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SOCIAL SCIENCE SERIES NO. 8



Environment
Canada

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Public Perceptions of Water Quality and their Effect on Water-Based Recreation

J. G. M. PARKES

SOCIAL SCIENCE SERIES NO. 8

**INLAND WATERS DIRECTORATE,
WATER PLANNING AND MANAGEMENT BRANCH,
OTTAWA, CANADA, 1973**

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Information Canada
Ottawa, 1973

Cat. No.: En36-507/8

CONTRACT #02KXKL327-3-8060
THORN PRESS LIMITED

Contents

	Page
PREFACE	vii
ACKNOWLEDGMENTS	ix
1. INTRODUCTION	1
Water-based recreation in Canada	1
The problem	1
The study	2
Objectives	2
Design	2
The questionnaire	4
2. THE RECREATION BASE	6
Saskatchewan	6
Quebec	6
Nova Scotia	12
Summary (Sommaire)	12
3. WATER QUALITY ANALYSES	15
Saskatchewan	16
Quebec	16
Nova Scotia	20
Summary (Sommaire)	21
4. QUESTIONNAIRE RESULTS	22
Saskatchewan	22
Quebec	24
Nova Scotia	26
Summary (Sommaire)	28
5. CONCLUSIONS	31
BIBLIOGRAPHY	35
APPENDIX I	
A. English Language Questionnaire	36
B. French Language Questionnaire	44
C. Water Quality Technical Report Form	52
APPENDIX II	
Occupation Categories	53

Illustrations

Figure 1. General study area	3
Figure 2. Saskatchewan section	7

Illustrations (cont.)

	Page
Figure 3. Photographs of beach sites — Nova Scotia, Quebec, and Saskatchewan	8
Figure 4. Quebec section — Missisquoi Bay	11
Figure 5. Nova Scotia section	13
Figure 6. Photographs of water quality at beach sites	17

Photograph credits (Figures 3 and 6): R. Tapp, M. Roberge, K. Murphy

Tables (cont.)

1. Cottage use in the Qu'Appelle Valley Lakes (1970)	6
2. Water quality data — Saskatchewan	16
3. Water quality data — Québec	20
4. Water quality data — Nova Scotia	20
5. Educational level — Saskatchewan	22
6. Income levels — Saskatchewan	22
7. Occupations — Saskatchewan	22
8. Area rating — Saskatchewan	23
9. Area advantages/disadvantages — Saskatchewan	23
10. Water quality perception accuracy — Saskatchewan	23
11. User activity and reduction due to water quality — Saskatchewan	24
12. Improvements desired — Saskatchewan	24
13. Willingness to pay for improved water quality — Saskatchewan	24
14. Average preferred dollar distribution — Saskatchewan	24
15. Education level — Québec	24
16. Income levels — Québec	25
17. Occupations — Québec	25
18. Area rating — Québec	25
19. Area advantages/disadvantages — Québec	25

Tables (cont.)

	Page
20. Water quality perception accuracy – Quebec	25
21. User activity and reduction due to water quality – Quebec	26
22. Improvements desired – Quebec	26
23. Willingness to pay for improved water quality – Quebec	26
24. Preferred dollar distribution – Quebec	26
25. Educational level – Nova Scotia	26
26. Income levels – Nova Scotia	26
27. Occupations – Nova Scotia	27
28. Area rating – Nova Scotia	27
29. Area advantages/disadvantages – Nova Scotia	27
30. Water quality perception accuracy – Nova Scotia	27
31. User activity and reduction due to water quality – Nova Scotia	28
32. Improvements desired – Nova Scotia	28
33. Willingness to pay for improved water quality – Nova Scotia	28
34. Preferred dollar distribution – Nova Scotia	28

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Preface

This study was part of the Department of the Environment's Summer Student Shoreline Survey program. The objectives of the study were to examine the public's perception of water quality, the influence of water quality on water-oriented recreation, and the willingness of the public to pay for improvement. The areas selected for study represent three distinct recreational environments: the maritime coast of Nova Scotia, the eastern township area of Quebec, and the plains of Saskatchewan. The data gathered concerning recreational use patterns and population characteristics at these sites are intended to be used for future planning.

Acknowledgments

Due to its broad geographical scope and dual nature, this study depended primarily upon the full cooperation and goodwill of the various provincial, federal, and university officials in the three provinces concerned. To try to name them all would take considerable space, but I must acknowledge the help of certain individuals who made my own task much easier.

Thanks, then to the area supervisors: Mr. Jack Glenn, Qu'Appelle Study Office, Water Management Service, Department of Environment, Regina, Sask.; Prof. Raymond Paquette, University of Sherbrooke, Sherbrooke, Que.; and Mr. Charles Raymond, Department of Industry and Development, Nova Scotia. In addition, much credit must go to the water quality program supervisors: Mr. David Silliphant, Water Quality Division, Water Management Service, Department of Environment, Dr. Irving Devoe, Department of Bacteriology, McDonald College, McGill University, and Dr. Donald Gordon, Bedford Institute, Halifax, Nova Scotia, assisted by Mr. Wayne Sarty, Dalhousie University, Halifax.

Also, the editing assistance of the following is much appreciated: Mr. J. W. Maxwell, Lands Directorate, Department of Environment, Mr. N. H. James, Mr. R. C. Hodges, Dr. F. J. Quinn, Mrs. E. Lefrançois, and Mrs. D. Vindasius, all of the Water Management Service, Department of Environment. In addition, the help of Lorne Swann of the same Department, in computer analysis, is gratefully acknowledged.

Finally to my Ottawa assistants, Mr. David Brown and Mr. Don Carter, a special thanks for their tireless efforts in administration and questionnaire design. To the ten interviewers across Canada goes my great appreciation for the professional manner in which you handled a very demanding job.

J. G. Michael Parkes
Study Director
Ottawa, 1972

Introduction

WATER-BASED RECREATION IN CANADA

Outdoor recreation has been defined as "... the activities pursued in achieving the relative and pleasurable use of leisure time in an outdoor environment".¹ Whether or not one adheres to this definition, it can be agreed that recreation in general, and water-based recreation in particular, constitutes a major use of leisure time by a majority of Canadians. Outdoor recreation is normally associated with active physical involvement. There is, in addition, the more passive appreciation of aesthetic, scenic and ecological values which can form part of this active involvement or exist independently.

Most forms of outdoor recreation have either a direct or indirect association with water because of water's characteristics, such as a medium for swimming or boating, or its ability to support life forms such as fish or waterfowl.

Data on the amount of participation in water-based recreation are scarce; nevertheless, it has been estimated by some economists that Canada produces both travel receipts and expenditures totalling over \$1 billion annually. As a motivation for travel, our waters hold a major interest for the vacationer and are an integral part of his recreation experience. As fees are rarely charged for the right to swim in lake, river or ocean waters, we can only guess at the dollar value afforded by the resource.² In addition, this recreation activity is largely supported by a labour-intensive service industry which provides many job opportunities.

THE PROBLEM

Traditionally water resources have been regarded as a common property resource, owned collectively by society though nominally managed by the government under its responsibility to supply public goods and services. Because the water resource has seemed limitless, it has been regarded as a free good for anyone to use. It has been subjected to unrestricted use and abuse; in many cases characterized by a general lack of foresight and concern for

environmental consequences or the rights of others. Nowhere is this more apparent than in the field of water-based recreation.

Notwithstanding our immense space and widely dispersed natural wealth, some 95% of all Canadians are concentrated in pockets along a southern belt from coast to coast, often located beside polluted harbours, lakes and rivers; breathing polluted air, squeezed between neighbours, and subjected to noise, unsightliness, and the odours of cities needing restoration. Closed swimming beaches are now commonplace from coast to coast. Mercury, oil slicks and algae abound.

As leisure time increases, and population levels rise, more and more pressure will be placed upon existing facilities and resources in order to cope with the demand for water-based outdoor recreation. Already, certain events have occurred which have both highlighted the fragility of our environment and directly affected Canadian recreational users. The sinking of the oil tanker "Arrow" near Chedabucto Bay off Nova Scotia, and the "Irving Whale" in the Gulf of St. Lawrence and the resultant oil spills, have had obvious implications for the recreation and tourist industry in those areas. Public perception of environmental degradation in Canada has developed rapidly, and is usually characterized by a reaction to such major events. Yet bunker oil pollution, with its high visible impact, is only one of numerous water quality problems which affect the recreational environment. The presence of algae, weeds, domestic and industrial wastes can significantly inhibit water-oriented recreation. Reduction of such activities can result in significant primary and secondary costs to certain service industries.

Problems in social choice emerge in determining the wants of society in terms of a better mixture of income, leisure, recreation and overall environmental quality. Concomitantly, we too often fall short in attempting to provide reliable indicators of the public's wants, needs and values in these areas. Thus it is imperative that both resource managers and the public have a clearer understanding of the cause of environmental disruption, its costs and consequences, and existing planning alternatives for the improvement of the situation.

The physical areas of recreation planning usually receive due consideration; social areas however, are often neglected. In cases where consideration has been given to social needs it has been in the form of what planners

¹ Canada, Department of Indian and Northern Affairs, National and Historic Sites Division, *Glossary of Terms in Common Usage in the Field of Non-Urban Parks and Recreation*. Federal-Provincial Parks Conference, Ottawa: (Queen's Printer: 1968).

² A. Tuomi, A/Director, Sports Fishing Directorate, DOE Personal Communication, Ottawa, 1972.

perceive will result in optimum social quality, usually without empirical investigation to test their assumptions.

Perception and attitude studies provide one means of showing what the recreational user prefers or how he is affected by external parameters such as water quality. Changes in water quality do not lend themselves to precise market quantification for benefit/cost purposes. However, attitude studies are one way in which the investigator may comment on the user's relative concern for such environmental issues as pollution of recreation sites. In this way, users who would not normally get a chance to make their views known are given an opportunity to express their subjective reaction to problems they perceive. The results of such studies could provide a more rational basis for a choice of planning alternatives. Thus future solutions might be made more responsive to the people for whom they are originally designed. Attitude and perception studies then, aim at discovering for a certain segment of the population just what individuals "see" in their environment, how they feel about it, what it means to them, and how they would be disposed to act towards it.

Perception studies in resources management have been developed for a number of water-related problems. White's work of perception of choice in the process of decision-making in resources management presented a model from which followed studies on flooding³, storms^{4,5}, drought⁶, and other environmental hazards. These studies broadened the base of the perception study as a vehicle for public involvement, yet their main thrust seemed to avoid planning problems and solutions and concentrated more on theoretical development.

The emphasis in this study is more upon the practical aspects of the perception study – how people perceive the water pollution problem, their estimation of its effect on the utility of the resource, and their willingness to pay for improvements. In fact, this study is designed to be used as a base for further planning. Theoretical contribution, while not ignored, is not emphasized.

THE STUDY

The study of public perception of, and concern for, water quality conditions at certain water-oriented recre-

³ Burton, Ian. *Types of Agricultural Occupance of Flood Plains in the United States*. Research Paper No. 75, Chicago: Department of Geography, University of Chicago Press, 1962.

⁴ Kates, Robert W. *Hazard and Choice Perception in Flood Plain Management*. Research Paper No. 78, Chicago: Department of Geography, University of Chicago, 1962.

⁵ Kates, Robert W. et al. "The Shores of Megalopolis: Coastal Occupance and Human Adjustment to Flood Hazard." *Publication in Climatology*, Vol. 18, No. 3 (1965).

⁶ Saarinen, T.F. *Perception of Drought Hazard on the Great Plains*. Research Paper No. 106, Chicago: Department of Geography, University of Chicago Press, 1966.

ation sites in Canada, was undertaken as part of the Department of the Environment's 1971 Summer Student Shoreline Survey program. It examines on-site differences in the perception of water quality problems, the influence of water quality on water-oriented recreation, and public willingness to pay for improved water quality.

Objectives

The perception project had as its objectives:

- (i) To determine the extent of awareness and concern about water quality problems at selected recreational sites in Canada,
- (ii) To determine if public awareness and water-oriented recreational activities are influenced by the physical quality of the water,
- (iii) To assess the recreational user's willingness to pay for improved water quality, and
- (iv) To gather information concerning recreational use patterns and population characteristics at these sites to provide a data base for future planners.

Information is available on water quality criteria required for various uses such as human consumption, swimming, etc. Guidelines and quality criteria are in the form of tolerance levels (Biochemical Oxygen Demand), turbidity, temperatures, coliform bacteria counts and other scientific measurements.⁷

The recreationist also places a subjective value upon the quality of the water because of its appearance, smell and taste. This value judgement directly affects the desire to participate in water-based activities. If this assumption is correct, the question arises as to how much people are willing to pay for improved water quality.

A number of hypotheses were drawn up to be tested. Environmental awareness has been linked to such variables as educational level, income level, and age level. If this is true, then those who would be most aware of pollution problems at the sites would be characterized by college educations, high income levels and be older than average in age. In addition, the more aware people are of the problem, the higher might be their motivation to act to remedy the situation. It is hypothesized also that those people who are more aware of the problem will be more likely to ameliorate their position by either situation avoidance or strong complaints. This may be shared by a willingness to pay for improved water quality.

Design

Seven high-use, water-oriented recreation sites in three areas of Canada were selected for study (Figure 1). These

⁷ United States, National Water Commission, *Water Quality Standards for Recreation* (Washington: U.S. Government Printing Office, 1961).

GENERAL STUDY AREA

Student Shoreline Survey - Public Attitude and Perception Study of Water Quality

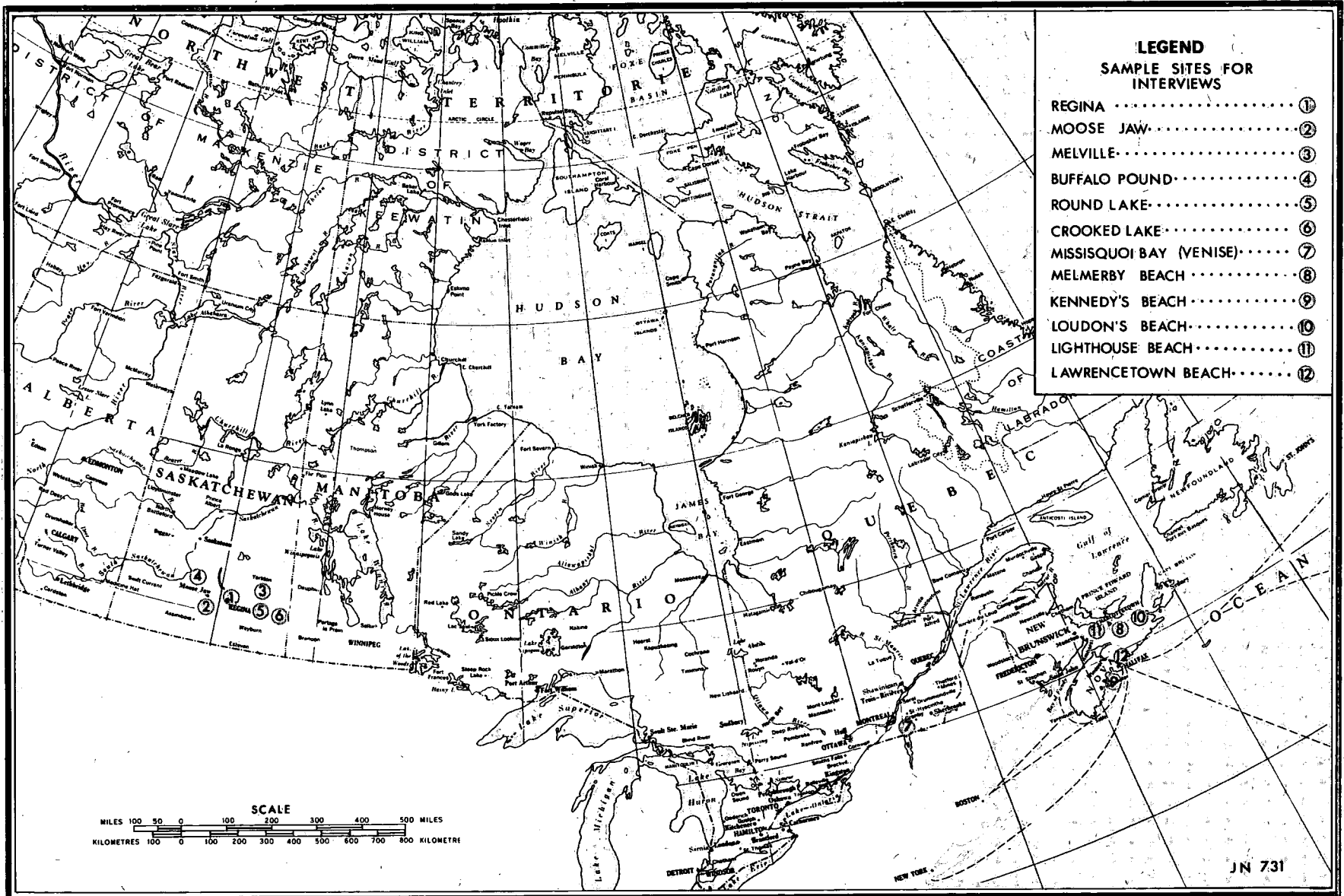


Figure 1

ENVIRONMENT CANADA
OTTAWA, 1971

areas represent three distinct recreational environments: the maritime coast of Nova Scotia, the Eastern Township area of Quebec, and the plains of Saskatchewan. The sites derive their attraction because of their proximity to water and, it is assumed, are in part dependent upon the water quality to maintain their attractiveness. It is this relationship upon which the study is focused.

