

AN ASSESSMENT OF THE ADEQUACY OF BASELINE
DATA RELEVANT TO THE DOCUMENTATION AND
EVALUATION OF THE IMPACTS OF OIL SANDS
DEVELOPMENT ON BLACK BEAR IN THE AOSERP
STUDY AREA

By

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1. INTRODUCTION

The objectives of this critique are to evaluate whether or not the state of baseline knowledge is adequate to assess the impacts of large developments on the black bear population in the AOSERP study area. This critique will further identify specific knowledge gaps for which information must be obtained to determine those baseline states (Table 1).

Documentation of the potential impacts of industrial developments on a black bear population requires two types of information: (1) information on black bear population dispersion (i.e., habitat use) will allow assessment of the change in population size that will occur as a result of habitat alteration, and (2) information on the effects of various types of potential impacts on black bear (i.e., habitat alteration, disturbance factors and direct mortality) will show the potential losses from each of these sources of perturbation.

Evaluation of impacts requires information on black bear population dynamics. The assessment of black bear population data will identify the limits within which black bear population size may change without threatening the structural and functional integrity of the black bear population and thus the ecosystems. This information will show the surplus of animals available to additional mortality from habitat loss, disturbance and increased exploitation associated with any oil sands development which may occur in the AOSERP area.

Table 1. Summary of Knowledge gaps of various parameters involved in assessing the impact of oil sands development on the black bear population in the AOSERP study area.

POPULATION DISPERSION

Seasonal Habitat Use	major knowledge gap
Critical Habitats: Denning	minor knowledge gap

POTENTIAL IMPACTS OF DEVELOPMENT

Habitat Alteration	minor knowledge gap
Disturbance Factors	minor knowledge gap
Direct Mortality	
- accidental	minor knowledge gap
- exploitation	major knowledge gap

POPULATION DYNAMICS

Population Size and Density	major knowledge gap
Mortality and Recruitment	
- for impact assessment	minor knowledge gap
- for management of exploitation	major knowledge gap

2. DOCUMENTATION OF IMPACTS

2.1 POPULATION DISPERSION

Information on habitat use by black bear in the AOSERP area is not considered adequate to allow the assessment of the change in population size that will occur as a result of habitat alteration.

Ruff (1978) obtained some good information on selection and avoidance of vegetation cover types by black bear in the Cold Lake area. However, Ruff (1978) found that habitat utilization varied in accordance with the sex and age-group of bears and also varied among seasons and among years. These variations in habitat use were generally attributed to the availability, distribution and abundance of preferred foods. Social inhibition and physical barriers were found to further influence the availability of habitat for black bears, particularly females.

Other black bear studies also report considerable variation in the use of available habitat (Lindzey and Meslow 1977a; Hatler 1967; Amstrup and Beecham 1976; Jonkel and Cowan 1971). In all studies, seasonal or opportunistic food availability appeared to influence the black bear seasonal distribution.

Because black bears exhibit variation in habitat use within and among regions and these variations are generally associated with the local availability of food, more supportive data is required for the application of the Cold Lake habitat use data to black bear in the AOSERP area.

Young (1978) provided an estimate of the black bear population size in the AOSERP area by extrapolating habitat use data from the Cold Lake studies. However, no supportive data was given showing similarities in structural composition of plant communities or vegetation cover types among these areas. The occurrence of common black bear food items in aspen and mixedwood cover types in both regions is not considered sufficient evidence to assume that cover selection by bears and therefore expected bear densities within cover types, are comparable between the two areas.

No systematic comparison of vegetation communities between AOSERP and Cold Lake areas is available. Although Stringer (1976) reported a preliminary vegetation survey of the AOSERP area, the occurrence of upland deciduous stands, particularly aspen communities is conspicuously absent. However, the AOSERP vegetation maps do identify upland aspen communities. No available reports from the Cold Lake black bear study area provide an adequate description of the vegetation communities for comparison with the AOSERP area.

In order to extrapolate black bear habitat use from the Cold Lake to the AOSERP areas, additional factors must be considered: (1) the implications of different compositions of vegetation cover types and the size and distribution of these vegetation types on black bear habitat use are not known, and (2) black bear habitat use has been shown to be influenced by social interaction, and the effects of a lower or higher population density on habitat use by bears and in relation to different dispersion of various vegetation types is also unknown.

