The Socio-Economic importance of maintaining the quality of recreational resources in Northern British Columbia:

The Case of Lakelse Lake

By William F. Sinclair

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Terrace, British Columbia

THE SOCIO-ECONOMIC IMPORTANCE OF MAINTAINING THE QUALITY OF RECREATIONAL RESOURCES IN NORTHERN BRITISH COLUMBIA: THE CASE OF LAKELSE LAKE

by

William F. Sinclair

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FOREWORD

In April, 1973, representatives of the Fisheries and Marine Service and the Regional District of Kitimat-Stikine met to discuss the existing and foreseeable resource and land use conflict problems on Lakelse Lake and within the Lakelse Lake watershed.

The British Columbia Hydro and Power Authority was planning to run a high voltage transmission line down Williams Creek, one of the lake's main tributaries. A mining company was carrying on active exploration for a possible open pit copper operation. Three logging companies were actively logging on the watershed and the cutting plans of two of these showed that they would soon be mutilating the view lines from the lake. Applications for agricultural leases were pending on Williams Creek. These lease applications along with extensive logging operations on the Lakelse River and elsewhere would have seriously endangered the watershed's important salmon spawning and rearing areas.

Much of the lake's shoreline and upland was owned privately and over the years the owners had developed recreational and permanent homes on many of the best sites. Three owners of large parcels were planning extensive subdivisions. The new owners of the lake's famous hot springs were talking expansion and modernisation of their pool resort facilities and two local commercial operators were planning expansion. Also, the Provincial Crown had recreational lots available for lease in two subdivisions, was expanding its public campsite and had plans to enlarge its picnic site.

The use of the lake itself had grown to a point where waterskiers, boaters, canoeists, sport fishermen and swimmers were seriously interfering with one another and with the lake's resident salmon spawning areas, swans and other water fowl populations.

Even to the casual observer it was apparent that development and use priorities would have to be established if the lake was to survive. So this study was initiated. Its purpose is to help identify priorities which will serve as a guide for future watershed area development and management while protecting fish and wildlife habitat.

While many of the report's findings were anticipated by those familiar with the state of the lake's development, there are some findings which came as a surprise. For example, non-Canadians make very little use of the lake. Also, the vast majority of the visitors to Lakelse Lake do not use the facilities provided by the hot springs. Contrary to local belief, Lakelse Lake on the basis of density use standards developed elsewhere, appears to be already overutilised.

Since the first and most critical steps in solving a resource and use conflict problem are recognising that problems exist and defining their nature and magnitude, this report should help regional residents to understand the seriousness and consequences of present and future use planned for the Lakelse watershed and other similar areas in northern British Columbia.

To the best of our knowledge this is the first time that a federal agency charged with the responsibility of managing a particular resource has worked together with agencies of the provincial government and a regional district to develop a plan for future development and the management of an entire watershed area. The results are gratifying and it is hoped that others will benefit from the experience and information gained from this research.

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Fisheries and Marine Service
Department of the Environment
Vancouver, British Columbia

John Pousette
Administrator-Treasurer
Kitimat-Stikine Regional District
Terrace, British Columbia

PREFACE

The approach used in this study is based on the multiple use concept. A single resource, such as a lake, frequently has conflicting uses for agriculture, forestry, fish and wildlife, recreation, manufacturing, and for domestic and municipal purposes. Such complex natural problems have no single solution. However, there is a range of feasible alternatives which, when identified, give direction to future development. In this study it was assumed that Lakelse Lake should be managed in a manner which ensures that it makes maximum contribution to the welfare of the people living in the area. Recreation and fish and wildlife habitat were identified as the most important nonconflicting activities on the lake. Thus, it is suggested that all future development should be carried out in a manner which does not detract from the lake's value as a wildlife and fish habitat and recreational area.

Integrated management of a lake, even a lake as small as Lakelse Lake, requires the cooperation of several public agencies each of which has its own limited understandings and objectives. Therefore, many agencies have been either directly or indirectly involved in helping to identify what activities should be included in the lake's assessment. Formal presentations were made to the Kitimat-Stikine Regional District Technical Committee and informal consultation was carried out with the appropriate representatives of all three levels of government. In addition to this, the contents of the report and its findings were discussed with several senior officials of private companies in the study region. This was done with the intention of avoiding many of the shortcomings which are inherent in the single use approach.

A study such as this could not have been undertaken successfully without a great deal of cooperation from public officials. I am indebted to Art Currie, Municipal Manager of Kitimat and his staff for comments made on some of the ideas incorporated in this report. Mr.

Currie himself provided me with a number of excellent ideas, many of which are included in Chapter Five of this report. I am equally indebted to Stu MacKenzie, Regional Manager, Alcan Smelter Services, Kitimat, who critically reviewed certain portions of this report. His kind courtesies, interest and general cooperation are very much appreciated.

I am indebted also to Scott Gain and Bryan Price of the provincial Parks Branch, Victoria, who provided a considerable amount of very valuable data on park attendance and contributed to my understanding of how a well-planned park might be developed. Roger Loggin and Mike Meyers of the provincial Assessors Office in Prince Rupert also provided a considerable amount of information for which I am indebted.

A substantial amount of help was received from John Pousette, Administrator-Treasurer of the Kitimat-Stikine Regional District, his assistant Ray Parfitt and other staff members of the district office. Their kind cooperation and encouragement proved invaluable to me. I also wish to acknowledge the kind courtesies extended to me by Ev Clift, Chairman of the Kitimat-Stikine Regional Board, and all members of the regional board's Technical Committee. I further wish to acknowledge the help which I received from John Munro, Doug Beck, and Guy Steed of Simon Fraser University who critically commented on certain portions of this presentation. An informal discussion with Gerry Walter of the University of Victoria was very helpful and a brief telephone discussion with Peter Pearse of the University of British Columbia provided me with some valuable insight on the economic evaluation technique which I use in Chapter Three.

But it is largely the technical personnel of the Fisheries and Marine Service Habitat Protection Unit to whom I owe special thanks. This group provided me with very valuable technical information which contributed substantially to the assessment carried out in this report.

I am particularly indebted to Bill Schouwenburg, Tom Cleugh, Bob McIndoe and Wayne Knapp. I also relied heavily on information provided by Ed Zyblut, biologist with the Northern Division.

I should like to mention also the great assistance rendered to me by those who carried out the telephone, shoreline and mail surveys which were used to gather information for this report. Bill Masse and Elizabeth Stokes are responsible for most of the field work. Also, I am very much indebted to Bill Masse for his excellent handling of the data once it was collected. His mathematical abilities and his tenacious patience proved very valuable to me in producing this report. David Hoare, Victor Barwin, and John Boland also made contributions to this final text. Sharon Dyke handled the computer tabulations.

Others to whom I am indebted for their helpful cooperation include the following Fisheries and Marine Service personnel: Vic Giraud, Supervisor Prince Rupert, Ed Christiansen, Supervisor Kitimat, Bud Bogart of Terrace and their respective office personnel.

I am also indebted to David Reid, economist, for his vigorous and constructively critical review of this paper.

As always I am especially indebted to Sharon Walker of the Economics Unit, Northern Operations Branch for her patience, diligence and loyalty to her work. She is responsible for typing, editing and the general appearance of this presentation. I am also grateful to Jerry Fung who prepared the maps contained herein.

While my debt to many is enormous, it would be misleading to suggest that the approach adopted in this study, and the conclusions, enjoy the support of all those contributors whom I have identified. As a matter of fact, while almost everybody will find something in the report with which they can agree, it is expected that many public officials

and private individuals will find points with which they disagree. This need not detract from the findings in this study. In fact, a critical review in the proper atmosphere might add greatly to the impact this report will have on the future of Lakelse Lake. In any case, my acknowledgements of assistance do not imply endorsement of the results or responsibility for any remaining errors of analysis or judgement. This remains my responsibility.

William F. Sinclair
Chief of Economics and Sociology,
Northern Operations Branch,
Fisheries and Marine Service,
June, 1974.

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INTRODUCTION

Lakelse Lake is a shallow, warm water lake located in the northwest corner of British Columbia (see Map 1). It is situated on the eastern margin of the Coastal Mountain Range and is part of the Skeena River system. Its surface area is about 5.2 square miles (14.2 sq. km. or 3,500 acres) and it has an average depth of 24 feet (7.9 m.).[1] It is a clean, warm lake which is ice covered four months each year. The lake is used by residents and non-residents primarily for recreational purposes. However, it also serves as a seaplane base and as a rearing area for fish. The property surrounding the lake includes two private resorts, numerous private homes, summer cottages, a public campsite and a public picnic area (see Map 2). In addition to this, much of the surrounding property is held under tree farm licence. Some of this area is currently being logged or will be logged within the foreseeable future. Map 3 shows the physical layout of the lake and the current status of surrounding property.

This paper reports on a series of surveys conducted during the summer of 1973 to determine the economic and social value of Lakelse Lake to residents of British Columbia. The study contains information on the lake's commercial and recreational activities and on how members of the general public feel Lakelse Lake should be developed for future generations. Even though the primary purpose is to evaluate the importance of Lakelse Lake to all British Columbians, and to make recommendations on the direction of future development, attention is focussed on examining the importance of Lakelse Lake to those living in the northwestern part of the province. It is believed that the importance of Lakelse Lake is enhanced to a considerable degree by the fact that it is located in northern British Columbia where the number of alternative recreational opportunities is limited.

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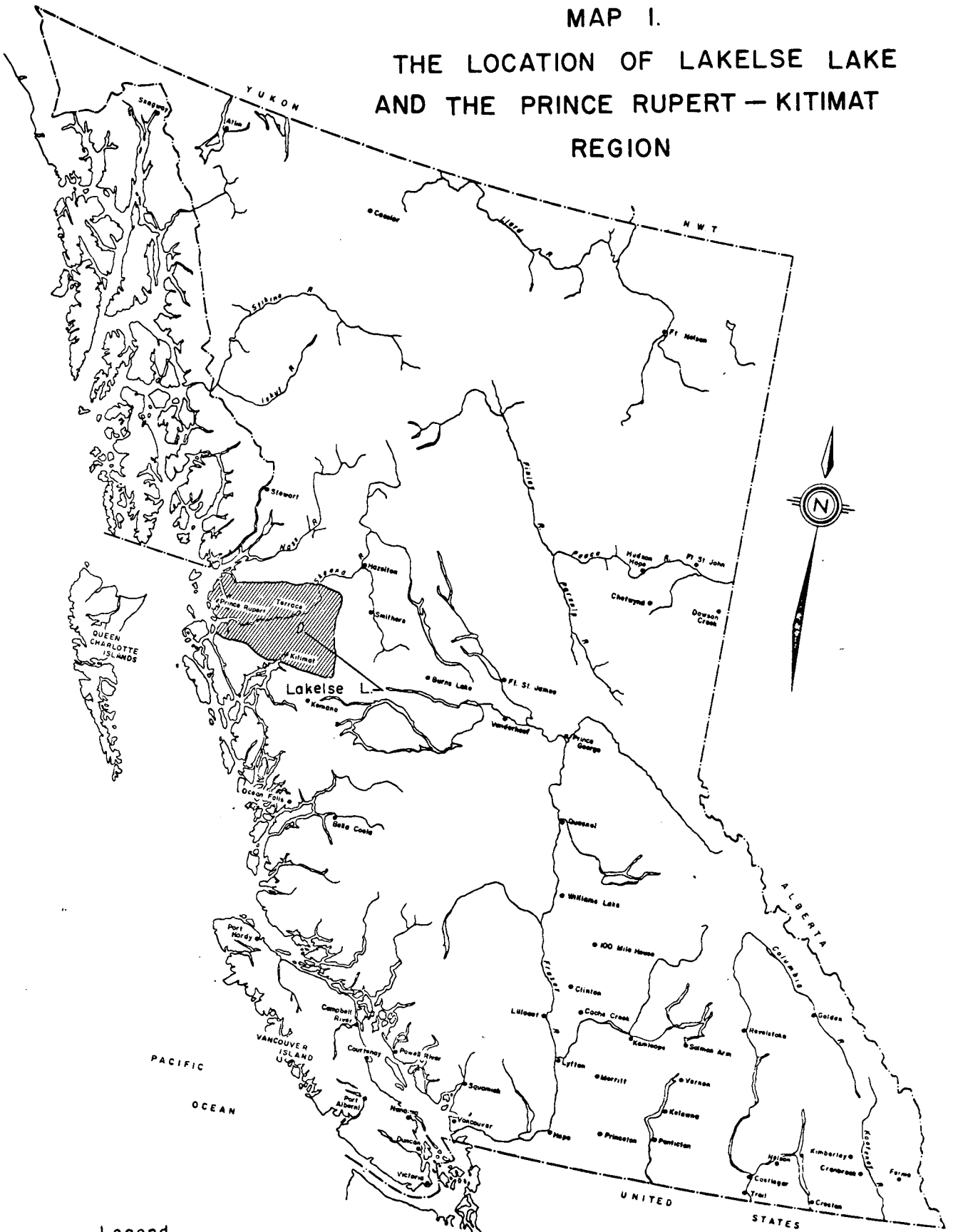
1 J. R. Brett, "The Physical Limnology of Lakelse Lake, British Columbia", Journal of the Fisheries Research Board of Canada, 1950, vol. 8, pp. 82-102.

MAP I.

THE LOCATION OF LAKELSE LAKE AND THE PRINCE RUPERT — KITIMAT REGION

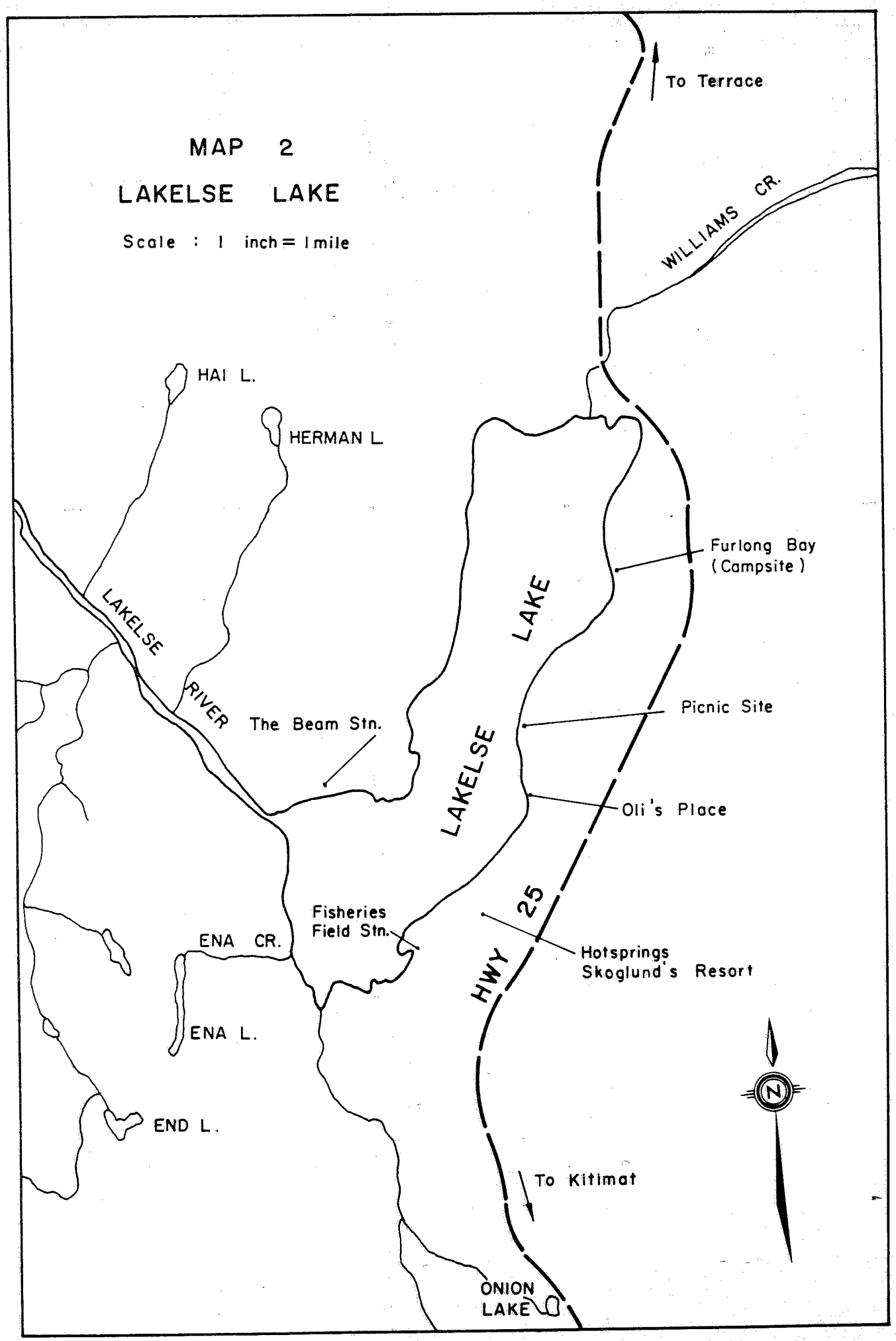


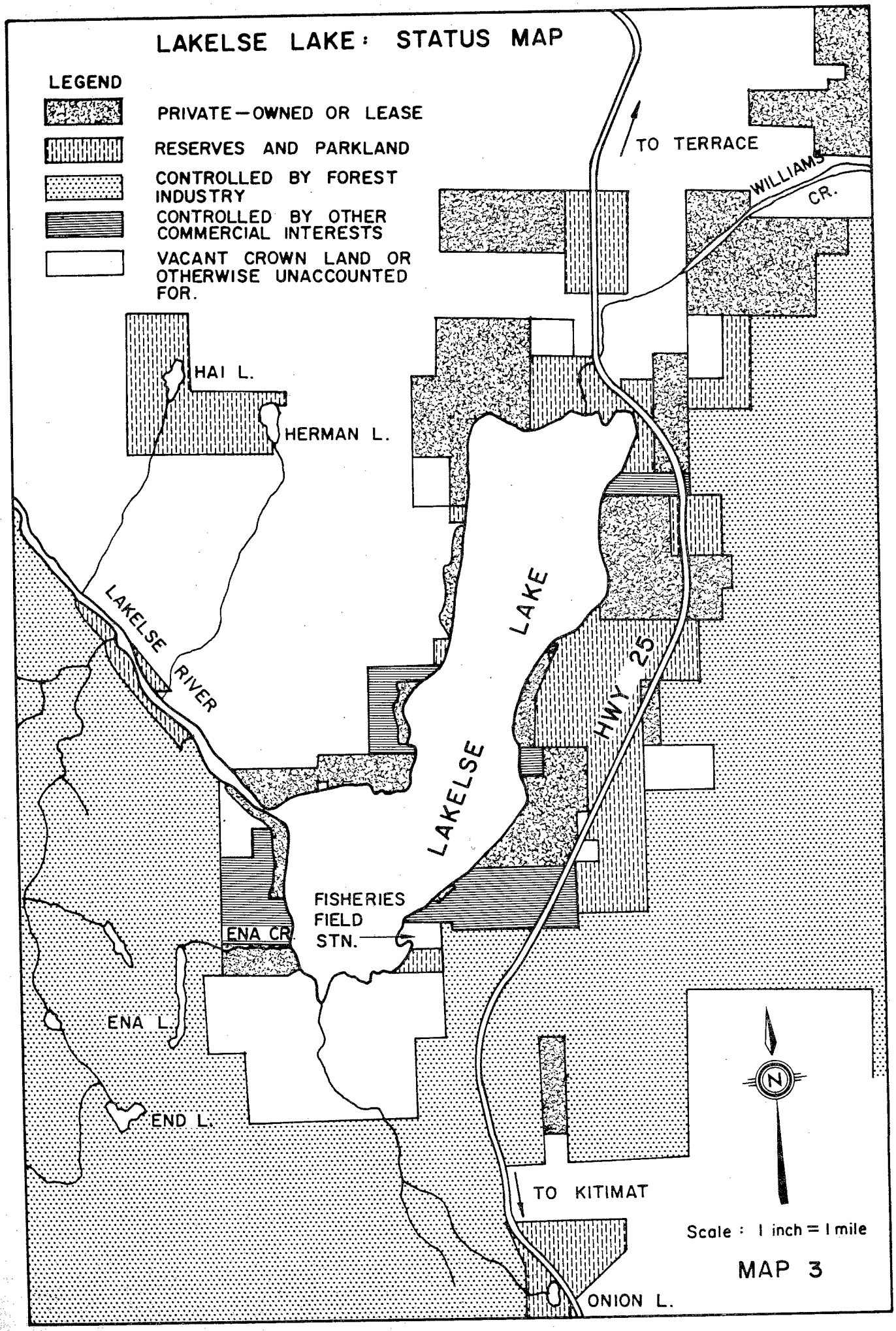
Legend

Border of Region

0 50 100 150 200

Scale in miles


MAP 2
LAKELSE LAKE
Scale : 1 inch = 1 mile
To Terrace
WILLIAMS CR.
HAI L.
HERMAN L.
LAKELSE RIVER
LAKELSE LAKE
Furlong Bay (Campsite)
Picnic Site
The Beam Stn.
Oli's Place
Fisheries Field Stn.
ENA CR.
HWY 25
Hotsprings Skoglund's Resort
ENA L.
END L.
To Kitimat
ONION LAKE
N


LAKELSE LAKE: STATUS MAP
LEGEND
PRIVATE—OWNED OR LEASE
RESERVES AND PARKLAND
CONTROLLED BY FOREST INDUSTRY
CONTROLLED BY OTHER COMMERCIAL INTERESTS
VACANT CROWN LAND OR OTHERWISE UNACCOUNTED FOR.
TO TERRACE
WILLIAMS CR.
HAI L.
HERMAN L.
LAKELSE RIVER
LAKELSE LAKE
HWY 25
FISHERIES FIELD STN.
ENA CR.
ENA L.
END L.
TO KITIMAT
ONION L.
N
Scale : 1 inch = 1 mile
MAP 3

Chapter One is used to provide an economic evaluation of non-recreational commercial activities which are directly associated with the lake. It measures the economic value of fish produced in the Lakelse Lake watershed and harvested in British Columbia's commercial fishery. It is assumed that there are other waterways in the area which are equally suitable for a seaplane base. Thus, no economic value is attributed to the lake as a result of its commercial seaplane activity.

Turning to the more specific aspects of the study, Chapter Two describes the recreational activities which take place on Lakelse Lake and identifies the primary users of the lake.[2] Socio-economic information is presented on participants and their reasons for visiting Lakelse Lake are identified. In Chapter Three calculations relating to the direct economic values attributable to participation in Lakelse Lake's recreational opportunities are presented. Some information on the social concerns and amenity values are also presented.

Chapter Four is used to analyse existing participation patterns and makes suggestions on the direction in which future development should proceed. Care is taken to ensure that the recommended development pattern will cater to a broad cross section of the resident population. This is done in the belief that public investment should be carried out in a manner which caters to the needs of Canadians from every social and economic background and not just certain segments of the population.

Chapter Five is designed to focus attention on the regional aspects of the Lakelse Lake development problem. Information on the economic development of northwestern British Columbia is compared and contrasted to the economic development of the rest of the province. In this

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2 Primary users are defined as those people who participate in on-site recreational activities. Other recreationalists who benefit from the existence of Lakelse Lake but do not directly participate in on-site activities - for example, sport fishermen on the main Skeena who exploit Lakelse Lake fish stocks - are not included in this study.

chapter an effort is made to present a one dimension quality of living index. This focuses attention on the difference in attitude and in the mode of living between residents of northern British Columbia and residents of the rest of the province.

The regional focus of this study makes it necessary to establish certain definitions which will be used throughout the presentation. For example, the term Prince Rupert-Kitimat Region is used to refer to that area of British Columbia which runs east from Prince Rupert along the Skeena River to Terrace and then south to Kitimat as shown in Map 1. The Prince Rupert-Kitimat Region contains the towns of Prince Rupert, Terrace and Kitimat and has an area population of approximately 41,251 people.[3] Approximately 1.7 percent of British Columbia's total population resides in the Prince Rupert-Kitimat Region.

The term resident is used to refer to individuals whose permanent place of residence is located in the Prince Rupert-Kitimat Region. A British Columbian non-resident is an individual who resides in British Columbia but does not live in the Prince Rupert-Kitimat Region. A Canadian non-British Columbian is a resident of Canada who does not live in British Columbia. The term Canadian non-resident is used to refer collectively to British Columbian non-residents and Canadian non-British Columbians. The term non-Canadian is used to refer to persons who do not reside in Canada.

Since Lakelse Lake's importance is tied inextricably to the amount of recreational or leisure activities provided for visitors, it is important to provide the reader with some definition of recreational or leisure-time activities. There are numerous problems created when attempting to define recreational or leisure activities. Man's activities

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3 For the purpose of this presentation the unincorporated area of Thornhill is included in the municipality of Terrace. Similarly, Port Edward is included with Prince Rupert.

extend over a long continuum, from the most depressing kind of drudgery to the most delightful type of leisure, from the greatest activity to the sheerest inactivity. Man's enjoyment or satisfaction is not necessarily related to the amount of physical exertion required to participate in a particular task. In the following, no clear-cut distinction is made between recreational activities which require some physical exertion and those that involve no physical exertion. Leisure is largely discretionary time which is used as the individual chooses. It includes recreation, time spent in social or group activities and excludes the time required to maintain personal existence. Thus, the terms recreational activities and leisure-time activities are used interchangeably to refer to pastimes which use or fill individuals' discretionary time. This definition is not perfect. For example, eating on one occasion may be considered a pleasure, and therefore, a conscious utilisation of discretionary time. On other occasions, it could be more appropriately considered a necessity to maintain personal existence. Moreover, this definition implies that virtually all of a retired person's waking hours is discretionary time and therefore recreational or leisure time. It is important to keep this somewhat confused definition of leisure and recreational activities in mind when attempting to understand the values which are subsequently discussed.[4]

Virtually all of the statistics contained in this paper are based on surveys conducted during the summer and fall of 1973. A description of the surveys, the methodologies involved and the response are presented in Appendix I. In the following, considerable care is taken to ensure that the views and opinions of all those living in the region in which Lakelse Lake is located are included. This is done in the firm belief that the government and its related agencies are responsible to all Canadians, including those still unborn, for the preservation and protection of the nation's resources.

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4 For a clearer understanding of this definition of leisure, see Marion Clawson and Jack L. Knetsch, Economics of Outdoor Recreation, Resources for the Future, John Hopkins Press, Baltimore, 1966, pp. 11-13.

CHAPTER ONE

THE ECONOMIC IMPORTANCE OF LAKELSE LAKE NON-RECREATIONAL ACTIVITIES TO THE PEOPLE OF BRITISH COLUMBIA

The purpose of this chapter is to present an analysis which will show the economic importance of the non-recreational, commercial activities which directly depend upon the existence of Lakelse Lake. All the activities which take place on Lakelse Lake are not necessarily beneficial to residents of the Prince Rupert-Kitimat Region or to the people of British Columbia. Furthermore, it is obvious that not all of the commercial, non-recreational activities which take place around the lake depend upon the existence of the lake. Thus, in this chapter care is taken to evaluate only those non-recreational activities which are clearly beneficial to residents of British Columbia and are directly dependent upon the existence of Lakelse Lake. No attempt is made in this chapter to measure the economic and social costs of activities which cannot be considered socially desirable or beneficial to British Columbia's population.

There are numerous difficulties associated with identifying only those non-recreational or leisure activities which are directly dependent upon the existence of the lake and which are clearly beneficial to the British Columbian population. For example, many people assume that the seaplane base which is located on Lakelse Lake is dependent upon the lake's existence. This, however, is not true. The seaplane base which is located on Lakelse Lake is dependent upon the lake's existence only in the sense that it could not continue to exist at its present location if Lakelse Lake was to disappear. There are other bodies of water located within a reasonable distance of Lakelse Lake which are equally suitable for use as a seaplane base. Therefore, it cannot be said that the existence of this commercial activity is directly dependent upon the existence of Lakelse Lake.

What is true of other natural resources is also true of Lakelse Lake. That is, Lakelse Lake is important only in the sense that it provides, either directly or indirectly, some service to people. Since Lakelse Lake water is used for sewage disposal, transportation, human and animal consumption, fish habitat and recreation, Lakelse Lake obviously provides some service to man and, therefore, has some economic value. However, the economic or social benefits that are associated with each of these activities need not be very large or even positive. The individual who uses the lake for sewage disposal is gaining direct benefits from using the lake as a vehicle for discarding waste. But, he is also imposing a cost on others who wish to use the lake's water for human consumption or recreation. Thus, in this case, the total benefits accruing to society from using Lakelse Lake for sewage disposal are small. This is true because the number of individuals who actually depend on the lake for sewage disposal is small and this type of use obviously limits its suitability for other types of activities. In other words, a few individuals are restricting the enjoyment of many individuals who, when given the choice, would prefer to use the lake for recreational purposes. It is reasonable to assume that the costs associated with preventing individuals from using the lake for recreational purposes exceed the total benefits which are generated when the lake is used for sewage disposal. Consequently, sewage disposal is not included in the economic and social evaluation carried out in this chapter. The benefits generated from using Lakelse Lake for sewage disposal are small accruing only to a few individuals. The costs imposed, however, are large and detract from the value of other beneficial activities which take place near the lake.

Further, for much the same reason, logging is not considered important when measuring the economic and social importance of Lakelse Lake. Critically important, from a socio-economic point of view, is the large number of alternative logging sites that exist in the northern portion of the province. The quality of Lakelse Lake's water is partially dependent upon the amount and type of vegetation which is located around

the lake and its watershed. The more pristine the lake water the greater is its use potential and the more valuable it is to potential users. If the land around the lake is logged, then the quality of the lake will deteriorate and directly decrease the economic value of the lake. Logging also detracts from the enjoyment of those who visit the lake for recreational purposes, thereby indirectly detracting from the economic value of the lake. The economic value of the lake is, therefore, both directly and indirectly dependent upon the vegetation surrounding the lake. However, the reverse is not true. The existence of watershed vegetation is not necessarily dependent upon the existence of the lake. Most of the trees and the vegetation would be there if the lake did not exist. This is not to say that the lake does not affect the economic value of the trees located in the Lakelse Lake watershed. Since the trees cannot be logged without deliberate, and sometimes costly, actions by logging operators to avoid harming the lake and its waterways, the economic value of the timber which could be produced from harvesting the trees in that area is substantially decreased. However, what is argued here is that the economic value of the timber which could be produced from the trees necessary to maintaining the Lakelse Lake watershed is not of major importance to the people living in the Prince Rupert-Kitimat Region or other British Columbians. If British Columbians decided to forego harvesting the timber around Lakelse Lake to protect the lake, the logging industry would not suffer any loss of revenue. There would be no decrease in the number of persons employed in the logging industry nor would the incomes generated in the Prince Rupert-Kitimat Region or in British Columbia necessarily decline. Other, perhaps more lucrative, logging areas are available in the Prince Rupert-Kitimat Region and in British Columbia. If logging companies were to forego their right to log the Lakelse Lake watershed area they would simply log in other locations using the same men and equipment they would have used had they logged the Lakelse Lake area. In return they would have maintained the quality of the water in the lake and would have preserved the economic value of the lake for residents of the region and the people of British Columbia. Furthermore,

the people of British Columbia will not have foregone the option to log that area at some future date if the economic and social conditions are such that it is deemed feasible.

Logging Scene - Lakelse Lake in Background

Despite the large number of commercially oriented activities which take place around the Lakelse Lake area, very few of these activities are both non-recreational and dependent upon the existence of the lake. As a consequence, in this study, only the lake's importance as a salmon rearing area is considered a commercially beneficial economic activity which is dependent upon the existence of the lake. All the commercially caught fish which spend all or a portion of their life cycle in the Lakelse Lake watershed are included in the calculations used to mea-

sure the economic and social importance of Lakelse Lake.[1] The geographic area included in this non-recreational analysis is shown in Map 4.

Many different species of fish spend all or a portion of their life cycle in the Lakelse Lake watershed. However, only salmon are harvested for commercial purposes. The salmon produced in the Lakelse Lake watershed make a significant contribution to the total Skeena River commercial salmon catch. This system contains all five species of Pacific salmon but only four are included in the economic evaluation presented in this chapter. Small numbers of chum salmon have been reported in the system during certain years but not in large enough quantities to make a significant contribution to the Skeena River commercial fishery.

Table 1:1 shows the estimated average annual Skeena salmon catch which is attributable to the Lakelse Lake watershed. In Table 1:1 the Lakelse Lake salmon escapement is expressed as a percentage of the total Skeena River salmon escapement. Approximately 56 percent of the total Skeena pink salmon escapement, 36 percent of the coho escapement, 9 percent of the chinook escapement and 2 percent of the sockeye escapement is attributable to the Lakelse Lake watershed. Thus, it is estimated that the Lakelse Lake watershed makes an annual contribution of 654,000 pink salmon, 53,000 coho salmon, 14,000 sockeye salmon and 3,600 chinook salmon to the Skeena River commercial catch. The total annual commercial catch of Lakelse Lake salmon is estimated to be 724,600 pieces.

Table 1:2 shows that the average annual landed value of salmon catch attributable to the Lakelse Lake system, in 1973 dollars, is $1,114,000. The total average annual wholesale value of salmon catch which is attributable to the Lakelse Lake watershed, in 1973 dollars, is $2,694,000.

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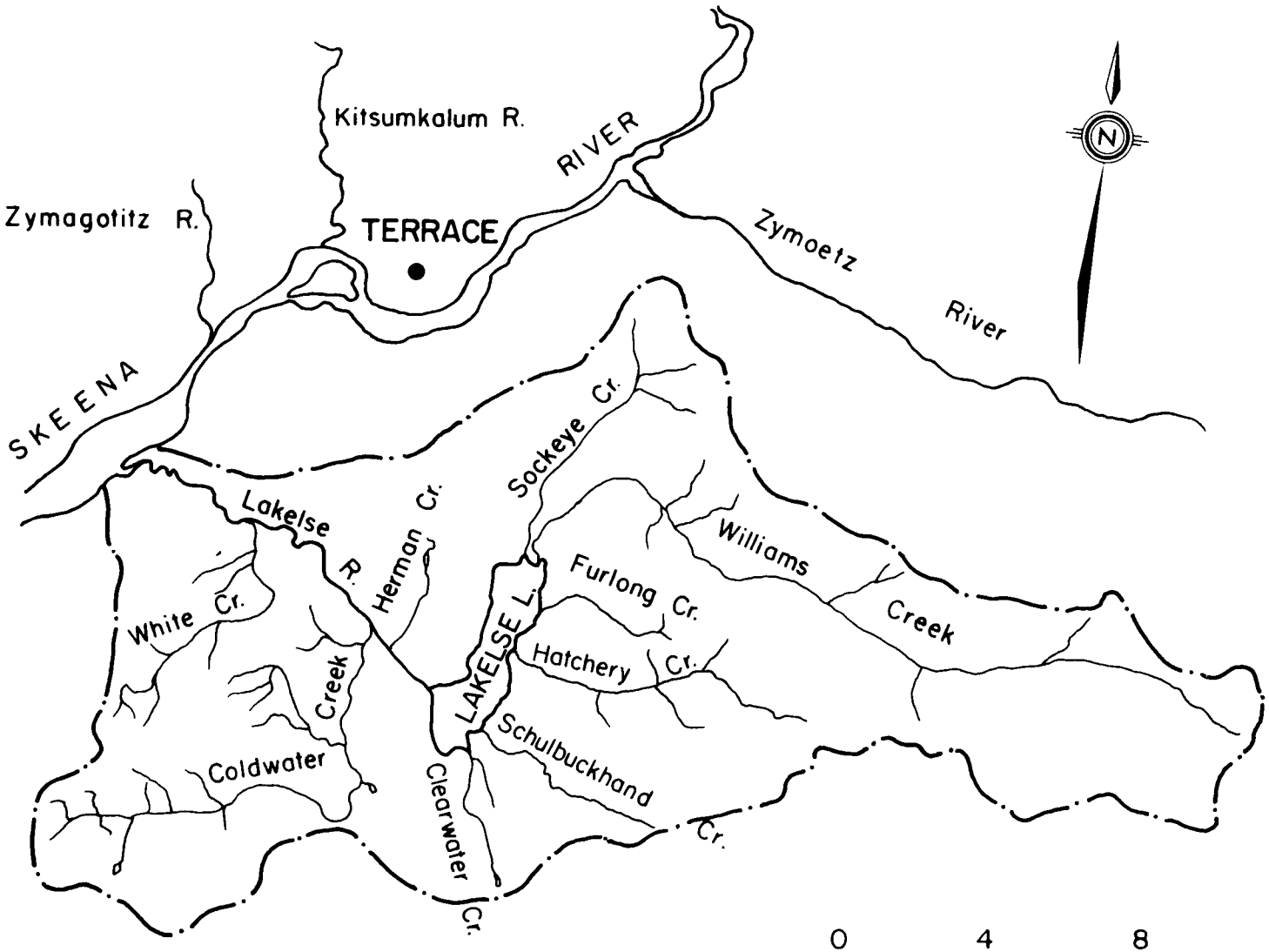
1 Although the Lakelse Lake watershed contains many species of fish only salmon support a commercial fishing operation. Other species are used solely for recreational purposes and are only partially and indirectly included in the recreational evaluations which follow.

