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GV 191.24 W5 NO. 1978: 8
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SONMOR, SHANNON
ANALYSIS OF UNGULATE USE AND

ANALYSIS OF UNGULATE USE AND FORAGE PRODUCTION
ON PRESCRIBED BURNS - BANFF NATIONAL PARK

Final Report

For: Len Dunsford
By: Shannon Sonmor

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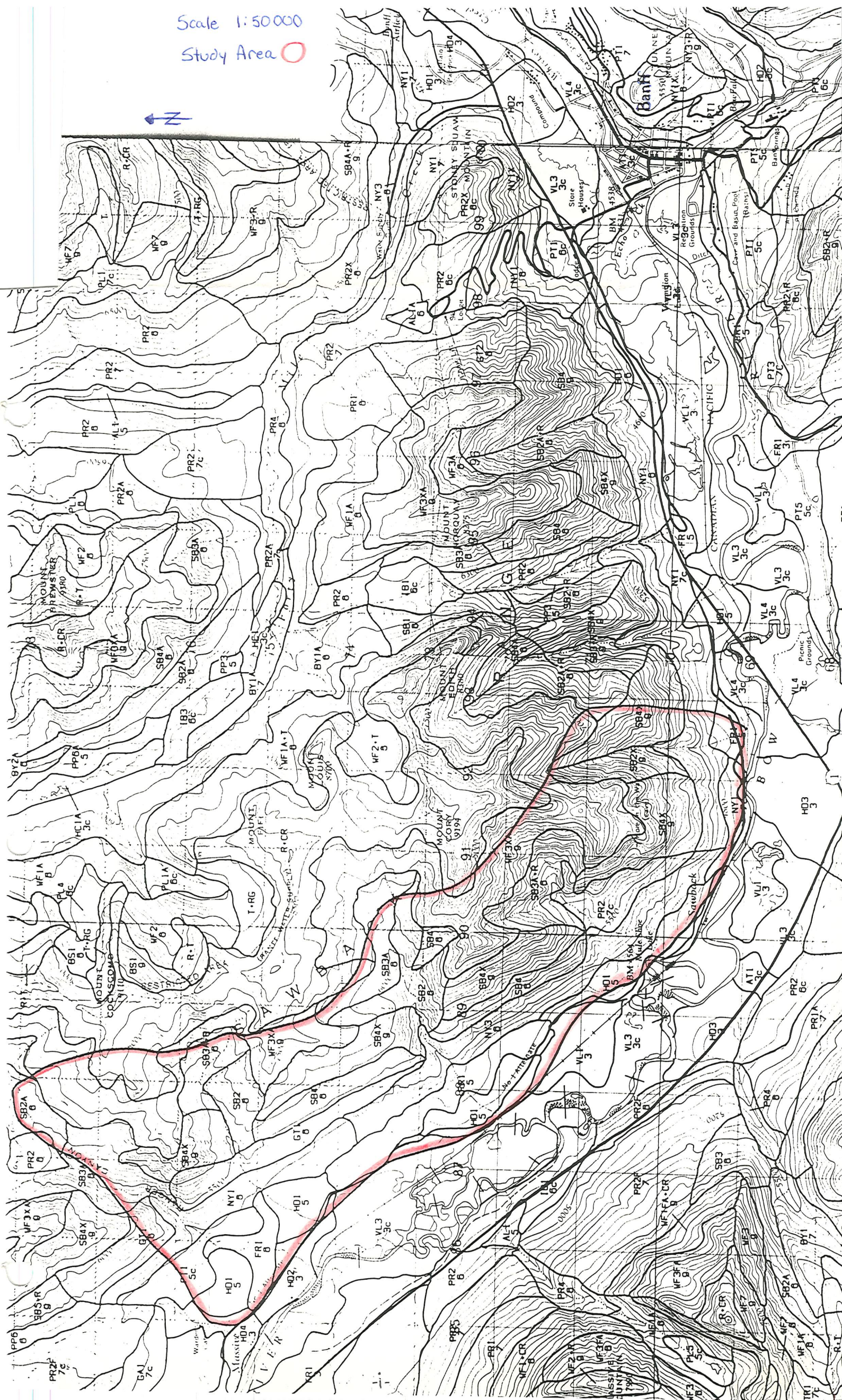


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INTRODUCTION

From April 28 to May 14, 1987, I conducted a practicum project to fulfill the requirements of the Wildland Recreation program. The project was undertaken in Banff National Park with the Warden Service. Brian Low, a Warden Service employee, supervised my work. I documented methodology for data collection, entered vegetation data onto a computer program for analysis, and proposed data evaluation and analysis possibilities.

This report presents the results of my practicum project. The report includes data collection methods, the computer program set-up for data evaluation, and proposed data evaluation possibilities. The national parks role in the study of prescribed burning is also discussed.

1.0 PRESENT MANAGEMENT

Fire is a natural process in the forest environment. For many years forest managers believed that fire destroyed wildlife and plant communities. Opinions are changing since fire is now being considered an effective management tool. When fire sweeps through an overmature, decadent forest stand, the area is opened up allowing for the growth of new plant species, providing excellent habitat for wildlife. Certain forest types depend on fire for their survival. For instance,

without fire Pinus contorta is eventually outcompeted by other species, and will no longer exist in the stand.

National parks are ideal locations for the study of prescribed burning since other land uses within the park are limited. No timber harvesting is allowed in national parks, so fire cannot eliminate potential timber supplies from the lumber market. National parks is just beginning to study the effects of fire and learning to effectively manage fire within the parks.

1.1 SUBJECT AND PURPOSE

The purpose of the practicum project was to assist the wardens in Banff National Park with their study of prescribed burns. I assisted in the collection of preburn data from permanent plots in proposed burns areas. I reviewed and documented the existing field data collection process which determines forage production and ungulate utilization on prescribed burn areas. Data which was collected during the spring of 1986 and the falls of 1985 and 1986 was input into the DataBase III software program, using an IBM-PC. Suggestions for data analysis were proposed.

1.2 STATEMENT OF PROBLEM

The use of fire as a management tool in national parks is a new field of study. At this time, the

best methods for assessing the effects of fire are unknown. Since little work has been done in this area the possibilities are unlimited. Due to restraints on manpower, the most time-effective method of sampling must be used. Time restrictions regarding sampling should have as little affect as possible on the quality of the data.

