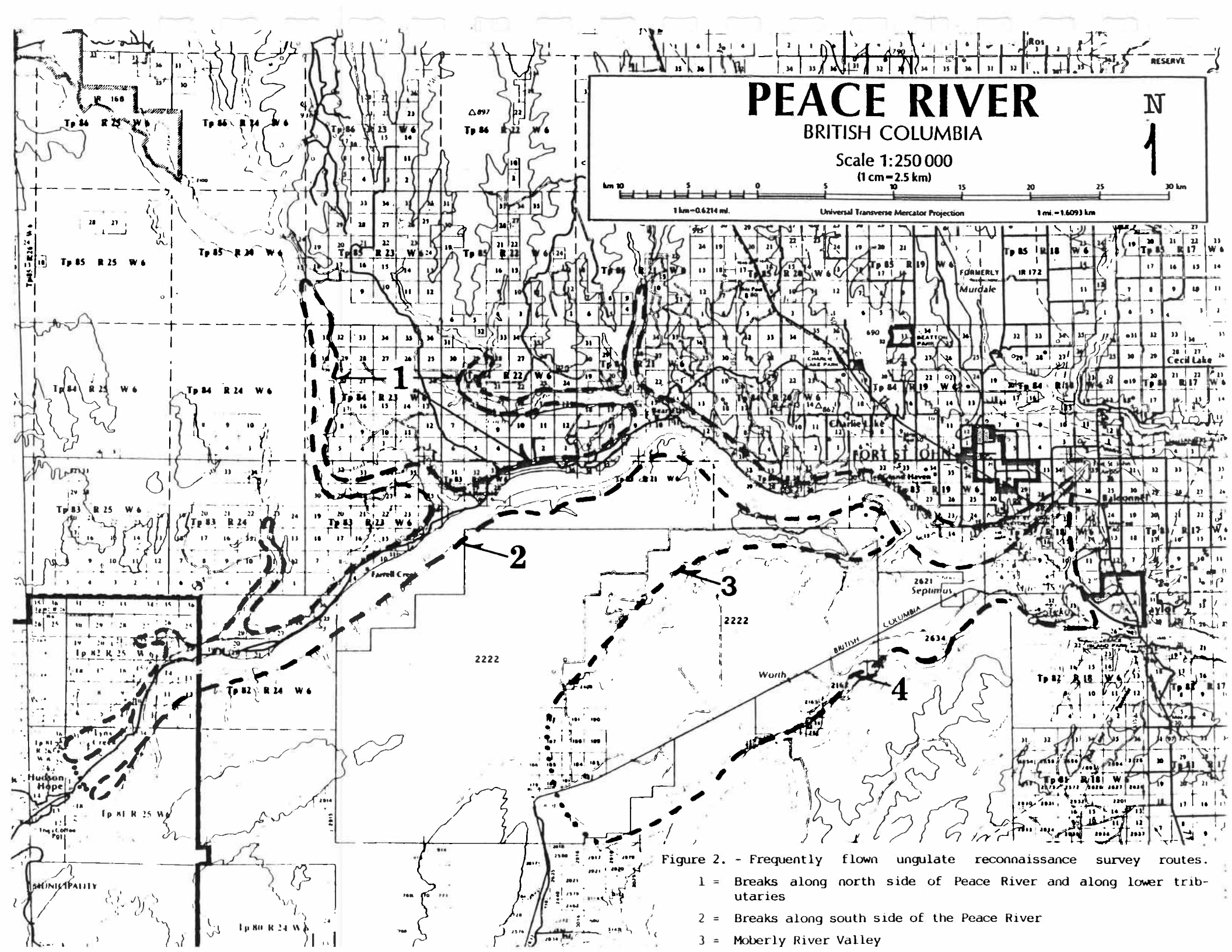


Figure 2. - Frequently flown ungulate reconnaissance survey routes.

- 1 = Breaks along north side of Peace River and along lower tributaries
- 2 = Breaks along south side of the Peace River
- 3 = Moberly River Valley

2.3.2 Population density data (Tables 2-4)

This information is from 3 main sources as follows:

- (1) "Reconnaissance" aerial surveys carried out in winter in areas having discrete boundaries and involving more or less complete coverage of lands within those boundaries. This primarily involves the Peace River valley between Fort St. John and Hudson Hope, and the lower portions of tributaries to it. Data are from Area 4 in Table 1, and from Appendix II in Blood (1979) and are restricted to the period 1963/64-1981/82 (Table 2). Location of survey units is shown on Figure 3.
- (2) MOE survey blocks in M.U.'s 7-33, 7-34, and 7-35. These are irregularly shaped units 14 to 46 km² in size located in areas of good deer winter range, i.e. along the breaks on the north side of the Peace from the Alberta Border to Hudson Hope, and along tributary valleys on the same side of the Peace (Figure 3). Some uplands between stream valleys are included. Unit boundaries are primarily roads, rivers, or topographic features. Data are available for some blocks for the period 1986/87-1988/89 (Table 3).
- (3) Aerial transects in the Cache Creek and Pine River/Stewart Lake areas (Figure 4). These were flown in the winter of 1989/90 and inventoried moose and elk as well as deer. The Cache Creek transects vary from 15 to 40 km in length and are east-west in orientation, covering the area approximately from Farrell Creek to Highway 97. They are 2 miles (3.2 km) apart. They cross the valleys of Farrell Creek, Halfway River, Lynx Creek, Red Creek and upper Wilder Creek, as well as the plateau surface between those streams. The Pine River/Stewart Lake transects trend southeast from the south shore of the Peace River between Farrell Creek and the mouth of the Pine River, and are up to 55 km long. They cross the breaks on the south side of the Peace River as well as the valleys of the Moberly and Pine Rivers, Septimus Creek, and upper Stewart Creek, and include the uplands between those

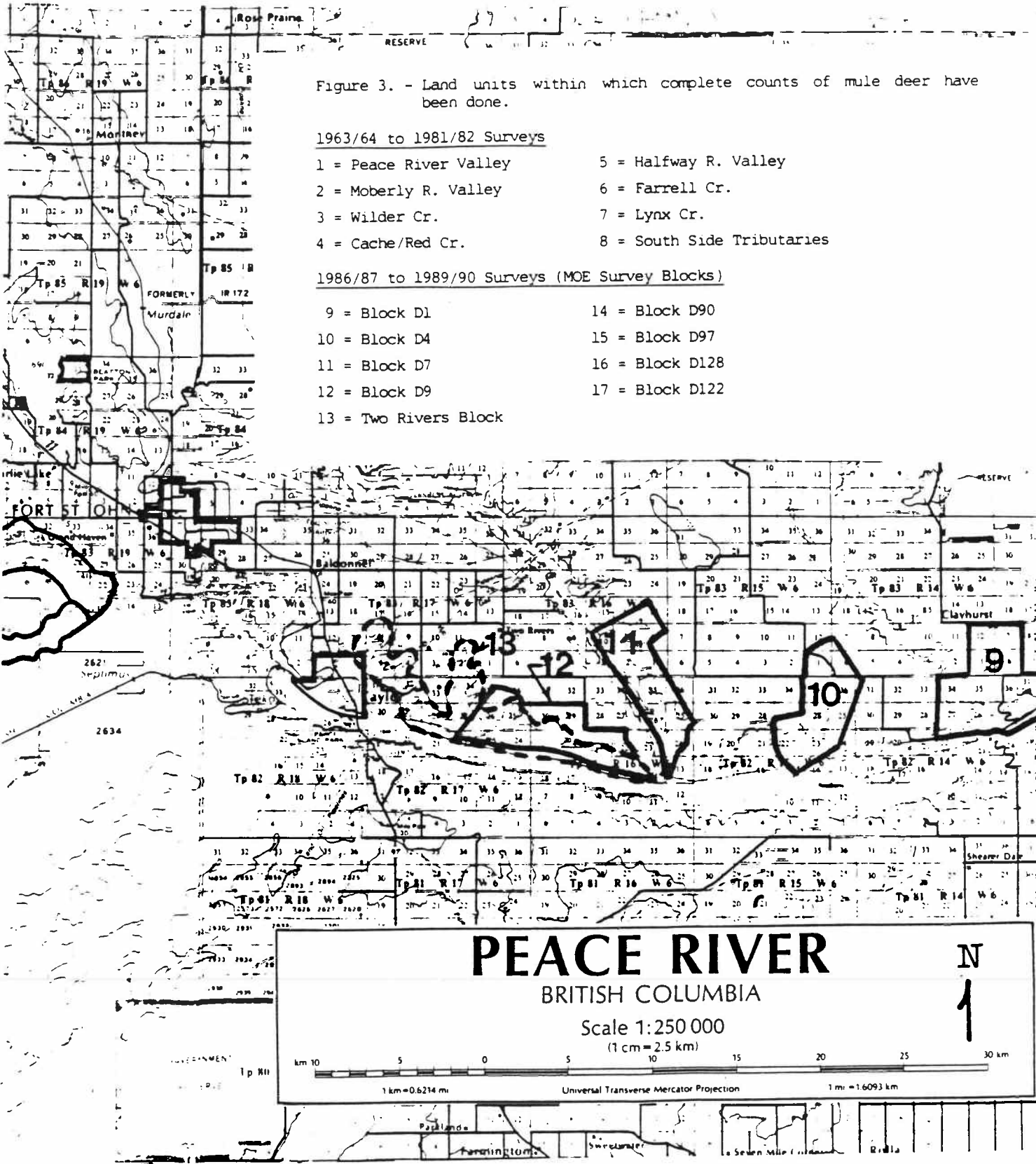


Figure 3. - Land units within which complete counts of mule deer have been done.

1963/64 to 1981/82 Surveys

- | | |
|------------------------|----------------------------|
| 1 = Peace River Valley | 5 = Halfway R. Valley |
| 2 = Moberly R. Valley | 6 = Farrell Cr. |
| 3 = Wilder Cr. | 7 = Lynx Cr. |
| 4 = Cache/Red Cr. | 8 = South Side Tributaries |

1986/87 to 1989/90 Surveys (MOE Survey Blocks)

- | | |
|-----------------------|-----------------|
| 9 = Block D1 | 14 = Block D90 |
| 10 = Block D4 | 15 = Block D97 |
| 11 = Block D7 | 16 = Block D128 |
| 12 = Block D9 | 17 = Block D122 |
| 13 = Two Rivers Block | |

PEACE RIVER

BRITISH COLUMBIA

Scale 1:250 000

(1 cm = 2.5 km)

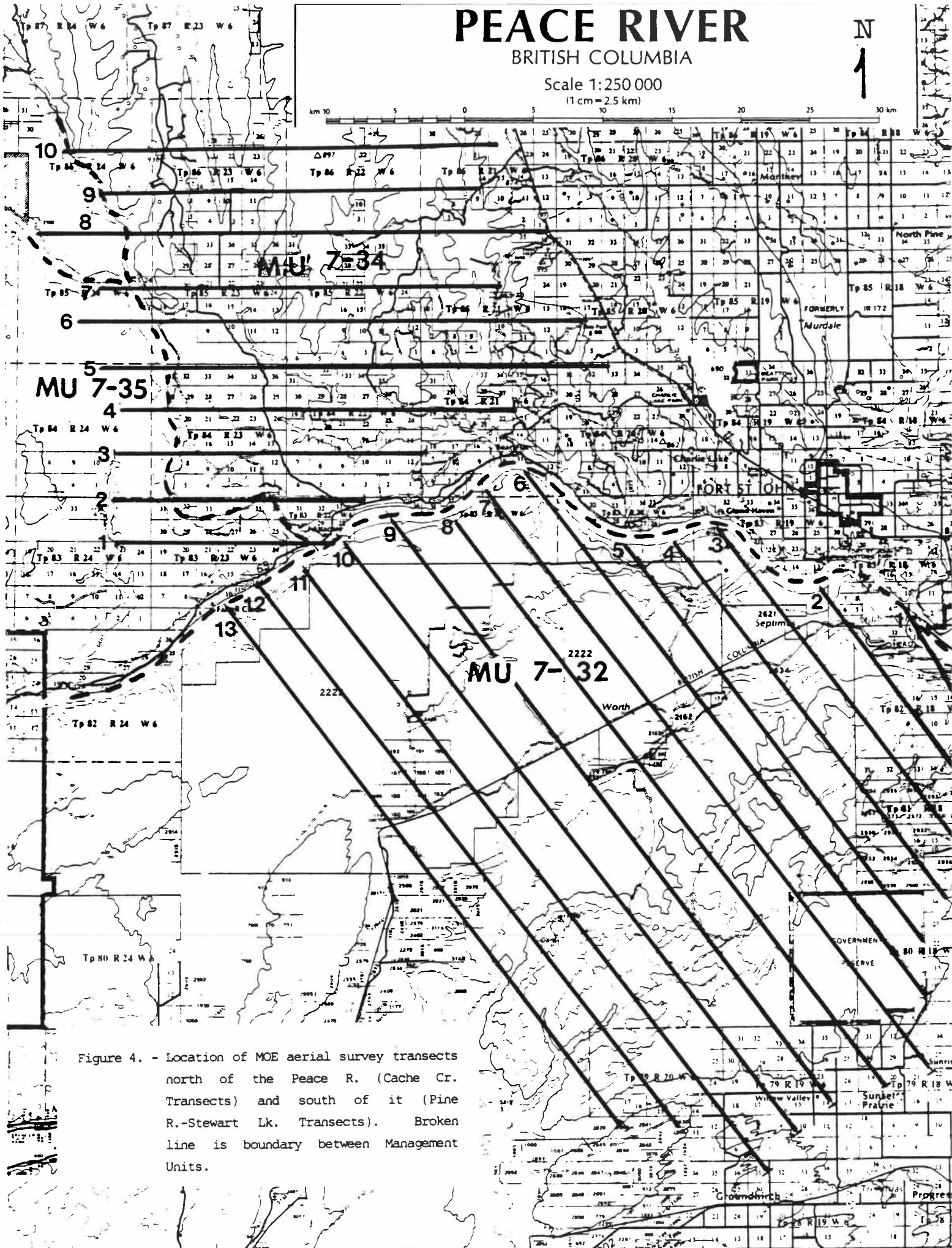
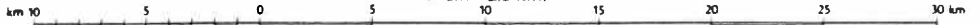


Figure 4. - Location of MOE aerial survey transects north of the Peace R. (Cache Cr. Transects) and south of it (Pine R.-Stewart Lk. Transects). Broken line is boundary between Management Units.

streams. For calculation of mule deer population densities (Table 4) a transect width of 500 m was assumed (R. Backmeyer, pers. comm.).

Mule deer population densities vary according to population size in any area. Winter densities in the Peace River valley from Fort St. John to Hudson Hope, between 1963/64 and 1981/82, have varied from about 0.6 to 2.4 per km² (Table 2). These figures are not corrected for missed animals, and include all land in the valley (water surfaces are omitted). During 1986/87 - 88/89, winter densities of up to 10 mule deer/km² have been recorded on survey blocks along the north side of the Peace, with averages there of about 4 to 6 per km² (Table 3). Density data from line transects are presented but are felt to be less reliable than block counts because of the arbitrary transect width, and less indicative of deer abundance because plateau habitats not normally used by deer in winter are included.

These data are for winter when almost all mule deer are concentrated on river breaks having a west to southeast exposure. During mid-winter, almost no deer are encountered on the plateau surface. The density figures indicate that when deer populations are high these key habitats may support up to 10 deer per km².

The density data also support the contention that deer numbers have increased greatly between the mid-1970's (about 1/km² in the Peace River valley) to the late 1980's (about 5.6 km²). In the late 1980's, data for the Two Rivers Block in M.U. 7-33 suggest a continued increase from 1986/87 through 1989/90 (Table 3).

2.3.3 Spring carry-over counts (Table 5)

These have been carried out by MOE staff by vehicle along roads in the Cache Creek area (Figure 5) in 1988, 1989, and 1990. Six routes have been used, varying from 12 to 25 km in length. All counts were done during early morning hours between April 26 and May 5. Two to 4 counts were done along each route each season. Although primarily designed to obtain age ratios, these counts can also show year to year trends in abundance, and suggest that deer numbers were higher in this area in 1989 and 1990 than in 1988 (Table 5).

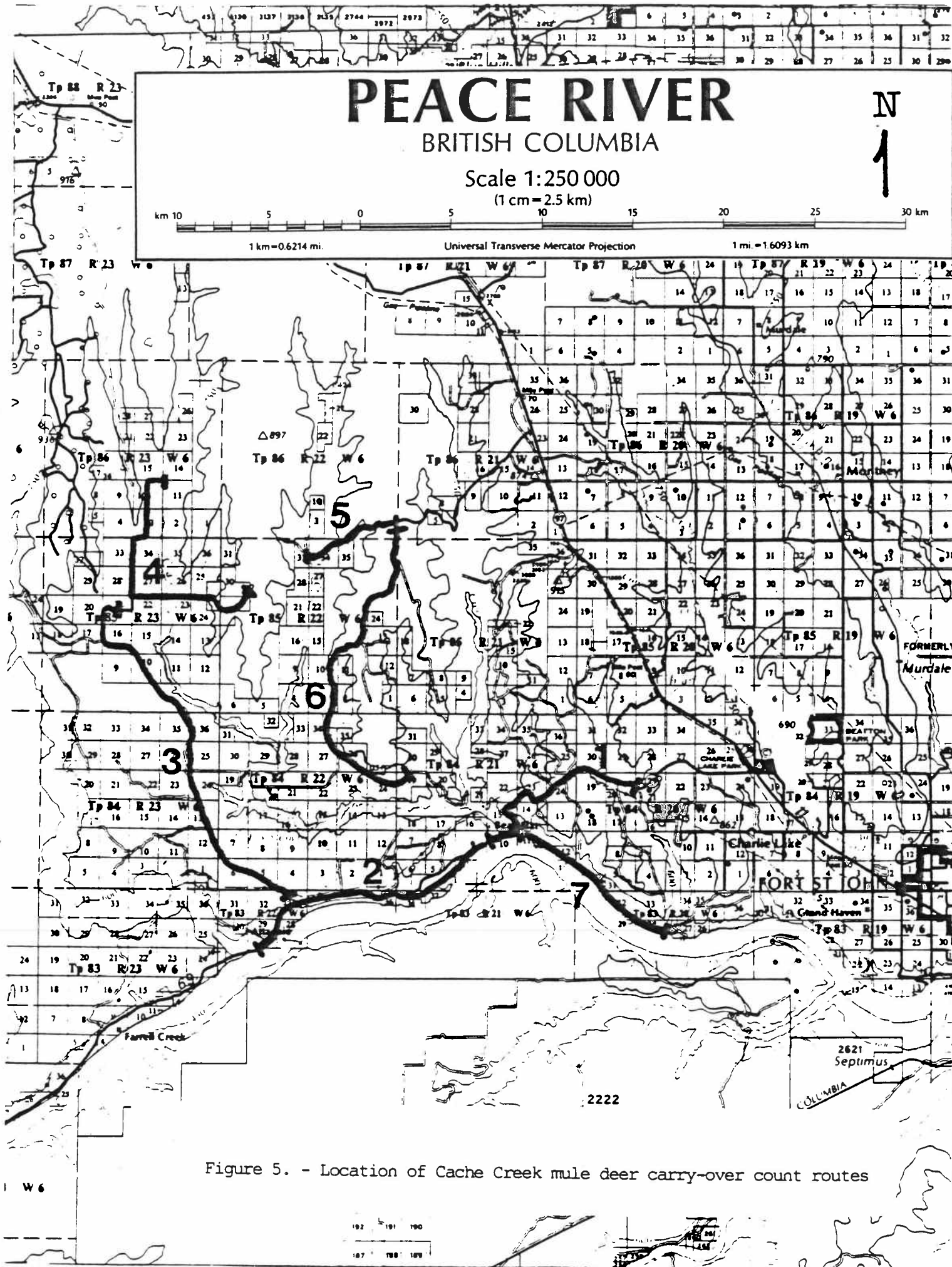


Figure 5. - Location of Cache Creek mule deer carry-over count routes

2.3.4 Existing regional summaries

A 1963/64 through 1972/73 tabulation of mule deer numbers and mule deer seen per hour of winter aerial survey was found in MOE files, Fort St. John, and is included as Appendix 3. The actual land area covered in those surveys is not readily evident, but probably includes areas covered by the reconnaissance surveys listed in Table 1, and perhaps other deer ranges as well, e.g. M.U.'s 7-20 and/or 7-33. Data for "Total Animals" in Appendix 3 suggest that some records are missing from the files which we reviewed. For example, a total of 710 deer is shown for 1964/65, yet we could find file data for only one deer survey for that winter (breaks along south side of the Peace) which recorded 138 deer. In view of the variable survey routes flown from year to year the "Total Animals" column in Appendix 3 is probably not very meaningful, however the number of deer seen per hour may be a useful index of population trends.

The total animal numbers in Appendix 3 appear to have been used to derive the 1962-1972 portion of the graph of deer abundance presented on page 20 of the Technical Appendix to MOE Blue Paper Number 2. This was entered as testimony at the B.C.U.C. Site C Hearings in 1981. The Blue Paper graph (Appendix 4) cites these figures as "Aerial Census Sightings (Site C Valley)". However the vertical axis of the Blue Paper graph appears to be in error, since it indicates deer numbers exactly 10 times higher than those given in Appendix 3.

