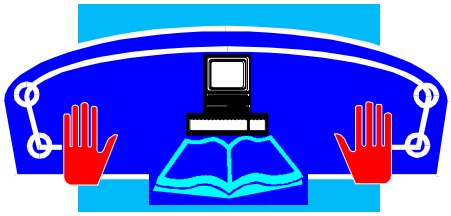

Canol Trail Assessment Proposal
Type of Study: Feasibility Studies
Date of Report: 1985
Author: Arctic And Alpine Consulting Services
Catalogue Number: 11-26-5

Marshall Macklin Monaghan Western Limited

Consulting Engineers Surveyors Planners

10532 - 110 Street
Edmonton, Alberta T5H 3C5
(403) 423-6820

11-20-5

January 28, 1985

File: 45-99015-003

Mr. Dave Lapp
Planner
GNWT Economic Development and Tourism
Yellowknife, N.W.T.
X1A 2L9

Dear Dave:

Re: CANOL Trail Assessment Proposal

The firms of Arctic and Alpine Environmental Consulting Services (Arctic and Alpine) and Marshall Macklin Monaghan Western Limited (Marshall Macklin Monaghan) are pleased to submit four copies of our proposal for the above noted project.

Arctic and Alpine team members have intimate knowledge of the CANOL Project and the corridor from both perspectives as research scientists and as recreationists. Since 1974, Peter and Linda Kershaw have completed detailed field investigations of the disturbances associated with the CANOL Project and the adjacent natural systems. Over these years, all of the proposed trail has been hiked at least once and all the tundra areas have been crossed several times. Their trips have included all four seasons of the year and for extended periods of time. They are extremely knowledgeable of the logistical constraints associated with access and support systems in the region which must be taken into consideration if the CANOL Corridor was to be developed and promoted as a recreational trail system for wilderness adventurists.

Marshall Macklin Monaghan team members bring to the project their experience in heritage resource planning and tourism planning in the Northwest Territories and the Yukon. Over the past twelve years, they have generated plans for the development and management of heritage resources and prepared comprehensive programs for their interpretation and conservation to the public. From their tourism work in the Liard-Mackenzie Region, they are familiar with characteristics of special market groups who may be interested in the types of wilderness adventure products in the CANOL Trail region.

Both firms also have in their "possession" an extensive data base relevant to this project. Being able to access the information immediately will save time in data assembly and this will allow for more effort in the analysis of resources and the development of the action plan and specific program recommendations. This is particularly important with such a short time frame.

We are prepared to complete this project, as outlined in detail within the attached proposal, for an "upset" fee of $21,500. This fee is based upon $19,552 for 401 person-hours of professional and technical time and $2,448 in out-of-pocket disbursements. We have also identified optional tasks in our work program which we would be willing to discuss with the Steering Committee.

Our firms are very committed both professional and personnally to this project because of our interests in heritage preservation, environmental education, and tourism and recreation.

Thank you for the opportunity to submit on this unique and challenging project. We would be happy to respond to any questions you may have concerning our proposal submission.

Yours very truly,

ALPINE AND ARCTIC ENVIRONMENTAL CONSULTING SERVICES

G.P. Kershaw.

Dr. G. Peter Kershaw, Ph.D.
Principal

MARSHALL MACKLIN MONAGHAN WESTERN LIMITED

Robert Wong

Robert A.G. Wong, M.A., M.C.I.P.
Senior Planner

CANOL TRAIL ASSESSMENT
PROPOSAL

Prepared for:

Government of Northwest Territories
Economic Development and Tourism
Tourism and Parks
Yellowknife, N.W.T.
X1A 2L9

Prepared by:

Arctic and Alpine Environmental Consulting Services
Marshall Macklin Monaghan Western Limited
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Edmonton, Alberta
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January 1985

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1.0 INTRODUCTION

1.1 The Importance of the CANOL Corridor and the Need for Action

The CANOL Project was a massive World War II development completed under the auspices of the U.S. Army. Yet because of national and international political intrigue and industrial mismanagement, the existence and significance of the project has been largely overlooked by Canadians. The CANOL Project directly involved much of northwestern Canada and Alaska and was larger in scope and more expensive than the Alaska Highway Project. It resulted in the construction of 10 aircraft landing strips within the Mackenzie River Valley; 2575 km of pipelines in four separate systems in the Northwest Territories, Yukon and Alaska; 828 km of gravel-surfaced tote road and paralleled by a telephone system; 2415 km of pioneered winter roads; 58 new wells drilled in the Norman Wells vicinity and the upgrading and modernizing of 2736 km of water transport routes. Construction of the Project effectively began in October 1942 and 18 months later, the Whitehorse refinery commenced operation. By June 1945, the CANOL Project was abandoned. However, it had resulted in the delineation of the Norman Wells oil field, the exploration and mapping of the previously unknown region between Ross River and Norman Wells, and the development of many northern engineering practices.

Within the Northwest Territories, the CANOL No. 1 crude oil pipeline route and its support facilities provide one of North America's greatest wilderness adventure opportunities. A wide variety of potential interpretation themes could be explored along this corridor, ranging from human history to natural history and including numerous examples of long-term natural responses to environmental disturbances. The scenery in the Mackenzie Mountains is a significant attraction to wilderness hikers and cross-country skiers. The eastern section is characterized by gently sloping, rounded mountains untouched by Lake Wisconsin glaciation, whereas deeply incised, broad-bottomed valleys near the Continental Divide provide vistas that may contain contemporary glaciers and rock glaciers. The route provides access to numerous examples of periglacial features that are totally unfamiliar to many visitors. Naturalists will enjoy the beauty and diversity of the area. Vegetation types vary from typical subarctic forests and bogs to

cushion plant tundra with plant species typical of the High Arctic. For avid naturalists, Woodland caribou, Dall's sheep, grizzly bear, moose, bald eagles, Perigrine Falcons, Gyrfalcon, Snow Geese and numerous Arctic avifauna and other resident wildlife species can frequently be seen along the route of the CANOL Project. Many of these species are considered threatened or rare in North America and therefore represent a significant resource in themselves. These attributes, when combined with the heritage resources of the CANOL Project, result in an extremely high tourism potential along the route, one that is almost certainly unparalleled in North America.

The CANOL Corridor with its raised, dry road bed, abandoned camps and emergency shelters (Wanigans) provides an excellent hiking facility for the wilderness adventurist. Along the route, numerous remnants from the days of the Second World War serve as a reminder of the past. Vacant camp buildings, abandoned truck hulks with less than 3000 miles on their odometers and CANOL markings on their doors; 1942 pinups and murals in bunk houses; 2000 bbls steel surge tanks and massive pump mountings; mile posts with the fading numbers; the sweep of the abandoned road winding of tens of kilometres across the tundra; all of these and more combine to attract and hold one's imagination. Many buildings are in an advanced state of deterioration and require immediate attention is required to stabilize these structures and to prevent vandalism. Neglect and abuse are currently eroding the potential role of these facilities in our national heritage.

The CANOL Corridor provides exceptional tourism opportunities for domestic and international travellers. First, however, it is necessary to define the appropriate types and levels of use and development and to delineate clear guidelines for the conservation and management of the natural, historical, and recreational resources that combine to make this route unique.

1.2 Study Objectives

Based upon a review of the Terms of Reference and discussions with David Lapp, we understand the purpose of the study to be:

- the preparation of a development concept or action plan which defines appropriate levels and types of development based upon a comprehensive assessment of the CANOL Trail's natural, historical and recreational resources.

In order to achieve this, we have defined the following specific objectives:

- inventory and assess recreational opportunities and logistical constraints,
- inventory and assess the natural resource potentials and constraints to development and use,
- inventory and assess the heritage resources (e.g. pump stations, maintenance camps, Wanigans) for conservation where possible and modification or removal where necessary,
- identify historical themes of the CANOL Project and assess their potential for interpretation,
- analyze existing and potential visitor use,
- assess the tourism facilities and services within the region and identify new opportunities to complement the project,
- obtain input from key interest groups,
- develop alternative concept plans and evaluate these to determine a preferred concept,

- recommend program guidelines to support the preferred concept plan, including:
  - conservation,
  - development,
  - resource management,
  - interpretation,
  - safety,
  - research, and
  - marketing and promotion,

- define development considerations, including:
  - costs,
  - social/economic impacts,
  - funding options, and
  - priority and project phasing.

2.0 QUALIFICATION HIGHLIGHTS

The following are the key qualifications of our team for the CANOL Trail Assessment Project:

- **Long-term Association with the CANOL Project Corridor**

  The Arctic and Alpine Team has worked in this area for ten years as research scientists and as recreationalists.

- **Understanding of Logistical Constraints along the CANOL Corridor**

  Arctic and Alpine members have worked throughout the study area with limited aerial support. They have a good understanding of the logistical constraints affecting access and support in this region and potential hazards along the route.

- **Extensive Background Knowledge of the History of CANOL Project**

  Arctic and Alpine Environmental Consulting Services has completed an extensive survey of the CANOL Project history. Research in the field has continued since 1974. This has involved a comprehensive review of published information, detailed study of unpublished material (much of it archival), interviews with people directly involved with the project and the accumulation of an extensive collection of historical photos and maps from the N.W.T. section of the CANOL Project. With this extensive data base, our team will be able to save considerable research time and thus focus on the analysis of the resources and the preparation of concepts and associated program requirements.

- **Detailed Knowledge of the Recreational Resources along the CANOL Corridor**

  The Arctic and Alpine team has worked from the Macmillan Pass on the Yukon/N.W.T. border to Camp CANOL at the Mackenzie River, traversing

the length of the road on foot and/or by air several times and during all seasons. Essentially, all of the proposed trail has been hiked at least once and all of the tundra areas have been crossed many times. All of the camps along the abandoned section of the CANOL Road have been visited and most have been used as base camps for extended periods. Approximately 145 km of the proposed trail was traversed by ski/snowshoe during the winter of 1978/79 and all major sections have been visited during spring, summer, fall, and winter.

- **Extensive Collection of Relevant Background Materials**

The Arctic and Alpine team possesses a large collection of material directly related to the CANOL Project Corridor. This includes:

- aerial photos from 1943, 1944, 1974 and others, covering the entire length of the N.W.T. section,
- all land use and topographic maps,
- copies of original archival collections including numerous maps, reports, correspondence, photos, diaries, etc.,
- recent slides and photos including several duplicating the views of historical photographs, and
- numerous published and unpublished reports on the physical and biological resources of the region (e.g. C.W.S., I.B.P., G.S.C. and National Museum of Canada.

Marshall Macklin Monaghan has current base line information relevant to this project:

- market data on the Alaskan Highway (e.g. origin, volume, seasonality, purpose of trip),
- visitation statistics at N.W.T., B.C. and Yukon visitor information centres (e.g. 60th Parallel, Fort Simpson, Watson Lake, Whitehorse),
- airline statistics by month for past five years, and
- special target market analysis including various adventure products.

- **Detailed Knowledge of the Natural Resources along the CANOL Corridor**

  Most scientific research along the proposed trail route has involved the study of disturbances associated with the CANOL Project and adjacent natural systems. This included a detailed inventory of the soils, geomorphology, vegetation and wildlife of a wide variety of environments.

  The research has resulted in numberous publications and/or presentations at professional meetings, a Ph.D. thesis studying long-term environmental impacts and thousands of colour and black and white photographs of the CANOL Trail study area.

- **Proven Experience in Historical Resource and Interpretation Planning**

  Marshall Macklin Monaghan has over twelve years of experience in the planning and development of historical resources and the preparation of comprehensive programs for the interpretation of these historical resources to the public. Several of these projects have been in the North, ranging from the preparation and implementation of interpretation centres to the development of entire heritage resource complexes (e.g. corridors, parks, communities).

- **Extensive Experience in Realistic Market and Cost Assessments**

  Marshall Macklin Monaghan has proven experience in the establishment of cost parameters and budgets for the interpretation and preservation of historic resources. Our team members have been involved in a wide variety of projects for which we have provided "realistic" assessments of capital and operating costs.

- **Leading Consulting Firm in Tourism and Recreation Planning with Extensive Northern Experience**

Marshall Macklin Monaghan has been a leader in the tourism planning field across Canada. We have successfully completed:

- three provincial tourism strategies,
- over 24 regional tourism plans, of which 3 are in the N.W.T., and
- over 20 community tourism plans, of which over a half dozen are for Yukon and N.W.T. communities.

We are currently working in the Liard-Mackenzie Region and, therefore, are familiar with the tourism activities in the region.

3.0 STUDY APPROACH AND WORK PROGRAM

The proposed study approach involves four basic interconnected phases:

Phase 1: Project Commencement
Phase 2: Assessment of CANOL Trail Opportunities and Constraints
Phase 3: Preparation and Evaluation of Concept Alternatives
Phase 4: Preparation of Preferred Action Plan

In Phase 1, we intend to commence the project with a conference call with the Steering Committee. The purpose of this meeting is to confirm and clarify the objectives and scope of the project to ensure that your expectations are well understood and will be met by our work program and proposed study products. During this call, we wish to review the list of people that we propose to contact for your approval.

Phase 2 involves a series of inter-related research, inventory and evaluation tasks centred on the CANOL Corridor. These will determine the opportunities and constraints posed by the natural and historical resources, and will assess the potential for a variety of recreational/tourism opportunities.

In Phase 3, preliminary concept alternatives will be prepared. Each alternative will be evaluated with respect to specific implications of the corridor resources. The evaluation will be reviewed with the Steering Committee and a preferred concept will be selected.

Phase 4 will commence following this selection, preparing the preliminary action plan. This will include an examination of factors such as the type and level of facility development and interpretation, resource management guidelines, funding options, priorities and phasing.

The following section describes each of these phases in terms of specific work tasks (see Figure 3.1). The Work Program Chart illustrates the inter-relationships between tasks and provides a basis for monitoring the progress of the study.

We have included a map of the CANOL Corridor to assist you when places are referenced in the text of this proposal (Figure 3.2).

Phase 1: Project Commencement

Task 1.1 Initial Client Conference Call

We propose a conference call with all of the Steering Committee members in order to facilitate early discussions and to confirm the scope of the study. This will allow the team to commence the study without delays, a necessary consideration given the short time frame of the study.

We intend to work closely with the Steering Committee throughout the project and therefore propose one in person review/working meeting at a key decision point in the study as well as a conference call after the submission of the Draft report. Informal discussions will occur on a continuous basis between the project co-ordinators.