1.3 AREA DESCRIPTION

Banff National Park is located in the Rocky Mountains, approximately 130 kilometres west of Calgary, Alberta. The park is comprised of 6600 square kilometres of rugged mountains and wide valleys due to glaciation. The vegetation ranges from tundra to coniferous forest to grassland. During the summer, Banff experiences moderately warm temperatures and low humidity. In winter months the air is cold and dry; deep snow accumulates at high elevations. Chinooks may pass through the area near the townsite during the winter and cause abnormally warm conditions.

Banff is home to a diverse range of wildlife species. Lawrence states that some of the larger mammals present are grizzly and black bears, cougars, and wolves. There are also coyote, fox, lynx, and many species

of chipmunks and squirrels. The ungulate population consists of moose, elk, woodland caribou, mountain goat, bighorn sheep, and deer. Banff National Park is home to a diversity of birds including grey jays, chickadees, nuthatches, and woodpeckers. (1983)

The study area for the practicum is located in the Bow Valley approximately fifteen kilometres west of the Banff townsite. The area has a southern aspect and ranges in elevation from 1400 to 2600 metres above sea level. Holland describes the topography of the area as hummocky and ridged with long linear slopes. The soils are mostly brunisols and regasols with some luvisols. (1982)

Three sites have been identified within the area. The first site an upland pine site designated C-3 consists of Pinus contorta, Juniperus communis, Arctostaphylos uva-ursi. The second site a mesic pine site which is a C-6 designation with Pinus contorta, Shepherdia canadensis, and Aster conspicuus as its main plant species. The third site is alluvial aspen and designated as C-16 with Populus tremuloides, Elymus innovatus, and Lathyrus ochroleucus growing there.

1.4 HISTORY OF FIRE IN BANFF

White states that fire has played an important role

in the shaping of the forest in the Banff area.

Before 1880, there were many fires which may have been caused by lightning or the natives living in the area. During the 1880's when man arrived in Banff, many of the fires were man-ignited due to the construction of the railway. Since 1940 the number of man-caused fires has been reduced due to improved fire control. The frequent burning of forests had maintained the dry montane and lower subalpine forests in Banff National Park. (1985)

1.5 POLICY AND STATEMENT

Parks Canada policy states that resources will be managed to "ensure the perpetuation of naturally evolving land" (1979). This means that since fire is a natural part of the environment fire should be allowed to occur where it would without man's interference.

Due to the presence of facilities and people within the national parks, fire cannot be allowed to occur in uncontrolled circumstances. Fire must be managed under control to achieve the best results. The prescription of fire is allowed since "Where active resource management is necessary, techniques will duplicate natural processes as closely as possible"

(Parks Canada, 1979). Therefore, fire is a natural part of the landscape and should not be excluded from national parks.

2.0 SAMPLING METHODS

2.1 BURNUNITS

The proposed burn areas in the park have been divided into burnunits. Burnunits are defined by natural or man-made boundaries such as roads, rock outcrops, creek drainages, and ridges. Within each burnunit three ecosites, as identified in the Ecological Land Classification, have been selected for sampling.

2.2 TRANSECTS

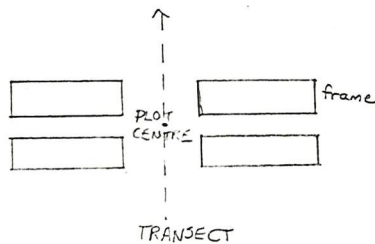
The sampling area within each ecosite is defined by five permanent fifty metre transects. A tree near the beginning of each transect has been blazed and the transect number has been carved on the blaze. A one metre square plot is located at every ten metre interval along the transect. A permanent stake marks the plot centre.

2.3 VEGETATION DATA COLLECTION

A rectangular plot frame is used to define the plot.

The frame may be placed in four different positions (see Figure 1). This is to avoid clipping the same vegetation twice in one year. The location of the frame should be the same at all plots and should be noted on the plot sheet. All data is recorded on fire/range plot sheets (see Appendix I).

Figure 1. Plot Frame Location

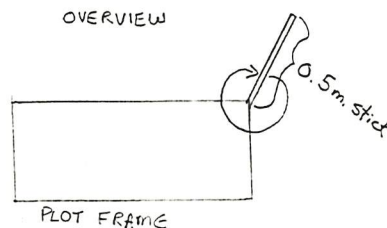


The grasses and herbs within the plot are identified and an estimate of the percentage cover of each species within the plot is made. The species name is listed using the first two letters of the genus and species (ie: Amelanchier alnifolia is AMAL). All species which are found in trace amounts are designated one percent.

The shrub species are identified and the number of potential browsable tips are counted in five separate height classes. The height classes are

0 to 0.5 metres, 0.5 to 1.0 metres, 1.0 to 1.5 metres, 1.5 to 2.0 metres, and 2.0 to 2.5 metres. The area to be sampled is determined by rotating a 0.5 metre stick over one of the corners of the plot frame (see Figure 2). The browsable tips which occur in the radius of the circle, within each height class, are recorded by species.

Figure 2. Sample area for browsable tips.



An estimation of the amount of browsing which has occurred is made. The estimation is the amount of the shrubs which was browsed for each species. The browsing is classified into three categories: A for slight, B for moderate, and C for excessive. The number of browsed tips for each species is tallied and recorded under the appropriate category on the plot sheet. The recorder should make note of any other animal activity (ie: bark eaten).

The herbaceous vegetation within each plot is clipped and placed in a bag which is marked with the burnunit, ecosite, and plot number. The vegetation is dried in an oven for twenty-four hours and then it is weighed. The weight is then converted to tonnes per hectare and recorded on the plot sheet.

The vegetation which is clipped should be palatable (ie: live) and accessible to animals. Vegetation which is inaccessible includes roots, vegetation covered by litter or other vegetation. Depending on the plant species; leaves, twigs, flowers, or berries may be collected.

2.4 PELLET-GROUP DATA COLLECTION

In each ecosite pellet-groups are tallied along the entire fifty metre transect for one metre on each side of the transect. This can be done while walking between plots. The pellets are categorized by species. The species include elk, deer, sheep, and other. Pellet-groups are distinguished as either winter or summer by their appearance. There is no definite method for distinguishing between deer and sheep pellet-groups other than local knowledge of the animal's

ranges.