2.3.5 Conclusions

Together, all sources of information suggest that deer numbers were probably higher in 1990 than at any time since the early 1960's. However, differences in survey techniques over the years make quantitative or graphic portrayal of these trends difficult. Deer per hour data and density information suggest that numbers have varied at least 6 to 8-fold over the past 25 years, and that populations in 1990 were as high as ever recorded.

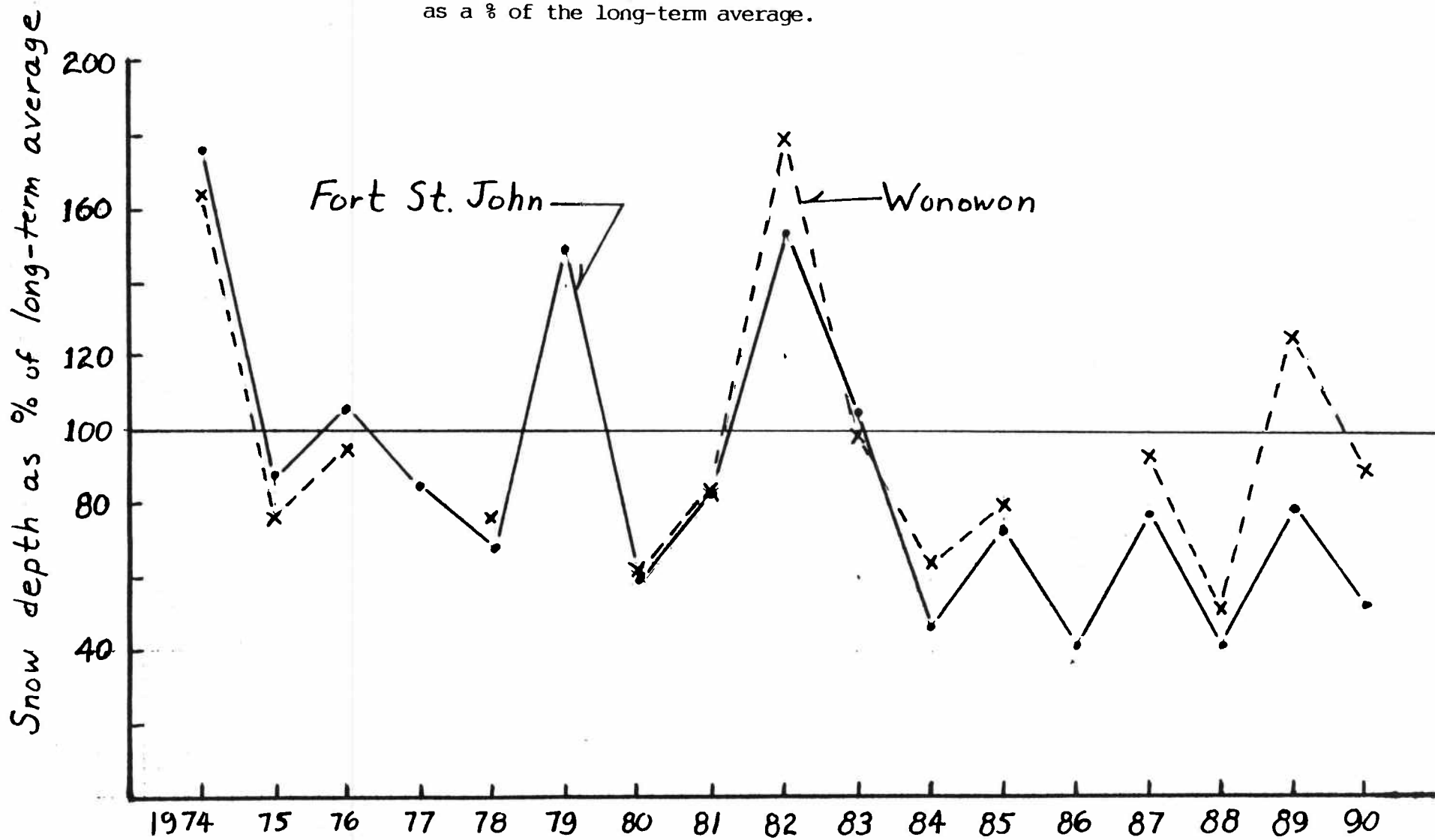
In the northern part of their range, deer populations are expected to fluctuate considerably in response to winter weather severity. The severe winter of 1966/67 probably caused severe mortality, while a combination of hunting pressure and bad winters in some years (especially 70/71 through 73/74) prevented recovery or reduced the population still further (Appendix 4). Restrictive hunting regulations introduced from 1974 to 1976, together with generally mild winters since then (except for a minor set-back in 1981/82), have probably accounted for deer herd increases in the 1980's (Figure 6).

2.4 White-tailed Deer (Table 6)

On many ungulate surveys white-tailed deer have been noted only incidentally, or have been included under the general heading of "deer", therefore information for this species is somewhat limited. Where white-tail numbers have been recorded they are probably conservative, especially when aerial surveys are involved, because it is more likely that a briefly seen white-tail would be recorded as a mule deer than vice versa.

White-tailed deer observations made during a variety of kinds of surveys are summarized in Table 6. Surveys on which white-tails were apparently not seen are excluded. A few white-tails have been seen in winter in most areas where mule deer are also common. The number of white-tails seen varied from 1 to 19 (Table 6), however these surveys vary considerably in location and size of area covered. The number of white-tails per 100 mule deer varies from 1 to 13, with most values being between 1 and 8. The data are not useful for assessing trends in abundance because of the variety of survey methods used and coverage of different locations in different years. However, they suggest that white-tails are not common in M.U. 7-33 (mean of 1 per 100 mule deer for 4 surveys), occur at a rate of about 4 per 100 mule deer in M.U. 7-34 (ground counts and aerial transects in Cache Cr. area), and a rate of about 13 per 100 mule deer in the eastern part of M.U. 7-32 (aerial transect data).

Figure 6. - Snow depth on the ground at the end of February, March, and April as a % of the long-term average.



2.5 Moose

2.5.1 Reconnaissance/classification surveys (Table 7)

Many surveys have covered the same areas described for mule deer (Figure 2) however moose are more widely distributed on the uplands in winter than are mule deer, and additional areas have been flown. These include the Upper Cache-Inga Lake, South Peace Reserve, Del Rio Ranch, and Stewart Lake area. Total moose counted and moose seen per hour of flying are given in Table 7 for the period 1963/64-1989/90. Because of the variety of areas flown, we have not attempted to group surveys into geographical areas as was done for mule deer in Table 1. The surveys are listed chronologically to show variations in moose per hour over time. Some data from transect surveys are included for the 1980's because few reconnaissance surveys were flown then.

Moose in this area make considerable use of uplands in winter, especially in early winter and throughout winters of low to moderate snow depth. However, they may concentrate in river valleys, sometimes temporarily, when snow cover is deep. This results in variable numbers of moose in river valleys within and between winters. Many of the reconnaissance/classification surveys have concentrated on river valleys (Peace; northern tributaries to Peace; Moberly; Pine) and therefore the results will reflect weather-related movements as well as real changes in regional abundance. Despite the above, rates of moose seen per hour are less variable than for deer, mostly falling in the range of 30 to 100 per hour. This suggests, as seems logical, that moose populations have not fluctuated as greatly since 1963/64 as have those of deer. The moose per hour data do not suggest any marked trends in abundance, however this could be because standardized, long-term data are not available for any one area.

As a matter of interest, the following are the maximum numbers of moose counted on reconnaissance surveys in various areas:

North side of Peace (FSJ-HH) plus lower tributaries	387 (65/66)
North side of Peace (FSJ-HH)	389 (81/82)
South side of Peace (FSJ-HH)	194 (74/75)
North and south sides of Peace Valley, FSJ-HH	574 (81/82)

Moberly/Del Rio	85 (80/81)
Moberly plus Pine River valleys	170 (68/69)
Pine River valley to Stewart Cr.	92 (81/82)

2.5.2 Population density data (Tables 8-13)

(1) Population estimates and densities for the Peace River valley.

Moose population estimates from reconnaissance surveys are converted to densities in Table 8. Land areas were adjusted to account for variations in survey coverage as described in the original data sources, which are also listed in Table 8.

The number of moose counted in winter in the Peace River valley between Fort St. John and Hudson Hope, usually including the lower reaches of tributary valleys, has varied from 164 to 574. This range probably results from variations in winter weather severity (more animals moving into the valley when snow cover is deep), changes in size of the regional population, and survey variability.

Moose densities in the Peace River valley, including all land but excluding waters of the Peace River, have varied from about 0.7 to 3.4 /km². The highest density was obtained on the most recent complete count of the valley, done on Feb. 1, 1982. Snow depth at Fort St. John on Feb. 1/82 was 75 cm, compared to the 1974-1985 mean of 46 cm, suggesting that snow depth on the uplands was a factor contributing to the high moose count in the Peace valley in 1982.

(2) Population estimates and densities for the lower reaches of valleys tributary to the Peace between Site C and Hudson Hope.

Surveys by Thurber (1976) in 1974/75, by D. Blood in 1976/77 (Blood 1979) and MOE in 1981/82 (Moberly valley only) are included. In all cases moose locations had been plotted on maps and this allowed their assignment to land areas measured by Blood (1979: Appendix II). Resulting densities are given in Table 9. Data are available for only 3 or 4 years, and

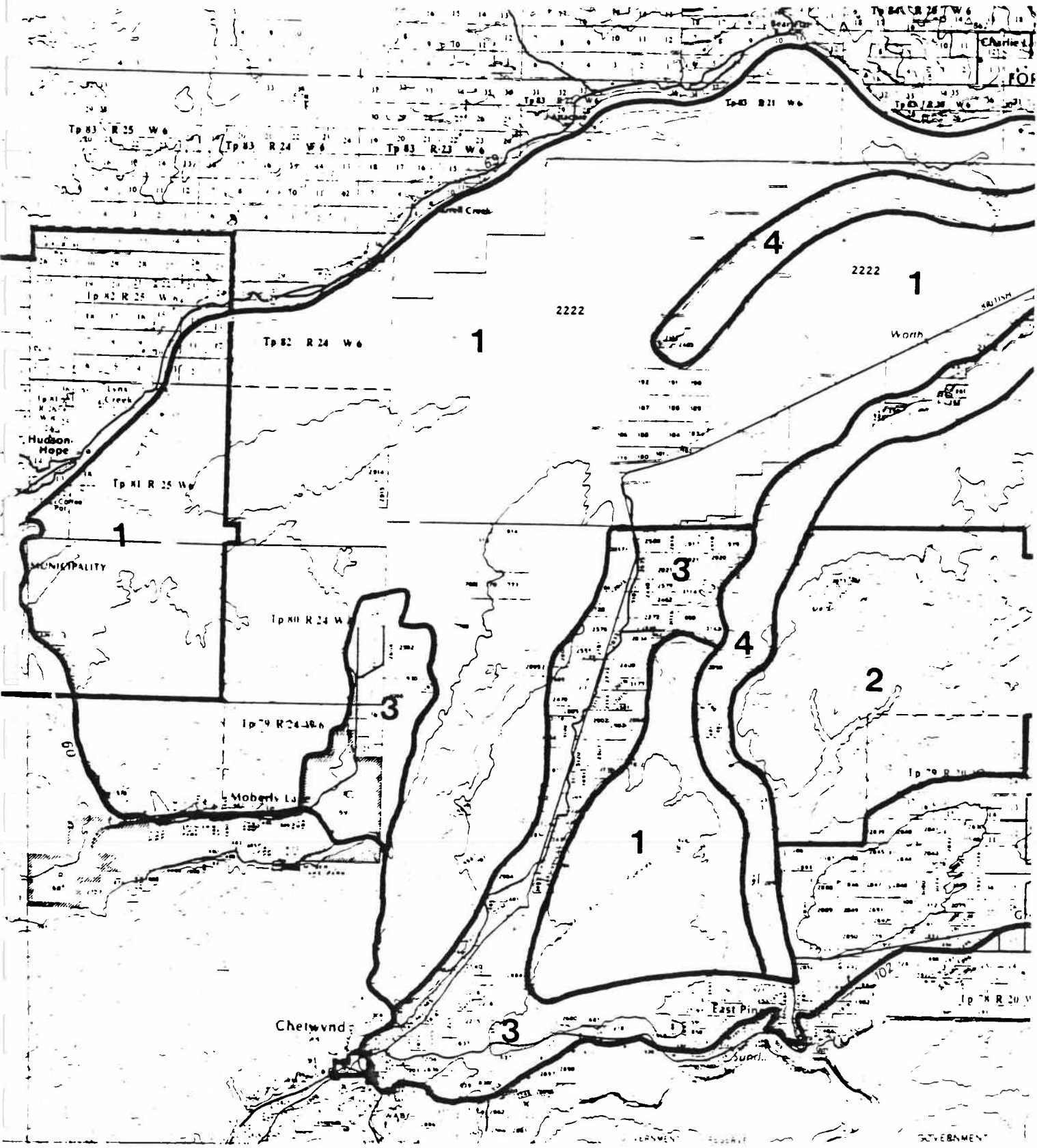
are quite variable. This is largely a result of the small areal extent of those areas and small samples of moose included in them.

(3) Stratified block counts and other surveys in M.U. 7-32.

From 1979/80 through 1984/85, MOE staff carried out aerial winter surveys designed to estimate the total moose population in M.U. 7-32 and to provide confidence limits for the estimates. The M.U. was divided into 4 strata for the 1979/80 through 1983/84 surveys (Figure 7) and 3 strata in 1984/85 (Harper 1985). A variable number of survey blocks was flown in each stratum. Results available in MOE files, Fort St. John, are given in Table 10. The percentage of the M.U. sampled varied from 3.4 to 17.2, and 95% confidence limits for the total moose population varied from about 15 to 30%. In 1984/85, advance surveys were flown with a fixed-wing aircraft to aid in stratification (Harper 1985). This procedure and greater sampling coverage than in earlier years probably account for the improved confidence limits ($\pm 15.6\%$) in that year.

These surveys provide some of the best estimates of moose population size and density that are available in the Peace Region. They indicate that high capability habitats like the Stewart Lake upland may support up to 2.7 moose per km² in winter, that both the uplands and river valleys usually have higher densities than the level plateau surface, and that densities for the M.U. as a whole have varied from 0.5 to 1.3 moose per km². These surveys were all done following hunting season harvests, therefore densities at the start of the hunting season would be higher, though not necessarily distributed between strata as indicated in Table 10.

Moose population density estimates based on random square-mile blocks in the northern part of the M.U. and on MOE transects in the eastern part of it are given in Table 11. These may provide fairly reliable density information for the locations sampled (Figures 4 and 8) but cannot be extrapolated to give



Tp 83 R 25 W 6

Tp 83 R 24 W 6

Tp 83 R 23 W 6

Tp 83 R 21 W 6

Tp 84 R 26 W 6

Charlie L.

FO

Tp 82 R 25 W 6

Tp 82 R 24 W 6

Tp 81 R 25 W 6

Tp 80 R 24 W 6

Tp 79 R 24 W 6

Tp 78 R 23 W 6

Tp 78 R 20 W 6

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3

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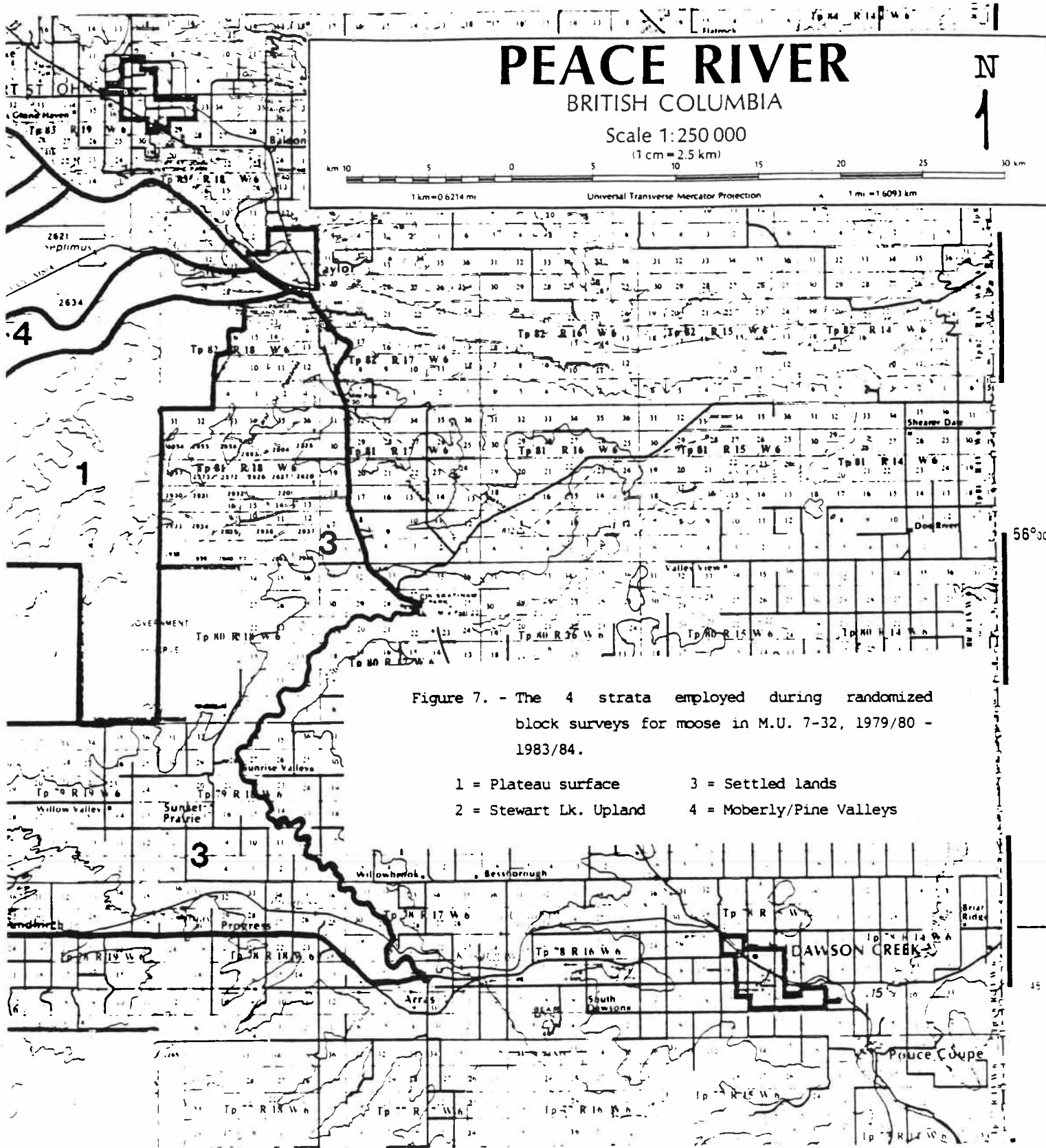


Figure 7. - The 4 strata employed during randomized block surveys for moose in M.U. 7-32, 1979/80 - 1983/84.

- 1 = Plateau surface
- 2 = Stewart Lk. Upland
- 3 = Settled lands
- 4 = Moberly/Pine Valleys

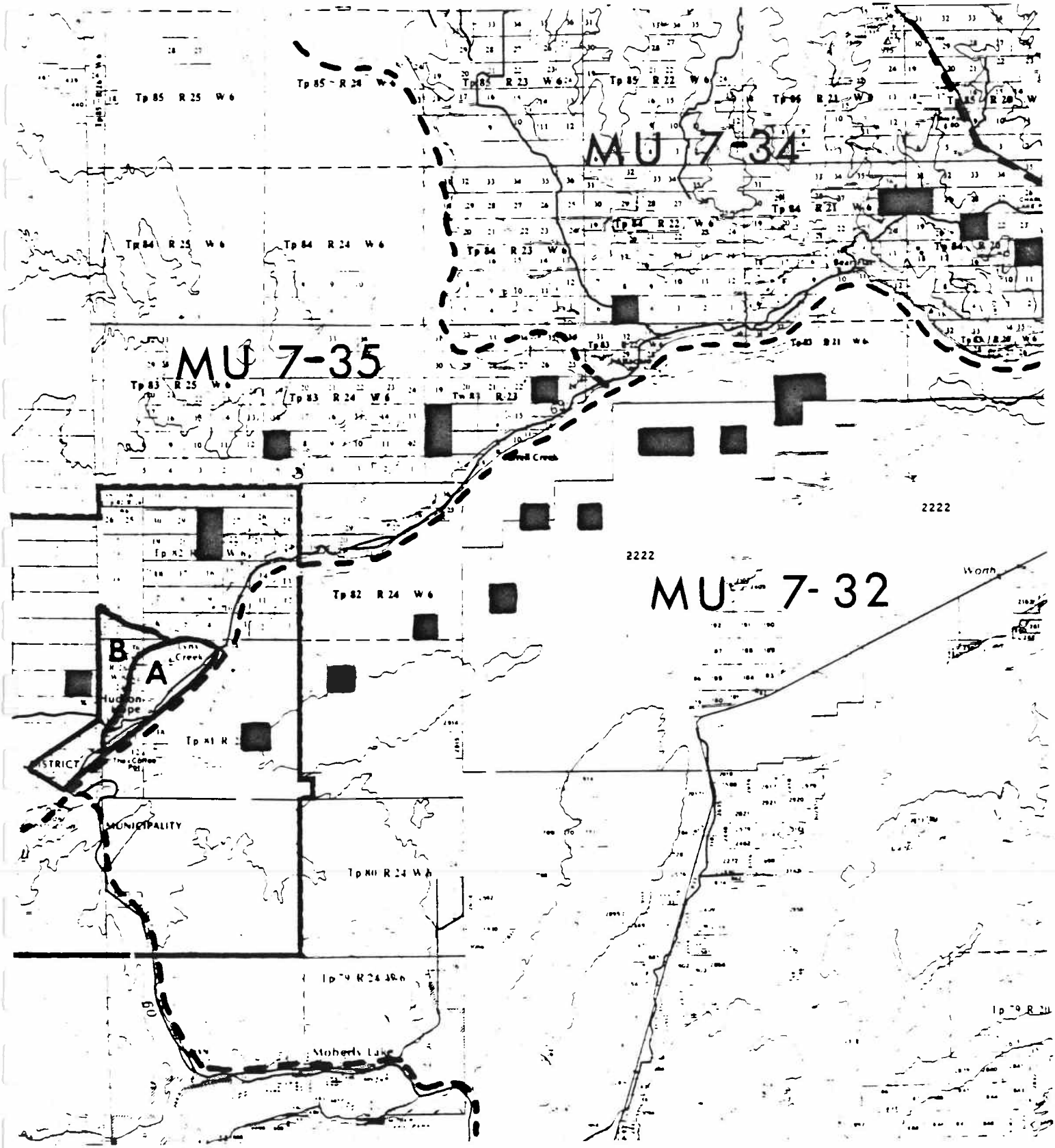
total M.U. estimates because the whole M.U. was not randomly sampled, and because of the arbitrary width of the transects (0.5 km). However, the data suggest densities of 1.5 to 2.5 moose per km² on non-settled parts of the plateau and are within the range of figures given in Table 10.