Task 1.2 Confirm and Clarify Goals and Objectives

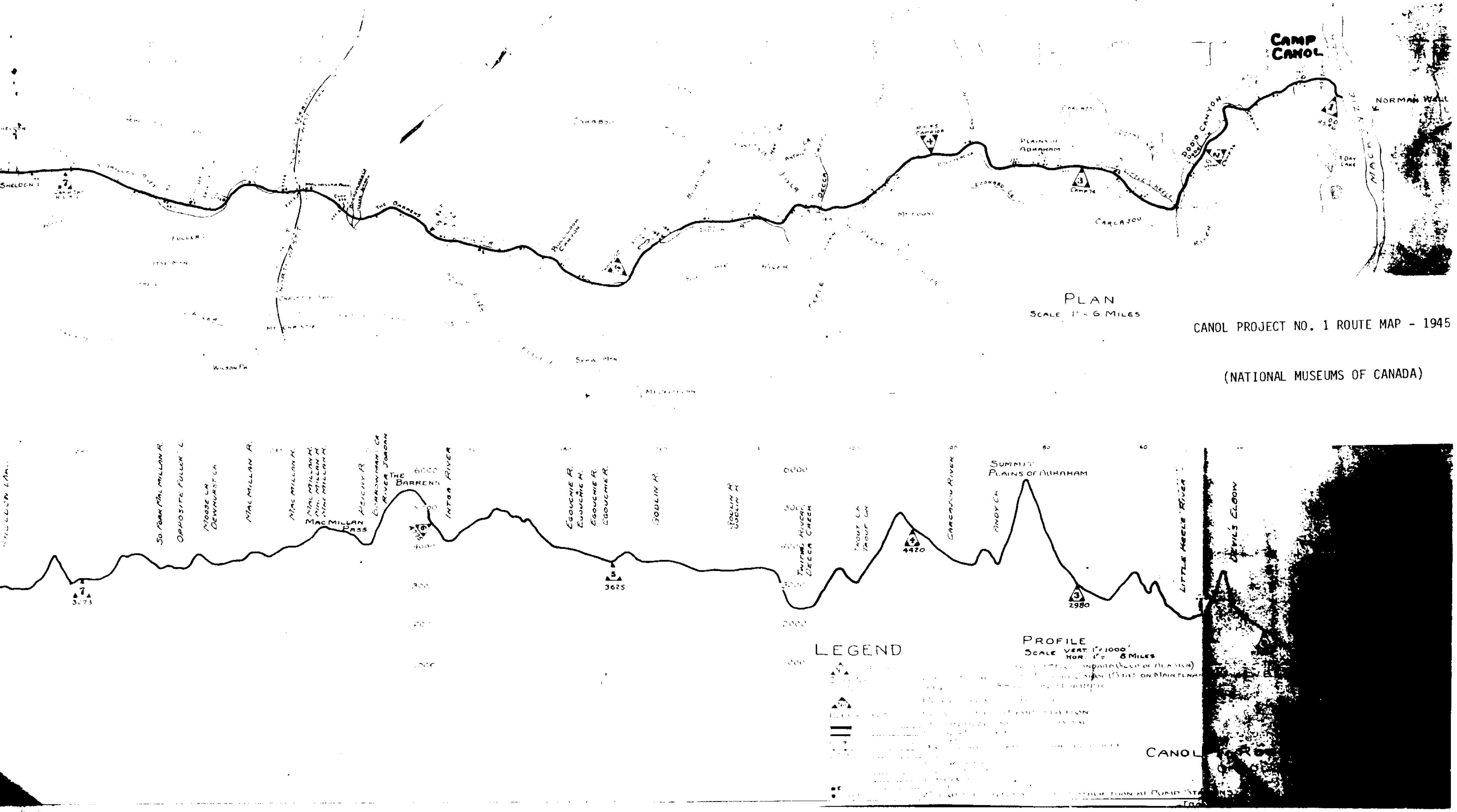
During the initial conference call, we will discuss, in detail, the current goals, objectives, and concerns of the CANOL Project Steering Committee. This will provide us with a clear understanding of the scope and expected products of this study.

Task 1.3 Review a List of Individuals, Groups, and Agencies to be Contacted

A list of individuals, groups, and agencies to be contacted for additional information and for financial support for the trail will be prepared and reviewed with the Steering Committee.

These include, but are not limited to:

- Prince of Wales Northern Heritage Centre
- Tourism and Parks
- Norman Wells (Historical Society)



CANOL PROJECT NO. 1 ROUTE MAP - 1945

(NATIONAL MUSEUMS OF CANADA)

- Western Arctic Visitors Association
- Old Squaw Lodge Operator (Sam Miller)
- Outfitters (e.g. Stan Simpson and Stan Stevens)
- Hunters and Trappers Association
- National Parks Centennial Citizens' Committee
- Renewable Resources
- Boreal Institute for Northern Studies
- Yukon Territorial Archives
- U.S. Army Corp of Engineers
- Bechtel Corporation
- Interprovincial Pipe Line
- Imperial Oil Limited
- Participants in the CANOL Project (e.g. Richard Finnie, Fred Andrew)
- Yukon Tourism, Recreation and Culture

No formal public meetings are anticipated at this time. We would be prepared to assist the Steering Committee after the project to present the Action Plan to communities and interest groups.

Task 1.4 Review Existing Level of Funding Alternatives

We wish to clarify with the Steering Committee what groups have currently expressed an interest in funding the project. We will contact these groups to identify the types of funding and the associated conditions in order to determine possible sources for research and development.

Task 1.5 Review Data Sources and Identify Data Deficiencies

Information shortages or the need for further investigation will be identified at the end of Phase 1. We will review any data deficiencies with the client project co-ordinator or the Steering Committee as the need dictates, and recommend any revisions or modifications to the work program.

Phase 2: Assessment of CANOL Trail Opportunities and Constraints

Task 2.1 Inventory and Assess Trail Heritage and Natural Resources

The historical and natural resources of the trail will be inventoried and analyzed. A summary will briefly describe and locate these resource features. It will also identify any perceived physical/logistical constraints or limitations to visitor use and the potential for resource degradation.

Heritage Resources

Our analysis will include heritage resources which may support the presentation of significant historical themes. These include:

- well preserved buildings can illustrate construction techniques and provide insights into living conditions in the camps (e.g. Pump Station No. 4 at Mile 108 contains well preserved quansit huts that provided living space for the resident crew, two 4-hole latrines, a maintenance garage, a tool storage facility, a pump house, a bath and wash house, several "wanigans" or "cabooses", numerous vehicle hulks and many assorted items that have been spread around the camp;

- abandoned machinery can be used to recreate the atmosphere of CANOL and to illustrate the ill-preparedness of the contractors during construction of the Project (e.g. deadlined vehicles with low mileage on their odometers, road graders without enclosed cabs for winter use);

- many features or locations along the route represent significant events in the Project's history (e.g. the abandoned wanigan and the trail extending from Fish Lake mark the terminous of the winter cat-train survey of 1942-43, the point at which the road was joined from east and west on New Year's Eve 1943, creeks that were named after CANOL Project personalities such as Andy Hay - Andy Creek);

- oil spills represent the fate of 15% of the oil that was pumped into the line but never made it to Whitehorse (e.g. Miles 222.5, 111, 103.5 and many small "salvage" spills).

In addition, heritage resources that are threatened by decay or natural events such as erosion by nearby rivers will be itemized.

Natural Resources

The natural resources of the Trail will be inventoried and analyzed. A summary identifying resource features which pose development and interpretive opportunities and those which limit or restrict development will be produced. These features will be mapped and evaluated in the report. They will include:

- geological features (e.g. outcroppings of limestone and dolomite of the Road River Formation adjacent to the road, fossil beds near Godlin Lakes, Cretaceous granodiorite stocks forming the highest peaks above the Tsichu River);

- geomorphological features (e.g. palsas on Macmillan Pass and along the Intga River, cryoplanation terraces and patterned ground on the Plains of Abraham, rock glaciers above Bull Cook Canyon, karst phenomena near Dodo Creek); and

- climatic conditions affecting visitor use (i.e., seasonal air temperatures, precipitation and snowfall; duration of daylight);

- eight ecosection descriptions and highlights of scenic and recreational attributes (e.g. Dodo Canyon - Joker Ridge Ecosection) -- unglaciated, limestone, spectacular canyon scenery, access to Echo and Carcajou Canyons);

- significant plant species (e.g. disjunct species such as Claytonia megarhiya and localized populations such as Salix dodgeana on the Plains of Abraham);

- significant wildlife species (e.g. Woodland caribou calving on Plains of Abraham; grizzly bears and Bald eagles on Mackenzie Mountain Barrens; Dall's sheep in Godland River area; Marmot colony in Caribou Pass);

- surface hydrology (e.g. opportunities for fishing and canoeing on the Tsichu River; constraints posed by Twitya river crossing and limited water supply on the Plains of Abraham); and

- examples of natural responses to 40 year-old man-induced disturbances (e.g. oil spills ranging from essentially sterile to completely revegetated; numerous examples of animals using CANOL facilities such as the swallows in buildings at Camp 208 and ground squirrels inhabiting over 70% of the pipe sections remaining in the Bolstead Creek area.

Based upon the scientific research completed by the Arctic and Alpine team, eight ecosections can be defined through which the CANOL Trail passes (see Figure 3.3). These ecoregions represent homogeneous ecological units characterized primarily by climatic, geomorphic, soil and vegetational characteristics. The ecosections will be the basis of our analysis of the natural history and resource evaluation.

Task 2.2 Assess Recreation Potential

Based upon the preceding analysis of the heritage and natural resources, the potential for a variety of recreational opportunities will be assessed. Our analysis will identify areas and features which have the potential for recreational uses such as:

- mountain climbing (e.g. mountains in the vicinity of Macmillin Pass, Caribou Pass, Bolstead Creek);

Topographic profiles along the Canol Road in the study areas (117 km or 73 miles), oriented from the northeast to the southwest

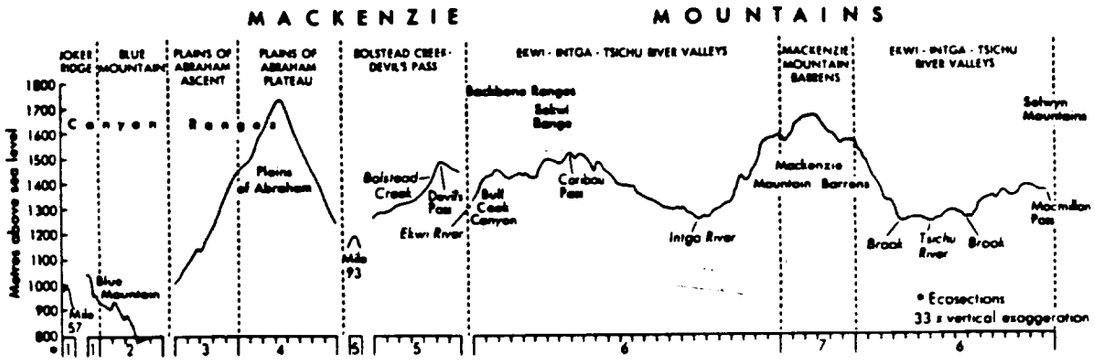


Figure 3.3

Ecosections Along the CANOL Road

(note orientation of profile)

- hiking excursions of a week or more with suitable drop-off and pick-up points (e.g. Godlin Lakes to the Continental Divide; Plains of Abraham to Camp 108; Camp CANOL to CANOL Lake);

- river canoeing (e.g. Twitya River access to Keele River and season of use on other rivers when clear passage through braided reaches can be expected);

- wildlife viewing (e.g. Dall's sheep on the Plains of Abraham and in Dobo Canyon; caribou and grizzly bear on the Mackenzie Mountain Barrens; moose along the Intga River section);

- fishing (e.g. Dolly Varden and Arctic grayling in the Carcajou and Twitya Rivers);

- cross-country skiing and snowshoeing trips (e.g. Plains of Abraham and Devils' Pass to Little Keele River);

- snowmobiling (e.g. Mackenzie Plains);

- nature study - the route passes through a wide range of terrain types over relatively short distances providing a rich enterpretive experience (e.g. from boreal forest at CANOL Lake to tundra on Blue Mountain to boreal forest along the Keele River and into tundra again on the Plains of Abraham);

- enjoyment of unique natural features (e.g. Echo Canyon, Twitya River hot springs);

In addition, special issues related to the logistics of regional use (e.g. availability of wood for fires, aircraft landing sites for winter and summer, food cache locations, outfitting and hunting) will be discussed.

Arctic and Alpine Environmental Consulting Services have traversed all of the trail once and several sections during all seasons by foot and air. Their scientific research and practical experience in accessing, camping and hiking the trail will provide a solid basis for the analysis. We also intend to support our analysis with information from other contacts in the region.

Task 2.3 Historic Theme Analysis and Preparation of Theme Structure

Theme Analysis

The history of the CANOL Project will be reviewed and analyzed with the intent to:

- develop a set of decision-making criteria derived from the characteristics and significance of the CANOL Corridor to the area and its regional importance to oil production and transportation;

- employ these criteria to suggest a series of themes and subthemes for use in an interpretation program along the trail; and

- divide these themes into their component parts in preparation for the construction of a theme structure.

Theme Structure

The information derived from the preceding analyses will be organized into a theme structure showing the relationship between themes, subthemes and elements.

Five major themes reflecting the various stages in the evaluation of the CANOL Project have been identified. These include:

- Impetus for the Project (pre 1942),
- Survey of the CANOL Road (winter 1942-1943),
- Construction (1943-1944),

- Operation (1944-1945), and
- Abandonment and Salvage (1945-Present).

Figure 3.4 is an illustration of a preliminary elaboration of one theme -- Survey of the CANOL Road -- into its subthemes and subtheme elements.

An example of an evaluation process used to establish the priorities of each theme, subtheme and theme elements has also been included (Figure 3.5). Such an evaluation framework is different for every project but is based upon:

- overall importance of the theme, etc., in the history of the region,
- overall impact of the theme component on the present characteristics of the region,
- interest to visitors, and
- availability of artifacts or extant historic resources to illustrate the themes.

We intend to work closely with the Prince of Wales Northern Heritage Centre Representative in order to establish a significance rating for each of these themes and subthemes. This priorization procedure will assist the project team to focus upon the key events or features for the interpretation concepts.

Task 2.4 Interview Key Interest Groups, Agencies and Individuals

In addition to our own experienced team members, other interest groups, agencies and individuals who are interested in the Trail Assessment project will be contacted by telephone or in person in Yellowknife to obtain their input and concerns regarding the Trail's development. A summary of their suggestions and concerns will be incorporated into the concept development phase.