MAP 4
LAKELSE LAKE WATERSHED



Legend

—·—·— Border of Lakelse Lake Watershed

TABLE 1:1

AVERAGE ANNUAL COMMERCIAL CATCH (IN PIECES) OF SALMON BY SPECIES ATTRIBUTABLE TO THE LAKELSE LAKE WATERSHED*

	Species in Pieces				
	Pink	Sockeye	Chinook	Coho	Total All Species
Average Annual Lakelse Escapement	607,000	13,000	2,000	26,000	648,000
Average Annual Skeena Escapement	1,086,000	648,000	22,700	72,000	1,828,700
Lakelse Escapement as a Percentage of Total Skeena Escapement	55.9%	2.0%	8.8%	36.1%	35.4%
Average Annual Catch of Skeena Salmon	1,170,000	699,000	41,400	147,000	2,057,400
Estimated Average Annual Catch Attributable to Lakelse	654,000	14,000	3,600	53,000	724,600

* Averaged from 1962 to 1971.

TABLE 1:2

ESTIMATED AVERAGE ANNUAL SALMON CATCH (IN PIECES), THE TOTAL LANDED VALUE, AND THE TOTAL WHOLESALE VALUE OF SALMON ATTRIBUTABLE TO THE LAKELSE LAKE WATERSHED

	Pink	Sockeye	Chinook	Coho	Total
Average Catch[1]	654,000	14,000	3,600	53,000	724,600
Total Landed Value[2]	$724,000	$53,000	$41,000	$296,000	$1,114,000
Total Wholesale Value[3]	$2,063,000	$103,000	$53,000	$475,000	$2,694,000

1 Averaged from 1962 to 1971.

2 Calculated using 1973 net landed prices plus an additional 10 percent for final net settlements.

3 Total wholesale value is an average of the landed to wholesale values for the years 1962 to 1971.

A proper economic evaluation of the Lakelse Lake salmon fishery requires that the total value added be calculated for both the primary (fish catching) activities and the secondary (fish processing) activities. At the primary level, this involves calculating the landed value of the catch, then subtracting the total costs associated with maintaining that level of catch. Cost calculations usually include the fixed and variable costs associated with harvesting the catch plus the public costs associated with managing and protecting the fish in their natural environment. At the secondary level, value added is determined by subtracting fixed and variable processing costs away from the difference between the landed and wholesale values. A number of practical difficulties prevent strict adherence to this procedure. First, at the primary level, most commercial fishing activities are carried out at less than optimal efficiency. Therefore, the value added attained is usually less than the potential value added. Consequently, the value added actually attained will tend to underestimate the true economic potential of a commercial fishery operation. Second, at both the primary and secondary levels, there is the problem of identifying sunk costs. If commercial fishing operations were to discontinue, the only possible savings to society would be the annual operating costs. Most fish management and protection expenditures would continue to exist. Furthermore, none of the capital equipment currently used to maintain fish productivity or to process salmon have salvage or alternative use value. Therefore, none of the capital expenditures associated with these activities could be recovered. In what follows, potential net yield is used to determine the value of the commercial fishery rather than the actual value added. The potential net yield is, in fact, the gross value of the catch minus the costs which would be incurred if the most efficient method of harvesting or processing the fish was utilised. Furthermore, all costs associated with managing, protecting and processing Lakelse Lake fish are assumed sunk or so meager as to be negligible.

Several studies have estimated that the net yield to commercial

fishermen is between 83 and 90 percent of the landed value.[2] Therefore, for the purpose of this chapter, the potential net yield at the primary level is estimated to be 85 percent of the landed value. Further, the minimum costs associated with a salmon fish processing operation (assuming all fixed costs to be sunk costs) are assumed to be 50 percent of the difference between the landed and wholesale values. The calculations used to derive the potential annual net yield from both the primary and secondary phases of the commercial fishing operations attributable to the Lakelse Lake system are shown in Table 1:3. As shown there, the annual net yield of salmon catch attributable to the Lakelse system is estimated to be $1,737,000.

It is now possible to estimate the value of this stream of benefits to the people of British Columbia. However, precise calculation of this value involves some predictions (and therefore assumptions) about: (1) how long the stream of benefits can be expected to occur, (2) the rate at which the value of today's dollar can be expected to decline over time, (3) what the market value of salmon might be relative to all other products in future, and (4) the relative cost of maintaining this stream of benefits in future.[3] For the purpose of this chapter, the stream of future benefits is discounted at 8 percent per annum to the year 2000. Increases in the population, rising per capita income levels and increases in the demand for protein products together suggest that the real value of salmon will increase in future. Therefore, an annual growth rate of 2 percent is used in an effort to take account of these trends. On this basis, it is estimated in Table 1:4 that the Lakelse watershed salmon commercial fishery has a present discounted value of $24,192,000.

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2 J. A. Crutchfield and G. Pontecorvo, The Pacific Salmon Fisheries, Resources for the Future, Inc., John Hopkins Press, Baltimore, 1969, Chapter 7, and J. A. Richards, An Economic Evaluation of Columbia River Anadromous Fish Programs, Ph.D. Thesis, Oregon State University, 1969.

3 The present discounted value concept will be used again in Chapter Three when direct economic values are calculated for the recreational activities which take place on Lakelse Lake.

TABLE 1:3

TOTAL POTENTIAL ANNUAL NET YIELD GENERATED FROM COMMERCIAL FISH PRODUCTION ATTRIBUTABLE TO THE LAKELSE WATERSHED SYSTEM - 1973

Potential Annual Net Yield Produced at the Primary Level	$1,114,000 x 85% :	$947,000
Potential Annual Net Yield Produced at the Secondary Level	$2,694,000 - $1,114,000 :	$790,000
Total Potential Annual Net Yield From Lakelse Lake Watershed	$947,000 + $790,000 :	$1,737,000

TABLE 1:4

TOTAL POTENTIAL ANNUAL NET YIELD AND DISCOUNTED PRESENT VALUE OF COMMERCIAL FISHING OPERATIONS WHICH ARE ATTRIBUTED TO THE LAKELSE WATERSHED

	Annual Net Yield (1973 Dollars)	Present Discounted Value
Primary Fishing	$947,000	$13,185,000
Secondary Processing	$790,000	$11,007,000
TOTAL	$1,737,000	$24,192,000

Summary

In this chapter we have estimated the economic value of non-recreational, commercial activities which are directly dependent upon the existence of Lakelse Lake. The seaplane base, logging, sewage disposal and other related activities were not considered non-recreational activities whose existence was dependent upon Lakelse Lake and its related waterways. It was argued that these activities imposed costs which detracted from the recreational opportunities on the lake more than offsetting the total benefits which they generated. Further, it was argued that if British Columbians decided to forego harvesting the timber in the Lakelse Lake watershed area, there would be no decrease in the benefits generated by the logging industry in British Columbia. Logging companies would simply turn their attention to other locations in the same region. The benefits generated by the salmon produced in the Lakelse Lake watershed and harvested in the west coast commercial fishery were considered directly dependent upon Lakelse Lake for their existence. Thus, an economic evaluation of the Lakelse Lake salmon fishery was carried out and used as a proxy for showing the economic importance of Lakelse Lake's commercial activities.

The net annual yield of salmon catch attributable to the Lakelse system is estimated to be $1,737,000. This stream of benefits discounted at 8 percent per annum to the year 2000 is estimated to be worth $24,192,000.

CHAPTER TWO

LAKELSE LAKE RECREATIONAL OPPORTUNITIES: PRIMARY USERS, PATTERNS OF PARTICIPATION AND SOCIO-ECONOMIC BACKGROUND

In Chapter One it was indicated that the number of commercial, non-recreational benefits generated by Lakelse Lake are limited; that Lakelse Lake and its surrounding area is very valuable from a recreational point of view and that most commercial activities detract from its recreational value. Moreover, it was noted that most commercial activities in and around the Lakelse Lake watershed are not dependent upon Lakelse Lake or its related waterways for their continued existence. This chapter presents information on the primary recreational users of Lakelse Lake, their patterns of use and their socio-economic background. The purpose is to gain some insight as to what type of future development is most suited to the needs of the lake's primary users. An economic evaluation of Lakelse Lake recreational opportunities follows in Chapter Three.

Primary Users and Their Patterns of Participation

In addition to the general residency classification defined in the Introduction, there is one additional resident category which, when viewed in isolation from the others, will help the reader to better appreciate the true value of Lakelse Lake. That is, the Lakelse Lake property owner who owns property located on the shores of the lake and who may fall into any one of the general categories previously established. A Lakelse Lake property owner is sometimes a resident, a British Columbian non-resident, or a non-Canadian. Whenever possible information on the status of Lakelse Lake property owners will be presented and compared

with the information provided on other resident categories.[1]

Table 2:1 shows that Lakelse Lake and the surrounding waterfront area is overwhelmingly a resident recreational area. According to Table 2:1, 49,065 party-visits were made to Lakelse Lake by Terrace residents during 1973. Kitimat residents made 25,265 and Prince Rupert residents made 11,685 party-visits. Non-residents accounted for only 6,020 party-visits during 1973. This amounted to slightly more than 6 percent of the total visits made during that year.

An indication of the importance to residents of Lakelse Lake as a recreational area is revealed by the data presented in Table 2:2. Table 2:2 shows that 2,924 of the total 3,330 Terrace households, (87.8 percent) visited Lakelse Lake during 1973. Nearly 82 percent of all Kitimat households and slightly over 54 percent of all Prince Rupert households visited Lakelse Lake during 1973.

Aside from the resident classifications used thus far, there are numerous other useful categories into which Lakelse Lake visitors may be divided in order to help identify participation patterns. For example, some individuals visit only during the day, while others stay overnight. Some make use of the lake during the summer and others visit the lake both in summer and winter. Table 2:3 shows the number and percentage of annual Lakelse Lake party-visits according to permanent place of residence and time of year. Terrace residents, with average annual visits of nearly 17, visit Lakelse Lake most often and are more likely to visit the lake during the winter than are residents of either Kitimat or Prince Rupert.

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1 Of the approximately 250 Lakelse Lake property owners, 194 (77.6 percent) use their Lakelse Lake property on a seasonal basis, 43 (17 percent) reside permanently on their Lakelse Lake property. It was determined in this study that approximately 90 permanent residents of the Lakelse Lake area committed 4,000 days to the enjoyment of recreational activities on the lake. These activity-days are over and above the total presented in this chapter.

TABLE 2:1

NUMBER AND PERCENTAGE OF TOTAL YEARLY PARTY-VISITS ACCORDING TO RESIDENT CATEGORY - 1973

(Rounded to Nearest 5 Party-Visits)

Residence	No.	Percentage
Terrace	49,065	53.3
Kitimat	25,265	27.5
Prince Rupert	11,685	12.7
B. C. Non-Resident	3,235	3.5
Canadian Non-B. C.	1,960	2.1
Non-Canadian	825	0.9
TOTAL	92,035	100.0

TABLE 2:2

TOTAL NUMBER AND PERCENTAGE OF TOTAL HOUSEHOLDS WHICH VISIT LAKELSE LAKE ANNUALLY BY PLACE OF RESIDENCE - 1973

	Total No. of Households *	Percentage of Households That Visit Lakelse %	No. of Households That Visit Lakelse
Terrace	3,330	87.8	2,924
Kitimat	3,025	81.9	2,477
Prince Rupert	4,520	54.1	2,445
TOTAL AREA	10,875	72.1	7,846

* Canada, Census, 1971.

TABLE 2:3

NUMBER AND PERCENTAGE OF ANNUAL, SUMMER AND WINTER LAKELSE PARTY-VISITS ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

(Rounded to Nearest 5 Visits)

	No. of Households That Visit Lakelse	Average Yearly Visits	Total Summer Party-Visits	Total Winter Party-Visits	Percentage of Summer Visits To Total Visits %	Total Yearly Household Visits
Terrace	2,925	16.8	42,490	6,575	86.6	49,065
Kitimat	2,475	10.2	22,940	2,325	90.8	25,265
Prince Rupert	2,445	4.8	10,540	1,145	90.2	11,685
TOTAL AREA	7,845	11.0	75,970	10,045	88.3	86,015

Winter Activities - Lakelse Lake

Table 2:4 shows the number and percentage of individual summer and winter visits to Lakelse Lake according to permanent place of residence for both resident and non-resident visitors. Summer visits account for over 88 percent of the total annual visits to Lakelse Lake. Moreover, Table 2:4 shows that non-residents seldom used the lake during the winter of 1972-73.

Table 2:5 provides a breakdown on the number of day and overnight visits, the average party size according to permanent place of residence, and the number of individual visitors to Lakelse Lake by per-

TABLE 2:4

NUMBER AND PERCENTAGE OF INDIVIDUAL SUMMER AND WINTER VISITS TO LAKELSE LAKE ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

(Rounded to Nearest 5 Visits)

Type of Visit	Terrace		Kitimat		Prince Rupert		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Summer Visits	244,800	86.6	104,000	90.8	49,010	90.2	12,565	93.5	8,025	100.0	2,375	100.0	420,775	88.5
Winter Visits	37,880	13.4	10,540	9.2	5,325	9.8	860	6.4	-	-	-	-	54,605	11.5
TOTAL	282,680	100.0	114,540	100.0	54,335	100.0	13,435	100.0	8,025	100.0	2,375	100.0	475,380	100.0

TABLE 2:5

NUMBER AND PERCENTAGE OF RESIDENT AND NON-RESIDENT PARTY AND INDIVIDUAL SUMMER VISITS TO LAKELSE LAKE ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

(Rounded to Nearest 5 Visits)

	Total Party Visits	Percentage of Visits		No. of Party Visits		Average Party Size		No. of Individual Visits		Total Individual Visits
		Day	Overnight	Day	Overnight	Day	Overnight	Day	Overnight	
Terrace	42,490	60.4	39.6	25,650	16,840	6.4	4.8	164,425	80,375	244,800
Kitimat	22,940	53.8	46.3	12,330	10,610	4.6	4.5	56,785	47,215	104,000
Prince Rupert	10,540	32.0	68.0	3,370	7,170	5.2	4.4	17,600	31,410	49,010
TOTAL RESIDENT	75,970	54.4	45.6	41,350	34,620	5.8	4.6	238,810	159,000	397,810
B. C. Non-Resident	3,020	87.1	12.9	2,630	390	4.2	3.9	11,040	1,530	12,570
Canadian Non-B. C.	1,960	89.3	10.7	1,750	210	4.1	4.0	7,185	840	8,025
Non-Canadian	825	74.6	25.4	615	210	2.9	2.8	1,780	595	2,375
TOTAL NON-RESIDENT	5,805	86.1	14.0	4,995	810	4.0	3.8	20,005	2,965	22,970

manent place of residence during 1973. These data indicate that non-resident visitors tend to make significantly less use of overnight facilities than do resident visitors. Day visitors travel together in larger groups than overnight visitors and the average size of non-resident visitor parties is smaller than the average size of resident visitor parties. These data clearly show that residents of Terrace use Lakelse Lake much more often than all other resident and non-resident categories.

Table 2:6 shows the average length of stay in days and hours for overnight and day visitors to Lakelse Lake according to permanent place of residence during 1973. The information presented in Table 2:6 shows that Prince Rupert day visitors, with over 5 hours, stayed longer than all other non-resident and resident categories. This was followed closely by Canadian non-British Columbian day visitors who stayed an average of 4.7 hours. Overnight visitors from Terrace stayed longer than all other resident and non-resident categories. Terrace overnight visitors stayed an average of 4.2 days, while Canadian non-British Columbians stayed an average of 3.9 days.

Socio-Economic Background of Visitors

Still another important consideration when attempting to assess the importance of a public recreational facility to a specific region is determining who uses the public facilities. Thus, in this section, we examine the age, income and occupational distribution of visitors to Lakelse Lake during 1973.

Table 2:7 provides a comparison between Lakelse Lake visitors who identified themselves as the head of their household and the age of the head of household for the general population by permanent place of residence for 1973. According to Table 2:7 a better than representative segment of each age group to 34 years of age visited Lakelse during 1973.

TABLE 2:6

AVERAGE LENGTH OF STAY IN DAYS AND HOURS
FOR OVERNIGHT AND DAY VISITORS TO LAKELSE LAKE
ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

	Overnight Visitors (Days)	Day Visitors (Hours)
Terrace	4.2	4.4
Kitimat	3.0	4.6
Prince Rupert	3.3	5.1
Lakelse Lake	-	3.3
B. C. Non-Resident	3.7	2.8
Canadian Non-B. C.	3.9	4.7
Non-Canadian	3.1	2.4
TOTAL	3.0	3.9

TABLE 2:7

COMPARISON OF AGE OF HEAD OF HOUSEHOLD VISITORS TO LAKELSE LAKE WITH AGE OF HEAD OF HOUSEHOLD OF GENERAL POPULATION* - 1973

Age Category	Terrace				Kitimat				Prince Rupert				Total Area			
	Lakelse Visitors		General Population		Lakelse Visitors		General Population		Lakelse Visitors		General Population		Lakelse Visitors		General Population	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
19 and Under	2	0.7	10	0.5	-	-	15	0.5	2	2.1	15	0.4	4	0.7	40	0.5
20 - 24	38	13.3	155	7.8	28	12.6	225	8.1	7	7.4	295	8.3	73	12.1	675	8.1
25 - 34	117	40.9	590	29.6	91	41.0	880	31.6	29	30.9	1,080	30.3	237	39.4	2,550	30.6
35 - 44	76	26.6	530	26.6	62	27.9	890	32.0	37	39.4	895	25.1	175	29.1	2,315	27.7
45 - 54	37	12.9	360	18.0	30	13.5	560	20.1	15	16.0	640	18.0	82	13.6	1,560	18.7
55 - 64	14	4.9	220	11.0	11	5.0	195	7.0	2	2.1	430	12.1	27	4.5	845	10.1
65 and Over	2	0.7	130	6.5	-	-	20	0.7	2	2.1	205	5.8	4	0.7	355	4.3
TOTAL	286	100.0	1,995	100.0	222	100.0	2,785	100.0	94	100.0	3,560	100.0	602	100.0	8,340	100.0

* Canada, Census, 1971.

A representative segment of the 35 to 44 years of age group visited Lakelse Lake during 1973 and a less than representative segment of the population visited Lakelse Lake in the over 45 age categories. This probably reflects the fact that older members of the population are less interested in outdoor recreation than their younger counterparts.

Table 2:8 shows the percentage of day visitors by age of head of household according to timing of the visit during the week for 1973. According to Table 2:8 a larger percentage of younger individuals appear to visit Lakelse Lake on weekends than during the week. Weekend visits to Lakelse Lake appear to be particularly important in the 20 to 24 years of age category. Non-residents over 55 years of age visited Lakelse Lake more frequently than did residents of similar age.

Tables 2:9 and 2:10, respectively, show the gross household income of residents and non-residents who visited Lakelse Lake during 1973 and the income of Lakelse Lake property owners. Persons from every income level made use of Lakelse Lake during 1973. The large percentage of resident visitors that earned between $10,000 and $15,000 a year is probably a reflection of the general income distribution of the resident population. Table 2:10 clearly shows that a high proportion of Lakelse Lake property owners earn better than $15,000 per annum.

Tables 2:11 and 2:12, respectively, show the occupation of the head of household for residents and non-residents who visited Lakelse Lake during 1973 and the occupation of Lakelse Lake property owners. The data presented in these tables show that persons from every occupation category visited Lakelse Lake during 1973. Once again, however, the Lakelse Lake property owners seem to be more heavily represented in the higher paying occupation categories. Further, a significant portion of Lakelse Lake property owners who are non-residents fall into the retired category. However, only 27 of the 184 property owners included in the survey are non-residents of the area. Therefore, it would appear

TABLE 2:8

PERCENTAGE OF DAY VISITORS BY AGE OF HEAD OF HOUSEHOLD

ACCORDING TO TIMING OF VISIT DURING WEEK - 1973

Age Category	Resident						Total Resident		Non-Resident		Total Resident & Non-Resident	
	Terrace		Kitimat		Prince Rupert							
	Week-day %	Week-end %	Week-day %	Week-end %	Week-day %	Week-end %	Week-day %	Week-end %	Week-day %	Week-end %	Week-day %	Week-end %
19 and Under	-	0.9	-	-	-	-	-	0.4	-	-	-	0.4
20 - 24	13.8	20.2	9.1	16.8	-	4.2	11.5	17.1	11.8	13.6	11.5	17.1
25 - 34	43.1	40.4	39.4	43.8	33.3	37.5	41.3	41.4	23.5	36.4	36.7	40.6
35 - 44	16.9	24.8	33.3	22.5	50.0	45.8	24.0	26.1	11.8	22.7	20.9	24.4
45 - 54	18.5	9.2	18.2	10.1	16.7	12.5	18.3	9.9	17.6	9.1	18.0	11.4
55 - 64	7.7	2.7	-	6.7	-	-	4.8	4.1	23.5	9.1	10.1	4.5
65 and Over	-	0.9	-	-	-	-	-	0.4	8.8	9.1	2.1	1.2
No Response	-	0.9	-	-	-	-	-	0.4	2.9	-	0.7	0.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 2:9

GROSS HOUSEHOLD INCOME OF RESIDENT AND
NON-RESIDENT VISITORS TO LAKELSE LAKE - 1973

Income Category	Resident								Non-Resident							
	Terrace		Kitimat		Prince Rupert		Total Resident		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Under $3,000	3	0.9	-	-	1	1.0	4	0.6	3	2.1	2	2.5	2	3.0	7	2.4
$3,000 - $4,999	1	0.3	1	0.4	2	2.1	4	0.6	5	3.6	2	2.5	2	3.0	9	3.1
$5,000 - $9,999	75	23.3	38	15.8	17	17.6	130	19.7	35	24.8	21	26.2	15	22.4	71	24.7
$10,000 - $14,999	159	49.4	138	57.5	43	44.3	340	51.6	58	41.1	33	41.3	19	28.4	110	38.2
$15,000 - $19,999	48	14.9	37	15.4	22	22.7	107	16.2	23	16.3	10	12.5	8	11.9	41	14.2
$20,000 and Over	19	5.9	19	7.9	8	8.2	46	7.0	13	9.2	11	13.8	18	26.9	42	14.6
No Response	17	5.3	7	2.9	4	4.1	28	4.3	4	2.9	1	1.2	3	4.5	8	2.8
TOTAL	322	100.0	240	100.0	97	100.0	659	100.0	141	100.0	80	100.0	67	100.0	288	100.0

TABLE 2:10

GROSS HOUSEHOLD INCOME OF
LAKELSE LAKE PROPERTY OWNERS - 1973

Income Category	Terrace %	Kitimat %	Prince Rupert %	Lakelse Lake %	All Owners %
Under $3,000	1.4	-	-	-	0.5
$3,000 - $4,999	2.9	-	-	6.0	2.6
$5,000 - $9,999	24.6	6.5	9.1	18.2	16.9
$10,000 - $14,999	36.2	38.7	9.1	42.4	35.3
$15,000 - $19,999	15.9	25.8	45.5	9.1	20.5
$20,000 and Over	7.2	16.1	31.8	18.2	14.7
No Response	11.6	12.9	4.5	6.0	9.5
TOTAL	100.0	100.0	100.0	100.0	100.0

TABLE 2:11

OCCUPATION OF RESIDENT AND NON-RESIDENT HEAD OF HOUSEHOLD WHO VISITED LAKELSE LAKE ON DAY AND OVERNIGHT VISITS - 1973

Occupation Category	Resident								Non-Resident							
	Terrace		Kitimat		Prince Rupert		Total Resident		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Executive	-	-	-	-	-	-	-	-	2	1.4	1	1.2	-	-	3	1.0
Managerial	21	7.2	13	5.9	6	6.4	40	6.6	16	11.3	2	2.5	2	3.0	20	6.9
Professional	34	11.7	25	11.3	11	11.7	70	11.5	26	18.4	18	22.5	18	26.9	62	21.5
Trades or Technical	67	23.0	96	43.2	34	36.2	197	32.5	39	27.7	20	25.0	9	13.4	68	23.6
Clerical or Sales	28	9.6	9	4.0	12	12.8	49	8.1	13	9.2	8	10.0	2	3.0	23	8.0
Self-Employed	38	13.1	11	5.0	10	10.6	59	9.7	11	7.8	11	13.8	9	13.4	31	10.8
Labourer	92	31.6	66	29.7	18	19.1	176	29.0	21	14.9	11	13.8	2	3.0	34	11.8
Retired	2	0.7	-	-	2	2.1	4	0.7	9	6.4	6	7.5	24	35.8	39	13.5
Student	4	1.4	2	0.9	1	1.1	7	1.1	3	2.1	-	-	1	1.5	4	1.4
Unemployed	3	1.0	-	-	-	-	3	0.5	1	0.7	-	-	-	-	1	0.4
Occupation Unknown	2	0.7	-	-	-	-	2	0.3	-	-	1	1.2	-	-	1	0.4
Other	-	-	-	-	-	-	-	-	-	-	2	2.5	-	-	2	0.7
TOTAL	291	100.0	222	100.0	94	100.0	607	100.0	141	100.0	80	100.0	67	100.0	288	100.0

TABLE 2:12

NUMBER AND PERCENTAGE OF LAKELSE LAKE PROPERTY OWNERS IN EACH OCCUPATION CATEGORY

Occupation Category	Resident								Non-Resident		Total	
	Terrace		Kitimat		Prince Rupert		Lakelse					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Executive	2	2.8	-	-	4	17.4	1	3.2	-	-	7	3.8
Managerial	10	13.9	4	12.9	4	17.4	1	3.2	1	3.7	20	10.9
Professional	11	15.3	5	16.1	-	-	3	9.7	7	25.9	26	14.1
Trade or Technical	11	15.3	11	35.5	2	8.7	10	32.3	2	7.4	36	19.6
Clerical or Sales	2	2.8	1	3.2	1	4.3	3	9.7	2	7.4	9	4.9
Self-Employed	22	30.5	4	12.9	10	43.5	4	12.9	4	14.8	44	23.9
Labourer	7	9.7	4	12.9	1	4.3	5	16.1	4	14.8	21	11.4
Retired	5	6.9	-	-	1	4.3	2	6.4	6	22.2	14	7.6
Unemployed	-	-	-	-	-	-	1	3.2	1	3.7	2	1.1
No Response	2	2.8	2	6.5	-	-	1	3.2	-	-	5	2.7
TOTAL	72	100.0	31	100.0	23	100.0	31	100.0	27	100.0	184	100.0

reasonable to assume that the distribution of visitors over occupational categories probably reflects the occupational distribution of the resident population. The same is probably true of non-resident visitors to Lakelse Lake. The occupational distribution of non-resident visitors to Lakelse Lake coincides with the occupational distribution of all non-resident visitors to the area.

Type of Participation and Reason for Visiting Lakelse Lake

We have, to this point, identified the primary users of Lakelse Lake and their pattern of participation. Further, we have identified visitors to Lakelse Lake by presenting information on their socio-economic background. This, however, does not give any indication about how much the visitors use the lake, the number and range of activities which the visitor enjoys as a result of his visit to the lake, nor does it indicate the main reasons why people choose to visit the lake. In this section a detailed breakdown on the amount of time expended in each major leisure activity at the lake is given for 1973. Also, information is provided on the main reasons why resident and non-resident recreational parties visited Lakelse Lake during 1973. This information will be utilised in Chapter Four when plans for future development around Lakelse Lake are discussed.

Table 2:13 provides a breakdown on the total days expended in each leisure-time activity by resident and non-resident day and overnight visitors according to permanent place of residence during 1973. According to Table 2:13 residents of the Prince Rupert-Kitimat Region expended 816,475 days participating in recreational activities at Lakelse Lake during 1973. Table 2:13 shows that non-residents expended 31,000 days on Lakelse Lake participating in these same activities. It is interesting to note that Terrace residents accounted for slightly more than 60 percent of the lake's total resident recreational days. Kitimat accounted for 24 percent of the lake's resident recreational

TABLE 2:13

NUMBER AND PERCENTAGE OF DAYS SPENT IN EACH LEISURE-TIME ACTIVITY BY RESIDENT AND NON-RESIDENT DAY AND OVERNIGHT VISITORS ACCORDING TO PLACE OF RESIDENCE - 1973

(Rounded to Nearest 5 Days)

Activity	Resident								Non-Resident							
	Terrace		Kitimat		Prince Rupert		Total Resident		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Camping	30,075	6.0	27,045	13.8	10,370	8.6	67,490	8.3	545	3.2	375	3.6	160	4.4	1,080	3.5
Swimming[1]	121,040	24.2	40,410	20.6	28,615	23.8	190,065	23.3	3,180	18.8	1,805	17.3	655	18.2	5,640	18.2
Sunbathing	72,745	14.6	24,645	12.6	15,100	12.5	112,490	13.8	1,730	10.2	870	8.3	290	8.1	2,890	9.3
Aesthetic Beauty	31,180	6.2	12,745	6.5	13,540	11.2	57,465	7.0	1,165	6.9	655	6.3	440	12.2	2,260	7.3
Motor Boating	34,435	6.9	8,715	4.4	5,545	4.6	48,695	6.0	765	4.5	685	6.6	20	0.6	1,470	4.7
Picnicking	95,820	19.2	33,200	16.9	10,130	8.4	139,150	17.0	3,395	20.0	2,725	26.1	420	11.7	6,540	21.1
Fishing	38,270	7.7	9,445	4.8	9,450	7.8	57,165	7.0	1,775	10.5	1,305	12.5	425	11.8	3,505	11.3
Hot Springs	675	0.1	100	0.1	-	-	775	0.1	30	0.2	5	0.1	-	-	35	0.1
Canoeing	11,395	2.3	8,400	4.3	3,200	2.7	22,995	2.8	805	4.8	220	2.1	30	0.8	1,055	3.4
Water-skiing	11,545	2.3	3,840	2.0	1,725	1.4	17,110	2.1	15	0.1	45	0.4	5	0.1	65	0.2
Hiking, Walking[2]	26,560	5.3	10,595	5.4	11,965	9.9	49,120	6.0	2,045	12.1	1,470	14.1	820	22.8	4,335	14.0
Photography	550	0.1	1,365	0.7	625	0.5	2,540	0.3	100	0.6	60	0.6	190	5.3	350	1.1
Rest Activities[3]	15,525	3.1	9,810	5.0	8,265	6.9	33,600	4.1	665	3.9	225	2.2	135	3.8	1,025	3.3
Rubber Dinghy, Kayak	2,570	0.5	150	0.1	185	0.2	2,905	0.4	-	-	-	-	-	-	-	-
Sailing	1,105	0.2	1,395	0.7	335	0.3	2,835	0.4	-	-	-	-	-	-	-	-
Social[4]	6,350	1.3	4,305	2.2	1,420	1.2	12,075	1.5	705	4.2	-	-	-	-	705	2.3
Business	-	-	-	-	-	-	-	-	35	0.2	-	-	10	0.3	45	0.2
TOTAL	499,840	100.0	196,165	100.0	120,470	100.0	816,475	100.0	16,955	100.0	10,445	100.0	3,600	100.0	31,000	100.0

1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.

activity while Prince Rupert accounted for slightly under 15 percent of the total. Residents appear to make relatively little use of the Lakelse Lake hot springs. Further, Kitimat residents appear to spend more of their recreational time sailing or socialising while visiting the lake than do either Terrace or Prince Rupert residents. Once again, however, these data clearly show that Lakelse Lake is used mainly by residents of the Prince Rupert-Kitimat Region.

Table 2:14 shows resident and non-resident hours spent in each leisure-time activity by day and overnight visitors according to permanent place of residence during 1973. The distribution of time expended over different leisure activities in this table does not vary significantly from those data presented in Table 2:13.

The relative popularity of the different leisure-time activities available to visitors to Lakelse Lake is revealed in Table 2:15. Table 2:15 shows the total number and percentage of hours spent in each Lakelse Lake leisure-time activity for all visitors during 1973. The information presented in this table shows that swimming, picnicking, sunbathing, camping and fishing are the most popular leisure-time activities among both resident and non-resident visitors to the lake. The relative importance of aesthetic beauty suggests that all visitors appear to consider the surrounding environment important to their general enjoyment of the area.[2]

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2 There are, of course, some problems associated with classifying open-ended questions into the relevant leisure-time activity categories. For example, aesthetic beauty could easily be interpreted so that it would most appropriately fall into the rest activities category. Even sightseeing could be included in this same general classification. Similarly, camping might be considered a recreational pastime by some and more appropriately a housekeeping chore by others. Although every attempt was made to define each activity category in a manner which would provide the reader with a clear understanding of what visitors to Lakelse Lake felt was important, the reader should be aware that these categories are subject to personal interpretation, and therefore, are somewhat arbitrary.

TABLE 2:14

NUMBER AND PERCENTAGE OF HOURS SPENT IN EACH LEISURE-TIME ACTIVITY BY RESIDENT AND NON-RESIDENT DAY AND OVERNIGHT VISITORS ACCORDING TO PLACE OF RESIDENCE - 1973

(Rounded to Nearest 25 Hours)

Activity	Resident								Non-Resident							
	Terrace		Kitimat		Prince Rupert		Total Resident		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Camping	131,400	6.0	124,750	13.8	53,200	8.6	309,350	8.3	1,500	3.2	1,750	3.6	375	4.3	3,625	3.5
Swimming[1]	528,850	24.2	186,400	20.6	146,775	23.8	862,025	23.3	8,800	18.7	8,375	17.2	1,600	18.2	18,775	18.0
Sunbathing	317,825	14.6	113,675	12.6	77,425	12.5	508,925	13.7	4,800	10.2	4,050	8.3	700	8.0	9,550	9.2
Aesthetic Beauty	136,225	6.2	58,775	6.5	69,450	11.2	264,450	7.1	3,225	6.9	3,050	6.3	1,075	12.3	7,350	7.0
Motor Boating	150,475	6.9	40,200	4.4	28,425	4.6	219,100	5.9	2,125	4.5	3,175	6.5	50	0.6	5,350	5.1
Picnicking	418,675	19.2	153,150	16.9	51,950	8.4	623,775	16.8	9,400	20.0	12,675	26.1	1,025	11.7	23,100	22.1
Fishing	167,200	7.7	43,575	4.8	48,475	7.8	259,250	7.0	4,900	10.4	6,075	12.5	1,025	11.7	12,000	11.5
Hot Springs	2,950	0.1	450	0.1	-	-	3,400	0.1	100	0.2	25	0.1	-	-	125	0.1
Canoeing	49,800	2.3	38,725	4.3	16,425	2.7	104,950	2.8	2,225	4.7	1,025	2.1	75	0.9	3,325	3.2
Water-skiing	50,450	2.3	17,700	2.0	8,850	1.4	77,000	2.1	50	0.1	225	0.5	25	0.3	300	0.3
Hiking, Walking[2]	116,050	5.3	48,850	5.4	61,375	9.9	226,275	6.1	5,650	12.0	6,825	14.1	2,000	22.8	14,475	13.9
Photography	2,400	0.1	6,300	0.7	3,200	0.5	11,900	0.3	275	0.6	275	0.6	475	5.4	1,025	1.0
Rest Activities[3]	67,825	3.1	45,250	5.0	42,400	6.9	155,475	4.2	1,850	3.9	1,050	2.2	325	3.7	3,225	3.1
Rubber Dinghy, Kayak	11,225	0.5	675	0.1	950	0.2	12,850	0.4	-	-	-	-	-	-	-	-
Sailing	4,825	0.2	6,425	0.7	1,725	0.3	12,975	0.4	-	-	-	-	-	-	-	-
Social[4]	27,725	1.3	19,875	2.2	7,300	1.2	54,900	1.5	1,950	4.2	-	-	-	-	1,950	1.9
Business	-	-	-	-	-	-	-	-	100	0.2	-	-	25	0.3	125	0.1
TOTAL	2,183,900	100.0	904,775	100.0	617,925	100.0	3,706,600	100.0	46,950	100.0	48,575	100.0	8,775	100.0	104,300	100.0

1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.

