

INTEGRATED RESOURCE PLAN: LOWER PEACE RIVER

REGIONAL OVERVIEW



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LOWER PEACE RIVER

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EXECUTIVE SUMMARY

Background

Development of the agricultural base in the Fort Vermilion Lowlands region took place slowly until the coming of the Mennonite and Ukrainian farmers in the early thirties. Settlers occupied the fertile grassland areas which had been maintained by partial burns carried out by the native people.

The establishment of a railhead and an all-weather road system in the late forties provided opportunities for commercial farming operations. Oil and gas development in the Rainbow/Zama district in 1965 and the construction of the Great Slave Lake Railway to the new mining town of Pine Point, N.W.T., began a period of economic activity for the region. High Level grew as a resource town and has become a service and administrative center for the region.

Expansion of the Lower Peace River Region farming population is creating the need for more land to be opened for agriculture. Concurrent with this demand is the need for an improved transportation network, facilities for processing agricultural products, and increased housing and recreation opportunities.

Resource opportunities

Agriculture. Cultivated lands coincide with the grassland areas identified by Moss (1953) and consist of the more fertile soils of the Chernozemic and Luvisolic Order. Opportunities for extension of the agricultural base are on less fertile soils of the Luvisolic and Gleysolic Orders, capable of crop production or, on the more marginal soils, livestock grazing and forage production.

Current market demand is strong for rapeseed and to a lesser extent for feedstock barley. Rapeseed can bypass elevators for processing directly at the Sexsmith plant. Both crops are well adapted to the Fort Vermilion growing season. Climatic changes affect crop productivity especially on marginal lands. Loss from fluctuating conditions can be offset by diversifying farm products.

Net returns per farm unit have been low in the Peace River region indicating farmers are not earning adequate income on their capital investment. Often it is necessary to supplement incomes through seasonal employment in industry. In determining the allocation of land to agriculture, comparison of the expected returns from alternative land uses such as forestry would be an important factor.

Forestry. Timber harvesting is being managed on a sustained yield basis to provide for Swanson mill demands, currently $419\,562\text{ m}^3$ annually. To meet regional needs, a permanent timber base is being established. Mill expansion utilizing small pole timber is presently underway. In the Peace River Forest, Swanson Lumber Company has until 1985 to exercise its option on a provisional reserve. A high proportion of immature timber will provide future resources for the industry. A slow growth of 1 or 2 percent in the industry is expected, creating some increase in seasonal employment in logging, fire control and reforestation and requiring skilled labor for mill operations.

Minerals. Minerals development, except for the exploratory phases, is predominantly to the western portion of the study area. Gas development of the Bluesky-Gething Formation west of Paddle Prairie ($21\,549 \times 10^6\text{ m}^3$) and of oil in the Rainbow/Zama fields is expected to dominate production for the next 30 years. Little impact on agricultural development is

expected. Opportunities will continue to exist for seasonal employment in the oil patch, and oil and gas revenue will continue to be a major contributor to the economy of the area.

Wildlife Utilization. The Lower Peace River Region is a resource area for fish, ungulate, waterfowl and furbearer production. Angling is a major recreation activity and will continue to increase in popularity, exerting pressure for enhancement of fishery resources in lakes and streams. A well-known staging and production ground for migratory waterfowl and other species, the area attracts hunters each season. Protection of nesting areas and of rare and endangered species is mandatory.

Hunting and trapping of furbearers continues as a traditional role and source of income for residents, contributing a reported \$145 000 in the 1976/77 season. Beaver has been a major contributor. Since areas with agricultural potential often coincide with wildlife resources, land use decisions that may affect these areas will require the generation of data for site specific planning.

Settlement. As communities of the Lower Peace River continue to develop, a higher level of services is demanded, especially in the more industry-oriented center of High Level. Housing and lot shortages, and potable water supplies are problems facing new residents coming into the region. The Peace River Regional Planning Commission, the agency responsible for land use planning for the communities of the region, is currently undertaking a study to help determine lands required for future urban settlement expansion.

Recreation. Recreation needs can be met by construction of facilities in the community centers and by providing access to land and water-

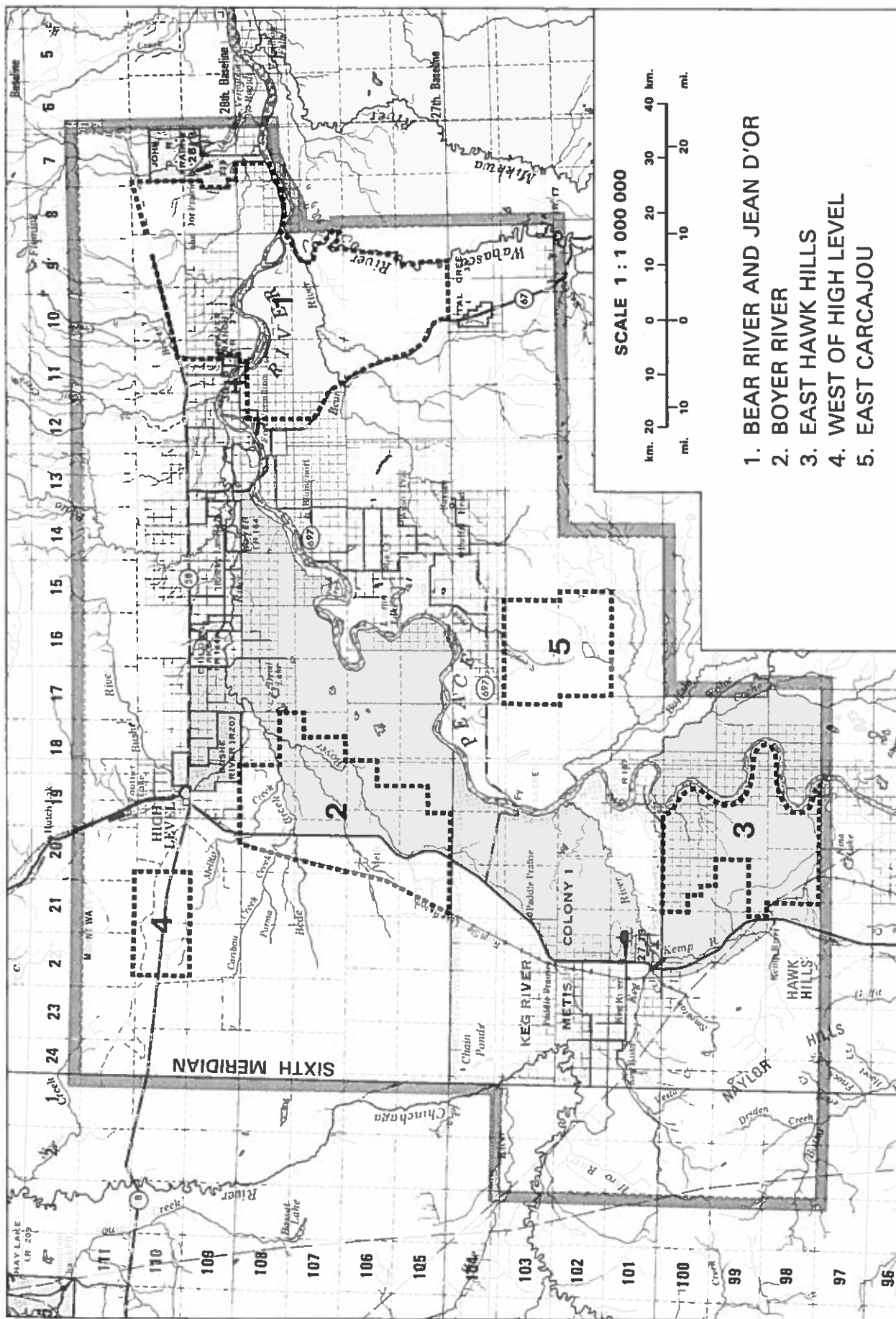
related resources. Development of areas with recreation potential (the sand dunes area, Wadlin Lake and specific sites on the Peace, Chinchaga, and Wabasca Rivers) will help to meet these needs. The Alberta Forest Service is planning future recreation development for the sand dunes area in the vicinity of Steephill Creek and Linton Lake (La Crete area), and near Machisi Lake on the west side (Sec. 27-34, 107-16-W5). Planning for recreational use of the Wabasca River is also in progress.

Recommendations

The Fort Vermilion Lowlands Region, as described in the Resource Utilization section under Agriculture, provides opportunities for agricultural expansion. Lands adjacent to the Peace River, east of Fort Vermilion, have been given priority for a detailed planning study to be carried out by the Resource Planning Branch of Energy and Natural Resources, to ascertain the agricultural potential for future disposition (Map 1). On the north side, toward Jean D'Or Prairie, 76 percent of the area having agriculture potential has Solodized-Solonetz soils which provide opportunities for mixed farming development. Few conflicts in land use are present.

On the south side in the Bear/Wabasca area, forestry utilization and recreation and wildlife potential conflict with agriculture opportunities. Areas having merchantable timber potential could be incorporated in a permanent timber base for independent operators, in accordance with the Alberta Forest Service recommendations.

Erosion, flooding and slumping occur along the streamsides. Development of information on soil erosion, stream classification, and drainage requirements is necessary to enable the land to be managed



1. BEAR RIVER AND JEAN D'OR
2. BOYER RIVER
3. EAST HAWK HILLS
4. WEST OF HIGH LEVEL
5. EAST CARCAJOU

MAP 1. AREAS PROVIDING OPPORTUNITIES FOR AGRICULTURE

as to protect water courses and conserve the soils. In problem areas, a two stage development from grazing reserve to crop cultivation might prove to be feasible, allowing time for environmental assessment.

Potential hydro electric development of the Peace (at Vermilion Chutes) and perhaps the Wabasca Rivers is a future possibility. Parts of the proposed agricultural area could experience impeded drainage by formation of a reservoir on the Peace River and the resulting backwater effects on streams presently draining the area.

Planning for development of large blocks of land, as recommended for this region, would incorporate water resource concerns, transportation and service needs. A land use plan including cost sharing programs between government agencies and the I.D. 23, e.g. for flood control, would expedite the development of the area.

Several possible impacts may occur along with development in this area. Development of the Jean D'Or Prairie/Bear River lands would add to elevator receipts. Grain terminals cannot adequately keep up with existing production. It would be necessary to have improved facilities at the elevators and a high standard road to handle any expansion in agricultural production.

In addition to transportation requirements, this development would create a demand for goods and services in the nearest center, Fort Vermilion, which would benefit from increased employment opportunities. In view of the town's proximity to water resources and access to the transportation routes west through High Level and south through Lesser Slave Lake, it is in a prime position to expand as an agriculture service center.

TABLE OF CONTENTS

	<u>Page</u>
1. TERMS OF REFERENCE	1
1.1 Purpose of Plan	1
1.2 Planning Area	1
1.3 Planning Style and Process	3
1.4 Concerns and Issues	3
2. THE REGION	11
2.1 Physical Setting	11
2.2 Settlement of the Area	30
2.3 Transportation	38
3. RESOURCE UTILIZATION	45
3.1 Agriculture	45
3.2 Forestry	61
3.3 Minerals	73
3.4 Fish and Wildlife	89
3.5 Recreation	103
3.6 Scenic and Historic	109
LIST OF REFERENCES	111

LIST OF MAPS

Map	Page
1. Areas Providing Opportunities for Agriculture	vii
2. Location of Lower Peace River Overview Area	2
3. Lower Peace River Overview Area	4
4. Physical Land Classification	13
5. Hydrology - Groundwater Quality in Peace River Aggregate Beds and Dunvegan Sandstone	19
6. Natural Grasslands of the Region (after E.H. Moss, 1953)	28
7a. Overlay 1 - Soil Conditions in the Bear River and Jean D'Or Prairie Area	Pocket
7b. Overlay 2 - Resource Utilization and Historic Resources in the Bear River and Jean D'Or Prairie Area	Pocket
8. Alberta Forest Service Management Units	63
9. Oil and Gas Fields	75
10. Mineral Dispositions	80
11. Trapline Incomes - 1971-74	95

LIST OF FIGURES

<u>Figure</u>		Page
1.	Flow Chart of Planning Process for the Lower Peace River Regional Overview	5
2.	Plant Community Succession in the Lower Peace River Region	26
3.	Lower Peace River Region Structural Cross-section Showing Oil and Gas Bearing Formations	74

LIST OF TABLES

Table		Page
1	Mean Daily Maximum and Minimum Temperatures in the Lower Peace (^o C)	23
2	Mean Monthly Precipitation (mm) in the Lower Peace	24
3	Population Distribution of Regional Centers as a Percentage of the Total Population of Improvement District 23	31
4	Arable Land in the Lower Peace River Overview Area	45
5	Improved Hectares Relative to Total Farm Size	47
6	Farms by Economic Class for 1976	47
7	Farm Categories	48
8	Summary of Primary Elevator Receipts	50
9	Agriculture Development Potential for Six Areas in the Lower Peace River Region	57
10	Footner Lake Forest Coniferous Timber Resources	62
11	Gas Reserves for Geological Formations in the Lower Peace River Region for 1978	78
12	Fisheries Data by Watercourse in the Lower Peace River Region	88
13	Aerial Ungulate Surveys Conducted within the Lower Peace River Region	91
14	Trapline Statistics for the Period 1971-74 for the Lower Peace River Region	92
15	Analysis of 1976/77 Fur Returns for Lower Peace River Region	93
16	Comparison of Trapline Statistics: Athabasca Oil Sands Region and Lower Peace River Region	93

ACKNOWLEDGEMENTS

This regional overview was prepared by an interdepartmental planning team made up of representatives of a number of provincial departments and local authorities in the region. In addition, many other agencies and individuals were consulted for information, concerns and issues and plans affecting the region. The regional overview has been reviewed by the Resource Integration Committee and was approved in September, 1979. Updating of material, minor editing and drafting of figures have taken place since that time. The recommendations of the Lower Peace River Regional Overview are being implemented through subsequent Integrated Management Plans.

The team members and representatives of agencies consulted are:

Planning Team

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Ruby Buick, resource planner for the Resource Planning Branch, coordinated the planning project and prepared the report.

CONVERSION TABLE

Length

1 mile (mi.) = 1.609 kilometres (km)
1 kilometre = 0.621 miles (mi.)

1 foot (ft.) = 0.3048 metres (m)
1 metre = 3.280 feet (ft.)
1 inch (in.) = 2.54 centimetres (cm)
1 centimetre (cm) = 0.3937 inches (in.)

Area

1 acre (a.) = 0.4047 hectares (ha)
1 hectare (ha) = 2.471 acres (a.)

1 square mile (sq. mi.) = 2.5899 square kilometres (km²)
1 square kilometre (km²) = 0.3861 square miles (sq. mi.)

Volume (Dry measure)

1 bushel (bu.) = 0.36367 hectolitres (hL)
1 hectolitre (hL) = 2.750 bushels (bu.)

1. TERMS OF REFERENCE

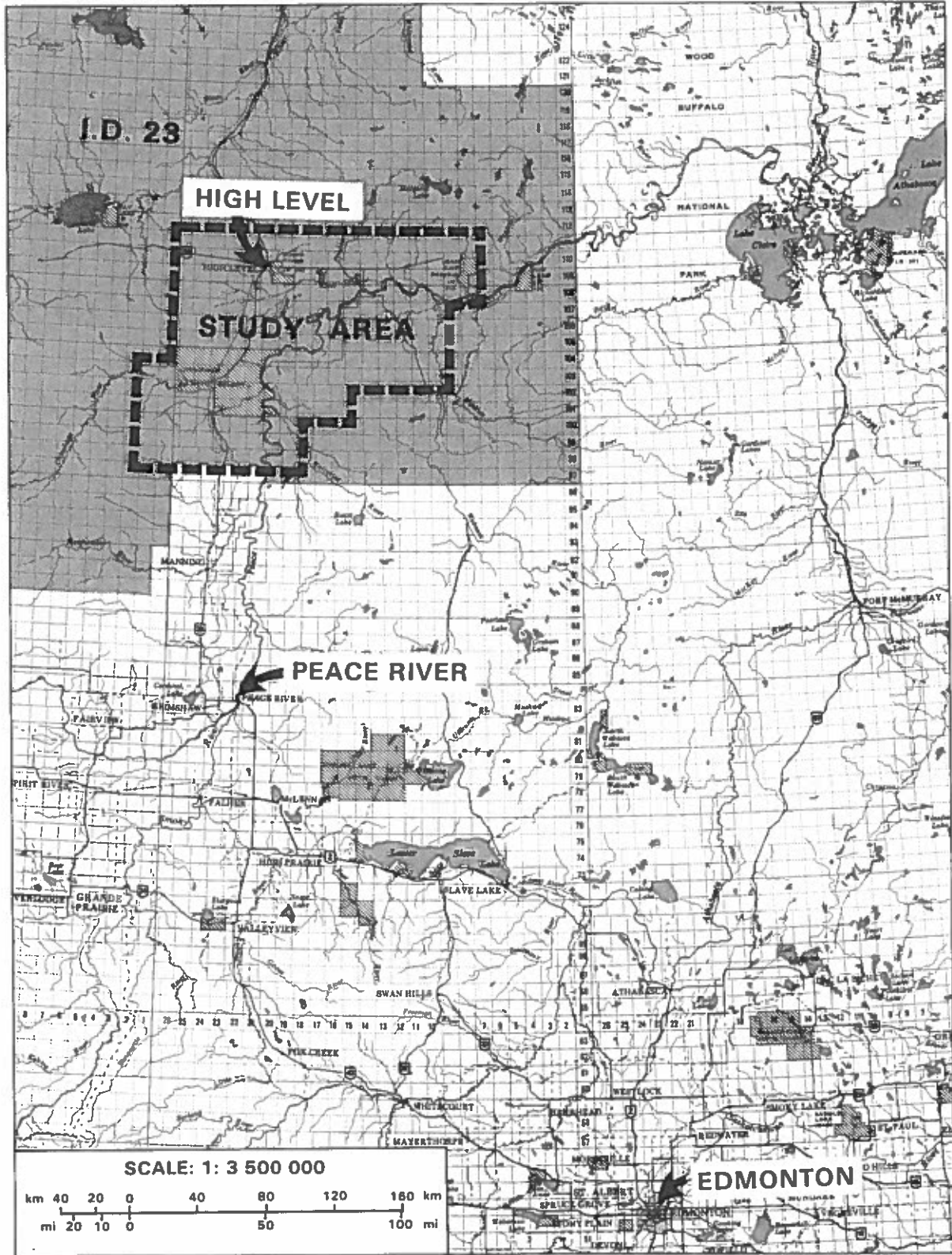
The Department of Energy and Natural Resources has administrative and resource management responsibilities over Crown lands in the Lower Peace River area of Alberta. Following the policy of the provincial government for agricultural expansion, the Public Lands Division has given priority to the La Crete, High Level and Keg River areas for resource planning. Land management agencies indicate the need for a broad direction to guide future development.

1.1 Purpose of plan

The Resource Planning Branch of Energy and Natural Resources is undertaking a planning study of the Lower Peace River land in the vicinity of the above communities, including Fort Vermilion (Map 2). This study will define, on a broad scale, existing and potential uses of the major resource activities: agriculture, forestry, minerals, wildlife utilization, recreation and settlement. Opportunities for agricultural development will be identified for future detailed studies to determine specified development locations and to resolve conflicts of resource use.

1.2 Planning area

The Lower Peace River Regional Overview includes the lands surrounding the communities of La Crete, Fort Vermilion, High Level and Keg River. The northern boundary extends to the base of the Caribou Mountains and northwest to include Mount Watt. On the west the boundary parallels the sixth meridian to the Keg River, where it extends further west to include Ranges 1 and 2. The southern boundary coincides with the Improvement District (I.D.) 23 boundary (Twp. 98). On the east side of Peace River, the boundary runs north to the Carcajou area, then



MAP 2. LOCATION OF LOWER PEACE RIVER OVERVIEW AREA

due east and north, circumventing the Buffalo Head Hills. From Tall Cree the boundary parallels the Wabasca River north to the Peace River. Jean D'Or Prairie is included in the northeast limit of the study area. The area of study covers approximately 18 130 Km² (7000 sq. mi.). Map 2.

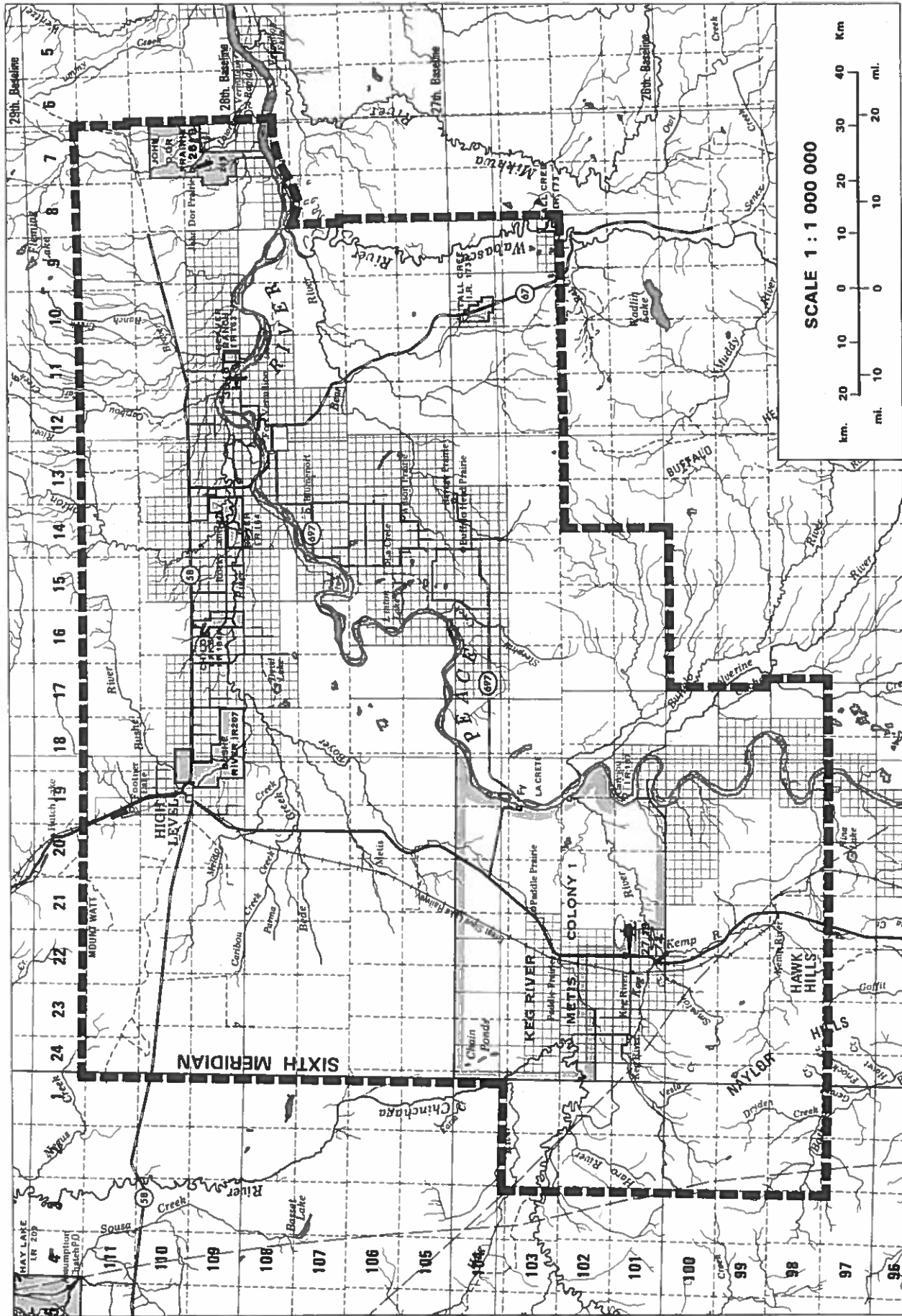
1.3 Planning style and process

The development of a regional overview for the Lower Peace River area will rely on the participation of agencies involved in guiding the development of the area. Those agencies having a major concern in resource development will have a representative role on the planning team. Their role includes collecting and evaluating data and establishing policy guidelines for management. Agencies having a lesser degree of concern in resource use will be invited to serve in a consultative role. In this respect, they will provide input and appraise planning decisions.