Questionnaires modeled on the Qu'Appelle Perception Study (Parkes, 1970) were constructed for each area, and systematized, stratified sampling procedures were employed. The questionnaires contained both closed and open-ended questions and were administered by on-site interviews. A total of 1,072 interviews were conducted at the beach sites during the peak recreation period, from July 1 to September 7, 1971.

In tandem with the interviews, water quality sampling programs were set up at the various recreational areas. Correlations were drawn between water quality at the interview sites and the respondent's replies to the questionnaire. The duration of sampling varied from one month in Nova Scotia (August, 1971) to two months in Saskatchewan (July and August, 1971). This variation was due to such factors as the availability of staff, financing, and laboratory facilities for analysis of water samples.

Finally, it is imperative to stress that full provincial cooperation contributed substantially to the success of this project.

THE QUESTIONNAIRE

A questionnaire was constructed in order to record public reaction to water quality at the recreation sites, attitudes towards water pollution and willingness to pay for improved water quality. Prepared in both official languages [see Appendices I(a) and I(b)], the questionnaires administered in all areas were identical except for question 1 regarding residence, which was not the same in the English and French versions. The questionnaires were administered through direct, on-site interviewing, and respondents were selected by a pre-determined sample method.⁸

Questions 2 and 3 refer to the urban/rural difference in residence and the number of years of recreation experience in the area. In theory, the longer the experience, the more familiar the respondent should be with local environmental problems.

Questions 5 through 10 are designed to determine the type of recreationist being interviewed, whether camper or

cottage, the duration of stay, ultimate destination, and whether equipment and lodging are owned, rented or borrowed. The hypothesis drawn is that differences in attitudes towards pollution might be influenced by user type, the duration of stay and financial commitment to the area.

Questions 11 and 12 are designed to determine how the respondent rates the particular area in which he is staying, listing its advantages and disadvantages. This is important in determining the strength of impact of visible water quality conditions. If comments are elicited which indicate that the respondent is disturbed about the quality of the water and, without leading or prompting, he lists it as a disadvantage of the area, it is obvious that a perception threshold has been passed and that conditions have become stressful enough for the individual to record them. Question 13 is only asked if a reference to water pollution is made in question 12. Questions 14 and 15 are designed to see what other areas the respondent uses as a frame of reference.

Question 16 asks the respondent directly about the water quality conditions in the area for the particular week. In addition, for comparison and control purposes, the interviewer's perception as well as the respondent's perception of the water quality is recorded. These are designed to be compared to the sampling technician's perceptions as well as the physical measurements of water quality for that time period.

The next questions (17 to 19) record whether or not the respondent has experienced a general reduction in the number of visits he makes to the area due to the water quality problems he mentioned previously and, if so, by how much. Questions 20-22 are a measure of the respondent's estimate of his recreation activities over the summer, by number of days. Question 23 then asks whether the water quality problems mentioned in Question 16 reduce the specific recreation activities listed. Questions 24 and 25 indicate the degree of investment in boating by the respondent.

Questions 26 and 27 probe whether or not the respondent would like to see improvements in the water quality and the nature of these improvements; this question then leads into a section on willingness to pay in some way for the improvements listed. Average expenses are established by questioning respondents regarding their expenditures incurred over and above the usual additional amount spent in the recreation experience (such as travel costs, extra gas, etc.).

Questions 28 and 30 present the respondent with an elementary bidding game to get information on expenditures. On the basis of the respondent's total expenditures, questions 31 and 32 then ask whether or not he would be willing to pay more to have clean water for recreation in the area, and if so, how much. Question 33 acts as a check on the previous question to sort out the respondent's pre-

⁸See Canada, Department of Fisheries and Forestry, *The Qu'Appelle Perception Study*, by J. G. M. Parkes, (1971), (unpublished). Stakes were placed at regular intervals at the beach sites. Interviewers were then instructed to interview those respondents closest to the stakes, moving in a clockwise manner from interview site to interview site.

ference. The distribution should give an indication of where the respondent feels that improvements are most needed.

The attitude question is an attempt to utilize a Likert-type scale to measure concern for water quality problems by enabling the respondent to indicate choice of agreement or disagreement among statements regarding water for recreation. The responses are scored and the total is, in theory, a measurement of attitude. The original set of questions for this attitude scale was developed in 1970 in the Ottawa and Montreal regions, and has a test-retest reliability of .97.

Questions 35 to 37 are designed to gain information regarding waste disposal practices in cottage developments

at the sample sites.

Questions 38 to 43 are standard socio-economic indicators utilized to establish social groupings in the sample.

Appendix I(c) contains the water quality technical report form, upon which the research scientist doing the testing recorded both technical parameters of water quality as well as a qualitative assessment of water quality conditions. This was used as a part of the control group perception against which the accuracy of perception of the respondents was measured.

Appendix II includes the occupation categories which were used in determining groupings within the sample.

The Recreation Base

SASKATCHEWAN

The lakes of the Qu'Appelle Valley provide Southern Saskatchewan with one of its few areas for water-oriented recreation. In addition to recreational demands, the Qu'Appelle surface waters are utilized as the source of municipal water by the cities of Regina (pop. 137,759)⁹ and Moose Jaw (pop. 31,289). Also, the water is used for both industrial and agricultural purposes. Over the years effluents discharged from municipalities and surface runoff from agricultural lands have contributed to water quality degradation in the lakes.

Estimates point to approximately 126,000 recreation trips to the Qu'Appelle Valley in 1970 which resulted in almost 3,000,000 recreation user days.¹⁰ Cottagers accounted for two-thirds of this use (Table 1), campers and day users the remainder. From this and previous studies, it is clear that the urban populations adjacent to the valley constitute the majority of users, and that they are placing an increasing value upon the recreational and aesthetic benefits afforded by the Qu'Appelle Lakes. This is reflected in the enormous increase in use over the last decade.

Table 1. Cottage use in the Qu'Appelle Valley Lakes (1970)

Lake	1970 Total number of cottages	Calculated cottage-days based on '64 survey	Total cottage population
Last Mountain Lake	2566	900,000	11,250
Buffalo Pound Lake	596	245,000	3,300
Echo and Pasqua	827	380,000	4,200
Mission	83	28,000	400
Katepwa	749	270,000	3,700
Crooked and Round	666	160,000	3,000
Grand totals	5487	1,983,000	25,850

Average of days cottages are open = 76.3 days
Average number of trips to a cottage = 11.6

For the purposes of this study, three beach areas were chosen for examination: Bird's Point Beach at Round Lake, Melville Beach at Crooked Lake, and the main beach at Buffalo Pound Provincial Park (Figure 2).

⁹Canada, Statistics Canada, 1971 Census of Canada, (Ottawa: Queen's Printer 1971).

¹⁰R. Fautley, Study Item 240, "Recreation", Qu'Appelle Study Report (Regina: Qu'Appelle Study Board, 1972, unpublished).

Bird's Point is located midway along the north shore of Round Lake. A small public beach about 300 feet long is maintained, bounded by a grassy picnic area, parking lot and dance hall (Fig. 3a). Limited facilities for both day users and campers exist. There are 147 privately owned cottages lining the lakeshore at this point (Fautley, 1970). Shoreline development has been almost exclusively devoted to private cottages.

Melville Beach is located on the north side of Crooked Lake, east of the Sakimay Indian Reserve (Fig. 3b). Almost one hundred cottages line the shore at this beach. The sample area consists of the 200-foot long public beach. A number of commercial facilities adjacent to the beach serve the general public. The majority of the shoreline is, however, in the hands of private cottagers.

The majority of users at these two beach areas are residents of Regina, Yorkton and Melville (Fig. 2).

Buffalo Pound Provincial Park is a major recreational development located at Buffalo Pound Lake, 24 miles north of Moose Jaw. It is owned and operated by the Department of Natural Resources, Government of Saskatchewan, and covers 2,368 acres (Fig. 3c). This recreation complex has parking spaces for 710 cars, 111 camping spaces and nine acres of public beach. Its well-groomed grassy areas which attracted over 150,000 visitors in 1970, serves residents primarily from Moose Jaw and Regina and provides a key component in the recreation base of the Qu'Appelle Valley.

QUEBEC

The second water-oriented recreation area of Canada examined is located at *Venise, Quebec*, on Peel Head Bay, Lake Champlain (Fig. 4). Set on low-lying land within the Richelieu watershed, Venise is an old and well-established recreational colony within commuting distance of Montreal (pop. 2,720,000), some 41 miles distant.

Venise and the adjacent area are burdened with a conglomeration of cottages, permanent residences, campgrounds and commercial establishments (Figs. 3d,e,f). There has been little planning and even less consideration given to zoning. As a result, only a small part of the shoreline is devoted to public access. The remainder of the shoreline is ringed firstly, by four private campgrounds whose developers charge an average of \$2.00 per day admission to their respective beach frontages, and secondly,

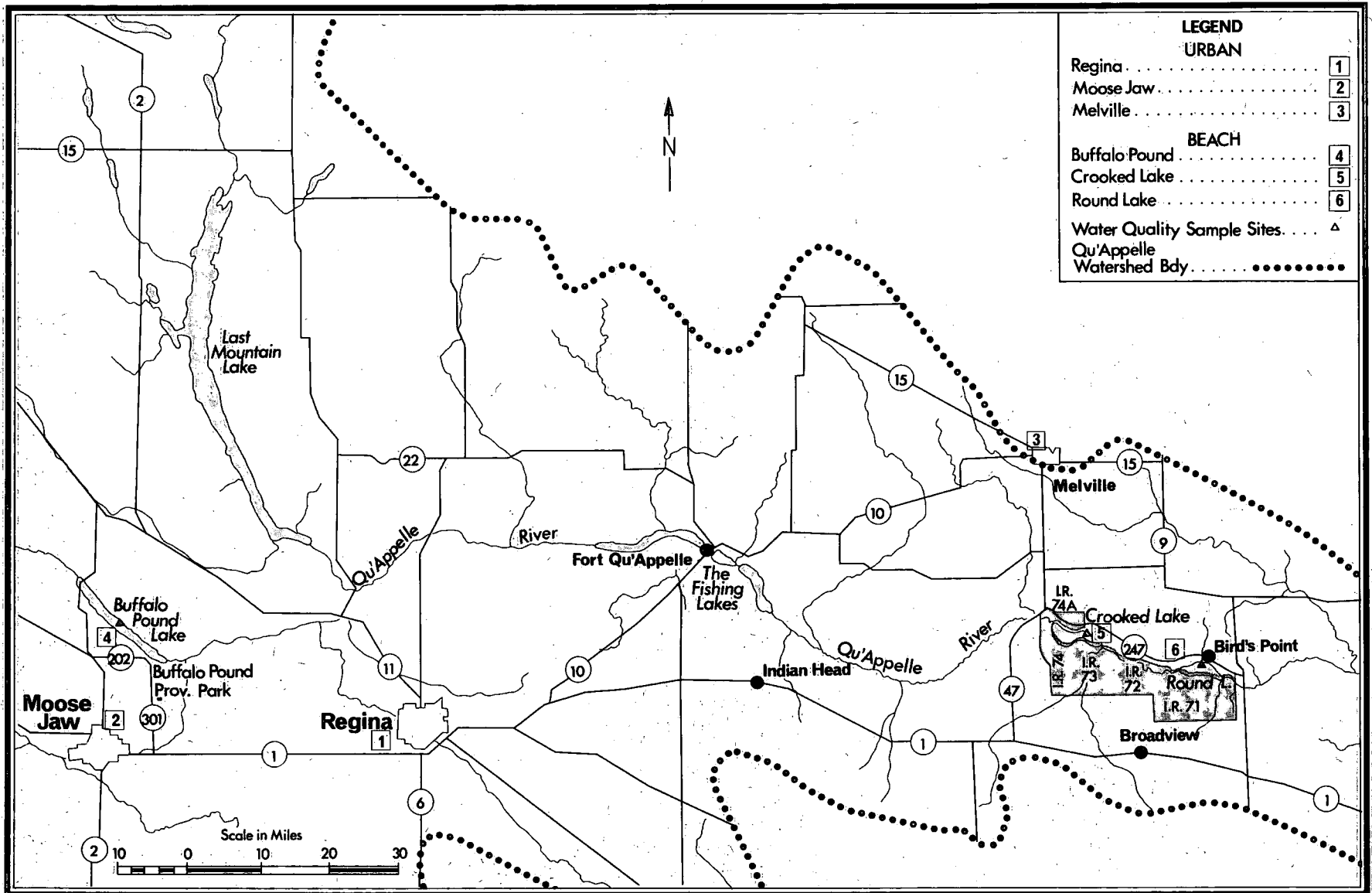


Figure 2. Saskatchewan section.



Birds Point, Round Lake (Sask.), August 17, 1971.

a



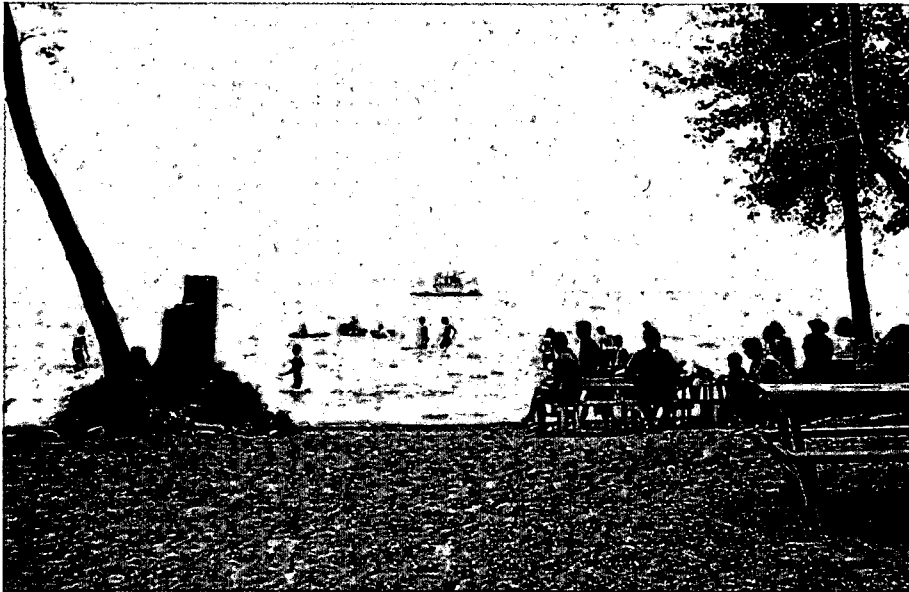
Melville Beach, Crooked Lake (Sask.), August 17, 1971.

b



Buffalo Pound Provincial Park, Buffalo Pound Lake (Sask.), August 18, 1971.

c



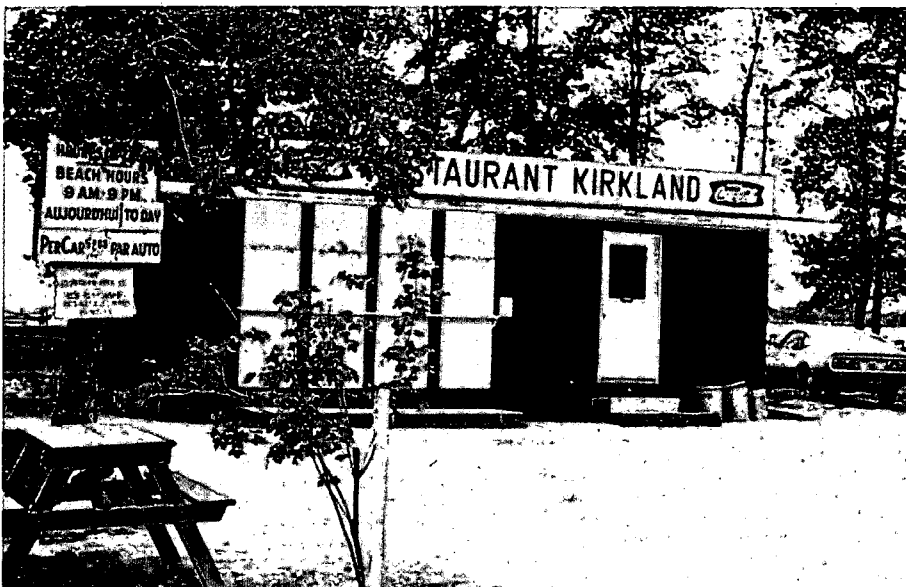
Kirkland Beach, Missisquoi Bay, Venise
(Que.), August 10, 1971.

d



Champlain Beach, Missisquoi Bay, Venise
(Que.), August 8, 1971.

e



Champlain Beach, Missisquoi Bay, Venise
(Que.), August 10, 1971.