The following guidelines for tallying pellet-groups should be followed.

1. Thirty pellets or more constitute a group.
2. There must be more than half of the pellet-group within the plot in order to be counted.
3. Groups close together are counted separately unless joined by pellets.
4. A large clump of pellets should be inspected to determine if different ages can aid in distinguishing separate groups.
5. Litter covering the groups should be cleared to allow for accurate identification.
6. After rainfall it is difficult to identify age classes due to moistening of older groups. Care must be taken in identifying.

3.0 ANALYSIS OF DATA

The data collected from the vegetation plots may be analyzed to allow for comparison of certain characteristics for each site which is sampled. For instance, The frequency of species may be calculated for each ecosite to allow for comparison between ecosites and seasons. The amount of browsing which has occurred will indicate the importance of certain species as

browse species. The clipped vegetation when converted to tonnes per hectare will allow comparison between ecosites and seasons in the sites forage production. The pellet-group density calculated for each ecosite will indicate population trends to be compared by season, year, and location of the ecosite. The main use of the data will be comparison of pre-burn and post-burn data.

APPENDICES

APPENDIX I
Fire/Range Plot Sheet

①

DATE:

OBSERVERS:

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APPENDIX II

Excerpt: National Parks Policy

Program Policies

1.0

Protecting Heritage Resources

1.1

Protecting Natural and Cultural Resources

Parks Canada will make protection of heritage resources its primary consideration.

Ecological and historical integrity are Parks Canada's first considerations and must be regarded as prerequisites to use. Protection of heritage resources is fundamental to their use and enjoyment by present and future generations.

The various factors which contribute to deterioration of heritage resources will be analyzed by means of thorough research and protection will be offered in ways appropriate for the type, significance and sensitivity of the resources. Parks Canada recognizes a responsibility to encourage public understanding and enjoyment of heritage resources. The means of doing so in a particular situation will depend upon the constraints which are necessary to ensure the perpetuation and protection of such resources.

1.2

Impact Assessment and Review

Parks Canada will take into account, in its planning and management, the full range of implications of any proposed actions on public lands under its administration, management and control.

The consequences of any proposed project, program or activity under Parks Canada's management and control or on lands under its jurisdiction must be considered as early as possible in planning, and this assessment incorporated in the decision to proceed with, reject or modify the proposed action. Consideration should be given to the full range of possible adverse impacts: biophysical, Socio-economic, cultural, archaeological, historical and aesthetic. All actions with environmental implications are subjected to identification, measurement and evaluation procedures to the degree dictated by the magnitude of the potential for adverse effects. In this way, Parks Canada adheres to the Federal Environmental Assessment and Review Process established by Cabinet in 1973.

1.3

Identifying Heritage Resources

Parks Canada will identify, in consultation with provincial and territorial governments, heritage

resources that are of national significance for possible inclusion in the Parks Canada system.

Parks Canada will undertake studies and inventories of Canada's heritage resources. Using criteria outlined in each activity policy, heritage resources of national significance will be identified and specific examples will be selected for possible establishment as elements in the Parks Canada system. Consultation with provincial and territorial governments is essential in park identification and selection.

1.4

Man/Land Relationships

Parks Canada will protect and present heritage resources in the Parks Canada system in ways which reflect the interrelationships between man and nature.

A distinction is sometimes made between places which are of cultural heritage significance, and places of natural heritage significance. But man and his environment cannot be separated. Parks Canada's efforts to preserve and present natural areas should not ignore the ways in which man has lived within a particular environment and efforts to protect and present historic places should recognize that physiography and climate have been significant factors in Canada's development and history.

1.5

Research

Parks Canada will conduct and encourage research for the identification, protection, understanding and use of Canada's heritage resources.

Research is essential for an understanding of heritage resources so that they can be identified, selected, protected, enjoyed and presented in a responsible and effective manner. Identification and selection of heritage resources of Canadian significance requires intensive studies and inventories of natural regions and historic themes. Protection of heritage resources requires continuing research into the impact of use and techniques of conservation and resource management. Meeting public needs often requires surveys and analyses to identify these needs and to determine how best to respond to them. Accurate interpretation programs must be based on competent research. In satisfying research requirements, Parks Canada will draw upon the expertise of researchers in federal, provincial and territorial government agencies, in universities and in the private sector, as well as upon the knowledge and experience of individual citizens.

In addition to undertaking essential research for

Parks Canada Objective for National Parks

To protect for all time representative natural areas of Canadian significance in a system of national parks, and to encourage public understanding, appreciation and enjoyment of this natural heritage so as to leave it unimpaired for future generations.

1.0

The National Park System

National parks are intended to protect representative examples of the diversity of Canada's landscape and marine areas for the benefit of present and future generations. To this end, Parks Canada has divided Canada into 48 natural regions, of which 39 are terrestrial and 9 are marine. Each of these natural regions should be represented in the system of national parks. In order to achieve this goal, certain natural areas are identified within each natural region, which include the greatest diversity of natural themes (biologic, geologic, physiographic, geographic and oceanographic) and which are therefore representative of the natural region. These areas are referred to as "representative natural areas of Canadian significance". Potential national parks are selected from among the representative natural areas of Canadian significance.

Parks Canada cannot, however, protect all of the areas identified as being representative natural areas of Canadian significance. By working with the provinces and territories to establish and make public a register listing identified areas, Parks Canada hopes to encourage other public agencies and appropriate private organizations to work toward their protection.

Public interest and support as well as the co-operation of provincial and territorial governments is essential for the establishment of new national parks or the adjustment of existing park boundaries. Within the provinces, a federal-provincial agreement is necessary setting out the terms and conditions of transfer of administration and control of required lands from the province to the federal government. The process of establishment may take several years and includes joint discussions and feasibility studies by the federal and provincial governments; agreement on terms of establishment and park boundaries; public involvement; resolution of land-use conflicts including agreement on traditional land uses which may be permitted and other special measures to reduce the impact of a new national park on local occupants or users; land assembly; and amendments to the federal legislation under which national parks are established. When this last step has been taken, Parks Canada can formally plan for the protection of the area and for public enjoyment of the park's natural heritage resources.