The planning process followed in this project is depicted in Figure 1. The implementation element of the process will involve the acceptance of the recommendations of the Overview and the establishment of further, more detailed levels of planning.

1.4 Concerns and Issues

Agricultural Expansion. The demand for agricultural land and a subsequent need for services, including marketing and transportation of products, and development of secondary agricultural processing are major issues. Opportunities for grazing are becoming important as the farm communities mature. Concurrent with the opening of agricultural land will be the demand for infrastructure.



MAP 3. LOWER PEACE RIVER OVERVIEW AREA

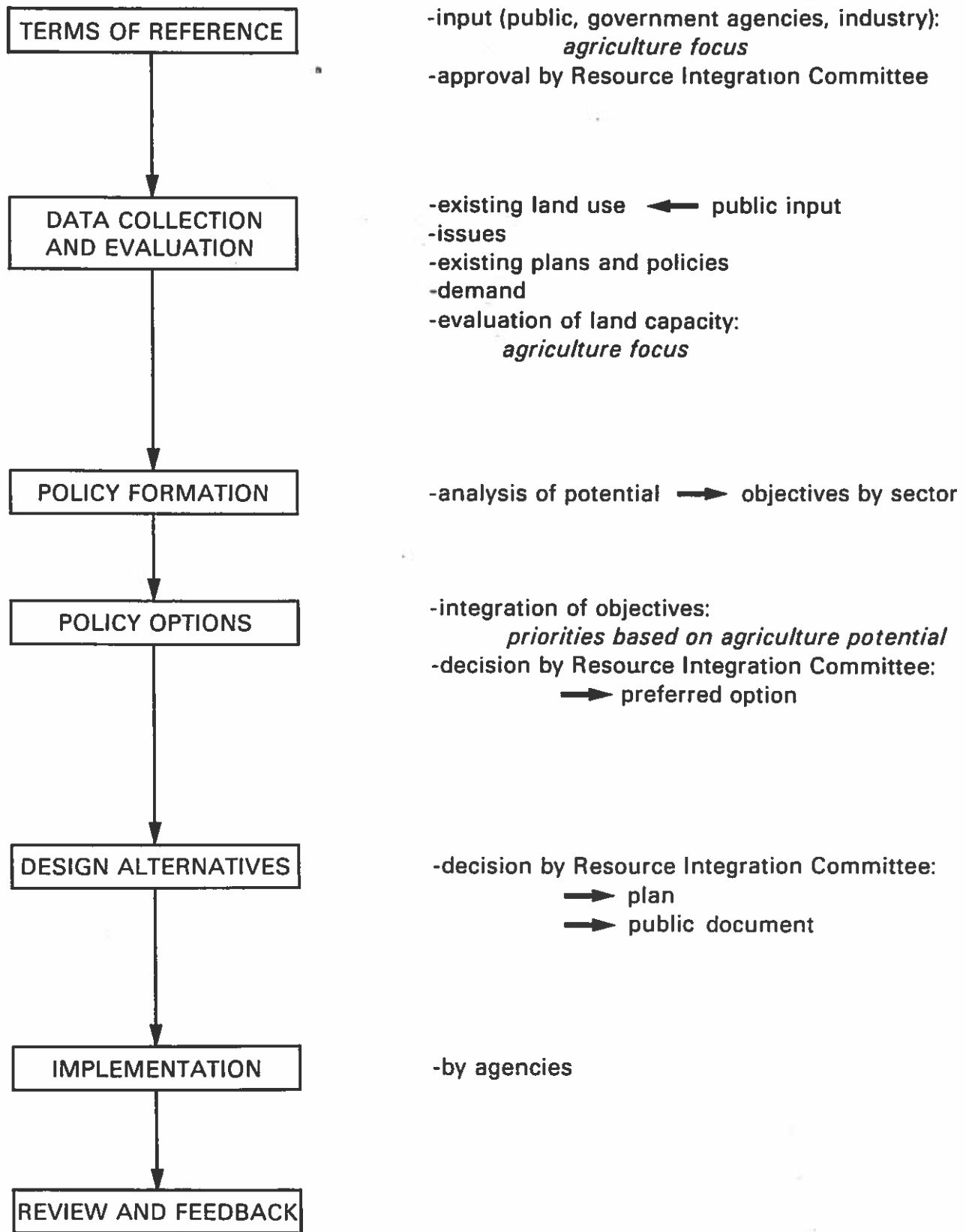


FIGURE 1. FLOW CHART of PLANNING PROCESS for the LOWER PEACE RIVER OVERVIEW

Drainage and Erosion. The nature of the terrain in the study area, with low relief and a high degree of wetlands and bogs, requires extensive consideration be given to drainage problems and flood control for any future development. The erosion of stream banks is of concern.

Water Requirements. The maintenance of adequate quantities of potable water for domestic, agricultural, industrial, wildlife and recreational use may conflict with the operations required for land clearing and drainage in areas under development.

Timber Harvesting. The agencies recognize a need to develop a permanent timber land base to meet industry demands for export lumber and, through implementation and further development of a farm woodlot program, to supply local markets. Greater refinement of the green-yellow area boundary is needed based on an evaluation of timber and agricultural potential. Policy formulation regarding timber disposal and timber holding reservations will help to clarify conflicts in lands being posted.

Forest Protection. The greater accessibility of the public and industry to Crown lands creates the need for increased forest protection including fire control.

Minerals Development. Minerals exploration and production will continue to be of major concern to the west and south of the study boundary, overlapping the Keg River area. There will be an on-going demand for services, transportation networks and labor from the Lower Peace River centers. The potential of major development in the MacKenzie Valley will have more direct impact for service requirements.

Recreation and Conservation. Concerns have been expressed for preservation of areas having potential for recreation or conservation and for the

development of these areas to meet present and future needs of the residents. The following areas have been identified: Wadlin Lake, Hutch Lake, the Caribou Mountains, Vermilion Chutes and several rivers within the study boundary. Additional recreation potential should be determined at more detailed levels of planning.

Habitat Protection. Waterfowl nesting and staging areas and wildlife feeding grounds and winter ranges need to be identified for preservation. The maintenance of a sustained fur harvest population is necessary for the native economy in the area.

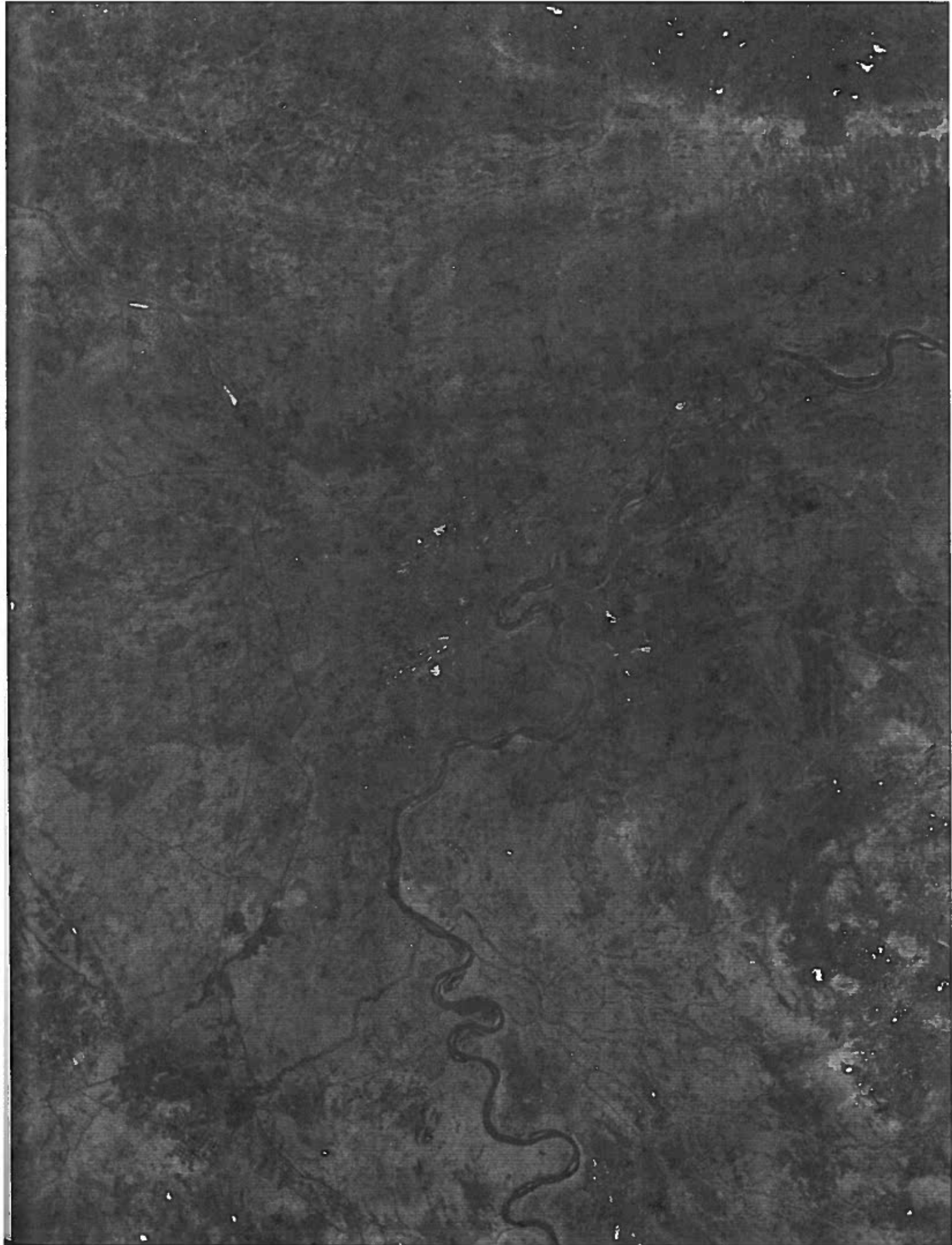
Cultural Preservation. Cultural features of unique value to the area or of historical significance including geologic features, representative plant communities and fur trade routes are identified as significant for possible preservation and interpretation.

Road Networks. Planning for road access in developing areas continues to be a major concern. A land use plan would help to program the funding and scheduling of road construction. The impact of access to newly opened lands is a factor in determining future use, e.g. the Fort Vermilion/Lesser Slave Lake route.

Town Expansion. There is a need for policy in opening land for town expansion, as in the High Level area. This can be directed to help maintain the service base as the communities grow. The Peace River Regional Planning Commission and the Improvement District Administration Branch are responsible for settlement planning and municipal services, respectively.

Labor Requirements. To meet labor requirements, resource industries continually seek more highly qualified personnel. By upgrading skills,

the local native population could fill many of these positions. A larger native role in the labor force could have significant impact on the region in any long-range planning decisions.



2. THE REGION

2.1 Physical setting

Physiography. (Map 4) The Lower Peace River study area is in a wide river valley, the gently undulating Fort Vermilion Lowland Region, and is bounded by the steep sloped uplands regions of Mount Watt and the Caribou Mountains on the north, the Clear Hills to the southwest and the Buffalo Head Hills to the southeast at a height of 760 to 915 m (2 500 to 3 000 ft.). The topography was modified by the Pleistocene glaciation, covering the region with a veneer of unconsolidated glacial, aeolian and recent deltaic deposits. Most of the region is forested or covered by poorly drained muskeg and swamp, except for partly cultivated areas in the lowlands adjacent to the Peace River and MacKenzie Highway.

In the lowlands region, lacustrine deposits of silts and clays laid down by Glacial Lake Peace cover the Loon River bedrock formation, a marine shale and laminated siltstone. Sediments of recent age, aeolian and alluvial deposition, extend along the river valley in the central sector of the study area. The base of the uplands is composed of the Shaftesbury Formation, a marine shale with bentonitic beds and ironstone concretions, which is covered with lacustro-till.¹ Till and residual materials blanket the upper slopes, a structure of marine shales of the Smoky Group overlying a cap of Dunvegan Sandstone.

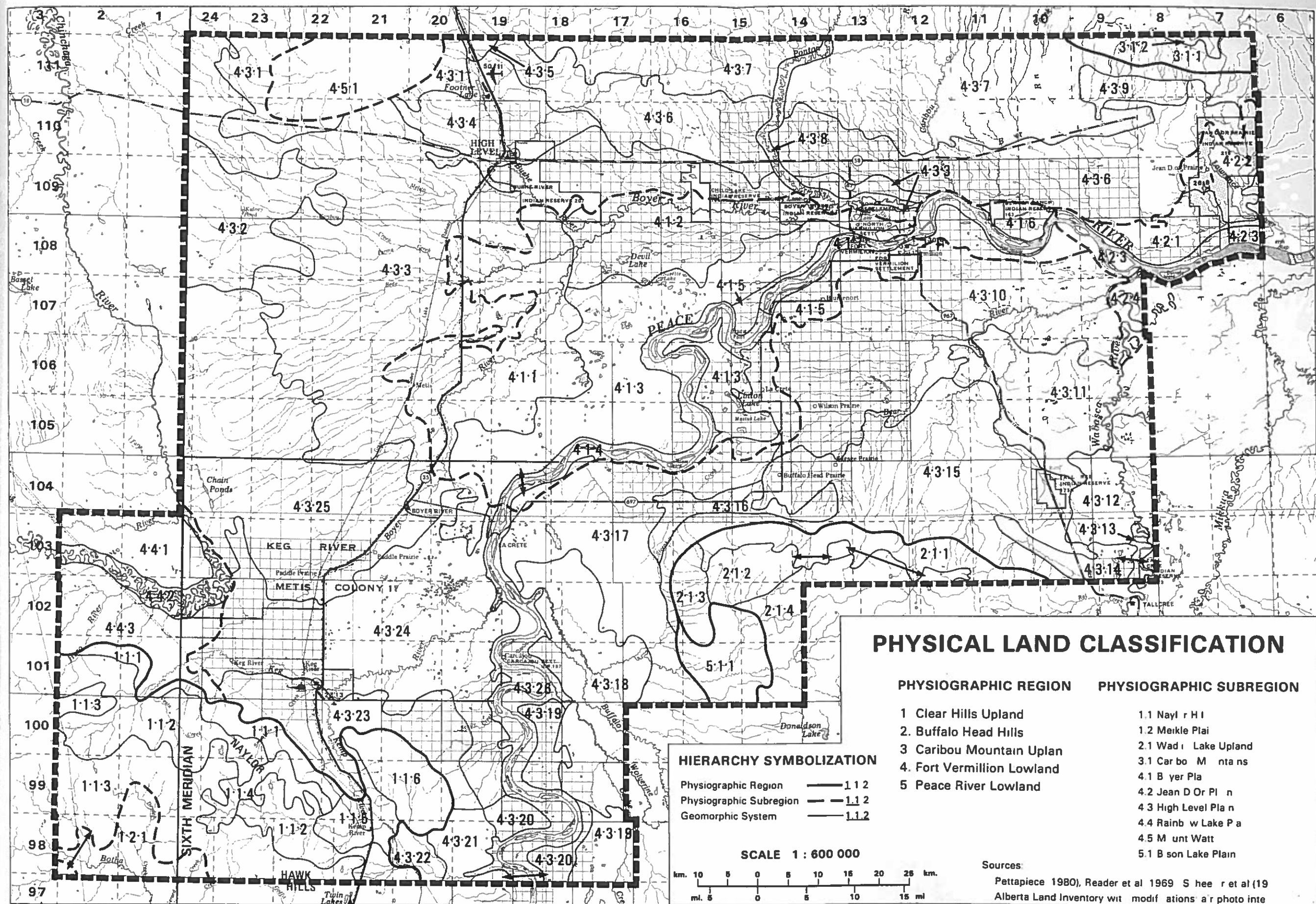
Hydrology. Water Quality and Quantity - Groundwater quality for domestic use is ver poor over most of the area, the waters being mostly of the calcium-magnesium sulfates type with a high total dissolved solids content.

1. The Shaftesbury Formation is prone to large scale slumping and should be identified in land use plans.

Better quality water occur in the sand and gravel deposits along the Peace River and in Dunvegan Sandstones of the upland regions (Map 5). The generally poor water quality is a result of the slow movement of groundwater through fine grained lacustrian-deposited materials in an area of low relief, increasing the total dissolved mineral content.

High yields to sustain community requirements can be expected from sands and gravels within the buried channels (100-500 imperial gallons per minute (igpm)) and from alluvial gravels along the Peace River (25-100 igpm). Paleozoic carbonates have high potential yields as well (Tokarsky, 1972a, 1972b). Safe yields of 5-25 igpm have been assigned to areas of aeolian deposition and to the Dunvegan Formation. Variable yields in the La Crete area from alluvial sands and silts are unlikely to give sustained yields over 25 igpm. Throughout other areas where sands and gravels are not present, yields of less than 5 igpm are likely. Surface water from dug-outs provides the potable supply for most farms.

Drainage Basins - The Peace River basin is the major drainage network for the study area. It flows east into the MacKenzie watershed at Lake Athabasca. The Chinchaga River on the western boundary flows into the Hay River basin to the northwest. The largest sub-basin is the Boyer River system which drains the northwest part of the study area. The channels form a parallel drainage pattern, intermittent and very sluggish on the flat terrain. The sub-basin of Wabasca/Bear River draining the north-facing slope of the Buffalo Head Hills is an area of much concern for drainage-related problems, especially as new farmlands and roads are being developed in the La Crete area. The other sub-basin, the Keg/Kemp River, drains the north slopes of the Naylor-Hawk Hills, an erosion prone area.



PHYSICAL LAND CLASSIFICATION

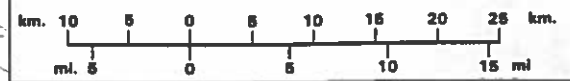
PHYSIOGRAPHIC REGION PHYSIOGRAPHIC SUBREGION

- | | |
|---------------------------|---------------------------|
| 1 Clear Hills Upland | 1.1 Naylor Hills |
| 2 Buffalo Head Hills | 1.2 Merkle Plain |
| 3 Caribou Mountain Upland | 2.1 Wadsworth Lake Upland |
| 4 Fort Vermillion Lowland | 3.1 Caribou Mountains |
| 5 Peace River Lowland | 4.1 Boyer Plains |
| | 4.2 Jean D'Orpion |
| | 4.3 High Level Plains |
| | 4.4 Rainwater Lake Plains |
| | 4.5 Mount Watt |
| | 5.1 Benson Lake Plain |

HIERARCHY SYMBOLIZATION

- Physiographic Region ——— 1.1.2
- Physiographic Subregion - - - 1.1.2
- Geomorphic System ——— 1.1.2

SCALE 1 : 600 000



Sources:
Pettapiece 1980), Reader et al 1969, Sheer et al (19
Alberta Land Inventory with modifications and photo interpretation

MAP 4. PHYSICAL LAND CLASSIFICATION

Map 4. LEGEND: PHYSICAL LAND CLASSIFICATION FOR LOWER PEACE RIVER OVERVIEW

Physiographic Region	Physiographic Subregion	Geomorphic System	Genetic Composition	Surface Expression	Texture	Slope	Soils (Great Group) and Drainage
CLEAR HILLS UPLAND	Naylor Hills	1.1.1	Moraine/Saprolitic blanket over Bedrock	inclined-failing	clay loam/silty clay	6-9%/16-30%	moderately well drained Gray Luvisols
		1.1.2	Moraine/Organic veneer over Glaciolacustrine	rolling/level	clay loam/organic over clay loam	6-9%/0-0.5%	moderately well drained Gray Luvisols/poorly drained Gleysols
		1.1.3	Moraine blanket and veneer over Bedrock	rolling/subdued	clay loam	6-9%/0.5-2%	moderately well drained Gray Luvisols/poorly drained Gleysols
		1.1.4	Glaciofluvial veneer over Moraine/Moraine	undulating	gravelly sand over clay loam/clay loam	2.5-5%	moderately well drained Gray Luvisols/rapidly drained Eutric Brunisols
		1.1.5	Lacustro-till// Moraine	level/subdued	clay//clay loam	0.5-2%/10-15%	moderately well drained Gray Luvisols/poorly drained Gleysols
		1.1.6	Moraine blanket and veneer over Bedrock/Fluvial veneer over Moraine	rolling/undulating	clay loam/gravelly sand over clay loam	6-9%/0.5-2%	moderately well drained Gray Luvisols/rapidly drained Eutric Brunisols
		1.2.1	Moraine = Organic veneer over Moraine	undulating// level	clay loam = organic over clay loam	2.5-5%/0.5-2%	moderately well drained Gray Luvisols=poorly drained Gleysols
BUFFALO HEAD HILLS UPLAND	Wadlin Lake Upland	2.1.1	Saprolite blanket over Bedrock/Moraine	failing	silty clay/clay loam	46-70%	moderately well drained Gray Luvisols/well drained Eutric Brunisols
		2.1.2	Morainal blanket/ veneer over Bedrock/Organic veneer over moraine	subdued/rolling	clay loam/organic over clay loam	2.5-5%/10-15%	moderately well drained Gray Luvisols/poorly drained Gleysols
		2.1.3	Moraine	inclined	clay loam	16-30%/10-15% west facing	moderately well drained Gray Luvisols
		2.1.4	Morainal blanket/ veneer over Bedrock/Organic over Moraine	undulating/level	clay loam/organic over clay loam	2.5-5%/2.5-2%	* moderately well drained Gray Luvisols/poorly drained Gleysols
CARIBOU MOUNTAIN UPLAND	Caribou Mountain	3.1.1	Saprolite blanket over Bedrock	inclined, ridged failing	silty clay	16-30%	moderately well drained Gray Luvisols
		3.1.2	Organic veneer over Moraine/Moraine blanket/ veneer over Bedrock	rolling	organic over clay loam/heavy clay	10-15%	very poorly drained Fibrisols/poorly drained Luvic Gleysols
FORT VERMILION LOWLAND	Boyer Plain	4.1.1	Fluvial//Organic veneer over Glaciolacustrine	level	loam//silty clay loam	0.5-2%	well drained Gray Luvisols//poorly drained Luvic Gleysols
		4.1.2	Fluvial/Organic veneer over Glaciolacustrine	level	sandy loam// organic over clay	0.5-2%	well drained Gray Luvisols/poorly drained Gleysol