f



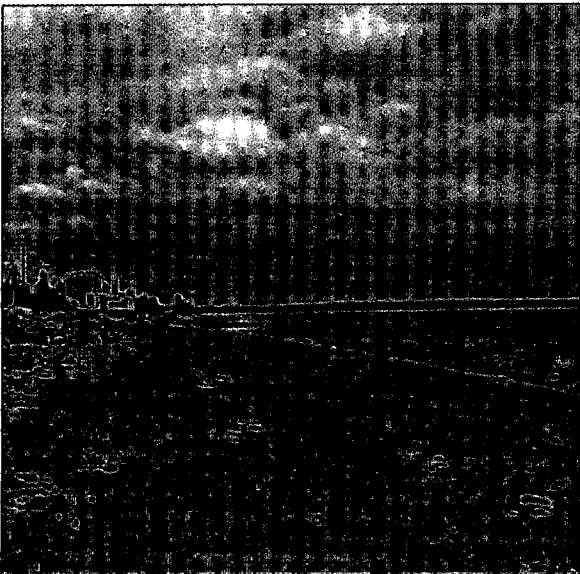
Melmerby Beach, New Glasgow (Nova Scotia), September 9, 1971.

g



Lawrencetown Beach (Nova Scotia), September 10, 1971.

h



Kennedy's Beach (Nova Scotia), September 8, 1971.

i

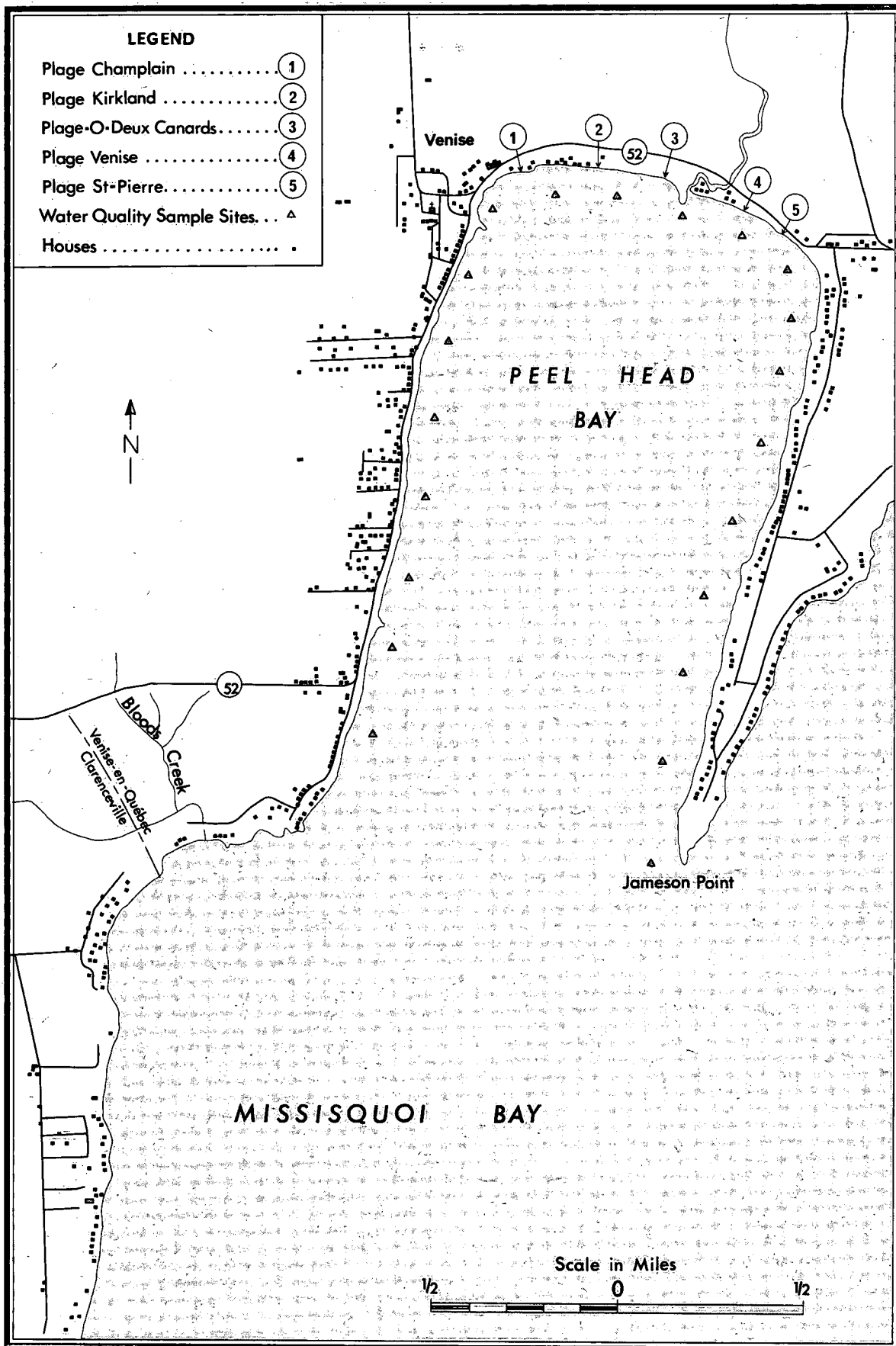


Figure 4. Quebec section – Missisquoi Bay.

by private cottages and permanent dwellings, mainly along Jameson Point (Fig. 4).

Despite its disorderly appearance, Venise is a very popular vacation spot. The proximity of a large body of water and the variety of commercial facilities make it a tourist mecca for many seeking relief from the industrial urban environment. In fact, it is common practice for families to camp at Venise for the entire summer, with the breadwinners commuting to work in Montreal. Unfortunately, it appears more and more as though the escape is a fictitious one. Although overcrowding of existing facilities and diminishing water quality in the last few years have reduced considerably Venise's attractiveness as a recreation area, many users visit year after year.

NOVA SCOTIA

The Canada Land Inventory lists 171 beaches in Nova Scotia, of which 142 front on salt water. These beaches attract many thousands of tourists and residents each year and depend upon good water quality, among other factors, to retain this attraction. It is an understatement to say that tourism in this province is a major industry. In the last ten years, the number of visitors to Nova Scotia has doubled to over 1,000,000 annually. Tourism generates an estimated \$42,000,000 in revenue per year.

The main focus for this part of the study is upon two widely separated areas: three salt water beaches on the Northumberland Strait near Pictou (pop. 4,247) and New Glasgow (pop. 10,792), and two salt water beaches located east and west of the Halifax-Dartmouth metro area (pop. 220,300) along the "south shore" (Fig. 5).

Generally speaking, the primary focus for water-based recreation in the Pictou-New Glasgow environs is along the shores of the Northumberland Strait. The three beaches studied in this area include: *Melmerby Beach* — owned by the Province of Nova Scotia and located 7.5 miles southeast of New Glasgow (Fig. 3g); *Loudon's Beach* — privately owned and approximately two and a half miles northeast of Pictou; and *Lighthouse Beach* — public beach located adjacent to an Indian Reserve between New Glasgow and Melmerby. Melmerby Beach is a mile-long sandspit which links the mainland to a small island in Northumberland Strait. It is a fine, wide, well-cared-for, spectacular, recreation beach with only modest commercial development and few cottages. There is no charge for parking. By contrast, Loudon's Beach charges fifty cents per car for parking, has a small museum located on its premises, and is quite close to a large campground. It offers a sandspit about one-half-mile long and eighty feet wide. Lighthouse Beach is a small sand crescent, opposite Loudon's Beach to the east of Pictou Road (Fig. 5). This beach is up-harbour from a pulp mill waste-settling pond located at Boat Harbour. The lagoon is in fact a small lake used by the Scott Maritimes Pulp Ltd. as an effluent disposal site and empties into Boat Harbour. It has been reported that beaches such as Lighthouse are threatened by effluent from the disposal

site. This question will be considered later in the Chapter on water quality.

The beaches in the Halifax area include *Lawrencetown Beach*, 15 miles east of Dartmouth and *Kennedy's Beach*, 30 miles west of Halifax. Lawrencetown Beach is a wide sand crescent, a mile-long, bracketed on either end by high cliffs (Fig. 3h). Kennedy's Beach is approximately one-quarter mile long and 20 feet wide at high tide. There is little commercial or cottage development at Lawrencetown. By contrast, Kennedy's Beach draws its users from an extensive cottage population around St. Margaret's Bay.

While it is recognized that there might have been many other beach sites in Nova Scotia just as worthy of study, these particular sites were chosen in the light of provincial planning problems and on the advice of provincial officials. In addition, the Nova Scotia beach sites were within a short distance of major population centers, similar to the beach sites in the other provinces studied. It must be noted that the reactions of populations at these beaches may not necessarily reflect the sum total of attitudes and perceptions at all provincial beaches.

SUMMARY

The recreation areas studied are a considerable distance from each other and vary in physical description and in the type of development each supports. Yet all of these beaches include certain common elements: they provide a basis for considerable water-oriented recreational activity, and this activity is dependent upon certain aesthetic properties, such as the quality of the water to attract and hold beach users.

These common factors invite systematic study of the recreational users of each area and their relationship with the environment they encounter. All the areas under study are adjacent to relatively large population concentrations. Thus the population "pool" that they draw from is reasonably uniform. Area access is relatively easy for all beaches studied. While it is obvious that facilities differ from beach area to beach area, in general it can be assumed that they all offer a "change of scene" to their user populations.

Certain questions arise as to the user characteristics in each province. Do recreational populations at the Quebec sites differ significantly from those in Nova Scotia or Saskatchewan? How accurately do they perceive pollution problems? Are they willing to pay to improve this environment? Do pollution problems exist at these sites at present?

An answer must be given to the last question before any relationship may be tested or assumptions drawn. The next chapter is devoted to establishing the current water quality conditions of the areas under study in order to correlate these conditions with specific user group reactions.

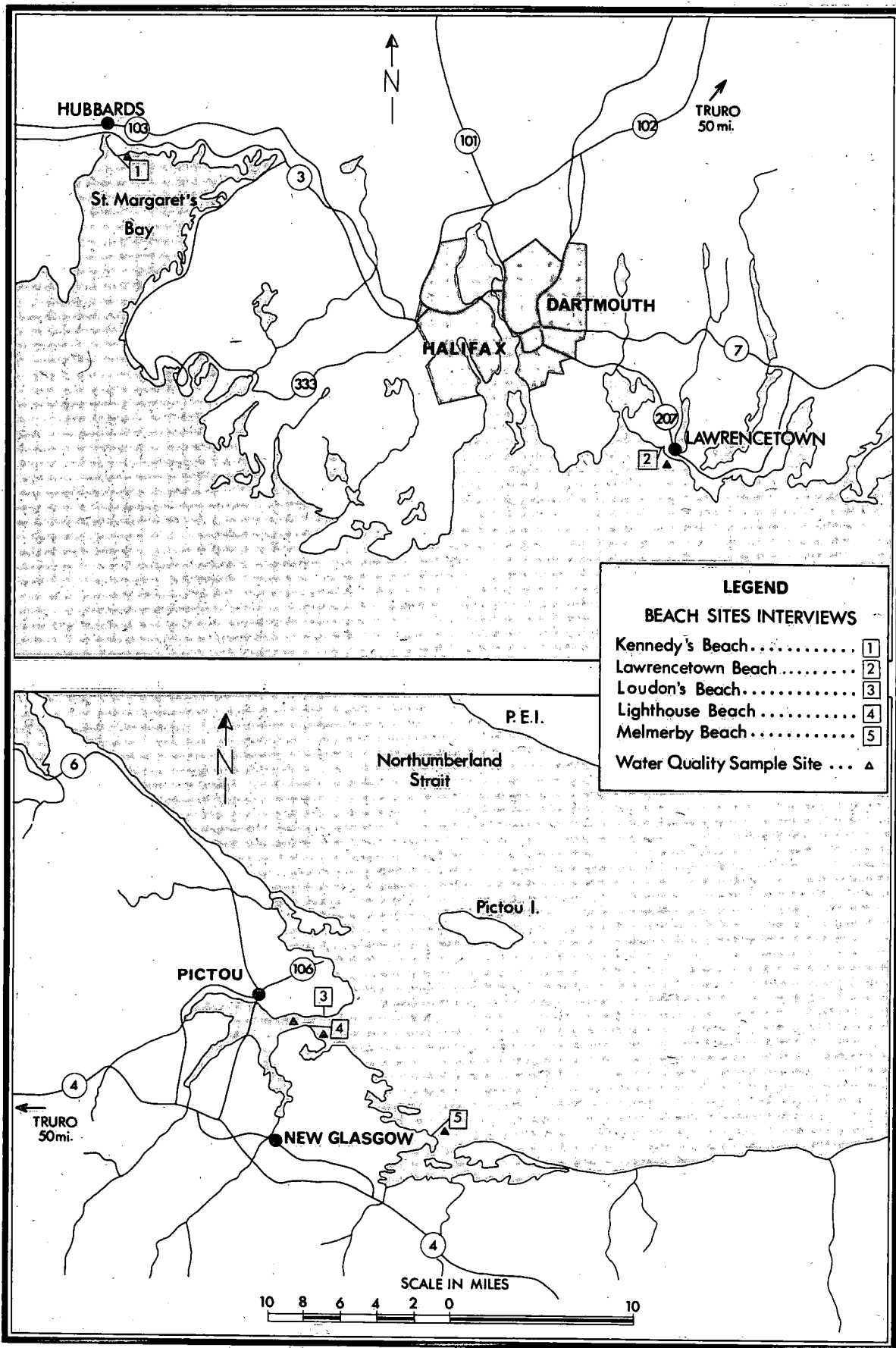


Figure 5. Nova Scotia section.

SOMMAIRE

Les études sur les espaces récréatifs varient considérablement les unes des autres, en ce qui a trait aux descriptions physiques et à la dialectique de chacune d'elles. Cependant, de tous ces propos on peut retenir des éléments communs: (1) ils fournissent une base d'étude des nombreuses activités récréatives utilisant l'eau et (2) le fait que ces activités dépendent de certaines propriétés esthétiques comme la qualité de l'eau dans le but d'attirer et d'en retenir les utilisateurs.

Ces facteurs communs invitent à l'étude systématique des utilisateurs de biens récréatifs dans chaque région et de leurs relations avec le milieu qu'ils rencontrent. Précisons que toutes les régions à l'étude sont voisines de vastes bassins de population. Ainsi les renseignements puisés auprès de ces populations sont raisonnablement représentatifs. L'accès à toutes les plages de l'étude y est raison-

nablement facile. Quoiqu'il soit évident que les facilités diffèrent d'une plage à l'autre, en général on peut supposer qu'elles amènent toutes un peu d'exotisme aux populations qui les utilisent par rapport à leur milieu habituel.

Certaines questions viennent cependant à l'esprit à propos des caractéristiques des utilisateurs provinciaux. Ainsi les utilisateurs des espaces récréatifs au Québec diffèrent de façon significative de ceux de la Nouvelle-Écosse ou de la Saskatchewan. Quelles sont leurs relations avec leur environnement? Avec quelle justesse perçoivent-ils les problèmes de pollution? Sont-ils d'accord pour payer afin d'améliorer cet environnement? Est-ce qu'il y a actuellement des problèmes de pollution à ces endroits? On doit apporter une réponse à cette dernière question avant d'analyser toute relation ou émettre toute hypothèse. Le prochain chapitre doit établir les conditions actuelles en rapport avec une eau de qualité dans ces régions à l'étude de sorte que la corrélation puisse être établie avec les principales réactions des groupes concernés.

Water Quality Analyses

It is assumed in contemporary North American water management practice that water quality is one of the most significant criteria associated with recreational use of our water resources. As a rule, local and provincial health officials are empowered to close public beaches and other recreational areas if they consider that the water quality at these sites is potentially dangerous to human health. A range of parameters has been established in the United States and in certain Canadian provinces which indicate the relative safety of water used for recreation. In addition to the human health criterion, the general requirements for both recreational uses and aesthetic enjoyment of surface waters are that they should be free of floating objects, oil, scum and substances that produce objectionable colour, odour and turbidity. At the same time they should be free of substances harmful to aquatic life. Yet the question remains as to how relevant these guidelines are to the users for whom they are drawn up.

Water quality criteria for water recreation have been established by the U.S. Federal Water Pollution Control Administration as well as certain Canadian provinces (Ontario and Saskatchewan).¹¹ In addition, the Inland

Waters Branch, Department of the Environment, Government of Canada has published a preliminary compilation of technical and scientific data pertaining to water quality objectives and standards, including guidelines for direct contact recreation.¹² These guidelines have been employed in this study in determining the suitability of the samples taken for recreational use.

The quality of water is influenced by natural surroundings, climate and man's activities. Location, topography, vegetation and chemical composition of the soils of the region dictate the natural background quality of the water. In addition, such factors as wind direction, cloud cover, temperature and erosion may influence daily quality. Data variations must be considered in this light. Man's activities, however, can be detrimental to water quality. Through the introduction of excessive pollutants into lakes and streams or by the overuse of existing facilities, the natural balance established in the ecosystem can be upset. This is as true for the recreational use of water as for any other use. To determine whether or not this process has occurred at the sites under study was one of the objectives of the water quality analysis program in all three provinces.