Figure 3.4
Example of Theme Structure

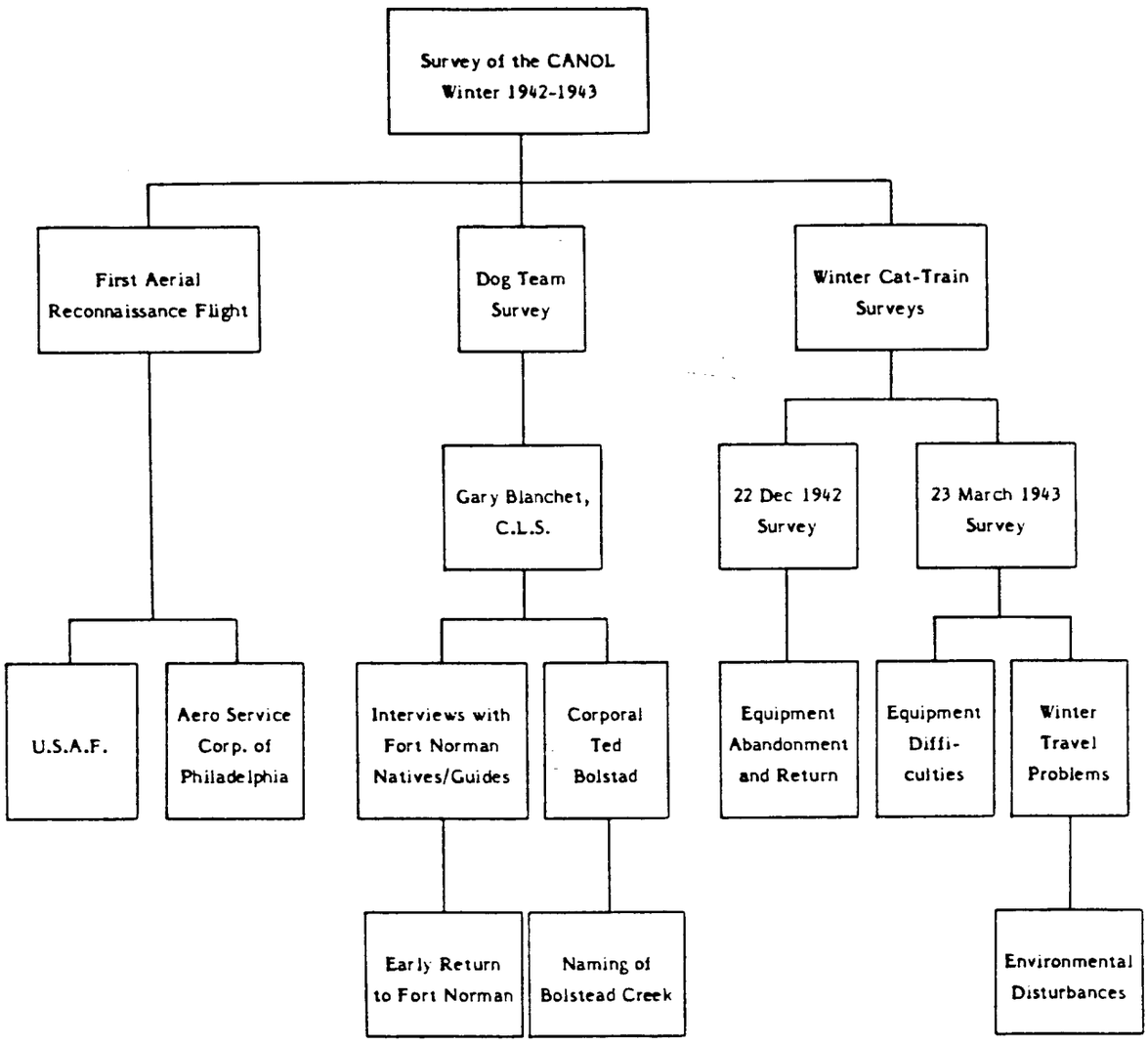


Figure 3.5

Example of Evaluation of Historical Themes

(from West Parry Sound Museum)

Table 2

Thematic Analysis

Logging

Theme	Theme Components	Theme Component Definition	Component Significance	Rationale for Theme Component Priority: Overall Impact of Component on District History A	Overall Impact of Component on Present District Characteristics B	Perceived Interest of Components to Museum Visitors C	Availability of Artifacts D	Comments Regarding Use of Component for Interpretive Displays/Programs
Logging (Primary Theme)	1. Transportation	Those means used to convey logs and lumber to processing centres and/or markets.	1	H	H	H	H	Aspects of the history of transportation interpreted under the logging theme should not be dealt with at length under other themes.
	1. A. Railways	Development and characteristics of railways used in the logging industry.	1-3	H	H	H	H	Interpretive material should deal specifically with those aspects of railway development directly concerned with the West Parry Sound District.
	1. A. a. Events/ Developments	Events in the development of the railways, including the actual construction process.	1-3-1	H	H	H		
	1. A. b. Life in Construction Camps	Living conditions in the railway construction camps.	1-3-8	L	L	H	H	Aspects of this theme component duplicate aspects that are more appropriately dealt with under other theme components. This component should therefore only be presented to interpret/illustrate

Optional On-Site Interviews

A team member will meet with the key groups in Norman Wells to discuss the CANOL Trail assessment project.

Task 2.5 Inventory and Assess Regional Tourism Facilities and Services

An inventory and evaluation of the existing and proposed regional tourism facilities that could complement or conflict with the development of the CANOL Trail project will be prepared. Such facilities and services will include:

- logistical support and tourist services (e.g. air charter, accommodation, food supplies, and emergency rescue services);
- existing land users (e.g. Old Squaw Lodge, outfitting operators); and
- proposed major interpretation facilities (e.g. Norman Wells museum/interpretation centre).

Task 2.6 Analyze Visitation

An analysis of present visitation levels, characteristics, and season of use will be undertaken. Potential target markets will also be identified and assessed concerning whether the CANOL trail can capture a greater percentage of these markets.

Several information sources will be reviewed including:

- 1982 Traveller Survey at N.W.T. Visitor Information Centres (VIC);
- VIC visitation statistics (1980-1983);
- 1984 Yukon Visitor Exit Survey;
- 1984 N.W.T. Visitor Exit Survey (preliminary results);
- airline statistics;
- RCMP backcountry registration forms;

- air charter records from Norman Wells, Fort Simpson, Fort Liard and Watson Lake; and
- use statistics of lodges and outfitters in the area.

Most of these sources are in Marshall Macklin Monaghan's library and have recently been reviewed for the Liard-Mackenzie Tourism Strategy. Site specific visitor information will be obtained from local operators in the region.

Task 2.7 Summarize Interpretive and Site Development Opportunities and Constraints

Using the information gathered in the previous six tasks, the opportunities and constraints to development will be detailed.

Opportunities may include:

- areas appropriate for:
  - heritage interpretation,
  - short, moderate, and long hiking and cross-country ski trips,
  - wildlife viewing,
  - canoeing,
  - mountain climbing,
  - possible road and air access points,
  - camps (winter and summer),
  - new tourist services, and
  - spectacular scenery.

Constraints may include:

- pedestrian crossings at major rivers (e.g. Twitya, Little Keele, Carcajou Rivers),
- animal - man conflicts (e.g. danger to man due to grizzly bears; harassment of caribou or sheep in calving/lambing areas),
- seasonal limitations affecting visitor use (e.g. short day length, extreme temperatures),

- availability of trail suppliers,
- public liability associated with safety of abandoned facilities, and
- access points and transportation logistics.

Task 2.8 Review Study Objectives in Light of Resource Summary and Recreation Assessment

Considering the above summary, a review of the initial study objectives will be undertaken. This review will allow refinement of the study objectives in order to refocus the work program on specific issues and opportunities.

Phase 3: Preparation and Evaluation of Concept Alternatives

Task 3.1 Preparation of Preliminary Concept Alternatives

It is expected that a number of alternative interpretive concepts for the CANOL Trail development and interpretive presentation will be developed to meet visitor needs within the range of opportunities and constraints posed by the site's natural and historical resources. This task will prepare descriptions and illustrative concepts for three different alternatives for the development of the Trail.

Task 3.2 Client Review and Evaluation Meeting

The advantages and disadvantages of these alternative approaches will be presented to the Steering Committee for review. A preferred concept or elements to be included in a preferred concept will then be selected.

The evaluation criteria will include but not be limited to:

- impact on natural resources,
- effectiveness of heritage resource conservation and interpretation,
- opportunities for private sector tourism ventures,
- benefits to nearby communities,
- relative development costs, and
- potential visitor level of use.

Task 3.3 Revisions and Refinement of Preferred Concept

Upon receipt of written comments from the Steering Committee, revisions and refinements to a preferred concept will be made.

Phase 4: Preparation of Preferred Action Plan

Task 4.1 Prepare Preliminary Action Plan

As a result of the Steering Committee review meeting, the preliminary development concept or action plan will be prepared. The plan will consist of:

- clear development and management objectives;
- a development concept drawing demonstrating the development and management objectives; and
- a series of program requirements related to specific management, development, and marketing issues.

Task 4.2 Trail and Facility Development Requirements

Subsequent to the selection of a preferred concept, specific recommendations will be made concerning opportunities for recreational facility and trail developments.

Consideration will be given to the definition of the type, scale and location of facility development such as:

- overnight camping facilities for summer and winter use (e.g. Pump Station No. 4 at Mile 108 or the Mile 80 Maintenance Camp), including the consideration of fire wood and water supplies;
- scenic viewing areas;

- interpretive nodes and appropriate interpretive media;
- bridges or other means for crossing rivers;
- museum and/or interpretive centre(s);
- landing strips; and
- others

The attached photograph illustrates an example of on-site development.

Task 4.3 Resource Management Requirements

Specific recommendations will be presented related to the type and scope of management of the natural resources. These management guidelines will include, but not be limited to:

- zoning,
- season of use in certain areas,
- types of appropriate vehicle access,
- regulation of fire arms, and
- protection of sensitive ecological systems.

Task 4.4 Trail On-Site Interpretation Requirements

In conjunction with Task 4.2, recommendations will be made regarding interpretive programs. These will address the following:

- integration of natural history and human history interpretation (e.g. perfecting winter construction practices, environmental impacts 40 years later),
- interactive versus static interpretive media (e.g. interpretive trail pamphlet, manned visitor centre at a "jump off" community),
- directional and interpretive signs,
- reconstruction/restoration of facilities, and
- special types of exhibits.

Task 4.5 Visitor Services and Safety Requirements

If the visitation and use of the CANOL trail is to increase, the recommendations concerning visitor safety and service requirements may be necessary. The following will be considered:

- emergency search and rescue services at nearby communities (e.g. Norman Wells, Tungsten, mining camps, lodges),
- trail user registration system, and
- regular monitoring system.

Task 4.6 Protection/Conservation and Removal Requirements

Recommendations will be provided concerning the appropriate management/treatment of historical resources along the trail. Options such as:

- total protection (e.g. removal of artifacts for museum display),
- restoration/reconstruction for interpretive purposes,
- removal (e.g. destruction of buildings in danger of collapsing), and
- others.

Task 4.7 Regional Tourism Development Requirements

Potential tourism opportunities that complement the overall CANOL trail development concept will be identified. These could include:

- wilderness lodge(s),
- outfitting for fishing and hunting,
- outfitting for recreational activities (e.g. mountain climbing, wilderness excursions),
- air charter services,
- accommodation/food and beverage establishments at "jump off" communities, and
- others.

Task 4.8 Research Requirements

The number and scope of proposed interpretive developments will dictate, to a certain extent, the need for further research to support the interpretive media, on-site reconstruction camps and protection and interpretation of environmental features. Specific recommendations will be provided concerning future research topics, level of detail and possible scheduling.

Task 4.9 Marketing and Promotion Requirements

The marketing and promotion requirements will be dependent upon the preferred level of development. Recommendations concerning an appropriate type of marketing program will be provided with suggestions concerning the type of image which should be promoted.

Task 4.10 Order-of-Magnitude Capital and Operational and Maintenance Costs

This task will establish order-of-magnitude capital costs for the proposed trail developments. Order-of-magnitude costs of operational programs and maintenance activities will also be presented.

Task 4.11 Social and Economic Implications

Potential economic and social benefits and costs associated with implementation of the preferred plan (e.g. employment opportunities, development of community services, etc.) will be identified.

Task 4.12 Funding Options

Optional sources of funding for the implementation of the plan, the proposed facility development and the other programs (e.g. interpretive brochures, research, marketing and promotion) will be assessed and recommended. Possible sources could include, but are not limited to:

- N.W.T. Tourism and Parks,
- Prince of Wales Northern Heritage Centre,
- National Parks Centennial Citizens' Committee list of private donors,
- Canada Minister of State for Culture,
- Interprovincial Pipe Line,
- Bechtel,
- Arctic Institute,
- Association of Canadian Universities of Northern Studies (UCUNS), and
- Science Advisory Board.

The potential sources will be organized into the types of appropriate activities that each may fund. For example, the Minister of State for Culture could potentially fund an interpretive publication on the CANOL Project. The Science Advisory Board could be approached for funding for the salary of a researcher (Native).

Tasks 4.13 and 4.14 Priorities and Phasing Requirements

In conjunction with the Steering Committee, priorities and subsequent phasing of the plan will be established.

Task 4.15 Draft Action Plan and Review Meeting

A draft action plan will be submitted to the Steering Committee for review. The draft action plan will contain:

- a statement of short and long term goals,
- a proposed historic theme structure,

- an evaluation of natural and historical resources assessing their recreational and interpretive potential,
- an assessment of regional tourism resources and the regional tourism strategy,
- an evaluation of the interpretive value of resources,
- an analysis of the characteristics and requirements of potential visitors,
- an outline of the interpretive messages to be presented,
- an overall development concept and specific interpretation development/management recommendations,
- a description of the proposed media and interpretation techniques,
- a summary of program requirements,
- cost estimates,
- priorities and phasing, and
- funding options.

It is suggested that the Steering Committee will review the draft report and discuss the contents of the Action Plan with the consultants via a conference call.

Optional Steering Committee Meeting

In replace of a conference call meeting, the Steering Committee may wish to meet with members of our team at this time to present and discuss the contents of the Action Plan. At the meeting, we would discuss specific issues in more detail (e.g. costs). The end result will be agreed upon direction and report modifications and refinements concerning the completion of the study.

Task 4.16 Submit Final Action Plan

Following the review, a final document will be prepared incorporating the comments and suggestions of the Steering Committee. The final report then will be submitted to the Steering Committee.

The following photographs illustrate the many recreational opportunities offered along the CANOL Trail. These features relate to both the natural and human history of the region.

The CANOL Road snakes across the Mackenzie Mountain Barrens near the point where east road construction met the west road construction on New Year's Eve 1944. Old Squaw Lodge has been constructed on the hill on the left side of the photo. (Kershaw and Kershaw, August 1979)

Pump Station No. 4 at Camp 108 is one of the best preserved camps on the CANOL No. 1 Pipeline. The buildings to the left are the pumphouse and maintenance garages while the quansits were past living quarters. This camp can be accessible by light aircraft and could therefore be a major trail starting and termination point as well as a significant historical interpretive development node. (Kershaw and Kershaw, September 1979)

The interior of the Pumphouse at Station No. 2 in Dodo Canyon. Many of the pipe valves, the pump mooring and fixtures are still in the well preserved pumphouse. These kinds of structures could form the basis of an interpretive programme focusing upon the "Operation of the CANOL Pipeline" theme. (Kershaw and Kershaw, 1977)

Palsas are typical geomorphological features in the discontinuous permafrost zone. This field is in Macmillan Pass and was first investigated in 1944 by A.E. Porsold of the National Museums of Canada. The Yukon portion of the CANOL Road has been reopened and the Pass could be a starting point for recreational users. (Kershaw and Kershaw, July 1978)

An abandoned section of bulldozer track on the Plains of Abraham is testimony to the once hectic pace of construction of the CANOL that occurred between 1942 and 1944. (Kershaw and Kershaw, August 1977)

4.0 THE TEAM

In combining the firms of Arctic and Alpine Environmental Consulting Services and Marshall Macklin Monaghan Western Limited, we have assembled a multi-disciplinary team of professionals who will provide specific expertise in the following fields:

- historical research,
- historical interpretive planning,
- ecological analysis,
- previous studies on the CANOL Trail,
- market demand analysis,
- recreation/tourism planning,
- concept planning and program development, and
- project management.

The organization of the project team is illustrated in Figure 4.1.