Symbols of Proportion (=, /, //)
The relative proportions of the two-term components are approximately:

50-55% = 45-50% (approximately equal)
70-90% // 10-30% (considerably more than)

55-70% / 30-45% (more than)

Map 4. Legend: continued

Physiographic Region	Physiographic Subregion	Geomorphic System	Genetic Composition	Surface Expression	Texture	Slope	Soils (Great Group) and Drainage	
FORT VERMILION LOWLAND Continued —	Boyer Plain	4.1.3	Eolian = Fen blanket over Eolian	subdued = level	sand = organic	6-9% = 0-0.5%	rapidly drained Eutric Brunisols = very poorly drained Organics	
		4.1.4	Fluvial terrace and floodplain/ Colluvial blanket over Undifferentiated	steep	silt loam/ loam	6-9%// 71-100%	moderately well drained Regosols	
		4.1.5	Fluvial	level	sandy loam// silt loam	0.5-2%// 2.5-5.0%	well drained Gray Luvisols//poorly drained Luvic Gleysols	
		4.1.6	Fluvial	level/un- dulating	silt loam/ sandy loam	0-0.5%/ 2.5-5%	imperfectly drained Dark Gray Chernozems//moderately well drained Gray Luvisols	
		4.1.7	Fluvial floodplain	level	silt loam// gravelly sandy loam	0.5-2%	moderately well drained Regosols// poorly drained Gleysols	
		Jean D'Or Plain	4.2.1	Fluvial terrace/ Fen veneer over Fluvial terrace	level	sandy loam/ organics over sandy loam	2.5-5%/ 0-0.5%	moderately well drained Gray Luvisols/ poorly drained Organics
			4.2.2	Fluvial/Organic blanket/veneer over Fluvial	level	silt loam/ organics over silt loam	0-0.5%	imperfectly drained Dark Gray Chernozems/poorly drained Organics
	4.2.3		Fluvial floodplain/ Fen veneer over Fluvial floodplain	level	silt loam/ organics over silt loam	0.5-2%/ 0-0.5%	moderately well drained Regosols/ poorly drained Organics	
	4.2.4		Fluvial floodplain	level	silt loam/ sandy loam	0.5-2%	moderately well drained Regosols/ poorly drained Gleysols	
	4.2.5		Fluvial floodplain	level	silt loam/ gravelly sandy loam	0.5-2%	moderately well drained Regosols// poorly drained Gleysols	
	High Level Plain		4.3.1	Lacustro-Moraine	level/un- dulating	clay//silty clay	0.5-2%/ 2.5-5%	moderately well drained Gray Luvisols/ poorly drained Luvic Gleysols
			4.3.2	Fen blanket over Glaciolacustrine = Glaciolacustrine	level	organic over silt loam = silt loam	0-0.5% = 0.5-2%	very poorly drained Gray Luvisols/ drained Gray Luvisols
		4.3.3	Glaciolacustrine	level	silt loam/ silty clay	0.5-2%/ 0-0.5%	well drained Gray Luvisols/poorly drained Luvic Gleysols	
		4.3.4	Glaciolacustrine/ Organic veneer Glaciolacustrine	level/un- dulating	clay/organic over clay	0.5-2% 2.5-5%	moderately well drained Gray Luvisols/ poorly drained Gleysols	
		4.3.5	Glaciofluvial veneer over Lacustro-Moraine	undulating	gravelly sand over clay	2.5-5%	rapidly/well drained Gray Luvisols/ Eutric Brunisols	
		4.3.6	Lacustro-Moraine	level	clay/heavy clay	0.5-2% 0-0.5%	moderately well drained Solonetz/ poorly drained Luvic Gleysols	
	4.3.7	Moraine	undulating/ level	clay/heavy clay	2.5-5%/ 0.0.5%	moderately well drained Solonetz/ poorly drained Luvic Gleysols		
	4.3.8	Fluvial floodplain	level	sandy loam/ clay loam	0.5-2%	well drained/poorly drained Regosols/ Humic Regosols		

Symbols of Proportion (=, /, //)
The relative proportions of the two-term components are approximately:

50-55% = 45-50% (approximately equal)
70-90% // 10-30% (considerably more than)

55-70% / 30-45% (more than)

Map 4. Legend: continued

Physiographic Region	Physiographic Subregion	Geomorphic System	Genetic Composition	Surface Expression	Texture	Slope	Soils (Great Group) and Drainage
FORT VERMILION Continued —	High Level Plain	4.3.9	Fluvial//Fen blanket over Fluvial	level	loam/organic over loam	0.5-2%	poorly drained Humic Gleysols// very poorly drained Organics
		4.3.10	Glaciolacustrine	level	silt loam/silt clay	0.5-2%/0-0.5%	well drained Gray Luvisols/poorly drained Luvic Gleysols
		4.3.11	Glaciolacustrine	level	clay = heavy clay	0.5-2% = 0-0.5%	moderately well drained Gray Luvisols = poorly drained Luvic Gleysols
		4.3.12	Bog/Fen blanket over Glaciolacustrine/Eolian	level	organic over clay//sand	0-0.5%	very poorly drained Organics// rapidly drained Eutric Brunisol
		4.3.13	Fluvial floodplain	level	silt loam/sandy loam	0.5-2%	moderately well drained Regosols/ poorly drained Gleysols
		4.3.14	Glaciofluvial// Organic blanket over Glaciofluvial	subdued// level	sand// over sand	6-9%/0-0.5%	rapidly drained Eutric Brunisols// very poorly drained Organics
		4.3.15	Organic veneer over Fluvial/ Glaciolacustrine	level	organic over silt loam/clay	0-0.5%	poorly drained Gleysols/moderately well drained Gray Luvisols
		4.3.16	Lacustro-Moraine	undulating	clay/heavy clay	2.5-5%/0-0.5%	moderately well drained Gray Luvisols/ poorly drained Luvic Gleysols
		4.3.17	Glaciolacustrine/ Fen blanket over Glaciolacustrine	level	silt loam/ organics over silt loam	0.5-2%/0-0.5%	well drained Gray Luvisols/poorly drained Organics
		4.3.18	Glaciolacustrine/ Organic veneer over Glaciolacustrine	hummocky	clay/organic over clay	10-15%/0-0.5%	moderately well drained Gray Luvisols/ poorly drained Humic Gleysols
		4.3.19	Eolian = Bog blanket over Eolian	subdued = level	sand = organic over sand	6-9% = 0-0.5%	rapidly drained Eutric Brunisols = very poorly drained Organics
		4.3.20	Fluvial	level	silt loam - sandy loam	0.5-2%	well drained Gray Luvisols//poorly drained Luvic Gleysols
		4.3.21	Glaciolacustrine	level	silt/loam gravelly sand	0.5-2%	moderately well drained Gray Luvisols/ rapidly drained Eutric Brunisols
		4.3.22	Glaciolacustrine	level/ undulating	clay	0.0.5%/2.5-5%	moderately well drained Gray Luvisols/ imperfectly drained Solods
		4.3.23	Glaciolacustrine	level	clay	0.5-2%	moderately well drained Solods = poorly drained Humic Gleysols
		4.3.24	Glaciolacustrine	undulating/ level	clay	2.5-5%/0.5-2%	moderately well drained Gray Luvisols/ poorly drained Gleysols
		4.3.25	Glaciolacustrine	level	clay/heavy clay	0.5-2%	moderately well drained Gray Luvisols/ poorly drained Luvic Gleysols
		4.3.26	Fluvial terrace floodplain//Coluvial blanket over Undifferentiated	level//steep	silt loam// loam	6-9%/71-100%	moderately well drained Regosols

Symbols of Proportion (=, /, //)

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50-55% = 45-50% (approximately equal)
70-90% // 10-30% (considerably more than)

55-70% / 30-45% (more than)

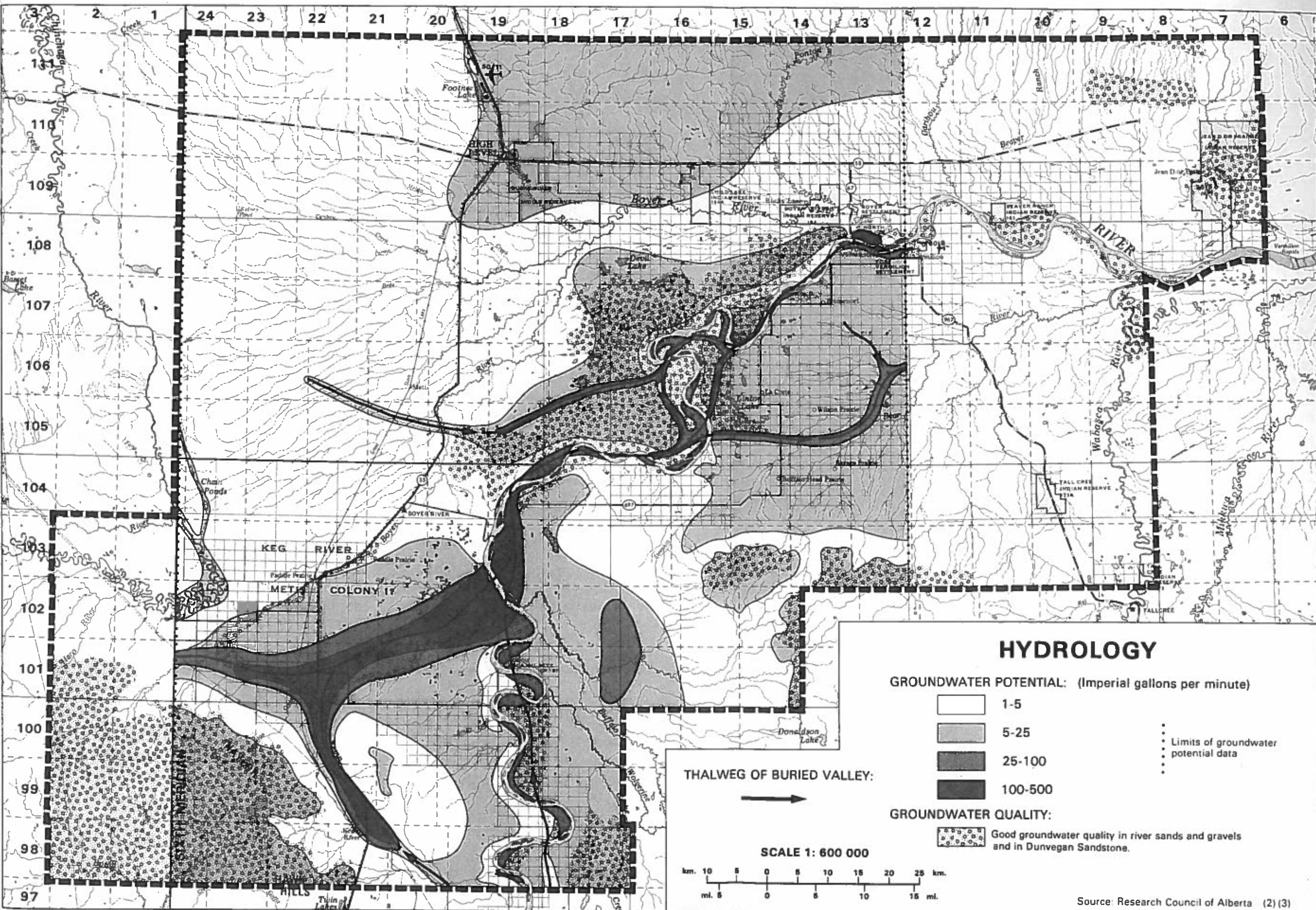
Map 4. Legend: continued

Physiographic Region	Physiographic Subregion	Geomorphic System	Genetic Composition	Surface Expression	Texture	Slope	Soils (Great Group) and Drainage
FORT VERMILION Continued —	Rainbow Lake Plain	4.4.1	Lacustrine-Moraine/ Moraine	level	clay/clay loam	0-0.5%	moderately well drained Gray Luvisols/ poorly drained Gleysols
		4.4.2	Fluvial floodplain and terrace	level	sandy loam/ silty clay loam	0-0.5%/ 0.5-2%	moderately well drained Dark Gray Gray Chernozems/poorly drained Humic Gleysols
		4.4.3	Lacustrine-Moraine/ Organic veneer over Lacustrine- Moraine	level	clay/organic over clay	0.5-2%	moderately well drained Gray Luvisols/ poorly drained Luvic Gleysols
	Mount Watt	4.5.1	Lacustrine-Moraine/ Saprolite blanket over Bedrock	rolling	clay/silty clay	16-30%/ 6-9%	moderately well drained Gray Luvisols
PEACE RIVER LOWLAND	Bison Lake Plain	5.1.1	Glaciolacustrine veneer/blanket over Moraine/ Organic veneer over Glacio- lacustrine	undulating	clay loam/ organic over clay loam	0.5-2%/ 2.5-5%	moderately well drained Gray Luvisols/ poorly drained Gleysols

Symbols of Proportion (=, /, //)
The relative proportions of the two-term
components are approximately:

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55-70% / 30-45% (more than)



HYDROLOGY

GROUNDWATER POTENTIAL: (Imperial gallons per minute)

- 1-5
- 5-25
- 25-100
- 100-500

••• Limits of groundwater potential data

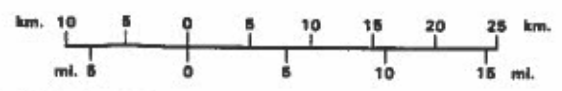
GROUNDWATER QUALITY:

- Good groundwater quality in river sands and gravels and in Dunvegan Sandstone.

THALWEG OF BURIED VALLEY:



SCALE 1: 600 000



MAP 5. HYDROLOGY

Source: Research Council of Alberta (2) (3)

Watershed Problems - According to the Alberta Forest Service three main problems requiring special consideration for land use are slumping, siltation and flooding. Slumping and siltation occur along the banks of the Peace and Wabasca Rivers, in the Mount Watt area and Buffalo Head Hills, and to a lesser extent along the Wolverine and Ponton Rivers and Steep Hill Creek.

Flooding has been a natural occurrence due to shallow gradients and low stream banks. Bear and Bushe Rivers, and Jackpine, Melito and Bear Creeks are regularly inundated. Surface disturbance around these streams will create more extensive flooding and increased erosion. Beaver activity is another contributor to the flooding and poor drainage, especially in the Boyer River and La Crete areas.

Climate. Climate is the most important component of soils development and biomass productivity. The region is in the Boreal climate zone which is characterized by long cold winters and short cool summers. Arctic air masses dominate during the winter, while in the summer air masses originating at lower latitudes or over the North Pacific Ocean are dominant. Major stormtracks do not influence the area and winds are relatively light. The Overview area lies along the southern fringe of the discontinuous permafrost zone. Nearly continuous permafrost is found in the Caribou Mountains.

The low altitude and long photoperiod are the major factors allowing agriculture in such a northerly latitude. Micro and macroclimate values reflecting these differences are solar radiation, growing degree days, freeze free period and precipitation. Recent installation of meteorologic stations in the study area will provide a detailed data base, including soil temperature information for future use.

Solar Radiation - Although the day length during summer is much longer than more southerly latitudes, and the number of hours of bright sunshine is similar, the total energy received is lower, due to the decreased angle of incidence and increased atmospheric attenuation. Radiant energy incident at the surface in July is approximately 10 times that which occurs in December. Orientation of slope is a major factor locally.

	<u>Hours of Daylight</u>	<u>Hours of Twilight</u>
June 21	18.5	6.5
Dec. 21	2.5	1.5

Growing Degree Days (GDD) - This is a measure of the deviation of the mean daily temperature above 5⁰C. Below this temperature there will be little growth in most crops. Fort Vermilion has about 1175 GDD and Keg River approximately 1100. Areas receiving less than 1050 GDD would not be suitable for growth of forages or cereals. Elevations above 450 m (1475 ft.) above sea level have fewer than 1050 GDD.

Mean daily maximum temperatures (Table 1) increase with increasing elevation during winter months. During summer the trend is reversed; the lowest elevations in the Peace Valley have considerably warmer maxima than surrounding hills at midday.

Freeze Free Period (FFP) - The FFP is the number of frost free days between spring and fall. The impact of frost is dependent on the severity at the stage of growth. A killing FFP (base temperature -2.2⁰C) of 80 days is required north of 55⁰ latitude to ripen cool season crops. The Fort Vermilion 30 year mean is 121 days. The light FFP (base temperature 0⁰C) is 91 days at Fort Vermilion, 78 at Buffalo Head

Table 1: Mean Daily Maximum and Minimum Temperatures in the Lower Peace (°C)

		J	F	M	A	M	J	J	A	S	O	N	D	YR.
Fort Vermilion	max	-18	-13	- 4	7	16	21	24	22	15	7	- 7	-15	5
280 masl	min	-28	-24	-17	- 5	3	7	10	8	3	- 3	-15	-24	- 7
Buffalo Head Prairie	max	-16	-13	- 3	7	17	21	23	21	16	8	- 5	-15	5
335 masl	min	-25	-23	-16	- 5	3	7	10	8	3	- 2	-13	-23	- 6
Keg River Ranger Station	max					16	21	23	22	17				
410 masl	min					0	4	7	5	0				
Keg River	max	-15	-10	- 2	8	17	21	23	22	16	9	- 4	-12	6
425 masl	min	-27	-24	-17	- 6	1	6	8	6	2	- 3	-14	-23	- 8
Hawk Hills	max					14	17	20	18	13				
610 masl	min					4	8	10	9	6				
Naylor Hills Lookout	max					14	18	21	19	13				
730 masl	min					3	7	9	8	2				
Battle River Lookout	max					13	17	20	18	13				
730 masl	min					3	7	9	8	3				

Source: Environment Canada, 1973 a

masl - meters above sea level

Prairie and 62 days at Keg River (1941-70). A 98-day mean for the 10-year period to 1975 at Fort Vermilion shows a trend toward a longer FFP. However, future predictions by scientists indicate a climate change which will cause both a shorter growing season and unexpected bad weather during crop production.

Precipitation - A major factor limiting crop growth is lack of moisture. Table 2 shows the influence of local hills on increasing precipitation. July is the month of maximum precipitation; wintertime has minimal. Spring and fall precipitation is quite low which allows access to the land. Soil texture will also affect accessibility. Crop areas with heavy soils will be better able to withstand rainless periods due to water holding capabilities. The low and variable rainfall in the lowest elevations results in severely damaging droughts one year in five.

Potential evapotranspiration rates in the region are low. There is a May-June maximum caused by relatively high winds, long day length, moderate temperatures and low rainfall. Low evaporation during fall inhibits the drying of crops after light rain or heavy dew.

Table 2: Mean Monthly Precipitation (mm) in the Lower Peace

	J	F	M	A	M	J	J	A	S	O	N	D	YR.
Fort Vermilion	20	21	21	17	31	41	62	46	31	22	23	25	360
Buffalo Head Prairie	16	19	22	20	33	51	66	47	36	23	22	20	374
Keg River R.S.*					28	41	64	25	36				
Keg River	22	22	20	20	36	53	59	52	45	21	27	26	
Hawk Hills L.O.*					33	53	114	61	61				
Naylor Hills L.O.*					43	62	64	61	48				
Battle River L.O.					40	72	73	54	42				
Buffalo L.O.					38	79	99	67	57				

* Alberta Forest Service Provided data for 1971 for these areas

Source: Environment Canada, 1975b

Soil Development. Luvisolic (Grey Wooded) soils predominate throughout the study area. They are well and imperfectly drained soils formed under various forest associations. The parent material is neutral to alkaline. Eutric Brunisols are developed on aeolian parent material (the dune area). Soils of the Gleysolic Order develop in the presence of a high water table. They are found in run-off zones of the Naylor/Hawk Hills and Buffalo Head Hills (north facing slope). Solonetzic soils formed from saline parent material occur under grassland or transitional grassland/woodland vegetation. They are extensive at the base of the Caribou Mountains. Organic soils are distributed throughout the area. They are formed under wet conditions and have a surface accumulation of peat.

Plant Communities. Plant communities in the Lower Peace River are differentiated into three major groups: marsh and bog vegetation, grasslands and forest communities (Moss, 1952). Numerous depressions have ponds, swamps, marshes or wet meadows surrounded by reed, willow and alder. They are often flooded in spring but become dry during summer.

Succession is generally from reed swamp through marsh and wet meadow to wooded communities (Figure 2). Other marshes have become boggy and show transition stages to tamarack swamp or bog forest. This is well represented in the plateau of the Caribou Mountains. Mounded topography near Keg River is representative of sphagnum bog development (Moss, 1953). Its cyclic pattern is reflected in the vegetation composition, alternating between dryer mounds and moister depressions.