The first priority in establishing the baseline knowledge of black bear habitat use in the AOSERP area should entail a detailed evaluation of the vegetation types and the regional variation in the composition and dispersion of vegetation types. If similar information were available for the Cold Lake study area, an objective comparison between these areas could lead to valid scientific extrapolation of black bear habitat use from the Cold Lake to at least a portion of the AOSERP area.

Fuller and Keith (in prep.) provided a limited amount of information on habitat use by four cubless female black bears during mid-summer until denning in the Fort Hills area. This study did not quantitatively differentiate black bear habitat use during the study period but generally showed that these bears used mixed aspen-jackpine cover more, and aspen cover less, than expected according to their proportionate availability. Although these authors concluded the habitat types and use were similar to those at Cold Lake, they provided no supportive comparisons.

No information on black bear food habits is available for the AOSERP area. Comparison of black bear food habits between the Swan Hills (Nagy and Russell 1978) and Cold Lake (Ruff 1978) show that considerable variability in food habits may occur at a similar latitude in Alberta. The vegetation of the Swan Hills also contains stands of spruce, pine, aspen, birch, and mixedwood forest as well as muskeg. Because the AOSERP area ranges between 160 and 300 km north of the Cold Lake area and that this region also contains a wide range of vegetation types it may be expected that black bear food habits will also vary according to the food available in various regions.

Both habitat use and food habits of black bear in the AOSERP area are major knowledge gaps that require further study.

Information on black bear home range sizes in the AOSERP area is limited to the study of four cubless females by Fuller and Keith (in prep.). The average home range of these bears (9.1 km²) was considerably smaller than the home range sizes reported for females from other studies in Alberta (Nagy and Russell 1978; Ruff 1978). Lindzey and Meslow (1977b) considered that small home range sizes were indicative of habitat richness. Comparison of available black bear studies shows a trend of smaller home ranges associated with higher population densities. Further study is needed on the AOSERP area to document the size and seasonal use of home ranges by various age and sex classes of black bears.

Information on the importance and selection of denning habitat is generally lacking in black bear literature. Ruff (1978) found that bears selected for mature stands of spruce/aspen forest and avoided muskeg. Fuller and Keith (in prep.) reported that four cubless females denned in either aspen or jackpine stands. In both studies the vegetation types selected for denning were also those selected for use at other time of the year. No critical denning habitat requirements were identified. Studies required to fill the knowledge gaps on black bear habitat selection will also provide information on preferred habitat types used for denning.

2.1.1 Summary

Information on habitat use by black bear in the AOSERP area is not considered adequate to allow the assessment of the change in population size that will occur as a result of habitat alteration. Studies have shown that black bear exhibit considerable variation in habitat use within and among regions and that these variations are generally associated with local availability of habitat types and food sources.

The following studies are required to fulfill the knowledge gaps on black bear population dispersion in the AOSERP area:

1. A detailed evaluation of vegetation types, their composition and dispersion in the AOSERP area. Similar information from the Cold Lake area will allow objective comparisons of black bear habitat use between these areas.
2. Documentation of black bear habitat use in the AOSERP study area including relative use, by season, of available vegetation cover types by different age and sex classes of bears and documentation of seasonal food habits. Documentation of seasonal habitat use will provide further information to determine black bear home range sizes in the AOSERP area.

2.2 SUSCEPTIBILITY OF BLACK BEAR TO IMPACTS OF DEVELOPMENT

Information on the susceptibility of black bear to impacts of development (habitat alteration, disturbance factors and direct mortality) is considered to be partially adequate to document the potential losses to the black bear population from each source of perturbation.

The effects of habitat alteration as a result of logging and forest fires have been reported in several studies (Edwards 1954; Lauckhart 1955; Scotter 1964; Jonkel and Cowan 1971; Lindzey and Meslow 1977a). Black bears have been shown to generally avoid open areas such as logging clear cuts (Jonkel and Cowan 1971;

Lindzey and Meslow 1977a) or open muskeg habitat (Ruff 1978). Black bear use of various seral stages following logging has been shown to depend on availability of food and cover. Intermediate seral stages often provide a higher quality habitat for black bear than mature forest although adequate forest cover is necessary to complete black bear habitat requirements. Habitats that have been reclaimed following disturbance have also been found to sustain increased use by black bear (Nagy and Russell 1978; Jonkel and Cowan 1971). It is obvious that if habitat which supports black bear is destroyed (e.g., by strip-mining), a corresponding loss will occur to the black bear population in proportion to the amount and importance of the habitat destroyed and the number of animals dependent upon that habitat. It has also been shown that black bear will use and re-establish in areas where habitat has been altered when reclamation and vegetation succession re-establishes adequate food and cover for black bear. It follows that if an adequate knowledge of seasonal black bear habitat use patterns in the AOSERP area is known, then the magnitude and duration of the change in the black bear population which will result from the alteration of habitat by industrial development may be predicted. This knowledge gap has been identified in section 2.1.