¹¹ U.S., Department of the Interior, Federal Water Pollution Control Administration, Water Quality Criteria, *Report of the National Technical Advisory Committee* (Washington: 1968) and Saskatchewan, Saskatchewan Water Resources Commission, Water Pollution Control Branch, *Water Quality Criteria 1970*, (Regina: 1970).

¹² Canada, Department of Environment, Water Management Service, Inland Waters Branch "Guidelines for Water Quality Objectives and Standards - A Preliminary Report" *Technical Bulletin No. 67* (Ottawa: Queen's Printer, 1972).

Water Quality Guidelines for Direct Contact Recreation
(Swimming, bathing, wading, water skiing)

Parameter	Objective	Maximum Limit
Total Coliform Organisms (Median MPN)	<100	500
Faecal Coliform Organisms (Median MPN)	< 20	200
Turbidity (Jackson Unit)	< 5	50
Secchi Disc Visibility (minimum)	20 f (6 m)	4 f (1.2 m)
pH, units	6.5-8.3	6; <9
Temperature	No increase over natural.	30°C. (85°F.)
Total Plankton Concentration (Biomass)	No increase (over normal level) by induced growth.	Not more than 5,000 org./l over normal level.
Colour (Pt-Co Scale)	< 15	100
Odour (T.O.N.)	Inoffensive.	16
Ether Extractible Oils & Grease (mg/l)	No noticeable oil slicks or floating grease.	5 mg/l
Synthetic Detergents	Less than foam-threshold. (usually <0.5 mg/l as ABS-equiv.)	2 mg/l as ABS-equiv.
Toxic Substances	Drinking Water Quality Standards.	Not to exceed emergency limits for toxicants.
Gross Radioactivity	None.	<10 pc/l

Table 2. Water quality data - Saskatchewan

(i) Technical

Location	Average temperature (°F)		Average pH		Average Secchi Disc. (feet)		Average turbidity level (JTU)		Total coliform count (per 100 ml.)	
	July	August	July	August	July	August	July	August	July	August
Round Lake	66.2	75.2	8.2	8.7	5.5	5.5	8	11	44	67
Crooked Lake	66.2	69.8	8.3	8.6	4.5	4.5	9	16	9	16
Buffalo Pound Lake	69.8	68.0	8.0	8.4	4.0	2.0	10	27	53	173

(ii) Qualitative

Location	Algae		Weeds		Discoloration	
	July	August	July	August	July	August
Round Lake	slight - moderate	moderate - bad	v. slight - slight	slight	slight	slight - moderate
Crooked Lake	slight - moderate	moderate	v. slight	slight - moderate	v. slight	slight
Buffalo Pound Lake	slight - moderate	moderate - bad	moderate	bad	slight	moderate

SASKATCHEWAN

A water quality sampling program was carried out at three Saskatchewan sites by the Water Quality Division, Inland Waters Branch, Department of the Environment. Water Quality data were collected every two days between June 30 and August 29, 1971 at Buffalo Pound, Round and Crooked Lakes.

Temperature, pH, colour, turbidity, coliform counts and a qualitative assessment of aesthetic properties were the parameters employed to give an overall assessment of the waters used for recreation at the three sites. These results are presented in Table 2.

Throughout most of the study period, the results met the accepted water quality criteria; however, some of the general requirements for aesthetic values were exceeded.¹³

For the most part, July was cool and cloudy, a fact reflected in the relative absence of algae and weeds in the lakes studied. However, August was sunny and hot, with a resultant increase in the growth of weeds, algae, and other plant organisms. On Buffalo Pound Lake in particular, large patches of weeds were present on both sides of the main swimming area, spoiling its aesthetic value and presenting a potential swimming hazard to young children (Fig. 6a,b).

Higher values of pH, colour, turbidity readings, BOD and coliform were experienced. In August, high concentra-

tions of algae upsetting the carbonate-bicarbonate system of the water caused pH values to be considerably higher than the established criteria. Turbidity values did not meet the recommended criteria for recreation at Buffalo Pound Lake. Conditions such as the shallowness of the swimming area, intensive public use and strong prevailing winds stirred up bottom sediments, causing the water to be very turbid. Increases in turbidity levels at Round and Crooked Lakes were due mainly to large growths of plant organisms which were concentrated in the beach areas when the wind blew onshore. However, these levels were less than those at Buffalo Pound, and they met the recommended criteria.

In summation, while water quality was suitable from June 30 to August 30 at Round and Crooked Lakes for all water-oriented recreation, it was marginally so at Buffalo Pound in August. There is no doubt that aesthetic values were diminished in this area particularly by high algal blooms, weeds and turbidity levels.

QUEBEC

In Quebec, a water quality sampling program was carried out at Peel Head Bay in cooperation with MacDonald College of McGill University. Water quality data were collected between July 9 and August 26, 1971.

There was an overall assessment of the waters used for recreation at the beaches. Total and fecal coliform bacterial counts were taken, and a qualitative estimation was made of aesthetic properties such as weeds, discoloration and oil, and floating objects. These results are presented in Table 3.

As can be seen in Table 3, water quality for recreation in this area is far from acceptable according to the

¹³ D.R. Silliphant, *Water Quality Data from Selected Recreational Areas on the Qu'Appelle Lakes* (Regina: Water Quality Division, Inland Waters Branch, Department of the Environment, 1971, (unpublished).



**Buffalo Pound Provincial Park, Buffalo
Pound Lake (Sask.), August 8, 1971.**

a

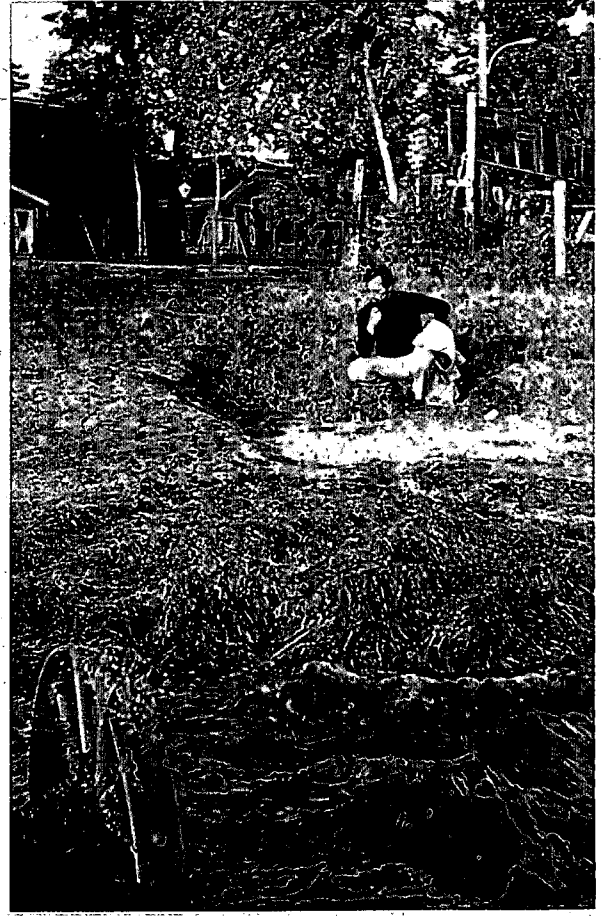


**Buffalo Pound Provincial Park, Buffalo
Pound Lake (Sask.), August 12, 1971.**

b



c Weeds are gathered and trucked away regularly, Venise (Que.), August 8, 1971.



d Weeds washed up regularly, Venise (Que.), August 10, 1971.

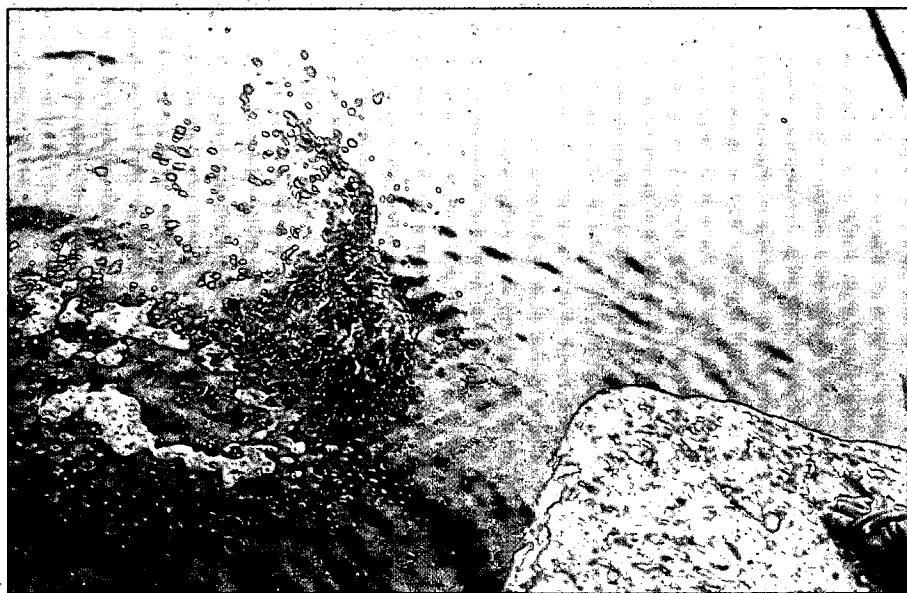


e Great accumulation of weeds, Venise (Que.), August 8, 1971.



f

Seaweed accumulation, Lighthouse Beach,
New Glasgow (Nova Scotia), Septem-
ber 9, 1971.



g

Effluent lagoon at Boat Harbour, New
Glasgow, September 9, 1971.



h

Effluent lagoon at Boat Harbour.

published guidelines. On some days, the fecal coliform count at certain stations was over 200 per 100 ml. As the maximum accepted level for water recreation is 50 fecal coliforms per 100 ml in some provinces, it would appear that recreational users in this area are exposing themselves to a possible health hazard.¹⁴ It is known that some campers and cottagers dispose of raw sewage directly into the bay; however, the majority do have septic tanks. The data suggest that certain streams which flow into the bay at Venise are grossly polluted, perhaps by local agricultural operations.

Table 3. Water quality data – Quebec

(i) Technical

Location	Fecal coliform No. of days fecal coliform count exceeded 50 F.C. 100/ml.	Total coliform No. of days total coliform count exceeded 500 F.C. 100/ml.
1. Peel Head Bay (west side)	6	1
2. Peel Head Bay (north side)	8	2
3. Peel Head Bay (east side)	3	3

(ii) Qualitative

Location	Weeds	Discoloration and oil	Floating objects
1. Peel Head Bay (west side)	moderate	moderate	moderate – bad
2. Peel Head Bay (north side) (including public beaches)	bad	moderate – bad	bad
3. Peel Head Bay (east side)	moderate – bad	moderate – bad	moderate – bad

In addition to this condition, a severe weed problem exists. Trucks are regularly called in to clean the accumulated piles of weeds from the beaches (Fig. 6c). It is a constant job to keep these areas free from weeds and other debris that drift ashore. These conditions were particularly apparent at some of the private beaches which outline the bay (Fig. 6d, 6e). Certainly, the aesthetic value of the area is spoiled by this condition, which also presents a potential swimming hazard. Moreover, a serious mercury pollution problem exists which presents a hazard to anyone eating fish from the area.

Obviously these conditions do not exist all over the province, and this spot certainly should not be taken as

¹⁴Op. Cit. p. 28 – In the present state of knowledge, and because of lack of definitive epidemiological evidence, water quality criteria for recreational uses can be based only on the *possibility* of health hazards rather than *probability* of actual danger to the health of man. Therefore, the suggested quantitative criteria (p. 24) should not be regarded as *absolute* nor as levels of *exactness*.

representative of the total recreational scene. However, there can be no doubt that, at this site, the quality of the water for recreational purposes is poor compared with that of the other areas surveyed.

NOVA SCOTIA

At the five beach sites described previously, water quality sampling program was carried out in co-operation with the Pollution Control Section of the Fisheries Research Board, Department of the Environment, Government of Canada, Halifax, Nova Scotia. Data were collected every second day between August 3 and September 12, 1971. Temperatures, pH, turbidity, colour and coliform counts were measured and as well, a qualitative assessment was made of the aesthetic properties of the water. The results appear in Table 4.

Table 4. Water quality data – Nova Scotia

(i) Technical

Location	Average Water temperature °F	Average pH	Average turbidity level (JTU)	Total coliform count (per 100 ml.)	Colour (Hazen units)
1. Queensland	59.9	8.18	0.0	36.8	7.4
2. Lawrencetown	55.2	8.11	0.0	33.6	5.1
3. Lighthouse	61.5	8.10	121.0	2,615.6	34.0
4. Loudon's	65.7	8.15	139.5	402.1	18.0
5. Melmerby	65.2	8.13	130.1	605.9	5.7

(ii) Qualitative

Location	Weeds, kelp	Discoloration	Floating objects
1. Queensland	moderate	light	moderate
2. Lawrencetown	bad	light – moderate	light – moderate
3. Lighthouse	bad	moderate	moderate
4. Loudon's	light	light – moderate	light – moderate
5. Melmerby	moderate	light – moderate	moderate – bad

From a health viewpoint, there does not appear to be any significant differences between quality requirements for recreational uses of marine and fresh waters, although there are differences in the physio-chemical properties of the two types of waters. The possibility of infection is more remote in saline waters than fresh waters, but it may exist.

Throughout the study period, conditions did meet accepted water quality criteria for recreation, except for a number of cases in the Pictou Harbour area (Loudon's and Lighthouse beaches). A hurricane on August 16 caused extensive deposits of kelp and other debris on most beaches and discoloration of the water through silting. The water at all beaches showed higher coliform counts after the storm (Figs. 6f, 6g, 6h).

In general, water quality at the Queensland and Lawrencetown beaches was excellent. At these sites, coliform counts, colour and other aesthetic properties were well within established limits for recreation (Table 4).

At Lighthouse and Loudon's beaches, however, conditions were somewhat different. Both beaches are located at Pictou Harbour, which serves as receiving waters for industrial wastes from a steel plant, fish plants and ship foundaries at Pictou as well as for domestic effluent from the towns of Stellerton and Pictou. Adjacent to Pictou Harbour, Boat Harbour receives mill wastes from a nearby kraft pulpmill at Abercrombie Point.¹⁵ The effluent discharge from this lagoon seems to cause a reddish-brown discoloration of the coastal seawater in and around Pictou Harbour. As both Loudon's and Lighthouse beaches are located in the immediate area of these waters (Fig. 5), both beach areas are suspect of receiving wastes discharges from the lagoon into the harbour as well as raw sewage from the town. The water quality results for recreation, however, were inconclusive. High periodic coliform counts as well as high average turbidity and colour levels were recorded at Lighthouse Beach (Table 4). In addition, wood fibres in the water were noted on September 5 and 6. There is a foam problem at this beach that was noted by sampling technicians. These results notwithstanding, the water quality met the accepted criteria for recreation for a majority of sampling occasions.

In a 1968 bacteriological report by the Division of Public Health Engineering, Department of National Health and Welfare, it was noted that "the sewage effluent from the Boat Harbour industrial waste lagoon has a significant effect on the bacteriological quality of the southern coastal portion of outer Pictou Harbour".¹⁶ The report recommended closure of the harbour for the taking of shellfish. The fact that the harbour was closed for the fishing of shellfish does not necessarily mean it is unsuitable for swimming. The bacteriological criteria for shellfish-growing areas are much more rigid than for recreation. However, it does point out that the area is affected to some degree by the effluent dumped into the harbour.

From the 1971 results of the water quality survey, it appears as though the coliform counts have changed little since the 1968 report. Other criteria used for recreation water quality were met, albeit marginally.

It must be mentioned that there is a severe air pollution problem in the area. The odour (H₂S) in the air over the Indian Settlement near Lighthouse Beach is particularly serious. This odour seems to originate at the mill at Abercrombie Point, on Pictou Harbour.

Melmerby Beach, on the other hand, may be regarded

¹⁵Scott Paper Company of Canada, Ltd.

¹⁶Canada, Division of Public Health Engineering, Department of National Health and Welfare, Report No. OR-68-6 by G. Kindrasky and R. Legault. (Ottawa, 1968).

as an excellent recreation beach, although longshore currents could conceivably carry effluent from Pictou Harbour into the waters surrounding it.

In summary, water quality for recreation at three of the beaches, Queensland, Lawrencetown and Melmerby, is excellent. Conditions at Loudon's Beach are less desirable, and those at Lighthouse Beach are the worst of the five Nova Scotia beaches sampled.

SUMMARY

The water quality sampling programs reveal a significant difference in the water used for recreation in the three areas studied.

In Saskatchewan, while water quality was suitable all season at Round and Crooked Lakes for all water-oriented recreation, it was marginally so at Buffalo Pound Lake in August. Aesthetic values were diminished in this area particularly by high algal blooms, weeds and turbidity levels.

At the Quebec site, severe water pollution problems have created a potential health hazard for swimmers, according to the published guidelines.

In the Nova Scotia areas, water quality for recreation at three of the beaches is excellent (Queensland, Lawrencetown and Melmerby beaches). Conditions at Loudon's Beach are less desirable and those at Lighthouse Beach are the worst of the five Nova Scotia beaches sampled.