Project Co-ordination

Mr. Robert Wong will be responsible for the overall project co-ordination, client liaison, and contract administration. He has been worked in this capacity on numerous other assignments including:

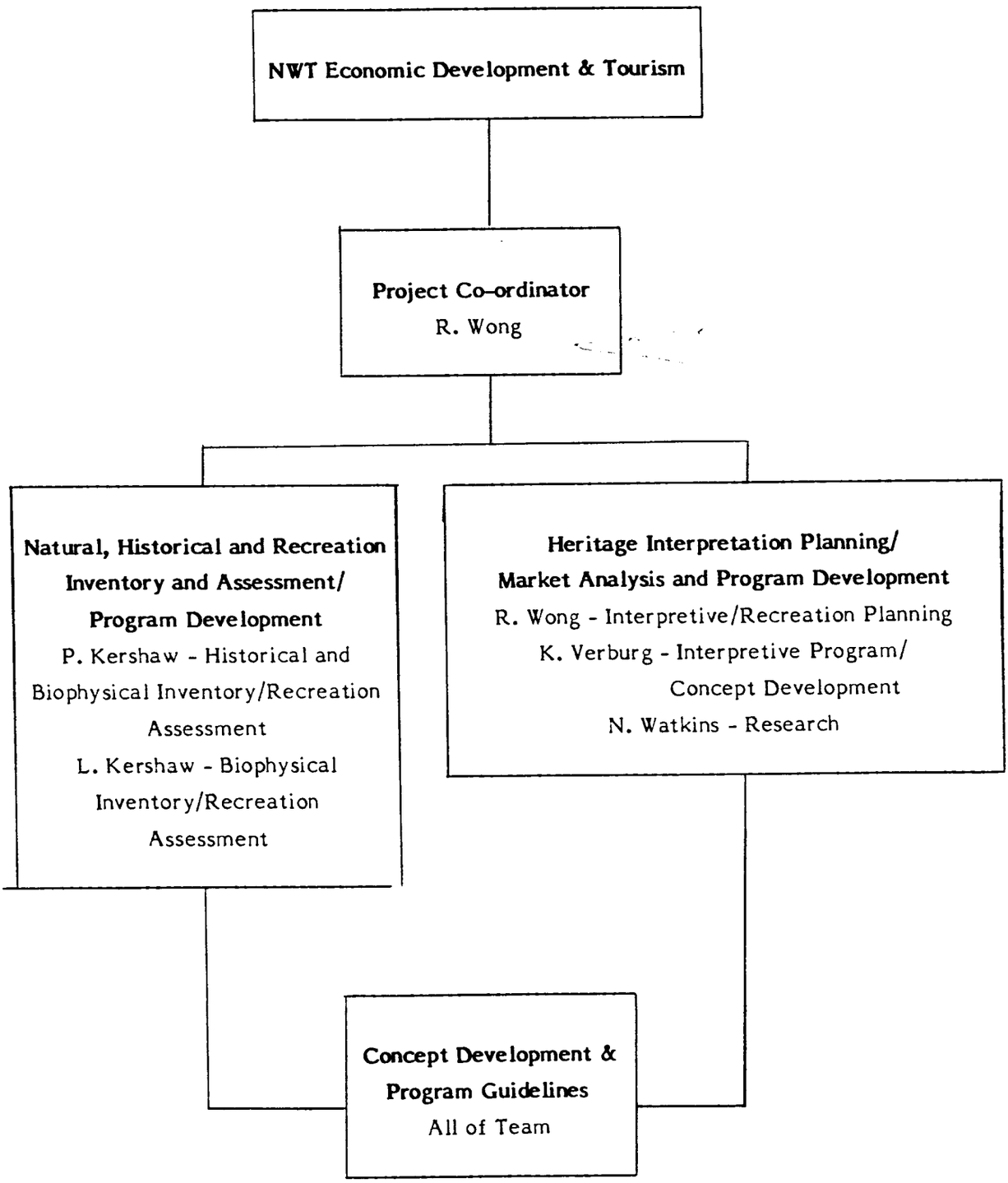
- Lake Wabamun Management Plan ($138,000)
- Battle River Tourism Destination Area Study ($56,000)
- Lethbridge Interpretive Master Plan ($44,000)

Mr. Wong's experience on technical aspects of the project are highlighted in section Interpretive Planning

Natural and Recreational Resource Inventory and Assessment

Dr. G. Peter Kershaw and Mrs. Linda J. Kershaw will be responsible for the inventory and assessment of CANOL Trail's natural resources and, with Mr. Wong,

Project Organization
Canol Trail Assessment



will assess heritage and recreational resources. They will also be heavily involved in the preparation and evaluation of alternate concepts and in the preparation of guidelines for resource management, heritage conservation and the environmental impacts.

They both have extensive knowledge of the CANOL Trail, as the following summaries show.

Dr. G. Peter Kershaw, Ph.D.,

Dr. Kershaw is well qualified to work on the CANOL Trail Assessment Project. He has worked in the proposed study area for 10 years, producing a M.A. thesis, a Ph.D. thesis, and numerous scientific, historic and popular publications. Research for his M.A. thesis involved a detailed inventory of the geomorphology, soils, vegetation and wildlife of Dale Creek valley (proposed for development as a tungsten mine) and Cirque Lake Valley (a proposed IBP site). The data were then analyzed to produce a map of terrain sensitivity. His Ph.D. thesis focused on the long-term ecological consequences of the CANOL Project in tundra environments. This involved 3 years of intensive work along the abandoned section of the road with limited air support and during all seasons of the year. In the course of this work, he gained an intimate understanding of the natural environment along the CANOL route and of its sensitivity to disturbance. Since 1979, he has been involved in several studies in the Hess and Tsichu River drainage basins near Macmillan Pass. These have included detailed mapping of vegetation and geomorphology, intensive large mammal and small mammal surveys and microclimate studies related to caribou behavior and habitat selection.

Early in his work, Dr. Kershaw recognized the opportunity that the CANOL Road provides for access to the wilderness of the Mackenzie Mountains and the fascinating history associated with the many World War II artifacts found along its route. Having hiked and skiied much of the road between Macmillan Pass and Norman Wells, he has first hand knowledge of many unique features, recreational resources and potential hazards along the proposed trail. This knowledge covers the wide variety of landscape components that would be assets to any proposed recreational/interpretive development (e.g. geomorphological/geological,

botanical and zoological, as well as historical). He is also familiar with the logistical constraints associated with access from Norman Wells and from Whitehorse during summer and winter. He knows many of the people associated with big game outfitting, Old Squaw Lodge, mining activities and support systems in the region and is also familiar with most current and proposed land use activities along the CANOL route.

Dr. Kershaw has been involved in outdoor education since 1971. For 3 years, he designed and led public hikes and bus tours in southern Ontario, and ran an outdoor education school for public school students. He has been teaching courses in biogeography and periglacial geomorphology at the University of Alberta for 5 years. These courses have involved numerous field trips and the supervision of numerous projects in boreal forest and tundra environments.

Mrs. Linda J. Kershaw, M.Sc.

Mrs. Kershaw has had extensive field experience in the CANOL Trail study area and will make a major contribution to this project. She first visited the area in 1974, collecting field data for detailed biophysical inventory and terrain sensitivity mapping of the Dale Creek and Cirque Lake Valleys. Plant identification and species distribution were areas of scientific specialization during the studies along the CANOL route. Since 1977, she has worked in the study area every year. She hiked and showshoed/skiied much of the road between Macmillan Pass and the Mackenzie River during 1977-1979, studying the long-term environmental impacts of the CANOL Project. During the course of this research, Mrs. Kershaw was responsible for the logistics and field support (e.g. preparation of much of the field equipment, required food caches, etc.). Consequently, she is familiar with many of the limitations that may face hikers/skiers in the area and recognizes many of the logistical constraints that they may face. Since 1979, she has been involved in several research programs in the Hess and Tsichu River drainage basins. These have included large scale geomorphological and vegetation mapping, as well as intensive large and small mammal surveys.

Mrs. Kershaw has a strong interest in the unique features of this region. This is reflected in her M.Sc. thesis topic (A Phytogeographical Survey of Rare, Endangered and Extinct Plants in the Canadian Flora) and in her work in the proposed park site on northern Ellesmere Island. She is familiar with many unique areas along the route of the CANOL Road and could play a major role in suggesting points of special interest.

Interpretive Planning/Market Analysis and Program Development

Mr. Robert A.G. Wong, M.A., M.C.I.P.

Mr. Wong will be responsible for theme analysis, market analysis, and the development of concept alternatives and associated programs. Mr. Wong has over six years of consulting experience in the field of interpretive and tourism planning. He is currently responsible for the market analysis and assessment of development opportunities within the Liard-Mackenzie Highway Corridor and, in particular, the communities of Tungstern, Wrigley and Fort Simpson. He has also been the project co-ordinator in such projects as:

- Lethbridge Historical Interpretive Master Plan,
- Tipperary Creek Conservation Area, Market and Economic Impact Meewasin Valley, and
- Battle River Tourism Destination Area Study.

Mr. Kees Verburg, M.Sc., M.C.I.P.

Mr. Verburg will be responsible for concept develoment and preparation of program guidelines. Mr. Verburg brings to this project over 15 years of experience in the planning, design and interpretation of natural and historic resources. His project experience includes such assignments as:

- Klondike National Historic Sites Master Development Plan,
- Yukon Steam Train Attraction Feasibility Study,
- Aardvark Environmental Centre,
- Klondike Gold Fields Interpretation Centre, and
- Land Use Controls to Preserve Heritage Projects.

During his employment with Parks Canada, he headed the study to develop guidelines for the planning and development of trail systems. This manual has been applied by Parks Canada and was the basis for the manual for the planning and construction of campgrounds.

Mr. Nicholas M.S. Watkins, B.Arch.

Mr. Watkins will be assisting Mr. Wong and Mr. Verburg with research and assessment of such factors as regional tourism facilities and services, and potential visitation. Mr. Watkins is currently involved in the research and evaluation of potential visitor traffic along the Liaird-Mackenzie Highway Corridor. He has also been heavily involved in assessing the recreational facilities and services for the Pine Lake Regulation Study: Recreation Assessment.

5.0 FEES AND TIMING

5.1 Fees

The work program outlined in this submission has been developed in response to the Terms of Reference. Our fees represent the level of effort required to meet the stated work program using specialists in the most economic manner.

Our team is prepared to undertake this assignment for a total fee of $22,000.00. The fee consists of $19,552.00 for 401 person-hours of professional and technical time and $2,448.00 for disbursements. The disbursements are based upon one meeting with the Steering Committee. Since Arctic and Alpine Environmental Consulting have extensive knowledge of the CANOL Trail, considerable time saving will occur during the inventory and data assembly stage (Phase 2). This will allow for greater time spent developing the concept alternatives and examining specific program requirements.

A summary of professional/technical fees and disbursements by phase is provided in Table 5.1. A detailed breakdown of fees by project team member is shown in Table 5.2.

In addition, we have presented two optional tasks in our work program for consideration by the Steering Committee. They are:

- Task 2.4 Interview Key Interest Group (personal on-site interviews)
    - time and disbursements of 1 person flying from Yellowknife to Norman Wells return. This trip would coincide with the first Steering Committee meeting.
- Task 4.14 Draft Action Plan and Review Meeting
    - time and disbursements of 2 people for major review and discussion meeting in Yellowknife.

Table 5.1 Summary of Fees

Phase	Hours	Professional/ Technical Fees	Disbursements	Total Fees
Phase 1	12	$ 640.00	$ 93.00	$ 733.00
Phase 2	142	6,848.00	355.00	7,203.00
Phase 3	77	3,808.00	1,075.00	4,883.00
Phase 4	170	8,256.00	925.00	9,181.00
Total	401	$ 19,552.00	$ 2,448.00	$ 22,000.00

Table 5.2 Detailed Breakdown of Professional Fees by Project Team Members

Staff	Hourly Rate ($)	Phase 1 (h)	Phase 1 ($)	Phase 2 (h)	Phase 2 ($)	Phase 3 (h)	Phase 3 ($)	Phase 4 (h)	Phase 4 ($)	Total Time (h)	Total Fee ($)
P. Kershaw	60	4	240	22	1,320	8	480	16	960	50	3,000
L. Kershaw	50	-	-	32	1,600	20	1,000	31	1,550	83	4,150
R. Wong	50	8	400	32	1,600	28	1,400	55	2,750	123	6,150
K. Verburg	65	-	-	8	520	8	520	20	1,300	36	2,340
N. Watkins	40	-	-	40	1,600	5	200	32	1,280	77	3,080
Word Processing	26	-	-	8	208	8	208	16	416	32	832
Totals		12	640	142	6,840	77	3,808	170	8,256	401	19,552

The costs estimate associated with these tasks are presented in Table 5.3. We would be happy to discuss these options with the Steering Committee at their convenience.

5.2 Invoicing

We suggest that project invoicing occur on a percentage complete basis according to an invoicing schedule. This schedule will reflect the level of effort expended during that time period up to 80% of the contract fee. The remaining 20% will be invoiced upon satisfactory completion of the study requirements.

5.3 Time Schedule

A suggested time schedule is outlined on the Work Program Chart at the end of Section 2.0. We have pinpointed key dates on which phases will commence. These dates are:

- February 1, 1985: Phase I: Review/Start Up Conference Call
- February 5, 1985: Phase II: Assessment of CANOL Trail Opportunities and Constraints
- February 18, 1985: Phase III: Preparation and Evaluation of Preliminary Concept Alternatives
- March 4, 1985: Phase IV: Preparation of the Preferred Action Plan
- March 29, 1985: Submit Final Report

We anticipate a start-up date of February 1, 1985 and would complete the project by March 29, 1985. To meet these target dates, we assume that written comments will be in the office of the consultants within 3 days of a Steering Committee meeting.

Table 5.3 Estimated Costs for Optional Tasks

Phase/ Task	Hours	Professional/ Technical Fees	Disbursements	Total Fees
Phase 2				
Interviews in Norman Wells (airfare from Yk)	16	800	400	1,200
Phase 4				
Steering Committee Meeting in Yk (2 people)	16	880	920	1,800

6.0 THE CONSULTANTS AND RELEVANT PROJECT EXPERIENCE

Arctic and Alpine Environmental Consulting Services and Marshall Macklin Monaghan Western Limited have combined their strengths for this project.

The Arctic and Alpine team is well known for its scientific research of the CANOL Project and arctic and subarctic environments. Members of the firm bring to the project their intimate knowledge of the entire trail and their practical experiences of hiking it during all seasons. They have completed several studies directly related to resource assessments and environmental impact analyses in these ecosystems.

Marshall Macklin Monaghan is a leading firm in the fields of Heritage Resource Interpretation and Planning, and Tourism and Recreation Planning and Implementation. They have completed a variety of heritage resource planning assignments comparable to the CANOL Project and have extensive project experience in the North. Their current work on the Liard-Mackenzie Regional Tourism Strategy, particularly as it pertains to tourism facilities and markets of wilderness adventure products, will be valuable to this assignment.

The following section presents descriptions of the firms and highlights relevant projects.