TABLE 2:15

TOTAL NUMBER AND PERCENTAGE OF HOURS SPENT IN EACH LAKELSE LAKE LEISURE-TIME ACTIVITY FOR ALL VISITORS - 1973

(Rounded to Nearest 25 Hours)

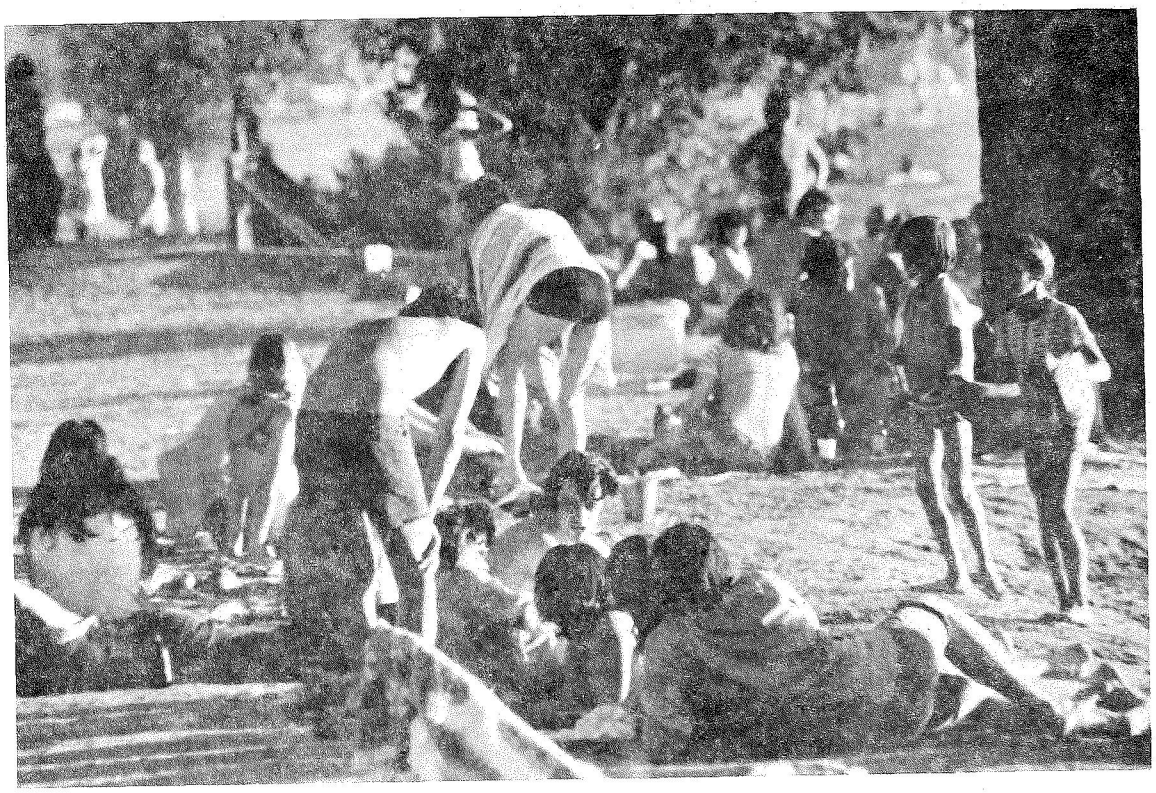
	Total No. of Hours	Percentage of Total Hours %
Camping	313,000	8.2
Swimming[1]	880,800	23.1
Sunbathing	518,475	13.6
Aesthetic Beauty	271,800	7.1
Motor Boating	224,450	5.9
Picnicking	646,850	17.0
Fishing	271,275	7.1
Hot Springs	3,500	0.1
Canoeing	108,275	2.8
Water-skiing	77,275	2.0
Hiking, Walking[2]	240,750	6.3
Photography	12,925	0.3
Rest Activities[3]	158,675	4.2
Rubber Dinghy, Kayak	12,850	0.3
Sailing	12,975	0.3
Social[4]	56,850	1.5
Business	125	0.1
TOTAL	3,810,850	100.0

1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.



Beach Activities - Lakelse Lake

Table 2:16 shows the indicated major reasons why residents and non-residents visited Lakelse Lake during 1973. Swimming, picnicking and camping were the three major reasons why residents visited Lakelse Lake during 1973. Camping, resting and fishing were the three major reasons why non-residents visited Lakelse Lake during 1973. Camping appears to be the single, most important reason given for visiting Lakelse Lake by both residents and non-residents. Fishing is not given as a major reason for visiting Lakelse Lake by residents although it did place a respectable third as a reason for visiting the lake among non-residents. A careful comparison of the reasons given for visiting Lakelse Lake by both residents and non-residents reveals that there are a number of activities which appear to serve the needs of both non-residents and residents alike. Activities such as camping, swimming and picnicking

TABLE 2:16

REASONS WHY RESIDENT AND NON-RESIDENT RECREATIONAL PARTIES VISIT LAKELSE LAKE: NUMBER AND PERCENTAGE OF TIMES EACH REASON IS MENTIONED - SUMMER 1973

Activity	Resident								Non-Resident							
	Terrace		Kitimat		Prince Rupert		Total Resident		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Camping	87	14.6	95	22.0	54	31.4	236	19.7	48	29.1	13	18.6	15	21.7	76	25.0
Swimming[1]	192	32.3	116	26.9	35	20.3	343	28.7	11	6.7	6	8.6	2	2.9	19	6.3
Sunbathing	37	6.2	25	5.8	9	5.2	71	5.9	2	1.2	-	-	-	-	2	0.7
Aesthetic Beauty	19	3.2	19	4.4	13	7.6	51	4.3	4	2.4	-	-	3	4.4	7	2.3
Motor Boating	31	5.2	18	4.2	5	2.9	54	4.5	3	1.8	1	1.4	-	-	4	1.3
Picnicking	155	26.1	114	26.5	21	12.2	290	24.2	9	5.5	8	11.4	2	2.9	19	6.3
Fishing	30	5.1	4	0.9	8	4.7	42	3.5	17	10.3	4	5.7	7	10.1	28	9.2
Hot Springs	1	0.2	-	-	2	1.2	3	0.3	3	1.8	1	1.4	-	-	4	1.3
Canoeing	12	2.0	11	2.6	3	1.7	26	2.2	1	0.6	1	1.4	-	-	2	0.7
Water-skiing	10	1.7	7	1.6	-	-	17	1.4	-	-	-	-	-	-	-	-
Hiking, Walking[2]	6	1.0	1	0.2	2	1.2	9	0.8	17	10.3	13	18.6	6	8.7	36	11.8
Photography	-	-	-	-	1	0.6	1	0.1	-	-	-	-	-	-	-	-
Rest Activities[3]	7	1.2	9	2.1	16	9.3	32	2.7	40	24.3	20	28.6	33	47.8	93	30.6
Rubber Dinghy, Kayak	2	0.3	-	-	-	-	2	0.2	-	-	-	-	-	-	-	-
Sailing	1	0.2	4	0.9	-	-	5	0.4	-	-	-	-	-	-	-	-
Social	3	0.5	8	1.9	1	0.6	12	1.0	7	4.2	3	4.3	-	-	10	3.3
Business	1	0.2	-	-	2	1.2	3	0.3	3	1.8	-	-	1	1.5	4	1.3
TOTAL	594	100.0	431	100.0	172	100.0	1,197	100.0	165	100.0	70	100.0	69	100.0	304	100.0

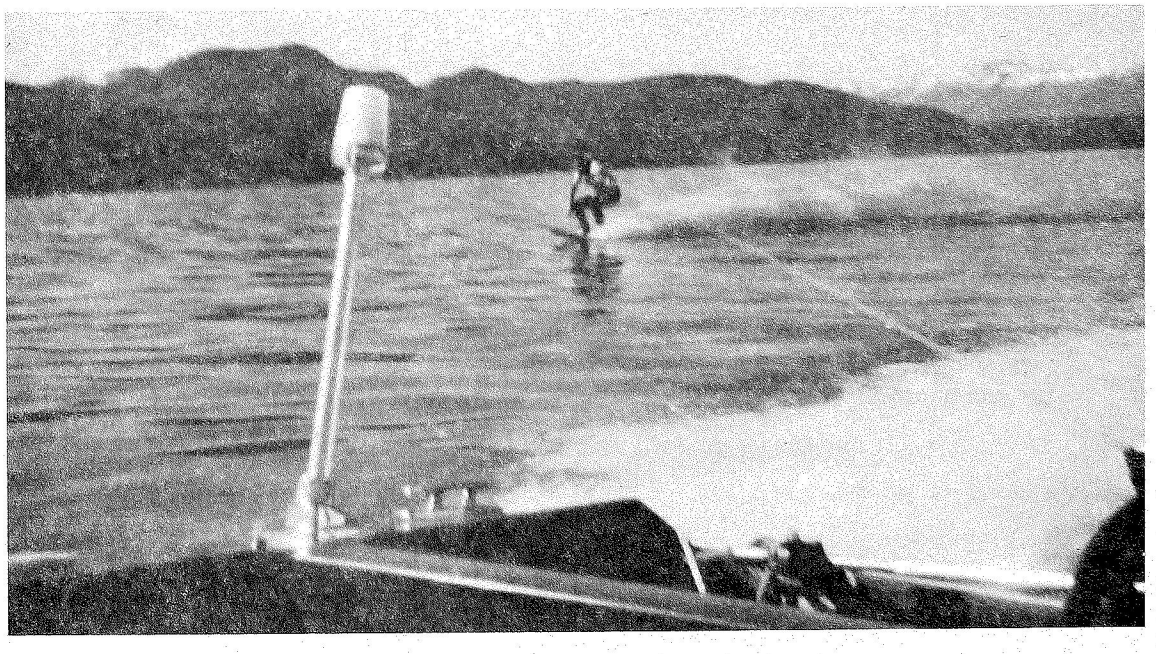
1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.

serve as comparatively important reasons why both residents and non-residents visit Lakelse Lake. However, it is obvious that some activities are important to residents and of absolutely no importance to non-residents while some activities are important to non-residents and of no importance to residents. Canoeing and water-skiing attract some resident visitors to the lake but do not appear to attract non-residents. By the same token, rest or vacation stops appear very important to non-residents and of no importance to resident visitors. It is also interesting to note that the main reasons given for visiting Lakelse Lake do not appear to provide an accurate indication of how visitors will allocate their time once in the area. For example, camping accounted for only 8.2 percent of the total number of hours residents stated that they spend at Lakelse Lake participating in some leisure-time activity (shown in Table 2:15) but accounted for 19.7 percent of the total reasons why residents visit the lake. These are important considerations to keep in mind when contemplating future development of the lake.



Water-Skiing - Lakelse Lake

Perhaps the best indication of how important Lakelse Lake is as a recreational area is revealed in Table 2:17. Table 2:17 shows the number and percentage of Lakelse Lake property owners by permanent place of residence and reason for purchasing Lakelse Lake property. Over 80 percent of Terrace residents, 88.6 percent of Kitimat residents and 90 percent of Prince Rupert residents who own Lakelse Lake property purchased their property primarily for leisure, recreational or retirement purposes. Only a very small percentage of individuals purchased Lakelse Lake property for either business or investment reasons. Thus, it is not unreasonable to assume that the market value of Lakelse Lake property is primarily determined by its attractiveness as a recreational or retirement area.

Summary

Information presented in this chapter has revealed that Lakelse Lake is an extremely important recreational area for residents of the Prince Rupert-Kitimat Region. During 1973, nearly 88 percent of Terrace households, 82 percent of Kitimat households and slightly over 54 percent of Prince Rupert households visited Lakelse Lake for recreational purposes. This, in turn, implies that residents of the Prince Rupert-Kitimat Region enjoyed in excess of 800,000 leisure days or greater than 3,706,000 leisure activity hours during 1973. Most recreational activities took place during the summer months. Approximately 88 percent of all visits to Lakelse Lake took place during June, July, August or September.

The Lakelse Lake area is also an important camping or resting place for non-residents during the summer. Nearly 6,000 non-resident parties visited Lakelse Lake during 1973. Non-residents accounted for over 31,000 leisure activity days or over 100,000 leisure activity hours during the summer of 1973. Unlike their resident counterparts, non-resident visitors to the lake usually used Lakelse Lake facilities during

TABLE 2:17

NUMBER AND PERCENTAGE OF LAKELSE LAKE PROPERTY OWNERS BY PERMANENT PLACE OF RESIDENCE AND REASON FOR PURCHASING LAKE PROPERTY

Reason For Purchase	Terrace		Kitimat		Prince Rupert		Lakelse Lake		Non-Residents		Total Area	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Leisure	42	42.4	21	47.7	19	63.3	2	3.8	13	39.4	97	37.6
Recreation	28	28.3	16	36.4	5	16.7	6	11.5	8	24.2	63	24.4
Business	1	1.0	-	-	-	-	4	7.7	-	-	5	1.9
Investment	7	7.1	3	6.8	2	6.7	2	3.8	4	12.1	18	7.0
Residence	10	10.1	2	4.5	1	3.3	31	59.6	1	3.0	45	17.4
Retirement	11	11.1	2	4.5	3	10.0	7	13.5	7	21.2	30	11.6
TOTAL	99	100.0	44	100.0	30	100.0	52	100.0	33	100.0	258	100.0

the day as a resting or recreational area. Non-resident visitors made less use of overnight facilities than resident visitors.

Socio-economic information provided in this chapter indicates that younger members of the population tend to make greater use of Lakelse Lake than do their older counterparts. Older members of the population appear to make greater use of the lake during weekdays while younger individuals use the lake during weekends. With the exception of Lakelse Lake property owners, it appears that persons from every income level and every occupation category make use of Lakelse Lake. Moreover, in the absence of evidence indicating otherwise, it would appear that the income and occupational distribution of users of the lake probably reflects the income and occupational distribution of the general population.

Both residents and non-residents tend to use the Lakelse Lake area for a wide range of leisure-time activities. Camping, swimming, sunbathing, picnicking and fishing are popular leisure-time activities among both resident and non-resident visitors to the lake. However, a careful comparison of reasons given for visiting Lakelse Lake by both residents and non-residents reveals that there are a number of activities which are more important to residents than to non-residents and also a number of activities which are more important to non-residents than to residents. Canoeing and water-skiing attract some resident visitors to the lake but these activities do not appear to attract non-residents. Resting is a very important reason why non-residents visit the lake. The greatest proportion of all Lakelse Lake property owners purchased their property for recreational or leisure purposes. This provides some indication of how important Lakelse Lake is as a recreational area.

CHAPTER THREE

THE ECONOMIC IMPORTANCE OF LAKELSE LAKE RECREATIONAL OR LEISURE ACTIVITIES TO THE PEOPLE OF BRITISH COLUMBIA

In the previous two chapters it was established that Lakelse Lake provides both resident and non-resident populations with a number of commercial and recreational opportunities. These opportunities, whether commercial or recreational, resident or non-resident, are socially and economically valuable to the people of British Columbia. In this chapter an economic assessment of the recreational and leisure opportunities provided by Lakelse Lake is undertaken. Further, residents' opinions and attitudes towards the recreational aspects of Lakelse Lake are assessed with the intention of giving a clear understanding of how residents rate their Lakelse Lake recreational experience relative to all other leisure activities available to them.

Methods of Establishing the Economic Benefits of Outdoor Recreation

The rapidly increasing number of resource conflicts that arise between recreation and other competing demands in rural areas has led to the development of several different methods of assigning monetary values to non-priced resources. A series of methods such as the "cost method", the "value added method", the "travel cost method" and the "willingness to pay method" have been developed and tested for validity.[1] Most of these methods have involved establishing a hypothetical price for access to recreational facilities where there is no charge. As a consequence, economists have attempted to develop proxies which would indicate the price users would pay given the conventional market mechanism. Yet, no method has generally been accepted as valid for establishing the value

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1 W. R. D. Sewell and John Rostron, Recreational Fishing Evaluation, Department of Fisheries and Forestry, Ottawa, February 1970, pp. 5-21.

of recreation in all circumstances.[2] This is because the method accepted as suitable for assessing the economic value of one type of resource is not necessarily suitable for another type of resource. Perhaps, the most widely accepted evaluation technique - and the one most frequently used in British Columbia and the Yukon to assess the economic importance of recreational resources - is the expenditure method approach.[3] This approach is based on two assumptions: (a) the value of recreation is worth at least as much as the recreationalist's total expenditures associated with the pursuit of the activities; and (b) the amount spent for recreation is determined by free choice over other alternatives where they would otherwise spend or save their money.[4] In

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2 The reader will recognise the two extremes taken by those who automatically refute all attempts to estimate the worth of recreational resources. At one extreme, there are those who believe that recreational values are priceless, that recreation is an aesthetic pursuit having unique personal and spiritual values and that economic worth implies commercialism designed to serve only mass tastes. At the other extreme, there are those who believe that anyone attempting to measure the economic importance of recreation is a quack or an unrealistic romantic who is trying to use economic arguments to stop "real" development and progress.

3 Peter H. Pearse and Gary Bowden, Big Game Hunting in the East Kootenay: A Statistical Analysis, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1966, Study Report No. 1; G. Bowden and P. H. Pearse, Non-Resident Big Game Hunting and the Guiding Industry in British Columbia: An Economic Study, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1968, Study Report No. 2; Peter H. Pearse and Michael E. Laub, The Value of the Kootenay Lake Sport Fishery: An Economic Analysis, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1969, Study Report No. 3; Pearse Bowden Economic Consultants, The Value of Non-Resident Sport Fishing in British Columbia, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1970, Study Report No. 4; Pearse Bowden Economic Consultants, The Value of Fresh Water Sport Fishing in British Columbia, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1971, Study Report No. 5; Pearse Bowden Economic Consultants, The Value of Resident Hunting in British Columbia, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1971, Study Report No. 6; also William F. Sinclair and Obert Sweitzer, The Economic Value of the Yukon Sport Fishery, Department of the Environment, Fisheries and Marine Service, Northern Operations Branch, Economics Unit, Vancouver, 1973.

4 Sewell and Rostron, op. cit., p. 7.

other words, it is implicitly assumed within this methodology that, where people choose to spend money on a particular recreational activity, the value of the activity is at least as high as the value of other goods and services that would have been purchased with the same amount of money.[5] The logical soundness of this approach, more than anything else, probably leads to its widespread application. It does have, however, one serious shortcoming. The expenditure method is not suitable for measuring primary or direct benefits which stem directly from participation in a particular recreational activity. It is useful only for measuring the value of secondary or indirect benefits which accrue to local residents because of non-resident participation in local recreational resources.[6] As already established in Chapter Two, Lakelse Lake is used primarily by residents of the Prince Rupert-Kitimat Region. Therefore, the expenditure method is not suitable for assessing the economic value of Lakelse Lake.

The Methodological Framework Chosen for This Study

The evaluation method used in this paper is based on the consumer surplus approach developed by Peter H. Pearse.[7] This approach estimates what the consumer is willing to pay for the opportunity to participate in a particular free recreational activity. The Pearse method has a number of obvious advantages which make it suitable for assessing the economic value of Lakelse Lake. It permits the development of consistent values without adopting the hypothetical questions approach used in other studies.[8] It permits the researcher to avoid the

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5 J. A. Crutchfield, "Valuation of Fishery Resources", Land Economics, 1962, vol. 38, p. 148.

6 For a brief explanation of direct or primary benefits and indirect or secondary benefits see Sinclair and Sweitzer, op. cit., pp. 47-50.

7 Peter H. Pearse, "A New Approach to Evaluation of Non-Priced Recreational Resources", Land Economics, 1968, vol. 44, pp. 87-99.

8 Peter H. Pearse and Gary Bowden, Big Game Hunting in the East Kootenay: A Statistical Analysis, Department of Recreation and Conservation, Fish and Wildlife Branch, Victoria, B. C., 1966, Study Report No. 1.

necessity of having to identify and quantify all the variables that are likely to influence demand for a particular recreational opportunity. Further, it avoids the use of some of the restrictive assumptions used in alternative approaches.[9]

While there are a number of advantages to the Pearse consumer surplus approach, there are also disadvantages.[10] One of these is the controversy which surrounds the concept of economic consumer surplus.[11] Consumer surplus is the amount which the consumer is willing to pay for a particular good or service over and above the price necessary to purchase that good or service. The value of a free good or service, accordingly, is precisely the total amount of consumer surplus accruing to the public as a result of using that particular free good or service. The concept of economic surplus is now more widely accepted as a useful tool in economics than in the past. The analysis conducted in this presentation adheres to the view that although economic surplus is a crude concept, it is a valuable tool in economics.[12] Perhaps the most serious shortcoming of the Pearse consumer surplus approach is the technique's premise that all recreationalists within a given income group are equally willing to pay for the opportunity to participate in a particular recreational activity. This, as Pearse has noted himself, is excessively arbitrary because of the likelihood that there will be a widespread difference in consumer preference.[13] Still another short-

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9 For example, it is implied in the expenditure method approach that if a particular recreational activity is lost to a region, expenditures formally made on this particular recreational activity would not be directed to other goods and services in that same region.

10 William G. Brown and Farid Nawas, "'A New Approach to the Evaluation of Non-Priced Recreational Resources': A Reply", Land Economics, 1972, vol. 48, pp. 403-405.

11 J. M. Currie, J. A. Murphy and A. Schmitz, "The Concept of Economic Surplus and Its Use in Economic Analysis", The Economic Journal, 1971, vol. 81, pp. 741-791.

12 This is a view which appears to be consistent with the opinions of Currie, Murphy and Schmitz, loc. cit.

13 Peter Pearse, "'A New Approach to the Evaluation of Non-Priced Recreational Resources': Rejoinder", Land Economics, 1972, vol. 48, p. 407.

coming is the charge that the Pearse approach does not capture the non-monetary costs associated with outdoor activities, such as choosing how to allocate limited time and the discomforts of travel. This, however, is a shortcoming that is inherent to most of the existing economic evaluation techniques.

In this presentation, these problems are reduced to some extent by stratifying Lakelse Lake visitors into six different income groups, into day and overnight categories and then, separating each recreational party into five different resident classifications. The consumer surplus for each of these six groups - referred to as Disaggregation Method 1 - was identified using the procedure adopted by Pearse in his introductory article.[14] This, however, created a procedural problem. The sample size in some categories was found to be too small. Thus, consumer surpluses were also calculated using what is referred to as Aggregation Method 2 which does not distinguish between resident categories. It is expected that the values calculated using Disaggregation Method 1 suffer from sample size problems, and as a consequence, probably underestimate the consumer surplus generated within certain income categories. On the other hand, Aggregation Method 2 avoids the sample size problem but probably overestimates the value of the consumer surplus generated within each income group because it fails to take sufficient account of differences in consumer preferences amongst recreationalists visiting from different geographical locations.[15] A "best estimate" value calculation is used as a compromise which helps to avoid the extremes created by these two biases.

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14 Peter Pearse, loc. cit.

15 It would seem rather obvious that the further an individual lives from Lakelse Lake the more likely it is that he will have acceptable recreational alternatives to the opportunities provided by Lakelse Lake. Thus, he would value the opportunities provided by Lakelse Lake less than those living closer who do not have similar opportunity alternatives.

The Value of Free Recreational Opportunities Provided by Lakelse Lake

One advantage of using Disaggregation Method 1 to calculate the value of Lakelse Lake recreational or leisure-time opportunities is that the value of these opportunities to residents of each geographic location can be shown. Tables 3:1, 3:2 and 3:3 show, respectively, the total and average consumer surplus enjoyed by residents of Terrace, Kitimat and Prince Rupert during 1973. Table 3:1 shows that the average consumer surplus enjoyed by residents of Terrace because of recreational opportunities provided by visiting Lakelse Lake during the day amounted to $27.50 per party-day. The total consumer surplus enjoyed by Terrace residents who visited Lakelse Lake during the day during 1973 amounted to $885,600. This table also reveals that overnight visitors, with an average consumer surplus of $24.80, valued Lakelse Lake facilities less than day visitors. The total consumer surplus provided by Lakelse Lake recreational facilities during 1973 to residents of Terrace amounted to $2,631,800. Similarly, according to Tables 3:2 and 3:3, Kitimat and Prince Rupert residents, respectively, enjoyed a total consumer surplus of $968,500 and $1,509,800 during 1973 as a result of recreational and leisure opportunities provided by Lakelse Lake.

Table 3:4 shows the total and average consumer surplus enjoyed by Canadian non-residents as a result of the recreational opportunities provided by Lakelse Lake during 1973. According to Table 3:4, Canadian non-resident day visitors enjoyed consumer surplus amounting to $83,700 and overnight visitors enjoyed consumer surplus worth $78,400. The total consumer surplus provided to Canadian non-residents as a result of visiting Lakelse Lake during 1973 for recreational purposes amounted to $162,100.

Table 3:5 shows the total and average consumer surplus enjoyed by non-Canadians as a result of participating in recreational or leisure opportunities provided by Lakelse Lake during 1973. The data presented

TABLE 3:1

TOTAL AND AVERAGE CONSUMER SURPLUS ENJOYED BY RESIDENTS OF TERRACE AS A RESULT OF VISITING LAKELSE LAKE - 1973

(Disaggregation Method 1)

	Day Visitors			Overnight Visitors			
Income Category	Total No. Party Visitor Days*	Avg. Consumer Surplus $	Total Consumer Surplus** $	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus** $	Total Consumer Surplus** $
Under $5,000	1,097	3.0	3,300	4,159	4.7	19,500	22,800
$5,000 - $9,999	9,483	27.3	258,900	11,909	45.5	541,900	800,700
$10,000 - $14,999	14,387	32.9	473,300	39,384	23.0	905,800	1,379,200
$15,000 - $19,999	5,451	21.7	118,300	10,145	12.2	123,800	242,100
$20,000 and Over	1,807	17.6	31,800	4,790	32.4	155,200	187,000
TOTAL	32,225	27.5	885,600	70,387	24.8	1,746,200	$2,631,800

* Includes winter visits.

** Rounded to nearest $100.

TABLE 3:2

TOTAL AND AVERAGE CONSUMER SURPLUS ENJOYED BY RESIDENTS OF KITIMAT AS A RESULT OF VISITING LAKELSE LAKE - 1973

(Disaggregation Method 1)

Income Category	Day Visitors			Overnight Visitors			Total Consumer Surplus*
	Total No. Party Visitor Days	Avg. Consumer Surplus	Total Consumer Surplus*	Total No. Party Visitor Days	Avg. Consumer Surplus	Total Consumer Surplus*	
		$	$		$	$	$
Under $5,000	234	4.0	900	596	1.0	600	1,500
$5,000 - $9,999	3,048	17.6	53,600	3,286	34.8	114,400	168,000
$10,000 - $14,999	7,268	22.5	163,500	21,470	19.3	414,400	577,900
$15,000 - $19,999	2,579	16.1	41,500	4,162	36.9	153,600	195,100
$20,000 and Over	1,524	8.5	13,000	1,785	7.3	13,000	26,000
TOTAL	14,653	18.6	272,500	31,299	22.2	696,000	$968,500

* Rounded to nearest $100.

TABLE 3:3

TOTAL AND AVERAGE CONSUMER SURPLUS ENJOYED BY RESIDENTS OF PRINCE RUPERT AS A RESULT OF VISITING LAKELSE LAKE - 1973

(Disaggregation Method 1)

	Day Visitors			Overnight Visitors			
Income Category	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total Consumer Surplus* $
Under $5,000	150	15.0	2,300	730	15.5	11,300	13,600
$5,000 - $9,999	752	2.8	2,100	4,060	26.9	109,200	111,300
$10,000 - $14,999	2,257	75.5	170,400	12,176	81.3	989,900	1,160,300
$15,000 - $19,999	903	24.5	22,100	4,790	30.8	147,500	169,600
$20,000 and Over	451	2.0	900	1,839	29.4	54,100	55,000
TOTAL	4,513	43.8	197,800	23,595	56.1	1,312,000	$1,509,800

* Rounded to nearest $100.

TABLE 3:4

TOTAL AND AVERAGE CONSUMER SURPLUS ENJOYED BY CANADIAN NON-RESIDENTS AS A RESULT OF VISITING LAKELSE LAKE - 1973

(Disaggregation Method 1)

	Day Visitors			Overnight Visitors			
Income Category	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total Consumer Surplus* $
Under $5,000	711	21.6	15,400	51	12.0	600	16,000
$5,000 - $9,999	1,335	15.0	20,000	527	33.2	17,500	37,500
$10,000 - $14,999	1,693	23.9	40,500	924	30.5	28,200	68,600
$15,000 - $19,999	358	8.0	2,900	373	49.6	18,500	21,400
$20,000 and Over	266	18.5	4,900	270	50.5	13,600	18,600
TOTAL	4,363	19.2	83,700	2,145	36.6	78,400	$162,100

* Rounded to nearest $100.

TABLE 3:5

TOTAL AND AVERAGE CONSUMER SURPLUS ENJOYED BY NON-CANADIANS AS A RESULT OF VISITING LAKELSE LAKE - 1973

(Disaggregation Method 1)

	Day Visitors			Overnight Visitors			
Income Category	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total Consumer Surplus* $
Under $5,000	88	0	0	40	5.7	200	200
$5,000 - $9,999	88	0	0	187	13.2	2,500	2,500
$10,000 - $14,999	441	6.0	2,600	187	15.9	2,500	5,100
$15,000 - $19,999	0	0	0	106	25.0	2,700	2,700
$20,000 and Over	0	0	0	240	43.0	10,300	10,300
TOTAL	617	4.3	2,600	760	24.4	18,200	$20,800

* Rounded to nearest $100.

in this table, once again, shows the minor importance of Lakelse Lake to non-Canadians. The total consumer surplus provided to non-Canadians by recreational opportunities on Lakelse Lake during 1973 amounted to $20,800.

Disaggregation Method 1 was also used to calculate the value of Lakelse Lake recreational pastimes to Lakelse Lake property owners during 1973. However, in this case, the data was adjusted to calculate the total cost per recreational day for each individual property owner who lived there only on a seasonal basis.[16] This was accomplished by taking 8 percent of the market value of the property as the opportunity costs of owning Lakelse Lake property, adding yearly taxes and yearly maintenance costs and dividing these costs by the average number of days the property owner stated he used the property for recreational purposes. The results of these calculations are shown in Table 3:6 which indicates the total and average consumer surplus enjoyed by Lakelse Lake property owners as a result of participating in recreational opportunities provided by Lakelse Lake during 1973. The information shown in Table 3:6 indicates that Lakelse Lake property owners enjoyed $322,100 worth of consumer surplus during 1973.

Consumer surplus calculations using Aggregation Method 2 are provided in Table 3:7. Table 3:7 shows the total and average consumer surplus enjoyed by residents of the Prince Rupert-Kitimat Region as a result of participation in Lakelse Lake recreation or leisure-time activities during 1973. As expected, the consumer surplus calculations using Aggregation Method 2 are considerably higher than those which were generated using Disaggregation Method 1. Resident day visitors to Lakelse Lake during 1973 enjoyed an average consumer surplus of $66.30. Resident overnight visitors enjoyed an average consumer surplus of

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16 It was assumed that those who permanently reside on their Lakelse Lake property own their property solely for a place to live and not as a recreational retreat. It was also assumed that all of the seasonal owners bought their property for recreational purposes (see Table 2:17).

TABLE 3:6

TOTAL AND AVERAGE CONSUMER SURPLUS[1] ENJOYED BY LAKELSE LAKE PROPERTY OWNERS

AS A RESULT OF LAKELSE LAKE RECREATIONAL PASTIMES - 1973

(Lakelse Lake Property Owners Who Reside at Lakelse on a Seasonal Basis)

(Disaggregation Method 1)

	Terrace			Kitimat			Prince Rupert			Canadian Non-Resident			
Income Category	Total Days Per Year	Average Consumer Surplus* $	Total Consumer Surplus* $	Total Days Per Year	Average Consumer Surplus* $	Total Consumer Surplus* $	Total Days Per Year	Average Consumer Surplus* $	Total Consumer Surplus* $	Total Days Per Year	Average Consumer Surplus* $	Total Consumer Surplus* $	Total Consumer Surplus* $
Under $5,000	68	0	0	0	0	0	0	0	0	234	0	0	0
$5,000 - $9,999	1,208	55.2	66,700	160	4.5	700	341	7.0	2,400	236	11.5	2,700	72,500
$10,000 - $14,999	1,767	49.9	88,200	476	29.6	14,100	500	36.3	18,200	115	3.0	300	120,800
$15,000 - $19,999	662	60.8	40,300	323	11.8	3,800	846	56.9	48,100	35	0	0	92,200
$20,000 and Over	284	67.3	19,100	576	17.0	9,800	625	12.3	7,700	0	0	0	36,600
TOTAL	3,989	53.7	214,300	1,535	18.5	28,400	2,312	33.0	76,400	620	4.9	3,000	$322,100

1 Cost Per Recreational Day = $\frac{8\% \times \text{Market Value} + \text{Yearly Taxes} + \text{Yearly Maintenance}}{\text{Days Used Per Year}}$

* Rounded to nearest $100.

TABLE 3:7

TOTAL AND AVERAGE CONSUMER SURPLUS ENJOYED BY RESIDENTS OF THE PRINCE RUPERT-KITIMAT REGION AS A RESULT OF VISITING LAKELSE LAKE - 1973

(Aggregation Method 2)

	Day Visitors			Overnight Visitors			
Income Category	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total No. Party Visitor Days	Avg. Consumer Surplus $	Total Consumer Surplus* $	Total Area Consumer Surplus* $
Under $5,000	1,678	32.6	54,700	5,485	32.9	180,500	235,200
$5,000 - $9,999	13,397	27.4	367,100	19,255	43.1	829,900	1,197,000
$10,000 - $14,999	23,564	110.1	2,594,400	73,030	87.3	6,375,500	8,969,900
$15,000 - $19,999	9,073	35.2	319,400	19,097	35.5	677,900	997,300
$20,000 and Over	3,678	19.8	72,800	8,414	33.2	279,300	352,200
TOTAL	51,390	66.3	3,408,400	125,281	66.6	8,343,100	$11,751,600

*Rounded to nearest $100.

$66.60. The total consumer surplus generated for residents of the Prince Rupert-Kitimat Region as a result of their visits to Lakelse Lake during 1973 amounted to $11,751,600.

Table 3:8 summarises the consumer surplus values for each income category using both the Disaggregation Method 1 and the Aggregation Method 2 techniques. It also provides a best estimate of annual benefits generated within each income category. This table shows that when using Disaggregation Method 1 it is estimated that residents enjoyed total annual benefits worth $5,432,200 as a result of visiting Lakelse Lake during 1973. Further, it shows that when using Aggregation Method 2 residents enjoyed $11,751,600 as a result of visiting Lakelse Lake. Finally, Table 3:8 shows that the best single estimate of the worth of the total annual benefits provided to residents of the Prince Rupert-Kitimat Region as a result of participating in Lakelse Lake recreational or leisure-time activities is $5,848,600.

Table 3:9 shows that the present discounted value of the stream of annual benefits to residents of the Prince Rupert-Kitimat Region (identified in Table 3:8) and to non-resident Canadians as a result of recreational opportunities provided by Lakelse Lake is $101,641,000. The present discounted values are based on the assumption that recreational benefits will continue to be generated in future years as they were during 1973. It also assumes that participation in Lakelse Lake recreational facilities will increase at 10 percent per year to the year 1981, at 2 percent per year for the period 1981 to 1990 and experience no growth in participation for the years 1991 to 2000. Further, it is assumed that as the recreational pressure increases on Lakelse Lake the quality of the recreational experience, thus the value to the individual recreationalist, will decline. For this reason, an 8 percent discount rate is used to the year 1981, a 10 percent discount rate is used for the period 1981 to 1990 and a 12 percent discount rate is used from 1991

TABLE 3:8

TOTAL DIRECT ANNUAL BENEFITS TO RESIDENTS OF
PRINCE RUPERT-KITIMAT REGION FROM VISITING LAKELSE LAKE - 1973

Income Category	Disaggregation Method 1 $	Aggregation Method 2 $	Best Estimate $
Under $5,000	37,900	235,200	235,200
$5,000 - $9,999	1,152,500	1,197,000	1,174,750
$10,000 - $14,999	3,238,200	8,969,900	3,238,200
$15,000 - $19,999	699,000	997,300	848,200
$20,000 and Over	304,600	352,200	352,200
TOTAL	$5,432,200	$11,751,600	$5,848,600

* Rounded to nearest $100.

