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Opportunities for integration in institutional arrangements for water management in the Yukon

Patrick James Dooling
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Opportunities for Integration in Institutional Arrangements for Water Management in the Yukon.

By

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Abstract

The history of water resources management in the Yukon has been characterized by conflict. This problem is due to the failure to address the interrelationships between water and land resources. Although many parts of the Yukon remain largely undisturbed wilderness areas, development pressures place increasing demands on Territorial water resources. To ensure these stresses do not degrade Yukon waters to the extent common in many Canadian regions, a reevaluation of the legal and administrative arrangements for water management in the Yukon is required. A majority of the legislation pertaining to water management in the Yukon was introduced in the 1970s and is unable to address many contemporary issues.

The recent enactment of a new Yukon Waters Act and improvements to some industrial regulations provide an opportunity to create a new Yukon water management framework that considers the relation of land and water resources and their uses. Given these emerging opportunities and the overdue need for change it is necessary to determine if an integrated approach can be applied in the Yukon as the foundation of such a water resources management framework. To this end an examination of both the legal and administrative tools for water management in the territory has been conducted.

The results of this institutional analysis indicate that while a number of improvements have been made to the legal structure, several opportunities for further refinement exist within the administrative realm. The realization of these opportunities requires a number of adjustments be made to the administrative arrangements for territorial water management. These changes include the identification of a lead water management agency and the formulation of water management policy. Further, Yukon water management is shown to benefit from the consideration of cumulative resource use effects and the introduction of a planning component to the overall process of water administration.

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Abbreviated Terms

Throughout this thesis, abbreviations are used for frequently cited agencies, documents and legislation. The following list provides the full name for these abbreviated terms.

CFA	Canada Fisheries Act
CPA	National Parks of Canada Act
CWA	Canada Waters Act
DIAND	Department of Indian Affairs and Northern Development
DFO	Department of Fisheries and Oceans
DOE	Department of Environment
GKR	Greater Kluane Region
IRC	Yukon Placer Implementation Review Committee
KNPR	Kluane National Park Reserve
KPMA	Klondike Placer Miners Association
NIWA	Northern Inland Waters Act
MRD	Mineral Resources Division
NGO	Non-Governmental Organization
UFA	Umbrella Final Agreement
WRD	Water Resources Division
YCS	Yukon Conservation Society
YCM	Yukon Chamber of Mines
YFPA	Yukon Fishery Protection Authorization
YPA	Yukon Placer Authorization
YPC	Yukon Placer Committee
YPMA	Yukon Placer Mining Act
YTG	Yukon Territorial Government
YTWB	Yukon Territory Water Board
YWA	Yukon Waters Act

Chapter One Introduction

1.1 Introduction

Although the population of the Yukon has remained at approximately 30,000 for the past decade, the demands placed on aquatic and terrestrial resources by industrial, recreational and other uses have grown considerably. This increasing demand, combined with several other emerging trends in the socioeconomic and political structure of the Yukon, indicates a need to reevaluate the legal and administrative arrangements for the management of territorial water resources. Activities of local economic significance such as mining have had, and continue to have, an impact on both land and water resources (Westwater Research Centre, 1980). However, resource management legislation and agencies have historically paid less attention to the relationship between non-renewable resource exploitation and water resource issues such as the quality, quantity and fish habitat alteration than they have to resource development. The exploitation and use of resources in the Yukon, due in part to economic dependence on unpredictable world mineral and metals prices, has been characterized by periods of rapid development and sudden decline. The management of both renewable and non-renewable resources in the Territory has, in comparison, undergone little change until very recently. Some non-renewable and resource extraction related legislation is extremely dated (eg. *Yukon Placer Mining Act* 1902, *Yukon Quartz Mining Act* 1954). Most of the legislation pertaining to water resources

management issues such as freshwater drinking supply and fisheries was introduced in the early 1970s (eg. *Canada Fisheries Act*, 1970; *Canada Water Act*, 1970; *Northern Inland Waters Act*, 1972). Among natural resources in the Yukon, the management of water has particularly lagged behind. Prior to the introduction of the *Northern Inland Waters Act* (NIWA) in 1972, "there was no legal or administrative framework for the comprehensive management of northern waters, or for the protection of pollution hazards" (MacLeod, 1977:103).

1.1.1 Research Question

The history of water resources management in the Yukon has been characterized by conflict. This has been due in part to the fact that water and land resources have been managed separately and sectorally. While recent legislative changes concerning Yukon water management do not explicitly outline mechanisms for change, they do provide an opportunity to create a new Yukon water management framework that considers the relation of land and water resources and their uses. As implied by the name, integrated resource management endeavours to consider the interactions occurring between components of a natural system. Further, the integrated approach attempts to establish a positive relationship between water resources planning and management and issues pertaining to social goals and economic development. This research will endeavour to ascertain the level of integration in territorial water management at present and will then establish the implications of and

opportunities for greater integration afforded by recent legislative changes.

1.2 Statement of Problem

Due to the age of pertinent resource management legislation and the nature of the Yukon economy, numerous conflicts between various resource users, regulators and interest groups have arisen. These conflicts have tended to revolve around questions of equity in access to the territorial freshwater resource. Although a great deal of resource exploitation has occurred in the Yukon, it has generally been concentrated in several areas such as the placer gold mining centre near Dawson City. As a result, much of the Territory remains largely undisturbed and there exists the potential to learn from the experiences of other Canadian water resources management practices (Rueggeberg and Thompson, 1984). The destructive changes common in many other areas of the country may be minimized by a shift to more proactive and adaptive resource management.

In order to avert a scenario similar to that which has unfolded in much of Canada, it appears that a reevaluation of water resources management is needed. Since land-based activities often impact water resources, water management must address a wide range of factors. This is certainly the case in the Yukon as territorial freshwaters support fisheries (First Nations subsistence, commercial and sport), industry (placer mining, hard rock mining and hydroelectric power development), agriculture (irrigation and livestock needs) as well as recreational activities (rafting, swimming, boating and aesthetics) and community needs

(drinking water, sewage treatment and wastewater disposal). Although the demands placed upon local water supplies are in some ways similar to those of many other Canadian regions, the institutional arrangements and agencies responsible for their management in the Yukon are unique.

As the central government authority in the Yukon, Canada's federal government is responsible for the management of all land and water resources with the exception of agriculture, wildlife and some fisheries. The federal government is therefore endowed with control over approximately ninety-five percent of the territorial land base. This responsibility is in the process of being devolved on a sector by sector basis to the Yukon Territorial government, however the procedure is slow and cumbersome (Chambers, *pers. comm.*, 1993). Recent developments such as First Nations Land Claims Settlements and Self-Government Agreements (Canada Department of Indian Affairs and Northern Development, 1993*a*&*b*) introduce a potential third (or fourth when one considers regional governments) level of authority to be consulted and included in resource management decision making.

As the agency responsible for the management of water resources, the federal government recently enacted the *Yukon Waters Act* (YWA) (June 23, 1992) to replace the outdated NIWA (1972). This new legislative tool, combined with recent and ongoing changes to mining and fishery legislation seems indicative of a desire to foster progress in territorial water use and management practices.

1.2.1 Research Objectives

In order to investigate recent legislative changes and assess integrative opportunities five research objectives have been developed:

1) to ascertain the current and potential future demands on territorial water resources as well as areas of historic and potential conflict in water resource use and allocation,

2) to determine the nature of water management practices and policies in the Yukon and to examine the activities and mandates of those agencies responsible and involved in Yukon water management,

3) to analyze water management and water use-related legislation in the Yukon and the determination of how it is applied and interpreted by those agencies responsible for and involved in Yukon water management,

4) to explore, through an extensive literature review, the concept of integrated water resources management as well as its benefits,

5) to determine the feasibility of applying integrated water resources management in the Yukon given existing legal and administrative arrangements.

The final and closely related pair of objectives are of most importance to this research since the proposed changes to Yukon water management are those best able to facilitate the introduction of some degree of integration.

1.3 Background

Located in northern Canada, the Yukon Territory differs from the rest of the country in more ways than its commonly perceived harsh climate. As a territory it is governed under an entirely different set of legal and institutional arrangements than are the provinces. This, combined with the early impetus for northern settlement having been gold exploration and the fur trade has meant

that the north has traditionally been treated as an area to exploit rather than to develop strategically. The Yukon of today is undergoing considerable change in both its system of government and the approaches taken to develop and sustain a viable socioeconomic base. In the past the Yukon economy relied on mining to create jobs and provide income for local people. However as world commodity prices have suffered, so has the Yukon economy. Many Yukoners today see the growing tourist trade as providing a much needed opportunity to boost their economy. Accompanying this shift in economic base is an increasing desire on the part of northerners to have a greater voice in the planning and management of their natural environment.

With the exception of wildlife and some fisheries management, lands and natural resources in the Yukon are controlled, regulated and allocated by the federal government. This is a contentious issue for many northern residents as they feel that the interests represented in resource management decisions are often those of southern Canadians and not those of the local people who are most immediately and directly effected (Yukon Territorial Government, 1987). The management of water resources is the responsibility of the federal Department of Indian Affairs and Northern Development. Allocative and licensing decisions regarding water use are handled by the Yukon Territory Water Board, a branch of the federal department. Although Yukoners are invited to participate in the activities of both the Department of Indian Affairs and Northern Development and the Water Board, the level of this participation, and hence the representative

nature of these bodies, is limited. The reasons for this are diverse and will be examined at length later in this work as will their implications for the success and evolution of water management in the Yukon.

In June of 1992 the federal government replaced the twenty year old NIWA with the YWA. This reformation was partially in response to the expressed desire for a change in water resources planning and partially due to the realization that the existing legislation was no longer able to adequately address contemporary resource management issues. While it is still unclear whether this new legislative tool will be able to operate with the existing institutional arrangements to address such long standing management problems as equity in water rights allocation, public involvement in water resource decision making and water quality protection from municipal and industrial uses, it is possible to note a number of emerging avenues for change. Therefore it is both necessary and timely to explore these paths in order to determine how they may affect the evolution of Yukon water resources management.

1.4 Methodology

To assess the opportunities, benefits and obstacles to applying an integrated approach to water management in the Yukon an institutional analysis will be conducted. A review of theoretical and practical knowledge and experiences will be provided in the following Chapter. This will assist in the formation of an analytical framework.

As this thesis research is applying a resource management approach not formerly applied to the study area, it is first necessary to fully review this approach. Therefore, a review of the literature concerning integrated resource management will be conducted. Further, in order to understand how integrated management principles can be incorporated into the management of water resources in the Yukon, it is necessary evaluate the existing uses of and threats to this resource as well as the tools and agencies currently responsible for their management. The potential for success or failure in integrating Yukon water resources management also depends on the legal and administrative arrangements involved. To evaluate the possibility of employing an integrated approach, it is then necessary to examine these arrangements.

Recommendations arising from this work will attempt to enhance the level of integration in territorial water management. It is important that these recommendations include consideration of operational constraints. By conducting interviews with persons responsible for interpreting and implementing water and related management tools such as the *Yukon Waters Act* some of these constraints will be identified.