6.1 Arctic and Alpine Environmental Consulting Services

Arctic and Alpine is a partnership between two professional ecologists - Dr. Peter Kershaw and Mrs. Linda Kershaw. We have worked as a team in the arctic, subarctic and alpine since 1974. Over the past 10 years, we have developed a great interest in and appreciation of the northern environments of western Canada. Much of our scientific research has been of an applied nature. In the past 5 years, this has led to our participation in biophysical inventories and terrain sensitivity analyses associated with northern development projects. Hence, the formation of Arctic and Alpine Environmental Consulting Services. In this capacity, we have provided the following services:

- large scale mapping of geomorphological features;
- definition an description of physiognomically and/or floristically defined plant communities;
- large scale mapping of plant communities;
- intensive surveys of large mammals studying seasonal and diurnal patterns of movement, population levels and habitat preferences;
- small mammal surveys studying population levels in various habitat types;
- terrain sensitivity mapping with respect to northern development;
- definition of potential conflicts associated with northern developments;
- assessment of native species as potential candidates for future revegetation programs;
- assessment of types and rates of native revegetation and hence, suggestions regarding mitigative measures for recent disturbances; and
- assessment of the national historical significance of the CANOL Project.

6.1.1 Relevant Project Experience

Experience gained from the following projects will have direct relevance to work in the CANOL Trail Assessment Project.

- Environmental Report on the Proposed MacTung Airstrip Development.
- Discussion of the Potential Environmental Effects of the MacTung Project on the Keele Peak Area.

- A National Historic Resource: The CANOL Project, N.W.T.

- Population and Distribution Characteristics of Resident Wildlife in the MacTung Study Area 1981-1983.

- Geomorphology and Vegetation of the MacTung Study Area.

- Ecological Characteristics of Tundra Disturbances in the Dempster Highway Corridor: Implications for Future Rehabilitation Programmes.

6.2 Marshall Macklin Monaghan Western Limited

Marshall Macklin Monaghan is a leading multi-disciplinary consulting organization which provides a wide range of services for both government and private enterprises in the heritage resource planning, tourism, municipal, environmental, urban development, transportation, recreation industry, commercial and resources fields.

All consulting work in Western Canada is managed from the head office of Marshall Macklin Monaghan Western Limited, located in Edmonton. The resources of the firm in Alberta as well as the full resources of the firm are available on a project by project basis.

The Tourism, Recreation and Heritage Resource Planning Group of Marshall Macklin Monaghan is a recognized team of professionals. We provide the following historic resource planning services:

- overall project design and co-ordination,
- preparation of themes and objectives statements,
- theme/resource analysis and elaboration,
- storyline development,
- design and co-ordination of historical, archaeological, and natural resources research programs,
- market and audience analysis,

- preparation of interpretation programs,
- artifact selection,
- preparation of development concept plans, master plans, and development plans,
- media selection
- preparation of programs for the commemoration, preservation and management of historic resources,
- exhibit design,
- preparation of cost estimates,
- design and co-ordination of structure or program feasibility studies, and
- spatial and functional programming.

In past park planning and historical resource planning assignments, we have also often utilized our in-house resource support capabilities in the fields of economic planning (economic and market feasibility) and municipal engineering.

6.2.1 Relevant Project Experience

The following list of our project experience relevant to the CANOL Trail Assessment demonstrates Marshall Macklin Monaghan's strong capabilities in the historical resource planning fields. More detailed descriptions of selected projects are included following Section 6. Our relevant projects include:

Heritage Interpretation Planning and Concept Development

- Rankin Inlet Historic Sites Project
- Dawson City Heritage Community Tourism Strategy
- Klondike Gold Fields Interpretation Centre
- Bear Creek Complex
- Aardvark Environmental Centre
- Evaluation of Nature Centres
- Yukon Steam Train Feasibility Study
- City of Lethbridge, Regional Heritage Trail
- City of Lethbridge Interpretive Master Plan
- Head-Smashed-In Buffalo Jump Interpretation Program

Market Analysis Projects

- Liard-Mackenzie Regional Tourism Strategy
- Tipperary Creek Market and Economic Impact Study
- Heritage Festival Park Feasibility Study
- West Parkland Chabot Park Concept Plan
- Watson Lake - Terrace Highway Regional Tourism Plan
- Battle River Tourism Destination Area Study
- Natural and Heritage Culture Tours, Cape Dorset
- Peace-Alaska Highway Regional Tourism Plan

Other Projects in Northern Canada

- Pangnintung Community Tourism Study
- Mackenzie Valley Regional Plan Appraisal
- N.W.T. Visitors Guide (82/83)
- Baffin Regional Tourism Strategy
- Keewatin Regional Tourism Strategy

Marshall Macklin Monaghan

LIARD REGIONAL TOURISM STUDY
Northwest Territories

One of three tourism planning projects funded under the Federal-Territorial Economic Development Agreement, the Liard Regional Tourism Study will provide guidelines for the development of the tourism industry in this outstanding wilderness area. As in the two other territorial tourism studies, the emphasis here will be on the potential of the tourism industry to provide economic opportunities for northern residents, while remaining within the social and environmental carrying capacity of this highly sensitive northern region.

To ensure that the strategy responds to local conditions, opinions, ambitions and concerns, the project encompasses an extensive public participation program including public meetings, radio broadcasts, interviews, open house sessions and home visits. The public awareness program will enhance local recognition of the benefits of well-planned and well-managed tourism developments, as well as identifying the means by which residents can take advantage of and deal positively with the impact of any tourism development.

The detailed implementation program that will be produced at the conclusion of this study will form the foundation for subsequent capital development and works programs, promotional strategies, industry organization and ongoing training programs.

Marshall Macklin Monaghan

RANKIN INLET HISTORIC SITES PROJECT

Rankin Inlet is a predominantly Inuit community located on the west side of Hudson Bay in an area referred to as the Keewatin Region of the Northwest Territories. In an attempt to preserve and present the interesting history of the Rankin Inlet area the local Hamlet Council selected four significant historic sites to be researched and interpreted.

Marshall Macklin Monaghan was hired by the Hamlet Council in conjunction with the Territorial Department of Economic Development and Tourism to research the four designated sites and develop interpretive brochures and signage for each.

The four sites represent four of the more significant historic areas from Rankin Inlets past as follows:

- Two archaeological sites on the nearby Meliadine River present a variety of remnants from both pre-historic and historic Inuit cultures.

- Marble Island off the coast of Rankin Inlet portrays the interesting whaling and exploration eras of the 18th and 19th centuries.

- The remnants of the Rankin Inlet Mine provide a reminder of the formation of the community of Rankin Inlet.

Marshall Macklin Monaghan

STEAM TRAIN ATTRACTION FEASIBILITY STUDY
Whitehorse, Yukon Territory

The intent of this project was to examine the feasibility of restoring and operating a steam-driven excursion train as a tourist attraction based in Whitehorse.

Currently the White Pass and Yukon Railway is an internationally known narrow gauge railway operating between Skagway, Alaska and Whitehorse, Yukon. The proposed excursion steam train would operate on the existing railway line serving as a transportation link between Whitehorse and Carcross (40 miles), and as an important tourist attraction in an attempt to increase passenger volumes.

Through the analysis of market trends and conditions, and economic, social and environmental impacts, the feasibility of operating an excursion steam train as a tourist attraction was determined. A component of the feasibility study was to indicate operating and maintenance requirements and guidelines to ensure the proper development of such an attraction.

Marshall Macklin Monaghan

THE DAWSON CITY COMMUNITY AND TOURISM DEVELOPMENT PLAN
Yukon Territorial Government

Under the Canada-Yukon Tourism Agreement, Dawson City was designated a Tourism Destination Area; and its historical, archaeological and cultural resources were to be developed to encourage tourists to explore the northern Yukon. So that the town's tourism resources would be integrated with other economic sectors of the community, it was necessary to prepare an overall community plan.

Once the community plan had been completed, a comprehensive two-part tourism planning program was undertaken to make sure that development would complement the historic character of Dawson City while optimizing the potential economic return to the tourism industry, the City, and the Yukon Territorial Government.

After the Comprehensive Tourism Development Plan was accepted, a plan was produced which was specifically directed at downtown Dawson, where a number of historic resources are located. Design guidelines, development recommendations and control mechanisms were prepared to retain and enhance the historic atmosphere.

Extensive public participation programs premitted residents and business interests to express opinions, preferences, concerns and aspirations. A Working Group, consisting of a number of local people, carried out tasks related to data collection and organization, and a Steering Committee, consisting of representatives of local, territorial and federal agencies and organizations, provided overall direction.

Marshall Macklin Monaghan

BATTLE RIVER TOURISM DESTINATION AREA STUDY

Alberta Tourism and Small Business

Working closely with representatives of Travel Alberta and the Battle River Tourist Association, Marshall Macklin Monaghan, in conjunction with Pannell Kerr Forster Campbell Sharp, completed an inventory and assessment of the tourism development opportunities in Zone 5. The dominant opportunities in Battle River Country are primarily capturing the family oriented day-use and extended-stay tourism markets.

The key products of this assignment were an opportunity plan for the next twenty years which will guide tourism development in the region by identifying investment opportunities for both the private and public sectors. Six tourism opportunity areas and three historic/recreational waterways were defined which possess recognizable identities, a variety of complementary tourism and recreational opportunities and marketable images. For each of the opportunity areas, recommended development objectives, a suggested development intent and associated opportunities were presented in the report. The proposed Reynolds-Alberta Museum is an example of a major attraction within the Wetaskiwin-Camrose Tourism Opportunity Area.

Marshall Macklin Monaghan

PEACE RIVER-ALASKA HIGHWAY REGIONAL PLAN
British Columbia Government

The Peace River-Alaska Highway tourism region, covers over 265 000 square kilometres in northeastern British Columbia, and extends from the Yukon Territory to Alberta. The region has abundant tourism resources, such as spectacular landforms and large fish and wildlife populations. And there is a growing need for facilities, services and attractions to complement these natural resources.

Our plan identified extended stay areas and centres of regional and local significance for future tourism development. This ensured more efficient managing of infrastructure requirements.

The tourism attractions and developments we proposed are intended to attract international, U.S. and domestic markets. These facilities include interpretation centres, recreation and sports complexes, recreational river programs, and provincial parks.

Marshall Macklin Monaghan

LIARD RIVER BASIN RECREATION CAPABILITY STUDY

British Columbia Hydro and Power Authority

This project required the identification and evaluation of existing and potential recreational sites in the vast Liard River basin of northern British Columbia and the southern Yukon, including assessment of the effects of various reservoir schemes on prime recreation sites. The study was conducted through detailed airphoto analysis to identify the sites with physical characteristics appropriate for recreational development.

These high priority sites were evaluated in the field. The resulting site data were integrated with reservoir levels and mapping data using the innovative THEMAPS computer mapping and evaluation programmes. Computer-generated three-dimensional perspectives of the Liard Valley under various reservoir schemes also were generated. For the sites with the highest recreational capability, conceptual development proposals were prepared. Economic evaluations were conducted to determine the effects of various reservoir configurations on existing and potential recreation resources.

Marshall Macklin Monaghan

FROBISHER BAY COMMUNITY STUDY
Government of Northwest Territories

Frobisher Bay, a community of approximately 2 500 people, is located 2 048 kilometres north of Montreal.

As part of the Baffin Regional Tourism Planning Project, we held meetings with residents, business groups and individuals, which produced ideas and concerns that will be synthesized into a tourism development plan for Frobisher Bay.

Because of its status as a government and transportation centre, the concept plan will include attractions and programs geared to providing visitors with the level of activities required for a longer stay in the community.

Marshall Macklin Monaghan

BAFFIN REGIONAL TOURISM PLANNING PROJECT
Government of the Northwest Territories

Our firm prepared a tourism strategy for the vast Baffin Region in the Northwest Territories: an area which includes the High Arctic Islands, Melville Penninsula, and the eastern half of Hudson Bay, as well as all of Baffin Island.

The result of this challenging undertaking is an action plan for the 80s which will guide tourism development throughout the region by identifying investment opportunities for both the public and private sector. Tourism development recommended in our strategy must provide local residents with substantial economic benefits, while at the same time remaining within the limits set by pre-determined social and environmental carrying capacities.

Marshall Macklin Monaghan

KLONDIKE GOLD FIELDS INTERPRETATION CENTRE

This Centre was designed to depict the salient aspects of the Gold Rush and the mining technology that it initiated from 1896 to 1966, when the last large goldmining dredge ceased operation. The services we provided included project direction, and involvement in all phases of planning from initial concepts through pre-design to cost estimation. Specifically, this involved the development of a theme structure, master planning, co-ordinating all indoor and outdoor aspects of the Interpretation Centre and the Mining Technology Display areas, exhibit and display area design, artifact selection and protection, visitor service and comfort requirements, cost estimation, implementation schedules, and operation and maintenance policies and programs.

Marshall Macklin Monaghan

BEAR CREEK COMPLEX
Parks Canada

The Complex is an historic gold mining equipment repair centre, composed of 24 buildings, dating back to around the 1910s, and being restored to its former complexity. Our services centred around the preparation of a master plan for the complex as well as the development of detailed interpretive concepts for such components as the blacksmith shop, the acetylene gas plant and the machine shop.

Marshall Macklin Monaghan

AARDVARK ENVIRONMENTAL CENTRE

The Aardvark Environmental Centre proposed for the Red Rock District outside of Denver, Colorado, was designed to present and interpret the impact of man upon the natural environment, and educate the general public on the sensitive use and development of the earth's resources.

As project manager, one of our staff members was completely responsible for site evaluation, master planning interpretation and exhibit design. Specifically, detailed biological and physical inventories were carried out, geotechnical and engineering studies co-ordinated, development concepts and detailed area plans prepared, facility programs and pre-design studies developed and comprehensive interpretation plans outlining concepts, themes, story-lines, media and exhibit formats were prepared.

These activities resulted in a manual detailing all stages of the work carried out and a proposed implementation schedule for the actual design and construction of the buildings, groundworks and specific indoor and outdoor exhibits.

Marshall Macklin Monaghan

APPLICATION OF LAND USE CONTROLS TO PRESERVE HERITAGE RESOURCES OF NATIONAL SIGNIFICANCE

Parks Canada National Historic Parks and Sites Program

Many nationally significant heritage resources are located on lands presently not under the jurisdiction of Parks Canada, nor under the control of other federal departments and agencies. Unless the present owners are sympathetic to their preservation, these heritage resources are, therefore, vulnerable to destruction by modern development or thoughtless action. The purpose of this project was to analyze heritage and land-use legislation of the Province of Ontario to determine its practical application in the protection of heritage resources of national significance and to propose a "model" process for the application of appropriate legislation and associated regulations under different conditions of heritage preservation.

