SCHEDULE 6
LOCAL STRATEGIC PLANS

Park Management Plans
Liard River Hot Springs Provincial Park Master Plan
Muncho Lake Provincial Park Master Plan
Stone Mountain Provincial Park Master Plan
Wokkpash Recreation Area Interim Management Statement

Pre-tenure Plans
Upper Sikanni Management Plan
LIARD RIVER HOTSPRINGS PROVINCIAL PARK

MASTER PLAN

APRIL, 1990
LIARD RIVER HOTSPRINGS
PROVINCIAL PARK

MASTER PLAN

MINISTRY OF PARKS, BRITISH COLUMBIA

April, 1990

Prepared for the Peace-Liard District by

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LIARD RIVER HOTSPRINGS
PROVINCIAL PARK
MASTER PLAN

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Many members of the public, area residents, and local government officials provided ideas and comments on the draft plan. A list of participants is included in the Appendix. People from Fort St. John and Fort Nelson also attended the public meetings.

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Map #1 LIARD HOTSPRINGS PROVINCIAL PARK

PARK LOCATION
Visitors using Alpha Pool, with the lush and unusual vegetation around the hot springs.

Liard Hotsprings Park entrance. Summer visitors are mainly Alaska Highway travellers.
Liard Hotsprings Provincial Park lies adjacent to the Alaska Highway on the Liard-Rabbit Plateau in northeastern British Columbia. The popularity of the park continues to grow resulting in increased pressure on sensitive natural resources as well as on developed facilities. This document is the updated Master Plan for the park, replacing an earlier plan in place since 1980. Residents of the park area, Fort Nelson and Prince George have contributed to the plans for how best to develop and manage this park.

Liard Hotsprings Provincial Park protects a nationally significant hotspings ecosystem. The park also provides one of the most popular campgrounds for travellers on the Alaska Highway, serving both regional residents and tourists.

The park management goals are:

- to preserve the outstanding natural hotspings and warm swamp ecosystem,
- to provide an educational and interpretive opportunity focussed on the hotspings environment,
- to provide a unique recreational experience in a natural hotspings environment,
- to provide camping facilities,
- to provide day use recreational opportunities.

The park will be managed in three zones. All of the hotspings and warm ponded swamps are in the Special Feature Zone where the emphasis will be on preserving the unique natural resources. A small part of the park is in the Intensive Recreation Zone, the majority of the forested area in the Natural Environment Zone.

Resource management will preserve remaining natural areas and protect the integrity of the hotspings ecosystem. Development will be limited to the areas already used for recreation, including Alpha and Beta pool, the boardwalks and the decks at the Hanging Gardens. A hydrological study will determine optimum pool use levels from a health point of view, as well as assess human impacts on the ecosystem. The study will determine the carrying capacity of the park to help govern use levels and any future development of facilities.

The park boundaries will be expanded to ensure compatible land uses surrounding the sensitive hotspings environment. Further commercial or residential development immediately adjacent to the park could encourage more use than the natural resources or facilities could accommodate.

Interpretation and information in Liard Hotsprings Park will encourage visitor awareness and appreciation of the hotspings and ponded warm swamp environment, and show how the park protects these unique resources. Information on appropriate use, behaviour, or alternative recreation activities will be provided. Promotion of Liard Hotsprings Park will be minimal since the park is already at or near capacity. Park promotion by the Ministry of Parks will be directed at the shoulder season, and better information will be provided for those who visit the park.

The park campground will not be expanded. Park managers will encourage the private sector to meet the excess demand by providing compatible planned facilities nearby. The Ministry of Parks will co-operate with the private sector in facility planning to ensure that increased accommodation does not result in unmanageable use pressures on the park.
PART 1: THE PLAN

1.0 INTRODUCTION

Liard Hotsprings Provincial Park lies adjacent to the Alaska Highway on the Liard-Rabbit Plateau in northeastern British Columbia. This document is the updated Master Plan for the park, replacing an earlier plan in place since 1980. The plan is divided into two sections. Part 1 contains the Master Plan, based on a comprehensive review of park resources and use. Part 2 contains a summary of background resource and use information, as well as a discussion of planning issues and options for management.

The popularity of the park continues to grow resulting in increased pressure on sensitive natural resources as well as on developed facilities. New management challenges are emerging and this plan will balance the Ministry of Parks' conservation and recreation mandates as they apply to Liard Hotsprings Park.

The key issues in the Master Plan focus on the ability of the park and its hotsprings ecosystem to handle increased use. These issues include future campground and other facility development options, park boundaries, resource management, the need for more information and interpretation, and the role of the private sector.

1.1 ROLE OF THE PARK AND MANAGEMENT GOALS

1.1.1 Regional and Provincial Context

The park protects the hotsprings and ponded warm swamps along with associated flora and fauna. The hotsprings are of national ecological significance, and have been ranked among the top five in Canada, based on a range of criteria applied to hundreds of springs across the country (Tera Environmental Consultants, 1984).

Within the region, where many of the best springs in Canada are found, the Liard Hotsprings are among the most important springs, highly rated for their aesthetic quality, diversity of flora and fauna, and for the springs formations themselves. The Liard Hotsprings are the only easily accessible developed springs along the Alaska Highway that still retain their natural character. The Provincial Park plays an important tourism and recreation role for regional residents and tourists travelling the Alaska Highway.

Other major parks in the region include Muncho Lake and Stone Mountain to the south. These parks are large wilderness destination parks, but most Alaska bound travellers pass through and do not spend more than a few hours visiting. More visitor services are now available in these latter parks with lake boat tours operational in 1989. These parks offer views of the northern Rocky Mountains, wilderness travel, and provide superb wildlife viewing opportunities.

Liard Hotsprings Park protects an important resource unique within the park system and provides a distinctive recreation experience not found elsewhere along the Alaska Highway.
The day use parking area is usually full with overflow campers during the summer months. The plan encourages development of campsites outside the park.

Beta Pool in quiet moment. This pool is more remote and receives less use than Alpha Pool. The proposed hydrological study will help identify the carrying capacity of this pool and determine its future use.
1.1.2 Park Role and Management Goals

The role of Liard Hotsprings Provincial Park is balanced between the conservation and recreation mandates of the Ministry of Parks.

The conservation role of Liard Hotsprings Provincial Park is to protect a nationally significant hotsprings ecosystem. The recreation role is to allow for a unique hotsprings experience for park visitors. The park also provides one of the most popular campgrounds for travellers on the Alaska Highway, serving both regional residents and tourists.

The park management goals are:

- to preserve the outstanding natural hotsprings and warm swamp ecosystem,
- to provide an educational and interpretive opportunity focused on the hotsprings environment,
- to provide a unique recreational experience in a natural hotsprings environment,
- to provide camping facilities,
- to provide day use recreational opportunities.

*Warm ponded swamp ecosystem adjacent to boardwalk; interpretive features include plants, birds, and fish*
Map #2  LIARD HOTSPRINGS PROVINCIAL PARK

REGIONAL SETTING

Scale: 1:1,000,000
1.2 SUMMARY OF RESOURCES, FACILITIES AND USE

Liard Hotsprings Park protects a large complex of hotsprings and ponded warm swamps along with associated flora and fauna. The hotsprings are of national ecological significance, and have been ranked among the top five in Canada, based on a range of criteria applied to hundreds of springs across the country (Tera Environmental Consultants, 1984).

Unlike most other thermal springs in Canada, the Liard Hot Springs do not flow directly into a nearby river or creek, but flow into an intricate system of swamps. These warm swamps are among the most unique features of the Park. The ecosystem is fragile and many species of both plants and animals depend on a narrow range of habitat conditions related to water level, temperature, and chemistry.

The park lies within the Boreal White and Black Spruce Biogeoclimatic Zone (Krajina and Brooke, 1970). Although the majority of species in the park are of the boreal variety, there is also an occurrence of 14 thermally influenced species; only the effects of the hotsprings account for their presence in the north. The hotsprings vegetation is striking compared to outlying areas in species composition, in the large diversity of species (including 14 species of orchids) and the luxuriance of their growth and the early-blooming growth pattern.

Farther away from the springs, are the shallow swamps which never freeze in winter due to the continually warm inflowing water. The vegetation here is quite interesting and often overlooked. Aquatic plants include the bladderworts, which are carnivorous plants. Chara, a lime-secreting algae, grows in abundance and often dies encrusted with lime deposits. It is an important tufa-forming mechanism (Reid, 1978).

Wildlife and their habitat are an integral part of the Liard Hotsprings ecology and provide a recreational experience through viewing and interpretation opportunities. A total of 135 species were recorded by 1978, with 28 of these mammals and 104 birds (St. Pierre 1980). Moose are year round residents and provide the most consistent viewing opportunities.

Seven species of waterfowl have been recorded, with the mallard and Canada Goose known to breed in the park. The remaining waterfowl are transients, migrating through the area in the spring and fall (St. Pierre, 1980). St. Pierre observed 11 species of shore birds, of which the solitary sandpiper and common snipe are known to breed in the swamps. Gulls, swallows, blackbirds, kingfishers and nighthawks may be frequently observed near the swamps.

Of particular interest to visitors are the numerous small fish swimming in pools alongside the boardwalk to Alpha pool. These are Lake Chub, a very adaptable species commonly encountered throughout Canada (Scott and Crossman, 1973). The only amphibian inhabiting the park is the Northwestern Boreal Toad, commonly observed at the edges of the hot springs swamps.

Cultural themes at Liard River include native use of the area, the fur trade, Geological Survey exploration, pioneers construction of the Alaska Highway, and early use of the hotsprings pools.
The majority of the park area is undeveloped. Two of the three main hot springs pools, (named Alpha and Beta Pools), and access to these have been developed since the construction of the Alaska Highway. Access to the pools is by a single boardwalk with one rest area between the parking lot and the pools. A boardwalk provides access to the new viewing decks at the Hanging Gardens.

The developed part of the park includes a 53 unit campground and day use area with parking for 60 vehicles. A maintenance yard with summer staff residences is located near the day use area. The campground was used at 150% capacity during the peak 1989 summer season. The day use area was used for overflow camping until the summer of 1990. This level of campground and day use visitation means the hot springs pools are already used at their maximum carrying capacity.

Liard Hot Springs Park receives the heaviest use of any park in the northern region. Although the park itself is not a final destination for the majority of highway travellers, most prefer to use the campground and hot springs facilities en route. Five year statistics indicate a steady growth in campground and day use indicating that the park is becoming better known and is the camping destination of choice for many Alaska Highway travellers.

1.3 ZONING (Refer to Map #4)

Although Liard Hot Springs Park is a relatively small park, its resources are unique in the park system and a zoning plan will ensure appropriate management. The zones are management prescriptions to indicate appropriate activities for an area.

The park will be managed using three zones described below:

**Special Feature Zone**

**Intensive Recreation Zone**

**Natural Environment Zone**

**Special Feature Zone**

Objective:

To preserve and present significant natural or cultural resources, features, or processes because of their special character, fragility and heritage value.

The Special Feature Zone in Liard Hot Springs Park includes all lands and waters directly associated with the hot springs ecosystem. This includes the sensitive hot springs and ponded warm swamp ecosystem and the unique flora and fauna associated with this hot springs environment. This zone will receive a high level of management protection with ongoing monitoring. Management actions will be oriented to maintaining the natural resources and, as appropriate, a high quality recreational and interpretive experience. Use levels will be maintained within the carrying capacity of the hot springs and ponded warm swamp ecosystem.

Development will be limited to the areas already used for recreation, including Alpha and Beta pool, the boardwalks and the decks at the Hanging Gardens. Water flow, temperature and vegetation in the area will not be altered without careful study and only if the environmental impacts are minimized.
flow, temperature and vegetation in the area will not be altered without careful study and only if the environmental impacts are minimized.

The Special Feature Zone also includes all those areas within the hot springs ecosystem not designated for development and includes several undeveloped hot springs, large expanses of ponded warm swamp and associated successional meadows and forest, as well as all warm and cool creeks flowing through the park. No facilities or services will be provided in this portion of the Special Feature Zone.

Activities include walking, guided interpretation or wildlife viewing, scientific study, photography and nature appreciation. This zone may be subject to temporary closures or permanently restricted access in order to preserve natural resources.

**Intensive Recreation Zone**

**Objective:**

*To provide for a variety of readily accessible, facility oriented outdoor recreation opportunities.*

The Intensive Recreation Zone in Liard Hotsprings Park includes the area of high facility development such as the campground, day use parking and related facilities. Improvements within this zone may include those facilities compatible with the Visitor Services Plan, such as an interpretive centre or kiosk. No further facilities or services are required in the Intensive Recreation Zone in the northern segment of the park. The Intensive Recreation Zone provides for park operations facilities which expedite efficient management of the park. This is a small area adjacent to the campground reserved for park maintenance, staff housing and other operations facilities.

Management will be oriented toward maintaining a high quality recreation experience. Operational facilities will be designed for efficient operation while remaining unobtrusive to the park visitor.

Activities include vehicle camping, picnicking, nature appreciation, and day use recreation such as horseshoes and children's play.

An Intensive Recreation Zone in the southern part of the park may be used in the future for expansion of visitor services. These uses may include day use parking and picnicking, and a campground if future conditions warrant such facilities.

**Natural Environment Zone**

**Objective:**

*To protect scenic values and to provide for backcountry recreation opportunities in a largely undisturbed natural environment.*

The Natural Environment Zone in Liard Hotsprings Park includes the forested and open meadow areas of the park not lying within the special feature zone outlined above. The Natural Environment Zone includes existing access trails and the unmaintained narrow four wheel drive road along the Liard River in the southern
part of the park. This route is used as an access lane by residents living to the east of the park.

Moderate development may be considered for user convenience, for example trails. Activities include, walking, wildlife viewing, guided interpretation activities, photography and nature appreciation. Cross-country skiing and other non-mechanized winter sports are also allowed in this zone. Access by motorized vehicle will be permitted on existing roads.

Visitors on guided interpretive walk. The plan emphasizes nature appreciation and interpretive facilities as part of the hot springs experience.
LIARD HOTSPRINGS PROVINCIAL PARK

Map #4 ZONING PLAN
1.4 PARK MANAGEMENT

1.4.1 Natural and Cultural Resources Management

Natural and cultural resource management is intended to protect the unique park features while allowing for compatible recreation uses. The analysis of resources, carrying capacity, and existing park boundaries indicated that further extensive facility development in the northern part of the park would be unsuitable except for those related to interpretation or information. The overall strategy for resource management will be to preserve remaining natural areas and protect the integrity of the hot springs ecosystem. The management strategy will accommodate recreational uses within the existing developed facilities. It will minimize environmental impacts by providing information and compatible alternative sites and activities for visitors.

A hydrological study will be completed to determine optimum pool use levels from a health point of view, as well as assess human impacts on the ecosystem. Such a study will accurately determine the carrying capacity of the park and govern use levels and any future development of facilities.

1.4.1.1 Natural Resources Management

Forest and Vegetation

The overall management objective will be to maintain forested areas in their natural state and to allow natural processes to occur without interference. Vegetation dependent on the thermal springs will be managed as part of the springs ecosystem, with the objective of retaining existing natural features.

Management actions will include:

- **Suppress fires if existing park or recreation facilities are threatened, or if area in immediate vicinity of hot springs is threatened,**

- **Control disease if park or recreation facilities are threatened, and only after evaluation of control impacts,**

- **Remove hazardous trees in campground or day use areas,**

- **Manage vegetation only outside of areas with unique plant communities associated with the hot springs or ponded warm swamp environment,**

- **Co-operate with other government agencies managing forests and fires outside of the park boundaries,**

- **Complete a vegetation and forest resource inventory to determine the location of rare species,**

- **Prepare a vegetation management plan.**
Wildlife

Wildlife resources in the park are not well understood. An inventory is required, as well as an evaluation of the importance of the hot springs and warm swamps to wildlife. The management objective will be to retain wildlife habitat and species populations in their natural state and to minimize impacts from human activities. Wildlife habitat enhancement will not be considered unless a species population is threatened, particularly by man's activities in the park. Hunting or trapping will not be permitted in the park due to the high recreational use levels and the importance of wildlife viewing.

The strategy on bear management will be to educate visitors and to minimize potential human-wildlife conflicts through the provision of information and the proper storage and removal of garbage.

Management actions will include:

- Conduct research on wildlife use of the hot springs environment.
- Monitor wildlife populations in the park,
- Maintain existing hydrological conditions to sustain wildlife, in particular the Lake Chub, Northwestern Boreal Toad and the warm water snail,
- Include Liard Hot Springs Park in the provincial wildlife viewing program,
- Provide public information on wildlife viewing and interpretation,
- Provide wildlife viewing points and trails where appropriate,
- Co-operate with government agencies managing wildlife outside the park boundaries,

Water Management, Water Quality

The overall objective is to allow natural processes to occur without interference and to ensure that any management actions do not adversely affect the sensitive park ecosystem. Existing water quality will be maintained.

Management actions will include:

- Assess the water quality, hydrology, and human use of the hot springs, to accurately determine the carrying capacity,
- Monitor water quality, and manage visitors to ensure that the carrying capacity of the hot springs pools is not exceeded,
- Monitor public comment on the quality of their hot springs experience,
Maintain maximum use of pools at present levels, suggested as 50 persons at a time.

Maintain existing downstream water flows by a policy of non intervention in the hot springs hydrology

Hotsprings and Warm Ponded Swamps

The overall objective will be to retain all existing undeveloped hot springs and swamp areas in their natural state and to allow natural processes to occur without interference. Management actions will include:

- Avoid interference in water flow or channeling, or in plant or animal habitat without an evaluation of environmental impacts, and only if essential to protect the hot springs environment.

The objective for the developed hot springs will be to keep their appearance as natural as possible, and to minimize interference with water flow, temperature, or the vegetation surrounding the springs. The optimum carrying capacity has been tentatively established at approximately 35-50 persons bathing at a time (See Resource Analysis). Management actions to sustain current recreation use of the pools will be undertaken as required and may include:

- Redesign the cooling water system at Alpha Pool to create less impact on the hot springs ecology (see Resource Analysis section)
- Intervene in ongoing cool water creek migration if pools are threatened, but only after evaluation of alternatives and environmental impacts
- Avoid annual vegetation removal by maintenance staff in plant communities surrounding the hot springs
- Increase supervision of pool during peak hours
- Monitor pool use, water temperature and flow on a regular basis
- Undertake any additional management actions as required to rehabilitate disturbed sites and to ensure minimum impact on the ecosystem by visitors

1.4.1.2 Cultural Resources Management

The objective of cultural resources management will be two-fold, to gain a better understanding of the cultural resources and; to protect known sites from disturbance.

Management actions will include:

- Conduct research into native (as the highest priority) and then European history of the hot springs area to gain a better understanding of park cultural resources,
- Interpret the native heritage aspects of hot springs use.
1.4.1.3 Land

(See Land Tenure Map, p. 14)

The land management objective will be to expand the park boundaries to ensure appropriate land uses surrounding the sensitive hot springs environment. The park is already at or near its carrying capacity. Further commercial or residential development immediately adjacent to the park would encourage more use than the natural resources or facilities could accommodate.

Crown lands to the west of the Alaska Highway, and particularly the three UREP sites (UREPs are lands reserved for recreation and enjoyment by the public) in the Ministry of Parks name should be included in the park. No further releases of land for commercial or residential development to the west of the Alaska Highway should be considered.

No hunting guiding licenses will be issued for the park area since no hunting is permitted. No new trapping licences will be issued.

The existing flood reserve and proposed pipeline right-of-way were established by the government and will remain in place until such time as they are no longer needed. Mitigation and or compensation for loss of park resources resulting from flooding or pipeline construction will be negotiated with the project proponents.

Mineral exploration or development will not be permitted in the park.

1.4.2 Visitor Services and Marketing

Liard Hotsprings Park will accommodate visitors and provide for recreation activities compatible with the unique hot springs environment. The objective will be to respond to the market demands wherever possible, while minimizing environmental impacts. The potential role of the private sector in providing services in and outside the park boundaries will be considered.

The main approach to visitor services will be to confine facilities to existing areas, and improve the opportunity to provide information and interpretation. The plan will encourage different activities in the park and region, and could if necessary, modify pool use patterns by encouraging shorter duration use, use during off peak hours, or improved supervision.
Liard River Hotsprings Park will provide the following recreation opportunities:

<table>
<thead>
<tr>
<th>Recreation Opportunity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource Appreciation</td>
<td>- Unique hotsprings and vegetation</td>
</tr>
<tr>
<td></td>
<td>- Warm ponded swamp vegetation and wildlife</td>
</tr>
<tr>
<td></td>
<td>- Wildlife viewing, large mammals, birds and warm swamp fish.</td>
</tr>
<tr>
<td>Beach/Waterplay</td>
<td>- Hotsprings swimming, rest stop</td>
</tr>
<tr>
<td>Picnicking</td>
<td>- Day use picnicking for Alaska Highway travellers</td>
</tr>
<tr>
<td>Camping</td>
<td>- Single and multi-day family camping for Alaska Highway travellers and local residents</td>
</tr>
<tr>
<td>Hiking</td>
<td>- Short day use trail or route hiking</td>
</tr>
<tr>
<td>Winter/Snow Play</td>
<td>- Cross-country skiing and winter hotsprings swimming</td>
</tr>
</tbody>
</table>

The present visitor services are appropriate for the park except for the lack of adequate information and interpretation. Virtually all recent surveys and studies have shown that the travelling public want more information and interpretive facilities. While the existing interpretive programs in the park provide a valuable service, neither of these market demands are fully met in the park. The conservation mandate of the park is not sufficiently explained to the visitor, nor is the interpretation and information available adequate to reflect the nationally significant feature of the hotsprings.

1.4.2.1 Interpretation and Information (Refer to Map#6)

The objective for interpretation and information in Liard Hotsprings Park will be to encourage visitor awareness and appreciation of the hotsprings and ponded warm swamp environment, and to show how the park protects these unique resources. A second objective will be to provide information on appropriate use, behaviour or alternative recreation activities to reduce impacts on the park's sensitive resources.

The appropriate means to enhance interpretation and information are:

- develop a small interpretive centre or multi-sided covered kiosk at the entrance to the boardwalk,
- produce an information and interpretation brochure on the park environment, including information on how to minimize environmental impacts through appropriate behaviour,
• continue to provide interpretive services through a naturalist and focus on the themes and storylines established for the park,

• develop one short access route to a wildlife viewing site and provide appropriate interpretive signs

• develop interpretive signs at the hot springs or hanging gardens to reinforce the interpretive messages given at the boardwalk entrance centre or kiosk

• develop a short looped walking and interpretive trail as a second priority in the eastern warm ponded swamp area to portray a full range of habitats and species;

• develop a trail, (as a very low priority), in the Mt. Ole area to provide an additional wildlife viewing and hiking opportunity.

1.4.2.2 Interpretation Programming

Interpretation programming will focus on conveying the distinctive themes and storylines about Liard Hot Springs Park. Natural resources such as the springs and wildlife will be emphasized, while incorporating stories on human use of the area. Interpretation programming also will be used to help orient visitors to other park opportunities in the region.

Park interpretation should link the brochure, information kiosk or interpretive centre, signs, trails and naturalist programs into one coordinated series of messages. It is recommended that to reflect park resources the interpretive themes and stories include:

Natural:  Hotspring and ponded warm swamp ecology
          Wildlife Viewing

Cultural:  Native Use of Hot Springs and Area
           Use of Hot Springs During Exploration Period
           Use of Hot Springs During Construction of Alaska Highway
           Local History

Promotion: Promote Circle Four Tour
           Promote Northern B.C. Parks, emphasize Muncho Lake, Stone Mountain,

Suggested features to emphasize in interpretation programming are:

• geology and geography of area
• formation and mechanics of hot springs themselves
• microclimate associated with hot springs
• tufa formation, hanging gardens, slope formation, dikes in swamps
• the many species of plants found here only because area is thermally influenced
• rare animals such as Ishnus damula, dragonfly not found elsewhere in north, and Physa, the snails related to southern cousins.
• carnivorous plants found in swamps
• moose habitat and viewing
• lake chub, adaptable species
• diverse resident bird population, migrating birds including shore birds
• the importance of protecting the rare hot springs habitat to ensure that unusual wildlife and vegetation are protected

1.4.2.3 Promotion

Promotion of Liard Hot Springs Park will be minimal since the park is already at or near capacity. Park promotion by the Ministry of Parks will be directed at the shoulder season, and better information will be provided for those who visit the park. Information on campground and private facility services and vacancies will be provided to northbound and southbound travellers. The Ministry of Parks will cooperate with the Peace River Tourist Association to provide the appropriate level of park information.

1.4.2.4 Campground and Day Use Facilities

The objective of campground and day use facilities in the park will be to provide a high quality camping and recreation experience in a natural setting. The day use facilities will focus on providing improved walking or interpretive opportunities, and for providing access to the hot springs.

The campground occupancy exceeds capacity throughout the summer and the day use area functions as an overflow camping area. Greater campground capacity will increase use pressure on the hot springs, and the day use area may still be required for overflow. Power is not available in the campground, and there is no suitable waste disposal site to service increased facilities. There is unused camping and accommodation capacity in the private sector enterprises nearby (See Background Section 2.5.2). The private sector can meet the demand for campsites near Liard Hot Springs.

The management actions will be:

• Forego campground expansion in the park; encourage the private sector to meet the excess demand by improving existing services and providing compatible planned facilities nearby,

• Co-operate with, and assist the private sector in facility planning to ensure that increased accommodation does not result in unmanageable use pressures on the park,

• Forego addition of service facilities such as showers or a sani-dump to encourage the provision of these facilities by the private sector,

• Provide better information on accommodation alternatives in the Liard Region, in Fort St. John, Fort Nelson, and at Muncho Lake; investigate the feasibility of providing vacancy information on the Liard Hot Springs area at Muncho Lake to allow travellers the option of using facilities at Muncho Lake.
Campground management actions cont’d.

- There is no overflow camping allowed in the park. When the park is full, visitors will be informed that private campgrounds are available.

Additional day use facilities will include only those identified for interpretive purposes or for walking and wildlife viewing needs. These are identified in the Interpretation Section.

1.4.3 Park Management Services

The park management services, with certain maintenance tasks provided in part by private contractors, will continue to include:

- maintenance of facilities and structures,
- wood supply, hand water pumps, pit or container toilets,
- sanitation services needed for toilets, campground and site,
- periodic winter ploughing of boardwalk,
- campground fee collection,
- interpretation programming,
- distribution of public information.

1.5 PLAN IMPLEMENTATION

The highest priorities for plan implementation will be:

- conduct hydrological study of the hotsprings pools and the ponded warm swamp ecosystem,
- produce park information/interpretive brochure,
- design and construct an interpretive centre or multi-sided interpretive kiosk,
- select optimum site and construct access trail to a wildlife viewing point,
- investigate ways to provide better information to travellers on accommodation vacancies and alternatives in Liard Hotsprings area,
- develop ways to provide better supervision of hotsprings pools and spread use out more evenly over time and between the two pools,
- undertake actions necessary to designate existing public lands to west of Alaska Highway as part of Liard Hotsprings Park,
- prepare forest and wildlife resource inventories of the park.

Secondary priorities for plan implementation will be:

- conduct detailed assessment to determine best location, then develop looped walking and interpretive trail on east side of boardwalk in the warm ponded swamp area,
- develop day use trail to open ridge of Mt. Ole,
- conduct wildlife research to determine the importance of the springs area to wildlife.
Epsilon Pool and warm swamp ecosystem; this site will remain in a natural state.

Hanging Gardens showing tufa deposits and shallow pools; this site is now accessible by boardwalk, helping to control use and damage to fragile tufa deposits.
PART 2: MASTER PLAN BACKGROUND

2.0 INTRODUCTION

The plan is divided into two sections. Part 1 contains the Master Plan, based on a comprehensive review of park resources and use. Part 2 contains a summary of background resource and use information, as well as a discussion of planning issues and options for management.

2.1 REGIONAL AND PROVINCIAL CONTEXT

Liard Hotsprings Provincial Park lies adjacent to the Alaska Highway on the Liard-Rabbit Plateau in northeastern British Columbia. The park protects the hot springs and ponded warm swamps along with associated flora and fauna. The hot springs are of national ecological significance, and have been ranked among the top in Canada, based on a range of criteria applied to hundreds of springs across the country (Tera Environmental Consultants, 1984).

Within the region, where many of the best springs in Canada are found, the Liard Hotsprings are among the most important springs, highly rated for their aesthetic quality, diversity of flora and fauna, and for the springs formations themselves. The Liard Hotsprings are the only easily accessible developed springs along the Alaska Highway that still retain their natural character. The Provincial Park plays an important tourism and recreation role for regional residents and tourists travelling the Alaska Highway.

2.2 PARK RESOURCES

2.2.1 Natural Resources

2.2.1.1 Physiography

Bedrock Geology

The Liard River Hot Springs area is underlain by folded, faulted, Paleozoic sedimentary rocks typical of the Liard Plateau region. The Liard River forms the boundary between the Rocky Mountains and Liard Plateau physiographic regions. The same bedrock formations are found north and south of the river; however, the rocks of the Liard Plateau to the north are more gently folded and less faulted, and the topography is more subdued, than in the Rocky Mountains.

The rock outcropping in the Park is shale, argillite, siltstone, and sandstone of upper Devonian and Mississippian age (Gabrielse, 1962). It overlies middle Devonian limestone, which is exposed in a north-trending anticlinal structure just north of the Hot Springs. The springs may be related to a major fault system which parallels the valley on the south side of the Liard River, or to other unmapped structures on the north side of the river. The chemical similarity of the spring water to that of the hot springs at Banff, and the similar bedrock geology, suggests that the geological origin
of the two spring complexes might be similar. At Banff, the springs occur as a result
of deep circulation of groundwater through thrust faults.

The bedrock in the immediate vicinity of the Hot Springs is concealed by drift.
However, the sandstone and shale are well exposed on Mt Ole in the southeast part
of the Park, as well as on the river bank near the highway bridge.

Geomorphology and soils

The Park includes small areas of landscapes representative of the Liard Plateau and
the Liard River Valley, such as the late Pleistocene outwash terraces and sand
dunes, the river bank, and the steep ridge of Mt Ole.

No systematic terrain mapping was attempted as part of this planning work;
however, observations were made of terrain conditions in the vicinity of the Hot
Springs during field work. The surficial geology of the area has been mapped by

The hill behind the Hot Springs slopes at an angle of about 12 to 24 degrees, and is
probably mantled with till and possibly other glacial deposits, and colluvial deposits
on some steeper slopes. Where observed, it was covered with old tufa deposits from
Fern Creek or from earlier spring locations. No bedrock outcrops were noticed in
the area of the springs. The Hot Springs emerge where the hillslope meets an
extensive glaciofluvial outwash terrace which fills most of the width of the river
valley. The gravel and sand of this terrace are veneered with loess; this consists of
silt and fine sand, and is typically 30 cm to a metre or more in thickness. In the
southeast part of the park, thicker sand dune deposits cover part of the terrace. The
surface elevation of the terrace varies slightly, reflecting the former course of the
Liard River. Lower lying areas adjacent to the hillside at the Hot Springs have led
to the formation of the warm swamps.

In the area of the warm swamps, the gravel and loess of the terrace have been
covered with a thin layer of tufa and organic deposits. A shallow pit at the edge of
the swamp adjacent to the campsite showed this layer to be only about 20 cm thick;
however, elsewhere in the swamps it may be much deeper. The tufa in the pit was
of loose, sandy texture, and contained organic fragments and snail shells. At the
base of the hillside in the spring source area, the tufa forms hard, porous deposits
with a thin soil developed on top, or occurs as large blocks mixed with the soil. It is
presumably at least several metres thick. Along the trail leading to Beta pool, the
tufa is covered in places with a silty, non-calcareous soil which may be loess.

Reid (1978) describes the soils in the Hot Springs area, but does not provide a soils
map. Generally, Brunisols are found in most well to imperfectly drained areas, both
on old tufa deposits and on the non-calcareous outwash terrace. Regosols occur on
younger tufa deposits, and on steep colluvial material on the slopes of Mt Ole. The
poorly drained swamp areas have Organic soils or, less commonly, Gleysols.

A landslide deposit covers part of the terrace at the foot of the steep south-facing
nose of Mt. Ole (Thurber, 1981). This feature is probably very old, possibly
reflecting more unstable conditions during deglaciation. This area is not believed to
have any significant landslide hazard at present, apart from local rockfall on the
steep slopes of the mountain.
Hotsprings Hydrology

In the discussion below, the definitions given by Souther and Halstead (1973) are used. These are:

- **Thermal spring** - a spring which is more than 5 degrees C warmer than the mean annual air temperature.

- **Hot spring** - A thermal spring warmer than 32 degrees C. Thermal springs below 32 degrees C are called warm springs.

- **Mineral spring** - a spring with total dissolved solids concentration greater than 1000 parts per million.

Sources and flow volumes

The locations of the various source springs in the Hot Springs complex have been mapped, and given Greek alphabetic names, by Pavlick (1974). During field work, the various spring sources, outflow streams, and swamps were inspected in an attempt to understand the flow network, temperatures were taken, and some flow volumes were estimated. The outflows from the Alpha and Beta pools were estimated by measuring surface velocity and average cross-sectional area through a channel segment. At several other locations, less precise estimates were made by observing velocity and channel dimensions.

Pavlick quotes a flow measurement of 649 gallons per minute, or 49 litres per second (l/s) for the combined flow of the Alpha spring and the inflow from the Hanging Gardens; the latter was estimated to be less than 81/s. St. Pierre (1980) reports estimates of 43 to 70 l/s, from several sources, for the flow into the Alpha pool, and one estimate of 30 l/s for flow from the Hanging Gardens. B.C. Hydro estimated the flow of the Alpha stream below the pools to be 80 l/s. The measured flow (this study) was 81 l/s. This includes the inflow from Psi spring and lower Fern Creek.

The measured flow in the outlet stream of Beta pool was 15 l/s; this compares with an estimate of 12 l/s by B.C. Hydro (St. Pierre, 1980).

The flow of Fern Creek where it crosses the trail is estimated, very roughly, to be about 30 to 40 l/s. This creek is a slightly warm mineral stream, presumably spring-fed. The flow at the trail is in several channels, and its position seems to be migrating gradually to the east as it builds up its tufa fan. Most of the flow is now in the easternmost channel, which is rapidly forming tufa deposits. (It was not clear during field work where the “Omega” spring mapped by Pavlick is. It may be covered by the east branch of Fern Creek, or it may be a separate spring source which was mistaken for a branch of Fern Creek.)

The flows from Gamma, Delta, and Epsilon springs were not estimated, but are probably small compared to Alpha and Beta springs. An additional small warm spring, previously unreported, feeds the easternmost swamp. It is possible that other small spring sources exist in the swamp complex.

The minimum estimated flow of the Liard River Hot Springs complex, considering all the known sources, is about 120 to 135 l/s. This would make it the second largest known thermal spring system in Canada (comparing with flow volumes given by
Souther and Halstead, 1973, and by McDonald et al., 1978). Only the Grayling River Hot Springs, estimated at a minimum of 144 l/s by St. Pierre, is larger.

Temperature

In general, temperatures measured during this study agree well with those reported by Pavlick and by St. Pierre, indicating that the temperatures of the springs do not vary much over time.

The temperature of the Alpha spring source was 53 degrees C. The average temperature of the main Alpha pool was 40 degrees C. This is slightly lower than previously reported measurements because of the diversion of Psi spring water into the pool to cool it. This diversion causes the water to be noticeably stratified; temperature in the pool varied from 26 to 49 degrees C. Some other temperatures are:

- Beta spring: 42 degrees C
- Gamma spring: 33 C
- Delta spring: 39 C
- Epsilon spring: 47 C
- Hanging Gardens: 21-23 C
- Psi spring: 22 C
- Fern Creek at trail: 14 C
- Lower Alpha pool: 26-38 C
- Alpha stream below pools: 37 C
- Alpha warm swamp: 18-28 C
- Epsilon warm swamp (near springs): 25-32 C
- Eastern spring and swamp: 17-22 C

Water quality

Numerous analyses have been made of the chemical water quality of the Hot Springs. These are reviewed by St. Pierre (1980). The waters are slightly alkaline (pH of about 7.2 to 8.2), and of Calcium sulphate character. Total dissolved solids has been measured at concentrations of about 1100 ppm in Alpha spring, and about 1000 ppm in Beta spring. About 3/4 of this concentration is accounted for by Ca\(^{++}\) and SO\(_4\)\(^{--}\) ions, with lesser amounts of Mg\(^{++}\), Na\(^{+}\), K\(^{+}\), HCO\(_3\)\(^{-}\), Cl\(^{-}\), and SiO\(_2\). Numerous trace metals are also present. Some sulfur in the water may be given off as H\(_2\)S gas.

The occurrence of bicarbonate ions in the water, and the precipitation of calcium carbonate (CaCO\(_3\)), is a result of a set of equilibrium reactions between CaCO\(_3\), HCO\(_3\)\(^{-}\), and CO\(_2\) in solution and in the atmosphere. These depend on temperature, pH, and the action of vegetation and decay organisms, amongst other factors. The reactions, and the process of tufa formation, are discussed by Pavlick (1974).

Generally, precipitation of CaCO\(_3\) in the form of tufa occurs most readily at breaks in slope, where the flow of water becomes faster and more agitated. This explains the formation of tufa terraces, such as the Hanging Gardens, and of tufa dams in the warm swamps.

Unlike most other thermal springs in Canada, the Liard River Hot Springs do not flow directly into a nearby river or creek, but flow into an intricate system of swamps. These warm swamps are the most unique feature of the Park. Their large extent is due partly to the topography of the outwash terrace, but is also due to the
high discharge of the Hot Springs, which are amongst the largest in Canada. Although not unique, the temperature of the spring water (suitable for bathing), and the tufa formations, make the Hot Springs a feature of high recreational interest.

2.2.1.2 Climate

The climate in the Liard Hotsprings region is typical of northern boreal zones, experiencing cold dry conditions. The annual total precipitation is 465mm, with May through September typically frost-free. There are 6 hours of sunlight at winter solstice and 20 hours in summer (B.C. Hydro).

These climatic conditions, when modified by the hot springs, allow for an ideal recreation setting.

2.2.1.3 Flora and Fauna

Flora

Liard Hotsprings is located in an area where the vegetation is expected to consist of boreal forest species, (eg. *Pinus contorta, Picea glauca, Picea mariana*) The park lies within the Boreal White and Black Spruce Biogeoclimatic Zone (Krajina and Brooke, 1970). Although the majority of species in the park are indeed of this wide-ranging boreal variety, there is also an occurrence of 14 thermally influenced species; only the effects of the hotsprings account for their presence in the north.

The hotspring vegetation is striking compared to outlying areas in species composition, in the large diversity of species (including 14 species of orchids) and the luxuriance of their growth and the early-blooming growth pattern. The reason for the difference is the obvious thermal effect of the hotsprings. There is at least a 2 degrees Celsius difference in annual temperature range, the hotspring vicinity remains frost free, the soils unfrozen and the relative humidity may be higher (Reid, 1978).

Thus, the hotsprings create a microclimate within the boreal forest, with conditions that are favorable for a unique vegetative community. In fact, in the early part of the century, the hotsprings were known as the Liard Tropical Valley. Many species could possibly be relicts from the warmer Hypsithermal interval which occurred 6,000 to 4,000 years ago (Porsild and Crum, 1961).

There are several plant communities in the park which show thermal effects. Obviously the pools themselves create a rich environment for lush growth. There is a large variety of species forming a dense growth of vegetation because of the immediate influence of the thermal waters. Ostrich ferns (*Matteuccia struthiapteris*) give these areas a tropical look, while cow parsnip (*Heracleum lanatum*) grows extremely tall and begins its growing season at least two weeks earlier than surrounding areas. Thermally influenced species that would not normally occur in the north but thrive near the springs include black snakeroot (*Sanicula marililanda*) and Lyall’s nettle (*Urtica lyalii*). Yellow monkey flower (*Mimulus guttatus*) is a colourful addition on the edges of the pools.

An important factor in the hotsprings vegetation pattern is the occurrence of tufa (the calcium deposits precipitated from hotsprings waters), and it is the tufa terrace
of the hanging gardens which provides the base for the spectacular greenery and flowers that grow there. The variety of species found at the hanging gardens is similar to those which occur near the springs. On the slopes behind the springs, the ground is underlain with tufa deposits and there is a thick and luxurious and undergrowth.

Farther away from the springs, are the swamps which, although being extremely shallow, will never freeze in winter due to the continually warm inflowing water. This is a bonus from the hot springs pools, for warm swamps are not common features in association with springs. The vegetation here is quite interesting and often overlooked. Aquatic plants include the bladderworts, which are carnivorous plants. Chara (Chara vulgaris), an important lime-secreting algae, grows in abundance and often dies encrusted with lime deposits. It is an important tufa-forming mechanism (Reid, 1978).

Among the many species found on the tufa islands are several species of orchids, the uncommon Kalms lobelia (Lobelia kalmii L.) and two more carnivorous plants, the sundew (Drosera spp.) and the butterwort (Pinguicula vulgaris). The carnivorous plants are likely here due to the low nitrogen content of the spring water. There is quite a variety of smaller communities in the transition from the forest to the swamp, and on the different islands in the swamp itself. Successional meadows supporting cinquefoil (Potentilla fruticosa) shrubs occur in previous ponded swamp areas.

Mt. Ole supports species of the alpine and sub-arctic variety. Open south facing slopes support stands of native grasses, rose (Rosa spp.), and aspen (Populus tremuloides). This habitat is favoured by elk.

Fauna

Wildlife and their habitat are a critical part of the Liard Hot Springs ecology and provide a recreational experience through viewing and interpretation opportunities.

Numerous studies in the park have included a wildlife component, but no comprehensive investigation of all species has been undertaken. There has not been adequate study of the wildlife ecology related to the springs. A total of 135 species were recorded by 1978, with 28 of these mammals and 104 birds (St. Pierre 1980). Moose are year-round residents and provide the most consistent viewing opportunities. During the summer months bulls, cows, and calves have been observed feeding on aquatic vegetation in the swamps. The presence of moose summer droppings and beds in the black spruce forest also indicate daytime use of the park (St. Pierre 1980). The park has been described as prime moose habitat (Woodhouse, pers. comm.). Moose are not plentiful in the park during the winter months, however, due to the lack of shrubs and saplings in the mature forest.

Rand (1944) reported that mule deer overwintered on the slopes of Mt. Ole, and sightings have been made in the vicinity of the hot springs (Reid 1975). Elk are also known to use the Mt. Ole area (Woodhouse, pers. comm.).

Fresh bear droppings are commonly seen in the park and there have been occasional sightings of sows and cubs over the years. A number of black bears have been taken from the park and relocated, and some habitual problem bears have been destroyed for safety reasons. Grizzly bear have also been recorded in the past, with one encounter in the southern segment of the park resulting in a fatal mauling. Grizzly bear are seldom seen in the park, and there have been no sightings in the campground or pool area in recent years.
Seven species of waterfowl have been recorded, with the mallard and Canada Goose known to breed in the park. The remaining waterfowl are transients, migrating through the area in the spring and fall (St. Pierre, 1980). There are several other types of bird species in the park. St. Pierre observed 11 species of shore birds, of which the solitary sandpiper and common snipe are known to breed in the swamps. Gulls, swallows, blackbirds, kingfishers and nighthawks may be frequently observed near the swamps, while flocks of bohemian waxwings use black spruce perches around the edges of the swamp. There are no known raptor nests in the park, although St. Pierre (1980) observed seven species flying over the park.

Many species of woodpeckers, thrushes, warblers and sparrows have been observed in the park but no thorough investigation has been undertaken (St. Pierre 1980). In winter, the gray jay, raven, chickadees and juncos are residents, while Reid (1974) observed one pair of mallards attempting to overwinter in the hot pools.

Of particular interest to visitors are the numerous small fish swimming in pools alongside the boardwalk to Alpha pool. These are Lake Chub (Couesius plumbeus), a very adaptable species commonly encountered throughout Canada (Scott and Crossman, 1973).

The only amphibian inhabiting the park is the Northwestern Boreal Toad (Bufo boreas), commonly observed at the edges of the hot springs swamps.

A small warm water snail, identified by Dr. Arthur Clarke of the Smithsonian Institution, occurs in the park but has not been studied in detail. It is not known whether this species still survives in the park, or whether its habitat has been modified. Clarke described the species as follows:

\[
\text{The Liard Hot Springs Physa is a distinct species and, as far as is now known, it occurs nowhere else. I collected it in 1973 in the outlet of Liard Hot Springs... in 19 degrees Celsius water on grass and moss at a depth of 1 to 4 inches. I presume that it lives only in moderately cool water at the edge of the warm water but not in it, and it therefore can be expected to have a very limited range.}
\]

\[
\text{This is a primitive Physa which shows relationships... to other relict North American Species. It is probably a glacial relict species... (Clarke 1978)}
\]

In summary, all species are important to the ecology of the park, while moose, waterfowl, and songbirds offer the greatest potential for wildlife viewing. For many visitors, the opportunity to view moose at close range from the boardwalk is a highlight of their trip. The songbirds of the park are not recognized by most visitors, yet the park provides an ideal setting for observation of these species.

2.2.2 Cultural Resources

Cultural themes at Liard River include native use of the area, the fur trade, Geological Survey exploration, pioneers and construction of the Alaska Highway. The overview of regional history is largely adapted from a Heritage Branch unpublished paper by Tarasoff and from The History of the Northern Interior of British Columbia, by A.G Morice (1978).
Native Use

The recorded knowledge of early native use of the site is very limited, although the potential for spiritual stories or legends relating to the springs may be high. There have been no oral histories done in the area to determine if such stories exist, or if the springs were used at all.

The Liard region was home to people speaking the Athapaskan and Kaska tongues, with original groups including Beaver, Sikanni, Nahanni and the Dog Rib (Young, The Fort Nelson Story). Moose was a mainstay of these peoples and they travelled the rivers of the region by canoe. Following arrival of the white man, the native use of the region was closely linked to the fur trade and exploration themes.

Heritage Branch records indicate sites with obsidian flakes and lithic scatter indicating early native hunting. Circular depressions near Beta pool suggest the presence of dug-out houses near the springs. These notations have not been thoroughly investigated and their significance is unknown.

Fur Trade

The rivalry for control of the fur trade in the Pacific Northwest led to exploration and the consolidation of trading interests with the erection of trading posts. The major trading influences in the Liard Region were the conflict between the Hudsons Bay Company and the Northwest Company, the amalgamation of the Hudsons Bay Company and the Northwest Company in 1821, and the western rivalry between the Hudsons Bay Company and the Russian American Company. The latter competition had the affect of impelling the Hudsons Bay Company to explore the Mackenzie River drainage before 1850.

Several posts were built including Fort Simpson at the confluence of the Liard and Mackenzie Rivers, Fort Liard at the junction of the eastern and western branches of the Liard River, and Fort Halkett at the confluence of the Smith and Liard Rivers. Fur trading was the reason for these posts, but they were important as centres for agriculture as well, with potatoes, turnips, cabbage and barley grown.

The first mention of the hot springs on the Liard River allegedly occurs in the diary of Robert Campbell, the HBC Factor at Fort Liard in 1835 and at Fort Halkett after 1839. Unfortunately, the diary is not extant. Further mention is not made until Camsell and Ogilvie’s reconnaissance of 1898. It is likely that the springs were known to local trappers and prospectors.

Robert Campbell established a post at Dease Lake, and reached the headwaters of the Stikine River. In 1840 he explored the north branch of the Liard River, discovering Lake Frances, Finlayson’s River and the Pelly River.

Following Campbells exploration of the Liard Plateau, the Liard River was used as a trading route to the Yukon. It was abandoned in 1870 when it was found that supplies could be taken in from Wrangell, Alaska to Telegraph Creek and on to Dease Lake. Although the Stikine River route involved a 150 mile portage, it was deemed preferable to the risks on the upper Liard River, for example those encountered at Devils Portage and Grand Canyon. Disaster were so frequent that the Teslin and other Indians believed that an evil spirit brooded over these waters.
Two Roman Catholic missionaries, Gascon and Petitot, published accounts of their trips up the Liard between 1861 and 1865. Billy Hill, a trapper, was apparently a local source of knowledge about the river. Gold was discovered near Fort Halkert by prospectors Henry Thibert and Angus McCullough. A small rush started but these two men's discovery of gold in the Cassiar Mountains two years later dwarfed the smaller strike on the Liard.

Geological Survey Explorations

The first scientific exploration of the Liard region was undertaken in 1887 by R.C. McConnell for the Geological Survey of Canada. With G.M. Dawson he entered the Liard Valley via Dease Lake. While Dawson followed Campbell's route to the Yukon, McConnell explored from Lower Post to Fort Simpson. He apparently did not visit the springs.

William Ogilvie accompanied George Dawson on the Yukon River in 1887, and accompanied by Charles Camsell explored the Liard in 1888 and 1889. The two men camped at Liard Hot Springs on both expeditions.

Pioneers

One of the first white men to live at the Hot Springs was Tom Smith, a prospector in the Klondike Gold Rush, who built a cabin on the site in the early 1920's. His wife died and he apparently arrived with his daughter Jane to live at the hot springs. After two years of trapping they decided to travel to Fort Liard with a large cache of furs. Tom was drowned in Devils Canyon, while his daughter was rescued by Indians who sent her to the Anglican mission at Hay River. Jane died at Hay River in 1934 at the age of 27. Early stories suggest that there were gardens in the vicinity of the hot springs, presumably those tilled by Smith. (Young, *The Fort Nelson Story*). Early stories about the springs suggested "tales of a tropical valley with tropical fruit" (Young, *The Fort Nelson Story*). These stories may be attributed to Lt. Col. J. Scott Williams who was making a reconnaissance of the area and found Smith's note about leaving for Fort Liard. Williams reported on the lush vegetation, perhaps the overgrown gardens of Smith, and hence the tropical valley myth was started. Charles Camsell, on his later geological work, refuted the myth, but it survived until construction of the Alaska Highway.

Alaska Highway Construction

Plans for a northern highway through British Columbia to Alaska were discussed as early as 1929. Various studies were commissioned, and fears about benefits and control expressed by politicians led to slow negotiations throughout the 1930's. It was the Japanese thrust to Alaska and the allied commitment to supply war materials to the Soviet Union that finally led to the construction of the Alcan Military Highway between Dawson Creek and Fairbanks, Alaska. A cat train preceded construction of the highway. From March until November, 1942, less than seven months, 10,000 American Army Engineers and 6,000 civilians constructed the 1,600 miles of highway. Of this length, 1,221 miles were in Canada. It came under Canadian military authority in 1946, and was opened to the public in 1947.

According to Young in *The Fort Nelson Story*, there was early interest in leasing the hot springs site for resort use.