1.4.1 Data Collection

The fulfilment of the objectives of this research require a review of pertinent government legislation as well as the organizational structures of, and institutional arrangements for, water management in the Yukon at a federal,

territorial and regional level. To this end, a six week field work and information collection trip was conducted during July and August of 1993. During this period the information in the Yukon Archives, Whitehorse Public Library, Yukon College Library, Kluane National Park Reserve Library as well as the public records of the Yukon Territory Water Board and Yukon Mining Recorder were exploited. Further explorations in the libraries of the Universities of British Columbia, Waterloo and Wilfrid Laurier have been undertaken.

During the field research period interviews were conducted with a range of government water administrators in order to obtain first hand information and practical input. Officials from the federal Department of Indian Affairs and Northern Development, Yukon Territory Water Board, Parks Canada and the Yukon Territorial Government were consulted (see Appendix). Representatives from the Yukon Chamber of Mines and the Yukon Conservation Society were approached to determine both their role in water decision making and the opportunities for special interest participation. The broad range of interview subjects was intended to provide an overview of the range of interpretations and perceptions characteristic of water and related management administrators in the territory. Interview subjects were selected according to their agency affiliation and occupational responsibility.

Interview questions were designed following preparatory literature, document and agency analysis. Preliminary questions were modified prior to conducting interviews and following the accumulation of information concerning

territory-specific institutional arrangements. Such revision led to the formation of a final question set, provided in the Appendix. This approach allowed the author to effectively gain understanding and insight into Yukon-specific water management issues, practices, strengths and weaknesses as well as needs and opportunities by revealing operational constraints and specific issues not appreciable through non-interactive data collection.

1.4.2 A Regional Example

Given the considerable size of the Yukon Territory, an exhaustive examination of all water resource management issues is not possible. In order to adequately assess these issues it is necessary to first determine the nature of the territorial water management regime and then examine specific issues in a representative region. Therefore, this research will examine Yukon water resources management in general and assess specific and practical cases in the southwestern portion of the Yukon. To this end water resource management conflicts and issues in the southwestern Yukon will be evaluated. This area includes Kluane National Park Reserve as well as land and waters adjacent to its northern and eastern boundaries (see Figure 1.1). This area is commonly referred to as the Kluane or Greater Kluane Region. Although the Region excludes the Territory's largest city, Whitehorse, it does include the communities of Haines Junction, Burwash Landing, Destruction Bay and Beaver Creek. These villages are home to a majority of the Yukon's rural population. The Kluane Region is

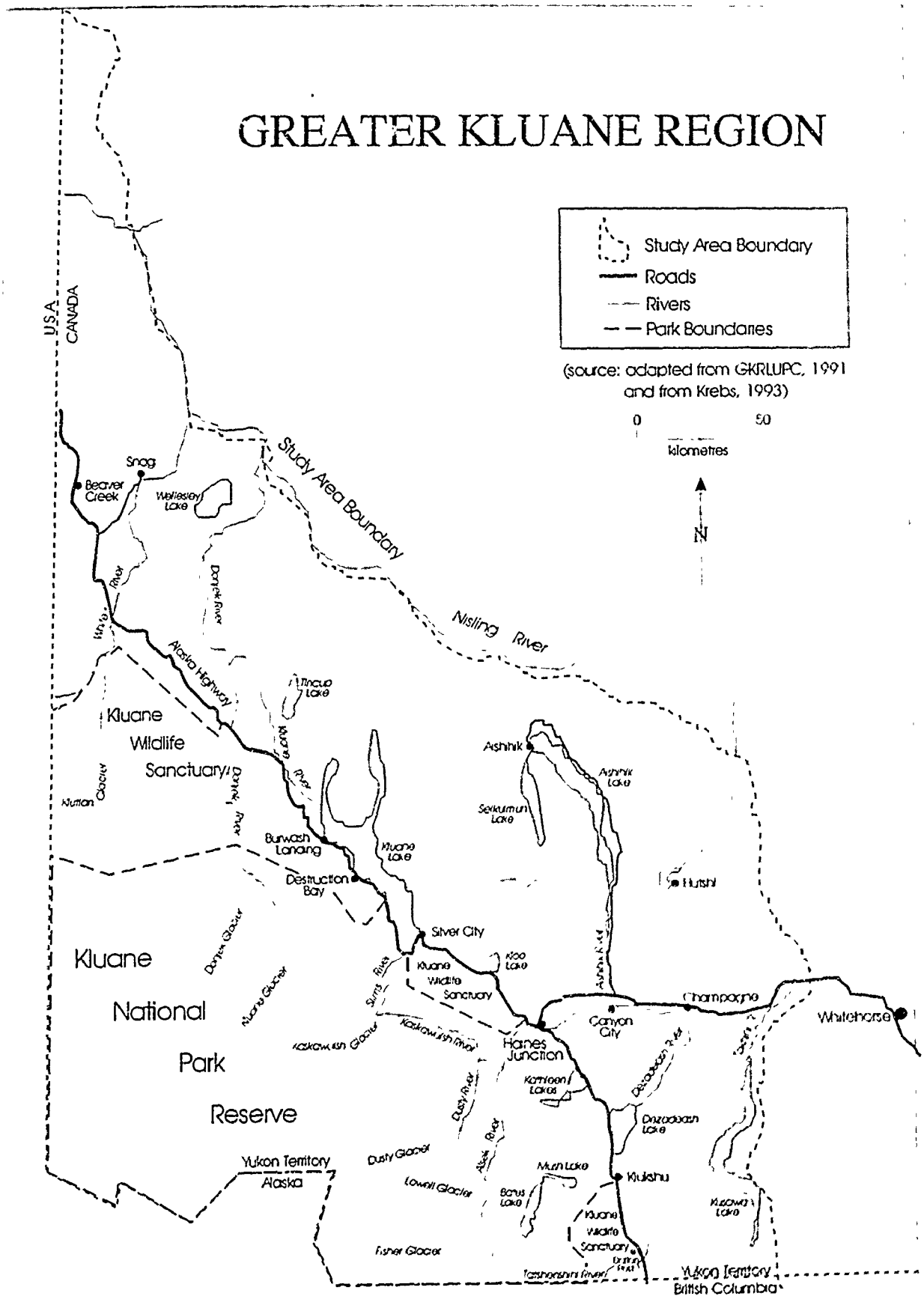

Figure 1.1 The Greater Kluane Region, Yukon Territory

also traversed by portions of the Haines and Alaska Highways. This transportation corridor, combined with the 22,015 square kilometre Kluane National Park Reserve, has resulted in considerable tourist activity and tourism development pressures (Burton, 1983).

The Greater Kluane Region has been selected for more detailed analysis due to the diversity of land uses practices, tourism pressures and land and water resource uses characterizing it. Activities such as placer and hard rock mining, hydroelectric power generation, agriculture, and livestock grazing as well recreation and tourist developments such as campgrounds, rafting, parks and a wilderness reserve, combine to make this region territorially important. Further, the physical base of the water resource in this area is exceptional as it includes sections of the north flowing Yukon River and south flowing Alsek and Tatshenshini Rivers. This area is also of interest as it was the focus of the *Greater Kluane Regional Land Use Plan* which attempted to bring together environmental and economic issues by employing a broader scope in land use planning (Greater Kluane Regional Land Use Planning Commission, 1992). Although frequent reference will be made to this area, it should be noted that since water management legislation and agencies have a Territory-wide focus consideration will also be given to their Yukon-wide application.

1.5 Conceptual Approach

In order to assess the opportunities for and barriers to integrated water

resources management in the Yukon, this research will include an in depth analysis of relevant institutional arrangements. Further, so that potential pathways of change and the obstacles to them can be identified, the integrated approach must be fully understood. Therefore, this section will provide a brief discussion of these concepts.

1.5.1 Institutional Analysis

Institutional analysis is interpreted in many different ways. Differences in definition are dependant upon study goals and analyst background. Institutional analysis as it relates to water resource management may be defined as being the examination of "those legal, political and administrative structures and processes through which decisions are made with respect to public policy" (Ingram *et al*, 1984:323). As this definition illustrates, institutional analysis must look at both the legal and organizational elements of water resource management. This is because over-emphasizing either one will result in an unclear or biased interpretation.

The need for a broad scope of examination is further supported by the fact that resource management agencies such as government ministries and related planning boards do not exist apart from legal arrangements such as laws and regulations. Since their mandate is determined by the legislation enabling the formation and operation of a body it determines the activities of that organization. In fact "neither structural nor resource constraints applied to an agency are as

readily apparent as those stemming from mandate" (Pross, 1979:142). Further, a legislative or regulatory document requires sound interpretation of its objectives in order to achieve successful fulfilment of government objectives. Therefore, the intrinsic relationship that binds these components of institutional arrangements to each other dictates that their interdependence be considered during analysis. Institutional analysis must address a range of factors which influence and affect legislation and agencies. Institutional analysis should consider both the content and cause of resource management problems so progress can be made to attempt to eliminate accompanying difficulties (Dryzek, 1990). The consideration of these points in an analysis of institutional arrangements for Yukon water management is especially important as "planning occurs on several institutional levels and within several mandates" and as a result, "has proceeded incrementally without the advantage of a broader value-based policy perspective" (Walker, 1990:49).

In attempting to create a stable economic base, natural resource management in the Yukon has been characterized by "the exploitation of the land and its resources - non-renewable as well as renewable" (Naysmith, 1981:237). A number of undesirable features are associated with this approach to resource management, primarily the creation of externalities (negative social costs) such as environmental degradation and a perceived inequity in resource allocation. As the magnitude of these externalities has grown, so has the dissatisfaction many northern people feel toward the process that creates them. With regards to water resources, two phenomena are emerging from this scenario: there is an increasing

trend for government involvement in water resource management and there is a growing need for reevaluation of the role of institutional arrangements created for purposes no longer desirable (Fernie and Pitkethly, 1986). In response to these issues, an in-depth institutional analysis is required to determine if the institutional set-up in the north is appropriate (Regier, 1981). While attempting to determine a more efficient legal and administrative structure, this institutional analysis needs also to consider how water resources planning may be integrated with both land use planning (Slivitzky, 1986) and social and economic planning (Foster and Sewell, 1981; Fernie and Pitkethly, 1986) as none of these exists in isolation.

1.5.2 Integrated Management

As is the case with institutional analysis, integrated management is also subject to variances in definition. These discrepancies are attributable to differences in research or project objectives and different interpreter biases. Since one of the goals of the previously discussed institutional analysis is to determine how water management can better be integrated with other considerations, it is first necessary to clarify the definition of an integrated approach.

Integrated resource management may be described as an approach which views resources as components of a system and treats the range of interactions and interdependent relationships between them. This perception is characterized by the awareness that each interaction has some impact on the components

involved and may also include emphasis on the consideration of social and economic factors as parts of the system with which resources interact. Following this definition of an integrated approach to resource management, integrated water management may be defined as being an approach which evaluates the interactions between water and other resources and assesses the role of water in social and economic activities. The main objective of integrated water management depends on the scope of the definition used and has evolved from one aimed at considering primarily the interactions of land and water resources (eg. Sewell, 1965; White, 1974) to an attempt to consider water resource issues together with concerns related to social and economic development (eg. Schramm, 1980; Foster and Sewell, 1981; Sewell, 1985; Mitchell, 1990*a*).