TABLE 3:9

TOTAL PRESENT DISCOUNTED VALUE (TO THE YEAR 2000) OF DIRECT ANNUAL BENEFITS TO RESIDENTS OF THE PRINCE RUPERT-KITIMAT REGION AND CANADA AS A RESULT OF THE RECREATIONAL OPPORTUNITIES PROVIDED BY LAKELSE LAKE - 1973

	Direct Benefits $	Present Discounted Value $
Prince Rupert-Kitimat Region	5,848,600	98,900,000
Non-Resident Canadians	162,100	2,741,000
TOTAL	$6,010,700	$101,641,000

to the year 2000.[17]

The direct or primary benefits provided by non-residents because of visiting Lakelse Lake are of little consequence to residents of British Columbia or Canada. The consumer surplus or values accruing to non-residents would not be considered a benefit by local management authorities and, depending upon the attitudes of local residents, may detract from their enjoyment of Lakelse Lake recreational activities. Nonetheless, residents do enjoy some secondary benefits as a result of non-resident participation in locally identified recreational resources. For example, non-residents will spend some money on gasoline, transportation or other locally produced goods and services as a result of visiting Lakelse Lake. This, in turn, will create some minimal amount of local income and employment. Thus, one measure of Lakelse Lake's importance to residents of the Prince Rupert-Kitimat Region and British Columbia is the amount of business profit and the number of jobs generated by expenditures on Lakelse Lake recreational activities. However, it was easily established that the benefits generated in this manner were rather minimal and unimportant. Lakelse Lake is primarily used by residents of the Prince Rupert-Kitimat Region. For this reason precise calculation of indirect benefits is not made. Nonetheless, it is interesting to note that non-residents did spend some money in the region as a result of visiting Lakelse Lake during 1973. Table 3:10 shows the total and average non-resident expenditures made in the Prince Rupert-Kitimat Region as a result of visits made to Lakelse Lake.[18] It shows that British Columbia non-resident parties spent an average of $51.60 per visit for a total expenditure of $294,000; it shows that Canadian non-British Columbian parties spent an average of $60.20 per visit for a total expenditure of $193,400; it shows that non-Canadian parties

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17 Some of the complications which are implicit in the discounted value technique were discussed in Chapter One when information on the economic value of Lakelse Lake's commercial fishery was presented.

18 Non-resident expenditures directly attributable to the existence of Lakelse Lake were identified by asking non-resident visitors to indicate how much longer they stayed in the region because of Lakelse Lake. Expenditures made during the extra stay period were attributed to Lakelse Lake.

TABLE 3:10

TOTAL NON-RESIDENT EXPENDITURES IN PRINCE RUPERT-KITIMAT REGION ATTRIBUTABLE TO LAKELSE LAKE RECREATIONAL EXPERIENCE - 1973

	Avg. Expenditures Per Party Attributable to Lakelse $	Total Number Party Visits	Total Expenditures Attributable to Lakelse* $
B. C. Non-Resident	51.60	5,699	294,000
Canadian Non-B. C.	60.20	3,213	193,400
Non-Canadian	62.90	2,716	170,800
TOTAL	56.60	11,628	$658,200

* Rounded to nearest $100.

spent an average of $62.90 per visit for a total expenditure of $170,800. It is also interesting to note from the data presented in Table 3:10 that non-Canadian visitors tend to spend more per visit than British Columbian non-resident visitors or Canadian non-British Columbians.

The Importance of Lakelse Lake Recreational or Leisure Activities Relative to Other Alternatives

The importance of Lakelse Lake recreational activities is also revealed in the lack of suitable alternative family recreational facilities available to residents of the Prince Rupert-Kitimat Region. For example, most other lakes in the area provide fishing opportunities but are cold water lakes not ideally suited for swimming, water-skiing or other related activities. Furthermore, until recently, they have not been accessible to the vast majority of the resident population. Kitsumkalum Lake is accessible by aircraft or by travelling over a restricted road and is 19 miles from Terrace. Meziaden Lake is approximately 150 miles from Terrace and is accessible only over a very rough road. Kitwanga Lake is about 77 miles from Terrace and Prudhomme Lake is 89 miles from Terrace. Thus, the family recreational opportunities provided by Lakelse Lake to residents of the Prince Rupert-Kitimat Region are somewhat unique and not readily available in other locations within the region.

In an effort to capture the comparative importance of Lakelse Lake, resident visitors to the lake were asked to select one of six categories indicating their opinion on the importance of Lakelse Lake. Table 3:11 provides a breakdown of the information gathered in this manner by permanent place of residence. More than 73 percent of all Terrace visitors considered Lakelse Lake either extremely important or very important, 4 percent considered it only of slight importance and no one indicated that it was not important. Similarly, more than 70 percent of Kitimat visitors indicated that they felt that Lakelse Lake was

TABLE 3:11

INDICATED IMPORTANCE OF LAKELSE LAKE TO RESIDENTS OF THE AREA ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

	Terrace		Kitimat		Prince Rupert		Lakelse		Total Residents	
	No.	%	No.	%	No.	%	No.	%	No.	%
Extremely Important	118	36.5	92	38.3	27	27.8	3	75.0	240	36.1
Very Important	119	36.8	78	32.5	31	32.0	1	25.0	229	34.5
Important	37	11.5	23	9.6	17	17.5	-	-	77	11.6
Moderately Important	35	10.8	32	13.3	12	12.4	-	-	79	11.9
Slightly Important	13	4.0	15	6.3	10	10.3	-	-	38	5.7
Of No Importance	-	-	-	-	-	-	-	-	-	-
No Response	1	0.3	-	-	-	-	-	-	1	0.2
TOTAL	323	100.0	240	100.0	97	100.0	4	100.0	664	100.0

either extremely important or very important. Understandably, Prince Rupert residents did not rate Lakelse Lake as highly as Terrace or Kitimat residents. Nonetheless, nearly 60 percent of all Prince Rupert visitors considered it either extremely important or very important.

Table 3:12 shows the indicated importance of Lakelse Lake to residents of the area according to household income. The data presented in this table reveals that Lakelse Lake is held in equally high regard by all income categories.

Still another indication of how important Lakelse Lake is to residents and non-residents is provided in Table 3:13. Table 3:13 indicates which amenities residents and non-residents found least available to them in the Prince Rupert-Kitimat Region. Over 31 percent of all Terrace visitors to Lakelse Lake during 1973 indicated that a swimming pool and swimming instruction were the leisure-time activities least available to them as residents of the region. Kitimat residents appeared mostly to be concerned with the lack of skiing facilities and lack of night life activities. Prince Rupert residents mostly appeared to be concerned with the lack of camping, picnic and beach facilities and the lack of an arena or gymnasium. Non-resident visitors to the area also were concerned with the lack of camping, picnic and beach facilities and with a lack of boat rental facilities. A substantial number of individuals among both residents and non-residents indicated that they were new in the area.

Summary

In this chapter it was noted that there are many different methods of establishing the economic value of outdoor recreational benefits. However, the one considered most suitable for determining the economic importance of Lakelse Lake is the Pearse consumer surplus method. Using this method it was established that a conservative esti-

TABLE 3:12

INDICATED IMPORTANCE OF LAKELSE LAKE TO RESIDENTS OF THE AREA

ACCORDING TO HOUSEHOLD INCOME - 1973

	Under $3,000		$3,000 - $4,999		$5,000 - $9,999		$10,000 - $14,999		$15,000 - $19,999		$20,,000 And Over		Income Unknown		Total Residents	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Extremely Important	4	26.7	2	40.0	31	24.8	127	38.7	34	33.3	19	42.2	23	52.3	240	36.1
Very Important	5	33.3	3	60.0	47	37.6	117	35.7	37	36.3	11	24.4	9	20.4	229	34.5
Important	4	26.7	-	-	21	16.8	30	9.1	11	10.8	6	13.3	5	11.4	77	11.6
Moderately Important	1	6.6	-	-	18	14.4	36	11.0	13	12.7	7	15.6	4	9.1	79	11.9
Slightly Important	-	-	-	-	8	6.4	18	5.5	7	6.9	2	4.4	3	6.8	38	5.7
No Response	1	6.6	-	-	-	-	-	-	-	-	-	-	-	-	1	0.2
TOTAL	15	100.0	5	100.0	125	100.0	328	100.0	102	100.0	45	100.0	44	100.0	664	100.0

TABLE 3:13

LEISURE-TIME ACTIVITIES RESIDENTS AND NON-RESIDENTS

INDICATED AS LEAST AVAILABLE IN REGION - 1973

	Resident								Non-Resident							
	Terrace		Kitimat		Prince Rupert		Total Resident		B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Arena or Gymnasium	22	4.2	15	4.8	3	22.5	40	4.2	1	0.6	-	-	-	-	1	0.3
Swimming Pool, Instruction	163	31.1	6	1.9	8	6.5	177	18.4	8	5.2	3	3.4	2	2.7	13	4.1
Camp, Picnic and Beach Facilities	14	2.7	25	7.9	30	24.6	69	7.2	6	3.9	5	5.6	8	10.8	19	6.0
Horseback Riding	4	0.8	2	0.6	3	2.4	9	0.9	1	0.6	4	4.5	1	1.3	6	1.9
Playgrounds, Municipal Parks	59	11.3	8	2.5	8	6.5	75	7.8	4	2.6	3	3.4	-	-	7	2.2
Ice and Roller Skating	11	2.1	9	2.9	3	2.5	23	2.4	-	-	-	-	-	-	-	-
Youth - Dances, Concerts	25	4.8	23	7.3	2	1.6	50	5.2	-	-	-	-	-	-	-	-
"Night Life" (Liquor outlets, dancing, etc.)	11	2.1	34	10.8	-	-	45	4.7	5	3.3	6	6.7	4	5.4	15	4.7
Golf Course	1	0.2	2	0.6	-	-	3	0.3	1	0.6	1	1.1	-	-	2	0.6
Civic Centre, Auditorium	23	4.4	8	2.5	-	-	31	3.2	-	-	-	-	-	-	-	-
Footpaths, Bicycle or Hiking Trails	10	1.9	12	3.8	4	3.3	26	2.7	4	2.6	4	4.5	6	8.1	14	4.4
Ski Facilities	40	7.6	38	12.1	9	7.4	87	9.1	2	1.3	-	-	2	2.7	4	1.3
Boat Rentals, Marina	7	1.3	9	2.9	3	2.5	19	2.0	6	3.9	7	7.9	6	8.1	19	6.0
Movies, Drive-Ins	6	1.1	3	1.0	-	-	9	0.9	1	0.6	1	1.1	-	-	2	0.6
Outdoor Sport Facilities (Tennis, playing fields)	43	8.2	16	5.1	5	4.1	64	6.7	4	2.6	1	1.1	-	-	5	1.6
Area Information	1	0.2	1	0.3	1	0.8	3	0.3	3	2.0	7	7.9	-	-	10	3.2
Better Transportation	6	1.1	1	0.3	-	-	7	0.7	5	3.3	2	2.2	-	-	7	2.2
Race Track (motorcycles, snowmobiles, cars)	4	0.8	4	1.3	-	-	8	0.8	-	-	-	-	-	-	-	-
Fewer Tourists	1	0.2	-	-	-	-	1	0.1	-	-	-	-	-	-	-	-
Art and Cultural Centre	5	1.0	7	2.2	-	-	12	1.3	-	-	-	-	1	1.3	1	0.3
Activities for Housewives	-	-	2	0.6	-	-	2	0.2	-	-	-	-	-	-	-	-
Access to Fishing, Upset with closures[1]	1	0.2	1	0.3	1	0.8	3	0.3	3	2.0	3	3.4	1	1.3	7	2.2
New in Area	5	1.0	3	1.0	1	0.8	9	0.9	23	15.0	8	9.0	11	14.9	42	13.3
No Response	61	11.7	86	27.3	41	33.6	188	19.6	76	49.7	34	38.2	32	43.2	142	44.9
TOTAL	523	100.0	315	100.0	122	100.0	960	100.0	153	100.0	89	100.0	74	100.0	316	100.0

1 "Upset with closures" refers to new sport fishing regulations which restricted sport fishing on certain rivers in the region. These regulations were adopted in the spring of 1973.

mate of the annual recreational value of Lakelse Lake to Terrace residents is approximately $2,631,800; that Lakelse Lake's annual recreational value to residents of Kitimat is at least $968,500 and its annual recreational value to Prince Rupert residents is in the neighbourhood of $1,509,800. Once again, on the conservative side, Lakelse Lake property owners receive annual benefits of approximately $322,100 as a result of the enjoyment they receive from recreational and leisure activities on Lakelse Lake. The single best estimate of the worth of the total annual benefits provided to residents of the Prince Rupert-Kitimat Region as a result of participating in Lakelse Lake recreational or leisure-time activities is $6,010,700. The present discounted value of this stream of annual benefits (to the year 2000) to residents of the Prince Rupert-Kitimat Region and to non-resident Canadians is $101,641,000.

It was also established that non-residents did spend some money in the region as a result of visiting Lakelse Lake during 1973. It was estimated that, as a result of Lakelse Lake's recreational facilities, British Columbian non-resident parties spent an average of $51.60 per visit for a total expenditure of $294,000; that Canadian non-British Columbian parties spent an average of $60.20 per visit for a total expenditure of $193,400 and that non-Canadians spent an average of $62.90 per visit for a total expenditure of $170,800.

Information presented in this chapter also revealed that more than 73 percent of all Terrace visitors to Lakelse Lake during 1973 either considered it extremely important or very important to them. Similarly, more than 70 percent of Kitimat visitors indicated that they felt that Lakelse Lake was either extremely important or very important. Nearly 60 percent of all Prince Rupert visitors considered it either extremely important or very important.

Some information was presented on what leisure-time activities resident and non-resident visitors to Lakelse Lake felt were least avail-

able to them in the Prince Rupert-Kitimat Region. Terrace visitors to Lakelse Lake during 1973 suggested that a swimming pool and swimming instruction were the leisure-time activities least available to them while living in the region. Prince Rupert visitors indicated that they were concerned about the lack of camping, picnic and beach facilities and the lack of an arena and gymnasium.

CHAPTER FOUR

GROWTH AND FUTURE DEVELOPMENT OF LAKELSE LAKE

In this chapter information will be presented on the environmental consequences of existing use patterns, the type of activity engaged in by various socio-economic groups and the changes which visitors to Lakelse Lake indicated as desirable according to their socio-economic background. This will be done for the express purpose of making recommendations on the direction of future development. It should be cautioned, however, that it is not the intention in this chapter to establish a plan for Lakelse Lake development, but rather to identify a direction for future development which will avoid administrative and policy ambiguities, and at the same time, maintain the lake's water quality, a healthy fishery resource, the lake's aesthetic surroundings and its attractiveness as a recreational area.

The Need for Planned Future Development

It was suggested in Chapter One that commercial, non-recreational activities such as logging and the seaplane base do not contribute to the economic value of Lakelse Lake because the existence of these activities are not dependent upon Lakelse Lake or its related waterways. It was also noted that the costs associated with using Lakelse Lake for sewage disposal are high (and imposed on the entire population of the region) while the benefits generated by this activity are relatively small (accruing only to those individuals who choose to dump sewage directly into the lake). It was shown that Lakelse is a valuable fish rearing lake. The value of the lake is enhanced considerably by its aesthetic surroundings and its attractiveness as a recreational area. Thus, the information presented in the previous three chapters provides background which clearly indicates that Lakelse Lake should be developed in a manner which maintains the lake's aesthetic

surroundings and its recreational attractiveness. Given the knowledge that logging and other non-recreational, commercial activities are likely to detract from the serene atmosphere and the aesthetic surroundings of the lake, it follows that no future development inconsistent with the recreational value of the lake should take place around the lake.[1]

Commercial, non-recreational activities, however, are not the only threat to the quality of recreation available around the lake. Unplanned, or poorly planned recreational development detracts from the quality of recreation available to visitors to the lake. Pedestrian and automobile activity, lines of side by side cabins and overcrowded shorelines will seriously detract from the recreational experience, pose health problems and may even restrict access to those who are financially or physically unable to compete for space.[2] By the same token, the juxtaposition of incompatible activities such as swimming and water-skiing not only detract from the quality of the recreational experience but also create the possibility of accidents. Thus, we have on the one hand the need to avoid the type of development which is inconsistent with the recreational value of the lake, and on the other hand, the obvious requirement that all development, even recreational development, adheres to some rational plan which avoids the hazards associated with incompatible activities and maintains the right of all individuals, particularly residents, to share equally in the opportunity to benefit from the amenities of the lake.

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1 The concepts of noise pollution and aesthetic pollution are fairly recent ideas which favourably broaden the critical awareness of the quality of life and man's need for uncommitted or leisure time.

2 If all the land around the lake is privately owned, then those who are financially unable to purchase lakeside property will be at a disadvantage when competing for the opportunity to participate in recreational activities on the lake. The same is true among certain segments of society that cannot compete for limited recreational opportunities because of certain physical limitations, such as the physically handicapped, the elderly and the very young.

The Negative Externalities Created by Existing Use Patterns

A report prepared by the Habitat Protection Unit, Northern Operations Branch, Fisheries and Marine Service (Vancouver) which is based on research carried out during the summer of 1973 indicates that logging and high density recreational use may be having a serious adverse affect on the quality of Lakelse Lake's water.[3] It also shows that nutrients from the shoreline appear to increase during midsummer at the time when recreational activities reach their height. The Habitat Protection Unit's report suggests that further increases in recreational activities in and around the lake (of the magnitude shown in this presentation) pose a serious threat to the physical well-being of the lake. The report's findings suggest that if the lake did not totally exchange its entire water mass one and two thirds times during the midsummer period, recreational values identified above might have already been destroyed.[4]

Perhaps the clearest indication that there is need for planning future development around the lake is the high degree of participation in the lake's recreational activities among the Prince Rupert-Kitimat Region's resident population. Nearly every family within the region makes some demands on the lake during each year.[5] For example,

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3 This study was initiated to investigate the total chemical and physical limnology of Lakelse Lake. The study identifies the degree of eutrophication and its sources. A summary of the study's findings is presented in Appendix II.

4 Lakelse Lake's water mass exchanges approximately six times each year. Thus, its water turnover is substantially greater than other lakes of similar size where the average number of water exchanges annually range between once every two and one half to once every forty years. This is one very important reason why Lakelse Lake is not considered polluted and the recreational potential is substantially greater than could normally be expected. See G. J. Brunskill and D. W. Schindler, "Geography and Bathymetry of Selected Lake Basins, Experimental Lakes Area, Northwestern Ontario", Journal of the Fisheries Research Board of Canada, 1971, vol. 28, pp. 139-155. Also, T. R. Cleugh and B. W. Hauser, "Results of Initial Survey of the Experimental Lakes Area, Northwestern Ontario", Journal of the Fisheries Research Board of Canada, 1971, vol. 28, pp. 129-137.

5 See Table 2:2, Chapter Two.

it is estimated that over 40 percent of the region's resident population visited Lakelse Lake during 1973.[6] High resident participation, together with a rapidly growing population,[7] suggest that overutilisation of the lake is presently taking place or will almost certainly occur in the near future.[8] The problem is made somewhat more acute by local weather conditions and, as noted previously, the tendency of the resident population to visit the lake only in the summer during warm weather.

Picnic Site - Lakelse Lake

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6 Approximately 18,565 of the region's estimated 41,251 resident population (1971 Census survey) visited Lakelse Lake during 1973.

7 An economic development scheme is being carried out in the region by federal and provincial governments. This development scheme should increase the number of jobs available in the region and result in a substantial increase in the region's resident population within the very near future.

8 A letter making specific recommendations to divert sewage away from Lakelse Lake is shown in Appendix III. Also, it is worth noting that according to the provincial Parks Branch, Lakelse Lake park attendance grew from a total of 55,380 people in 1967 to 207,644 in 1971.

The number of days which can be considered well-suited to outdoor family oriented recreational activity is limited to a few days each year when practically the entire resident population and a substantial number of tourists visit the lake to participate in outdoor leisure activities.

The physical well-being of Lakelse Lake is affected greatly by the number of cabins located around the perimeter of the lake. This is particularly so because all establishments located in the area dump raw sewage directly into the lake. However, it is also true that the primary resource of the lake is its water and that the shoreline forms the context or base, from which water-oriented recreation may be carried out. Thus, the greater the number of shoreline facilities, the greater the intensity of activity on the water. When viewed in this context, shoreline development becomes of paramount importance both when attempting to identify the lake's capacity to accommodate recreation and when attempting to measure the danger which results from overuse and pollution.

Lakelse Lake has approximately 250 privately owned lots on its shoreline. Of these 250 privately owned lots, 107 are in what is referred to as "unimproved condition" and 143 are in "developed condition" with cottages or other developments located on them. Under the present uncontrolled conditions, these developments ensure that some minimal amount of effluent will be dumped into Lakelse Lake each year. These developments also ensure that the lake will be subjected to some minimum amount of recreational activity each year.[9] For example, it has been suggested that lake shore development should be planned with on-water boating activities in mind.[10] Numerous different, and often conflicting,

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9 Of the 250 privately owned lots around Lakelse Lake, 156 are owned by individuals who use their property on a seasonal basis and 43 are owned by those who live on their property year-round. It was determined that approximately 675 persons visit family owned recreational property around the lake and commit over 8,000 days to the enjoyment of lake activities each year.

10 Reiner Jaakson, "Planning for the Capacity of Lakes to Accommodate Water-Oriented Recreation", Plan, 1970, vol. 10, p. 32.

recreational activities can be carried out from a boat. Water-skiing may be expected to detract from the enjoyment of fishermen, motor-boating in general will detract from the enjoyment and the safety of those who prefer to canoe, and to some extent, boating threatens the safety and enjoyment of those who choose to swim. If lake shore property owners, as a group, own more boats than can safely be accommodated on the lake, then overuse and congestion will occur.[11] In an attempt to overcome this problem, some researchers have developed boat capacity standards for lakes so that boating may be regulated in a manner which is consistent with the recreational values of the people using the lake and, at the same time, maintain some degree of safety.[12] For instance, Reiner Jaakson suggested that a 3,000 acre lake, which is used for fishing, water-skiing and general boating, has a cottage-owned boat capacity of approximately 180 boats.[13] According to the information presented in Table 4:1, Lakelse Lake property owners own 241 boats which were used for nine different purposes during 1973. When viewed in this light, taking into account Lakelse Lake's short recreational season, the limited number of public access locations, and the lake's size it would appear as if Lakelse Lake presently exceeds its cottage-owned boat capacity.[14]

Still another important consideration when attempting to assess the future use capacity of a lake is the number and percentage of property owners who participate in particular types of activities. For example, Table 4:2 shows the number and percentage of boat users among Lakelse Lake property owners according to permanent place of residence

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11 Jaakson, op. cit., p. 33.

12 Reiner Jaakson, "Zoning to Regulate On-Water Recreation", Land Economics, 1971, vol. 67, pp. 382-388.

13 Jaakson, Plan, 1970, vol. 10, p. 37.

14 Information on the number of publicly owned boats which are used on Lakelse Lake each year is unavailable. Thus, it is not possible to determine if publicly owned boat activity exceeds the use capacity criteria established in other independent research.

TABLE 4:1

NUMBER AND PERCENTAGE OF TYPE OF BOATS OWNED BY LAKELSE LAKE PROPERTY OWNERS - 1973

	No.	Percentage
Motorboat	142	58.9
Rowboat	43	17.8
Canoe	22	9.1
Sailboat	22	9.1
Kayak	2	0.8
Riverboat	2	0.8
Dugout	1	0.4
Rubber Raft	5	2.1
Lakeboat	2	0.8
TOTAL	241	100.0

TABLE 4:2

NUMBER AND PERCENTAGE OF BOAT USERS AMONG LAKELSE LAKE PROPERTY OWNERS ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

	Terrace		Kitimat		Prince Rupert		Lakelse		Canadian Non-Resident	
	No.	%	No.	%	No.	%	No.	%	No.	%
Use Boats	59	81.9	27	84.4	24	92.3	26	81.3	16	55.2
Do Not Use Boats	13	18.1	5	15.6	2	7.7	6	18.8	13	44.8
TOTAL	72	100.0	32	100.0	26	100.0	32	100.0	29	100.0

during 1973. According to this information, more than 80 percent of all resident property owners used a boat on Lakelse Lake during 1973. In fact, over 92 percent of Prince Rupert property owners used a boat on the lake during this period. If it can be assumed that future property owners will continue to use boats on the lake to the same extent, then it is not unreasonable to predict that (with an average of 1.7 boats per cottage) all future development will add greatly to Lakelse Lake's congestion and safety problems.

Private ownership of lake shoreline property presents other problems which are directly related to those already noted above. If most of the property is owned by private individuals, as is the situation on Lakelse Lake, then the ability of administrators to establish planned rational development of the lake is limited. The area of a lake where the greatest concentration of water-oriented recreation occurs is the shoreline. If the shoreline is lined with privately owned cottages and public access to the lake is limited, then congestion will almost certainly occur in the shoreline areas where the public is able to gain access. It will be almost impossible to separate those activities which have unfavourable or restricting influence on other types of activities. For example, boat launching ramps and marinas will share shoreline sites with swimmers, sunbathers and those seeking the aesthetic appeal of the lake. Furthermore, dense riparian development makes it almost impossible to separate water-skiing, speed-boating and other types of noisy, almost frenzied, activities away from those who seek the quiet tranquility and solitude of waterside wilderness areas.

Both the importance of separating incompatible recreational activities and the need to preserve the recreational values of the lake are revealed in Table 4:3. Table 4:3 shows what property owners and public visitors indicated they feel should be changed in facilities or administration of Lakelse Lake. The information provided in this table shows that over 44 percent of all public visitors to Lakelse Lake during

TABLE 4:3

INDICATED CHANGES DESIRED IN LAKELSE LAKE FACILITIES OR ADMINISTRATION BY OWNERS ACCORDING TO PERIOD OF PROPERTY USE AND PUBLIC VISITORS TO LAKELSE LAKE - 1973

	Property Owners							
	Seasonal		Year-Round		Combined Seasonal & Year-Round		Public Visitors	
	No.	%	No.	%	No.	%	No.	%
Dissatisfied with Campsite Facilities & Administration	39	8.6	6	6.8	45	8.3	735	44.1
Dissatisfied with Swimming Facilities	68	15.0	13	14.8	81	14.9	168	10.1
Want Nature Trails, Bird Sanctuaries, etc.	3	0.7	1	1.1	4	0.7	53	3.2
Want More Boating Facilities	24	5.3	5	5.7	29	5.4	63	3.8
Want Less Commercial Development Around Lake	84	18.5	17	19.3	101	18.6	64	3.8
Prevention of Water Pollution	17	3.7	7	8.0	24	4.4	47	2.8
Opposed to Logging & the Destruction of Wilderness Areas	107	23.5	26	29.5	133	24.5	94	5.6
Want More Fish in Lake	69	15.2	6	6.8	75	13.8	19	1.1
Complaints about Hot Springs	3	0.7	1	1.1	4	0.7	39	2.3
Control Power Boats	5	1.1	2	2.3	7	1.3	41	2.5
Spray for Mosquitoes	3	0.7	-	-	3	0.6	18	1.1
Better Road Access Needed	16	3.5	2	2.3	18	3.3	20	1.2
Prohibit Dogs on Beach	-	-	-	-	-	-	24	1.4
Want Ski Facilities	-	-	-	-	-	-	4	0.2
Control or Ban Snowmobiles	-	-	-	-	-	-	3	0.2
Want Motor Bike & Horseback Riding Trails Near Lake	-	-	-	-	-	-	3	0.2
Complaints About Airplanes	-	-	-	-	-	-	3	0.2
Satisfied With Present Conditions	14	3.1	2	2.3	16	3.0	224	13.4
Have Not Been Long Enough In Area to Comment	2	0.4	-	-	2	0.4	46	2.8
TOTAL	454	100.0	88	100.0	542	100.0	1,668	100.0

1973 were dissatisfied with campsite facilities or the administration thereof. In contrast to public visitors, property owners were mainly dissatisfied with the logging and the destruction of wilderness areas around the lake. More than 29 percent of the property owners who live on Lakelse Lake year-round expressed dissatisfaction with logging and the destruction of wilderness areas. More than 23 percent of property owners who make use of their Lakelse Lake property on a seasonal basis indicated dissatisfaction with logging and the destruction of wilderness areas. Property owners also indicated that they wished to have less commercial development around the lake and, like public visitors, were dissatisfied with swimming facilities. Property owners, as a group, wanted water pollution abatement and more fish in the lake. On the other hand, 13.4 percent of all public visitors and 3 percent of all property owners indicated that they were satisfied with present conditions around the lake. The information further suggests that there is

Cabin Located on Shoreline of Lakelse Lake

a considerable difference of opinion between public visitors and property owners as to what changes would be most beneficial to the recreational value of the lake. Property owners wanted better road access, less commercial development and were generally less imaginative in the number of changes which they desired. In contrast to property owners, public visitors were mostly concerned with campsite facilities and had a wide variety of changes which they suggested were important. In summary, the information presented in Table 4:3 clearly indicates that virtually all public visitors and all property owners value Lakelse Lake as a recreational area and that there were many conflicting activities carried out on Lakelse Lake during 1973.

The planning and development of Lakelse Lake must be based on the concept that it has a limited, and identifiable, capacity to accommodate shoreline and water-oriented recreation. The amount of recreation that the lake can withstand should be calculated to achieve two aims: (1) to protect the environment of the lake; and (2) to maintain a density of use which will be considered attractive by recreationalists. Neither of these two objectives will be achieved if existing use patterns are maintained in future.

The Type of Activities Which Future Development Should be Designed to Accommodate

We have, to this point, identified four important considerations which should be incorporated in a plan for future development of Lakelse Lake. These are: (1) the need to provide diversified shoreline and water-oriented recreational zones so that incompatible activities do not overlap and detract from recreational enjoyment, (2) the type of recreational facilities around the lake should be diversified so that they encourage year-round use of the lake, thereby dissipating density use patterns which have developed in the past, (3) a substantial amount of the lake's shoreline should be set aside for public access so that use activity is distributed around the lake and not confined to specific

locations, and (4) the development which does take place should make adequate provision for waste and sewage disposal so that it does not adversely affect the innate physical quality of the lake. In addition to these, there are also other social considerations, which should be taken into account when planning the direction of future development. The lake should be developed in a manner which ensures that it meets the needs of a broad cross section of the resident population. Young and old, wealthy and poor should share equally in the recreational opportunities provided by what is essentially a publicly owned resource. Implicit within this philosophy is the idea that lake front property should not be owned by private individuals who would restrict the view and the accessibility of the lake to the general population. Thus, there are questions of how to allocate existing recreational space and what type of recreational facilities should be provided so that the lake contributes to the enjoyment of all segments of the resident population.

The first and most obvious impediment to giving all social segments equal opportunity to gain full enjoyment of the lake is private ownership of the land around the perimeter of the lake. Private ownership affects public enjoyment of Lakelse Lake in four interrelated ways: (1) it restricts the legal ability of the general public to gain access to the lake, (2) it restricts the amount of water frontage land available to the general public, (3) it detracts from the aesthetic attractiveness of the lake and surrounding area, and (4) it often prevents lower income groups from sharing equally in their recreational opportunities provided by the lake.

All of these disadvantages are present at Lakelse Lake. Public access is restricted, the amount of land available for public access is limited and, as noted earlier in Table 4:3, the problems associated with lakeside development and the destruction of wilderness areas appear to detract from the enjoyment of those who visit the lake. Lakelse Lake's total water frontage is 11.6 miles. Of this 11.6 miles, 5.3 miles

(or 45.7 percent) is owned privately and only 1.5 miles (12.9 percent) is established as park land or park land reserve.[15] This allocation of water frontage suggests that there is less than adequate provision for the general public. Moreover, as already noted above in Chapter Two, it is clear from the data presented in Tables 2:9 and 2:10 that compared to the general resident visitor to Lakelse Lake, a high percentage of property owners fall into the upper income categories.[16] Thus, there is the obvious implication that private ownership of Lakelse Lake shoreline property is unduly hampering the accessibility of the lake to lower income groups.

Another consideration which must be taken into account when planning the development of a lake with a view to providing optimum enjoyment to all segments of the resident population is the type of facilities provided and who is likely to use them. For example, recreational facilities which cater to families with boating and water-skiing equipment, will tend to increase the enjoyment of the higher income groups who are able to purchase the equipment necessary to participate in these types of recreational activities.[17] Even within specific recreational categories, public provision of certain facilities will cater mainly to specific income groups. The size of personal expenditures associated with sail-boating and motor-boating is considerably

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15 It is generally agreed that at least a portion of a lake's shoreline should be reserved for the primary uses hurt by "improvement". One study in Wisconsin suggested that at least 25 percent of a lake's shoreline should be preserved for public use. It is this author's contention that a far greater portion of Lakelse Lake's shoreline should be devoted to public access because there is an absence of other lakes of similar quality in the area and because of a very high resident participation rate. See C. W. Threinen, Some Spatial Aspects of Aquatic Recreation, Wisconsin Conservation Department, Fish Management Division, 1961, p. 7.

16 A comparison between Tables 2:9 and 2:10 shows that only 22.2 percent of residents who visited Lakelse Lake's public areas during 1973 had household incomes of greater than $15,000 per year and that 35.2 percent of property owners had similar incomes.

17 Herbert H. Stoevener and William G. Brown, "Analytical Issues in Demand Analysis for Outdoor Recreation", Journal of Farm Economics, 1967, vol. 49, p. 1302.

greater than the size of the personal expenditures associated with row-boating, canoeing and other similar types of boating. It follows, therefore, that boat launching ramps will be used mainly by those who are financially able to purchase boats and boat trailers. Similarly, the greater the amount of lake surface zoned solely for water-skiing, speed boat racing and other specialised types of activities, the fewer the on-water opportunities available for the lower income groups.

Table 4:4 shows the total hours spent in each Lakelse Lake recreational or leisure activity according to gross household income. This table shows that a fairly substantial number of hours are spent at Lakelse Lake by individuals from every household income group. Further, it shows that individuals living in households earning gross incomes of between $10,000 to $14,999 spent by far the greatest amount of time visiting Lakelse Lake during 1973. Thus, it is probably indicative of the average income of the general population.

Table 4:5 shows the percentage of total hours that visitors in each income group committed to particular recreational activities around Lakelse Lake during 1973. It is clear that certain activities appeal more to some income groups than to others. For example, a comparison between each activity column and the "all activities" column indicates that virtually all income categories spent the same proportion of their time swimming and enjoying aesthetic beauty. Water-skiing appealed mainly to higher income categories; 32.4 percent of those who water-skiied during 1973 were from households earning $20,000 a year or more. Camping was popular among the middle income groups. A less than representative proportion of those in the less than $5,000 per annum category camped near the lake during the summer of 1973. The same is true of income categories earning over $15,000. However, more than 61 percent of those who camped at Lakelse Lake during 1973 came from households earning between $10,000 and $15,000. This same group took part in only 53 percent of the total number of hours spent participating in all

TABLE 4:4

TOTAL HOURS SPENT IN EACH LAKELSE LAKE RECREATIONAL OR LEISURE ACTIVITY ACCORDING TO GROSS HOUSEHOLD INCOME - 1973

(Rounded to Nearest 25 Hours)

	Under $3,000	$3,000 - $4,999	$5,000 - $9,999	$10,000 - $14,999	$15,000 - $19,999	$20,000 And Over
Camping	850	2,675	51,550	192,725	53,775	11,450
Swimming[1]	2,225	11,775	134,500	474,475	161,375	96,450
Sunbathing	2,325	3,400	100,650	266,500	99,650	45,925
Aesthetic Beauty	825	3,625	55,600	138,500	43,525	29,725
Motor-Boating	450	400	34,725	121,275	38,825	28,775
Picnicking	4,125	4,375	126,425	359,475	104,475	47,975
Fishing	200	2,175	50,950	126,475	55,275	36,175
Hot Springs	-	-	375	1,425	1,425	275
Canoeing	-	-	6,750	55,350	29,475	16,700
Water-skiing	150	-	4,450	35,875	11,750	25,050
Hiking, Walking[2]	3,525	6,250	49,000	118,400	36,200	27,350
Photography	175	250	4,500	5,550	1,150	1,325
Rest Activities[3]	600	875	24,175	100,975	22,000	10,050
Rubber Dinghy, Kayak	-	-	-	9,100	2,100	1,650
Sailing	-	-	3,625	6,800	1,775	775
Social[4]	475	5,375	5,975	13,450	29,200	2,375
Business	-	-	25	-	100	-
TOTAL	15,925	41,175	653,275	2,026,350	692,075	382,025

1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.

TABLE 4:5

PERCENTAGE OF TOTAL HOURS THAT VISITORS IN EACH INCOME GROUP
COMMITTED TO A PARTICULAR RECREATIONAL OR LEISURE ACTIVITY AROUND LAKELSE LAKE - 1973

Income Category	Camping	Swimming[1]	Sun-bathing	Aesthetic Beauty	Motor Boating	Picnicking	Fishing	Hot Springs	Canoeing	Water-Skiing	Hiking, Walking[2]	Photography	Rest Activities[3]	Rubber Dinghy, Kayak	Sailing	Social[4]	Business	ALL ACTIVITIES
Under $3,000	0.3	0.3	0.5	0.3	0.2	0.6	0.1	-	-	0.2	1.5	1.4	0.4	-	-	0.8	-	0.4
$3,000 - $4,999	0.9	1.3	0.7	1.3	0.2	0.7	0.8	-	-	-	2.6	1.9	0.6	-	-	9.5	-	1.1
$5,000 - $9,999	16.5	15.3	19.4	20.5	15.5	19.5	18.8	10.7	6.2	5.8	20.4	34.8	15.2	-	27.9	10.5	20.0	17.1
$10,000 - $14,999	61.6	53.9	51.4	51.0	54.0	55.6	46.6	40.7	51.1	46.4	49.2	42.9	63.6	70.8	52.4	23.7	-	53.2
$15,000 - $19,999	17.2	18.3	19.2	16.0	17.3	16.2	20.4	40.7	27.2	15.2	15.0	8.9	13.9	16.3	13.7	51.4	80.0	18.2
$20,000 and Over	3.7	11.0	8.9	10.9	12.8	7.4	13.3	7.9	15.4	32.4	11.4	10.2	6.3	12.8	6.0	4.2	-	10.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.

activities. Eighty-one percent of all visitors to the hot springs were from households earning between $10,000 and $19,999 per annum.

