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A CENSUS OF MOOSE ON SYNCRUDE'S LEASES 17 AND 22 DURING EARLY FEBRUARY, 1977

by

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Prepared for

SYNCRUDE CANADA LIMITED

and

ALBERTA OIL SANDS ENVIRONMENTAL RESEARCH PROGRAM

PROJECT TF 1.1

October 1978

The Hon. D.J. Russell Minister of the Environment 222 Legislative Building Edmonton, Alberta

### and

The Hon. L. Marchand Minister of State for the Environment Fisheries and Environment Canada Ottawa, Ontario

Sirs:

Enclosed is the report "A Census of Moose on Syncrude's Leases 17 and 22 During Early February, 1977".

This report was prepared for the Alberta Oil Sands Environment Research Program, through its Terrestrial Fauna Technical Research Committee (now part of the Land System), under the Canada-Alberta Agreement of February 1975 (amended September 1977).

Respectfully,

W. Solodzuk, DEng. Chairman, Steering Committee, AOSERP Deputy Minister, Alberta Environment

A.H. Macpherson, Ph.D. Member, Steering Committee, AOSERP Regional Director-General Environmental Management Service Fisheries and Environment Canada

## A CENSUS OF MOOSE ON SYNCRUDE'S LEASES 17 and 22 DURING EARLY FEBRUARY, 1977

#### DESCRIPTIVE SUMMARY

### ABSTRACT

A total count of moose was attempted on Syncrude Canada Ltd. leases 17 and 22 in February 1977. Transects spaced at 0.4 km intervals were flown with a Hughes 500C helicopter. All seven marked moose known to be present on the area were seen, suggesting 100% observability during the survey. Total numbers of moose observed, and likely the total moose population, declined 40% (43 to 26) between February 1976 and February 1977. A disproportionately higher number of moose were present in aspen than in other vegetation types.

#### BACKGROUND AND PERSPECTIVE

One specific objective of the Large Mammal Ecology study is to describe and interpret the numerical, distributional, and structural changes occurring in moose populations, within and around areas affected by oil sands development. Aerial surveys are the most efficient method of collecting most of this information.

To date, two winter aerial surveys (1975-76 and 1976-77) have been conducted on the AOSERP moose study area, north of the Syncrude lease area. As the AOSERP study area has not yet been influenced by major oil sands activity, a survey conducted on a large disturbed area of land could identify, to industry and government agencies, how moose populations were being affected. With the co-operation and financial support of Syncrude Canada Ltd. a transect survey was conducted on their number 17 and 22 lease sites in February 1977. Survey results indicated that moose were located primarily in areas where industrial-related activities (disturbance) were light. In addition, there was a decline in total moose present on the Syncrude lease between 1976 and 1977. It is not yet known whether this decline in moose numbers can be attributed to (1) annual migrations into and out of the lease area (largely a function of snow levels found in the surrounding Birch and Muskeg mountain areas) or (2) whether it may be a continuation of the general moose population decline, noted by Hauge and Keith (in prep.), occurring in the Fort McMurray region.

### ASSESSMENT

The former Terrestrial Fauna Technical Research Committee of AOSERP (now part of the Land System), Syncrude Canada Ltd., and the Oil Sands Environmental Study Group (OSESG) have reviewed and accepted this report and recommend it for publication. The Alberta Oil Sands Environmental Research Program accepts the report "A Census of Moose on Syncrude's Leases 17 and 22 During Early February, 1977" as an important and valid background document and thanks the researchers for their contributions.

The content of this report does not necessarily reflect the views of Alberta Environment, Fisheries and Environment Canada, or the Alberta-Oil Sands Environmental Research Program. The mention of trade names for commercial products does not constitute an endorsement or recommendation for use.

R.A. Hursey, Ph.D. Research Manager Land System

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### ABSTRACT

A total count of moose was attempted on Syncrude Canada Ltd. leases 17 and 22 in February 1977. Transects spaced at 0.4 km intervals were flown with a Hughes 500C helicopter. All seven marked moose known to be present on the area were seen, suggesting 100% observability during the survey. Total numbers of moose observed, and likely the total moose population, declined 40% (43 to 26) between February 1976 and February 1977. A disproportionately higher number of moose were present in aspen than in other vegetation types.