As mentioned earlier, water management in the Yukon is a federal government responsibility. The allocation of water rights and the determination of appropriate, or at least acceptable, uses is controlled by the Yukon Territory Water Board, itself empowered by the new federal YWA. As the agent responsible for granting the right to use water and setting the conditions for this use, the Water Board has the potential to act as a catalyst for improved integration of water resources management. However, it appears that rather than moving toward more integrated water resource management, decisions continue to be made on a case by case basis, adding to the problem of incrementalism in decision making.

1.6 Thesis Overview

The remainder of this thesis will be an investigation of the institutional arrangements for Yukon water resources management. The institutional analysis is intended to provide insight into recent changes in the arrangements for territorial water management. This knowledge will allow opportunities for improved integration to be identified. Recommendations will be based in the strategic and operational levels in an attempt to indicate the steps necessary to achieve an integrated approach in territorial water management. Rather than provide a picture of the water management framework as an end-product this thesis will indicate steps required to move towards an integrated structure. This investigation begins in Chapter Two with a literature review. The literature review will examine institutional analysis and integrated resource management. Chapter Three will provide an overview of water resources in the Yukon and their uses. This will be followed in Chapter Four by an institutional analysis of the legislation and agencies directly and peripherally related to Yukon water management. This institutional analysis will be based upon an analytic framework developed through the findings of the literature review. The results of this analysis will be discussed in Chapter Five with a specific focus on Yukon water management issues and problems, management needs, as well as recommendations and opportunities for evolution. Finally, Chapter Six will summarize the research findings, assess the usefulness of integrated resource management and indicate areas for future research.

Chapter Two Literature Review

2.1 Introduction

Following Chapters of this thesis will include an institutional analysis of water management in the Yukon and an assessment of the suitability of the integrated approach to affect evolutionary change. It is therefore necessary to first consult the body of literature on these two topics to explore both technical requirements and conceptual developments.

Institutional analysis has received increasing attention among geographic researchers in the past since its rise in popularity in the 1970s. Mitchell (1989) suggests that in spite of this growing popularity, institutional analysis remains more a descriptive than an analytical tool. Indeed, Mitchell and others (eg. Ingram *et al.*, 1984) have outlined steps to be taken so that future institutional analyses provide a more substantive contribution to understanding the intricacies and constraints faced in managing water and other natural resources.

2.2 Institutional Analysis

Defined in Chapter One as the study of legal and administrative arrangements and mechanisms for managing such things as water resources, institutional analysis is important to this research. By conducting an institutional analysis of Yukon water management it will be possible to interpret opportunities for integrative change. Prior to conducting the institutional analysis it is necessary

to establish the way such an examination should be structured and what variables it should address. To this end a brief review of literature concerning institutional analysis in general and water management in particular will be provided.

2.2.1 Elements for Consideration

The conceptual elements of institutional analysis vary from author to author and study to study. This is because different studies are intended to accomplish different goals and therefore require individual points of analysis. To understand the type of variables included in institutional analysis for geographic and social science research this section will provide an overview of several different conceptual approaches.

Noble *et al.* (1977) aim to enhance the coordination of resource management and development programs through use of institutional analysis. To this end, the authors outline a number of points they see as necessary for inclusion in such analyses. These areas of interest include the need to assess the quality, consistency and effectiveness of the institutional setting. It is stressed that an elusive balance exists between these three criteria and that too much attention to one of the elements will occur at the expense of another. Further, the authors propose that a successful management program need ascertain and establish this harmony.

Decreasing program redundancy and enhancing management efficiency are common goals of institutional analysis. Indeed, these are motivating goals for

Mulford and Rogers (1982). The authors outline an analytical structure for improving administrative coordination which examines seven factors: 1) program focus, 2) participants or actors, 3) degree of formalization, 4) commitment of financial and human resources, 5) degree of centralization, 6) type of control and, 7) program goals. The authors contend that their general framework is beneficial to establishing an environment conducive to joint decision making and coordinated agency activities.

Hanf (1978) advocates an institutional focus to ascertain more successful management through the reduction of interagency conflict, overlap and inefficiency in an increasingly decentralized decision making climate. In this work the author urges consideration be given to sources and characteristics of resource management problems. Hanf argues that by analyzing the scope, complexity and interrelatedness of problems and then comparing them to the political-administrative system it is possible to assess institutional incongruities. The author proposes institutional analysis should examine administrative structure to establish hierarchical organization. This is intended to foster an understanding of the ability of one decision to exert an influence on decision making at another bureaucratic level, thereby reducing decision making uncertainty.

From the three cases discussed here it is evident that there exists considerable flexibility and variation among concepts of what an institutional analysis should investigate. Whereas the first two examples are oriented toward placing an emphasis on the institutional setting for problem remediation, the third

advocates first investigating the problem and then assessing the administrative realm. In spite their different approaches, these examples are characterized by a common goal: the effort to foster improved administrative efficiency through institutional evolution. The following section will investigate examples of applications of institutional analysis concepts such as those discussed above to clarify common practices. This review will also help determine the approach most valuable to the institutional analysis to be undertaken here.

2.2.2 Past Efforts

Institutional analysis is a common approach to addressing a range of social questions. Numerous studies have undertaken such analysis yet few have followed a common approach. In order to understand the reason for variable conceptual approaches several examples of institutional analysis for water management will be illustrated here.

An early attempt at conducting institutional analysis for water management was conducted by the Canada - United States University Seminar in 1971 and 1972. One contribution of the final document, *A Proposal for Improving the Management of the Great Lakes of the United States and Canada* (Canada - United States University Seminar, 1973) was an analytical framework devised to address complex international water management issues. The framework included eight elements: 1) identification of problems, 2) assessment of existing organizations, 3) review of previous research efforts, 4) identification of criteria applied to resource

management organization, 5) analysis of key agencies, 6) determination of limits of authority, 7) development of new conceptual organization and, 8) the creation of several alternative scenarios. Study participants contended that organizational change was necessary. It was thought that following the above analysis it would be possible to establish institutional limits to and practical directions for this growth.

Ingram *et al.* (1984) provide a detailed account of common failures of institutional analysis of water management and then suggest a number of criteria for examination. The authors charge that institutional analysis typically provides little more than a listing or description of organizational structures. This descriptive bias is viewed as a limitation to the success of institutional analysis and a restriction to its legitimacy as a tool for improved water management. In proposing a revised analytical construct attention is given to the need to move toward more substantive and prescriptive approach to highlight "possible strategies and solutions that can be applied to the problems identified" (1984:323). Preliminary attention is directed to analytical and problem contexts and existing institutional organization. The first of these areas consists of problem definition and awareness of limits of analysis. This is intended to provide an understanding of the management scenario and the nature of the issues to be addressed. The second component includes detailed investigation of administrative subtleties including the stakes and motivations of involved participants, alternative decision making arenas, decision making biases,

administrative hierarchies, and external influences. Finally, it is suggested that a range of options be evaluated to determine the best possible solution for area-specific needs.

Mitchell (1990*a*) suggests that an analytical framework established to examine a water management situation should address six areas of concern. First, a determination of the context in which management must occur is necessary. This will include consideration of the state of the environment, economic situation and arrangements and legal and administrative arrangements. Second, the tools for agency legitimation need to be assessed. This includes examination of agency objectives and rules of operation. Third, agency function should be analyzed and the appropriate level of operation should be determined for each function. Fourth, the structure and flexibility of management bodies should be established. Decision making processes and mechanisms such as bargaining, mediation and negotiation are the fifth area for consideration. Finally, participant cultures and attitudes should be weighed as they help explain what may be realistically expected to occur.

Following examination of several conceptual discussions of institutional analysis in general and three examples concerned specifically with water resources management, a number of consistencies and discontinuities are observable. It is evident that there does not exist one established analytical framework for institutional analysis. This is because the nature of any analysis depends on its objectives and the context in which it is conducted. This review of institutional

analysis theory has revealed that features including problem and management context, decision making environment, tools for legitimation, as well as administrative structure and flexibility should be considered in any analysis. Following the work of Ingram *et al.* (1984) and Mitchell (1990*a*) it appears institutional analysis must provide a treatment which balances descriptive and prescriptive investigative components.

2.3 Integrated Resource Management

In order to facilitate further discussion about the integration of water resources management in the Yukon it is necessary to explore the nature of the integrated approach being proposed here and to examine its evolution in a resource management context. It is also prudent at this time to survey literature relating to past water and related resource management studies in the Yukon and the Greater Kluane Region (GKR) since these will offer insights into evolutionary trends in territorial water management and potential obstacles to the development of an integrated approach.

Prior to reviewing the specific qualities of integrated water management, it is worthwhile to establish the definition of the more general concept of natural resources management. For the purposes of this research, resource management is defined as "the actual decisions concerning policy or practice regarding how resources are allocated and under what conditions or arrangements resources may be developed" (Mitchell, 1989:3). As this definition implies, there exists a

difference between resource management theory and practice. If theoretical resource management research is to be of practical value, it is necessary to determine why this difference exists. One explanation for this discrepancy is offered by Mitchell who suggests the variation arises because;

> different values and interests lead to varying preferences regarding goals and objectives, alternative interpretations of information and evidence and various ideas regarding appropriate strategies and actions (1991*b*:1).

Fernie and Pitkethly (1986) argue that the political support enjoyed by some agencies and directed toward the satisfaction of some objectives differs from that afforded to others. Regardless of the exact cause of this disparity, it is clear that the effect of political support and mandate interpretation are important considerations to be weighed when attempting to determine the opportunities for change and the reason for inconsistencies between resource management theory and practice.

Dryzek (1990) proposes that the effect of factors such as political support inequities, changing mandate interpretation and conflicting management objectives may be lessened by the introduction of a guiding principle or resource management philosophy for future activities and directions. A number of resource management orientations exist, such as unified, comprehensive and holistic views, and others founded in sustainable development ethics and ecosystem perspectives. While some similarities exist between these approaches, each has unique characteristics.

One approach to managing natural resources is integrated resource

management. Integrated resource management is not a new approach. In fact, it has appeared in different forms in both resource management literature and practice for many years. Accompanying each rebirth integrated resource management evolves somewhat from its previous incarnation. The reason for the evolution of the integrated approach is a result of both changing public expectations and resource management objectives. Booy (1974:545) defines the integrated approach as being characterized by "a unity of purpose, a coordination of means, and a cooperative effort". Building upon this beginning, the integrated approach evolved to address the interactions between land and water resources and their use (Mulder *et al.*, 1979; Falkenmark, 1981), sometimes to facilitate multiple use satisfaction (Fox *et al.*, 1983). Combining these two earlier interpretations, contemporary work views integrated resource management as a tool which examines selected system components and the interactions between them (Mitchell, 1989). The constituents should include the consideration of terrestrial and aquatic resources as well as social and economic arrangements. In other words, an integrated approach to resource management is one which recognizes the interdependent relationships which exist between the socioeconomic and biophysical components of an area. Saini and Sinha (1985:1) illustrate this by writing that an integrated approach should examine "the social, economic and environmental goals in terms of various activities, places and groups of people".