Liard River Hot Springs, was a bathing place for soldiers and was called Theresa Hot Springs by the Americans. The present day park area was near the site of a
construction camp located at the Liard River. At the hot springs, a rough boardwalk was constructed to the first pool and plank floats extended onto the water for bathing. At the second pool, sometimes called Trappers Pool, Tom Smith’s cabin was destroyed and two frame buildings were constructed, "one over a small pool... and one alongside for a dressing room." Considerable hay was also cut from farm land near the hot springs in 1943. (Tarasoff, in Pavlick, 1975) Another author suggested that a covered ramp went down to the pool, the pool had a floor in it, and the building covering the pool was screened (Remley, 1976).

Tom and Rose Mould had gardens between the two springs... “and they had potatoes and carrots, and they could leave them there all winter and dig them out as they needed them... as soon as the tourists started coming through they couldn’t maintain their garden... had to abandon it... there’s part of an old fence there.” (George Nelms, as quoted in Remley, 1976)

There are remains of a log structure north of the road along the Liard River, and the clearings from the old highway construction camp may be seen just outside the park boundary on the route to the original river crossing.

Early travellers on the Alaska Highway refer to the springs as a place to exchange experiences with other visitors (Trout, 1972) This use of the springs as a gathering place to exchange stories and meet fellow travellers is still an important and uncommon cultural aspect of the park.

2.2.3 Visual Resources

The visual resources of the park are highlighted by the relatively pristine setting of the wetlands and springs associated with the undeveloped parts of the park. The hanging gardens and the lower undeveloped pools are the most striking of these sites.

Views in the park are gained from Beta pool where brush clearing has provided attractive vistas to the slopes on the south bank of the Liard River. Limited views are gained from the two viewing decks at the hanging gardens. Although no formal trail exists, limited views of the Liard valley would be possible along the ridge northeast of the pools.

In the southern part of the park, superb views of the Liard River valley and the characteristics of the Liard Plateau are gained from the approach ridge and summit of Mount Ole. Pleasant views from the old Alaska Highway crossing sites reveal the Trout River confluence and the cobble beach of the Liard River. These places are seldom visited because no information or trail facilities exist.

Views of the park are also experienced travelling northbound on the Alaska Highway. The forested slopes of the Liard River valley and the rivers edge is seen approaching the bridge and while crossing it.
2.3 RESOURCE ANALYSIS AND CARRYING CAPACITY

The carrying capacity of the Liard River Hotsprings Park ecosystem is a major component of resource and visitor management. Carrying capacity can refer to biological or social factors. It is defined as the ability of a site to absorb human use without unacceptably altering the natural environment or reducing the recreational or interpretive experience. The carrying capacity of Liard River Hotsprings Park has not been measured precisely. The determination of carrying capacity is approximate at best and should be applied as a management tool rather than an exact scientific measure.

2.3.1 The Liard Hotsprings Ecosystem

The Hotsprings ecosystem is defined as the community of plants and animals dependent on the physical environment created by the hotsprings and associated hydrological and terrestrial features. Although parts of this ecosystem have been studied, there is no detailed information on the relationship of the plant and animal community to the hotsprings and ponded warm swamp environment (Reid, 1975, Porsild and Crum, 1961, St. Pierre, 1980).

There is sufficient information to state that the ecosystem is fragile and that many species of both plants and animals depend on a narrow range of habitat conditions related to water level, temperature, and chemistry. Small variations occur naturally over time, but man induced changes could have a devastating affect on any species. Small changes in water quality or levels could have significant detrimental affects throughout the ecosystem. Since plant and animal species are all linked in some way within the ecosystem, the best management approach is a conservative one where modifications to the natural environment are minimized or curtailed altogether.

A practical example of an ecosystem relationship in Liard Hotsprings Park is illustrated by water flow levels in the ponded warm swamp areas. Lowered water levels in any of the swamps can impact on fish and plant species by depriving them of the required environmental conditions for survival. Changes in water temperature through the reduction of water levels can also eliminate some species.

Hotsprings Pools: Physical and Environmental Aspects

The hotsprings pools themselves are a complex part of the overall ecosystem. The resource analysis will focus on the undeveloped and developed pools separately since each requires a special management approach. A detailed resource analysis of the Hotsprings is beyond the scope of this plan and details on the springs can be found elsewhere (St. Pierre, 1980, Reid, 1978, Pavlick, 1974).

The main limitations on the use of the Hot Springs for bathing are the need to maintain the volume and quality of hot water to feed the warm swamps, and the necessity of maintaining adequate water quality in the bathing pools for health reasons.

Warm Swamps and Hydrology

Although the flow volume is large compared to other hot springs which are heavily used for recreation, the uniqueness and sensitivity of the warm swamps precludes the diversion of hot water away to bathing pools elsewhere, or the expansion of pools to the point where water temperature or quality deteriorates. If the
temperature or the volume of water draining into either of the warm swamps is substantially decreased, or if the water is seriously polluted, then plant and animal communities in the warm swamps are likely to suffer.

The warm swamps appear to be highly sensitive to disruption of the flow patterns through them. Changes to the flow patterns occur naturally, although slowly. Rapid changes due to breaching the tufa dams in the ponded warm swamps, or artificially deepening channels, can result in lower water levels or temperatures in parts of the swamps, with impacts on plant and animal communities.

Continued eastward migration of Fern Creek as it builds up its tufa fan, is allowing some creek water to spill over into Psi Spring, lowering its temperature and possibly threatening the "fern garden". There is some possibility that it could eventually spill further east into the Alpha pool source itself. Intervention in this natural process by keeping Fern Creek from migrating further east could help ensure that the recreational qualities of alpha Pool are not changed, and that the existing fern garden would remain in place.

Alpha Pool

Diversion of cool water from the Psi Spring into the Alpha source area to cool the bathing pool interferes with the hot source spring, with possible impacts on any unique biota and geological phenomena which might exist in this hottest part of the spring complex. If this cooling diversion is required, it would be preferable from an ecological perspective, to empty the cool water into the Alpha pool downstream of the hot source area.

There is no obvious solution to the problem of temperature stratification in the Alpha bathing pool which the introduction of cooler water creates. One long term possibility would be to lower the level of the main Alpha bathing pool by 10-20 cm, to isolate the main hot source from the bathing pool and recreate a more natural situation where the hot water cascades downstream from its source. The man-made modifications in the pool area do not appear to have resulted in changes to flow volumes or to any spring source. Plant and animal habitat has been altered or lost, but the effects of this are unknown. At present, visitors clearly prefer Alpha pool for its clear water and attractive setting.

Beta Pool

Beta Pool has a low flowthrough and modest use churns up the muddy bottom, creating an unattractive bathing experience and limiting carrying capacity. The risk of contamination by bacteria is increased since bacteria flourish in silty water. Enhanced flow and aesthetic conditions could result in a higher carrying capacity for the Beta pool thereby relieving potential future overcrowding of Alpha Pool.

Complete redesign or drastic intervention in the Beta spring hydrology could be the only way to solve the problem in the long run, short of rehabilitating the site to its original natural condition.

Groundwater contamination from the pit toilet at Beta Pool could be a problem since flow through the very porous tufa deposits underneath the entire springs area may be very rapid. The hydrological engineering evaluation recently completed for the Ministry of Parks in this regard was inconclusive with respect to pit toilet
Alpha Pool viewed from deck across the hot source pool; cooler water is added to the hot pool to moderate water temperature for swimming.

Beta Pool, looking south; this pool has a lower level of water flow and the water is turbid after use due to a muddy bottom.
Replacement of the pit toilet with a chemical or other alternate system may be required in the future.

There is no "excess" hot water available for diversion or expansion of bathing pools from either the Alpha or Beta pools. The prospect of piping water to a location outside the park or elsewhere in the park is not environmentally sound due to the dependence of the warm swamp plant and animal species on the hot springs water. Diversion of hot springs water could have a catastrophic effect on the park ecosystem.

Hotsprings Pools and Carrying Capacity: Recreation and Health Aspects

Alpha and Beta pools are a major recreation resource of Liard HotSprings Park. The recreational carrying capacity of these pools is an important aspect of park management.

With current campground and day use levels, the pools are likely used by as many as 75 people per hour, assuming steady visitation during peak hours. Most of these people would swim in the Alpha pool with few travelling to the more distant and frequently muddy Beta pool. Beta Pool was closed due to high chlormform counts from the mid-1970's until 2-3 years ago.

The carrying capacity of the pools can be measured in a number of different ways. Health and safety considerations can, in theory, produce a fairly firm number of acceptable users, while a figure for recreational carrying capacity related to the quality of the recreational experience is more difficult to determine.

Health

The Liard HotSprings are currently defined as a public beach with specific water quality requirements (District Health Office, pers. comm.). The fecal chlormform count cannot exceed 200 parts per 100ml, nor can any 10% water sample exceed 400 parts per 100ml (Health Act, B.C. Reg. 282/72). The carrying capacity of the pools from a health perspective, is any amount of use which results in water quality standards within the above limits. The high rate of flow through Alpha Pool results in flushing of fecal matter and urine, thereby allowing more people to use it. The lower rate of flow through Beta pool limits the use capacity of the pool. It is not known how much additional through flow would be required to increase the use capacity of Beta pool.

In both pools, chemical water treatment could have disastrous effects on the hot springs and ponded warm swamp ecosystem. This means that to remain within the health carrying capacity of the pools there are only two options for future consideration: regulate use when chlormform counts move upwards, and/or modify pool designs as required to allow a more suitable water flow.

The Health Act regulations also stipulate carrying capacity for swimming pools according to water area and volume. Although the Liard HotSprings are defined as a public beach, their characteristics may be compared to wading or swimming pools to help with this evaluation of appropriate use levels. This comparison is made only to provide an additional guideline for consideration; there are many differences between swimming or wading pools and the hot springs. Note that the figures in the Health Act regulations apply to treated swimming pools, so that in the Liard
situation a smaller load capacity may be appropriate even if flow through volumes are taken into account.
The B.C. regulations define bathing load as:

\[
\text{Bathing Load} = \frac{D}{27} + \frac{S}{10}
\]

Where \( D \) = area of pool in square feet where depth is over 5 feet, and \( S \) = area of pool in feet squared where water is less than 5 feet deep.

Applying this formula to Alpha and Beta pool results in a bathing load of about 40 for Beta pool and 45 for Alpha pool, for a total of 85 bathers at any one time. These figures are intended to reflect suitable bathing loads in treated pools and are only used as a guideline here. If the lower flow rate of Beta pool is taken into account then the bathing load should clearly be reduced, to perhaps 20-25 at any given time. Alpha Pool can theoretically accommodate 45 bathers without health effects, as shown by both the formula and the lack of health problems in the past. Both pools naturally flush over night to a clear state, thus helping to avoid accumulations of fecal matter or other contaminants.

Recreation

Recreational carrying capacity is an important consideration in Liard Hotsprings Park. Swimming in the pools has always been a social experience, where visitors relax and perhaps trade stories about their travel adventures. The pools are restful places to soothe the mind and body in a natural setting. Overcrowding will reduce the satisfaction of many pool users; what constitutes over-crowding can not be easily determined. Visitors recreation experience will be positive as long as they perceive conditions to their liking. Research on carrying capacity suggests that as use reaches an overcrowded state, visitor satisfaction declines and finally visitors will alter their behaviour to either not enter the pools or come back at off peak hours to avoid the crowds (Shelby and Heberlein, 1986). Visitors also migrate to Beta Pool if Alpha is too crowded. In this way use of the pools is self-regulating, but not necessarily in an optimum way.

The 1987 July park use statistics indicate that 134 people per day camped at Liard Hotsprings, while there appear to have been about 185 vehicles per day using the day use facilities. This vehicle count translates into approximately 425 day users per day for a total daily use of about 560 individuals, when added to the camping total. If use of the pools were evenly distributed, this total means that over a 15 hour day, 37 people per hour could be using the pools, a figure within the capacity of the pools. If, however, it is assumed that use patterns are irregular and most people would use the pools at peak after supper hours, then a figure of almost 75 people per hour is evident. Such a number of users at any given time would be at the upper limit or exceed the pools' carrying capacity. Use of the pools extends to midnight during the summer months, while many visitors leave early in the morning.

Anecdotal evidence suggests that the Alpha pool is considered crowded when it reaches its bathing load of 45, while a number of 10-20 bathers seems to be a pleasant and tolerable level. Those people seeking a quieter experience will walk the extra distance to Beta Pool even though the water quality is less attractive. The recreational carrying capacity of Beta Pool is likely less than Alpha Pool since it is less broken up by partitions, the water is murky, and the attitudes of users may be
different. A use level of 10-12 bathers in Beta Pool is a reasonable optimum number.

Health and Recreation

The combination of health and recreational carrying capacity considerations provides sufficient insight to identify optimum pool use levels. The maximum number of people using both pools should never exceed 85, since this would exceed health and safety guidelines. The sensitive environmental conditions, the untreated water and the special recreational quality of the springs, however, suggests that the optimum carrying capacity should be set at a lower level. A range of 35-50 pool users at any given time is suggested as the maximum carrying capacity that would balance visitor demand with health, safety and environmental conditions. This means that presently, during peak hours, the pools will not sustain additional numbers of bathers without a reduction in water quality and user satisfaction.

Methods of managing use by providing alternate park activities, more information and interpretation of park resources, and better supervision or control of use would help maintain use levels within the carrying capacity of the pools. Improvements to Beta Pool may also serve to increase the overall carrying capacity of the pools.

In summary, the Liard Hotsprings Pools are already used to their carrying capacity during much of the summer season. Park management strategies may help maintain use at reasonable levels. The development of additional accommodation and services in the park, or an over-development of private facilities would result in increased use pressures on the sensitive pools environment.

2.3.2 Terrain and Soils

Although the Park and adjacent areas have large areas with few constraints to development (such as campsites, buildings, and roads), much of the Hot Springs area has quite sensitive soil conditions. The sensitivity of soils can be summarized as follows:

- **Extremely sensitive** - Active tufa terraces, such as the Hanging Gardens and the area of Beta pool; the tufa ponded warm swamps; spring sources.
- **Very sensitive** - Flooded and wet areas of the warm swamps; tufa-derived soils on slopes in the spring source area.
- **Somewhat sensitive** - Organic soils (bogs) adjacent to the warm swamps; tufa-derived soils in flat areas; sand dune deposits.
- **Not sensitive** - Outwash terraces; drift-covered hillsides.

The recent tufa deposits can be very fragile, and subject to damage as a result of repeated foot traffic. All the tufa-derived soils are porous and subject to compaction. This can lead to trenching of trails, as is occurring on the trail to Beta pool, with the resulting risk of erosion by running water. Peat soils are likewise subject to compaction. When building trails on these soils, crushed rock fill can be used in well-drained areas, and boardwalks in poorly drained areas, to prevent compaction and erosion.
The tufa deposits are extremely porous, and as a result are unsuitable for the construction of pit toilets.

The loess-covered outwash terraces are, in general, highly suitable for campsite, building, and road construction, and reasonably suitable for pit toilets and septic tank fields. Roads must be gravelled in silty areas. In many areas, highly permeable, coarse gravel layers may lie at a shallow depth below sandy layers or loess deposits. In these areas, pit toilets could contaminate well water if the toilet pits lie close to the water table. Therefore, pit toilets should not be built near wells, or where the water table is near the surface. The water quality of the existing campsite pump wells should be inspected.

Suitable areas for campsite expansion or building are the well-drained terrace areas between the highway and Epsilon warm swamp, across the highway from the present campsite, and along the dirt road in the southeast part of the Park.

2.3.3 Vegetation Resources

Vegetation in the hot springs and warm ponded swamp areas is closely linked to water levels, temperature and soil chemistry. The aquatic and emergent vegetation in the swamp areas occupies a habitat with specific environmental conditions. The vegetation community and several interesting plants are one of the main ecological features of note in the park, and loss or change of habitat conditions will reduce the interpretive, educational, and scientific value of the park.

The vegetation in the hot springs or hanging gardens area is easily damaged by trampling, but these impacts have been controlled by providing boardwalks and the recent viewing decks at the hanging gardens. Impacts on vegetation could result from management activities such as water temperature and flow changes, or removal of vegetation for maintenance purposes.

2.3.4 Wildlife Resources

Wildlife are the least understood park resource. Their relationship to the hot springs and ponded warm swamp environment has not been well documented. There is a diversity of species using the park for nesting, resting, browsing, or possibly as a mineral lick. Species that require aquatic or emergent vegetation for food, such as the moose, obviously depend on the continued water levels to ensure the existence of their food source. The Lake Chub depend on warm water temperature to survive the winter, while the elk on Mount Ole use south facing slopes for grazing.

Wildlife viewing points could alter animal behavior patterns or cause them to move out of the park, thus reducing this opportunity. Each species responds differently to human presence, and may behave in various ways depending on season. A clear understanding of mating, nesting, feeding and other habits of each species to be viewed will help reduce negative impacts. If the wildlife leave the area, they have already exceeded the point where they feel comfortable. If nesting or breeding habits change, then human presence may also be responsible.

Wildlife viewing is best done under guided supervision to ensure that habitat and species are not disturbed in a negative way. Small groups are more suitable for wildlife viewing. Public education is crucial to low impact wildlife viewing.
Boardwalk with rest area on way to Alpha Pool; this rest area could be extended into wildlife viewing platform.

Cow moose in swamp area, viewed from near Beta Pool.
Liard Hot Springs Provincial Park, at mile 496 of the Alaska Highway, was established on April 26, 1957 as a Class A Provincial Park. The park includes 668 acres to the east of the highway and north from the banks of the Liard River. There are no in-holdings or tenures in the park, although there are several lots immediately adjacent to the park boundary. There is a proposed gas pipeline Right-of-Way along the Alaska Highway and through the southern part of the park. This route is one of several alternatives being considered in the event of an Alaska Highway gas pipeline. The potential effects on the park, should such a pipeline be built are unknown, but access to the southern part of the park could be improved.

DL 6803, Blocks A and B are privately owned and a restaurant and gas station are operated on the site.

DL 6339, 3937 and 3938 are crown owned and reserved as U.R.E.P. sites.

DL 6862 and 3935 at the Liard River bridge are privately owned and Liard River Lodge is operated on the site.

The Department of National Defense hold DL 6340, 6385, and 6386 encompassing lands at both ends of the Liard River bridge.

The existing park road along the Liard River is used as private access by persons living to the east of the park. The Ministry of Crown Lands has considered the possibility of developing recreational or residential lots to the west of the park, between the Alaska Highway and the Liard River. These plans have not materialized, and are one of the planning issues addressed in this report. The lands in question are flat forested terraces adjacent to the Liard River and are suitable for recreational or other development. Potential recreational values on these lands include camping, Liard River frontage and cobble beach, views of Liard River Valley, wildlife viewing, and access to the Liard River for riverboat tours.

Orders-in Council have been passed to create a water reserve over the park (622/56 and 365/70), a mineral and placer reserve (922/77), and exclusion from the Liard Provincial Forest (1376/82)

There are three archaeological sites identified within the park boundary, including obsidian flakes and lithic scatter in the vicinity of the road beside the Liard River (coded as II1Sm by Heritage Branch), circular cultural depressions in the vicinity of Beta Pool and a log structure c.1900 north of the road parallel to the Liard River.

Mining claims to the north of the park are active, while claims to the south are defunct.
2.5 EXISTING FACILITIES (Refer to Map #7)

2.5.1 In the Park

The majority of the park area is undeveloped. Two of the three main hot springs pools and access to these have been developed since the construction of the Alaska Highway. Alpha pool facilities include change rooms, new decking and a series of natural and artificially created pools of various temperatures. There are two container toilets at Alpha Pool, with removable sanitary drums for cleaning. Beta pool has been altered to accommodate decking, change rooms and views south. A pit toilet is located north of the pool.

Access to the pools is by a single boardwalk with one rest area between the parking lot and the pools. A boardwalk connects the trail between Alpha and Beta Pools to the new viewing decks at the Hanging Gardens.

The developed part of the park includes a 53 unit campground and day use area with toilets, playground and parking for 60 vehicles. A maintenance yard with summer residences is located near the day use area. The campground was used at 150% capacity during the peak 1989 summer season. The day use area is regularly used for overflow camping, with 22 tables and fire circles provided. This level of campground and day use visitation means the hot springs pools are already used at their maximum carrying capacity.

There are no formal hiking trails or established routes in the park, nor are there any interpretive structures, signs or permanent displays, other than the day use area park information signs. Game trails and old cut lines have been used in the past for recreational access and by park interpreters.

2.5.2 Outside the Park

The services and facilities provided by private enterprise outside the park boundaries are an important link in the service infrastructure for the region. These outside services could influence the types of facilities and services that are most appropriate within the park. For example, showers and sani-dumps are now provided by the private sector.

Liard River Crossing

There are two restaurants and gas stations operating near the park, one immediately opposite the park entrance, the other at the Liard River bridge. The Liard River Lodge provides accommodation with 17 rooms and advertises 50 campsites. Liard River Lodge also has a sani-dump station.

The Boardwalk Cafe and Trapper Rays gas station, directly opposite the park entrance, advertise a cabin and an unspecified number of campsites. Both private enterprises at the Liard River offer camping, although at present these facilities have not been fully developed and neither are used to capacity.
Muncho Lake

"J and H Wilderness" provides 8 rooms and 50 camping sites. Muncho Lake Lodge provides 12 rooms and 17 trailer hook-ups. Highland Glen has 4 rooms, 10 cabins and 15 campsites, 8 with full services. Muncho Lake Park also has 30 campsites. Park use statistics and interviews with managers suggest that the private and public camping facilities are not used to capacity. These figures indicate that within one half hour of Liard Hotsprings Park there are 51 private rooms or cabins, 82 developed private campsites with at least 25 fully serviced units, and an additional 50 rustic camping sites. Muncho Lake Park provides an additional 30 public campsites.

On any given summer night, the private sector can provide 133 rooms or campsites in the vicinity of Liard Hotsprings Park. These facilities are not used to capacity.

2.6 MARKET ANALYSIS

2.6.1 Park use

Liard Hotsprings Park is the best known provincial park in northern British Columbia. Stone Mountain and Muncho Lake parks, although larger with impressive scenery, are not as famous as the Liard Hotsprings, and do not attract the same level of overnight or day use. The circle tour combining the Alaska Highway parks and the Stikine, Spatzizi and Edziza parks adjacent to the Cassiar Highway offers an attractive route for travellers, but few will venture into these wilderness parks. Liard Hotsprings is often the sole representative provincial park that many travellers will visit in the region. It is both a symbolic gateway to British Columbia from the north, and the last stop prior to heading north to the Yukon and Alaska.

The Yukon Visitor Exit Survey (1987) indicated that almost 100,000 visitors used the Alaska Highway travelling either both ways or north or south. The average party size on the Highway was 2.2. Approximately 2,000 visitors entering the Yukon travelled the Alaska Highway to Watson Lake and then down the Cassiar Highway to complete the circle tour. These latter visitors were primarily residents of British Columbia.

The Stone Mountain and Muncho Lake park experiences will likely increase in importance as the demand for wildlife viewing grows, and the use of Liard Hotsprings increases to capacity. There are few, if any, points along the entire Alaska Highway in the Yukon that offer virtually guaranteed quality wildlife viewing such as that provided at Stone Mountain. The importance of Liard Hotsprings for wildlife viewing, in particular moose and bird species, should be recognized.

Liard Hotsprings Park receives the heaviest use of any park in the northern region. Although the park itself is not a final destination for the majority of highway travellers, most prefer to use the campground and hot springs facilities en route. The campground has operated at 110% of capacity during the summer since the mid-1980’s, culminating in 150% occupancy in 1989 (See Graph #2). The pools are frequently crowded during peak hours of the summer months. The seasonal campground use shown in Graph #3 indicates that the park campground is not used to capacity during the months of May, September and October.
Five year statistics indicate a steady, if uneven, growth in campground and day use indicating that the park is becoming better known and is the camping destination of choice for many Alaska Highway travellers (See Graph #3&4). The total number of Alaska Highway travellers has not increased at the same rate as campground users. Weather and flood events have affected park visitation, for example in 1988 when the Alaska Highway was closed for several days due to landslides.

Total annual campground use has been between 10,000 to 15,000 in recent years, while between 30,000 and 40,000 visit the hot springs on a day use basis. An informal 1980 Ministry of Parks survey indicated that almost 50% of Alaska Highway travellers turned in to Liard Hot Springs Park. This figure is dated but total park use statistics indicate that the percentage of highway travellers stopping at Liard Hot Springs is still very high. Graph #4 indicates the campground use statistics for the periods 1974-1977 and 1983-1988.

The "rubber tire" market is expected to expand at 15% per annum in the 1990's (McLaren Plansearch 1988). The 1992 Anniversary will no doubt attract much greater numbers of visitors to the region and the composition of travellers may change. Whether use declines for a period after 1992 or continues to increase remains to be seen, but few private operators indicate a willingness to invest a great deal for one seasons expected influx of tourists.

2.6.2 Visitor Origins, Mode of Travel

Use of the park during the summer months is primarily by tourists on the Alaska Highway, while year round use by residents and truckers is also considerable. The campground use reflects the type of traveller on the Alaska Highway with 50-60% from the United States, and 40% from Canada, with 20% of these Canadians from British Columbia (See Graph #1). The number of Europeans is increasing to 6-8% of total visitation (VES, 1987).

Most visitors arrive with campers, trailers or motorhomes, but as many as 20% use their car and tent for camping. The majority of bus passengers are retired, whereas those travelling by car, camper or truck, are employed. The majority of park visitors are retired, and most travel in family groups. More of the American visitors are retired than Canadians. These trends are likely to continue although Yukon statistics for the Alaska Highway suggest that the percentage of Canadian travellers is increasing significantly.

Many day users are on bus tours en route to or from Alaska, with very limited time in the park. Few of these visitors have time to use the pools, but many are spectators at poolside. Most would have some time to read interpretive information. Graph 1

2.6.3 Visitor Profile

The visitors to the Liard Hot Springs Provincial Park are diverse yet they share some common characteristics. The Yukon Visitor Exit Survey (1987) revealed many of these characteristics of Alaska Highway Travellers. The outline below was derived from an evaluation of the VES responses. The typical or most frequent summer visitor to Liard Provincial Park is likely to:
Origins and Planning

- be an American from the Pacific Northwest. If Canadian, then from B.C. or Alberta; if European, then a German or Swiss,
- have made the decision to come to the area before leaving home, probably within the last year,
- have found out about the park by reading about it in a magazine or other source; many will have heard about it through friends and may travel with them; less than 10% will have heard about it through direct advertising,
- be travelling primarily in R.V.'s and to a lesser extent car, truck, or camperized vehicle,
- be travelling in a party of 2.2-2.8, in other words with family or friends, motivated 'to see and do',

Age and Occupation

- be retired,
- be a professional, or skilled worker, if employed,
- have a higher than average income, and be well educated,

Destination

- be travelling to or from Alaska if an American, to the Yukon if a Canadian

Activities and Interests

- come to see the scenery and wilderness, with an interest in flora and fauna,
- go fishing as an incidental activity,
- not hike unless they are part of the 10% minority; more likely to hike if short 15 min.-25 min. loop trails provided,
- take lots of photographs,
- appreciate the wildflowers,
- want more information and interpretation on landscape, people, flora and fauna,
- want personal contact with staff or interpreters,
- be generally satisfied with the trip and consider coming back to see and do more, or at least recommend trip to others,
GRAPH #1

ALASKA HIGHWAY VISITOR ORIGINS
Approximate Percentages

Europeans (5.0%)

Canadians (40.0%)

Americans (55.0%)

GRAPH #2

LIARD HOTSPRINGS CAMPGROUND USE
Percent Occupancy by Month

<table>
<thead>
<tr>
<th>Year</th>
<th>May</th>
<th>June</th>
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<td>1989</td>
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Note: There were 21 camping sites from 1983-1985, and 53 sites from 1986 until 1989.
2.6.4 Existing Information and Marketing

Many travellers learn about the Liard Hot Springs by word of mouth from previous visitors or incidentally along the highway at campgrounds and other facilities. The park is first promoted in Fort Nelson, where the "Welcome Visitor" program describes the park and encourages visitors to stop. The interpretive program offered at the park is also well advertised in Fort Nelson, at the museum and various hotels. Visitors to the Muncho Lake area are encouraged to visit the hot springs on a day use basis.

There is no formal advertising for the park, except in the popular Alaska Highway travel guides such as "Milepost". There is no promotional brochure, and many travellers would only become aware of the park by reading a road map.

2.6.5 Changing Travel Patterns

As destination areas in northern B.C. and the Yukon become developed and better known, the traditional 'pass-through' traveller segment will likely decline in importance and be replaced in part by vacationers, or those on package tours, with northern B.C. or the Yukon as a final destination. This means that more roadside opportunities for recreation and interpretation will likely be demanded in the future.

2.6.6 Changing Activity Preferences

Numerous reports have concluded there is a large number of visitors wanting to view and interpret wildlife (VES, 1987) This conclusion is based on worldwide trends, such as the proliferation of commercial services offering wildlife viewing as a prime attraction. Bird-watching has been noted as the fastest growing recreation activity in Canada. Visitors will take advantage of interpretive opportunities in northern B.C., where these facilities are available.

A recent wildlife viewing study in British Columbia, also concluded that wildlife viewing is rapidly increasing in popularity. In British Columbia up to 20% of the population take trips for observing wildlife, while 10% participate in hunting (B.C. Tourism 1988). These projections are significant to Liard Hot Springs Park and other parks in the region since wildlife viewing is cited as a major travel motivation by most travellers on the Alaska Highway.

Thorne, Stevenson, Kellog, (1982) and others, have indicated there is a trend toward self-awareness with an increase in demand for educational, interpretive, and experiential travel. The visitors of the future will often be sophisticated and seek high quality information about the natural and cultural landscape they are passing through. This trend means emphasis should be placed on ensuring that facilities are easily found, information readily interpreted and a variety of programs offered to satisfy an increasingly segmented and specialized travelling public. Senior citizens may seek nature interpretation, while families with young children may seek short duration walks; all will be looking for opportunities that meet their particular demand.
2.6.7 Visitor Satisfaction

The most recent information on visitor satisfaction in Liard Provincial Park is from the comment cards distributed in 1988. The responses indicated that most visitors were very satisfied with the park, citing cleanliness and helpful staff. Most visitors wanted the park to remain natural. There were several requests for improved camping facilities including showers and laundry, while many people requested more information, interpretation, or walking opportunities.

These comments raise several issues focusing on the need to satisfy park visitors yet also protect the environment. The public's immediate wants may not always be consistent with wise stewardship of park resources over the long term.

Public Perception about Liard Hotsprings Park

The public were asked to comment on the park in 1987, providing a good insight for planning. Most visitors found the park to be clean with friendly and helpful attendants. The vast majority of visitors liked to see the park left in its natural state. The most common needs identified were:

- want information on hotsprings, flora, history
- install showers
- install sani-station
- keep dogs and bikes off the boardwalk
- build roof over wood sheds (now done)

Less frequent requests were:

- provide more hiking trails,
- install laundry facilities,
- improve access for elderly and handicapped,
- install more water hand pumps,
- enforce noise and behaviour standards at pools,

Interest Group Perception About the Liard Hotsprings Park

During the preparation of this plan several interest groups and private facility operators were consulted. Their information and views have a bearing on the plan and are summarized here:

- people who visit Muncho Lake take side trips to Liard Hotsprings,
- leave the springs in their natural state, do not commercialize,
- government should advertise what services are available along the highway,
- place park vacancy signs at Muncho Lake,
- the park should not have improved services, let private sector provide services,
- visitors want more interpretive information,
- the wildness of Liard Hotsprings is one of its greatest assets,
- the pools should be free of charge,
- need improved ski trails for winter use.
2.7 PLANNING ISSUES

Planning issues are addressed in the plan to ensure that park objectives are met and that the dual conservation and recreation mandates for park management are realized. Issues have been identified by the public and interest groups, by park staff or during the research for the plan. These issues and alternative approaches to solving the problems are outlined below. Note that many of these issues are closely related to one another, with similar courses of action for handling them.

Planning Issues Summary

1. Do the park resources have the capacity to accommodate more use?

The northern half of the park is already developed to near its maximum extent without further affecting the hot springs ecosystem. There is modest potential to increase use of the pools by improved people management. There is limited potential to increase passive uses of the wooded areas around the swamps, for example wildlife viewing points, trails or interpretive stations. These opportunities, if carefully planned and implemented, would not result in unacceptable impacts on the natural resources. These opportunities are linked more to redistributing and managing existing use levels rather than providing for increased total use.

The southern half of the park is an integral part of the landscape and ecological features which the park protects. This area is suitable for development of day use or overnight facilities and could be used for hiking or viewing. Should there be a demand for future campground space, such development could be considered either in this southern part of the park, or on lands outside the present park boundaries, to the west of the Alaska Highway. (See other planning issues below)

In summary, the range of options are:

- redistribute and manage existing use, provide for new recreation activities such as wildlife viewing,
- provide for camping facilities and day use in the southern part of park,
- discourage all development which would result in levels of pool use beyond their natural carrying capacity.

2. Is expansion of camping or development of other facilities such as an interpretive centre, showers or sani-dump, appropriate?

Increased campground facilities in the park would encourage greater use of the hot springs which are already at or near capacity during the summer months. On the other hand the existing use of the day use area for overflow camping is unsatisfactory since it provides a substandard camping experience, places a heavy burden on sanitation facilities, may displace day users wishing to picnic and swim in the pools, and discourages use of existing private facilities outside the park.
The options for solving this problem are:

- expand campground facilities in some other part of the existing park to relieve use of the overflow parking lot,
- encourage development of private campgrounds outside the park and forego any such development in the park,
- discontinue use of the day use area for camping and encourage use of existing under used capacity of private facilities along the Alaska Highway.

The provision of showers and a sani-dump in the park would not necessarily result in negative environmental impacts, provided planning and design were well executed. The problem is more a question of attracting additional use with improved facilities, resulting in overuse of the hot springs pools. On the other hand, provision of showers could reduce the use of the hot springs as a bathtub, thereby reducing environmental impacts and health risks.

The options for resolving this question are:

- to forego any campground facility improvements in the park and encourage the private sector to meet the demand for showers and a sani-dump outside the park. This option would separate the private and public market clearly, and provide choice in the type of services,
- to develop shower and sani-dump facilities in the park to meet the customer demand for this type of service,
- forego development of showers in the existing campground, but include them in any plans for a new or expanded campground.

An interpretive centre or kiosk is very appropriate for the park and would be a focus for interpreting natural and cultural resources as well as providing the means to inform the visitor about the benefits of minimizing impacts on the sensitive hot springs ecosystem. The analysis of tourism trends supports this position by suggesting that people desire more interpretive opportunities in general. The public has also commented that they would like more information on the park. Adding an interpretive component to the park facilities will help to educate the public about the parks conservation role. The conservation aspect of the park is presently not visible to the public, or is available only at certain times through interpretive programs.

3. **Should there be more opportunities for visitors to participate in a wider variety of activities?**

More opportunities for a wider variety of activities could help reduce pressure on the hot springs pools. Such activities should be environmentally sound and appropriate for the park setting. Interpretation and hiking activities are both suitable for the park and would help reinforce the reasons for protecting the hot springs ecosystem. Increased interpretation opportunities provided through information brochures, wildlife viewing points, guided walks, or short trails are appropriate. Further development of recreation facilities such as playgrounds or
games are not needed in the park since such facilities are available elsewhere and do not contribute to the appreciation of the unique hot springs environment.

The options are:

- spread out use by increasing interpretation and offering more hiking and wildlife viewing opportunities,
- maintain the status quo of activities, but influence pool use and behaviour with better information on the conservation mandate of the park.

4. How much of the hot springs area should be developed and which areas should be left natural?

The northern half of the park, where the hot springs are located, is already fully developed with a campground, day use and pool facilities. Two of the three larger hot springs are developed, leaving one major spring and three minor ones in their natural state. The remaining natural hot springs and surrounding vegetation are very fragile, and would be easily damaged by trampling or bathing.

All warm ponded swamps and the remaining forest in the park are important wildlife habitat contributing to the wildlife viewing opportunities in the park. Further erosion of this habitat through additional development could threaten the natural quality of the park.

The range of options are:

- leave the remaining springs in their natural state in perpetuity, with virtually no human use,
- allow for occasional guided interpretive walks to some of these pools provided this did not create a demand for improved access and development,
- develop trails to viewpoints overlooking one of these pools to provide an opportunity for the public to appreciate a representative hot spring in its natural state.

5. Can the role of the private sector be enhanced, and how would this effect the park?

The private sector could play a positive role in meeting the demand for accommodation and services in the Liard Hot Springs area. Further development outside the park could result in increased use of the hot springs, yet the provision of services outside the park could also help achieve park management objectives by reducing development pressures in the park.

A clear division between the types of accommodation and services provided in the park and by the private sector outside the park will aid the private sector and provide the public with clear alternatives. At present the lack of information on alternative camping or service opportunities likely contributes to the crowding at
Liard Hotsprings Park. This master plan, by setting a direction for development in the park, could help provide the private sector with the assurances necessary to invest in improved facilities and services. A greater number of visitors would be attracted to improved private facilities.

The options are:

- rely on the private sector to meet camping and services demands not met in the park,
- maintain existing crown lands to west of Alaska Highway in crown ownership and monitor effects of existing private facilities as they expand and improve. Only release land for further commercial development if there is proven demand and the park is able to accommodate the increased use such developments would induce.
- expand the park area to include lands to west of Alaska Highway to ensure the integrity of the park resources is protected in perpetuity. If the private sector is unable to meet the demand, develop additional campground in expanded park area.

Hanging Gardens in full summer bloom. This cascading springs area is now protected with a viewing deck to prevent trampling of the fragile tufa deposits.


Marktrend Marketing Research Inc. 1985. *Alberta Resident Travel Study, BC Ministry of Tourism,*


Young, Gerri F. No date. *The Fort Nelson Story.* D.W. Friesen and Sons Ltd. Cloverdale, B.C.

APPENDIX I

List of Contacts

Adamson, Dan. Ministry of Parks, Prince George.
Baytalan, Greg. Health Inspector, Peace River Region.
Beitz, Anne and Gene. Liard River Lodge.
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Cobbett, Maggie. (Park Interpretation Contractor).
Connelly, Derek, Peace Liard District, Ministry of Parks.
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Gall, Mike. Peace Liard District, Ministry of Parks.
Gunness, Jack. Muncho Lake Tours.
Heathman, Rick. Ministry of Parks, Prince George.
Lansdell, Jane. Boardwalk Cafe.
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Peace Liard Regional District, Board Members.
    Frank Parker, Chairman
    Louis Carew, Director
    Grace Bumstead, Director
    Bob Price, Director
    Cliff Ashdown, Director
    Dave Doman, Director
    Harry DeHaan, Director
    Don Edwards, Director
Murtha, Mike. Ministry of Parks, Prince George.
Ross, Gail. Ministry of Parks, Prince George.
Sadlier, Paul. P.S. Logging. (Park Maintenance Contractor)
Schildknecht, Urs. Highland Glen.
Tauers, Mary. Muncho Lake Lodge.
Woodhouse, Bill. Ministry of Parks, Fort St. John.
Liard River Hotsprings Park Master Plan Public Involvement Process and Newsletter

1989

June to August
- Contract awarded for master plan project.
- Contractor met with Ministry of Parks regional and district staff, interest groups and local businesses which may be affected by the plan.

September to October
- Preliminary draft master plan produced for review and revision.

November
- Final draft produced and circulated for public review and comment.
- Personal letters and news release sent to individuals and businesses to ensure they were aware of public review process.
- Public meetings held in Fort Nelson and Fort St. John with a total of 33 people registering.

1989/90

December to February
- Opportunity for public input (A long period of time to allow input from people in remote areas).
- Thirteen (13) written submissions received as a result of public review process.

March to April
- Master plan revised and final plan produced.
LIARD HOTSPRINGS PROVINCIAL PARK

Ministry of Parks, British Columbia
Draft Master Plan Public Review

INTRODUCTION

The Ministry of Parks is preparing an updated Master Plan for Liard Hotsprings Provincial Park, replacing an earlier plan in place since 1980. Public review of the proposed park management options is invited at two public information sessions to be held in Fort Nelson and Fort St. John. These drop-in meetings will be held on Wednesday evening, November 15 in Fort Nelson and Thursday evening November 16 in Fort St. John.

PARK RESOURCES

Liard Hotsprings Provincial Park lies adjacent to the Alaska Highway on the Liard-Rabbit Plateau in northeastern British Columbia. The park protects a complex of hotsprings and warm swamps along with associated flora and fauna. These hotsprings are of national ecological significance, and have been ranked among the top five in Canada. The ecosystem is fragile and many species of both plants and animals depend on a narrow range of habitat conditions related to water level, temperature, and chemistry.

The Liard Hotsprings are the only easily accessible developed springs along the Alaska Highway that still retain their natural character. The Provincial Park plays an important tourism and recreation role for regional residents and tourists travelling the Alaska Highway.

The majority of the park area is undeveloped. Two of the hotsprings pools named Alpha and Beta have been developed since the construction of the Alaska Highway. Access to the pools is by a single boardwalk with one rest area between the parking lot and the pools. A boardwalk provides access to the new viewing decks at the Hanging Gardens.

The developed part of the park includes a 53 unit campground and day use area with parking for 60 vehicles. A maintenance yard with summer staff residences is located near the day use area.

PARK USE

Liard Hotsprings Park receives the heaviest use of any park in the northern region. The popularity of the park continues to grow resulting in increased pressure on sensitive natural resources as well as on developed facilities. The campground was used at 150% capacity during the 1989 summer season. The day use area is regularly used for overflow camping, with 22 tables and fire circles provided. This level of campground and day use visitation means the hotsprings pools are already used at their maximum carrying capacity.
THE PARK ROLE

The role of Liard Hotsprings Provincial Park is balanced between the conservation and recreation mandates of the Ministry of Parks. The conservation role of Liard Hotsprings Provincial Park is to protect a nationally significant hotsprings ecosystem. The recreation role is to allow for a unique hotsprings experience for park visitors. The park also provides one of the most popular campgrounds for travellers on the Alaska Highway, serving both regional residents and tourists. New management challenges are emerging and the proposed plan will address these.

PARK MANAGEMENT

The key issues in the Master Plan focus on the ability of the park and its hotsprings ecosystem to handle increased use. These issues include future campground and other facility development options, park boundaries, resource management, the need for more information and interpretation, and the role of the private sector.

Objectives

The park management objectives are:

- to preserve the outstanding natural hotsprings and warm swamp ecosystem,
- to provide an educational and interpretive opportunity focussed on the hotsprings environment,
- to provide a unique recreational experience in a natural hotsprings environment,
- to provide camping facilities,
- to provide day use recreational opportunities,

Natural Resource Management

The overall strategy for resource management will be to preserve remaining natural areas and protect the hotsprings ecosystem. The management strategy will accommodate recreational uses within the existing developed facilities. The objective for the developed hotsprings will be to keep their appearance as natural as possible, and to minimize interference with water flow, temperature, or the vegetation surrounding the springs. Detailed studies will be undertaken to assess the hydrology of the hotsprings and the health aspects of Beta pool.

Park Boundaries

The plan proposes an addition to the park to ensure compatible land uses surrounding the sensitive hotsprings environment. Crown lands to the west of the Alaska Highway could be included in the park if this plan is adopted. If the park boundaries are expanded, this additional area would be left in a natural state.
Visitor Services

The main approach to visitor services will be to confine facilities to existing areas, and improve information and interpretation services. The plan will encourage different activities in the park, such as wildlife viewing, and could if necessary, help reduce the impacts of heavy pool use by encouraging shorter duration visits, use during off peak hours, or improved supervision.

There will be no active park promotion by the Ministry of Parks, but better information would be provided for those who visit the park.

Campground

The park campground occupancy exceeds capacity throughout the summer and the day use area functions as an overflow camping area. Greater campground capacity in the park would increase use of the hot springs, and the day use area may still be required for overflow. There is unused camping and accommodation capacity in the private sector enterprises nearby. In the proposed plan, the private sector will be encouraged to meet the demand for campsites near Liard Hotsprings.

Implementation

The highest priorities for plan implementation will be:

- produce park information/interpretive brochure,
- design and construct an interpretive centre or multi-sided interpretive kiosk,
- conduct detailed hydrological and health assessments of hot springs and pools,
- select optimum site and construct a short access trail to a wildlife viewing point,
- investigate ways to provide better information to travellers on accommodation vacancies and alternatives in Liard Hotsprings area,
- develop ways to provide better supervision of hot springs pools and spread use out more evenly over time and between the two pools,
- undertake actions necessary to designate existing public lands to west of Alaska Highway as part of Liard Hotsprings Park.

PLANNING ISSUES SUMMARY

1. *Do the park resources have the capacity to accommodate more use?*

The northern half of the park is already developed to near its maximum extent without further affecting the hot springs ecosystem. There are health concerns relating to the use of Beta Pool since this spring has a lower flow rate than Alpha Pool. A detailed evaluation of hydrology and health aspects in the hot springs area would help determine the best course of action.

The southern half of the park is an integral part of the landscape and ecological features which the park protects. This area is suitable for development of day use or overnight facilities and could be used for hiking or viewing. Should there be a demand for future campground space, such development could be considered either in this southern part of
the park, or on lands outside the present park boundaries, to the west of the Alaska Highway.

In summary, the range of options are:

- redistribute and manage existing use, provide for new recreation activities such as wildlife viewing,
- assess the hydrological and health aspects of the hot springs area to determine the best option for public use
- provide for camping facilities and day use in the southern part of park,
- discourage all development which would result in levels of pool use beyond their natural carrying capacity.
- undertake discussions to expand the park area to the west of Alaska Highway to ensure the integrity of the park resources is protected in perpetuity. If the private sector is unable to meet the demand, develop additional campground in expanded park area.

2. Is expansion of camping or development of other facilities such as an interpretive centre, showers or sani-dump, appropriate?

Increased campground facilities in the park would encourage greater use of the hot springs which are already at or near capacity during the summer months. On the other hand, the existing use of the day use area for overflow camping is unsatisfactory since it provides a substandard camping experience, places a heavy burden on sanitation facilities, may displace day users wishing to picnic and swim in the pools, and discourages use of existing private facilities outside the park.

The private sector could play a positive role in meeting the demand for accommodation and services in the Liard Hot Springs area. A clear division between the types of accommodation and services provided in the park and by the private sector outside the park would aid the private sector and provide the public with clear alternatives. A greater number of visitors could be attracted to improved private facilities.

The options for solving this problem are:

- expand campground facilities in some other part of the existing park to relieve use of the overflow parking lot,
- encourage development of private campgrounds outside the park and forego any such development in the park,
- accommodate overflow camping only if there is no alternative or in an emergency. Campers would have to leave by 10:00 A.M. the following day,
- discontinue use of the day use area for camping and encourage use of existing under used capacity of private facilities along the Alaska Highway.
The provision of showers and a sani-dump in the park would not necessarily result in negative environmental impacts, provided planning and design were well executed. The problem is a question of attracting additional use with improved facilities, resulting in overuse of the hotsprings pools. On the other hand, provision of showers could reduce the use of the hotsprings as a bathtub, thereby reducing environmental impacts and health risks.

The options for resolving this question are:

- to forego any campground facility improvements in the park and encourage the private sector to meet the demand for showers and a sani-dump outside the park. This option would separate the private and public market clearly, and provide choice in the type of services,
- to develop shower and sani-dump facilities in the park to meet the customer demand for this type of service,
- forego development of showers in the existing campground, but include them in any plans for a new or expanded campground.

An interpretive centre or kiosk is appropriate for the park and would be a focus for interpreting natural and cultural resources as well as providing the means to inform the visitor about the benefits of minimizing impacts on the sensitive hotsprings ecosystem. Adding an interpretive facility to the park would help to educate the public about the park's conservation role. The conservation aspect of the park is presently not visible to the public, or is available only at certain times through interpretive programs.

3. Should there be more opportunities for visitors to participate in a wider variety of activities?

More opportunities for a wider variety of activities could help reduce pressure on the hotsprings pools. Such activities should be environmentally sound and appropriate for the park setting. Interpretation and hiking activities are both suitable for the park and would help reinforce the reasons for protecting the hotsprings ecosystem. Increased interpretation opportunities provided through information brochures, wildlife viewing points, guided walks, or short trails are appropriate.

All warm ponded swamps and the remaining forest in the park are important wildlife habitat contributing to the wildlife viewing opportunities in the park. Further erosion of this habitat through additional development could threaten the natural quality of the park.

The options are:

- spread out use by increasing interpretation and offering more hiking and wildlife viewing opportunities,
- maintain the status quo of activities, but influence pool use and behaviour with better information on the conservation mandate of the park,
- leave the remaining springs in their natural state in perpetuity, with virtually no human use,
Your comments are requested on this draft plan. You are invited to participate by attending one of the meetings listed below, or by writing to the District Manager, Ministry of Parks.

Meetings:

Fort Nelson: 7-9 p.m., November 15, Raven Room, Town Hall

Fort St. John: 7-9 p.m., November 16, Beatton Room, Pioneer Inn

Write:

Mr. Grant MacPherson,
District Manager, Peace Liard District,
Ministry of Parks,
S.S. #2, Comp. 39, Site 12,
Fort St. John, B.C.,
V1J 4M7

Phone: (604)-787-3407
To:    V. Collins
       Executive Director
       Parks and Outdoor Recreation Division

Date:  November 14, 1984
File:  2-4-5-2

I am pleased to forward the attached document to you and recommend that it be approved as the Muncho Lake Provincial Park Master Plan.

[Signature]
1.0. Moore
Regional Director
Northern B.C. Region

DL/em

APPROVED:  [Signature]
EXECUTIVE DIRECTOR

DATE:  2/4/85
# MUNCHO LAKE PROVINCIAL PARK

## Master Plan

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In this document, reference is made to four P.O.R.D. campgrounds at Muncho Lake available free of charge to park visitors. It has been a traditional concern of private operators within the Park that too many camping opportunities have been provided to Alaska Highway tourists at too little cost. Although government sites are unstructured and rustic, they are felt to be in direct competition with private enterprise.

Recently, several proposals contained within this plan have been implemented. This has served to address the above issue as well as reduce the flood hazard at several sites within the Park.

a) Wildrose and Rocky Mountain campsites have been closed.

b) MacDonald Campsite, south end, has been closed.

c) MacDonald Campsite, north end, and Strawberry Flats Campsite have been improved and formalized.

d) A fee has been introduced for camping at Muncho Lake.
MUNCHO LAKE PROVINCIAL PARK
Master Plan

PLAN SUMMARY

-Muncho Lake Provincial Park provides partial representation of the northern Rocky Mountains, Muskwa Ranges regional landscape. Contained within its boundaries are geological and geographic phenomena which rival most of the southern Rocky Mountain parks. Some of the more prominent and important features of the landscape include dipped limestone bedding, thrust faults, rolling alpine, extensive alluvial fan formations and water surfaces. Important mineral licks located at the north end of the Park attract Stone's sheep to the roadside where they become a significant tourist attraction.

-Within the boundaries of Muncho Lake Park exist several vacant, privately-held lots as well as developed lodges and service centres. The Plan recognizes the contribution made by private sector developments to park tourism and stresses cooperation and further encouragement to these facilities. Other private lots within the Park are assessed and prioritized for future acquisition, however none are required at this time to achieve Park objectives.