The effects of garbage dumps on black bears has been discussed in numerous studies (Retfalvi 1972; Cole 1976; Rogers et al. 1976; Ruff 1978; Nagy and Russell 1978). Generally, the effects of this habitat alteration is the concentration of bears from the surrounding area to an artificial food source. This situation generally results in altered habitat use patterns of bears frequenting dumps and habituation by bears to the presence of man. Bears frequenting garbage dumps often develop into "nuisance bears" which are selectively destroyed because of their potential danger to man and because they are more vulnerable to sport hunting. In any event the potential impact of garbage dumps on black bear can be avoided by proper management of garbage disposal practices. Therefore no impact on black bear should occur.

Available studies indicate that continuous and discontinuous disturbance factors have little effect on black bears. One exception may be deleterious effects on bears from disturbance during the denning period (Ruff 1978). Although bears usually withdraw from sources of discontinuous disturbances, available information indicates the effects are short-term. Black bears have also been shown to habituate quite readily to sources of continuous disturbances. However, no systematic studies have been conducted to document the effects or extent of habitat exclusion caused by continuous disturbances or the amount and effect of energy loss as a result of discontinuous disturbances. Studies are required to fill these knowledge gaps.

No information is available on the potential for direct mortality of black bears from accidental kills or increased exploitation by recreational hunters in the AOSERP area. Wildlife mortality records from Jasper National Park show low numbers of black bear are killed each year due to collisions with vehicles (letter dated 10 April, 1978, from R. Flanagan, Superintendent, Jasper National Park). However no information on rates of kills based on bear densities and traffic volume are available to predict the magnitude of this type of impact which could occur in the AOSERP area.

The potential for increased black bear mortality due to increased recreational hunting can be controlled by management practices. However, studies are needed to assess the current kill rates and to predict the expected increase in hunting pressure and harvest of black bear due to increased human population associated with oil sands development.

2.2.1 Summary

Information on the effects of habitat alteration appear adequate to predict the potential loss to the black bear population. This assessment, however, requires information on the seasonal habitat use by black bear in the AOSERP area. The effects of the availability of garbage dumps to black bear and potential mortality due to increased hunting pressure are generally predictable,

however these factors can be controlled by management practices. No quantitative data are available to predict the effects of disturbance factors or accidental kill rates.

The following studies are required to fill the knowledge gaps on the susceptibility of black bears to potential impacts of development:

1. a study is required to document the extent and effects of habitat exclusion and stress to disturbance factors.
2. a study is required to document the current black bear mortality due to recreational hunting in the AOSERP study area and to determine the extent and effect of increased hunting pressure and harvest of black bear due to increased human population associated with oil sands development.

3. EVALUATION OF IMPACTS

3.1 POPULATION DYNAMICS

The information on the size and density of the black bear population is not considered adequate to assess impacts resulting from oil sands development in the AOSERP area. This knowledge gap is directly related to the habitat use information required to document population dispersion. Information on black bear mortality and recruitment rates is not considered necessary to assess the surplus of animals available to additional mortality resulting from oil sands development. However, knowledge of these variables of the black bear population may be required to establish management policy on black bear harvest by recreational hunting.

Black bear population studies show a large variation in bear densities within and among regions (a range of 0.32 km² to 56.80 km² per bear). Studies in Alberta show substantial regional differences in black bear densities: 2.59 km² per bear near Cold Lake (Kemp 1972) and 56.80 km² per bear on the Swan Hills (Nagy and Russell 1973). Because differences in distance, vegetation and geography between Swan Hills and Cold Lake are not considered to be greater than differences in these variables between Cold Lake and the AOSERP area, little confidence can be placed on the extrapolation of the Cold Lake population data to the AOSERP area. Further studies are required to fill the major knowledge gap on black bear population density and size in the AOSERP area.