SOMMAIRE

Le programme d'échantillonnage portant sur la qualité des eaux révèle une différence appréciable entre les eaux utilisées pour fin récréative dans chacune des trois régions sous observation.

D'abord en Saskatchewan, bien que la qualité de l'eau était acceptable pendant toute la saison aux lacs Round et Crooked, sous tous les aspects récréatifs en liaison avec l'eau, la situation au lac Buffalo Pound, en août, était en marge des autres lacs. La valeur esthétique de cette région était diminuée, en particulier par la présence d'algues, de poussées planctoniques et de pollution par solides.

Quant aux espaces québécois, de sérieux problèmes de pollution des eaux représentaient certains dangers pour la santé des baigneurs.

En Nouvelle-Écosse, la qualité de l'eau pour fin récréative est excellente à trois plages (Queensland, Lawrencetown et Melmerby). Les conditions à la plage de Loudon sont peu enviables et celles de Lighthouse Beach sont les pires des cinq plages où l'on a recueilli des échantillons.

Questionnaire Results

The previous chapter reported on water quality data that were collected at the various recreational sites under study. Through this program, a general pattern of water quality conditions for the study period emerged. At the same time, it was hypothesized that recreationists at the sites placed a subjective value on these conditions, which in turn influenced the amount of use made of the resource. One of the objectives of the study was to determine the extent to which this use was impeded, if at all, by the water quality conditions.

A set of closed and open-ended questionnaires was constructed to illicit user response to water quality conditions [Appendices I(A) and I(B)]. Recreation user characteristics, the extent of their awareness of water quality conditions, as well as an assessment of willingness to pay for improved water quality were tabulated and analysed. Three teams of students were assembled and interviewing was completed under professional direction through the various planning offices selected. Over 1,100 on-site interviews were made: 432 in Saskatchewan, 386 in Quebec, and 292 in Nova Scotia.

To gauge the accuracy of perception of water quality problems by the recreational population, a control group was established, consisting of the water quality sampling scientists and the interviewers. Both these groups were required to keep detailed records of their subjective comments concerning water quality at the various sites over the summer field programs. These results were then analysed and matched against the perceptions of the various user groups to derive some indication of how close the observations the general public matched those of the trained interviewers and scientists.

In Saskatchewan, the user population is characterized by high average incomes, high average levels of education and in general professional, semi-professional and managerial occupation categories (Tables 5-7). Over one third of those interviewed have incomes averaging more than \$8,000 per year, while over half average \$6,000 (Table 6). Almost one-quarter of those interviewed have some university training. Two-thirds have completed high school (Table 5). One third are included in the managerial, professional or semi-professional occupation categories. One quarter are skilled, semi-skilled or unskilled workers, and the remainder in the housewife or student classifications (Table 7). These

figures tend to support the view that the recreation areas examined in Saskatchewan are oriented towards the highly mobile, educated, affluent middle and upper-middle socio-economic segments of the population.

Table 5. Educational level – Saskatchewan

	Per cent of sample
Completed grade school	6.8
Part high school	27.5
Completed high school	30.3
Completed technical school	10.5
Part university	14.5
Completed university	9.8
No response	0.6

Table 6. Income levels – Saskatchewan

	Per cent of sample
Under \$3,000	16.4
\$3,000 – \$5,999	12.5
\$6,000 – \$7,999	15.7
\$8,000 – \$9,999	14.4
\$10,000 – \$15,000	16.2
Over \$15,000	4.9
No response	19.9

Table 7. Occupations – Saskatchewan

	Per cent of sample
Professional	9.3
Semi-professional	10.7
Managerial	11.4
Clerks, typists	7.4
Skilled workers	4.0
Semi-skilled workers	10.2
Unskilled workers	5.4
Housewives	25.4
Students	13.7
No response	2.5

In addition, almost 90 per cent of those interviewed are city dwellers, and over half come from the main urban centres of southern Saskatchewan, Regina and Moose Jaw. Most users have spent an average of eight years vacationing

and/or recreating in the areas covered. One-third of those interviewed were campers, one-third, cottagers, and the remaining one-third, day-users. Campers and cottagers stay on-site an average of 8.4 days.

What features of the recreational environment attract this population? Over 76 per cent of users rate their recreation areas "very good" or "excellent", and only 0.2 per cent rate the areas "poor" (Table 8). In order to determine exactly what attracts them to these areas, respondents were asked to enumerate both the advantages and disadvantages of that particular site for themselves. Almost 70 per cent are attracted for aesthetic reasons. Such comments as "nice green lawns and trees", "a real change from the prairie", or "it's real pretty" indicate this choice (Table 9). Over 45 per cent mention the facilities – camping spots, changing rooms, etc. as the main advantage of the site. This reaction characterizes interviews in Buffalo Pound Provincial Park. Distance, in terms of ease of access and proximity to home is the third most mentioned advantage. Least mentioned as site advantages are water quality (11 per cent), organized activities (9.8 per cent), and commercial amenities (8.3 per cent). Conversely, the study asked what features of the site constituted disadvantages for the users. Not surprisingly, over half mention the lack of facilities. This reaction is recorded mainly at the Round and Crooked Lake sites, which cannot nearly match the planned amenities of the provincial park at Buffalo Pound Lake. However, what is important is that almost half of those interviewed mentioned water quality as a disadvantage of the site. "Ugly green scum", "that junk in the water", or "the awful weeds" are frequently-noted comments. Other disadvantages are rarely mentioned (Table 9).

Table 8. Area rating – Saskatchewan

	Per cent response
Excellent	22.8
Very good	54.6
Good	20.1
Fair	2.3
Poor	0.2

Table 9. Area advantages/disadvantages – Saskatchewan

Characteristic	Per cent response	
	Advantage	Disadvantage
Aesthetics	69.6	7.7
Distance (proximity and route)	37.9	12.5
Facilities	45.9	52.0
Water quality	11.1	49.8
Organized activities	9.8	12.8
Commercial amenities	8.3	6.3

A large number of those interviewed did perceive water quality problems. As mentioned previously, both in the

water quality testing program and in the interviewing program, scientists and interviewers were asked to fill out questions related to the qualitative aspects of the water. These results were used as a control against which the observations of the user groups were measured. The user groups proved to match closely the scientists and interviewers concerning qualitative problems. The control group noted algal problems 39.8 per cent of the time during the period of the study. The respondents noted similar problems 40.3 per cent of the time during a similar period (Table 10).

Table 10. Water quality perception accuracy – Saskatchewan

Problem	Per cent response	
	Respondents	Control
Algae	40.3	39.8
Weeds	26.6	49.3
Other	0.5	0.5

How is this affluent, urbanized, perceptive recreation population affected by the water quality disadvantages it perceives, if at all? In fact, 15,000 recreation-days are recorded by the various users in water-oriented activities such as swimming, fishing, hiking, water-skiing, boating and picnicking. Of this total, 6,776 recreation days or 46 per cent are spent in swimming, boating or water-skiing (water-contact sports). The results show that for each activity, a certain amount of reduction in the recreation period is experienced by the user population due to water quality problems (Table 11). For instance, the typical Saskatchewan user swims an average of 9.4 days per season. In 1971, his swimming at the sites in question was reduced an average of 3.4 days or by about one-third due to poor water quality conditions, mostly occurring in the month of August, and due mainly to algae blooms. Fishing was reduced by about 15 per cent for the same reason, water-skiing by 28 per cent and boating by 10 per cent.

Given that a problem exists and is perceived, an attempt must be made to discover if improvements in water quality conditions are desired, and to what extent the recreation population would be willing to support such improvements. Of those interviewed, 71.5 per cent indicated that they desire improvements in water quality (Table 12). In addition, over a third specifically mention algae as the major problem, and another 27 per cent indicate weeds as their major complaint. Three-quarters of the 71.5 per cent are willing to pay to improve the general condition of the water. From each interview schedule, the average amount spent by the respondent over and above the usual additional expenses incurred in the recreation experience was estimated. It was found that the average recreational user in this population estimates that he spends almost \$23.00 per week in such additional expenses. Also, he would be willing to pay \$5.18 per user week per season to improve water quality conditions (Table 13). This repre-

Table 11. User activity and reduction due to water quality – Saskatchewan

	Swimming	Fishing	Hiking	Water-skiing	Boating	Picnicking
Total number of activity days	4,076	1,867	1,975	801	1,899	3,679
Average number of activity days per user	9.4	4.3	4.5	1.8	4.4	8.5
Total activity day reductions recorded	1,486	244	13	238	218	49
Average number of activity day reductions per user	3.4	0.6	0.1	0.5	0.5	0.1

Table 12. Improvements desired – Saskatchewan

	Per cent response
General improvement in water quality	71.5
Algae removed	37.2
Weeds removed	27.1

Table 13. Willingness to pay for improved water quality – Saskatchewan

Per cent willing to pay	71.5
Mean expenditure per week on recreational activities	\$22.91
Average amount willing to pay per week	\$ 5.18

sents a sizeable portion (22 per cent) of his average weekly expenditures incurred in the recreational experience. There was no general agreement on the part of the users upon the mode of collection for this amount. Some were willing to pay additional taxes, some wanted to pay at the site, and some wanted to pay per recreation season. In addition to these questions, a preference indicator was devised which enabled the respondent to distribute a hypothetical one hundred dollars among some other uses to which public funds are put. Table 14 illustrates the average dollar distribution preferred by the sample. The amount tallied for recreation lakes is almost double every other use. This might be influenced by a number of factors. First, interviews are taken on site. The immediacy of the recreation environment could sway the decision towards more money for its improvement. Secondly, the problem of water quality conditions could be severe enough to prompt this reaction by the users. Thirdly, in general the recreation population at these particular sites are affluent, middle to upper-middle stratum, urban and suburban residents with little personal need for better housing, schools and health services. The true explanation of the results probably is a combination of all these factors.

In summary, the results of the questionnaire analysis from the water quality program in Saskatchewan indicate a problem with *algal* blooms. Recreational users are aware of the problem and are experiencing a reduction in their water-oriented activities. In addition, there seems to be general agreement that something should be done to clear up the problem, even if it means an appropriation of public

Table 14. Average preferred dollar distribution – Saskatchewan

Housing	\$15.02
Education	\$18.91
Highways	\$14.40
Health services	\$18.69
Recreation lakes	\$31.42

funds and/or an additional levy paid out of pocket on the site, or by taxes.

QUEBEC

In Quebec, the user population sampled is characterized by high average incomes similar to those in Saskatchewan, although with a lower average education level (Tables 15 and 16). Over one-third of those interviewed have incomes over \$8,000 per year, and over half have more than \$6,000. In education, only 16.6 per cent have had some university training, while 42.6 per cent have not completed high school education. Only 10.9 per cent hold professional or semi-professional positions, compared to double this figure for Saskatchewan (Table 17). Over one-third are categorized as clerks, skilled, semi-skilled, or unskilled workers. It is clear that this recreation population is different in certain basic characteristics than the one for Saskatchewan, yet similarities do exist.

Table 15. Education level – Quebec

	Per cent of sample
Completed grade school	20.8
Part high school	21.8
Completed high school	34.1
Completed technical school	6.5
Part university	11.4
Completed university	5.2
No response	0.2

The sample population is highly urbanized. Almost 98 per cent are city dwellers, with two-thirds of this total coming from Montreal. The majority of those interviewed (62 per cent) were on their annual vacation. Most users have spent an average of nine years in the area. Forty-three per cent are cottagers, 25 per cent campers, and the

remainder day users. This recreation population remains fairly constant over the summer season. Those interviewed have a mean length of stay of 43 days per year.

Table 16. Income levels – Quebec

	Per cent of sample
Under \$3,000	9.3
\$3,000 – \$5,999	20.5
\$6,000 – \$7,999	21.1
\$8,000 – \$9,999	13.5
\$10,000 – \$15,000	15.6
Over \$15,000	5.5
No response	14.5

Table 17. Occupations – Quebec

	Per cent of sample
Professional	4.7
Semi-professional	6.2
Managerial	19.4
Clerks, typists	9.6
Skilled workers	8.1
Semi-skilled workers	12.5
Unskilled workers	3.9
Housewives	26.7
Students	6.0
No response	2.9

In terms of area attraction, 69 per cent of the population rate the area as "very good" or "excellent" and 13.3 per cent rate it "fair" or "poor" (Table 18). The latter figure is significantly higher than the responses obtained in Saskatchewan.

Table 18. Area rating – Quebec

	Per cent response
Excellent	27.8
Very good	42.1
Good	16.3
Fair	6.0
Poor	7.3

For over 80 per cent of those interviewed, the major advantage of the area is aesthetic (Table 19). Comments centre on the "beautiful setting" and the "fresh clean air". All other reasons such as proximity to a major urban centre, type of facilities, or superior water quality, are secondary to aesthetic reasons. Only 16 per cent are attracted by the water quality, and mentioned it as a specific advantage. Almost double this total feel that the water quality is the main disadvantage of the area. Almost one-quarter complained of the lack of modern facilities for recreation. These figures are proportionately less than those obtained in Saskatchewan.

Table 19. Area advantages/disadvantages – Quebec

Characteristics	Per cent response	
	Advantage	Disadvantage
Aesthetic	80.8	6.0
Distance (proximity and route)	18.2	1.4
Facilities	11.7	24.2
Water quality	16.0	30.6
Organized activities	16.9	18.7
Commercial amenities	1.8	1.8

As in Saskatchewan, the population is quite accurate in its estimation of qualitative water problems when compared with the control group (Table 20), although the recreation users tend to stress the presence of weeds a bit more than the control group (respondents note weeds 63 per cent of the time; the control group record a more modest 54 per cent).

Table 20. Water quality perception accuracy – Quebec

Problem	Per cent response	
	Respondents	Control
Algae	10.4	26.9
Weeds	63.0	54.0
Other	0.4	0.9

In terms of resource use, over 23,600 days are recorded for water-oriented activities (Table 21). Of this total, respondents claim 3,400 days when water quality problems restrict these activities. While this total is about half of that of Saskatchewan, the proportionate reduction is closer. Of an average use of 20.5 swimming days per season, the typical user has been restricted by water quality problems for 6.8 days, or about 28 per cent of the time. Fishing activity was similarly reduced by about one-third. No other water oriented activities were materially affected by the water quality.

It is obvious that a water quality problem exists at this site. This is borne out by both technical and qualitative judgements, as well as by the reduction of activity days on the part of the users. Yet an anomaly exists in that only 45 per cent of those interviewed desire improvements in water quality, and only 37.6 per cent are willing to pay to improve it (Table 22). Not only that the average amount the recreation population is willing to pay amounts to a scant 83 cents per user week (Table 23). This total is only a fraction of the average amount spent on recreation by the population per week per season, some 44 dollars. Perhaps recreational users are not unwilling to see public funds spent on cleaning up the problem, but would just prefer that the money not come directly out of their pockets (Table 24). Nevertheless, a major discrepancy seems to exist between action and attitude.

Table 21. User activity and reduction due to water quality – Quebec

	Swimming	Fishing	Hiking	Water-skiing	Boating	Picnicking
Total number of activity days	7,888	1,221	6,583	1,473	2,748	3,043
Average number of activity days per user	20.5	3.2	17.1	3.8	7.1	8.0
Total number of activity days reduction	2,642	417	—	96	198	13
Average no. of activity days reduction per user	6.8	1.1	—	0.3	0.5	0.1

Table 22. Improvements desired – Quebec

	Per cent response
General improvement in water quality	45.4
Algae removed	1.9
Weeds removed	9.9

Table 23. Willingness to pay for improved water quality – Quebec

Per cent willing to pay	37.6
Average expenditure per week	\$43.98
Average amount willing to pay per week	\$ 0.83

Table 24. Preferred dollar distribution – Quebec

Housing	\$15.57
Education	\$16.79
Highways	\$14.00
Health services	\$22.89
Recreation lakes	\$28.04

A number of factors could influence these results. It is clear that the most significant differences between the Saskatchewan and Quebec recreation populations lie in average education levels and occupation groupings. The differences in their respective concerns for the quality of the water in their recreational environment may be a reflection of this difference. It would be too simplistic to state that such differences explain the variance in willingness to pay for improvement or even concern for water quality, yet both groups are equally cognizant of the problem, and demonstrate equal amounts of recreational resource utilization. It may be that those at the Quebec site are more tolerant of a lower quality of water because of the abundance of lakes and rivers in the area. Since southern Saskatchewan is chronically water-short, perhaps the value that people place on existing supplies is higher than in an area where water for recreation is abundant. Another explanation of the situation can be tied to the theory of cognitive dissonance, and is discussed in Chapter Five.

In summary, the technical and qualitative data indicate that the water at the Quebec site is polluted bacteriologically and aesthetically. This fact does not seem to deter

extensive use of the water for recreational purposes. It would appear that present standards or guidelines do not realistically reflect the total situation. The water quality conditions do not seem to have significant bearing upon either deterring the use of the resource or prompting clean-up measures. The lack of concern for the problem by the users and his unwillingness to pay to alleviate the problem may be influenced by certain sociological factors which are identified in Chapter Five.