(4) Miscellaneous surveys in M.U. 7-34.

Moose population density estimates based on various surveys in M.U. 7-34 are presented in Table 12. The square-mile survey blocks (1974/75) sample only the plateau surface (Figure 8) however only 5 blocks were surveyed in M.U. 7-34 and the results are probably not reliable. The transect surveys, east-west in orientation, cover both the plateau surface and stream valleys and provide more representative coverage (Figure 4), however the results may not be directly comparable to other techniques because of the arbitrary transect width. The transects give winter moose density estimates from 0.9 to 1.7 per km² (Table 12). Based on a land area of 1,445 km², total population estimates for the M.U. would be 1,300 to 2,456. Confidence levels for these estimates are not known. The available data do not allow reliable comment on the relative importance of uplands and river valleys in this area.

(5) Miscellaneous surveys in M.U. 7-35.

Moose population density estimates based on various surveys in M.U. 7-35 are given in Table 13. Comments on one-square-mile blocks in M.U. 7-34 also apply here, although the results appear realistic. The transect surveys (Figure 4), as in M.U. 7-34, were of east-west orientation and sampled stream valleys as well as intervening uplands. Block 61 surveyed by P. Davidson is within the breaks of the Peace R. valley at Hudson Hope, and Block 60 is immediately adjacent to it (Figure 8). These blocks are probably not representative of the adjacent uplands or of the M.U. as a whole.



MU 7-35

MU 7-34

MU 7-32

Tp 85 R 25 W 6

Tp 85 R 24 W 6

Tp 85 R 22 W 6

Tp 86 R 21 W 6

Tp 85 R 20 W 6

Tp 84 R 25 W 6

Tp 84 R 24 W 6

Tp 84 R 23 W 6

Tp 84 R 22 W 6

Tp 84 R 21 W 6

Tp 84 R 20 W 6

Tp 83 R 25 W 6

Tp 83 R 24 W 6

Tp 83 R 23 W 6

Tp 83 R 22 W 6

Tp 83 R 21 W 6

Tp 83 R 20 W 6

Tp 82 R 24 W 6

Tp 81 R 24 W 6

Tp 80 R 24 W 6

Tp 79 R 24 W 6

Tp 79 R 23 W 6

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Moberly Lake



Figure 8. - Miscellaneous moose survey blocks. Square mile blocks flown in 1974/75 (Thurber 1976) and MOE Block 61 (A) and 62 (B) flown in 1989/90.

In M.U. 7-35, transect surveys gave density estimates of 0.76 moose per km² (1981/82) and 0.82 per km² (82/83) (Table 13). Based on a total area of 2,352 km², a population of 1,788 to 1,929 moose is indicated. As for M.U. 7-34, confidence levels for these estimates are not known. Densities may be considerably higher in high quality valley habitats, as indicated by that of 3.0 per km² obtained near Hudson Hope in March 1990 (Table 13).

2.5.3 Conclusions

Data on moose seen per hour, and stratified counts in M.U. 7-32, suggest that moose populations may have varied 2 to 3-fold in size in recent years. Moose are much better adapted to snow than are deer therefore much less weather-induced variation in population size is expected. Variations in abundance can probably be attributed to effects of the most severe winters together with hunter harvests. Population trends are probably best shown by hunter harvest and effort data, presented later.

Population densities over the entire area of M.U.'s 7-32, 7-34 and 7-35 appear to vary from about 0.5 to 2.0 per km². Densities may reach 3.5 per km² in the Peace River valley when large numbers of moose move into it to avoid deep snow on the plateau.

2.6 Elk (Table 14)

2.6.1 Survey results

Elk have a very clumped distribution pattern in this area but in those locations where herds occur they may be predictably found on grassy south-facing river breaks in winter and early spring. Elk have often been seen on reconnaissance/classification surveys along river valleys in M.U.'s 7-32, 7-34 and 7-35 although numbers have been quite variable because some social groups are often bedded in adjacent tree cover and missed. Survey data available to us are summarized in Table 14.

1). M.U. 7-32

File data suggest that elk were first noted in the Moberly River valley in 1966/67, but some animals were probably present before that. The herd appears to have increased to at least 55 by 1975/76 and 100 by 1989/90. Survey data do not indicate

elk in the Pine River valley until 1981/82. Although a few could have been present prior to that, regular winter aerial surveys did not encounter any. The presence of 62 elk along the Pine in 1988/89 suggests immigration from elsewhere, although not from the Moberly where 100 were counted on the same survey. On surveys described only as Moberly/Pine, 15 elk in 1968/69 and 27 in 1978/79 were probably all along the Moberly. Thirty elk counted in the reserve between the Peace and Moberly were probably also in or near the Moberly valley and cannot be considered as a separate herd. The data suggest a minimum of 167 elk in M.U. 7-32 in recent years, about 100 of these wintering along the Moberly breaks and 67 in the Pine and Septimus valleys.

2). M.U.'s 7-34/35

Elk in this area largely or entirely winter along the Halfway River. Despite extensive aerial surveys in this area dating from at least 1963/64, no elk were reported until 1982/83. The counts of 107 and 56 on transects in this area in 1989/90 suggest immigration from elsewhere, rather than local reproductive recruitment. Fifty six elk were recorded on Dec. 21/89 (Transects 3 and 4) and a total of 107 on Feb. 13/90 (Transect 10). Although these sites are some distance apart, it is likely that some or all of the animals counted in December were seen again in February, but had moved farther north. In any event it appears that the present elk population in the Halfway River area exceeds 100 head.

2.6.2 Conclusions

The elk population in M.U.'s 7-32, 7-34 and 7-35 has increased dramatically since 1965, from virtually none to at least 275. It is probable that some have been missed on even the best aerial surveys and that the actual total is somewhat higher. These are distributed on 3 discrete winter ranges along the lower Halfway, Moberly, and Pine/Septimus valleys. The occasional elk or small group has been reported from a variety of other areas, including

the Peace River Valley between Taylor and Hudson Hope, usually from spring to fall. No elk are known to regularly winter on breaks along the Peace in this area.

The elk population increase is probably attributable to mild winters in recent years, expansion of elk into vacant but suitable habitat, negligible hunting mortality prior to 1989, and possibly immigration from outside of the 3 M.U.'s under review.

3.0 WILDLIFE HARVEST DATA

3.1 Methods and Information Sources

Hunter harvest and effort statistics are from the Summary Statistics Data Base of the MOE, Victoria, and were provided in computer print-out format. MOE comments concerning interpretation of the data base are given in Appendix 5. The harvest statistics cover the 14-year period 1976 through 1989, i.e. the period since the present system of Management Units (M.U.'s) was established. Information on hunting seasons is from B.C. Hunting Regulations and Limited Entry Hunting Synopses.

Species included in this review are those which could be affected by the Site C project and for which reliable harvest estimates are available. Some species which occur in M.U.'s surrounding the project have been excluded because they are rare or uncommon on lands in the Peace Valley which would be flooded by the Site C Dam (e.g. grizzly bear; spruce grouse; sharp-tailed grouse).

The area of analysis for wide-ranging game species includes a block of 10 M.U.'s surrounding the Site C project area; that for ruffed grouse and waterfowl includes only the 3 central M.U.'s immediately contiguous to the project area (Figure 1).

Most of the harvest and hunter effort statistics are estimates based on hunter sample questionnaires, but these are believed to be relatively accurate and comparable unless samples are small. Harvests by Guide/Outfitter clients, where they occur, have been added to the resident hunter sample estimates and are based on complete returns by the guides. Compulsory inspection data, which provide an absolute measure of legal harvests, are only available for elk for the period 1987-1989. Several species of furbearers (wolf, coyote, lynx, and wolverine) can be shot by hunters, but do not require a species license, therefore a reliable means of sampling such hunters is not available. Some harvest and effort data are provided for wolves, based on indirect methods, however this is less reliable than for the ungulates and should be treated with caution. Similar data are not available for coyote, lynx, or wolverine. Trapline catches are considered in Section 4.0.

3.2 Regional and Temporal Variations in Harvest and Effort

3.2.1 Deer (Tables 15-17)

Deer data are for mule and white-tailed deer combined. Separate white-tailed and mule deer harvest data have only been available since 1987 and only for resident hunters, therefore an analysis by species was not attempted.

Deer harvest estimates for each of 10 M.U.'s are given in Table 16. Deer harvests increased from about 100 in 1976 to 500 in 1981, dropped to about 200 in 1983, and then increased steadily to nearly 1500 in 1989. These trends are believed to reflect variations in size of the regional deer population. Trends in deer killed per hunter and in hunter-days expended per deer bagged (Table 16) support the contention that there has been a real and sizeable increase in deer abundance since 1983. Hunting regulations have been steadily liberalized since 1986, largely through implementation of Limited Entry Hunting (LEH) for antlerless animals (Table 17). However, these harvests are thought to have had little impact on deer abundance. A series of low-snowfall winters since 1982/83 (Figure 6) is probably the main factor responsible for the dramatic increase in deer numbers.

Most of the Peace Region deer harvest occurs in the 10 M.U.'s listed in Table 16, and 42% of that is in M.U.'s 7-32, 7-34 and 7-35 combined.

3.2.2 Moose (Tables 18-20)

Moose harvest estimates for 10 M.U.'s surrounding the Site C project area (Table 19) have varied from 1,263 to 2,996. Apparent trends are a steady increase from 1978 to 1982, a drop in 1983, and then an increase again from 1984 to 1988. These trends are probably at least partially attributable to severe winters in 1981/82 and 82/83, followed by more moderate winters since then. Trends in moose per hunter and hunter-days per moose show a similar pattern (Table 19), but are less variable than in the case of deer. Moose hunting regulations in M.U.'s 7-32, 7-34 and 7-35 have varied somewhat in response to estimated moose abundance (Table 20) but have probably had little influence on long-term

trends. Short antlerless seasons have been held when populations were increasing or high, resulting in higher harvests in those years. Limited Entry hunting for antlerless moose was initiated in 1988.

Since 1976, about 38% of the moose harvest in the 10 M.U.'s has been taken in zones 7-32, 7-34 and 7-35 combined, indicating their high capability for moose production. Comparison of M.U. 7-32 population estimates (Table 10) with harvest estimates (Table 18) suggests that kills from 1979 to 1984 removed from 5 to 20% of the total population each year. From 1976 through 1989, about 65% of all hunter-days in M.U.'s 7-32, 7-34, and 7-35 combined were attributable to moose hunting.

3.2.3 Elk (Tables 21-23)

Few elk were harvested in the 10 M.U.'s until hunting seasons were liberalized in 1989 in response to herd increases (Table 21). Elk hunting was not allowed in M.U. 7-32 until 1985 (Pine-Moberly L.E.H. season) and in M.U.'s 7-34/35 until 1989 (Table 23). Two-thirds of all elk taken in the 10 M.U.'s were harvested in 1989. Twenty eight percent of 92 elk harvested to date were killed in M.U. 7-43, 23% in 7-32, 17% in 7-35 and 10% in 7-34.

As might be expected, the mean number of elk taken per hunter has been low (0.1) and the number of hunter-days per animal high (58) (Table 22). In M.U.'s 7-32, 7-34 and 7-35 combined, elk hunting has contributed only 1% of total big game hunter-days in the 10 M.U.'s over the period 1976-1989, but made up 4.5% of the total in 1989.

3.2.4 Black bear (Tables 24-26)

Black bear harvests in the 10 M.U.'s have varied from 167 to 374 per year (Table 24). The numbers do not suggest any significant trends in population size during the period 1976-1989. Although higher than average harvests occurred in the 3 most recent years of record, this appears to be related to increased numbers of hunters (Table 25). The number of bears taken per hunter, and number of hunter-days per bear killed have been relatively constant from 1976 to 1989, despite bag limits varying from 1 to 5 animals.

Over that period, season length in M.U.'s 7-32, 7-34 and 7-35 has increased from 118 days per year (56 days in fall and 62 in spring) to a continuous season of 215 days from April 15 to November 15 (Table 26). This has apparently been a response to depredation problems.

M.U.'s 7-32, 7-34 and 7-35 combined account for about 40% of the study region harvest.

3.2.5 Wolf (Tables 27-28)

The variable numbers in Table 27 indicate that the wolf harvest estimates lack precision. However, they suggest that about 50 wolves may be taken per year by sport hunters in the 10 M.U.'s surrounding the Site C project, and that no single M.U. is dominant in the harvest. The large increase in hunter-days (but not in harvest) in 1988 and 1989 (Table 28) suggest that the means of calculating this statistic was changed in those years in comparison to earlier years. About 15 wolves per year were taken in M.U.'s 7-32, 7-34, and 7-35 combined.

3.2.6 Ruffed grouse (Table 29)

Estimated ruffed grouse harvests in M.U.'s 7-32, 7-34 and 7-35 combined have varied widely, from 226 to 12,956 (Table 29). The harvests show a 10-year cyclic trend, with peaks in 1978 and 1989. The number of birds taken per hunter shows a similar trend. The number of hunter-days attributable to ruffed grouse is not available. In the 3 central M.U.'s the mean annual ruffed grouse harvest has been highest in 7-34 (1.0 per km²), followed by 7-32 (0.7) and 7-35 (0.5).

3.2.7 Ducks and geese (Tables 30-31)

The estimated 1976-1989 harvests of ducks and geese in M.U.'s 7-32, 7-34, and 7-35 are given in Tables 30 and 31 respectively. Total duck harvests have varied from 365 to 1386; birds per hunter per year from 4.6 to 12.2. No long term trends are apparent in harvest levels or hunter success. From 1976 through 1989, 63% of the duck kill was in M.U. 7-32, 28% in 7-34, and 9% in 7-35. Hunter-day information is not available for duck hunters.

Numbers of goose hunters sampled have been small, resulting in very variable year to year estimates of the harvest (Table 31). Total harvest estimates for the 3 central M.U.'s have varied from 9 to 313 geese per year. The number of geese taken per hunter per year, 2.1 birds, is considerably lower than for ducks. As in the case of duck harvests, the goose data do not suggest any obvious trends in abundance between 1976 and 1989, and harvests were highest in M.U. 7-32 (71%), followed by 7-34 (27%) and 7-35 (3%). Most goose hunting occurs along the Peace River, and involves Canada geese. Hunter-day data for geese are not available.

3.3 Guided Hunter Harvests (Table 32)

Only about 0.2% of deer harvested in the 10 M.U.'s combined have been taken by guided hunters, these mostly in M.U. 7-43. Guided hunters have taken 1,261 moose in those M.U.'s from 1976 through 1989, or 4.4% of the total harvest. M.U. 7-43 accounted for 972 (77%) of those moose. Twelve elk, or 13% of the 1976-1989 harvest were taken by guided hunters, 10 of those in M.U. 7-43. Guided hunters took about 8.5% of the black bears and 2% of the wolves harvested. Most guided hunter activity was in M.U.'s in the western part of the study region, primarily 7-43, and to a lesser extent 7-36 and 7-35 (Table 32).

3.4 Harvests Per Unit Area (Table 33)

Although more deer have been harvested in M.U. 7-33 than in any other zone, the mean harvest per unit area has been highest in M.U. 7-34, followed by 7-33 and 7-35. During the period 1987-1989, the mean harvest per unit area for M.U. 7-34 was 18 per 100 km²; for M.U.'s 7-32, 7-34, and 7-35 combined it was 7 per 100 km². This points out the extremely high regional importance for deer of those M.U.'s which encompass the Peace River valley and the lower reaches of tributary valleys.

Moose harvests per unit area have been notably higher in 4 M.U.'s (10 or more per 100 km²) than in the remainder (Table 33). This includes the 3 M.U.'s which border the Site C project area, again stressing the regional importance of those lands. Compared to other game species, the number of elk harvested per unit area has been very low to date, but could increase significantly in the future. Among the 10 M.U.'s under consideration, black bear harvests per unit area have also been highest in the 3 M.U.'s bordering Site C. Those 3 units account for about 40% of the regional bear harvest.

3.5 Summary of M.U. 7-32, 7-34 and 7-35 Harvests (Tables 34-37)

Harvest and effort statistics are summarized for each of the above M.U.'s so that most relevant data for an individual M.U. is available in two tables, one for big game and one for gamebirds. Data for 1976 through 1989 were combined to produce means and ranges for harvests per year, harvest per unit area, hunters per year, animals per hunter, hunter days per year, hunter days per animal, and hunter days per unit area.

3.6 Conclusions

Based on data for 10 M.U.'s surrounding the Site C project area, deer harvests have varied 15-fold over the 1976-89 period, and have increased steadily from 1983 to peak levels in 1989. This increase reflects a real increase in deer abundance that has probably been promoted by a series of mild winters. Elk harvests were negligible until 1989, when 62 were taken during a liberalized hunting season made possible by increasing elk populations. The moose harvest has varied only about 2-fold, but like deer has increased steadily since 1983 in response to population growth and regulation changes. Black bear, wolf, duck, and goose harvests do not show any obvious long-term trends. Ruffed grouse harvests have been strongly cyclic, with the most recent peak during 1987-89.

The 3 M.U.'s bordering the proposed Site C reservoir (7-32, 7-34, and 7-35) make up only 17% of the land area of the larger sample of 10 M.U.'s used in this analysis, but have provided 42% of the deer harvest, 38% of the moose harvest, 50% of the elk harvest, and 40% of the black bear harvest during 1976-89. This is largely due to their high biophysical capability for those species. Hunter effort shows a similar geographic relationship.

Within the 3 central M.U.'s, mean annual big game harvests per unit area have been highest in 7-34 (19.5 game animals per 100 km²), followed by 7-35 (14.3) and 7-32 (13.4). Hunter effort shows a similar relationship. In those 3 M.U.'s combined, 4 big game species made the following contributions to the harvest and number of hunter-days generated (1976-1989):

	<u>% of harvest</u>	<u>% of hunter-days</u>
Moose	69	65
Deer	21	26
Black bear	10	8
Elk	0.3	1

The above proportions change somewhat in years when deer populations are high, but moose still predominate. In M.U.'s 7-32, 7-34 and 7-35 combined, guided (non-resident) hunters harvested only 5% of the black bears, 1% of the moose, and a negligible percentage of elk and deer.

In the 3 central M.U.'s combined, ruffed grouse, duck, and goose harvests per unit area have been highest in M.U. 7-34 (mean of 114 birds/100 km²/year), lowest in M.U. 7-35 (51), and intermediate in 7-32 (87).

4.0 TRAPLINE CATCH DATA

4.1 Methods and Information Sources

Catch records were provided by MOE staff in Fort St. John. Only traplines within M.U.'s 7-32, 7-34, and 7-35 are reviewed. Data for native Indian traplines are generally not available. The data base includes voluntary returns made by trappers in earlier years, and more recent compulsory records kept by fur buyers. Recent catch totals are conservative in that some pelts may be used locally, sold to tourists, or otherwise not reach the licensed buyers.

At a M.U. level, data are presented for both Registered Trappers and Private Property Trappers. Registered trappers hold an exclusive territory and can trap on any Crown lands within it. Private property trappers must be licensed, but can trap only on private land and normally make their own arrangements for access to such lands.

The two MOE data sources used were Historical Harvest Summary Coding Sheets (HHSCS) and Wild Fur Harvest Summary Reports (WFHSR).

4.2 M.U. 7-32, 7-34, and 7-35 Catches

4.2.1 Trapper activity (Table 38)

During the 5-year period 1985/86 through 1989/90, about 52 private property trappers and 23 registered trapline holders operated in the 3 M.U.'s. The location of Registered Traplines is shown on Figure 9. Most private property trappers trap intermittently; nearly half trapped only 1 year of the past 5. In contrast, about half of the holders of registered lines were active in either 4 or 5 of the past 5 years (Table 38).

