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FIRE HISTORY OF BOWRON  
LAKE PARK  
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FIRE HISTORY OF BOWRON LAKE PARK

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November 1993

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## Introduction

As part of the process to develop a vegetation management plan for Bowron Lake Provincial Park, the fire history of the park was assessed based on a one-day reconnaissance trip in June and 2 1/2 days of field work in August of 1993.

In June, Dennis Asher, Judi Beck, Stan Harvey and John Parminter of the Ministry of Forests, Debbie Cichowski of the Ministry of Environment, Lands and Parks and Bruce Lawson of the Canadian Forest Service examined portions of the park. The intent then was to obtain an initial impression of the historic role of fire and investigate the possibility of locating some sites for prescribed burning experiments in spruce - true fir types.

The fieldwork in August again involved Debbie Cichowski and John Parminter, as well as Donald McLennan of Oikos Ecological Consultants and Bruce Blackwell of B.A. Blackwell and Associates. Brad Hawkes represented the Canadian Forest Service this time. More detailed examinations were carried out at the landscape and stand levels. Fire boundaries were sketched on maps and stands were visited to assess site history and current stand structure.

## Objectives

The terms of reference for the Bowron Lake Park Vegetation Summary and Management Plan (Cichowski 1993) stated that:

"The objective for vegetation ecosystem management in Bowron Lake Park is to allow natural ecosystem processes to occur. Because ecosystem processes, especially fire, have been managed both within and outside the park, the degree to which past management has affected the vegetation landscape must be assessed prior to developing a management plan. Also, the vegetation features of the park must be assessed in a regional context to determine the significance of those features within a larger area."

Our fire history objectives are to determine the historic role of fire in the park, assign boundaries and dates to specific fire events, discuss the role of fire in maintaining the park's ecosystems and make recommendations for further work.

Given the size of the study area (121 600 ha) and the rather limited amount of fieldwork carried out, it was not possible to produce a definitive fire history with precise boundaries and dates. However, these initial examinations determined that fire has played an historic role in many of the park's forests and will continue to do so in the future. Another report (Hawkes 1993) describes fire history and behaviour for the more recent 1961, 1971 and 1992 fire seasons.

#### **Sources of Information**

Since the creation of the park in 1961, forest inventory work within its boundaries has been nearly non-existent. Recent forest cover maps exist only for a small portion of the park, in the northern limits. One regional forest inventory map dating from the early 1960s was located which showed colour-coded areas of mature forest, immature forest, non-commercial brush and non-forested types. Since the map was of a general nature and at a large scale, its utility was minimal.

The fire atlases of the Protection Branch of the Ministry of Forests in Victoria show the areal extent of known fires, both lightning-caused and man-caused. The first set of maps is at a scale of 1:63 360 and covers the time period from the early 1920s to the early 1940s. The second set of maps consists of a base map at 1:125 000 and mylar overlays that cover each of the decades from the 1940s to 1980s. Fires since 1985 have been entered into a computer database, giving a geographical location and size.

Only three fires of significant size were noted in the fire atlases - one from 1961 and two from 1971. All were lightning-caused. Smaller lightning and man-caused fires, primarily from the 1950s onwards, are also present.

Reports for the large and small fires of 1961 and 1971 which burned within Bowron Lake Park were obtained from the microfilm records in the Ministry of Forests' file room in Victoria. These provided more accurate fire locations to check against the fire atlas as well as detailed information on fuel types, fire weather and fire behaviour.

In 1989 personnel from the Habitat Inventory Section of the Wildlife Branch, Ministry of Environment, Lands and Parks (Victoria) carried out fieldwork in Bowron Lake Park as part of the Yellowhead Biophysical Project. Further photo-interpretive work yielded biophysical maps at a scale of 1:50 000.

## **Methods**

With background information from the fire atlases, the forest cover maps for the northern portion of the park and the biophysical maps and airphotos used in that project, the field teams surveyed the majority of Bowron Lake Park by boat and helicopter. Based on visual observation of the landscape, historic fire boundaries were sketched at a scale of 1:63 360.

The more accessible stands were visited in order to confirm or deny their fire origin, determine their vegetation species composition, describe their horizontal and vertical structure and assign a probable stand age. Evidence of fire took the form of charred or fire-scarred living trees, charred dead wood (either standing snags, stumps or fallen logs) and charcoal in the soil.