### ACKNOWLEDGEMENTS

This research project TF 1.1 was funded by Syncrude Canada Ltd. and by the Alberta Oil Sands Environmental Research Program, a joint Alberta-Canada research program established to fund, direct, and co-ordinate environmental research in the Athabasca Oil Sands area of northeastern Alberta.

### INTRODUCTION

1.

In February 1977, researchers of the Alberta Oil Sands Environmental Research Program (AOSERP) conducted a moose population survey for Syncrude Canada Ltd. The area surveyed, which included portions of Syncrude's leases 17 and 22, was the same as described by Penner (1976) and is illustrated in Figure 1. The objective of the survey was to determine the density and distribution of the moose population in the vicinity of the Syncrude plant in late winter.

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### METHODS

2.

The moose population survey was conducted with a Hughes 500C helicopter flying 0.4 km (0.25 mi) transects in an east-west direction. Air speed varied between 64-112 km/h (40-70 mph) and the altitude ranged from 46-91 m (150-300 ft) above ground level. The crew consisted of the pilot, navigator, and two observers. The sex of each moose was determined by the presence or absence of a vulva patch (Mitchell 1970). Segregation of yearlings from adults was not possible. Moose marked earlier by AOSERP personnel were individually identified by color-coded collars. A 1.6 km to 2.54 cm (1 mi to 1 in) forest-cover-series map of the study area was used for navigating and plotting moose observations. The general vegetative cover associated with each moose observation was also recorded.

Total helicopter time required for the survey was 7.4 hours. Sky conditions varied from clear to overcast; temperatures ranged between -11 and  $0^{\circ}$ C. Snow depth measured at the AOSERP Mildred Lake Research Facility during the survey was 22 cm. Using ratings poor, fair, good, and excellent, we judged observation conditions as fair to good.

### RESULTS

3.

A total of 26 moose (9 bulls, 12 cows, and 5 calves) were seen on the moose study area during the survey (Table 1). Seven of the nine radio-collared moose known to be on the study area as of 29 January, 7 to 8 days before the survey, were among the 26 observed. Subsequent relocation flights of radio-collared moose 2 days after the survey confirmed the absence of the two unobserved radio-collared individuals. This indicates an observing efficiency of 100%. Using the figure of  $324 \text{ km}^2$  (Penner 1976) for the moose survey area, we estimated a population density of 0.1 moose/km<sup>2</sup> (0.3 moose/mi<sup>2</sup>). The observed calf/cow ratio was 5/12 (42:100). The bull/cow ratio was 9/12 (75/100).

Thirty-eight percent (10 of 26) of the moose were observed in the MacKay or Athabasca river valleys (Figure 2). The remainder of the moose were found either north of the main area cleared by Syncrude, or in the southwest portion of the moose study area. No moose were observed between the west interceptor ditch and the Fort MacKay highway. In general, most of the moose were in areas where current activity (disturbance) was light or absent.

A pack of five wolves (<u>Canis lupis</u>) was also observed. Penner (1976) delineated 17 vegetation types and estimated the proportion of the study area each covered; we regrouped these vegetation types into four broad categories (Table 2). A chi-square test was conducted to see if the observed distribution of moose differed from an expected as reflected in the availability of these vegetation categories (Table 3). A highly significant value indicated that moose preferred aspen types (16 of 21 observations).

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Census	Total <sup>a</sup>				
Period	Bulls Cows		Adults	Calves	Moose Seen
Dec. 1975 <sup>b</sup>	12	16	28	9	37
Feb. 1976 <sup>b</sup>	na ana ang Ngang <del>a</del> ng	-	28	15	43
Feb. 1977	9	12	21	5	26

Table 1. Numbers of moose observed in aerial surveys conducted on the Syncrude lease in 1975-76 and 1977.