-Commercial guides provide hunting services throughout the Park; others access outlying territories via Muncho Lake Park. Areas closed to hunting within the Park include the highway buffer strip and an enlarged area surrounding the mineral licks. The plan recommends an extension of the no-shooting zone to height of land in the north-easterly portion of the Park.

-Other than for tourist camping, opportunities for non-consumptive recreational activity are extremely limited in the scenic Muskwa
Ranges. The plan recognizes that such activities as hiking, viewing and interpretation would increase tourist appreciation and attractiveness along the highway corridor. Current camping facilities provided by the Division are of inadequate standard and too profuse to meet park objectives. Greater opportunities exist to promote private enterprise in the Park through the formalization of P.O.R.D. campgrounds and with a reduction in the total number of available campsites. Short hiking trails and viewpoints will be developed at several locations, and a wildlife viewing area will be provided near the mineral licks.

-An area of particular beauty and relatively effortless access exists at the head of Nonda Creek. Presently the Park boundary lies at valley bottom thus creating an uncertain and unnatural border on which to base permit enforcement and wildlife management. It is recommended that the only boundary amendment to Muncho Lake Park be in this vicinity.

-The Park will be zoned predominately as Natural Environment with recognized Development areas along the Alaska Highway. A parkway sub-zone has been designated along the highway right-of-way in recognition of visual quality objectives set for the corridor. An area of the Park between the Toad River and Nonda Creek has been zoned as wilderness.

- It is recommended that Resources Management and Visitor Services plans be formulated for Muncho Lake Park which address such management issues as wildlife, fire, fisheries, park marketing, promotion and interpretation.
PART 1

1.0 INTRODUCTION

Within the context of modern history and exploration there are certain areas of the country which have remained essentially unexplored until only recent times. In British Columbia, the rapid development of most southern Interior towns and villages centred around mineral wealth, whereas on the coast, the expansion of commercial fishing and logging led to the establishment of coastal communities. The Peace River Block, situated in the northeastern corner of the Province, was settled during the late 1800's and introduced a Euro-American farming population to the B.C. prairie. This settlement remained the most northerly populated area of the Province for several years. Except for the ramblings of prospectors and adventure seekers, the mountains which separated the Peace River country from the rest of B.C. remained unexplored wilderness until the 1940's and 50's. A lack of official nomenclature for all but the most distinct features of the northern Rockies indicates the relative lack of exploration and settlement in the Muncho Lake area prior to its "discovery" in 1942.

Muncho Lake is situated on the 59th parallel aside the backbone of the northern Rocky Mountains (figure 1). At this point the Continental Divide is located well west of the Rockies; the Peace and Liard Rivers having cut through the barrier to drain regions within the Rocky Mountain Trench and Liard plateau. Within Muncho Lake Park, the Toad River flows out of the southern portion of the Park while the Trout River flows northward through Muncho Lake; both joining the Liard River on its way to the Arctic Ocean.

During route reconnaissance for the Alaska Military Highway it was decided that the upper Toad and Trout Rivers could be followed as a short-cut to the Liard, avoiding costly construction through the "Grand Canyon" of the Liard. The new route would cross a divide between the two rivers, skirt the eastern shoreline of Muncho Lake and descend the Trout River to cross the Liard above the canyon.
It became apparent to all who travelled the completed highway that Muncho Lake provided the most scenic section of the project. Recognizing the attraction of the northern Rocky Mountains, the Province established a Liard River Reserve in 1944. This reserve extended over most of the Liard Hotsprings, Muncho Lake and Summit Lake (Stone Mountain Park) areas. The huge tract was eventually split into separate reserves with the Muncho Lake Protective Strip occupying most of the present Park area. In 1955, a 260,000 acre U.R.E.P. reserve was established as further protection of the scenic terrain adjacent to the Muncho Lake corridor. During the following year, a study was completed by the Parks and Recreation Division (Forest Service) recommending that the area be designated a Class B Provincial Park. In May, 1957 the park was established with boundaries much as they remain today.

Since the vast area of the northern Rockies has been realized, many of the extensive valley systems and mountain ranges have been explored, however the territory remains rugged wilderness. Few roads branch from the Alaska Highway, thus leaving foot or horseback as the sole means of truly exploring the hinterland. Nevertheless the Highway itself permits thousands to experience the character of the northern terrain. Improvements to the route and its service centres continue to attract tourist travel to northern B.C. and Muncho Lake Provincial Park will continue to be a scenic highlight of the journey.

This Master Plan not only contains information pertaining to the resource base of the Park but also presents and addresses the complex issues which effect park management today. It suggests policy objectives and development proposals that will guide effective management of the Park and its resources. The plan will be reviewed in accordance with Division policy in five years time, although due to the character of northern development it is expected that no major revisions will be required.
1.1 REGIONAL AND PROVINCIAL CONTEXT

Centred only 115 kilometres south of the B.C.-Yukon border on Mile 456 of the Alaska Highway (Highway 97), Muncho Lake Provincial Park is one of the more remote Parks in the Province. Here the Rocky Mountains near their northern terminus adjacent the Liard Plateau which extends into the Yukon Territory north of 60 degrees (Figure 2).

Muncho Lake Park provides the Provincial Park system with partial representation of the Rocky Mountains Natural Region's Muskwa Ranges (P.O.R.D., 1982). (Figure 3) These Ranges lie north of the Peace River and extend to the Rockies' northern extreme at the Liard River. In general, summit elevations increase northward from the Peace River area, the highest peak in the Range being Mt. Churchill at 3500 metres (south of Stone Mtn. Park). The Muskwa Range has been strongly eroded by alpine and valley glaciation with complex folding quite evident on some faces. As opposed to some of the southern Rocky Mountain ranges, the Muskwa Range contains many more areas of true alpine terrain. The Regional Landscape is currently represented by Muncho Lake, Stone Mountain and Kwadacha Wilderness Provincial Parks (Appendix 1).

Within Muncho Lake Park elevations do not exceed 2300 metres (7600'), however the attractive block mountains appear higher due to the low tree line and generally low valley corridors. Certainly the drive along the valley of the Toad River provides scenic views comparable to any mountain landscape found elsewhere in the Province. Of the 1000 kilometre portion of the Alaska Highway within B.C., it is the drive through the Rockies which highlights the trip.

Muncho Lake Park is one of the very few Provincial Parks which is home to a number of residents. The population in and around Muncho Lake located to the area following completion of the Alaska Highway. Some depend on the land and its resources for their livelihood however more rely on the attractiveness of the scenery and provide services to the thousands of tourists that pass through the Park annually. The "community" of Muncho Lake contains between twelve and sixteen permanent residents, generally
FIGURE 2
MUNCHO LAKE PROVINCIAL PARK
- REGIONAL PERSPECTIVE -

LEGEND

SCALE IN KILOMETERS

0 20 40 60 80 100 120
1:2,500,000
aligned with the four gas stations, three restaurants and three lodges in the Park. Others are more seasonal, usually residing in the Park during the summer and fall months only.

Fort Nelson (pop. 7500) is located 250 km. east of the Park on the Alaska Highway. It is a community of resource and service industry workers who often spend long weekends and holidays in the mountain Parks of Muncho Lake and Stone Mountain. As with many northerners, much of their recreational activity depends on the outdoors; fishing, hunting, camping, trail driving and riding. The vast wilderness presented by their northern locale offers a variety of opportunities to pursue these activities in relative seclusion.
LIARD - RABBIT PLATEAUS

Fort Nelson Lowland

CASSIAR-NORTH OMINECA MOUNTAINS

Muncho Lake Park

Stone Mtn Park

Wokkpash

Kwadacha Park

NORTHERN ROCKY MOUNTAIN TRENCH

MUSKWA RANGES

NORTHERN FOOTHILLS

PEACE RIVER PLATEAU

WILLISTON LAKE

SOUTH OMINECA MOUNTAINS

NATURAL REGIONS AND REGIONAL LANDSCAPES IN NORTHERN B.C.

FIGURE 3
1.2 PARK RESOURCES

1.2.1 Natural Resources

a) Geology and Topography

As with all ranges of the Rocky Mountains, the Muskwas present a series of northwest-southeast trending valleys and ridges. They contain complex folds, wide U-shaped valleys and rugged peaks of Palaeozoic limestone and quartzites. The mountains within Muncho Lake Park are further divided into two sub-ranges: the Terminal Range west of the Trout River valley and the Sentinel Range to the east.

In comparison to the southern Rockies, the Muskwa Ranges show evidence of a more complex, tectonic deformation during their uplifting and development. The Toad River valley unit of the Park shows evidence of intricate patterns of folded and faulted sedimentary strata. The east side of the Trout River valley strikingly illustrates the castellated, southwesterly-dipped limestone peaks typical of the northern ranges. Thick Silurian and Devonian limestones have been thrust up and over younger rocks in westerly dipping blocks. The view gives the impression of a tilted table-top.

It has been estimated that at the height of glaciation the Muncho Lake region was covered in ice to the 2500 metre level. The most prominent evidence of glacial landscape modification is found within the Trout River valley which was a major escape route for the Rocky Mountain (Ice) Lobe. During this time many temporary lakes formed near the melting ice fronts, depositing boulder clay, sand, gravel and varved clays at these locations. Matthews (1980) has identified a major Ice-edge meltwater channel along the eastern slope above Peterson Creek (figure 4).

Rocky Mountain Ice extended only as far north as the (present) northern shore of Muncho Lake where it met the larger Cordilleran Ice Sheet extending south from the Liard River. A pro-glacial lake was formed within the valley, which then drained eastwards toward the Mackenzie Basin.
slopes of carbonates and quartzite combined with a low tree-line, introduces extreme runoff conditions during periods of heavy rainfall. Most tributary creeks flow within steeply enclosed valleys where there is little or no soil cover to limit the absorption capabilities of the land. The creeks enter the main valley under deep piles of rubble formerly eroded from the mountain slopes. With each subsequent flood, more debris is deposited on the floor of the main valley and is distributed in a fan-shaped formation. Over the last several centuries, this continuing process has created several large fans throughout the Muncho Lake valley, many of them having merged with the debris fans of neighbouring creeks. Creeks originating in the Terminal Range do not develop alluvial fans due to a more subdued grade as well as a heavier vegetation cover.

d) Vegetation

Three biogeoclimatic zones can be identified within the Park. (Figure 5) In the valley bottoms and rising to an elevation of 880m, the Boreal White/Black Spruce Zone is found, while above this level (generally between the elevations of 950m and 1550m) lies the subalpine Spruce/Willow/Birch Zone. Throughout Muncho Park the subalpine is at or slightly above the level of the Alaska Highway. Within both of the zones, harsh conditions limit tree growth and large stands of trees with commercial value are rare. Above 1500 m lies the high altitude Alpine Tundra Zone. This is a cold, wind swept, snowy environment with a very short frost free period. Several extensive alpine meadows and ridges characterize this zone within the Park.

There are several interesting vegetation features found in the vicinity of Muncho Lake. In several areas the forest is in various stages of succession; most evident along Peterson Creek where fire has destroyed a large area of forested land. Over twenty years later, the land has yielded a seral cover of lodgepole pine and aspen.

On the alluvial fans, riparian plant species also grow in various succesional stages. Some of the more stable fans have experienced a full vegetative cycle: a shrub cover of willow and birch eventually establishing into forests of white and black spruce. Others achieve only a partial cycle before recurring floods displace all vegetation from the fans.
Subsequent glaciofluvial runoff from ice stagnating near the north end of Muncho Lake created an outwash plain of sand and gravel overlying lacustrine sediments within this outwash zone. At the north end of Muncho Lake, the site of the present viewpoint marks the ice contact face. Muncho Lake was thus formed as the drainage of the retreating Rocky Mountain Ice was impeded by previously deposited material.

In addition to evidence of continental glaciation, alpine glaciers have also helped shape the landscape within Muncho Lake Park. Cirques, moraine ridges and glacial drift can be found throughout the area, especially in the high country adjacent Park boundaries.

In general, the topography of Muncho Lake Park is steep, with elevations ranging from 646 m to 2122 metres. Only the valleys of the Trout and Toad Rivers provide flat terrain suited to development. A number of alpine plateaux and basins present exceptional hiking opportunity, however access to these areas is extremely difficult.

b) Climate

According to the Koppen-Geizer classification system, the climate of Muncho Lake Park is described as "Humid Continental-Cool Summers". Such areas characteristically experience short, cool summers and long, cold winters. Two major factors influence the climate of the Northern Rockies: the northern latitude and the dominance of Arctic air masses which result in relatively heavy summer precipitation. Table 1 illustrates specific weather recordings for Muncho Lake. An indication of general seasons and their length is shown in Table 2.

During winter, long periods of intense cold are common. Snowfall is generally light and infrequent, but rarely does a melt occur before the spring. As experienced by many northern climates, shoulder seasons (spring and fall) are usually quite short. During summer, Arctic air is largely replaced by cool, moist Pacific air producing showery conditions. Under certain circumstances a weather system will develop, usually in the first part of summer, that will produce prolonged, severe rainfall. This situation is known to develop in mixed-air zones (where warm, humid air
### TABLE 1  MUNCHO LAKE CLIMATE DATA

<table>
<thead>
<tr>
<th>MUNCHO LAKE</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
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### TABLE 2  GENERAL SEASONS - FORT NELSON/SMITH RIVER

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<tr>
<th></th>
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<th>HiSummer Begins(^2)</th>
<th>HiSummer Ends</th>
<th>Summer Ends</th>
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<td>Smith River</td>
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<td>June 23</td>
<td>Aug. 22</td>
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<td>Fort Nelson</td>
<td>May 2</td>
<td>May 28</td>
<td>Aug. 31</td>
<td>Sept. 25</td>
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<tr>
<td>Ft. Nel.: 96 Days</td>
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<td>Winter Begins(^3)</td>
<td>HiWinter Begins(^4)</td>
<td>HiWinter Ends</td>
<td>Winter Ends</td>
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<td>Oct. 21</td>
<td>Apr. 8</td>
<td>Apr. 27</td>
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<tr>
<td>Ft. Nel.: 170 Days</td>
<td>Ft. Nel.: 203 Days</td>
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<td>Source: Climatic Suitability for Recreation in B.C.: M.O.E., 1977</td>
<td></td>
<td></td>
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</table>

\(^1\) daytime max. temp. = 18°C

\(^2\) daytime min. temp. = 0°C

\(^3\) daytime avg. temp. > 18°C

\(^4\) daytime avg. temp. < 0°C
moves against colder mountain air) producing up to 25mm of rain over a five hour period. In Muncho Lake Park, this excessive rainfall, combined with snowmelt from the upper levels, has contributed to the formation of extensive alluvial fans along the eastern slopes of the Sentinel Range and has resulted flooding along portions of the main valley.

In general, winds blow from the southwest during summer months and from the northwest during the winter. Morning periods of calm are usually replaced by gusts during mid or late afternoon. Windy conditions are most evident on Muncho Lake where vegetation does not impede their force.

c) Hydrology

Hydrologic features and processes play a dynamic role in the development of landscapes. Within the Park, Muncho Lake (Kaskan for "Big Lake") represents one of the few large bodies of water in the northern Rocky Mountains. The lake is over twelve kilometres long, varies in width between one and six kilometres and maintains a maximum depth of over two hundred metres. Its waters are jade green in colour due to the presence of copper oxides leached from the bedrock. The average summer water surface temperature is a cool ten degrees (C).

Other hydrological features of the Park include waterfalls, canyons and karst; small lakes are often found in alpine areas. At the south end of Muncho Lake, the inflow of the Trout River has created a bouldery delta approximately three kilometres in length. At valley bottom, both north and south of the lake, the Trout is shallow and fast flowing over a rough gravel bed. The Toad River, deep and swift, splits in several places to provide a good example of a braided channel. Many of the bars are vegetated, while others are constantly being eroded and shifted. Both rivers experience high water levels during the spring freshet (mid-June) causing further erosion and channel fluctuation.

The most dramatic, and potentially dangerous, hydrological process which occurs in the Park is the on-going development of major alluvial fans along the western flanks of the Sentinel Range. This range, with its steep
slopes of carbonates and quartzite combined with low tree-line, introduces extreme runoff conditions during periods of heavy rainfall. Most tributary creeks flow within steeply enclosed valleys where there is little or no soil cover to limit the absorption capabilities of the land. The creeks enter the main valley under deep piles of rubble formerly eroded from the mountain slopes. With each subsequent floods, more debris is deposited on the floor of the main valley and is distributed in a fan-shaped formation. Over the last several centuries, this continuing process has created several large fans throughout the Muncho Lake valley, many of them having merged with the debris fans of neighbouring creeks. Creeks originating in the Terminal Range do not develop alluvial fans due to a more subdued grade as well as a heavier vegetation cover.

d) Vegetation

Three biogeoclimatic zones can be identified within the Park. (Figure 5) In the valley bottoms and rising to an elevation of 880m, the Boreal White/Black Spruce Zone is found, while above this level (generally between the elevations of 950m and 1550m) lies the subalpine Spruce/Willow/Birch Zone. Throughout Muncho Park the subalpine is at or slightly above the level of the Alaska Highway. Within both of the zones, harsh conditions limit tree growth and large stands of trees with commercial value are rare. Above 1500 m lies the high altitude Alpine Tundra Zone. This is a cold, wind swept, snowy environment with a very short frost free period. Several extensive alpine meadows and ridges characterize this zone within the Park.

There are several interesting vegetation features found in the vicinity of Muncho Lake. In several areas the forest is in various stages of succession; most evident along Peterson Creek where fire has destroyed a large area of forested land. Over twenty years later, the land has yielded a seral cover of lodgepole pine and aspen.

On the alluvial fans, riparian plant species also grow in various successional stages. Some of the more stable fans have experienced a full vegetative cycle: a shrub cover of willow and birch eventually establishing into forests of white and black spruce. Others achieve only a partial cycle before recurring floods displace all vegetation from the fans.
MUNCHO LAKE PROVINCIAL PARK

FIGURE 5
- VEGETATION ZONES -

- Boreal White/Black Spruce Zone ≤ 880 m
- Subalpine Spruce/Willow/Elk Zone 880 - 1500 m
- Alpine Tundra Zone > 1500 m
- Burned Area

--- Boundary Between Vegetation Zones

SCALE IN KILOMETERS
<table>
<thead>
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<th>Table 3</th>
<th>Common Plant Species of Muncho Lake Park</th>
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<td>Lichens:</td>
<td>Cetraria tilesii (common golden lichen)</td>
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<tr>
<td></td>
<td>Cetraria nivalis (common white lichen)</td>
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<td>Higher Plants:</td>
<td>Horse tail</td>
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<td>Common Mtn. Juniper</td>
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<td></td>
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<td>Bog orchis</td>
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<td>Kinnikinnick</td>
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<td>Balsam Poplar</td>
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<td>Cottonwood</td>
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<td>Mountain Alder</td>
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<td>Shrub Birch</td>
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Source: Ted Underhill, P.O.R.D., 1980
Near Moose Lake, in the southern portion of the Park, rare bog orchids have been identified and documented. Access to these sensitive plants is hampered by the wetland environment. In the extensive alpine areas within the Terminal Range, vegetation is often found growing in distinctive bands which appear to follow the contours of the land. Processes of soil creep have created undulations on the landscape resulting in deeper soils, thus permitting the establishment of higher-level vegetation species than might normally occur.

Table 3 presents a partial list of vegetation species found in the Park.

Soils around Muncho Lake Park are typical of those throughout the northern mountain region. Humo-Ferric Podzols are dominant within elevations of 1100m to 1500 metres; between 1500m and 1700 metres the podzols blend with Melanic/Dystric Brunisols; to the 1900m elevation soils of the Brunisol and Regosol types dominate until rock and scree constrain soil establishment in the alpine environment. Very few pockets of deep soil occur in the Park. In most of the developable areas, only a thin veneer of soil covers the underlying glacial drift.

The process of alluvial fan formation consistently disrupts the establishment of soil within the path of flood waters and debris torrents. On several lots adjacent to identified, active fans, excavations have unearthed standing timber buried by previous torrents. This serves to illustrate the vehement forces associated with these flows as well as the slow process of soil formation under such environmental conditions.

e) Wildlife

Observations on wildlife in northeastern B.C. are described in the 1980 TIDSA study.

In the northern Rocky Mountains, large ungulates (except caribou and moose) are approaching the northern limits of their range and are under constant physiological stress due to cold winter temperatures, the short growing season and a limited food supply. Hence, overall
numbers and population densities are relatively low. Animals often concentrate in specific areas with favourable habitat, particularly in winter, and they are very susceptible to disturbance.

Figure 7 indicates preferred habitat areas for various species at Muncho Lake Park.

Although Canada Land Inventory mapping has not been completed for the Muncho Lake area, ratings for the Alaska Travel Corridor are found in Dooling, 1974. East of the Park, the Toad and Racing River confluence is an important area of Class 2 (see appendix 2), winter range for sheep, moose and deer. Moose Lake, actually an ox-bow lake formed along the Toad River, is an excellent location for viewing moose. At most times a cow, calf or both are visible to the travelling public. A small, local Class 3 wintering area for caribou and moose exists on the east side of Muncho Lake. Areas of past forest fires are important vegetation edge habitat for ungulates.

Excellent caribou range is found in the alpine west of Muncho-Peterson Pass and the flatlands south of Muncho Lake are important as year round caribou habitat and winter moose range. Above a mineral lick at Milepost 438, an area of Class 3 winter range for sheep and goat was found. Mineral licks north of Muncho Lake are also important for attracting Stone's sheep, and the slopes adjacent to the mineral licks are classified as Class 3 and 4 range. On the red bluffs west of Muncho Lake is one of the few mountain goat concentration areas along the Alaska Highway.

Other wildlife species in the Park include grizzly and black bear, wolf, coyote, lynx, martin, marmot and fisher and beaver. Avian species which may be observed in the vicinity of Muncho Lake is generally dependent on the time of year. Muncho Lake, and to a lesser degree, Drogheda Lake, are common congregation areas for migrating bird populations. The beaches at the south end of Muncho Lake are preferred by Canada Geese, a variety of ducks, as well as gulls, grebes, mergansers and loon, which are a common sight on the lake itself.
Probably the highest quality sport fishery along the B.C. Alaska Highway can be found at Muncho Lake; numerous Lake trout (char) over 30 pounds have been taken from the cold, clear waters. Concentrations of trout are particularly common at inflowing creek mouths and in shallow bays on the west side of Muncho Lake. Other species include Dolly Varden char, mountain whitefish, Arctic grayling, white and longnose suckers. This latter variety has become increasingly common in the lake, to the detriment of more favourable species.

Like many other northern lakes, source waters of Muncho Lake originate high in the mountains and glaciers of the vicinity. As a result, low nutrient levels are maintained in its waters. This oligotrophic condition contributes to the slow growth and late maturation of fish, making the various species susceptible to overfishing. Nonetheless, the Park’s main attraction for regional residents is the fishing.

Both the Trout and Toad Rivers host Arctic grayling and Dolly Varden char. Access points to the rivers include crossings of the Alaska Highway as well as from a few lanes which leave the road at various points. Drogheda Lake was a popular fishing spot for travellers prior to relocation of the Highway in 1981. Now, few persons take advantage of the reported opportunity presented by the outflowing creek.

Located at such a northern latitude, Muncho Lake park is plagued by the annual onslaught of nuisance insects. Mosquitos and blackflies can impair the best of plans for outdoor recreation. Usually most common in June and early July, the mosquito population continues to multiply until hot, dry weather begins to dry up their habitat. It is in August that the blackflies then begin to torment the Park visitor and the ungulate population in the Park. Only after the first frost can one be ensured of an insect-free experience.
f) Visual Resources

Four visually distinct zones occur within Muncho Lake Park. These zones are illustrated in Figure 6, as well as specific visual features referred to in the following descriptions.

i) Toad River Unit:

This unit provides the most impressive mountain scenery found in the Park. Of particular significance to Highway travellers is Folded Mountain located on the north side of the Toad. Northbound tourists get an extended opportunity for full-face viewing of this feature as they approach the Park's southern portal. The mountain presents striking patterns of twisted and overturned sedimentary strata. Forefront to the mountain itself is a high cliff of exposed stratified bedrock, similarly folded and faulted. Along some portions of the highway, vertical walls line the right-of-way to create a visual tunnel which focuses the viewers attention on the attractive river/mountain interface of the Toad River valley. Beyond the narrow confines of the southern portal, the Toad valley broadens into a wide, U-shaped valley containing features which are common in many mountain river systems.

Ox-bow lakes, tortuous meanders, point bars and islands, against a backdrop of snow-clad peaks, create visual variety which is very appealing to drivers who have travelled many miles through the largely uniform landscape of the Alberta and Yukon plateaux. Only at the extreme western end of the highway corridor has human development impaired the visual quality of the unit. Abandoned buildings on private lots remind viewers of an unsuccessful business which once served the Highway.

ii) Peterson Pass Unit:

This unit represents the connector between the Toad and Muncho Lake visual units. Here, the highway traverses the drainage divide of the Toad and Trout Rivers. To the east lie the dipped mountains of the Sentinel
Range, while the western view is dominated by the foreslopes of the Terminal Range. Open space, created by the forest fire which destroyed much of the unit's tree cover, provides impressive opportunities for viewing the saw-toothed mountains to the east. A highway pullout serves as a viewpoint for Alaska Highway travellers. Near the north end of the unit significant views of Peterson Mountain become more frequent. It is on the north side of the pass, near the Muncho Creek crossing, that the valley provides a glimpse of the Trout River valley to the west. Southbound drivers are treated to oblique views of the Toad River and adjacent mountain ranges as they descend Peterson Pass. A large gravel pit at Peterson Creek crossing (Toad R. unit), detracts from an otherwise unobtrusive scene, otherwise few man-made features within the unit degrade the visual landscape. Specific visual features within this unit include Peterson Creek canyon, waterfalls, fossils and small water bodies such as Drogheda Lake.

iii) Muncho Lake Unit:

Through this unit the Alaska Highway follows along the eastern shore of Muncho Lake providing excellent viewing opportunities both across to the Terminal Range and northward down the Trout River valley.

Views to the east are somewhat limited by the close proximity of the Sentinel Range, except where the highway crosses the large, open alluvial fans. These locations permit an unencumbered view to the summit of the adjacent mountain slopes. Along these tributary valleys canyons, hoo-doos and interesting sedimentary rock exposures lie only a short distance from the highway. At Mile 456, an un-named creek wash extends several hundred metres back into the mountains where it abuts an especially scenic backdrop. North of this location, the highway travels adjacent to dolomite cliffs exposed during construction of the route. From selected viewpoints, rock pillars can be seen towering along the cliffs above the highway. To the west, the forested slopes of the Terminal Range rise steeply from the Muncho Lake shoreline. A narrow, incised channel of debris can be seen, tracing the path of recurrent mudslides and snow avalanches. Exposed red
bedrock opposite Mile 462 indicates the copper oxide intrusions common to the Terminal Range. Few rocky peaks can be seen to the west from the valley bottom, although hints of the extensive alpine country are evident at several locations.

At the north end of Muncho Lake and sitting on the remains of a former ice dam, a developed viewpoint presents tourists with a commanding view over the entire lake. Beautiful blue waters frame a small spit and island which stand out from the otherwise uniform alignment of the western shoreline. From here, many of the features described previously can be identified.

The Muncho Lake unit contains very impressive scenery, especially the pristine lake/Terminal Range interface, however, several man-made features impair vistas on the east side of the lake. These include telephone lines, abandoned ramshackle buildings and a variety of signs along the highway right-of-way. Several private lots contain the relics of abandoned vehicles, service centres and residences, long since fallen into disrepair.

iv) Trout River Unit:

North of Muncho Lake, the highway travels along relatively flat terraces above the Trout River. Several alluvial fans are crossed; many having merged together because of their expanse. Views to the east are of the uniformly dipped beds of the Sentinel Range. Tributary streams, as in the Muncho Lake unit, present views up their valleys as well as down to the Trout River. In general, scenes to the west are of the forested Terminal Range and although no particular peaks or features stand out from the rest, where tributary streams enter the Trout River wide valleys run deep into the heart of the mountains, well outside outside Park boundaries.

At Mile 472, cream-coloured, silty clay deposits rise steeply above the Trout River. Erosional processes of wind and water have sculpted the cliffs into tall pillars of lacustrine material. The light colour of the hoo-doos dominates many views along the river valley. Similar formations on Prochniak Creek (northern Park boundary) present an equally striking visual feature. Exposed minerals in the silt attract many ungulate species
to their vicinity, such becoming primary visual features in themselves.

Travelling northward, several crests in the road provide good views of the narrowing Trout River valley. Immediately south of the Park boundary the Terminal and Sentinel Ranges begin to merge, creating a tight gorge in which flows the Trout River. Not far north of this point the Rocky Mountains become much more subdued until they finally reach their terminus at the Liard River.

1.2.2 Cultural Features

a) Archaeological

Although the nomadic ramblings of the Kaska-Athabaskan Indians have been documented in the northern Rocky Mountains, little evidence exists within Muncho Lake Park today. Archaeological surveys conducted during construction of the Alaska Highway (Museum of Modern Man; Washington, D.C.) yielded very few clues to the lifestyle of northern Indian bands. On Muncho Lake, assumed to be a primary encampment, only three sites have been identified in reports published by the B.C. Provincial Museum (appendix 2). Several chert flakes, indicative of primitive tool making activity, have been found scattered on the beaches at the north end of the lake. On the stony spit along the western shoreline remains of a campsite have also been identified. Chert flakes can be found along the beaches of the southern shoreline, although no further evidence suggests that the mouth of the Trout River at this location was a common camping area.

Descendants of a once dominant native population still reside in the vicinity of Muncho Lake. The MacDonald Band, now limited to less than a dozen family members, continue to maintain a self-sustaining lifestyle in the area. A family graveyard is located on the banks of the Toad River near the southwest corner of the park. Discussions with these individuals may lend more information than is presently available.
b) Historical

As previously discussed, non-native discovery of the Muncho Lake area did not really occur until the construction of the Alaska Highway in 1942. At various locations, construction camps were established to temporarily house the platoons of U.S. Army personnel used on the "Trail of '42". Within the Park, evidence of the campsites remain today; at Drogheda Lake, foundations and a 5-hole latrine can be seen amongst the trees. North of Muncho Lake, the remains of several buildings and one standing residence permit viewers to visualize the type of encampment established in this area during the construction period. Unfortunately, the quality of building standard implemented for these temporary camps precludes any opportunities for restoration.

Through Peterson Pass, an original tote-road used during construction winds through the regenerating forest. The road base remains solid and a short hike along its route illustrates the "trial and error" type of construction that characterised the original highway. At several locations, the re-aligned road reveals abandoned sections of the former route, often illustrating early construction features such as wooden culverts and "corduroy.

Recent historical evidence within the Park dates from the mid-1940's. Such "artifacts" include the previously mentioned delapidated buildings and discarded piles of junk which line the Highway right-of-way.

1.2.3 Recreation Features (as prepared by D. Clarke)

A recreation feature analysis was prepared for Muncho Lake Park and is summarized in Figure 7.

Probably the most significant outdoor recreation feature is Muncho Lake which is one of the few large lakes in the Rocky Mountains. This lake provides excellent opportunities for angling, boating and canoeing, and presents a major visual feature. The best opportunities for lakeside camping and day use are found on the alluvial fans. Two good pea-gravel beaches are located at the present sites of MacDonald and Strawberry Flats.
FIGURE 7
MAJOR RECREATION FEATURES

Provincially significant recreation features

[Map showing various features and activities in Muncho Lake Provincial Park, including Trout River opportunities for angling, riverside day use, and other recreational areas.]

Scale: 1:25,000

Legend:
- Important wildlife habitat areas
campgrounds. These represent the only noteworthy beaches on the lake.

The extensive alpine plateaux on the west boundary of the park, (north and west of Muncho Lake), as well as the large alpine valley in the southeastern section of the Park, are considered to be Provincially significant recreation features. These alpine areas offer gentle topography, small scenic surface waters, interesting periglacial features, excellent hiking and viewing opportunities and wildlife habitat. Other smaller alpine areas are found at the headwaters of many tributary streams.

Another feature for which the Park has become well known is the mineral lick formations along the Trout River north of Muncho Lake. These cutbanks are found at several locations along the Trout River, the largest of which are considered Provincially significant as important visual features. Their attraction is heightened due to the likelihood of viewing Stone's sheep in their vicinity.

In Muncho Lake Park, dynamic hydrological processes cut deep, narrow canyons throughout the Sentinel Range to form massive alluvial fans on the valley floor. The largest and most active of these fans are considered provincially significant as visual features and interpretive features. Recreation opportunities on these particularly unstable rock deltas are limited to hiking and viewing. Stabilized, forest covered fans are of lesser feature significance but provide the best opportunities for camping and day use in the Park. Less hazard is presented at these locations than on the more active fans.

Folded Mountain is a major visual feature for its pattern of deformed sedimentary strata and its focal point position in the Park. As possibly one of the most obvious examples of a structural rock form, this feature is considered Provincially significant for viewing and interpretation.

Opportunities for mountaineering are provided throughout the Park, however are most evident in the Toad River valley where several peaks and walls of dolomite intrusion are readily accessible from the road.

Located at the southern portal is an area suited to camping. The flat, open understory and existing laneway provide good opportunities for picnicking and R.V. parking. The site is utilized mostly by those who are familiar with its location.
The Alaska Highway presents prime illustration of a cultural recreation feature. In itself the highway conjures an image of adventure to those contemplating a holiday to northern B.C. and Yukon. From its early days as a dusty, narrow laneway to the current hard-topped road which passes through a variety of landscapes, the Alaska Highway remains one of the primary attractions of the north.
1.3 CURRENT SITUATION

Figures 8 and 9 illustrate current land status and facilities located in Muncho Lake Park.

The park presently encompasses 88,416 hectares, with boundaries set parallel to the Alaska Highway. Several private lots, reserves, leased Crown Land and permitted non-conforming facilities exist within the Park. The following chart serves to illustrate many of these tenures.

PRIVATE INHOLDINGS
=Peace River District Lots:
  621, 622, 623, 624, 625, 627, 1168, 1172, 1173, 1174, 1179, 1182, 1183, 1641, 1650.

PARK USE PERMITS (land interests)

PUP 399 - Stream gauge on the Toad River;
PUP 400 - Gravel Pit at Mile 452;
PUP 448 - Access Road to private lot;
PUP 535 - Road Maintenance camp at Mile 456;
PUP 639 - Gravel pit at Mile 456;
PUP 705 - Access Road up Honda Creek;
PUP 810 - Garbage Dump at Mile 456;
PUP 940 - Highway construction through Peterson Pass;
PUP 1036 - N.W.Tel Repeater Station at Mile 443;
PUP 1084 - Seismometer Station at Mile 457;
PUP 1240 - Gravel Pit at Mile 441;
PUP 1241 - Gravel Pit at Mile 465;
PUP 1005 - Pine provenance test sites, Ministry of Forests.

RIGHTS OF WAY

=Alaska Highway #97, 300 feet right-of-way runs north to south through Park.
Access Road to leased land outside Park boundaries at Mile 442 (Sorenson).
Northwest Tel access road through Park at Mile 429.
Access Road to former Davis-Keays mine southwest of park, bridge crossing of the Toad is extremely dangerous.

GUIDE/OUTFITTER TERRITORIES

-PUP 957 N.B. Sorenson; Big Game guiding; southwest quarter of Park.
-PUP 1252 B.R. Southwick; Big Game guiding; southeast quarter and northern half of Park.
-PUP 1255 B.R. Southwick; Commercial Recreation Guiding; northern quarter of Park.

TRAPPING TERRITORIES

-PUP 807 M.A. Churchill; Registered Trapper; northern half of Park.

CROWN LAND LEASES

-D.L. 1552, Block 1; Mile 456. Former residence camp, now a repeater site.

CROWN LAND RESERVES

-D.L. 1645, 1646, 1647, 1648. Northwest Highway System bridge reserves at the crossing of the Toad and Trout Rivers.

TRESPASSES

-Indian cabins; southwestern portion of Park. Letter of Authority granted.
-Horse corral; Mile 456. Letter of Authority granted.
-Airstrip; Mile 456. No Authority granted. Located in Park.
-Auto Junkyard; Mile 456. No Authority granted. Located in Park.
-Private campground; Mile 463; D.L. 1178 Former leased lot, now Park.
FIGURE 9
PARK USE PERMITS AND OTHER EXISTING DEVELOPMENT

- PARK USE PERMITS AS MARKED
- TRAPPING/HUNTING TRAILS
- ABANDONED CABINS
- ARCHAEOLOGICAL SITE
- ORIGINAL HIGHWAY
- COMMERCIAL GUIDING TERRITORY BOUNDARY
- TRAPPING TERRITORY BOUNDARY
- R.O.R.O. CAMPGROUND
- HIGHWAY PULLOUT (WITH INFO-BOX)
- HIGHWAY VIEWPOINT

MUNCHO LAKE PROVINCIAL PARK
PARK FACILITIES

-Park headquarters, Mile 462;

-Campgrounds: Strawberry Flats -23 sites (undesignated)
   (Type II)
   -3 toilets
   Rocky Mountain -14 sites
   -2 toilets
   MacDonald -15 sites
   -3 toilets
   -boatlaunch (undesignated)
   -capped well
   Wildrose -8 sites
   -2 toilets

-Trails: Trails of type III standard are located at various locations in the park. Most trails are associated with guide-outfitting operations in the vicinity of Muncho Lake.

-Park Information:
   -Mile 448/Km 715 Viewpoint (Peterson Pass)
   -Mile 476/Km 762.5 Pullout

-Scenic Viewpoints:
   -Mile 448/Km 715 Viewpoint (Peterson Pass)
   -Mile 464.5/Km 744 Muncho Lake Viewpoint

-Pullouts:
   -various locations as on Figure 9, most with litter barrels, maintained by Public Works Canada.
1.4 MARKET ANALYSIS

As could be expected for any remote section of the Province, market demand analyses for the Alaska Highway region are quite scant. The 1980 T.I.D.S.A. (Travel Industry Development Subsidiary Agreement; BC-Canada) analysis of the Peace River-Alaska Highway tourism industry presented one of the few compilations of information regarding travel and tourism in northeastern British Columbia. Its purpose was to examine and assess tourism opportunities in the region, especially those along the Alaska Highway. The report provides insight to present and future demand for facilities in the Muncho Lake area, and when analysed with P.O.R.D. statistics, suggests future trends which may impact on outdoor recreation management.

The Alaska Highway forms a portion of a tourist circuit known as the "Golden Circle". The more recently constructed Cassiar-Stewart Highway #37 presents an option of returning to or from Alaska over a different, highly scenic route. Surprisingly, the attraction of more aesthetic surroundings does not seem to surmount the attraction of driving the "long, dusty trail". Many tourists opt to retrace their earlier route, solely for the purpose of travelling to and from the north along the fabled Alaska Highway. In general, the most frequent tourists around Muncho Lake are Americans on their way to or from Alaska. Clearly 50% of summer passenger traffic on the Highway is of U.S. origin (PWC correspondence; PORD campsite surveys) and over three-quarters of Alaska Highway tourists use campground facilities according to a 1975 tourism study by Menzies and Associates. The majority of these tourists travel in their own self-equipped recreation vehicles. Second to the U.S. market, B.C., Yukon and Alberta residents form a large proportion of tourist traffic on the highway. Representation of other Provinces is generally in inverse proportion to their distance from British Columbia.

Bus tours would appear to be becoming increasingly popular on the
highway; most are of U.S. origin and utilize the services of the lodges within the Park. Information displays and viewpoints encourage these entourages to stop and benefit from opportunities presented in the Park. Although Muncho Lake is not regarded as a major tourist destination point, the Peace-Liard District does host B.C.'s largest proportion of non-resident, big game hunters, as well as being the home of the second largest resident hunter population in the Province (TIDSA). During the hunting season, which generally commences on August 1, many local and international hunters arrive in Muncho Lake and vicinity to participate in the sport hunting of Stone's sheep, moose and grizzly bear. Lodge owners rely heavily on business generated by the lucrative hunting industry; most importantly, they benefit from resident hunters who do not require the services and provisions of a licenced guide. The majority of guided hunts attract an international clientele, predominantly American and West German, most of whom fly directly to Fort Nelson where they are picked up and chauffeured to Muncho Lake. As a result, mental images and impressions of British Columbia are, for many, concocted based on experiences achieved in the Park and surrounds. Therefore, the maintenance of a quality environment not only benefits international impressions of the Park, but also those of the Province and of the entire country.

For many Fort Nelson residents (pop. 7500) Muncho Lake Park presents a mountain environment in which to spend leisurely long weekends and holidays. At most of these times the usual predominance of foreign tourists in the Park is displaced by an increase in regional residents. The main attraction for these users is the fishing opportunity presented in Muncho Lake; several families spend their annual vacations in the Park where camping, scenic surrounds and a relaxed atmosphere enhance their stay. Local campers generally use the less crowded campgrounds of MacDonald and Wildrose. At other sites, their camperized light trucks can easily be distinguished from the fully-equipped behemoths generally associated with the Alaska-bound tourist. North of Fort Nelson the Division intends to develop a provincial park at Maxhamish Lake. A resultant decrease in regional use of Muncho Lake Park is not expected however, since Maxhamish
Lake will attract only those interested in the active, beachside recreational activities in closer proximity to Fort Nelson.

Until recently, B.C. Hydro plans were to flood a portion of the Liard River north of Muncho Lake for hydro-electric power. The influx of temporary workers, combined with the possible flooding of Liard Hot Springs Provincial Park, would have significantly altered the role of Muncho Lake Park. For the meantime however, this project has been abandoned and it is not expected that a Liard Reservoir will be created in the next 20 years.

In many of the southern parks, adventure recreational activities have become increasingly popular. Whitewater canoeing, mountaineering, hang-gliding and wilderness skiing are all activities which require a large land base for support. The TIDSA study reports that there is "considerable appeal for adventure recreation" in the Peace River-Alaska Highway vicinity. Although demands for adventure recreation are definitely increasing and opportunities exist in Muncho Lake Park to undertake any of these sports, constraints imposed by the Park's limited size, comparative absence of significant recreation resources and distance from major markets, its short summers and long, cold winters impair the attractiveness of Muncho Lake as a destination adventure recreation area.

Camping and day use opportunities at Muncho Lake are provided by both the public and private sectors; all commercial establishments in the Park offer campgrounds to the touring public. Given the proper information, Park visitors are presented with a complete range of camping opportunities at Muncho Lake. Owners of recreation vehicles often prefer the hook-ups available from the private sites; others may be attracted to the hot showers and laundry facilities. However, given the choice of how to spend their camping dollar, most elect to camp on the lakeshore at the government sites. Except during the spring Fishing Derby, or when tourist caravans arrive in the Park, private campgrounds rarely achieve full capacity. Only on long weekends do P.O.R.D. campgrounds reach over 60% occupancy.

Muncho Lake represents one of ten provincial parks strategically located along the northern Alaska Highway (north of Wonowon). Of these
however, only two formally offer much more than a place to park for the evening. Liard Hotsprings Park presents to touring recreationists a unique bathing and interpretive experience. Andy Bailey Park, south of Fort Nelson, provides outdoor recreation opportunities to residents of that northeastern B.C. community. Both Muncho Lake and Stone Mountain Parks offer potential beyond which they are currently developed, as significant suppliers of diverse recreational opportunities in a Rocky Mountain setting.

Table 4 summarizes occupancy statistics as derived from the Park Data handbook series, local knowledge and detailed observations made during the high tourist season of July and August. Analysis of the data reveals that, occupancy at the four public campgrounds rarely exceeds capacity. Compared with Liard Hotsprings Provincial Park, use levels at Muncho Lake can be considered moderately low. The relatively few campers that stay overnight generally spread themselves uniformly among the campgrounds.

Figure 10 presents a schematic analysis of traffic volumes on the Alaska Highway in northern B.C. and the southern Yukon. From this it can be seen that a fairly consistent number of vehicles travel between Fort Nelson and Watson Lake, Yukon, with an expected increase in traffic on the highway south of Fort Nelson. Recent studies (Peepre, 1983) indicate that 31% of traffic volumes in the Peace-Liard Region are comprised of pass-through visitors. For the northern B.C. section of the Alaska Highway, this figure could very well be doubled although even at the recorded level, the percentage "passing through" is the highest of any region in B.C.

Marketing of parks and tourism features in Yukon and Alaska have a significant affect on Northern B.C. park visitation. As new parks and tourist facilities attract more visitors north of 60° it can be expected that visitation at Muncho Lake Park will increase proportionally.
### TABLE 4 OCCUPANCY RATES - MUNCHO LAKE PARK & LIARD HOTSPRINGS

x=5%

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1 number of developed campsites
2 "xxx" = contractor afternoon recordings; "---" = PORD evening recordings
1.5 PLANNING ISSUES

Muncho Lake Provincial Park presents a complex range of issues relating to recreation and resource management. To maintain uniformity in the decision-making process, this plan outlines some of the current conditions which impact on park policy and future management strategy.

a) Land Management

As stated previously, the Park contains a composite of land tenure, including private inholdings, reserves, leases and vacant Crown Land. Although it is relatively easy to distinguish between public and private property, different public land tenures can present confusion and irregularity. Examples of such include designated district lots now contained in the Park, Crown land leases on lots surrounded by parkland, and federal land reserves protecting “future” bridge sites (actually having been constructed several years ago).

Of the private inholdings, only a few (Table 5) represent desirable acquisitions at this time. Most others are associated with the service industry which operates within the Park, or are abandoned service centres and residences. Two lots at Drogheda Lake have been identified as potential acquisitions by the Division. Since commencement of this Plan however, the lots have changed ownership with no prior notification being given to the Ministry (albeit unobligated). This serves to illustrate that more formal processes may be required to establish the Division's approved intent to acquire key inholdings.

For the southbound tourist travelling the Alaska Highway, Muncho Lake is the first Rocky Mountain park encountered during their travels. The Highway Scenic Improvement Act, under which has been designated the Alaska
Highway (B.C.Reg. 261/70), provides an avenue to enforce improvements to premises and properties deemed "unsightly or offensive to any part of the (travelling) public". In the past, some commercial operators have complained about several unsightly private developments at Muncho Lake.

Given the objectives of provincial parklands, justification exists to investigate options which may obligate property owners within the Park to maintain tidy grounds. In order to implement the Scenic Improvement Act, cooperation must be attained with Public Works Canada, the B.C. Ministry of Transportation and Highways as well as the Regional District of Peace-Liard. Throughout the Park are other examples of distracting obtrusions. Abandoned telephone poles line the highway right-of-way south of Mile 456. Several have toppled, while others have wires hanging from their broken cross-members. North of Mile 456, telephone poles still in use are often set at bizarre angles disrupting the continuity of the visual corridor. Several signs within the Park indicating nearby services have become redundant following implementation of the Provincial sign programme. These hand-lettered boards no longer serve a purpose to the public and detract from the park setting.

The MacDonald Indian band has been resident in the vicinity of Muncho Lake for several generations. Their inherent nomadic lifestyle has required the maintenance of several temporary homes in the valleys of the Toad and West Toad Rivers. Although no formal Permit has been granted to the Indians, the band recognizes the intent of the provincial park and has cooperated with the Division. Letters of Authority have given the band permission to maintain a relatively unencumbered lifestyle in the Park. It is expected that the band will dissolve as the present generation passes.

Although there are very few roads which branch from the Alaska Highway, abandoned roadways, by-passes and private access lanes are located within the Park. The Alaska Highway has now been re-routed above scenic Peterson Canyon thereby avoiding recurrent debris torrents and flooding. Unfortunately
several interesting natural features which occur in the canyon have also been by-passed, features which remain accessible to those who hike up the old road bed.

At the south portal an access road leaves the Park and climbs gently to an alpine meadow (NorthWest Tel microwave tower). This area is not only popular with local hunters, but also provides beautiful scenery and hiking opportunities to non-consumptive recreationists. The road and bridge across the Toad River are considered private property, however the upper Nonda Creek headwater areas of the Park is accessible on foot or horseback from this road.

At Mile 440, the former Davis-Keays mining road leaves the highway and parallels the south side of the Toad River valley, eventually leaving the Park at the southwestern boundary. Shut-down of the mine in 1976 reverted land tenure over the area back to the Crown. The abandoned, delapidated steel bridge crossing of the Toad River has therefore become a park facility. This potentially dangerous crossing is used quite regularly by hunters, local guide-outfitters and a resident who lives outside the Park boundary; should the bridge collapse, liability may rest on the Parks and Outdoor Recreation Division.

An access road to a hunting lodge located just outside of the Park boundary at Mile 441 has created a similar situation. However, so long as a permit is maintained by the user, he will maintain liability for the dangerous bridge crossing at Otelsas Creek.

Located on parkland at Mile 456 is an unlicenced airstrip. Although not a popular landing strip, it is used quite regularly by private pilots who maintain residential lots in the park. Emergency airstrips such as this are often required in remote mountain environments where unpredictable weather patterns change rapidly. Since the Alaska Highway right-of-way forms a portion of the airstrip, discussions with Public Works Canada are required before the Division decides whether to request removal of the runway from the Park or alternately, delete that portion of the Park under the runway.

Announcements made recently by B.C. Hydro indicate that plans for the
construction of the Liard River Hydroelectric Project immediately north of Muncho Lake Park have been indefinitely suspended. The proposed dam would have created a reservoir through the Liard Canyon, continuing northwesterly to the B.C.-Yukon border; Liard River Hot Springs Park would be inundated as a result of the project. Although commencement is not foreseen within the time frame of this plan, it must be borne in mind that the role of Muncho Lake Provincial Park may change considerably should the scheme be resurrected in the future.

Since the commencement of this document the Division has received a request for boundary information in relation to proposed mineral exploration west of Muncho Lake. Access to this particular area is very remote and quite possibly limited to a route through the park. Monitoring of future development must be maintained.

b) Park Image

Muncho Lake Park lies adjacent 55 miles of the Alaska Highway; tourists enter the south portal at Mile 425/Km 680 and leave at Mile 480/Km 770. It has clearly been identified that across this distance there is a significant lack of Park identity. Entrance portal information is quickly forgotten as drivers travel through the Park, encountering a range of facility standards, pull-outs, viewpoints, campsites and litter barrels. These facilities are maintained by different public agencies including Public Works, their contractors, the Parks Division and its contractors. Only at developed campgrounds is the P.O.R.D. identity evident and it has been noted that frequently tourists consider only the campgrounds as parkland. This lack of information and identity means that many of the different geological and biological phenomena of the Park go unnoticed by through traffic. The "Alaska Milepost", published in New York, represents the most positive promotion and attention given to the Park.
c) Commercial Inholdings

For the few residents who live at Muncho Lake, services that they provide to tourists represent their livelihood. For many, a year's existence often depends on the summer tourist season. The dilapidated remains of former businesses are testimony to the fickle nature of the tourist industry. A symbiotic relationship is maintained by the Park and the private facilities which it surrounds. At present, it is the Park which benefits most from the information which is disseminated at the lodges and service centres. It is there that tourists learn where to watch for the sheep, what fish are in the lake, what the winters are like, how the mountains were formed and why the waters of Muncho Lake are such a pretty blue colour. Although the Division recognizes the importance of the private sector at Muncho Lake, yet to be fully recognized are the benefits to each which exists through cooperative effort. Both the business community and the Division have similar objectives at Muncho Lake: to attract the travelling public and encourage them to stay a little longer in the Park.