NOVA SCOTIA

In Nova Scotia, the user population is characterized by high average incomes, very high education levels, and an emphasis on professional and semi-professional occupation categories (Tables 25-27). As with Saskatchewan and Quebec populations, over one third of those interviewed have incomes over \$8,000; almost 60 per cent have incomes over \$6,000 (Table 26). Approximately 42 percent have had some university training, and 70 per cent have at least completed high school. This is a reflection of the large number of college students and recent graduates who are attracted to the Nova Scotia seaside in the summer months. Almost one third hold professional or semi-professional positions (Table 27).

Table 25. Education level – Nova Scotia

	Per cent of sample
Completed grade school	3.1
Part high school	15.4
Completed high school	30.2
Completed technical school	9.3
Part university	20.9
Completed university	20.9
No response	0.2

Table 26. Income levels – Nova Scotia

	Per cent of sample
Under \$3,000	21.3
\$3,000 – \$5,999	16.5
\$6,000 – \$7,999	22.6
\$8,000 – \$9,999	15.5
\$10,000 – \$15,000	13.4
Over \$15,000	6.9
No response	3.8

Table 27. Occupations – Nova Scotia

	Per cent of sample
Professional	14.8
Semi-professional	9.6
Managerial	7.6
Clerks, typists	13.0
Skilled workers	5.5
Semi-skilled workers	4.8
Unskilled workers	0.7
Housewives	20.9
Students	19.8
No response	3.3

In addition, as in other areas studied, a large majority (89 per cent) are city dwellers. The average person remained eleven days in the general area and over one third interviewed were tourists. Most users have spent an average of thirteen years in the Maritimes and a large proportion were day users (73 per cent).

Over 78 per cent rate the recreation areas under study as "excellent" or "very good" (Table 28). This figure is almost identical to results recorded in Quebec. A scant 4.1 per cent find the areas "poor" to "fair". Over three-quarters of those interviewed indicate that the aesthetic properties of the areas are the main reason for their being there (Table 29). "The beautiful seacoast", "the salt air", or "the sea" are the reasons most frequently mentioned. In addition, over one third are attracted by the quality of the salt water. Many refuse to believe that the sea could be polluted, for a number of reasons. For example, "the ocean is so large that it can absorb all the garbage we put into it", or more frequently, "the tide comes in and goes out twice a day, and gets rid of all the junk around here". Also, the distance factor is very attractive for some (34 per cent). It is only a ten mile drive from the Halifax-Dartmouth area to get to three of the beaches, the roads are generally good, and quite scenic. Surprisingly, approximately the same percentage of respondents (30 per cent) indicate that this distance factor is the greatest disadvantage of the area. Over half of the recreation population note the lack of facilities as the major disadvantage of all beaches. "Not enough changing places", or "no decent parking space" are reasons often mentioned. Only 7.5 per cent found the water quality a disadvantage (Table 29). These objections are mainly from the New Glasgow area beaches, particularly Loudon and Lighthouse beaches.

Table 28. Area rating – Nova Scotia

	Per cent response
Excellent	32.9
Very good	45.8
Good	16.9
Fair	3.8
Poor	0.3

Table 29. Area advantages/disadvantages – Nova Scotia

Characteristic	Per cent response	
	Advantage	Disadvantage
Aesthetic	75.2	7.2
Distance (proximity & route)	34.2	29.4
Facilities	18.3	50.2
Water quality	33.1	7.5
Organized activities	2.4	4.5
Commercial amenities	9.3	11.4

Few of those interviewed perceive water quality problems in the same way as the control group (Table 30). However, this lack of uniformity can be misinterpreted. In fact, there are very few water quality problems at most of the beach areas. This is borne out by both the technical data and the qualitative assessment of the control group. Only in the Boat Harbour area is any significant water problem noted.

Table 30. Water quality perception accuracy – Nova Scotia

Problem	Per cent response	
	Respondents	Control
Algae	2.4	12.8
Weeds	2.4	12.0
Other	0.1	0.2

Almost 8,000 user activity days are recorded by the sample population. Virtually no reduction in water oriented activity occurred, except for a .5 per cent reduction in swimming in the Loudon and Lighthouse beach areas (Table 31). The typical user spends an average of 18.9 days per season swimming at the beaches, 7.4 days picnicking, and 1.4 days boating.

One might assume that, on the basis of the figures on recreational use, users are not too concerned about water quality because of this relatively clean recreational environment. On the contrary, although very few (7.2 per cent) indicate that a general improvement in water quality is necessary, almost two-thirds are willing to pay to maintain the high level of quality encountered at the sites (Table 33). In addition, the average amount indicated by each user to accomplish this end was quite large, \$4.36 per week per season. This concern is also reflected in their preference for distribution of the hypothetical 100 dollars mentioned earlier. The "Recreational Lakes" category (which for the purposes of this part of the study includes the sea coast) received almost twice as much support in proportion to the other choices which could be made (Table 34). There also exists a positive correlation ($R^2 = .40$) between income level and willingness to pay. No such correlations were encountered in the Saskatchewan and Quebec populations.

Table 31. User activity and reduction due to water quality – Nova Scotia

	Swimming	Fishing	Hiking	Water-skiing	Boating	Picnicking
Total number of activity days	4,638	187	703	63	342	1,826
Average number of activity days per user	18.9	0.7	3.0	0.2	1.4	7.4
Total number of activity days reduction	23	0	0	0	0	0
Average number of activity days reduction per user	0.5	0	0	0	0	0

Table 32. Improvements desired – Nova Scotia

	Per cent response
General improvement in water quality	7.2
Weeds removed	3.8
Other	0.0

Table 33. Willingness to pay for improved water quality – Nova Scotia

Per cent willing to pay	65.5
Average expenditure per week on recreational activities	\$24.62
Average amount willing to pay per week	\$ 4.36

Table 34. Preferred dollar distribution – Nova Scotia

Housing	\$16.23
Education	\$19.89
Highways	\$08.49
Health services	\$17.64
Recreation lakes	\$35.45

In summary, an analysis of the water quality program reveals that for the users interviewed, there is practically no water quality problem at the majority of the beaches studied in Nova Scotia. However, much concern for the preservation and maintenance of a high level of environmental quality is evidenced by the responses of the questionnaire survey. Again, certain socio-economic and cultural factors appear to influence these results. The recreational population in Nova Scotia is well-educated, and well-informed on resource issues. As well, their occupational structure reflects a large number of professionals, and semi-professionals. Awareness of local pollution problems, such as at Boat Harbour, is generally good. Many comments indicate concern over such potential problems as possible oil spills as a result of the strikes off Sable Island, near the Nova Scotia Coast. However, the majority of those interviewed still cannot comprehend large scale pollution of the sea. Its very size seems to provide a minimizing effect on any thoughts regarding water pollution problems in the coastal zone which might exist now or in the future. Yet, there is obvious concern demonstrated to maintain the

present high environmental quality of the relatively unspoiled Nova Scotia coast.

SUMMARY

In summary, the three populations examined have certain cultural elements which seem to affect their perception of water quality problems. To identify these elements is difficult; to try and explain differences in perceptions and attitudes towards only one small segment of their total environment is nearly impossible. However, some initial findings may be noted from the results of this study.

In terms of average education, the Nova Scotia recreation population has the highest level, followed closely by Saskatchewan and then Quebec. Nova Scotia recreationists have the highest percentage of users in the professional and semi-professional occupation groups, while the Quebec group has the lowest. Both Saskatchewan and Quebec recreational groups possess an equally high percentage of skilled and semi-skilled workers. The Saskatchewan sample recorded the highest average income levels, although there is very little difference among the three groups sampled. Patterns of age structure reveal a high percentage in the Quebec sample over 40 (over 50 per cent). In Nova Scotia, this situation reverses, with almost two-thirds of those interviewed being under forty years of age. Saskatchewan on the other hand resembles an almost perfect bell curve peaking at age forty.

From an analysis of the study results, it appears as though education level, age and occupation are the social characteristics which most influence water quality problem awareness and willingness to pay among the three groups¹⁷. All the groups are highly urbanized and have relatively high disposable incomes, yet there is a significant difference in willingness to pay for improvements in water quality among them. In order of ranking, the Saskatchewan user population has the highest willingness to pay, followed by Nova Scotia and Quebec. Poor water quality at the Quebec site does not seem to exert any position influence on this group's attitudes towards cleaner water for recreation.

¹⁷ Correlation coefficients were generated and a multiple regression analysis run with public awareness and willingness to pay as dependent variables.

All respondents rate their respective areas very highly, the differences in water quality notwithstanding. A large majority of those interviewed are attracted to all the sample sites for aesthetic reasons, far more than factors such as commercial amenities, organized activities or ease of access. However, water quality problems are mentioned as the major disadvantages in certain Saskatchewan and Quebec sites. Both the Quebec and Saskatchewan recreation populations are quite accurate in their awareness of water quality problems, which was borne out by the high correlation between the technical control group's and respondent's perceptions.

All areas experience reductions in some forms of water-oriented activities due to water quality problems, although water quality differs considerably from region to region. Activity patterns of recreational use are very similar in all areas studied. At the Quebec site, where according to the technical data the water quality is the worst, the number of visits to the area is reduced by 20 per cent over the season, and activities such as swimming by over one-third. However, there is an inconsistency in the reaction of the population to these problems. Only about half of those interviewed at the Quebec site favour water quality improvements and just 17 per cent are willing to pay for them. This compares to three-quarters of the respondents interviewed in Saskatchewan who wanted improvements and almost two-thirds who would be willing to pay for them.

The results of the attitude questions (Appendix I, p. 36) were disappointing in that only in one area (Nova Scotia) could a significant correlation be drawn between attitude score and perception accuracy or willingness to pay for improved water quality ($R^2=.40$). Results from the three general areas were remarkably similar in terms of average numerical scores (70.8 in Saskatchewan, 70.3 in Quebec and 70.7 in Nova Scotia). It is difficult to account for such uniformity in average scores however, breakdowns of the scores by income level user type, and beach area would possibly provide far different statistics. Unfortunately time constraints did not allow such analysis. The uniformity of average scores might be explained by the large sample number which would tend to dampen the effect of extreme scores. Still, the scores do support the general conclusion of this paper, that concern for water quality problems is relatively strong in the sample group.

SOMMAIRE

En résumé, les trois populations observées ont certains aspects culturels qui semblent modifier leur perception des problèmes relatifs à la qualité de l'eau. L'identification de ces éléments est difficile: essayer d'expliquer les différences de perception et d'attitude en ce qui a trait à une faible partie de leur environnement total est presque impossible. Cependant, on peut retenir quelques premières constatations des résultats de cette étude.

En termes de niveau moyen d'éducation, la population qui se récréait en Nouvelle-Écosse a le plus haut niveau, suivie de très près par la Saskatchewan et le Québec. Les amateurs de plein-air de la Nouvelle-Écosse ont le plus haut pourcentage de représentation parmi les groupes professionnels et semi-professionnels, tandis que le Québec a le plus faible. Les groupes (populations échantillonnables) de Saskatchewan et du Québec ont un même fort pourcentage de travailleurs spécialisés et semi-spécialisés. La population de Saskatchewan enregistre le revenu moyen le plus élevé, cependant qu'il n'y a que très peu de différence parmi les trois groupes interrogés. La structure d'âge de la population québécoise révèle un haut pourcentage (plus de 50%) de gens au dessus de 40 ans. En Nouvelle-Écosse, la situation est inverse, avec près des deux tiers de l'échantillon au dessous de 40 ans. La distribution de la population en Saskatchewan se distingue par sa distribution normale (en forme de cloche) distribuée de même de chacun des côtés du sommet (avec un sommet à 40 ans).

De ces résultats, il semble que le niveau d'éducation, l'âge et l'occupation sont les caractéristiques sociologiques qui influencent le plus, parmi les trois groupes, l'attention portée au problème de la qualité de l'eau et la volonté d'en assumer les coûts. Même si tous les groupes sont hautement urbanisés et ont un revenu disponible relativement élevé, il y a tout de même des différences significatives dans la volonté de payer pour accroître et y maintenir une eau de qualité. Sous ce rapport, la Saskatchewan vient en tête, suivie par la Nouvelle-Écosse et le Québec. Ainsi la piètre qualité de l'eau dans les régions du Québec ne semble pas porter la population vers le désir de se récréer dans des eaux plus propres.

Tous les groupes estiment à un très haut point leur propre milieu, ne tenant pas compte des différences dans la qualité de l'eau. Une large partie de la population interrogée est attirée vers ces espaces pour des raisons esthétiques, beaucoup plus que par les facilités commerciales, activités organisées ou facilités d'accès. Toutefois, les problèmes suscités par la qualité de l'eau sont reconnus comme les principaux désavantages de ces espaces dans les régions où les problèmes sont techniquement les pires, i.e., Saskatchewan et Québec. La population qui se récréait dans ces deux provinces est très au fait de la perception de ces problèmes.

Toutes ces régions ont expérimenté, sous une forme ou sous une autre, une réduction des activités reliées à l'eau due au fait des problèmes de qualité. Cependant, les formes d'activité au niveau de chaque utilisation sont à peu près les mêmes d'une région à l'autre. Au Québec, ou selon les données techniques la qualité était pauvre, le nombre d'utilisateurs des espaces récréatifs a diminué de 20 pour cent au cours de la saison, et pour une activité comme la natation par plus d'un tiers. Il faut toutefois noter certaines inconsistances dans la réaction de la population face à ces problèmes. Seulement la moitié des gens interrogés au Québec favorisent une augmentation de la qualité de l'eau, tandis que seuls 17 pour cent d'entre-eux sont d'accord

pour en payer le prix. En Saskatchewan, les trois-quarts de la population interrogée s'est dite d'accord avec une augmentation de la qualité de l'eau et presque deux-tiers sont d'accord pour en payer les coûts.

Dans chaque section de ce chapitre, on peut voir que

nombre de facteurs sociologiques ont une influence sur les différents résultats observés. Les expliquer isolément sur la seule foi des données recueillies serait naïf. Toutefois, une tentative est faite, dans le prochain chapitre, d'expliquer les différences de perception-réaction en terme de la théorie des dissonances cognitives.

Conclusions

The essence of perception is deceptively straightforward. Each individual must organize the facts he gathers from his environment in order to be able to understand and make sense of it. The manner in which people define, classify and correct ideas of all kinds is subject to enormous variation, and therefore a simple explanation of this phenomenon is extremely difficult.

In the past it has been assumed that behaviour is consistent with perception, and that the perception should at least give an indication of what the ultimate behaviour pattern will be. The theory upon which this assumption rests is called *cognitive consistency*. This theory assumes that where inconsistencies are found, the experience is uncomfortable and pressures are set up to reduce them. This does not preclude irrationality as a part of the devices used to achieve consistency. Information or experience which is inconsistent with previously adopted attitudes or behaviours can be discounted or minimized. Following this theory, it can be assumed that those exposed to pollution will choose not to perceive it where it conflicts with previously established thought patterns. Where observed behaviour is not consistent with our descriptions of perception, the error may lie in (a) the description of perception, (b) the observation of behaviour, or (c) our assumption of consistency between behaviour and perception.

One could say that the study results indicate that (c), the assumption of consistency between behaviour and perception, is lacking. The accuracy of perception tests demonstrates that there is a high correlation between the awareness of water quality problems of the recreation populations at the sites in Nova Scotia, Saskatchewan and Quebec, and the technical control group. Yet there are significant differences in the behaviour of these three populations vis-à-vis willingness to pay to improve or maintain the quality of the water resource. Recreation activity levels are high among all groups, yet those in Nova Scotia and Saskatchewan seem to be more concerned over the quality of their recreational environment. However, this does not explain the fact that behaviour patterns with regard to water-oriented sports have been changed or reduced in those areas with the poorest water quality. Perhaps it can be explained in the following manner.

Cognitive consistency does not say that people behave rationally or consistently, but rather that they try to preserve the appearance of rationality in what they perceive, the attitudes they adopt, and the way in which they

behave. When the water looks inviting, and the swimmer is enjoying its use, and he learns it is polluted, he may enter a state of dissonance. Dissonance can be reduced by a change in attitude, behaviour, or perception. Thus, the swimmer can (a) stop swimming in the water (this accounts for the reduction), (b) not return (this is unlikely), or (c) continue to swim, and dismiss the whole subject of pollution at that site as a figment of some scientists' or politicians' imagination. If (c) is chosen, then it is clear that willingness to pay to improve the quality of the water will drop. The contrary result may appear in Saskatchewan, and still be consistent with the theory. The Swimmer chooses (a) but instead of dismissing the subject, translates his alarm over the situation by a behaviour pattern which includes raising his willingness to pay for improvements in the recreational environment. The Nova Scotia results may be explained by the original theory of cognitive consistency, i.e. it is consistent with the respondent's perception of an idyllic spot to be willing to pay to retain this perception. Thus, there is a high degree of willingness to pay, even though a good water quality exists.

In order to provide a capsule of the findings of this study, it is best to return to its first objectives.

Objective 1 – To determine the extent of awareness and concern about water quality problems at selected recreational sites in Canada.