4.2.2 Catch on private versus Crown land (Table 39)

During the period 1985/86, about 74% of combined M.U. 7-32, 7-34, and 7-35 catch was taken by registered trappers and 26% by private property trappers (Table 39). The private property catch was highest in M.U. 7-35 and lowest in M.U. 7-32.

4.2.3 Species composition of the catch (Table 40)

Species composition of the trapline catch in the 3 M.U.'s for 1985/86 through 1989/90 is given in Table 40. The percentages reflect both numerical abundance and trapper effort, the latter being strongly influenced by pelt prices. Squirrels were most abundant (but of little economic importance), followed by beaver,

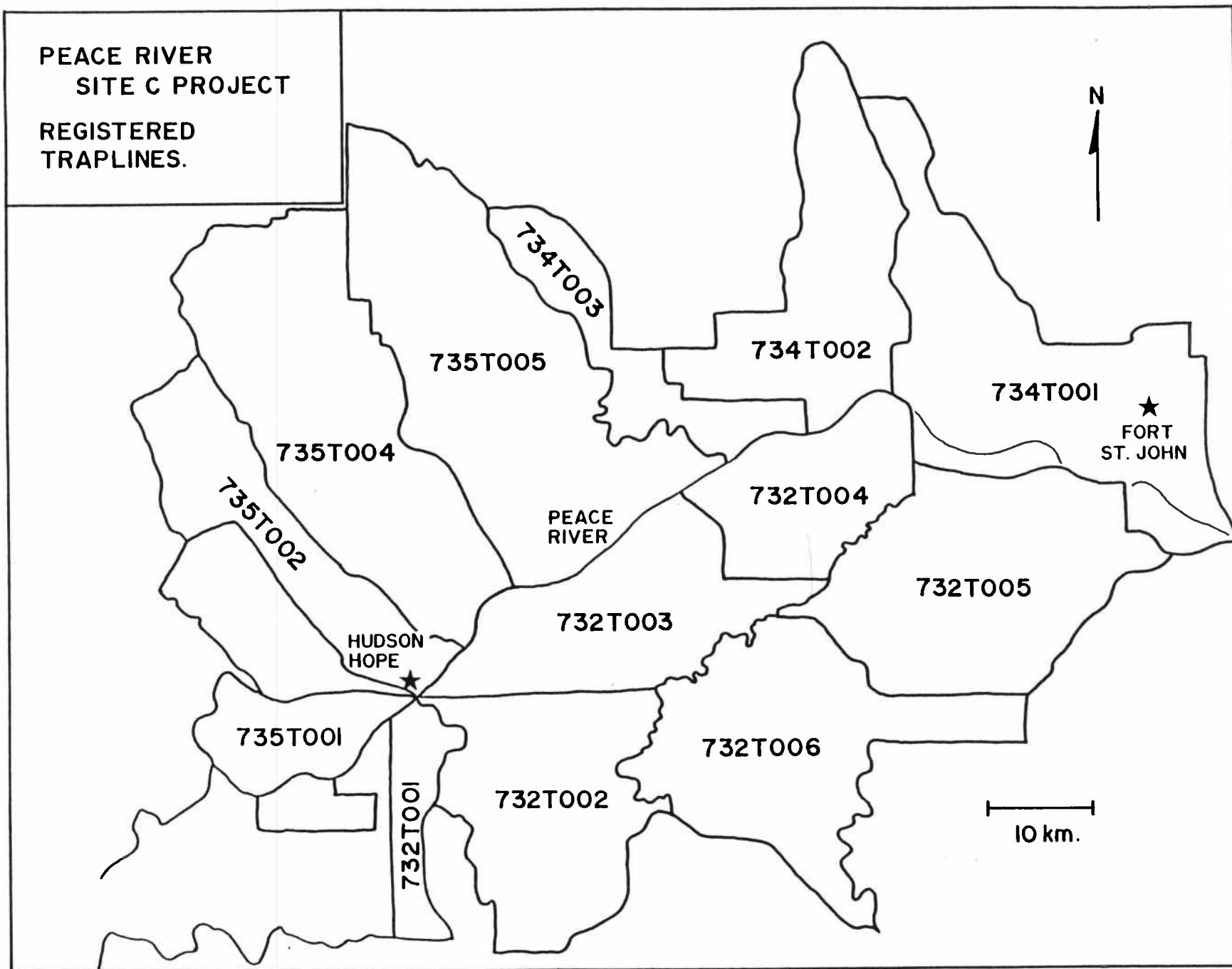


Figure 9. Locations of registered traplines.

marten, muskrat, weasel, coyote, and mink. Six other species accounted for, individually, 1% or less of the catch. Aquatic/riparian species made up about one-third of the total catch, terrestrial species two-thirds. The proportion of aquatic/riparian species was highest in M.U. 7-34 (43%) and lowest in M.U. 7-35 (13%).

4.2.4 Variations in the annual catch (Tables 41-45)

Means and ranges in the number of pelts taken per year for the 7-year period 1983/84 through 1989/90 are given in Table 41. Between-year variation is large for most species, and probably accounted for by factors such as the 10-year cycle (carnivores, especially lynx), variable hydrologic conditions (beaver; muskrat), and pelt price. The marten appears to be the least variable species in the catch. Actual numbers on which the means and ranges in Table 41 are based are given in Tables 42-45 which show trends over the 7-year period. The strong downward trend in the lynx catch from 1983/84 to 1986/87 (Table 42) is not evident in most other carnivores.

4.2.5 Evidence for the 10-year cycle (Tables 46-47)

The lynx catch in M.U.'s 7-32, 7-34 and 7-35 combined shows a strong 10-year periodicity, with peaks in 1962/63, 72/73, and 82/83 (Table 46). These peaks are all 2 years after snowshoe hare peaks reported in the Prince George area (Sullivan 1990) and at Rochester Alberta (Brand and Keith 1979). It is normal for lynx populations to peak 2 years after hares, therefore hares probably peaked in the Site C area at the same time as at Prince George and Rochester. Variations in the lynx catch are probably more pronounced than in the population from which the catch is taken due to heavy trapping effort when populations are high and reduced effort when they are low. Brand and Keith (1979) noted that fur returns for Alberta accurately indexed the timing of peaks and lows in lynx populations on their study area at Rochester, but did not accurately reflect the cyclic amplitude.

In view of the pronounced cyclic variation in snowshoe hare numbers in northern B.C., one might expect other predators to have a pattern similar to lynx. Data in Table 47 are rather inconclusive, largely due to small sample sizes and/or variations in trapper activity, effort, and specialization. There is a suggestion of fisher peaks one year after the lynx peaks (73/74 and 83/84). Coyote harvest peaks corresponded with lynx peaks in 1972/73 and 82/83, but the coyote take was also high in other years in the 1980's, possibly a reflection of pelt prices. The data do not indicate a correlation between lynx and marten but again this may be masked by trends in effort. The fox catch is too small to provide useful information. Mink may have peaked with lynx in 1962/63 and 82/83, however this is not evident in 1972/73, and like coyotes, some high catches occurred in 1986/87 and 1987/88 when the lynx catch was low. Analysis of data for a larger number of M.U.'s might throw more light on these relationships.

4.2.6 Catch per unit area (Table 48)

Catches per 100 km² for the 7 year period 1983/84 through 1989/90 are given in Table 48. The total number of pelts taken per unit area is remarkably similar for the 3 M.U.'s, about 20 to 24 pelts per 100 km² per year. Maximums in Table 48 indicate the catch/unit area in the best year of the 7 examined. It should be noted that the 7-year period falls between lynx peak of 1982/83 and the next projected peak is 1992/93. The data are based on fur sales to buyers and are conservative because pelts kept for local use, sold to tourists, etc. are not included. Also, the kill of wolf, black bears, lynx, and wolverine by sport hunters is not included.

4.3 Catches on Registered Traplines Bordering Site C (Tables 49-60)

Nine registered traplines border the proposed Site C Reservoir and 3 others would be crossed by the associated transmission line (Figure 9). The years for which catch data are available are given in Table 49. No information is available for one Native Indian trapline, and little for two others. The number of years of catch data for the other 9 traplines varies from 15 to 36.

Tables 50 through 60 summarize trapline activity and catch information for each of the 11 lines having catch records. These principally show the minimum, maximum, and mean number of pelts of each species taken per year for the period of record.

4.4 Conclusions

In the Site C area, about 74% of the fur catch is taken by Registered Trappers; the remainder by Private Property Trappers. Squirrels are most abundant in the catch, followed by beaver, marten, muskrat, weasel, coyote, mink, and 6 other species. There is considerable year-to-year variation in species catches. The lynx catch is strongly cyclic here, the most recent peak being in 1982/83. Mean annual catches in the Site C area have been about 20 to 24 pelts per 100 km² in recent years.

5.0 LITERATURE CITED

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Table 1. - Mule deer counted per hour on winter aerial surveys in M.U.'s 7-32, 7-34 and 7-35.

1. North side Peace R. plus Tributaries

This was the most frequently flown area during the period 1963/64 - 1982/83. It normally included the valley slopes (breaks) along the north side of the Peace from Fort St. John to Hudson Hope, plus breaks along Red Cr., Cache Cr., Halfway R. (to Cameron R.), Farrell Cr., and Lynx Cr. On some surveys only some of the tributaries were flown, and some surveys did not extend west of Farrell Creek. However, most winter deer range is east of Farrell Creek.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Jan. 9/66	413	103	- Went west to Gold Bar
Dec. 8/66	241	72	- Short trips up Cache; Halfway; Farrell
Jan. 15/70	179	98	- Short trips up Halfway and Cache
Dec. 7/70	149	75	- includes Red, Cache and Halfway
Jan. 4/72	144	79	- west only to Farrell Cr.
Dec. 10/73	146	32	- no details
Jan. 15/79	360	90	- includes animals west to Portage Mtn.
Dec. 10/81	561	112	- includes animals west to Portage Mtn.
Dec. 9/82	696	216	- includes animals west to Portage Mtn.

2. Breaks along north side of Peace River

This included the breaks between Fort St. John and Hudson Hope, but not the valleys of tributary streams.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Winter 63/64	235	94	- west only to Halfway R.
Nov. 26/74	.57	?	- Taylor Bridge to Site One
Feb. 24/75	121	?	- " " " " "
June 12/77	269	?	- Fort St. John-Hudson Hope
Feb. 1/82	358	?	- " " " - " "

3. Breaks along south side of Peace River

This included the valley slope from Fort St. John to Hudson Hope.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Dec. 21/64	138	110	- "not an indication of total numbers"

Jan. 4/72	23	31	- Moberly R. to mouth of Farrell Cr.
Nov. 26/74	52	?	- Taylor Bridge to Site One
Feb. 24/75	68	?	- Taylor Bridge to Site One
Jan. 11/77	65	?	- Fort St. John to Hudson Hope
Jan. 15/79	12	?	- no details given

4. Breaks along north and south sides of Peace River

This usually covered from Fort St. John to Hudson Hope. Flying times, where given, were for entire flight therefore results cannot be given separately for north and south sides. However, separate flights of the north and south sides given under headings 2 and 3 above have been added in where possible (winters of 74/75 and 76/77).

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Mar. 19/64	284	87	- omitted s. side east of Halfway R.
Jan. 11/68	133	30	- includes Moberly R. breaks
Nov. 26/74	109	?	- Fort St. John-Hudson Hope
Feb. 24/75	189	?	- " " " - " "
Feb. 1/82	417	70	- includes lower 10 km of Moberly

5. Breaks along south side of Peace, plus lower Moberly R. valley

This included a variable distance along the Moberly, sometimes to the Del Rio Ranch, and sometimes only the lower 15 ± km.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Dec. 8/66	174	84	- lower 16 km of Moberly
Jan. 15/70	105	53	- " 11 km " "
Dec. 10/73	12	7	
Mar. 5/76	23	?	- to Moberly Lake
Feb. 1/82	48	?	- lower 10 km of Moberly

6. Moberly River valley

This included variable distances up the Moberly, however the lower 15 km which has most of the deer winter range was always included. Only the open breaks along the north side were surveyed.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Dec. 7/70	19	13	- includes Moberly to Old Fort along Peace
Jan. 4/72	47	47	- lower 24-32 km
Dec. 22/76	1	?	- no details

Jan. 11/77	25	?	- lower 20 km
Feb. 13/81	44	?	- to Del Rio Ranch
Dec. 7/81	57	57	- n. side to Lot 192
Nov. 23/82	8	8	- no details available
Dec. 10/82	15	10	- " " "
Jan. 20/83	11	17	- " " "
Jan. 6/89	88	88	- LT 98911 (UIDB)

7. Pine River Valley

This usually covered breaks along the Pine River from its mouth upstream to the vicinity of Stewart Creek.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Mar. 20/64	312	121	- both sides s. to Stewart Cr.
Dec. 10/82	56	51	
Jan. 6/89	278	70	- LT 98912 (UIDB)

8. Moberly and Pine River valleys

These were often flown in a loop on one survey out of Fort St. John, upstream to the Del Rio Ranch and Stewart Creek areas.

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Remarks</u>
Jan. 16/69	107	46	
Jan. 4/72	138	69	- "counting conditions ideal"
Dec. 16/77	23	6	- includes Stewart Lake and Del Rio Ranch
Jan. 14/79	49	9	- includes Stewart Lake and Del Rio Ranch
Dec. 7/81	139	56	- Moberly to Lot 192; Pine to Windy Cr.
Dec. 10/82	71	27	- Moberly and Pine R. breaks
Nov. 21/86	170	?	- to Windy Creek and Del Rio (CL98601)
Jan. 6/89	366	73	- LT 98911 and LT 98912

9. Miscellaneous surveys

<u>Date</u>	<u>Mule deer</u>	<u>Deer/hr.</u>	<u>Location</u>
Jan. 9/76	176	52	Lower and upper Cache Cr.
" /"	28	6	Halfway-Kobes-Farrell
Feb. 16/78	22	9	Reserve between Pine and Moberly Rivers
Feb. 13/82	11	?	South side Peace, Moberly to Old Fort

Table 2. - Mule deer population density in the Peace River valley and in the lower portions of its tributary valleys.

1. Peace River Valley

Includes breaks on north and south sides from just below the mouth of the Moberly River to Hudson Hope, plus all terraces, farmland, and gravel bars in the valley, i.e. all land between the escarpment on the north side and the escarpment on the south side. The lower reaches of tributary valleys are included in some surveys. Land areas are based on Blood (1979 Appendix II).

<u>Winter</u>	<u>Mule deer</u>	<u>Area*</u> <u>(km sq.)</u>	<u>Deer/</u> <u>km sq.</u>	<u>Remarks</u>
1963/64	284	168	1.7	- omitted s. side east of Halfway R. (MOE)
1967/68	133	270	0.5	- includes Moberly R. breaks (MOE)
1974/75	109	250	0.4	- RRCS (Thurber 1976)
"	189	250	0.8	- " (Thurber 1976)
1976/77	221	250	0.9	- Blood (1979)
1981/82	396	168	2.4	- MOE Survey, Feb. 1 1982

2. Valleys of Tributary Streams

The MOE reconnaissance/classification surveys have included variable distances up the tributary valleys and most did not plot animal locations on maps, therefore the data cannot be used to calculate densities. However Blood (1979) plotted deer locations on maps in the lower portion of tributary valleys and calculated land areas, as given below.

<u>Winter</u>	<u>Mule deer</u>	<u>Area</u> <u>(km sq.)</u>	<u>Deer/</u> <u>km sq.</u>	<u>Remarks</u>
1976/77	20	24	0.8	- Moberly Valley: n.&s. sides plus valley bottom along lower 16 km.
"	11	5	2.1	- Wilder Cr.: lower 4.5 km
"	27	13	2.1	- Lower Cache/Red Creeks
"	6	20	0.3	- Halfway R. (lower 13 km)
"	16	13	1.2	- Farrell Cr. (lower 10 km)
"	11	6	1.7	- Lynx Cr. (lower 4 km)

1976/77	42	21	2.0	- 11 small tributary valleys along s. side of the Peace.
"	<u>139</u>	<u>102</u>	<u>1.3</u>	- lower parts of all tributaries.

* Land areas as follows (based on Blood 1979, Appendix II):

- 168 km sq. = valley slopes and bottom of Peace R. only. Tributaries not included; water surface of Peace R. not included.
- 250 km sq. = above, plus lower parts of tributary valleys (Moberly excluded).
- 270 km sq. = above plus Moberly valley to a line drawn across it at upper extremity of flooding.

Table 3. - Mule deer population density in MOE survey blocks in M.U.'s 7-33, 7-34, and 7-35.

1. Two Rivers Survey Block (7-33)

<u>Winter</u>	<u>Mule deer</u>	<u>Area (km sq.)</u>	<u>Deer/ km sq.</u>	<u>Remarks</u>
86/87	217	46	4.7	- UIDB : TC98701
87/88	200	"	4.3	- " : SB98801
"	293	"	6.4	- " : SB98802
88/89	283	"	6.2	- " : SB98902
89/90	326	"	7.1	- " : SB99001

2. M.U. 7-33 Blocks

<u>Winter</u>	<u>Mule deer</u>	<u>Area (km sq.)</u>	<u>Deer/ km sq.</u>	<u>Remarks</u>
1988/89	52	22	2.4	- UIDB : SB98803 (D1)
"	84	23	3.7	- " : SB98804 (D4)
"	116	32	3.6	- " : SB98805 (D7)
"	<u>132</u>	<u>30</u>	<u>4.4</u>	- " : SB98806 (D9)
"	384	107	3.6	- Mean for 4 blocks

3. M.U. 7-34/7-35 Blocks

<u>Winter</u>	<u>Mule deer</u>	<u>Area (km sq.)</u>	<u>Deer/ km sq.</u>	<u>Remarks</u>
1988/89	150	14	10.7	- UIDB : SB98807 (D90)
"	204	26	7.8	- UIDB : SB98808 (D97)
"	119	37	3.5	- UIDB : SB98810 (D128)
"	<u>145</u>	<u>34</u>	<u>3.9</u>	- UIDB : SB98809 (D122)
"	618	111	5.6	- Mean for 4 Blocks

Table 4. - Mule deer population density along transects in the Cache Creek and Pine River/Stewart Lake areas, winter 1989/90.

1. Cache Creek Transects

Dec. 21/89 Survey

<u>Transect</u>	<u>Mule deer</u>	<u>Area (km sq.)</u>	<u>Deer/ km sq.</u>	<u>Remarks</u>
T1	7	7.3	1.0	- UIDB : LT98905
T2	53	6.9	7.7	" "
T3	9	10.5	0.9	" "
T4	64	13.5	4.7	" "
T5	70	14.0	5.0	" "
T6	16	14.3	1.1	" "
T7	8	14.3	0.6	" "
T8	<u>31</u>	<u>18.0</u>	<u>1.7</u>	" "
	258	98.8	2.6	

Feb. 13/90 Survey

<u>Transect</u>	<u>Mule deer</u>	<u>Area (km sq.)</u>	<u>Deer/ km sq.</u>	<u>Remarks</u>
T3	19	14.5	1.3	- UIDB : LT99002
T6	14	13.5	1.0	" "
T9	0	14.3	0.0	" "
T10	<u>2</u>	<u>10.5</u>	<u>0.2</u>	" "
	35	53.0	0.7	

2. Pine River-Stewart Lake Transects

Dec. 10/89 Survey (UIDB : LT98903)

<u>Transect</u>	<u>Mule deer</u>	<u>Area (km sq.)</u>	<u>Deer/ km sq.</u>	<u>Remarks</u>
T1	13	6.3	2.1	- entire transect length
T2	16	11.5	1.4	- " " "
T3	22	18.3	1.2	- " " "
T4	71	18.3	3.9	- " " "
T5	13	5.8	2.3	- Peace R. to B.C. Rail.
T6	36	10.0	3.6	- " " " "
T7	10	9.5	1.1	- " " " "
T8	1	9.5	0.1	- " " " "
T9	11	10.3	1.1	- " " " "
T10	0	10.5	0.0	- " " " "
T11	<u>10</u>	<u>10.5</u>	<u>1.0</u>	- " " " "
	203	120.5	1.7	

Dec. 20/89 Survey (UIDB : LT98904)

<u>Transect</u>	<u>Mule deer</u>	<u>Area</u> <u>(km sq.)</u>	<u>Deer/</u> <u>km sq.</u>	<u>Remarks</u>
T5	15	12.3	1.2	- southeast of B.C. Rail.
T6	11	9.8	1.1	- " " "
T7	6	13.5	0.4	- " " "
T8	9	13.3	0.7	- " " "
T9	13	14.8	0.9	- " " "
T10	8	13.8	0.6	- " " "
T11	5	13.0	0.4	- " " "
T12	6	<u>26.3</u>	<u>0.2</u>	- entire transect.
		116.8	0.6	

Table 5. - Results of spring carry-over counts for mule deer in the Cache Creek area, M.U. 7-34.