The federal-provincial agreement to create a new national park is one of the most significant steps in the process of national park establishment. It is a joint agreement, and as such, commits two levels of government to a common objective: to protect the park area and encourage public understanding and enjoyment of the area both at the time the park is established and in the future. When national parks are created in conjunction with native land claims, for example in the northern wilderness areas, a special agreement will be necessary between Parks Canada and representatives of local native people to set up an agreed joint management regime for the park. Without the support and co-operation of the provinces, territories, native organizations and the general public, the federal government cannot meet its responsibility to protect the natural heritage of all Canadians.

1.1

Identifying Representative Natural Areas of Canadian Significance

1.1.1

Representative natural areas of Canadian significance will be identified within each land and water natural region of Canada according to the following criteria:

- i) The area must portray the diverse geological, physiographical, oceanographical and biological themes of a natural region; and
- ii) The area must have experienced minimum modification by man or, if significant modification has occurred, must have potential for restoration to a natural state.

1.1.2

Representative natural areas of Canadian significance will be identified in consultation with provincial and territorial governments, other federal agencies and with the interested public.

1.1.3

Representative natural areas of Canadian significance will be identified regardless of their current protected status or jurisdiction.

1.2

Selecting Potential National Parks

1.2.1

Potential national parks will be selected from among identified representative natural areas of Canadian significance according to the following criteria:

- i) the area will be within a natural region which does not already have sufficient representation in the system of national parks; and

Background

Canadians live in a land rich in natural beauty. The shores of three oceans, the Great Lakes, mountains, prairies, thousands of lakes and rivers, forest and tundra - these along with their flora and fauna are some of the natural treasures we have inherited.

For centuries this landscape was affected mainly by natural forces. But more recently, with the advent of an agricultural and then an industrial society, human activities have been altering the natural environment at an accelerating pace.

National parks are a means of preserving in a natural state areas which are representative of the major natural environments of Canada. They are special places which protect part of the heritage of all Canadians, now and in the future. They offer a range of opportunities to learn about and enjoy the natural environment. In order to enable the continued protection of these areas, it is necessary to ensure that visitor activities do not result in harmful changes to ecology or to the appearance of the landscape. To this end, zones are identified within each park which reflect the degree of resource protection required and the type and intensity of visitor use that is appropriate. In this way, a balance can be achieved between visitor use and wilderness preservation within each national park. In some parks in remote and sensitive natural regions, where large areas are required for ecological preservation and where man can experience nature on its own terms, only certain zones may be designated, so as to maintain the entire area in a wilderness state.

Not all national parks are the same. In remote or northern areas, potential national parks may be identified which are the homeland of people who have traditionally depended on the land and its resources for their survival. Their culture reflects this fundamental relationship. In certain cases, lands which have been traditionally used by native people are the subject of unresolved native land claims. If such areas are to be protected within the national parks system, they must be planned and managed in a way which reflects these special circumstances. An appropriate balance must be maintained between the rights of the public to understand and enjoy Canada's natural heritage, the rights of local

people to continue certain traditional uses and the requirement to protect the wilderness of the area.

The first national park in Canada was established in 1885 to protect the newly discovered Banff Hot Springs for public use. The national park system now covers 1.3 percent of Canada's land mass, including areas in each province and territory. Although a variety of landscapes is now represented in Canada's national park system, certain elements are missing; for example, arctic and sub-arctic natural regions and prairie grassland. In addition, marine natural regions are not well represented in the national parks system. Although there are complex jurisdictional problems related to their establishment, policies for national marine parks will be developed. Decisive action is required while the opportunities exist if the heritage of the past is to be passed on to the future. The identification and protection of our important natural heritage areas cannot await or accommodate the advance of competing land uses. National parks are an investment in the future. Foresight in preserving such areas will bring many future rewards even if access is difficult today.

On the international level, Canada's national parks are an important component of a world-wide endeavour to protect outstanding natural areas. Within Canada, the national parks are part of a family of parks and wildlife areas administered by different levels of government and designed to serve various public needs. Within this Canadian family of parks, the national parks are distinct because they are natural areas of Canadian significance, because they are protected by federal legislation and because they are financed by and dedicated to all Canadians.

There are many benefits of national parks. Some are intangible such as the knowledge that future generations will be able to appreciate wilderness areas of untouched natural beauty. Others are more tangible, such as the enjoyment of visiting national parks across Canada. There are also benefits which can be measured in terms of jobs created and tourism industry development. Furthermore, national parks are ecological benchmarks for research into natural processes and into the relative effects of man on lands outside national parks. For all these reasons, Canada has a responsibility to protect these special places and to encourage public appreciation now and in the future.

3.0

Protecting National Park Resources

Land management within national parks differs markedly from that of most other lands, where effort is directed toward modifying or controlling nature, producing crops or extracting natural resources. Within national parks, effort is directed towards protecting our natural heritage by maintaining the physical environment in as natural a state as possible. This fact has far-reaching implications for the resource management of national parks in that many concepts or ideas which are relevant or essential to the successful management of other lands have limited relevance to the management of national parks. Therefore, caution should be exercised before any active manipulation of park resources is undertaken with preference given to allowing natural processes to function unless they have been clearly altered or made inoperative by man-induced changes.

The management of national parks should not, however, be in isolation from the regions in which they are located. Few, if any, land uses, either within or outside national parks, can occur without there being both beneficial and detrimental effects on the surrounding lands. Co-operation with other land management agencies is therefore essential.

National parks are special areas which are protected by federal legislation from all forms of extractive resource use such as mining, forestry, agriculture, oil, gas and hydro electric development and sport hunting. In some new national parks, however, certain traditional resource uses by local residents may be allowed to continue. Such activities must not destroy or seriously impair the natural values for which the park was established. They will be clearly agreed to in each case at the time of formal establishment of the national park. It is also essential that in establishing new national parks Parks Canada honour the treaties of Indian people which in some cases may involve hunting, fishing and trapping rights in national parks.

The natural and cultural resources of a national park must be protected from the effects of man's activities so that they can be left unimpaired for future generations. Actions by Parks Canada to provide for public understanding and enjoyment of national parks must be carefully considered to minimize their environmental impact. The process of environmental assessment and review is intended to ensure that the full-range of possible adverse effects of any action within national parks is identified, measured and evaluated and that measures are taken to reduce foreseen adverse impacts or to proceed with alternative actions.