To complement, not compete, with the private sector is a recognized policy of the Parks and Outdoor Recreation Division. At Muncho Lake, the public campgrounds offer camping opportunities to Park visitors. These rustic facilities do not compete directly with the full-service campsites located on private land, however they often discourage selection of the private campgrounds. Occupancy figures indicate that the Division is providing so many campsites at Muncho Lake that it may be unrealistic to expect tourists to select alternatives supplied by the private sector. Concentration on the development of trails and day-use facilities as well as campgrounds would provide increased attraction and the necessary encouragement to promote longer stays in the Park, thus presenting more of an opportunity for business to attract clientele.
d) Natural Hazards

It has been documented that the fans on which Division campgrounds have been developed are recognized flood hazard areas. For a short period each year, campers are exposed to danger from high lake levels and debris torrents. Rocky Mountain campground presents the most serious hazard; constantly shifting stream channels, a lack of vegetation other than scattered, half buried cottonwood trees, and a boulder strewn roadbed are evidence of the potential flood situation which exists at this location. At Wildrose campground, a debris torrent from 1979 has buried much of the original site. Only a thin veneer of soil supports the mature spruce cover which predominates over much of the remainder. The MacDonald campground is felt to be quite safe at its north end, however quite hazardous at the south. It is here that a dilemma confronts the park manager since located at the south end of MacDonald campground is the most significant beach along the shore of Muncho Lake. A 50 metre stretch of pea-gravel beach presents a rare opportunity to enjoy lakeside recreation opportunities found nowhere else along the Alaska Highway. On a sunny, warm day in late July or August it would be very hard to justify the closure of adjacent campsites based on potential flood hazard; many Fort Nelson residents regularly spend summer vacations in this area. Strawberry Flats campsite, the first encountered by northbound travellers, provides safe camping on its southern end but an increased hazard potential exists on the central and northern portions of the site. A relatively established tree cover indicates the limit of the recognized safe area. In an attempt to protect the Alaska Highway from further damage, the bouldery channels of the identified creek beds have been excavated into dikes which deflect flood waters through bridges and culverts. However, it has been pointed out by Eisbacher (1980, G.S.C.) that the use of surface material to deflect a debris flow provides insignificant protection.
Due to the natural attraction of the alluvial fans, it is unrealistic to expect visitors to avoid them; presented are opportunities for viewing, camping and lake access. Moreover, they are important for their inherent interpretive values; the alluvial fans maintain a natural balance of erosion and deposition. Examples that they provide for the roadside study of vegetational succession and topographic transition are unparalleled in the northern Rocky Mountain natural region. Although the Division must recognize that protection of the Alaska Highway is paramount, indiscriminate removal of the gravel resource should not be allowed to impair the scenic and interpretive value of the fans, nor conflict with the objectives of a Class A Provincial Park.

The porous gravel base on which has been developed many of the public and private facilities presents serious waste management problems. In the campgrounds, subterranean runoff can leach wastes from pit toilets and transport them into Muncho Lake. Lodge owners must also ensure that their waste products are properly stored, treated and released. Drinking water supplies maintained by several of the lodges originate directly from the lake.

e) Visitor Data

As highlighted within Table 4, use figures obtained at Muncho Lake Park must often be extrapolated from a vague data base. Several methods have been used to determine occupancy rates in the past; the most accurate of these are evening counts taken by on-site staff, while the least dependable data is collected by contactors who visit the campsites at late morning or afternoon.
f) Resources Management

Much of the northern B.C. landscape has been altered by wildfire. Thousands of burned hectares now line the highway between the park and Yukon. Fires play a dominant role in the ecological succession of vegetation species; the interruption of these processes has often been considered unnatural. Within the Park, the scenic resource presented by the forests, lakes and mountains create a high level of viewer pleasure. Compared to the relatively stagnant visual landscape of burnt areas, the preservation of diverse images such as those presented at Muncho Lake becomes very important. The aesthetic value of a mature forest cover within the relatively small land area covered by the Park must be weighed carefully against the value of an undisturbed ecological cycle. In this analysis it would appear that some areas of the Park are more visually sensitive than others and for this reason should be protected from wildfire. Moreover, the existence of permanent structures and private dwellings necessitates an intensified fire control responsibility.

Although there is a basic knowledge of wildlife species, their habitats and general population levels in the Park, there has traditionally been a lack of consistent supporting data on which to base wildlife management decisions. In a Region where the guide-outfitting industry provides such a dependable economic base, detailed study of the renewable wildlife resource is of paramount importance. Only with more detailed information can managers accurately determine the significance that quotas, possession limits, viewing and added hunter pressure have on wildlife populations in the vicinity of the park. Such studies have now commenced with the implementation of a wildlife survey in 1983.

Current hunting regulations have established no-shooting zones along the Alaska Highway and areas which maintain a natural attraction to wildlife (eg. Mile 472 mineral licks). Muncho Lake Park boundaries lie
parallel to the Alaska Highway at a distance of three miles. North of the lake, this relatively narrow corridor (which does not delineate natural topographic boundaries) creates a very slim hunting zone between the restricted area and the park boundary. Although no problems present themselves in the southern half of the Park, any expansion of non-consumptive recreation opportunities north of Mile 456, in combination with opening dates set at the height of the outdoor recreation season (Aug. 1), could create unavoidable conflict between hikers and hunters within this limited area.

The Division has recently requested (through the Wildlife Branch) that quotas be placed on Stone's sheep hunted in the Park. Although game populations recognize no administrative boundary, adherence by hunters to a parkland quota may be difficult to enforce in locations where park boundaries are not based on significant topographic features. At one particular area this situation certainly arises. The upper Nonda Creek headwaters lie in an exquisitely scenic alpine basin where a quota has been allotted to the operating guide. However, the park boundary lies at valley bottom (Nonda Creek) thus bisecting the natural basin and management jurisdiction. To effectively manage both the natural and recreational resources of this valley, a boundary revision is required (see Appendix 7).

In an attempt to reduce the numbers of road kill along the Alaska Highway, the Division has experimented with strategic saltblock placements in adjoining drainages. This appears to have been an effective solution since sheep have been seen congregating in these areas, however, an increased opportunity for poaching may result in cases where the blocks are placed out of direct sight from the highway.

Over the past several years it has been proposed that a major viewing platform be constructed above the mineral hoodoos located at Mile 472. With the absence of specific wildlife studies to address such proposals, it has
been suggested that the introduction of people to this feature may impact slightly on the behavior patterns of the Stone's sheep. However, given the few number of times that sheep have actually been observed at this unique erosional feature, benefits derived from public interpretation of the hoodoos justify any minor disturbance created by such activity.

As has been indicated earlier in the plan, the fisheries value of Muncho Lake has reportedly decreased over the past few years. Although no formal documentation substantiates the decrease, local residents and Ministry of Environment biologists verbally confirm the situation. At the annual Muncho Lake Fishing Derby as many as 200 persons have been known to enter with winning fish weighing in excess of thirty pounds. However, winners from the recent past have recorded far smaller specimens and Fish and Wildlife managers have become increasingly concerned about the depletion of trout in Muncho Lake due to overfishing. Because of the lake's oligotrophic character, the waters sustain little food for resident populations. Current regulations may not adequately reflect this environmental condition, however amendments are difficult to introduce without a reliable data base. To provide this information, it has been suggested that a program of fish head collection be implemented in cooperation with local lodge owners and the Ministry of Environment. From the collected data, an accurate assessment of restrictions could be made by fisheries biologists. It is also recognized that enforcement of regulations has been exceedingly difficult at Muncho Lake and that non-compliance has been a major contributor to over-depletion. According to the local Conservation Officer, tourists generally do not contribute to this problem; most often it is local and regional residents who exceed possession limits.

Most conversations with a Guide-Outfitter invariably lead to a discussion of "packers" and the competition that they introduce to the guiding industry. Unregulated packers operate in much the same manner as a licenced guide; the exception being that the packer cannot legally lead his client to an animal. Enforcement of the Wildlife Act in these situations is obviously difficult, and this fact has caused an acute increase in packing
services throughout the north. Although the Ministry of Environment is ultimately responsible for the impact that these operations have on the guide-outfitting industry, Park managers must exercise utmost discretion when authorizing packer activity in the Park.

Commercial recreation guiding opportunities have been identified throughout Muncho Lake Park. Horse-back photography expeditions are most marketable during the months of July and August and could contribute significantly to the visitor's experience as well as economic stability of the Park's tourist industry. Although the short season precludes establishment of a separate commercial guide operation, given an adequate market assessment, existing guides in the park may be encouraged to expand their services to this activity.

Since the popular introduction of off-road recreation vehicles such as the all-terrain cycle, park managers have been faced with increased enforcement problems. Muncho Lake Park has been no exception; the alluvial fans, campgrounds, park headquarters and abandoned roadways have proved to be popular areas to engage in off-road activities. Certainly it is not realistic to dispell the popularity of these vehicles; suitable areas within the Park may be identified in order to reduce conflicts which arise in more sensitive locations. Alternatively, stricter enforcement of a ban may be required.
PART 2

2.1 PARK PURPOSE AND OBJECTIVES

As an important element of the B.C. Park System, Muncho Lake represents an integral unit in a series of provincial Parks along the Alaska Highway. In combination with its partial representation of the Rocky Mountains Natural Region, the Park contributes significantly to the system's conservation, outdoor recreation and tourism goals. The scenic splendor of the Muskwa Ranges has the capability to attract a variety of outdoor recreation enthusiasts; well over 100,000 tourists pass through the Park annually. The Park affords good fishing and wildlife viewing opportunities while the numerous side valleys, access points and low vegetation levels encourage backcountry hiking, riding and hunting. A significant contribution to the northern tourist economy is provided by the Park and the services located at Muncho Lake.

The following objectives reflect the purpose of Muncho Lake Park and indicate management direction for the achievement of Division goals.

Conservation: To conserve a partially representative, accessible example of the Muskwa Ranges natural landscape with biophysical and historical elements associated with the northern Rocky Mountains natural region. Muncho Lake Park contains many of these elements including the scenic geological and glaciofluvial landscape, the natural wildlife resource and the historic attributes of the Alaska Highway.

Outdoor Recreation and Tourism: To provide Regional residents and tourists to the highly scenic Rocky mountain landscape a continued opportunity for consumptive recreational use of Park resources, while expanding opportunities for a variety of non-consumptive outdoor recreational activities in close proximity to the Alaska Highway.
2.2 ZONING

Muncho Lake Provincial Park will be zoned to reflect the diversity of land use within its boundaries. Future developments will recognize this zoning plan and adhere to the configurations illustrated in Figure 11. The scheme reflects zoning of existing parkland as well as those lots recommended for acquisition.

Lands traditionally held under private ownership, along with developable parkland located along Muncho Lake, have been included in the Development Zone. This zone extends the length of the Park, recognizing the Alaska Highway corridor. Within the zone, a Parkway sub-zone has been designated in recognition of the scenic parklands which front the Alaska Highway through most of Muncho Lake Park.

That portion of the Park lying between the Toad River and Honda Creek has been zoned as wilderness. Although fairly proximate to secondary road access (via Honda Creek), the unit presents characteristic elements of the Muskwa Range wilderness. Narrow creek valleys restrict foot and horse access to all but a few identifiable locations. A wide alpine bowl surrounded by majestic mountain ridges offers exceptional opportunities for wilderness hiking, camping and hunting.

The remainder of the Park is zoned as Natural Environment.

Within each zone and sub-zone, general statements direct appropriate management intensity. At Muncho Lake Park lands within each zone will be managed in accordance with the following objectives:

Development Zone: To provide for a variety of facility-oriented recreational opportunities which reflect the needs of park visitors.

Natural Environment Zone: To provide for intermediate levels of outdoor recreational opportunities and use in a natural setting.
Wilderness Zone: To protect and preserve landscapes and resource processes while allowing for low levels of recreational use.

Additionally, the Parkway sub-zone will provide intensified protection to the inherent scenic quality of lands adjacent to the Alaska Highway. Developed facilities and resource operations will not be permitted within the sub-zone, giving managers an opportunity to further direct future activities in the Park. However, if after careful consideration specific lots or areas are required for development, they may be re-designated for such use.
2.3 MANAGEMENT PLAN

2.3.1 Natural Resource Management

a) Land Management

Muncho Lake Park presents a unique blend of land use within its boundaries. Visitors do not generally consider the scenic surroundings to be parkland owing to the lack of park image and the apparent dominance of private service facilities. Throughout the Development Zone a diverse variety of land tenure in the Park has caused some management confusion with regard to permitting and regulation enforcement; an attempt will be made to rationalize incongruous forms of tenure. The overall intent is to give the Division management responsibility for all public lands within the boundaries of Muncho Lake Park. Tighter control may then be implemented to ensure that all uses conform with the goals and objectives of a Class A Park.

Objective: To manage the land base of Muncho Lake Provincial Park in a manner which best achieves the Division's goals for conservation of the regional landscape and provision of outdoor recreation opportunities.

- The Park will be managed to ensure that adequate area is maintained to achieve conservation and outdoor recreation goals.
- Land use within the Park will strictly adhere to the approved Zoning Scheme.
- Land reserves at Trout River Crossing will be cancelled and added to the park as they are no longer required by Public Works Canada.
- The Lands lease for the repeater station at Lot 1552, Block A, will be cancelled and the property absorbed into the Park. The repeater is scheduled for removal in the near future.
- Gravel pits currently recognized by P.U.P., yet outside Park boundaries (according to OIC 3436/69) will be acquired and managed in accordance with Park objectives.

- In order to absolve the Division from potential liability, land containing the unofficial Mile 456 airstrip will be removed from the Park. Resultant vacant Crown land status more definitively implies that all liability rests with the user (Lands Branch correspondence).

- All trespasses within the Park (as indicated in Section 1.5) will be investigated and remedied.

- Key private lots within the Park (as in Table 5) will be acquired as they become available; the Division should record its intent to secure high priority properties through First Right for Refusal.

- The Division recognizes the designation of the Alaska Highway through Muncho Lake Provincial Park as a scenic highway pursuant to the Highways Scenic Improvement Act and will co-operate with other agencies and property owners to encourage roadside property cleanup through the Park.

- Relocated Alaska Highway Right-of-Way Mile 442-450 will be removed from Muncho Lake Park upon completion of legal surveys. At that time the former right-of-way following Peterson Canyon will be added to the Park.

- A co-operative effort between the Division and Public Works Canada will minimize impairment to park resources and its natural scenic quality potentially resulting from Alaska Highway operation and improvement, including removal of gravel from the Parkway sub-zone.

- Existing gravel pits will be rehabilitated as they expire. New pits will be discouraged within the Park, however if determined as necessary, future operations will not be permitted within the scenic Parkway sub-zone.

- The Division will recognize traditions of the MacDonald Indian Band within Muncho Lake Park and maintain the existing authorization process to deal with their activities.

- Legal opinion will be sought with regard to the Davis-Keays Road bridge. The bridge will be signed as a hazard and the road closed to public traffic at that point. Access beyond Park boundaries along the road is impassible except by foot, horseback or four wheel drive vehicle.

- It is desirable to expand the Park boundary to include the headwaters of Nonda Creek. This will permit the Division to manage the natural and recreational resources within the Nonda Creek valley in a more rational
TABLE 5 PROPERTY ACQUISITION PRIORITIES (Refer to Figure 8):

<table>
<thead>
<tr>
<th>District Lot #</th>
<th>Priority:</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
<th>Hi Rec Benefit</th>
<th>Lo Rec Benefit</th>
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<tr>
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<td>X</td>
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</tr>
<tr>
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<td></td>
<td></td>
<td>X</td>
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<tr>
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<td></td>
<td>X</td>
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</table>
manner. In comparison with other boundary points in the park (which do not bisect areas of recreational significance), revision in the Nonda Creek valley reflects its greater accessibility to Park visitors. (Figure 12).

b) Wildlife Management

Much of the recreational use of parkland in Northern B.C. is associated with the wildlife resource. Abundant wildlife populations in the northern Rocky Mountains have traditionally attracted resident and international hunters to commercial camps throughout the region. Muncho Lake Park attracts hunters in pursuit of Stone's sheep, one of four species of wild sheep sought by trophy enthusiasts. Management of big game in Muncho Lake Park has been limited to permitting operations and road-kill reduction programs. Few studies have been undertaken on which to base sound management methods. Park managers have traditionally relied on the advice of Fish and Wildlife Branch biologists. Increased non-consumptive recreational use will require a re-evaluation of existing management regulations.

Muncho Lake hosts a sport fishery that has achieved wide-spread recognition in the northern Rockies; overfishing has reportedly reduced populations of lake char (trout) and other sport species. Annual fishing derbys held in the park seem to indicate a decline of large, mature stocks. Detailed studies are required to discern the legitimacy of these reports. Results should be incorporated into formulation of a Wildlife Management Plan for the Park.

Objective: To manage fish and wildlife populations in Muncho Lake Park by methods which best achieve a balance between the Division's goals for conservation of the resource and provision of consumptive and non-consumptive recreation opportunities.

- A study of big game populations, especially Stone's sheep, within Muncho Lake Park will be conducted jointly between the Division and the Ministry
of Environment. This study will address issues relating to potential conflicts arising from the consumptive and non-consumptive use of wildlife in the Park, sensitivity of habitat areas, user pressure on the resource (hunting use and other recreational uses), legitimacy of current regulations, impacts of domestic grazing on natural populations and recommend methods of ensuring on-going renewal of the resource.

- Trapping is a non-recreational extractive activity and is therefore inconsistent with Park objectives. The existing trapline in the Park will be phased out in accordance with the Division Wildlife Management Policy.

- It is desirable that the no shooting zone be extended to height of land on the east side of the Muncho Lake valley north of Muncho Creek crossing (mile 454.5). This change reflects the narrow highway corridor area within this portion of Muncho Lake Park, the wildlife viewing objective of the Trout River planning unit and the potential for day-use recreation which exists in this most developed area.

- Consideration will be given to the adjustment of opening dates for (sheep) hunting from August 1 to August 15 to provide a greater opportunity for non-consumptive enjoyment of the resource during the height of the outdoor recreation season.

- Existing permits for Big Game guiding within the Park shall be managed in accordance with an approved Division Wildlife Policy and Park Resource Management Plan.

- No developments will be permitted to seriously disrupt or impair the use of natural mineral licks within the Park.

- The Division will encourage further study of fish populations in Muncho Lake with the objective to formulate a management plan which will ensure adequate stocks for the achievement of park goals.

- A stocking program of introduced sport fish species may be implemented at the request of the Fish and Wildlife Branch, objectives of which would be to increase the quality of fishing experience offered at Muncho Lake.
c) Vegetation Management

The Park maintains little diversity of vegetation within its boundaries. The Boreal forests are of uniform age with the exception of the area at Peterson Pass. Only on the bouldery fans adjacent to the Alaska Highway are vegetation communities and ecological processes most apparent.

Objective: To conserve the natural, scenic vegetation cover within Muncho Lake Park.

- Owing to the scenic corridor through which the Alaska Highway traverses the Northern Rockies, all wildfire threatens the visual resource of Muncho Lake Park. A Fire Management Plan will be formulated for the Park which considers conservation objectives.
- Horse grazing within the Park will be closely monitored and studied as part of wildlife surveys to determine its impact on natural forage supplies. Grazing quotas will be applied consistent with the recommendations of Division and Ministry of Environment habitat biologists. Domestic grazing will not be permitted adjacent to public rights-of-way.
- The introduction of exotic forage species within the Park will be minimized through existing conditions which limit feeding of domestic stock to concentrated feed pellets.
- The reported wild orchid community near Moose Lake (km 705) will be investigated and reported on within a visitor services plan for Muncho Lake Park.
- Firewood cutting will only be from approved areas within the Park.
- To ensure the conservation of natural successional vegetation on the fans, extraction of gravel for purposes other than emergency protection of the Highway will not be permitted. No gravel will be removed from the Park except from areas under Park Use Permit.
- All-terrain vehicles will not be permitted in the Park except on areas designated for such use.
d) Water Management

Presently, northern watersheds are relatively unspoiled by human development and activity. The potential exists at Muncho Lake to ensure that abundant freshwater supplies continue for the benefit of private and public water users in the Park.

Flooding of Park developments has resulted in loss of facilities during previous seasons. Since the Alaska Highway opened in 1942 sections have been damaged on several occasions by debris torrents which sweep mud and boulders over this vital northern connector.

Objective: To conserve the quality of freshwater supplies and the natural hydrological processes which occur in Muncho Lake Park.

- Park developments will be relocated as to minimize risk to Park visitors resulting from sudden, severe flood and debris advances. Established paths of the torrents will be completely avoided by all development.
- The Division will seek co-operation with Public Works Canada to ensure that:
  - flood control projects do not impair Park values;
  - excavations or other activities do not impair the dynamic process of alluvial fan development in the Park.
- Toilet design at park developments will ensure that effluent is not leached into the lake by subterranean drainage.
- The Peace-Liard Health Unit will be encouraged to ensure that sewage treatment on private lakeshore properties at Muncho Lake does not impair lake water quality.
2.3.2 Cultural Resource Management

a) Historical Resources

Evidence of early native exploration and activity exist in the Park although an assessment of their significance is not available. Most of these sites relate to fishing and hunting campsites which existed prior to 1940.

Historical evidence of Alaska Highway construction exists in the form of old building foundations, telegraph lines, abandoned rights-of-way and junk piles scattered along the valley floor. Several commercial developments associated with the early Alaska Highway now stand derelict.

Objective: To assess and protect significant historical resources in Muncho Lake Park.

- Known archeological sites and artifacts will remain undisturbed.
- Only select remnants of the early Highway construction period will be preserved; these to be determined by an Interpretation Plan for Muncho Lake Park.
- A section of the former Alaska Highway through Petersen Pass will be protected as a hiking trail.
- Activities of the MacDonald Indian Band will be considered in management plans formulated in Muncho Lake Park.

b) Visual Resources

The attractive nature of Muncho Lake Park is a reflection of the various visual landscapes presented to the Highway traveller. The dramatically rugged southern Toad River corridor, the subdued rolling terrain of Peterson Pass, the impressive interface of Muncho Lake and the terminal Range, and the tapering corridor of the upper Trout River valley
combine to present a diverse visual treat to north and southbound tourists.

Muncho Lake Park is one of the scenic highlights on a trip to or from Alaska. Unfortunately, certain elements along the highway right-of-way detract from the picturesque backdrops of mountains, forest and water.

Objective: To conserve the high scenic quality of Muncho Lake Park with particular emphasis on maintaining an attractive visual corridor adjacent to the Alaska Highway.

- Park developments, especially those in lakeshore areas, will be designed to enhance the visual quality of their setting.
- Permitted resource activity in the Park will be screened from view and rehabilitated upon expiration.
- A maximum degree of visual quality standard will be maintained along the highly visible corridor of the Alaska Highway. A Parkway sub-zone will delineate those areas where intensified management will enhance the visual resource objective.
- The Division will attempt to rid the Park of abandoned, dilapidated buildings and offensive visual distractions.
- The Division will request that P.W.C. or N.W. Tel remove abandoned telephone poles within the highway right-of-way and have others repaired and realigned.
- The Division will co-operate with Ministry of Highways signing policy to clear the parkway of non-standard signs.
- Park signs will be used to denote interesting features such as major peaks, rivers, valleys and services.
- The Division will develop additional viewpoints at interesting natural and cultural features throughout the Park to encourage travellers to stop and safely enjoy the scenery. (Appendix 6)
2.3.3 Recreation Resources

Muncho Lake Park has not traditionally experienced use of its recreation resources for other than consumptive activity. Besides stop-over automobile camping, hunting and fishing represent the most popular recreational pursuits associated with the area. However, potential exists to expand these horizons through the identification and promotion of additional activities and opportunities in the Park. The Alaska Highway continues to deliver potentially receptive outdoor recreationists to Muncho Lake.

Objective: To expand and develop opportunities for non-consumptive recreational activity in Muncho Lake Park which are compatible with the traditional activities of hunting and fishing, and which do not promote direct competition to existing services offered by the private sector.

- The Division will encourage lengthened stays within the Park through the development of short hiking trails and attractive facilities to entice and serve highway travellers.
- The Division will identify and provide information on potential hikes along the alluvial fans and valleys in the Sentinel Range.
- Commercial proprietors will be encouraged to provide outdoor recreation services within the Park. A Visitor Services plan will be formulated for the Park which gives consideration to such activities as horse back trips, boat and equipment rentals, campsites, guided hiking and photography trips.
- Hunting is recognized as a traditional and legitimate use of the Park's wildlife resource. However, season adjustments and minor regulation revisions may be required to accommodate other outdoor recreation activities promoted in this plan.
- Viewing of wildlife will be encouraged, especially in the northern section of the Park.
- Recreation activities which impair Park objectives will not be encouraged. Of particular concern are the increased numbers of all-terrain cycles and vehicles in use near the public camping areas. The Division will enforce regulations.
- The Division will not develop facilities in direct competition with established private entrepreneurs.
2.4 DEVELOPMENT PLAN

Figure 12

2.4.1 Recreation Services

i) Campgrounds: To provide campgrounds located away from natural hazards which in combination with private facilities located in the Park, meet the demands of regional residents and tourists.

- Rocky Mountain campsite will be closed, its roads blocked and all evidence of facilities removed. This site is highly vulnerable to flood and debris torrents.

- Wildrose campsite will be closed and its access road blocked and all evidence of facilities removed. This site is highly vulnerable to flood and debris torrents.

- Strawberry Flats campsite will be redesigned and formalized to meet stated objectives. Fifteen sites are required at this location.

- MacDonald campsite will be redesigned and formalized to accommodate fifteen units concentrated at the north end of the site only.

- Sealed vault toilets will be standard at all campsites.

ii) Day-Use Recreation: To permit short-duration opportunities for hiking, fishing and picnicking in the Park.

- A walking trail will be maintained along Peterson Canyon (south end) leading to the waterfall and side canyon features of this former Highway route. Parking for five vehicles will be provided.
A trail will be developed along the former tote road behind Strawberry Flats. This trail will lead to a lookout point above Muncho Lake. Where views can be attained of Muncho Lake, the Trout River valley and the Terminal Range. A small pullout will serve as parking.

A boat launch area will be maintained at MacDonald campsite.

The southern approach to the former Trout River crossing (km 765.5/Mile 476) will be retained as a day-use fishing spot. The existing laneway may need slight improvement.

A short lane access to the Trout River will be retained for day use fishing at km 766.5/Mile 477.

iii) Roadside Attractions: To present interesting natural and cultural features of Muncho Lake Park to travellers on the Alaska Highway.

A southbound pullout will be provided at Km 687.5/Mile 431 to accommodate viewing of Folded Mountain (All pullouts require a co-operative effort with Public Works Canada).

The pullout at Km 696/Mile 435.5 will be signed and improved for viewing of the alluvial fan and two scenic waterfalls along the south valley wall. (Centennial Falls)

The pullout at KM 702.5/Mile 439.5 will be signed and improved for viewing the steep canyons of the north ridges as well as the Toad River valley southwest of the Park.
- Brush will be cleared from the Moose Lake pullout to improve viewing opportunities at this location.

- The existing viewpoint at Peterson Pass will be maintained.

- A pullout will be constructed for southbound travellers at Km 728/Mile 456.5 to allow viewing and photography of the scenic mountain valley to the east.

- The existing Muncho Lake viewpoint will be maintained at Km 744.5/Mile 464.5.

- At Km 758.5/Mile 472, the existing litter barrel pullout will be developed to include a small viewpoint overlooking the Trout River valley. Benches on the adjacent terrace will provide a convenient rest area. (see Appendix 7)

- At Km 759/Mile 472, the road will be widened slightly to permit shoulder parking and viewing of Stone's sheep at this popular mineral lick. A caution sign will warn on-coming traffic of the hazard presented by stopped vehicles.

(NB. The above proposals require the co-operation of Public Works Canada as most lie in the established Alaska Highway right-of-way).

- A type II walking trail will provide access to a safe viewing platform overlooking the Trout River Hoodoos at Km 760/Mile 472.5. Restricted access along the valley rim will ensure the integrity and continued use of the licks by Stone's Sheep (see Appendix 7).
2.4.2 Visitor Services:

To promote Muncho Lake Park and to ensure that both visitors and potential visitors are provided with information regarding the Park's natural and cultural features, as well as the opportunities available to them for outdoor recreation. A Visitor Services Plan will be formulated which provides interpretive information about the natural and cultural themes presented by the Park, and which gives consideration to the following proposals.

- development of a Park Information/Facilities display and Folded Mountain viewing point at the Park's southern portal;
- signs at several locations throughout the Park which point out interesting topographic features and opportunities for informal day hiking;
- a self-interpreting loop walking trail to link Petersen Pass viewpoint with the original 1942 Alaska Highway just below. A lookout could be located on the burned knoll adjacent to this historic route;
- a pullout along the rock fan at (former) Rocky Mountain campsite with information regarding alluvial fan formation and vegetative succession;
- at the former gravel pit near Km 760/Mile 472.5, redevelopment as a Stone's sheep interpretive display;
- the existing southbound Park information pullout be expanded at Km 762.5/Mile 474.5. Proper signs should be erected to direct use to this facility;
- a roving interpretive programme be implemented using Liard Hot Springs staff to present scheduled interpretive programmes at the lodges in Muncho Lake Park.

The plan will further consider marketing and promotional methods in an attempt to entice increased visitation to Muncho Lake. Co-operation with local lodges and tourist associations will be required, much potential exists for the private sector to become significantly involved in marketing at Muncho Lake. A variety of commercial services could be provided to potential park visitors. These possibilities should form a significant portion of the Visitor Services Plan.
2.5 Future Development

The following developments are regarded as non-essential within the current planning time frame, however consideration should be given to these facilities when increased use levels and demands for expanded outdoor recreation opportunities become evident.

- A picnic site may be constructed at Drogheda Lake with interpretive information available regarding the construction of the Alaska Highway. This site could be joined to Peterson Pass lookout via the original 1942 Highway trail.

- Development of a Type III day-use trail with parking at Km 750/Mile 465.5. An existing lane leads up the flood wash to the mountain edge where an easy hike leads to sheep habitat, scenic canyons and interesting geological formations.

- A highway rest area may be developed at Peterson Canyon Km 707/Mile 442.5.

- Potential continuation of the historic Highway trail through Peterson Pass exists between Km 708/Mile 443 and Km 713/Mile 446 (just south of Peterson Pass Viewpoint).

2.5.1 Winter Recreation

During the winter months, a marked decrease in traffic on the Alaska Highway results in very few visitors to Muncho Lake Park. Those who remain speak of excellent cross-country and snowmobiling opportunities available in the valleys of the Park. However, two factors limit winter recreation at this latitude: daylight hours are extremely short and daytime temperatures can be bitterly cold (mid-winter months offer as few as six hours of daylight and average daytime high temperatures of between -20° and -30°). March and April are the preferred months for winter recreation.
No proposals are presented here for formally accommodating winter activity at Muncho Lake. Use levels are too low and unstructured to warrant consideration at this time. However, the future holds potential for an increase in late-winter activity of a public or commercial nature.

Objective: To recognize the potential for winter recreational activity at Muncho Lake and collect pertinent data about the resource for presentation in a Visitor Services Plan.
2.6 MARKETING PLAN

Muncho Lake Provincial Park is, of course, final destination for very few of the many who travel the Alaska Highway; a vast majority of park use is by the transient tourists of the northwest highway system. The long distance and relative cost of travelling to Muncho Lake indicates that marketing of the Park is directly associated with marketing of the entire Alaska Highway, northern British Columbia and the Yukon. Once committed to the journey Muncho Lake Park is but one of several attractions presented to the tourist along the route.

Expanded traffic volumes on the Alaska Highway will have an impact on recorded visits to Muncho Lake, however will not by themselves contribute to promotion of the Park or its facilities. Only by increasing the length of stay in the Park can recreation and tourism objectives be realized. Proposals have been presented in this plan which are intended to slow traffic through the Park, thereby increasing the potential for overnight or multi-night stays at Muncho Lake. They are also intended to foster a lasting impression on tourists and encourage word-of-mouth promotion of the Park amongst tourists who meet at other locations.

Private commercial operators within the Park can do much to promote the area and increase the satisfaction of those visiting Muncho Lake. By providing private business with information about the Park, its facilities and attractions, this information can then be disseminated to customers throughout the vicinity.

The development and promotion of Maxhamish Lake Park northeast Fort Nelson is not expected to reduce the number of local resident visits to Muncho Lake - both parks are quite different in both purpose and attractiveness. However, Liard Hot Springs Park will continue to present a significant competitor for camping dollars along the Northern B.C. section of the Alaska Highway.
Muncho Lake Park shall be promoted and marketed through an approved visitor services plan which will consider:

- encouragement of private sector involvement in park promotion;

- establishment of a marketing strategy for Alaska Highway provincial parks including Muncho Lake, Stone Mountain and Liard Hotsprings Parks.

- expansion of tourist attractions in the Park which may encourage visits of longer duration;

- submission of material to national and international tourist guides covering northern B.C.;

- media coverage of northern parks and their attractions and;

- the publication of a Northern B.C. Region Provincial Parks map.
2.7 PLAN IMPLEMENTATION

Policies presented in this Master Plan will become effective upon approval of the document. High priority is given to:

- reconstruction of park campgrounds;
- development of viewpoints;
- establishment of a Trout River Hoodoos interpretive area;
- entrance portal information displays;

as well as the implementation of policies regarding:

- the Highway Scenic Improvement Act;
- land designations;
- boundary revisions;
- hunting regulation amendments

The formulation of Resources Management and Visitor Services Plans for Muncho Lake Park will ensure that management of the Park continues in accordance with this Master Plan.
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APPENDICES

1. Rocky Mountains Natural Region
2. Canada Land Inventory. Capability for Wildlife Ratings
3. Known Archaeological Site
4. Provincial Park Zoning System
5. Highways Scenic Improvement Act and B.C. Reg. 261/70
6. Legal Description, Muncho Lake Park
7. Boundary Revision - Nonda Creek
8. Suggested Design Schemes
9. Photographs
1. **Environmental Characteristics**

1. **Location, Size and Climate**
   - Situated in eastern British Columbia, extending in a northwesterly direction from the southern international boundary almost to the B.C. - Yukon boundary.
   - **General Climate:**
     - Mean annual precip. - Muskwa Ranges: 40-100 cm (higher in the core of the mountain area)
     - Mean daily temp. January - north of Peace River: less than 20°C
     - Mean daily temp. July - 14°C to 16°C throughout

2. **Physiographic Characteristics**
   - Consists of four major groups of ranges from south to north: Border Ranges Continental Ranges (coincident with most of the southern half of the length of the Rockies), Hart Ranges (extend from the Kaskwa area to the Peace River) and the Muskwa Ranges (north of the Peace River).
   - Western boundary of the physiographic region is the eastern side of the rocky Mountain Trench.
   - Rocky Mountain are largely underlain by sedimentary and metaphoric ranges.
   - The predominant rocks are Palaeozoic and Proterozoic limestones, quartzites, schists and slates.
   - The Rocky Mountains, despite the age of the rocks, display relative youth as a mountain system (uplifted about 75 million ago).
   - Pleistocene continental glaciation covered the ranges to heights to 2,300 to 2,600 metres.
   - The Rockies characteristically display distinct stratification.

3. **Hydrologic Characteristics**
   - There are only modest numbers of lakes, none of which exceed 20-30 sq. km.
   - The streams and rivers drain in a structurally controlled trellis pattern.
Numerous glaciers (alpine and valley types) and icefield, especially in the Continental and Muskwa Ranges.

The only river which flows through the Rocky Mountains is the Peace.

4. **Biotic Characteristics**

   Particularly in the Border, Continental and Muskwa Ranges, the treeline is often controlled by typography rather than by climate.

   **Biogeoclimatic patterns:**
   
   1) **Alpine Tundra**
      
      S.E.S.-S.F.
      
      Sub-Boreal Spruce
      
      Western Hart Ranges
      and Southwestern
      Muskwa Ranges

   2) **Alpine Tundra (extensive)**
      
      Spruce-Willow-Birch
      
      Boreal W.+B. Spruce
      
      Muskwa Ranges (except SW)
      and Eastern Hart Ranges
      (Alpine is minor)

   **Biotic Regions:**

   1) **Subalpine Forest**
      
      - Border Ranges
      
      - Western Continental Ranges
      
      - Western fringe of Hart Ranges
      
      - Southwestern fringe of Muskwa Ranges

   2) **Alpine**
      
      - the central core of the Continental Ranges, between 50° and 54°N latitude
      
      - a central portion in the southern Hart Ranges
      
      - A large area in the Muskwa Ranges, south of the Toad River and north of the Akie River.

   3) **Boreal Forest**
      
      - northern and southeastern Muskwa Ranges
      
      - eastern Hart Ranges
Muskwa Ranges

- located north of the Peace River
- summit elevations increase northward from the Peace
- highest peak: Mt. Churchill (3,500 metres)
- elevation range: 3,000/3,200 metres down to 800/1,000 metres a.s.l.
- quartzites and limestone underlie many of the high peaks.
- area has been strongly eroded by alpine and valley glaciation.
- complex folding is common.
- many peaks are castellated or flat-topped if strata are horizontal.
- longitudinal valleys of considerable width and length and prominent features.
- glaciation was uneven in intensity; some areas show little evidence of glacial erosion despite a veneer of drift throughout the ranges.
- rugged, majestic ranges similar to the Continental Ranges in geology, glaciation and appearances.
- much more extensive alpine than southern ranges.
- biogeoclimatic pattern:
  Alpine Tundra
  Spruce-Willow-Birch
  Boreal W&B Spruce
  (Sub-Boreal Spruce) - southwest periphery
- biotic areas: Northern Alplands
  Boreal Forest
- Current representation (1982):
  Kwadacha Wilderness Park: satisfactory
  Muncho Lake Park: partial
  Stone Mountain Park: partial
APPENDIX 2  C.L.I. CAPABILITY FOR WILDLIFE (UNGULATES)

Class 1: Lands with no significant limitations to the production of ungulates.

Class 1w: Class 1 lands that are winter range.

Class 2: Lands with very slight limitations to the production of ungulates.

Class 2w: Class 2 lands that are winter range.

Class 3: Lands with slight limitations to the production of ungulates.

Class 3w: Class 3 lands that are winter range.

Class 4: Lands with moderate limitations to the production of ungulates.

Class 5: Lands with moderately severe limitations to the production of ungulates.

Class 6: Lands with severe limitations to the production of ungulates.

Class 7: Lands with no ungulate production.
APPENDIX 3  KNOWN ARCHAEOLOGICAL SITES

BRITISH COLUMBIA ARCHÄOLOGICAL SITE INVENTORY FORM

2. Previous designation(s) IfSk T1

3. Site name(s)

4. Location (a) Section Lot Plan
   (b) The site is located 103 meters due south of Muncho Lake and 132° West (300 m) Trout River mouth (South). The cabin is just north (but due west) of mile 457 of the Alaska highway.

5. Access Access is most readily available by boat. Travelling by boat towards the south-west corner of Muncho Lake stop at the mouth of Trout River. From this point travel south-southwest at 172° for a distance of 300 meters arriving at the cabin.

6. Administrative jurisdiction (a) Resource Management Region Omineca-Peace
   (b) Regional Dist Peace River-Liard (c) Forest/Grazing Dist Prince George
   (d) Highways Dist Fort St. John (e) Prov. Park Dist Omineca-Peace (b)

7. Lat. 58 ° 56' 04" N. 8. Long. 125 ° 47' 02" W.

9. UTM /

10. Air photo

11. Map (a) 94 K/13W Muncho Lake (b).

12. Drainage (a) minor Muncho Lake and Trout River (b) major 32

13. Elevation (a) 2700 ft. (b) 1 meter

14. Cultural affiliation (a) Kaska (b)

15. Site type Historic Site: Log Cabin

16. Dimensions (a) exact 4.3m X 4.1m (b) estimated

   (a) original
BRITISH COLUMBIA ARCH/EOLOGICAL SITE INVENTORY FORM

2. Previous designation(s)............IfSk T2.................. 3. Site name(s)...................

4. Location (a) Sec. .................. Lot. 1650 .............. Plan...........................

(b) Just before mile post 450 on Alaska Hwy., SW side of Hwy., On NW end of Drogheda Lake, 26 m. down outlet creek (Muncho Creek). Cross creek onto left (SW) bank. Follow old road cut s. up to terrace 22 m. Site is here on terrace centred between remains of two old buildings (probably dating to building of Alaska Hwy. - rumour was that they were US army buildings.)

5. Access Drive to N. end of Drogheda Lake (approx. mile 450 on Alaska Hwy.) Here there is a parking lot. Park and walk 26 m. N. along outlet creek. (Muncho Cr.) Cross on plank (Corner post for lot 1650 is here). Walk 22 m. up (roughly south) to terrace. Site extends from here to far side of terrace (roughly 42 m. WNW).

6. Province and districts............. B.C. .............. (a) Regional District...Peace River...Liard

(b) Forest and Grazing District.....Prince George........ (c) Highways District...Fort St. John

(d) Provincial Park...Omineca-Peace... (e) Resource Management Region...Omineca-Peace (Liard)

7. Lat....58° 50' .40" N. 8. Long....125° 43' 30" W. 9. UTM..................


12. Drainage (a) minor...Muncho Creek, Trout River (b) major...32. Liard

13. Elevation (a). ca...3500' asl or 1067 m. asl (b) ..4-5 m. above Drogheda Lake

14. Cultural affiliation (a)...Kaska, Athapaskan (b)..........

15. Site type...general activity

16. Dimensions (a) exact...42 m. WNW x 22 m. NNE (b) estimated...50 x 25 m. 

(c) original...50 x 25 m.? 

17. Condition (a) present...90% (b) future...doubtful, if so by hwys.
BRITISH COLUMBIA ARCHÆOLOGICAL SITE SURVEY FORM

1. Location and access

Esker at north end of Muncho Lake

<table>
<thead>
<tr>
<th>Sec.</th>
<th>Lot</th>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>59-02</td>
</tr>
</tbody>
</table>

2. Site name

3. Previous designations

4. Type

5. Dimensions

6. Depth of deposit

7. Elevation

8. Water

9. Vegetation on site

10. Surrounding vegetation

11. Fill of site

12. Subsoil and surrounding soil

13. Burials

14. Habitations

15. Other features

16. Present condition

17. Possibility of future disturbance

18. Known finds and present location

1 point frag., detritus
NATIONAL MUSEUM

19. Owner(s)/tenant(s) past and present

20. Attitude to excavation

21. Camping facilities

22. Historically territory of

TLEHOTNA Indians

23. Site was/was not occupied by Indians in historic times until

24. Informants

25. Map.

26. Air photo

27. Photographs

28. Published references

29. Remarks and recommendations

30. Reported by

R. S. Macleish, 1957

31. Observed by

32. Recorded by

33. Date

(Continue or expand on back if necessary. Sketch map is desirable.)
### British Columbia Archaeological Site Inventory Form

2. Previous designation(s) ........................................... 3. Site name(s) ..................................................

4. Location (a) Sec. ........................................ Lot ................................................ Plan ................................................

   (b) "Found chips on the shore below high water mark in cove between mile 462 and 463. Possibly these had been washed out of low terrace some feet or so above high water."

5. Access. Drive along Alaska Hwy. Either park truck and hike to water's edge or possibly better park at water's edge via one of the lodges at mile 463 and walk or canoe down (SOUTH) the lake to wherever the site may be.

6. Province and districts ........................................ B.C. ........................................ (a) Regional District Peace River - Liard

   (b) Forest and Grazing District Prince George  ................................ (c) Highways District Ft. St. John 4-6

   (d) Provincial Park Omineca-Peace, Liard(e) Resource Management Region Omineca-Peace

7. Lat. ........................................ "N." 8. Long. ........................................ "W." 9. UTM ........................................

10. Air photo .................................................... 11. Map (a) 94N/4, Trout River ................................

   (b) ....................................................

12. Drainage (a) minor Muncho Lake, Trout R. ................................ (b) major 32, Liard R. ................................

13. Elevation (a) ca. 2681' or 817.2 m. asl  ................................ (b) 1 foot below high water mark

14. Cultural affiliation (a) Kaska, Athapascan ................................ (b) ..........................................................

15. Site type ........................................ general activity?

16. Dimensions (a) exact ........................................ (b) estimated ........................................

   (c) original ........................................

17. Condition (a) present ........................................ (b) future ........................................
BRITISH COLUMBIA ARCHAEOLOGICAL SITE INVENTORY FORM

2. Previous designation(s).................. IgSk T3
3. Site name(s)...................................

4. Location (a) Sec................................ Lot 627.......................... Plan..............................................
(b) Approximately mile 464 Alaska Hwy., N. end Muncho Lake on E. side, Ca,
...35 m. N. of point formed where long finger-shaped bay starts. Here there
is a cat cut leading down to lake. On N. side of cat cut 27m up from lake
high water mark there is an overturned tree where there was 2 flakes of grey
chart.

5. Access. It may be possible to drive off the Alaska Hwy. via a side road and/or
...cat cut right to the site. We drove down to lake via sideroad at UTM grid.
...ref. 407474 (good places to camp here!) and canoed up.

6. Province and districts.......... B.C........................................ (a) Regional District. Peace River - Liard
(b) Forest and Grazing District.....Prince George...... (c) Highways District...Fort St. John
4-6
(d) Provincial Park...Omineca-Peace (Liard) (e) Resource Management Region...Omineca-Peace

7. Lat..59° 02' 35" N. 8. Long. 125° 47' 40" W. 9. UTM 10VCA 397480

9. Air photo...BC 5476: 195-197z, 251-253...... 11. Map (a)............ 94N/4, Trout R.
(b) .............................................................

12. Drainage (a) minor... Muncho Lake, Trout River... (b) major... 32. Liard River

13. Elevation (a) 2700' asl 823 m. asl... (b) 3 m. above level of Muncho Lake

14. Cultural affiliation (a) Kaska, Athapascan...... (b) .............................

15. Site type. random find/possible general activity

16. Dimensions (a) exact... 1 x 1 m...... (b) estimated ........................
(c) original

17. Condition (a) present ? (b) future disturbed by cat cut, if ther
BRITISH COLUMBIA ARCH/ELOGICAL SITE INVENTORY FORM

2. Previous designation(s) . IgSk T4

3. Site name(s) .

4. Location
   (a) Sec.
   Lot.
   Plan.
   (b) Approximately mile 464, Alaska Hwy at NW corner of small circular bay

5. Access
   At ca. mile 463.5, Alaska Hwy, you can see the bay which is the first
time for about 4 kilometers that you are close to the lake. There is a
large culvert draining under the road into the bay. Approximately 0.1 km N
past this is the access road on the left which goes down to the unorganized
camping areas along the N side of the bay and to the N of the bay itself. Right
at the (continued on page 4)

6. Province and districts
   (a) Regional District . Peace, River, Liard
   (b) Forest and Grazing District . Prince George
   (c) Highways District . Fort St. John
   (d) Provincial Park . Bulkley-Nechako
   (e) Resource Management Region . Nechako-Peace Region, Liard

7. Lat. . 59° 02' 47" N
   Long. . 125° 46' 43" W
   UTM . 10041C . 406474

8. Air photo . FC5476: 196-197, 251-252

9. Map
   (a) . 94N/4, Trout River
   (b) .

10. Drainage
    (a) minor . Trout River
    (b) major . Liard

11. Elevation
    (a) . 2681 ft or 817.2 m aasl
    (b) . 0-30 cm above July level of Muncho Lake

12. Cultural affiliation
    (a) . Kashe, Athapaskan
    (b) .

13. Site type .
    (a) general activity

14. Dimensions
    (a) exact . 16 x 3 m
    (b) estimated .
    (c) original .

15. Condition
    (a) present .
    (b) future disturbed by ice and wave
    action, possible expansion by Parks
    (c) Br.
BRITISH COLUMBIA ARCHAEOLOGICAL SITE INVENTORY FORM

2. Previous designation(s)........................................................................... IgSk.T6
3. Site name(s)........................................................................................................

4. Location (a) Sec...................................................... Lot...................................................... Plan......................................................
(b) on a 2.5 m. terrace at the place where the peninsula on the westerly
    shore of Muncho Lake joins the mainland.

5. Access  Alaska Highway to Mile 463 then by boat southwesterly across Muncho
    Lake to the peninsula, then along the peninsula to its base. Disembark
    and proceed up the slope of the terrace on the Northeasternly side of a
    small pond about 20 meters.

6. Province and districts....................................................... (a) Regional District  Peace River-Liard
        (b) Forest and Grazing District  Prince George .................................................................
        (c) Highways District................................................................. 44 Ft. St. John
        (d) Provincial Park ................................................................. 64 Liard
        (e) Resource Management Region .................................................... Ominica-Peace

7. Lat....59...... °...00...... ′............................................. 53°N. 8. Long...125...... °...47...... ′..........................32°W. 9. UTM 104YCA........ 397448

10. Air photo................................................................. BC.5476:195-196................................................ 11. Map 
(b)................................................................................................................. 94N/4. Trout River

12. Drainage (a) minor............................................................... Muncho Lake, Trout River
(b) major............................................................................................................. 32, Liard River

13. Elevation (a)................................................................. 2700′ a.s.l., 823 m. a.s.l
(b) ................................................................. 2.5 m. above Muncho Lake

14. Cultural affiliation (a)............................................................................... Kaska, Athapaskan
(b) ....................................................................................................................

15. Site type...........................................................................................................
general activity

16. Dimensions (a) exact............................................................................... 20 m. x 10 m.
(b) estimated .................................................................................................... 20 x 20 m.
(c) original...........................................................................................................

17. Condition (a) present................................................................. 100% Intact
(b) future low probability of future
BRITISH COLUMBIA ARCHÆOLOGICAL SITE INVENTORY FORM

2. Previous designation(s).................................................. IgSk.T5
3. Site name(s)..............................................................

4. Location (a) Sec. ....................................................... Lot. ................................................................. Plan.
   (b) Near mile 465 Alaska Hwy. at N. end Muncho Lake just before outlet for Trout River on west side of lake just before point where current for Trout River starts to become noticeable.

5. Access. Drive to approximately mile 464 on Alaska Hwy and turn left (W) onto side road (first road past bay seen from Hwy.) which turns first S, then W, then N. Follow to the end and launch boat. Paddle, row, or motor whatever you got to very N. end of lake on west side just before the current is noticeable.