Many of the shallow marshes have become transformed into grass meadows, an association of *Agropyron-Stipa-Carex* species, as a result of

PLANT COMMUNITY SUCCESSION IN THE LOWER PEACE RIVER REGION

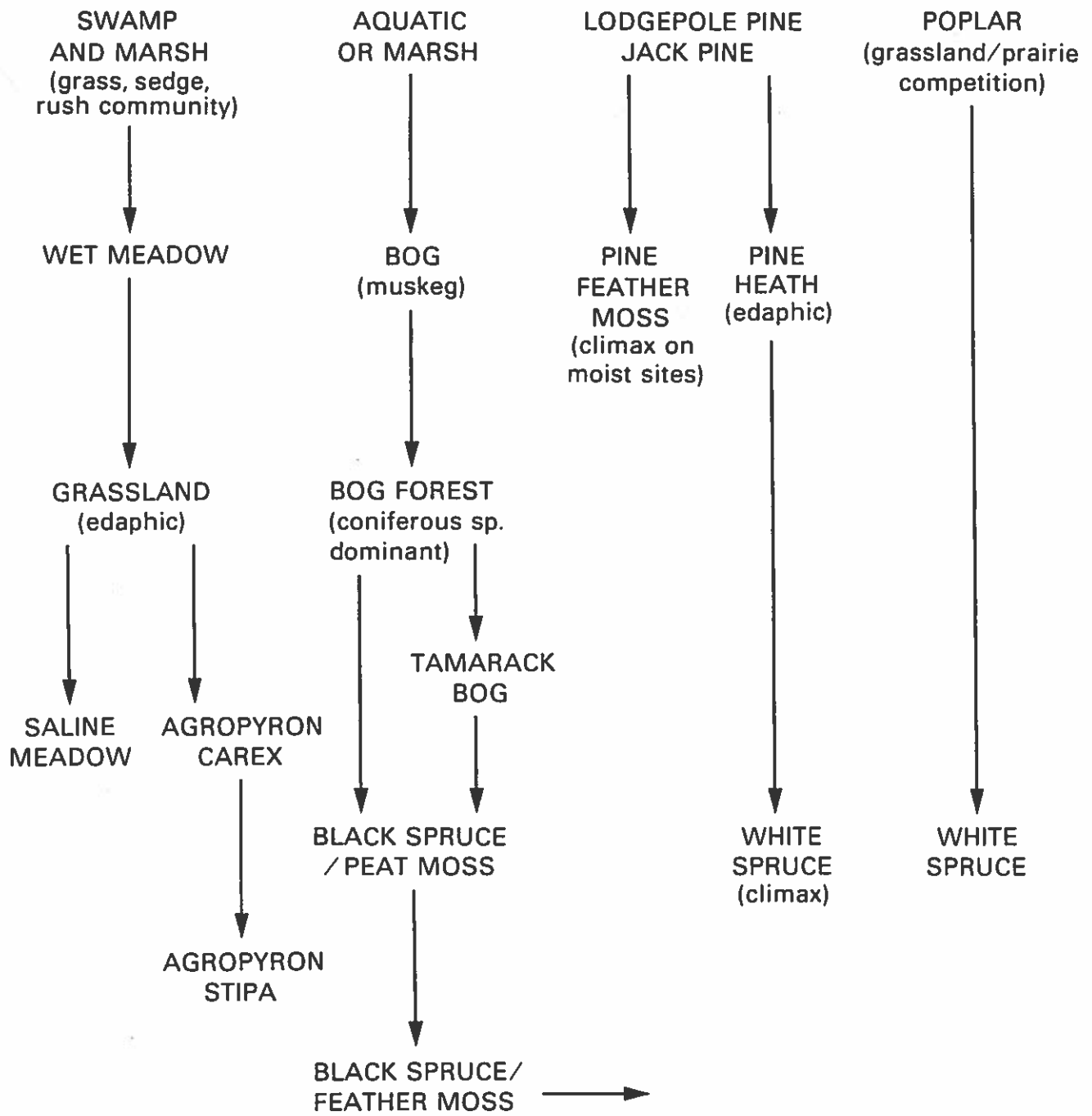


FIGURE 2. PLANT COMMUNITY SUCCESSION in the LOWER PEACE RIVER REGION

the lowering of the water table. Agricultural development in the region relates closely to these grassland areas, which extended over a distance of 325 km (200 mi.) south to north (Map 6). Heavy grazing and drainage change the Agropyron-Carex faciation² to the Agropyron-Stipa type³ and the latter to the Stipa type⁴. Biotic influences such as grazing and controlled burning by the native people maintained the grasslands as an edaphic climax.

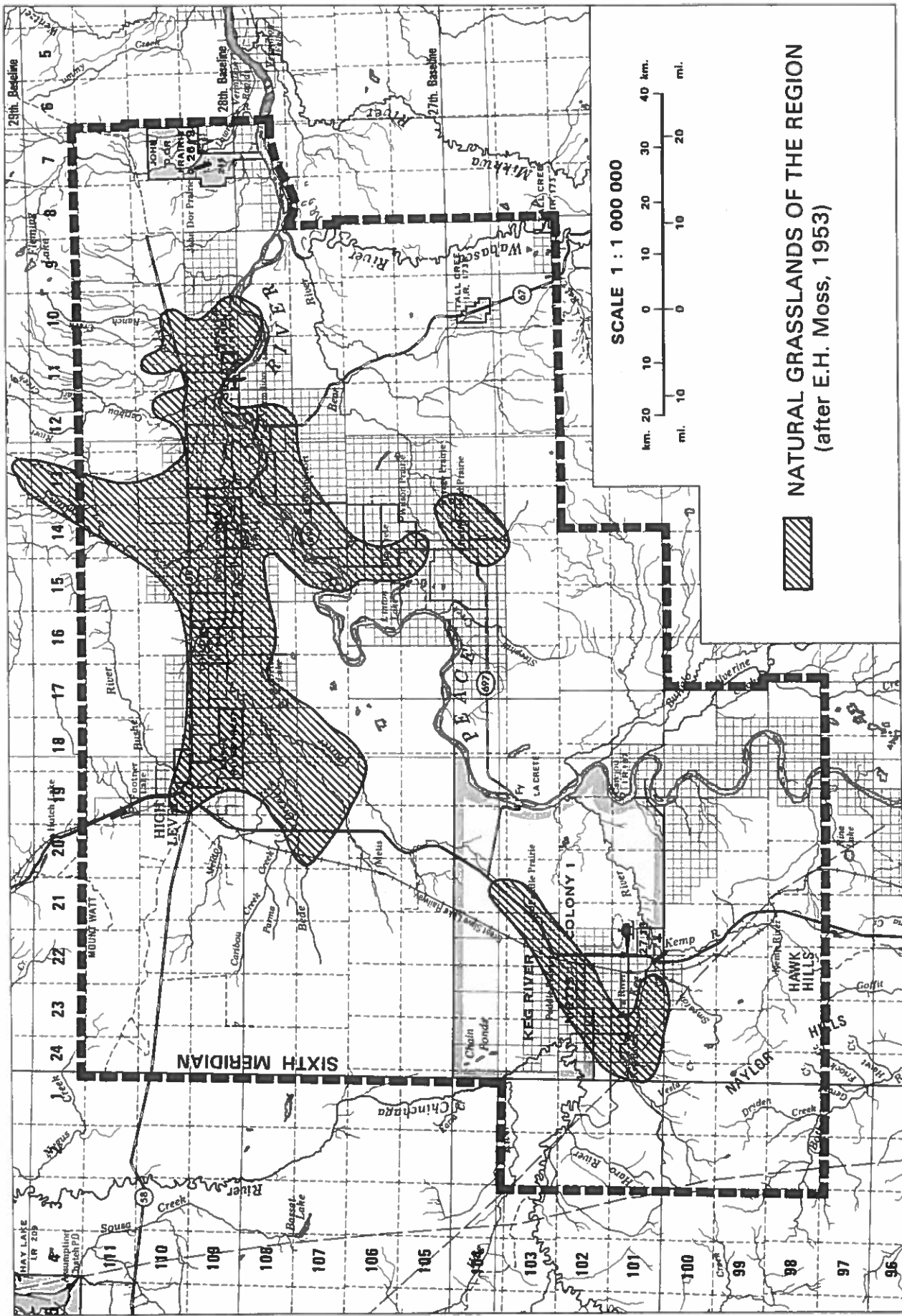
Saline meadows are found in isolated areas. They are often fed by springs and include pools, sinkholes and barren patches and extensive grassy flats. Only the more resistant grasses and sedges grow in such conditions.

Forest Communities. The study area is in a transition zone between the northern forest zone and the prairie. Spruce-aspen complex in association with pine and the less prominent tamarack, balsam fir and paper birch are the dominant forest community.

White Spruce Association - The climax association for mesic sites throughout northwest Alberta, white spruce is the most prevalent. Wildfire is the chief factor impeding development of this climax.

Black Spruce Association - It generally intergrades with the white spruce association or is found as a sub-climax stage of a muskeg sere, maintained by poor drainage and by periodic burning. Black spruce also occurs in pure stands or intermixed with pine as in the Caribou Mountains.

-
2. Found on moist flats.
 3. Has a rolling mesic habitat.
 4. Found on dry slopes.




NATURAL GRASSLANDS OF THE REGION
 (after E.H. Moss, 1953)

MAP 6. NATURAL GRASSLANDS OF THE REGION (after E.H. Moss, 1953)

Larch (Tamarack) Vegetation - This association develops on a peaty substratum as a subclimax stage of a bog sere, which continues in a relatively wet condition. With the growth of sphagnum mounds, conditions become more favourable for black spruce but less suited to tamarack, sedges, etc.

Pine Association - Pine vegetation is found on sandy areas of aeolian deposition. It also occurs on heavier soils in the Hawk Hills area which is dominated by lodgepole pine with a mix of spruce and poplar. The area was severely burned in the mid-twenties, giving a present age of 50 years plus to the pines, which reproduce by seed following the burning of stands. As a pine stand thins out with advancing age, the shade-tolerant and longer living spruce overtop the pine to become dominant.

Poplar Association - The aspen poplar is the most common tree of the region, forming pure stands and also growing intermixed with the other tree species. Balsam poplar occurs on more moist sites such as river flats. In contrast with balsam poplar, aspen thrives over a wide range of edaphic conditions. Poplar and natural grassland are close competitors in the parkland areas. Encroachment of the poplar by suckering has brought about the replacement of some areas. Natural succession of poplar to white spruce is indicated throughout the region.

2.2 Settlement of the area

Indians occupying the Lower Peace River area were of the Athabaskan linguistic root and formed two tribal groups--the Beaver and the Slave. They maintained the prairies of the Hay Lakes and the Fort Vermilion Lowlands by controlled burning, provided forage for ungulates, a major food source.

Expansion of the fur trade westward brought buyers into the area, following the major route of access, the Peace River. Cree Indians, acting as intermediaries, led the traders into the area and occupied lands along the routes. Fort Vermilion became an established fur trading post of the North West Company and later of the Hudson's Bay Company.

Limited settlement had taken place prior to the 1930's when Dutch and German Mennonites arrived in the Carcajou and La Crete areas, and Ukrainian farmers established the Rocky Lane Community. The Mennonites, a group seeking religious freedom, formed the largest ethnic group in the Lower Peace, and to date are second in size only to the Native and Metis who represent 40 percent of the area population in I.D. 23. Settlement of the Metis Association lands at Paddle Prairie took place about 1939 when boundaries were established.

Transportation was by river boat until all-weather roads reached the area in the late forties. With the railhead established at Manning, agriculture commodity shipment increased. The oil boom of 1965 in the Rainbow/Zama district marked a new period of high economic activity in the region. The town of High Level was established as a main service center for the oil patch. Fort Vermilion's role as an administrative and service center for the larger native population and the surrounding

farms has been eroded as emphasis has shifted to High Level as the regional center.

At this time, the Great Slave Lake Railway to the mining town of Pine Point was completed. Elevator facilities established at High Level and Keg River, and road improvements through the farming communities created an opportunity for a commercial farming base to be established.

Population. Growth and Employment. Table 3 demonstrates the population distribution in Improvement District 23.

Table 3: Population Distribution of Regional Centers as a Percentage of the Total Population of Improvement District 23

Total Population - 11 769					
<u>Areas</u> (1977 I.D. 23 Recreation Census)			<u>Towns</u> (1978 Municipal Census)		
	<u>Pop.</u>	<u>%</u>		<u>Pop.</u>	<u>%</u>
La Crete	2 035	17.3	High Level	2 043	17.4
Fort Vermilion	1 950	16.6	Rainbow Lake	<u>806</u>	<u>6.8</u>
High Level Rural	568	4.8		2 849	24.2
Zama Lake	250	2.1			
Rainbow Lake Rural	50	0.4			
Metis Settlement	550	4.7	<u>Treaty Indian</u>	3 124	26.5
Keg River	<u>393</u>	<u>3.3</u>			
	5 796	49.2			

Areas of increasing population are the regional centers of High Level and La Crete, the Mennonite farming district. High Level serves the farm communities to the east, oil and gas industry to the west and the lumber industry within the Footner Lake Forest District. One-third

of the town's employment is in the oil and gas industry, one-third in forestry and lumber and one-fifth in agriculture. The remaining 13 percent is in the administrative and service sector.

High Level has grown by irregular bursts since incorporation under "new town" status in 1966. The increase for the past two years has averaged 13 percent annually. Incoming residents have a strong academic background and special skills to meet the demand for industrial and administrative employment. The character of the High Level community is reflected in the large number of young families of less than 5 years residency.⁵

The La Crete farming belt extends from Buffalo Head Prairie to the north and east toward Fort Vermilion. Continuous growth of the community due to the high birthrate in the Mennonite family has created a need for expansion of the agricultural land base. Farm family size includes an average of five children per unit. The hamlet of La Crete contains 450 residents and is the farm service center and educational center. Hamlet residents comprise two groups: those with an academic background who work in government and education, and the long term residents engaged in business. The needs of these groups are often different from those of the rural areas, especially for recreation and services, which are in higher demand by hamlet residents.

Outside employment and business exchanges in centers such as High Level provide opportunities to the expanding La Crete community. Such contact often challenges established traditions, resulting in

5. This information was drawn from a questionnaire completed by Improvement District 23 residents.

assimilation. Residents of the area have expressed their desire for an I.D. Council which is more responsive to their needs.

Although the birthrate among treaty Indians appears to be decreasing since 1970, the population continues to increase.⁶ From 1976-78 a 6 percent rate of growth was registered.⁷

The Boyer River and Tall Cree Bands and the Dene Tha on the Bushe Reserve are within the study boundary. Location has been important in determining contact and employment opportunities to members of the native communities. Those groups historically involved with the white civilization, the Boyer and Tall Cree Bands, have a higher level of employment than other bands. Barriers which natives face in participating in the work force are lack of low cost housing in High Level, lack of skills, and communication problems. From 80 to 90 percent of the males drop out of school by age 16, allowing little chance for occupational training. Only 50 percent of the native work force are able to find gainful employment. Most employment opportunities are seasonal and for subsistence, e.g. trapping and hunting, reserve work, fire fighting and reforestation. Though there is a good potential for agriculture on Reserve lands, few opportunities have been realized.

A profile of the Fort Vermilion population shows basically long term residents who are either Cree speaking native people or descendents of early settlers. The latter have a high school education and work in the service sector. Short term residents (less than 5 years residency) have a strong academic background and fill the more

6. See age pyramids in "Natives in the Lower Peace", a working paper prepared by the Peace River Regional Planning Commission in 1976.

7. According to information received from the Indian Affairs Office at High Level, Alberta.

specialized service roles. The predominant problem in the settlement is unemployment, affecting the native group most.

Seasonal employment provides supplemental income for almost 50 percent of the farmers, helping to fund capitalization of farm operations. Oil and gas development, logging operations, and hunting and trapping are the major opportunities for part time employment which is compatible with production of agricultural crops during the growing season.

In view of the strength of the oil and gas industry, and the growth of the forestry and agriculture sectors, it is expected that the economy of the region will continue to remain fairly strong. High Level will probably experience increased commercial development and demand for a higher level of services.

Many residents travel weekly or yearly outside I.D. 23 to southern centers in the Peace River or to the larger centers of Edmonton and Calgary for business, supplies and services. Manning is the distribution center for Keg River residents, many of whom identify more closely with I.D. 22. A major emphasis of these movements, apart from the economics of a larger market, is the need for diversity. Shopping, visiting and sightseeing are a form of recreation relieving the feelings of isolation and consequent monotony associated with resource towns.

Community Concerns. Transportation. A major problem in movement of supplies into the Lower Peace River and of resources to southern markets is the inadequate road system. Upgrading of highways to maximum load bearing capacity is a major concern as well as improving secondary roads. Improved service by rail, air and local bus has been requested. The residents find the high gasoline rates prohibitive.

Agricultural Expansion. Many of the early settlers of La Crete, Rocky Lane and Key River areas have children who will farm and request land for expansion of the agricultural base. Problems associated with existing farm operations relate to grain storage and movement. Agricultural expansion would require an increase in grain handling capacity at the railhead including more elevators, improved storage facilities and increased rail shipments. Demand for community pasture by the Rocky Lane settlement will be alleviated by the Provincial Grazing Reserve development in that area. Drainage and land clearing costs are the major problems incurred in agricultural development.

Community Expansion. Housing availability is a basic problem in High Level and to some extent in La Crete and Fort Vermilion. In contrast to farm families who have constructed their own homes, newcomers to the area rent employee housing or occupy mobile homes. Land is not available for building. Construction and material costs are high and taxes are prohibitive. People often do not have the resources either to undertake improvements or to construct their homes.

Residents throughout the area have found water quality unsatisfactory. Improvement to the municipal water systems in High Level and Fort Vermilion has been requested.⁸ Since ground water is chemically non-potable over much of the area, surface water sources are used in many places. Dugouts to collect surface water are more common than wells. In many areas water has to be trucked in. The sand and gravel terraces along the Peace River provide better water quality and could be utilized

8. According to information drawn from questionnaires completed by Improvement District 23 residents

in the future settlement of the area.

Sewage disposal problems occur in areas with poor drainage. Generally, a pumpout system for septic tanks is required, as in the Keg River area.

In conclusion, a municipal water supply and sewage system are crucial considerations to further development of communities in the area.

Recreation. Many of the recreational needs can be met by development of facilities within settlement centers. High Level, which has an industrial oriented base, in contrast to the surrounding rural communities, demands a high degree of recreation oriented services. Access to land-and water-based activities for fishing, boating and camping ranks high among all communities. Picnic and campsites all favored in the farming communities because of the opportunity for large family units to participate. Although the Mennonite tradition does not emphasize recreation, it is beginning to be demanded by the La Crete community.

Development Opportunities. Secondary agricultural processing is the major area of development all Lower Peace River communities would like to pursue. Transportation costs are a deterrent for the cattle industry, emphasizing the need for local meat processing. Grain marketing facilities including feedstock production and seedcleaning plants will be feasible with an expanding agricultural base. Other development recommendations include forest industry expansion (pulpmill, chipboard factory), peat moss production, tourism and decentralization of administrative offices.

Constraints to business expansion, as stated by residents,⁹ are a lack of housing, high taxes, utility and freight costs and distance to markets. The need for skilled labor could be alleviated by local training programs, especially for the unemployed native sector.

9. Based on information drawn from Improvement District 23 resident questionnaires.

2.3 Transportation

Present Use. The Peace River Regional Planning Commission (1976) identified the existing infrastructure as rail, road, air and bus service. Rail and trucks serve basically to move raw resources out. Most of the traffic within the region is generated by automobiles travelling to the regional center, High Level, or to major service centers to the south. There is daily bus service between Fort Vermilion and High Level. Commercial highway traffic and the Great Slave Railroad service northern districts. Lead ore from Pine Point is one of the major resources shipped out of the area. High Level and Rainbow Lake have daily airline service. Two private charter airlines operate within the region to service remote communities such as Fox Lake and Garden River. They provide service for the man air ambulance flights to Edmonton.

Grain delivery is by farm truck to primary elevators and single boxcar shipment by rail to terminals. Commercial trucking and hopper car usage are minimal at present. With production of 9.1×10^6 hL (2.5×10^6 bu.) and boxcars averaging 8000 hL (2200 bu.), 1136 boxcars are required. At present each of the three elevators can handle a four car spot, or 12 per train unit. The Great Slave Lake Railway operates 3 days per week to the Northern Alberta Railways terminal at Roma Junction. This would allow a maximum of 36 carloads per week to be moved.

Swansons ship approximately $4.2 \times 10^6 \text{ m}^3$ ($100 \times 10^6 \text{ fbm}$) of lumber south each year. At 287 m^3 ($60 \times 10^3 \text{ fbm}$) per carload, 1667 loads are required. Maximum capacity is approximately $10 \times 10^3 \text{ kg}$ ($220 \times 10^3 \text{ lbs.}$) per load. As well, 20 truck loads of chips per day (7210 per annum) go to the Grande Prairie Swanson Lumber Company mill.

Cost of transport is one of the major economic factors affecting the market for northern products, especially for grains. Throughput rates apply only to grains travelling all the way on the lines of one railway. Therefore, products such as malt barley which are routed through Calgary on the C.P.R. must travel under different bills of lading, adding to costs. For lumber shipped from High Level to Chicago and points east, the rail differential is insignificant in comparison to rates from other Alberta centers.

Labor. Alberta Transportation has a major maintenance center at High Level employing 30 to 40 people. Additional summer employment provides for increased activity in road maintenance and construction. According to the Nichols (1978) study, "The long term outlook is for little growth in employment with the lower maintenance requirements associated with paved roads ... offsetting the greater number and length of roads in the region..."

Needs. Transportation needs have been defined by residents and by the resource industries. These are summarized as follows:

- Road improvement and maintenance programs including paving of Rainbow Lake to High Level to La Crete and from Keg River to Hwy. 35. Projected costs for upgrading and paving 128 km (80 mi.) to Rainbow Lake are \$18 million and 85 km (53 mi.) from Hwy. 35 north of Keg River to La Crete (S.R. 697) are \$15 million.
- Increased air service to High Level and initiation of service to Fort Vermilion/La Crete. Present airport facilities at High Level and Fort Vermilion are capable of sustaining a higher level of service to meet increased demands.

- Access to lakes and rivers for recreation activities.¹⁰
- Increased rail car availability for grain and timber shipments.
- The road opened to Lesser Slave Lake.
- Need improved local bus service.
- Lower gasoline rates.

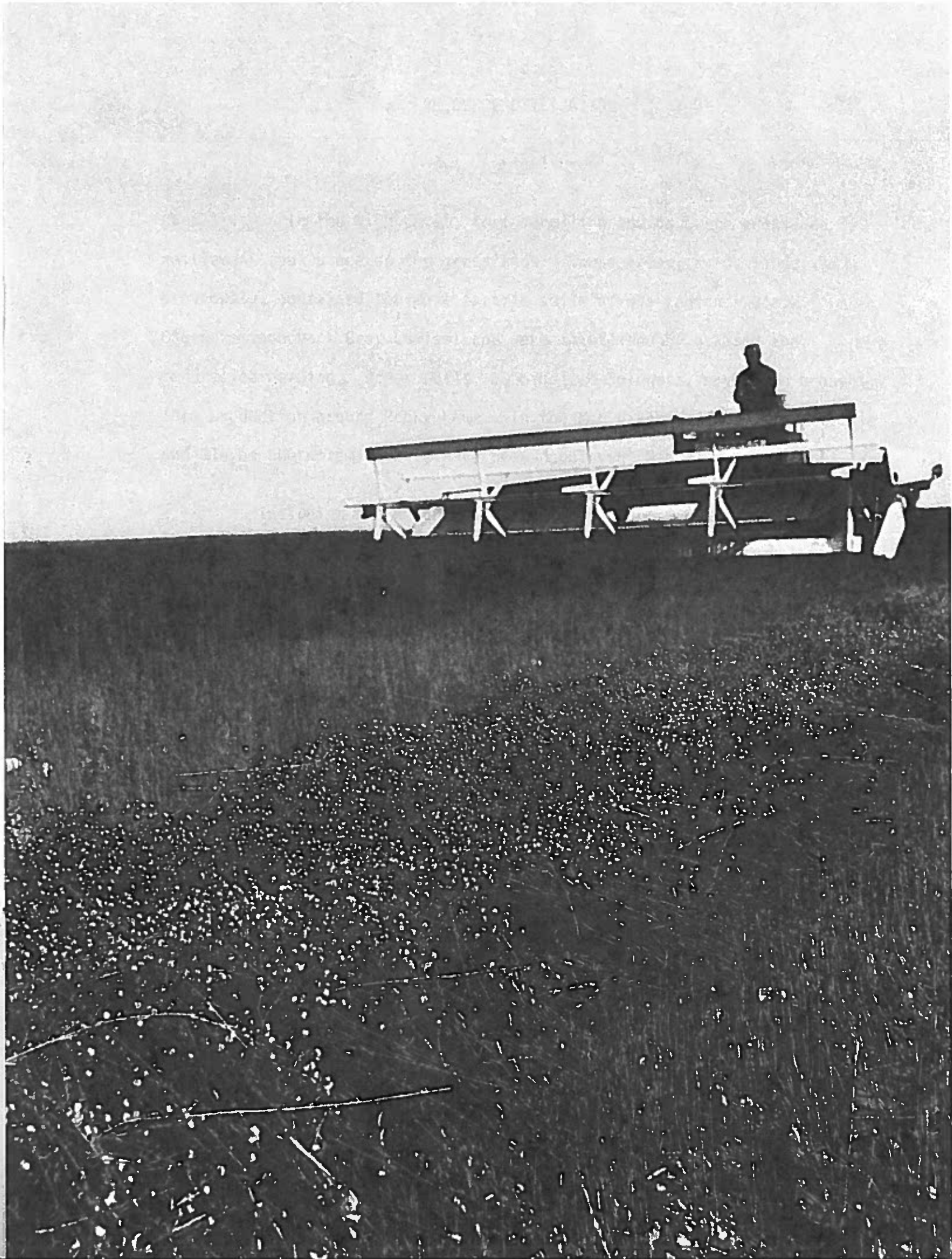
Development Considerations. The following points should be given due consideration in transportation development for the region:

- A recent legal action undertaken by the National Farmers Union against the two major railways highlights the seriousness of the grain handling problem experienced in High Level. Furthermore, an article appeared in the Edmonton Journal on May 12, 1979, and stated: "Railways have failed to supply adequate locomotives and rolling stock to move the required quantities of grain from the primary elevators to the terminal elevators for transshipment overseas." Cancellation of contracts, loss of grain sales and demurrage charges resulted.
- Some of the roads in the Lower Peace River are not structurally built to carry the loading of grain and lumber transports from point of origin to primary elevators. Present limits are 16 000 kg (35 000 lbs) on a tandem axle - considered a normal load. The maximum load allowed on class 1 highways is 50 000 kg (110 000 lbs.) G.V.W. A 75 percent load limit, 37 400 kg (82 500 lbs.) G.V.W., exists for Hwy. 35 north due to light paving from Twin Lakes to south of High Level, and for Hwy. 85 east.