3.1

Resource Protection

Natural resources within national parks will be given the highest degree of protection to ensure the perpetuation of a natural environment essentially unaltered by human activity.

3.2

Resource Management

3.2.1

Natural resources within national parks will be protected and managed with minimal interference to natural processes to ensure the perpetuation of naturally evolving land and water environments and their associated species.

3.2.2

An integrated natural resource data base will be developed and maintained for each national park.

3.2.3

Manipulation of naturally occurring processes such as fire, insects and disease may take place only after monitoring has shown that:

- i) there may be serious adverse effects on neighbouring lands; or
- ii) public health or safety is threatened; or
- iii) major park facilities are threatened; or
- iv) natural processes have been altered by man and manipulation is required to restore the natural balance; or
- v) a major natural control is absent from the park; or
- vi) the continued existence of a plant or animal species, which is rare or endangered or which is critical to representation of the natural region, is threatened by a natural cause such as insects or disease; or
- vii) the population of an animal species or stage of plant succession which has been prescribed in the objectives for a park, cannot be maintained by natural forces.

3.2.4

Where active resource management is necessary, techniques will duplicate natural processes as closely as possible.

3.2.5

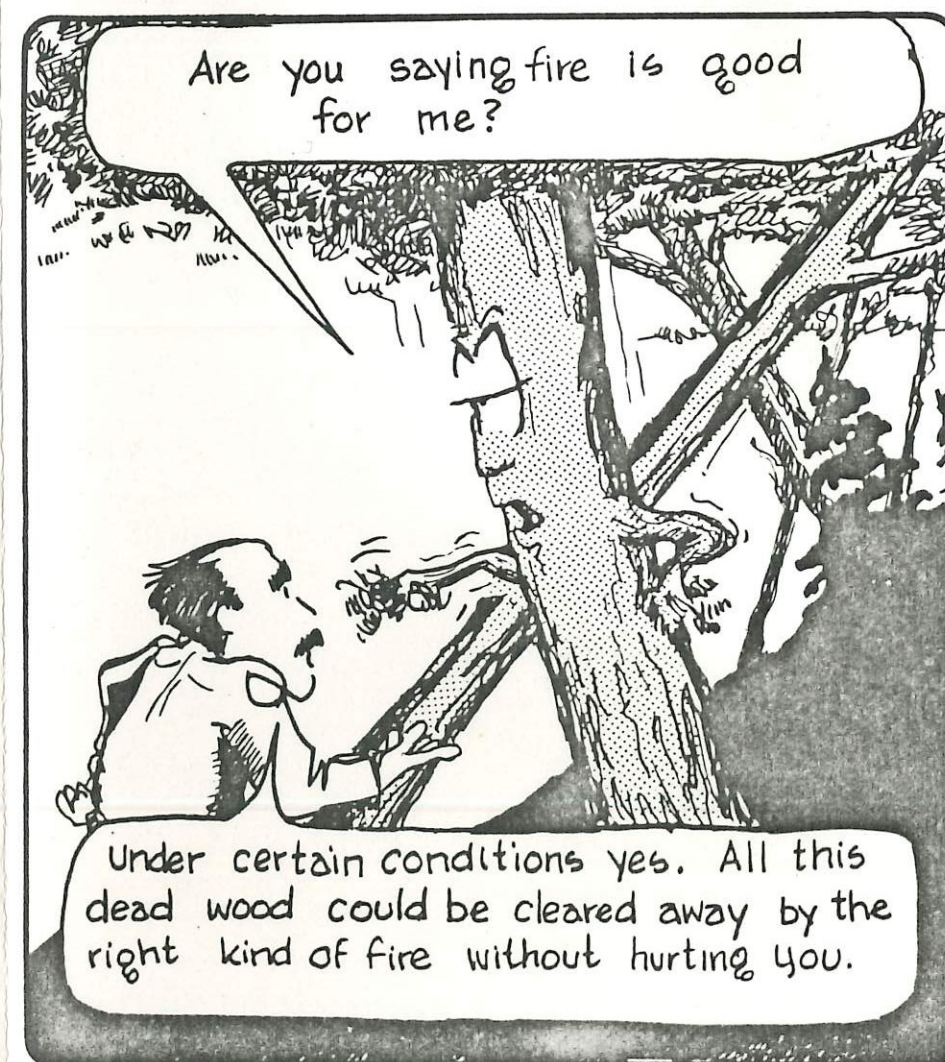
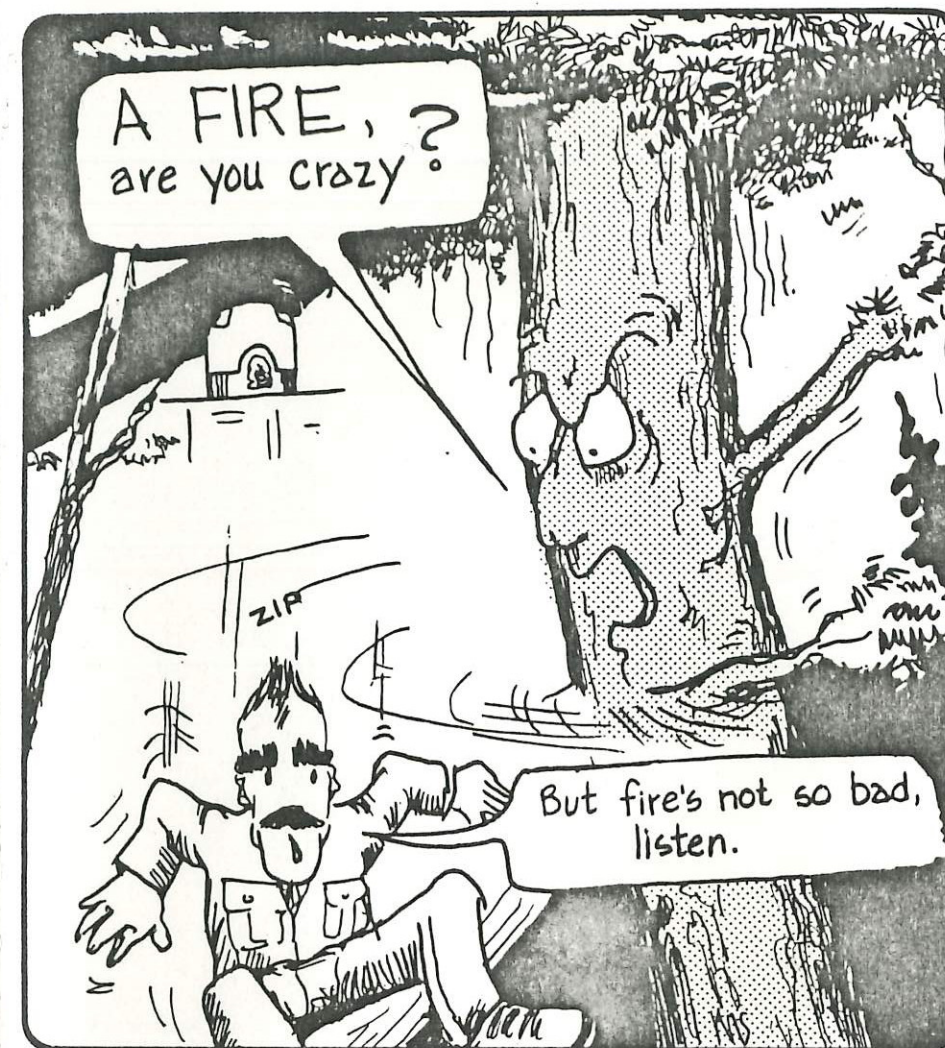
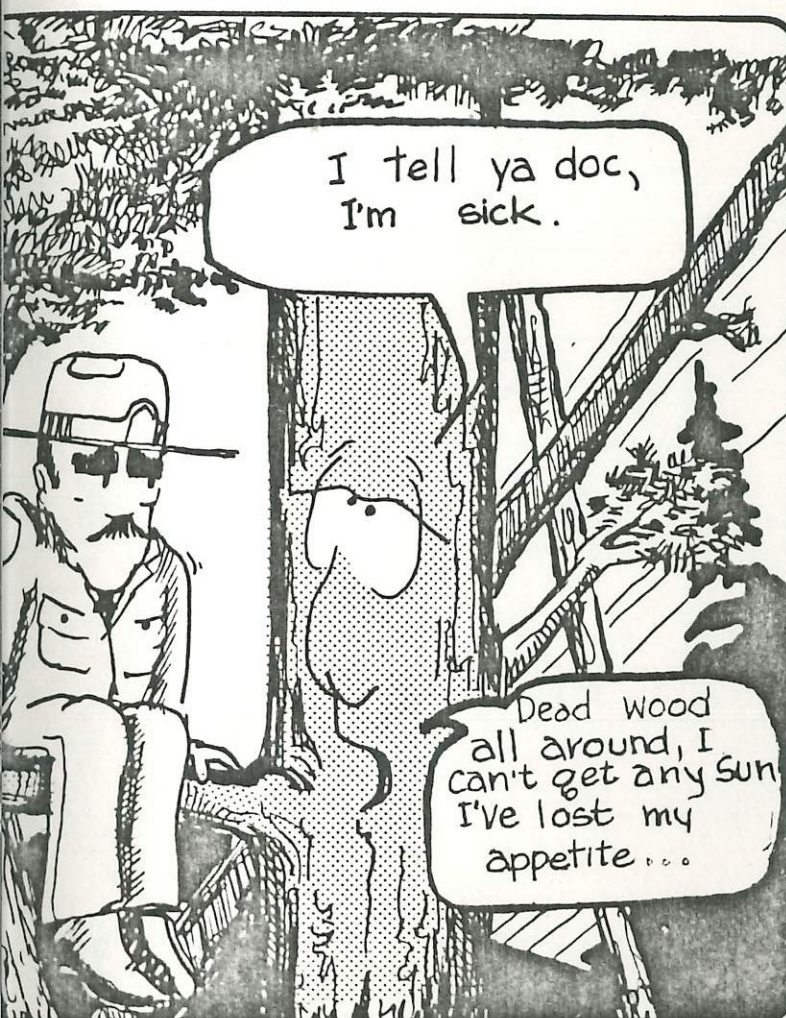
Resource management in each national park will take into account factors such as park size, objectives, zoning, geographic location and the nature of activities occurring in surrounding areas.