Transect numbers and lengths (km)							
Year/ parameter	1 (19)	2 (25)	3 (22)	4 (12.5)	5 (15)	6 (12)	Total (105.5)
<u>1988</u>							
No. counts	4	4	3	4	4	4	23
Total deer	219	228	52	93	101	311	1004
Mean/count	55	57	17	23	25	78	44
Range	42- 70	43- 73	12- 24	8-41	14- 33	47- 121	
Total dist. (km)	76	100	66	50	60	48	400
Deer/km	2.9	2.3	0.8	1.8	1.7	6.5	2.5
<u>1989</u>							
No. counts	2	2	2	2	2	2	12
Total deer	228	243	43	19	27	316	876
Mean/count	114	122	22	10	14	158	73
Range	96- 132	117- 126	19- 24	8-11	13- 14	152- 164	
Total dist. (km)	38	50	44	25	30	24	211
Deer/km	6.0	4.9	1.0	0.8	1.1	13.2	4.2
<u>1990</u>							
No. counts	3	3	2	2	1	2	13
Total deer	363	249	47	48	0	308	1015
Mean/count	121	83	24	24	0	154	78
Range	110- 128	76- 96	11- 36	20-28	-	140- 168	
Total dist. (km)	57	75	44	25	15	24	240
Deer/km	6.3	3.3	1.1	1.9	0.0	12.8	4.2

Table 6. - Number of white-tailed deer counted, and ratios of white-tailed deer to mule deer, M.U.'s 7-32, 7-33, 7-34, and 7-35.¹

Year ²	M.U.	Survey method ³	W.T.D.	Mule Deer	W.T.D./ 100 mule deer
63/64 (w)	7-34/35	Aerial (Recon.)	1	235	<1
65/66 "	"	" "	3	413	1
70/71 "	"	" "	6	149	4
71/72 "	"	" "	3	144	2
73/74 "	"	" "	10	146	7
74/75 "	"	" "	2	57	4
" "	7-32	" "	4	68	6
76/77 "	7-34/35	" "	1	158	<1
" "	"	" "	4	269	2
81/82 "	7-32	" "	3	81	4
82/83 "	7-34/35	" "	6	696	1
87/88 "	7-33	" (Bl. 2-R)	2	289	1
1988 (s)	7-34	Ground	6	306	2
" "	"	"	8	160	5
" "	"	"	11	244	5
" "	"	"	19	251	8
1989 (s)	"	"	11	424	3
" "	"	"	16	435	4
88/89 (w)	7-33	Aerial (Bl. 2-R)	1	284	<1
" "	7-34	" (Bl. D97)	8	201	4
" "	7-32	" (Recon.)	3	278	1
89/90 (w)	7-34	Aerial (Trans.)	4	35	11
" "	"	" "	8	258	3
" "	7-32	" "	18	203	9
" "	"	" "	17	73	23
" "	7-33	" (Bl. D1)	4	52	8
" "	"	" (Bl. D7)	1	117	1

1. Data from MOE files, Fort St. John, and UIDB, Victoria.

2. w = winter; s = spring

3. Aerial reconnaissance in M.U. 7-34/35 include breaks along north side of the Peace from Fort St. John to Hudson Hope plus tributary valleys in that area. Those in 7-32 were along the Pine River. Survey blocks are shown on Figure ; aerial transects on Figure . Block 2-R refers to Two Rivers.

Table 7. - Moose numbers and moose/hr. on winter aerial reconnaissance surveys in M.U.'s 7-32, 7-34 and 7-35.¹

<u>Winter</u>	<u>Moose</u>	<u>Moose/hr.</u>	<u>Location</u>
1963/64	136	54	- North side Peace, Ft. St. John-Hudson Hope.
	181	56	- North and south sides of Peace
	73	28	- Pine R. valley
1964/65	141	113	- South side Peace, Ft. St. John-Hudson Hope.
1965/66	387	77	- North side Peace plus tributaries, FSJ-HH.
1966/67	268	80	- North side Peace plus tributaries, FSJ-HH.
	158	73	- South side Peace, FSJ-HH, plus lower Moberly.
1967/68	259	59	- North and s. side Peace, FSJ-HH, plus Moberly.
1968/69	170	91	- Moberly and Pine valleys
1969/70	64	35	- North side Peace plus tributaries, FSJ-HH
	63	32	- South side Peace, FSJ-HH, plus lower Moberly.
	102	51	- South Peace Reserve
1970/71	202	45	- Upper Cache-Inga-Gundy-Blueberry-Aitkin
	36	39	- Mile 103-109 region
	106	106	- Upper Cache-Inga (west of Wonowon)
	120	60	- North side Peace plus tributaries, FSJ-HH.
	83	55	- Moberly (Hudson Hope to Fort St. John)
1971/72	84	45	- North side Peace plus tributaries, FSJ-Farrell Cr.
	38	51	- Breaks on s. side Peace, Farrell Cr.-Moberly mouth.
	56	56	- Moberly valley (lower 15-20 mi.)
	157	79	- Moberly and Pine River valleys.
1972/73	-	-	
1973/74	87	19	- North side Peace plus tributaries, FSJ-HH
	118	67	- South side Peace, FSJ-HH plus Moberly/Del Rio
1974/75	28	93	- Halfway R. valley (lower 20 mi.)
	25	?	- Breaks along n. side Peace, FSJ-HH
	61	?	- " " " " " "
	139	?	- " " s. " " "
	194	?	- " " " " " "

1974/75	255	?	- Breaks along both sides of the Peace, FSJ-HH
	164	?	- Breaks along both sides of the Peace, FSJ-HH
1975/76	64	149	- Upper and lower Cache Cr.
	166	49	- " " " " "
	226	51	- Halfway-Kobes-Farrell
	78	87	- Inga
	60	?	- Moberly Lk.-S. Peace-Moberly R.- Maurice Cr.
1976/77	191	?	- North side Peace plus tributaries, FSJ-HH
	202	?	- Breaks on n. side Peace, FSJ-HH
	142	?	- " " s. " " "
	344	?	- Breaks along both sides of Peace R., FSJ-HH
	83	?	- Moberly R. valley
	44	?	- " " "
1977/78	36	?	- " " "
	22	?	- Pine R. valley
	173	44	- Stewart Lk.-Pine-Moberly-Del Rio
	36	98	- Del Rio Ranch area
	115	92	- Stewart Lk. area (Dec.)
	249	94	- " " " (Feb.)
	75	?	- Between Moberly and Peace Rivers
1978/79	268	52	- Pine/Moberly-Del Rio-Stewart Lk.
	171	33	- Breaks along n. & s. sides of Peace, FSJ-HH
	128	?	- Pine and Moberly R. valleys
1979/80	-	-	
1980/81	85	?	- Moberly-Del Rio
	44	?	- Moberly R. Breaks
	41	?	- Del Rio area
1981/82	220	44	- North side Peace plus tributaries, FSJ-HH
	389	?	- Breaks along n. side Peace, FSJ-HH
	185	?	- " " s. " " , plus Moberly
	574	?	- Breaks along both sides of Peace R., FSJ-HH
	38	38	- Lower Moberly
	92	61	- Pine R. valley
	130	52	- Moberly-Pine
1982/83	140	43	- North side Peace plus tributaries, FSJ-HH
	33	18	- Moberly R. valley
	50	50	- " " "
	19	29	- " " "
	67	61	- Pine R. valley
	17	36	- " " "
	100	38	- Pine-Moberly R. valleys
	36	32	- " " " "
1983/84	-	-	
1984/85	-	-	

1985/86	-	-	
1986/87	137	?	- Pine-Moberly R. valleys
1987/88	-	-	
1988/89	124	73	- Pine R.-Stewart Lk. transects (partial) LT98806
1989/90	229	38	- Pine R.-Stewart Lk. transects (partial) LT98903
	298	50	- Pine R.-Stewart Lk. transects (partial) LT98904
	170	38	- Cache Cr. transects (partial) LT98905
	83	42	- Cache Cr. transects (partial) LT99002

1. Data from MOE files, Fort St. John and UIDB, Victoria. No correction for missed animals.

Table 8. - Moose population densities in winter in the Peace River valley, Site C to Hudson Hope.¹

Winter	Moose	Area ² (km sq.)	Moose/ km sq.	Remarks
Mar. 19/64	181	168	1.1	Omitted s. side e. of Halfway R. (MOE)
Jan. 11/68	259	270	1.0	Included lower part of some tributaries. (MOE)
Nov/Dec 74	164	250	0.7	Upstream of Moberly R. mouth (Thurber 1976)
Feb/Mar 75	255	250	1.0	As above
Jan. 11/77	344	250	1.4	Peace and lower tributaries except Moberly (Blood 1979)
Feb. 1/82	574	168	3.4	Doesn't include tributary valleys (MOE)

¹ all surveys done by helicopter. No correction for missed animals.

² Land areas as follows (based on Blood 1979, Appendix II):

168 km sq. = valley slopes and bottom of Peace R. only. Tributaries not included; water surface of Peace R. not included.

250 km sq. = above, plus lower parts of tributary valleys (Moberly excluded).

270 km sq. = above plus Moberly valley to a line drawn across it at upper extremity of flooding.

Table 9. - Moose population densities in winter in the lower reaches of stream valleys tributary to the Peace, Site C to Hudson Hope.¹

Location ²	Winter	Moose	Land area (km sq.)	Moose/ km sq.	Source
Moberly R.	1974/75	20	24	0.8	Thurber 1976 (Fig. 8-1)
	1974/75	9	24	0.4	Thurber 1976 (Fig. 8-1)
	1976/77	45	24	1.9	Blood 1979 (App. II)
	1981/82	11	24	0.5	MOE survey
Wilder Cr.	1974/75	2	5	0.4	Thurber 1976 (Fig. 8-1)
	1974/75	5	5	1.0	Thurber 1976 (Fig. 8-1)
	1976/77	10	5	2.0	Blood 1979 (App. II)
Cache/Red Cr.	1974/75	7	13	0.5	Thurber 1976 (Fig. 8-1)
	1974/75	3	13	0.2	Thurber 1976 (Fig. 8-1)
	1976/77	26	13	2.0	Blood 1979 (App. II)
Halfway R.	1974/75	4	20	0.2	Thurber 1976 (Fig. 8-1)
	1974/75	2	20	0.1	Thurber 1976 (Fig. 8-1)
	1976/77	28	20	1.4	Blood 1979 (App. II)
Farrell Cr.	1974/75	6	13	0.5	Thurber 1976 (Fig. 8-1)
	1974/75	5	13	0.4	Thurber 1976 (Fig. 8-1)
	1976/77	28	13	2.2	Blood 1979 (App. II)
Lynx Cr.	1976/77	3	6.5	0.5	Blood 1979 (App. II)

1. all surveys by helicopter. No correction for missed animals.

- 2. Lower 16 km of Moberly R.
- " 5 km of Wilder Cr.
- " 7 km of Cache/Red Cr.
- " 13 km of Halfway R.
- " 10 km of Farrell Cr.
- " 3 km of Lynx Cr.

Table 10. - Moose population density and total size estimates based on stratified winter aerial surveys in M.U. 7-32.¹

Winter	Density by strata ²				M.U. 7-32 Total		
	1	2	3	4	% of M.U. surveyed	Moose density (per km sq.)	Moose pop. estimate
1984/85 (Dec) ³					17.2	0.76	2,641 ± 15.6%
1983/84 (Mar.?)	0.86	1.59	0.53	2.33	4.7	0.98	3,616 ± 25.8%
1983/84 (Dec.?)					12.6	0.87	3,203 ± 23.0%
1982/83 (Mar.)					8.4	0.59	2,180 ± 26.9%
1982/83 (Dec.)					8.5	0.50	1,835 ± 29.4%
1981/82 (Jan) ⁴		2.59					
1979/80 (Mar.)	1.42	2.72	0.51	1.57	3.4	1.29	4,794 ± 24.4%
Mean							3,045

¹ Based on data from MOE files, Fort St. John. Not corrected for missed animals.

² Stratum 1 = Plateau surface in northern and western part of the M.U. (1,961 km sq.)
 " 2 = Stewart Lake block (325 km sq.)
 " 3 = Settlement fringe along southern and eastern edge of the M.U. (1,041 km sq.)
 " 4 = Valleys of the Moberly and Pine Rivers (368 km sq.)

³ M.U. 7-32 was divided into only 3 strata (Harper 1985). Maps showing strata locations are not included in the report.

⁴ Apparently only the Stewart Lake stratum was flown in 1981/82.

Table 11. - Miscellaneous estimates of moose population density in winter in portions of M.U. 7-32.¹

Winter	Moose per km. sq.	Kind and location of survey
1974/75 (Dec.)	1.5	based on helicopter survey of 18, one-square-mile (2.59 km sq.) blocks on the plateau surface in the northern part of the M.U., Highway 97 to Maurice Cr. From Figure 8-1 in Thurber 1976.
1974/75 (Feb.)	1.5	as above
1989/90 (Dec. 10)	1.9	based on 240 lineal km (120 km sq.) of transect flown in the eastern part of the M.U. (MOE data: LT98903). Census reliability rated good.
1989/90 (Dec. 20)	2.5	based on 234 lineal km (117 km sq.) of transect flown in the eastern part of the M.U. (MOE data: LT98904). Census reliability rated as good.
1989/90 (Dec. 10/20)	2.2	combined data for LT98903 and LT98904.

¹ all surveys by helicopter. No correction for missed animals.

Table 12. - Estimates of moose population density in winter in M.U. 7-34.¹

Winter	Moose per km sq.	Kind and location of survey
1974/75 (Dec.)	0.5	based on helicopter survey of 5, one-square-mile (2.59 km sq.) blocks on the plateau surface in the southern part of the M.U. Data from Figure 8-1 in Thurber 1976.
1974/75 (Feb.)	0.2	as above.
1981/82 (Feb.)	1.02	based on 10 fixed-wing transects covering 10% of the M.U. Total moose population estimated to be 1,340.
1982/83	0.93	based on 9 transects covering 137.5 km sq. Probably same transects flown in 81/82. Type of aircraft used not stated.
1989/90 (Dec.)	1.74	from 8 east-west transects surveyed by helicopter in the Cache Creek area. Total area sampled was 98.6 km sq. (based on 0.5 km transect width). LT98905.
1989/90 (Feb.)	1.57	from 4 transects in Cache Creek area. Total area surveyed was 53 km sq. (based on 0.5 km transect width). LT99002.

¹ Surveys involve both helicopter and fixed-wing aircraft. No correction for missed animals.

Table 13. - Estimates of moose population density in winter in M.U. 7-35.¹

Winter	Moose per km sq.	Kind and location of survey
1974/75 (Dec.)	0.4	based on helicopter survey of 7, one-square-mile (2.59 km sq.) blocks on the plateau surface in the southern part of the M.U. Data from Figure 8-1 in Thurber 1976.
1974/75 (Feb.)	0.7	as above
1981/82 (Feb.)	0.76	based on fixed-wing survey of 11 east-west transects totaling 213 km sq. in area.
1982/83	0.82	from aerial survey of 11 transects totaling 91.75 km sq. in area. Kind of aircraft used is not known.
1989/90 (Mar.)	3.01	Block 61 between Lynx Cr. and Hudson Hope, 25.6 km sq. in area (P. Davidson, MOE, Fort St. John). This is within the Peace River valley.
1989/90 (Mar.)	0.87	Block 60 between Lynx Cr. and Hudson Hope, 20.5 km sq. in area (P. Davidson, MOE, Fort St. John).
1989/90 (Mar.)	2.08	Blocks 60 and 61 combined.

¹ Surveys involve both helicopter and fixed-wing aircraft. No correction for missed animals.

Table 14. - Observations of elk recorded on MOE aerial surveys in M.U.'s 7-32, 7-34 and 7-35.

Winter	Moberly	Pine	Moberly/Pine	S. Peace Reserve	Halfway
1966/67	7				
68/68			15*		
69/70	1				
70/71	11				
71/72	13				
73/74	8				
74/75	1				
75/76	55				
76/77	30				
	15				
	6				
77/78	20			30*	
78/79			27*		
80/81	50				
81/82	30	7			
	29				
82/83	23	8			8
	17	6			
	62				
86/87			128		
88/89	100	62	162		8(SB)
			146		
89/90	79	67**	15(TR)		107(TR)
			7(TR)		56(TR)

* probably along Moberly River valley.

** includes 24 elk in Septimus Cr. valley
 SB = Survey Block No. 128 (Halfway River). SB98810.
 TR = Line Transect involving partial coverage. All other flights were reconnaissance/classification surveys along river valleys.

Table 15. - Estimated Deer harvests in 10 M.U.'s surrounding the Site C Project.¹

Yr.	7-31	7-32	7-33	7-34	7-35	7-36	7-43	7-44	7-45	7-46	Total
'76	14	14	27	14	27						96
'77	24		69	71	58				12	12	246
'78		26	103	72	8		3	16		23	251
'79	19	28	87	66	28		9	2		27	266
'80	26	93	155	25	35	9	9	25	35	9	421
'81		46	131	131	77		7	84	23	15	514
'82	19	75	135	54	58		7	7	27	13	395
'83		19	76	38	19	6		20	19		197
'84		59	157	60	16	5	7	27		11	342
'85	7	52	176	41	67		7	16	34	7	407
'86		107	357	203	85	12	14	49	73	30	930
'87	14	92	527	282	104		13	37	53	6	1,128
'88	20	122	556	251	70	13	11	27	31	25	1,126
'89	27	193	630	256	114	7	42	52	75	61	1,457
T. ²	170	926	3186	1564	766	52	129	362	382	239	7,776
M. ³	12	66	228	112	55	4	9	26	27	17	555
R. ⁴	0-27	0- 193	27- 630	14- 282	8- 114	0- 13	0- 42	0- 84	0- 75	0- 61	96- 1,457
%	2	12	41	20	10	1	2	5	5	3	101%

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort. Includes both Mule Deer and White-tailed Deer.

² T = Total

³ M = Mean

⁴ R = Range

Table 16. - Hunter effort and success for Deer in 10 M.U.'s surrounding the Site C Project.¹

Year	Harvest	No. of hunters	No. of hunter-days	Animals per hunter	Hunter-days per animal
1976	96	1,691	9,626	0.06	100
77	246	1,798	8,213	0.14	33
78	251	2,082	9,249	0.12	37
79	266	2,222	8,198	0.12	31
80	421	2,946	13,092	0.14	31
81	514	3,157	13,990	0.16	27
82	395	2,841	14,978	0.14	38
83	197	1,920	9,227	0.10	47
84	342	1,737	7,874	0.20	23
85	407	1,532	7,808	0.27	19
86	930	2,945	13,827	0.32	15
87	1,128	3,897	20,365	0.29	18
88	1,126	3,262	21,099	0.35	19
89	1,457	4,536	20,663	0.32	14
Total	7,776	36,566	178,209		
Mean	555	2,612	12,729	0.21	23
Range	96- 1,457	1,532- 4,536	7,808- 21,099	0.06- 0.35	14-100

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

Table 17. - Mule deer hunting, seasons in relation to total harvest, M.U. 7-32, 7-34 and 7-35 combined, 1975-1990.¹

Year	<u>Season length(days)</u>		Deer harvest	Remarks
	Bucks ²	A/L		
1975	38	-		Oct. 4-Nov. 10. Any buck.
76	16	-	55	Nov. 13-28 (later season). Any buck.
77	16	-	129	Any buck.
78	16	-	106	Stewart Lk. Special weapons season begins.
79	16	-	122	Any buck.
80	16	-	153	" "
81	16	-	254	" "
82	16	-	187	" "
83	16	-	76	4-point bucks only.
84	16	-	135	" " "
85	16	-	160	" " "
86	23	23(LEH)*	395	266 reg. permits, 43 archery (LEH)
87	23	" "	478	266 reg. permits, 43 archery (LEH)
88	23(+5LEH)	" "	443	411 reg. permits, 43 archery (LEH)
89	24(+5LEH)	" "	563	411 reg. permits, 63 archery (LEH)
90	24(+9LEH)	26 "		411 reg. permits, 63 archery (LEH)

* regular permits antlerless only; archery permits any sex/age. LEH seasons are in Sep-Oct, before opening of buck season.

1. Information from MOE Hunting Regulations and Limited Entry Hunting Synopses.
2. Buck season ended from Nov. 15 (1987) to Nov. 28 (1976), except for 1975 (Nov. 10). 4-point regulation instituted in 1983 continued through 1990, except for LEH seasons (any buck through 1989; 2-point or older in 1990).