2.3.1 Advantages and Disadvantages

Similar to other natural resource management approaches, integrated management is characterized by a number of distinct advantages and several criticisms. The main benefit of integrated resource management is that it helps reduce the problem of incrementalism which is often associated with non-integrated, sectoral planning (Pearse, 1986). The reduction of ad hoc decision making is achieved through the broader view taken with an integrated outlook. Its more generous scope allows the interactions of terrestrial and aquatic resources in a socioeconomic context to be examined, thereby facilitating an improved understanding of the effects a decision or action in one area will have on other components and other areas of the system (White, 1974; Schramm, 1980). In this regard, Mitchell (1991*a*) cites the consideration of the interrelationships between resources and their uses and the attempt to manage for them as being a key to reducing problems in resource management. The improved understanding of component interactions and relationships afforded by the integrated approach also fosters greater flexibility in resource management, an important quality in dealing with complex socioeconomic and biophysical issues.

Another benefit of integrated resource management commonly cited in the literature is its recognition of the importance of communication between different departments and levels of government involved in resource management (Livingston and Bastedo, 1990). It is often suggested that large bureaucratic structures result in the formation of a host of agencies, frequently with different

priorities and perceptions (Mulder *et al.*, 1979), working at cross purposes to each other (Mitchell and Sewell, 1981). Therefore, the importance of inter-agency communication should be stressed as it improves information exchange and idea sharing for resource management. Since it "brings the legal and organizational mechanisms together so that all components" of the resource management issue "can be unified in the decision making process" (Kundell, 1989:19) integrated management may help improve interagency communication. By fostering enhanced interagency communication, the integrated approach facilitates better informed resource management decision making (Newson, 1992) and a more efficient use of information and institutional resources (Booy, 1974; Mulder *et al.*, 1979; Pross, 1979).

While the advantages of this approach are generally agreed upon by its supporters, the criticisms levelled against managing resources in an integrated fashion are more contentious. Critics of the integrated approach, it should be noted, are not limited to supporters of other resource management philosophies. Some of the strongest critics of integrated resource management are also its supporters who offer their critiques so that potential errors can be avoided. For example, Schramm (1980) cautions that integrated management not become too ambitious or far reaching in its efforts as this can result in a failure to recognize important component linkages and the effects of their interactions. Should this occur, the benefits of integrated management could be negated.

Among the most common criticisms of integrated resource management is

the inability to successfully implement an integrated strategy once it has been developed (Booy, 1974; McDonald and Kay, 1988). Although this is partially due to the fact that resource management and environmental protection are "but one of society's concerns" (Mitchell and Sewell, 1981:10), it is also a result of the inability to clearly define both what an integrated approach should embody and who should be responsible for its implementation (Mitchell, 1989). Owing to the inability to define the institutional arrangements necessary to make an integrated approach work, government and resource management agencies are often reluctant to attempt working in this way (Falkenmark, 1981; Kundell, 1989). This has generally meant that problems have been cited in order to avoid adopting an integrated strategy. These justifications have tended to focus on concerns such as the perceived inflated time and financial resources needed to manage with the broader scope characteristic of integrated management (Shrubsole, 1990). Arising from these apprehensions have come signs that while the integrated approach is a sound theoretical resource management tool, it is unclear how, where and when it is appropriate for practical application. It has been suggested that this problem is furthered by the fact that "many institutional arrangements seem to reinforce a tendency away from integration and more towards enhancing self-interest" (Mitchell, 1990*b*:216). The institutional and area specific analyses being conducted here will reveal how an integrated approach may better be used in managing water resources in the southwest Yukon in order address these uncertainties.

2.3.2 Scope of Integration

That integrated management requires the inclusion of socioeconomic and biophysical considerations in resource management decision making is clear. Less apparent, however, is the degree of integration of these components that is necessary. Mitchell and Sewell (1981:10) write that the degree of integration possible depends in part upon "the web of jurisdictional and institutional arrangements which often run counter to attempts at realizing integrated management of resources". This is true because the application of an integrated approach requires the implementing body to possess both the tools and willingness to ensure success. Unfortunately, this is not always the case (Pitkethly, 1990). Therefore, to determine applicability and suitable content, before an integrated approach can be designed for an area it is first necessary to examine the institutional arrangements it will join. While institutional arrangements are a constraint to the degree of integration possible, they are not the only factor to be considered when attempting to apply an integrated management approach.

Another concern pertaining to the use of an integrated approach is the fact that the level of integration possible is not automatically the same as the level of integration necessary or desirable. Wiener (1972:45) cautions that "the extent to which systems should be integrated depends both on technological-economic variables and on institutional-political constraints". While less emphasis is placed upon technological limitations in today's post-industrial society, the definition of integrated resource management provided earlier illustrates that a *selected* number

of socioeconomic and biophysical components need to be considered in resources management. Though it is important that these components aid in the formation of as representative a management scenario as possible, they should not be so exhaustive as to render analysis and management cumbersome and ineffective (Mitchell, 1991*a*). This means that prior to applying an integrated approach an examination of the socioeconomic and biophysical structure of the management area is beneficial in the determination of structure, linkages and needs (J. Mitchell, 1973; Kreutzwiser, 1991; Newson, 1992).

From this discussion, it is clear that not every resource management problem is well suited to analysis from an integrated viewpoint. A majority of references to integrated resource management focus on land and water resource use relationships and considerations (eg. Sewell, 1965; White, 1974; Mulder *et al.*, 1979; Falkenmark, 1981) and how they can be included in the planning and development of social and economic objectives (eg. J. Mitchell, 1973; Booy, 1974; Schramm, 1980; Foster and Sewell, 1981; Sewell, 1985; Kundell, 1989; Dzurik, 1990; Mitchell, 1990*a* & 1991*a*; Newson, 1992). Therefore, the remainder of this chapter will include an analysis of how integrated water resource management has evolved, what it entails as well as how and where it has been applied. From this discussion an improved understanding of the integrated approach as it might be applied to a specific area will be gained.

2.4 Water Resources Management

During the past several decades, a number of different approaches have been adopted to manage water resources in Canada. The recent past has been marked by both subtle and pronounced changes in these approaches. Although some regional differences in water management objectives do exist (Schramm, 1980), most of these owing to site specific needs and conditions, a common evolutionary theme is observable. The primary reason for the evolution of water management practices is a growing awareness of the importance of clean water resources and equitable and safe use and access to them. Accompanying this growing concern has been a response from government and associated water management bodies to try to respond to the changing desires of the public. In order to determine how integrated resource management fits into the evolution of water management practices, a brief examination of several earlier and related approaches is valuable.

2.4.1 Evolution of Water Management

Although it is clear that water management practices have changed both with and in response to changing public demands, the specific nature of this change is less evident. Therefore, Table 2.1, developed by the author through this literature review, provides a useful illustration of the general evolutionary trends in Canadian water management practices. Since the objectives of this thesis are concerned with the institutional opportunities for and barriers to improving the

degree and type of integration in water management, each period has also been analyzed for the level of integration (or lack thereof) it possesses. As the table indicates, in the period from the 1940s through the 1960s, many areas of Canada were suffering the effects of heavy flooding and erosion problems (Sewell, 1965; Mitchell and Shrubsole, 1992). During this time water management responses were rather understandably inclined to focus upon ways in which the damage and losses associated with these problems could be mitigated.

Table 2.1 The Evolution of Water Management Approaches

Period	Time Frame	Characteristics	Level of Integration
River Control	1940s through 60s	• flood control focus • river flow regulation • relied on technical measures	None • single purpose, narrow focus and goal oriented approach
Comprehensive	1970s	• efficiency in resource allocation and decision making • introduction of legislative tools for problem solving	Minimal • desire to consider some land and water interactions evident but tools lacking • early attempts to modify existing institutional arrangements
River Basin Development	1980s to 1990	• growing consideration of land and water relationships • recognition of need to alter institutional arrangements to facilitate better integration water resources management	Moderate • strong theoretical support for consideration of biophysical and socioeconomic component interactions but institutional arrangements a limiting factor
Integrated	1990 to present	• attempts made to consider the interactions and interdependent relationship between socioeconomic and biophysical components	Potentially High • early in development of a 'new' integrated approach but tools such as institutional analysis being used to determine opportunities for integration

As a result of these specific objectives, water management tended to be somewhat narrow in its view of resource issues. This period of water management may be termed the river control period (Mitchell and Shrubsole, 1992) as many flood prevention activities involved the construction of river regulating and controlling dams and dykes.

Following this phase, the emphasis of water management shifted from a river control perspective to one more concerned with efficiency of use (eg. James, 1974). The efficiency question during this period referred to both the institutional arrangements and decision making structures involved in water resource management (eg. Falkenmark, 1981; Foster and Sewell, 1981). Although some attention was being given to the interactions and relationships between land and water resources, the management of water resources at this time was far from integrated. In fact, the most common term used in water management literature at this time was comprehensive. Therefore, this era of water management might best be referred to as the comprehensive period.

Most characteristic of the comprehensive period was the introduction of a number of environmental and water management related legislative acts. During this time both the *Canada Water Act* (1970) and the *Northern Inland Waters Act* (NIWA) (1972) were introduced in response to growing public concern over such issues as water quality protection and water rights allocation. The creation of these legislative tools signified an attempt on the part of the government of Canada to improve the institutional arrangements for water management (Pearse, 1986). However, critics argue that in choosing to address a number of small problems rather than the underlying larger issues, the resulting responses tended to be general, often creating more trouble than they solved (Mulder *et al.*, 1979). Emond concurs with this point and argues that this is because "adjudication distorts rather than resolves environmental disputes" (1979:90).

Owing in part to criticisms such as those cited above, water management in the 1980s continued to evolve. Indeed, this was a much needed change for as Slivitzky (1986:220) succinctly stated at the time, "it seems that in Canada water management legislation has never really achieved its objectives". The events following the comprehensive period are characterized by a phase of river basin development (Table 2.1). During this time a strong research supporting and elaborating on integrated water management began to develop. At this time the resource management literature pertaining to integrated water management was concerned with improving water management practices. To this end proposed changes include a switch to regionally based, decentralized management authorities (Fernie and Pitkethly, 1986; Slivitzky, 1986) and modified institutional arrangements which would bring institutional abilities closer to achieving goals desired (Foster and Sewell, 1981; Naysmith, 1981; Pearse *et al.*, 1985; Savory, 1988; Shrubsole, 1990).

The impetus for the next change in water resources management was provided by the development of an outline of and the determination of the need for integrated water management to function within modified institutional arrangements. Although there was some support developing for integrated water management at this time, it still tended to focus on ways in which land and water resource interactions could be managed. This narrow view of an integrated approach restricted practical applications of integrated water management. As McDonald and Kay (1988:227) write, "there have been few real attempts to

provide integrated management information and even fewer evaluative studies of the policy and management of integration within the water resources field". From this statement the need for the changes being proposed during the latter stages of the river basin development period are clear: the success of integrated water management is dependant on its being viewed as a broad tool to be used as part of social and economic planning.