3.2.6

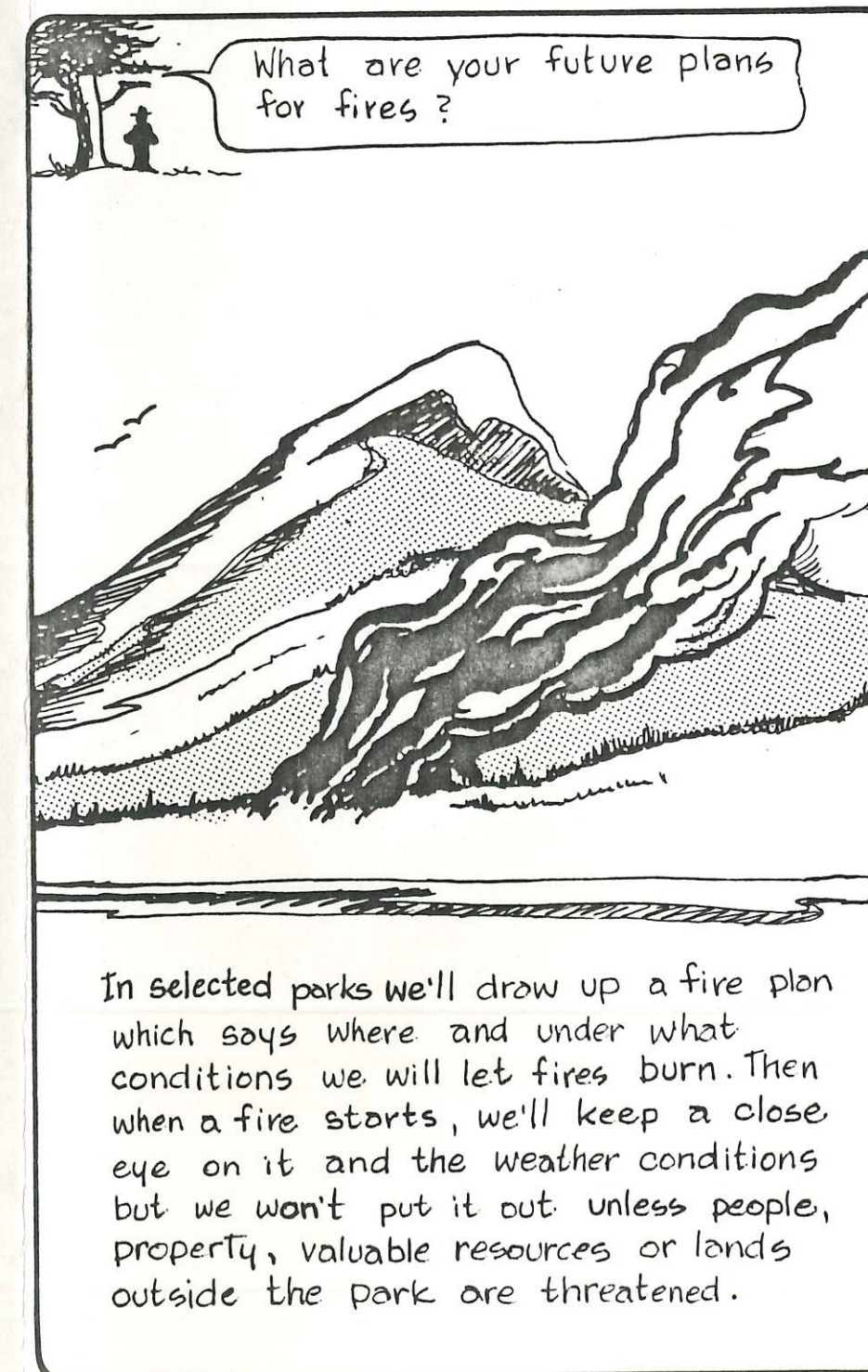
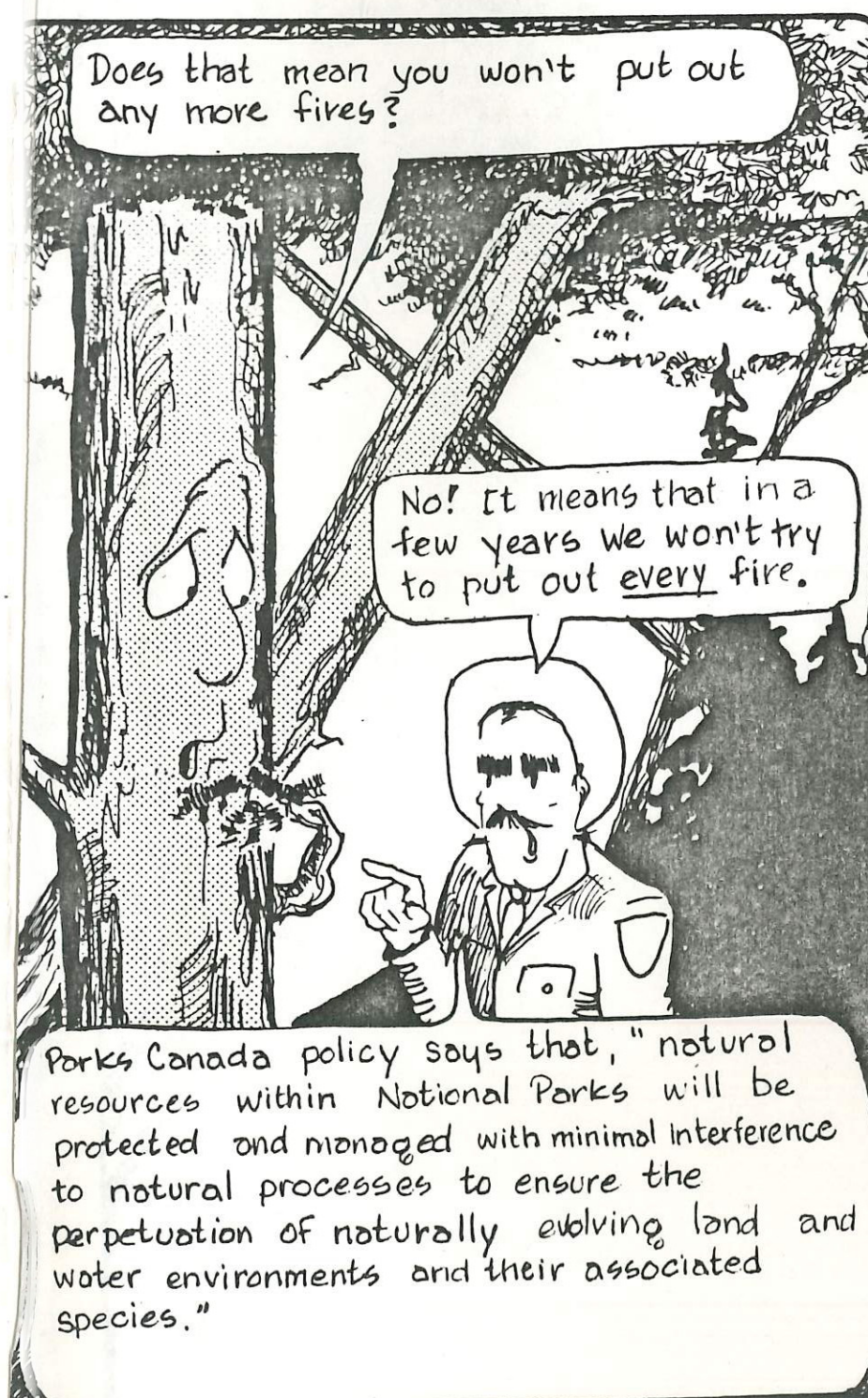
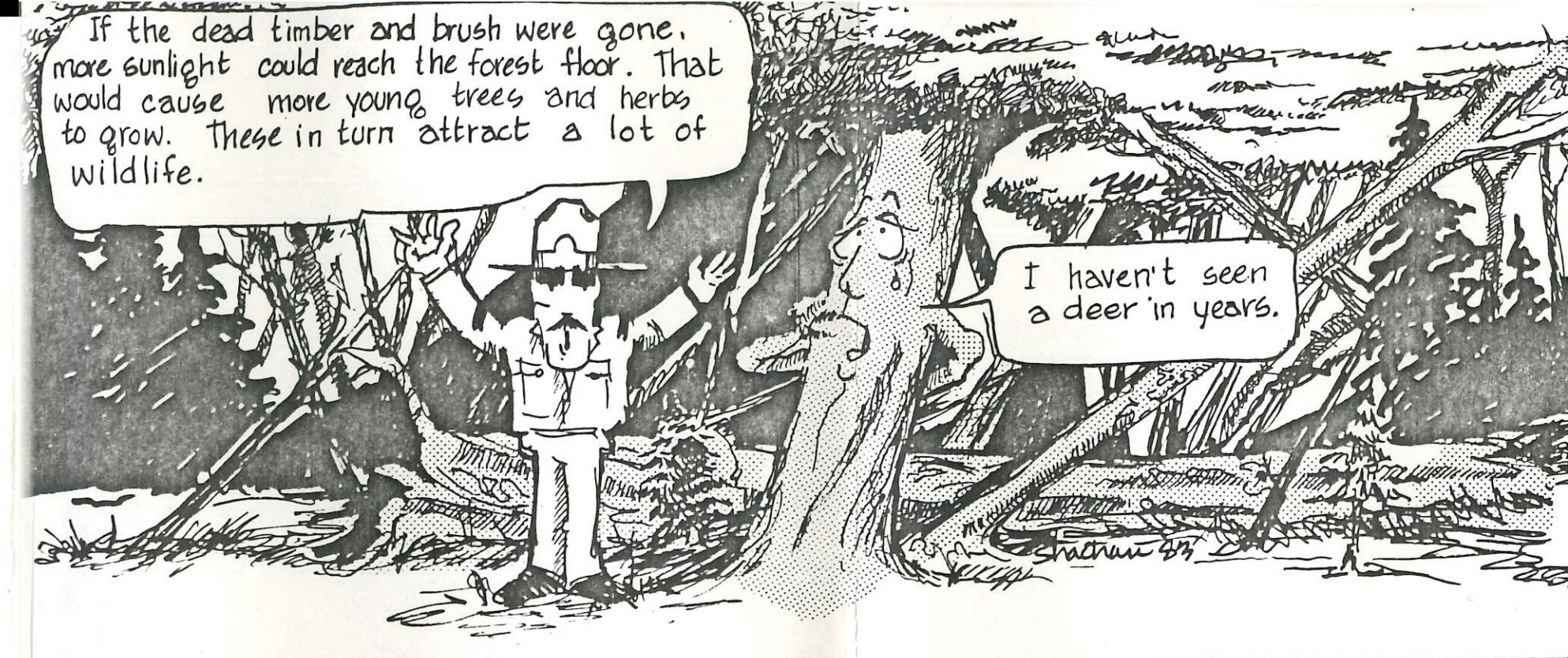
Habitat critical to the survival of an animal or plant species or population may be provided by