Here there are two opposing points which could be considered the start of the river. On the west side (see page 4)

6. Province and districts.................................................. B.C.
   (a) Regional District Peace River - Liard
   (b) Forest and Grazing District Prince George
   (c) Highways District 44-Pt. St. John
   (d) Provincial Park 4-6 Omineca-Peace (Liard)
   (e) Resource Management Region Omineca-Peace (Liard)

7. Lat. 59° 03' 02" N. Long. 125° 48' 03" W. 9. UTM 10VCA 394487.5

8. Air photo. BC 5476: 251-253

9. Map (a) ................................................................. 94N/4, Trout River

10. Drainage (a) minor: Muncho Lake, Trout River... (b) major... 32. Liard River

11. Elevation (a) 2684 ft. a.s.l or 818 m. a.s.l... (b) ca. 75 - 1.00 m. above July lake level

12. Cultural affiliation (a) Kaske... (b)

13. Site type general activity, possible workshop and/or campsite

14. Dimensions (a) exact... 5 m. radius... (b) estimated... ?
   (c) original... ?

15. Condition (a) present... good... (b) future... minimal

16. Priority...
BRITISH COLUMBIA ARCHAEOLOGICAL SITE INVENTORY FORM

1. Site No. IgSk 7

2. Previous designation(s) IgSk T7

3. Site name(s) IgSk 7

4. Location (a) Sec. 1175 Plan

(b) on a high terrace above a small shallow and swampy cove on the east shore of Muncho Lake, north of a small creek that crosses the Alaska Highway at approximately mile 462.5.

5. Access From the Alaska Highway, walk westerly down an unnamed creek at approximately Mile 462.5, to Muncho Lake, then follow a trail, northerly up the side of the bluff. At the bluff edge, turn westerly and continue about 20 m.

6. Province and districts B.C. (a) Regional District Peace River - Liard

(b) Forest and Grazing District Prince George (c) Highways District 44, Ft. St. John

(d) Provincial Park 6 Liard (e) Resource Management Region Ominica-Peace


10. Air photo

(b) 94 N/4, Trout River

12. Drainage (a) minor Muncho Lake, Trout River (b) major 32, Liard R.

13. Elevation (a) 2715 ft or 827.5 m. asl (b) approx. 10 m. above Muncho Lake

14. Cultural affiliation (a) Kaska, Athapaskan (b)

15. Site type general activity

16. Dimensions (a) exact 17 m. EW x 30 m. NS (b) estimated

(c) original

17. Condition (a) present undisturbed (b) future little chance of future disturbance

18. Priority
**BRITISH COLUMBIA ARCHÆOLOGICAL SITE INVENTORY FORM**

2. Previous designation(s)................. IgSk.7

3. Site name(s).................

4. Location (a) Sec.................. Lot. 1175. Plan

   (b) on a high terrace above a small shallow and swampy cove on the east shore
   of Muncho Lake, north of a small creek that crosses the Alaska Highway at
   approximately mile 462.5.

5. Access: From the Alaska Highway, walk westerly down an unnamed creek at approximately
   Mile 462.5, to Muncho Lake, then follow a trail, northerly up the side of the
   bluff. At the bluff edge, turn westerly and continue about 20 m.

6. Province and districts................. B.C.

   (a) Regional District Peace River - Liard

   (b) Forest and Grazing District Prince George

   (c) Highways District 44, Ft. St. John

   (d) Provincial Park 4, Omineca-Peace

   (e) Resource Management Region Omineca-Peace

7. Lat. .59°.01'.27"N. 8. Long. 125°.46'.27"W. 9. UTM 10VCA 408458

10. Air photo

11. Map (a) 94 N/W, Trout River

12. Drainage (a) minor Muncho Lake, Trout River

13. Elevation (a) 2715' or 827.5 m. asl

14. Cultural affiliation (a) Kaska, Athapaskan

15. Site type general activity

16. Dimensions (a) exact. 17 m. EW x 30 m. NS

17. Condition (a) present... undisturbed

   (b) future... little chance of future disturbance

   (c) original

   (d) estimated
BRITISH COLUMBIA ARCH/EOLOGICAL SITE INVENTORY FORM

1. Site No. IgSk - 8

2. Previous designation(s) IgSk T.W.H.
3. Site name(s) 

4. Location (a) Sec. Lot Plan
(b) The site is located within lot # 1181 on the East shore of Muncho Lake at approx. mile 462.3 of the Alaska Highway. Within this lot there is a step rise towards the North side of the lot, the site is located on top of this rise.

5. Access From mile 462.3 of the Alaska Highway proceed westward by foot towards the lake. At this point (ie. the shore line) a noticeable step rise will appear to the North of your location which should be at the beach just in front of a small cabin. Proceed Northward to the top of the rise and one reaches the location of the site.

6. Province and districts British Columbia (a) Regional District Peace River - Liard
   (b) Forest and Grazing District Prince George (c) Highways District Fort St. John
   (d) Provincial Park Omineca - Peace (e) Resource Management Region Omineca - Peace

7. Lat...59...O....44....N. 8. Long...125...46...34....W. 9. UTM...407....444...10V

8. Site elevation (a) 2700' Ft. (b) 4m above Muncho Lake

9. Cultural affiliation (a) Kaska (b) 

10. Site type General Activity

11. Dimensions (a) exact 30 m. x 19 m. (b) estimated unknown

12. Drainage (a) minor Muncho Lake (b) major 32

13. Elevation (a) 2700' Ft. (b) 4m above Muncho Lake

14. Cultural affiliation (a) Kaska (b) 

15. Site type General Activity

16. Dimensions (a) exact 30 m. x 19 m. (b) estimated unknown

17. Condition (a) present Disturbed & eroding (b) future

18. Priority
<table>
<thead>
<tr>
<th>ZONE</th>
<th>OBJECTIVES</th>
<th>MANAGEMENT GUIDELINES</th>
<th>FACILITIES/ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>To provide for a variety of facility-oriented recreational opportunities.</td>
<td>-management will be oriented toward maintaining high quality recreation and interpretive experience.</td>
<td>-intensive recreational facilities such as auto campgrounds, cabins, lodges, picnic areas, beach and swimming areas, nature houses, campfire buildings, downhill ski facilities, walk-in campgrounds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-intensive management may be required to ensure that high quality recreation and interpretive opportunities are maintained.</td>
<td>-ancillary facilities such as parking, sanitation, picnic tables, restaurants, may be included in this zone.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-special design consideration generally required.</td>
<td>-visitor facilities will be of a primitive nature.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-intensity of developments and standard of facilities are variable and will relate to the objectives for the Park.</td>
<td>-only minimal primitive facilities would be developed consistent with low intensity uses. Activities consistent with this zone include: camping, hiking, mountaineering, canoeing, kayaking, cross-country skiing and snowshoeing, fishing, nature observation. In some cases, hunting may be considered an appropriate use. In some cases, it will be necessary to allow the limited use of aircraft, motorboats, snowmobiles, etc. as important means of access for management or to permit reasonable public access into extremely remote areas. Subsequent use permits</td>
</tr>
<tr>
<td>Natural</td>
<td>To provide for intermediate levels of outdoor recreational opportunities/use in a natural setting.</td>
<td>-management will be oriented toward maintenance or restoration of the natural environment.</td>
<td>-visitor facilities will be of a primitive nature.</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td>-visitor access may be restricted to preserve the recreational experience or to limit impact on the area.</td>
<td>-only minimal primitive facilities would be developed consistent with low intensity uses. Activities consistent with this zone include: camping, hiking, mountaineering, canoeing, kayaking, cross-country skiing and snowshoeing, fishing, nature observation. In some cases, hunting may be considered an appropriate use. In some cases, it will be necessary to allow the limited use of aircraft, motorboats, snowmobiles, etc. as important means of access for management or to permit reasonable public access into extremely remote areas. Subsequent use permits</td>
</tr>
<tr>
<td>Wilderness</td>
<td>-To protect and preserve landscapes and resource processes.</td>
<td>-oriented toward the protection and preservation of the area's atmosphere, environment or ecology, while optimizing recreational opportunities associated with the &quot;wilderness experience&quot;.</td>
<td>-visitor facilities will not be provided, except where absolutely necessary to provide for public safety or minimizing user impact.</td>
</tr>
<tr>
<td></td>
<td>-To provide for low levels of recreational use in an environment where natural processes occur with a minimum of human interference.</td>
<td>-unstructured visitor mobility.</td>
<td>-transportation limited to foot access, and non-motorized boats.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-visitor support facilities will not be provided, except where absolutely necessary to provide for public safety or minimizing user impact.</td>
<td>-transportation limited to foot access, and non-motorized boats.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-transportation limited to foot access, and non-motorized boats.</td>
<td>-transportation limited to foot access, and non-motorized boats.</td>
</tr>
</tbody>
</table>

- Development and use are consistent with the maintenance of natural conditions. Activities consistent with this zone would be: hiking, camping, canoeing, kayaking, snowshoeing, cross-country skiing, nature observation, horseback riding, picnicking, swimming, fishing, interpretation programs. |
- Minimal facilities such as trails, shelters, hikers' campsites, portages, horse corrals, observation blinds, may be developed to complement these activities, but the emphasis of the development will be toward public safety rather than the encouragement of more intensive levels of use.
- Visitor facilities will be of a primitive nature.
- Only minimal primitive facilities would be developed consistent with low intensity uses. Activities consistent with this zone include: camping, hiking, mountaineering, canoeing, kayaking, cross-country skiing and snowshoeing, fishing, nature observation. In some cases, hunting may be considered an appropriate use. In some cases, it will be necessary to allow the limited use of aircraft, motorboats, snowmobiles, etc. as important means of access for management or to permit reasonable public access into extremely remote areas. Subsequent use permits.
All Crown land described as:

Commencing at a point on the southern limit of the right-of-way of the Alaska Highway and being 91.44 m due South of a standard post and mound referenced as number 92 and shown on Plan 3, Township 408, by A.C. Pollard, B.C.L.S., and being approximately 1 mile 91.44 m South of the Vechina River drainage; then due South for 4.83 km; then in a westerly and northerly direction at a distance of 4.83 km from the southerly and westerly limit of the Alaska Highway to the intersection with the center of the Vechina Creek; then in an Easterly direction down said center line to the intersection with the center line of the Vechina River; then due East to the southerly limit of the Vechina River drainage; then in a southerly direction along the southerly drainage limit of the Vechina River and Vechina Lake to a point being the headwaters of the main stream of Vechina Creek; then in an Easterly and Southerly direction along the left hand bank of said creek to its intersection with the left hand bank of the Vechina River; then in a westerly direction along said bank to a point due North of a standard post and mound referenced as number 92; then due South to aforesaid post and mound; then 91.44 m due South to the point of commencement.

EXCEPT THEREOF:

1. District Lots 621, 622, 623, 624, 625, 627, 1160, 1172, 1173, 1174, 1179, 1182, 1183, 1641, 1650;

2. Commencing at a point 90.48 m N 29° 42' 30" W of a point marked R. 70 P., Conc. C, on the northerly boundary of the right-of-way of the Alaska Highway at Mile 433.6;
   thence N29°42'30" W 182.88 m;
   thence S60°10'30" E 457.20 m;
   thence S29°42'30" E 182.88 m;
   thence N60°10'30" E 30.48 m, more or less, to the southerly boundary; then Northerly 30.48 m along said southerly boundary; then N29°42'30" W 30.48 m, more or less, to the point of commencement and containing approximately 7.77 ha.

3. Commencing at a point 90.48 m S29°44'00" E of the northwest corner of Lot 568;
   thence S29°44'00" W 30.48 m, more or less, to the southerly boundary of Lot 568; then Northerly along said southerly boundary to the southeast corner of Lot 568;
   thence S29°44'00" W 4.92 m;
   thence S60°16'00" W 449.58 m;
   thence N29°44'00" W to the northwest corner of Lot 622;
   thence Northwesterly along the southerly boundary of Lots 622 and 621 to the southeast corner of Lot 621; then Northwesterly along the eastern boundary of Lot 621 to a point 30.48 m Southerly of the northeast corner of Lot 621; then Northwesterly along the eastern boundary of Lot 621 to a point 30.48 m Southerly of the point of commencement and more or less, to the southerly boundary of the highway right-of-way; then 30.48 m along the southerly boundary of the highway right-of-way; then N29°44'00" W 30.48 m, more or less, to the point of commencement and containing approximately 19.43 ha.

4. Commencing at a point which lies 121.92 m S29°44'00" W and 22.28 m S 10°45'00" E of a point marked VI, P.T.R. 108 located on the easterly boundary of the Alaska Highway right-of-way at Mile 453;
   thence S10°45'00" E 278.60 m;
   thence N29°44'00" W 30.48 m, more or less, to said westerly boundary of the highway right-of-way; then Southerly 30.48 m along said westerly boundary; then N29°44'00" W 30.48 m, more or less, to said westerly boundary of the highway right-of-way; then Southerly 30.48 m along said westerly boundary; then N29°44'00" W 30.48 m, more or less, to said westerly boundary of the highway right-of-way; then Southerly 30.48 m along said westerly boundary; then N29°44'00" W 30.48 m, more or less, to the point of commencement and containing approximately 1.77 ha.

5. Commencing at a point 129.02 m N 90°00'00" E of a point marked VI, P.T.R. 108 located on the easterly boundary of the Alaska Highway right-of-way at Mile 464;
   thence N90°00'00" E 426.72 m;
   thence North 95.20 m;
   thence N90°00'00" E 283.94 m;
   thence Southeasterly 335.28 m parallel to and 30.48 m perpendicularly distant from said westerly boundary of the highway right-of-way; then N90°00'00" E 30.48 m, more or less, to the said westerly boundary of the highway right-of-way; then Southerly 30.48 m along said boundary; then N90°00'00" E 30.48 m, more or less, to the point of commencement and containing approximately 17.17 ha.

6. Commencing at a point which lies 121.92 m S29°45'30" W and 15.24 m N 14°30'00" E of a point marked VI, P.T.R. 104 located on the easterly boundary of the Alaska Highway right-of-way at Mile 477;
   thence S29°45'30" W 274.32 m;
   thence N14°30'00" E 227.61 m;
   thence N29°45'30" W 304.80 m, more or less, to the westerly boundary of the highway right-of-way; then Northerly 30.48 m along said westerly boundary; then N29°45'30" W 30.48 m, more or less, to the point of commencement and containing approximately 0.17 ha.

All of Peace River District and containing 111,310.02 hectares more or less.
BACKGROUND DETAILS TO THE ESTABLISHMENT OF MUNCHO LAKE PARK

1955 - August 15: Crown lands adjacent to the Alaska Hwy. and known as Muncho Lake Protective Strip were reserved as a U.R.E.P. by O.I.C. 2021 (103,603.20 ha).

1957 - May 31: Muncho Lake Park was established as a Class "B" Provincial Park by O.I.C. 1294 (88,467.42 ha).

- December 6: L. 623, Peace River Dist. (0.40 ha) was deleted from park & Ls. 1643 & 1644, Peace River Dist. (1.37 ha) were added to park by O.I.C. 3006.

1969 - October 30: 56.82 was deleted from park for gravel pits required by the Ministry of Highways by O.I.C. 3436.

HIGHWAY SCENIC IMPROVEMENT ACT
CHAPTER 169

Interpretations
1. In this Act,
'Provincial land' means land of the Province in which the public road is located,
'designated highway' means a highway or part of a designated highway by the minister under section 2,
'highway' has the same meaning as in the Highway Act,
'municipality' includes the City of Vancouver,
'municipal premises' means land within 150 m of the outside line of a designated highway.
'sealed' has the same meaning as in the Motor Vehicle Act and includes the remains of a vehicle.

Designation of highways
2. The minister may designate a highway as a public road or part of it and shall give notice of it in the Gazette and in a newspaper circulating in the area in which the highway is located or, if there is no newspaper, in a newspaper circulating generally in the Province.

Notice to remove an unauthorised accumulation
3. (1) Where, for premises
(a) not within a municipality, the minister, or
(b) within a municipality, the council is satisfied that there is an unauthorised accumulation of rubbish, garbage, ashes, filth, discarded materials, or the bodies or parts of vehicles or machinery, or any other accumulation which is causing the premises to be unauthorised or offensive to any part of the public travelling on a designated highway, the minister or the council shall give notice to the owner or to the occupier of the premises requiring him to remove the accumulation or to take remedial measures to prevent such accumulation or to prevent the accumulation of such material from appearing on the premises
(2) A notice under this section shall be served on the owner or occupier, either personally or by leaving it for him with an adult at his place of ordinary residence.
(3) Notice to a tenant shall be served on the owner or occupier, either personally or by leaving it for him with an adult at his place of ordinary residence.

Removal of unauthorised accumulations
4. (1) Where the requirements of a notice served under section 3 have not been complied with and
(2) in the opinion of the person designated as the person to whom the notice is directed, the premises, because of the accumulation remain unauthorised or offensive to any part of the public travelling on a designated highway, the person responsible for the accumulation may issue a notice to the premises or the premises which has been made of it, within 30 days of notice being served on the owner or occupier requiring such notice to be removed or to take remedial measures to prevent such accumulation or to prevent the accumulation of similar material from appearing on the premises.

Appeal
5. (1) An appeal from the decision of the minister or of a council under this Act to the Court of the Province in which the premises are located, and the court may, for good cause, vary or grant the notice, or may dismiss the appeal.
Where a notice is varied, it is effective and enforceable as varied, and the determination of the Court is final.
(2) Notice of intent to appeal shall be given to the court and to the minister or council within 15 days of the service of notice appealed against, or in the event of the court dismissing the appeal, the appeal is withdrawn.

Dispute between owners and occupiers
6. Where the requirements of a notice served under section 3 have not been complied with and
(1) the premises remain unauthorised or offensive to any part of the public travelling on a designated highway, the person responsible for the accumulation may issue a notice to the premises in which the premises are located for an order that he be removed or to take remedial measures to prevent such accumulation or to prevent the accumulation of similar material from appearing on the premises.
(2) Notice of intent to appeal shall be given to the court and to the minister or council, and the court may, for good cause, vary or grant the notice, or may dismiss the appeal.

Offences and penalties
7. (1) No person shall abandon a vehicle on a highway or public road in a designated highway
(2) No person shall abandon a vehicle on Crown land.

8. (1) Any person who abandons a vehicle or who obstructs the movement of a vehicle on a highway or public road as defined
(2) Any person who abandons a vehicle on Crown land, on a designated highway or public road as defined,
(3) Any person who abandons a vehicle or who obstructs the movement of a vehicle on a highway or public road in a designated highway, or on Crown land, is guilty of an offence and is liable on conviction to a fine not exceeding $300.

9. (1) Any person who abandons a vehicle or who obstructs the movement of a vehicle on a highway or public road in a designated highway, or on Crown land, is guilty of an offence and is liable on conviction to a fine not exceeding $300.
B.C. Reg. 261/70.

HIGHWAYS (SCENIC IMPROVEMENT) ACT, 1968

DESIGNATION MADE NOVEMBER 6, 1970, BY MINISTER

Pursuant to section 3 of the Highways (Scenic Improvement) Act, 1968, those highways, or parts thereof, numbered 2, 29, and 97 lying within the boundaries of the Peace River-Liard Regional District but not within the boundaries of any incorporated municipality, on the request of the Board by resolution, are designated for the purposes of that Act.
Existing Status: Currently, the park boundary within the vicinity of the Nonda Creek headwaters is described as "the main channel" of the creek. At this location however, it is difficult to determine the actual main stream; various maps illustrate the boundary differently. With the recent guide-outfitting quotas placed within the park, management and enforcement of P.U.P.s will become difficult when only a small stream separates parkland from vacant Crown land. In addition, many hectares of very scenic, easily traversable land within the Nonda Creek basin is excluded from the park although within the same valley.

Proposal: There are no apparent encumbrances which would prevent the extension of parkland to include all of the Nonda Creek as illustrated below. The seasonal private residence located in the vicinity lies outside of the proposed extension and is related to the Park only in that its occupant maintains a P.U.P. and quota for commercial guide-outfitting in the area. Because of the proximity to this base camp, management of the park's wildlife resource would be more effective if the basin became the jurisdiction of one agency. The boundary revision follows natural topographic features associated with a watershed, adding 1295 hectares to the park.
APPENDIX 9 PHOTOGRAPHS
FOLDED MOUNTAIN & TOAD RIVER

TOAD RIVER VALLEY - SOUTHWEST PORTAL
UPPER NONDA CR. - BOUNDARY REVISION

ALPINE BOWL - TOAD RIVER UNIT
TROUT RIVER MINERAL LICKS

SHEEP LICKS - HAZARD CORNER
PRIVATE LOTS - MILE 463

ABANDONED SERVICE CENTRE
MILE 440
ABANDONED TELEPHONE POLES
Ministry of Lands, Parks and Housing
Parks and Outdoor Recreation Division
Northern B.C. Region

Stone Mountain
Provincial Park
MASTER PLAN

Summer 1984
To: Vince Collins  
Assistant Deputy Minister  
Parks & Outdoor Recreation Division  
1019 Wharf Street  
Victoria, B.C.

I am pleased to forward the attached document to you and recommend that it be approved as the Stone Mountain Provincial Park Master Plan.

Date: May 10, 1985

P.O. Moore  
Regional Director  
Northern B.C. Region

APPROVED:  
Assistant Deputy Minister  
DATE 15/8/85.
STONE MOUNTAIN PROVINCIAL PARK
Master Plan

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FIGURE 1
PROVINCIAL PERSPECTIVE

- LARGE PARKS
- LARGE RECREATION AREAS
- SMALL PARKS AND RECREATION AREAS
- P.O.R.D. REGIONAL BOUNDARY

STONE MOUNTAIN PARK

Fort St John
Dawson Creek
Prince George
Queenel
Williams Lake
Kamloops
Nanaimo
Vancouver
PLAN SUMMARY

- For northbound Alaska Highway travellers Stone Mountain Provincial Park represents an introduction to the Rocky Mountains. The Alaska Highway attains its highest elevation through the Park.

- Most of the Park cannot be seen from the highway; the road follows a relatively narrow corridor through the fifteen kilometre breadth of parkland.

- Stone Mountain Park provides partial representation of the Rocky Mountain Natural Region, Muskwa Ranges regional landscape; valuable representative areas lie south of the park along Wokkpash Creek.

- The Park offers exceptional backcountry recreation opportunities in close proximity to the Alaska Highway for residents of Fort Nelson and other communities in northeastern British Columbia.

- The Park represents a destination area for very few persons; most visitation is from casual pass-through traffic.

- The Park supports big game species with hunting currently the most popular recreation pursuit.

- Existing highway commercial operations do not enhance the Park image or achieve the management objectives determined by this plan.

- The Park will be zoned to accommodate various types of land use with an overall intent to remove most resource extraction and highway commercial activity from the limited parkway corridor.

- The Plan recommends expansion of the Park southward to include the Wokkpash Park study area.

- Changes to hunting regulations are recommended in the North Tetsa River headwaters and the MacDonald Creek valley.

- The Division will co-operatively attempt to achieve scenic improvement to all lands along the Alaska Highway using the Highway Scenic Improvement Act.

- A touring campground will be developed on the east edge of Summit Lake.
- Expanded picnicking facilities will be added to the Park.

- Day hike trails into alpine basins which lie in close proximity to the highway will encourage longer stays at Stone Mountain Park.

- The Plan recommends that Resources Management and Visitor Services plans be formulated for Stone Mountain Park.
1.0 INTRODUCTION

Within the context of modern history and exploration there are certain areas of the country which have remained essentially unexplored until only recent times. The Peace River Block, situated in the northeastern corner of the Province, was settled during the late 1800's and introduced a Euro-American farming population to the B.C. prairie. This settlement remained the most northerly populated area of the province for several years. Except for the ramblings of prospectors and adventure seekers, the mountains which separated the Peace River country from the rest of B.C. remained unexplored wilderness until the 1940's and 50's.

Stone Mountain Park is situated near the 58th parallel aside the backbone of the northern Rocky Mountains (Figure 1). At this point the Continental Divide is located well west of the Rockies; the Peace and Liard Rivers having cut through the barrier to drain regions within the Rocky Mountain Trench and Liard plateau. Summit Lake, within Stone Mountain Park, marks the divide between the watersheds of the Muskwa/Fort Nelson River systems and the Racing/Liard River system. These major drainages eventually meet the Mackenzie and flow northward to the Arctic Ocean.

Within the Park lie the headwaters of the east-flowing North Tetsa River and northwest flowing MacDonald Creek. Summit Pass was attained during construction of the Alaska Highway in 1942; the pass still represents the highest point on the route (1,275 m) and presents northbound travellers their first view of the Rocky Mountains.

Recognizing the attraction of the northern Rockies, the province established a Liard River Reserve in 1944. This reserve extended over most of the Liard Hotsprings, Muncho Lake and Summit Lake scenic areas. The huge tract was eventually split into smaller separate reserves and in 1957 lands surrounding Summit Lake were established as Class B Stone Mountain Park with boundaries much as they remain today.
FIGURE 2
- REGIONAL PERSPECTIVE -

LEGEND

LARGE PARKS

SMALL PARKS/RECREATION AREAS

SCALE IN KILOMETERS

0 20 40 60 80 100 120

1:2,500,000

WATSON LAKE (approx. 50 km)

HYLAND RIVER PARK

LIARD RIVER

LIARD HOTSPRINGS

MUNCHO LAKE PARK

STONE MOUNTAIN PARK

FT. NELSON

ANDY BAILY RECREATION AREA

SPATSIZI PLATEAU WILDERNESS PARK

KWADACHA WILDERNESS PARK

TATLATUI PARK

WILLISTON LAKE
Although a vast area of the northern Rockies' valley systems and mountain ranges have been explored, most of the territory nonetheless remains rugged wilderness. Few roads branch from the Alaska Highway, thus leaving foot or horseback as the sole means of truly exploring the hinterland. In contrast however, the Highway does permit thousands to experience the character of the northern terrain; improvements to the route and its service centres continue to attract tourist travel to northern B.C. and through the Provincial parks of the Alaska Highway system.

This Master Plan not only contains information pertaining to the resource base of the Park but also presents and addresses the complex issues which effect park management today. It suggests policy objectives and development proposals that will guide those responsible for continued effective management of the Park and its resources. The plan will be reviewed in accordance with Division policy whenever required.
1.1 REGIONAL AND PROVINCIAL CONTEXT

Centered only 160 kilometres south of the B.C./Yukon border on Mile 400 of the Alaska Highway (Highway 97), Stone Mountain Provincial Park is one of the more remote parks in the province. Here the Rocky Mountains near their northern terminus adjacent the Liard Plateau which extends into the Yukon Territory north of 60 degrees (Figure 2).

Stone Mountain Park provides the provincial park system with partial representation of the Rocky Mountains Natural Region's Muskwa Ranges (P.O.R.D. 1982). Lacking are the representative icefields and timbered glacial valleys typical of the Rocky Mountain landscape. The Muskwas lie north of the Peace River and extend to the Rockies' northern extreme at the Liard River. In general, summit elevations increase northward from the Peace River area, the highest peak in the range being Mount Churchill at 3,500 metres (south of Stone Mountain Park).

The Muskwa Range has been strongly eroded by alpine and valley glaciation with complex folding quite evident on some faces. As opposed to some of the southern Rocky Mountain ranges where the treeline extends to a higher elevation, the Muskwa Range contains many more areas of true alpine terrain. The Regional Landscape is currently represented in the Provincial Park system by Muncho Lake, Stone Mountain and Kwadacha Wilderness Provincial Parks (Appendix 1).

In general, elevations within the Park exceed 2,300 metres (7,600') only in the southern portion of the MacDonald Creek headquarters. Mt. St. Magnus (2,550 m) serves as a southern boundary marker and represents the highest mountain in the Park. Peaks through Summit Pass do not appear as formidable since elevation differences between the highway and adjacent mountains average only 900 metres. Only a relatively small area of Stone Mountain Park is visible from the Highway as it traverses the northern portion. Nonetheless, of the 1,000 kilometre portion of the Alaska Highway within B.C., it is the drive through the Rockies which highlights the trip.

A commercial lodge, service centre and restaurant is located at Summit Lake. The operation is family-run and therefore introduces a resident
LIARD-RABBIT PLATEAUS

Muncho Lake Park

Stone Mtn Park

Wakppash

Kwadacha Park

NORTHERN ROCKY MOUNTAIN TRENCH

CASSIAR-NORTH OMINECA MOUNTAINS

MUSKWA RANGES

PEACE RIVER PLATEAU

NORTHERN FOOTHILLS

SOUTH OMINECA MOUNTAINS

FORT NELSON LOWLAND

FORT NELSON

SCALE IN KILOMETERS

FIGURE 3

NATURAL REGIONS AND REGIONAL LANDSCAPES IN NORTHERN B.C.
population to the Park throughout the year.

Fort Nelson (pop. 7500) is located only 160 km east of the Park on the Alaska Highway. It is a community of resource and service industry workers who often spend long weekends and holidays in the mountain Parks of Muncho Lake and Stone Mountain. As with many northerners, much of their recreational activity depends on the outdoors; fishing, hunting, camping, trail driving and riding. The vast wilderness presented by their northern locale offers a variety of opportunities to pursue these activities in relative seclusion.
INFORMATION

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1.2 PARK RESOURCES

1.2.1 Natural Resources

a) Geology and Topography

As with all ranges of the Rocky Mountains, the Muskwas present a series of northwest-southeast trending valleys and ridges. They contain complex folds, wide U-shaped valleys and rugged peaks of Palaeozoic limestone and quartzite. In comparison to the southern Rockies, the older Muskwa Ranges generally show evidence of more complex, tectonic deformation during their uplifting and development over 50 million years ago. Throughout Stone Mountain Park are examples of tilted sedimentary strata, folds, faults and synclines. Valley bottoms in the headwaters of MacDonald Creek are characterised by vertical beds which protrude through their lesser resistant erosional scree. Many small lakes have formed in the resultant basins.

In general, the topography of Stone Mountain Park is steep, with elevations ranging from 1200 m to 2550 metres. All of the bare mountain slopes are covered with the fragmented rubble of sedimentary strata, a result of ground water and frost action. Only in the broad valley of MacDonald Creek are large, flat areas of developable land.

A more localized sub-range of the Muskwas, the Stone Range, represents a heavily eroded, relatively horizontal-bedded landscape typical in the northern portion of the Park. The sedimentary strata of the bare mountains provide a clear profile of mesozoic deposition over a period of at least 60 million years. Although the dynamic processes of weathering and erosion seem to change the face of the landscape ever so slightly, such processes have successfully removed all records of paleozoic deposition from these same mountains.

Glaciation has been most responsible for forming the present-day landscape of the Muskwa Range. A large centre of ice accumulation was situated just south of the park in the upper Wokkpash Creek valley. This Rocky Mountain Ice Sheet extended northward over the park area at an elevation of 2200 m, thus scouring the lower peaks of the Stone Range.
FIGURE 4

STONE MOUNTAIN PROVINCIAL PARK

- TOPOGRAPHY -

Contour Interval 200' (60 m)

- 1550 m (5000')

- >1550 m (5000')

- >2450 m (8000')

SCALE IN KILOMETRES
The U-shaped MacDonald Creek valley illustrates one of the many major ice valleys located in the vicinity of Stone Mountain Park. Just a few kilometres east of the Park the Rocky Mountain Ice Sheet abutted the Laurentide Ice Sheet (originating from Hudson's Bay). This boundary is well marked by drift deposits which have accumulated in the vicinity of the North Tetsa - Tetsa River confluence.

As glacial ice melted, Summit Lake and its vicinity received an immense deposition of gravel and boulders followed by an intense period of fluvial erosion. Major outwash plains were formed in the headwaters of North Tetsa River. Five distinct terrace levels indicate the intensity of fluvial action which scoured this particular part of the Park.

In addition to evidence of continental glaciation, alpine glaciers have greatly shaped the landscape within the Park. Cirques, moraine ridges and glacial drift can be found throughout the area, especially in the high country adjacent to the southern Park boundaries. Only one small icefield remains in the Park today.

b) Climate

According to the Koppen-Geizer classification system, the climate of Stone Mountain Park is described as "Humid Continental-Cool Summers". Such areas characteristically experience short, cool summers and long, cold winters. Two major factors influence the climate of the Northern Rockies: the northern latitude and the dominance of Arctic air masses which result in relatively heavy precipitation. In addition, the high elevation of Stone Mountain Park contributes significantly to its local climate. Table 1 shows weather recordings for Fort Nelson which cannot accurately reflect patterns for Summit Lake but nonetheless create a general impression of seasonal length and temperature extreme.

During winter, long periods of intense cold are common. Snowfall is generally quite heavy in the vicinity of the Pass although high winds keep many of the exposed slopes quite free from accumulation. Although no records have been maintained for Summit Lake, it is a general assumption that the snow-free recreation season is quite short compared with other locations along the B.C. Alaska Highway. The alpine bowls surrounding Summit Pass do not clear until late June or early July and receive their
first accumulations by mid-September. As experienced by many northern climates, shoulder seasons (spring and fall) are usually quite short.

During summer, Arctic air is largely replaced by cool, moist Pacific air producing showery conditions. Under certain circumstances a weather system will develop, usually in the first part of summer, that will produce prolonged, severe rainfall. This situation is known to develop in mixed-air zones where warm, humid air moves against colder mountain air. Situated on the eastern edge of the Rocky Mountains, Stone Mountain Park is very susceptible to these frontal conditions. Summer storms through the Pass can be quite severe, and have been known to create flash flooding along the valley of the North Tetsa River. If coupled with the spring fresher (late June, early July) flood conditions become more pronounced as meltwaters combine with precipitation.

As can be expected through many mountain passes, winds are quite dominant in the vicinity of Summit Pass. Summer winds tend to originate from the west, flowing up the MacDonald Creek Valley and through Summit Pass. During high-summer these winds can be strong enough to significantly lower daytime maximum temperatures, thus creating cool conditions through most of the outdoor recreation season. Winter winds are of arctic origin and are capable of producing super-zero windchill factors making extended
outdoor activity nearly impossible.

c) Hydrology

Within the Park, fluvial action is dominant due to steep slopes and the amount of precipitation which falls annually in the vicinity of Summit Pass. A variety of water bodies and kettle holes scattered throughout the Park are recharged by spring meltwater and summer rains. Deep canyons trace the flow of intermittent creeks and in valley bottoms, glacial deposits have been channelized and transported by water action. The MacDonald Creek valley illustrates many of these hydrological and glacio-fluvial features; its bed meanders from side to side along the valley, creating new channels as gravel bars are created and shifted. At low flow, abandoned channels lie exposed throughout most of the valley, however following major storms water levels rise rapidly. This pattern is typical of many mountain creeks and rivers.

Summit Lake is the largest water body in the Park. Although its colour does not reflect glacial origin, the deep blue waters are recharged annually by snow melt and precipitation. The shoreline is steep and rocky, thus quite limiting to recreational access except from its eastern end. West of the pass, Rocky Crest Lake is a small sub-alpine lake with a shallow, gravel-covered bottom. The shoreline ranges from muck to gravel and is of gentle grade. Between the two lakes, in the pass itself, a broad wetland marks the divide between the watersheds of the Tetsa-Muskwa and Racing-Toad River systems. Both rivers ultimately drain into the Arctic Ocean via the Liard and Mackenzie Rivers.

Situated in the Park is an example of an outwash plain formation thought to be unique to the provincial park system (Weston, P.O.R.D. 1980). In the headwaters of the North Tetsa River, southeast of Mount St. George, a series of stepped terraces record the catastrophic drainage pattern which occurred during the later stages of glacial retreat from the area. Blocked by ice and debris at Summit Lake, outwash from the retreating MacDonald valley glacier escaped south of Mount St. George carrying glacial drift down the valley of the North Tetsa. Further erosion provided by the melting ice-front in the Tetsa headwaters quickly carved a variety of channels through the newly deposited till. This intricate landform
pattern is clearly visible from the NorthwesTel tower ridge. The North Tetsa headwaters originate from stepped, pater-noster lakes which lie deep in the flanks of a rugged mountain ridge.

Water quality in the park is reported to be good for domestic and contact recreational use (Dooling, 1974). Although time has passed since tests were made, conditions remain much the same today. One exception however, is the outflow from a small creek draining the private lots at Summit Lake. Here a warning sign identifies the water course as contaminated and unfit for consumption. Investigations have concluded that sewage has been seeping from the Lodge, a problem to be rectified by the owner and the Regional Health Unit in the near future.

(d) Vegetation and Soils

Although three biogeoclimatic zones can be identified within the northern Rocky Mountain Natural Region, relative elevations in Stone Mountain Park support only two. From the point of lowest elevation along the MacDonald Creek valley (1,080 m) to the 1,550 m contour lies the subalpine Spruce/Willow/Birch zone. Surrounding Summit Pass (1,275 m), treeless alpine meadows hover just above the sparse forest cover which lines the highway; harsh conditions limit tree growth and large stands are rare. Only on sheltered sites containing pockets of mineral rich soil do forests achieve significant size, in most other areas scree slopes preclude the establishment of all higher forms of vegetative cover. Above 1,500 m lies the high altitude Alpine Tundra Zone. This is a cold, wind-swept, snowy environment with a very short frost-free period. Dwarf birch and willow are riparian species which can be found in the North Tetsa and MacDonald Creek valleys.

There are several interesting vegetative features found in the Park. Surrounding Summit Pass a seral stand of lodgepole pine has established on the well drained, south-facing slopes which characterize this location. The forest indicates an area once burned by wildfire, which probably occurred during or shortly following construction of the Alaska Highway. The extensive wetland which occupies Summit Pass contains species including black spruce, sedge, bullrush and native grasses. On shady sites in upland locations, permafrost extrusions have encouraged small basins of alpine
muskeg to form on their surface. These "bogs" are actually accumulations of mosses which have grown in multiple layers over glacial till. When walked on, the ground feels spongy underfoot; these areas are particularly sensitive to trampling and major disturbance. Reports compiled for the Golden Circle recreation study (Dooling, 1974) indicate the presence of the Lapland Rosebay shrub species in the park. Samples can be found in the vicinity of Summit Pass; the Park represents the species southern range extremity.

Table 3 presents a partial list of vegetation species found in the Park.

Soils around Stone Mountain Park are typical of those throughout the northern mountain region. Humo-Ferric Podzols are dominant within elevations of 1100m to 1500 metres; between 1500m and 1700 metres the podzols blend with Melanic/Dystric Brunisols; to the 1900m elevation soils of the Brunisol and Regosol types dominate until the dominance of rock and scree prohibit soil establishment in the alpine environment. Very few pockets of deep soil occur in the Park. In most of the developable areas, only a thin veneer of soil covers the underlying glacial drift. In Summit Pass, the soils are very wet and poorly drained.

e) Wildlife

Observations on wildlife in northeastern B.C. are described in the 1980 TIDSA study.

In the northern Rocky Mountains, large ungulates (except caribou and moose) are approaching the northern limits of their range and are under constant physiological stress due to cold winter temperatures, the short growing season and a limited food supply. Hence, overall numbers and population densities are relatively low. Animals often concentrate in specific areas with favourable habitat, particularly in winter, and they are very susceptible to disturbance.

Although Canada Land Inventory mapping has not been completed for the Summit Lake area, ratings for the Alaska Travel Corridor are found in Dooling, 1974 (appendix 2) along with descriptions of the Summit Pass area.
<table>
<thead>
<tr>
<th>Table 2</th>
<th>Common Plant Species of Stone Mountain Park</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lichens:</strong></td>
<td>Cetraria tilesii (common golden lichen)</td>
</tr>
<tr>
<td></td>
<td>Cetraria nivalis (common white lichen)</td>
</tr>
<tr>
<td><strong>Higher Plants:</strong></td>
<td>Horse tail</td>
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<tr>
<td></td>
<td>Common Mtn. Juniper</td>
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<tr>
<td></td>
<td>Creeping Juniper</td>
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<td></td>
<td>False Asphodel</td>
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<td>Death Camass</td>
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<td></td>
<td>Yellow Lady's Slipper</td>
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<td></td>
<td>Bog orchis</td>
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<tr>
<td></td>
<td>Toad-Flax</td>
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<td></td>
<td>Wild Strawberry</td>
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<td></td>
<td>Yellow Dryas</td>
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<td></td>
<td>Wild Rose</td>
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<tr>
<td></td>
<td>Fireweed</td>
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<tr>
<td></td>
<td>Lapland Rosebay</td>
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<tr>
<td></td>
<td>Kinnikinnick</td>
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<tr>
<td></td>
<td>Indian Paintbrush</td>
</tr>
<tr>
<td><strong>Trees:</strong></td>
<td>Lodgepole Pine</td>
</tr>
<tr>
<td></td>
<td>White Spruce</td>
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<tr>
<td></td>
<td>Balsam Poplar</td>
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<td></td>
<td>Cottonwood</td>
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<td></td>
<td>Trembling Aspen</td>
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<td></td>
<td>Mountain Alder</td>
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<td></td>
<td>Shrub Birch</td>
</tr>
</tbody>
</table>

Source: Ted Underhill, P.O.R.D., 1980
Wild ungulates are well represented here by six different species. Moose are to be found along the mountain slopes above Summit Lake and along MacDonald Creek. Mule deer venture up MacDonald Creek in the summer from their range further north. Elk sign on the north side of Summit Pass indicates that they at least pass through here from time to time. Caribou are known to winter in the Pass itself and migration by this species here is an annual event. Stone sheep also migrate from one side of the Pass to the other and have been observed in the rock cut of the Alaska Highway when they do so. Mountain goat have also been observed in the Pass area and pellet groups of this species were recorded on the climb to Mt. St. George from MacDonald Creek.

Few furbearing mammals inhabit the Park; high elevations and harsh winter conditions limit the range of many of the familiar species. Squirrel, columbia marmot and chipmunk represent most of the existing species, although grizzly and black bear, wolf, coyote, lynx, martin, fisher and beaver have been observed. Migrating waterfowl utilize Summit and Rocky Crest Lakes, raptors can often be seen circling the skies (golden eagle especially); avian species, which may be observed in the vicinity of Summit Lake, are generally dependent on the time of year. Ptarmigan is a common sight above treeline.

At Summit Lake, lake trout have been planted (from Muncho Lake) for several years by the Fish and Wildlife Branch. Coarse fish (such as the black sucker) and whitefish are also present in the lake. Like most other mountain lakes, source waters of Summit Lake originate from mountains and streams in the vicinity. As a result, little nutrient level is maintained in its waters. This oligotrophic condition contributes to the slow growth and late maturation of fish, making the various species susceptible to overfishing. MacDonald Creek, due to its exposed waters with little or no food production probably does not contain species of significance to sport fishing, although Arctic Grayling have been caught occasionally by locals.

Located at such a northern latitude, Stone Mountain Park is plagued by the annual onslaught of nuisance insects. Mosquitos and blackflies can impair the best of plans for outdoor recreation. Usually most common in June and early July, the mosquito population continues to multiply until
hot, dry weather begins to dry up their habitat. It is in August that the blackflies then begin to torment the Park visitor and the ungulate population. It is in forested areas where prevailing winds do not penetrate that the insect population particularly prospers. As a result, open subalpine/alpine environments present the most enjoyable experiences.

f) Visual Resources

As stated previously, Stone Mountain Park represents the northbound tourist's first encounter with the Rocky Mountains. Unlike many of the southern approaches to the Rockies, the Alaska Highway suddenly emerges from the gentle, vegetated terrain of the Foothills to the steep, bare slopes of the Stone Range.

The park's eastern portal is contained within the limited viewshed created by the glacial deposits which once dammed Summit Lake. The North Tetsa River has carved a valley through these deposits and at one point the highway parallels a recognizable canyon; the river is contained within limestone walls about ten metres in height. Once in the area of Summit Lake "community" a wide panorama opens which permits viewing of the surrounding peaks and valleys. To the north a sparsely vegetated ridge faces the viewer while to the west towers a magnificent example of geological history. "Stepped Mountain" presents five distinct vertical sedimentary layers of varying ages; these bands represent over 60 million years of deposition under the great seas which once covered most of North America. From the eastern end of Summit Lake the park visitor can view the kame deposits which contain the waterbody. A sharp slope defines the southern shore of the lake, limiting views to the relatively confined basin created by the borderline terraces. The lake itself maintains a deep blue colour which is most often covered with white-capped waves; a result of the prevailing easterly wind. Amongst these scenic features however visual blight has become a part of the Summit Lake vicinity. Derelict vehicles and gaudy development characterize the commercial facility located here. In addition, the remains of a former Federal Government maintenance yard has left the site at the east end of Summit Lake in a very unappealing
condition. Along the narrow right-of-way between the lakeshore and the Alaska Highway, telephone poles unfortunately detract from an otherwise unencumbered view of Summit Lake and its southern shoreline.

Through Summit Pass views are quite limited and concentrated on the wetland terrain which divides the Tetsa/MacDonald watersheds. At various times of the year, moose can be seen wading in the shallow pools of the Pass. Lodgepole pine forest lines the northern slope immediately adjacent to the roadway. As the divide is crossed, the eastern extreme of the MacDonald Creek valley widens. Created in the vicinity of Rocky Crest Lake is an identifiable basin which envelopes the viewer with a foreground of forested slopes and a background of bare, grey peaks. Within this basin is a variety of visual features. Rocky Crest Lake is a scenic pool which often reflects the spruce forest which defines its southern shore; the erosion pillars (for which the park has been recognized in early planning reports and popular tourist travelogues) are visible on the north side of the bowl. Negative impact is introduced in the zone by a large gravel pit which dominates the view from the parkway. This expansive pit is currently used (and signed) as a vantage point for viewing the hoodoos. A small berm has been left along the side of the road which has eroded and deteriorated, creating less of a screen than an unnatural landscape feature.

Rocky Crest Canyon provides the highway traveller with a scenic display of landscape and biotic features. Over a relatively short distance, the road quickly changes elevation as it passes through the canyon. On the north side bare walls of dolomite rise steeply while to the south an expansive panorama is presented over the MacDonald Creek valley which rises to its headwaters on the southern boundary of the Park. To many viewers, this scene is one of the most impressive along the entire length of the highway. The braided, light-coloured gravel channel of the creek, bounded by dark green forests and exposed rocky summits creates a picturesque mountain landscape, especially when viewed from the elevation attained by the highway. Adding to the enjoyment of the view is the likely opportunity of seeing Stone's sheep as they cross the right-of-way at the top end of the canyon. Tourists especially perceive the opportunity to view wildlife as one of the highlights of any journey.

The western portion of the parkway parallels MacDonald Creek and affords good views of the valley at several pullouts and highway grade
STONE MOUNTAIN PROVINCIAL PARK

VISUAL RESOURCES

- Highway Viewshed
- Principal Viewpoint
- Principal Focalpoint
changes. Two abandoned commercial ventures have fallen into disrepair and detract from an otherwise attractive scene. Along the floodplain of the Creek, former gravel extraction operations have also had a negative impact on the landscape, however the passage of time and the distance from which the facilities are seen lessen this impact. At Mile 396/ km 630 the operation of a Public Works quarry has removed the rock walls which border a scenic canyon, one of the few proximate features in this portion of the Park. This draw contains a unique bedrock pillar several metres high and crowned with immature spruce trees. Other forms of vegetation cling to its sides while below a clear, boulder-strewn creek descends from the flanks of Mt. St. Paul. Between this point and the western portal of the Park, the visual landscape is a continuum of sparse forest cover and grassy slopes overlooking the wide MacDonald Creek valley to densely forested mountain flanks.

Outstanding scenery is also available to those who venture into the backcountry. The North Tetsa River headwaters, with its outwash terraces, aquamarine tarn and rugged mountain backdrop is a scenic gem. As one ascends the MacDonald Creek valley, the mountains become more rugged and steep, contrasting brightly with the green alpine meadows which line the sides of the creek. North of the Alaska Highway, highly accessible bare alpine bowls surround Mount St. Paul. The light grey talus of the Stone Range creates a barren, desolate landscape not replicated elsewhere in the Park. From a low pass, views can be attained northeast from the Park into the Dunedin River Valley.

1.2.2 Cultural Features

a) Archaeological

Although the nomadic ramblings of the Kaska-Athabaskan Indians have been documented in the northern Rocky Mountains, little evidence exists within Stone Mountain Park today. Archeological surveys conducted during construction of the Alaska Highway (Museum of Modern Man, Washington, D.C.) yielded very few clues to the lifestyle of northern Indian bands. At Summit Pass, assumed to be a primary encampment, three sites have been identified in reports published by the B.C. Provincial Museum (appendix 3). Several
chert flakes, indicative of primitive tool making activity, have been found scattered on the beaches at Rocky Crest lake. Chert flakes can also be found on the raised terraces adjacent MacDonald Creek along with remains of a small Indian brush shelter. It has been reported that most archaeological evidence has been destroyed by construction of the highway through Summit Pass and by the related resource activities such as gravel extraction and camp development.

b) Historical

As previously discussed, modern man's exploration of the Summit Lake area did not really occur until the construction of the Alaska Highway in 1942. At various locations, construction camps were established to temporarily house the platoons of U.S. Army personnel used on the "Trail of '42". The former government maintenance camp at the east end of Summit Lake is actually an original U.S. construction camp. West of the Pass, the site of two motels indicate the location of two other construction camps, these relating to the upgrading of the Highway immediately following its original construction. Unfortunately, the quality of building standard implemented for these temporary camps precludes any opportunities for restoration.

Above Summit Pass, an original tote-road used during construction winds through the lodgepole/spruce forest. The road base remains solid and a short hike along its route illustrates the "trial and error" type of construction that characterised the original highway; at several locations the re-aligned road reveals abandoned sections of the former route. This section is presently impassable except to ATV's and horses. It is used as access to alpine areas north of the highway.

Recent historical evidence within the Park dates from the mid-1940's. Such "artifacts" include the previously mentioned delapidated buildings and discarded piles of junk located throughout the corridor.
1.2.3 Recreation Features

A recreation feature analysis was prepared for Stone Mountain Park and is summarized in Figure 7.

Probably the most significant recreation feature of the Park is the expanse of rolling alpine terrain which characterizes the northern half of the Park. This landscape permits superb hiking and wildlife observation opportunities within close proximity to the Alaska Highway. From access points immediately adjacent to the road, the hiker can surmount the sparse forest in short order, thus enabling him to roam at will over vast areas of scenic mountain terrain. North of the highway, short drainages lead to the fragmented slopes of Mt. St. Paul and its connecting ridges. Stone's sheep abound in this area. From the NorthwesTel repeater station south of Summit Lake, the hiker is treated to excellent views of the MacDonald Creek valley and southward to one of the passes which separates Stone Mountain Park from the Wokkapash Valley. Of provincial outdoor recreational significance are the outwash terraces accessible from the headwater area of the North Tetsa River. Here Jade Spring tarn is nestled amongst towering rugged peaks which seem to block further access to the south where two pater-noster lakes lie in their flanks. This area abounds in hiking, climbing and backcountry camping opportunities.

Along the Highway corridor, wildlife viewing opportunities at Rocky Crest Canyon rate as provincially significant. Stone's sheep often graze along the sides of the highway where they become a centre of attention.