Ageing of several trees at particular sites was done to determine fire dates. This is appropriate when the tree species present are known to regenerate fairly quickly after crown fire events and can therefore provide an accurate estimate of the fire year. A cross-section of one fire-scarred tree was taken to date a crown fire which at that point was just a surface fire, scarring some trees which lived and therefore dated the event.

### **Area Description**

Bowron Lake Park contains four biogeoclimatic zones (see Fig. 1). At the lower elevations are the Sub-Boreal Spruce Zone (SBS) and Interior Cedar - Hemlock Zone (ICH), at middle elevations throughout is the Engelmann Spruce - Subalpine Fir Zone (ESSF) and at the highest elevations is found the Alpine Tundra Zone (AT).

Specifically, the ICHwk4 (wet, cool) and ICHmk3 (moist, cool) are present, the SBSwk1 (wet, cool), the ESSFwc3 (wet, cold) and ESSFwk1 (wet, cool) and the AT is undifferentiated. At this reconnaissance level of investigation the discussion can be realistically carried out only at the zone level.

### Sub-Boreal Spruce Zone

The SBS zone occupies the lower to middle elevations of the north-west and west-central portions of the park - from around Swan Lake, through Bowron Lake and eastward to Indianpoint Lake and the western arm of Isaac Lake. The SBS also extends up the valleys of the Bowron River and its major tributary, Huckey Creek.

The major climax tree species are hybrid spruce and subalpine fir. Associated tree species can include lodgepole pine, black spruce, black cottonwood, Douglas-fir, trembling aspen and paper birch (Ministry of Forests and Lands 1987).