10. For further information, refer to the Recreation section.

- Emphasis on travel as a form of recreation is more important for new resource towns. Alternative travel routes, such as the opening of the road from Fort Vermilion to Lesser Slave Lake, provide opportunities for the residents to have greater access to the environment and to southern communities. An increase in tourism can be expected with improved access to the region.
- The Fort Vermilion/Lesser Slave Lake route cuts 112 km (70 mi.) off the Peace River route. The route is slated to become a major avenue of movement into the MacKenzie Valley. Road completion date was scheduled for 1980.
- In 1980, the transportation budget for I.D. 23 was approximately \$15 million, and represented 19 percent of the total Peace River Region budget of \$80 million. The 19 percent was to go toward construction and maintenance of the MacKenzie Highway, Hwy 58, secondary, and local roads. There will be 18.9 km (11.8 mi.) of base course and paving at \$3.9 million on Hwy. 58 east of High Level, and 11.3 km (7 mi.) of grading at a cost of \$0.8 million on S.R. 697 between La Crete and Fort Vermilion. One million was budgeted for new road construction in the High Level area.
- Opportunities to plan access routes to new agricultural lands can be coordinated in a "block development" approach. Drainage, which continues to be a major problem and cost factor, can also be coordinated in advance to realize economics of operation.

- Road building can be designed to accommodate many different land uses including seismic operations, timber harvesting, forest fire protection, recreation, and utility corridors. Further research into the administrative problems of public use of such roads is required for resolution on the issue.



3. RESOURCE UTILIZATION

3.1 Agriculture

Capability. In the High Level, Fort Vermilion and La Crete areas, early settlement took place on the grasslands. These areas, as outlined previously, contained the most fertile soils of the region - Black Chernozem and Dark Gray Luvisol and were maintained by grazing and controlled burning. Boyer soils, a Solodized-Solonetz, have been brought into production around Rocky Lane. In the Keg River area Gleyed Luvisolic and Gleyed Chernozemic soils have been developed (Map 4).

Including the potentially arable land outside of the soils survey report areas, the total arable land north of Twp. 97 in northwest Alberta would be approximately double the 1.13×10^6 ha (2.8×10^6 a.) of arable land in Table 4. All of the land in the first two categories, with the exception of an area east of Hawk Hills, is under development. A large percentage of the undeveloped arable soils are marginal Luvisolic or poorly drained Gleysolic soils. According to researchers of the Beaverlodge Station, this potential is probably best suited for the production of forages and livestock. Forage crop rotations would be required for successful operations because of the inherent deficiencies of such soils.

Table 4: Arable Land in the Lower Peace River Overview Area

	<u>Good to Very Good</u>	<u>Fairly Good to Good</u>	<u>Fair to Fairly Good</u> hectares	<u>Poor to Fair</u>	<u>Non- Arable</u>
Mt. Watt/ Fort Vermilion	--	107 040	515 720	239 790	983 860
Keg River	<u>2 980</u>	<u>19 460</u>	<u>218 950</u>	<u>44 000</u>	<u>106 940</u>
Total	2 980	126 500	734 670	283 790	1 080 800

Total Arable: 1 147 950 hectares (Poor to Very Good, inclusive)

Source: Alberta Soil Survey #26 and #30.

Conditions constraining agricultural activity are a soils salinity, acidity, drainage, elevation, slope and potential for erosion. Soils of the Solonetzic Order have a shallow profile, a hard pan lense causing problems of root penetration, and high salinity in the C horizon. Poorly drained soils, including the Gleysolic Order and rapidly drained soils of the Podzolic Order, are prohibitive for agricultural development. Lands higher than 550 m (1800 ft.) in elevation are considered constraint areas in terms of agricultural productivity. Prohibitive areas of slope are those greater than 9 percent incline, rough broken areas (streamside) and mounded topography occurring east and west of Peace River in the Carcajou area. Solonetzic soils and soils of aeolian parent material have high erosion potential. Fine textured lacustrine soils are also susceptible to erosion. Organic soils are not considered for agricultural development. The level of significance of data is 1:250 000.

Locations identified at this broad level which show least serious constraints for agricultural development are listed as follows:

- Beaver Ranch to Jean D'Or Prairie
- Bear River area
- South of High Level to Metis Settlement No. 1 (Boyer River area)
- West of High Level
- South of Tomkins Landing Road
- East of Hawk Hills

Existing Uses. Total farm acreage and the number of farms in I.D. 23 have experienced a rate of growth above that for both the Peace River region and Alberta (Hanus, 1979). The ratio of improved hectares to total farm area is lower however (Table 5). The median farm size for all three

areas was under 227 ha (560 a.) and represented 53 percent of the farms in the Lower Peace River area based on 1976 statistics.

Table 5: Improved Hectares Relative to Total Farm Size

	<u>Total Farm Area</u> hectares	<u>Total Improved</u>	<u>Percentage</u>	<u>No. of Farms</u>
I.D. 23	158 066	89 517	55.6	579
Peace River	2 487 468	1 582 611	63	8 120
Alberta	20 039 951	11 790 907	58	57 310

Source: Alberta Soil Survey #26 and #30

A greater proportion of I.D. 23 farm returns, as shown in Table 6, are in the lower economic classes, compared with the rest of the province.

Table 6: Farms by Economic Class, 1976 (Percent)

Value Sold \$	<u>1,200-</u> <u>2,499</u>	<u>2,500 -</u> <u>4,999</u>	<u>5,000 -</u> <u>9,999</u>	<u>10,000</u> <u>and Over</u>
I.D. 23	13	24	24	39
Peace River	12	16	21	50
Alberta	9	13	17	60

Source: Alberta Soil Survey #26 and #30

Sixty percent of the farms sold value less than \$10 000 and 37 percent sold value under \$5000. Farm enterprises are family owned and operated and outside labor is seldom used.

Almost three-quarters of the Lower Peace River farms specialized in crop production in 1976 (Table 7) as compared with all of Alberta with 47 percent in crop production and 44 percent in livestock production.

The difference of emphasis is attributed to the lack of livestock processing facilities, distant markets and longer feeding periods for beef in the Lower Peace River area (Hanus, 1979).

Table 7: Farm Categories

	<u>Crop Production</u>	<u>Mixed Farming</u>	<u>Livestock</u>
	percentage of all farms		
I.D. 23	74.6	11	12
Peace River	75	5.6	17.5
Alberta	47	7	44

Source: Alberta Soil Survey # 26 and #30

Improved rangeland is minimal because I.D. 23 is still a developing area, so that all cultivated land is usually sown to cash crops. Most livestock men use native bush pastures. The federally operated PFRA at Bushe Indian Reserve has approximately 970 ha (2 400 a.) cleared in grazing lease for a capacity of 1000 head. Three hundred head were being grazed there in 1978. The lease will not be renewed this year as the Band intends to develop the land for crops. The Alberta Rural Development Agency has develop a grazing site at Metis Settlement No. 1 with 212 cattle. A program is underway to stock buffalo as a management project. The Grazing Association at Keg River, with eight farmers, has 300 head on a site near Chinchaga River on a 10-year lease period. A Provincial Grazing Reserve is being developed north of Boyer settlement, in the northern half of Twp. 110, Ranges 13 and 14, where 2226 ha (5 500 a.) of a 4047 ha (10 000 a.) pasture are cleared. Identification of other potential grazing lands will help to accommodate future demand levels.

Production. Data of farm acreage, seeded acreage and crop production is compiled by the Canadian Wheat Board for the primary elevators (delivery points) at High Level and Keg River (Table 8). High Level is one of the ten highest delivery points in the province for elevator receipts; it is

the highest ranked for rapeseed production. Major crops seeded are barley (39 percent) and rapeseed (37 percent) which accounted for 76 percent of all seeded crops and 50 percent of all cultivated land in the 1977-78 season. Keg River elevator statistics list 52 percent of land seeded to barley and 32 percent to rapeseed. Wheat ranks third in crop production in I.D. 23 and tame hay fourth. Flaxseed and oats are the remaining basic crops.

Changes in production are reflected in the receipts delivered at the elevators. The throughput ratio represents the ratio of receipts to the elevator capacity. Receipts remained fairly constant at High Level from 1969 to 1972. Since 1973, elevator receipts have continuously increased from approximately 3.2×10^6 hL (9.95×10^3 bu.) to 8.7×10^6 hL (2.5×10^6 bu.) in 1977-78, including overtrack receipts. Elevator receipts have increased 32 percent yearly since 1969. The number of quota hectares has similarly increased at a rate of 7.5 percent yearly.

Increase in production at Keg River is represented by a 28 percent yearly increase in elevator receipts since 1969. Total quota hectares increased at a yearly rate of 6 percent. The lower figures for the 1977-78 season represent both a changeover from barley to rapeseed, which produces few bushels per hectolitres per hectare (approximately one-third as much) and lower quota hectares registered (over 800 ha (2 000 a.) less than previous year). The rate of increase in crop production is greater than the rate of increase of land improvement, due mainly to better farming practices and crop variety improvements. The seriousness of elevator congestion is to be noted in the high throughput ratios--8.42 for High Level and 6.42 for Key River as against the breakeven figure for the province (1977-78) of 3.5.

Table 8: Summary of Primary Elevator Receipts

<u>HIGH LEVEL</u>					
Year	Elevator Capacity (hL)	Receipts (hL)	Quota (ha)	Total Farm Area (ha)	Throughput Ratio (Receipts/Capacity)
1969-70	65 824	273 137	47 443	120 141	3.9
1970-71	65 824	241 356	32 442	112 078	3.7
1971-72	65 824	234 186	58 995	121 860	3.6
1972-73	85 826	329 233	59 295	122 164	3.8
1973-74	85 826	325 495	64 243	128 948	3.8
1974-75	85 826	413 286	63 430	127 137	4.81
1975-76	85 826	384 763	66 278		4.48
1976-77	85 826	718 976	71 699	123 439	8.38
* 1977-78	85 826	722 976	75 258	140 200	8.42

<u>KEG RIVER</u>					
Year	Elevator Capacity (hL)	Receipts (hL)	Quota (ha)	Total Farm Area (ha)	Throughput Ratio (Receipts/Capacity)
1969-70	23 275	52 376	9 309	18 165	2.3
1970-71	23 275	62 988	11 272	19 688	2.7
1971-72	23 275	69 641	11 678	20 467	3.0
1972-73	23 275	79 368	11 501	20 116	3.4
1973-74	23 275	70 749	12 291	21 731	3.0
1974-75	23 275	121 525	11 222	19 026	5.22
1975-76	23 275	113 829	14 308		4.89
1976-77	23 275	198 564	14 736	23 748	8.53
* 1977-78	23 275	149 468	13 820	23 949	6.42

NOTE: Figures from 1970-71 on include perennial forage in Quota Areas.
 New breaking included in 1970-76 Quota Areas.
 Total farm area 1975 for High Level and Keg River is 146 163 hectares

* The open market system came into effect this year. Overtrack receipts were an additional 178 198 hL in High Level and 21 820 hL in Keg River.

1 hL = 2.75 bu.
 1 ha = 2.371 ac.

Source: Canadian Grain Commission

Farmers in the area are totally dependent on the quota system for marketing crops, unlike farmers in south and central Alberta who can rely on feedlots and feedstock processing plants to utilize excess. There is a significant amount of grain hauled out of the area by-passing the local elevators. Forty percent of the rapeseed crop is trucked directly to the Sexsmith Northern Alberta Rapeseed plant. Other surplus grains are trucked south and sold on the open market. Small amounts of rapeseed are trucked south for seed cleaning, as there are no bagging facilities in the area.

Land Values. Average land values reached \$250/ha (\$101/a.) in 1977, representing over a two-fold increase since 1973. For the rest of the province the value increased to \$526/ha (\$213/a.). "The difference in the absolute values of land can be explained by the lower produce sales per farm experienced by the study area farmers, a greater amount of transfers of undeveloped land and a lack of urban pressure which southern centers have experienced" (Hanus, 1979).

The price of uncleared land is \$74/ha (\$30/a.). Clearing costs are an additional \$309/ha (\$125/a.). The Agriculture Development Council is proposing low interest loans for clearing land. A limited number of beginning farmers have qualified for Agriculture Development Corporation loans at 7 percent interest.

Market Factors. World wheat trade has doubled in the past twenty years, to some 72×10^6 tonnes (80×10^6 tons) while trade in coarse grains has increased four times during the same period to 83×10^6 tonnes (92×10^6 tons) (Westdal, 1979). Two main factors responsible for the steady upward growth in demand are the increasing world population, especially in developing countries, and the growth in demand for livestock products in many affluent countries. (1 tonne - 1000 kg)

Trade in wheat has shifted largely from Western Europe to Asia and the Far East. Countries in Asia now account for over half the total wheat imports and the major rapeseed contracts. Rising imports by the Soviet Union and countries in the Middle East and Latin America account for the rest of the growth. In feed grains trading, over half the quantities are imported by Japan, the Soviet Union and Western Europe. These shifting trade patterns place pressure on west coast ports for increased export movements. Expansion of grain handling facilities at the port of Prince Rupert, B.C. is underway to help service this growing market.

Transportation costs as well as international market fluctuations, influence crop and livestock production in the Lower Peace River Region. It is more profitable for farmers to transport higher value crops, such as rapeseed, than lower value coarse grains. Rapeseed, now a major crop in the area, is processed at the new Sexsmith plant (425 km (266 mi.) to the south), which has a 3.2×10^6 hL (9×10^6 bu.) capacity, producing oil and meal for domestic and export sale. As barley is replacing wheat as livestock feed, the increase in the percent of cultivated area seeded to this crop indicates its suitability to the area and its use in crop rotation.

Trends. The following points summarize the condition in the agricultural sector in the Lower Peace River Region:

- Agriculture has been and will continue to be the mainstay of the economy of the region.
- The farming in the region is characterized by farmland development, new farm creation and farm consolidation.

- The value of farmland, even though it is lower than the provincial average, has been steadily increasing in the region.
- Growing cash crops, rapeseed and barley mainly, is the main specialization of the area's farmers.
- Availability of off-farm job employment opportunities in the construction, hydrocarbon and forest industries provided for speedier development of farms and easier entry into agriculture in the region.
- Continuous improvements of the transportation network provide an essential element in the creation of commercially viable farm industry in the area.

Agricultural Development Projections. Those areas providing opportunity for agriculture have been given priority for development as follows:

1. Bear River/Jean D'Or Prairie Area.
 - a) On the south side of the Peace River, the area extends east to Wabasca River, south to Tall Cree Indian Reserve (27th baseline) and west paralleling the road to the Fort Vermilion settlement.
 - b) On the north side of the Peace River the area fronts on Beaver Ranch Creek, then extends north along the road and east to Jean D'Or Prairie Indian Reserve.

These areas represent the largest block of agricultural potential within the study area and are recommended for a detailed planning study. Land claims by the Boyer River and Tall Cree Bands are pending on some of this land and may affect future disposition.

In the Bear River area, the soils are mainly Luvisols with Gleysols (Map 7a). There is commercial timber potential, especially along the rivers and streams. Concerns for recreation and wildlife potential have been expressed (Map 7b). A future detailed study would have to weigh the benefits and net returns before any allocation of land is made. (See Maps 7a and 7b overlays in pocket).

The northern sector includes 33 400 ha (84 000 a.) of Boyer soils, a Solonetz-Solod, which will require special management practices. The most feasible development on this soil type is mixed farming. There are no conflicts with forestry resources in this area. An ecological site has been designated in the Beaver Ranch area, fronting on the Peace River.

Both of these areas have access by major road networks--the Hwy. 58 extension to Jean D'Or Prairie on the north and, on the south, the all-weather road from Fort Vermilion to Red Earth and Lesser Slave Lake scheduled for completion in 1980.

2. The Boyer River Area

The area extends east to the sand dunes area which is bounded by the green area, south to Metis Settlement No. 1 (27th baseline), west to the great Slave Railway and north to the settlement area (28th baseline). Culp and Davis series, notably Luvisol soils, are cut by intermittent drainage channels. This area is basically in the yellow area; it has no timber potential. The Steen and Boyer gas fields underlie the western side. Because of the number of drainage channels, there is a very high beaver population to the eastern edge which produces the highest earnings for fur trapping for the region. The land is adjacent to Hwy. 35 north and

in close proximity to the High Level delivery station. Major costs involved in development would be for channelling drainage and building bridge access. In view of these factors, no action is presently proposed.

3. East Hawk Hills Area

The area east of Hawk Hills is bounded on the east by the Peace River, on the south by the study boundary line, and by the green area fronting the Hawk Hills on the west. Drainage problems are caused by run-off from Hawk Hills. Soils are formed on parent materials of lacustrine and alluvial and aeolian deposits, with fairly good agricultural potential in some areas. Timber potential in the P01 Management Unit occurs on river bends. The site is in close proximity to Keg River delivery station but problems of access exist. No further studies are recommended at this time.

4. Area West of High Level

The area includes Twp. 110, Ranges 21 and 22, adjacent to Rainbow Lake Road. Development of this area would be more restricted. Merchantable saw timber bounds these townships. Agricultural development would cause increased potential for forest fires. Run-off from Mount Watt and spring seepage at the base causes drainage problems and increased costs for development. No future studies are proposed for the development of the area at this time.

5. East Carcajou Area

The area includes Twps. 102 and 103, Ranges 17 and 18. This area has already been identified for development and is in the process of being posted. Road access is presently under construction. The area's potential is with the luvisolic soils (Davis), covered with aspen vegetation and some

coniferous timber pockets to the east and west border, providing opportunities for a permanent woodlot base. No detailed planning study for this area is proposed since it is already under development.

6. Other Areas

A limited land area west of Keg River within the study area, has some potential, but increased elevation and drainage problems due to run-off from Naylor Hills will restrict productivity. Extension of existing settlement by incremental units is possible. There are limited opportunities to extend the agriculture settlement area east of High Level, north of Hwy. 58. Land south of the Bushe River Indian Reserve is presently being posted. There is virtually no land with potential remaining on the east edge of the La Crete community.

Table 9 provides statistics on the total potential land for agricultural development in each of the six areas. Total potential land refers to those areas where soil conditions pose no severe constraints for agricultural development. Improved land represent 56.6 percent of the total potential land area, the existing ratio of development in the Lower Peace River region. Farm units contain 259 ha (640 a.) of improved land, the area required for a viable farm operation to produce a net return to the land.

Table 9: Agriculture Development Potential for Six Areas in the Lower Peace River Region

Area	Total Potential Land	Improved Land	Farm Units
	(thousands of hectares)		
1. Jean D'Or Prairie Area	44.3	25.0	96
Bear River Area	49.9	28.2	109
2. Boyer River Area	40.9	23.1	89
3. East of Hawk Hills Area	23.2	13.2	50
4. West of High Level	14.4	8.1	31
5. East Carcajou Area	13.8	7.8	30
TOTAL	186.4	105.3	405

: Preliminary estimates only

Issues Identified. Marketing, transportation and storage are major considerations affecting the agricultural economy. Distances to markets are significant for livestock movement (Grande Prairie and Edmonton), for dairy products (Peace River) and for grain hauling (High Level, Keg River or points beyond). Bottlenecks at the delivery points have restricted market opportunities for farmers. Inadequate storage space to accommodate various kinds and grades of crop receipts as well as an insufficient number of grain cars and orders are the contributing factors. With improved acreage increasing each year and productivity of crops increasing at a greater rate, delivery problems will continue to worsen. Easier access, lower haul costs and increasing market opportunities through Prince Rupert where a 36.4×10^6 hL (100×10^6 bu.) grain terminal is being planned, will have a positive impact on crop movements through the entire Peace River Region.

The establishment of additional grain terminals with seed cleaning facilities in conjunction with a feedstock processing mill is a priority for agricultural communities in the region. A proposal by the Peace Agra Co-op Group, "A New Generation Concept for Crop Handling Stations and Transportation," has called for a crop handling station at High Level and two satellite stations at points east to provide a receiving and transfer ability to the High Level station for conditioning, storage or sale. Other agricultural processing facilities required are for livestock and dairy, to service local markets and those farther north. The stringent regulations required for such operations and the financial backing necessary are basic problems to be resolved.

Factors associated with opening new land are costs of services and land management practices.¹¹ Incremental openings on the edge of existing development areas are often costly and difficult to service. The alternatives to the present edge-opening system are to prohibit any further development or to open large blocks of land (Carcajou Research Ltd., 1977). This latter system would allow interagency cooperation to establish a development plan sensitive to the natural land characteristics and is being adopted by Energy and Natural Resources.

11. For examples, roads, schools, communications, utilities and social services.



3.2 Forestry

The Lower Peace River Region study area is within the Footner Lake Forest and the northern part of the Peace River Forest. The vegetation complex as mentioned previously is the spruce/aspen community, representative of the Mixed Wood and Hay River Section of the Boreal Forest Region (Rowe, 1972). Productivity in the Boreal Zone is generally lower than in the Central and Subalpine Forests, but a large percentage of the productive forest consists of merchantable timber.