Table 4:6 shows the percentage of time visitors devoted to each recreational or leisure activity around Lakelse Lake according to type of employment during 1973. According to the information shown in the "all activities" column, 15.4 percent of all activities around Lakelse Lake during 1973 were carried out by persons from households whose major source of income was earned in the logging industry. Similarly, 41 percent of the total activities were carried out by persons whose major source of income was from the service industry and 24.5 percent were from households whose "breadwinner" was employed in manufacturing. Camping does not appear to be very important to those employed in logging. However, it is important to persons in all other employment categories. Table 4:6 shows also that hiking, walking and photography were particularly important to those identified as retired.

Table 4:7 shows the number and percentage of persons in each income category according to changes they want in Lakelse Lake facilities or administration. The data presented in this table shows that dissatisfaction with existing facilities and administration cuts across all income groups fairly equally. It also shows that people in every income group were dissatisfied with swimming facilities, boating facilities and were opposed to logging. According to Table 4:7, there does not appear to be any significant relationship between household income and the changes visitors wish to see implemented. However, similar data presented in Table 4:8, which compares desired changes with type of employment, suggests that there is a significant relationship between type of employment and changes visitors prefer. For example, according to Table 4:8, 14.5 percent of all retired visitors to the lake want additional nature trails and bird sanctuaries while only 3.3 percent of all visitors expressed similar sentiments. Only 1.3 percent of all persons employed in logging indicated that they were opposed to logging and

TABLE 4:6

PERCENTAGE OF TIME VISITORS DEVOTED TO EACH RECREATIONAL OR LEISURE ACTIVITY AROUND LAKELSE LAKE ACCORDING TO TYPE OF EMPLOYMENT - 1973

Type of Employment	Camping	Swimming [1]	Sun-bathing	Aesthetic Beauty	Motor Boating	Picnicking	Fishing	Hot Springs	Canoeing	Water-Skiing	Hiking, Walking [2]	Photography	Rest Activities [3]	Rubber Dinghy, Kayak	Sailing	Social [4]	Business	ALL ACTIVITIES
Logging	4.5	18.2	19.1	13.4	28.1	21.7	13.4	17.6	14.4	31.9	9.0	4.7	7.9	50.0	5.3	45.2	-	15.4
Fishing	-	1.1	0.9	3.5	-	0.1	0.6	-	2.8	-	1.0	-	-	-	-	-	-	0.9
Mining	1.7	3.0	2.6	3.0	0.5	0.6	2.1	-	0.9	-	4.5	4.7	1.1	-	-	3.6	-	2.4
Service	46.6	39.7	38.2	34.6	33.6	36.8	46.4	47.1	45.4	41.2	47.9	22.8	42.6	28.6	21.1	22.6	78.6	41.0
Manufacturing	31.6	23.4	24.5	27.9	26.7	26.5	21.7	11.8	24.1	21.0	19.3	47.0	31.3	-	47.4	19.1	-	24.5
Construction	6.8	9.6	8.9	9.2	4.8	8.3	8.1	17.6	8.3	4.2	3.3	2.7	6.4	-	-	1.2	-	7.3
Transportation	4.9	1.0	2.6	1.3	2.9	1.5	0.7	-	1.4	1.7	1.3	2.0	1.9	-	-	-	-	1.8
Student	-	0.7	2.1	0.3	0.2	0.5	0.1	-	-	-	2.0	2.0	0.2	-	-	1.2	-	0.8
Retired	3.0	1.3	0.4	5.5	0.2	0.7	5.9	5.9	-	-	8.7	14.1	6.0	-	-	7.1	21.4	3.6
Unemployed	0.6	0.3	0.1	0.6	-	0.5	0.2	-	0.5	-	0.3	-	-	-	-	-	-	0.3
Unclassified	0.5	1.0	0.3	0.7	2.9	1.5	0.8	-	2.3	-	2.5	-	2.8	7.1	26.3	-	-	1.4
No Response	-	0.8	0.3	-	-	1.5	-	-	-	-	0.4	-	-	14.3	-	-	-	0.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1 Includes skindiving.

2 Includes bike-riding, sightseeing, trail-riding.

3 Includes relaxing at campfires, birdwatching, rest or vacation stop, rockhounding, exercising pet.

4 Includes games, social parties, visiting cabin, visiting friends.

TABLE 4:7

INDICATED CHANGES DESIRED IN LAKELSE LAKE FACILITIES
OR ADMINISTRATION BY VISITORS TO LAKELSE LAKE, SUMMER 1973
ACCORDING TO GROSS HOUSEHOLD INCOME

	Under $3,000		$3,000 - $4,999		$5,000 - $9,999		$10,000 - $14,999		$15,000 - $19,999		$20,000 And Over		Income Not Identified		All Income Categories	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
Dissatisfied with Campsite Facilities & Administration	8	30.8	10	34.5	122	39.1	370	44.9	121	47.5	76	45.2	25	46.3	732	43.9
Dissatisfied with Swimming Facilities	1	3.8	3	10.3	36	11.5	79	9.6	32	12.6	9	5.4	8	14.8	168	10.1
Want Nature Trails, Bird Sanctuaries, etc.	-	-	-	-	8	2.6	31	3.8	4	1.6	10	6.0	2	3.7	55	3.3
Want More Boating Facilities	1	3.8	3	10.3	13	4.2	20	2.4	12	4.7	11	6.6	2	3.7	62	3.7
Want Less Commercial Development Around Lake	1	3.8	-	-	12	3.8	37	4.5	9	3.5	7	4.2	-	-	66	4.0
Prevention of Water Pollution	2	7.7	-	-	10	3.2	22	2.7	8	3.1	5	3.0	-	-	47	2.8
Opposed to Logging and the Destruction of Wilderness Areas	8	30.8	3	10.3	16	5.1	50	6.1	6	2.4	11	6.6	-	-	94	5.6
Want More Fish in Lake	-	-	2	6.9	1	0.3	10	1.2	4	1.6	1	0.6	1	1.8	19	1.1
Complaints About Hot Springs	1	3.8	-	-	5	1.6	20	2.4	8	3.1	4	2.4	1	1.8	39	2.3
Control Power Boats	-	-	2	6.9	8	2.6	23	2.8	4	1.6	4	2.4	-	-	41	2.5
Spray for Mosquitoes	-	-	-	-	6	1.9	9	1.1	1	0.4	2	1.2	-	-	18	1.1
Better Road Access Needed	-	-	-	-	3	1.0	10	1.2	6	2.4	-	-	1	1.8	20	1.2
Prohibit Dogs on Beach	-	-	1	3.4	4	1.3	15	1.8	1	0.4	2	1.2	1	1.8	24	1.4
Want Ski Facilities	-	-	-	-	-	-	4	0.5	-	-	-	-	-	-	4	0.2
Control or Ban Snowmobiles	-	-	-	-	-	-	1	0.1	1	0.4	1	0.6	-	-	3	0.2
Want Motor Bike & Horseback Riding Trails Near Lake	-	-	-	-	-	-	3	0.4	-	-	-	-	-	-	3	0.2
Complaints About Airplanes	-	-	-	-	-	-	2	0.2	-	-	1	0.6	-	-	3	0.2
Satisfied with Present Conditions	3	11.5	4	13.8	56	18.0	105	12.7	28	11.0	16	9.5	12	22.2	224	13.4
Have Not Been Long Enough in Area for Comment	1	3.8	1	3.4	12	3.8	13	1.6	10	3.9	8	4.8	1	1.8	46	2.8
TOTAL	26	100.0	29	100.0	312	100.0	824	100.0	255	100.0	168	100.0	54	100.0	1,668	100.0

TABLE 4.8

INDICATED CHANGES DESIRED IN LAKELSE LAKE FACILITIES OR ADMINISTRATION BY VISITORS TO LAKELSE LAKE ACCORDING TO EMPLOYMENT CATEGORY - 1973

	Logging		Fishing		Mining		Service		Manufacturing		Construction		Transportation		Student		Retired		Unemployed		Unclassified		No Response		All Categories	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Dissatisfied with Campsite Facilities & Administration	106	45.9	6	50.0	12	35.3	296	44.9	216	48.2	45	33.6	4	18.2	10	45.5	25	36.2	2	22.2	8	36.4	2	40.0	732	43.9
Dissatisfied with Swimming Facilities	36	15.6	-	-	-	-	61	9.2	54	12.1	12	9.0	1	4.6	2	9.1	2	2.9	-	-	-	-	-	-	168	10.1
Want Nature Trails, Bird Sanctuaries, etc.	5	2.2	-	-	2	5.9	21	3.2	16	3.6	1	0.7	-	-	-	-	10	14.5	-	-	-	-	-	-	55	3.3
Want More Boating Facilities	10	4.3	-	-	-	-	26	3.9	14	3.1	5	3.7	-	-	2	9.1	3	4.3	-	-	1	1.5	1	20.0	62	3.7
Want Less Commercial Development Around Lake	10	4.3	2	16.7	-	-	33	5.0	14	3.1	6	4.5	-	-	1	4.5	-	-	-	-	-	-	-	-	66	4.0
Prevention of Water Pollution	10	4.3	-	-	1	2.9	15	2.3	11	2.5	8	6.0	-	-	-	-	-	-	2	22.2	-	-	-	-	47	2.8
Opposed to Logging and the Destruction of Wilderness Areas	3	1.3	1	8.3	9	26.5	23	3.5	17	3.8	22	16.4	8	36.4	3	13.6	4	5.8	2	22.2	2	9.1	-	-	94	5.6
Want More Fish in Lake	2	0.9	-	-	-	-	10	1.5	4	0.9	2	1.5	-	-	-	-	1	1.5	-	-	-	-	-	-	19	1.1
Complaints About Hot Springs	2	0.9	2	16.7	-	-	21	3.2	6	1.3	5	3.7	1	4.5	-	-	1	1.5	1	11.1	-	-	-	-	39	2.3
Control Power Boats	9	3.9	-	-	-	-	11	1.7	15	3.4	3	2.2	1	4.5	-	-	1	1.5	-	-	1	4.5	-	-	41	2.5
Spray for Mosquitoes	-	-	-	-	1	2.9	10	1.5	2	0.5	3	2.2	1	4.5	-	-	1	1.5	-	-	-	-	-	-	18	1.1
Better Road Access Needed	-	-	-	-	-	-	9	1.4	8	1.8	2	1.5	-	-	-	-	-	-	1	11.1	-	-	-	-	20	1.2
Prohibit Dogs on Beach	7	3.0	-	-	-	-	6	0.9	6	1.3	2	1.5	-	-	1	4.5	1	1.5	-	-	1	4.5	-	-	24	1.4
Want Ski Facilities	-	-	-	-	-	-	1	0.1	3	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	0.2
Control or Ban Snowmobiles	1	0.4	-	-	-	-	-	-	2	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	0.2
Want Motor Bike & Horseback Riding Trails Near Lake	-	-	-	-	-	-	1	0.1	2	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	0.2
Complaints About Airplanes	-	-	-	-	-	-	-	-	2	0.4	1	0.7	-	-	-	-	-	-	-	-	-	-	-	-	3	0.2
Satisfied with Present Conditions	28	12.1	1	8.3	7	20.6	91	13.8	46	10.3	17	12.7	6	27.3	1	4.5	18	26.1	1	11.1	6	27.3	2	40.0	224	13.4
Have Not Been Long Enough in Area for Comment	2	0.9	-	-	2	5.9	25	3.8	10	2.2	-	-	-	-	2	9.1	2	2.9	-	-	3	13.6	-	-	46	2.8
TOTAL	231	100.0	12	100.0	34	100.0	660	100.0	448	100.0	134	100.0	22	100.0	22	100.0	69	100.0	9	100.0	22	100.0	5	100.0	1,668	100.0

the destruction of wilderness areas while 5.6 percent of all employment categories indicated they were opposed to logging and the destruction of wilderness areas.

Logging Scene on East Side of Lakelse Lake

Table 4:9 shows the number and percentage of persons in each gross income category according to the amenities which they feel are least available to them as residents of the region. Swimming pool and swimming instruction appear to be important to all income groups. Very few individuals indicated that they were concerned about fishing closures in the area and almost no one wanted fewer tourists. A substantial number of people appear to want ski facilities, municipal parks and playgrounds and more night life activities. More important to this assessment, however, is the apparent lack of divergence in opinion as to what amenities were least available between the various income groups.

TABLE 1:9

AMENITIES NOTED AS LEAST AVAILABLE TO RESIDENTS

ACCORDING TO GROSS HOUSEHOLD INCOME - 1973

	Under $3,000		$3,000 - $4,999		$5,000 - $9,999		$10,000 - $14,999		$15,000 - $19,999		$20,000 And Over		Income Not Disclosed	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Arena or Gymnasium	4	13.8	1	7.7	10	5.5	25	5.3	4	2.5	4	6.0	1	1.6
Swimming Pool, Instruction	5	17.2	2	15.4	43	23.8	92	19.6	29	17.8	14	20.9	14	21.9
Camp, Picnic and Beach Facilities	1	3.5	2	15.4	4	2.2	32	6.8	13	8.0	-	-	-	-
Horseback Riding	-	-	-	-	-	-	5	1.1	3	1.8	-	-	-	-
Playgrounds, Municipal Parks	-	-	2	15.4	17	9.4	38	8.1	10	6.1	4	6.0	2	3.1
Ice and Roller Skating	1	3.5	-	-	2	1.1	7	1.5	2	1.2	4	6.0	2	3.1
Youth - Dances, Concerts	3	10.3	1	7.7	11	6.1	14	3.0	11	6.8	4	6.0	12	18.8
"Night Life" (Liquor outlets, dancing, etc.)	-	-	-	-	9	5.0	20	4.3	9	5.5	2	3.0	6	9.4
Golf Course	-	-	-	-	-	-	5	1.1	1	0.6	-	-	-	-
Civic Centre, Auditorium	3	10.3	-	-	5	2.8	11	2.3	3	1.8	3	4.5	7	10.9
Footpaths, Bicycle or Hiking Trails	-	-	-	-	4	2.2	17	3.6	6	3.7	2	3.0	-	-
Ski Facilities	2	6.9	2	15.4	8	4.4	41	8.7	21	12.9	11	16.4	2	3.1
Boat Rentals, Marina	1	3.5	-	-	2	1.1	8	1.7	3	1.8	4	6.0	1	1.6
Movies, Drive-Ins	-	-	-	-	4	2.2	2	0.4	2	1.2	-	-	-	-
Outdoor Sport Facilities (Tennis, playing fields)	3	10.3	1	7.7	10	5.5	33	7.0	14	8.6	3	4.5	6	9.4
Area Information	-	-	-	-	1	0.6	1	0.2	1	0.6	-	-	-	-
Better Transportation	-	-	-	-	1	0.6	3	0.6	-	-	-	-	-	-
Race Track (Motorcycles, snow-mobiles, cars)	-	-	-	-	2	1.1	3	0.6	2	1.2	-	-	-	-
Fewer Tourists	-	-	-	-	-	-	-	-	-	-	1	1.5	-	-
Art and Cultural Centre	-	-	2	15.4	3	1.7	6	1.3	4	2.5	-	-	-	-
Activities for Housewives	-	-	-	-	-	-	2	0.4	-	-	-	-	-	-
Access to Fishing, upset with closures[1]	-	-	-	-	-	-	3	0.6	-	-	-	-	-	-
New in Area	1	3.5	-	-	3	1.7	2	0.4	2	1.2	-	-	-	-
No Response	5	17.2	-	-	42	23.2	100	21.3	23	14.1	11	16.4	11	17.2
TOTAL	29	100.0	13	100.0	181	100.0	470	100.0	163	100.0	67	100.0	64	100.0

1 "Upset with closures" refers to new sport fishing regulations which restricted sport fishing on certain rivers in the region. These regulations were adopted in the spring of 1973.

Very briefly, the data presented in Tables 4:5 and 4:6 appear to indicate that water-skiing, canoeing, fishing and motor-boating appeal mainly to individuals living in households where gross income is over $20,000 per annum. Camping and the hot springs appeal mainly to those earning between $10,000 and $19,999. Hiking and walking had better than proportional representation in the less than $4,999 income categories. Persons in every type of employment visit Lakelse Lake and participate in virtually all types of recreational activities. However, it was noted that loggers do not appear particularly interested in camping but did choose to participate in most other activities.

Tables 4:7 and 4:8 show that there was no significant divergence of opinions between income groups about what type of changes they would like to see in lake administration or facilities. The same was true of resident visitors' opinions about what amenities were least available in the region as shown in Table 4:9. However, there did appear to be a significant relationship between the visitors' employment and changes they wished to see in facilities and administration. Once again, these tables indicated that nature trails were important to those who indicated that they were retired.

Still another important consideration when assessing the implications of planning future development is the age of those using existing facilities. Table 4:10 shows the average party size of resident and non-resident visitors according to age and time of visit during the week. According to this table, Terrace resident weekday parties contain an average of 3.6 persons under 10 years of age while Terrace resident weekend parties contain an average of only 1.6 persons under 10 years of age. The opposite appears to be true of Prince Rupert where younger people visited Lakelse Lake during the weekend while older persons visited during the week. Nonetheless, this information clearly shows that Lakelse Lake is very important to young residents of Terrace and Kitimat during weekdays. It also shows that it is an important

TABLE 4:10

AVERAGE PARTY SIZE OF DAY VISITORS ACCORDING TO AGE AND TIME OF VISIT - 1973[1]

Age Category	Resident											
	Terrace		Kitimat		Prince Rupert		Total Resident		Non-Resident		Total Resident & Non-Resident	
	Week-day Avg.	Week-end Avg.	Week-day Avg.	Week-end Avg.	Week-day Avg.	Week-end Avg.	Week-day Avg.	Week-end Avg.	Week-day Avg.	Week-end Avg.	Week-day Avg.	Week-end Avg.
Adults	2.2	2.9	2.4	2.7	2.7	1.5	2.3	2.7	2.3	2.3	2.3	2.8
11 - 15	2.3	0.9	1.1	0.3	0.7	1.0	1.8	0.7	0.6	1.6	1.5	0.7
0 - 10	3.6	1.6	1.6	1.3	1.3	3.5	2.8	1.7	0.6	0.6	2.3	1.4
TOTAL	8.1	5.4	5.1	4.3	4.7	6.0	6.9	5.1	3.5	4.5	6.1	4.9

1 Weekend visitors are those who visit Lakelse Lake on Saturdays and Sundays. Weekday visitors visit Lakelse Lake on days other than Saturday and Sunday.

family recreational area to all persons living in the Prince Rupert-Kitimat Region.

This section may now be summarised. It would appear from the data presented in this section that there is a relationship between the recreational activities of individuals and their socio-economic background. Although somewhat sketchy and incomplete, the data presented in this section suggests that nature trails, boat rental facilities and an increase in the amount of public shoreline area would contribute substantially to the enjoyment of all social groups - particularly the retired and the lower income groups. A considerable amount of dissatisfaction was expressed about swimming facilities. This coupled with the knowledge that Lakelse Lake is a very important family recreational area suggests that there is a need for more family swimming areas. Further, boat rental facilities should be provided at the lake and would probably be used by all segments of the resident population. To this end, the fee should be nominal and the number of boats which are used for rental purposes should be consistent with the boat capacity of the lake. As noted earlier, certain types of boating activities detract substantially from the enjoyment of those who choose to participate in other types of activities. Thus, care should be taken when building boat launching facilities and when establishing a fee for launching privately owned boats. Since boat launching ramps appeal mainly to the higher income groups and would detract further from the control that administrators might have over on-lake activities, the provision of boat rental facilities should be given higher priority than launching ramps.

Conclusions and Recommendations

It was not the intention here to establish a plan for future development around Lakelse Lake. The social and physical complexities involved in such a plan are enormous and exceed the scope of this presentation. Nonetheless, several interesting policy goals have been

identified in this chapter and related to information gathered on Lakelse Lake. For example, it is determined from the assessment carried out in this chapter that all future development should proceed in a manner which contributes to four broad policy goals. All future development should proceed in a manner which: (1) protects the physical environment of the lake and its water; (2) maintains a density of use which will be considered attractive by recreationalists; (3) meets the needs of a broad cross section of the resident population; and (4) does not impose personal costs on individuals who currently own property around the lake or other segments of the resident population.

The information presented in this chapter and the identification of these four policy goals suggest, in turn, the practical feasibility of assessing developments around the lake. There are a number of considerations which should be taken into account when assessing future developments. These are: (1) the need to provide diversified shoreline and water-oriented recreational zones so that incompatible activities do not overlap and detract from recreational enjoyment, (2) the types of recreational facilities around the lake should be diversified so that they encourage year-round use of the lake, thereby dissipating density use patterns which have developed in the past, (3) a substantial amount of the lake's shoreline should be set aside for public access so that use activity is distributed around the lake and is not confined to specific locations, (4) the development which does take place should make adequate provision for waste and sewage disposal so that it does not adversely affect the innate physical quality of the lake, and (5) care should be taken to ensure that the recreational facilities which are provided will be such that young and old, wealthy and poor, will share equally in the recreational opportunities provided by what is essentially a publicly owned resource.

The accomplishment of these goals and objectives implies that a moratorium on all development around the lake be established so that

administrative authorities are able to establish a body responsible for the administration, development and planning of the lake. These plans should be developed in a manner which direct themselves to specific objectives such as those identified above and the plans should be made available to the public for discussion and feedback.

One major conclusion which stems directly from the assessment carried out in this chapter is that all future development must be consistent with both the physical and recreational well-being of the lake. If future development is carried out in a manner which ignores the importance of maintaining the attractiveness of the lake to recreationalists, the very qualities which are valuable to residents of the Prince Rupert-Kitimat Region will be destroyed. By the same token, if development does not proceed in a manner which safeguards the environmental quality of the lake's water then the value of the lake will similarly be destroyed.

CHAPTER FIVE

THE PROBLEM OF PRESERVING LAKELSE LAKE: A REGIONAL PERSPECTIVE

In the previous four chapters, it was shown that Lakelse Lake is extremely valuable (a prized possession) to the people of the Prince Rupert-Kitimat Region. Further, it has been indicated that Lakelse Lake's value is closely linked to the fact that there is a shortage of service and recreational alternatives available to the people living in the region. In this sense, the problems associated with protecting the Lakelse Lake values are symptomatic of a more general problem which is prevalent throughout the entire region and throughout British Columbia. That is, in British Columbia both public and private agencies have failed to show adequate concern for making this northern portion of the province an attractive place for people to live. In this chapter we will show that this is a serious oversight which works to the disadvantage of industry located in the region, to business throughout British Columbia and to all British Columbians. This will be accomplished in the following manner. First, a review of the economic structure of the Prince Rupert-Kitimat Region will be provided; second, an overview of the behaviour of both the public and private sectors will be presented; then finally, it is suggested that the Prince Rupert-Kitimat Region could achieve a more effective growth pattern if it is recognised that the shortage of recreational and leisure alternatives is, in fact, a regional problem and a more appropriate regional policy is adopted.

The Prince Rupert-Kitimat Region's Industrial Development

Like the rest of British Columbia's economy the development of the Prince Rupert-Kitimat Region's economy has been firmly rooted to the extraction of its natural resources. The largest single employer in the area, the Aluminum Company of Canada, was attracted to the region because

of the power potential in the area, the presence of an excellent year-round deep water harbour and the urgings of the provincial government.[1] The existence of a logging industry, many sawmills, and a pulp and paper industry is obviously tied to the rich endowment of timber in the area. Likewise, the fishing industry has tended to centre in Prince Rupert because of the large fish populations available in the area. Up until the present time the Prince Rupert-Kitimat Region's economy has been based solely on the exploitation of its natural resource endowments. Manufacturing exists, but only as an extension, or as a complement of its resource-based activities.

Despite the region's dependence on resource extraction and resource processing, natural resources are not the only economic resources necessary to its growth and prosperity. The region's output is also dependent upon the availability of capital and labour. In this region, as in all British Columbia, significant amounts of both capital and labour must be imported to complement the native natural resources and permit an increase in the region's productive capacity. When considering each of these two factors in turn, it appears that one has contributed to the smooth and uniform growth of the region's economy while the other has not. The presence of an excellent highway system, hydroelectric power development, pulp and paper mills and the aluminum smelter in Kitimat all attest to the fact that a large amount of investment has taken place in the region over time. In fact, given the vulnerability of the region's output to fluctuations in world demand and the generally unfavourable labour climate which has persisted in the province, the flow of capital into the region has been considerable. Labour, however, does not appear to have been as readily available.

Most of the Prince Rupert-Kitimat Region's industrial base is

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1 The provincial government of the 1930s urged the Quebec-based Aluminum Company of Canada to expand to British Columbia. This was rejected at the time but later in 1948 the company announced that it was going to construct a large plant on the Pacific coast involving an enormous hydroelectric development. Jes Odam, "Kitimat's 20 Years Old and Showing the Strain", The Vancouver Sun, 20 August 1973, p. 11.

labour intensive. Fish processing and logging are both labour intensive operations. In fact, the production of all forest products share this attribute - particularly the production of lumber, plywood and the low volume papers.[2] Thus, the presence of an adequate permanent labour force with energies, motivations, skills and knowledge complementary to the industrial requirements of the region is particularly important to the region's economic development. It is difficult to establish whether or not the region is actually short of labour in this sense. However, intuitive consideration would suggest that if there is such a labour shortage in this region of the province either incomes would be higher than normal, in an effort to attract outside labour, or there would be a higher incidence of job vacancies than in other parts of the province. Since wage settlements are usually negotiated on a province-wide basis and there is little information on the number of job vacancies that cannot be filled, a precise estimate of the degree of labour shortage cannot be made. Yet there is ample evidence to suggest that there is a labour shortage in the Prince Rupert-Kitimat Region. During the past year the aluminum smelter at Kitimat has experienced a 45 percent turnover amongst its 2,600 employees. Eurocan has indicated that its employee turnover will be about 40 percent this year and there is evidence which indicates that the employee turnover in logging camps in the northern areas of British Columbia is running well over 100 percent.[3] This information, coupled with the knowledge that there is idle labour in other parts of the province,[4] suggests that the Prince Rupert-Kitimat Region has trouble maintaining a labour force consistent with its industrial needs. This observation is supported, to some extent, by the behaviour of local industry which often makes non-pecuniary payments to labour.

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2 "How Investors Can Assess Forest-Products Industry", The Financial Post, 13 October 1973, p. C6.

3 "How Frontier Areas are Fighting Staff Turnover", The Financial Post, 29 September 1973, p. 11.

4 The unemployment rate has ranged between 6 and 8.4 percent of the province's labour force during the past year. See Statistics Canada, The Labour Force, Catalogue 71-001, August 1973.

The Problem: A Hindrance to Economic Growth

The size of a region's labour force varies directly with its population. For instance, the labour force participation rate in British Columbia usually ranges between 50 and 57 percent.[5] Therefore, a region's ability to attract and maintain a labour force commensurate with the requirements of its industrial base is directly dependent upon the region's ability to attract a population having the appropriate skills and training. Particularly in British Columbia with its small locally born population, immigration has been of overwhelming importance to the economic development of the province.[6] Large numbers of immigrants have entered British Columbia since the Second World War and have helped to sustain a fairly rapid rate of economic development. It follows therefore, that a region within British Columbia with a labour intensive industrial base has to experience population growth which is consistent, although not necessarily in the same proportion, with growth in its industrial development.[7] This has not occurred in the Prince Rupert-Kitimat Region. Despite the fact that the amount of activity in logging, pulp and paper and mill operations has increased, the growth of the region's population has been less than that of the lower mainland and not significantly greater than that of the province as a whole (see Table 5:1).[8] Thus, high labour turnover rates, population trends and

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5 Statistics Canada, op. cit.

6 Ronald A. Shearer, "The Economy of British Columbia", Trade Liberalization and a Regional Economy: Studies of the Impact of Free Trade on British Columbia, ed. Ronald A. Shearer, John H. Young, Gordon R. Munro, University of Toronto Press, 1971, pp. 30-31.

7 The growth of Kitimat is much less than predicted when first established. The town of Kitimat was planned originally as a community of 25,000.

8 These data show that the population of British Columbia rose from 1,398,464 in 1956 to 2,184,162 in 1971 (a 56.2 percent increase); that the combined population of Kitimat, Prince Rupert and Terrace rose from 24,174 in 1956 to 37,541 in 1971 (a 55.3 percent increase) and the lower mainland's population rose from 804,556 in 1956 to 1,264,599 in 1971 (a 57.2 percent increase).

TABLE 5:1

TOTAL AND PERCENTAGE OF TOTAL BRITISH COLUMBIA
POPULATION BY SELECTED LOCATIONS
1956, 1961, 1966 AND 1971

	1956		1961		1966		1971	
	No.	% of B.C.	No.	% of B.C.	No.	% of B.C.	No.	% of B.C.
Kitimat	9,676	0.7	8,217	0.5	9,792	0.5	11,803	0.5
Terrace	4,000[1]	0.3	5,940	0.4	8,637	0.5	9,991	0.5
Greater Prince Rupert	10,498	0.8	11,987	0.7	14,677	0.8	15,747	0.7
Total of Region	24,174	1.8	26,144	1.6	33,106	1.8	37,541[2] (42,458)	1.7
B. C. Lower Mainland	804,556	57.5	944,317	58.0	1,109,929	59.2	1,264,599	57.9
Total British Columbia	1,398,464		1,629,082		1,873,674		2,184,162	

1 Estimate of Terrace population using 1971 municipal boundaries.

2 Region's population is shown in brackets. In an effort to make data as consistent as possible for comparison purposes over time, only the populations of Kitimat, Terrace and Prince Rupert are used to calculate the percentage of the region's population to total British Columbia population.

Source: Statistics Canada, 1971, 1966, 1961, 1956 Census Surveys.

the behaviour of industry attempting to attract labour to the area together indicate that the region has been unable to attract and maintain a population which is commensurate with the labour force requirements of its industry.

There are two ways of looking at the foregoing conclusion with respect to labour mobility. That is: (1) the region is unable to attract population and a labour force to reside in the area suggesting it has poor inward mobility; or (2) there is a high degree of labour mobility and the population leaves the area as fast or faster than it migrates to the area. In either case this results in a lower rate of economic growth. From the former viewpoint, there is a hindrance to the interregional mobility of the labour force. Since labour mobility is a very important adjustment process, closely linked to economic growth and necessary to iron out disequilibria in the economy's growth performance, it follows that any hindrance to mobility necessarily creates economic inefficiency.

On the other hand, from the latter viewpoint, the inward and outward movement of the population is much higher than required to sustain efficient economic growth. Since both public and private costs are associated with the movement of population it is economically wasteful. An indication of how costly population or labour force movements can be is given by an official of Alcan who stated that "staff turnover is a $2 million problem".[9]

The Reason for the Problem

The problem of identifying why the Prince Rupert-Kitimat Region has been unable to attract and maintain a population commensurate with the labour force requirements of its industry is difficult, particularly since an appeal to the commonly accepted concepts found in stan-

9 "How Frontier Areas are Fighting Staff Turnover", The Financial Post, 29 September 1973, p. 11.

dard economic theory do not appear to provide satisfactory answers. For instance, populations usually shift from lower to higher income regions. But, as noted previously, wages are usually negotiated on a province-wide basis. Therefore, except for the possibility of workers earning higher incomes by working longer hours in northern communities, there is little evidence to suggest that earnings within British Columbia vary enough between regions to explain population movements. As pointed out by Thomas J. Courchene, relative wages do not capture adequately the economic attraction of various regions within the country.[10] So even if there is a difference in wages between regions, wage differences alone cannot explain completely why one region maintains a basic labour force while another does not.

Perhaps it would be more useful to explore the reasons for high quit or turnover rates in other parts of North America. However, once again, the answers are vague and do not necessarily provide satisfactory explanations for the Prince Rupert-Kitimat Region. The quit or turnover rate of a region is usually expected to vary inversely with unemployment.[11] Yet labour force turnover rates are consistently high in the northern regions of British Columbia and have been for many years. Worker turnover varies widely through time but not in a pattern consistent with the changes in rates of unemployment.

Thus, it would appear that the failure to attract permanent residents to the area can be explained neither in terms of wage variations nor in terms of alternative employment opportunities.

Explanations for high labour turnover may be found, in part,

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10 Thomas J. Courchene, "Interprovincial Migration and Economic Adjustment", Canadian Journal of Economics, 1970, vol. 3, pp. 550-576.

11 John Vanderkamp, "Interregional Mobility in Canada: A Study of the Time Pattern of Migration", Canadian Journal of Economics, 1968, vol. 1, pp. 595-608, also Arthur Donner, "Labour Turnover, Expectations and the Determination of Money Wage Changes in U. S. Manufacturing", Canadian Journal of Economics, 1972, vol. 5, pp. 16-34.

in the region's historical development. For instance, in most parts of the world the normal or traditional development of a community evolves in stages over a considerable period of time. This has not been the case in two of the three communities which comprise most of the Prince Rupert-Kitimat Region's population. Neither Terrace nor Kitimat existed in 1951. In fact, Kitimat can be classified as an "instant town".[12] It is a town which was developed and dominated by a single large industry. The management of the aluminum company had a strong impulse to develop Kitimat as a "model township". This is a philosophy which prevails in Kitimat today. Terrace, on the other hand, developed as rapidly although more spontaneously than Kitimat. Its development centered around the logging industry and the associated sawmills. Terrace also serves as a transportation centre and is located on the only overland highway linking Prince Rupert with the rest of British Columbia and North America. It is unquestionably true that the growth of Terrace is partially explained by the development of Kitimat.

Despite dissimilarity in their development, both Terrace and Kitimat are relatively new communities. The residents, so many of whom have been in the area for a short time, do not share a common cultural past nor do they have the traditional sense of attachment which most people feel to their communities.[13] This is partially reflected in the data given in Table 5:2 which provides a comparison between the age distribution of the Prince Rupert-Kitimat Region's population and the population of the rest of the province. Table 5:2 shows that the percentage of persons over 65 years of age is almost one third that of the remainder of British Columbia or the lower mainland. Even more striking, the percentage of persons 45 years and older living in the region is approximately one half that of the remainder of British Columbia or the lower mainland. Thus, it appears that most of the Prince Rupert-Kitimat

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12 Prince Rupert was also an instant town in the early 1900s. However, this is comparatively early in British Columbia's development. Prince Rupert has developed a heritage similar to other towns in the province.

13 For an explanation of the lack of traditional ties in northern British Columbia see: Ronald A. Shearer, op. cit., p. 27.

TABLE 5:2

AGE DISTRIBUTION FOR SELECTED LOCATIONS IN BRITISH COLUMBIA

1971

Age Category	Terrace		Kitimat		Prince Rupert[1]		Prince Rupert-Kitimat Region		Remainder[2] of B.C.		B.C. Lower[3] Mainland	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0 - 9	3,295	25.4	2,885	24.7	3,765	22.6	10,170	24.0	377,505	17.7	173,830	16.0
10 - 19	2,690	20.8	2,350	20.1	3,235	19.4	8,460	20.0	414,965	19.4	194,990	18.0
20 - 34	3,415	26.4	3,280	28.0	4,435	26.5	11,375	26.9	466,855	21.8	247,675	22.9
35 - 44	1,465	11.3	1,745	14.8	1,985	11.8	5,295	12.5	250,485	11.7	130,650	12.0
45 - 64	1,565	12.1	1,380	11.8	2,585	15.5	5,670	13.4	428,850	20.0	226,485	21.0
65 - 69	150	1.2	40	0.3	340	2.0	545	1.4	67,695	3.2	34,765	3.2
Over 70	350	2.7	35	0.3	365	2.2	770	1.8	135,995	6.3	73,975	6.9
TOTAL	12,930	100.0	11,715	100.0	16,710	100.0	42,285	100.0	2,142,350	100.0	1,082,370	100.0

1 Prince Rupert category includes Port Edward.

2 Remainder of B.C. category includes all of British Columbia less the Prince Rupert-Kitimat Region.

3 The B.C. Lower Mainland category includes Greater Victoria.

Source: Statistics Canada 1971 Census Survey.