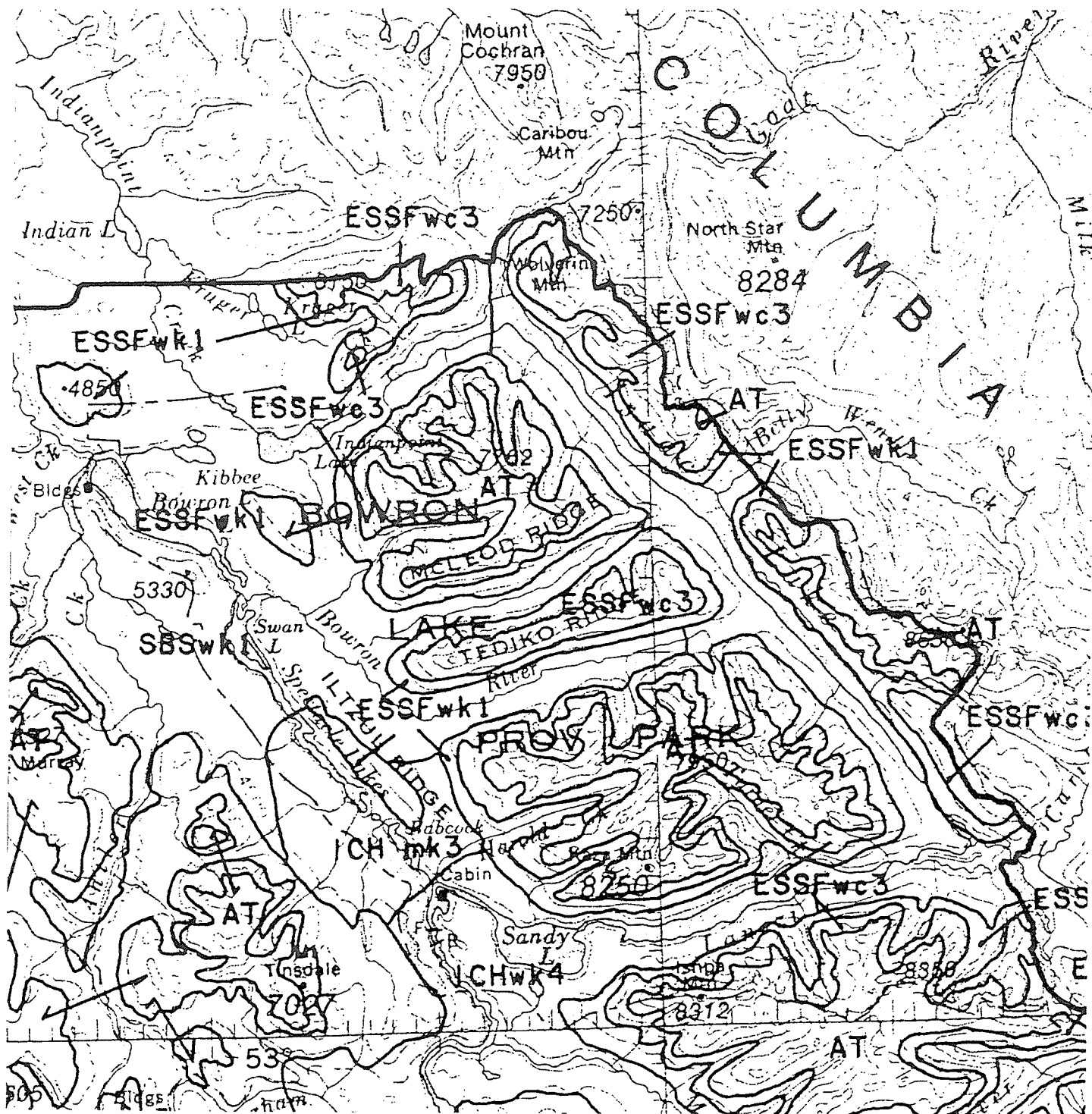


Figure 1. Biogeoclimatic zones of Bowron Lake Park.

The accompanying mapsheet which delineates the park's fire history, as determined by this project, shows that the majority of the last century's fire activity was in the SBS zone. While exact boundaries could not always be located, at least two fires in 1898 and 1893 burned over much of the lower and middle elevations of the north-western portion of the park (see Fig. 3). An earlier fire, presumed to have been in 1848, burned northwest of Indianpoint Lake. Other burned areas were seen north and south of the west end of Isaac Lake but fire years could not be estimated.

The forests originating from the fires of 1893 and 1898 consist of a relatively even-aged overstory of lodgepole pine, often with some trembling aspen, and hybrid spruce (likely shorter than the other two species). Much of the terrain consists of glaciofluvial deposits with dry soils, producing conditions more favourable to lodgepole pine and trembling aspen. The understory may contain younger subalpine fir and western hemlock. These later successional species may require the moister conditions produced by a build-up of soil organic matter and a shade-providing overstory before they can become established on such sites.

Remnant stands exist on the ridge west of McCabe Creek and between the western ends of McLeod and Tediko ridges. Some proportion of these remnants are in the ESSF zone.

Along Kibbee Creek a fire-scarred lodgepole pine indicated a fire in about 1853. This could be the result of a small, and presumably lightning-caused, fire or be near the boundary of a crown fire which was reduced to a surface fire at that point. Neither possibility could be investigated in the time available.

In this century, a fire in about 1920 burned over the ridge along the west side of Bowron Lake, coming down to the lakeshore in the vicinity of the park headquarters buildings. For the most part, it only came partway downslope along the ridge.



Figure 2. View to the north end of Bowron Lake - SBS at lower elevations, ESSF on ridge. Fire patterns on ridge face.



Figure 3. View north down the lower reaches of the Bowron River. Showing complex of fire patterns in the SBS. Top fire of 1971 is to the right, Spectacle Lakes to the left.

The only man-caused fire of significant size in the park dates from 1970 and is east of the south end of Bowron Lake. Compared to the area burned by lightning-caused fires, the impact of this fire was negligible.

Around the sides of Devils Club Mountain, on the east shore of Bowron Lake, both blowdown and fire evidence were seen. The blowdown, probably dating from 1975, contained burned snags. While the fire was too old to have opened up the stand and encouraged the blowdown, this points out that natural disturbances are not necessarily spatially discrete events.

#### Interior Cedar - Hemlock Zone

The ICH zone occupies the lower to middle elevations of the south-west, southern and eastern portions of the park - primarily along the lower end of Spectacle Lakes, and on both sides of Sandy Lake, Lanezi Lake and Isaac Lake to its northern corner at Wolverine Bay.

The major climax tree species are western redcedar, western hemlock, hybrid spruce and subalpine fir. Associated tree species are Douglas-fir, lodgepole pine, trembling aspen, black cottonwood and paper birch (Ministry of Forests and Lands 1987).

Continuing southward from the 1898 fire in the SBS zone, which likely spills over into the ICH, are found large fires from 1905, another dating to around 1850 and another from 1749.