<sup>a</sup>Includes yearlings.

<sup>b</sup>Penner (1976).



Figure 2. Distribution of moose on the Syncrude moose study area in early February, 1977.

Vegetation types <sup>a</sup>	-Percent of area <sup>a</sup>	Regrouped vegetation types	Percent of area
Trembling aspen	4.8	Aspen types	26.3
Trembling aspen-balsam poplar	1.2		
Trembling aspen-willow and/or alder	14.2		
Mixedwood (11% to 40% coniferous)	7.5	Mixed wood	21.1
Mixedwood (41% deciduous to 41% coniferous)	2.6		
Mixedwood (61% to 89% coniferous)	6.1		
Black Spruce (cover 11 to 40%)	5.7	Spruce muskeg	35.5
Black Spruce (cover 41 to 100%)	15.4		
Black spruce-willow	6.1		
White spruce	1.6	Miscellaneous	17.1
Jack pine	0.9		
Tall shrub	6.0		
Dwarf birch-tamarack	2.4		
Riparian shrubs and herbs	2.2		
Disturbed with regeneration no regeneration cleared area	0.5 5.8 17.3		
요즘 영상에 대한 방법에 가지 않는 것이 없다.			

Table 2. Vegetation types on the Syncrude lease near Fort McMurray.

<sup>a</sup>As given by Penner (1976).

<sup>b</sup>Regrouped by Hauge and Keith for this report; disturbed areas not included.

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- 산 이미지 1942년 1일. 		S			
	Aspen types	Mîxed- wood i	Spruce muskeg	Misc.	Totals
Observed distribution of moose on aerial survey	16	1	.4		21

Table 3. Distribution of moose on the Syncrude lease in relation to available vegetation types, February 1977.

<sup>a</sup>Chi-square = 11.9 (p<0.01).

### DISCUSSION

4.

The three most notable results of this moose survey were: (1) the finding that all seven of the marked moose known to be present on the area were seen, suggesting a 100% observability during this survey; (2) the evident decline in numbers of moose present on the Syncrude lease between February 1976 and 1977; and (3) the disproportionately higher use of aspen vegetation types.

The first factor is important because it gives us confidence in the moose population data obtained on this survey, and indicates that the helicopter-transect method is an entirely satisfactory means of censusing moose on this lease in winter. Thus, it seems meaningful to compare the February 1976 and February 1977 counts of 43 and 26 moose, respectively, and to speculate on the ecological cause of this difference.

Penner (1976) suggested that movements could be occurring into and out of the Syncrude area during winter. Hauge and Keith (in prep.) documented migrations out of and back into the AOSERP Bitumount moose study area 9.6 km (6 mi) north of the Syncrude lease (Figures 1 and 3). They felt that these movements may be made to avoid deeper snow levels found to the west (Birch Mountains) and to the east (Muskeg Mountain). Such annual migrations may be occurring on the Syncrude area as well. Coady (1974) found that snow levels influenced the timing and magnitude of major moose movements. It is possible that the mild winter of 1976-77 (warm temperatures and low snow levels) may have reduced the number of moose which traditionally move into the Syncrude area during the winter. The water equivalents of snow in the Birch Mountains and Muskeg Mountain areas were approximately 60 to 65 mm in February 1977, as opposed to 125 mm in March 1976.

A partial alternative explanation for the decreased numbers of moose on the Syncrude lease in the winter of 1977 is the possible continuation of the general population decline that has been occurring in the region for at least three years (Hauge and Keith in prep.). Mean densities of moose on an AOSERP moose

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study area of 1,680 km<sup>2</sup> declined about 16% between late winter 1976 and 1977 (Jacobson in prep.). This change was not statistically significant, but may well reflect a further decline in numbers.

The disproportionately higher use of aspen vegetation types recorded on the February 1977 survey is consistent with the observations of Hauge and Keith (in prep.) elsewhere in the region. This is undoubtedly a seasonal phenomenon which should be taken into account in planning and comparing annual moose surveys.

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