Region's population live within the region only during their working lives. Once given the freedom of retirement, most of the population tend to relocate outside of the region.[14]

The lack of tradition and of historical ties provide only a portion of the answer. Prince Rupert is a community with a longer historical tradition which dates back to the turn of the century. Yet the percentage of persons 65 years of age and older living in Prince Rupert is not significantly different from the percentage of persons 65 years of age and older living in either Terrace or Kitimat. This suggests that there are other, perhaps more important reasons why, the Prince Rupert-Kitimat Region appears an unattractive place to live.

The number of possible explanations is numerous. Everything from poor television reception to a lack of recreational facilities and even poor weather conditions are cited as reasons for the problem. It is obvious that no single reason serves as the sole explanation. All of the reasons that are generally given probably do contribute to the problem and are interrelated in a complex manner. For example, Table 5:3 shows the average annual maximum and minimum temperatures and the average annual amount of precipitation for Prince Rupert, Terrace and Kitimat. It also shows that even though the temperature and the amount of precipitation vary considerably within the confines of the region, the temperature does not normally drop below 20^{o}F. in the winter nor rise above 70^{o}F. in the summer. Yet, the region does experience large amounts of precipitation both in the summer and in the winter. Snowfalls in excess of twenty inches are not uncommon in Kitimat and extended periods of cloudy wet weather are commonplace throughout the region. The generally inferior climate of the Prince Rupert-Kitimat Region would, undoubtedly, accentuate other minor or major irritants faced by those living in the region, and as such, would help to discourage permanent settlement.

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14 It should be noted when interpreting data in Table 5:2 that Terrace has a senior citizens' home which provides low-cost rental units for independent senior citizens over 65 years of age.

TABLE 5:3

AVERAGE MINIMUM AND MAXIMUM TEMPERATURES AND AVERAGE ANNUAL PRECIPITATION FOR PRINCE RUPERT, KITIMAT, TERRACE AND THE BRITISH COLUMBIA LOWER MAINLAND

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Prince Rupert												
Max. Temp.	39.8	41.4	44.6	50.1	56.3	59.6	62.5	63.4	59.7	52.8	46.0	41.1
Min. Temp.	30.5	31.3	33.1	36.7	41.9	46.6	49.9	50.7	47.7	42.5	36.8	32.8
Mean Temp.	35.2	36.4	38.8	43.4	49.1	53.1	53.1	57.0	53.7	47.6	41.4	37.0
Precipitation (in.)	8.83	6.96	7.71	6.81	5.11	4.27	4.62	5.87	8.54	13.23	11.53	10.93
Terrace												
Max. Temp.	27.5	34.1	40.9	51.4	60.8	65.2	71.2	68.4	61.0	47.7	34.8	29.5
Min. Temp.	19.9	24.8	28.8	34.5	40.8	47.2	51.5	51.5	46.0	38.7	28.2	22.7
Mean Temp.	23.7	29.5	34.9	43.0	50.8	56.2	61.4	60.0	53.5	43.2	31.5	26.1
Precipitation (in.)	6.07	4.94	3.41	2.46	1.22	1.77	2.17	2.46	3.70	9.01	7.36	8.64
Kitimat												
Max. Temp.	30.5	35.5	43.1	51.6	60.0	64.8	69.3	67.6	61.6	50.2	39.8	33.9
Min. Temp.	20.7	25.5	30.9	35.2	41.5	48.8	52.8	53.2	48.3	40.4	32.0	26.4
Mean Temp.	25.6	30.5	37.0	43.4	50.8	56.8	61.0	60.5	55.0	45.4	35.9	30.2
Precipitation (in.)	10.56	7.37	7.29	5.92	3.28	3.48	2.70	4.18	7.40	16.00	14.53	14.07
B. C. Lower Mainland												
Max. Temp.	41.5	47.1	49.4	55.5	62.0	65.1	70.3	68.3	66.5	54.8	44.8	45.8
Min. Temp.	30.5	33.9	37.0	39.4	45.4	50.2	53.9	52.2	50.8	43.8	34.4	37.2
Mean Temp.	36.0	40.5	43.2	47.4	53.7	57.6	62.1	60.3	58.7	49.3	39.6	41.5
Precipitation (in.)	5.92	2.69	2.69	0.51	1.91	2.07	0.37	1.14	1.07	4.48	7.24	9.22

Source: Weather information from the Department of Transport (all temperatures in degrees Farenheit).

Another factor is the apparent shortage of females in the region. This is both a cause and effect of the comparatively low rate of permanent settlement. Table 5:4 shows the male to female population ratio for selected British Columbia locations during 1971. According to this information both in the 20 to 44 and 45 to 64 age categories the region has almost 20 percent more males than females living in the area. Kitimat has nearly 30 percent more males than females in the 45 to 64 age category and Terrace has 30 percent more males than females in the over 65 age category. This differs from the rest of British Columbia and British Columbia's lower mainland area where there is a one to one male to female ratio over most age categories.

The confusion among residents as to just what factors are most important in detracting from the region's attractiveness as a place to live probably is best illustrated by a study conducted in Terrace during 1973 by the Community Resources Committee.[15] The study was initiated to provide the community with a directory of services and to find out what services were most needed and should be expanded in Terrace. The study revealed a number of interesting points. Eighty-eight percent of those surveyed indicated that they required low cost drug prescriptions, 28 percent indicated that a YMCA and YWCA were required, 20.1 percent stated that they needed further recreational services and 19.6 percent indicated that there was an inadequacy of commercial services in Terrace. More interesting from the point of view of this discussion, however, is the fact that 47.7 percent indicated they did not know what was lacking or urgently needed in the community. The general conclusion of the survey suggested that there was a need to "make substantial alterations in both organisation and financing" of local government if they were to attract a population, but "most individuals were unable to form any clear idea of what the priorities should be were services to be expanded".[16]

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15 Approximately 20 percent (or 800) of Terrace households were sampled in the survey.

16 The Terrace Herald, 22 August 1973, p. 5.

TABLE 5:4

MALE TO FEMALE POPULATION RATIOS FOR
SELECTED BRITISH COLUMBIA LOCATIONS - 1971

Age Category	Terrace	Kitimat	Prince Rupert & Port Edward	Total Region	B.C. Less Total Region	B.C. Lower Mainland
0 - 19	1.0:1	1.1:1	1.0:1	1.0:1	1.0:1	1.0:1
20 - 44	1.1:1	1.2:1	1.2:1	1.2:1	1.1:1	1.0:1
45 - 64	1.1:1	1.3:1	1.2:1	1.2:1	1.0:1	1.0:1
65 and Over	1.3:1	0.7:1	1.3:1	1.7:1	0.9:1	0.8:1
Average	1.1:1	1.1:1	1.2:1	1.1:1	1.0:1	1.0:1

Even though the Terrace survey identifies a number of important services which are lacking in the community, it does not capture the interrelated complexity of one service to another. It is doubtful that a significant percentage of the population would be using prescription drugs during any particular period of time. Similarly, only a small portion of the total population would use a YMCA or a YWCA.[17] As noted earlier in Table 2:2, 87.8 percent of the households in Terrace, 81.9 percent of the households in Kitimat and 54.1 percent of the households in Prince Rupert visited Lakelse Lake at least once a year. Furthermore, it was established that members of Terrace households averaged 16.8 visits to Lakelse Lake annually, Kitimat households averaged 10.2 visits annually and Prince Rupert households averaged 4.8 visits annually. Given the generally poor weather conditions of the region and the distance of the lake from the three centres (Terrace, Kitimat and Prince Rupert), participation in Lakelse Lake recreational activities appears high. Lakelse Lake's importance probably lies in the fact that there is a lack of alternative recreational opportunity, as well as an absence of other lakes suitable for family recreation. The lack of recreational alternatives also is revealed in very high rates of participation in other activities which are readily available to residents of the region. For instance, it also was established that nearly 33 percent of the total resident population of the region sport fish each year, that over 61 percent of the fishermen living in Kitimat fished on one particular river,[18] and that over 72 percent of resident households visited Lakelse Lake at least once during 1973 (see Table 2:2).

The shortage of amenity related alternatives is revealed in other types of services as well. Table 5:5 shows the number of service outlets and the average number of persons per service outlet in eleven selected British Columbia communities. The communities selected for

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17 Thirty-eight point seven percent of the teenagers included in the survey indicated that they would like additional recreational and entertainment services.

18 This was one of the findings of the telephone survey carried out during the summer of 1973 and described in Appendix I.

TABLE 5:5

NUMBER OF SERVICE OUTLETS (THE AVERAGE NUMBER OF PERSONS PER SERVICE OUTLET)

IN SELECTED BRITISH COLUMBIA COMMUNITIES - 1973

	Population	Banks	Restaurants	Gas Stations	Drug Stores	Grocery Stores	Liquor Outlets	Other Retail Outlets	Doctors and Dentists	Lawyers	Low Service to Total Population
Prince Rupert	15,747	4 (3936.8)	23 (684.7)	10 (1574.7)	2 (7873.5)	19 (828.8)	26 (605.7)	56 (281.2)	15 (1049.8)	9 (1749.7)	6
Terrace	12,995	5 (2599.0)	17 (764.4)	22 (590.7)	5 (2599.0)	13 (999.6)	14 (928.2)	52 (249.9)	19 (683.9)	5 (2599.0)	5
Kitimat	11,803	4 (2950.7)	10 (1180.3)	9 (1311.4)	2 (5901.5)	8 (1475.4)	11 (1073.0)	31 (380.7)	15 (786.9)	3 (3934.3)	9
Powell River and Westview	13,726	3 (4575.3)	14 (980.4)	20 (683.3)	3 (4575.3)	16 (857.9)	9 (1525.1)	60 (228.8)	23 (596.8)	7 (1960.9)	5
Campbell River	10,000	6 (1666.7)	20 (500.0)	22 (454.5)	5 (2000.0)	10 (1000.0)	16 (625.0)	73 (137.0)	23 (434.8)	10 (1000.0)	0
Port Alberni	20,063	8 (2507.9)	26 (771.7)	35 (573.2)	6 (3343.8)	25 (802.5)	22 (912.0)	74 (271.1)	23 (872.3)	7 (2866.1)	5
Chilliwack	9,135	7 (1305.0)	29 (315.0)	33 (276.8)	6 (1522.5)	18 (507.5)	19 (480.8)	82 (111.4)	52 (175.7)	15 (609.0)	0
Penticton	18,146	6 (3024.3)	29 (625.7)	32 (567.1)	6 (3024.3)	22 (824.8)	35 (518.5)	78 (232.6)	45 (403.2)	21 (864.1)	2
Trail	11,149	4 (2787.3)	17 (655.8)	17 (655.8)	3 (3716.3)	7 (1592.7)	29 (384.4)	49 (227.5)	18 (619.4)	6 (1856.2)	3
Nelson	9,400	3 (3133.3)	20 (470.0)	13 (723.1)	5 (1880.0)	10 (940.0)	26 (361.5)	56 (167.9)	27 (348.1)	5 (1880.0)	1
Cranbrook	12,000	7 (1714.3)	30 (400.0)	23 (521.7)	3 (4000.0)	10 (1200.0)	25 (480.0)	53 (226.4)	16 (750.0)	13 (923.1)	3
AVERAGE		(2745.5)	(668.0)	(721.1)	(3676.0)	(1002.7)	(717.7)	(228.6)	(611.0)	(1840.2)	

comparison have approximately the same size population; some are located in remote areas and others are located in easily accessible areas. The comparison is based on the average number of persons serviced by each outlet: it is assumed that the greater the average number of persons serviced by each service outlet, the poorer or more inadequate are the facilities within each service category. For the purpose of grading the community it is assumed that less than average provision of any service is inadequate. Thus, the "low service to total population category" indicates for each community the number of service categories for which the facilities are considered inadequate. According to Table 5:5, Kitimat is inadequately serviced in nine of the nine service categories shown. Prince Rupert is inadequately serviced in six of the nine categories shown and Terrace is inadequately serviced in five of the nine categories shown. Of the five communities which are shown to be poorly serviced in more than one half of the service categories considered, only Powell River and Port Alberni are not located in the Prince Rupert-Kitimat Region. Both Powell River and Port Alberni are located in relatively remote areas. Neither is located on a main thoroughfare and both have relatively wet climates.[19]

A further distinction can be drawn between the communities revealed as inadequately serviced and those which seem to have reasonably good service facilities. That is, those communities which are established around a single industry appear to be relatively poorly serviced. Kitimat, Powell River, Port Alberni and Trail are four communities which are established around one or two major employers.[20] Those communities which are revealed to be fairly well serviced often have an established tourist trade. Campbell River, Penticton and Nelson are three such examples.

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19 Overland transportation to Port Alberni requires the use of at least one ferry. Access to Powell River from everywhere except Vancouver Island requires two ferries.

20 Kitimat presently has two major industries: aluminum smelting and pulp and paper. Two companies, Alcan and Eurocan, account for virtually all of the base employment in Kitimat.

Table 5:6 shows the total number of hotels, motels, government campsites, and the average number of residents per outlet for each of the eleven communities shown in Table 5:5 above. When applying the criteria established above on the data provided in Table 5:6, it appears that most of the communities included in this analysis have adequate overnight facilities. Only Kitimat, Powell River-Westview and Port Alberni, with their respective average population service figures of 100.0, 49.0 and 36.6 appear to lack hotel and motel accommodation. Only Prince Rupert, Kitimat and Powell River-Westview appear to be short of campsite facilities.

The criteria used here to determine whether a community is adequately serviced or not is based solely on the number of service outlets which fall into each service category. Quantity does not necessarily reflect quality nor does it take into account the special or unique needs of a particular community. The needs of a community for a particular activity can be assessed in terms of the community's economic activities. The proper assessment of the quality of the facilities available to residents of a particular community is more difficult. Quality must be established by measuring existing facilities against some standard criteria which are consistently applied in one or more locations. Thus, the opportunity to assess the quality of facilities provided is somewhat limited. Nevertheless, hotel and motel accommodation is graded and subject to inspection in British Columbia.[21] This affords the opportunity to measure the quality of the motel and hotel accommodation provided in each of the communities included in Tables 5:5 and 5:6.

Table 5:7 shows the number and percentage of government ap-

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21 Motel and hotel accommodations are graded in British Columbia subject to the following conditions: First, the hotel or motel operator must request to be listed on the British Columbia approved accommodation list. Second, the motel or hotel must pass inspection standards. Since there is no logical reason why hotels or motels in one part of the province would have greater incentive to seek government approval than hotels or motels located in other parts of the province, it follows that the greater the percentage of government approved accommodation in a particular community the better is the quality of the accommodation available.

TABLE 5:6

TOTAL NUMBER OF HOTELS, MOTELS (THE AVERAGE NUMBER OF RESIDENTS PER HOTEL-MOTEL UNIT) NUMBER OF GOVERNMENT CAMPSITES (THE AVERAGE NUMBER OF RESIDENTS PER CAMPSITE UNIT) - 1973

	Population	No. of Hotels & Motels	Total No. of Units	No. of Government Campsites	Total No. of Units
Prince Rupert	15,747	13	598 (26.3)	1	17 (926.3)
Terrace	12,995	15	431 (30.2)	2	144 (90.2)
Kitimat	11,803	4	118 (100.0)	2	46 (256.6)
Powell River and Westview	13,726	10	280 (49.0)	1	50 (274.5)
Campbell River	10,000	30	558 (17.9)	3	266 (37.6)
Port Alberni	20,063	20	548 (36.6)	4	263 (76.3)
Chilliwack	9,135	25	419 (21.8)	1	283 (32.3)
Penticton	18,146	69	1,675 (10.8)	3	157 (115.6)
Trail	11,149	13	358 (31.1)	2	85 (131.2)
Nelson	9,400	18	411 (22.9)	1	118 (80.0)
Cranbrook	12,000	33	789 (15.2)	3	210 (57.1)
AVERAGE			(32.9)		(188.9)

TABLE 5:7

NUMBER AND PERCENTAGE OF GOVERNMENT APPROVED HOTEL AND MOTEL UNITS LOCATED IN SELECTED BRITISH COLUMBIA COMMUNITIES

	Total Units	Government Approved*	Percent Approved of Total	Average No. of Residents Per Approved Unit of Service
Prince Rupert	598	337	56.4	46.7
Terrace	431	303	70.3	42.9
Kitimat	118	84	71.2	140.5
Powell River and Westview	280	202	72.1	68.0
Campbell River	558	437	78.3	22.9
Port Alberni	548	433	79.0	46.3
Chilliwack	419	264	63.0	34.6
Penticton	1,675	1,414	84.4	12.8
Trail	358	190	53.1	58.7
Nelson	411	320	77.9	29.4
Cranbrook	789	439	55.6	27.3
AVERAGE	562.3	402.9	71.7	48.2

* British Columbia Tourist Directory 1973.

proved hotel and motel units and the average number of residents per approved hotel and motel unit in each of the British Columbia communities used in Tables 5:5 and 5:6. According to Table 5:7, Penticton with 84.4 percent of its total accommodation approved has the highest percentage of approved hotel and motel facilities. In most communities between 70 and 80 percent of total motel and hotel accommodation meets government standards. Of the eleven communities shown in Table 5:7, Trail, Cranbrook and Prince Rupert appear to have the poorest hotel and motel facilities.

A comparison between Tables 5:6 and 5:7 indicates that the average number of residents per unit of accommodation increases significantly when only approved accommodation is taken into account. Particularly in the case of Trail, the adequacy of motel and hotel accommodation changes considerably when quality is taken into account. Trail has above average accommodation when only considering the total number of units available but has insufficient accommodation when only government approved accommodation is taken into account.

Table 5:8 shows the average number of persons per household and per room in each of the Prince Rupert-Kitimat Region's three main population centres, British Columbia municipalities with populations between 5,000 and 9,999 people, British Columbia municipalities with populations between 10,000 and 29,999 and Greater Vancouver. A comparison of the data presented in Table 5:8 suggests that Prince Rupert, Kitimat and Terrace all have a housing shortage. Terrace has the highest number of persons per household, Kitimat is second and Prince Rupert is third. The publicity which the housing shortage problem receives in Kitimat is probably best explained in terms of three factors. First, Kitimat has a slightly higher average number of persons per room than either Prince Rupert or Terrace. Second, Kitimat has a scarcity of houses with basements for children to play in during inclement weather. Third, lack of hotel or other associated facilities probably causes the

TABLE 5:8

AVERAGE NUMBER OF PERSONS PER HOUSEHOLD AND PER ROOM FOR SELECTED BRITISH COLUMBIA LOCALITIES

	Prince Rupert	Kitimat	Terrace	B.C. Municipalities Populations 5,000 to 9,999	B.C. Municipalities Populations 10,000 to 29,999	Greater Vancouver
Average Number of Persons Per Household	3.5	3.9	4.0	3.3	3.3	2.7
Average Number of Persons Per Room	.70	.73	-[1]	.62	.62	.58

1 Data unavailable.

Source: Statistics Canada 1971 Census Survey.

shortage of private dwellings to be more visibly apparent in Kitimat than in either Prince Rupert or Terrace.[22]

There are other service amenity shortages which detract from the area's attractiveness as a place to live. Except for a vocational school in Terrace, the region does not have a post-secondary educational facility. Families with school age children must face the reality that if they are to continue to live in the Prince Rupert-Kitimat Region and their children are to receive a post-secondary education, the family will be separated once their children reach their late teens.

The information presented in Tables 5:5, 5:6, 5:7 and 5:8, together with the discussion, suggests that the service facilities available in the Prince Rupert-Kitimat Region are inadequate. Furthermore, at least in the one situation where it is possible to gauge (i.e. hotel and motel accommodation in Prince Rupert), the percentage of substandard facilities to total facilities is high.[23] This in itself must detract from the region's attractiveness as a place to live. Yet it must not be assumed that the district is short of all service facilities. For example, except for a lack of psychiatric facilities, the region has excellent hospitals, it has good quality roads and ample communication and transportation linkage. This suggests that the type of service facilities which are most critically missing are the type of service facilities

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22 The shortage of single men's accommodation is discussed in the Vancouver Sun's article of August 20 referred to above.

23 The importance of having adequate hotel and motel facilities in Prince Rupert can be better appreciated by noting that Prince Rupert is located at the end of the only overland highway linking British Columbia's north coast with the rest of the province. Furthermore, it is the location of the most northerly deep-sea port linking Alaska with mainland British Columbia and Vancouver Island. The State of Alaska Department of Public Works reported that 27,593 (7,030 vehicles) passengers boarded their ships at Prince Rupert en route to Alaska during 1972. The same agency reported that 29,158 passengers and 7,543 vehicles disembarked from their vessels at Prince Rupert during 1972. British Columbia Ferries indicated that 18,533 passengers travelled by ferry from Kelsey Bay to Prince Rupert and 19,958 made the return trip from Prince Rupert to Kelsey Bay.

usually provided by the private sector and financed by small entrepreneurs. Also, there appears to be a lack of certain social service facilities (i.e. nontechnical schools, recreational parks) which cannot be directly linked to the production process.

The attractiveness of the area and the presence of social service amenities are interrelated in a complex manner. The size of a region's population varies directly with its attractiveness as a place to live. What is less apparent, however, is that attractiveness is interrelated with investment. The amount of investment made in an area depends on the attractiveness of the region as a place to live just as the attractiveness of the area as a place to reside, in turn, depends on investment. It is in fact a vicious circle. The very qualities which modern man has learned to expect as necessary for his comfort and the comfort of his family are precisely those qualities which small investors would consider important when deciding where to establish a business. Once more, the degree of investment risk and the growth potential of a business is directly dependent upon the size of the population core and the ties of the population to the area.[24] This would be especially true in those areas where most of the population has excellent access to a large modern service centre such as Vancouver.

Furthermore, in this same vein, the smaller the community the fewer the service facilities and the more vulnerable the local economy is to economic disturbances. It follows that the more willing a worker is to move out of a particular area, the more likely he will be to move when faced with the prospect of temporary unemployment or retirement. Even a temporary mill closure in an area with only one or two base industries will adversely affect the welfare of local business. In the first place it will reduce the local discretionary income component

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24 T. N. Brewis, "Regional Economic Planning - The Canadian Scene", Conference on Economic Development in Manitoba, (Winnipeg: Economic Development Advisory Board of Manitoba, 1971), p. 64.

through a direct reduction in the size of the local payroll. Secondly, it will indirectly reduce the amount of discretionary income available for local expenditure through a reduction in government transfer payments. Transfer payments move with population and a loss of unemployment insurance or strike payments can add greatly to local business risk. John Vanderkamp has noted in the Canadian case that "out-migration which may take place in response to unemployment conditions, adds to unemployment at the same time as it subtracts from it".[25] Unemployed and retired persons maintain a particular level of expenditure which is usually financed by transfer payments and which adds considerably to the economic stability of a region.[26] This type of stability would not be present in the Prince Rupert-Kitimat Region: as already noted above, high labour turnover rates and the absence of retired persons suggests that, once free of work, individuals tend to relocate outside the region.

It is worth noting from the information presented in Table 5:2 that the Prince Rupert-Kitimat Region has both a higher percentage of children and a lower percentage of old age pensioners than other locations in British Columbia. Also, according to the information presented in Table 5:4, it has relatively fewer women than the remainder of British Columbia or British Columbia's lower mainland. This may indicate that there is a shortage of the type of labour normally associated with lower paid service employment. This in itself may inhibit the development of a service industry in the region.

One additional factor which, paradoxically, may help to inhibit the growth of a service industry in the Prince Rupert-Kitimat Region is the existence of a modern transportation network. It is usually accepted that investment in social overhead capital such as transportation facilities helps to encourage the type of investment necessary for growth in a

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25 John Vanderkamp, "The Effect of Out-Migration on Regional Employment", The Canadian Journal of Economics, 1970, vol. 3, pp. 541-549.

26 Courchene, op. cit., pp. 550-576.

region. This is probably true in most cases but not necessarily true in the Prince Rupert-Kitimat Region. A transportation network makes it easier to transport raw material, the supplies necessary for industrial output, and final goods. However, it also makes it easier for both temporary and permanent movements of population. Those who are able to afford airline tickets to visit Vancouver on a regular basis have access to Vancouver service facilities. This means that higher income groups have easier access to outside service facilities and are not dependent on local market outlets nor do they seek to encourage the establishment of such facilities. This could work to the disadvantage of medium or lower income groups who are dependent on local service facilities for the purchase of their goods. Moreover, it discourages investment in service related facilities. In short, a convenient transportation system makes it easier for people to move in as well as out of an area. In a region where the tendency is to leave the area, personal income is high and it is easy to travel, the overall effect probably is detrimental rather than beneficial to a region when the development of a service sector is important.

A mobile population has other detrimental effects on the establishment of community service facilities. In an area where the population does not have the sense of attachment that people normally feel to their communities, there is little incentive for individuals to support money bylaws which will not bring about visible and immediate benefits to themselves. Individuals who plan on remaining in the community for two or three years would be expected to support money bylaws to pay for swimming pools or ambulance service. Benefits from this type of expenditure would be immediate and visible. However, large expenditures intended for the long range good of a community would not necessarily receive support from those people who do not intend to permanently reside in the area.[27]

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27 This may account for the observation made by T. N. Brewis: rural communities in general differ in their attitudes toward their respective situations, some showing more initiative than others in seeking solutions to their problems. See T. N. Brewis, op. cit., p. 68.

To summarise the argument of this section, the ability of an area to attract and maintain a population is directly dependent upon the service amenities provided in the area and the associated economic opportunities. Small businessmen or investors are lured to an area for many reasons. However, these usually include access to a concentrated market, an established business community with which the investor may interact, financial and communications services and a skilled labour pool. Except for the communication and transportation facilities, none of these factors appear to be present in the Prince Rupert-Kitimat Region. Finally, the base industry or outside injections to the local economy may increase the size of the local payroll and the number of employment opportunities. However, the effect of such injections is weak when expenditures on local goods and services are small. It would seem reasonable to conclude, therefore, that one important reason why the Prince Rupert-Kitimat Region is unable to attract and maintain a population which is commensurate with the labour force requirements of its industry is due to a lack of investment in small service facilities not directly tied to the production process within the region. This inhibits both the region's growth and its prospects for future development.

The Behaviour of Public and Private Agencies

The behaviour of most agencies involved in development planning in British Columbia indicates that they are at least partially aware of the problems outlined in the foregoing discussion. Federal, provincial and even local governments commit a considerable amount of time and effort to planning regional development. Private firms and organisations located in northern British Columbia participate in the development of new towns and local government. Despite this, very little significant progress has been made in coordinating the activities of these various agencies to ensure effective social and economic growth.

The reasons for lack of coordination are partly of an ideological nature and partly due to poor policy or even failure to understand

the underlying problems. If, for example, we look at the behaviour of government it becomes clear that the two senior levels of government frequently work at cross-purposes. The former provincial government devoted most of its attention to building roads, railways and seaports. They were mainly concerned with encouraging resource development, not with influencing the distribution of population or encouraging new investment in the less promising parts of the province.[28] In contrast, the federal government has devoted a considerable amount of effort both to the redistribution of population and to encouraging investment in low income areas. The federal government, through the Department of Regional Economic Expansion and local initiative programs, has encouraged investment but most of the investment is directed at the less prosperous parts of Canada and not the less prosperous parts of the province. The Department of Manpower, through its programs, has encouraged underemployed or unemployed individuals to relocate into areas where there are better prospects for employment. The subsidised movement of unemployed workers does not necessarily ensure that they will move into areas of the province where labour is in short supply. Further, if they do move to these areas, it does not ensure that they will permanently remain in these areas. This suggests that, in many instances, Federal Manpower is unknowingly encouraging workers to move from less developed regions outside of British Columbia into the lower mainland area where jobs are not necessarily available. Moreover, neither government has been particularly concerned with encouraging small businessmen to invest in local service facilities or making the remote areas of the province more attractive places to live.[29]

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28 Brewis, op. cit., p. 67.

29 Brewis, in a review of regional economic planning in Canada, noted that the former British Columbia provincial government did recognise the need to provide a more uniform standard of services throughout the province. He noted in an address in Manitoba in 1971 that "the desire to provide a more uniform standard of services throughout the province has resulted in the formation of regional district councils and a very substantial reduction in the number of school districts. The government will pay up to 90 percent of the cost of the poorest municipalities for schools and hospital services". See T. N. Brewis, op. cit., p. 67.

This pattern of development is likely to prevail in British Columbia even though the new provincial government has brought about some beneficial change by enacting into legislation the Development Corporation of British Columbia Act, the Farm Products Industry Improvement Act and the Community Recreational Facilities Fund Act.[30] Except for the Farm Products Industry Improvement Act which is aimed directly at the rural areas of British Columbia, neither of the other two acts appear to deal directly with the problem of decreasing the contrast between rural and urban areas in British Columbia. The Community Recreational Facilities Fund Act provides up to one third of the funds necessary for building recreational facilities in British Columbia communities. The funds available under the act are equally available to both remote, underserviced municipalities and the better serviced, more accessible, population centres.[31]

Further, it would appear that the type of development schemes which the provincial and federal governments are carrying out in the northern parts of the province are not significantly different from those carried out in the past. The federal and provincial governments recently announced a northern development scheme designed to "generate $495 million in net economic benefits over the next 25 years" in and around the the Prince Rupert-Kitimat Region.[32] This development scheme, like the

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30 The Farm Products Industry Improvement Act is designed to encourage and assist in the continued development and expansion of the agricultural industry in the province. The Development Corporation of British Columbia Act is to encourage the continued operation of industrial enterprises in the province. The Community Recreational Facilities Fund Act was enacted to encourage the development of recreational facilities throughout British Columbia. Even though it is argued here that these three new pieces of legislation do not adequately deal with the problem, these acts are definitely beneficial to the northern areas of the province. They should help to encourage the type of development necessary to make remote areas more attractive places to live and help to facilitate economic growth.

31 It should be noted by the reader that the administrators of this act state that they do implement the act in a manner which favours the less populated areas of the province.

32 Evan Atkinson, "$495 Million Dollar Benefits Seen in North Development", The Vancouver Sun, 24 July 1973.

previous ones, appears to be mainly concerned with encouraging resource development and not with increasing the attractiveness of the area. This type of development will increase the basic income of the area but will not necessarily help solve the problems outlined in the previous section. The confusion which surrounds the scheme is probably best displayed by comments made by Peter Oberlander, the former Secretary (Deputy Minister) of the federal Ministry of State for Urban Affairs (also a teacher at the University of British Columbia's School of Community and Regional Planning) and Norman Pearson, Executive Assistant to British Columbia's Minister of Lands, Forests and Water Resources. Mr. Oberlander, when discussing the need to check Vancouver's uncontrolled population growth stated:

> In northern B. C., for example, the way in which DREE money is allocated to help mining or forestry operations will determine which northern communities will grow and which won't.[33]

Mr. Pearson in contrast to Mr. Oberlander stated:

> Some people favour decentralisation of population away from the major cities. But that would mean we'd run the risk of attracting more people to the province. For instance, if we make the north more attractive to people then more people will come here from elsewhere - it won't mean that we'll redistribute the people who are already here.[34]

Thus, we have on the one hand, a former senior official of the federal government indicating that a large-scale joint federal-provincial expenditure on railroads and seaports will help to eliminate the unbalanced growth of British Columbia's population. On the other hand, a senior official of the provincial government suggests that they would decentralise the population of British Columbia away from the major cities by making the north a more attractive place to live. Mr. Oberlander by his remark appears to believe that resource-based industrial growth will determine the distribution of populations throughout the province. Mr. Pearson appears to agree with the basic approach of this paper, that the

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33 Iain Hunter, "Improve Our Cities by Fighting Trends", The Vancouver Sun, 18 October 1973, p. 6.

34 Moira Farrow, "Williams Cites Co-Operation in Forest Service", The Vancouver Sun, 15 October 1973, p. 8.

north must be made a more attractive place to live if it is to attract and maintain a population. He does not, however, appear to consider this an important problem.

The behaviour of local government and of the private sector, like the two senior levels of government, is not always consistent nor always conducive to the type of change necessary to make the Prince Rupert-Kitimat Region a more attractive place to live. It would seem reasonable to expect that the type of facilities which attract tourists to the area would also help to make the area more attractive to its residents. However, while the Kitimat municipal government has never been in favour of tourism,[35] the Alcan aluminum smelter at Kitimat conducts tours of their plant during the summer, thereby encouraging tourists to visit the area. This is a situation where the largest single employer in Kitimat is encouraging tourism while the municipality openly prefers to discourage tourism.

The attractiveness of the Prince Rupert-Kitimat Region also is affected by the behavioural pattern of local industry. As already noted above, the number of natural amenities available to local residents is limited. Nonetheless, the region is not without its attributes. The region abounds with large tracts of wilderness areas, excellent fresh and salt water fishing and is well stocked with small and big game wild animals. These are the natural advantages which many residents and visitors to the area consider a value of living in the north. Despite this, logging operations with their clear-cutting policies frequently impinge upon the areas which are best suited for recreational use. They frequently destroy the very attributes which help to make the region a pleasant place for their employees and their employees' families to live. The clear-cut logging which takes place around the perimeter of Lakelse Lake provides an excellent example of logging companies working to the disadvantage of local residents. Lakelse Lake is the only lake suitable

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35 "Our Regional District is a Failure", The Terrace Herald, 15 August 1973.

for family oriented recreation in the entire region and, as established in this presentation, is a very important outdoor recreational area. Despite this, the logging companies have seen fit to log off some sections of the lake right to its shoreline.

There are numerous other self-defeating behavioural patterns which detract from the ability of the region to encourage local investment or to maintain a population. Among the most important of these are Kitimat's pragmatic view of planned community development. Considerable effort was put into the planning of Kitimat's environment so that it would be an appealing place to live. However, it would seem to be important for administrators to question whether or not the people of the north want a rigidly planned environmental structure. It may be more realistic to assume that the free spirit philosophy which prevails in most frontier areas of North America would reject the planned concept and desire a more natural working and living environment. It may also be relevant for Alcan management to ask themselves whether their practice of providing subsidised housing actually works to the long-range advantage of their employees. As previously noted, Kitimat and Terrace both have severe housing shortages. The Alcan company, in response to this housing shortage, and their concern for their employees, provides them with subsidised housing. This practice probably reflects the concern the company has for its employees and as such can be considered commendable. It does, however, also contribute to the housing shortage by making it unprofitable for private investors to build houses in the area.[36] Once again, this is an example of a private agency, despite its good intentions, helping to discourage the type of investment necessary to the area's development.

A Potential Solution

It is clear from the foregoing discussion that the programs

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36 Bertrand de Jouvenel, "Rent Control: An Example of Price Fixing", ed. C. Lowell Harriss, Selected Readings in Economics (Third Edition) Prentice-Hall, 1966, pp. 43-45.

carried out by government administrations and by private industry will not eliminate the impediments to growth present in the Prince Rupert-Kitimat Region. Large-scale infrastructure investments are undoubtedly necessary for the region's development but as indicated above, they do not appear to be effective in solving the problems associated with the population turnover. Furthermore, any attempt by employers to attract workers to the area by increasing wages would probably be self-defeating. If residents follow existing behavioural patterns, an increase in per capita income would merely enable them to visit Vancouver on shopping trips more frequently. It would not necessarily encourage private investment nor add to the amount of goods and services available in the region. Also, since wage negotiations usually take place on a province-wide basis, a wage differential between regions would likely be quickly narrowed by corresponding - perhaps inflationary - increases in other regions.

The development and planning which has taken place in the Prince Rupert-Kitimat Region is typical of much of the planning carried out in Canada. T. N. Brewis and Gilles Paquet stated that:

> ...there seems to be a lack of imagination in the elaboration of these devices. For instance, although many attempts at decentralization of economic activity in the United States and Canada have failed because of the refusal by executives and their wives to move to the periphery and to its cultural desert, no attempt to remedy such problems by providing congenial urban environments, symphonic orchestras, and good French restaurants to Halifax or St. John's would ever be considered.[37]

This behaviour is particularly relevant to the behaviour of the provincial government. The provincial government has attempted to stimulate and perpetuate the region's growth by concentrating all of its efforts on encouraging certain production oriented types of investment. These types of investment may only serve to accentuate the problem by increas-

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37 T. N. Brewis and Gilles Paquet, "Regional Development and Planning in Canada - An Exploratory Essay", Canadian Public Administration, University of Toronto Press, 1968, vol. 2, p. 161.

ing the demand for other types of service facilities which are in short supply and already used to full capacity.

Implicit within this discussion is the belief that any program designed to overcome the Prince Rupert-Kitimat Region's problems should possess certain characteristics. For instance, based on the discussion in the previous section, it should encourage private investment. The program should stimulate a sense of pride, a sense of attachment to the region. Ideally the program should be simple, straightforward, and uncontroversial. This would help avoid some of the contradictions identified above. Further, it would seem appropriate that such a program be designed so that it takes advantage of existing facilities and the region's natural endowments.