2.4.2 Integrated Water Resources Management

A majority of the early integrated water management applications have been oriented to integrating the uses of, and relationships between, terrestrial and water resources. However, a growing number of researchers are attempting to illustrate ways in which integrated water resources management can be used to integrate socioeconomic and biophysical concerns through the unifying role of the hydrologic cycle.

Although parts of the integrated approach have been included in other water management orientations, it is only recently that any attempts are being made to consider the "interrelationships between water and social and economic development" (Mitchell, 1990*a*:1). Born from the more general approach of integrated resource management, integrated water resources management shares a number of qualities with its parent. A specific definition of integrated water management is difficult to derive from the many which exist in the body of literature on this topic. One such definition, useful for the purposes of this

research, states that integrated water management is the "broader consideration of socioeconomic and environmental impacts and the interrelationships among the many facets of water resources, even when dealing with some specific aspect" (Dzurik, 1990:2). While this definition recognizes the importance of considering socioeconomic and biophysical properties in managing water resources it is also important to consider the level and scope of their analysis. The level and scope of analysis are important for they influence opportunities for implementation and cooperation in integrated water management.

Mitchell (1990*a*) postulates that integrated water management can exist in three different forms; the first and simplest view of integrated water management is one primarily concerned with water quality and quantity issues, another possible interpretation holds integrated management to be the consideration of land and water resource interactions to be central, while the third orientation of integrated water resource management attempts "to ensure that water is managed and used so that development may be sustained over the long term" (Mitchell, 1990*a*:1). As was the case with the general integrated approach to resource management, the evolution of integrated water management has moved from one concerned with specific issues to one which attempts to address, through the management of water resources, a host of broad issues with social and economic implications. As each approach to integrating the management of water resources varies considerably with the scope of analysis undertaken, it is important that the intentions of the application match its capabilities. For the work being done in

this thesis, the integrated approach will assess how a program of water management activities which addresses the interaction of land and water resources and their use fits into the social and economic planning regime of the Yukon in general and GKR specifically.

Another factor of considerable importance in determining not only the degree of integration to be applied but also what kind of success it might be expected to achieve is the level of analysis. In this instance the level of analysis is intended to include the differentiation between the expected abilities of integrated management and how they address the difference between theory and reality which the definition of resource management provided earlier alluded to. Arising from this difference between theoretical ideals and practical realities is the recognition of the need for and benefits of an integrated water management program followed by the failure to successfully implement one (Booy, 1974; McDonald and Kay, 1988; Shrubsole, 1990). The ability to differentiate between theory and reality is clearly important to the success of integrated water management. To facilitate this differentiation, three levels of analysis are proposed and discussed by Mitchell (1990*a*); the normative, strategic and operational. The normative level is the theoretical ideal and is defined as what ought to be done in managing water resources. More realistic in its considerations is the strategic level which examines what can be done. Finally, the operational level of analysis looks at what is actually being done. While all three of these levels of analysis are necessary in working towards integrated water

management, the latter two are of particular importance. This is because they are better able to reveal any constraints and opportunities to this approach arising from institutional arrangements in the field. Therefore, this work will give consideration to Yukon water management practices on all three levels. Normative level characteristics will first be established. It will then be possible to create recommendations which consider operational constraints but attempt to achieve the highest degree of integration possible by working towards the normative ideal. Such recommendations will be provided in Chapter Five and though based in the normative ideal of integration will attempt to address identified strategic and operational concerns.

Normative level analysis of integrated water management reveals a number of properties which characterize this approach (see Table 2.2). It is important to remember these components are representative of the theoretical ideal. Due to operational constraints it is unlikely any existing water management framework

Table 2.2 Theoretical Components of Integrated Water Management

- consideration of land and water resource interactions
- attempt to incorporate water management into attainment of local socioeconomic objectives
- understanding of environmental linkages and cumulative use effects
- interagency communication & cooperation for information exchange and shared objectives
- comprehension of value of maintaining mix (balance) of resource uses
- fair and equitable protection of all resource uses
- multiple interest representation and avenue for public/affected party involvement
- planning component in place
- selected management unit suitable for detailed study
- decisions/outcomes flexible and subject to review

will include them all. An awareness of these components is useful, however, since the Yukon-specific water management recommendations to follow will be aimed

at moving the practical and operational reality closer to this normative ideal.

2.4.3 The Planning Unit

The management of water resources in populated regions has tended to be based on watershed and subwatershed boundaries. This is because watersheds are viewed as areas which are naturally bounded by the land drained by a river and its tributaries (Ontario Ministry of Natural Resources, 1992). Agencies such as the Conservation Authorities in Ontario have focused their efforts on managing water on a watershed basis (Mitchell, 1990:*b*). Further, several watershed-based studies have been conducted in Canada (McNeil and Windsor, 1990). In both of these instances the study areas have been, in comparison to much of the Yukon, relatively densely populated. As a result of the often high level of human involvement in these watershed areas, planning and managing water resources on a watershed basis allows for the inclusion of biophysical and socioeconomic considerations present in the area. However, watershed-based water resource management in a predominantly rural and wilderness area such as the GKR is less appropriate. This is because the rural and highly dispersed nature of the region's population makes the consideration of both biophysical and socioeconomic components on a watershed basis difficult. Therefore, prior to examining the ability of integrated water management to aid in improving water resources management in the Yukon, it is necessary to determine what the appropriate planning unit for this should be.

Considering that one of the main advantages of the watershed management unit is that it allows socioeconomic and biophysical components to be examined within naturally occurring boundaries, the temptation is to apply it to Yukon water management issues. However, given the size of the two main watersheds within the GKR, the Yukon and Alsek, it is unreasonable to attempt to base the consideration of socioeconomic and biophysical components on these units. This is because, as illustrated above, the rural nature of the population in much of the southwestern Yukon means that many watersheds in the GKR have only limited, and often concentrated, human involvement. This is not to say these socioeconomic elements should be ignored, only that they may best be addressed in a way which does not rely on an expansive watershed as the planning unit. This point is further supported by the fact that many Yukoners want improved community and regional planning and development exercises, not more centralized government run programs (Roots, 1981; Canadian Arctic Resources Committee, 1983; Yukon Renewable Resources, 1986). Water resource issues in the GKR are such that they should be managed by examining the biophysical composition of the area. This will allow the potential impacts to be forecast and permit determination of mitigation measures for these disturbances should the activity be deemed acceptable in the region.

2.5 Water Management in the Yukon

The body of literature pertaining to water management in the Yukon has

grown with public and government interest in the area. Prior to the introduction of NIWA (1972), little attention was paid specifically to northern water management issues. During this period, resource management literature tended to focus on resource development issues such as mineral rights and resource exploitation (Chretien, 1970). The frontier attitude was the predominant one in relation to northern Canada at this time and water resources management was not a primary concern. A common perception of this era is echoed by Grainge and Shaw (1971) who contended that water resources in the north were under minimal threat from development. Following the creation and implementation of NIWA however, the enhanced framework and tools for water resources management led to more involved and complex water resources research.

The main areas of interest for researchers in this period were the activities and purpose of Yukon Territory Water Board (YTWB) and the new arrangements for water use licensing, both having been created under NIWA. These new institutional arrangements were viewed with cautious optimism as being possible mechanisms for water quality protection (Brandon, 1972). Appearing as a precursor to later river basin and integrated approaches, Gill (1973) expressed concern over the consideration of aquatic biophysical components apart from uses of the water resource and suggested that the NIWA and Water Board provided an opportunity to correct this oversight. Although early Yukon-specific water resources management research was oriented toward providing guidance for the application of the NIWA, the difference between resource management theory

and practice was apparent. This is evidenced by the findings of Nicholls (1981) who notes that the first water use licence application under the new Act, an application by the Northern Canada Power Commission for hydro-electric power development, resulted in the questioning of the YTWB's role and mandate interpretation. Institutional arrangements were clearly an issue to be dealt with by future water resources research.

Although the direction and need for further Yukon water resources research was clear, little such work was conducted following early research into the NIWA and the YTWB. During this period most water resources research tended to focus on peripheral or sectoral water use (eg. Klondike Placer Miners Association, 1979; Stanley Associates Engineering, 1979 & 1980; Christensen, 1983). There are several possible explanations for this, not the least likely of which is the fact that water and related resources at this time continued to be viewed as necessarily exploitable in the effort to develop a northern economic base. Some attention was paid to issues of northern mineral development, especially placer mining, and its impact on water resources (Williams, 1974; Klondike Placer Miners Association, 1979). The results of this work illustrate that socioeconomic development was given priority over environmental management as the strength of the placer mining industry allowed it to continue operations under the outdated *Yukon Placer Mining Act* (1906). In fact, placer mining interests at this time considered water use licensing procedures to be cumbersome and unreasonable (Garinger, 1977). Christensen (1983) suggests that during the

eighty-five year period from the beginning of the Yukon gold rush in 1898 until the growth of environmental concern in 1983, little effort was made to protect fisheries and water quality from the impacts of placer gold mining, then the Yukon's leading industry.

This lengthy period of inaction was followed by an attempt to alter the way in which water resources were managed. The frontier attitude and its associated emphasis on northern resource development was gradually being replaced by the desire to achieve northern resource management strategies more firmly based in conservation and environmental management than economic development and resource exploitation (Wonders, 1981; Burnet, 1984). The most noticeable feature of this effort was the introduction of the idea that water management be included as part of land use planning (Dacks, 1981; Rees, 1983 & 1987). Other similar expressions of the desire to integrate land and water management appeared during this phase. For example, Thompson and Warner (1983:459) suggest that northern water resources

> be recognized as a renewable resource that must be managed not only to assure human users of continuous clean supplies, but also to protect the wildlife and habitats that this resource supports.

Although these urgings were not immediately answered by any noticeable transformation in the practice of water management, they did provide the impetus for future improvements in Yukon water management. Change did not occur with great expediency however. There exist a number of important water resource research efforts which are also of importance in establishing the development of

Yukon water resources management practices.

2.5.1 Previous Studies

Another event in water resources research occurring at this time was the Yukon River Basin Study. Conducted during 1983 and 1984, study participants from the province of British Columbia, Yukon Territory, the State of Alaska and the Government of Canada gathered to formulate a plan for the use and management of resources in the vast Yukon River Basin (Yukon River Basin Committee, 1984). Although this work was an early attempt at introducing some integration to water and land resources management in the Yukon, its greatest contribution to this research is found in two of the baseline information studies which it generated. Conducted by the University of British Columbia's Westwater Research Centre in early 1984 these studies examined the institutional arrangements for water management in the Yukon River Basin (Thompson and Ourom, 1984) as well as the degree of and opportunities for integration of water management and land use planning in the area (Thompson and Rueggeberg, 1984).

Although Thompson and Ourom (1984) focus their institutional analysis on international issues, some insight into Yukon arrangements at this time are provided. The Yukon specific discussion takes the form of a brief overview of the NIWA and the YTWB. Criticisms contained in this work focus on the numerous interpretations of the mandate of the Water Board. It is suggested that the

mandate, as stated in the NIWA, could "provide for water planning in the Yukon" (1984:15). A further point of contention is raised with respect to the lack of comprehensiveness in the management of Yukon lands and waters resulting from the failure to classify resource uses. It is stressed that this is a significant oversight as resource use classification is an integral part of the water licensing procedure. Finally, the fact that water management related legislation such as the Canada Fisheries Act, although potentially a tool to aid water quality management is unable to address concerns in advance of their occurrence as it is "reactive rather than managerial in nature" (1984:37). This work indicates that although NIWA and the Water Board had been in place for more than a decade, they were not being used to their full potential to facilitate efficient water resource management in the Yukon Territory.