Several flat, dry camping areas exist along the parkway. East of Summit Lake, the former highways maintenance campsite offers good vehicle parking, however, in its present state, a combination of visual detraction, environmental conditions and lack of vegetation makes this area unappealing for recreation activity. At Rocky Crest Lake, the dry lodgepole pine forest offers good camping opportunity with southern sun exposure. This location also offers hiking, fishing and viewing opportunities for those who wish to explore during their stay. Hoodoos situated behind the flat site, although not provincially significant, are important as a regional
landscape feature primarily due to their close proximity to the travel corridor. Further west, the raised beaches adjacent MacDonald Creek provide suitable camping opportunities; the gravelly soils maintain high tolerance to trampling and campground construction activity. However, the likelihood of flood occurrence is great in this reach of the creek and this area holds little attraction for recreational activity other than overnight camping.

Several other outstanding features of regional importance occur in the Park. "Stepped" Mountain north of Summit Lake presents a topographic pattern of regional significance. Vertical banding evident in its structural form is indicative of the geological history of the Rocky Mountains. The peak is a dominant landscape feature in the Park, especially as viewed by traffic approaching from the east. On the opposite side of the valley, the forested kame terrace which overlooks Summit Lake offers an impression of the glacial history of the area. Its significance to the impoundment of Summit Lake indicates the depositional characteristics of the last glacial period. On this terrace, a lodgepole pine forest provides significant camping opportunity which is accessible to vehicles via NorthwesTel's access road. In open areas, shallow pockets of alpine muskeg present an unusual interpretive feature. These areas are particularly sensitive to abuse, especially that created by all-terrain vehicles and four-wheel drives.

Flowing northwards from its headwaters, MacDonald Creek and its characteristic U-shaped glacial valley provide foot access to the southern extremity of Stone Mountain Park. The valley is characterized by a low vegetation cover and broad gravel outwash areas. Hiking opportunities are of high quality and many outstanding areas can be viewed from valley bottom; steep mountain flanks line the route and opportunities for wildlife viewing are great. The long, arduous route culminates at a pass overlooking the Wokkpash valley where many other outstanding outdoor recreation features exist. The southern boundary of Stone Mountain Park is formed by numerous mountain ridges which connect peaks of local topographic significance. Opportunities exist here for mountaineering, viewing and wildlife observation. More importantly, this area provides foot access to the Wokkpash Park proposal area, itself an outdoor recreation feature of outstanding quality.
1.5 CURRENT SITUATION

Figure 8 illustrates current land status and facilities located in Stone Mountain Park.

The park presently encompasses 25,906 hectares, with boundaries being the headwater areas of MacDonald Creek and the N. Tetsa River. Several private lots, reserves, leased crown land and permitted non-conforming facilities exist within the Park. The following chart serves to illustrate many of these tenures.

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PRIVATE INHOLDINGS

-Peace River District Lots:

1625, 1627, Mineral Claims: 2198, 7507, 7510, 7511, 7512, 8219, 8220, 7097, 7098, 7099, 7100 (located near the western boundary of the Park)

PARK USE PERMITS (land interests)

PUP 496- Quarry -Public Works Canada
PUP 986- Snow course -Ministry of Environment
PUP 1149- Repeater Station and Access Road -NorthwesTel
PUP 1155- Permafrost Test Site -Energy, Mines and Petroleum Resources
PUP 1239- Gravel Pit -Public Works Canada

RIGHTS OF WAY

- Alaska Highway #97, 300 foot right-of-way runs north to south through the park, also containing a communications pole line.
- Access Road to former canyon by-pass, used by trespass ATV's.
- PUP 1149, 66' Right-of-way to repeater tower at elevation 1675 m.

GUIDE/OUTFITTER TERRITORIES

- PUP 1251 - Ed. Wiens: Big Game Guiding, portion of the Park north of Alaska Highway and the North Tetsa River headwater area
TRAPPING TERRITORIES

- 3 un-permitted traplines exist within the park.

CROWN LAND LEASES

- D.L. 1562, Block A: Mile 391 Repeater Station, NorthwesTel

CROWN LAND RESERVES


TRESPASSES

- illegal ATV use, North Tetsa River headwaters and north of Alaska Highway.

PARK FACILITIES

- Day Use: Rocky Crest Lake - four picnic tables, 2 toilets, litter barrels
- Pullouts: Various locations as on Figure 8, some with litter barrels, maintained by Public Works Canada.
1.6 MARKET ANALYSIS

As could be expected for any remote section of the Province, market demand analyses for the Alaska Highway region are quite scant. The 1980 T.I.D.S.A. (Travel Industry Development Subsidiary Agreement; BC-Canada) analysis of the Peace River-Alaska Highway tourism industry presented one of the few compilations of information regarding travel and tourism in northeastern British Columbia. Its purpose was to examine and assess tourism opportunities in the region, especially those along the Alaska Highway. The report provides insight to present and future demand for facilities in northern British Columbia and when analysed with P.O.R.D. statistics and other data, suggests future trends which may impact on outdoor recreation management.

The Alaska Highway forms a portion of a tourist circuit known as the "Golden Circle". The majority of highway use is by pass-through traffic; the highway is an important link between southern Canada/U.S.A. and Yukon, Northwest Territories and Alaska. The more recently constructed Cassiar-Stewart Highway #37 presents an option of returning to or from the north over a different, highly scenic route. Surprisingly, the attraction of more aesthetic surroundings does not seem to surmount the attraction of driving the "long, dusty trail". Many tourists opt to retrace their earlier route, solely for the purpose of travelling to and from the north along the fabled Alaska Highway. In general, the most frequent tourists around Summit Lake are Americans on their way to or from Alaska. Clearly 50% of summer passenger traffic on the Highway is of U.S. origin (PWC correspondence; PORD campsite surveys) with over three-quarters of Alaska Highway tourists using campground facilities along the route (according to a 1975 tourism study by Menzies and Associates). The majority of tourists travel in their own self-equipped recreation vehicles.

Figure 9 presents a schematic analysis of traffic volumes on the Alaska Highway in northern B.C. and the southern Yukon. From this it can be seen that a fairly consistent number of vehicles travel between Fort Nelson and Watson Lake, Yukon. This flow appears to be slightly lower than that on the Cassiar-Stewart Highway, indicating less truck traffic along the Alaska Highway (PWC pers. conv.). Analysis of the A.A.D.T. figures (Avg. Ann. Daily Traffic) shows that summer traffic increases by approximately
150% over winter traffic along all routes. These figures are most representative of tourist use. Second to the U.S. market, B.C., Yukon and Alberta residents form a large proportion of tourist traffic on the highway. Representation of other provinces is generally in inverse proportion to their distance from British Columbia. Bus tours would appear to becoming increasingly popular on the highway; most are of U.S. origin and utilize the services of the lodge within the Park.

Although the area is not regarded as a major tourist destination point, the Peace-Liard District does host the Province's largest proportion of non-resident, big game hunters. During the hunting season, which generally commences on August 1st, many local and international hunters arrive in the Muskwa Range to participate in the sport hunting of Stone sheep, moose and grizzly bear. The majority of guided hunts attract an international clientele, predominantly American and West German, most of whom fly directly to Fort Nelson where they are picked up and chauffeured to various camps. As a result, mental images and impressions of British Columbia are for many, based on experiences achieved in the Park and surroundings. Therefore, the maintenance of a quality environment not only benefits international impressions of the Park, but also those of the Province and of Canada.

The Peace-Liard District is home to the second largest resident hunter population in the Province (TIDSA). Local proprietors rely heavily on business generated by the lucrative hunting industry; most importantly, they benefit from resident hunters who do not require the services and provisions of a licensed guide.

For many Fort Nelson residents (pop. 7500) Stone Mountain Park presents a mountain environment in which to spend long weekends and short holidays. The main attraction for local users is the hunting opportunity presented in the Stone Range. Several sportsmen spend their annual vacations in and around the Park where scenic surrounds and a relaxed atmosphere enhance their stay. Access to sheep habitat is made by the C.N. road and the old pass road north of the highway.

Stone Mountain Park represents one of ten provincial parks strategically located along the northern Alaska Highway (north of Wonowon). Of these only Liard Hotsprings, and Andy Bailey offer much more than a place to park for the evening. Both Stone Mountain and Muncho
Lake Parks offer potential, beyond which they are currently developed, as significant suppliers of diverse outdoor recreational opportunities in a Rocky Mountain setting.

North of Fort Nelson the Division intends to develop a provincial park at Maxhamish Lake. A resultant decrease in regional use of Stone Mountain Park is not expected however, since Maxhamish Lake will attract only those interested in active beachside recreational activities in close proximity to Fort Nelson.

Camping and day use opportunities in Stone Mountain Park are provided by the public sector; the commercial establishment at Summit Lake offers motel accommodation to the touring public. No records are maintained as to how many overnight in the park near Rocky Crest Lake although user statistics for 115 Creek Wayside Park, only fifteen minutes west, often include figures from Stone Mountain Park (Table 4). Tetsa River Park, twenty minutes east of Stone Mountain is more formal than 115 Wayside, however offers no additional information other than camping and fishing opportunities. Its setting is that of the subdued Rocky Mountain Foothills Natural Region. Both 115 Wayside and Tetsa River Parks play an important role in the touring park system of the Alaska Highway.

In many of the southern parks, adventure recreational activities have become increasingly popular. Whitewater canoeing, mountaineering, hang-gliding and wilderness skiing are all activities which require a large land base for support. The TIDSA study reports that there is "considerable appeal for adventure recreation" in the Peace River-Alaska Highway vicinity. Although demands for adventure recreation are increasing throughout the province, and opportunities exist in Stone Mountain Park to undertake many of these sports, constraints imposed by the Park's limited expanse, short summers and long cold winters slightly impair the attractiveness of the area as a destination adventure recreation area. However, with increased visitation expected as a result of major park designations in the Northwest Territories and Yukon (Kluane and Nahanni for example), and potential expansion of Stone Mountain Park to include the internationally significant Wokkpash Valley, the provincial parks of the northern Rocky Mountains may become more attractive as wilderness designations.
TABLE 3 OCCUPANCY RATES - MUNCHO LAKE, 115 CREEK & TETSA RIVER PARKS

\[ x = 5\% \]

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<td></td>
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<td>(418)</td>
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1. Number of developed campsites
2. Includes recordings of undeveloped Stone Mtn. overnight parking (10)
3. Estimate only
4. "xxx"=Contractor afternoon recording; "---"=Park staff evening recording
1.7 PLANNING ISSUES

Stone Mountain Park presents a complex range of issues relating to recreation and resource management. This section outlines some of the current conditions which impact on park policy and future management strategy.

a) Land Management

As stated previously, the Park contains a composite of land tenure through its relatively narrow fifteen kilometre breadth. Private inholdings, mineral claims, reserves, leases and vacant Crown Land lots are spaced randomly along the Alaska Highway corridor. Of the private inholdings, all are associated with either the service industry which operates within the Park, or abandoned service centres and residences. Although there is a definite and recognized need for service facilities and rest stops along the Alaska Highway, the Peace-Liard Regional District Official Plan (1975) does not recognize Summit Lake as a preferred roadside service location. Spaced 80 kilometres apart, centres at Tetsa River (east of the park) and at Toad River (to the west) adequately serve the Highway through this section and as further improvements are made to the Alaska Highway, distance between necessary service stops will increase. Motel accommodation is available at Fort Nelson and Toad River, a distance of 200 kilometres. The main attraction of Summit Pass is the scenic location, not necessarily the commercial enterprise that is situated there. All park inholdings are desirable parkland acquisitions at some time in the future.

The Highway Scenic Improvement Act, under which has been designated the Alaska Highway (B.C.Reg. 261/70), provides an avenue to make visual improvement to premises and properties deemed "unsightly or offensive to any part of the (travelling) public". Given the objectives of Class A provincial parklands and the scenic appeal of the Alaska Highway through this Rocky Mountain Park, justification exists to investigate options which may now obligate property owners surrounded by the Park to maintain tidy grounds. In order to implement the Scenic Improvement Act, cooperation must be attained with Public Works Canada, the B.C. Ministry of Transportation
and Highways as well as the Regional District of Peace-Liard. Throughout the Park are other examples of distracting obtrusions: wrecked vehicles (Tetsa Canyon), refuse piles and unscreened aggregate operations impose on the enjoyment potential of the Park visitor. Several signs within the Park indicating nearby services have become redundant following implementation of the Provincial Park sign programme. These hand-lettered boards no longer serve a purpose to the public and also detract from the park setting.

A 1977 Order-in-Council removed from the Park an area of eleven mineral claims located adjacent to the west boundary. It was felt that this area could not be managed as parkland and would be best retained as vacant Crown land; although once the claims are forfeited, the area can revert back to the park. As a result, the claims have been faithfully renewed although work has never commenced on the properties (Ministry M.P.R. pers. comm.). They are due to expire and be forfeited in 1985. As the claims lie adjacent to the highway near the west portal, the land will be reabsorbed into the Park when they lapse.

Within the confined parkway corridor followed by the Alaska Highway are two active resource extraction operations. Public Works Canada currently utilizes both a large gravel pit and a rock quarry for purposes of highway development and maintenance. These permitted activities reduce the recreational value of adjacent parkland. Located immediately behind the gravel pit are erosional hoodoo features which were identified in the original Stone Mountain Park proposal as being one of several significant recreation features in the study area. Moreover, removal of bedrock from the quarry has eroded the scenic value of a prime canyon feature in close proximity to the highway. Presently, neither of these unscreened operations conform with visual quality or recreation objectives suitable for a tourist corridor through a Rocky Mountain Park.

b) Park Image

Stone Mountain Park lies adjacent 15 kilometres of the Alaska Highway; tourists enter the south portal at Km 619 and leave at Km 634. It has clearly been identified that across this distance there is a significant lack of park identity. Entrance portals are quickly forgotten as drivers travel through the Park. Only on the developed recreation site at Rocky
Crest Lake is the P.O.R.D. identity evident. This lack of information and identity means that many of the different geological and biological phenomena of the Park go unnoticed by through traffic. The "Alaska Milepost", published in New York, represents the most positive promotion and attention given to the Park.

c) Recreation Opportunities

For those northbound recreationists who wish to camp in the scenic landscape of the Rocky Mountains, there are no campgrounds along the Alaska Highway between the park and Toad River. Currently the only suitable areas for overnight parking at Stone Mountain are the abandoned Highway maintenance site at the east end of Summit Lake, the highway pullout along the north shore of the lake and the day-use picnic site at Rocky Crest Lake. The restrictive area of Summit Lake Lodge does not permit expansion to include a private campground. A short distance east of the park boundary, in the rolling Rocky Mountain Foothills landscape of the Tetsa River, a private operator maintains a small campground and motel.

Public recreation facilities have been constructed adjacent to Rocky Crest Lake west of Summit Lake. Unlike developable areas along Summit Lake, the west side of the Pass has not been so totally degraded by historical land uses associated with construction and operation of the Alaska Highway. The micro-climate of this area also compares more favourable than at other locations along the parkway. An open, dry forest cover and protection from prevailing easterly winds make the Rocky Crest area most suitable for nodal recreation facility development.

Overlooking the valley of Summit Pass is a telecommunications tower operated and maintained by NorthwesTel. A five kilometre road winds up to the site from which commanding views of the MacDonald and North Tetsa valleys can be obtained. The road has traditionally permitted vehicles easy access to the open alpine meadows of the upper North Tetsa headwaters. This type of opportunity is extremely rare in the province and is further enhanced at Stone Mountain Park by low vegetation levels and the relative elevation of the Alaska Highway through Summit Pass. Unfortunately, abusive
use by four wheel drives and more recently all-terrain vehicles has resulted in substantial damage to sensitive soil and vegetation types. Signs have done little to combat the mounting problem. A serious park management conflict is therefore presented in this location; outdoor recreation objectives must be carefully considered with respect to conservation and preservation objectives.

Commercial recreation guiding opportunities have been identified throughout Stone Mountain Park. Hiking and photography expeditions are most marketable during the months of July and August and could contribute significantly to the visitor's outdoor recreation experience as well as to the economic stability of the northern tourist industry. The addition of Wokkpash valley to Stone Mountain Park will significantly enhance the feasibility of adventure recreation activity and do much to promote the park as a destination point.

d) Resources Management

Much of the northern B.C. landscape has been altered by wildfire. Thousands of burned hectares now line the Alaska Highway between Wonowan and the Yukon Territory. Fires play a dominant role in the ecological succession of vegetation species; the interruption of these processes has often been considered unnatural. Within the Park, very little land area is forested; steep slopes and severe conditions impair the establishment of most vegetation types. It is only in the vicinity of Summit Pass and MacDonald Creek that significant stands of spruce and pine are found. There, the scenic resource presented by forest, lakes and mountains create a high level of viewer pleasure. Compared to the relatively stagnant visual landscape of burnt areas, the preservation of diverse images such as those presented along the Highway in Stone Mountain Park becomes very important. The aesthetic value of a forest cover within the relatively small land area traversed by touring recreationists must be weighed carefully against the value of an undisturbed ecological cycle. In this analysis it would appear that some areas of the Park are more visually sensitive than others and for this reason should be protected from wildfire. Moreover, the existence of permanent structures and private dwellings further necessitates the Division's fire control responsibility.
As previously mentioned, hunting is the primary recreational activity undertaken in the park. Basins north of the highway as well as the North Tetsa River headwaters are available for guided hunts while all other areas of the park are restricted to resident hunting. A significant portion of the reported abusive use of alpine areas is attributable to irresponsible resident hunting practice; stricter access control and public awareness may help to amend the problem.

Successful blending of consumptive and non-consumptive recreation activity (eg. day hikes) is difficult in the limited confines of parkland adjacent to the travel corridor. The season opening date for mountain sheep is August 1st in Wildlife Management Unit 7-50, 51 and 54. Given that the recognized height of the hiking season coincides with the opening of the hunting season, potential conflict may arise amongst recreation groups if areas of the park are promoted for hiking and backcountry camping. This issue can however be resolved in various ways, from radically amending hunting regulations throughout the Park, to zoning appropriate areas for non-conflicting uses.

Although there is a basic knowledge of wildlife species, their habitats and general population levels in the Park, there is a consistent lack of supporting data on which to base wildlife management decisions. Population surveys have been a high priority for several years, however have only been implemented in the recent past. Management decision-making has therefore been based on speculative data and advice furnished by the Fish and Wildlife Branch. As it has been argued in the past, in a Region where the Guide-Outfitting industry provides such a dependable economic base, detailed study of the renewable wildlife resource is of paramount importance. Only with more detailed information can managers accurately determine the significance that quotas, possession limits, viewing and added hunter pressure have on wildlife populations in the vicinity of the park.

In an attempt to reduce the numbers of road kill along the Alaska Highway, the Division has experimented with strategic saltblock placements in adjoining drainages. This appears to have been an effective solution since sheep have been seen congregating in these areas. The programme should be carefully evaluated however, to ensure that the practice is not unknowingly conditioning animals to rely on an unnatural mineral supply, or bait sheep to areas from which they may be poached.
PART 2

2.1 PARK PURPOSE AND OBJECTIVES

As an important element of the B.C. Park System, Stone Mountain represents an integral unit in a series of provincial Parks along the Alaska Highway. Partially representative of the Rocky Mountains Natural Region, the Park contributes significantly to the system's conservation, outdoor recreation and tourism goals. The accessible scenic splendor of the Muskwa Ranges has the capability to attract a variety of outdoor recreation enthusiasts; well over 100,000 tourists pass through the Park annually. The Park affords good scenery and wildlife viewing opportunities while the side valleys, access points and low vegetation levels encourage backcountry hiking, riding and hunting.

The following objectives reflect the purpose of Stone Mountain Park and indicate management direction for the achievement of Division goals.

Conservation: To conserve a partially representative, and accessible example of the Muskwa Ranges natural landscape with biophysical and historical elements associated with the northern Rocky Mountains natural region. Within the Park these elements include the scenic geological and glaciofluvial landscape as well as the natural wildlife resource.

Outdoor Recreation and Tourism: To provide Regional residents and tourists to the highly scenic Rocky Mountain landscape a continued opportunity for consumptive recreational use of Park resources, while expanding opportunities for a variety of non-consumptive outdoor recreational activities in close proximity to the Alaska Highway.
2.2 ZONING

Stone Mountain Provincial Park will be zoned to reflect the diversity of land use within its boundaries. Future developments will recognize this zoning plan and adhere to the configurations illustrated in Figure 12. Developable parkland associated with the Alaska Highway has been included into the Development Zone. This zone extends the length of the Park, recognizing the Alaska Highway corridor. Within the zone, a Parkway sub-zone has been designated in recognition of the scenic parklands which front the highway through most of the Park.

Those portions of the MacDonald Creek valley which lie beyond the highway viewshed (Figure 6) or the distance of a day hike have been zoned as wilderness. The valley presents characteristic elements of the Muskwa Range and offers exceptional opportunities for wilderness hiking, camping and hunting. The remainder of the Park, those areas north of the Highway and the valley of the upper North Tetsa River, has been zoned as Natural Environment.

Within each zone and subzone, general statements direct appropriate management intensity. At Stone Mountain Park, lands within each zone will be managed in accordance with the following objectives:

**Development Zone:** To provide for a variety of facility-oriented recreational opportunities which reflect the needs of park visitors.

**Natural Environment Zone:** To provide for intermediate levels of outdoor recreational opportunities and use in a natural setting.

**Wilderness Zone:** To protect and preserve landscapes and resources processes while allowing for low levels of recreational use.
The Parkway sub-zone will provide intensified protection to the inherent scenic quality of lands adjacent to the Alaska Highway. Developed facilities and resource operations will not be permitted within the sub-zone, giving managers an opportunity to further direct future activities in the Park. However, if after careful consideration specific lots or areas are required for development, they may be re-designated for such use.
FIGURE: 10

STONE MOUNTAIN PROVINCIAL PARK

- ZONING -

Natural Environment Zone

Wilderness Zone

(Proposed) Wilderness Zone

Wokkposh Valley

Scale in Kilometres
2.3 MANAGEMENT PLAN

2.3.1 Natural Resource Management

a) Land Management

Stone Mountain Park presents a unique blend of land use within its boundaries. Visitors do not generally consider the scenic surroundings to be parkland owing to the lack of park image and the apparent dominance of private service facilities.

The Park area presented at Stone Mountain is not sufficient to fully present the northern Rocky Mountains Natural Region. Exquisite areas lie south of the park along the Wokkpash Creek valley. These areas contain several outstanding natural features as well as the high peaks and glaciers of the central Muskwa Range.

Objective: To manage the land base of Stone Mountain Provincial Park in a manner which best achieves the Division's goal for conservation of the scenic regional landscape and the provision of outdoor recreation opportunities.

- The Park will be managed to ensure that an adequate area is protected to achieve outdoor recreation and conservation objectives.
- A boundary revision is encouraged which will include the headwaters of Wokkpash Creek. This park study area, if approved, will be added to Stone Mountain Park and the area managed as part of the wilderness zone.
- Land use within the park will conform to the approved zoning scheme.
- All private lots within the Park will be acquired if made available to the Division. Of highest priority are those which currently offer no service to the Park visitor.
- In an attempt to rid the parkway sub-zone of unsightly accumulations, the Division will recognize the designation of the Alaska Highway through Stone Mountain Provincial Park as a scenic highway pursuant to the Highways Scenic Improvement Act. This will enable a co-operative effort between the Division, the Ministry of Highways and the Regional District to encourage roadside property clean-up.
- The reserve and lease for the repeater station at Lot 1562, Block A, will be cancelled in co-operation with the Lands Division and the property absorbed into the Park. A P.U.P. will be issued for the repeater area only.
- Mineral claims which are currently inholdings surrounded by parkland will be incorporated into Stone Mountain Park.
- Public Works Canada will be encouraged to minimize impairment to park resources potentially resulting from Alaska Highway operation and improvement.
- The Division will encourage Public Works Canada to find alternate areas outside of the park for gravel and quarry operations. Existing operations will be rehabilitated to acceptable standards in keeping with the visual quality objectives of the parkway sub-zone. New pits will be discouraged within the Park, however if determined as necessary, future operations will not be permitted within the scenic Parkway sub-zone.
- The former canyon bypass road lying north of the existing highway will be blocked to all motor vehicles to ensure the conservation of fragile alpine environments.

b) Wildlife Management

Much of the recreational use of parkland in northern B.C. is associated with the fish and wildlife resource. Abundant wildlife populations in the northern Rocky Mountains have traditionally attracted resident and international hunters to commercial camps throughout the Region. Stone Mountain Park attracts resident and international hunters in pursuit of Stone's sheep, (one of four species of wild sheep sought by trophy enthusiasts) as well as for Osborne caribou and grizzly bear. At present there is limited knowledge of habitat or the condition of fish and wildlife populations inhabiting the Park. Studies must be undertaken in conjunction with Fish and Wildlife Branch in advance of formulating a wildlife management plan to consider such management issues as amendment to hunting regulations and fish stocking programs.
Objective: To manage fish and wildlife populations in Stone Mountain Park by methods which will increase observability of the resource for non-consumptive recreational use while still accommodating consumptive recreational hunting.

-A study of big game populations, especially Stone's sheep, within Stone Mountain Park will be conducted jointly between the Division and the Ministry of Environment. This study will be given high priority and used to supply baseline data for the formulation of a wildlife management plan for the Park.

-A wildlife management plan will address issues such as the role of hunting in Stone Mountain Park, guide-outfitters' quotas, potential conflicts between consumptive and non-consumptive park users, sensitivity of the wildlife resource to outdoor recreational use and it will recommend methods to ensure on-going renewal of the resource.

-The Division will continue to use salt blocks as a method of reducing road-kill and hazard along the Alaska Highway; however, salt blocks will not be placed in locations which tempt illegal hunting practices. If attempts to reduce road-kill by this manner prove to be insignificant, the project will be discontinued or amended in accordance with the wildlife management plan.

-Trapping is a non-recreational extractive activity and is therefore inconsistent with Park objectives. Existing traplines will be recognized; however the eventual intent is to remove these rights in accordance with the Division's Wildlife Policy.

-Existing permits for big game guiding within the Park shall be managed in accordance with the Wildlife Policy and park resources management plan.

-To promote non-consumptive recreation opportunities, the no-shooting area of the Park will be extended to include the entire North Tetsa River headwater area (including portions north of the Alaska Highway) which has greater potential for non-consumptive recreational use. One year prior to expiration of the current Park Use Permit (1251), notification will be made to the permittee of the Division's intent to close a portion of his territory (see PUP 1251, condition 16).

-The MacDonald Valley will be opened to guide-outfitting activity.

-The stocking program of introduced sport fish species will be continued at the request of the Fish and Wildlife Branch, objectives of which would be to increase the quality of fishing experience offered at Summit Lake.
c) Vegetation Management

The Park maintains little diversity of vegetation within its boundaries. Substantially forested portions of the Park are limited to the Summit Pass corridor. Elsewhere loose scree and severe climatic conditions impair the establishment of forest cover.

Sensitive alpine vegetation has been severely damaged by the indiscriminate use four wheel drive vehicles and A.T.V.'s in the Park. Many years will be necessary to restore these areas to their natural state.

Objective: To conserve the natural, scenic vegetation cover within Stone Mountain Park.

-Owing to the scenic corridor through which the Alaska Highway traverses the Northern Rockies, all wildfire threatens the visual resource of Stone Mountain Park. A Fire Management Plan will be formulated for the Park which considers conservation objectives and the protection of public and private facilities in the Park.
-To ensure the conservation of natural alpine vegetation, no vehicle access (excepting maintenance vehicles) will be permitted beyond a point to be determined on the telecommunications tower road. The former bypass road north of Rocky Crest Canyon will also be blocked to all vehicle use.

d) Water Management

Presently, northern watersheds are relatively unspoiled by human development and activity. The potential exists at Summit Pass to ensure that abundant fresh water supplies continue for the benefit of private and public water users in the Park. The reported tainted source at the commercial lodge has created unpotable conditions in a tributary of the North Tetsa River adjacent to the highway.

Seasonal flooding occurs along MacDonald Creek each spring. Several floodwater channels and shifting gravel banks indicate potentially dangerous locations to development.
Objective: To conserve the quality of fresh water supplies and the natural hydrological processes which occur in Stone Mountain Park.

-Toilets erected in the Park will incorporate a design which ensures that effluent is not leached into water courses by subterranean drainage.

-The Peace-Liard Health Units will be encouraged to ensure that adequate standards are maintained for sewage disposal on private properties in the Park.
-No development will be permitted on identifiable flood plains within the Park.
2.3.2 Cultural Resource Management

a) Historical Resources

Evidence of early native exploration and activity exist in the Park although an assessment of their significance is not available. Most of these sites relate to fishing and hunting campsites on Summit Lake and MacDonald Creek which existed prior to 1940.

Historical evidence of Alaska Highway construction exists in the form of old building foundations, telegraph lines, abandoned rights-of-way and junk piles scattered along the valley floor. Commercial developments and former camps associated with an earlier period of the Alaska Highway now stand derelict.

Objective: To assess and protect significant historical resources in Stone Mountain Park.

- Known archeological sites and artifacts will remain undisturbed.
- Other than the significance of Summit Pass as the highest point on the Alaska Highway, no other historical features in the Park are worthy of special protection.

b) Visual Resources

The attractive nature of Stone Mountain Park is a reflection of the various visual landscapes presented to the Park visitor. The dramatically rugged southern section is contrasted by the more gentle terrain of Summit Pass and the confined corridor presented in Rocky Crest Canyon.

For those northbound travellers, the sudden transition to a Rocky Mountain landscape from over 600 kilometres of prairie and foothills is extremely refreshing and invites a relaxing stop in a park setting.

Objective: To conserve the high scenic quality of Stone Mountain Park with particular emphasis on maintaining an attractive visual corridor adjacent to the highway.
- Park developments will be designed to enhance the visual quality of their setting.
- Existing permitted resource activities will be screened from view during the operation period and rehabilitated to high visual standards upon expiration.
- A maximum degree of visual quality standard will be maintained along the highly visible corridor of the Alaska Highway. A parkway sub-zone will delineate these areas where intensified management will enhance the visual resource objective.
- The Division will attempt to rid the Park of dilapidated buildings and offensive visual distractions in cooperation with the Regional District and Ministry of Highways, through the Highway Scenic Improvement Act. In addition, the formulation and implementation of Regional District building design controls over new construction within the Parkway sub-zone will be encouraged.
- The Division will seek the cooperation of Public Works Canada and NorthwestTel to have telephone poles removed or alternatively, relocated to the north side of the Alaska Highway along Summit Lake, thus eliminating these distractions from the lakeshore.
- The Division will develop additional viewpoints at interesting natural features throughout the Park to encourage travellers to stop and safely enjoy the scenery.
- The Division will encourage the removal of non-standard signs from the Highway right-of-way in accordance with government policy.
- Park signs will be used to denote interesting features such as major peaks, rivers, valleys and services.
2.3.3 Recreation Resources

Stone Mountain Park has not traditionally experienced use of its recreation resources for much other than consumptive activity. Hunting and fishing represent the most popular outdoor recreational pursuits associated with the area. However, the potential exists to expand these horizons through the identification and promotion of additional activities and opportunities in the Park. The Alaska Highway continues to deliver potentially receptive outdoor recreationists to Stone Mountain Park.

Objective: To expand and develop opportunities for non-consumptive recreational activity in Stone Mountain Park which are compatible with the traditional activities of hunting and fishing, and which do not promote direct competition to existing services offered by the private sector presently located in or around the Park.

- The Division will encourage lengthened stays within the Park through the development of hiking trails and attractive facilities to entice and serve highway travellers,
- The Division will identify and provide information on potential hikes along the major creek valleys and basins in the Park.
- Commercial operators will be encouraged to provide outdoor recreation services within the Park. A Visitor Services Plan will be formulated for Stone Mountain Park which gives consideration to such activities as guided hiking and photography trips. These activities would effectively present the Park's natural features to the public; the inclusion of the Wokkapsh valley will significantly increase the attractiveness of these pursuits.
- Hunting is recognized as a traditional and legitimate use of the Park's wildlife resource. However, season adjustments and regulation revisions are required to accommodate other outdoor recreation activities promoted in this plan.
- Opportunities for the viewing of wildlife will be encouraged, especially in the parkway sub-zone.
- The North Tetsa River headwaters, north and south of the Alaska Highway will be closed to the discharge of firearms. The benefits for non-consumptive
recreation opportunities in this vicinity outweigh those for consumptive use. The limited area of the basin does not promote compatibility between the two uses.

- Recreation activities which impair Park objectives will not be encouraged. Of particular concern are the increased numbers of all-terrain cycles and vehicles in use within the sensitive alpine environment of the Park. The Division will continue to enforce regulations.
2.4 DEVELOPMENT PLAN
(Figure 11)

2.4.1 Recreation Services

i) Campgrounds: The objective is to provide campground facilities within the scenic Rocky Mountain Natural Region which will meet the demands of regional residents and tourists along the Alaska Highway.

-Land at the immediate east end of Summit Lake will be rehabilitated and improved to provide overnight parking opportunities for twenty vehicles. Shoreline berming may reduce wind disturbance at the site.

ii) Day Use Recreation: The objective is to provide opportunities for short-duration hiking, fishing, viewing and picnicking in the Park. Emphasis will be placed on developing facilities which take advantage of the scenic alpine terrain of the Park.

-Picnic sites at Rocky Crest Lake will be expanded to provide facilities for ten groups. A vegetative screen planted along the road right-of-way will screen the highway from tables placed along north beach of the lake. The site will also serve as overflow parking for the adjacent campground.

-A Type II trail will link the Rocky Crest day use area to the hoodoos which are visible from the Alaska Highway.

-The site at the east end of Summit Lake will also permit car-top boat launching, fishing and picnicking by park visitors.

-A Type III day hiking trail will be constructed to the North Tetsa River basin south of Summit Lake. Trailhead parking will be provided from a
point on the telecommunications tower road.

-The existing highway day-use site on the north shore of Summit Lake will be retained as a highway pullout. No further facilities will be added and overnight parking will be discouraged.

-A short hiking trail and point-of-interest may be identified at the picturesque canyon located at Mile 396.4/Km 633.5.

iii) Roadside Attractions: The objective is to safely present interesting natural and cultural features of Stone Mountain Park to travellers on the Alaska Highway.

-A northbound pulloff, viewpoint and park information display will be constructed near the east portal at Mile 390.2/Km. 620 (All pullouts require the co-operative effort of Public Works Canada).

-A pullout will be provided for viewing the hoodoo formations along the north side of the Alaska Highway at Mile 394.5/Km. 625.5.

-Existing pullouts will be maintained through Rocky Crest Canyon.

-At Km. 629/Mile 396 a viewpoint overlooking MacDonald Creek will be selectively cleared to replace the existing dangerous pullout .5 Km east of this point.

-A west portal pulloff, viewpoint and park information display will be developed at Mile 398.5/Km. 633 overlooking the MacDonald Creek valley.

2.4.2 Information Services

A Visitor Services Plan will be formulated for the Park which will have as its objective: to promote Stone Mountain Park and to ensure that both visitors and potential visitors are provided with information regarding the park's natural and cultural features, as well as opportunities available to them for outdoor recreational pursuit.

-Signs at several locations throughout the Park can point out interesting topographic features;

-Interpretive displays may be developed at Rocky Crest Lake regarding Stone's sheep and other wildlife of the Park, as well as photographic displays of unaccessed portions of Stone Mountain Park and the Wokkpash Creek Valley.
Information displays at Summit Lake could describe vegetation communities in the Park.

The Plan will further consider marketing and promotional methods in an attempt to attract increased destination-visititation to the Stone Mountain/Wokkpash area. Co-operation with other agencies and tourist associations may be required.
2.5 FUTURE DEVELOPMENT

The following developments are considered unnecessary during the current planning time frame, however warrant consideration when increased use levels and demands for expanded outdoor recreation opportunities become evident.

- Delineation of a trail along MacDonald Creek to the (proposed) Wokkpash extension.

- Further site evaluation conducted in the Rocky Crest Lake vicinity and the North Tetsa subalpine basin to determine the feasibility of future campground development.

- Delineation of a trail north of the Alaska Highway to alpine basins at the base of Mount St. Paul.

2.5.2 Winter Recreation

During the winter months, a marked decrease in traffic on the Alaska Highway results in very few visitors to Stone Mountain Park. Two factors limit winter recreation at this latitude: daylight hours are extremely short and daytime temperatures can be bitterly cold. (Mid-winter months offer as few as six hours of daylight and average daytime high temperature of between -20 and -30) March and April are the preferred months for such winter recreation activities as ski touring and mountaineering. No proposals are presented here for formally accommodating winter activity at Stone Mountain Park. Use levels are too low and unstructured to warrant consideration at this time. However, the future holds potential for an increase in late-winter activity of a public or commercial nature.

Objective: To recognize the potential for winter recreational activity in Stone Mountain Park and collect pertinent data about the resource for presentation in a Visitor Services Plan.
2.6 MARKETING

Stone Mountain Provincial Park is, of course, final destination for very few of the many who travel the Alaska Highway; a vast majority of park use is by the transient tourists of the northwest highway system. The long distance and relative cost of travelling to the northern Rockies indicates that marketing of the Park is directly associated with marketing of the entire Alaska Highway, northern British Columbia and the Yukon. Once committed to the journey Stone Mountain Park is but one of several attractions presented to the tourist along the route.

Expanded traffic volume on the Alaska Highway will have an impact on recorded visits to Stone Mountain, however will not by themselves contribute to promotion of the Park or its facilities. Only by increasing the length of stay in the Park can recreation and tourism objectives be realized. Proposals have been presented in this plan which are intended to slow traffic through the Park, thereby increasing the potential for a longer stay. They are also intended to foster a lasting impression on tourists and encourage word-of-mouth promotion of the Park amongst tourists who meet at other locations. In addition, by providing private business with information about the Park, its facilities and attractions, this information can then be disseminated to customers throughout the vicinity.

The development and promotion of Maxhamish Lake Park northeast Fort Nelson is not expected to reduce the number of local resident visits to Stone Mountain - both parks are quite different in both purpose and attractiveness. The addition of Wokkash Lake and surrounds to Stone Mountain Park will further enhance the outdoor recreation and scenic attractiveness of the park, and further encourage regional, national and international visitors to the northern B.C. Rocky Mountains.

Stone Mountain Park shall be promoted and marketed through an approved Visitor Services plan which will consider:

- encouragement of private sector involvement in park promotion;
- establishment of a marketing strategy for Alaska Highway provincial parks including Stone Mountain, Muncho Lake, Liard Hotsprings and (proposed) Wokkpash Parks.

- expansion of tourist attractions in the Park which may encourage visits of longer duration;

- submission of material to national and international tourist guides covering northern B.C.;

- media coverage of northern parks and their attractions and;

- the publication of a Northern B.C. Region Provincial Parks map.
2.7 PLAN IMPLEMENTATION

Direction given in this Master Plan will become effective upon approval of the document. High priority is given to:

- construction of a park campground;
- development of viewpoints;
- entrance portal information displays;

as well as the implementation of policies regarding:

- the Highway Scenic Improvement Act;
- Land designations;
- hunting regulation amendments.

The formulation of Resources Management and Visitor Services Plans for Stone Mountain Park will ensure that management of the Park continues in accordance with this Master Plan.
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    Mountains-Muncho Lake and Stone Mountain.
APPENDICES

1. Rocky Mountains Natural Region

2. Canada Land Inventory, Capability for Wildlife Ratings

3. Known Archaeological Sites

4. Provincial Park Zoning System

5. Highways Scenic Improvement Act and B.C. Reg. 261/70

6. Legal Description, Stone Mtn. Park

7. Photographs
APPENDIX 1 - ROCKY MOUNTAINS NATURAL REGION

1. ENVIRONMENTAL CHARACTERISTICS

1. Location, Size and Climate

- Situated in eastern British Columbia, extending in a northwesterly direction from the southern international boundary almost to the B.C. - Yukon boundary.

- General Climate:
  mean annual precip. - Muskwa Ranges:
  40-100 cm (higher in the core of the mountain area)

  mean daily temp. January - north of Peace River: less than 20°C
  mean daily temp. July - 14°C to 16°C throughout

2. Physiographic Characteristics

- Consists of four major groups of ranges from south to north: Border Ranges Continental Ranges (coincident with most of the southern half of the length of the Rockies), Hart Ranges (extend from the Kakwa area to the Peace River) and the Muskwa Ranges (north of the Peace River).

- Western boundary of the physiographic region is the eastern side of the rocky Mountain Trench.

- Rocky Mountain are largely underlain by sedimentary and metaphorich ranges.

- The predominant rocks are Palaeozoic and Proterozoic limestones, quartzites, schists and slates.

- The Rocky Mountains, despite the age of the rocks, display relative youth as a mountain system (uplifted about 75 million ago).

- Pleistocene continental glaciation covered the ranges to heights to 2,300 to 2,600 metres.

- The Rockies characteristically display distinct stratification.

3. Hydrologic Characteristics

- There are only modest numbers of lakes, none of which exceed 20-30 sq. km.

- The streams and rivers drain in a structurally controlled trellis pattern.
Numerous glaciers (alpine and valley types) and icefield, especially in the Continental and Muskwa Ranges.

The only river which flows through the Rocky Mountains is the Peace.

4. Biotic Characteristics

Particularly in the Border, Continental and Muskwa Ranges, the treeline is often controlled by typography rather than by climate.

Biogeoclimatic patterns:

1) Alpine Tundra
   - S.E.S., S.F.
   - Sub-Boreal Spruce

2) Alpine Tundra (extensive)
   - Spruce-Willow-Birch
   - Boreal W.+B. Spruce

Biogeoclimatic patterns:

1) Subalpine Forest
   - Border Ranges
   - Western Continental Ranges
   - Western fringe of Hart Ranges
   - Southwestern fringe of Muskwa Ranges

2) Alpine
   - the central core of the Continental Ranges, between 50° and 54°N latitude
   - a central portion in the southern Hart Ranges
   - A large area in the Muskwa Ranges, south of the Toad River and north of the Akie River.

3) Boreal Forest
   - northern and southeastern Muskwa Ranges
   - eastern Hart Ranges
Huskwa Ranges

- located north of the Peace River
- summit elevations increase northward from the Peace
- highest peak: Mt. Churchill (3,500 metres)
- elevation range: 3,000/3,200 metres down to 800/1,000 metres a.s.l.
- quartzites and limestone underlie many of the high peaks.
- area has been strongly eroded by alpine and valley glaciation.
- complex folding is common.
- many peaks are castellated or flat-topped if strata are horizontal.
- longitudinal valleys of considerable width and length and prominent features.
- glaciation was uneven in intensity; some areas show little evidence of glacial erosion despite a veneer of drift throughout the ranges.
- rugged, majestic ranges similar to the Continental Ranges in geology, glaciation and appearances.
- much more extensive alpine than southern ranges.
- biogeoclimatic pattern:
  - Alpine Tundra
  - Spruce-Willow-Birch
  - Boreal W&B Spruce
  - (Sub-Boreal Spruce) - southwest periphery
- biotic areas: Northern Alplands
  - Boreal Forest
- Current representation (1982):
  - Kwadacha Wilderness Park: satisfactory
  - Muncho Lake Park: partial
  - Stone Mountain Park: partial
APPENDIX 2  C.L.I. CAPABILITY FOR WILDLIFE (UNGULATES)

Class 1: Lands with no significant limitations to the production of ungulates.

Class 1w: Class 1 lands that are winter range.

Class 2: Lands with very slight limitations to the production of ungulates.

Class 2w: Class 2 lands that are winter range.

Class 3: Lands with slight limitations to the production of ungulates.

Class 3w: Class 3 lands that are winter range.

Class 4: Lands with moderate limitations to the production of ungulates.

Class 5: Lands with moderately severe limitations to the production of ungulates.

Class 6: Lands with severe limitations to the production of ungulates.

Class 7: Lands with no ungulate production.
**BRITISH COLUMBIA ARCHAEOLOGICAL SITE INVENTORY FORM**

1. Site No.  IdSD. 1

2. Previous designation(s)  IdSD. TI

3. Site name(s)  

4. Location (a) Sec.  Lot. 1562  Plan. 

(b) approximately mile 392 on Alaska Hwy. at E. end of Summit Lake. In Hwy. maintenance yard on flat disturbed area approximately 20-35 m. from lake edge.

On S. side of E. end of lake as far from road as is possible before sloping area on S. side of lake.

5. Access  Drive to maintenance camp (mi. 392 Alaska Hwy.). Park near road at E. end of Summit Lake and walk S. towards creek outlet. Site is approximately 20-35 m. N. of Creek and 20-35 m. E. of lake. Half of observed site is on roadway and half in a less disturbed area with only 2 remaining trees (alpine fir).

6. Province and districts  B.C.  

(a) Regional District  Peace River - Liard

(b) Forest and Grazing District  Prince George  

(c) Highways District  44 Fort St. John

(d) Provincial Park  Ominica-Peace, Liard  

(e) Resource Management Region  Ominica-Peace


8. Air photo  BC5508:138-140  

(b)  

9. Map (a)  94 K/10E MacDonald Creek

10. Drainage  

(a) minor Tetsa River, Nelson River  

(b) major 32 Liard

11. Elevation  

(a) 4150' asl or 1265 m. asl  

(b)  

12. Cultural affiliation  

(a) Slave or Kaska  

(b)  

13. Site type  general activity  

14. Dimensions  

(a) exact 15 m. x 15 m.  

(b) estimated  

(c) original  

15. Condition  

(a) present 0%  

(b) future a cataclysmic disembowelment of the earth would not do any more damage.  

17. Priority  

In Priority.
### BRITISH COLUMBIA ARCH/EOLOGICAL SITE INVENTORY FORM

2. Previous designation(s) None

3. Site name(s) None

4. Location (a) Sec. Lot. Plan
   
   (b) Summit Pass, Mile 393-394 on Alaska Hwy, from the SE shore of the small lake west of Summit Lake, along the divide separating the two lakes, and including the area N. of the lake at the SW end of Summit Lake.

5. Access Drive via Alaska Hwy. Park anywhere and walk

6. Province and districts B.C. (a) Regional District Peace River - Liard
   
   (b) Forest and Grazing District Prince George (c) Highways District 44 Fort St. John
   
   (d) Provincial Park Omineca Peace, Liard (e) Resource Management Region Omineca Peace

7. Lat. 58° 38’ 37” N. 8 Long. 124° 42’ 13” W. 9 UTM

8. Air photo B.C. 5508: 137 - 140

9. Map (a) 94X/10E

10. Drainage (a) minor Tetsa River, Ft. Nelson R. (b) major 32, Liard

11. Elevation (a) 4200’ asl or 1280 m. asl (b)

12. Cultural affiliation (a) Slave (possibly Kaska) (b)

13. Site type general activity?, trail

14. Dimensions (a) exact (b) estimated 1500 m. E/W x ? (c) original

15. Condition (a) present ? (b) future road work & ground water have disturbed area and will continue. Priority
BRITISH COLUMBIA ARCHaeOLOGICAL SITE INVENTORY FORM

2. Previous designation(s) IdSe - T2

3. Site name(s)

4. Location (a) Sec. Lot Plan
   (b) heading NW, exactly at mile 397 on the Alaska highway turn left (W) down
   side road for (0.3 m. on speedometer) 474 m. then left again (SE) onto a
   smaller side road approximately (0.1 m.) 178 m. past a gravel pit. The site
   is located on a river terrace about 3 m. above the road and on a point
   created by yet another road (washed out) that runs back to the highway. On
   the right bank of MacDonald Creek.

5. Access Drive to mile 397 on the Alaska Highway, turn left on an abandoned
   section of the highway for 474 m. then left again about 178 m. to a gravel
   pit. Flake scatter will be found on the slope of a terrace at the top of
   the gravel pit - a brush shelter will be found about 10 m. across a washed
   out road at the edge of a terrace.

6. Province and districts B.C. (a) Regional District Peace River - Liard
   (b) Forest and Grazing District Prince George (c) Highways District 44 Ft. St. John
   (d) Provincial Park Ominica Peace - Liard (e) Resource Management Region Ominica Peace


10. Air photo BC 5508:15-16, 138-137 11. Map (a) 94X/10W

12. Drainage (a) minor MacDonald Creek, Racing R. (b) major 32, Liard River

13. Elevation (a) 3500' asl, 1050 m. asl (b) 5 m. above MacDonald Creek

14. Cultural affiliation (a) Slave or Kaska (b)

15. Site type Resource utilization, land mammal hunting (ethnographic style brush
   shelter hunting camp)

16. Dimensions (a) exact 50 x 20 meters (b) estimated
   (c) original

17. Condition (a) present 20% intact - brush shelter (b) future low
   100% intact

18. Priority
### SUMMARY OF ZONING SYSTEM

<table>
<thead>
<tr>
<th>ZONE</th>
<th>OBJECTIVES</th>
<th>MANAGEMENT GUIDELINES</th>
<th>FACILITIES/ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>To provide for a variety of facility-oriented recreational opportunities.</td>
<td>- Oriented toward maintaining high quality recreation and interpretive experience.</td>
<td>- Intensive recreational facilities such as auto campgrounds, cabins, lodges, picnic areas, beach and swimming areas, nature houses, information buildings, downhill ski facilities, walk-in campgrounds.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Intensive management may be required to ensure that high quality recreation and interpretive opportunities are maintained.</td>
<td>- Ancillary facilities such as parking, sanitation, picnic tables, restaurants, may be included in this zone.</td>
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<td></td>
<td></td>
<td>- Special design consideration generally required.</td>
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<tr>
<td></td>
<td></td>
<td>- Intensity of developments and standards of facilities are variable and will relate to the objectives for the Park.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Private motorized vehicles may be restricted.</td>
<td></td>
</tr>
<tr>
<td>Natural Environment</td>
<td>To provide for intermediate levels of outdoor recreational opportunities/use in a natural setting.</td>
<td>- Management will be oriented toward maintenance or restoration of the natural environment.</td>
<td>- Development and use are consistent with the maintenance of natural conditions. Activities consistent with this zone would be: hiking, camping, canoeing, kayaking, snowshoeing, cross country skiing, nature observation, horse back riding, picnicking, swimming, fishing, interpretation programs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Visitor access may be restricted to preserve the recreational experience or to limit impact on the area.</td>
<td>- Minimal facilities such as trails, shelters, hikers' campsites, portages, horse corrals, observation blinds, may be developed to compliment these activities, but the emphasis of the development will be toward public safety rather than the encouragement of more intensive levels of use.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Designation of transportation modes may be necessary to avoid potential conflicts. (e.g. horse trails, cycle paths, hiking trails)</td>
<td>- Visitor facilities will be of a primitive nature.</td>
</tr>
<tr>
<td></td>
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<td>- Private motorized vehicles may be permitted.</td>
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<tr>
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<td>- Intensity of management and development will be consistent with moderate levels of recreational use.</td>
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<tr>
<td></td>
<td></td>
<td>- Visitor support facilities will be limited, and directed toward providing for public safety and minimizing user impact.</td>
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<tr>
<td>Wilderness</td>
<td>To protect and preserve landscapes and resource processes.</td>
<td>- Oriented toward the protection and preservation of the area's atmosphere, environment or ecology, while optimizing recreational opportunities associated with the &quot;wilderness experience&quot;.</td>
<td>- Only minimal primitive facilities would be developed consistent with low intensity uses. Activities consistent with this zone include: camping, hiking, mountaineering, canoeing, kayaking, cross-country skiing and snowshoeing, fishing, nature observation. In some areas, hunting may be considered an appropriate use. In some cases, it will be necessary to allow the limited use of aircraft, motorboats, snowmobiles, etc. as important means of access for management or to permit reasonable public access into extremely remote areas. Sub-zoning and use permits</td>
</tr>
<tr>
<td></td>
<td>To provide for low levels of recreational use in an environment where natural processes occur with a minimum of human interference.</td>
<td>- Unstructured visitor mobility.</td>
<td></td>
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<tr>
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<td></td>
<td>- Visitor support facilities will not be provided, except where absolutely necessary to provide for public safety or minimizing user impact.</td>
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<tr>
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<td></td>
<td>- Transportation limited to foot access, and non-motorized boats.</td>
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</tbody>
</table>
Commencing at a standard pipe post and cairn number 231 on the northerly limit of the Alaska Highway at the said highway as the said highway is shown on a plan of survey made by A.C. Folland, B.C.I.C. dated the 2nd of February, 1961, and filed in the Department of Lands and Forests under number 7 June, 1961; the said post being in the vicinity of Mile 359.6, Peace River Land District; thence due north to the northerly boundary of the watershed of North Tetaa River; thence in a general westerly direction along the northerly boundaries of the watersheds of North Tetaa River and MacDonald Creek to the headwaters of an unnamed creek which flows into said MacDonald Creek to the north of the mouth of One Ten Creek; thence southerly to and along the right bank of the main stream of the said unnamed creek flowing into MacDonald Creek to the north of the mouth of One Ten Creek to the right bank of said MacDonald Creek; thence in a general westerly direction along the said right bank of MacDonald Creek to a point due north of the intersection of the left bank of aforesaid One Ten Creek with the left bank of said MacDonald Creek; thence south to the said intersection and continuing in a general southerly direction along the said left bank of One Ten Creek to the headwaters thereof, being a point on the westerly boundary of the watershed of the main stream of aforesaid MacDonald Creek; thence in a general southerly and easterly direction along the westerly and southerly boundaries of the watershed of the said main stream of MacDonald Creek to the easterly boundary of the said watershed of MacDonald Creek; thence in a general northerly direction along the said easterly boundary of the watershed of MacDonald Creek and the westerly boundary of the watershed of the main southerly tributary of North Tetaa River to a point due south of aforesaid pipe post and cairn number 231 set on the northerly limit of the Alaska Highway; thence north to said pipe post and cairn number 231, being the point of commencement except thereout Lots 606, 607, 608, 609, 610, 1562, 1625, 1626, 1627, and 1652, and containing approximately 64,000 acres.