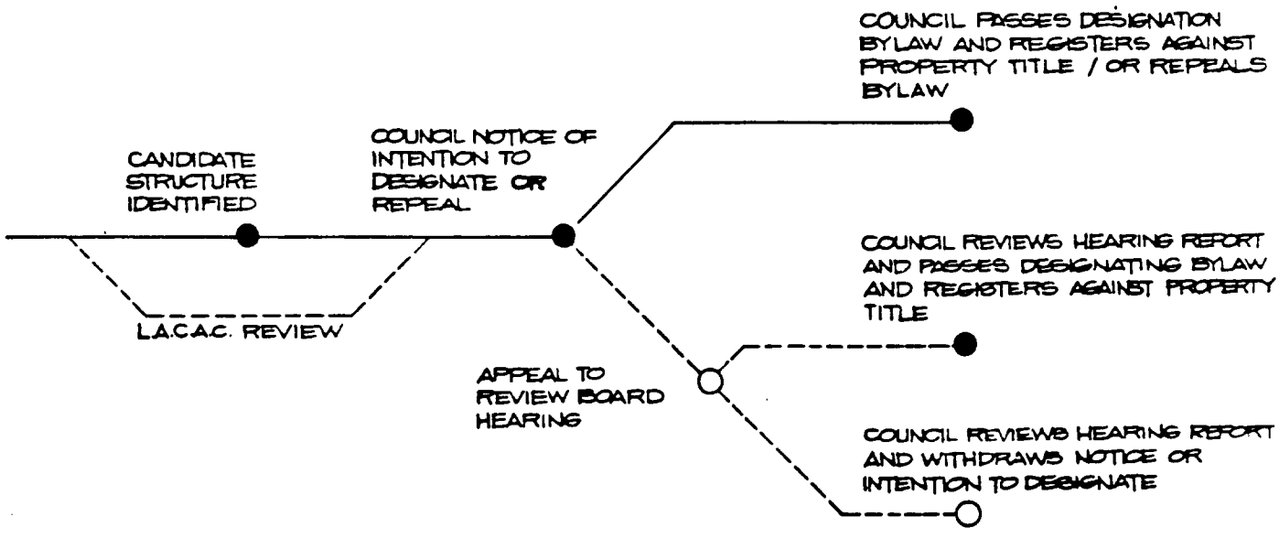


FIGURE 3

DESIGNATION OF BUILDINGS / PROPERTIES PER PART IV OF ONTARIO HERITAGE ACT

Marshall Macklin Monaghan

EVALUATION OF NATURE CENTRES

As part of a large-scale study investigating interpretation techniques and processes, one of our staff members was asked to visit and evaluate small- to medium-sized nature centres operated by municipalities, authorities, associations or government agencies throughout the United States and Canada. The evaluation included:

- Purpose and perceived role of each centre
- Location and general character
- Perceived and actual users
- Interpretation programs and exhibits
- Functional relationships
- Administration and organization

The project resulted in a comprehensive report summarizing various approaches to the interpretation of the natural environment to the general public supported by an extensive slide catalogue detailing specific characteristics of each centre visited.

Marshall Macklin Monaghan

TIPPERARY CREEK CONSERVATION AREA MARKET AND ECONOMIC IMPACT STUDY
Meewasin Valley Authority, Saskatoon, Saskatchewan

The Tipperary Creek Conservation Area is one of the most significant natural areas in the Saskatoon region. The fact that it contains 17 known archaeological sites including features such as a medicine wheel, stone cairns, bison kills and tipi rings offers an excellent addition of opportunities for public education and historical interpretation.

The Interpretive/Site Development Master Plan for Tipperary Creek, prepared for the Meewasin Valley Conservation Authority in 1984, recommends an extensive site development and interpretive program. The main feature is the visitor interpretation centre which will present an overall orientation and interpretation of the conservation area. The visitor centre and a series of inter-related interpretive nodes (physically and thematically) are proposed which will tell the story of the Northern Plains Indian culture. However, the Master Plan does not directly address the matter of tourism potential or the potential economic benefits available through development of the site.

Marshall Macklin Monaghan and Derek Murray and Associates Ltd. have been commissioned to evaluate the entire project proposed in the Master Plan from an economic and tourism perspective. A key component of the assignment is to identify other opportunities in terms of on-site programming, marketing, and the complimentary developments to maximize economic tourism benefits in addition to those cultural, interpretive and recreational benefits resulting from the implementation of the proposed Master Plan.

Some of the initial considerations to be assessed include: integrating the promotion and marketing of Tipperary Creek with the Saskatchewan Rivers Heritage Area, employing Native peoples to conduct and participate in the interpretive program and providing scheduled drama productions as part of the interpretive program. Tipperary Creek Conservation Area is a unique opportunity, and can become a significant tourism generator for the Saskatoon region and Saskatchewan as a whole.

Marshall Macklin Monaghan

HISTORICAL INTERPRETIVE MASTER PLAN
City of Lethbridge, Urban Parks Project

The City of Lethbridge completed an Urban Parks Master Plan for the river valley and coulee system of the Oldman River in April 1983 under the provincial "Urban Parks for the Future" programme. During the preparation of the Master Plan, it became clear that the study area contained a wide diversity of significant heritage resources and the interpretation and conservation of those heritage resources should receive serious attention. Consequently, the City of Lethbridge commissioned Marshall Macklin Monaghan to prepare a comprehensive Historical Interpretive Master Plan for the Urban Parks study area, which details the themes, subthemes, media, developments and programmes required to interpret the heritage resources to the general public.

In addition, the Master Plan is to integrate the programmes and facilities of the Sir Alexander Galt Museum into the park interpretive programme. Therefore, the team members explored the potential roles and use of the Museum as a central interpretive facility providing the overall historical context for the orientation to the entire park.

In general, the City of Lethbridge Historical Interpretive Master Plan provides direction and guidelines for the development and interpretation of the City's heritage resources for the next ten years. These guidelines include:

- a detailing of all proposed interpretation developments and supporting programmes and associated capital costs;
- operations and maintenance recommendations and associated costs;
- conservation/preservation recommendations and associated costs; and
- an implementation program defining the phasing and priority of developments, programmes and other required actions.

Marshall Macklin Monaghan

FORT WHOOP-UP INTERPRETATION CENTRE
City of Lethbridge

Our firm was contracted by the City of Lethbridge to undertake an Historical Interpretive Master Plan for the Urban Parks Project area. The Historical Interpretive Master Plan provides direction and guidelines for the development and interpretation of the City's heritage resources for the next ten years. One of the major focal points of the Plan is the Fort Whoop-Up replica and Interpretation Centre.

The intent of the study was to provide facility design implications, capital and operating costs, annual man-year requirements, theme development and proposed policy and program guidelines for the development of the interpretation centre. The recommendation for the facility establishes comprehensive, long-range direction for the development, management and use of this heritage resource. The questions which are addressed include:

- What are the significant historical or cultural themes and how should these be interpreted?

- What existing resources best reflect these themes and what must be done to ensure their preservation?

- What human, financial and organizational resources are required to carry out the selected interpretation and preservation works or programs?

- Where can the required resources best be obtained and how best be utilized?

Marshall Macklin Monaghan

COALBANKS INTERPRETATION CENTRE
City of Lethbridge

In May of 1983, our firm was commissioned by the City of Lethbridge to prepare an Historical Interpretive Master Plan which would guide the development and interpretation of the City's heritage resources for the next ten years. One of these resources is Coalbanks a proposed interpretive node to focus on coal mining, its commercial exploitation and shipment, the personalities involved and the creation of a company town.

Marshall Macklin Monaghan was responsible for detailing the themes, media, capital and operational costs, policies, design implications and programs required to interpret this specific heritage resource.

The Coalbanks interpretive node would be established as an open air Kiosk or in a period constructed building. The building would be placed in an historically approximate atmosphere and would contain exhibit areas, reception/ administration areas, information section, storage area and an audio-visual presentation theatre. The facility and interpretive program will represent the highest priority theme for the Urban Parks area - **Early settlement and Resource Development (1874 - 1905).**

Marshall Macklin Monaghan

HEAD-SMASHED-IN BUFFALO JUMP INTERPRETATION PROGRAM
Alberta Culture

Head-Smashed-In Buffalo Jump, a pre-historic resource of world-wide significance is located in southwestern Alberta. In order to interpret the significance and complexity of the Buffalo Jump to the general public, Alberta Culture has decided to establish an Orientation/Interpretation Centre on the site as part of the overall interpretation program.

Our firm has been commissioned to assist Alberta Culture to establish the guidelines for the preparation of designs for interpretive displays and publications, and for the construction, procurement and installation of these displays.

To meet these objectives, an appropriate theme structure, an interpretation and display concept and a storyline linking the various elements of the theme structure and interpretation concept have been prepared.

Marshall Macklin Monaghan

SIBLEY PARK HERITAGE CENTRE
Ontario Ministry of Natural Resources

As part of a Tourism Development Study for Sibley Provincial Park, we recommended the development of the Sibley Heritage Centre as a major regional attraction. Based on the accepted concept development plan for the park, this development package was selected for more detailed study.

The Heritage Centre concept uses a variety of media to interpret the heritage resources of Sibley Provincial Park. Media suggested to interpret important park themes include not only traditional display and literature techniques, but also a host of audio-visual programs, sale of educational products, participation programs, and other assorted facilities and programs.

The emphasis of the facility is on **"hands on"** learning and interpretive activities. The orientation of programming is towards all age groups including adults, with a special emphasis on activities and learning experiences for children.

The displays will interpret the six major park themes as defined in the Park Master Plan as well as a number of lesser but still important themes. The six major themes are **Geology of the Peninsula, Forest Transition Zone, Botanical Anomolies, Wildlife, Native Occupation** and **Silver Islet Mine.**

Our firm designed a development concept that would be large enough to encompass a variety of features and services of sufficient scope to constitute a regional attraction, but not of a scale inappropriate to or detracting from the wilderness environment of the park.

Marshall Macklin Monaghan

OLD FORT WILLIAM, THUNDER BAY

Ministry of Natural Resources/National Heritage Limited (1970)

Our firm was contracted to prepare a master plan for the development of a 65 hectare site on the Kaministikwia River in Thunder Bay. This report rationalized the historic objectives and findings developed to reconstruct the Fort William Fur Trading Post which, in the years 1803-1821, constituted "A Hinge of a Nation" on the major North West Company Trade Routes.

Based on the Master Plan concepts, we provided complete engineering services for site development works, including extensive structural designs for the reconstruction of over forty historically authentic buildings. Special care was taken in the design of modern day facilities to ensure they would not detract from the Fort's 150 year old appearance.

Since its opening by the Queen in 1972, Old Fort William has become a major tourist attraction in northwestern Ontario.

Marshall Macklin Monaghan

EARTH SCIENCES GALLERY

Royal Ontario Museum

The primary purpose of this museum planning and design project is to develop an interpretation concept and program that will enable the R.O.M. to provide the general public with clear explanations, descriptions and understanding of earth sciences through the development of a major gallery in which several geological and specific mineralogical displays are closely intertwined.

The major components of this assignment include:

1. The preparation of a theme structure that will identify and assign priorities to the major and minor themes to be interpreted.

2. The preparation of a scientifically and philosophically sound interpretation/display concept based upon the theme structure and the detailed knowledge of curators and other relevant specialists.

3. The preparation of a "tight" storyline and the specific focus and scope of each component of that storyline.

4. The selection and description of appropriate "display" techniques for each component of that storyline (panels, audio-visual programs, films, dioramas, animated displays, dramatics, lectures, etc.).

5. The preparation of floor plans, elevations and other visual details required to depict the relationships of the interpretation/display units throughout the Earth Sciences Gallery.

6. The preparation of a model accurately depicting the proposed development of the Earth Sciences Gallery.

7. The development of construction drawings, documentation, specifications and tender packages.

8. The contract supervision of the construction of the gallery and the installation of the displays.

Marshall Macklin Monaghan

MINTO AREA HISTORICAL MINE SITE
New Brunswick Department of Welfare

The impending closure of the New Brunswick Coal Company's underground mine at Minto, north-east of Fredericton, resulted in our firm being retained to undertake a study of the potential use of the mine as a tourist attraction.

We recommended that the historic buildings be moved to a central location and developed as a replica turn-of-the-century mining town, with an orientation centre and museum.

CURRICULUM VITAE
(January 29, 1985)

NAME **Gerald Peter Kershaw**

EDUCATION

1973. B.E.S. University of Waterloo, Waterloo, Ontario

1976. M.A. University of Waterloo, Waterloo, Ontario

1983. Ph.D. University of Alberta, Edmonton, Alberta

TEACHING EXPERIENCE

1971-73.
Grand River Conservation Authority, Cambridge, Ontario. Designed and conducted kindergarten through Grade 13 and general public outdoor education programs throughout the Grand River Watershed).

1973-75.
Physical Geography Lab Instructor for two courses, University of Waterloo.

1976-78.
Physical Geography Lab Instructor for two courses, University of Alberta.

1979-81.
Sessional Lecturer at the University of Alberta, teaching three undergraduate and one graduate level Biogeography courses. These included Intermediate Physical Geography, Boreal Ecology, Boreal Ecology Field Studies, and Northern Studies. Two courses were heavily field oriented.

1981-present.
Assistant Professor at the University of Alberta, teaching for undergraduate and graduate level Biogeography courses. These include Intermediate Physical Geography, Boreal Ecology and Northern Development, Environment Alberta, Periglacial Geomorphology, and Northern Studies.

PROFESSIONAL SPEAKING ENGAGEMENTS

Kershaw, G.P. 1974. The Periglacial Environment, Some Limitations to Development;

Faculty of Environmental Studies Seminar, University of Waterloo, Waterloo, Ontario.

Kershaw, G.P. 1976. Resource Development and Land-Use Mapping: The MacTung Case Study; Short Course in Remote Sensing, Ontario Assoc. Remote Sensing, May 3-5, 1976, University of Toronto, Toronto, Ontario.

Kershaw, G.P. 1976. Long Term Adjustments to Man-Induced Disturbances in Subarctic Alpine Tundra: Canol Project, 1942-45, N.W.T.; Ph.D. Colloquium, Department of Geography, University of Alberta, Edmonton, Alberta.

Kershaw, G.P. 1980. Morphological Investigations of Palsas in the Western Part of Selwyn Mtns., Yukon-Northwest Territories. Research Report and Seminar, Guest Lecture Series, The University of Waterloo, Ontario.

Kershaw, G.P. 1980. Tundra Responses to Disturbances Resulting from the CANOL Project: Negative or Positive Impacts? Boreal Circle Lecture, The Boreal Institute for Northern Studies, The University of Alberta, Edmonton, Alberta.

Kershaw, G.P. 1980. Long Term Ecological Effects of the CANOL Project. Lecture to the Yukon Summer School, Faculty of Extension, The University of Alberta, Edmonton, Alberta.

Kershaw, G.P. 1980. Interview on CBC TV's "The Bottom Line" concerning the ecological effects of pipeline developments in northern environments. Calgary, Alberta.

Kershaw, G.P. 1981. Pipelines and Environment, The Long View Seminar held at the Northern Pipeline Agency, Calgary, Alberta.

FIELD WORK EXPERIENCE

1971, 05-08.
Eramosa River Watershed, Ontario: Landuse and vegetation mapping as part of an education program for eight secondary school students under my guidance.

1973, 05-11.
Rockwood, Ontario: Ecosystem description and outdoor education development proposal for property later donated to the University of Waterloo (B.E.S. Thesis).

07-08.
Yukon, N.W.T. and Alaska: Geomorphological mapping project, International Geographical Union. Reconnaissance and ground truthing exercise along accessible roads in this area.

1974, 07-09.
Selwyn Mtns., N.W.T./Yukon: Ecosystem description (biological and geomorphological) and terrain sensitivity mapping (M.A. thesis).

1975-76, 06-08.
Rocky Mountains, Alberta: Debris slope processes and environments. Rockfall, talus shift and avalanche related research.

1977, 06-08; 1978, 07-09 and 1979, 02-05, 06-08
Mackenzie Mts., N.W.T.: Assessment of man-induced disturbances (biological and geomorphological) resulting from the CANOL Project (1942-45). Backpacking, snowshoeing and skiing with limited aerial support (Ph.D. thesis).

1977, 07 and 1978, 08-09.
Selwyn Mtns., N.W.T.: Vegetation analysis for AMAX Airport Feasibility Study.