One possibility which is available to the region and would meet these guidelines is a policy program designed to stimulate a tourist industry. The provincial government has for many years carried out a tourist promotion program in British Columbia. In fact, some of this promotion has been directed at the Prince Rupert-Kitimat Region.[38] Many of the large-scale capital expenditures necessary to support and facilitate the tourist industry are present within the region now.

An excellent highway network, a ferry system and good airport facilities ensure adequate access to the region. The presence of good hunting and fishing, of wilderness areas and natural scenic beauty make the region ideally suited to this type of development. The unexploited

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38 The provincial government currently has two tourist promotion schemes underway which affect that region. The provincial government has turned out a brochure which highlights the attractions available to tourists who travel the Yellowhead Highway route. The Yellowhead Highway route commences at Edmonton, Alberta, proceeds through Jasper, Prince George, Smithers to Prince Rupert. The government also promotes what is referred to as the Totem Circle route which commences at Vancouver, proceeds through Cache Creek, Prince George, Smithers, then to Prince Rupert. The route continues by ferry from Prince Rupert to Vancouver Island and finally ends at Vancouver.

potential of tourism in the area is revealed in Tables 5:9 and 5:10. Table 5:9 shows the reasons why non-residents who visit Lakelse Lake came to the Prince Rupert-Kitimat Region. Table 5:10 shows the indicated highlights of their trip. According to Table 5:9, scenery and natural beauty did not attract many visitors to the region. However, according to Table 5:10, once in the region most visitors felt that scenery and natural beauty highlighted their visit.

The possibility of developing a tourist industry in the region is further displayed by information gathered by the Fisheries and Marine Service, Department of the Environment, during the summers of 1972 and 1973. These studies indicate that during the latter half of June, July, August and the first week of September in 1972, tourists visiting the Prince Rupert-Kitimat Region spent in excess of $750,000 in the region.[39] Similar surveys conducted during the summer of 1973 showed that the number of visitor-days which tourists spent in the region had increased by 33 percent over the previous summer. Despite the substantial increase in tourist activity during 1973, there is no reason to expect that this rate of increase will continue in future.[40] Nonetheless, once again, it does indicate that the region has good tourist potential, especially when it is remembered that the region lacks many of the service facilities normally found in tourist areas.

The development of a tourist industry in the Prince Rupert-Kitimat Region would contribute to the growth and economic stability of the region. It would increase and diversify the region's base employment and income. The region's economy would be less dependent on two or three industries and therefore less vulnerable to changes in the demand for the products which these industries produce. More important,

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39 David J. Reid, The Importance of Sport Fishing to the North Mainland Coast and North Central Areas of British Columbia: An Economic Survey, Department of the Environment, Fisheries and Marine Service, Northern Operations Branch, Economics Unit, Vancouver 1974, PAC/T-74-10, NOB/ECON 6-74.

40 One important reason why the amount of tourist activity increased during the summer of 1973 is the extension of the highway from Terrace to Stewart. This opened up a new area which has many natural attractions.

TABLE 5:9

THE REASONS WHY NON-RESIDENTS WHO VISIT LAKELSE LAKE VISIT THE PRINCE RUPERT-KITIMAT REGION BY RESIDENCE CATEGORY - 1973

	B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Residents	
	No.	%	No.	%	No.	%	No.	%
Visit Friends, Relatives	44	19.2	30	21.3	4	3.5	78	16.1
General Vacation	79	34.5	55	39.0	36	31.9	170	35.2
Fishing	17	7.4	10	7.1	8	7.1	35	7.2
Hot Springs	6	2.6	-	-	-	-	6	1.2
Sight-Seeing	49	21.4	27	19.1	39	34.5	115	23.8
Passing Through	8	3.5	10	7.1	17	15.0	35	7.2
Scenery, Natural Beauty	4	1.7	5	3.5	5	4.4	14	2.9
Business	16	7.0	2	1.4	3	2.7	21	4.3
Swimming	2	0.9	-	-	-	-	2	0.4
See Alcan	1	0.4	-	-	-	-	1	0.2
Visit Cabin	1	0.4	-	-	-	-	1	0.2
Other	1	0.4	2	1.4	1	0.9	4	0.8
No Response	1	0.4	-	-	-	-	1	0.2
TOTAL	229	100.0	141	100.0	113	100.0	483	100.0

TABLE 5:10

THE INDICATED HIGHLIGHTS OF THEIR VISIT TO THE PRINCE RUPERT-KITIMAT REGION BY VISITORS TO LAKELSE LAKE ACCORDING TO RESIDENT CATEGORY - 1973

	B.C. Non-Resident		Canadian Non-B.C.		Non-Canadian		Total Non-Residents	
	No.	%	No.	%	No.	%	No.	%
Fishing	34	16.7	21	17.8	16	15.5	71	16.7
Swimming	16	7.8	1	0.8	4	3.9	21	4.9
Scenery, Natural Beauty	81	39.7	60	50.8	55	53.4	196	46.1
Lack of Crowdedness	13	6.4	8	6.8	11	10.7	32	7.5
Alcan Tour	8	3.9	6	5.1	4	3.9	18	4.2
Hot Springs	23	11.3	7	5.9	2	1.9	32	7.5
Fish Cannery	-	-	2	1.7	-	-	2	0.5
Lakelse (campsite, lake, beach)	3	1.5	6	5.1	2	1.9	11	2.6
Wildlife	8	3.9	3	2.5	5	4.9	16	3.8
Airshow	2	1.0	-	-	-	-	2	0.5
No Response	16	7.8	4	3.4	4	3.9	24	5.6
TOTAL	204	100.0	118	100.0	103	100.0	425	100.0

however, is the effect that a tourist industry would have on investment in local service facilities. An influx of visitors to the region each year would increase the region's ability to support a more complex service industry.[41] It would attract businessmen to invest in service facilities not presently available in the region. An increase in the region's service facilities would make the region a more attractive place to live and would increase the proportion of expenditures devoted to locally produced goods and services.[42]

It is difficult to predict precisely what the development of a tourist industry would do for the region. Despite this, it is worth noting that there are many desirable aspects to this type of development. The type of tourist which the region would attract would not be significantly different from those who currently visit the region. Many of the visitors would be campers. This suggests that provincial and local authorities will have to make substantial investment in nature parks, trailer parks, camper accommodation and other outdoor recreational facilities. This should increase the resident's enjoyment of the area. More importantly, it will probably increase the regard the local resident has of his region. A resident could be expected to attach some significance to the fact that a stranger is willing to spend both time and money for the privilege of staying longer in the region to enjoy many of the attributes he probably takes for granted. Once more, it is worth noting that at least one recent economic study indicates that the expenditures made by campers generates more local income than expenditures made by other types of tourists.[43] One other potential benefit which is related to the

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41 It was noted earlier when comparing the service facilities of different British Columbia communities that those communities which cater to tourists during the summer months appeared to have more adequate service facilities.

42 Once a service industry is established it could be expected that most of those individuals who formerly visited Vancouver on shopping trips would find it more convenient to purchase locally.

43 The reason given for this was that hotels and motels are usually supplied by wholesalers located outside the region. B. H. Archer and Christine B. Owen, "Towards a Tourist Regional Multiplier", Regional Studies, 1971, vol. 5, pp. 289-294.

type of tourist who will visit the region is the type of employment which this type of industry will create. The Prince Rupert-Kitimat Region has a large indigenous population. Many lived in the Prince Rupert-Kitimat Region long before pulp and paper mills or even the logging industry were established. An industry which caters to visitors might create employment opportunities more in line with the skills and abilities of the region's indigenous population.[44] For example, individuals not necessarily suited to working in a mill might be willing and capable of working as a hunting or fishing guide. The development of a tourist industry should increase the employment opportunities for many of those not suited to the type of employment presently available in the region.

Developments of any type usually have both good and bad points. No doubt the development of a tourist industry will have some undesirable aspects. One possible source of irritation might be the unwillingness of local residents to share their favourite fishing spots, favourite hunting areas, or Lakelse Lake. This is a cost to those residents of the region who do not wish to share their recreational resources with "outsiders". Despite this, it should be noted that a program to encourage a tourist industry cannot be conducted by one municipality in isolation from other municipalities in the region. Visitors to one area will use the facilities available in another. Tourists travelling by ferry to Prince Rupert via Vancouver Island will pass through Terrace and will probably visit Kitimat. This suggests that a solution encompassing much more than just a single municipality or a single area is required to solve the region's growth problem. Moreover, it also points to the need for administrators to be aware that tourism is only one of a number of possibilities which may help to improve the growth efficiency of the region.

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44 Two Indian craft shops have been developed in the general area which points to the employment opportunities which a tourist industry would create. Indian craft shops have been established at both Ksan and Moricetown Falls which cater to tourists visiting the area during the summer period. Both of these establishments are owned and operated by Indians living in the area.

Summary

The problem which this chapter identifies as an impediment to social and economic growth in the Prince Rupert-Kitimat Region does not readily lend itself to rigorous analysis. Much of the information used to support the argument presented here is obscure and difficult to quantify. This is partially due to the difficulties encountered when trying to interpret human behaviour or grade qualities which are mainly a matter of personal opinion. It also reflects the problem of gathering information on sparsely populated areas and the general lack of research on this particular aspect of growth. Nonetheless, it would seem reasonable to conclude that the Prince Rupert-Kitimat Region has been unable to attract and maintain a population core commensurate with the labour force requirements of its industry. This is economically wasteful and contributes to the local industry's costly labour force turnover problem. Many of the region's residents consider the region an unattractive place to live and this is mainly due to the fact that both private and public agencies have failed to be concerned with making the Prince Rupert-Kitimat Region an attractive place to live. It would appear that the two senior levels of government have been overly concerned with encouraging production oriented types of investment and have not devoted enough attention to encouraging the establishment of service facilities which detract from the inconvenience of living in northern locations or add to the recreational alternatives available to local residents. Local government has not helped to encourage people to remain in the area and private enterprise often behaves in a manner which contributes to this problem. In short, it appears that the inconveniences associated with living in northern British Columbia detract from the attractiveness of the region as a place to live and that the Lakelse Lake situation is just one symptom of this overall problem.

The tourist program which is put forth in this chapter is only one of a number of possibilities which might help overcome some of the

region's social and economic growth problems. It does seem well-suited to the needs and requirements of the region, but it should be cautioned that this type of solution depends upon the cooperation of both public agencies and private corporations which are in a position to influence the region's development. Moreover, it should be noted that tourist development is not an end unto itself but it does provide a mechanism whereby the roots of the problem may be attacked. Natural endowments such as Lakelse Lake take on a much more visible value when residents of the area observe visitors travelling thousands of miles to participate in outdoor recreational activities which are readily available to them. The problem is not to create new values, but to encourage those who are in a position to influence future development to preserve those that are already present.

British Columbia and the Prince Rupert-Kitimat Region's economic development is overwhelmingly dependent upon resource extraction and resource processing. This makes it imperative that British Columbia's population growth is distributed throughout the province where natural resources are available and where the need for labour is greatest. This would contribute to the province's social and economic growth and help to ensure adequate future economic development. Government agencies and business enterprises located in the Prince Rupert-Kitimat Region should recognise that it is in their best interests to make the region an attractive place to live. Their objectives should be to create a life that is bearable, that is viable, in which people who are young and those who are old have a place to live without foregoing the conveniences normally associated with the more densely populated areas of the province. Once it is decided that Lakelse Lake and surrounding area should be maintained so that it will provide quality recreation for present and future generations, one small positive step towards this goal will have been taken.

CONCLUSION

Lakelse Lake is a very valuable common property resource. It is important to Canadians and to all British Columbians, especially those living in the Prince Rupert-Kitimat Region. Lakelse Lake's importance to the resident population is enhanced considerably by the shortage of alternative recreational opportunities in northern British Columbia. Residents of the Prince Rupert-Kitimat Region enjoyed more than 3,000,000 leisure hours, 800,000 leisure days, participating in recreational or leisure-time activities on or near Lakelse Lake during 1973. Nearly 88 percent of Terrace households, 82 percent of Kitimat households, and slightly over 54 percent of Prince Rupert households visited Lakelse Lake for recreational purposes during that year. Individuals from every income level, every occupational category and every age group visit Lakelse Lake for recreational purposes. Lakelse Lake is also an important camping or resting place for non-residents during the summer. Over 6,000 non-resident parties spent over 100,000 activity hours on or near the lake during 1973.

Even though Lakelse Lake's importance is tied inextricably to recreationally related activities, it is also of commercial importance. Lakelse Lake is used for sewage disposal, transportation, human and animal consumption and as a seaplane base. The net economic and social benefits that are associated with each of these activities are not necessarily large or even positive. In fact, the costs associated with using Lakelse Lake for sewage disposal are high and are imposed on the entire population of the region, while the benefits generated by this activity are small and benefit only those individuals who choose to dump sewage directly into the lake. It is estimated that the benefits generated in the commercial fishing industry by the Lakelse Lake watershed amount to approximately $1,737,000 annually. This, in turn, implies that the salmon spawning and rearing capacity of the Lakelse Lake watershed, discounted at 8 percent per annum to the year 2000, has a value of approximately $24,000,000.

There are many different methods of assessing the economic value of outdoor recreational benefits. The one considered most suitable for determining the economic importance of Lakelse Lake is the Pearse consumer surplus method. Using this method it was conservatively estimated that the annual recreational value of Lakelse Lake to Terrace residents is approximately $2,631,800; that Lakelse Lake's annual recreational value to residents of Kitimat is at least $968,500 and its annual recreational value to Prince Rupert residents is $1,509,800. Lakelse Lake property owners receive annual benefits of approximately $322,100. It is estimated that residents of the Prince Rupert-Kitimat Region receive approximately $5,848,600 worth of recreational or leisure-time benefits from Lakelse Lake each year. The present discounted value of this stream of annual benefits, discounted at 8 percent per annum to the year 2000, is $101,641,000. In addition, non-residents do spend money in the region as a result of visiting Lakelse Lake. British Columbian non-resident parties spent $51.60 per visit during 1973; Canadian non-British Columbian parties spent an average of $60.20 per visit and during that same year non-residents spent an average of $62.90 per visit.

The importance of Lakelse Lake's recreational activities is further revealed by the attitudes and opinions of the resident population. The leisure-time activities which individuals indicated were least available to them as residents of the region were also the activities which residents participate in while visiting Lakelse Lake. More than 70 percent of all those who visited Lakelse Lake during 1973 consider Lakelse Lake to be either extremely important or very important to them as residents of the area. Moreover, virtually all property owners indicated that they purchased their property on Lakelse Lake for recreational or leisure purposes.

If Lakelse Lake is to survive then all future development in and around the lake must be planned in a manner which safeguards both the environmental quality of the lake's water and the physical attractiveness

of the lake as a recreational area. The planning and the development of Lakelse Lake must be based on the concept that it has a limited, and identifiable, capacity to accommodate shoreline and water-oriented activities. The amount and type of activities which are carried out on Lakelse Lake should be assessed with specific policy goals in mind. The policy goals outlined in this presentation were that all future development should proceed in a manner which: (1) protects the physical environment of the lake and its water; (2) maintains a density of use which will be considered attractive by recreationalists; (3) meets the needs of a broad cross-section of the resident population; and (4) does not impose personal costs on individuals who currently own property around the lake or other segments of the resident population. The acceptance of these four policy goals, in turn, implies that in future no logging should take place around Lakelse Lake or its related waterways. The development which does take place should make adequate provision for waste and sewage disposal so that it does not deteriorate the innate physical quality of the lake. Steps should be taken to ensure that all segments of the population share equally in the recreational opportunities provided by what is essentially a publicly owned resource.

The problems associated with maintaining Lakelse Lake are symptomatic of a more general problem which prevails in northern British Columbia. Neither government agencies nor private enterprise devote enough attention to encouraging the establishment of service facilities which would alleviate the inconvenience of living in northern locations or add to the recreational alternatives available to the resident population. The two senior levels of government frequently devote too much attention to building roads, railways and other production-oriented development. Local government does not take an active role in helping to encourage people to remain in the district. Private enterprise often behaves in a manner which detracts from the welfare of the resident population. In short, government agencies and private enterprise should recognise that it is in their best interests to make northern British Columbia a more

attractive place to live. Lakelse Lake, for many, contributes to the attractiveness of living in the Prince Rupert-Kitimat Region. Thus, it is in the best interest of agencies in both the public and private sectors to make adequate provision for the future well-being of Lakelse Lake.

APPENDIX I

Sources of Data

Most of the statistical information provided in this report was developed from surveys conducted during the summer and fall of 1973. In this regard, three surveys were carried out during that period. The first, and perhaps most important, was the telephone survey which was conducted mainly during May and June in Kitimat, Terrace and Prince Rupert.[1] Second, there was an on-site or shoreline survey carried out daily throughout the summer. Third, a mail survey of Lakelse Lake property owners was conducted during the fall. A general description of these surveys and the methodologies employed are presented below.

Telephone Survey

The telephone survey was intended to establish the size of the population resident to the Prince Rupert-Kitimat Region who used Lakelse Lake on a regular or casual basis. The procedure involved selecting a number of names and telephone numbers at random from the appropriate municipal telephone directory (municipal directories were not available). The number of names drawn in this survey was proportional to the population of the municipality. The total number of persons and the percentage of the population surveyed in each of the sampled municipalities is shown in Table I:1. As shown in Table I:1, 4,757 of the estimated 42,458 residents living in the Prince Rupert-Kitimat Region were included in the survey. This represented over 11 percent of the households in the region.

For the purposes of the telephone survey it was necessary to ensure that the enumerators were consistent in their approach. A great deal of

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1 The three municipalities of Kitimat, Terrace and Prince Rupert contain approximately 90 percent of the Prince Rupert-Kitimat Region's total population.

TABLE I:1

TOTAL NUMBER OF PERSONS AND

PERCENTAGE OF POPULATION SURVEYED - 1973

(Telephone Enumeration)

	Total No. of Households Contacted	Total No. of Uncooperative Households	Total No. of Cooperative Households Contacted	Total Population*	Total No. of Persons In Cooperative Households	Percentage of Population Contacted
Terrace	343	7	336	13,885	1,321	9.5
Kitimat	418	14	404	11,803	1,594	13.5
Prince Rupert	522	12	510	16,770	1,842	10.0
TOTAL	1,283	33	1,250	42,458	4,757	11.2

* Statistics Canada 1971 Census.

care was taken to ensure that the information gathered was precisely what was necessary for the study. The enumerators were asked to guard themselves against developing habits which might detract from the validity of the results. The enumerators always worked together in pairs. In this way one person was able to monitor or listen to the other person and make suggestions or necessary corrections to their procedure as they went along. This helped to avoid some of the problems associated with deviating from the assigned procedure.

Enumerators were given the following instructions:
"It is intended that all telephone enumeration will take place between 6:00 and 7:30 p.m. Monday, Tuesday and Wednesday each week the surveys are conducted. Telephone enumeration is not to be carried out on Thursday or Friday, although 'try agains' might be carried out in the afternoon any day of the week. Suggested format is as follows: Telephone enumerators shall phone the number on the list and shall say "This is _____, I am a research assistant with the Kitimat-Stikine Regional District. I would like to take a moment of your time to ask a few short questions." The questions are as follows:

1. How many times each year do members of your household visit Lakelse Lake?
2. What, in order of importance, are their three main reasons for visiting Lakelse Lake? Scenic beauty, picnicking, swimming, fishing, water-skiing, skidoing, etc.
3. How many members of your household sport fish?
4. What is your favourite fishing location in the Prince Rupert, Kitimat and Terrace area?
5. How many persons live in your household?

If the interviewee answers 'yes' to question 3 then ask them question 4 and 5 in order. If, on the other hand, the interviewee answers 'no' to question 3 then omit question 4 and ask question 5. The enumerator should initiate each phone call by

asking for the head of household and should end each telephone call by thanking the individual for his and her time and co-operation."

The three basic rules for the telephone survey were:

1. Politeness
2. Speak in a clear concise voice - it is absolutely necessary that this be done because a person who is interrupted by a telephone conversation which is not personally directed to them and by what essentially is an invasion of privacy by telephone will terminate the conversation immediately if they do not understand what the conversation is about.
3. It is absolutely essential that when there is no answer that all 'no answers' be tried again several times. Every possible effort should be made to contact the persons by telephone when their name is drawn on the sample. 'Try agains' should be tried at least twice in the evening and then perhaps try the next day during the afternoon.

Lakeside Survey

While the telephone survey enabled estimation of the total population visiting Lakelse Lake, it did not help to identify the type of activities which were carried out on the lake nor did it provide a basis for estimating the number of non-residents who visit the lake. The lakeside survey was used to develop this information.

Table I:2 shows the number and percentage of parties enumerated in the lakeside survey according to location of their interview and permanent place of residence. The vast majority of the interviews were conducted in the campsite at Furlong Bay (see Map 2). In fact, only 195 parties were interviewed at the picnic site.

TABLE I:2

NUMBER AND PERCENTAGE OF SURVEYED PARTIES ACCORDING TO LOCATION OF INTERVIEW AND PERMANENT PLACE OF RESIDENCE - 1973

	Furlong Bay		Picnic Site		Oli's Place		Hot Springs		Beam Station		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Terrace	194	28.5	97	49.7	21	32.8	5	83.3	6	75.0	323	33.9
Kitimat	160	23.5	47	24.1	33	51.6	-	-	-	-	240	25.2
Prince Rupert	68	10.0	22	11.3	5	7.8	1	16.6	1	12.5	97	10.2
Lakelse Lake	1	0.1	2	1.0	1	1.6	-	-	-	-	4	0.4
B.C. Non-Resident	119	17.5	19	9.7	3	4.7	-	-	1	12.5	142	14.9
Canadian Non-B.C.	75	11.0	4	2.1	1	1.6	-	-	-	-	80	8.4
Non-Canadian	64	9.4	4	2.1	-	-	-	-	-	-	68	7.1
TOTAL	681	100.0	195	100.0	64	100.0	6	100.0	8	100.0	954	100.0

Table I:3 shows the number and percentage of day and overnight surveyed parties according to permanent place of residence. The information provided in this table indicates that 539 overnight visitor parties and 415 day visitor parties were interviewed in the on-site survey. A comparison between Tables I:2 and I:3 reveals that a substantial number of day visitor parties were included in this survey. It further reveals that only a small percentage of the day visitor parties were actually interviewed at the picnic site.

In each situation, wherever possible, the enumerator directed his questions to the oldest member of the visiting party. In the vast majority of cases this meant the father or the head of household member of the group. However, in those situations where the husband or wife were not present, the enumerator was instructed to record answers which reflected the opinions of all members of the recreational party. This did not appear to create a problem because most individuals visit the lake in family groups.

It is estimated that 3,406 of the nearly 18,565 (18.4 percent) visitors to Lakelse Lake during 1973 were included in the survey.

Mail Survey

In addition to the telephone and lakeside survey, a mail survey was carried out among Lakelse Lake property owners during August and September of 1973. The results of this survey are shown in Table I:4. Table I:4 shows that a useable return of 83.7 percent was generated in this survey.

Each of the 250 Lakelse Lake property owners was sent the original questionnaire. If an answer was not received within one week, a follow-up questionnaire was sent. A total of four reminders was sent to each property owner who did not respond to the previous send. The series of

TABLE I:3

NUMBER AND PERCENTAGE OF DAY AND OVERNIGHT SURVEYED PARTIES ACCORDING TO PERMANENT PLACE OF RESIDENCE - 1973

	Day Visitors		Overnight Visitors		Total	
	No.	%	No.	%	No.	%
Terrace	195	47.0	128	23.7	323	33.9
Kitimat	129	31.1	111	20.6	240	25.2
Prince Rupert	31	7.5	66	12.2	97	10.2
Lakelse Lake	3	0.7	1	0.2	4	0.4
B.C. Non-Resident	30	7.2	112	20.8	142	14.9
Canadian Non-B.C.	20	4.8	60	11.1	80	8.4
Non-Canadian	7	1.7	61	11.3	68	7.1
TOTAL	415	100.0	539	100.0	954	100.0

TABLE I:4

RESULTS OF LAKELSE LAKE PROPERTY OWNERS MAIL SURVEY - 1973

Total Property Owners	Total Number With No Forwarding Address	Total Number of Sends	Total Returns Property Used Year-Round	Total Returns Property Used on Seasonal Basis	Total Returns From Absentee Owners	Percentage of Useable Returns to Total Sent
250	23	227	34	148	8	83.7

follow-up questionnaires was accompanied with covering letters explaining what the survey was for and how the information gathered in the survey would be used. Excellent cooperation was received from the property owners as virtually all returns were received by the third reminder. Chi-square tests were performed on the relationship between timing of response and the number of days each year devoted to recreational activities on Lakelse Lake. These tests were conducted to determine if there was a response bias in the mail return. The tests proved negative, therefore, no response bias was revealed.

The Quality of the Survey Results

The data are subject to certain surveying and sampling error. For instance, in a mail survey there is practically always some problems which result from the interpretation respondents apply to certain questions. Lakeside or shoreline surveys nearly always encounter some randomness problems and mail surveys also have randomness problems and poor returns. In the surveys conducted for this study, every precaution was taken to safeguard the accuracy of the information gathered. All three surveys were subject to careful scrutiny and the information gathered was tested for response bias. Good sampling return and excellent cooperation was experienced in all three surveys. Thus, it is felt that the information used in this study is reasonably reliable and accurate.

APPENDIX II

Introduction

An investigation of the limnology of Lakelse Lake, in the Skeena River drainages basin, was undertaken by the Fisheries and Marine Service (Habitat Protection Unit of the Northern Operations Branch) during 1972 and 1973 to deduce and document the possible degree of eutrophication.[1] Limnology, for the purpose of this investigation, was considered in the broadest terms to include nutrient studies as related to lake primary production, lake morphometry, and temperature regime only as it was not financially possible to investigate the total chemical and physical limnology. The form this summary will take is to examine the (1) lake morphometry, (2) fishery, (3) nutrients, (4) temperatures, (5) pollution, (6) logging, and ending with a brief discussion of the (7) lake trophic level.

Lake Morphometry

Morphometric parameters are of fundamental importance in all aquatic situations. They influence the productivity of the lake and are basic parameters of all limnological problems. The depth contours (1949) are plotted on the outline map Figure II. Mean and maximum depth are 7.9 m. and 31 m. respectively. The lake has an area of 14.17 sq. km. and a volume of 108×10^6 cubic meters.

The maximum length and width are 8.7 km. and 2.4 km. respectively. Shoreline development (relation of shore length to the circumference of a circle equal in area to that of the lake) is not great at 1.83. The flushing period, or that time required for an amount of water

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1 The eutrophication of waters means their enrichment in nutrients and the ensuing deterioration of their quality due to the luxuriant growth of plants with its total effect on the overall metabolism of the waters involved. Euthrophic is very rich in nutrients, oligotrophic is very sparse in nutrients, mesotrophic is mid point between eutrophic and oligotrophic.

equal to the lake volume to pass through its outlet, is a significant limnological parameter in this study. The exchange rate is computed at:

$$\frac{\text{Lake volume}}{\text{Flow}} = \frac{87{,}555 \text{ Acre feet}}{554{,}800 \text{ Acre feet/yr.}} = 0.157 \text{ yrs. or } 58 \text{ days}$$

Fishery

Five salmonid species utilise the Lakelse River watershed to some extent. The ten year average adult escapement (1961-70 inclusive) is as follows: Pinks - 625,000; Coho - 30,000; Sockeye - 13,600. Chinook and chum data is incomplete but each average escapement would be in the order of 100 - 300 fish. The bulk of the sockeye escapement spawn is in Schulbuckhand, Williams, and Sockeye Creeks. Hatchery Creek was an important tributary (in the past) but through flood control modifications, now has very limited numbers of fish in the creek. Evidence of beach spawning on Lakelse Lake itself has not been observed at any time. Other small streams in the watershed are minimal in importance as spawning grounds.

Nutrients

Nutrient sampling was carried out twice during September and November 1972 and seven times from March to October 1973. Lake and stream water samples were collected from 23 stations, (see Figure I). The number of samples taken per station varied with the depth at each site. At inshore shallow stations only one surface sample was taken, at intermediate depths surface and bottom samples were taken, and at the lake's deepest station (Station 5, 30 meters) six samples were taken. One litre water samples were collected with a Nansen bottle, preserved with 5 ml/l. of chloroform and frozen, or immediately frozen, and sent to the Cypress Creek Laboratory in Vancouver for analysis. The nutrients measured were ammonia, nitrate-nitrite, and phosphates. Analytical results are recorded in Information Sheet I.

The period of highest average lake nitrate-nitrite concentration was on June 5, 1973 at 0.029 mg/1 per sample. The period of highest nitrogen input from the hot springs canal was on September 3, 1973, with a high of 0.76 mg/1, a low of 0.09 mg/1, and an average of 0.45 mg/1 for all four hot spring sample stations.

The period of highest average lake concentrations of phosphorus was on September 3, 1973 at 0.056 mg/1 per sample. The highest input from the hot springs canal was on August 13, 1973, with a high of 0.50 mg/1, a low of 0.03 mg/1, and an average of 0.30 mg/1 per sample site. Concentration levels at the Williams Creek outlets also were relatively higher on September 3, 1973.

Collections of nitrogen as ammonia were analysed on a complete sample circuit twice, in August and September 1973. The period of highest average lake concentrations of ammonia was August 13, 1973, at 0.044 mg/1. The hot springs canal also was highest during this period with a high of 2.200 mg/1, a low of 0.080 mg/1, and an average of 1.455 mg/1 throughout the canal.

Temperatures

Detailed temperature profiles from each visit are presented in Information Sheet II. Maps of vertical temperature gradients are shown in Figure III. Lake temperatures were taken at three sample sites (1, 4 and 5) using a telethermometer and recorded at every meter. The lake was generally isothermal during the sampling periods. Maximum observed stratification was $5^{o}C$ on August 13, 1973. The lack of well-defined stratification in Lakelse Lake is probably due to the shallow depth and the strong southwesterly winds.

Pollution

Pollution from the various residential and tourist components

are unknown at this time. When proper sewage system design and installations are adhered to, adverse effects on water quality should be minimal. Some design criteria of the recent past are in need of major revision. Control parameters such as area drainage size, loading concentration, soil permeability and slop have not been fully considered. With facilities situated in such close proximity to the lake shore some form of rigid inspection should be undertaken. The use of dyes flushed down toilets could aid in indicating any possible leakage of the present facilities now in use. Public education of the effects of phosphate soaps, fertilisers, etc., on their local environment should be undertaken.

Mention has been made of the remains of a fish counting fence on the upper Lakelse River which has reduced velocities on the river and caused to some degree an impoundment of the lake. Some residents feel that removal of the fence would facilitate a more rapid drainage of the lake resulting in less flooding of their properties. However, such removal could possibly commence a scouring action of the river bed upstream to Lakelse Lake itself, one end result being a quagmire for waterfrontage on the lake.

Logging

In the past years, extensive logging operations have been undertaken in the Lakelse Lake area. Immediately after such forest harvesting certain factors can result. The decay of slash materials may increase nutrient loads to a certain degree. As the lake is in a partial west coastal climatic zone of heavy precipitation, deforestation may result in temperature increases in the stream during periods of low summer flow and freezing of spawning grounds during the winter. The loss of cover can adversely affect timing and quantity of the watershed runoff to the lake, increasing erosion and thereby inducing stream turbidity and sedimentation. The snowpack itself may melt at an accelerated rate when the forest canopy is removed, increasing the chances of uncontrolled spring runoff flows and a loss of watershed storage for later months.

The annual rate of cut of the Lakelse Lake watershed is presently reduced from previous years. This decrease in deforestation will lessen the nitrogen nutrient input into Lakelse Lake and help to decrease the trophic level of the lake.

Trophic Level

Nutrient loading into Lakelse Lake could only be measured at two sources, the inflowing streams and the hot springs canal. Nutrient leaching from the shoreline could not be estimated. Nutrient loading from the streams is computed at 0.019 grams of phosphorus per square meter of lake. The hot springs canal loading is computed at 0.02 grams of phosphorus per square meter of lake, which is as much as all the streams combined. However, these figures are based on the entire summer. According to the Environment Directorate (1971) loading should be computed for spring nutrient input when nutrient loading should be at a peak. If we considered only spring values the nutrient input would be much lower indicating, therefore, that the peak nutrient input comes during the summer.

The nutrient input of the streams (0.019 gms. P/m^2) indicates low enrichment from the watershed as a result of deforestation and natural soil leaching. If only spring values are considered, the nutrient input is only slightly higher at 0.022 gms. P/m^2. Phosphorus input at this level (0.019 - 0.022 gms. P/m^2) would likely produce an oligotrophic lake.

The Lakelse Lake hot springs canal had the greatest detected nutrient input during the sampling period. The nutrient input into the lake from the canal increased during midsummer, when the greatest recreational use of the area occurs.

The combined total loading of the streams and the hot springs is 0.039 grams of phosphorus per square meter, which is also a low enrichment level. Therefore, the majority of nutrient input must come from

another source. The only other reasonable source is from shoreline leaching. Estimates of the amount of input from this source is impossible to measure due to the constant mixing in the lake and the rapid exchange rate. If it were not for these two factors the trophic level of the lake would be much higher, possibly eutrophic.

The source of nutrients from the shoreline appears to increase in midsummer in conjunction with the influx of recreational activities. Estimates (from W. Sinclair) of the human population at Lakelse Lake are 43 permanent residences and 100 seasonal residences (each with an average of 4 people), 161,965 overnight visitors, and 258,815 day visitors. Estimating phosphorus input for only the overnight visitors at 10 ppm. total phosphorus and 25 gallons of water per person per day would equal a total summer loading of 2.2×10^3 Kgms. If the total nutrient input from all the above sources are estimated the total impact on the trophic level of the lake can be appreciated. The problem would be compounded if the lake did not totally exchange its entire water mass 1 2/3 times during this period.

Conclusion

Lakelse Lake is a relatively small, warm water lake. It is utilised by substantial numbers of all five salmonid species, and since it is the only warm water lake in the area, has a relatively large recreation potential.

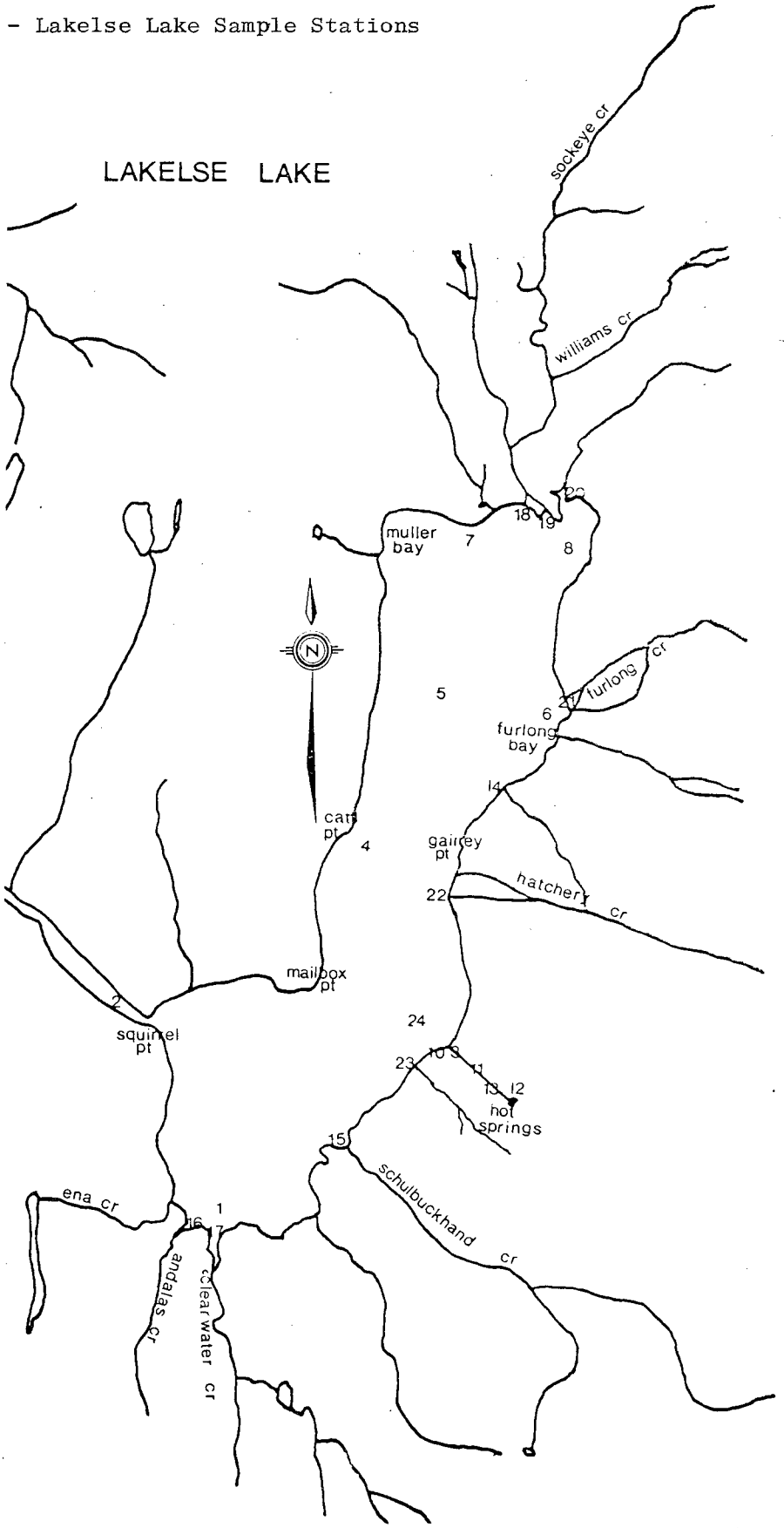
Current evidence does not indicate the exact source of nutrient loading, but shows that the streams have a low nutrient input and that the hot springs canal has a summer loading greater than all the streams combined. However, these two sources still do not have a substantial nutrient input, therefore, a third source (shoreline leaching) must be considered. Extrapolating the human population and nutrient input indicates that an appreciable amount of nutrients could come from this source.