Remnant stands exist on the west side of Iltzul Ridge and near Unna and Sandy lakes. On Iltzul Ridge, two-storied stands can be seen from Spectacle and Babcock lakes. These stands contain veteran Douglas-firs which survived the fire of 1905 as well as

the trees which regenerated after that event. The younger trees are most often lodgepole pine, paper birch, trembling aspen, hybrid spruce and western hemlock (see Fig. 4). The veterans may be even-aged and indicate a previous fire in the early 1830s, but this requires further investigation to confirm.

A stand between Unna Lake to Cariboo Falls consisted of lodgepole pine and paper birch with shorter hybrid spruce and an understory of western hemlock, subalpine fir, western red cedar and Douglas-fir. Several fire-scarred remnant lodgepole pines were present and one of these, which had already been felled for safety reasons, provided a cross-section (see Fig. 5). It yielded a fire date of 87 years ago - or 1906, but judging by the younger trees in this stand which dated from 1905 it was assumed that was the correct fire year. An error of one year in counting a fire scar is not uncommon due to missing rings at the point of analysis.

The 1850 fire probably burned mostly outside of what is now Bowron Lake Park. The stand examined on the west side of lower Spectacle Lake consisted of lodgepole pine and hybrid spruce with an understory of subalpine fir. Scattered paper birch in the main canopy were also present.

A fire in about 1749 burned the area between Sandy and Lanezi lakes and is presumed to have also burned the opposite slopes. The lower elevations here have forests consisting of Douglas-fir, hybrid spruce, western hemlock, western redcedar and lodgepole pine.

Although charcoal was found on the west side of Isaac Lake, on the cooler and wetter north-east aspects, there is minimal outward evidence of fire here at the landscape level. Stands along these shores contain western hemlock, hybrid spruce, western redcedar and subalpine fir. Paper birch may be present on wetter sites.



Figure 4. Two-storied stand on Iltzul Ridge, ICH zone. Veteran Douglas-fir with a mixed understory. A charred stump indicates the fire history.



Figure 5. Fire-scarred lodgepole pine near Unna Lake. The scar dated to 1906 but the fire was likely in 1905, when the tree was 35 years old. In the ICH zone.

While it is certain that fires have burned these forests, the fire frequency is long enough that the stands reach old age and tend to look rather homogeneous in spite of having originated after different fire events. For example, a 50 year old stand adjacent to a 100 year old stand produces an obvious boundary. A 300 year old stand next to a 350 year old stand does not.

The warmer and drier south-west aspects on the east side of Isaac Lake have a more discernible fire history, much of which is above the ICH in the ESSF. The most prominent fire-origin stands in the ICH are south of Betty Wendle Creek, where two fire events date to 1930 and somewhere between 1850 and 1750.

Stands along these shores may be pure western redcedar, pure western hemlock or mixed western hemlock - western redcedar with some hybrid spruce and subalpine fir. Sometimes charred or, more rarely, living fire-scarred western redcedar and western hemlock are found at the edges of burns. Hardwoods may also be present.

#### Engelmann Spruce - Subalpine Fir Zone

The ESSF zone is found above the SBS and ICH, between those zones and the AT zone throughout the more mountainous portions of the park. The major climax tree species are subalpine fir and Engelmann spruce. Associated tree species are lodgepole pine and, to a lesser extent, trembling aspen, black cottonwood and western redcedar (Ministry of Forests and Lands 1987).

A 530 hectare lightning-caused fire of 1961 - the Wol - is the most obvious fire in this zone on the slope along the east side of Isaac Lake (see Fig. 6). Others from 1961 at the southern end of the lake are smaller. The Wol fire contains some remnant stands and strips of forest that interact with avalanche tracks. This burn is regenerating very well thanks to abundant seed sources.



Figure 6. Wol fire of 1961 at the north end of Isaac Lake. Primarily burned in the ESSF.



Figure 7. Older burn on the east side of Isaac Lake, below Betty Wendle Creek. Likely dating from between 1850 and 1750. Note some interaction with avalanche tracks.

Two more recent burns in the ESSF were in 1971 on the south side of Ford Peak (the Key fire) and the other on the lower slopes of Flattop Mountain above Harold Creek (the Top fire). These burns were not regenerating as well as the 10-year older Wol fire, indicative of the slower rate of recovery of forests in the ESSF. However, the older burns south of Betty Wendle Creek now have well-established forests up to the treeline so it is apparent that regeneration is successful in the long-term (see Fig. 7).