AND FURTHER TO RECOMMEND THAT under the provisions of Section 14 of the "Department of Recreation and Conservation Act" being Chapter 53, Statutes of British Columbia, 1957, the said Stone Mountain Park be of Class "B".

AND FURTHER TO RECOMMEND THAT a certified copy of this minute if approved be forwarded to the Superintendent of Lands, Parliament Buildings, Victoria, B.C.

DATED this 25th day of June, 1957, A.D.

[Signature]

Minister of Recreation and Conservation

APPROVED this 25th day of June, 1957, A.D.
BACKGROUND DETAILS TO THE ESTABLISHMENT OF STONE MOUNTAIN PARK

1951 - Feb. 6 - O.I.C. 282/51 - L. 1562 North of Alaska Hwy. reserved as a repeater site for Dept. of Transport, Canada.


1965 - Mar. 2 - O.I.C. 581/65 - reserve established by O.I.C. 283/51 over Blk. A, D.L. 1562 is cancelled and lot reserved instead for Dept. of Transport, Canada as a microwave site.


1968 - Apr. 11 - O.I.C. 1150/68 - reserve over L. 1562, South of Alaska Hwy. established by O.I.C. 283/51 was cancelled except thereout Blk. A.


1976 - Jan. 30 - O.I.C. 371/76 - reserve over L. 610 established by O.I.C. 892/55 was cancelled.

1977 - Oct. 12 - O.I.C. 3158/77 - excluded the following mineral claims from the park: - Min. Lease 1 (L. 2198); 7507; 7510; 7511; 7512; 8219; 8220; 7097; 7098; 7099; 7100.


HIGHWAY SCENIC IMPROVEMENT ACT

CHAPTER 49

Interpretation

1. In this Act

"Crown land" means land of the Crown in right of the Province.

"Designated highway" means a highway or part of a highway designated under section 2.

"Highway" has the same meaning as in the Highway Act.

"Municipality" includes the City of Vancouver.

"Municipal premises" means land within 130 m of the centre line of a designated highway.

"Vehicle" has the same meaning as in the Motor Vehicle Act and includes the remains of a vehicle.

2. The Minister may designate a highway or part of a highway and shall give notice of the designation in the Gazette and in a newspaper circulating generally in the Province.

3. Notice to remove unsightly accumulations

(a) on a provincial highway, the Minister or
(b) on a municipal highway, the City of Vancouver
is served on the owner or occupier of the premises or any other person having an interest on the premises or in the possession of a vehicle within which such premises are located, requiring the owner or occupier to remove the accumulation within 30 days from the date of service, failing which the accumulation shall be removed by the Minister at the cost of the owner or occupier.

Dispute between owner and occupier

6. Where the requirements of the notice served under section 3 have not been carried out by or on behalf of any person having an interest in the premises or in the possession of a vehicle on or in such premises, the Minister may, in writing, require the owner or occupier to remove the accumulation and, if the owner or occupier fails to comply with such notice within 30 days after receipt thereof, the Minister may cause such accumulation to be removed by a workman appointed by the Minister and the cost thereof shall be charged to the owner or occupier.

Appeal

5. (1) An appeal lies from the decision of the Minister or of a council under the Act to the Court of Queen's Bench of the Province in which such premises are situated, and the court may, after notice to the owner or occupier, hear the appeal and make such order therein as it shall think fit.

(2) Notice of an intention to appeal shall be given to the owner or occupier and, where notice is not given, the court shall not entertain the appeal unless it is satisfied that the owner or occupier has had an opportunity of being heard before the appeal is decided.

Abandoned vehicles

7. (1) No person shall abandon a vehicle on a highway in or on Crown land.

(2) Where it appears to the Minister, or to any person authorized by the Minister, or by any person acting under any power, authority or direction of the Minister or any person acting under any power, authority or direction of the Minister, that an abandoned vehicle has been abandoned, the Minister, or any person so authorized, may remove or dispose of the vehicle and, for the purposes of this section, "abandoned vehicle" means a vehicle which is not in use or which is not being moved on a highway in or on Crown land or which is not being moved on a highway in or on Crown land and is not in use or which is not being moved on a highway in or on Crown land.

(3) Where a vehicle is removed or disposed of under this subsection, the Minister may, in writing, require the owner or occupier of the premises on which the vehicle is situated to remove the vehicle from the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the owner or occupier is not removed, the premises and, if the 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Pursuant to section 3 of the Highways (Scenic Improvement) Act, 1968, those highways, or parts thereof, numbered 2, 29, and 97 lying within the boundaries of the Peace River-Liard Regional District but not within the boundaries of any incorporated municipality, on the request of the Board by resolution, are designated for the purposes of that Act.
N. TETSA RIVER "CANYON" - MILE 390
PROPOSED INFORMATION STOP

"STEEPD MOUNTAIN" NORTHBOUND VIEW
GOOD HIKING NORTH OF ALASKA HWY
MT. ST. PAUL

TYPICAL FRAGMENTED SLOPES
MACDONALD CREEK VALLEY

PROPOSED MACDONALD CREEK VIEWPOINT
SCENIC CANYON - MILE 396

PROPOSED VIEWPOINT AND PARK INFORMATION
MILE 398.5
WOKKPASH RECREATION AREA
INTERIM MANAGEMENT STATEMENT
(EFFECTIVE 1991 - 1994)

MINISTRY OF PARKS
NORTHERN B.C. REGION

JANUARY 1991
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I. BACKGROUND

A. Setting

1. Designation
   - Park Act Recreation Area established by O.I.C. 2212, 86.10.12.

2. Location
   - 160 km west of Fort Nelson on the Alaska Highway then 20 km south via Churchill Mine Road (Mine Road is suitable only for 4 x 4 vehicles)
   - adjacent to the southwest boundary of Stone Mountain Park (Fig. 1).

3. Area
   - 37,800 ha (adjacent Stone Mountain Park is 25,906 ha).

4. Access
   - by foot/horse via present trail from Churchill Mine Road to Wokkpash Lake
   - by foot/horse via McDonald Creek trail in Stone Mountain Park
   - by air charter to Wokkpash Lake.

B. Natural and Cultural Features

1. The most outstanding display of hoodoos (erosion pillars) in B.C. They are up to 300’ high and line Wokkpash Gorge below the lake for 5 km. (Fig. 2).

2. Forlorn Gorge - a deep, very narrow and twisting canyon, cut several hundred feet into the limestone.

3. Several groups of stepped lakes.

4. Superb northern Rocky Mountain scenery, including glaciers, waterfalls and alpine basins.

5. Wokkpash Lake, rock glaciers, ephemeral lakes, a large rock slide.

6. Dolly Varden char in Wokkpash Lake and Creek.

7. Moose, stone sheep, mountain goat, caribou, grizzly bears, as well as smaller mammals and rodents. A few bird species inhabit the area and some waterfowl can be found on the lakes in summer months.
C. Encumbrances
1. Northernmost part in the vicinity of the Churchill Mining Road is in the Liard Provincial Forest.
5. Parks/Mines inter-ministry protocol.

D. Outdoor Recreation Opportunities
1. Wokkpash Recreation Area provides a complementary wilderness component to Stone Mountain Park. Together they form the nucleus of a potential destination area in northeastern B.C.
2. Wokkpash is unusual in providing a northern wilderness which is accessible on foot from a major highway; most such areas require an expensive air charter.
3. An existing 85 km loop trail through Wokkpash Recreation Area and Stone Mountain Park is an added benefit, providing scenic variety. Side trips into tributary areas are possible. There is also the potential for a longer route from Plug Creek, returning to the Alaska Highway via the Tetsa Valley.
4. The main recreation opportunities are:
   - hiking, camping, nature appreciation, riding, climbing
   - guided hunting and fishing

E. Current Recreation Use
1. Use is low at present as the area is generally unknown.
2. The main use is guided hunting. Some fishing charters are also starting to visit the area. Hiking is limited to a few local groups. Occasional climbing expeditions have visited the area in the past.
II. PROVINCIAL PARK SYSTEM CONTEXT

A. Conservation Role

1. Ensures protection for the Special Natural Features of the hoodoos and gorges and the outstanding scenic and wildland recreation resources.

2. Provides enhanced representation of the Northern Rocky Mountains (Muskwa Ranges) Regional Landscape.

B. Recreation Role

1. Protects a northern wilderness destination which is accessible without the use of aircraft.

2. In conjunction with Stone Mountain Park provides a tourism focal point in northeastern B.C.

III. RECREATION AREA ZONING

The Wokkpash Recreation Area is zoned Wilderness. In addition, a Special Feature Sub-Zone applies to Wokkpash Gorge, Forlorn Gorge and Wokkpash Lake to highlight the significance of these features and to emphasize the need for sensitive management. (Fig. 3)

IV. NATURAL AND CULTURAL RESOURCE MANAGEMENT

A. Land

1. Objective

- to manage the land so that the wilderness character of the recreation area is maintained.

2. Management Actions

- arrange with the Ministry of Forests to remove the northern most portion of the Recreation Area from Liard Provincial Forest
- start the process for reclassification to Class A Park status, since a mineral assessment has been completed with negative results
- limit the development of facilities such as trails and campsites to the minimum required for safety and to control environmental impacts
WOKKPASH RECREATION AREA

ZONING

Wilderness

Special Feature Sub-Zone

0 5 km
investigate the upper Tetsa and Chischa Valleys, which are contiguous with the east boundary of Wokkpash, as a potential park area providing representation of the Foothills landscape. If they were also added to the park system, the result would be a major and diverse destination park with highway access.

B. Water

1. Objective

- to maintain the natural condition and quality of all water bodies in Wokkpash Recreation Area.

2. Management Actions

- ensure satisfactory sewage disposal by the guide-outfitter camp
- freshwater resources will not be used for purposes other than domestic water supply.

C. Vegetation

1. Objective

- to retain the vegetation of this recreation area in a natural state.

2. Management Actions

- no removal or manipulation of vegetation will be permitted except as required for range enhancement as part of a wildlife management plan to maintain/recreate natural conditions
- the wildlife management plan will determine whether fire management is needed
- a bio-physical assessment may be required to develop a wildlife management plan and assessment of vegetation. This should be done prior to or as part of any habitat enhancement. Any assessment would include Stone Mountain Park.

D. Fish

1. Objective

- to retain natural conditions so that present fish populations are maintained.
2. Management Actions

- guided and resident fishing will continue as a legitimate activity in the recreation area
- though existing provincial fishing regulations do not reflect the suspect low productivity of glacial Wokkpash Lake, B.C. Parks will pursue conservative regulations for the Recreation Area
- a lake survey has already been completed; a creel census is not warranted at present use levels. However, the guide is required to keep records of angling activity as a condition of his permit. This, in conjunction with anecdotal information and staff observations, will provide adequate information for the present. If use pressures increase or population declines are suspected, more specific action, such as a creel census, may be undertaken.

E. Wildlife

1. Objective

- to retain natural conditions in the recreation area so that present wildlife populations are maintained in a largely natural state for hunting and viewing.

2. Management Actions

- hunting by residents and guided non-residents will continue
- wildlife surveys will be conducted on a regular basis to determine populations and set hunting regulations
- a wildlife management plan will be prepared for Wokkpash Recreation Area/Stone Mountain Park. The objective will be to maintain the natural species diversity and to maintain the populations required to meet demand for wildlife. Predator populations may be controlled if necessary to prevent loss of many major prey species. Habitat manipulation will be guided by this principle (e.g. the management plan may prescribe fire to compensate for past fire suppression, but not to artificially boost
- trapping is a non-recreational activity which is incompatible with the objectives for the area. The trampoline will be acquired when possible. In the meantime, the activity will continue under permit.

F. Geological Resources

1. Objective

- to honour the Mines/Parks inter-ministry protocol regarding exploration
- to minimize disturbance from such activities
to eventually eliminate all mineral activity in order to permit reclassification to Class A Park.

2. Management Actions

- as a mineral evaluation has already been undertaken, the conditions of the protocol appear to have been satisfied. B.C. Parks will start the process of reclassifying the area.
- the nb staking reserve (OIC 1011/1977) which covers the key features will be maintained until reclassification to Class A Park (Fig. 4).
- in the event that reclassification does not proceed at this time, the inter-ministry protocol will continue in effect and will apply to any mineral activity.

G. Cultural Resources

1. Objective

- to minimize disturbance of any sites which may be discovered.

2. Management Actions

- there are no known sites and the potential for any is low. No archaeological work will be undertaken.

H. Outdoor Recreation Features and Visual Resources

1. Objective

- to protect the outstanding recreation and scenic features from disturbance.

2. Management Actions

- the protection of recreation features and views will take precedence over resource activities.
- establish firm guidelines for the protection of outdoor recreation features and visual resources form disturbance by potential resource development. Controls will be enforced by Resource Use Permits.
- the development of facilities such as trails and campsites will be kept to the minimum required for safety and to control environmental impacts.
V. VISITOR SERVICES MANAGEMENT

A. Recreation Opportunities

1. Objective

- to encourage enjoyment of Wokkpash Recreation Area as the wilderness component of the combined park area
- to promote the opportunity for a wilderness circle hike, starting directly from the Alaska Highway.

2. Management Actions

- in keeping with the wilderness objective, facilities will be kept to an absolute minimum
- campsites will be grubbed out only when continued use of specific sites necessitates some remedial action
- as the circle trail is well established, work will be limited to a few locations where the trail has been eroded by the rivers (e.g. lower McDonald)
- no additional trail development will be undertaken; visitors interested in visiting upper Wokkpash Valley or tributary basins can easily find a route through the open alpine
- B.C. Parks will investigate the feasibility of a route from upper Plug Creek into the headwaters of the Tetsa River
- there will be no on-site interpretation of features in the Recreation Area
- B.C. Parks will not request or encourage any upgrading of the Churchill Mine Road
- the informal trailhead parking area at the road crossing of Wokkpash Creek is adequate for the next few years. A suitable trailhead for the McDonald Valley should be located and signed in Stone Mountain Park. Trailhead maps and information at both locations will be useful
- the guide’s existing hunting cabin will remain. Any request to enlarge the camp (e.g. additional cabins, small fishing lodge, boats, rough airstrip on the gravel bar) will only be considered on the basis of a business development plan, to avoid incremental growth. Any development will be kept very limited in recognition of the lake’s probable low productivity, the confined nature of the valley and the sensitivity of the northern wilderness. The preferred option is no additional development
- one Resource Use Permit will be made available for float plane charter service to and from Wokkpash Lake. No ancillary services or facilities will be authorized (e.g. angling guiding, boats, camps). Instead, the permittee must make arrangements with the present guide for the provision of these services
- any applications for recreational guiding (other than hunting and fishing) will be judged on the basis of their compatibility with the wilderness objectives for the area.

B. Management Services

1. Objective

- to provide a management presence in the new recreation area.

2. Management Actions

- no management facilities are required
- periodic backcountry ranger patrols will be undertaken to familiarize park staff with the recreation area and establish a presence
- staff will work closely with the present guide-outfitter in gathering information and establishing a presence in the recreation area.

C. Promotion and Information Program

1. Objectives

- to increase awareness of Wokkpash Recreation Area
- to provide information to potential users
- to provide off-site interpretation of the special features

2. Management Actions

- visitors will be informed of the nature of the area and particularly the potential difficulty of some river crossings. The wide, braided channels of Wokkpash Creek and McDonald River make footbridges impractical
- information about the park's location and opportunities will be provided through the usual methods such as maps and brochures
- a brochure for Stone Mountain Park/Wokkpash Recreation Area will be considered
- B.C. Parks will work closely with the Peace River Alaska Highway Tourist Association to market the area as a major wilderness destination in northeastern B.C.
- outdoor writers and photographers will be encouraged and assisted to prepare articles about the area
- information will stress that the area is adjacent to and accessible from the Alaska Highway
- information will emphasize that the area is the wilderness component of a larger park unit. Potential users will be alerted, in particular, to the need to ford rivers.
- trailhead information will be provided
VI. INTERIM MANAGEMENT STATEMENT IMPLEMENTATION

The priorities for 1991-94 are:

- develop a management presence through periodic patrols and close contact with permit holders (guide-outfitter, air charter company)
- work with the Tourist Association, outdoor writers and others to increase awareness of the area as a prime wilderness destination in northeastern B.C.
- locate a trailhead for the McDonald Valley trail in Stone Mountain Park; sign both trailheads for the loop trail; restrict trail work to the one or two sections which require relocation; inform hikers of the need to ford rivers
- start the process for reclassifying the Recreation Area to a class A Park
- have the northern end of the Recreation Area removed from Liard Provincial Forest
- provide off-site interpretation of the special features at Summit Lake Campground in Stone Mountain Park; consider a joint Stone Mountain/Wokkpash brochure
- ensure that all commercial activities operate under permit
- continue wildlife surveys; start work on a wildlife management plan; apply conservative hunting and fishing regulations
- attempt to acquire the trapline
- honour the Mines/Parks protocol, as necessary, for Mineral exploration; maintain the no-staking reserve until Class A Park status is achieved
- investigate the upper Tetsa and Chischa Valleys for their potential to represent the Foothills landscape; reconnoitre a trail link between Wokkpash Recreation Area and the Tetsa Valley
- by 1994, prepare a master plan, with public involvement, for the combined unit of Stone Mountain Park/Wokkpash Recreation Area.
UPPER SIKANNI MANAGEMENT PLAN

Ministry of Environment, Lands and Parks
and
Ministry of Energy, Mines and Petroleum Resources

November 1995
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The Ministry of Environment, Lands and Parks (MELP) recently completed wildlife capability mapping for the Muskwa-Kechika region of northeastern British Columbia. This mapping exercise confirmed the provincial and international importance of the Northern Rocky Mountains and eastern foothills for wildlife and wilderness values. Because of the abundance and diversity of large mammal species, this area is one of the highest priority areas in the province for the protection and management of wildlife species. The following wildlife species have been included in this mapping exercise: grizzly bear, Stone sheep, elk, black bear, moose, caribou, Plains bison, mountain goat, mule deer and white-tail deer. Recent overview inventories of the Upper Sikanni River and its tributaries, have demonstrated that viable populations of sportfish species including rainbow trout, Arctic grayling, and mountain whitefish exist within the watershed.

The Muskwa-Kechika region contains some of the province’s greatest potential for large accumulations of natural gas. Natural gas exploration and development is expected to intensify over the next few years, particularly along the eastern slopes. Industry operations and activities include low impact seismic explorations, and the construction of roads, wellsites, pipeline rights-of-way, power lines and compressor facilities, and establishes precedent for additional activity within an area. Although some petroleum and natural gas development activities may be small in scale, they can have cumulative environmental impacts, particularly in areas with high wildlife and wilderness values. It is important that the location, nature and extent of petroleum and natural gas exploration activities in sensitive areas be carefully managed to sustain environmental resource values while insuring that opportunities for continued economic benefits from a healthy oil and gas industry are maintained.

The Muskwa-Kechika region also contains timber and mining values and provides exceptional recreation opportunities. Although at this time recreation usage is low and there are no immediate timber and mining plans for the Upper Sikanni, the potential for future usage and extraction is recognized. Current mineral deposits in the area, taken from the Revised Minerals Inventory Maps, show mineral deposits such as copper, zinc, barite and barium.

The Ministry of Energy, Mines and Petroleum Resources (MEMPR) has received a number of requests for oil and gas tenure in the Upper Sikanni Chief river drainage and has deferred offering the tenures for competitive bid for two years to provide MELP with sufficient time to complete initial wildlife and habitat assessments in the area. There are a number of existing oil and gas tenures in the area and some preliminary geophysical exploration and drilling has occurred. The Upper Sikanni Management Plan (USMP) has been developed to provide guidance and direction for the continued exploration and potential development of natural gas in this sensitive area.
Until such time as the Fort St. John Land and Resource Management Planning (LRMP) processes define land use zoning and protected areas under the Protected Areas Strategy, the USMP will provide interim working guidelines. The USMP will be considered as a pilot project, for the further development in the Muskwa-Kechika, and may also be of use to the northeast LRMP tables as they address special management zoning issues. The USMP will assist both MELP and MEMPR in ensuring that important environmental resource values are sustained, and that opportunities for environmentally responsible resource development are maintained.
INTRODUCTION

The USMP has been developed primarily to ensure that impacts to sensitive wildlife and habitat from oil and gas exploration and resource developments are minimized. The plan consists of: a description of broad habitat types, guidelines for works within the Upper Sikanni drainage derived from habitat descriptions, a list of wildlife species, an annotated map identifying areas subject to specific management and operational terms included as conditions of tenure. The plan will apply to petroleum and natural gas tenures issued in the Upper Sikanni drainage as provided for in the protocol agreement between MEMPR and MELP. Both agencies recognize both the high potential for natural gas development and the high wildlife habitat values in the Upper Sikanni drainage.

The Ministry of Environment, Lands and Parks has determined that the Upper Sikanni drainage should be managed on an ecosystem based approach, as the optimal method of accommodating both human use and resource extraction, while sustaining a long term, strong wildlife population. This plan calls for the issues of connectivity and biodiversity to be applied in all stages of development and to apply to all species.

Access development for the oil and gas industry has major impacts on elk, moose, Stone sheep, mountain goat, caribou, Plains bison, grizzly bear, wolverine, gyrfalcons, wolves, and all fish species of the Sikanni River and watercourses. Access development increases variety of uses which can fragment wildlife ranges, increase hunting/fishing pressure, and ultimately reduce habitat suitability. Impact mitigation strategies will require monitoring and adjusting to insure they are compatible with the objectives of the plan.

The primary habitat management objectives of the plan are consistent with the Biodiversity Guidebook, 1995, developed for the Forest Practices Code and include:
• maintenance of connectivity of ecosystems in such a manner as to ensure the continued dispersal and movement of forest/alpine dwelling organisms across the landscape. Linkage corridors between protected areas and sensitive development zones. These areas are critical in that they provide for seasonal migration, escape cover and gene pool exchange.
• maintenance of a variety of patch sizes, seral stages, forest stand attributes and structures, across a variety of ecosystems and landscapes. Maintaining a full range and appropriate distribution of habitat types across the landscape, emphasizing rare habitats (such as grasslands and riparian habitats).
• provision of un-harvested areas of sufficient size to maintain forest interior habitat conditions, as well as prevent the formation of excessive edge habitat (Biodiversity Guidebook 1995).

While this plan may not meet all objectives of all sectors, it represents the best opportunity to demonstrate that a balanced approach to resource management can be achieved through inter-agency cooperation and sound development practices.
The Fort St. John LRMP process is currently developing strategic objectives and strategies that encompass the USMP management area. Until such time as this process defines land use zoning the USMP will provide direction for resource development.

PLAN AREA

Situated in the northeastern part of British Columbia, the USMP encompasses approximately 1832 sq. km. Located where the extensive boreal plains and muskeg of the east meet the Rocky Mountains, the Upper Sikani Chief River watershed is significant in terms of wildlife species groupings, remoteness, minimal development, low human population and supports a wide ranging predator-prey system.

The most westerly edge of this area consists of varied terrain which includes jagged peaks, cliffs, talus slopes and sparsely vegetated alpine slopes. The mid to eastern end of the subject area, the habitat changes from alpine to longer, wider valley habitat, with a varied forest canopy. Grassland habitat occurs in the eastern edge. Windward slopes and exposed ridge crests remain free of snow for extensive periods during the winter. Due to its northern latitude, inland location, and high elevation, the climate is severe and the growing season short. This is the northernmost known occurrence of Englemann spruce in the Rocky Mountains.

The plan area lies within the Fort St. John Forest District and is comprised of the following biogeoclimatic zones (forest types):

Alpine Tundra - (AT)

The alpine tundra, essentially a treeless region characterized by a harsh climate, is dominated by dwarf shrubs, herbs, mosses and lichens. This zone has high recreational appeal. It also provides important range for caribou, mountain goats and mountain sheep. Due to the severe climate it is extremely sensitive to use. Disturbed landscapes require decades, or even centuries, to recover to their natural states. The AT zone occurs above approximately 1400 m in northeastern British Columbia. The most common krummholz species are subalpine fir, Engelmann spruce and white spruce. A krummholz is typically a high elevation, stunted tree, open habitat, characterized by islands of the above species, intermixed with a dense shrub cover of willows and scrub birch.

Spruce-Willow-Birch - (SWBmk)

The SWBmk zone is the most northerly subalpine zone in British Columbia. Elevations range between 1000 and 1700 m, and is commonly the subalpine zone above the Boreal White and Black Spruce zone in northern British Columbia. At lower elevations, the zone is characterized by open forests of primarily white spruce
and subalpine fir; upper elevations are dominated by deciduous shrubs including scrub birch and willow. In some high wide valleys, cold air collects resulting in a mosaic of scrub, grassland and wetlands on valley floors below a band of forest on the valley sides. This zone provides extensive moose, caribou and, in the east, elk habitat.

Boreal White and Black Spruce - (BWBSmw2)

The BWBSmw2 biogeoclimatic zone occurs at elevations ranging from approximately 350 to 1100 m. The regional climate is relatively moist and warm with a longer growing season than the higher elevation BWBSwk. The following applies to both the BWBSmw2 and the BWBSwk2. The forests are dominated by white spruce or aspen. Forest fires are frequent throughout the zone, maintaining most of the forests in various successional stages. Forest harvesting in BWBS is relatively active and will continue to grow with the increased use of trembling aspen and balsam poplar. The Upper Sikanni has, at this time, no harvesting of the BWBS zone. The BWBS zone has the least snowfall of all the northern zones and consequently is very important for wintering ungulates. The zone provides prime habitat for fur-bearing mammals.

Boreal White and Black Spruce - (BWBSwk2)

The BWBSwk2 biogeoclimatic zone occurs at elevations ranging from approximately 900 to 1300 m. The climate is wetter and cooler with a shorter growing season than the BWBSmw. The forests are dominated by white spruce or lodgepole pine.

Historically the Upper Sikanni Chief River has accommodated a variety of uses by both First Nation and settler communities, such as: trapping, guiding and outfitting, hunting, fishing and small scale mining operations. This region is within the ethnolinguistic area of the Athapaskan; Sekani/Beaver (Halfway River Indian Band and Prophet River Indian Band - Treaty 8). Both of these First Nations communities rely extensively on fish and wildlife for sustenance, and trapping is an important component of their way of life. There are known First Nations’ grave sites in the subject area.
METHODS

The information depicted on the annotated map, as with all information within this report, was derived from a variety of sources. The main source of information was from the Upper Sikanni Chief River Watershed (Muskwa Foothills Project 1994) broad level biophysical habitat mapping, which was completed by MELP. As a secondary source of information MELP utilized the knowledge of its own staff, trappers and First Nations, as well as the guide and outfitter which occupied the area at the time. MELP wishes to acknowledge how useful and crucial these contributors have been in molding this project. Their knowledge of the area and of certain species has proven an invaluable resource.

Research was conducted on whether any known archeological sites are within the USMP. Ongoing archeological studies are being conducted by the Halfway Band at this time; several sites have been identified. It is evident that there is a need for further archeological studies before any development occurs.

Recreation issues have been identified by the Peace River Alaska Highway Tourist Association and the Ministry of Forests. Interviews were conducted to bring forth areas of interest and areas of concern, with respect to recreation and tourism, within the USMP. However, the main focus of this plan is wildlife habitat management.

The annotated map was constructed from both a 1:250,000 and 1:20,000 TRIM mapping base. Tenure information was derived from current records from Energy, Mines and Petroleum Resources. McElhanney Associates of Fort St. John completed the manual digitizing of information from the 1:50,000 map base.

The generalized broad habitat classes were derived from satellite imagery, aerial photographs, forest cover maps and existing wildlife knowledge. This information is useful for providing general procedures and restrictions in terms of oil and gas development. However, more detailed information is required to properly address site specific issues and to more precisely assess local wildlife and fisheries needs. The current data only provides this habitat plan with baseline information on distribution and range. Development plans (pre/post assessment and monitoring) must focus on identifying the impacts of oil and gas operations on wildlife within the Upper Sikanni. Some of this information may have to be gathered by the proponent prior to development approval. Ongoing telemetry studies on the Plains bison, and further wildlife and fisheries inventories conducted by BC Environment will continue to help to fill some information gaps.
MAPPING

The mapping consists of an Upper Sikanni base map and a broad habitat map for the Upper Sikanni. These maps have been produced at a 1:50,000 and 1:100,000 scale, and both maps are in large formats and accordingly cannot be attached to the plan; report sized versions have been attached to the plan but should only be used to obtain a general overview of the plan area and broad habitat locations.

The Upper Sikanni Base Map contains the following data: water drainages, contours, trails, high fishery value sites, grazing leases, privately owned property, roads, seismic lines, wellsites, recreational reserves, bridges, cabins, airstrips, ecological reserves, archeological sites, existing and proposed tenures, 1300m elevation, proposed Protected Areas, and pipelines.

The Broad Habitat Map, in addition to containing all data on the base map, illustrates the approximate borders of all zones and habitats discussed in Broad Habitat Types. The map shows the approximate borders of the two sensitive zones: in pink and green. The map indicates the approximate locations of each habitat, using symbols. These habitats and their designations are explained in greater detail in the Broad Habitat Type section.
1. Closed Forest Type

**DEFINITION/DESCRIPTION:**

The Closed Forest Type consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Cool Aspect, Well Drained, Boreal, Closed Subalpine and Warm Aspect.

Typically, a closed canopy dense coniferous forest consists of varying components of spruce, black spruce, lodgepole pine, subalpine fir and small intrusions of deciduous species such as aspen, balsam poplar and birch. The forest understory generally consists of moss, labrador tea, some alder willow and various shrub and herb species. This habitat is found in the valley bottoms and lower slopes with gentle to moderate gradient. The closed forest habitat in this area is within the BWBS and SWB biogeoclimatic zones. The closed forest provides the best thermal and hiding cover for many species of birds and mammals.

Many species use this habitat for escape cover, perching, nesting and some species utilize the area year-round. This habitat is most valuable where there are natural openings or waterbodies as it then increases the diversity of habitat and allows for use by a greater number and variety of species. Large continuous areas of closed forest are important for species such as fisher, martin, squirrels and boreal owls.

The greatest attributes of the closed forest type from a wildlife perspective are: snow interception capabilities; the security provided by the closed canopy to small mammals for protection from avian predators; escape cover for prey species from land predators; its temperature moderating abilities which provide relief during period of temperature extremes; and, its effectiveness in isolating and minimizing human disturbance by shielding it from view by its natural revegetating abilities.

There are four blue listed species that utilize this habitat: grizzly bear, wolverine, fisher and bald eagle

**DISTRIBUTION:**

The closed forest habitat is extensive on a regional basis but in the Sikanni watershed, it occurs mostly in the immediate Upper Sikanni River valley and in the eastern half of the project.
MANAGEMENT STRATEGIES:

Low Sensitive - This habitat type has been developed extensively by the petroleum and forest industries east of the USMP. It is readily reclaimed and small to moderate disturbances tend to be screened by this forest. Due to its linear nature, oil and gas development can generally be practiced here with fewer negative effects on wildlife than in other adjacent habitat types. Pre-planning must be done to minimize disturbances and proper reclamation must be undertaken after development. Development can occur within this habitat type but the following practices to minimize negative impacts on species utilizing this habitat are expected:

- Minimize clearing sizes for pipelines, roads, wellsites, other development;
- Distribute coarse woody debris on disturbed sites during reclamation;
- Vary the shape of clearings to mimic natural forest openings and increase edge effects;
- Prompt revegetation of disturbed areas using original tree and bush species;
- Dogleg linear openings to minimize site disturbances;
- Consideration of visual impacts from all distances and discretion when locating development; and,
- Maintain short sight distances in corridor developments.

Notes:

1. Some warm aspect forested habitats constitute Class 1 grizzly bear range. Warm aspect forests also have the potential to provide ungulate winter range. Where warm aspect forests provides both ungulate winter range and grizzly bear habitat, development will be restricted. This will be determined on a site specific basis, when more detailed development plans and field data have been collected.

2. Some portions of this habitat may be required as wildlife travel corridors, managed as a buffer for more sensitive open habitats (meadow complexes and mineral licks) or lakes and streams.

2. Open Forest Type

DEFINITION/DESCRIPTION:

The Open Forest Type consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Forest Wetland and Open Subalpine Forest.

This forest type is similar in composition to the closed forest type but the canopy closure and understory layer differ significantly. This forest canopy is more open, allowing more light to reach the forest floor, enhancing shrub and herbaceous growth and terrestrial lichens. The open canopy is a result of a lower density of mature trees caused by marsh climatic conditions, nutrient poor soils, poor drainage...
and/or fire history. Open forest dominates the higher elevation forest types and often is the transition zone from closed forest type to the subalpine meadow/parkland and alpine. Although this habitat provides less security than closed forest in terms of hiding cover for larger animals, it plays an important role in providing escape cover from the adjacent open habitats such as alpine or warm aspect grassland. Open forest is noted for:

- Shrub/herb and lichen producing understory providing important winter/summer forage for large and small mammals and birds;
- Providing hiding/escape cover for animals utilizing adjacent open habitats; and,
- Moderating visual impacts of development and disturbance.

It is important winter range for moose, Plains bison and caribou. Other species that utilize this habitat include the following blue listed animals: grizzly bear, wolverine, fisher, Smith’s Long Spur and bald eagle. The shrub/herb understory provides a home for numerous birds and small mammals.

**DISTRIBUTION:**

The open forest habitat is extensive in the Upper Sikanni watershed. It is generally concentrated along the valley bottoms but also occurs on the upper slopes of these valleys and in draws of the mountain ranges. A large percentage of this habitat is in the western half of the project area, running north/south from Cranswick Lake area to the headwaters of Sidenius Creek.

**MANAGEMENT STRATEGIES:**

Low Sensitive - The effects of oil and gas development on this habitat type are predicted to be similar to those of the closed forest type and this habitat type will be managed with the same objectives as the closed forest type. Given the more open nature and the cumulative detrimental visual effects created by development, planning must address minimizing visual impacts. Development buffers will be required where this habitat is adjacent to open habitat types of lakes, streams and grasslands.

3. **Shrub/Grass Lowland - (Coloured pink on map)**

**DEFINITION/DESCRIPTION:**

The Shrub/Grass Lowland consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Wetland and Cold Air Drainage/Grassland.

This habitat type is found in low elevation wet areas and is characterized by low dense shrubs, scrub birch, willow, grasses and sedges. These areas remain treeless due to low nutrient soils, poor drainage and cold air drainage. Meadows occur and create a mosaic
of natural openings within the forest types, providing edge habitats which promote abundance and diversity of animal species.

Many raptors, including the Peregrine falcon (red listed), forage in open areas such as the shrub/grass lowland where small birds and mammals are abundant. Large mammals such as moose, caribou and elk also forage in these meadows and Plains bison utilize them extensively in winter in lower snowfall areas. Where shrub/grass lowlands occur adjacent to streams or lakes, it provides nesting habitat for waterfowl. There are five blue listed species that occur in this habitat: Plains bison, grizzly bear, wolverine, Smith’s Long Spur and bald eagle.

DISTRIBUTION:

Shrub/grass Lowland occur in only a small percentage of the total area and therefore preservation of the habitat is critical. It is generally found in the wetter sections of the valley bottoms. A large portion of this habitat is pocketed along the Sikanni River at Jesson Creek and Sidenius Creek.

MANAGEMENT STRATEGIES:

High Sensitive: The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided; any activity will require site specific management.

The openness of this habitat, promotes species diversity and development should be avoided. Meadows require treed, visual buffers to isolate them from development activities and in areas where the shrub/grass lowlands create a complex of meadows and interchanging forested areas. They must be managed as a complete unit that prevents habitat fragmentation. Any unavoidable development must be sufficiently buffered to prevent disturbances to wildlife utilizing this open habitat.

It is a critical winter range for Plains bison.

4. Warm Aspect Grassland - (Coloured pink on map)

DEFINITION/DESCRIPTION:

The Warm Aspect Grassland consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Warm Aspect Grassland.

Typically this is dry grassland habitat dominated by perennial grasses and forbes. In the Upper Sikanni watershed, this habitat is limited to steep, south facing slopes or alpine ridges. This ecosystem can be initiated and perpetuated by fire, either natural or human-caused. Extensive grazing by ungulates help maintain this early seral habitat. Mule deer, Plains bison, Stone sheep and elk depend heavily on these area for foraging in winter months as they can easily access suitable forage species in low snow or even
snow-free conditions. Falcons, hawks and eagles use this open terrain for hunting. Mountain bluebirds, voles and grouse are also found here. This is one of the few habitat types where several large ungulate species will occur together in significant numbers to create a unique wildlife viewing opportunity. These areas also tend to green up in the early spring providing an important food source for ungulates and for recently emerged black and grizzly bears.

**DISTRIBUTION:**

The Warm Aspect Grassland habitat is very limited in the Upper Sikanni watershed. The majority of the habitat occurs in the easterly end of the subject area, along the south facing slopes of the Upper Sikanni River.

**MANAGEMENT STRATEGIES:**

High Sensitive: The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

This habitat is limited and is very important to several species for winter range. The openness and location of these areas on steep slopes make them very sensitive to activity not only within the habitat itself but also in adjacent habitats directly below. The steepness of these slopes increases the chance of slumping and erosion. For animals utilizing this habitat, adjacent escape cover/terrain is essential, therefore suitable habitat adjacent to the warm aspect grasslands must be preserved to provide an avenue of escape. For most animals this constitutes a forested area where they can find visual shelter and thermal retreat during temperature extremes. For Stone sheep or mountain goats adjacent alpine or rocky habitats will provide the best avenue of escape and should be avoided.

5. **Riparian - (Coloured pink on map)**

**DEFINITION/DESCRIPTION:**

The Riparian zone consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Riparian.

Riparian habitats are identified by the presence of vegetation requiring large amounts of free or unbound water and are typically a dense moist forested area, with shrub and forbes dominated understories, affected by seasonal flooding or high water tables associated with streams, rivers or small creeks. Riparian zones along a watercourse, typically consist of a wet/saturated habitat with emergent herbaceous species, sedges and rushes and shrubs, to a moist deciduous forest of aspen, balsam poplar, willow, dogwood, and further up the river bank a coniferous forest habitat with of Englemann spruce, pine, with a shrub and forbes understory. This habitat is affected by seasonal flooding or high water tables. The large mature deciduous and coniferous trees along a
Streambank provide a future source of large organic debris in the aquatic environment; fallen dead trees and snags, eroded root structure and logs are the large organic debris that provide stream bed stability, cover and habitat for young fish. Disturbance and destruction of the riparian zone can have serious impacts to both the short and long-term viability and productivity of fish and fish habitat. The microclimate of riparian zones is different from that of the surrounding coniferous forest because of increased humidity, a higher rate of transpiration, more shade, and increased air movement. Riparian habitats also provide migration routes and travel corridors between summer and winter ranges.

There are five blue listed species that utilize this habitat: Plains bison, grizzly bear, western wolverine, fisher and bald eagle. As well, the Peregrine falcon, which is red listed, occur here. This area is used for breeding, nesting, feeding, and thermal and hiding cover, as well as providing food sources and natural streambank stabilization for fisheries values.

**DISTRIBUTION:**

This habitat type occurs in only a small percentage of the subject area, and is very critical habitat for almost all of the species noted in Appendix A. It is mainly situated along the banks of the Upper Sikanni River and is in scattered locations elsewhere along other drainages.

**MANAGEMENT STRATEGIES:**

High Sensitive: Riparian and wetland habitats play a critical role in maintaining biodiversity, and therefore must be managed with great care. The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

Despite the low occurrence, this habitat is important for numerous species. The habitat tends to be linear in nature, following the rivers and streams and bordering lakes. The situation may arise where access development is required through a riparian area, and in that situation strict guidelines must be followed and efforts to determine the shortest route, with the least disturbance must be made. Proposed crossings through riparian areas will be considered on a site specific basis. The objective is to maintain the natural habitat.

6. **Avalanche Chute - (Coloured pink on map)**

**DEFINITION/DESCRIPTION:**

The Avalanche Chute Zone consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Avalanche Chute.
This is, as the name suggests, an avalanche maintained habitat. Repeated avalanches prevent forest development and perpetuate an early seral habitat of shrub species such as alder and willow and in catchment areas, rich herbaceous growth. The lush vegetation found in these areas in summer is of prime importance to grizzly bears and is utilized by mountain goats, Stone sheep, black bears, ptarmigan, hoary marmots and numerous other species. In the Upper Sikanni drainage avalanche chutes are concentrated in the west end near the height of land on north and east facing slopes where snow accumulations are greatest. The chutes occur in rugged terrain, occur in narrow valleys and feature very steep slopes. These conditions create open exposure to any activity that may take place in valley bottoms or on opposite valley walls. There are four blue listed species that utilize this habitat: Stone sheep, grizzly bear, western wolverine and gyrfalcon.

**DISTRIBUTION:**

There are nine notable avalanche chutes in the Upper Sikanni, and they occur west of Mount Bertha and run north/south. The lower portion of the chute is directed towards valley bottoms or watercourses.

**MANAGEMENT STRATEGIES:**

High Sensitive: The siting of wells and related processing facilities is prohibited. Access through these areas for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

If development adjacent to or nearby avalanche chutes is to occur, site specific planning will be required to ensure that avalanche habitats are not disturbed.

7. **Subalpine Meadow Parkland**

**DEFINITION/DESCRIPTION:**

The Subalpine Meadow Parkland consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Subalpine Meadow Parkland.

This habitat can best be described as the transition zone between the open or closed forest habitats and the unforested alpine habitats. By nature, it incorporates a mixture of both habitat types, but can be characterized as a open forest type with stunted subalpine fir and low growing shrubs. Ground cover is dominated by herbaceous species such as grasses, forbes, sedges and terrestrial lichens. Large open meadows occur and tree cover is interspersed in patches or clumps. This habitat often occupies mid to upper slope locations and contain tree densities so low as to have little influence on understory cover and ground moisture. The vegetation tends to be open due to the low productivity of these sites. These areas may provide significant winter range for caribou as there is extensive terrestrial lichen cover and low snow conditions. This
combination of alpine vegetation and sparse forest cover provides a unique habitat important to blue listed species like the Smith’s long spur, grizzly bear, Stone sheep, Plains bison and gyrfalcon and the red listed Peregrine falcon.

**DISTRIBUTION:**

This habitat is extensive in the Upper Sikanni and is mainly found in the eastern half of the watershed. It lies between the vegetated alpine and the open subalpine.

**MANAGEMENT STRATEGIES:**

Medium Sensitive - Some areas of subalpine meadow/parkland are rated as class 1 grizzly bear and caribou habitat. Based on degree of sensitivity, siting of access, wellsites and facilities should be avoided, however, it is recognized that terrain may limit alternate options. These areas will be tied to high sensitive habitats to create a more complete and diverse habitat.

In this open habitat, disturbances tend to have greater impact than in forested types, however, short term disturbance is acceptable and careful reclamation can be successful when the project is complete. Buffer zones to protect adjacent alpine and attention to minimizing visual impacts on wildlife and the public will be conditions.

8. **Vegetated Alpine - (Coloured green on map)**

**DEFINITION/DESCRIPTION:**

The Vegetated Alpine consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Alpine Plateau, Vegetated Alpine.

This is a high elevation, non-forested habitat dominated by grasses, sedges, forbes and terrestrial lichens. In depressions and wetter sites, lush herbaceous vegetation occurs; low shrubs, heather, avens and juniper will be prevalent. This habitat occurs on mountain and ridge tops or in high elevation basins above ≈ 1300m. The terrain varies from very steep, with rock outcrops, to gently rolling or flat plateau areas. Windward slopes and exposed ridge crests remain free of snow for extensive periods during the winter. They tend to be dry during the growing season, which limits plant growth. The vegetation tends to be scattered due to the low productivity of these sites and the dry conditions favour a high proportion of deep-rooted cushion and rosette plants. Snow often forms deep drifts; forbes, bunchgrass and dwarf evergreens occur.

Vegetated alpine areas represent critical winter and summer range for ungulate species like Stone sheep, caribou and mountain goat. Gyrfalcons, Peregrine falcons and bald eagles also occur. Wetter, more lush areas of alpine provide foraging areas for grizzly bears and hoary marmots. An abundance of ungulates also means scavengers like wolverines, and predators like wolves, will also use this habitat. To a lesser extent
moose, elk and Plains bison use alpine for foraging. More rugged areas of alpine provide calving areas

**DISTRIBUTION:**

This habitat exists throughout the subject area, but at times occurs in isolation from other vegetated alpine habitats. Connectivity of these isolated areas is a management objective.

**MANAGEMENT STRATEGIES:**

High Sensitive:

Alpine areas are a result of extreme climatic conditions. It is difficult to successfully reclaim these areas, particularly with natural vegetation such as lichen. Developments in the alpine can remain visible for a long time due to the openness of this habitat. Disturbance to animals at times such as late winter/early spring, calving or lambing periods, or during fly season, can have serious impacts on wildlife. Changes in habitat, interrupted feeding, and blocking travel and migration routes can create added stress and induce fear responses such as running and general nervousness thereby negatively affecting overall condition. It is critical that impacts to these areas be minimized as winter range for alpine species is very limited in the Sikanni watershed.

**9. Sparsely Vegetated Alpine - (Coloured green on map)**

**DEFINITION/DESCRIPTION:**

The Sparsely Vegetated Alpine consists of the following broad habitat classes, which are shown on the 1:250,000 GIS map: Sparsely Vegetated Alpine, Warm Aspect Alpine and Rock.

These alpine areas occur in the west end of the watershed where the climate and terrain are more extreme. Sparsely vegetated alpine habitats tend to consist of very steep rocky areas, cliffs, windswept dry ridges and plateaus, and talus slopes; unvegetated rock habitat has been included in this habitat grouping due to its existence around the outer edges of some sparsely vegetated alpine. Lack of moisture, lack of soil and harsh climate limit vegetation cover on these areas. Hardy drought and cold resistant grasses and forbes can be found here, as well as a few species of low shrubs. Distribution is sparse and sporadic. Windward slopes and exposed ridge crests remain free of snow for extensive periods during the winter and they are dry during the growing season. Few species utilize this habitat in winter or summer. Those which do are Stone sheep, mountain goats, hoary marmots, some raptors, like the peregrine falcon, ptarmigan. The grizzly bear may use this habitat sporadically.
DISTRIBUTION:

On a regional basis, as with the vegetated alpine habitat, there is very little sparsely vegetated alpine habitat. The majority occur along the mountainous western portions of the Upper Sikanni.

MANAGEMENT STRATEGIES:

High Sensitive: Sparsely vegetated alpine has a low to moderate importance for wildlife habitat. This habitat is most valuable for recreational potential in association with undeveloped valleys and preserved as wilderness. The sheer ruggedness of the terrain precludes much of it from development.

10. Lakes

DESCRIPTION:

The fisheries inventory for Trimble, Beattie and Marion Lakes is outdated and very limited; bull trout, arctic grayling, lake chub, suckers, mountain whitefish and rainbow trout are known to occur. Other lakes in the area have no documented information, such as Cranswick, Colledge and Sikanni Chief Lake. Typically lakes in the watershed are cold and have low productivity which makes them susceptible to fishing pressure. Waterfowl and shorebird species which utilize the lakes provide a prey base for gyrfalcons, Peregrine falcons, hawks and owls, and small land predators such as mink and fox. Bald eagles utilize lakes, nesting in nearby riparian and forested areas. Emergent vegetation in lake shallows provide an important food source for moose and muskrat. Beavers occur in lakes where deciduous tree species are adjacent.

DISTRIBUTION:

There are approximately 46 lakes within the Upper Sikanni watershed area. The larger lakes occur at higher elevations, in wide alpine valleys. Smaller lakes commonly occur along the main Sikanni valley and along or at the headwaters of tributaries of the Sikanni. Lake edges usually consist of a densely vegetated, marsh habitat. Lake depths range from 5m to 34m. There is a high occurrence of alluvial fans where streams enter into lakes. The Upper Sikanni watershed in comparison to other watersheds in Northeastern British Columbia has a high amount of lake habitat. This is highlights the significance of the watershed in terms of this specific habitat type.
MANAGEMENT STRATEGIES:

(See specific guidelines for fisheries, water and water crossings.)
The Guidelines provide for a 1 km zone around Trimble Lake. Any other development
near lakes, ponds or wetlands must adhere to stated guidelines.