Existing Use. Swanson Lumber Company is the largest timber operator in the region. In 1977, the company commenced operation of a new highly automated sawmill complex. The annual allowable cut to support the mill, 419 562 m³ of timber, must be harvested mainly during winter months due to poor ground conditions such as muskeg, high water tables, and soft and unstable ground. Each logging operation requires 65 000 to 85 000 m³ per winter season, cut to achieve maximum efficiency of cost vs. volume. Timber harvesting operations are within 240 km (150 mi.) of High Level. Swanson Lumber is the major contractor for quotas for Little Red River Sawmills at Jean D'Or Prairie, I.R. 215 (30 030 m³ annually) and for Zama Sawmills Ltd. at Assumption, I.R. 209 (32 604 m³ annually).

Harvestable timber for market is white spruce, mainly from north facing river valleys, islands and mountain slopes. Utilization of 20.3 cm (8 in.) stump and 12.7 cm (5 in.) top diameter is now standard. The dressed lumber is shipped to the Eastern U.S. by rail (257 m³ per carload). Residue is chipped and delivered to the Procter and Gamble pulp mill in Grande Prairie at a rate of 54 000 bone dry units annually (1 B.D.U. = 1090 kg).

The company recently completed an extension to the sawmill to produce studs from the smaller pole-sized timber (20.3 cm (8 in.) dia. min.). This will employ 30 people, adding to the 200 fulltime jobs at the mill complex. One more shift of 50 employees was scheduled for the 1978/79 season.

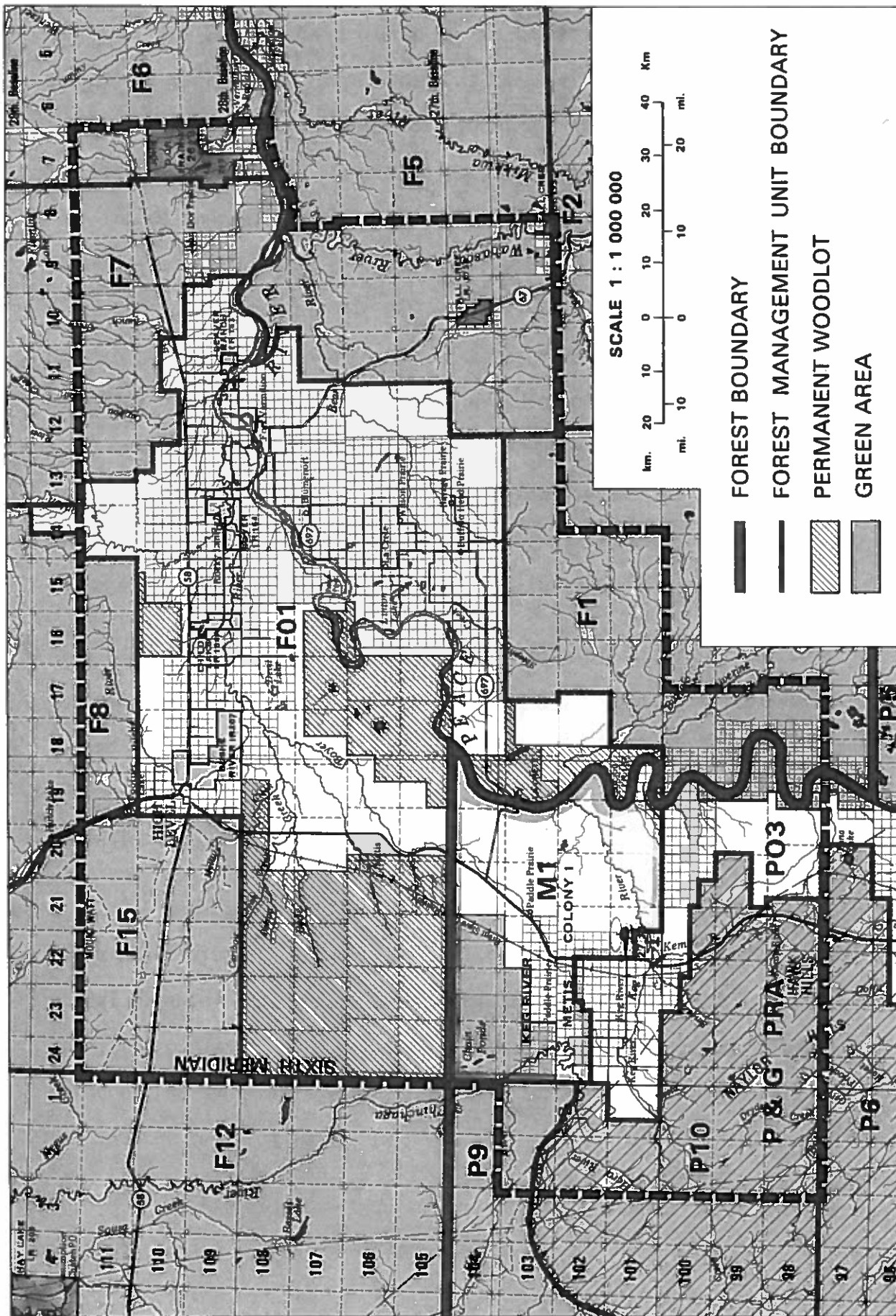
The study area includes parts of six Forest Management Units (F.M.U.) within the Footner Lake Forest and parts of three within the Peace River Forest (Map 8). Table 10 is a summary by Forest Management Unit for Footner Lake Forest.

Table 10: Footner Lake Forest Coniferous Timber Resources

(Annual allowable cut is based on 120 year rotation age)

Forest Management Unit	Total Sawlog Within Study Area (m ³)	F.M.U. Capability (AAC in m ³)	Committed Volume for Timber Dispositions in R.M.U. ₃ (AAC in m ³)	Percent of R.M.U. Growing Stock Within Study Area Boundaries
F01	193 050	26 813	nil	100
F1	602 409	15 409	nil	70
F5	933 435	25 740	25 740	53
F7	478 803	13 299	13 299	73
F8	159 449	114 114*	114 114	7
F15	912 777	42 900*	42 900	57

* Based on an accelerated annual allowable cut in order to remove decadent and overmature growing stock quickly. This cutting rate cannot continue after 1986 and will be reduced to a normal annual cut at that time.



MAP 8. ALBERTA FOREST SERVICE MANAGEMENT UNITS

The F01 management unit has an important significance in the overall timber resource development of the Overview area, as it provides the major supply of timber for both local use and small commercial timber operations. The current Forest Service F01 Timber Management Plan has designated six compartments within the F01 unit. Four of these compartments are managed on a sustained yield basis, including the western compartment (Twp. 105-108, Rge. 21-24, W5M) which is administered by the Public Lands Division. The Alberta Forest Service is seeking to have this area transferred to their jurisdiction. The remaining two compartments are for timber liquidation in potential agricultural expansion areas. Timber is sold through the issuance of local and commercial timber permits with no volume committed under timber quota. In recent years, demand for large permits (over 64 m³) has exceeded supply.

Within the F1 unit, the annual allowable cut is to be committed through the issuance of local and commercial timber permits to meet demand by local residents and smaller timber operators. The proximity of the Management Unit to settled areas results in pressure for agricultural expansion into the green area.

The F5 and F7 management units are managed on a sustained yield basis with all productive areas required to maintain their stated annual allowable cut for coniferous timber. Should a portion of the committed productive timber base of either F.M.U. be removed, there would not be sufficient volume remaining to sustain the annual allowable cut for the quota periods.

Within management units F8 and F15, the annual cut has been accelerated due to the necessity of reducing the high volumes of decadent

and overmature growing stock. Reduction of the permanent forest land base combined with the present accelerated cut will result in a greatly reduced allowable annual cut for the next 20-year period. In management unit F8, this reduction in annual allowable cut could result in complete halt in harvesting by 1986.

The P03 Forest Management Unit within Peace River Forest supports two commercial timber permits with a total volume of 12,921 m³, within the study area. One local timber permit has also been issued in this area.

To date, there has been no utilization of timber in the P9 unit. In the future, timber in this unit is to be allocated for small commercial timber permit sale to meet local use demands.

The portion of Forest Management Unit P10 which is within the Overview area is part of the provisional reserve area of Procter and Gamble Cellulose Company of Canada Ltd. They have until 1985-86 to exercise their option to begin timber harvesting operations within this area. There is also a timber quota for sawlog material within the area with an allowable annual cut of 25 740 m³.

The M1 Forest Management Unit contained in Metis Settlement No. 1 is administered by the Metis Development Branch of the Alberta Government. However, the Alberta Forest Service will assist in timber management planning. Some harvesting operations to supply local and regional demands involve an estimated annual cut of approximately 8580 m³. In order to provide better utilization of timber supplies and to incorporate sustained yield management, a community farm woodlot is planned.

Reforestation. Reforestation programs carried out in the Overview area are restricted primarily to green area timber dispositions. The normal reforestation policies apply to all cutovers. Additionally, an afforestation program funded from the Alberta Heritage Savings and Trust Fund is being implemented and included 795 ha (1965 a.) in forest management unit F7 and 971 ha (2400 a.) in P10 during 1979. These programs continued in F7 and P10 during 1980 and will continue to program completion in 1986. The total area to be afforested in each unit will depend on suitability of the land. All afforestation programs will go through the normal referral process and will also be submitted to the Resource Integration Committee for comments prior to commencement.

Development Projections. As other forested areas in the province become committed through the establishment of timber development areas, and as the timber in the northern regions of the province matures, a greater interest by forest product companies will be evident. Low productivity (slow growth) in this region and the remoteness of stands have meant higher costs of extraction and transportation. There is a significant amount of immature timber in the Overview area. However, some of this timber must be considered as growing stock to sustain existing timber operations. Large scale Timber Development Areas proposed in the Overview area will be for the Fort Vermilion and the Peace River Regions.

Hardwood utilization in Alberta is currently operating at a small scale in relationship to the volume available. Major problems in hardwood usage are due to short fibre characteristics, extra weight, defects and subsequent delivery costs.

The trend toward large automated mills requiring a smaller and better trained work force will predominate in the industry at the expense of smaller labor-intensive mills, which often employ native people. The opportunity for the establishment of smaller mill operations must remain, however, to supply local and regional requirements.

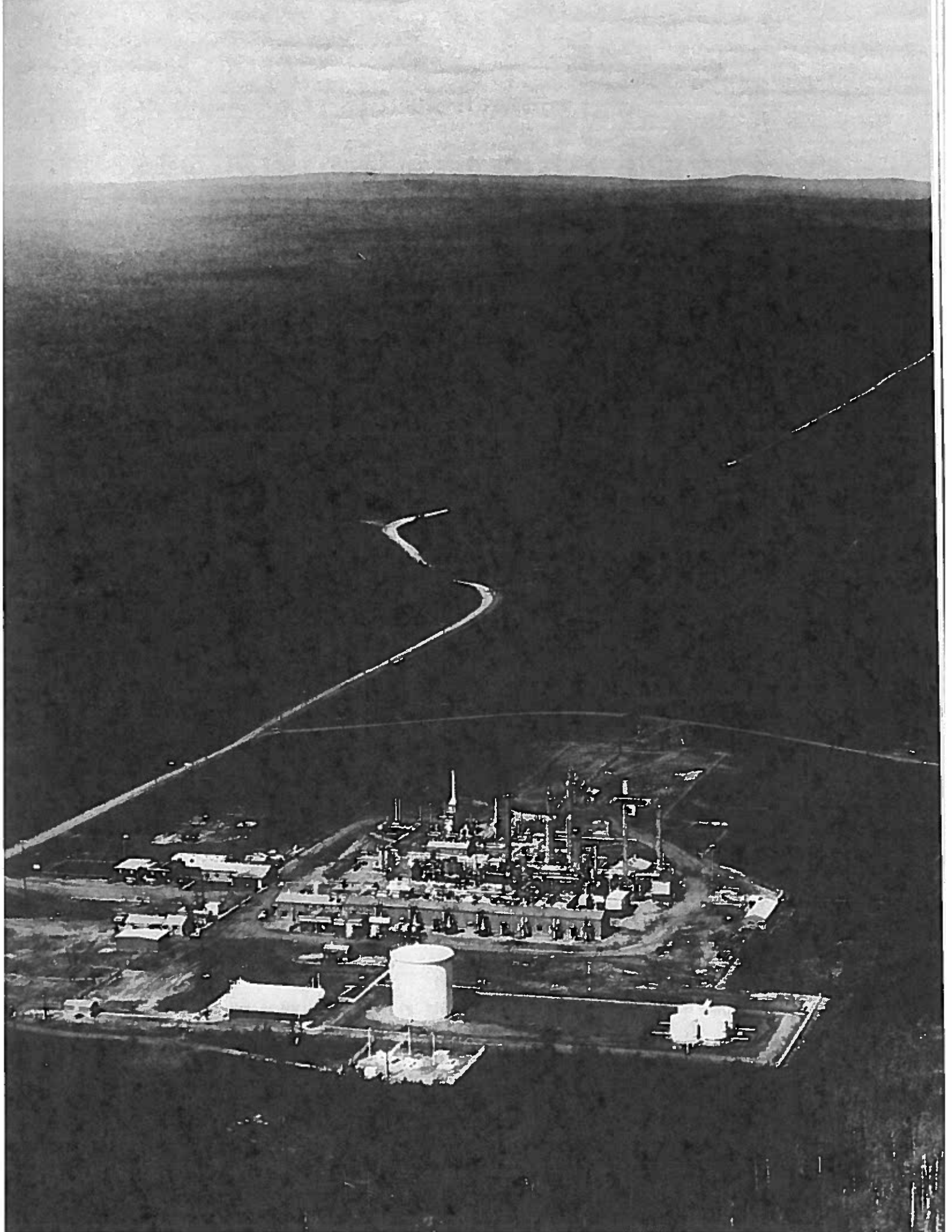
The stud mill addition to Swanson Lumber at High Level provides 30 prime sector jobs for the community. The impact from this expansion, based on multiplier factors for induced employment, will result in total employment of 89 and a population increase of 256. Most of this increase will be concentrated in High Level. Increase in seasonal logging employment will result in about 40 new positions.

The labor demand will be for a higher skill-level employee and a reduction in non-technical people. At present, Swanson has to import skilled labor for its mill operations. There is opportunity, however, for some employees to receive training within the company. Many rural people may find work in the forest industry less accessible because of the large scale operations being centered in High Level.

Management Concerns. There are a number of concerns related to the utilization of the forestry resources in the area:

- Concerns have been expressed by residents and by the Alberta Forest Service regarding timber availability to provide opportunities to independent operators and to meet local market demands.
- Land clearing and improvement for settlement expansion is a major cause of fire in the FO1 unit. There is a need to investigate the possibility of a progressive land clearing system to reduce the number of fire-related incidents.

- The Alberta Forest Service has expressed a concern to maintain permanent management unit boundaries to avoid decreasing the annual quota production.
- The Alberta Forest Service has identified the need for defining the roles of other agencies responsible for watershed management.

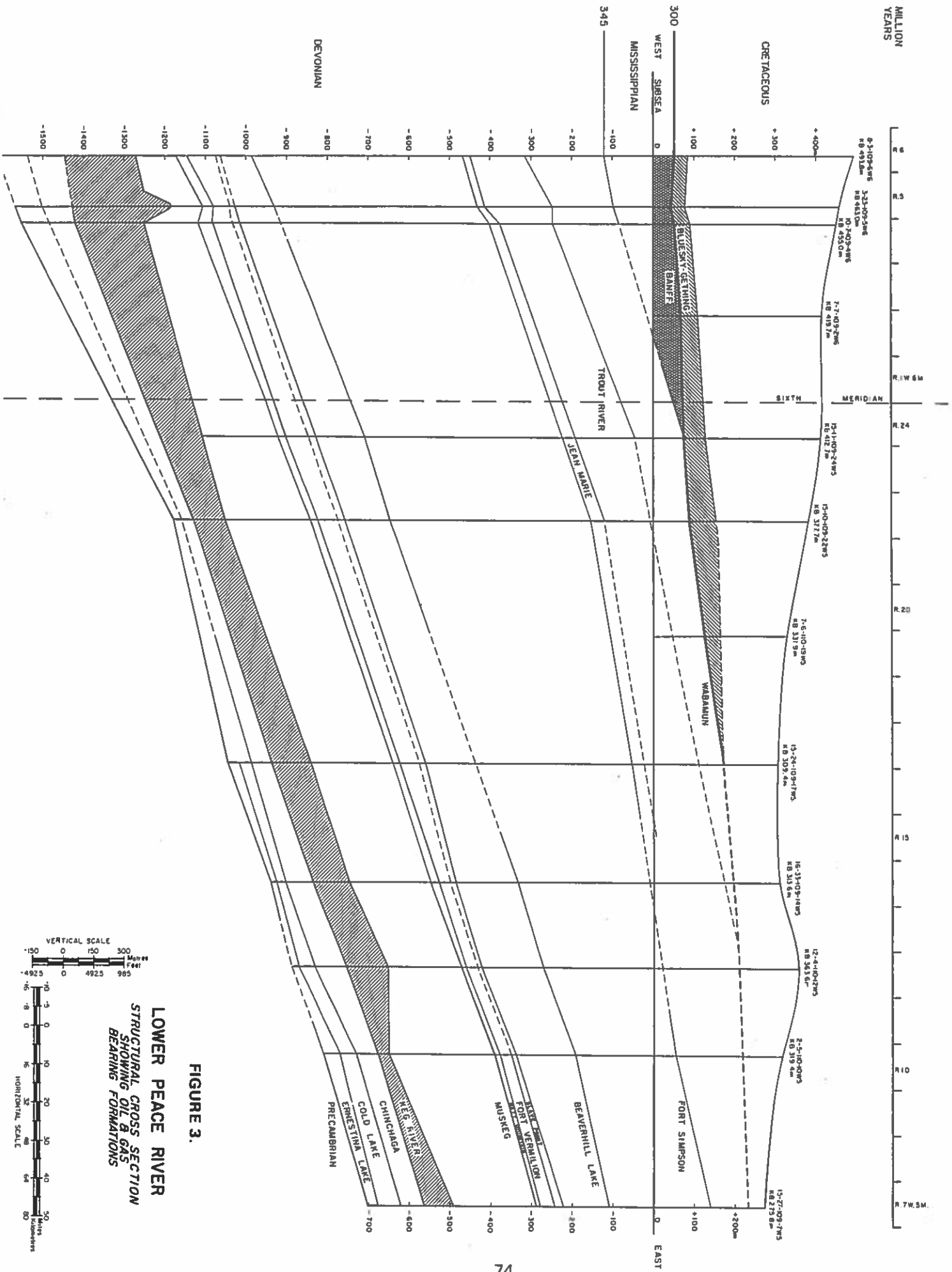


3.3 Mineral Resources

Geology. The Lower Peace River study area is underlain by formations of the Upper and Lower Cretaceous age, which dip to the southwest at 2m/km (10 ft./mi.). The Cretaceous was laid down during a period of subsidence 65-100 million years ago and is composed largely of marine shales, shoreline sands and deltaic sands. The Bluesky-Gething Formation, which contains the primary gas reservoir underlying the study area, represents the early period of this deposition (Figure 3). Water production is widespread throughout the field areas, but is locally variable. Water production is highly dependent on such factors as depth of completion, production rate, porosity-permeability and degree of fracture (Williams, 1979).

The base of the Lower Cretaceous Formation rests with slight angular unconformity on eroded Paleozoic rocks of the Mississippian and Devonian Formations. They dip to the southwest at 6m/km (30 ft./mi.), overlaying the granitic Precambrian base which subcrops approximately 183 km (114 mi.) to the east of the study area. The shales, carbonates and clastics of the Mississippian Formation were deposited in a warm extensive interior seaway. The Devonian sediments are largely carbonates and evaporites deposited in a warm, often saline environment. The pinnacle reef development of the Rainbow-Zama oil fields was laid down during this time.

Gas Reserves. Natural gas is the primary mineral resource underlying the western portion of the study area (Map 9). The Bluesky-Gething Formation contains most of the known resources of the Steen, Boyer and Haro fields, though the Mississippian has some potential. The deposits



LOWER PEACE RIVER
STRUCTURAL CROSS SECTION
 SHOWING OIL & GAS
 BEARING FORMATIONS

FIGURE 3.

extend west to the Rainbow Lake area (32 km (20 mi.)). The Bluesky is a fine to very fine grained, subangular, poorly to well sorted, clay bearing quartz sand. The content of clays ranges from 2.5 to almost 20 percent, of which a large portion is glauconite or illite. Subsurface depth ranges from 183 m (600 ft.) to 488m (1600 ft.). Thin streaks of conglomerate are present in various areas.

Table 11 contains information on gas reserves for geologic formations in the region. The Boyer gas field has the largest land surface area expressing the Bluesky-Gething formation. While the Haro gas field has had the highest cumulative production to 1978, the Boyer has the largest proven reserves-over two and one-half times larger than the Haro reserves. With respect to the Mississippian, Banff and Rundle Formations, the Haro gas field has had both the largest cumulative production and proven reserves to 1978.

The gas reserves indicated play an important role in Alberta's reserve calculation. Using an export price of $\$158.66/10^3 \text{ m}^3$ wellhead price (March 1980) for natural gas, the following figures indicate gross value of the gas that is recoverable:

Bluesky-Gething	$21\ 549 \times 10^6 \text{ m}^3$
Cretaceous Other	$63 \times 10^6 \text{ m}^3$
Wabamun	$10 \times 10^6 \text{ m}^3$
Mississippian	$318 \times 10^6 \text{ m}^3$
	<hr/>
	$21\ 940 \times 10^6 \text{ m}^3$

Export value of $21\ 940 \times 10^6 \text{ m}^3$ @ $\$158.66/10^3 \text{ m}^3 = \3.48 billion for recoverable gas in or abutting the study area ($10^6 \text{ m}^3 =$ million cubic meters).

Table 11: Gas Reserves for Geologic Formations in the Lower Peace River Region for 1978

Formation	Gas Field		
	BOYER	HARO	STEEN
<u>Bluesky-Gething</u>			
- Area (hectares)	204 150	115 328	93 459
- Initial Recoverable Gas In-Situ ($\times 10^6 \text{ m}^3$)	12 400	5 370	4 264
- Cumulative Production ($\times 10^6 \text{ m}^3$)	25	460	0
- Marketable Gas ($\times 10^6 \text{ m}^3$)	12 375	4 910	4 264
<u>Boyer (Cretaceous)*</u>			
- Recoverable Gas In Situ ($\times 10^6 \text{ m}^3$)	63	-	-
<u>Steen (Wabamun)*</u>			
- Recoverable Gas In-Situ ($\times 10^6 \text{ m}^3$)	-	-	10
<u>Banff** and Rundle</u>			
- Initial Recoverable Gas In-Situ ($\times 10^6 \text{ m}^3$)	56	313	-
- Cumulative Production ($\times 10^6 \text{ m}^3$)	13	18	-
- Marketable Gas ($\times 10^6 \text{ m}^3$)	23	295	-

* There has been no production of this reserve.