Information on natality, mortality and recruitment rates of black bear are only required to assess the potential impacts of short-term population reductions (i.e., population loss that would result from disturbance factors and accidental kills) and to assess the potential impacts of increased exploitation through recreational hunting. Disturbance factors and accidental kills are not expected to result in significant losses to the black bear population. Increased mortality due to recreational hunting

can be controlled through the management of hunting pressure on black bears through the existing provincial government agencies. It is also known that the productivity of black bear populations is normally adequate to compensate for annual reductions in population size that result from recreational hunting causes of mortality (i.e., the tenets of recreational hunting assume that each population has a surplus of animals and the ability to replace that surplus which will sustain an annual harvest). Therefore, knowledge of black bear recruitment rates is not considered necessary in order to assess the impacts of oil sands development in the AOSERP area.

However, if AOSERP is required to provide information necessary for the management of black bear mortality that would result from the anticipated increase in recreational hunting, the existing data are not adequate and information on the following knowledge gaps is required:

1. the current levels of hunter harvest,
2. anticipated increase in hunter harvest induced by oil sands developments, and
3. black bear recruitment rates, to establish the surplus of animals available to hunting.

3.1.1 Summary

Information on black bear population size and density as they relate to habitat use are not considered adequate to allow the assessment of impacts resulting from oil sands development. Although information on black bear mortality and recruitment rates is not considered necessary for the assessment of impacts, this information may be required to establish a management policy on black bear harvest by recreational hunting.

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5. RESEARCH PROPOSAL

Following is a proposal outlining the program of studies which are required to fill the identified data gaps.

5.1 INTRODUCTION

The evaluation of the state of baseline knowledge of black bear in the AOSERP study area has identified several major knowledge gaps for which information is required to allow the assessment of oil sands development on black bear (Penner et al. in prep.). Information on seasonal habitat use by black bear from other regions was not considered adequate for application to the AOSERP study area because of the documented variability in habitat use and food habits within and among regions, particularly within Alberta. Local availability of habitat types and food sources appears to govern black bear dispersion in any particular area. Additionally, detailed comparisons of black bear habitat between the AOSERP area and Cold Lake area (the nearest black bear study for which data has the best potential for extrapolation to the AOSERP area) have not been described in the available studies and reports. Information on black bear population size and density is also inadequate to allow the assessment of the change in population as a result of habitat alteration and to determine the surplus of animals available to additional mortality resulting from impacts associated with oil sands developments. Additionally, information is not available on current levels of black bear mortality due to exploitation from recreational hunting. Information is also not available on the predicted rate of increase of hunting pressure induced by oil sands developments. Data on both population size and population recruitment rates are required to evaluate the potential impact arising from increased exploitation and to set management policies to regulate black bear exploitation. However, the management of black bears as a hunting resource is the responsibility of the Department of Recreation Parks and Wildlife, Alberta Provincial Government. Proper management of black bear

harvest by recreational hunting in the AOSERP area will result in no adverse impacts on the black bear population. If AOSERP assumes the responsibility of obtaining adequate information necessary to allow the development of black bear management policies, studies on the black bear population size, recruitment rates, and current and predicted mortality rates are required.

This research proposal is designed to obtain quantitative information on black bear in the AOSERP study area to allow the assessment of impacts of oil sands development on the black bear population.

5.2 OBJECTIVES

The objectives of the following proposed studies are:

1. To provide a detailed evaluation of vegetation types, their composition and dispersion in the AOSERP study area to facilitate the design of black bear habitat use and population studies in the AOSERP study area and to allow the quantitative comparison of black bear habitat between the Cold Lake study area (Kemp 1972; Ruff 1978) and the AOSERP study area to determine if the Cold Lake black bear habitat use information is applicable to at least a portion of the AOSERP area.
2. To determine black bear population density and seasonal habitat use in the major physiographic regions of the AOSERP study area to allow the assessment of the change in black bear population that would result from habitat alteration from oil sands developments.
3. To determine the current black bear mortality resulting from recreational hunting, the predicted increase in black bear harvest resulting from hunting pressure induced by oil sands development and the black bear population size and recruitment rate to allow the development of management policies to regulate black bear exploitation.

5.3 APPROACH

The proposed studies will be conducted in two phases:

Phase I will entail detailed studies on the composition and dispersion of vegetation types in the study area. These data will facilitate the design of black bear habitat use and population studies to ensure that the information obtained will be applicable to all areas with potential for oil sands development. These data will also allow the comparison of black bear habitat between the Cold Lake study area and the AOSERP study area to determine whether the Cold Lake black bear information is applicable to at least part of the AOSERP study area. The results of these studies will show for which regions in the AOSERP study area studies on black bear habitat use and populations are required.