Table 18. - Estimated moose harvests in 10 M.U.'s surrounding the Site C Project.¹

Yr.	7-31	7-32	7-33	7-34	7-35	7-36	7-43	7-44	7-45	7-46	Total
'76	65	312	296	227	303	24	114	506	328	69	2244
'77	125	274	239	186	201	27	164	596	381	53	2246
'78	126	297	191	97	191	11	130	148	247	56	1494
'79	58	352	214	118	163	23	168	209	212	29	1546
'80	136	628	238	162	171	21	193	270	175	53	2047
'81	102	681	151	140	228	42	225	187	124	29	1909
'82	97	535	402	210	372	26	349	410	276	83	2760
'83	80	172	162	77	158	39	192	178	163	42	1263
'84	85	221	200	101	227	30	215	250	223	47	1599
'85	54	345	252	104	218	25	272	246	244	37	1797
'86	56	384	220	157	282	30	273	309	255	67	2033
'87	64	319	242	138	282	50	345	288	351	39	2118
'88	48	380	384	148	333	53	537	457	360	96	2796
'89	90	447	373	159	370	62	402	335	365	77	2680
T ²	1186	5347	3564	2024	3499	463	3579	4389	3704	777	28532
M ³	85	382	255	145	250	33	255	314	265	55	2038
R ⁴	48- 136	172- 681	151- 402	77- 227	158- 372	11- 62	114- 537	148- 537	124- 381	29- 96	1263- 2796
%	4	19	12	7	12	2	13	15	13	3	100%

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² T = Total

³ M = Mean

⁴ R = Range

Table 19. - Hunter effort and success for Moose in 10 M.U.'s surrounding the Site C Project.¹

Year	Harvest	No. of hunters	No. of hunter-days	Animals per hunter	Hunter-days per animal
1976	2,244	6,334	35,749	0.35	15.9
77	2,246	6,638	36,710	0.34	16.3
78	1,494	5,268	31,098	0.28	20.8
79	1,546	4,566	27,089	0.34	17.5
80	2,047	5,914	30,791	0.34	15.0
81	1,909	5,833	31,661	0.33	16.6
82	2,760	6,903	39,156	0.40	14.2
83	1,263	5,243	32,458	0.24	25.7
84	1,599	4,416	27,089	0.36	16.9
85	1,797	4,659	28,504	0.39	15.9
86	2,033	5,144	33,524	0.40	16.5
87	2,118	5,549	33,962	0.38	16.0
88	2,796	6,138	36,614	0.46	13.1
89	2,680	6,111	36,301	0.44	13.5
Total	28,532	78,743	460,706		
Mean	2,038	5,625	32,908	0.36	16.1
Range	1,263- 2,796	4,416- 6,903	27,089- 39,156	0.24- 0.46	13.1-25.7

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

Table 20. - Moose hunting seasons in relation to total harvest, M.U. 7-32, 7-34 and 7-35 combined, 1975-1990.¹

Year	Season length (days)		Moose harvest	Remarks
	Bulls ²	A/L		
1975	94	23		Bull season Aug. 15-Nov. 16
76	93	23	842	
77	93	-	661	No antlerless season
78 ³	84	-	585	Bull season 70 days in 7-32
79	84	9	633	" " 73 " " "
80	79	9	961	" " 68 " " "
81	79	16	1049	" " 65 " " "
82	64	9	1117	Season end Oct. 31
83	70	-	407	No antlerless season
84	68	-	549	" " "
85	67	-	667	" " "
86	65	-	823	" " "
87	65	-	739	" " "
88	63	5(LEH)	861	195 antlerless permits
89	63	5(LEH)	976	" " "
90	54	5(LEH)	?	" " "

¹ Information from MOE Hunting Regulations and Limited Entry Hunting Synopses.

² Bull seasons open August 15 in all years, and close between Nov. 16 (1975) and Oct. 31 (1988-90).

³ Stewart Lake special weapons season begins (either sex). Split seasons for bull moose begin.

Table 21. - Estimated Elk harvests in 10 M.U.'s surrounding the Site C Project.¹

Yr.	7-31	7-32	7-33	7-34	7-35	7-36	7-43	7-44	7-45	7-46	Total
'76											0
'77							2				2
'78								1	2		3
'79											0
'80			1								1
'81									2		2
'82		2									2
'83											0
'84											0
'85							2				2
'86		4									4
'87		4					1				5
'88		3			1		5				9
'89	2	8	3	9	15	7	16	1		1	62
T ²	2	21	4	9	16	7	26	2	4	1	92
M ³	0.1	1.5	0.3	0.6	1.1	0.5	1.9	0.1	0.3	0.1	6.6
R ⁴	0-2	0-8	0-3	0-9	0-15	0-7	0-16	0-1	0-2	0-1	0-62
%	2	23	4	10	17	8	28	2	4	1	99%

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² T = Total

³ M = Mean

⁴ R = Range

Table 22. - Hunter effort and success for Elk in 10 M.U.'s surrounding the Site C Project.¹

Year	Harvest	No. of hunters	No. of hunter-days	Animals per hunter	Hunter-days per animal
1976	0	19	100	0.00	-
77	2	33	143	0.06	72
78	3	14	144	0.21	48
79	0	12	32	0.00	-
80	1	13	88	0.08	88
81	2	28	143	0.07	72
82	2	22	170	0.09	85
83	0	22	143	0.00	-
84	0	28	193	0.00	-
85	2	54	229	0.04	115
86	4	32	209	0.13	52
87	5	73	348	0.07	70
88	9	70	388	0.13	43
89	62	512	2,966	0.12	48
Total	92	932	5,296		
Mean	6.6	67	378	0.10	58
Range	0-62	12-512	32-2,966	0.00-0.21	43-115

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

Table 23. - Elk hunting seasons in relation to total harvest, M.U. 7-32, 7-34 and 7-35 combined, 1975-1990.¹

Year	M.U.	Season length days ²		Elk kill	Remarks
		Bull	A/L		
75-84	all	-	-	2	No elk seasons
85	7-32	14	14(C) ³	0	Pine/Moberly LEH (21 permits)
86	"	14	14(C)	4	Pine/Moberly LEH (21 permits)
87	"	14	14(C)	4	Pine/Moberly LEH (40 permits)
88	"	14	14(C)	4	Pine/Moberly LEH (40 permits)
89	"	11		32	Pine/Mob. LEH, 3 point (35 permits)
	"	51			Pine/Mob. LEH, 6 pt.+ (35 permits)
	"		31(C)		Pine/Mob. LEH, Calf (10 permits)
	7-34/35	10			Bulls with branched antler
	"	51			6-point bulls
90	7-32		31(C)		Pine/Mob. LEH, Calf (10 permits)
	all	10			Bulls with branched antler
	"	51			6-point bulls

¹ Information from MOE Hunting Regulations and Limited Entry Hunting Synopses.

² All seasons fall between Sep. 1 and Oct. 31.

³ (C) = Calf

Table 24. - Estimated Black Bear harvests in 10 M.U.'s surrounding the Site C Project.¹

Yr.	7-31	7-32	7-33	7-34	7-35	7-36	7-43	7-44	7-45	7-46	Total
'76	20	40	44	50	38	4	16	36	12	17	277
'77	6	39	107	35	28	18	12	33	25	12	315
'78	16	58	44	24	7	3	20	6	9	0	187
'79	17	17	34	28	17	14	4	16	13	7	167
'80	33	58	109	27	37	7	18	38	33	14	374
'81	31	36	32	18	36	11	11	30	48	0	253
'82	22	85	66	23	16	8	20	4	23	12	279
'83	31	49	50	30	48	20	18	33	25	13	317
'84	14	66	63	24	41	26	32	4	29	4	303
'85	19	72	20	12	28	6	11	26	28	0	222
'86	7	38	51	12	44	31	37	12	0	0	232
'87	7	45	67	12	51	17	62	56	21	7	344
'88	18	47	81	15	39	5	42	23	0	30	300
'89	33	82	57	27	37	10	42	29	14	13	344
T ²	273	732	825	337	467	180	345	346	280	129	3,914
M ³	20	52	59	24	33	13	25	25	20	9	280
R ⁴	7-33	17- 85	20- 109	12- 50	7-51	3-26	4-62	4-56	0-48	0-30	167- 374
%	7	19	21	9	12	5	9	9	7	3	101%

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² T = Total

³ M = Mean

⁴ R = Range

Table 25. - Hunter effort and success for Black Bear in 10 M.U.'s surrounding the Site C Project.¹

Year	Harvest	No. of hunters	No. of hunter-days	Animals per hunter	Hunter-days per animal
1976	277	646	3,811	0.43	13.7
77	315	837	4,241	0.38	13.5
78	187	593	3,084	0.32	16.5
79	167	459	2,268	0.36	13.6
80	374	794	3,255	0.47	8.7
81	253	873	4,884	0.29	19.3
82	279	792	3,994	0.35	14.3
83	317	918	4,825	0.35	15.2
84	303	789	4,244	0.38	14.0
85	222	698	4,050	0.32	18.2
86	232	725	4,501	0.32	19.4
87	344	649	5,089	0.53	14.8
88	300	815	4,955	0.37	16.5
89	344	901	5,510	0.38	16.0
Total	3,914	10,489	55,711		
Mean	280	749	4,914	0.37	15.0
Range	167-374	459-918	2268-5510	0.29-0.53	8.7-19.4

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

Table 26 - Black bear hunting seasons in M.U. 7-32, 7-34, and 7-35, 1975-1990.¹

Year	M.U.	Season length (days)		Bag limit	Remarks
		Fall	Spring		
1975/76	7-32/34	56	62	2	
	7-35	56	62	1	
76/77	as above				
77/78	as above				
78/79	7-32	72	62	2	
	7-34	56	62	2	
	7-35	72	62	1	
79/80	7-32/35	56	62	1	
	7-34	56	62	2	
80/81	7-34/35	56	62	3	
	7-32	56	62	1	
1981	all	134		1	
1982	"	215 ²		2	Season April 15-Nov. 15
1983	"	"		2	Season April 15-Nov. 15
1984	"	"		5	Season April 15-Nov. 15
1985	"	"		5	Season April 15-Nov. 15
1986	"	"		5	Season April 15-Nov. 15
1987	"	"		5	Season April 15-Nov. 15
1988	all	215		5	Season April 15-Nov. 15
1989	"	"		5	Adults without cubs only.
1990	"	"		2	Adults without cubs only.

1. Information from MOE Hunting Regulations and Limited Entry Hunting Synopses.
 2. Separate spring and fall seasons discontinued in 1982. Season open continually from spring opening to fall closing.
-

Table 27. - Estimated wolf harvests in 10 M.U.'s surrounding the Site C Project.^{1 2}

Yr.	7-31	7-32	7-33	7-34	7-35	7-36	7-43	7-44	7-45	7-46	Total
'76			14		27			7			48
'77	20				20						40
'78		8							8	21	37
'79			9			9	9		9		36
'80	9		16						38		63
'81	10					1		8			19
'82	1						2	12	7		22
'83	31	12	30		60	6	18	6		7	170
'84	31	5	5		10	1	5		15	5	77
'85	2		20			14			7	7	50
'86		20	6	36							62
'87			10					5			15
'88			12				2		15	1	30
'89		14	12			1	12	12		3	54
T ³	104	59	134	36	117	32	48	50	99	44	723
M ⁴	7	4	10	3	8	2	3	4	7	3	52
R ⁵	0-31	0-20	0-30	0-36	0-60	0-14	0-18	0-12	0-38	0-21	15- 170

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² Wolf data should be interpreted with extreme caution. Estimates of harvest are derived from reports on the Hunter Sample that are then expanded to the population of hunters purchasing B.C. Resident Hunting Licenses.

³ T = Total

⁴ M = Mean

⁵ R = Range

Table 28. - Hunter effort and success for Wolf in 10 M.U.'s surrounding the Site C Project.^{1,2}

Year	Harvest	No. of hunters	No. of hunter-days	Animals per hunter	Hunter-days per animal
1976	48	128	1,095	0.38	23
77	40	47	553	0.85	14
78	37	225	2,686	0.16	73
79	36	251	1,801	0.14	50
80	63	191	1,670	0.33	27
81	19	106	632	0.18	33
82	22	127	781	0.17	36
83	170	333	3,983	0.51	23
84	77	252	2,480	0.31	32
85	50	104	2,580	0.48	52
86	62	261	1,987	0.24	32
87	15	266	2,450	0.06	163
88	30	175	12,774	0.17	426
89	54	373	8,498	0.14	157
Total	723	2,839	43,970		
Mean	52	203	3,141	0.25	61
Range	15-170	47-373	553-12,774	0.06-0.85	14-426

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² Wolf data should be interpreted with extreme caution. Estimates of harvest, number of hunters, and hunter-days are derived from reports on the Hunter Sample that are then expanded to the population of hunters purchasing B.C. Resident Hunting Licenses.

Table 29. - Estimated Ruffed Grouse harvests and hunter success in M.U.'s 7-32, 7-34, and 7-35, 1976-1989.¹

Year	Estimated harvest			Total	Birds per hunter
	7-32	7-34	7-35		
1976	2818	1925	1649	6,392	7.5
77	3689	1194	1658	6,541	12.0
78	4494	2048	1412	7,954	8.1
79	3196	1910	718	5,824	8.6
80	3689	1635	892	6,216	6.8
81	1216	446	229	1,891	3.8
82	1116	81	180	1,377	3.1
83	155	38	65	258	1.7
84	139	53	34	226	1.8
85	900	192	95	1,187	6.2
86	2737	1304	1037	5,078	7.9
87	4625	3190	2712	10,527	11.6
88	2776	1256	1007	5,039	8.5
89	5061	3866	4029	12,956	12.3
Total	36,611	19,138	15,717	71,466	
% of Total	51	27	22	100	
Mean	2,615	1,367	1,123	5,105	8.3
Range	139-5061	38-3866	34-4029	226-12,956	1.7-12.3

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistics Data Base, Hunter Harvest and Effort.

Table 30. - Estimated duck harvests and hunter success in M.U.'s 7-32, 7-34 and 7-35, 1976-1989.¹

Year	Estimated harvest			Total	Birds per hunter
	7-32	7-34	7-35		
1976	487	247	27	761	4.9
77	867	247	164	1,278	10.2
78	667	328	-	995	7.1
79	404	103	130	637	6.4
80	300	104	297	701	6.9
81	483	348	23	854	6.5
82	672	287	54	1,013	5.9
83	216	138	11	365	4.6
84	628	24	-	652	9.3
85	258	102	55	415	5.1
86	954	148	-	1,102	12.2
87	263	142	68	473	5.0
88	601	203	-	804	10.3
89	443	761	182	1,386	9.5
Total	7,243	3,182	1,011	11,436	
% of Total	63	28	9	100	
Mean	517	227	72	816	7.3
Range	216-954	24-761	0-297	365-1386	4.6-12.2

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistics Data Base, Hunter Harvest and Effort.

Table 31 - Estimated goose harvests and hunter success in M.U.'s 7-32, 7-34, and 7-35, 1976-1989.¹

Year	Estimated harvest			Total	Birds per hunter
	7-32	7-34	7-35		
1976	27	-	-	27	0.3
77	12	176	10	198	2.9
78	248	16	-	264	2.3
79	-	9	-	9	0.2
80	80	-	7	87	1.2
81	-	131	-	131	2.1
82	279	34	-	313	2.6
83	131	13	-	144	3.4
84	86	43	-	129	2.7
85	61	14	14	89	1.3
86	62	56	-	118	2.7
87	149	-	11	160	2.4
88	229	84	-	313	4.4
89	159	-	13	172	1.8
Total	1,523	576	55	2,154	
% of Total	71	27	3	101	
Mean	109	41	4	154	2.1
Range	0-279	0-176	0-14	9-313	0.2-4.4

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistics Data Base, Hunter Harvest and Effort. The majority of geese harvested are expected to be Canada Geese.

Table 32. - Total number of selected big game animals harvested by guided hunters in 10 M.U.'s surrounding the Site C Project, 1976-1989.¹

M.U.	Number of animals harvested ²						% of Total
	Deer	Moose	Elk	Bl. bear	Wolf	Total	
7-31	1	30	0	44	6	81	5
7-32	1	21	1	35	0	58	4
7-33	0	0	0	2	0	2	tr.
7-34	0	2	0	0	0	2	tr.
7-35	0	76	1	40	0	117	7
7-36	0	118	0	50	3	171	10
7-43	12	972	10	144	4	1,142	70
7-44	2	0	0	1	0	3	tr.
7-45	1	21	0	3	0	25	2
7-46	1	21	0	15	4	41	2
Total	18	1,261	12	334	17	1,642	100%
% of total	1	77	1	20	1	100%	

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort. Elk data from Compulsory Inspection (CI) records for non-resident hunters; other species are from Guide-Outfitter returns and could include a small number of B.C. residents.

² Species such as Caribou, Stone Sheep, Mountain Goat and Grizzly Bear are taken in some of the listed M.U.'s but do not occur near Site C and therefore are not included in the tabulation.

Table 33. - Mean and maximum harvests of selected big game species per unit area in 10 M.U.'s surrounding the Site C Project.^{1 2}

Animals harvested per 100 km sq.								
M.U.	Deer		Moose		Elk		Black bear	
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.
7-31	0.2	0.5	1.6	2.6	tr.	tr.	0.4	0.6
7-32	1.8	5.1	10.2	18.1	tr.	0.2	1.4	2.3
7-33	3.5	9.6	3.9	6.1	tr.	tr.	0.9	1.7
7-34	7.8	19.5	10.0	15.7	tr.	0.6	1.7	3.5
7-35	2.3	4.8	10.6	15.8	tr.	0.6	1.4	2.2
7-36	0.1	0.4	1.0	1.8	tr.	0.2	0.4	0.8
7-43	0.2	0.7	4.4	9.3	tr.	0.3	0.4	1.1
7-44	0.9	2.8	10.6	20.1	tr.	tr.	0.8	1.9
7-45	0.4	1.2	4.2	6.1	tr.	tr.	0.3	0.8
7-46	0.3	1.1	1.0	1.7	tr.	tr.	0.2	0.5

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistics Data Base, Hunter Harvest and Effort.

² wolf data not included because of questionable accuracy.

Table 34. - Summary of big game harvest statistics for M.U. 7-32, 1976-1989.¹

Statistic	Species harvested ²				Total
	Deer ³	Moose	Elk	Bl. bear	
Harvest/yr.					
Mean	66	382	1.5	52	502
Range	0-193	172-681	0-8	17-85	
Harvest/100 km sq.					
Mean	1.8	10.2	tr.	1.4	13.4
Range	0.0-5.1	4.6-18.1	0.0-0.2	0.5-2.3	
No. hunters/yr.					
Mean	427	1126	17	139	
Range	220-691	784-1758	0-51	60-197	
Animals/hunter					
Mean	0.15	0.34	0.09	0.38	
Range	0.0-0.28	0.16-0.43	0.0-0.29	0.21-0.57	
Hunter-days/yr.					
Mean	2015	6662	86	711	9474
Range	957-3449	4516-9584	0-254	303-1104	
Hunter-days/animal					
Mean	30	17	57	14	
Range ⁴	18-79	13-41	20-62	8-26	
Hunter-days/100 km sq					
Mean	54	177	2	19	252
Range	25-92	120-255	0-7	8-29	

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² wolf data not included because of questionable accuracy.

³ includes both mule and white-tailed deer.

⁴ for years in which at least 1 animal was harvested.

Table 35. - Summary of big game harvest statistics for M.U. 7-34, 1976-1989.¹

Statistic	Species harvested ²				Total
	Dear ³	Moose	Elk	Bl. bear	
Harvest/yr.					
Mean	112	145	0.6	24	282
Range	14-282	.77-227	0-9	12-50	
Harvest/100 km sq.					
Mean	7.8	10.0	tr.	1.7	19.5
Range	1.0-19.5	5.3-15.7	0.0-0.6	0.8-3.5	
No. hunters/yr.					
Mean	384	430	5	65	
Range	136-600	264-675	0-54	41-96	
Animals/hunter					
Mean	0.29	0.34	0.12	0.37	
Range	0.07-0.50	0.22-0.43	0.0-0.17	0.24-0.52	
Hunter-days					
Mean	1761	2216	44	324	4345
Range	630-4205	1417-3659	2-515	133-754	
Hunter-days/animal					
Mean	16	15	68	13	
Range ⁴	7-101	11-29	-	8-29	
Hunter-days/100 km sq.					
Mean	122	153	3	22	300
Range	44-291	98-253	tr.-36	9-52	

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² wolf data not included because of questionable accuracy.

³ includes both mule and white-tailed deer.

⁴ for years in which at least 1 animal was harvested.

Table 36. - Summary of big game harvest statistics for M.U. 7-35, 1976-1989.¹

Statistic	Species harvested ²				Total
	Deer ³	Moose	Elk	Bl. bear	
Harvest/yr.					
Mean	55	250	1	33	339
Range	8-114	158-372	0-15	7-51	
Harvest/100 km sq.					
Mean	2.3	10.6	tr.	1.4	14.3
Range	0.3-4.8	6.7-15.8	0.0-0.6	0.3-2.2	
No. hunters/yr.					
Mean	250	574	11	83	
Range	131-412	416-739	1-136	52-121	
Animals/hunter					
Mean	0.22	0.44	0.11	0.40	
Range	0.04-0.35	0.29-0.55	0.0-1.0	0.13-0.70	
Hunter-days					
Mean	1217	3736	60	515	5528
Range	642-2012	2897-4873	4-740	170-866	
Hunter-days/animal					
Mean	22	15	53	15	
Range ⁴	17-119	11-23	8-49	4-36	
Hunter-days/100 km sq					
Mean	52	159	3	22	236
Range	27-86	123-207	tr.-31	7-37	

¹ Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

² wolf data not included because of questionable accuracy.

³ includes both mule and white-tailed deer

⁴ for years in which at least 1 animal was harvested.