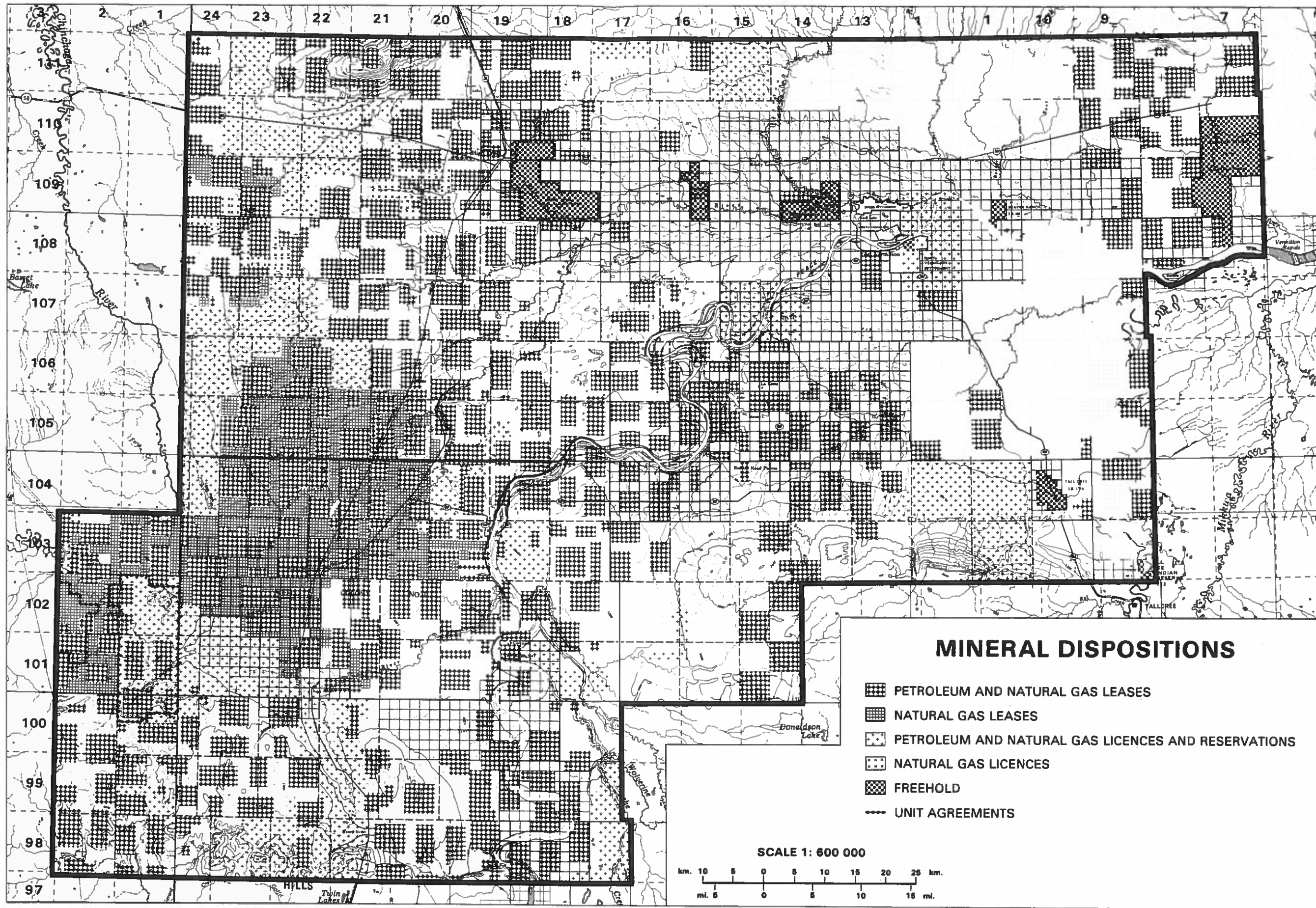
** The Banff formation consists of five rock units of shale, carbonate or clastic. The porous upper carbonate unit and upper clastic units, developed during a regression of the seas, are the primary productive zones. Porosity cut-offs of 12% and 16% in the sand and carbonate respectively are used in evaluating hydrocarbon pay.

Rainbow-Zama Area. There are in the order of 13 oil and gas fields to the west of the study area with pay occurring in multiple pools. The Keg River pinnacle reefs are the primary productive areas; Slave Point and Muskeg Formations overlay the reefs forming potential oil and gas reservoirs. Ongoing development in this area will have significant economic impact for the region and the province. The value of the Rainbow field alone, a fraction of the total reserves, is:

Remaining recoverable oil	$58\,928 \times 10^3 \text{ m}^3$ @ \$83.64/m ³ (wellhead March 1980) = \$4.9 billion
Remaining recoverable gas	$14\,546 \times 10^6 \text{ m}^3$ @ \$158.66/10 ³ m ³ (export price) = \$2.3 billion

Oil Sands. The Buffalo Head Hills area is underlain by oil sands in the Bluesky-Gething Formation and oil impregnated carbonates in the Mississippian and Upper Devonian. Recent drilling and detailed log evaluation have upgraded the reserves to a level where the potential exists for possible economic recovery in the future. The oil-embedded strata adjacent to the study area are at depths inaccessible by surface mining and would have to be recovered by in situ technology. No dollar value can be placed on the oil sands as the quality and extent are undetermined; however, the potential for future development must be considered.

Mineral Dispositions. Approximately 70 percent of the area has some form of petroleum and natural gas agreement covering it (Map 10). Petroleum and Natural Gas Leases, the most commonly held disposition, are development and exploration oriented and give rights to the resource. At expiration of the 5-year term, (formerly 10 or 21 years), a lease continues as to that part of the proven agreement. Natural Gas Leases are concentrated in the central west sector, relating to the Boyer, Haro



MAP 10. MINERAL DISPOSITIONS

and Steen fields. Natural Gas Leases extend for 21 years and the lessee acquires rights for proven natural gas in specific zones. Other forms of dispositions under which exploration for oil and gas may be conducted are petroleum and natural gas licences and reservations.

Licences are granted for a term of 5 years, while the holder of a reservation may be entitled to select leases on a checkerboard pattern and hold them for a term of 10 years. In all instances, the leases would, at the expiry of their original terms, continue as to productive horizontal and vertical limits. Unit agreements have been established among owners of oil and gas agreements for the purpose of achieving the most efficient development of and production from an oil or gas pool. The setting up of unit agreements in the Chinchago River area is a further indication of the preparation for production of Bluesky-Gething gas.

Less pressure for exploration and development is indicated by a greater amount of undisposed land in the following areas: south of Tompkins Landing Road, Boyer River, Bear River, and the Caribou River area.

Production. Primary pipeline concentration is on the western boundary where the proven productive gas fields are located. Development of a gathering network is currently underway to produce the Bluesky-Gething and Mississippian zones. Paddle Prairie production ($564 \times 10^3 \text{ m}^3$) and Keg River ($846 \times 10^3 \text{ m}^3$ including Keg River south) account for 58 percent of the $2464 \times 10^3 \text{ m}^3$ daily production from the area. A station at Paddle Prairie south was to come onstream in the winter of 1979.

Oil and gas pipelines transect the southwest corner of the study area, bringing resources from the Rainbow-Zama field to the Rainbow Pipeline terminus in Edmonton. Production of 20 658 m³/d of high quality oil is worth more than \$20 million every month to the provincial government in royalties alone.¹² Rainbow Pipeline, a joint venture of Mobil, Aquitaine and Imperial, is operated by Mobil.

Rainbow-Zama production represents about 9.3 percent of the provincial total. Statistics for the oil industry show I.D. 23 with 11 percent of total provincial proven conventional oil reserves and 2 percent of total provincial proven natural gas reserves. Most of the 58 producing wells have been completed to the Keg River reef structures at depths of 2012 m (6600 ft.), but some at 1707 m (5600 ft.) from the Muskeg Formation are productive.

Oil recovery is high (71.5-88 percent) with secondary waterflood and gas miscible flood systems to maintain underground pressures. Most of the natural gas recovered from the field is reinjected. The gas will be produced after all the oil has been removed. The salt water, produced with the oil, is also reinjected along with large quantities of fresh water, piped from Rainbow Lake to fill voids left in the formation after oil production.

A proposal to carry Alaskan oil through Canada to the U.S. by building a pipeline from Skagway to Northwest Alberta would have significant impact on the study area, as it would meet the existing oil pipeline at Keg River. A MacKenzie Valley pipeline at some future date would also have considerable impact.

12. Information obtained from the April 17, 1978 issue of the Edmonton Journal.

A number of factors influence production development in the Rainbow-Zama area:

- As natural gas increases in value, previously by-passed gas may now be economical to develop.
- There is potential of large oil and gas discoveries by further drilling in areas of sparse well control.
- Deeper exploration drilling may uncover new oil and gas fields. Approximately 15 percent of the Stratigraphic column has been evaluated by the recent Bluesky-Gething gas play.
- An expansion of processing and transportation facilities will be needed in the next few years as the gas fields become more economical to develop.

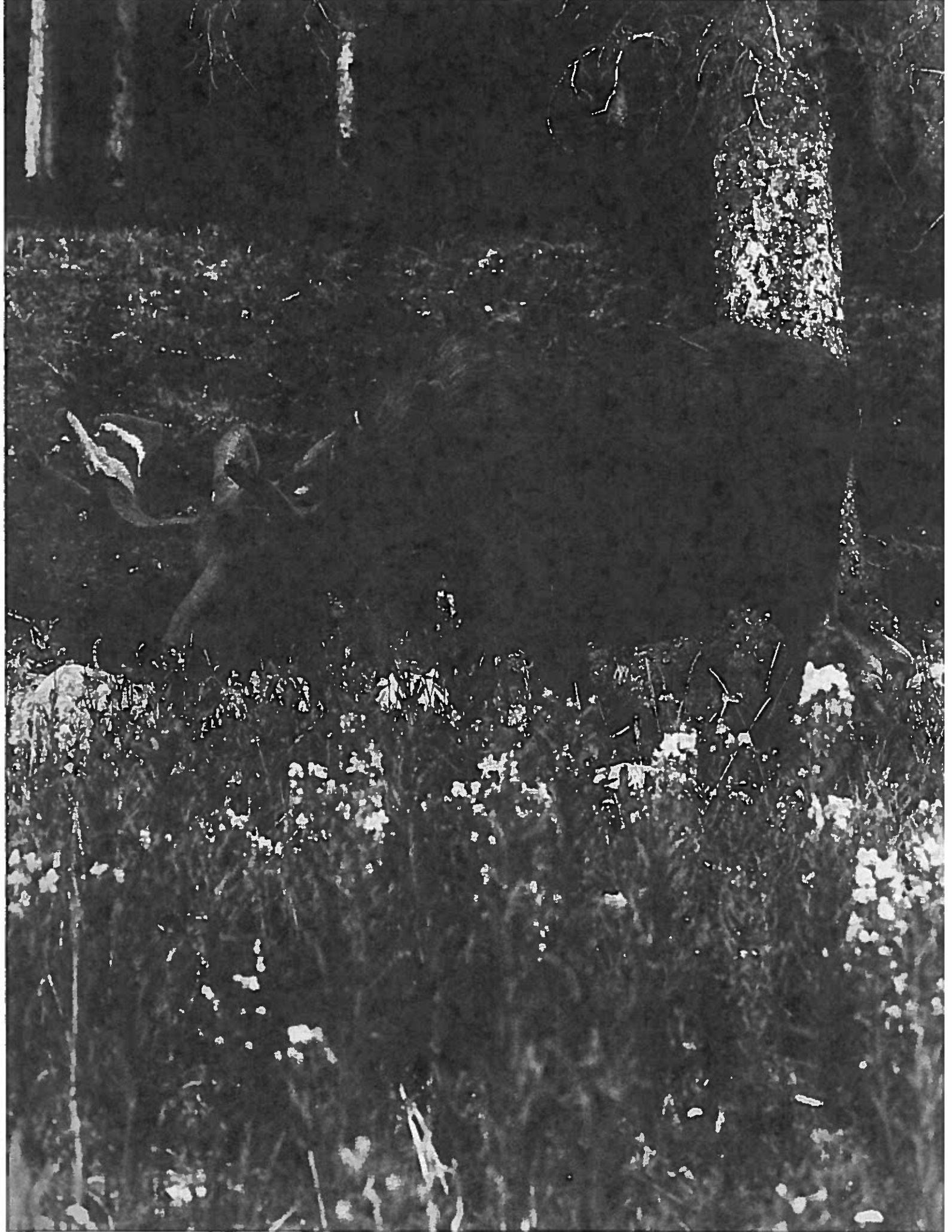
Revenue will continue to be received from the lease of mineral dispositions on Crown mineral rights for years to come. In 1983 the mineral rights below productive zones will revert to the Crown and be available for disposition. Since the proven gas fields within the study area are mostly shallow gas, most of the deeper rights will be available for disposition at that time. Total revenue received for the sale of petroleum and natural gas rights in the Lower Peace River Region study area to January 1979 is \$8.94 million.

Impacts - The oil and gas industry provides, directly and indirectly, about half the jobs in the province. Similarly, about 50 percent of public sector expenditures derive from oil and gas reserves. The industrial tax base on the oil industry contributes to the finances of I.D. 23, which are used to help underwrite municipal services in the communities.

The oil and gas industry has generated a high number of jobs, both permanent and temporary. Rainbow Lake, a resource town of 800, was established by Aquitaine in 1966-67. Aquitaine management have determined that in-place reserves will provide on-going operations to the year 2000. In High Level, one third of the employment is in the oil and gas industry. Several service companies and contractors based in the town provide maintenance supply and service functions for the industry. A report on the oil and gas industry in I.D. 23 done in 1975 by the Peace River Regional Planning Commission, mentions that spin-offs in terms of permanent employment have not accrued to the region. The oil industry requires highly technical trades people and, therefore, must import labor from the south.

Off-season employment with the industry is compatible with farming operations; approximately 40 to 50 percent of the area farmers are employed with the industry in winter months. In Paddle Prairie, one-half of those employed work in the oil patch.

On-going operations are expected to continue in the area west of High Level, but no significant expansion of the permanent labor force is expected. High turnover rates in the industry present opportunities for local people to fill vacancies. Seasonal activity in drilling and exploration operations will continue to create peak flows of men and materials through the community (Nichols 1978).



3.4 Wildlife and Fisheries Resources

Fisheries. Most of the fish resources within the study area are found in the streams. The Peace River possesses the greatest potential for providing increased fisheries opportunities (Bishop, n.d.). Walleye, goldeye and pike have been taken at various locations, especially at the mouths of incoming streams such as the Wolverine, Keg, Buffalo, Wabasca and Ponton. Native fisheries along certain areas of the Peace River are a tradition for harvesting a winter food supply.

Many of the larger streams contain pike, walleye and Arctic grayling. Table 12 is a summary of fisheries data from the Lower Peace Region.

The area has few lakes, most of them too shallow to support over-wintering of the fish populations. Those lakes which have survey data are listed as follows:

- Footner Lake-Very shallow, maximum 2 m (6.5 ft.).
- Machisi Lake (N.W. 27, S.W. 34, 107-16-W5)-The area is 20 ha (50 a.); depth 4.9 m (16 ft.). Winter dissolved oxygen content is fair. Further investigation for fisheries development is required.
- "Sawmill" Pond (Sec. 1-103-10-W5)-Winter dissolved oxygen content is poor. Lake stocking (1971-72) was not successful. However, could be developed as a "put and take" fishery, with high costs involved.
- Wadlin Lake-Is in close proximity to a settlement area and has important resource potential. The area is 1185 ha (2928 a.); mean and maximum depth are 6.4 (21) and 11.9 m (ft.) respectively. The lake contains whitefish, northern pike and yellow perch. There is limited potential for domestic/commercial whitefish. Road access in summer is poor.

Table 12: Fisheries Data by Watercourse in the Lower Peace River Region

<u>Watercourse</u>	<u>CLI Rating</u>	<u>Sport Fish Species Known To Be In Streams</u>	<u>Comments</u>
Peace River	2	goldeye, walleye, pike	at stream inlets
Keg River	4	Arctic grayling, pike, (walleye)	mostly in upper reaches
Wolverine River	3 to 4	goldeye, walleye, pike	upper portions Class 3
Buffalo River	3 to 4	goldeye, walleye, pike	upper portions Class 3
Unnamed Stream Mouth Sec. 28-102-19-W5	4	n.d.	
Boyer River	2	(grayling, pike, walleye)	
Ponton River	2 to 3	grayling, (pike, walleye)	
Caribou River	3	grayling	
Carl Creek	3	n.d.	
Beaver Ranch Creek	3 to 4	(pike, walleye, grayling)	lower portions Class 4
Bear River	4	n.d.	
Lawrence River	2	Arctic grayling	
Melito Creek	3	n.d.	
Bushe River	3	n.d.	
Chinchaga		walleye, pike	

Parentheses indicate reported but not verified.
n.d.= no data available.
CLI = Canada Land Inventory.

Source: Bishop, n.d.

Other lakes with resource potential in the northwest region are more difficult to access. At Rainbow Lake to the west, walleye is the most popular eating fish. Bistcho and Thurston near the territorial border have walleye and northern pike. The Caribou Mountain Lakes, Pitchme, Wentzel, Margaret and Caribou, have the best potential for lake trout and are presently utilized by fly-in operations. The problem of determining the carrying capacity of fisheries under pressure must be resolved.

Angling is one the major recreation activities as noted in the I.D. 23 Council Questionnaires. The continuous increase in the number of anglers, reflected in the 9.5 percent increase in sales of angling licences in the five years from 1972 to 1977, is expected to continue. As the farming areas become more established, resulting in more leisure time, the popularity of angling as a form of recreation will continue to grow. Pressure will be placed on resource agencies to increase opportunities for angling to residents and tourists. Lack of access, a major problem, will be alleviated by opportunities provided along the Fort Vermilion/ Lesser Slave Lake route.

Protection considerations for management practices include impact of road construction, extraction and mill operations along streams (affecting the oxygen content), restricted gravel removal in streambeds and the prohibition of livestock access to streams.

Wildlife. Waterfowl. Few detailed waterfowl surveys have been conducted within the study area. On the basis of general surveys, it is known that the study area contains some important staging areas for ducks and geese, including the gravel and sand bars along the Peace River (utilized

14. Marshland capabilities quality for C.L.I. ratings of 4, 5 and 6.
15. Ungulate production in the Lower Peace Region study area qualities for C.L.I. ratings of 4, 5 and 6.

wood bison may migrate to the northeastern corner of the area (Russell, n.d.).

been reported in the Fort Vermilion area. During some winters a few northeastern and western portions of the study area and a few elk have and along the Peace River. Isolated herds of caribou may occur in the population of whet-tailed and mule deer occurs within the settled areas is low¹⁵. Moose are by far the most important ungulate species. A small other areas of the province, ungulate production within the study area these can be utilized to provide general information. In comparison to areas of ungulates is very limited. Some surveys have been undertaken and Ungulates. Information on the distribution and critical wintering the study area in the future.

and non-resident hunters could contribute substantially to the economy of major staging area for geese, interest in hunting has increased. Resident As the La Crete/Fort Vermilion area has become better known as a to the continental duck population is significant.

ing High Level]. With the 18 000 km³ (7000 sq. mi. study area, the contribution fairly low. In 1976, duck production was considerable in marshlands surround- for waterfowl, which by Canada Land Inventory (C.L.I.) classification¹⁴ is Surveys of particular marshlands are required to verify capabilities

utilized extensively (Russell, n.d.).

105-106, Rge. 15 and 16) and those in Twp. 106, Rge. 18 may also be 108, Rges. 16 and 17). Marshlands immediately west of La Crete (Twp. primarily by Canada Geese) and the Devil, Surette Lake complex (Twp.

In general, moose densities average less than 1 moose per sq. mi. (Table 13).¹⁶ However, the 1977 survey of the Buffalo Head Hills would indicate that moose respond favourably to recent land disturbances such as fire or logging. A large proportion of the 75 moose observed on this survey were observed in recently burned or logged areas.

Table 13: Aerial Ungulate Surveys Conducted Within the Lower Peace River Region

Area	Date	Miles Flown	Total Moose	Moose Per Square Mile
Buffalo Head Hills	1977	260	75	0.6
Twp. 107, Rge. 10, 11 W5	1977	60	8	0.3
Fort Vermilion Provincial Grazing Reserve (prior to clearing)	1977	136	18	0.53
Peace River (south to Carcajou)	1974	100	47	1.8
Paddle Prairie	1978	130.5	37	1.1

Source: Bishop, n.d.

Furbearers. (Table 14). An analysis of fur returns for 1976-77 revealed that muskrat and beaver constituted over 50 percent of furs taken in the Lower Peace Region (Table 15). Lynx, because of high market value, was responsible for nearly 20 percent. For the period 1971-74, however, beaver was the dominant contributor to 51 of 70 traplines. Lynx continued in importance and was responsible for major returns in 27 traplines.