APPENDIX III
Brochure on Fire

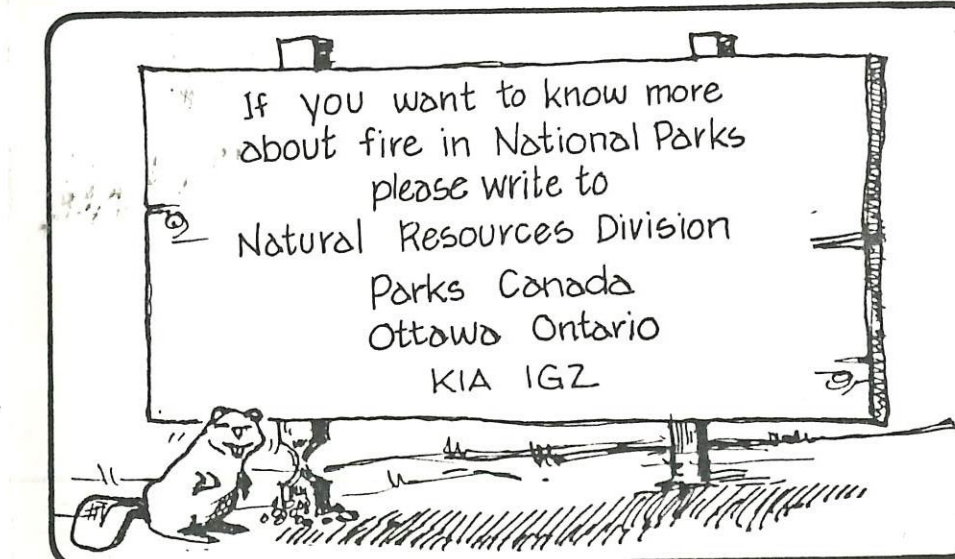
Fire! it's natural



Total protection from fire disrupts the forest's natural cycle and results in uniform stands of trees



It will be several years before we have the knowledge and training necessary to implement forest fire management plans in our national parks. Many park employees are now being trained in modern fire management methods and pilot studies are being done in several parks.



Published by authority of the Minister of the Environment
Minister of Supply and Services Canada 1983

QS-9000-000-BB-A1
ISBN 0-662-52344-X
Cat. R 62-128-1983

Canada

APPENDIX IV
DataBase III Set-up

DataBase III Data Entry of Fire/Range Plot Data

BURNUNIT	Sawback
DATE	Month/Day/Year
PLOT UTM	PG 888 999
PLOT NUM	A
TRANSECT	TRANSECT. PLOT is: 1.1
CLIPGRAMS	1.2
CLIP TPHA	1200
HERB1	ELIN
PERCENT1	99
SHRUB1	AMAL
S1-0T50	# browsable tips
S1-50T100	in each height class
S1-100T150	for species
S1-150T200	
S1-200T250	
S1-BROWSEA	# browsed tips in each
S1-BROWSEB	browse class
S1-BROWSEC	
etc. for number of shrubs	
PHOTOFILE	correlates data to slides
COMPLETE	? data entered accurately, enter "Y"; further data to be entered or edited, enter "N"
NOTES1	Comments
NOTES2	

BURNUNIT Sawback
DATE 03/31/87
PLOT-UTM PG 777 888
PLOT-NUM A
TRANSECT 1.1
ELKW # pellets for animal and winter or summer.
ELKS
DEERW
DEERS
SHEEPW
SHEEPS
OTHERW
OTHERS
PHOTOFILE correlates to slides
NOTES1 comments

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