Phase II. Based on the results of phase I, field studies will be conducted in those physiographic regions for which data on black bears from the Cold Lake studies are not applicable. These studies will be designed to determine: (1) the relative use of available habitat types by each age and sex class of black bear, (2) black bear population density in major physiographic regions and relative to each available habitat type, (3) black bear population dynamics, particularly mortality and recruitment rates to show the surplus of animals that would be available for additional mortality that would result from the expected increase in recreational hunting pressure.

These data would be collected in a systematic manner so that they may be applied to all areas that may be subject to oil sands development in the AOSERP area.

5.4 OUTLINE OF WORK

1. Detailed evaluation of vegetation types in the AOSERP study area will be based on the vegetation maps and associated reports recently prepared for the AOSERP area. This evaluation will assess the variability in species and structural composition of major vegetation types among the four physiographic regions in the AOSERP study area and the Cold Lake

study area. The initial information for this evaluation will be obtained from existing vegetation studies (Stringer 1976). Field studies may be required to provide data for regions not previously studied. These studies would entail a quantitative description of the species and structural composition of typical stands of various vegetation types.

The results of this evaluation will determine the extent to which the Cold Lake black bear habitat use data are applicable to the AOSERP study area and indicate where additional field studies of black bear habitat use and population size are required.

2. If vegetation studies determine that black bear habitat between the Cold Lake and AOSERP study areas are not sufficiently similar to allow the extrapolation of the Cold Lake data, a comprehensive black bear field study will be conducted in a study area most representative of oil sands development sites.

An intensive capture and re-capture program will be required to determine the total black bear population (density) on the black bear study area. A selected number of black bears from all age and sex classes will be fitted with radio-collars. Data from captures, observations and daily telemetric locations of instrumented bears will be used to determine black bear movements, seasonal habitat use, spatial relationships between bears and to delineate the seasonally occupied areas of their home range. The food habits of black bears will be determined by analysis of scats which will be collected in the study area throughout the field season (May through October).

The specific methods of the black bear capture program, telemetry study and food habits study will be similar to those employed in the successful black bear study conducted at Cold Lake (Kemp 1972; Ruff 1978). Careful considerations are required to ensure that methods and logistics used are cost effective in obtaining adequate information to allow the assessment of impacts

of oil sands developments on black bear in the AOSERP study area.

3. Studies on black bear population dynamics will be conducted to determine the surplus of animals available to additional mortality resulting from increased black bear exploitation due to oil sands development. Information on natural mortality and recruitment rates will be obtained from the capture and telemetry program previously described. Information on current black bear mortality due to recreational hunting will be obtained through the establishment of a hunter check station and/or questionnaire surveys of black bear hunters. The questionnaire survey will also provide information on the increase of black bear hunting pressure that will be induced by oil sands developments.

The results of these studies will provide information on which to predict the impact of the anticipated increase of black bear mortality from recreational hunting and information on which to develop management policies to regulate black bear harvest in the AOSERP study area.

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5.6 BUDGET

We estimate that the following level of effort will be required to complete this study as outlined above:

Vegetation Studies

Evaluation of available data	\$ 8,000.00
Field studies and data evaluation (if required)	20,000.00

Black Bear Population Size and Habitat Use Studies	160,000.00
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Studies of Black Bear Hunting Mortality

Check Station (Spring and Fall)	22,000.00
Questionnaire Survey	<u>7,000.00</u>

TOTAL	\$ 217,000.00
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5.7 SCHEDULING

5.7.1 Vegetation Studies

Detailed evaluation of vegetation types in the AOSERP and Cold Lake study areas are required prior to any field studies on black bear. These studies will determine whether black bear data from the Cold Lake studies are applicable to part of the AOSERP study area and will further identify the most appropriate area for black bear population and habitat use studies in relation to further oil sands developments in the AOSERP study area. Field studies, if required to provide data for the evaluation of vegetation, should be conducted during June to September, 1979.

5.7.2 Black Bear Population Size and Habitat Use Studies

The intensive capture and recapture program and telemetry studies will be conducted during the May to October period. This six month period should provide sufficient time to obtain an

adequate sample size to determine both population density and seasonal habitat use by black bear in the selected location of the AOSERP study area.

5.7.3 Black Bear Mortality and Recruitment Rate Studies

Data on natural mortality and recruitment rates of black bears will be obtained during the studies on black bear population size and habitat use. Information on current levels of black bear mortality from recreational hunting will be obtained through a hunter check station that will be run during both spring and fall black bear hunting seasons. The questionnaire survey that will provide information on the potential increase in black bear hunting pressure that will be induced by oil sands development will be run during the November to April period.

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