Table 37. - Summary of harvest statistics for selected gamebirds in M.U.'s 7-32, 7-34, and 7-35, 1976-1989.¹

M.U. Statistic ²	Species			Total
	R. grouse	Ducks	Geese	
<u>7-32</u>				
Kill/yr. - M	2,615	517	109	3,241
- R	139-5061	216-954	0-279	
Kill/100 km sq. - M	70	14	3	87
- R	4-135	6-25	0-7	
Hunters/yr. - M	318	66	46	430
- R	81-560	33-109	24-93	
Birds/hunter - M	8.2	7.9	2.4	
- R	1.6-15.1	3.9-14.3	0-4.2	
<u>7-34</u>				
Kill/yr. - M	1,367	227	41	1,635
- R	38-3866	24-761	0-176	
Kill/100 km sq. - M	95	16	3	114
- R	3-268	2-53	0-12	
Hunters/yr. - M	163	31	18	212
- R	16-356	10-54	6-35	
Birds/hunter - M	8.4	7.4	2.3	
- R	0.9-12.0	2.4-15.5	0-5.0	
<u>7-35</u>				
Kill/yr. - M	1,123	72	4	1,199
- R	34-4029	0-297	0-14	
Kill/100 km sq. - M	48	3	0.2	51
- R	1-171	0-13	0-0.6	
Hunters/yr. - M	132	15	10	157
- R	22-280	11-36	5-25	
Birds/hunter - M	8.5	4.8	0.4	
- R	1.6-14.4	1.0-9.0	0-2.0	

1. Data from MOE, Wildlife Branch, Victoria: Summary Statistical Data Base, Hunter Harvest and Effort.

2. M = Mean; R = Range

Table 38. - Trapline activity in M.U.'s 7-32, 7-34 and 7-35 combined, 1985/86 through 1989/90¹

No. of years active out of 5	Private property traplines		Registered traplines	
	No. active	% active	No. active	% active
5	0	0%	5	22%
4	4	8%	7	30%
3	9	17%	7	30%
2	14	27%	3	13%
1	25	48%	1	4%
TOTAL	52	100%	23	99%

¹ Derived from MOE Wild Fur Harvest Summary Report.

Table 39. - Proportion of the fur catch taken on Crown vs. private land, 1985/86 through 1989/90.¹

Species	% of total fur catch in each Management Unit ²							
	M.U. 7-32		M.U. 7-34		M.U. 7-35		Total	
	Pri	Crown	Pri	Crown	Pri	Crown	Pri	Crown
Black bear	72%	18%	0%	100%	8%	92%	52%	48%
Beaver	18	72	30	70	16	84	21	79
Coyote	45	55	31	69	53	47	43	57
Fisher	25	75	30	70	27	73	26	74
Fox	44	56	100	0	11	89	61	39
Lynx	20	80	13	87	0	100	14	86
Marten	33	67	31	69	20	80	26	74
Mink	22	78	28	72	36	64	26	74
Muskrat	21	79	33	67	14	86	25	75
Otter	0	100	0	100	86	14	46	54
Squirrel	10	90	24	76	49	51	24	76
Weasel	24	76	66	34	41	59	38	62
Wolf	100	0	33	77	100	0	71	29
Wolverine	0	0	0	100	0	100	0	100
TOTAL	20%	80%	32%	68%	34%	66%	26%	74%

¹ assumes that Registered Trapline holders trap only on Crown land and that those with private property trapping permits trap only on private lands.

² data from MOE Wild Fur Harvest Summary Report, 1983/84 through 1989/90.

Table 40. - Species composition of the trapline catch in M.U.'s 7-32, 7-34, and 7-35, 1985/86 through 1989/90.¹

Species	M.U. 7-32		M.U. 7-34		M.U. 7-35		Total	
	Catch	%	Catch	%	Catch	%	Catch	%
<u>Aquatic/Riparian</u>								
Beaver	1,311	29.3	446	26.4	276	11.2	2,033	23.6
Muskrat	481	10.7	258	15.3	7	0.3	746	8.6
Mink	61	1.4	25	1.5	22	0.9	108	1.3
Otter	4	0.1	2	0.1	7	0.3	13	0.1
Sub-total	1,857	41.5	731	43.3	312	12.7	2,900	33.6
<u>Terrestrial</u>								
Bl. bear	58	1.3	2	0.1	12	0.5	72	0.8
Lynx	10	0.2	8	0.5	3	0.1	21	0.2
Coyote	125	2.8	173	10.2	162	6.6	460	5.3
Wolf	4	0.1	3	0.2	2	0.1	9	0.1
Fox	10	0.2	15	0.9	9	0.4	34	0.4
Fisher	54	1.2	10	0.6	22	0.9	86	1.0
Marten	569	12.7	177	10.5	876	35.6	1,622	18.8
Weasel	292	6.5	128	7.6	235	9.5	655	7.6
Wolverine	0	0.0	2	0.1	1	0.0	3	0.0
Squirrel	1,493	33.4	438	26.0	828	33.6	2,759	32.0
Sub-total	2,615	58.5	956	56.7	2,150	87.3	5,721	66.4
TOTAL	4,472	100	1,697	100	2,462	100	8,621	100

¹ Data provided by Ministry of Environment, Fort St. John, B.C. Includes the catches of both private property and registered trapline holders.

Table 41. - Means and ranges in the number of pelts taken each year in M.U.'s 7-32, 7-34, and 7-35, 1983/84 through 1989/90.¹

Species	7-32		7-34		7-35		Total	
	M. ²	R. ³	M.	R.	M.	R.	M.	R.
B. bear	9	0-24	<1	0-1	2	0-4	11	1-2
Beaver	219	83- 569	73	26- 148	41	4-102	333	127- 794
Coyote	26	6-41	35	2-72	28	0-90	89	13-183
Fisher	15	6-32	2	0-4	4	1-9	21	12-37
Fox	1	0-5	2	0-7	2	0-7	5	1-15
Lynx	5	0-19		0-6	5	0-27	11	1-46
Marten	110	63- 169	29	12- 48	163	107- 346	302	231- 519
Mink	13	1-25	4	0-21	3	1-7	20	3-45
Muskrat	70	0- 148	37	0- 143	1	0-5	108	3-253
Otter	1	0-3	<1	0-1	1	0-5	2	0-6
Squirr.	359	63- 852	75	28- 221	200	69- 322	634	263- 1,278
Weasel	54	24- 107	25	9-43	45	25-77	124	65-208
Wolf	1	0-2	1	0-2	<1	0-1	2	0-4
Wolv.	<1	0-1	<1	0-1	<1	0-1	1	0-1
TOTAL	883		285		495		1663	

1. Derived from MOE records, Fort St. John. Includes holders of both registered and private property traplines.
2. M = Mean
3. R = Range

Table 42. - The number of pelts taken each year in M.U.'s 7-32, 7-34, and 7-35 combined, 1983/84 through 1989/90.¹

Species	Number of pelts recorded each season							TOTAL
	1983 /84	1984 /85	1985 /86	1986 /87	1987 /88	1988 /89	1989 /90	
B. bear	1	3	16	3	9	20	24	76
Beaver	127	181	291	794	518	207	214	2332
Coyote	35	133	79	183	134	49	13	626
Fisher	37	22	21	24	15	13	12	144
Fox	4	4	4	15	6	7	1	41
Lynx	46	6	9	1	1	9	1	73
Marten	231	245	238	368	249	519	263	2113
Mink	29	8	3	28	45	11	20	144
Muskrat	17	3	67	253	237	81	103	761
Otter	0	3	5	2	6	0	0	16
Squirr.	840	842	330	263	591	1278	297	4441
Weasel	114	99	80	127	208	169	65	862
Wolf	2	4	1	3	2	1	0	13
Wolv.	0	1	1	1	0	1	0	4
TOTAL	1483	1554	1145	2065	2021	2365	1013	11,646

¹ From MOE records, Fort St. John. Includes holders of both registered and private property traplines.

Table 43. - The number of pelts taken each year in M.U. 7-32, 1983/84 through 1989/90.¹

Species	Number of pelts recorded each season							TOTAL
	1983 /84	1984 /85	1985 /86	1986 /87	1987 /88	1988 /89	1989 /90	
B. bear	0	3	11	1	4	18	24	61
Beaver	94	137	244	569	272	83	134	1,533
Coyote	26	34	41	39	29	8	6	183
Fisher	32	29	13	12	10	12	6	105
Fox	0	1	3	5	1	0	0	10
Lynx	19	4	6	1	0	3	0	33
Marten	63	124	118	169	90	125	82	771
Mink	25	5	1	23	20	4	12	90
Muskrat	16	0	48	110	148	72	98	492
Otter	0	3	0	1	3	0	0	7
Squirr.	480	542	213	103	262	852	63	2,515
Weasel	52	38	24	60	107	66	29	376
Wolf	2	1	0	0	1	1	0	5
Wolv.	0	1	0	0	0	0	0	1
TOTAL	809	913	722	1093	947	1244	454	6,182

¹ From MOE records, Fort St. John. Includes holders of both registered and private property traplines.

Table 44. - The number of pelts taken each year in M.U. 7-34, 1983/84 through 1989/90.¹

Species	Number of pelts recorded each season							Total
	1983 /84	1984 /85	1985 /86	1986 /87	1987 /88	1988 /89	1989 /90	
B. bear	0	0	1	0	1	0	0	2
Beaver	26	40	34	148	144	89	31	512
Coyote	2	70	10	54	72	30	7	245
Fisher	2	1	4	3	0	0	3	13
Fox	0	1	0	3	4	7	1	16
Lynx	0	0	0	0	1	6	1	8
Marten	12	12	13	31	22	48	63	201
Mink	3	2	1	2	21	0	1	30
Muskrat	1	2	19	143	87	9	0	261
Otter	0	0	0	1	1	0	0	2
Squirrel	38	51	48	28	80	221	61	527
Weasel	9	35	14	34	43	26	11	172
Wolf	0	2	0	2	1	0	0	5
Wolv.	0	0	0	1	0	1	0	2
TOTAL	93	216	144	450	477	437	179	1,996

¹ From MOE records, Fort St. John. Includes holders of both registered and private property traplines.

Table 45. - The number of pelts taken each year in M.U. 7-35, 1983/84 through 1989/90.¹

Species	Number of pelts recorded each season							Total
	1983 /84	1984 /85	1985 /86	1986 /87	1987 /88	1988 /89	1989 /90	
B. bear	1	0	4	2	4	2	0	13
Beaver	7	4	13	77	102	35	49	287
Coyote	7	29	28	90	33	11	0	198
Fisher	3	1	4	9	5	1	3	26
Fox	4	2	1	7	1	0	0	15
Lynx	27	2	3	0	0	0	0	32
Marten	156	109	107	168	137	346	118	1,141
Mink	1	1	1	3	4	7	7	24
Muskrat	0	1	0	0	2	0	5	8
Otter	0	0	5	0	2	0	0	7
Squirr.	322	249	69	132	249	205	173	1,399
Weasel	53	26	42	33	58	77	25	314
Wolf	0	1	1	1	0	0	0	3
Wolv.	0	0	1	0	0	0	0	1
TOTAL	581	425	279	522	597	684	380	3,468

¹ From MOE records, Fort St. John. Includes holders of both registered and private property traplines.

Table 46. - Lynx harvests in M.U.'s 7-32, 7-34, and 7-35 1960 to 1990.¹

Year	No. of active traplines	No. of traplines taking lynx	Total lynx trapped	Lynx per active trapline	Lynx per line taking lynx
1960/61*	4	2	5	1	3
61/62	2	1	25	13	25
62/63**	9	6	<u>168</u>	19	28
63/64	8	5	60	8	12
64/65	10	8	43	4	5
65/66	10	5	23	2	5
66/67	8	1	3	<1	3
67/68	9	2	10	1	5
68/69	7	1	3	<1	3
69/70	10	2	7	1	4
70/71*	6	2	13	3	4
71/72	5	3	64	13	21
72/73**	9	7	<u>111</u>	12	16
73/74	11	9	96	9	11
74/75	13	8	39	3	5
75/76	13	5	8	1	2
76/77	12	3	9	1	3
77/78	13	4	5	<1	1
78/79	12	0	0	0	0
79/80	12	3	5	<1	2
80/81*	9	3	13	1	4
81/82	14	8	65	5	8
82/83**	11	8	<u>125</u>	11	16
83/84	20	10	46	2	5
84/85	30	6	6	<1	1
85/86	32	3	9	<1	3
86/87	40	1	1	<1	1
87/88	39	1	1	<1	1

88/89	36	4	9	<1	4
89/90	28	1	1	<1	1

* predicted years of snowshoe hare peaks

** lynx population peaks

1. From catch returns provided by MOE, Fort St. John. Data for 1960/61 through 1982/83 are for Registered Traplines only. Both Registered and Private Property trappers are included in the 1983/84 through 89/90 data.

Table 47. - The recorded total catch of fisher, coyote, marten, fox, and mink in M.U.'s 7-32, 7-34, and 7-35 combined.¹

Year	Fisher	Coyote	Marten	Fox	Mink
1960/61*	0	3	9		3
61/62	0	0	3		4
62/63**	9	7	32	1	42
63/64	7	43	0		1
64/65	6	17	0		3
65/66	11	22	2		0
66/67	1	6	8		8
67/68	7	5	9	1	0
68/69	6	4	25		1
69/70	9	12	66	1	8
70/71*	2	18	20		0
71/72	0	7	17		3
72/73**	20	89	157		3
73/74	32	74	123	1	4
74/75	23	77	80	1	2
75/76	27	55	200		6
76/77	8	58	179		8
77/78	14	53	93		15
78/79	12	38	263		13
79/80	22	71	362	1	26
80/81*	18	25	323		19
81/82	13	12	200	2	21
82/83**	19	102	218	5	31
83/84	37	35	231	4	29
84/85	22	133	245	4	8
85/86	21	79	238	4	3
86/87	24	183	368	15	28
87/88	15	134	249	6	45
88/89	13	49	519	7	11
89/90	12	13	263	1	20

* years of presumed snowshoe hare peaks
** years of lynx peaks

1. Data from MOE, Fort St. John. Very few traplines active in earlier years, especially 1960/61 and 61/62. Includes only Registered Traplines from 60/61 through 82/83, and both Registered and Private Property traplines after that.

Table 48. - The fur catch per unit area in M.U.'s 7-32, 7-34, and 7-35, 1983/84 - 1989/90.¹

Species	Catch per 100 km sq.							
	M.U. 7-32		M.U. 7-34		M.U. 7-35		Total	
	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.
B. bear	0.2	0.6	tr.	0.1	0.1	0.2	0.1	0.3
Beaver	5.8	15.1	5.1	10.2	1.7	4.3	4.4	10.5
Coyote	0.7	1.1	2.4	5.0	1.2	3.8	1.2	2.4
Fisher	0.4	0.9	0.1	0.3	0.2	0.4	0.3	0.5
Fox	tr.	0.1	0.1	0.5	0.1	0.3	0.1	0.2
Lynx	0.1	0.5	0.1	0.4	0.2	1.1	0.1	0.6
Marten	2.9	4.5	2.0	3.3	6.9	14.7	4.0	6.9
Mink	0.3	0.7	0.3	1.5	0.1	0.3	0.3	0.6
Muskrat	1.9	3.9	2.6	9.9	tr.	0.2	1.4	3.3
Otter	tr.	0.1	tr.	0.1	tr.	0.2	tr.	0.1
Squirr.	9.6	22.7	5.2	15.3	8.5	13.7	8.4	16.9
Weasel	1.4	2.8	1.7	3.0	1.9	3.3	1.6	2.8
Wolf	tr.	tr.	0.1	0.1	tr.	tr.	tr.	0.1
Wolv.	tr.	tr.	tr.	0.1	tr.	tr.	tr.	tr.
TOTAL	23.5		19.7		21.0		22.0	

¹ Based on catch statistics provided by MOE, Fort St. John. Size of M.U.'s as follows: 7-32 = 375, 883 ha; 7-34 = 144, 464 ha; 7-35 = 235, 238 ha. Includes data for both Registered and Private Property traplines.

Table 49. - Available catch information for registered traplines in the Site C area.

Trapline	DAB Reports ¹		MOE Summary Reports ²	MOE Historical harvest ³
	Trapline No.	Years	1983/84-89/90 (7 years)	summary sheets
<u>RESERVOIR AREA</u>				
M.U. 34				
T001	1	73/74-75/76	(3) 87/88-89/90	(28) 50/51-82/83
T002	2	"	(3) 86/87-88/89	(25) 50/51-81/82
T003	3	"	(3) 84/85;88/89;89/90	(16) 62/63-82/83
M.U. 35				
T005	4	"	(6) all except 87/88	(30) 49/50-82/83
T004	5	"	(4) 83/84;85/86-88/89	(26) 50/51-82/83
T002	6	"	(5) 84/85;86/87-89/90	(18) 63/64-81/82
M.U. 32				
T003	7	"	(6) 83/84-88/89	(9) 74/75-82/83
T004	8	"	(5) 83/84-86/87;89/90	(14) 57/58-82/83
T005*	9	no data	no data	(4) 44/45-57/58
<u>TRANS. LINE</u>				
M.U. 32				
T006*	10	no data	no data	no data
T002*	11	no data	no data	(5) 51/52-81/82
T001	12	73/74-76/77	(7) all years	(16) 58/59-82/83

¹ Blood, D.A. 1979. Peace River Site C hydroelectric development environmental and socioeconomic assessment. Wildlife Sub-Report. Report to B.C. Hydro and Power Authority. (Appendix 4).

² Wild Fur Harvest Summary Reports (WFHSR) provided by Mr. R. Woods, MOE, Fort St. John. Numbers in parentheses indicate total years data available.

³ Historical Harvest Summary Coding Sheets (HHSCS) provided by Mr. R. Woods, MOE, Fort St. John. Numbers in parentheses indicate total years data available. Range of years is from earliest to latest available in this data source and may include years with no catch information.

* Blood, D.A. 1977. Site One-Site C-Fort St. John Transmission Line, Wildlife impact report. Prepared for Thurber Consultants Ltd. 1977. (Table 4, p.17)

Table 50. - Individual trapline harvest summary

TRAPLINE 34T001

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSC:	1950/51-82/83 (33 yr)	28	85
WFHSR:	1987/88-89/90 (3 yr)	<u>3</u>	<u>100</u>
Combined:	1950/51-89/90 (40)	31	78

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				31 yrs.	years species trapped
<u>1. Aquatic/riparian</u>					
Beaver	350	14 (45%)	5-58	10	25
Muskrat	471	12 (39%)	4-210	16	38
Otter	0	0	0	0	0
Mink	60	9 (29%)	1-28	2	7
<u>2. Terrestrial</u>					
Lynx	85	10 (32%)	1-43	3	9
Coyote	94	16 (52%)	1-18	3	6
Wolf	0	0	0	0	0
Fox	11	4 (13%)	1-6	<1	3
Marten	69	10 (32%)	1-12	2	7
Fisher	13	8 (26%)	1-3	<1	2
Wolverine	11?	1 (3%)	11%	?	?
Weasel	511	15 (48%)	1-106	16	34
Squirrel	2,810	13 (42%)	2-500	91	216

Notes

1. Low-value species were mostly taken in earlier years, i.e. squirrel (97% taken in 1950's) and weasel (89% taken prior to 1962).
2. Older data (1950's) largely rounded off to 10's or 100's, suggesting they are estimates.
3. Wolverine data are suspect.

Table 51. - Individual trapline harvest summary.

TRAPLINE 34T002

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1950/51-81/82 (32)	25	78
WFHSR:	1986/87-88/89 (3)	<u>3</u>	<u>100</u>
Combined:	1950/51-88/89 (39)	28	72

<u>Species</u>	<u>Total catch</u>	<u>No. years taken</u>	<u>Min. and max. no. taken/yr.</u>	<u>Mean no. taken/yr.</u>	
				<u>28 yrs.</u>	<u>years species taken</u>
<u>1. Aquatic/riparian</u>					
Beaver	312	26 (93%)	3-43	11	12
Muskrat	4	2 (7%)	2	<1	2
Otter	1	1 (4%)	1	<1	1
Mink	1	1 (4%)	1	<1	1
<u>2. Terrestrial</u>					
Black bear	2	2 (7%)	1	<1	1
Lynx	11	4 (14%)	1-5	<1	3
Coyote	28	9 (32%)	1-6	1	3
Wolf	10	6 (21%)	1-3	<1	2
Fox	0	0	0	0	0
Marten	36	5 (18%)	1-30	1	7
Fisher	7	5 (18%)	1-3	<1	1
Wolverine	2	2 (7%)	1	<1	1
Weasel	102	10 (36%)	1-30	4	10
Squirrel	1,883	14 (50%)	12-400	67	135

Notes

1. Most of the marten (30 out of 36) were taken in one year, 1988.

Table 52. - Individual trapline harvest summary

TRAPLINE 34T003

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1962/63-82/83 (21)	16	76
WFHSR:	1984/85-89/90 (6)	3	50
Combined:	1962/63-89/90 (28)	19	68

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				19 yrs.	years species taken
1. <u>Aquatic/riparian</u>					
Beaver	161	14 (74%)	3-38	8	12
Muskrat	0	0	0	0	0
Otter	0	0	0	0	0
Mink	2	1 (5%)	2	<1	2
2. <u>Terrestrial</u>					
Black bear	0	0	0	0	0
Lynx	56	6 (32%)	1-34	3	9
Coyote	127	11 (58%)	2-63	7	12
Wolf	13	6 (11%)	1-5	1	2
Fox	0	0	0	0	0
Marten	41	7 (37%)	1-18	2	6
Fisher	2	1 (5%)	2	<1	2
Wolverine	0	0	0	0	0
Weasel	30	5 (26%)	1-20	2	6
Squirrel	242	7 (37%)	20-50	13	35

Notes

1. 61% of lynx and 50% of coyotes taken in one year (82/83)
2. 44% of marten taken in one year (85/86)
3. No. squirrels taken after 1980.