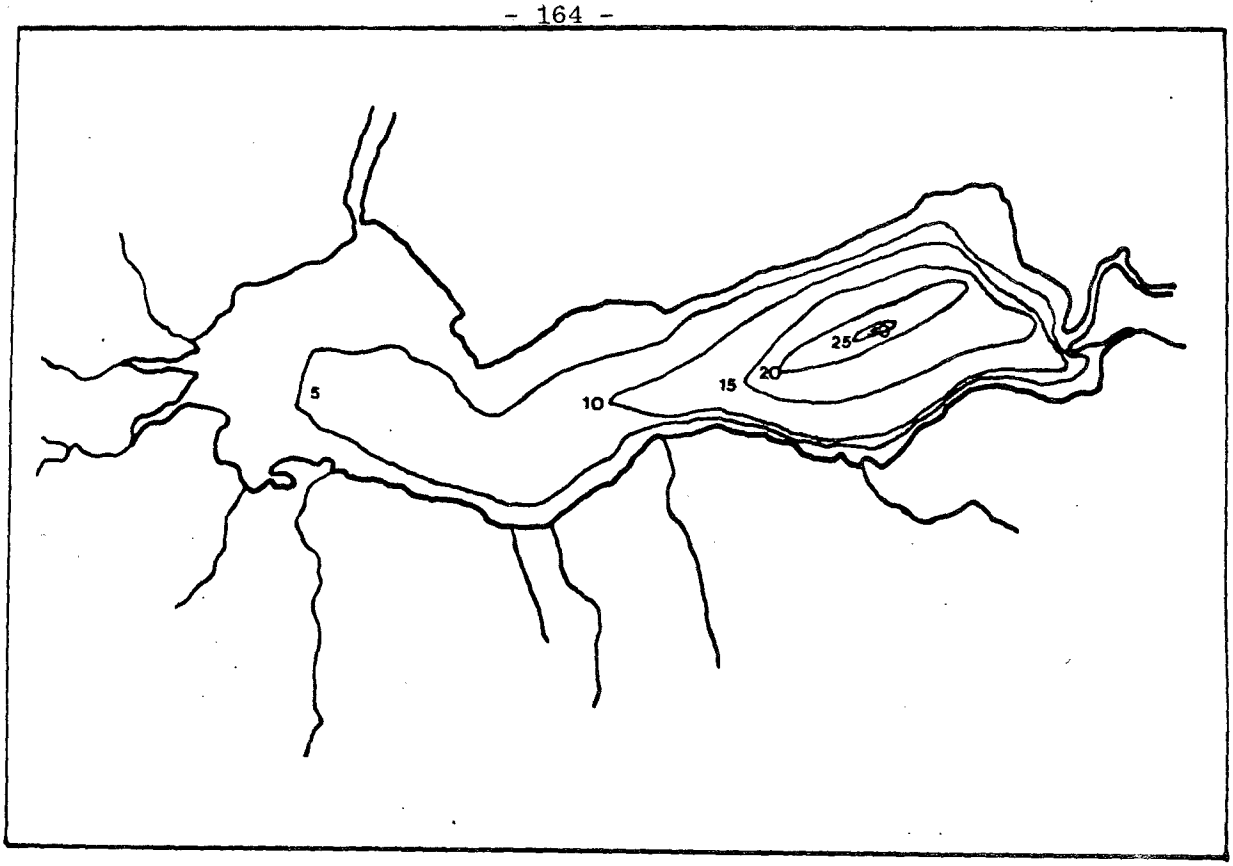
In conclusion, although absolute evidence is not present, the recreational activities on the lake or lake shore must be considered as having the major influence on the lake trophic level. If the water exchange rate were less it is very likely that the lake would have a luxuriant growth of plants with its repercussions on the lake metabolism. Therefore, unless some adequate measures are taken to regulate present development, the trophic level will increase and eventually cause severe eutrophication within the lake.

R. A. McIndoe and W. Knapp
Habitat Protection Unit,
Northern Operations Branch,
Fisheries and Marine Service

April, 1974.

Figure I - Lakelse Lake Sample Stations





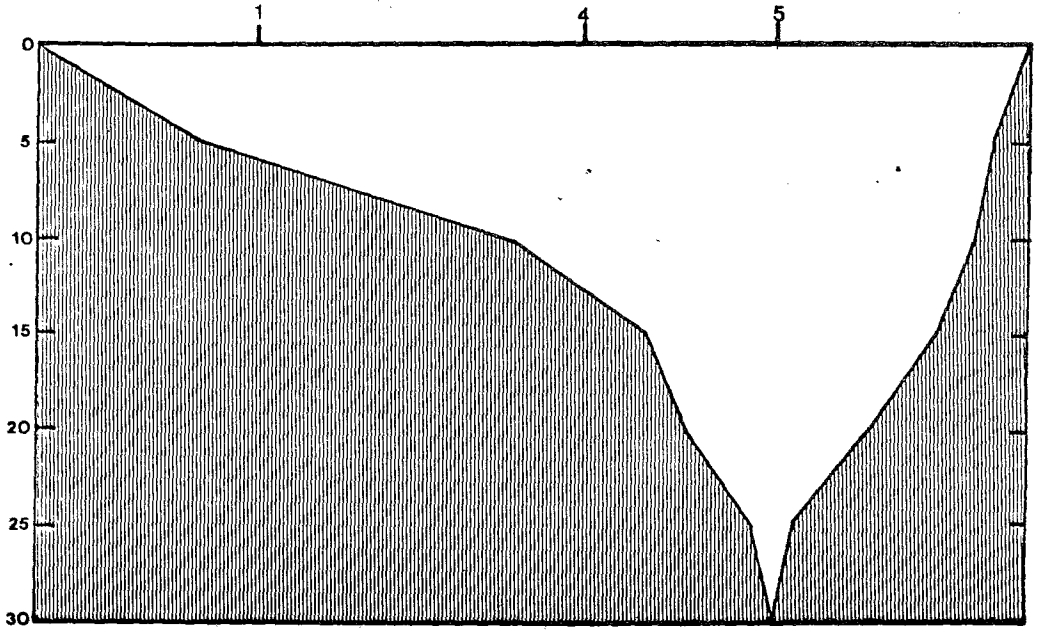
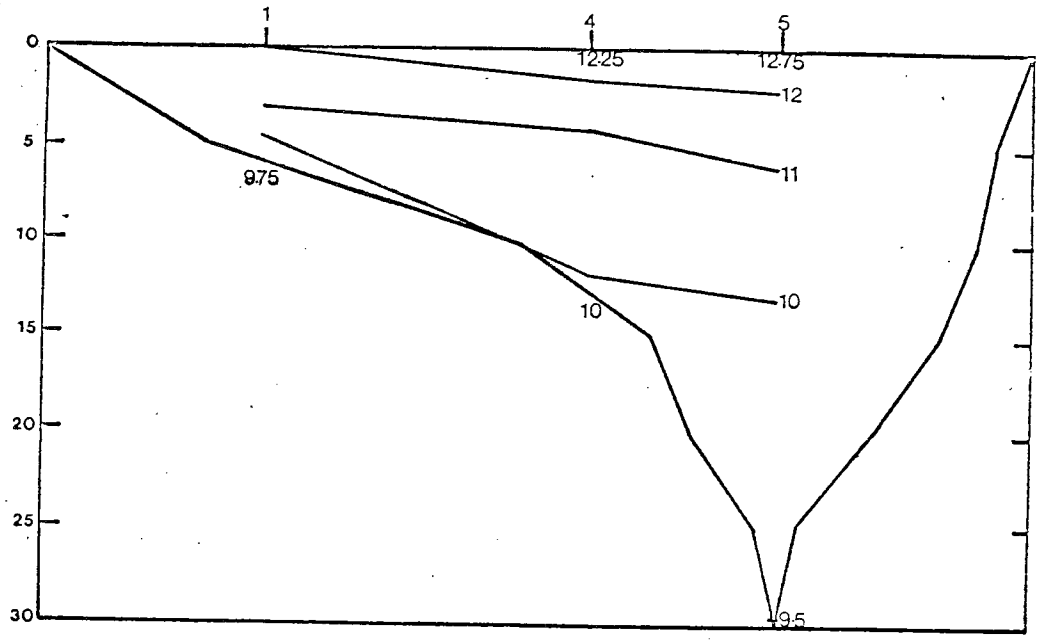
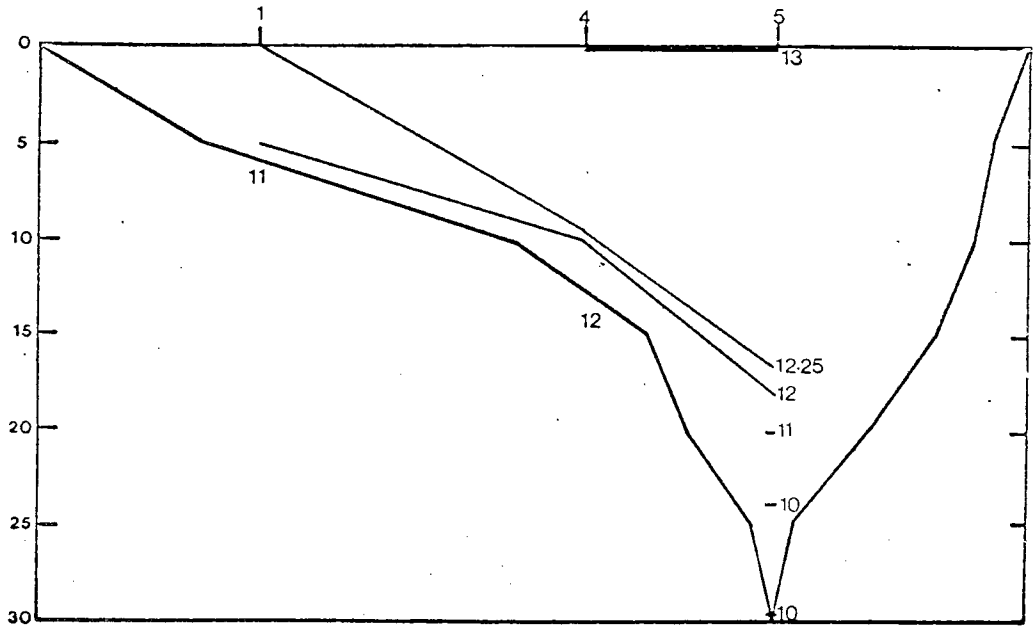


Figure II - Lakelse Lake Morphometry

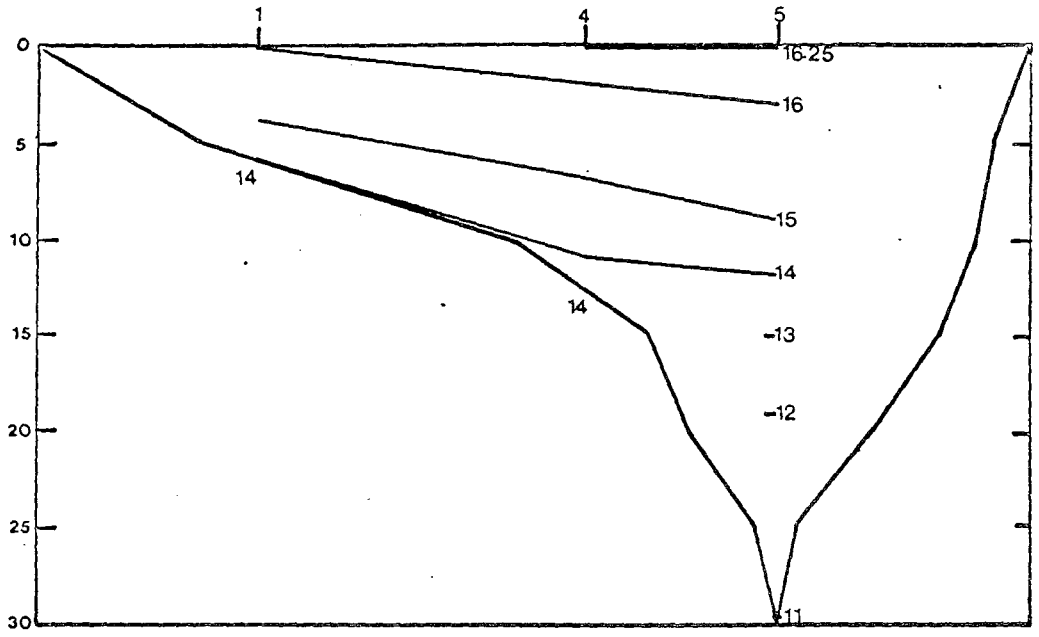
Figure III - Thermal Regime



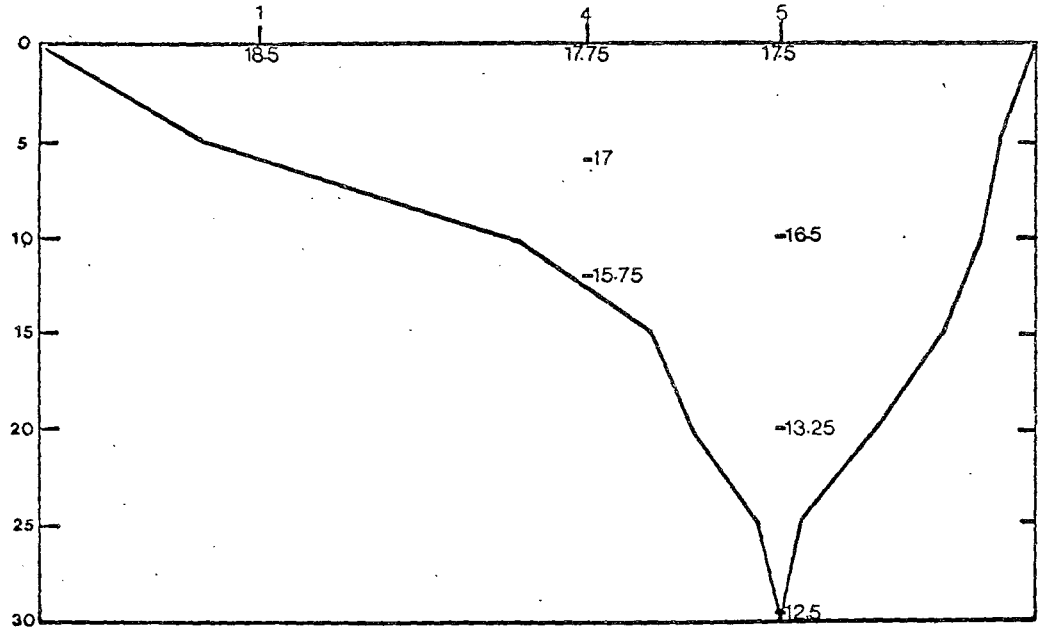
June 15, 1973



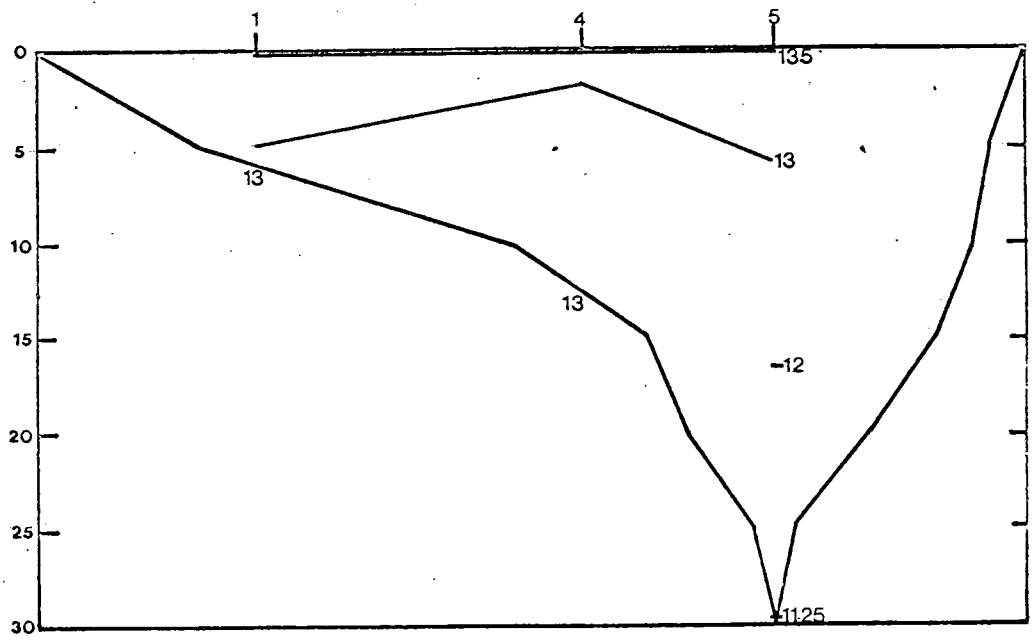
July 4, 1973



July 24, 1973



August 13, 1973



September 13, 1973

INFORMATION SHEET I

Lakelse Lake Nutrient Analysis (in figures)

SITE	DATE	Surface NH_3-N	NO_2-N	NO_3-N	OPO_4-P	TPO_4-P
1	Sept 11/72	.07	<.01	<.2	<0.010	0.03
2		< .07	<.01	<.2	<0.010	0.01
3		.08	<.01	<.2	0.010	0.03
4		< .07	<.01	<.2	<0.010	0.02
5		< .07	<.01	<.2	<0.010	0.01
6		< .07	<.01	<.2	<0.010	0.03
7		< .07	<.01	<.2	<0.010	0.03
8						
9		< .07	<.01	<.2	0.012	0.06
10						
11		.51	.025	<.2	<0.010	0.11
12						
13						
14						
		- - - - - - - - -				
1	Nov. 11/72					
2						
3		.01	<.01		< .01	.01
4						
5						
6						
7						
8						
9						
10		.03	<.01		< .01	.01
11		.17	<.01		.01	.06
12		.17	<.01		≤ .01	.08
13		.39	.01		.05	.24
14		< .01	<.01		≤ .01	.02
		- - - - - - - - -				

Surface

SITE	DATE	NH_3-N	NO_2-N	NO_3-N	OPO_4-P	TPO_4-P
1	Mar. 31/73					
2						
3		.120	<.008	.025	< .02	< .02
4						
5						
6						
7						
8		.047	<.008	<.015	< .02	< .02
9						
10		.055	<.008	.033	< .02	.03
11		.185	<.008	.140	< .02	.064
12		1.000	<.008	.030	< .02	.105
13		.082	<.008	.25	< .02	.03
14						

- - - - - - - - -

SITE	DATE	DEPTH(M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
1	June 14/73	0		0.04	<.02	< .01
		2		0.04	.0368	.066
2		0		0.02	<.02	< .01
3		0		0.02	.31	
4		0		0.04	<.02	< .01
		3		0.03	<.02	< .01
		6		0.03	<.02	< .01
5		0		0.04	<.02	< .01
		5		0.02	<.02	< .01
		10		0.03	<.02	< .01
		20		0.03	<.02	< .01
		25		0.03	<.02	0.01
		30		0.02	0.185	0.172
7		0		0.02	<.02	< .01
		6		0.03	<.02	0.012
		12		0.02	<.02	< .01
8		0		0.03	<.02	< .01
		3		0.02	<.02	< .01
		6		0.03	<.02	< .01
6		0		0.02	<.02	< .01
		3		0.04	<.02	< .01
		6		0.03	<.02	< .01
14		0		0.03	<.02	< .01
		3		0.03	<.02	<0.026
		6		0.03	<.02	< .01
24		0		0.02	<.02	< .01
		1.5		0.03	<.02	< .01
		3		0.03	<.02	00.075
10		0			.02	
11		0		0.02	.0515	< .01
12		0		0.02	.0437	0.088
13		0		0.03	<.02	0.064
15		0		0.05	<.02	< .01
16		0		<0.008	<.02	0.015

SITE	DATE	DEPTH(M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
17	June 14/73	0		<0.008	<.02	0.018
18		0		0.04	<.02	0.015
19		0		0.04	<.02	< .01
20		0		0.02	<.02	< .01
21		0		0.01	<.02	< .01
22		0		0.04	<.02	< .01
23		0		0.04	<.02	< .01

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
1	July 5/73	0		0.01	N/D	< .01
		2		0.01	N/D	N/D
2		0		0.008	N/D	< .01
3		0		0.03	0.052	0.039
4		0		0.01	N/D	< .01
		3		0.01	N/D	N/D
		6		0.009	N/D	< .01
5		0		0.01	N/D	< .01
		5		0.011	N/D	< .01
		10		0.009	N/D	< .01
		20		0.022	N/D	0.01
		25		0.018	N/D	0.012
		30		0.024	N/D	< .01
6		0		0.009	N/D	< .01
		3		0.009	N/D	N/D
		6		0.008	N/D	< .01
7		0		0.009	N/D	< .01
		6		0.01	N/D	N/D
		12		0.009	N/D	N/D
8		0		0.009	N/D	< .01
		3		0.01	0.081	0.113
		6		0.02	N/D	< .01
10		0		0.009	<0.02	< .01
11		0		0.02	0.063	0.055
12		0		0.02	<0.02	0.024
13		0		0.04	0.068	0.091
14		0		0.009	N/D	< .01
		3		0.009	N/D	< .01
		6		0.01	N/D	< .01
15		0		0.008	N/D	< .01
16		0		<0.008	N/D	< .01
17		0		<0.008	N/D	< .01
18		0		0.01	N/D	N/D

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
19		0		0.01	<0.02	< .01
20		0		0.008	<0.02	< .01
21		0		0.01	N/D	N/D
22		0		0.02	N/D	N/D
23		0		0.03	N/D	0.024
24		0		0.01	N/D	< .01
		1.5		0.02	N/D	< .01
		3.0		0.01	N/D	< .01

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
1	July 24/73	0		<0.008	<0.02	0.011
		2		<0.008	<0.02	<0.01
2		0		<0.008	<0.02	<0.01
3		0		<0.008	<0.02	0.017
4		0		<0.008	<0.02	<0.01
		3		<0.008	<0.02	<0.01
		6		<0.008	<0.02	<0.01
5		0		<0.008	<0.02	<0.01
		5		<0.008	<0.02	<0.01
		10		<0.008	<0.02	0.011
		20		<0.008	<0.02	0.011
		25		0.01	<0.02	<0.01
		30		0.02	<0.02	0.011
6		0		<0.008	<0.02	0.014
		3		0.008	<0.02	0.013
		6		<0.008	<0.02	0.010
7		0		<0.008	<0.02	0.015
6		6		<0.008	<0.02	0.012
		12		<0.008	<0.02	0.01
8		0		<0.008	<0.02	<0.01
		3		<0.008	<0.02	<0.01
		6		<0.008	<0.02	<0.01
10		0		<0.008	<0.02	<0.01
11		0		<0.008	<0.02	0.235
12		0		0.02	<0.02	0.086
13		0		0.02	<0.02	0.081
14		0		<0.008	<0.02	<0.01
		3		<0.008	<0.02	<0.01
		6		<0.008	<0.02	<0.01
16		0		<0.008	<0.02	0.012
17		0		<0.008	<0.02	0.017
18		0		<0.008	<0.02	0.011
19		0		0.03	<0.02	0.01

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
20		0		<0.008	<0.02	< .01
21		0		<0.008	<0.02	0.0135
22		0		0.01	<0.02	<0.01
23		0		0.02	<0.02	0.0345
24		0		<0.008	<0.02	<0.01
		1.5		<0.008	<0.02	<0.01
		3		<0.008	<0.02	0.0115

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4-P	TPO_4-P
1	Aug. 13/73	0	0.08	<0.01	<0.02	<0.01
		2	0.06	0.01	<0.02	<0.01
2		0	0.06	<0.01	<0.02	<0.01
3		0	0.08	<0.01	<0.02	0.03
4		0	0.13	0.01	<0.02	<0.01
		3	0.07	<0.01	<0.02	<0.01
		6	0.05	<0.01	<0.02	<0.01
		12	0.07	<0.01	<0.02	<0.01
5		0	0.04	<0.01	<0.02	<0.01
		5	0.02	<0.01	<0.02	<0.01
		10	0.06	<0.01	<0.02	<0.01
		20	0.05	0.01	<0.02	<0.01
		25	0.05	0.04	<0.02	<0.01
		30	0.08	0.03	<0.02	<0.01
6		0	0.08	<0.01	<0.02	<0.01
		3	0.05	<0.01	<0.02	<0.01
		6	0.06	<0.01	<0.02	0.01
7		0	0.09	<0.01	<0.02	<0.01
		6	<0.01	<0.01	<0.02	<0.01
		12	0.04	<0.01	<0.02	<0.01
8		0	0.04	<0.01	<0.02	<0.01
		3	0.04	<0.01	<0.02	<0.01
		6	0.07	<0.01	<0.02	<0.01
10		0	0.10	0.01	0.02	0.08
11		0	1.40	0.07	0.17	0.30
12		0	2.10	0.13	0.23	0.50
13		0	2.20	0.16	0.25	0.40
14		0	0.09	<0.01	<0.02	<0.01
		3	0.07	<0.01	<0.02	<0.01
		6	0.09	<0.01	<0.02	<0.01
15		0	0.02	<0.01	0.03	0.10
18		0	0.08	<0.01	<0.02	0.02

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4
19		0	0.07	<0.01	<0.02	0.01
20		0	0.09	<0.01	<0.02	<0.01
21		0	0.08	<0.01	<0.02	<0.01
22		0	0.04	<0.01	<0.02	0.01
23		0	0.10	0.04	<0.02	0.03
24		0	0.07	<0.01	<0.02	<0.01
		1.5	0.04	<0.01	<0.02	<0.01
		3	0.04	0.03	<0.02	<0.01
Upper Williams		0	0.02	<0.010	<0.02	0.02

SITE	DATE	DEPTH(M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4
1	Sept 3/73	0	0.03	<0.01	<0.02	0.02
		2	0.03	0.03	<0.02	0.022
2		0	0.04	<0.01	<0.02	0.015
3		0	0.36	0.09	0.04	0.15
4		0	0.14	0.01	<0.02	<0.01
		3	0.08	<0.01	<0.02	<0.01
		6	0.08	<0.01	<0.02	0.023
5		0	0.06	<0.01	<0.02	0.021
		5	0.05	<0.01	<0.02	<0.01
		10	0.05	<0.01	<0.02	<0.01
		20	0.06	0.01	<0.02	<0.01
		25	0.04	0.03	<0.02	<0.01
		30	0.04	0.03	<0.02	<0.01
6		0	0.05	<0.01	<0.02	<0.01
		3	0.04	<0.01	<0.02	<0.01
		6	0.04	<0.01	<0.02	0.011
7		0	0.12	<0.01	<0.02	0.013
		6	0.03	<0.01	<0.02	<0.01
		12	0.10	0.02	<0.02	<0.01
8		0	0.03	<0.01	<0.02	0.013
		3	0.05	<0.01	<0.02	0.012
		6	0.10	<0.01	<0.02	0.015
10		0	0.09	<0.01	<0.02	0.028
11		0	0.39	0.40	<0.02	0.14
12		0	0.73	0.56	<0.02	0.24
13		0	0.51	0.76	1.5	0.057
14		0	0.02	<0.01	<0.02	0.011
		3	0.01	<0.01	<0.02	0.024
		6	0.01	<0.01	<0.02	0.069
15		0	0.02	0.03	0.16	0.016
16		0	0.01	<0.01	<0.02	0.034
17		0	0.01	<0.01	<0.02	0.020
18		0	0.03	<0.01	0.05	0.068
19		0	0.02	0.02	0.15	0.12

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4
20		0	0.08	<0.01	<0.02	0.014
21		0	0.03	<0.01	<0.02	0.011
22		0	0.02	0.02	<0.02	0.019
23		0	0.02	0.05	<0.02	0.042
24		0	0.02	<0.01	<0.02	0.011
		1.5	0.01	<0.01	<0.02	0.032
		3	0.02	<0.01	<0.02	0.011
25		0	0.01	0.01	<0.02	0.010

SITE	DATE	DEPTH (M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4
1	Oct. 13/73	0		0.01	<0.02	<0.01
		2		0.02	<0.02	<0.01
2		0		0.01	<0.02	<0.01
3		0		0.01	<0.02	0.03
4		0		0.01	<0.02	0.02
		3		0.02	<0.02	<0.01
		6		0.01	<0.02	0.01
		12		0.01	<0.02	0.01
5		0		0.02	<0.02	0.01
		5		0.01	0.03	0.06
		10		0.01	<0.02	0.05
		20		0.02	<0.02	0.02
		25		0.01	<0.02	0.02
		30		0.02	0.09	0.07
6		0		0.01	<0.02	0.02
		3		0.01	<0.02	0.02
		6		0.01	<0.02	0.02
7		0		0.02	<0.02	0.02
		6		0.02	<0.02	0.02
		12		0.01	<0.02	<0.01
8		0		0.01	<0.02	<0.01
		3		0.02	<0.02	<0.01
		6		0.01	<0.02	<0.01
10		0		0.01	<0.02	0.01
11		0		0.04	0.04	0.06
12		0		<0.01	0.09	0.10
13		0		0.70	0.13	0.20
14		0		0.01	<0.02	<0.01
		3		0.04	<0.02	<0.01
		6		<0.01	<0.02	0.02
15		0		<0.01	<0.02	0.01
16		0		0.02	<0.02	<0.01

SITE	DATE	DEPTH(M)	NH_3-N	(NO_2-N+NO_3-N)	OPO_4	TPO_4-P
17		0		0.03	<0.02	0.02
18		0		<0.01	<0.02	0.01
19		0		0.02	<0.02	<0.01
20		0		0.02	<0.02	<0.01
21		0		0.01	<0.02	<0.01
22		0		0.02	<0.02	0.02
23		0		0.01	<0.02	0.01
24		0		<0.01	<0.02	<0.01
		1.5		0.01	<0.02	0.01
		3		0.02	<0.02	0.02

INFORMATION SHEET II

Lakelse Lake Temperatures

June 15/73

DEPTH(M)	SITE	TEMP°C	SITE	TEMP°C	SITE	TEMP°C
0	1	12.0	4	12.25	5	12.75
1		12.0		12.25		12.5
2		11.5		11.25		12.0
3		11.0		11.25		11.5
4		10.75		11.0		11.5
5		9.75		11.0		11.25
6		9.75		10.75		11.0
7				10.5		11.0
8				10.25		11.0
9				10.25		11.0
10				10.25		11.0
11				10.25		10.5
12				10.0		10.25
13						10.0
14						10.0
15						10.0
16						10.0
17						9.75
18						9.5
19						9.5
20						9.5
21						9.5
22						9.5
23						9.25
24						9.5
25						9.5
26						9.5
27						9.5
28						9.25
29						9.5
30						9.5

July 4/73

DEPTH(M)	SITE	TEMP°C	SITE	TEMP°C	SITE	TEMP°C
0	1	12.25	2	13.0	3	13.0
1		12.50		13.0		13.0
2		12.50		13.0		13.0
3		12.25		13.0		13.0
4		12.25		13.0		13.0
5		12.0		13.0		13.0
6		11.0		13.0		13.0
7				13.0		13.0
8				13.0		13.0
9				12.5		13.0
10				12.0		13.0
11				12.0		13.0
12				12.0		13.0
13						13.0
14						13.0
15						12.75
16						12.75
17						12.5
18						12.0
19						11.75
20						11.0
21						10.75
22						10.75
23						10.50
24						10.0
25						10.0
26						10.0
27						10.0
28						10.0
29						10.0
30						10.0

July 24/73

DEPTH(M)	SITE	TEMP°C	SITE	TEMP°C	SITE	TEMP°C
0	1	16.0	2	16.25	3	16.25
1		15.75		16.25		16.25
2		15.5		16.0		16.25
3		15.5		16.0		16.0
4		15.0		15.5		16.0
5		15.0		15.25		16.0
6		14.0		15.25		16.0
7				15.0		15.75
8				15.0		15.5
9				15.0		15.0
10				15.0		15.0
11				14.0		14.25
12				14.0		14.0
13						13.5
14						13.25
15						13.0
16						12.5
17						12.25
18						12.0
19						12.0
20						11.75
21						11.5
22						11.25
23						11.25
24						11.0
25						11.0
26						11.0
27						11.0
28						11.0
29						11.0
30						11.0

Aug. 13/73

DEPTH (M)	SITE	TEMP °C	SITE	TEMP °C	SITE	TEMP °C
0	1	18.5	2	17.75	3	17.5
1						
2		18.0				
3				17.75		
4						
5						17.25
6				17.0		
7						
8						
9						
10						16.50
11						
12				15.75		
13						
14						
15						
16						
17						
18						
19						
20						13.25
21						
22						
23						
24						
25						12.75
26						
27						
28						
29						
30						12.50

Sept. 13/73

DEPTH(M)	SITE	TEMP°C	SITE	TEMP°C	SITE	TEMP°C
0	1	13.5	2	13.5	3	13.5
1		13.5		13.5		13.5
2		13.5		13.0		13.25
3		13.25		13.0		13.25
4		13.25		13.0		13.25
5		13.0		13.0		13.25
6		13.0		13.0		13.0
7				13.0		13.0
8				13.0		13.0
9				13.0		13.0
10				13.0		13.0
11				13.0		13.0
12				13.0		13.0
13						13.0
14						13.0
15						12.5
16						12.25
17						12.0
18						12.0
19						12.0
20						11.75
21						11.75
22						11.75
23						11.75
24						11.5
25						11.5
26						11.5
27						11.5
28						11.25
29						11.25
30						11.25

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APPENDIX III

May 1, 1974

Your file / Votre référence

Our file / Notre référence

31-2-L2

Mr. John Pousette,
Administrator-Treasurer,
Regional District of Kitimat-Stikine,
12-4644 Lazelle Avenue,
Terrace, B.C.

Dear Mr. Pousette:

Attached for your information is a copy of a report on the Lakelse Lake studies which were conducted over the last year.

The report warrants some comment pertinent to the question of enrichment of Lakelse Lake and the need for controlling that enrichment. Several things are obvious from our limited efforts. It is clear that nutrient input from the streams flowing into the lake is very low as is the input from permanent and seasonal residences and businesses. By comparison, the nutrient loading attributable to the huge number of people using the lake in the summer months for recreational purposes is enormous. It is also possible to conclude that the only reason the lake has not become eutrophic is that, because of its shallowness, it is subject to constant flushing.

Mr. Bill Sinclair in his study of Lakelse Lake has predicted that recreational usage will double in the next six years. In my estimation, the amount of sewage produced by this number of people will destroy the lake in both a fish producing and a recreational sense if that sewage is handled in the same manner as at present. This reality should be recognized and steps taken almost immediately to gain control of the domestic wastes being released into the lake. There are very few alternatives open, I believe, for handling the problem whose solution lies in the control of nutrient releases. Tertiary treatment is the only known method for removing nutrients from domestic sewage, but tertiary treatment facilities require stable influent flows. The domestic sewage releases here are seasonal and flows are without doubt not constant.

.../2

The only alternatives available involve the diversion of sewage away from the lake. This could be accomplished by pumping the sewage into the nearest large river following partial treatment or collecting the sewage in holding tanks and trucking it to the nearest large treatment plant. A prerequisite for both alternatives is controlled access for picknicking and camping so that domestic waste sources would be concentrated.

Should you have any questions concerning this report and our interpretation of the implications, I will be only too pleased to discuss them with you when I come to Terrace on May 8, 1974.

Yours very truly,

W.J. Schouwenburg, Chief,
Habitat Protection Unit,
Northern Operations Branch.

Encl.

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