In the absence of fire disturbances, the upper elevation ESSF forests exhibit small scale gap processes. All-aged stands of subalpine fir will occupy these sites with single tree mortality creating snags, coarse woody debris for soil formation and openings for understory tree regeneration (see Fig. 8). Lower elevation ESSF stands will be mixed Engelmann spruce - subalpine fir and also operate based on gap dynamics.

#### The Alpine Tundra Zone

This zone is found above the ESSF and, by definition, is largely treeless. Some subalpine fir in krummholz form may occur sporadically at the lower elevations or in sheltered areas. The AT zone in Bowron Lake Park is often steep and rocky, with little vegetation to speak of.

Alpine meadows are not extensive, being limited to an elevational band below the mountain peaks and above the ESSF. Snow avalanche tracks serve to provide vegetational diversity and often they extend downslope into the ICH and SBS.

Fires can burn into the AT zone, usually originating at the lower elevations. An old burn on McCabe Ridge (between Bowron Lake and Isaac Lake) burned very high on the slopes and left evidence in the form of charred snags in the avalanche tracks (see Fig. 9).



Figure 8. Upper elevation  
ESSF forest exhibiting  
small scale gap  
processes. Pure  
subalpine fir.



Figure 9. Upper ESSF, nearly AT,  
on McCabe Ridge. Showing charred  
snags which indicate past fire  
activity on these open slopes.

The 1898 burn at the west end of Tediko Ridge also burned high and its movement up the Bowron River valley was halted by an avalanche track which acted as a fuelbreak.

Others such as the 1961 fire in Moxley Creek (the Wol fire) and the 1971 fire above Harold Creek (the Top fire) also burned to high elevations, as have a few other older fires as well. Depending on the type of alpine vegetation present, it may have a long recovery time. Another effect is likely the promotion of more snow avalanches due to the removal of protective forest cover in the upper elevation starting zone.

This interaction between fire and avalanches can be considered as an agent of diversity, adding to the existing number of avalanche tracks which exist more or less due to topographic factors. The creation and maintenance of avalanche tracks promotes a different vegetative complex at the lower elevations in the runout zone which could be important habitat for wildlife species, probably grizzly bear and moose.

## **Discussion**

### Fire History and Effects

This rather cursory examination of the fire history of Bowron Lake Park has determined that fire has played a significant role in the park's forested ecosystems. The majority of recent fire activity has been in the SBS zone, followed by the ICH and ESSF zones. The AT zone has also been affected to a lesser extent.

Many parts of the park have forests which are clearly of fire origin. Based on visual observation and dating techniques, fire boundaries have been drawn and dates assigned. It is also apparent from the charcoal record that fire has affected those sites which show no outward evidence of being of fire origin.

Natural fire has served to maintain a variety of forest age classes on the landscape, with each burned area containing a tree species mixture which reflects the site's ecological characteristics, vegetative composition at the time of the fire and post-fire conditions. Fire, therefore, is a major determinant of the park's biodiversity.

The presence of later successional species in the understories of many fire origin stands points to replacement of the early successional species such as lodgepole pine, trembling aspen and paper birch by western hemlock and subalpine fir. In the continued and long-term absence of fire, the park's biodiversity will decrease.

#### Future Role of Fire

Although some fires which were suppressed had the potential to get larger, the overall impact of fire suppression on the park's ecosystem health has not been great. The fire frequency is long enough and the fire suppression period has been short enough that the first outweighs the second. This makes adoption of appropriate wildland fire management strategies that much easier, given that adverse ecological impacts of fire exclusion have been minimal.

#### Adjacent Lands

While the fire regime of some of the biogeoclimatic zones of Bowron Lake Park may be consistent with the rest of the zone (e.g. the ESSF fire frequency averaging from 200 to 300 years and each fire burning from 50 - 500 hectares), it is important to examine the park in context.

For example, the fires of 1920 and 1850 on the western side of the park also burned land which is now outside of the park and subject to forest harvesting operations. Therefore, due to land use change around the park, lightning-caused fires will not be able to maintain their historic natural regime.

Bowron Lake Park's future fire regime will have to be determined based on the role the park will play in maintaining natural ecosystem processes such as fire at the landscape level. At the same time, park managers are constrained by the fact that the park represents only a portion of that historic landscape. In addition, preservation of certain rarer ecosystems (which may indeed owe their origins to fire) may exclude fire from some sites in the future.

Hawkes (1993) discusses the potential for fires originating within the park to spread to adjacent lands. This is also a consideration which, along with visitor safety, will be a key component of the park's fire management plan.