It is evident from the data that awareness of specific on-site water quality problems is high, and that the user populations examined are very accurate in perceiving such problems. However, the degree to which the same populations express concern over the problem of water pollution and its possible effects is quite different. Concern seems to be highest in Saskatchewan, with Nova Scotia a close second. The Quebec user population seems indifferent to the water quality problem, and more willing to accept conditions as they are. Education level and type of occupation seem to influence positively the levels of respondent concern, i.e., the higher the level of education or status of occupation, the greater the degree of concern over water quality problems.

Objective 2 – To determine if public awareness and water oriented recreational activities are influenced by the physical quality of water.

Awareness by respondents of significant deterioration in water quality conditions over the season, such as a heavy

algal bloom in Saskatchewan or the aftermath of a storm in Nova Scotia, was immediate and in general, accurate. Reduction in water-oriented activities due to poor water quality varied between one-fifth and one-third of the total user time in Quebec and Saskatchewan. In Nova Scotia, where water quality for the most part was excellent, there was little or no reduction in water-oriented activities. There seems to be a positive relationship between reductions in recreational water use and diminishing water quality conditions.

However, as previously noted, general user concern over water pollution problems, as expressed through the questionnaire comments, does not seem to be influenced by on-site water quality conditions. Instead, this concern appears to be a function of other factors such as education and occupation levels.

Objective 3 – To assess the recreational user's willingness to pay for improved water quality.

In general, the majority of those users interviewed (60 per cent) expressed willingness to pay for improved water quality. Almost three-quarters of the recreationists in Saskatchewan would be willing to pay from four to five dollars per user week per season for improved water quality. Approximately two-thirds of those users interviewed in Nova Scotia were willing to pay a similar amount. Users in the Quebec group were the least willing to pay, particularly if the amount came directly from their own pockets. At the Quebec sample site, one-third of the users were willing to pay about one dollar per user week per season for improved water quality. However, these results notwithstanding, what people say they will do, and what

they actually do, are often at variance.

Objective 4 – To gather information concerning recreational use patterns and population characteristics at these sites to provide a data base for future planners.

All areas have affluent urban-oriented user populations – the majority of those interviewed have incomes in excess of \$8,000. The highest education levels are encountered in the Saskatchewan and Nova Scotia groups. The majority of the Quebec users are managers, and skilled and semi-skilled workers, with a smaller percentage of university trained than the other two groups.

To conclude, it is evident both from an examination of current planning literature, as well as practical experience, that studies of attitudes and perceptions can and should be used as a means of infusing new kinds of data into the management of environmental quality. While it is recognized that such studies by government agencies could lead to manipulation of information, or that planning formulation could become so complex and raise so many obstacles that nothing would be accomplished, responsible decision-makers must recognize the necessity of including the views of the user public in environmental resources management. Safeguards can be placed upon the results so that trust and confidence will be forthcoming on the public's part. This is best created by an open situation. Thus, the act of studying public perceptions and attitudes should be regarded as part of a two-way process. The results should be made available to both planners and public alike. These studies should not, however, become ends in themselves, but rather only one of many vehicles for more direct public involvement in environmental planning.

La substance de la perception est apparemment simple. Chaque individu doit structurer les sensations qu'il retient de son environnement pour pouvoir comprendre et en tirer un sens. La seule façon dont les gens définissent, classifient et corrigent leurs impressions de toutes sortes varie énormément, et de là une simple explication de ce phénomène devient extrêmement difficile.

Autrefois, on supposait que le comportement était consistant avec la perception, et que la perception devait au moins donner une idée de ce que pourrait être ce comportement dans sa version finale. Cette théorie d'où l'on tire certaines suppositions s'appelle la théorie de la consistance cognitive. Cette théorie suppose essentiellement que si l'on trouve des inconsistances, l'expérience n'est pas jugée correcte et on tente alors de corriger la situation. Il ne faut toutefois pas en conclure que l'irrationalité est utilisée comme moyen pour atteindre la consistance. L'information ou l'expérience qui est inconsistante eu égard à certaines attitudes ou comportements préfabriqués peut être diminuée, minimisée. Selon cette théorie, on peut

supposer que ceux qui sont exposés à la pollution ne pourront la percevoir si elle entre en conflit avec des préjugés. Cependant, si le comportement observé n'est pas consistant avec la description faite des perceptions, l'erreur peut venir de (a) la description de ces perceptions, (b) l'observation des comportements, ou (c) nos hypothèses relatives à la consistance entre comportement et perception.

On peut prétendre que les résultats de l'étude indiquent que (c), l'hypothèse de consistance entre comportement et perception, n'est pas vérifiée. La justesse des analyses de perception démontre que la population, qui se récrée dans les espaces de Nouvelle-Écosse, Saskatchewan et Québec est très importante. Il y a toutefois des différences substantielles parmi ces trois populations vis-à-vis leur volonté d'accroître la qualité de leurs eaux. L'éveil de la population à ces problèmes est élevé parmi tous ces groupes, cependant ceux de Nouvelle-Écosse et Saskatchewan semblent être plus impliqués par l'état de leur environnement récréatif. Toutefois, ceci n'explique pas pourquoi l'attitude des gens face aux jeux et sports

aquatiques a changé ou s'est détériorée le plus dans les régions ayant les eaux les plus pauvres. On peut peut-être expliquer la situation de cette façon.

La théorie ne dit pas si les gens se sont comportés rationnellement ou de façon consistante, mais plutôt qu'ils ont essayé de préserver les apparences d'une rationalité au travers de laquelle ils perçoivent, les attitudes qu'ils adoptent et enfin leur façon de se comporter. Quand l'eau semble invitante et que le baigneur est heureux d'en faire usage, et qu'il apprend qu'elle est polluée, il peut entrer dans un état de dissonance. Cette dissonance peut être réduite par un changement dans les attitudes, comportement ou perception. Ainsi un baigneur peut (a) arrêter de se baigner dans les eaux (on comptabilise cela comme une réduction), (b) ne pas y retourner (c'est très improbable), ou (c) continuer de se baigner et mettre cette pollution au compte de l'imagination de certains scientifiques ou politiciens. Si l'attitude (c) est adoptée, il est évident que la volonté de payer pour augmenter la qualité de l'eau va diminuer. C'est une explication plausible. Le résultat contraire peut se produire, comme en Saskatchewan, et être encore consistant avec la théorie. Le baigneur préfère (a) à l'attitude qui veut ignorer complètement le problème, traduire ses craintes dans une attitude qui, entre autres choses, augmente le désir de payer les coûts d'un mieux-être de l'environnement récréatif. Les résultats en Nouvelle-Écosse peuvent être expliqués par cette théorie, quelque peu originale, des dissonances cognitives — i.e., consistants avec une perception idyllique de la situation par le répondant qui accepte par le fait même de payer pour maintenir cette perception. C'est ainsi qu'il peut exister une grande volonté de payer, même si l'eau est de bonne qualité.

Au lieu de constituer à ce moment-ci un résumé des résultats de cette étude, il nous semble préférable de retourner aux objectifs premiers.

1^{er} Objectif — Déterminer le mode d'attention et d'implication au sujet des problèmes de qualité de l'eau, en certains endroits au Canada.

Il semble évident, à partir des données recueillies, que l'attention portée à ces problèmes est élevée, et que les populations utilisatrices qui furent observées ont une perception très juste de ces problèmes. Toutefois, le degré avec lequel une même population se prétend concernée par le problème de la pollution de l'eau, et les effets qu'il en résulte sont très différents. L'implication semble être très forte en Saskatchewan, alors que la Nouvelle-Écosse arrive très près en seconde place. Les utilisateurs québécois semblent indifférents au problème, et sont plutôt portés à accepter les conditions existantes. Les niveaux d'éducation et les catégories d'occupation semblent influencer positivement le niveau d'implication, i.e., plus le niveau d'éducation et/ou d'occupation est élevé, plus on est au fait des problèmes de la qualité de l'eau.

2^e Objectif — Préciser si l'attention du public et les activités reliées à l'eau sont influencées par la qualité physique de l'eau.

L'attention portée par les groupes utilisateurs à toute détérioration des conditions de l'eau pendant une saison tel que l'apparition d'algues en Saskatchewan ou aux résultats d'un orage en Nouvelle-Écosse fut immédiate et en général assez juste. La diminution des jeux et sports aquatiques varie de un-cinquième à un-tiers de fois l'utilisation au Québec et en Saskatchewan où la qualité des eaux est moins que parfaite. En Nouvelle-Écosse où la qualité de l'eau est en grande partie excellente, il n'y eut que très peu ou pas de réduction dans la pratique de ces activités. Il semble y avoir une relation positive entre la diminution dans la pratique de ces activités reliées à l'eau et la qualité décroissante de l'eau.

Cependant, comme nous l'avons déjà noté, les utilisateurs en général conscients des problèmes de pollution de l'eau, tel qu'expliqué dans les commentaires du questionnaire, ne semblent pas être influencés par la qualité de l'eau. Il semble plutôt que leur attitude est fonction de d'autres facteurs comme les niveaux d'éducation et d'occupation.

3^e Objectif — Évaluer la volonté des utilisateurs des ressources récréatives à payer pour augmenter la qualité de l'eau.

En général, la majorité de ces utilisateurs interviewés (60 pour cent) ont exprimé une volonté de payer les coûts de l'augmentation de la qualité de l'eau. Près des trois-quarts des amateurs de plein air de la Saskatchewan sont prêts à payer de quatre à cinq dollars par semaine d'utilisation par saison pour augmenter cette qualité. A peu près les deux-tiers de ceux interviewés en Nouvelle-Écosse se sont dit prêts à payer le même montant. Les groupes québécois étaient moins intéressés à payer, spécialement si le montant vient de leur poche. D'ailleurs on y remarque qu'un tiers des québécois utilisateurs était prêts à payer un dollar par semaine d'utilisation par saison pour une eau de qualité supérieure. Toutefois, on doit prendre note de la différence entre ce que les gens prétendent faire, et ce qu'ils font effectivement.

4^e Objectif — Réunir des informations concernant les modes d'utilisations des activités récréatives et les caractéristiques de la population selon les régions pour fournir des données de base pour les futurs planificateurs.

Toutes les régions ont des utilisateurs urbains vivant dans une certaine aisance—la majorité des répondants avait un revenu supérieur à \$8,000. Les plus hauts niveaux d'éducation ont été rencontrés dans les groupes de Saskatchewan et Nouvelle-Écosse. La majorité des utilisateurs au Québec sont des "collets blancs" travailleurs spécialisés et semi-spécialisés avec un très petit pourcentage d'universitaires en comparaison des autres groupes.

L'étude des attitudes et perceptions devrait être utilisée comme un moyen d'introduire de nouvelles données dans la gestion de la qualité de l'environnement. Il est cependant admis que de telles études faites par des agences gouvernementales pourraient mener à la manipulation d'informations ou que les modes de planification seront tellement complexes et amèneront de tels obstacles que rien d'utile n'aura été créé. Ainsi, on devra faire attention dans l'interprétation des résultats pour que le public puisse réagir dans un climat serein et plein de confiance. On atteint ce

degré de crédibilité lorsque la situation est claire et précise. Ainsi l'étude des perceptions et attitudes d'une population doit être perçue comme un procédé ambivalent. Les résultats doivent être disponibles pour les planificateurs et le public, avec toutes les précisions requises. Ces études ne doivent toutefois pas être une fin en soi, mais plutôt un véhicule parmi tant d'autres pour augmenter la participation directe du public à la planification de son environnement, spécialement la participation de ceux qui sont impliqués en premier lieu.

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A. English-Language Questionnaire

Respondent's Number

1. Where is your home? (Town/City and Province)

2. Do you live on a farm or in town?

Farm

Town

3. For how many years have you been coming to this area?

4. Are you here on your annual vacation?

Yes

No

5. Are you:

staying at a cottage?

camping?

just at the lake for the day?

other? (specify)

6. (Cottagers and Campers only):

How long is your visit here? (in days)

7. (Campers only) Is this:

your main destination?

a stop-over enroute?

8. (Campers only) Do you use:

a tent?

a trailer?

other?

9. (Campers only) Do you:

rent

own

borrow

the tent (trailer)?

10. (Cottagers only) Do you:

rent

own

borrow

the cottage?

11. In general, how do you rate the area around here as a recreation spot?

Excellent

Good

Fair

Poor

Very Poor

Don't know

12. What do you think are the main advantages and disadvantages of the area? (Record verbatim; probe by asking, "Anything else?")

[ask if water pollution (or some particular form of it) is mentioned in 12]

13. How did you first become aware of a water pollution problem in this area?

Coding Categories Only:

Radio

Newspaper

T.V.

Friends

Personal Experience

Other (Specify)

Uncertain

14. What other lake areas, if any, have you visited recently for recreation? (Up to three) (indicate province for each lake)

15. Including this lake, which is generally the best area for recreation, next best, etc.? (Ensure that the lakes mentioned in 14 are the ones rated here.)

(1)

(2)

(3)

(4)

16. Do you have any particular complaints about the water in *this lake this week*? (Record verbatim, then ask about the strength of each problem mentioned and put a check in the chart on page 38.) (Probe by asking, "Anything else?")

17. How many visits do you make here during the summer?

18. Do the lake problems that you mentioned reduce the number of visits that you make here during the summer?

Yes

No

Uncertain

19. (If yes) Approximately how much do these problems reduce your visits?

Chart (see question 16)

Respondent's Perception

Problem	Perception		Degree of Perception		Uncertain
			Moderate	Extensive	
	Yes	No	(bad)	(very bad)	
a. Floating objects					
b. Foam					
c. Algae					
d. Discolouration					
e. Cloudiness					
f. Oil scums					
g. Domestic sewage					
h. Weeds			bad	very bad	
i. Odour					
j. Irritation (skin, eyes, ears)					
k. Taste					
l. Other (specify)					

Interviewer's Perception

Problem	Perception		Degree of Perception		Uncertain
			Moderate	Extensive	
	Yes	No	(bad)	(very bad)	
a. Floating objects					
b. Foam					
c. Algae					
d. Discolouration					
e. Cloudiness					
f. Oil scums					
g. Domestic sewage					
h. Weeds			bad	very bad	
i. Odour					
j. Irritation (skin, eyes, ears)					

Ask 23 only with reference to problems which the respondent mentioned in 16.

	Swim	Fish	Hike	Water Ski	Hunt	Boat	Picnic/sightsee	Other (Specify)
20. Do you _____ here during the summer?								
21. How often do you _____ here during the summer? (Record in days)								
22. Does your family _____ here during the summer?								
23a. Do floating objects reduce the amount of _____ that you do here? By how much?								
b. Does foam reduce the amount of _____ that you do here? By how much?								
c. Does algae reduce the amount of _____ that you do here? By how much?								
d. Does discolouration reduce the amount of _____ that you do here? By how much?								
e. Does cloudiness reduce the amount of _____ that you do here? By how much?								
f. Do oil scums reduce the amount of _____ that you do here? By how much?								
g. Does domestic sewage reduce the amount of _____ that you do here? By how much?								
h. Do weeds reduce the amount of _____ that you do here? By how much?								
i. Does odour reduce the amount of _____ that you do here? By how much?								
j. Does irritation to the (skin, eyes, ears) reduce the amount of _____ that you do here? By how much?								
k. Does taste reduce the amount of _____ that you do here? By how much?								
l. Does _____ reduce the amount of _____ that you do here? By how much?								

24. (Boaters only) Do you use a:

sailboat?

canoe?

motorboat?

cruiser?

25. (Boaters only) Do you:

rent

own

borrow

the boat?

26. Are there any improvements in the quality of the water which you would like to see made?

Yes

No

Uncertain

(If "no" or "uncertain" to #26, omit 27-32).

27. What improvements would you like to see?

28. (Day users only). On the average, it costs a person \$2.00 to come to this lake for *the day*. Would say that, on the average \$2.00 represents *your* expenses?

Yes

No

Uncertain

(If no) How much are your expenses for the day?

29. (Campers only). On the average, campers spend _____ *per day* at this lake. Would you say that on the average _____ represents *your* expenses?

(If no) How much are your expenses *per day*?

30. (Cottagers only) On the average, cottagers spend _____ *per week* at this lake. Would you say that on the average _____ represents *your* expenses *per week*?

Yes

No

Uncertain

(If no) How much are your expenses *per week*?
_____ day user/camper/cottager

31. If _____ represents your expenses per (day/week) would you be willing to pay an additional amount per (day/week) for clean water in the lake?

Yes

No

Uncertain

day user/camper/cottager

32. (If yes to 31) How much per (day/week?)

33. If you were asked to distribute \$100 dollars, how much would you give to improve:

Housing

Education

Highways

Health services

Recreation lakes

34. Will you come back here again?

Yes

No

Don't know

Attitude Question

(Hand respondent next page to fill out himself. Instructions: (Would you please look over these statements and put a check indicating how you feel about each one. Whenever the word "recreation" is used, think of any and all kinds of water recreation which *you* participate in — for example, swimming, fishing, boating, water-skiing — and also things like camping, picnicking, hiking or just relaxing near a lake or river.)