1978, 02-03, 08-09 and 1979, 02.
Tsichu River Meteorological Station, N.W.T.: Operated Meteorological Service of Canada reporting station. During the winter months, also conducted snow surveys in 30 km of Ph.D. thesis research area adjacent to the station.

1980, 07-08.
Selwyn Mtns., N.W.T.: Studied plant communities, wildlife and, surficial geology of a 30 km area as an extension to the AMAX Airport feasibility study.

1981, 07-09; 1982, 02, 06, 08, 09 and 1983, 02, 06
Selwyn and Mackenzie Mtns., Yukon/N.W.T.: Mapped surficial geology and vegetation and studied small and large mammal populations within a 500 km^2 area centred on the AMAX MacTung mine development. Eight aerial wildlife censuses were conducted over 2 years to assess distribution patterns during the summer-fly season, Fall-rut, mid-Winter and Spring-calving. Studies of summer and winter ecology were completed.

1983, 08 and 1984, 08
Selwyn and Mackenzie Mtns., Yukon/N.W.T.: Completed the 3rd and 4th years of the small mammal habitat selection studies in the Tsichu River drainage basin.

1983 - present.
Bioclimatic studies in Boreal Mixedwood Habitats, Alberta: four automated microclimatic stations were established to monitor the atmospheric and soil climate of 5 habitat types. Snowpack characteristics plus small mammal habitat selection and population characteristics are also monitored.

1984, 06-08.
Man-induced disturbances along the Dempster Highway, Yukon/N.W.T.: Tundra disturbances were inventoried and their plant cover and soil characteristics described.

1984, 08, 10.
Mackenzie Valley, N.W.T: reconnaissance survey to select a site for long-term disturbance studies in subarctic ecosystems.

CURRENT RESEARCH

Long-term adjustments to man-induced disturbances in Subarctic, Arctic and Alpine areas. *The CANOL Project, N.W.T. (1942-1945)* - the study of vegetation, substrate and wildlife (small and large mammal) responses throughout the year. *The Dempster Highway, Y.T./N.W.T.* - an inventory of existing disturbances in tundra environments. Detailed experimental studies are being planned. *The Fort Norman area N.W.T.* - a long-term experimental programme instituted through a Canadian Forestry Service contract entitled 'Studies of the Environmental Effects of Disturbances in the Subarctic' (SEEDS).

The ecological and geomorphological role of permanent snow patches in the Mackenzie Mtns. is under investigation. During 2 years of aerial surveys these sites have proven to be important post calving woodland caribou aggregation sites. Their microclimatic and geomorphological characteristics are being described in conjunction with wildlife observations.

The long-term pedological, vegetational and zoological effects of crude oil spills in subarctic environments.

Carrying capacity of boreal mixed-wood forests and their utilization for intensive game ranching developments are under study at the Ministik Lake Wildlife Research Station. Large (i.e. bison, elk and moose) and small mammal herbivores (e.g. microtine rodents, richardson ground squirrels, etc.) are included in this year-round ecological research. Microclimate recording stations and snow surveys monitor utilized and control (exclosure) areas in conjunction with the Department of Animal Science's habitat selection/energy status monitoring programmes. The microclimate programme is a long-term study of the various wildlife habitats.

Dendroclimatic studies using shrubs from various locations in the Mackenzie Mtns. are underway in an attempt to extend the climatic record for this remote area. Data will be cross-correlationed with that from tree specimens in order to assess the reliability of shrubs in climatic analyses.

PAPERS, REPORTS AND PUBLICATIONS

PAPERS PRESENTED AT PROFESSIONAL MEETINGS

Kershaw, G.P. 1976. Preliminary morphological description description of rock glaciers in the Cirque Lake area in the Yukon/Northwest Territories, Canada. Can. Assoc. Geog. 1976 Annual Meeting, University of Laval, Quebec. Quebec.

Gardner, J.S. and G.P. Kershaw. 1977. Distribution and frequency of alpine rockfalls and some landscape implications in the Highwood Pass area, Alberta. Can. Assoc. Geog. 1977 Annual Meeting, Program and Abstracts, University of Regina, Regina, Sask.

Kershaw, G.P. and D. Gill. 1978. Palsa distribution and evolution in the Macmillan Pass area, Northwest Territories, Canada. Can. Assoc. Geog. 1978 Annual Meeting, University of Western Ontario, London, Ontario.

Gill, D., Peter Kershaw and Ken Bodden. 1979. Winter predator-prey interactions in the arctic/alpine tundra of the Selwyn Mountains, Yukon/Northwest Territories. Can. Assoc. Geog. Western Region 1979 Annual Meeting, University of Calgary, Calgary, Alberta.

Kershaw, G.P. and D. Gill. 1979. The effect of man-induced disturbances on the winter ecology of deciduous shrub tundra, Selwyn Mountains, Northwest Territories. Can. Assoc. Geog. 1979 Annual Meeting, University of Victoria, Victoria, B.C.

Gill, D. and G.P. Kershaw. 1979. Ecological role of river icings in the Tsichu River Valley, Northwest Territories, Canada. The Snow and Ice Symposia, Canberra General Assembly, International Union of Geodesy and Geophysics, Canberra.

Kershaw, G.P. 1980. Maps of the Mackenzie Mountains with particular reference to the CANOL Project. The Fourteenth Annual Conference of the Assoc. of Can. Map Libraries, Edmonton.

Kershaw, G.P. 1981. Long-term environmental consequences of the CANOL crude oil pipeline. Northern Development and Ecology Conference, Saskatoon.

Kershaw, G.P. 1982. Some long-term environmental consequences of an abandoned crude oil pipeline in the Northwest Territories, Canada. 11th Annual Arctic Workshop, Boulder.

Kershaw, G.P. 1983. Some abiotic consequences of the CANOL Crude Oil Pipeline Project, 35 years after abandonment, Fourth International Permafrost Conference, Fairbanks, Alaska.

Kershaw, G.P. 1983. Characteristics of 35 year old crude oil spills in Tundra plant communities. 34th Alaska Science Conference, Whitehorse, Yukon.

Kershaw, G.P. and Kershaw, L.J. 1984. Some lasting ecological effects of oil spills in subarctic alpine tundra. 13th Annual Arctic Workshop, Boulder.

PRESENTATIONS IN POSTER SESSIONS AT PROFESSIONAL MEETINGS

Kesik, A.B. and G.P. Kershaw. 1976. The assessment of landforms and vegetation for the development of the MacTung area, N.W.T. Proceedings of Cogont '76, Ontario Division Can. Assoc. Geog. Occasional Paper 5, Trent University, Peterborough, Ontario. pp. 24-25.

Kershaw, G.P. and D. Gill. 1978. Palsa/Peat plateau studies in the Macmillan Pass-Tsichu River Area, Northwest Territories, Canada. Third International Conference on Permafrost, Program, National Research Council of Canada. p. 54.

PUBLICATIONS

Gardner, J.S. and G.P. Kershaw (Abstract) 1977: Distribution and frequency of alpine rockfalls and some landuse implications in the Highwood Pass area, Alberta. Can. Assoc. Geog. 1977 Annual Meeting, Program and Abstracts, University of Regina, Regina, Sask. pp. 6-8.

Gill, D. and G.P. Kershaw (Abstract) 1979: Ecological role of river icings in the Tsichu River Valley, Northwest Territories, Canada. The Snow and Ice Symposia Canberra General Assembly, International Union of Geodesy and Geophysics, Canberra.

Gill, D. and Kershaw, G.P. 1980: Ecological role of river icings in the Tsichu River Valley, Northwest Territories, Canada, December 1979. Sea Level, Ice and Climatic Change; International Association of Hydrological Sciences Publication Number 131: 131-138.

Gill, D., Peter Kershaw and Ken Bodden (Abstract). 1979: Winter predator-prey interactions in the arctic/alpine tundra of the Selwyn Mountains, Yukon/Northwest Territories. Can. Assoc. Geog. Western Region 1979 Annual Meeting, Program and Abstract, University of Calgary, Calgary, Alberta. pp. 7-8.

Kershaw, G.P. 1973: Rockwood: Resource Analysis and a Development Proposal. B.E.S. thesis, University of Waterloo, 127 pp., 34 fig., 28 plates.

Kershaw, G.P. (Abstract) 1976: Preliminary morphological description of rock glaciers in the Cirque Lake area of the Yukon/Northwest Territories, Canada. Can. Assoc. Geog. 1976 Annual Meeting, Program and Resume, University of Laval, Quebec Quebec. pp. 162-164.

Kershaw, G.P. 1976: The Periglacial Environment and Its Limitations to Development, the MacTung Case Study, Northwest Territories-Yukon Territory, M.A. thesis, University of Waterloo, Waterloo, Ontario. 298 pp., 3 maps.

Kershaw, G.P. 1978: Rock glaciers in the Cirque Lake area of the YukonNorthwest Territories. the Albertan Geographer, 14: 61-88.

CURRICULUM VITAE

NAME

Linda Joan Kershaw

EDUCATION

1974 - B.Sc. University of Waterloo, Waterloo, Ontario
1976 - M.Sc. University of Waterloo, Waterloo, Ontario

WORK EXPERIENCE

1981-84, 10-04
Edmonton, Alberta: Re-organization of the C.F.S. herbarium located at the Northern Forest Research Centre (approximately 20,000 specimens).

1982-83, 01-06
Macmillan Pass, N.W.T. and Edmonton, Alberta: Collected field data and compiled reports and maps of the vegetation, geomorphology and wildlife of the 500 km^2 MacTung study area, Yukon/N.W.T.

1981, 10
Edmonton, Alberta: Preliminary air photo analysis delineating plant communities in the LogTung area, Yukon Territory.

1979, 10 - 1980, 12
Edmonton, Alberta: Literature reviews and preparation of maps and reports on the biophysical impacts of a proposed pipeline and powerline realignment associated with the Dickson Dam Project, Alberta. Environmental evaluation of residential and industrial development sites in central Alberta. Evaluation of the Travers Reservoir for expansion of recreational facilities. Literature reviews of the effects of fire on rough fescue grassland and potential impact if pine beetle on forests in southern Alberta. Aerial photo interpretation of Riding Mountain Park grassland areas.

1979, 05; 1978, 06; 1977, 05
Edmonton, Alberta: Made preparations for 9, 7 and 11 weeks respectively of summer field work along the Canol Road (backpacking with limited aerial support). Work included calculation of the nutrient and caloric content of foods used and preparation of prepackaged, dried meals. Designed, constructed and/or repaired camera bags, food sacks, and other equipment.

1979, 02; 1978, 08-09; 1978, 02-03
Tsichu River Meteorological Station, N.W.T.: Operated a Meteorological Service of Canada reporting station sharing responsibility with G.P. Kershaw.

1979, 01
Edmonton, Alberta: Made preparations for 9 weeks of winter field work (skiing/snowshoeing with limited aerial support).

1978, 10-12
Edmonton, Alberta: Identified 7,000 vascular plant specimens collected during 1977-1978 along the Canol Road, N.W.T.

1977-1978, 12-03
Edmonton, Alberta: Reorganization of the Canadian Wildlife Service Herbarium located at the Northern Forest Research Centre. Produced a report on the organization and use of the herbarium and a checklist of the vascular plants on file.

1977, 01-05 09-12; 1976, 09-12
Edmonton, Alberta: Research assistant in the Department of Botany, University of Alberta. Tasks included the following:
-mapping of vascular plant species in Alberta for the Flora of Alberta.
-statistical analysis of fen vegetation.
-chemical analysis of water and soil samples.
-herbarium and library work related to bryological studies
-chemosystematic analysis of flavenoids in *Ledum, Arctostaphylos, Epilobium* and *Viola* and of proteins in *Brassica*.
-analysis of growth and chlorophyll production of plants grown under red and far red light conditions.

1976, 10
Edmonton, Alberta: Analysis of debris slope vegetation of the Kananaskis area, Alberta.

1974-1976
Waterloo, Ontario: Lab instructor for introductory biology course for honours students.

1974-1975
Ottawa, Toronto, Waterloo, Vancouver and Victoria: Herbarium research for M.Sc. thesis in CAN, DAO, TRT, WAT, UBC and V.

1972, 05-08
Waterloo, Ontario: Survey of recreational requirements and facilities in Waterloo. Employed by the City of Waterloo.

FIELD WORK EXPERIENCE

1984, 07-08
Ogilvie Richardson Mtns., Yukon/N.W.T.: Collected field data in a study of revegetation of disturbances in the Dempster Highway corridor.

1981-1983, 02,06,08
Selwyn Mountains, Yukon/N.W.T.: Small mammals census by traplines in representative plant communities. Aerial surveys of resident large mammals in the Tsichu River area during mid-winter, spring/calving, summer-fly and fall-rut seasons. Mapping of plant communities and surficial geology at a scale of 1:50,000 within the 500 km² study area.

1980, 06-07 and 1977, 07
Selwyn Mountains, N.W.T.: Vegetation analysis for the AMAX Airport Feasibility Study, Tsichu River/Macmillan Pass area, N.W.T.

1980, 06
Ellesmere Island, N.W.T.: Vegetation and wildlife survey for a proposed national park in the Lake Hazen area, northeastern Ellesmere Island.

1979, 10 and 1980, 04-05
Central and Southern Alberta: Ecosystem analysis of areas proposed for pipeline and powerline rerouting, for shoreline recreational development and for industrial park development.

1979, 06-08; 1978, 07-09; 1977, 06-08
Selwyn-Mackenzie Mountains, N.W.T.: Assessment of man-induced disturbances (botanical, zoological, pedological, microclimatological) resulting from the CANOL Project (1942-45). backpacking with limited aerial support.

1979, 02-05
Selwyn-Mackenzie Mountains, N.W.T.: Conducted wildlife and snow surveys along 85 miles of the abandoned Canol Road. Skiing and snowshoeing with limited aerial support.

1978, 02-03
Selwyn-Mackenzie Mountains, N.W.T.: Conducted snow surveys along 20 miles of the Canol Road adjacent to the Tsichu River Meteorological Station.

1977, 04-05
Nahanni National Park, N.W.T.: Conducted vegetation and avifauna research on the Prairie Creek alluvial fan.

1976, 06-07
Rocky Mountains, Alberta: Studied debris slope movements and vegetation in the Kananaskis area.

1974, 07-08
Selwyn Mountains, Yukon/N.W.T.: Ecosystem description (biological and geomorphological) and terrain sensitivity analysis of two valleys on the Continental

Divide adjacent to the Canol Road.

1973-1975, 05-08
Southern Ontario: Ecosystem site analysis of areas proposed for development.

PAPERS, REPORTS AND PUBLICATIONS

PAPERS PRESENTED AT PROFESSIONAL MEETINGS

Kershaw, L.J. 1976. *A Phytogeographical Survey of Rare, Endangered and Extinct Vascular Plants in the Canadian Flora.* Annual Meeting, Canadian Botanical Association, Lennoxville, Quebec.

Denford, K.E. and L.J. Kershaw. 1977. *Chemosystematics of* Ledum *Species in North Western America.* Annual Meeting, Canadian Botanical Association, Winnipeg, Manitoba. (Presented by K. Denford)

PUBLICATIONS

Kershaw, L.J. 1976. *A Phytogeographical Survey of Rare, Endangered, and Possibly Extinct Vascular Plants in the Canadian Flora.* M.Sc. Thesis, University of Waterloo, Waterloo, Ontario.