While Thompson and Rueggeberg (1984:15) contend that "a number of statutory powers and administrative systems are available within the existing institutional structure to enable comprehensive water planning and management to take place" in the Yukon, they conclude that such is clearly not the practical reality. In analyzing the integration of water management with land use planning, the authors provide a detailed analysis of the institutional arrangements in existence at that time in an effort to ascertain why "there has been little explicit attempt to integrate water and land use management in the north" (1984:22). The focus of this report is on both land and water use planning procedures and the role of the Water Board and NIWA. Similarly to the previously discussed

Westwater document, this work examines the difference between the potential and practical activities of the Water Board. In this instance the analysis aims to ascertain which agency should be responsible for integrating water and land use planning. Although the definition of integrated management used in Thompson and Rueggeberg's paper is somewhat narrower than the one being proposed here, it is of considerable importance to this thesis due to the similar research objectives.

Following their analysis the authors of the study provide several recommendations for change which they believe will enhance the integration of water and land management. The most important recommendation offered is that "the Water Board offers an approach to water planning that is more consistent with the approach to be followed in the new land use planning process" (1984:28). This finding is based on the fact that the Board provides adequate opportunities for public input, is inter-agency in composition and can, if the will exists, be devolved to a territorial level in the future. Although recent changes in both Water Board structure and the legislation which empowers it create a somewhat different scenario for water management today than was formerly the case, these conclusions are invaluable for this research. In spite of its innovative research and conclusions, Thompson and Rueggeberg's findings remain unimplemented in the practical management of Yukon water resources today.

Following this intensive examination, the volume of research focusing on water management issues such as institutional arrangements and integration has

decreased. Still, some work continued to examine the need for improvements in Canada's northern water management practices. Pearse *et al.* (1985) provide further such insights. These authors examine northern water management issues in a manner similar to their Westwater predecessors: by analyzing the role of NIWA and the YTWB. It is argued that water resources management in the north "should aim at maintaining the productivity of natural systems and that the intrinsic value of natural water regimes should be recognized" (Pearse *et al.*, 1985:144). The findings of this work concur with those discussed above in that they urge greater integration of land and water resources management. That the YTWB structure allows it to decide on both water quality and quantity management issues is considered a positive feature not shared by any other Yukon resource management body. While this document does not explicitly recommend the Water Board serve as the agency responsible for integrating water resources management as did Thompson and Rueggeberg, it does advocate a clarification in the Board's role in water planning to create a more flexible northern water management strategy.

Contemporary Yukon water management research tends to provide more criticism and analysis than the recommendations common in earlier such work. For example, government and academic works illustrate the failure of local resource management practices to adequately address the changing needs of both the northern environment and its residents. This failing is associated with problems such as ad hoc decision making (Yukon Renewable Resources, 1986;

Walker, 1990) and the failure to effectively empower northern residents in the decision making which affects their lives (Yukon Territorial Government, 1987; McTiernan, 1990; Greater Kluane Regional Land Use Planning Commission, 1992). The source of these fundamental problems is to be found in "a patchwork of multi-level laws that are difficult to interpret and apply" (Yukon Renewable Resources, 1990*a*:2), the fragmentation of resource management responsibilities between levels of government (Fenge, 1987), the lack of established priorities in resource allocation and use (Thompson *et al.*, 1986) and a lack of clearly stated objectives toward which resource management programs might work (Canada Auditor General, 1990). Since research has tended to focus more on analysis than on alternatives, the legal and administrative analysis to follow will endeavour to further illustrate why these problems persist and what steps might be taken to remedy them.

2.5.2 The Greater Kluane Region

While the previously discussed research has provided examples of water resource management in the Yukon, none focused specifically on the region being examined here, the GKR. Since a majority of the legal and administrative tools which exist in the Yukon have a territory wide focus, the body of literature examining Kluane Region issues is limited. Water management research on the GKR has generally been conducted for other purposes, such as regional land use planning exercises, tourism development strategies, and community water and

sanitation studies. Although their objectives differ from those of this research, a brief analysis of previous water management and related works is useful for the insight they will provide into regional water management needs and issues.

During the period between 1980 and 1992, two regional land use planning exercises were completed in the Kluane Region, these being the East Kluane Land Use Plan (Yukon Renewable Resources, 1980) and the Greater Kluane Regional Land Use Plan (Greater Kluane Regional Land Use Planning Commission, 1992). Although both of these studies examined a broad range of socioeconomic and biophysical factors in the GKR, their objectives did not explicitly include an integrated approach as is being evaluated here.

The first of the two land use plans, *The East Kluane Land Use Plan* (Yukon Renewable Resources, 1980) takes the form of a regional resource inventory and is used to evaluate the economic base of the area and opportunities for its enhancement. The attention given to water resources is limited to a listing of the main water and related resource uses in the region: fishing, placer mining, recreational pursuits, agriculture and grazing.

The objectives of the *Greater Kluane Regional Land Use Plan* (Greater Kluane Regional Land Use Planning Commission, 1992) reflect the dominant resource management attitudes of the day: sustainable development, heritage resource protection and enhancement of quality of life. The specific water resource management goals of the plan, the desire to "highlight the importance of water to the ecology of the region" and "to ensure the maintenance of water

quality" (1992:50), are far from integrative strategy builders. Indeed, while the plan emphasizes sustainable development, such vague water resource management goals seem unlikely to make much of a contribution to the integration of water resources management in the GKR.

Although not explicitly concerned with water resources management per se, there are a number of other studies in the GKR of interest here. For example, *The Kluane Region Study* (Synergy West, 1974), a precursor of the 1980 regional land use plan, recognizes the importance of water to the region. However, as a result of concentrating on resource description it fails to adequately answer water management questions. Similarly, the *East Kluane Planning Area* report (Reid, Crowther and Partners Ltd., 1982) provides an adequate water resource description but omits discussion and analysis of such imperatives as management practices and institutional arrangements. Wilson (1979) provides a brief summary of federal and territorial land and water management policy in the region, and somewhat prophetically concludes that the lack of a regional direction, local input and the failure to meet the expectations of local peoples are all factors limiting the success of resource management. Concentrating on tourism development opportunities in the Kluane Region, Burton (1983:91) recognizes the role water plays in this respect and urges the maintenance of "the natural attractive force and wilderness characteristics of Kluane".

2.6 Conclusion

The nature of research trends pertaining to water resources management in the Yukon are a good indication of both what has been studied, what conclusions have been reached, and areas still in need of attention. This literature review has revealed a number of such areas of concern. The pivotal point to emerge from this review is that while the need to address the interdependent interrelationships between water and land resources as a component of regional development practices has long been identified in theory as the direction in which future water management approaches could move, such has yet to materialize in practice. Further, the literature cites reasons for the reluctance to integrate water resources management ranging from unclear institutional and research requirements to broad terms of reference sometimes perceived as cumbersome, costly and time consuming to fulfil. While there clearly exists a difference between the theory and practice of water resources management integration, or as Mitchell (1990*a*) calls this, the normative, strategic and operational levels of analysis, there appears to be a need for the type of integrated water management defined here. Not only would this foster greater community input and involvement in decision making as well as facilitate a water resources management practice more adept at recognizing and addressing the differences which exist between northern and southern Canadian regions, but would also foster examination of the array of unique situations within the Yukon itself.

Chapter Three Yukon Water Resources

3.1 Introduction

Yukon water resources differ considerably from those in other parts of the country. This dissimilarity is due to socioeconomic and biophysical properties particular to the north. Although the multiple and often conflicting demands placed upon water resources create management problems throughout the world, the ability to address them is particularly constrained by features particular to the north. For example, the low biological productivity rates characteristic of more severe northern climates have implications for the ability of an aquatic system to respond to internally and externally generated change and disturbances. Therefore, whereas multiple use of a southern water resource may well be accompanied by some degree of water quality deterioration, the same uses in the north may be catastrophic if they stress the system beyond its more limited assimilation abilities. Further, the structure of the Yukon's socioeconomic base often results in the creation of additional water management difficulties. This is illustrated by the conflict between Yukon mining and fisheries interests which, in spite of numerous attempts at resolution, has persisted for decades. Such differences frequently arise due to the fact that the Yukon's relatively low population tends to be concentrated and involved in a host of activities, each requiring access to the same water resource. The need to accommodate pursuits such as fishing, placer mining, river rafting, swimming and hydroelectric power

generation in close proximity to one another creates enduring obstacles to success in water resource management. That many legal and administrative arrangements for northern water management and regulation were not designed to deal with contemporary issues and conflicts further exacerbates such water management concerns. In order to respond to these emerging and sometimes persistent questions it is evident that the institutional arrangements for water management in the Yukon need to be reassessed. During this evaluation it is essential that the sources and complexities of conflict be addressed. Therefore, this chapter will provide a brief description of the Yukon water resource base as well as an analysis of its uses.

3.2 The Territorial Scenario

The physical diversity of the Yukon water resource is as broad as the range of uses to which it is put. With diverse topographic relief, the world's largest non-polar ice field, Canada's highest peak and numerous mountain ranges, valley trenches and plateaus, the array of water systems dissecting the Territory is extensive and complex.

Canada's northern territories contain approximately one-half of the nation's water resources (Department of Indian Affairs and Northern Development, 1982). The Yukon share of this resource is considerable and includes a number of international, interterritorial and interprovincial rivers of local, regional and national importance.

Socioeconomically and biophysically important waterways in the Yukon include portions of the Peel, Porcupine, Liard, Alsek, White and Tatshenshini Rivers. However, it is the Yukon which is the largest and most important river in the territory. Having served as the final section of the journey to Dawson City during the 1898 Yukon Gold Rush, the Yukon River is of considerable historical and cultural value to Yukoners and Canadians alike. The Yukon River drainage basin dominates most of southwestern Yukon. Draining the area north of the Kluane Ranges and the City of Whitehorse and south of the Ogilvie and Selwyn Mountains, the Yukon River flows some 2500 kilometres northwest from its headwaters through the Yukon Territory and State of Alaska en route to the Pacific Ocean (Wickstrom, 1978). The territorial portion of the Yukon watershed is used for fishing, mining, agriculture and hydroelectric power generation as well as hunting, trapping, recreation, and community water withdrawals and waste disposal. Although large, the Yukon and other territorial rivers are unable to absorb and adapt to the growing demands and impacts placed upon them. Therefore the ability of water management practices to address multiple uses is a necessary part of protecting the natural and heritage qualities of the Yukon River.

3.3 The Greater Kluane Region

The Greater Kluane Region is being used here for area-specific discussion and analysis of common Yukon water management problems. Therefore it is necessary to understand the nature of the water resources in this area as well as

the range and type of uses to which it is put. To this end the remainder of this Chapter will include discussion of water resources and their use.