Reported returns to traplines are minimum figures because harests taken on resident rapping licences on private lands are not included. However, an analysis of the 1976-77 fur returns for 78 trappers

16. Surveys were carried out utilizing animal densities per square mile conversion is not meaningful.

Table 14: Trapline Statistics for the period 1971-1974 for the Lower Peace River Region
Income and Species* Contributing 50% or More

Trap Line Number	1971/72	1972/73	1973/74	1974/75 (incomplete)	Average Income (for positive returns)
35	2,191 Be	3,516 Be/Mk	3,114 L	0	2,940
61	333 L	1,251 Be	0	313 Be	634
79	1,532 Be	0	1,184 Be	0	1,358
102	0	1,632 Be	1,972 Be	0	1,802
241	0	0	452 L/Fr	0	452
243	1,012 L	3,063 L/Be	1,385 L/Be	0	1,820
247	2,663 L	2,206 Be	0	0	2,435
248	2,365 Be	6,062 Be/L	0	0	4,214
254	0	1,124 Be	1,237 Be	0	1,180
256	0	1,604 Be	1,403 Be	312 Be	1,106
1233	883 Be	1,325 Be	529 Be	717 Be	863
1269	0	1,049 Be	707 Be	0	878
1285	1,961 Be	3,060 Be/Fr	1,953 Be	0	2,324
1300	4,291 L/Be	5,906 Be	0	896 Be	3,688
1328	606 Be	9,932 L	2,090 Be	0	4,209
1341	762 Be/L	1,209 Mk/Be	159 Be	0	710
1347	2,376 L	3,892 Be	0	70 Be	2,436
1371	844 Be/L	2,025 Be/L	1,750 Be	0	1,540
1375	0	2,540 Be/Sr	814 Be	0	1,677
1376	0	0	0	0	0
1403	561 L/Wv	1,186 Ct/Be	487 Ct	0	745
1462	50 Be	621 L	308 L	0	326
1488	0	933	0	0	933
1492	0	3,910 Be/Mt	858 Be	0	2,384
1533	0	4,550 L/Be	2,158 L/Be	0	3,354
1549	1,342 L	2,128 Be/L	0	269 L	1,246
1561	0	3,358 L/Wf	538 Be/Fr	0	1,948
1566	655 L/Be	407 Be	998 Fr/Be	0	687
1589	183 Sr/Be	106 Be	0	71 Be	120
1602	0	91 L	0	0	91
1616	0	4,439 Be	3,598 Be	0	4,018
1657	0	1,475 Be/L	765 L/Be	0	1,120
1664	326 Be	218 Be	0	68 Be	204
1671	0	1,536 Sr/Mr	2,148 L/Be	0	1,842
1707	3,406 Be	5,233 Be	3,690 Be	0	4,109
1721	938 L/Be	1,442 Be/L/Wv	1,182 Be/L	0	1,187
1724	0	3,564 Be	929 Be	2,853 Be/L	2,448
1754	0	7,005 L	2,969 Mk/Be	0	4,987
1796	583 Be	750 Be	848 Be/Ht	0	727
1929	0	0	4,246 L	0	4,246
1971	2,334 L	1,908 Be	0	0	2,121
1991	164 Wf/Sr	2,209 Ct/L	1,747 Fr/Wv	0	1,373
2022	5,853 Be	5,568 Be	3,495 Be	2,900 Be	4,981
2087	881 Be	731 Be/Fr	0	0	806
2119	0	0	0	0	0
2120	0	814 Sr/L	0	815 Sr/L	815
2187	2,049 L	485 Be/L	0	0	1,267
2198	0	0	0	0	0
2236	0	236 Fr	409 Fr	0	322
2271	2,132 L	373 Be	0	0	1,252
2273	5,433 Be	9,021 Be	0	0	7,227
2274	0	1,171 Fr/Be	875 Fr/Be	0	1,023
2282	0	1,185 Be	707 Be	0	946
2288	379 Be	1,209 Be	446 Be	0	678
2292	1,694 L	1,601 Be/L	3,432 L/Be	0	2,242
2298	266 Be	841 Be	0	358 Mr	488
2303	1,775 L	837 Be	435 Be/L	0	1,015
2325	3,493 L	1,087 L	357 Be	0	1,645
2328	933 Be	2,610 Be	1,214 Be	0	1,586
2332	289 Sr	1,238 Sr/L	584 Sr/Be	0	704
2349	310 Be	367 Be	572 Be	0	416
2399	434 L/Sr	1,134 L/Be	0	0	784
2410	189 Be	989 Be	947 Ct	0	708
2421	0	1,838 Be	584 Be	0	1,211
2495	481 L	479 Wv/L	273 L/Fr	0	401
2627	0	390 Be	0	0	390
2697	407 Be/Sr	876 Ct.Be	1,476 Wv/L	0	917
2712	2,123 L	2,716 Be	0	0	2,420
2722	0	2,563 Be	0	0	2,563
2756	0	687 Sr	315 Sr	0	501
2758	0	306 L	0	0	306

* Abbreviations for furbearing animals used in trapping income calculations:

Beaver - Be	Lynx - L	Squirrel - Sr
Coyote - Ct	Mink - Mk	Wolf - Wf
Fisher - Fr	Muskrat - Mr	Wolverine - Wv

Table 15: Analysis of 1976-77 Fur Returns for Lower Peace River Region

Species	No. Trapped	Av. Prices (1975-76)	Total Revenue	% of Total Revenue
Muskrat	13,470	3.31	\$44,585.70	30.8
Beaver	1,609	19.52	31,407.68	21.7
Lynx	118	237.90	28,072.20	19.4
Fisher	206	65.94	13,583.64	9.4
Mink	515	17.69	9,110.35	6.3
Marten	382	21.33	8,148.06	5.6
Squirrel	6,516	.80	5,212.80	3.6
Weasel	1,156	1.12	1,294.72	0.9
Coyote	25	50.00	1,250.00	0.9
Wolverine	5	162.86	814.30	0.6
Fox	16	48.00	768.00	0.5
Wolf	10	71.14	711.40	0.5
			TOTAL	
			\$144,958.85	

Total number of registered trappers - 78

Average revenue per trapper - \$1,858.45

Source:

Table 16: Comparison of Trapline Statistics: Athabasca Oil Sands Region and Lower Peace River Region

Average Value 1971-74 \$ Income	Athabasca		Lower Peace	
	No.	%	No.	%
0 - 250	51	26%	6	9%
250 - 1000	70	36%	26	34%
1000 - 2500	54	28%	26	34%
2500 - 5000	18	9%	11	16%
Over 5000	2	1%	1	1%
TOTAL	195		70	

(No returns reported for 18 Twps. of Meti Settlement)

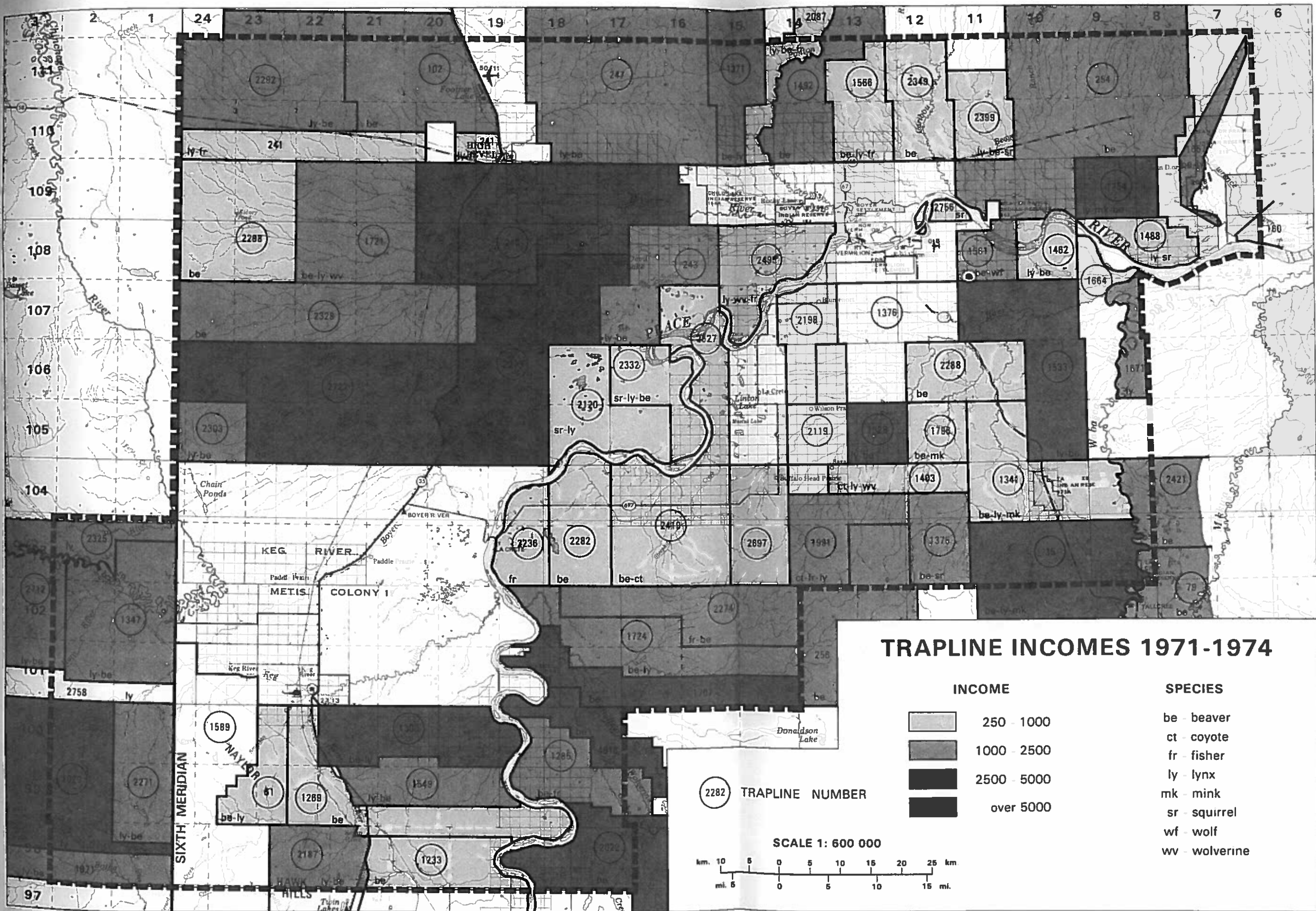
showed an average return of 1858 per trapper. Returns to trappers, based on 1971-74 returns, showed that 34 percent of the reported earnings were in the \$250-\$1000 category. Median income for this period was \$1120, with an average income of \$1628.

From a comparison of statistics from Athabasca and Lower Peace River returns for 1971-74, 9 percent of the traplines in the Lower Peace earned less than \$250 (Map 11), while 25 percent in the Athabasca area were in that category (Table 16). These figures are not indicative of the greater reliance of the Lower Peace River Region trappers on this resource use.

Furs are sold to dealers such as Belcourt and Hudson's Bay Company, on the reserves and in High Level. Some are sent directly to auction in Edmonton. They are generally sent to Europe for processing, then returned to Canada for sales. Longhair furbearers--mink, marten and fisher--command a high market price and are in great demand.

Hunting and trapping are traditional native roles providing food for the winter and income for a subsistence-level life style. One-half of the trappers are of native origin. Except for a few, all are from the region. The first trapline dispositions were narrow strips maintained by individuals; now they are assigned as trapping areas to tribal associations. Numbers 247 and 254 are treaty blocks for people from reserves. Incorporation of smaller areas into larger units aids in management control.

Conflicts exist between farmers on privately owned land and trappers. Timber cut blocks can damage trap areas, and in seismic



TRAPLINE INCOMES 1971-1974

INCOME

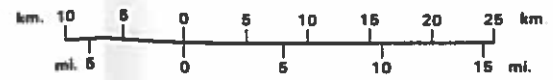
- 250 - 1000
- 1000 - 2500
- 2500 - 5000
- over 5000

SPECIES

- be - beaver
- ct - coyote
- fr - fisher
- ly - lynx
- mk - mink
- sr - squirrel
- wf - wolf
- wv - wolverine

2282 TRAPLINE NUMBER

SCALE 1: 600 000

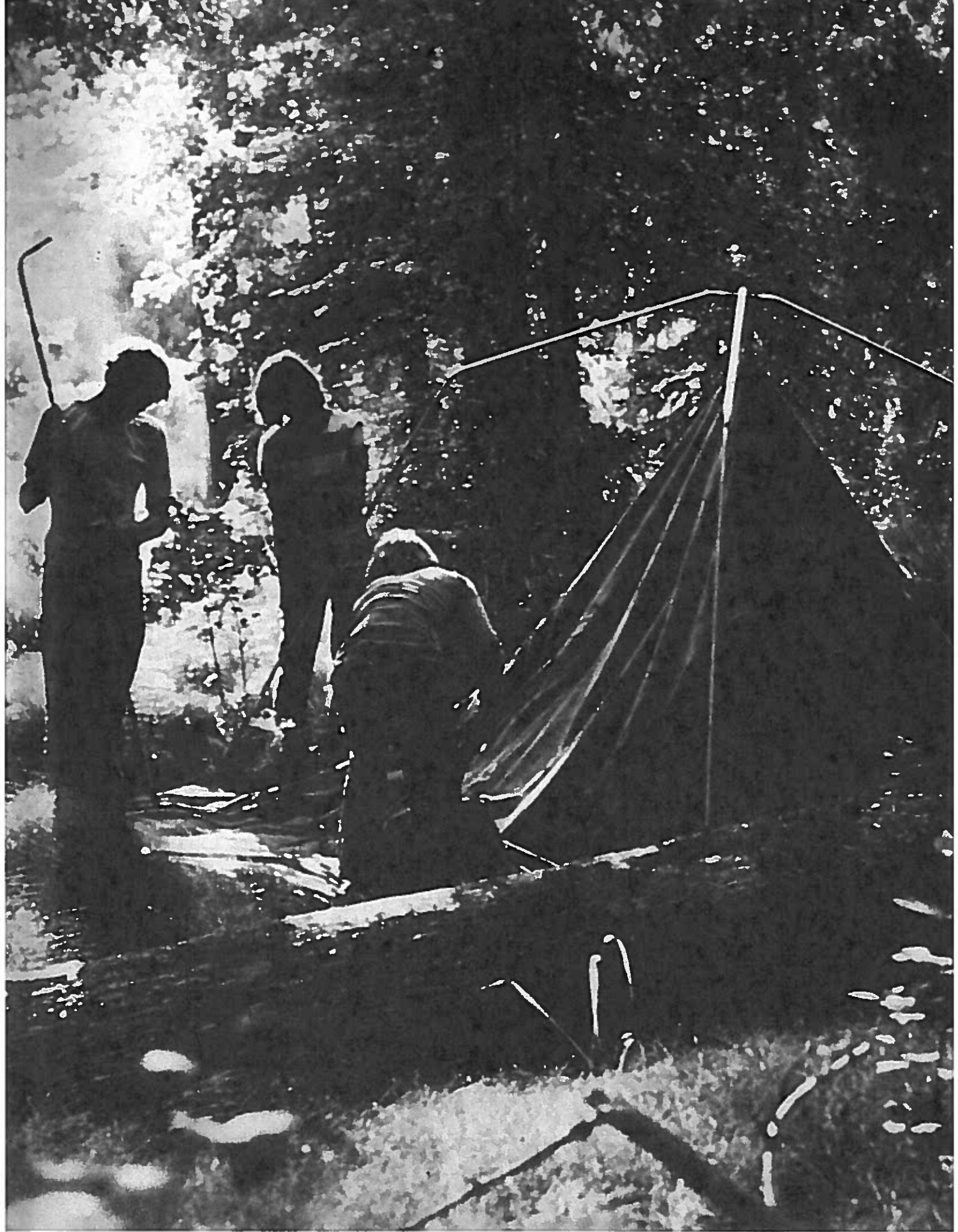


MAP 11. TRAPLINE INCOMES 1971-1974

operations, equipment may bury traps and disrupt operations resulting in lower returns.

All the areas selected for agricultural potential have valuable furbearer resources. Studies to detail these resources and the impact of development on them should be undertaken concurrently with land use planning.

Problems. Wolves, black bear, beaver, ducks and blackbirds are abundant within the study area and create problems for the agricultural community. Subsidies for problem wildlife control are substantial and will increase in future years if numbers of domestic livestock and grazing dispositions increase. Therefore, problem wildlife subsidies should be considered on a site-specific basis if new lands are to be opened for agricultural expansion.



3.5 Recreation

From information presented in the Settlement section, it is obvious that the needs of the different communities vary in relation to the degree that recreation is perceived as a value. High Level has a much greater urban orientation; a greater variety of town and land based recreation facilities are demanded. Recreation activities are a social utility to complement the regimented industrial and service sector work roles. Among the agricultural areas, especially La Crete, where activities are centered around the farm, recreation is not as significant a factor. Family recreation such as picnicking and camping is more in demand.

As settlement areas progress through levels of development, concurrent with increased technological changes, a greater emphasis will be placed on recreation. There will be increasing demand placed on the resource base to provide for these needs, especially in communities where the growth rates are high.

Recreation Opportunities. Existing. The following is a list of existing recreational opportunities in the Lower Peace River Region:

- Hutch Lake, 32 km (20 mi.) north of High Level, is maintained by the Alberta Forest Service. Hutch Lake is a general recreation area containing picnic and camping sites and a dock for boating and fishing. Existing use, by High Level residents and travellers north, is extremely limited.
- Overnight camping facilities are available at High Level and Paddle Prairie, and the Peace River crossing near Fort Vermilion. Use of overnight roadside camps is by commercial and tourist traffic on the MacKenzie Highway.

- Buffalo Tower Day Use Area is about 72 km (45 mi.) from La Crete, on top of Buffalo Head Hills. It is a sightseeing and picnic area used by local people.
- Rainbow Lake is 26 km (16 mi.) south of the Town of Rainbow Lake (west of the study area). It offers camping, boating and fishing.

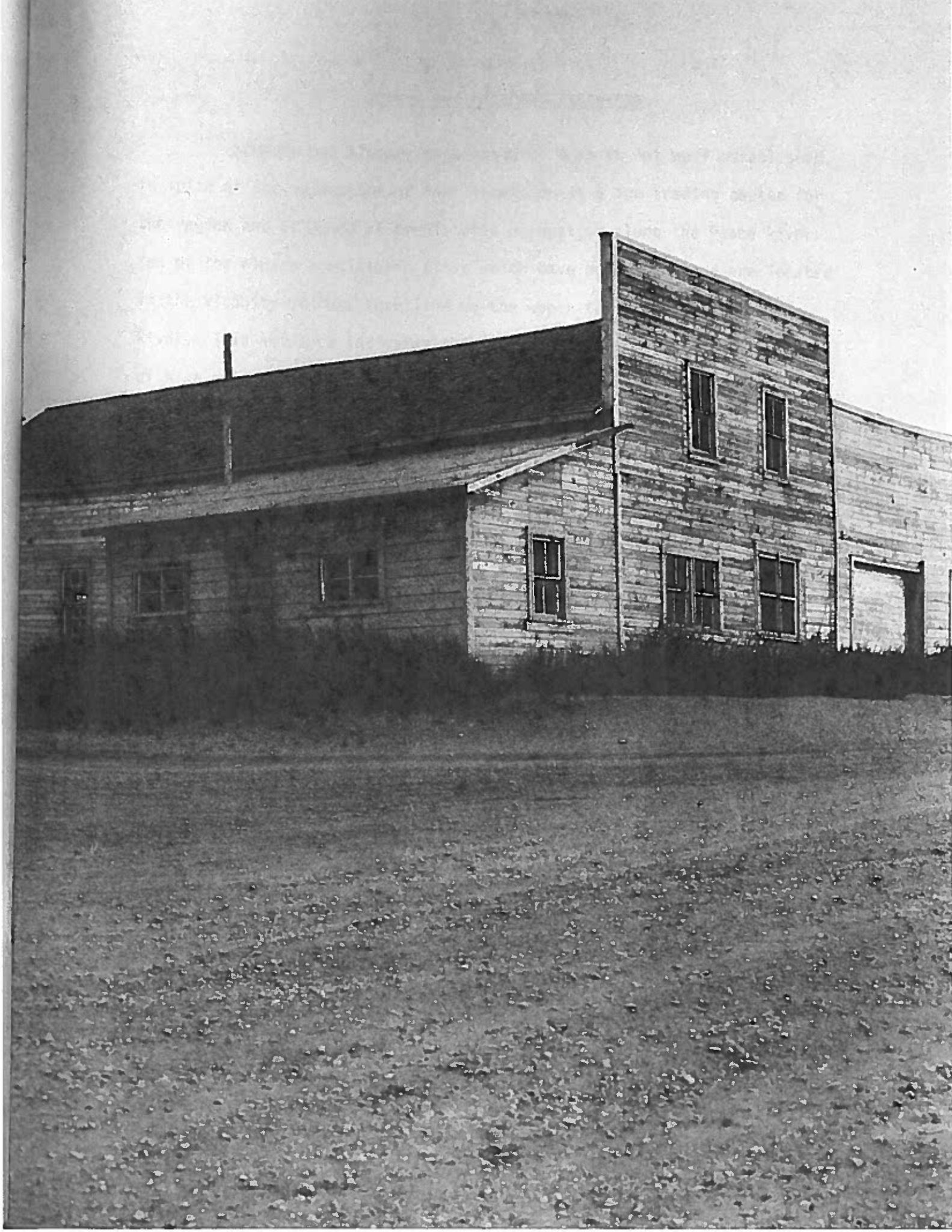
As well as these, the Peace River is a major recreation feature and is utilized for boating and water skiing.

Potential. Potential recreation sites in the Lower Peace River Region include:

- The Sandhill area is an extensive area of old sand dunes interspersed with muske meadows. The vegetation complex is jackpine, moss and shrubs. The Sandhill area extends east and west of the Peace River from La Crete.
 - a) The area east of river is most heavily used at present due to all-weather access throughout. Opportunities exist for picnicking, camping and general recreation to meet the needs of the La Crete community.
 - b) The area west of river, south of High Level, has limited access. Potential exists for fishing, camping, hiking and winter skiing. The Alberta Forest Service is presently looking at development in the vicinity of Machisi Lake.
- Wabasca River has potential for canoeing and boating. Camping and picnic sites can be developed where road crossing occurs (Tall Cree).
- Wadlin Lake is located south of Tall Cree toward the Buffalo Head Hills. There is good potential for camping, fishing and boating. Preservation of special resources, especially the pelican colony,

a rare and endangered species, must be ensured. The opening of the Fort Vermilion/Lesser Slave Lake route will create pressure for access to the lake. The Alberta Forest Service has plans for future road improvements.

- Chinchaga River is located north and west of Keg River, on the Metis Association lands. The area has potential for boating and camping activities for Keg River residents.
- Caribou Mountain Lakes (Margaret, Eva, Pitchme, Wentzel and Caribou) area offer good opportunities for fishing and boating. There is present use, fly-in operations for fishing. Margaret and Pitchme are good trout lakes. Carrying capacity of the lakes would have to be studied to determine the level of development allowable while maintaining the resource.
- Bistcho Lake, to the northwest of the region, has recreation potential. It is the largest water body in northwest Alberta. No development has yet taken place.
- In the Peace River corridor, Carajou, Thompkins Landing, Fort Vermilion and Vermilion Chutes have been identified as areas with site development potential for river access and camping.



3.6. Scenic and Historic Resources

Scenery and history as a resource base is not well established in spite of the importance of Fort Vermilion as a fur trading center for the region and evidence of prehistoric occupation along the Peace River. Ten of the eleven prehistoric sites which have been uncovered are located in the vicinity of Fort Vermilion on the upper terraces of the Peace River. This evidence indicates the Lower Peace River Valley is an area of high site potential.

Sites which would be of concern for prehistoric occupation include fishing and hunting grounds, quarry sites and natural shelters. Poorly drained areas and densely wooded interior would be of lower potential for habitation. The study area is largely unknown archaeologically and would require field surveys to define historic potential where large scale surface disturbance is anticipated.

Any potential development must conform to Alberta Culture policy statements, which indicates that any land development activity that impacts or potentially impacts historical resources must have adequate investigations conducted to ensure the best measures in historical resources conservation are taken. Development proposals should be reviewed by the Archaeological Society of Alberta before or at the time of application for development approval.

The old town site of Fort Vermilion is a historic resource which could become the focus for a tourist industry. Within the vicinity are the Old Bay House (1788) and the Sheridan Lawrence Ranch (1887),

both designated as Registered Historic Resources. St. Barnabus Anglican Church (1902) and St. Louis Roman Catholic Church (1890) are under consideration for such designation. Other points of interest include the original Experimental Farm at Stoney Point (1890's), a log building associated with Revillion Freres and the Grotto at Aleski in the Boyer River settlement. Old trails in the area could be designated historic routes for use by hikers. Alberta Forest Service mentions five in all: three within the grasslands, one along Buffalo Head Hills and one to the Caribou Mountains.

Demand for the development of the scenic and historic resources is growing in the region, especially in Fort Vermilion. Development has been limited up to the present time as the tourist base is not yet significant.

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