Table 53. - Individual trapline harvest summary

TRAPLINE 35T002

<u>Data source</u>	<u>Period covered</u> <u>(inclusive)</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1963/64-81/82 (19)	18	95
WFHSR:	1984/85-89/90 (6)	5	83
Combined:	1963/64-89/90 (27)	23	85

<u>Species</u>	<u>Total catch</u>	<u>No. years taken</u>	<u>Min. and max. no. taken/yr.</u>	<u>Mean no. taken/yr.</u>	
				<u>23 yrs.</u>	<u>years species taken</u>
<u>1. Aquatic/riparian</u>					
Beaver	252	19 (83%)	1-51	11	13
Muskrat	6	3 (13%)	1-4	<1	2
Otter	0	0	0	0	0
Mink	2	2 (9%)	1	<1	1
<u>2. Terrestrial</u>					
Black bear	0	0	0	0	0
Lynx	20	7 (30%)	1-7	1	3
Coyote	63	12 (52%)	1-14	3	5
Wolf	2	2 (9%)	1	<1	1
Fox	0	0	0	0	0
Marten	285	19 (83%)	1-50	12	15
Fisher	17	5 (22%)	1-7	1	3
Wolverine	2	2 (9%)	1	<1	1
Weasel	99	9 (39%)	2-30	4	11
Squirrel	999	15 (65%)	1-247	43	67

Notes

1. 7 fisher taken in 67/68. 88% of 17 fisher were taken prior to 1975.

Table 54. - Individual trapline harvest summary

TRAPLINE 35T004

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1950/51-82/83 (33)	26	79
WFHSR:	1983/84-88/89 (6)	<u>4</u>	<u>67</u>
Combined:	1950/51-88/89 (39)	30	77

<u>Species</u>	<u>Total catch</u>	<u>No. years taken</u>	<u>Min. and max. no. taken/yr.</u>	<u>Mean no. taken/yr.</u>	
				<u>30 yrs.</u>	<u>Years species taken</u>
<u>1. Aquatic/riparian</u>					
Beaver	724	27 (90%)	2-50	24	27
Muskrat	31	4 (13%)	1-27	1	8
Otter	0	0	0	0	0
Mink	18	8 (27%)	1-4	<1	2
<u>2. Terrestrial</u>					
Black bear	35	10 (33%)	1-12	1	4
Lynx	87	11 (37%)	1-24	3	8
Coyote	155	19 (63%)	1-47	5	8
Wolf	3	3 (10%)	1-2	<1	1
Fox	23	10 (33%)	1-5	1	2
Marten	1,000	24 (80%)	1-186	33	42
Fisher	54	19 (63%)	1-6	2	3
Wolverine	1	1 (3%)	1	<1	1
Weasel	378	21 (70%)	1-38	13	18
Squirrel	2,274	21 (70%)	1-439	76	108

Notes

1. 72% of marten taken since 1979/80
2. 27 out of 31 muskrats (87%) taken in one year (73/74)

Table 55. - Individual trapline harvest summary

TRAPLINE 35T005

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1949/50-1982/83 (34)	30	88
WFHSR:	1983/84-1989/90 (7)	30	86
Combined:	1949/50-1989/90 (41)	36	88

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				36 yrs.	Years species taken
1. <u>Aquatic/riparian</u>					
Beaver	891	30 (83%)	1-81	25	30
Muskrat	11	6 (17%)	1-5	<1	2
Otter	0	0	0	0	0
Mink	38	13 (36%)	1-10	1	3
2. <u>Terrestrial</u>					
Black bear	86	13 (36%)	3-17	2	7
Lynx	211	16 (44%)	1-66	6	13
Coyote	344	29 (81%)	1-38	9	12
Wolf	68	17 (47%)	1-12	2	4
Fox	2	2 (6%)	1	<1	1
Marten	988	21 (58%)	2-160	27	47
Fisher	62	15 (42%)	1-12	2	4
Wolverine	7	4 (11%)	1-4	<1	2
Weasel	504	26 (72%)	1-125	14	19
Squirrel	4,327	30 (83%)	4-770	120	144

Notes

1. Highest beaver catches were prior to 1973/74
2. 82 of 86 bears were taken prior to 1964/65
3. Very few marten taken in 1950's and 1960's.

Table 56. - Individual trapline harvest summary

TRAPLINE 32T003

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1974/75-82/83 (9)	9	100
WFHSR:	1983/84-88/89 (6)	<u>6</u>	<u>100</u>
Combined:	1974/75-88/89 (15)	15	100

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				15 yrs.	Years species taken
1. <u>Aquatic/riparian</u>					
Beaver	332	15 (100%)	1-65	22	22
Muskrat	249	7 (47%)	12-70	17	36
Otter	2	1 (7%)	2	<1	2
Mink	51	9 (60%)	1-15	3	6
2. <u>Terrestrial</u>					
Black bear	0	0	0	0	0
Lynx	51	6 (40%)	1-19	3	8
Coyote	34	7 (47%)	1-12	2	5
Wolf	4	2 (13%)	1-3	<1	2
Fox	0	0	0	0	0
Marten	229	13 (87%)	2-55	15	18
Fisher	45	11 (73%)	1-8	3	4
Wolverine	1	1 (7%)	1	<1	1
Weasel	56	6 (40%)	4-18	4	9
Squirrel	383	6 (40%)	12-210	26	64

Notes

1. 48 of 51 lynx taken from 1980-81 through 83/84

Table 57. - Individual trapline harvest summary

TRAPLINE 32T004

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1957/58-82/83 (26)	14	54
WFHSR:	1983/84-89/90 (7)	5	71
Combined:	1957/58-89/90 (33)	19	58

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				19 yrs.	Years species taken
1. <u>Aquatic/riparian</u>					
Beaver	207	9 (47%)	7-49	11	23
Muskrat	942	16 (84%)	1-225	50	59
Otter	0	0	0	0	0
Mink	22	6 (32%)	1-7	1	4
2. <u>Terrestrial</u>					
Black bear	0	0	0	0	0
Lynx	27	6 (32%)	2-12	1	5
Coyote	10	4 (21%)	1-5	<1	3
Wolf	0	0	0	0	0
Fox	1	1	1	<1	1
Marten	188	12 (63%)	1-72	10	16
Fisher	40	8 (42%)	1-12	2	5
Wolverine	1	1 (5%)	1	<1	1
Weasel	58	7 (37%)	1-20	3	8
Squirrel	603	9 (47%)	2-270	32	67

Notes

1. Up to 1970/71, only muskrat and beaver were trapped. Muskrat catches have been quite consistent up to present.
2. Marten catches very variable from year to year.
3. Very few squirrels taken after 1980/81.
4. Beaver less consistently trapped than on other lines.

Table 58. - Individual trapline harvest summary

TRAPLINE 32T005

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1944/45-57/58 (14)	4	29
WFHSR:	nil	<u>nil</u>	nil
Combined:	1944/45-57/58 (14)	4	29

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				4 yrs.	Years species taken
1. <u>Aquatic/riparian</u>					
Beaver	78	4 (100%)	9-27	20	20
Muskrat	50	4 (100%)	2-25	13	13
Otter	0	0	0	0	0
Mink	1	1 (25%)	1	<1	1
2. <u>Terrestrial</u>					
Black bear	3	1 (25%)	3	1	3
Lynx	0	0	0	0	0
Coyote	15	1 (25%)	15	4	15
Wolf	2	1 (25%)	2	<1	2
Fox	2	1 (25%)	2	<1	2
Marten	0	0	0	0	0
Fisher	1	1 (25%)	1	<1	1
Wolverine	0	0	0	0	0
Weasel	33	2 (50%)	8-25	8	17
Squirrel	178	2 (50%)	68-110	45	89

Notes

1. Native Indian trapline. No returns for recent years.

Table 59. - Individual trapline harvest summary

TRAPLINE 32T001

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1958/59-82/83 (25)	16	64
WFHSR:	1983/84-89/90 (7)	7	100
Combined:	1958/59-89/90 (32)	23	72

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				23 yrs.	Years species taken
1. <u>Aquatic/riparian</u>					
Beaver	291	20 (87%)	4-55	13	15
Muskrat	301	12 (52%)	2-136	13	25
Otter	4	3 (13%)	1-2	<1	1
Mink	53	12 (52%)	1-13	2	4
2. <u>Terrestrial</u>					
Black bear	11	3 (13%)	1-8	<1	4
Lynx	183	14 (61%)	1-76	8	13
Coyote	31	11 (48%)	1-8	1	3
Wolf	0	0	0	0	0
Fox	0	0	0	0	0
Marten	223	18 (78%)	1-46	10	12
Fisher	31	12 (52%)	1-5	1	3
Wolverine	1	1 (4%)	1	<1	1
Weasel	496	16 (70%)	1-81	22	31
Squirrel	3,601	17 (74%)	1-602	157	212

Notes

1. Most muskrats taken prior to 1962.
2. Very few squirrels taken in 1980's (most in 1960's).
3. 72% of lynx taken during peak years 1961/62 through 1963/64. High squirrel and weasel catches at this time too.

Table 60. - Individual trapline harvest summary

TRAPLINE 32T002

<u>Data source</u>	<u>Period covered</u>	<u>Years with data</u>	
		<u>No.</u>	<u>%</u>
HHSCS:	1951/52-81/82 (31)	5	16
WFHSR:	nil	<u>nil</u>	nil
Combined:	1951/52-81/82 (31)	5	16

Species	Total catch	No. years taken	Min. and max. no. taken/yr.	<u>Mean no. taken/yr.</u>	
				5 yrs.	Years species taken
<u>1. Aquatic/riparian</u>					
Beaver	42	4 (80%)	1-15	8	11
Muskrat	162	2 (40%)	19-143	32	81
Otter	0	0	0	0	0
Mink	3	2 (40%)	1-2	1	2
<u>2. Terrestrial</u>					
Black bear	0	0	0	0	0
Lynx	18	3 (60%)	2-13	4	6
Coyote	0	0	0	0	0
Wolf	0	0	0	0	0
Fox	0	0	0	0	0
Marten	7	1 (20%)	7	1	7
Fisher	0	0	0	0	0
Wolverine	0	0	0	0	0
Weasel	95	2 (40%)	17-78	19	48
Squirrel	5,685	5 (100%)	200-1,700	1,135	1,135

Notes

1. Native Indian trapline. No returns for recent years.

B. Consumptive Wildlife Resources

1. Past and present wildlife population densities and trends in the study area are to be documented and analyzed. The relative importance of climatic, habitat and management factors in determining population distributions and densities and periodic changes in these parameters are to be described.
 - a. All relevant previous wildlife population inventories for the project study area are to be retrieved, documented and analyzed. Data sources examined are to include previous Site C wildlife studies, MOE file data, data and information from wildlife associations, clubs, hunters and trappers, and information from public and government agency consultations⁴. Where possible, historic data shall be linked to biophysical habitat types within the study area.

3. All available wildlife harvest data are to be retrieved, documented and analyzed to provide estimates of harvests within the reservoir area. Trends and fluctuations in reservoir area harvests are to be related to corresponding changes in harvests for the Peace region. Factors determining wildlife harvests within the project area are to be identified and quantified as far as possible.

CLASSIFIED AERIAL COUNT SUMMARY

M.U. 7 - 32 UNIT _____ LOCATION Pine and Moberly

Date of Count December 7, 1981

Count Conditions (Good, Avg, Poor) Good

Flight Number 82 - 01 p.m.

Type of Aircraft Bell 206 Helicopter

Length of Flight (Hours, Minutes) 2 hours, 30 minutes

Number of:	Mule Deer Moberly	Mule Deer Pine	White Tail Deer Pine
Adult Females	24	28	1
immature			
Adult Males	11/7	12/12	0/0
mature			
Unclassified XXXXXX	0	5	0
Juveniles	15	24	2
Total Animals	57	81	3
Animals Per Hour	57/hour	54/hour	
Female/Male/Juv: Ratio	100/75/62.5	100/86/86	
Adult/Juvenile Ratio	100/36	100/46	
Percent Juvenile	26.3	31.6	

REMARKS:

Very good visibility, clear and cold.
 Counted north side of Moberly to approximately Lot 192, and from Windy Creek on the Pine River back to the Peace. (See map and transcript.)

CLASSIFIED AERIAL COUNT SUMMARY

734/7-35

M.A. 28 (Mule Deer)

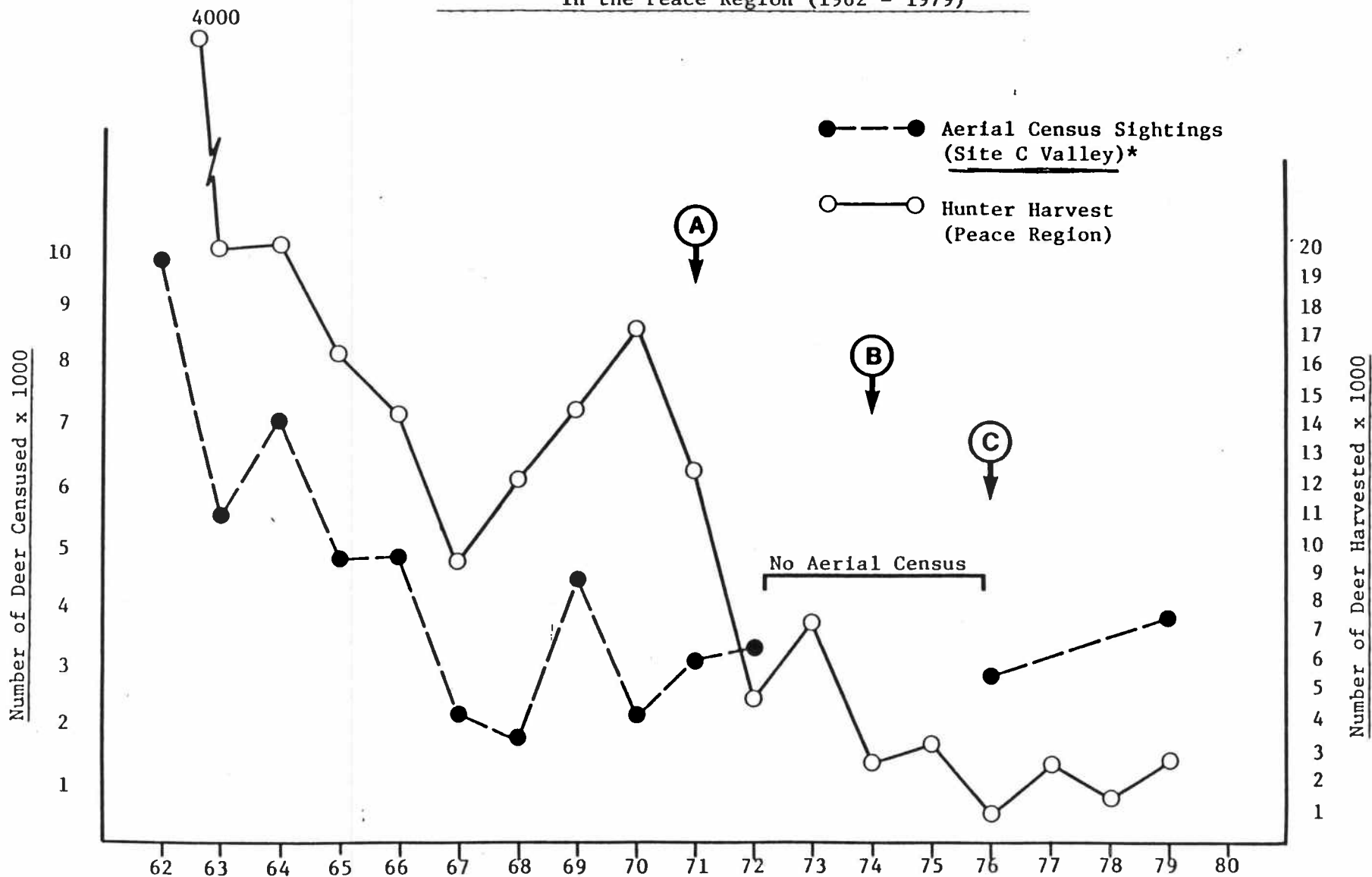
UNIT Peace

LOCATION

DATE OF COUNT	Helicopter Fall Counts (November - January)									
	63 - 64	64-65	65-66	66-67	67-68	68-69	69-70	70-71	1971-72	72-73
COUNT CONDITIONS (Good, Av., Poor)										
FLIGHT NUMBER										
TYPE OF AIRCRAFT	-OK-	-OK-	-OK-	-OK-	-OK-	-OK-	-OK-	-OK-	-OK-	-OK-
LENGTH OF FLIGHT (Hours, Minutes)	7+	8.05	7.55	9.50	8.55	4.10	8.55	5.83	5.00	7:10
No. Of:			104 - Insexed adults							
Ad. Females	224	262	122	252	68		194	103	144	193
Ad. Males	100	131	78	61	22	121	57	27	50	47
U/C Adults	71	66	21	8	40	131	64	11	3	8
Juveniles	150	252	150	161	81	51	151	70	108	82
Total Animals	545	491 570	475	482	211	172	456	211	305	326
ANIMALS PER HOUR:	75+	85	60	49	24	42	51	36	61	47
F:M:JUV: RATIO	100:44:67	100: 50:96	100: 61:79	100: 24:64	100: 32:120		100: 33:82	100: 26:68	100: 35:75	100: 22:43
AD: JUV: RATIO	100:38	100:57	100:31	100:50	100:62	100:42	100:49	100:49	100:55	100:37
% JUVENILE										

Appendix 3. MOE summary of the mule deer seen per survey hour, 1963/64 through 1972/73.

Figure 5: Trends in Deer Numbers and Deer Harvest in the Peace Region (1962 - 1979)



Changes in Harvest Regulations

- Ⓐ Bag limit reduced from 2 to 1
- Ⓑ Doe season closed
- Ⓒ Season reduced from 38 days to 16 days

Notes

* 1976 data is from Blood. All other years are from Fish and Wildlife Branch census flights.

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**** USERS OF TABLE 1A - PLEASE NOTE THE FOLLOWING PERTINENT COMMENTS****

1. M.U. X00 (eg. 200) represents data in regions where the location was not specified.
2. Kills reported thru Compulsory Inspection, but not aged are included as ADULTS.
3. Kills not sexed are not included in results for this table. Use Table 1B.
4. Sources of data for TABLE 1A:
 - Resident hunter effort is an estimate derived from the Hunter Sample.
 - Non resident hunter effort is derived from Guide-Outfitter Declarations.
 - Resident hunter harvest of non compulsory inspected species is an estimate derived from the Hunter Sample.
 - Non resident hunter harvest of non compulsory inspected species is derived from Guide-Outfitter Declarations.
 - All hunter harvest of compulsory inspected species is derived from the Compulsory Inspection system (now including elk from Regions 7 and 8).
5. Totalling the number of hunters by M.U. may result in double counting of some individuals who hunted in more than one M.U. This is an aspect of the Hunter Sample and Guide-Outfitters Declaration systems that results from the decision to manage on an M.U. basis and the definition of a HUNTER UNIT (any hunter hunting in one M.U.). This is NOT a concern with RESIDENT hunters when you request a Provincial Summary, because the Regional and Provincial TOTALS eliminate any double counting.
6. Resident Hunter Sample DEER data is now available as MULE (DEMU) or WHITE-TAILED (DEWT) from 1987 on or both combined as (DEER) for all years. Users must request DEER prior to 1987. Non-Resident DEER data for all years is only available as DEER, species are not separated.
NOTE: when requesting DEER after 1987, there is an unknown amount of double counting for Number of Hunters and Number of Hunter Days as the data is derived from adding DEMU and DEWT resident hunter survey results.
7. Specifying Limited Entry Survey (LE) as the data source overrides the standard sources detailed in (4) above. Harvest and effort results will be based solely upon the Limited Entry Survey for MOOSE, ELK, WHITE-TAILED and MULE DEER.
8. USE CAUTION when interpreting SHEEP data requests using this table. Kill data for each species of sheep (eg. stone sheep - SHES) is derived from Compulsory Inspection. However, hunter effort (no. of hunters and hunter days) will be listed for all sheep species hunted in the area you specify. This is because the Hunter Sample and Guide-Outfitter Declaration systems do not differentiate between sheep species for reporting hunter effort.
9. USE EXTREME CAUTION when interpreting WOLF data requests using this table. Estimates of HARVEST, NUMBER OF HUNTERS and DAYS for RESIDENTS are derived from reports on the Hunter Sample that are then expanded to the population of hunters purchasing B.C. Resident Hunting Licences. This procedure is used as there is not a separate B.C. Resident Wolf Licence from which to sample.
10. WHEN REQUESTING A MONTH RANGE (less than calendar year) HARVEST is presented for the range specified, but hunter effort is presented for the entire year. This occurs, because unsuccessful hunter effort data collected via survey is not fixed to a date as is effort associated with a kill date.
11. Users requesting HUNTING VALUE should note that this is NET ECONOMIC VALUE OF HUNTING IN 1989 DOLLARS for both B.C. resident and non-resident hunters. Values/hunter-day are derived from updates of 1981 Provincial Survey results and are determined for each big game species, for each region for residents and non-residents.