Water resources in the Greater Kluane Region (GKR) are perhaps the most diverse of any region in the territory. This is due in part to the region's less severe climate than that common to other parts of the territory. Another factor influencing regional hydrology is location. The GKR is situated between the Wrangell and Saint Elias Mountains to the west, the Kluane Ranges to the north, the Yukon Plateau to the south and is partially traversed by the Shakwak Trench. The Kaskawulsh, Donjek, Lowell, Seward and Hubbard Glaciers combine to create the largest non-polar ice field in the world (Greater Kluane Regional Land Use Planning Commission, 1992). Aside from being partially responsible for shaping the topography of the GKR, these glaciers contribute water and eroded material to the Region's water network. In fact, the flow volumes and habitat supporting abilities of many streams and rivers in the Region fluctuate seasonally as they are relatively newly created and are directly glacially fed (Synergy West, 1974).

The hydrology of the area is dominated by part of two watersheds: the Yukon and the Alsek Rivers and their tributaries. However, the portion of these watersheds lying within the GKR is small in comparison to their total dimensions. It is important to clarify the fact that since approximately two-thirds of the GKR lie within the boundaries of the Kluane National Park Reserve (KNPR), the uses and protection afforded to this part of the area's water resources are regulated by

the *National Parks of Canada Act* (CPA) and the wilderness management and preservation objectives contained in the *Kluane National Park Reserve Management Plan* (Environment Canada Parks Service, 1990). Further, it is necessary to remember that although no commercial hard rock mines are presently in operation in the Kluane Region, there does exist the potential for such a development, and the impacts which might accompany it, within the Kluane Game Sanctuary at the Wellgreen site.

Although all waters in the region play an important part in meeting both biophysical and socioeconomic needs, several river systems are dominant in terms of their contribution and use. The Kluane Region portion of the Yukon, Dezadeash, Kluane and Aishihik Rivers are all relied upon to fulfil a number of socioeconomic needs. Further, Kluane, Aishihik and Kathleen Lakes are of importance for such uses as fisheries and recreation.

The high quality of GKR water resources supports a diversity of activities and uses, ranging from native and recreational hunting and fishing, and tourist oriented rafting, swimming and sightseeing to municipal water withdrawals and industrial applications such as placer and hard rock mining. This range of uses means numerous resource use conflicts must be resolved and decisions must be made regarding such controversial questions as water rights allocation and use, wildlife and fishery habitat sensitivity, allowable community and industrial pollution discharge levels and types and levels of tourist access.

The remaining chapters in this thesis will illustrate how water resources are

managed in the Yukon as well as what steps may be taken to improve this practice. To understand the obstacles faced when managing Yukon waters it is first necessary to examine the uses to which they are put and the implications to successful planning and management. To enhance this understanding, the remainder of the chapter will provide a brief examination of water uses in the GKR.

While it should be recognized that all renewable and non-renewable resource uses are potential stresses to any natural system, the magnitude varies depending on the degree of disturbance and the ability of the affected system to absorb and respond to change. This responsive ability may be considered a direct result of a system's complexity in behaviour and composition for as Nicolis and Prigogine (1989:218) state, it is "connected to the ability to switch to different modes of behaviour as environmental conditions are varied". In a less complex and more sensitive environment such as that of the Yukon's GKR, any change will be difficult to absorb and will likely have a noticeable effect (Rueggeberg and Thompson, 1984). With this in mind, the following analysis of water and related resource uses will illustrate that all uses of northern water and related resources are accompanied by some degree of disturbance, none being truly sustainable.

3.3.1 Mining

Due to its remote location and small population, the Yukon has not attracted the type of infrastructure investment and development common in most

other parts of the country. One advantage the Yukon has enjoyed is its relative abundance of gold and other minerals. Since the Gold Rush of 1898 mining has been an important industry in the Yukon. This has had implications for socioeconomic development, growth and stability. Since mining has until very recently been the primary source of private industry jobs, income and tax revenues, it follows that as unstable world gold and mineral prices have fluctuated, so has the Yukon economy. The boom and bust cycles which have resulted in these periodic shifts have had a marked impact upon resource valuation, allocation and use. The drop of Yukon mineral revenues from 541.8 million dollars in 1990 to 346.2 million dollars in 1991 is evidence of this problem (Department of Indian Affairs and Northern Development, 1992:8).

While some viable quartz and hard rock mines have operated in the Yukon in the past, placer gold mining has been and continues to be the foundation of the territorial mining industry. Placer mining is the removal of overburden debris through hydraulic blasting or steam injection processes to access fine gold deposits contained in the sediment. By 1990 a total of 17,915 valid placer mining claims had been staked throughout the territory and the 194 active claims produced 132,658 ounces of crude gold (Waroway and Latoski, 1991:iii).

Although thirty-eight streams in the GKR are documented placer gold producers, due to low world gold prices only twelve mines were active in 1988 (Bain, 1989:1) and only nine remained in operation through 1990 (Waroway and Latoski, 1991:xxxvi). The twelve placer gold claims active in the Kluane Region

in 1988 produced approximately 6,799 crude ounces of gold, or 4.2 percent of the territorial total (Greater Kluane Regional Land Use Planning Commission, 1992:81). Although these figures seem to indicate that placer mining is not an important contributor to the economy of the GKR, the opposite is true. Placer mining is credited as being "a potentially strong and positive option for strengthening and diversifying the economy of the planning region" (Greater Kluane Regional Land Use Planning Commission, 1992:81). The main placer mining locations within the GKR, as shown in Figure 3.1 are concentrated around Fourth of July, Kimberly and Quill Creeks as well as Kluane and Dezadeash Lakes. Although there are clearly opportunities for further placer development, it is not anticipated that any major growth will be experienced without an increase in the presently low world gold price (Bain, 1989). Further, the shifting emphasis of the Yukon economy toward more economically stable and environmentally friendly sources of income such as tourism will likely place further restrictions on this extractive industry.

While placer mining provides economic opportunities for some Yukoners, it is increasingly faulted as being detrimental to the natural environment. The main such criticism is that placer mining operations produce abnormally high loads of suspended sediment which in turn reduce dissolved oxygen levels and disturb important fish spawning and habitat areas (Department of Indian Affairs and Northern Development, 1982; Burton, 1983; Weagle, 1990). Placer mining has also been reported to alter, sometimes significantly, wildlife habitat and affect

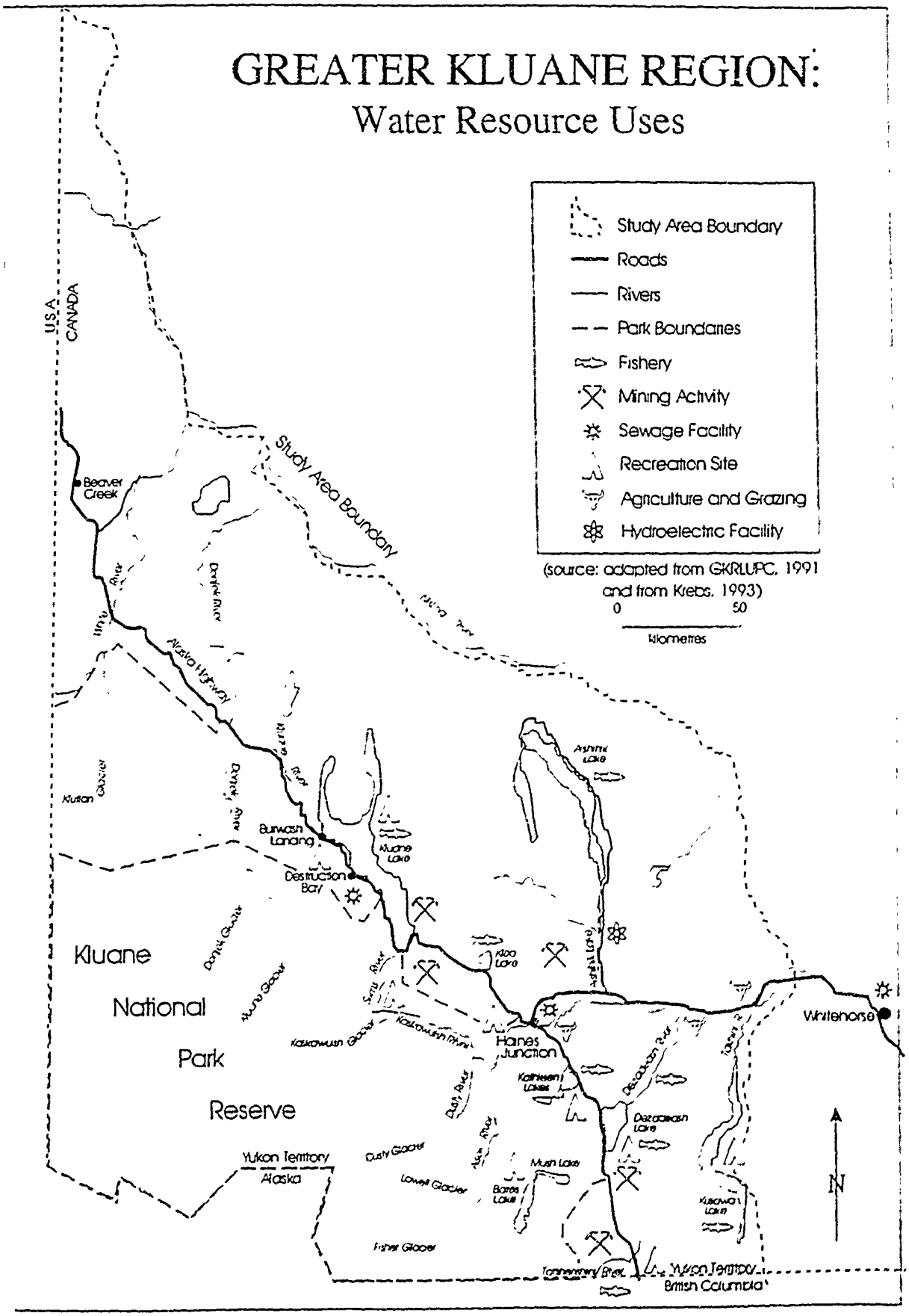

Figure 3.1 Water Resource Uses in the Greater Kluane Region

recreational activities such as hunting and fishing (Fox *et al.*, 1983; Seakem Group Ltd., 1992). The mining industry has historically been reluctant to admit problems such as these existed (Garringer, 1977; Klondike Placer Miners Association, 1979; Fox, 1984*b*). However, due to increasing public environmental awareness and pressures on the industry, some recognition of the need for a re-evaluation has arisen and changes in both the operation and regulation of the industry are occurring (Latoski, *pers. comm.*, 1993).

3.3.2 Hydroelectricity

Hydroelectric power development is another use of water in the Yukon with the potential to alter natural processes. Aside from being faced with common hydroelectric development problems such as ecosystem disturbance, fish and wildlife habitat destruction, potential upstream flooding, aesthetic deterioration and land and water rights allocation uncertainty, the development of hydro-power in the north is confronted with a number of obstacles not common in other parts of the co .ntry. Fox (1984*a*) suggests that due to location, climate and resource scarcity, northern hydro developments can expect to encounter barriers including higher construction and materials costs. For these reasons and others to be discussed here, the present .otal territorial generation of hydroelectric power is equal to only one percent of estimated total capacity (Craig, 1990).