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
A. Newspapers, T.V. and radio often exaggerate by claiming that recreation requires very clear lakes and rivers.					
B. I am not too concerned if the water used for recreation is cloudy.					
C. One type of water that is not suitable for recreation is water that is brown in colour.					
D. Having cleaner lakes for recreation is a luxury we could easily do without.					
E. To enjoy water recreation, it is necessary to be able to see several feet into the water.					
F. For recreation, water that appears green on the surface is almost as good as clear water.					
G. Although cloudy lake water can irritate the eyes, it should not decrease lake recreation very much.					
H. When officials plan a new park, they should realize that there are several things more important to have than crystal blue lakes.					
I. A green plant growth on the surface of a lake or river should prevent people from using the water for recreation.					
J. Clear water is essential for recreation.					
K. There is an over-emphasis on sanitation in our society.					
L. Keeping lakes suitable for recreation is not important enough to be a problem for the provincial or federal governments.					
M. A committee should be set up to improve the quality of lakes and rivers used for recreation.					
N. It is only natural that water used for recreation becomes discoloured or cloudy.					
O. People generally enjoy whatever recreational areas are available.					
P. It is more important to clean up lakes used for recreation than to have good highways.					
Q. Generally, only fussy people are concerned with the cleanness of lakes and rivers used for recreation.					
R. If I had to choose between clean water and good recreation facilities (for example camp stoves, washrooms, etc.), I would choose the facilities.					
S. To enjoy recreation, people need water that is pure.					
T. Water that is cloudy is probably still clean enough to use for recreation.					

35. (Cottagers only) What type of sewage disposal system do you use here?

Septic tank

Sewer

None

Uncertain

36. (Cottagers only) Do you think that your sewage disposal system is contributing at all to polluting the water?

Yes

No

Uncertain

37. (If yes to 36) How much?

some

a great deal

(Record any comments verbatim)

38. Are you connected with any organizations which have an interest in water problems?

Yes

No

39. (If yes) which organization?

40. To what age group do you belong?

(a) 18-20

(b) 21-29

(c) 30-39

(d) 40-60

(e) Over 60

41. Which of these answers best describes the level of education which you have completed?

(a) Grade school

(b) Part high school

(c) High school graduate

(d) Part University

(e) University graduate

(f) Technical-Vocational School

42. What is your occupation?

43. Into which category does your annual income fall?

(Please include your spouse's income & income from all other sources, such as investment.)

(a) Under \$3,000

(b) \$3,000-\$5,999

(c) \$6,000-\$7,999

(d) \$8,000-\$9,999

(e) \$10,000-\$14,999

(f) \$15,000 and over

INTERVIEWER'S RECORD

1. Respondent's Sex:

Male

Female

2. Date of Interview:

3. Time of Interview:

Morning

Afternoon

Evening

4. Length of Interview:

6. Comments:

5. Sample Site:

Lake:

Beach Stake:

Cottage Unit No.:

Cottage Sample No.:

Interviewer's Signature:

B. French-Language Questionnaire

Français – Questionnaire du Québec

1. Où se trouve votre résidence permanente?

- Montréal
- Sherbrooke
- Autre
- Québec
- Autre province
- Les États-Unis

2. Habitez-vous sur une ferme ou en ville?

- Une ferme
- En ville

3. Depuis combien d'années passez-vous quelque temps ici l'été?

4. Cet endroit, est-il votre lieu de vacance annuelle?

- Oui
- Non

5. Êtes-vous:

- Résidants
- Dans un chalet
- En camping
- Hôtel-Motel
- Ici pour la journée seulement

6. Campeurs et résidants de chalets seulement

Combien de temps durera votre séjour?

7. Campeurs seulement

Cet endroit est-il votre destination finale?
une étape?

8. Campeurs seulement

Utilisez-vous:

- une tente
- une remorque

9. Campeurs seulement

La tente (la remorque) est-elle

- louée
- prêtée
- possédée

10. Habitants de chalets seulement

Cette maison (ou chalet) vous est-elle

- prêtée
- louée
- possédée

11. Comment classeriez-vous cet endroit en ce qui concerne ses possibilités récréatives?

Excellent

Bon

Moyen

Pauvre

Très pauvre

Ne sais pas

15. Y compris le Richelieu, classez ces plans d'eau tenant compte de leurs possibilités récréatives:

1^{er} choix

2^e choix

3^e choix

4^e choix

12. Quels sont d'après vous les principaux avantages et désavantages de cet endroit? (Notez mots pour mots; posez la question «rien d'autre?» pour en savoir davantage.)

13. (Si la pollution a été mentionnée dans la question 12) Comment avez-vous pris d'abord connaissance du problème de la pollution?

(Ne rien suggérer)

Radio

Expérience personnelle

Journaux

Autre (spécifier)

T.V.

Incertain

14. A quel autre lac ou rivière êtes-vous déjà allé à des fins récréatives. (Pas plus de trois)

Lac:

Province:

17. Combien de fois visitez-vous ces lieux durant l'été?

18. Est-ce que l'un des problèmes mentionnés à la question no. 16 diminue vos activités dans ce domaine?

Oui

Non

Incertain

19. Si votre réponse est «oui», de quelle façon ces problèmes influencent ou diminuent vos visites?

Tableau (voir question n° 16).

Perception du répondant

Problèmes	Perception		Degré de perception		Incertain
	Oui	Non	Modéré	Extensif	
a. Objets flottants					
b. Ecume					
c. Algues					
d. Mauvaise coloration					
e. Poussières					
f. Taches d'huile					
g. Egouts domestiques					
h. Mauvaises herbes					
i. Odeur					
j. Irritations (yeux, etc.)					
k. Goût					
l. Autre					
m. Autre					

Perception de l'interrogé

Problèmes	Perception		Degré de perception		Incertain
	Oui	Non	Modéré	Extensif	
a. Objets flottants					
b. Ecume					
c. Algues					
d. Mauvaise coloration					
e. Poussières					
f. Taches d'huile					
g. Egouts domestiques					
h. Mauvaises herbes					
i. Odeur					
j. Irritations					

(Posez le no. 23, avec référence aux problèmes mentionnés par l'interrogé au no. 16.)

	La nage	La pêche	Excursion à pied	Le ski nautique	La chasse	Le canotage	Pique-nique	Autres (Spécifiez)
20. Est-ce-que vous pratiquez _____, ici durant l'été?								
21. Combien de fois est-ce-que vous pratiquez _____ ici durant l'été?								
22. Est-ce-que votre famille pratique _____ durant l'été?								
23. a. Est-ce-que les objets flottants diminuent votre niveau de pratique de _____ ici? De combien?								
b. Est-ce-que l'écume réduit votre niveau de pratique de _____ ici? De combien?								
c. Est-ce-que les algues réduisent votre niveau de pratique de _____ ici? De combien?								
d. Est-ce-que la mauvaise coloration diminue votre niveau de pratique de _____ ici? De combien?								
e. Est-ce-que le temps nuageux diminue votre niveau de pratique de _____ ici? De combien?								
f. Les écumes d'huile réduisent-elles votre niveau de pratique de _____ ici? De combien?								
g. L'eau provenant des égouts réduit-elle votre niveau de pratique de _____ ici? De combien?								
h. Les mauvaises herbes réduisent-elle votre niveau de pratique de _____ ici? De combien?								
i. Les odeurs réduisent-elles votre niveau de pratique de _____ ici? De combien?								
j. Les irritations (de la peau, des yeux et des oreilles) réduisent-elles votre niveau de pratique de _____ ici? De combien?								
k. La saveur réduit-elle votre niveau de pratique de _____ ici? De combien?								
l. _____ réduit-il la quantité de _____ que vous faites ici? De combien?								

N.B. Si vous n'avez pas de famille, inscrivez un x ici:

une embarcation motorisée sans cabine

24. Canoéistes seulement: Votre bateau est-il

un voilier

un canot

une embarcation motorisée avec cabine

25. Canoéistes seulement: Votre bateau est il

loué

possédé

emprunté

26. Pourriez-vous me donner une idée pour améliorer la qualité de l'eau?

Oui

Non

Incertain

(Si la réponse est «non» au no. 26, ne répondez pas aux nos. 27-32.)

27. Quelles améliorations voudriez-vous y voir?

28. (N'interrogez que les visiteurs de jour.) Il vous coûte en moyenne \$2.00 par jour pour venir à ce lac. Pouvez-vous dire que ce montant (\$2.00) représente en moyenne vos dépenses pour une journée?

Oui

Non

Incertain

(Si non) Quel est le montant que vous dépensez pour une journée?

29. (N'interrogez que les campeurs.) Les campeurs dépensent, en moyenne _____ par jour à ce lac. Pouvez-vous dire que _____ est conforme à la somme que vous dépensez par jour?

(Si non) Quel montant dépensez-vous par jour?

30. (N'interrogez que les résidents de chalets.) Les résidents des chalets dépensent, en moyenne, _____ par semaine, à ce lac. Pouvez-vous dire que ce montant est conforme à la somme

que vous dépensez par semaine?

Oui

Non

Incertain

(Si non) Quel montant dépensez-vous par semaine?

31. Si _____ représente vos dépenses par (jour/semaine) seriez-vous disposé à déboursier un montant supplémentaire par (jour/semaine) pour une meilleure qualité de l'eau dans ce lac?

Oui

Non

Incertain

32. (Si vous avez répondu «oui» à la question #31.) Combien déboursieriez-vous par (jour/semaine)?

33. Si vous aviez à distribuer \$100. entre les 5 postes suivants, de quelle façon le feriez-vous?

Logement

Education

Routes

Service de santé

Aménagements récréatifs
en bordure de l'eau

34. Comptez-vous revenir à cet endroit?

Oui

Non

Incertain

Question d'attitude

(Remettre la page suivante à l'interviewé pour qu'il y réponde lui-même). Manière de procéder: Veuillez mettre un crochet pour chaque affirmation qui vous semble la plus appropriée. Lorsque le mot «récréation» apparaît, pensez aux différents usages récréatifs que vous faites de l'eau, comme par exemple: la natation, la pêche, le canotage, le ski-nautique etc.; pensez aussi aux activités comme: le camping, les pique-niques, les excursions ou seulement à la détente près d'un lac ou d'une rivière.

	Très vrai	Vrai	Incertain	Faux	Absolument faux
A. Les journaux, la t.v. et la radio exagèrent souvent en affirmant que les loisirs aquatiques nécessitent des lacs et des rivières très propres.					
B. Le fait qu'il se trouve des matières en suspension dans l'eau ne m'incommodent pas trop.					
C. L'eau brunâtre ne convient pas aux activités aquatiques.					
D. Avoir de l'eau propre dans nos lacs est un luxe dont nous pouvons nous passer facilement.					
E. Pour jouir des activités aquatiques, il est nécessaire que l'eau soit assez claire pour voir à plusieurs pieds en profondeur.					
F. L'eau qui semble verte en surface est aussi propice à la récréation qu'une eau claire.					
G. Même si l'eau «trouble» peut irriter les yeux, cela ne diminue pas beaucoup le plaisir des activités aquatiques.					
H. Quand les autorités veulent créer un nouveau parc, elles devraient se dire que la limpidité de l'eau n'est pas la chose la plus importante à prévoir.					
I. Quand des plantes vertes croissent à la surface de l'eau les gens ne devraient pas s'y baigner.					
J. Une eau claire est essentielle pour les activités aquatiques.					
K. On exagère l'importance de la propreté en général dans notre société.					
L. La propreté des eaux ne revêt pas une importance suffisante pour représenter un véritable problème pour les gouvernements.					
M. On devrait mettre sur pied un comité chargé d'améliorer la qualité des eaux utilisées à des fins récréatives.					
N. Il est normal qu'une eau où l'on pratique des activités récréatives change de couleur ou devienne trouble.					
O. Les gens sont généralement satisfaits des aménagements récréatifs qui sont à leur disposition.					
P. Il est plus important d'épurer les eaux destinées aux loisirs que d'avoir de bonnes routes.					
Q. Généralement, seules les personnes difficiles sont préoccupées par la propreté des eaux.					
R. Si j'avais à choisir entre une eau propre et de bons aménagements de loisir (Quais, parcs, promenades, etc.) je choisirais les aménagements.					
S. Pour jouir de leurs loisirs, les gens ont besoin d'une eau propre.					
T. Une eau trouble est probablement encore assez propre pour servir à des activités aquatiques.					

35. (Pour les résidents dans les chalets seulement)
Quel est le type de système d'écoulement d'égouts
vous servez-vous ici?

Un réservoir septique

Un système d'égout

Aucun

Incertain

36. (Pour les résidents dans les chalets seulement)
Pensez-vous que votre système d'écoulement
d'égouts contribue à la pollution de l'eau?

Oui

Non

Incertain

37. (Si la personne a répondu oui à la question No. 36)
De combien?

Un peu

Beaucoup

(Enregistrer tout commentaire verbal)

38. Faites-vous partie d'une organisation qui s'intéresse
aux problèmes des eaux?

Oui

Non

39. Si vous avez répondu «oui» au #38 — De quelle
organisation faites-vous partie?

40. Dans quel groupe d'âge vous situez-vous?

(a) 18-19

(b) 21-29

(c) 30-39

(d) 40-60

(e) 60 et plus

41. Lequel des différents niveaux d'éducation suivants
convient le mieux au vôtre?

(a) École primaire

(b) École secondaire (en partie)

(c) Diplôme de l'école secondaire

(d) Niveau universitaire

(e) Diplôme universitaire

(f) École technique ou vocationnelle

42. Quel est votre occupation?

43. Dans quelle catégorie de revenu vous situez-vous?
(Veuillez inclure les revenus de votre épouse, ainsi
que les revenus provenant de toutes autres sources)

(a) \$3,000 et moins

(b) De \$3,000 à \$5,999

(c) De \$6,000 à \$7,999

(d) De \$8,000 à \$9,999

(e) De \$10,000 à \$14,999

(f) \$15,000 ou plus

NOTE DE L'INTERVIEWEUR

1. Sexe de l'interviewé:

Mâle

Femelle

2. Date de l'interview:

3. Heure de l'interview:

Matin

Après-midi

Soir

4. Durée de l'interview:

5. Endroit de l'interview:

Lac:

No. indicateur de la plage:

No. du chalet:

No. de l'échantillon du chalet:

6. Commentaires

Signature de l'intervieweur:

C. Water Quality Technical Report Form

This report is intended to provide a daily measure of water quality which may be correlated with public interviews.

STATION A.M.
DATE TIME P.M.

- A. 1. Water temperature ($^{\circ}\text{C}$)
- 2. Conductivity ($\mu\text{mho/cm. } 25^{\circ}\text{C}$)
- 3. pH
- 4. D.O. (% saturation)
- 5. Secchi disc (ft.)
- 6. Turbidity (J.T.U.)
- 7. Apparent colour (Hazen units)
- 8. D.O. (p.p.m.)
- 9. Coliform count (per 100 mls)
- 10. Fecal coliform count (per 100 mls)
- 11. B.O.D. (p.p.m.)

- B. 12. Wind speed
- 13. Wind direction
- 14. Cloud cover (%)
- 15. Rainfall
- 16. Temperature ($^{\circ}\text{F}$)

C. Qualitative Assessment: 4 – very bad 1 – slight
3 – bad 0 = very slight
2 – moderate

- 17. Algae
- 18. Floating Objects
- 19. Odour
- 20. Scum
- 21. Foam
- 22. Discolouration
- 23. Weeds
- 24. General Comments:

Occupation Categories

10 Professional

- 11 Accountant
- 12 Biologist, Chemist
- 13 Engineers
- 14 Economist
- 15 Teachers, Instructors
- 16 Lawyer
- 17 Physician
- 19 University Prof.

20 Semi-Professional

- 21 airline pilot
- 22 social worker
- 23 computer programmer
- 24 draughtsman
- 25 journalist, author
- 26 medical, dental technician
- 27 nurses (R.N. psych, etc.)
- 28 research technicians (audio & visual too)
- 29 surveyor

30 Officials, Managers, Proprietors

- 31 civil servant – admin.
- 32 executives
- 33 managers (sales, banks, etc.)
- 34 contractors
- 35 foreman
- 36 claims investigators (credit too)
- 37 real estate
- 38 store owner
- 39 travel or insurance agent

40 Clerical and Sales

- 41 stewardess
- 42 bank teller
- 43 cashier
- 44 clerk (all sorts)
- 45 keypunch operator
- 47 secretaries (stenos, typists)

- 48 salesman
- 49 car salesman or dealer

50 Skilled

- 51 airplane mechanic
- 52 bricklayer
- 53 electrician
- 54 carpenter
- 55 machinist – all types
- 56 plumber
- 57 railroad workers – most types
- 58 T.V., radio repairmen
- 59 welder

60 Semi-Skilled

- 61 assembly line worker
- 62 automobile and other types of repair
- 63 bartender
- 64 bus driver and train engineer
- 65 firefighter
- 66 machine operator in factory
- 67 armed forces, policeman
- 68 factory workers
- 69 truck driver

70 Unskilled

- 71 laborer
- 72 gas station attendant
- 73 garbage collector
- 74 waitress
- 75 janitor
- 76 taxicab driver
- 77 warehouse hand
- 78 farmer, farm labourer

- 80 housewife
- 85 retired
- 90 student
- 95 unemployed

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