Kershaw, L.J. and J.K. Morton. 1976. Rare and potentially endangered species in the Canadian flora - a preliminary list of vascular plants. *Canadian Botanical Association Bulletin* 9(2):26-30.

Kroeger, P.G. and L.J. Kershaw. 1979. *A Checklist of Vascular Plants in the Canadian Wildlife Service Herbarium, Western and Northern Region, Edmonton, Alberta. January, 1979.* Canadian Wildlife Service.

Kershaw, G.P. and L.J. Kershaw, Manuscript submitted. Characteristics of 35 year old oil spills in tundra plant communities of the Mackenzie Mountains, N.W.T. Canadian *Journal of Botany.*

UNPUBLISHED REPORTS FOR GOVERNMENT AND INDUSTRY

Gill, D., G.P. Kershaw and L.J. Kershaw. 1980. *Environmental Report on the Proposed Mactung Airstrip Development, Northwest Territories.* Prepared for Treval Environmental Applications Limited, Edmonton. 133 pp.

England, J., L. Kershaw, C. Lafarge-England and J. Bednarski. 1981. *Northern Ellesmere*

Island: A Natural Resource Inventory. Prepared for Parks Canada. June, 1981. Department of Geography, University of Alberta, Edmonton.

Kershaw, L.J. and G.P. Kershaw. 1981. *Preliminary Vegetation Description of the LogTung Project Area, Yukon*. Prepared for Treval Environmental Applications Limited, Edmonton. 20 pp. 1 map.

Kershaw, L.J. and G.P. Kershaw. 1982. *A Discussion of the Potential Environmental Effects of the MacTung Project on the Keele Peak Area*. Prepared for AMAX Northwest Mining Co., Vancouver. 34 pp.

Kershaw, G.P. and L.J. Kershaw. 1982. *A National Historic Resource: The CANOL Project, Northwest Territories*. Prepared for the Government of the Northwest Territories, Yellowknife. 57 pp.

Kershaw, G.P. and L.J. Kershaw. 1982. *1981-1982 Population and Distribution Characteristics of Resident Wildlife In The Tsichu River Study Area, Yukon/N.W.T.* Prepared for AMAX Northwest Mining Co. Ltd. 50 pp. 3 maps.

Kershaw, G.P. and L.J. Kershaw. 1983. *1981-1983 MacTung Wildlife Studies, Yukon/N.W.T.* Prepared for AMAX Northwest Mining Co. Ltd. 100?? pp. 6 maps.

Kershaw, G.P. and L.J. Kershaw. 1983. *Geomorphology and Vegetation of the MacTung Study Area, Yukon/N.W.T.* Prepared for AMAX Northwest Mining Co. 105 pp. 2 maps.

Marshall Macklin Monaghan

ROBERT A.G. WONG, M.C.I.P.
Senior Planner

EDUCATION

1979	M.A. University of Alberta
1976	B.A. University of Western Ontario

RELEVANT PROJECT EXPERIENCE - INTERPRETIVE PLANNING

Senior Planner responsible for project co-ordination, client liaison and the analysis of media and messages for the interpretive displays in the Lethbridge Urban Parks project. The assignment involves the exhibit design and supervision of fabrication of four interpretive areas related to the Lethbridge Historical Interpretive Master Plan.

Senior Planner responsible for project co-ordination, client liaison, public involvement and the preparation of various technical components for historical interpretive studies. Lethbridge Historical Interpretive Master Plan and Head-Smashed-In Buffalo Jump. Technical aspects of these studies included a historical resource inventory and assessment for interpretive potential, audience analysis, alternative interpretive concept development and interpretation program preparation.

Senior Planner responsible for project co-ordination, and other technical components for the Ukrainian Cultural Heritage Village, Landscape Program. The project was to prepare a landscape program document which would serve as the basis for the detailed design of historic and modern landscape development.

Project Planner responsible for project management and the preparation of technical components for a variety of recreation planning studies for reservoirs. Preparation of the concept of the Weasel Valley - Reservoir Recreation Study for the Peigan Indian Band. Project involved integrating the historical, archaeological and cultural resources into a concept plan of the reservoir area for recreation and tourism.

Project Planner responsible for project management and the preparation of technical reports regarding regional tourism and recreational opportunities for Saskatchewan Tourism Strategy; Battle River Tourism Destination Area Study, the Saskatchewan Tourism Data Evaluation and Planning Framework Study and the Comox-Strathcona Regional Parks Study. As a component of the Battle River Tourism Destination Area Study and Comox-Strathcona Regional Parks Study, prepared an evaluation of the historical resources and themes in terms of their interpretive value for recreation and tourism.

Project Planner responsible for project management, market analysis, alternative concept development plans for various municipal parks developments including: Edmonton Heritage Festival Park and Fort Saskatchewan West Parklands. Prepared an analysis of the potential users/visitors to the park in terms of number of visitors, characteristics and preferences. A major component of the recreation study was to assess the role that the Fort Saskatchewan Museum and Historic Site can play in the river valley park. Further, all these studies required the development of facility and landscape programs for the implementation of the master plan.

OTHER PROJECT EXPERIENCE

Planner involved in the preparation of an environmental impact evaluation for the relocation of an oil pipeline and power lines near the Dickson Dam Reservoir. Responsible for the community involvement program and corridor and route selection and evaluation components.

Project Planner responsible for identifying current and potential land uses which could have implications upon the water quality of the Elbow River. Participated in the inventory and analysis of the land uses, and management practices in the rural and urban areas of the watershed with the intent to provide recommendation for further study and mitigation.

Project Planner participating on the technical components for the Cold Lake - Beaver River Regional Water Resources Study. The project required the identification, and quantified assessment of existing and future impacts of water level fluctuations on lake and river recreation resources.

Project Planner for the preparation of biophysical inventory and evaluation of 6 400 ha. of property in the Regional District of East Kootenay, B.C. for a private landowner. Resource management strategies for activities such as agriculture, recreation and tourism, wildlife management and Christmas tree farming were prepared.

Project Planner responsible for project management, administration and co-ordination of two ski facility utilization studies in southwestern and southeastern Alberta (Westcastle and Cypress Hills Ski Areas). The studies involved the preparation of a retroplan for upgrading the facilities. Involvement included environmental analysis, market analysis and policy planning components. Participated in cost proforma analysis for Strathcona Science Park Ski Facility and Lyon Mountain Ski Area.

Planner and Project Planner responsible for the preparation of biophysical resource inventory and analysis for a number of land development and resource management plans on the Saulteaux Indian Reserve, Edmonton's Northwest Annexation area and in local municipalities.

PROFESSIONAL BACKGROUND

1980 - present **Marshall Macklin Monaghan Limited**

Planner and Senior Planner responsible for project management and preparation of a range of recreational and environmental projects including: historical interpretive plans, regional park and tourism strategies, municipal recreation master plans, park master plans, environmental impact assessment studies and resource management plans.

1979 - 1980 Ecoplans Limited

Recreation/Environmental Planner responsible for project management, survey administration for a variety of land development projects.

1979 - 1980 University of Alberta, Department of Geography

Project Co-ordinator, Junior Atlas of Alberta Project. Responsible for project management and administration, determination of the content of the atlas, compilation and design.

Robert A.G. Wong (Continued)

PUBLICATIONS

Jackson, E.L. and **Robert A.G. Wong**. "Perceived Conflict between Urban Cross-Country Skiers and Snowmobilers in Alberta". Journal of Leisure Research. Vol. 14, No. 1, 1982.

PROFESSIONAL ASSOCIATIONS

Canadian Association of Geographers
Alberta Recreation and Parks Association
National and Provincial Parks Association of Canada
Canadian Institute of Planners
Toastmasters Club International

Marshall Macklin Monaghan

KEES VERBURG, M.C.I.P.
Manager, Heritage Resource Planning
Associate

EDUCATION

1960	Diploma, Landscape Architecture, Ontario Agricultural College, Guelph, Ontario
1964	B.Sc. Landscape Horticulture, University of Toronto, Ontario
1966	M.Sc. Resource Planning, University of Guelph, Ontario
1970	Certificate, Audio-Visual Communication, University of Wyoming
1970	Doctoral Studies: Interpretive Planning, Colorado State University
1972	Ph.D. Planning (Candidate), University of British Columbia

RELEVANT PROJECT EXPERIENCE

Project Director, London Historical Museums Master Plan. To provide the Museum administration with specific, carefully-evaluated directions for the development and evolution of the London Historical Museums.

Project Director, Head-Smashed-In Buffalo Jump Interpretation Program and Exhibit Design. To direct and co-ordinate all stages of planning, design and construction, including theme and storyline preparation, interpretive programming, conceptual and developed designs, working drawings, specifications, tendering process and the contract administration during fabrication and installation of exhibits.

Project Director, Earth Sciences Gallery, Royal Ontario Museum. Co-ordination of all aspects related to the planning, design and construction of all exhibitry and audio-visual programs for the 15 000 square foot Earth Sciences Gallery.

Project Director, Historical Interpretive Master Plan, City of Lethbridge. To prepare a comprehensive Master Plan, which details the themes, media, facilities and programmes required to interpret the heritage resources to the general public.

Project Director, Historical Interpretive Design Studies, City of Lethbridge. Co-ordination of all aspects related to the planning, design and construction of exhibitry for the Fort Whoop-Up complex, the Coalbanks interpretation and the Sir Alexander Galt Museum's viewing gallery and the outdoor display area.

Project Director, Klondike Gold Fields Interpretation Centre. The services included project direction and involvement in all phases of planning from initial concepts through design to cost estimation of all exhibitry.

Project Director, Aardvark Environmental Centre. Included responsibility for site evaluation, master planning, interpretive programming and exhibit design. Resulted in a manual detailing proposed implementation schedule for design and construction buildings, groundworks and special indoor and outdoor exhibits.

Project Director, Evaluation of Nature Centres. Evaluation of small to medium-sized nature centres throughout the U.S. and Canada, focussed upon role, character, users, programs, exhibits, administration and organization.

Project Director, Ukrainian Cultural Heritage Village. To detail the character and design requirements of the period landscape settings for all theme areas and historic structures located throughout the Village.

Project Director, Yukon Steam Train Attraction Feasibility Study, Whitehorse. To examine the feasibility of restoring and operating a steamdriven historic excursion train as a tourist attraction.

Project Director, Klondike National Historic Sites Master Development Plan. Preparation of a Master Plan for the preservation, restoration and commemoration of 52 Klondike national historic sites, including theme development, pre-design for three interpretation centres and interpretive planning for 13 living or animated house museums.

Project Director, Egyptian Centre of History & Culture. The conceptual planning, theme development and interpretive programming for a $16 000 000 centre near Cairo.

OTHER PROJECT EXPERIENCE

Project Director, Land-Use Controls to Preserve Heritage Projects. Investigation into the applicability of land-use controls to preserve heritage resources of national significance.

Project Director, Port Alberni Heritage Harbour. Concept development and facility design for a major tourist attraction focussed on a heritage harbour and the restoration/interpretation of an historic vessel for the City of Alberni, B.C.

Project Director, Concept Planning & Theme Attraction. Conceptual planning, theme development and interpretive programming for the Lord Chamberlain's Playground, a major theme attraction near Victoria, British Columbia.

Project Director, West Parry Sound District Museum. A feasibility study outlining need, character and program requirements for a regional museum.

PROFESSIONAL BACKGROUND

1979 - date **Marshall Macklin Monaghan Limited**

Manager, Tourism and Recreation Planning and Landscape Architecture. (1981-date)

Responsible for organizing, co-ordinating and evaluating studies undertaken by these Departments, and supporting studies, including resource inventories, recreation infrastructure analysis, concept planning and facility design as well as the preparation of comprehensive strategies for integrated resource planning and management.

Chief Tourism and Recreation Planner (1979-1981)

Responsible for organizing and co-ordinating all park planning studies including natural and historic parks and resources, tourism studies and resort investigations and in participating in inter-disciplinary land use and environmental studies.

1969 - 1979 **Parks Canada**

Head Regional Planner, (1974-1979)

Responsible for the organization, co-ordination and direction of all tourism, recreation and feasibility studies carried out under agreements for recreation and conservation; re-organization and direction of master plan developments for townsites and visitor service centres; and development and co-ordination of all regional analysis and park integration studies and land use capability studies.

Consultant on Tourism, Recreation and Parking Planning (1969-1974)

Consulted to the private and public sectors, including such organizations as the Colorado State University, Navaho Indian Council, Aardvark Environmental Centre, Parks Canada and the University of British Columbia. Provided advice and expertise on land use capability assessment to other firms and consultants.

Marshall Macklin Monaghan

NICHOLAS M.S. WATKINS

Senior Researcher

EDUCATION

1973 Bachelor of Architecture
University of British Columbia
Vancouver, B.C.

PROFESSIONAL BACKGROUND

September 1984 - Present

Self Employed

Marshall Macklin Monaghan Western Limited
Edmonton, Alberta
Senior Architectural Programmer and Technician providing architectural research assistance and technical production of graphics for selected projects.
Senior researcher for a variety of recreational and tourism products including inventory and analysis of tourism facilities and market data.

Liard-Mackenzie Regional Tourism Strategy
Pine Lake Recreation Assessment
Lake Wabamun Management Plan

March 1982 - August 1983

Dennis A. Christianson Architect Ltd.
Edmonton, Alberta
Intern Architect with programming, design and administrative responsibilities for the following projects:

N.A.I.T., Edmonton:
LRC Renovations, Central Services Building

Lakeland College, Vermilion:
Facility Programme, Trades Centre
Campus Master Plan

Marshall Macklin Monaghan

NICHOLAS M.S. WATKINS

Senior Architectural Programmer
Senior Researcher

March 1981 - February 1982

Sinclair and Naito Architects Ltd.
Edmonton, Alberta
Intern Architect responsible for the design and working drawings for Norman Wells School, N.W.T.

April 1979 - February 1981

Alberta Public Works
Project Management Division
Edmonton, Alberta

Project Manager responsible for capital works projects for Services for the Handicapped Division, Alberta Social Services and Community Health. including the following:

June 1977 - March 1979

Department of the Attorney General
Government of Alberta
Facilities Management Group
Edmonton, Alberta

February 1976 - May 1977

Ministry of the Attorney General
Government of British Columbia
Facilities Management Unit
Vancouver, B.C.

November 1973 - January 1976

Self Employed
Steambubble Graphics
Vancouver, B.C.

Graphic Design Consultant respnsible for document production and planning assistance in the following projects:

Marshall Macklin Monaghan

NICHOLAS M.S. WATKINS

Senior Architectural Programmer
Senior Researcher

Steambubble Graphics (cont'd)

Guidelines for Courthouse Design; Justice Development Commission; (Unpublished).
Corrections Planning for the Vancouver Island Justice Region; Cornerstone Planning Group; (1975)
Court Facility Inventory; Department of Public Works; (1974)
Remand Accommodation; Graham Brawn and Associates; (1973).

PUBLICATIONS

Architects Forum Magazine

Managing Editor, Alberta; Member of Editorial Board; and Contributor of the following articles:

The Preservation of Heritage Buildings; (1980)
The Monochromatic Building; (1981).
Light Rail Transit in Edmonton and Calgary; (1982).
Senior Citizen Housing; co-author with Kathryn Merrett, (1982).
The University of Alberta Fieldhouse; (1982).
Pioneering CAD Douglas Cardinal; (1984).