#### Interpretive Programs

Based on our interaction with some park visitors it became apparent that more work is needed in the area of natural history interpretation. We were asked if the lichens on the trees were killing them and responsible for the dead forests on the opposite mountainside. We explained that the lichens were not parasitic plants and provided food for wildlife. The dead trees on the opposite slope were within the bounds of the Top fire of 1971, which we explained was a natural occurrence and an integral part of the park's ecology.

A natural history program would surely improve the visitors' appreciation of the park's ecosystems and the forces operating within them. Explanation of the historic role of fire would not only enrich their experience but build public recognition of and

support for appropriate fire management strategies in the park. Such a natural history program could take the form of expanded displays at the visitor centre, brochures and self-guiding nature trails.

#### Further Research Needs

As was noted earlier, the fire boundaries and dates assigned can be considered tentative in view of the limited amount of fieldwork carried out. More work will be required to firm up the boundaries and determine the fire years with more assurance. In some areas the age of the oldest trees on the site will not necessarily indicate the year of the last fire disturbance. But other evidence may show that fire has played a role even if the dates cannot be determined.

While the terms of reference (Cichowski 1993) called for development of a fire frequency map, this is not possible given the lack of certain data. If the standard forest inventory information were available for the entire park, it would be possible to model the areas represented by the different forest cover age classes. However, since the upper limit of the age class data may indeed be less than the fire frequency in some biogeoclimatic zones, the analysis would fall short.

#### Fire Management Policy

It should be the responsibility of B.C. Parks to define their philosophical approach to fire management in parks and recreation areas as well as the strategies and tactics to be employed. This has been done by the Forest Service for its wilderness areas. The most recent MOF wildfire management policy states that wildfires will be managed "...consistent with land and resource management objectives" (Ministry of Forests 1992) as opposed to the previous policy which required vigorous initial attack.

The most recent Parks fire management policy (Ministry of Lands, Parks and Housing 1986) corresponds to the previous Forest Service approach of fire suppression. In the long run, B.C. Parks needs to define its fire management philosophy, policies, strategies and tactics so future park fire management plans will be able to address the specifics of local conditions and operational options under the guidance of the greater scheme of a well-defined philosophy and policy.

### Literature Cited

- Cichowski, Debbie. 1993. Bowron Lake Park vegetation summary and management plan - terms of reference. B.C. Parks, Ministry of Environment, Lands and Parks, Prince George, B.C. 5 p.
- Hawkes, Dr. Brad. 1993. Bowron Lakes Provincial Park recent fire occurrence, behavior, and weather: a review of the 1961, 1971, 1992 fire seasons. Pacific Forestry Centre, Canadian Forest Service, Natural Resources Canada, Victoria, B.C. 15 p.
- Ministry of Forests and Lands. 1987. A field guide for the identification and interpretation of ecosystems of the Cariboo Forest Region - revised author's draft. Research Section, Ministry of Forests and Lands, Williams Lake, B.C. Unpaged.
- Ministry of Forests. 1992. Wildfire management. Draft policy dated July 8, 1992. 2 p.
- Ministry of Lands, Parks and Housing. 1986. Forest and vegetation management. Policy dated 86-06-18. 6 p.



Province of British Columbia  
Ministry of Environment

# BOWRON LAKE PARK

Scale 1:63,360 or 1 Inch to 1 Mile

## FIRE HISTORY

### REFERENCE

- |                             |  |                     |  |
|-----------------------------|--|---------------------|--|
| Park Boundary               |  | Roads Local         |  |
| Patrol Cabin                |  | Public Shelter      |  |
| Campsite (Undeveloped)      |  | Cabin               |  |
| Contour (Interval 500 feet) |  | Trail               |  |
|                             |  | Glacier or Icefield |  |

Compiled and produced by Mapping Section,  
Survey and Mapping Branch,  
Ministry of Environment,  
Parliament Buildings, Victoria, B.C. 1981.

**BOWRON LAKE PARK IS CLOSED TO HUNTING**  
Park Gazetted 29th June, 1961.

Map and indexes with price lists may be obtained from S.A.S. - C. Admin. of Environment, Parliament Buildings, Victoria, B.C.

- 1946 Burned area, with date or estimate
- B** Burned area, no date or estimate
- ▽ Small lightning fires, 1940-1984
- R** Remnant forest, unburned
- ▼ Charcoal in soil
- \* Charred live tree or fire-scarred tree, or charred snag or stump