11. Rivers/Streams

DEFINITION/DESCRIPTION:
The rivers/streams in the Upper Sikanni watershed area provide spawning habitat for
most of the species listed in the Lakes section above. Fish species inhabiting the rivers
are an important food source for various wildlife species. There are four blue listed
species that utilize this habitat: grizzly bear, western wolverine, gyrfalcon and bald
eagle. The peregrine falcon, which is red listed, utilizes this habitat.

DISTRIBUTION:
There are approximately 13 named rivers/streams and many unnamed rivers/streams
within the Upper Sikanni watershed. Those named rivers/streams are: Trimble Creek,
Kohler Creek, Jesson Creek, Sidenius Creek, Colledge Creek, Gorrie Creek, Millet
Creek, Loranger Creek, Chicken Creek, Bartle Creek, Embree Creek, Gautschi Creek
and Moose Lick Creek.

MANAGEMENT STRATEGIES:

(See specific guidelines for fisheries, water and water crossings)
There will only be certain points along any watercourse in the Upper Sikanni watershed
area where crossings can possibly occur. Refer to the Guideline Application section and
the annotated map for further guidelines. Directional drilling will be considered in lieu
of further road development or any crossing. Any proposals will be addressed on a site
specific basis.
OPERATIONAL GUIDELINES

PURPOSE

The purpose of the Operational Guidelines is to provide proponents and or operators with a set of operating guidelines that will be employed at all levels, from geophysical survey operations, through initial well drilling, to the abandonment and reclamation of development. Activities within the USMP are subject to the guidelines which identify mitigation requirements. Proponents and operators are encouraged to discuss any areas of concern or questions related to the interpretation of these standards with MELP and MEMPR staff.

While specific operational techniques are identified in this plan they are by no means the only procedures permitted; the proponent and operators are encouraged to use and develop techniques that will reduce environmental impacts.

The Upper Sikanni Management Plan and its operational component are to be used in conjunction with MEMPR’s Oil and Gas Handbook. It is particularly important that all sub-contractors and their employees, be made aware of the conditions and guidelines of the USMP.

These Guidelines do not alleviate the responsibility of proponents to comply with all federal and provincial legislation.
General Guidelines

Development Plans

Development plans for the Upper Sikanni drainage must be submitted to EMPR/MELP after consulting with other operating companies and tenure holders in the plan area. While recognizing the issues of confidentiality and competitive requirements, tenure holders or their representatives will be required to meet with MELP and MEMPR staff as a committee to ensure that opportunities for cooperative and coordinated access occurs. Proponents are expected to coordinate their plans and activities with other operators to the greatest degree practical to reduce area impacts. This can involve: pooling efforts and resources, and use of common roads, pipeline and utility right-of-ways, and general infrastructure; efforts should be aimed at minimizing surface impacts and disturbances. Plans for deactivation and rehabilitation of all roads and trails at the end of each permitted phase of development must be incorporated in development plan.

At each stage of development, a proponent will be required to provide the best estimate of the overall extent of development. This is required to ensure that the scope and potential impacts of the proposed total development are clearly understood and identified.

Applications for well licenses and other surface disturbances such as pipelines and facilities must be submitted as a part of the development plan so as to project scenarios and development infra-structure options.

1. Initial Drilling - It is recognized that a definitive plan is not feasible at the initial stages of development. However, it is important that with the first exploration well, some outline of the conceptual developments be provided. This information will be helpful to scope potential impacts and related issues. The development proposal should attempt to identify locations for additional wells, should address conceptual pipeline and production facility plans, identify access options, and include details of mitigation measures and options for minimizing the impacts of drilling, production, and testing operations. This phase will include baseline environmental information for the area of the potential development. This information, referred to as an “impact assessment,” is intended to assess specific sensitivities of a given area, as well provide a broader assessment of access routes and potential development, and to evaluate mitigation options.

2. Pool Delineation - Once a pool has been discovered, a more detailed delineation development plan inclusive of additional proposals and more definite plans for mitigation of impacts from drilling, production, access routes and testing operations (e.g. pads, innovative testing methods) will be required. Elaboration of pipeline/facility proposals would also be expected. Delineation proposals should include proposed well locations and associated drilling and waste management options, access, and test/short-term production scenarios.
3. Pool Development - Ongoing production and pool development will require an operational management plan encompassing all facilities, access routes, pipelines, and associated infrastructure. The overall objective is to minimize intrusion and continue to mitigate the impacts wherever possible.

Habitat Impact Assessments

The level of detail required to evaluate the impacts of a proposed activity or development will vary depending on which phase of the development being proposed. It may be necessary to conduct environmental baseline analysis to determine what specific sensitivities exist and to define appropriate levels of development and mitigation.

Proponents are to meet with local EMPR and MELP officials to identify site specific issues prior to plan submission. It is particularly important that all contractors, subcontractors and their employees, be made aware of the conditions and guidelines of the USMP.

The level of detail expected in any habitat impact assessment will vary with project stage, the ultimate scope of development, the relative sensitivity of the proposed development area, and the extent of other existing and potential developments (both energy and non-energy related) in the area. The detail must be sufficient to allow examination of the impact of the proposed development on the environment.

All assessments methodology and reporting must meet government and professional requirement standards and are expected to address the following issues:

1. an analysis of site and access selection and construction procedures, with options;
2. baseline environmental conditions including the current status, habitat use, behaviours of wildlife and plan communities with a specific focus on blue and red listed species, direct and indirect impacts of the project on species, coordination measures that could reduce/eliminate adverse impacts to species. This assessment should include studies on wetlands and riparian resources, critical wintering habitat, impacts on alpine habitat and fisheries, and direct impacts on specific wildlife species. Critical lambing and calving grounds and critical rutting will be verified by proponent funded assessments/inventories;
3. impact mitigation options and plans to mitigate impacts;
4. monitoring and reporting plans;
5. results of public consultation programs and details of any future programs; and,
6. plans for reclamation of all disturbed areas with the primary objective of returning
the site to wildlife capability as close as possible to previous levels prior to
disturbance.

A foremost concern for MELP is the sub-alpine/alpine habitat. Proponents must be
prepared to provide technical justification and support for access proposals in these
areas. Alternative locations and technologies must be considered and assessed and a
detailed discussion of these issues included with any proposal. MEMPR/MELP will
evaluate the proposals and make a decision on siting. Restricted productivity is a
recognized characteristic of the alpine habitat, as is the visual impact of any
development within the alpine. Many alpine habitats support migration/corridors
routes which are critical to maintain. Mitigation strategies to deal with problems
associated with reclamation, ie: time to re-establish grass and plant growth and soil,
erosion, climate, native species planting, visual effect, and equipment needed to
properly scarify and re-seed must be included in the proposal. Connectivity between
alpine habitat and the surrounding habitat must be taken into consideration. This is to
ensure that escape corridors and post-calving habitats are not at risk.

Referral Process

The referral process will follow current procedures, however, the time frame required
for each proposal will be examined on its own merits and in relation to other activity or
development proposals. Each application should be submitted to MEMPR and
processed quickly, as soon as it is known that an activity will take place within the
Upper Sikanni. This extra time is needed in order to complete any studies that the
proponent will be requested to complete prior to commencing operations.

- Initial response time will be a minimum of 30 days
- Comprehensive development plans are needed in order to properly evaluate each proposal
- Impact assessment, monitoring and evaluation plans for air, water, wildlife, fisheries, and
terrestrial habitat as well as comprehensive reclamation plans must be submitted with the
development plans
- Where development has the potential to disrupt fisheries habitat, a fisheries inventory must
be completed prior to submitting development proposals
- Archeological overview assessments will be required
- The operating requirements in the watershed may evolve as the cumulative impacts of
activities and knowledge of the area become known.

Environmental Monitor

Project proponents will be required to provide an environmental monitor who will be
onsite for all construction activities creating surface disturbances. The monitor will
report all findings to MELP, MEMPR and the proponent.
Topsoil Salvaging

Prior to construction, all available topsoil (A and B horizon) on the well pad, gravel pit and new access road will be salvaged and stockpiled for use in reclamation. A soil assessment will be conducted to determine the total depth of the A and B horizon, which in turn will be the amount of topsoil to be removed and stockpiled. Topsoil salvaging will not occur during inclement weather or when the soil is significantly wet to cause damage or compaction. Topsoil stockpile areas will be outside traffic areas within the wellpad location. Drainage will be routed around and away from the pile. Topsoil stock piles will be signed and a berm constructed or ditched around the pile to contain all soil. Immediately after stockpiling topsoil will be seeded.

An assortment of boulders and miscellaneous woody vegetation removed from the well pad, gravel pit and access road will be stockpiled. This material will be pulled back and spread over reclaimed areas. The equivalent of 1-2 logs per acre and two or more brush piles (per acre) 10 feet across and 7 feet high will also be stockpiled and placed on reclaimed areas.

Flight Patterns/Distance

- A ‘Coordinated Flight Management Plan’ shall be completed and presented to MELP with each referral application. This shall include plans as to where staging areas will be, flight path to be used and hours of operation. The main objective of the plan is to avoid critical wildlife habitat and reduce harassment of wildlife.
- No flights shall take place over critical winter range between December 1st and May 1st.
- All fixed-wing aircraft as well as helicopters must follow the defined flight path to avoid critical habitat zones.
- All fixed-wing aircraft as well as helicopters must maintain an altitude of no less than 500m above ground, following the designated flight path. The main flight path follows the Upper Sikanni, approaching from the east (foothills) and flying directly to the area of interest, maintaining the 500m altitude.
- Following and circling of wildlife is strictly prohibited, unless wildlife studies are being conducted.

Timing/Seasonal Restrictions

These restrictions will, in most cases, apply to geophysical and pipeline programs. Where applicable, the following timing restrictions will apply also to roads and wellsite activity. These restrictions are site specific and commonly in the pink and green zone.
- Critical ungulate winter range - No activity between December 1st to May 1st.
- Critical lambing and calving grounds - No activity between May 15th to July 1st.

Proponent will be required to conduct inventories to define the critical lambing and calving grounds.
• Critical rutting - No activity between October 15th to December 31st. *Proponent will be required to conduct inventories to establish these areas as above.* Restrictions in the watershed may evolve as the cumulative effects of activity and knowledge of the area become known.

**Note:** Management of timing constraints is essential if plan objectives are to be achieved. Flight paths will be assessed in relation to each species as to where and when lambing and calving take place. Much of conditions 1 - 4 (timing constraints), and most critical winter ranges, coincide with the High Sensitivity Habitats which are shown on the attached map. Restraints such as critical rutting areas cannot be mapped as they are not necessarily habitat related and site specific ground truthing will be required.

**Fisheries**

• Where there may be an impact to fishery resource and habitat, a site specific fisheries inventory and habitat assessment must be completed prior to submitting development proposals.
• Two specific zones exist along all rivers/streams. The first coincides with the riparian habitats along all rivers/streams. The second is the critical instream habitat zones which are marked on the annotated map. These critical fishery habitat zones were identified using fishery maps and locating Class 3 LODs (Large Organic Debris) and Class 3 pools.
• Crossings of the rivers will be determined by habitat and terrain. The proponent is expected to produce an assessment showing various crossing options, so that with the aid of site specific investigation, the most appropriate crossing can be determined.

**Water and Water Crossings**

• Access to and use of the water sources will be examined on a site specific basis and must be approved by MELP.
• All 'significant stream' crossings must be made with clearspan removable bridges. Significant streams are: Sikanni Chief River, Trimble Creek, Kohler Creek, Jesson Creek, Sidenius Creek, Colledge Creek, Gorrie Creek, Millet Creek, Loranger Creek, Chicken Creek, Bartle Creek, Embree Creek, Gautschi Creek and Moose Lick Creek. Where smaller or unnamed crossings are involved, clean snowfills may be accepted.
• No development within 500m of Marion Lake, Beattie Lake, Cranswick Lake, Colledge Lake and The Sikanni Chief Lakes (Pass Lakes). A variable width disturbance buffer will be employed around all other lakes and ponds. The width of the buffer will be determined by site specific factors such as visual impacts, erosion potential, surrounding habitat class, fisheries values and type of development. Access for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.
• No development within 500m of the following rivers and creeks: Sikanni Chief River, Trimble Creek, Kohler Creek, Jesson Creek, Sidenius Creek, Colledge Creek, Gorrie Creek, Millet Creek, Loranger Creek, Chicken Creek, Bartle Creek, Embree Creek, Gautschi Creek and Moose Lick Creek. Access for geophysical exploration, pipelines and roads will be permitted but should be avoided if possible.

Geophysical Operations

• Seismic operations will be heliportable only, with avoidance/handcut lines not to exceed 1.5 meters width. Avoidance handcut methods should be used, where possible, to provide line-of-sight, rather than cutting trees down.
• Conventional operations may be approved where there are existing conventional lines.
• Seasonal restrictions on all seismic operations will apply between May 15th and July 1st. Where critical ungulate winter range and critical rutting areas are verified the following restrictions will apply:
  - Winter range: No activity between December 1st and May 1st.
  - Rutting range: No activity between October 15th and December 31st.
• Adjustment may be required to seismic programs that propose lines that run directly through or alongside critical habitat.
• Coordination of seismic programs must be demonstrated where possible. Use of existing lines must occur where appropriate. There is recognition that technical and competitive limitations need to be addressed when sharing data and is dependent on where the below ground structures lie. Where existing seismic information is available, the proponent is expected to attain this data.
• Ensure that all slashers are equipped with anti-spill spouts and absorbent pads when they arrive at the job-site.
• Trees near major rock faces do not impede line-of-sight and should be left standing.
• Lines should not be closer than 400m of each other or existing lines (existing lines defined as being those lines where regeneration does not exceed 2m). Where any seismic line intersects a point of access (i.e. a road, trail, another seismic line, etc.) the line is to be dog-legged.
• Reclamation plans for blowouts are to be in place before recording begins. If a blowout occurs, reclamation of the blowout will occur the next day.
• Any seismic line which progresses into the subalpine and alpine habitats will be expected to leave no trace of their activities within these habitats.
• Length of lines will be examined as to whether shorter lines could be possible without jeopardizing the end results; it is realized that rock structure and depth of possible zone are determining factors and that 'the shorter the line the shallower the zone'.
• Where the use of vibrosies or airgun techniques are possible they may be requested as an alternative to dynamite.
• A reclamation plan must be submitted with each seismic program that includes:
  * Trash removal. (e.g. flagging tap, containers and debris)
  * Felled trees will be bucked to lie flat to the ground.
  * Any damage to the duff layer will be repaired to prevent erosion
  * Access from either end of the line must be blocked; where ATV access is not possible
    or where next years growth will provide some screening abilities, this may not be
    required.

As information and activity evolves, requirements and conditions may vary.

Roads (access/closure)

Access management and control is key to achieving the objectives of the USMP. Access
control measures will be required to minimize or eliminate vehicular traffic not related
to development activity. It should be noted that recreational trails already exist in the
Upper Sikanni. Oil and gas industry vehicles, may be subject to weight restrictions,
limits on daily number of vehicles using the access. Measures may include:
• A coordinated access route developed using the concept of a single mainstream
  road, and a single pipeline route to minimize access. This route must be used by all
  operators to access the Upper Sikanni drainage.
• Measures such as controlled access and/or access closures may apply to other
corridors, where there is a demonstrated need. This may include a variety of
measures such as: gates, berms, excavation and slash placement. An effective
measure for permanent access closure in this watershed, where it is agreed that
closure is needed, will include steep slope recontouring coupled with the
distribution of large scattered rollback material, bridge/culvert removal, surface
diversion berms for erosion control and vigorous regrowth for screening.
• Access for exploratory wells, will be limited to temporary, winter-use roads only.
Exceptional circumstances may warrant change and specific approval must be
granted by the Assistant Deputy Minister, Energy Resources Division, and
Petroleum Resources, (ADME), in consultation with MELP.
• Travel on temporary roads is restricted to the period between November 1st and
March 31st. No vehicular equipment is to be moved on or after March 31st unless
specifically approved by the ADME, in consultation with MELP.
• Coordination of use of main road must be demonstrated.
• A maximum vehicle use restriction may apply to all access routes.
• All significant stream crossings must be made with clearspan removable bridges.
• Long, direct line of site situations must be avoided.
• Any road widening could be accomplished by lowering the existing road and not by
cutting into backslopes.
• Where steep cutslopes exist, they will be serrated, roughened or benched to allow
catchment areas for broadcasted seed.
• Seeding of roadsides must be done using plant/grass species unpalatable to wildlife, to reduce wildlife-vehicle collisions and conditions that promote poaching.
• Traffic speeds may need to be posted and adhered to. The objective is to reduce dust and reduce the potential for animal-vehicle collisions.
• Several options for pipeline and access corridors/crossings will be developed. These routes may not be the most economical routes, as other factors will be considered. These corridors/crossings may change as field studies and data acquired from proponent impact assessments are interpreted and increase knowledge.
• All gravel sources are to be authorized by BC Lands, and similar to the well pad, any gravel pit will have the topsoil stripped and stockpiled for use in reclamation.

Exploratory Wells/Drilling/Well Pads

• Directional drilling must be considered, if technically feasible, in lieu of further road development or further critical habitat alteration. The use of extended reach directional drilling and multiwell pads is recommended where possible.
• Remote sumps orumpless systems are to be used.
• The monitoring of wellsites remotely is recommended within the Upper Sikanni.
• Geotextile matting to reduce lease disturbances and conserve natural vegetation/topsoil is recommended.
• The use of benign mud systems is recommended.
• Initial drilling start up date is November 1st and breakup date is March 31st. No equipment to be moved before or after that period (unless otherwise agreed upon).
• Wellsites may be required to have fencing installed around the perimeter of each site. Sumps/tailing ponds will be fenced.
• All noise sources must be insulated.
• A closed drilling system is to be used in all drilling operations within the Upper Sikanni unless otherwise approved by MEMPR. Use of a closed system greatly reduces the size of reserve pits associated with drilling activities, further reducing well size. Use of the closed system significantly reduces the potential for contamination of shallow groundwater aquifers with drilling fluids.
• All wellsite locations should be located where cut and fill slopes could be minimized.

The well pad design should incorporate berms and a containment pit should be constructed to retain all runoff and sediment produced on site. The pad will have diversion channels on its perimeter to keep runoff from undisturbed areas from draining onto the pad (these will be rip-rapped). Energy dispersion
structures will be installed to ensure that diverted runoff is adequately controlled and erosion at discharge points is minimized. Each pit will be lined with a non-permeable synthetic liner to isolate fluids in the pit from shallow groundwater. The small reserve pits would be similarly lined.

- If the wellsite is successful, areas on the wellpad not required for future production will be reclaimed. This would involve bringing all slopes back to their original grade and seeding the disturbed areas. It may also be necessary to install silt barriers at selected locations to control off-site sedimentation until vegetation is reestablished on the disturbed areas. The well pad will be fenced.

- All gravel sources are to be authorized by BC Lands, and similar to the well pad, any gravel pit will have the topsoil stripped and stockpiled for use in reclamation.

Pipelines

- A single mainstream pipeline route has been defined in the plan. This route must be used by all operators.

- Separate pipeline corridors/crossings will be defined; these routes may not be the most economical route, as other factors will be considered. These corridors/crossings may change as field studies and surface/sub-surface data acquired from proponent impact assessments are provided.

- Routes will consider ecological as well as economic issues and be assessed on a site specific basis. Any route chosen will have taken into consideration several variables and will have been developed through consultation with the proponent.

- To utilize any pipeline route to its full potential certain factors of construction will be assessed: e.g. pipe size - large enough to eliminate the need for more pipelines, the laying of several pipelines within one corridor and width of right-of-ways (18m - 20m maximum).

- If pipeline access can be drilled to a wellsite which is situated in critical habitat such as alpine, then this method will be the preferred method.

- The proponent will be required to produce an impact assessment describing alternative routes possible, which may or may not include identified routes.

Waste

- Where vehicular traffic is used, efforts should be made to minimize vehicular traffic in disposing of waste water and other by-products.

- A closed mud system will be utilized, however a reserve pit may be required for cuttings and produced fluids, the mud being circulated for reuse. The pit will be lined with a 18 mil synthetic liner, depending on site characteristics. It will be fenced with a stock tight wire mesh fence. Following drilling, the liquid waste may be evaporated, trucked out injected down the wellbore or irrigated on the surface, and the pit will be backfilled and returned to natural grade and reclamation will then take place.

- Refer to the Waste Management Act for daily camp waste disposal.
Facilities/Power Lines

- All petroleum and gas processing facilities will be located outside the USMP area.
- Where feasible dehydration facilities will be situated outside the boundaries of the USMP area.
- Alternatives to running overhead lines will be considered where right-of-way crosses through wetlands, marshes.

Personnel/Camp Management

The following conditions are intended to reduce any negative impacts of human habitation:
- Company housing and/or camp facilities must be located outside the USMP area.
- MELP maintains authority to limit firearms in USMP.
- Refer to the Waste Management Act for daily camp waste disposal.
Reclamation plans must be submitted and approved as part of the construction permitting and approval process. Objectives of reclamation in the Upper Sikanni is to return the site to a condition where self-sustaining native vegetation provides:

1. Wildlife habitat capabilities equal to or greater than initial conditions.
2. Erosion control equal to or greater than conditions found on adjacent undisturbed sites.

Immediately following completion of a pipeline, abandonment of a wellsite, or the abandonment of any road, a complete reclamation of the subject lands will take place. Where seasonal barriers prevent the reclamation of any site, the proponent must begin reclamation as soon as seasonal barriers have changed.

If the wellsite is successful all areas on the well pad not necessary for eventual production will be reclaimed. This would involve bringing all slopes back to their original grade and seeding the disturbed areas. It may also be necessary to install silt barriers at selected locations to control off-site sedimentation until vegetation is reestablished on the disturbed areas. The well pad will be fenced.

Recontouring

All cuts that are made in steep or rolling terrain will be regraded and recontoured to blend into the surrounding landscape and to reestablish the natural drainage patterns. Emphasis during recontouring should be to return the disturbed areas to its original contour, to stabilize slopes, control surface drainage and to provide a more aesthetic appearance. Ruts and other scars should also be filled.

Scarification

Prior to re-spreading topsoil, disturbed areas will be scarified to loosen areas compacted by equipment traffic. Scarifying by ripping would promote water infiltration, better soil aeration and root penetration. In sloping areas scarification would also be important to provide a roughened interface between the topsoil and subsoil which would reduce the potential for soil slippage.

Ripping should be at least 12 inches deep and spaced no more than 16 inches apart. Scarification equipment may be required to make multiple passes over the same area to adequately relieve compaction. Ripping should be conducted when materials are dry to improve shattering of compacted layers. Every effort should be made to scarify along the contour to reduce erosion.
Topsoil

Prior to construction, all available topsoil (A and B horizon) on the well pad, gravel pit and new access road will be salvaged and stockpiled for use in reclamation. A soil assessment will be conducted to determine the total depth of the A and B horizon, which in turn will be the amount of topsoil to be removed and stockpiled. Topsoil salvaging will not occur during inclement weather or when the soil is significantly wet to cause damage or compaction. Topsoil stockpile areas will be outside traffic areas within the wellpad location. Drainage will be routed around and away from the pile. Topsoil stock piles will be signed and a berm constructed or ditched around the pile to contain all soil. Immediately after stockpiling topsoil will be seeded.

An assortment of boulders and miscellaneous woody vegetation removed from the well pad, gravel pit and access road will be stockpiled. This material will be pulled back and spread over reclaimed areas. The equivalent of 1-2 logs per acre and two or more brush piles (per acre) 10 feet across and 7 feet high will also be stockpiled and placed on reclaimed areas.

Salvaged topsoil should be spread uniformly over the disturbed areas. If compaction occurs during topsoil spreading, scarification would be necessary unless it could be relieved by equipment used for seedbed preparation. Topsoil spreading should not occur during wet periods when soils are easily compacted. Travel over newly topsoiled areas would be restricted. A trackhoe should be used to spread topsoil (approximately 2 inches depth) on steep cut and fill slopes wherever feasible.

Seeding

Immediately after stockpiling, topsoil of any disturbed area will be seeded with a mixture that is in accordance with the guidelines set out in the Oil and Gas Handbook; consultation with B.C. Environment is recommended.

Maintenance/Monitoring

Long-term monitoring is required to assure that revegetation is successful and erosion from disturbed areas is controlled. In the late spring or early summer in the first year after seeding a determination would be made by the proponent and MELP as to the need to fertilize seeded sites for improved establishment. Maintenance/monitoring is required until entire site is revegetated with native species and erosion potential is equivalent to the surrounding undisturbed areas.

ROADS - RECLAMATION

1. All precautionary measures, such as cross ditches and water bars, to prevent soil erosion and sedimentation to streams must be taken immediately after the road is put to bed.
2. All stockpiles from disturbed areas are to be seeded.

This prevents loss of soils due to erosion, as seeding will stabilize soils and provide vegetative cover until reclamation begins.

3. Seeding requirements to meet reclamation objectives will be done in consultation with Ministry of Forests and BC Environment.

Seed mixes which allow re-establishment of native species should be used in reclaiming disturbed areas.

Seed mixes must possess the following characteristics: fast growing, self-sustaining, little to no maintenance requirements and create limited fire hazard.

It is critical that certified seed be used and does not contain noxious weed seeds. The seed types and species are prescribed by the Ministry of Forests.

When seeding newly cleared areas to prevent erosion, avoid species attractive to bears. Benefits to a bear from roadside forage rarely outweigh the disadvantages of being close to roads.

All road construction within provincial grazing reserves must be seeded as specified by the Ministry of Forests.

4. Seeding should be done after the spring thaw or in late fall.

Soil moisture levels are most favorable for seed germination and seedling survival during the spring and early summer.

5. Where seeding cannot be carried out during the optimum period for germination, increased seeding rates and fertilizer applications must be employed to ensure successful revegetation.

6. Apply fertilizers prior to or during the seeding of disturbed areas.

The objective is to provide sufficient nutrient concentrations in the topsoil. The nutrients most commonly found lacking in the soils are nitrogen, phosphorous and sulfur. If soil conditions are unknown a soil analysis may be necessary to determine the type and amount of fertilizer required. No fertilizers to be applied within 10m of any stream.

7. Disturbed sites should be contoured as closely as possible to naturally appearing topography and an appropriate soil profile.
Specific site prescriptions will detail proposed end use and activities necessary to meet this use. Roads on environmentally sensitive areas will require complete recontouring.

8. Soil profile compaction on disturbed areas may have to be loosened to assist root penetration and soil moisture penetration.

9. On sites where erosion control problems are identified mulch may be required to hold seed in place. On disturbed slopes this will control erosion until vegetative cover is established, improves moisture retention and prevents surface crusting of the soil.

Where biodegradable straw mulch is used it should be covered with natural fibre netting held in place by wooden pegs. Cellulose fiber mulches should be used to hold seed in place on very steep slopes.

Asphalt mulch will not be used as it tends to seal soil and contribute to excessive heat absorption.

Where brush mulch is used, limbs and small stems should be mechanically crushed after disposal. Properly deposited slash will assist in erosion control and revegetation by providing microsites for seed germination and plant growth; decomposition will provide additional nutrients thus improving reclamation capability. Mats are cost-effective in areas where sites would otherwise require regrooming and reseeding several times before they are stabilized.

Chemical binders or soil stabilants are applied in aqueous solution for the purpose of penetrating the soil surface and reducing erosion by physically binding soil particles.

Chemical soil binders should be used to protect disturbed soil from wind and water erosion during delays in grading operations and also during hot and dry periods after final grading.

10. Slopes that are steep, dry or south-facing, characterized by sensitive soils or where vegetation establishment would be difficult, may require more intensive efforts to hold soil in place until vegetation is re-established.

11. Fertilizer and chemical binder/soil stabilizers application methods must prevent entry of these products into streams.

12. Abandoned pits should be stabilized by recontouring where possible and revegetating.

They must be replaced in the proper sequence over the recontoured pit area. Topsoil is to be salvaged from all over burden and aggregate stockpile sites.
BRIDGES - (Please also refer to Road Reclamation guidelines)

1. Procedures for abandonment:
   - Remove all structures, block maintenance roads and remove culverts.
   - Remove all the unstabilized fill material from the site and reslope and seed all unstable areas. Where erosion has occurred, contour the streambanks to as near original shape as possible.
   - Take measures to prevent vehicular access across streams.

2. Restore all disturbed areas adjacent to the stream to finished, stable slopes using appropriate methods such as seeding, planting, mulching, placing mat binders, soil binders, rock or gravel blankets or terracing on long slopes.

3. Apply slow release fertilizers prior to or during the seeding of disturbed areas.

   Conduct a soil analysis to determine the type and amount of fertilizers required. The objective is to provide sufficient nutrient concentrations in the topsoil; the nutrients most commonly found lacking in the soils are nitrogen, phosphorus and sulfur. If non slow release fertilizers are used, fertilizing should be done after germination.

DRILLING - (Please also refer to Road Reclamation guidelines)

1. Additional backfilling and recontouring may be required to make allowances for settlement and establishment of the appropriate grade. Stockpiled topsoil and overburden shall be spread in an appropriate profile over the site. The entire site should be revegetated.

2. After completion of all initial cleanups, sumps should be mounded up above the original level (extremely important during the winter months).

3. Surface drainage shall be diverted around disturbed areas; where this is not possible, erodible material must be protected by rip-rap or some other acceptable means.

4. Restore any natural drainage, volume and route, as near as possible to its original state.
APPENDIX A
CONDITIONS OF TENURE

Existing Oil and Gas Tenure

There are number of existing tenures located within the USMP. Those tenures will be subject to the general guidelines section of the USMP.

Oil and Gas Tenures proposed for disposition on December 13, 1995

1. All oil and gas exploration and development activities must conform with the operational guidelines set out in the Upper Sikanni Management Plan.

2. Flight management plans will be required to address wildlife concerns.

3. No development will be permitted within 1 Km of Trimble Lake.

4. Where significant impact to fishery resource and habitat is anticipated, site specific fisheries inventories must be completed prior to submitting development proposals.

5. Directional drilling should be considered in lieu of further road development.

6. Development proposals must include plans for deactivation and rehabilitation of all new roads and trails.

7. All significant road stream crossings of those streams identified in the Upper Sikanni management Plan, are to be made with clearspan removable bridges.

8. Efforts should be made to minimize vehicular traffic in disposing of waste water and other by-products.

9. Major gas processing facilities should be sited outside the Upper Sikanni Chief River drainage.

10. Seismic operations will be heli-portable with hand cut lines not to exceed 1.5 meters width. Use of existing lines must be considered where appropriate. Conventional operations may be approved where there are existing conventional lines. Efforts must be made to co-ordinate geophysical exploration surveys.

11. Site specific restrictions will apply to all geophysical exploration surveys and pipeline construction as follows unless special circumstances warrant and prior approval is obtained:
   a) Operations will be prohibited in areas of critical ungulate winter range from December 1 to May 1.
   b) Operations will be prohibited in critical lambing and calving grounds from May 15 to July 1.
   c) Operations will be prohibited in critical rutting areas from, October 15 to December 31.

12. Habitat impact assessments will be required for all exploration and development proposals. (Define activities in detail)

13. Existing designated routes must be used to access the Upper Sikanni Chief River drainage.

14. Co-ordination of use of main access road must be demonstrated. Gating and additional physical control measures may be required.
15. a) Access for exploratory wells will be limited to temporary, winter-use roads only unless exceptional circumstances warrant and specific approval is granted by the Assistant Deputy Minister, Energy Resources Division, (ADME).

b) Travel on temporary roads is restricted to the period between November 1 and March 31. No vehicular equipment is to be moved on or after March 31 unless specifically approved by the ADME.

c) Should exploratory drilling confirm the presence of commercially viable quantities of natural gas, proposals for all season roads will be accepted and evaluated.

16. **Access Requirements in Sensitive Habitat Areas.**
   (Shaded pink and green on the Upper Sikanni Management Plan USMP map)

   a) Well sites and related facilities (define) will not be approved in areas shaded pink on USMP map inclusive of riparian areas, cold air drainage, shrub grassland, avalanche chutes, warm aspect grassland and warm aspect forest. Access routes through these areas should be avoided if possible.

   b) In Green areas alternate exploration technologies such as directional drilling should be considered and evaluated before proposing new access in sensitive green areas. Proposals for access in sensitive areas defined in the Upper Sikanni Management plan must include detailed plans describing exploration efforts to date, and a detailed justification of the need to construct the access and for the location of a wellsite. The proposal must include potential development scenarios and infrastructure requirements, together with a detailed description of impact mitigation strategies which are consistent with the habitat plan.

17. Existing recreation trails in area; related access and site restrictions may apply.

18. Sensitive visual quality area; visual impact assessment may be required.

19. Potential for archaeological resources exists; overview assessment may be required.

20. Parcel is located in an area traditionally used by the Halfway River First Nation; Consultation with the Nation may be required.

21. **Special caveat for parcel 951059 re buffalo calving area.**
   Access and wellsite location will be prohibited in buffalo calving area delineated on USMP map.

22. **Special caveat for parcel 951055, 951060B, 951060C**
   Parcel contains traditional use site of significance to the Prophet River First Nation; consultation with the Nation may be required.

23. **Special caveat for parcel 951060B**
   Potential for macro-paleontological resources may exist in the Chicken creek area; for more detailed information on possible site location contact Prophet River First Nation
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Summary</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moose</td>
<td>Y X X X X X X X X</td>
<td>Associated with early seral, shrubby habitat. Riparian areas and emergent vegetation in lakes important summer food sources.</td>
</tr>
<tr>
<td>Plains bison</td>
<td>B X X X X X X</td>
<td>Shrub/Grass Lowland provides critical winter range. Some subalpine/alpine areas are important calving habitat.</td>
</tr>
<tr>
<td>Rocky Mountain elk</td>
<td>Y X X X X X X</td>
<td>Depend on open, grassy habitats for foraging; may include alpine. Forested types needed for thermal and hiding cover.</td>
</tr>
<tr>
<td>Caribou</td>
<td>Y X X X X X X</td>
<td>Alpine important for winter range. Open pine/spruce forest with significant terrestrial lichen cover may also provide important winter range. Calving may occur in high elevation, rocky, forested areas.</td>
</tr>
<tr>
<td>Stone's sheep</td>
<td>B X X X X X X</td>
<td>Closely associated with alpine habitats. Sensitive to disturbance particularly during lambing time and in winter. Winter range limited. Low elevation mineral licks may be used extensively.</td>
</tr>
<tr>
<td>Mountain goat</td>
<td>Y X X X X X X X X</td>
<td>Requires rocky terrain for escape cover. Normally associated with alpine but not uncommon in rocky canyons of rivers or forest types near rock bluffs and talus slopes. Associated with south aspects of these habitats in winter.</td>
</tr>
<tr>
<td>Mule deer</td>
<td>Y X X X X X X X X</td>
<td>Warm aspect grassland critical for winter range. Forest openings and alpine may provide summer habitat.</td>
</tr>
<tr>
<td>White-tailed deer</td>
<td>Y X X X X X</td>
<td>Dependent on snow intercepting forest cover with herb/shrub understory for winter use. Uncommon in Upper Sikanni area.</td>
</tr>
<tr>
<td>Black bear</td>
<td>Y X X X X X X X X</td>
<td>Warm aspects and road/pipeline right-of-ways heavily used in spring. Riparian and early seral habitats important. Den in rock crevices or at base of large spruce or cottonwood.</td>
</tr>
<tr>
<td>Grizzly bear</td>
<td>B X X X X X X X</td>
<td>Riparian and avalanche chutes used extensively for foraging. Burned areas may provide important berring habitat. Den in high elevation, high snowfall locations. Sensitive to human activity.</td>
</tr>
<tr>
<td>Western wolverine</td>
<td>B X X X X X X X X</td>
<td>Depend on ungulate carrion. Availability and diversity of large mammals underlies the distribution, survival and reproductive success of wolverines. Sensitive to human activity and development.</td>
</tr>
<tr>
<td>River otter</td>
<td>Y X X X X X</td>
<td>Restricted to river and stream corridors but utilizes adjacent forest for denning purposes.</td>
</tr>
<tr>
<td>Beaver</td>
<td>Y X X X X X</td>
<td>Limited to watercourses where there is an adequate supply of adjacent deciduous forest.</td>
</tr>
<tr>
<td>Marten</td>
<td>Y X X X X</td>
<td>Requires mature coniferous forests with abundant small mammal prey populations. Coarse woody, debris is an important habitat feature. Closed canopy forests are preferred habitat type. Large forest openings limit martin use.</td>
</tr>
<tr>
<td>Common Name</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Fisher</td>
<td>Follow hare and porcupine distribution. Limited to deep snow, requires closed canopied mature forests for winter habitat in heavy snowfall areas. Wildlife trees used for denning. Large forest openings are avoided.</td>
<td></td>
</tr>
<tr>
<td>Lynx</td>
<td>Follow hare abundance and distribution almost exclusively. Seral forest stages important for maintaining hare populations.</td>
<td></td>
</tr>
<tr>
<td>Mink</td>
<td>Limited to streams, lakes and other wetland areas. Dependent on riparian habitat and associated prey species.</td>
<td></td>
</tr>
<tr>
<td>Long-tailed weasel</td>
<td>Use a variety of habitats with abundant small prey. Coarse woody debris and cover from aerial predators important.</td>
<td></td>
</tr>
<tr>
<td>Northern Flying squirrel</td>
<td>Use extensive forest lands with some trees 17m or more in height. Declines in population could indicate fragmentation of habitat.</td>
<td></td>
</tr>
<tr>
<td>Red squirrel</td>
<td>Dependent conifer forests where it feeds on conifer seeds and mushrooms. Nests in tree cavities.</td>
<td></td>
</tr>
<tr>
<td>Red fox</td>
<td>Prefer edge habitat such as that bordering the shrub/grassland meadows and warm aspect grasslands. Also use early seral stages of forests with openings such as might be created by fire.</td>
<td></td>
</tr>
<tr>
<td>Coyote</td>
<td>An adaptable predator utilizing a wide range of habitat types but preferring open habitats and edges.</td>
<td></td>
</tr>
<tr>
<td>Gray wolf</td>
<td>Use seismic lines, other Right-of-ways and frozen lakes and rivers as travel corridors. Distribution dependent on ungulate prey populations and distribution.</td>
<td></td>
</tr>
<tr>
<td>Smith's Long Spur</td>
<td>Breed in alpine and subalpine habitats. Also use forest openings such as shrub/grassland meadows and man-made openings.</td>
<td></td>
</tr>
<tr>
<td>Mountain bluebird</td>
<td>Found mainly in semi-open habitats such as subalpine parkland areas and early second growth forests. Nests in cavities in trees, rock and soil. Feeds mainly on insects.</td>
<td></td>
</tr>
<tr>
<td>Purple finch</td>
<td>Arboreal nester (3-6m above ground). Coniferous and deciduous forest. Feed on buds and seeds in winter.</td>
<td></td>
</tr>
<tr>
<td>Pileated woodpecker</td>
<td>Prefers closed canopy coniferous forest where intrusions of deciduous growth such as aspen occur. Create cavities that may be used later by cavity nesting animals.</td>
<td></td>
</tr>
<tr>
<td>Boreal chickadee</td>
<td>Inhabits northern coniferous forests. Insect feeder. Nest in small cavities usually close to the ground.</td>
<td></td>
</tr>
<tr>
<td>Northern flicker</td>
<td>Use open forests and other sparsely treed habitats for forest openings. Create cavities for nesting, prefers aspen or pine with varying stages of decay. Abandoned cavities utilized by numerous other cavity nesting species.</td>
<td></td>
</tr>
<tr>
<td>Blue grouse</td>
<td>Occupy a variety of forested habitats. Tend to breed in forests adjacent to open habitats such as burned or logged areas, meadows and alpine.</td>
<td></td>
</tr>
<tr>
<td>Common Name</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>White-tailed ptarmigan</td>
<td>Use highest, least vegetated mountainous habitat. They may also occur in logged or burned subalpine areas. Tend to winter at lower elevations.</td>
<td></td>
</tr>
<tr>
<td>Northern shrike</td>
<td>Use open habitat with a perching site such as a snag. Breed in subalpine shrubland habitat.</td>
<td></td>
</tr>
<tr>
<td>Peregrine falcon</td>
<td>Nests on cliffs above lakes or river canyons. Very rare in the BC Interior.</td>
<td></td>
</tr>
<tr>
<td>Northern goshawk</td>
<td>Primarily a forest bird. Hunts in open areas such as grasslands, meadows, marshes, etc.. Usually breed in interior of large tracts of coniferous forests; heavily impacted by logging.</td>
<td></td>
</tr>
<tr>
<td>Bald eagle</td>
<td>Usually associated with water but may be found almost anywhere. May utilize carrion where available. Nest in tall snags or old growth trees near water.</td>
<td></td>
</tr>
<tr>
<td>Golden eagle</td>
<td>Forage over any open habitat with abundant prey. May nest in trees but more often on cliff edges. May utilize carrion where available.</td>
<td></td>
</tr>
<tr>
<td>Boreal owl</td>
<td>Cavity nester, preferring closed, mixed forest types. May breed at isolated locations at high elevations.</td>
<td></td>
</tr>
<tr>
<td>Great Grey owl</td>
<td>Found in all types of timbered habitats, and also frequents river valleys, lakeshores and agricultural areas. Nest in old hawk nests in trees, holes in cliffs, clay banks and man-made structures.</td>
<td></td>
</tr>
<tr>
<td>Barrows goldeneye</td>
<td>Nest in large natural cavities or cavity made by pileated woodpecker in conifer or deciduous trees. Will readily use a nest box. Nests must be near rivers, lakes and wetlands.</td>
<td></td>
</tr>
<tr>
<td>Harlequin duck</td>
<td>Use fast running, turbulent streams and nest on the ground immediately adjacent.</td>
<td></td>
</tr>
<tr>
<td>Northern pintail</td>
<td>Usually nest near water but may be found in grassland areas, meadows, forests and subalpine bogs.</td>
<td></td>
</tr>
<tr>
<td>Green-winged teal</td>
<td>Use emergent vegetation associated with marshes and lakes.</td>
<td></td>
</tr>
<tr>
<td>Common loon</td>
<td>Breeds on large and small lakes, in forested and open areas, and occasionally on marshes and rivers. Nest on shore on islands or partially submerged debris close to shore.</td>
<td></td>
</tr>
<tr>
<td>Hoary marmot</td>
<td>Inhabits alpine tundra, denning on rocky or talus slopes often under large boulders. Feed heavily on grasses and forbs from late April to late August. Hibernate for eight months of the year.</td>
<td></td>
</tr>
<tr>
<td>Northern Bog lemming</td>
<td>Frequents black spruce bogs but may also be found in deep mossy spruce woods, wet subalpine meadows and alpine tundra.</td>
<td></td>
</tr>
<tr>
<td>Common Name</td>
<td>Comments</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Meadow vole</td>
<td>Usually inhabits wet meadows where there is a protective carpet of grasses or mosses. It avoids deep forests and high, dry grassland.</td>
<td></td>
</tr>
<tr>
<td>Gappers Red-backed vole</td>
<td>Prefer conifer forest habitats, utilizing coarse woody debris for cover. Is an important prey species for many raptors and mammalian predators.</td>
<td></td>
</tr>
<tr>
<td>Pygmy shrew</td>
<td>Found most often in forest openings and grassy meadows; also in sphagnum bogs or in the shrubby borders of bogs and wet meadows. Smallest mammal in North America. Feed on insects and young mice.</td>
<td></td>
</tr>
<tr>
<td>Little Brown bat</td>
<td>Exploits a wide range of habitats. Hunt over lakes and streams and in forest openings. Summer roost in tree cavities, rock crevices, caves and under the bark of trees. Hibernate in caves and abandoned mines.</td>
<td></td>
</tr>
<tr>
<td>Northern Long-eared myotis</td>
<td>Occurrence noted at Hudson’s Hope. May occur in the boreal forest type in Sikanni watershed.</td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX C
### HABITAT USE BY WILDLIFE SPECIES EVALUATION LIST

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Red</th>
<th>Blue</th>
<th>Yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed Forest</td>
<td>5</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Open Forest</td>
<td>6</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Shrub/Grass Lowland</td>
<td>1</td>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td>Warm Aspect Grassland</td>
<td>1</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Riparian</td>
<td>1</td>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>Avalanche Chute</td>
<td>4</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Subalpine Meadow Park</td>
<td>1</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Vegetated Alpine</td>
<td>6</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Sparsely Vegetated Alpine</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Lakes</td>
<td>1</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Streams</td>
<td>1</td>
<td>4</td>
<td>19</td>
</tr>
</tbody>
</table>
# APPENDIX D

## COMMON AND SCIENTIFIC NAMES OF ANIMALS AND PLANTS WITHIN THE UPPER SIKANNI WATERSHED

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fishes</strong></td>
<td></td>
</tr>
<tr>
<td>Arctic grayling</td>
<td>Thymallus arcticus</td>
</tr>
<tr>
<td>Burbot</td>
<td>Lota lota</td>
</tr>
<tr>
<td>Dolly Varden (includes Bull trout)</td>
<td>Salvelinus malma</td>
</tr>
<tr>
<td>Mountain whitefish</td>
<td>Salvelinus confluentus</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>Prosopium coulteri</td>
</tr>
<tr>
<td></td>
<td>Oncorhynchus mykiss</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
</tr>
<tr>
<td>Beaver</td>
<td>Castor canadensis</td>
</tr>
<tr>
<td>Black bear</td>
<td>Ursus americanus</td>
</tr>
<tr>
<td>Caribou</td>
<td>Rangifer tarandus</td>
</tr>
<tr>
<td>Coyote</td>
<td>Canis latrans</td>
</tr>
<tr>
<td>Gappers Red-backed vole</td>
<td>Canis lupus</td>
</tr>
<tr>
<td>Gray wolf</td>
<td>Ursus arctos</td>
</tr>
<tr>
<td>Grizzly bear</td>
<td>Martes pennanti</td>
</tr>
<tr>
<td>Fisher</td>
<td>Marmota caligata</td>
</tr>
<tr>
<td>Hoary marmot</td>
<td>Myotis lucifugus</td>
</tr>
<tr>
<td>Little Brown bat</td>
<td>Mustela frenata</td>
</tr>
<tr>
<td>Long-tailed weasel</td>
<td>Felislynx</td>
</tr>
<tr>
<td>Lynx</td>
<td>Martes americana</td>
</tr>
<tr>
<td>Marten</td>
<td>Microtus pennsylvanicus</td>
</tr>
<tr>
<td>Meadow vole</td>
<td>Mustela vison</td>
</tr>
<tr>
<td>Mink</td>
<td>Alces alces</td>
</tr>
<tr>
<td>Moose</td>
<td>Oreamnos americanus</td>
</tr>
<tr>
<td>Mountain goat</td>
<td>Odocoileus hemionus</td>
</tr>
<tr>
<td>Mule deer</td>
<td>Synaptomys borealis</td>
</tr>
<tr>
<td>Northern Bog lemming</td>
<td>Glaucomys sabrinus</td>
</tr>
<tr>
<td>Northern Flying squirrel</td>
<td>Myotis septentrionalis</td>
</tr>
<tr>
<td>Northern Long-eared myotis</td>
<td>Bison bison</td>
</tr>
<tr>
<td>Plains bison</td>
<td>Microsorex boyi</td>
</tr>
<tr>
<td>Pygmy shrew</td>
<td>Vulpes vulpes</td>
</tr>
<tr>
<td>Red fox</td>
<td>Tamiasciurus hudsonicus</td>
</tr>
<tr>
<td>Red squirrel</td>
<td>Lutra canadensis</td>
</tr>
<tr>
<td>River otter</td>
<td>Cervus elaphus</td>
</tr>
<tr>
<td>Rocky Mountain elk</td>
<td>Ovis dalli</td>
</tr>
<tr>
<td>Stone sheep</td>
<td>Gulo gulo</td>
</tr>
<tr>
<td>Western wolverine</td>
<td>Odocoileus virginianus</td>
</tr>
<tr>
<td>White-tailed deer</td>
<td></td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Birds</td>
<td>Birds</td>
</tr>
<tr>
<td>Bald eagle</td>
<td>Haliaeetus leucocephalus</td>
</tr>
<tr>
<td>Barrows goldeneye</td>
<td>Bucephala islandica</td>
</tr>
<tr>
<td>Blue grouse</td>
<td>Dendragapus obscurus</td>
</tr>
<tr>
<td>Boreal chickadee</td>
<td>Parus hudsonicus</td>
</tr>
<tr>
<td>Boreal owl</td>
<td>Aegolius funereus</td>
</tr>
<tr>
<td>Common loon</td>
<td>Gavia immer</td>
</tr>
<tr>
<td>Golden eagle</td>
<td>Aquila chrysaetos</td>
</tr>
<tr>
<td>Great Grey owl</td>
<td>Strix nivalis</td>
</tr>
<tr>
<td>Green-winged teal</td>
<td>Anas crecca</td>
</tr>
<tr>
<td>Gyrfalcon</td>
<td>Falco rusticolus</td>
</tr>
<tr>
<td>Harlequin duck</td>
<td>Histrionicus histrionicus</td>
</tr>
<tr>
<td>Mountain bluebird</td>
<td>Sialia currucoides</td>
</tr>
<tr>
<td>Northern flicker</td>
<td>Colaptes auratus</td>
</tr>
<tr>
<td>Northern goshawk</td>
<td>Accipiter gentilis</td>
</tr>
<tr>
<td>Northern shrike</td>
<td>Lanius excubitor</td>
</tr>
<tr>
<td>Peregrine falcon</td>
<td>Falco peregrinus</td>
</tr>
<tr>
<td>Pileated woodpecker</td>
<td>Dryocopus pileatus</td>
</tr>
<tr>
<td>Purple finch</td>
<td>Carpodacus purpureus</td>
</tr>
<tr>
<td>Smith's Long Spur</td>
<td>N/A</td>
</tr>
<tr>
<td>White-tailed ptarmigan</td>
<td>Lagopus leucurus</td>
</tr>
<tr>
<td>Trees</td>
<td>Trees</td>
</tr>
<tr>
<td>Alder</td>
<td>Alnus spp.</td>
</tr>
<tr>
<td>Aspen</td>
<td>Populus spp.</td>
</tr>
<tr>
<td>Balsam poplar</td>
<td>Populus balsamifera</td>
</tr>
<tr>
<td>Birch</td>
<td>Betula spp.</td>
</tr>
<tr>
<td>Black spruce</td>
<td>Picea mariana</td>
</tr>
<tr>
<td>Cottonwood</td>
<td>Populus spp.</td>
</tr>
<tr>
<td>Red-Osier dogwood</td>
<td>Cornus stolonifera</td>
</tr>
<tr>
<td>Lodgepole pine</td>
<td>Pinus contorta</td>
</tr>
<tr>
<td>Subalpine fir</td>
<td>Abies lasiocarpa</td>
</tr>
<tr>
<td>White spruce</td>
<td>Picea glau</td>
</tr>
</tbody>
</table>