In spite of the limitations and obstacles outlined above, there does exist one major hydroelectric development in the GKR. Located near the community

of Haines Junction, the controversial dam at Aishihik Lake today provides power primarily to Whitehorse but also to much of rural southwestern Yukon. The first water use licence granted by the Yukon Territory Water Board under the *Northern Inland Waters Act*, the Aishihik Lake development revealed early limitations of the Act, the Water Board and the licensing process (Nicholls, 1981).

Controversy arose regarding this 1972 development project for a number of reasons. The primary concern related to what role the Water Board was to play in the process of granting water use licences. Another problem regarding hydro developments was raised by Yukon First Nations who felt they were excluded from the project planning process even though such large scale development could potentially impact their traditional way of life. These concerns are echoed by the Yukon Conservation Society which argued that the Northern Canada Power Commission (now the Yukon Energy Corporation) displayed allegiance to southern Canadian interests rather than attempting to represent the concerns of the northern residents to whom they should be responsible (Yukon Conservation Society, 1979). Although these concerns were not addressed during the planning of the Aishihik Lake facility, some efforts have been made to deal with similar problems in the future and will be discussed in a following section.

Given the GKR's small and dispersed population it would seem logical that the demand for electrical power is low. This assumption is partially valid and partially invalid. In 1987 the GKR consumed only 1.1 percent of the energy generated in the territory (Nairne and Associates, 1989). Should the proposed

Wellgreen Mine development northwest of Burwash Landing proceed, this figure would increase dramatically. Further, recent estimates predict the electrical demands of the rapidly growing community of Haines Junction will double in the next two decades (Nairne and Associates Ltd., 1989). Although the Wellgreen development is not presently in operation, the fact that mining operations are estimated to account for as much as fifty percent of the total territorial energy demand is an important point for consideration when developing any future power generating objectives or strategies (Fox, 1984*a*).

The cyclical nature of the Yukon mining industry has historically meant that government and industry have been reluctant to risk the time and financial investment required to locate, design, license and construct a hydroelectric project in the territory (Department of Indian Affairs and Northern Development, 1982). During periods of northern economic growth, some observers have proposed that the federal and territorial government offer subsidized power to potential mineral operations as a way of enticing them to inject capital into the local economy (Westwater Research Centre, 1980; Fox *et al.*, 1983). It has also been suggested that mega-projects such as hydro developments could be used to sustain economic growth and prosperity (Dacks, 1981). However, critics opposed to this view argue that tax-payer subsidies for hydro developments are unrealistic in the Yukon since even with such cost savings many mines are often forced to close due to economic downturns and resulting revenue reductions (Yukon Conservation Society, 1979; Fox, 1984*a*). Further, it is held that hydro power projects subsidized by the

government may sustain the misconception that abundant supplies of power exist and the need for conservation and soft alternatives are unnecessary (Fox, 1984*a*). Therefore, the possibility of meeting local power requirements with several small area-specific power developments rather than a few mega-projects has been proposed as an alternative worthy of consideration (Westwater Research Centre, 1980).

The decrease in power requirements accompanying the present economic downturn in the territorial mining sector should provide adequate opportunities to assess a number of possible future energy demand scenarios. Two overriding reasons create an imperative need for this assessment: 1) the ten water licences currently issued for hydroelectric power generation are expected to expand to twenty four in the near future (Craig, 1990) and 2) the mining sector of the Yukon economy will eventually recover, creating a new market and demand for power. Given this evidence, the suggestion of Fox (1984*a*) that power planning be made an integral part of land and water use management seems particularly valid today.

3.3.3 Municipal Uses

Municipal water needs in the GKR are similar to those of most other communities in the country, however the manner in which these demands are met differs considerably in the north. Aside from the industrial and hydroelectric water uses described above, municipal water demands in the GKR are an

important factor in the design of an integrated water management strategy. Municipal water requirements in the GKR include domestic water withdrawals in addition to sewage and waste disposal. While these are demands typical of any human community, economic, climatic and demographic factors dictate a number of restrictions concerning the ways in which these demands can be met. These limitations include problems such as the freezing of sewage lagoons and low biological sewage decomposition during limited or nonexistent photosynthetic activity over lengthy northern winters (Roach *et al.*, 1993*a* & *b*). Further, it is common that the financial resources and social infrastructure required to deliver comprehensive and effective drinking water and sewage facilities to some small and remote communities do not exist (Grainge and Shaw, 1971; Roach, 1992). These problems, combined with the poor understanding of basic sanitation and health needs by some local people makes the job of providing basic municipal facilities such as wastewater removal and drinking water difficult.

Although the water supplies in the GKR are sufficient to meet the needs of the area's residents, the dispersed nature of the population and freezing pipes in winter months create problems not encountered in the rest of the country. The four largest communities in the GKR, namely Haines Junction, Burwash Landing, Destruction Bay and Beaver Creek, presently rely on groundwater for their community needs (Roach *et al.*, 1993*b*). The main trouble with this reliance on groundwater supplies is that there exists some potential for the contamination of these sources from problems such as acid mine drainage and agricultural and

grazing land runoff (Greater Kluane Regional Land Use Planning Commission, 1992). Further problems may arise if the groundwater flow regime is interrupted or altered by surface-water containment for hydroelectric power generation or placer mining. In order to address water quality concerns, most communities in the GKR employ a chlorine gas-based disinfection process (Roach *et al.*, 1993*b*) and problems related to water quantity are alleviated through the use of community water storage tanks.

While water quality and quantity issues are not serious concerns at present, the solutions to GKR community sewage treatment and disposal problems and their impacts upon the region's water resources are more elusive. As mentioned earlier, a number of constraints are placed upon the type and efficiency of sewage treatment in the north. Whereas many southern locations are able to employ approaches such as septic fields, underground pipes and sewage lagoons with some success, these options are constrained by cold northern winters, permafrost, unstable active ground layers and finances (Grainge and Shaw, 1971; Roach *et al.*, 1993*b*). As a result of these limiting factors, larger communities in the GKR utilize sewage lagoons to manage community sewage treatment (Figure 3.1). Although sewage lagoons are often seen as the best possible method of addressing local sewage treatment requirements, their decomposition rates fluctuate considerably with climatic conditions. Resulting effluent output peaks create occasional problems in the form of untreated or improperly treated effluent being discharged into local waterways. An additional problem pertaining to sewage

lagoons in the GKR is that not all were designed to handle the growing volumes of waste being introduced to them. Therefore the potential for surface and groundwater contamination exists from the release of sewage effluent from these facilities. This means that, where possible, facilities will have to be expanded or reconstructed. However, given the lack of available funding, both of these alternatives are unfavourable. The importance of this point should be stressed as recent research concerning the implications of inadequate sewage treatment indicates there could be a number of adverse impacts on human health (see Roach, 1992; Roach *et al.*, 1993*b*).

3.3.4 Agriculture

Although agriculture is a terrestrially based activity, the impacts associated with this land use often spread to aquatic environments. Runoff from fields containing agro-chemicals or livestock wastes can reach surface and groundwater systems, creating disturbances such as fish habitat alteration and degradation, changes in dissolved oxygen levels and human-health problems. While agriculture is not a dominant land use in the GKR, there are several areas of agricultural concentration and development potential. As Figure 3.1 illustrates, these areas are found in the Dezadeash and Takhini River Valleys and near Haines Junction.

The low level of agricultural development in the GKR is a function of climate. With a frost free season of only 52 days, a short vegetative period of 122 days, and average precipitation less than is required to support most crops

(Synergy West, 1974), it is understandable that commercial agriculture in this area has not developed beyond market gardening (Yukon Renewable Resources, 1980). Additional limitations are placed on the potential for agricultural development by the region's rugged topography and low soil fertility. Further, as they may potentially disturb wildlife habitats, wilderness areas, and heritage sites, large-scale agricultural undertakings are considered locally undesirable land uses (Greater Kluane Regional Land Use Planning Commission, 1992).

Although the economic significance of agriculture in the GKR is limited, there is both the desire and potential to further the input of other agricultural pursuits such as hothouse and hydroponic-based food production as well as cattle ranching and grazing (Craig, 1990). The impact on water resources from an increase in 'indoor' agriculture would be negligible, however, the same is not true in the case of livestock grazing. It is apparent that runoff from livestock grazed fields reaching waterways may occasionally contain high faecal coliform levels (Brenneman, *pers. comm.*, 1993; Whitley, *pers. comm.*, 1993). In 1989, twenty active grazing leases covered over 5,000 hectares of land, an area expected to expand by an additional 7,600 hectares in the near future (Greater Kluane Regional Land Use Planning Commission, 1992:71). It is estimated that these leases generate between 114,000 and 343,000 dollars for the regional economy each year (Greater Kluane Regional Land Use Planning Commission, 1992:71). Though do exist opportunities to expand the grazing sector of the area's agricultural industry. It is important, however, to consider the potential

implications for impacts to human health and the environmental accompanying such growth.

3.3.5 Recreation and Tourism

Although the mining-related inputs to the Yukon and GKR economies have declined of late, recreation and tourism related revenues have flourished. Crossed by the Alaska Highway, the GKR relies on its spectacular scenery and high volumes of seasonal tourist traffic to generate revenues. In 1988, regional tourism revenues amounted to 10.7 million dollars (Greater Kluane Regional Land Use Planning Commission, 1992). Covering 22,015 square kilometres of wilderness, the Kluane National Park Reserve has been labelled the "tourism anchor" of the region (Environment Canada Parks Service, 1989*a*:7). This important regional role is due to both the significant wilderness scenery and outdoor recreation opportunities available in the Park. Indeed, although a vast majority of the area's tourists are bound for destinations other than the GKR, enhanced visitor facilities within and around the Park boundary as well as improved access to recreational activities are increasing the number of people remaining in the area. Aside from representing the GKR's wilderness quality, water resources provide opportunities for swimming, fishing, canoeing and rafting, and are vital to the success of the local tourism sector (Yukon Renewable Resources, 1990*b*). Figure 3.1 provides a visual indication of the importance of water resources to recreational activities. It should be noted, however, that such

activities require access to a healthy water system, not one spoiled by other uses (Savory, 1988). Further, it is important to remember that the sensitive nature of northern aquatic ecosystems dictates that only a limited number of users and uses can be supported in any given area (Westwater Research Centre, 1980).

Although recreational water uses are considered here to be generally less disruptive to natural processes than industrial applications, this should not be taken to mean that they are non-impacting. As implied above, it is necessary to consider the fragility of these water systems during the determination of how much water-based recreational activity should be permitted, which areas should be made accessible for exploitation, and what types of access should be allowed. These questions have been debated for a number of years in the GKR since the potential to expand already considerable tourism sector revenues is great (eg. Parks Canada, 1979; Burton, 1983; Marsh, 1987; Yukon Territorial Government, 1989; Environment Canada Parks Service, 1989*b*; Greater Kluane Regional Land Use Planning Commission, 1992). The theme to emerge from these initiatives is that the wilderness qualities of the GKR in general and Kluane National Park Reserve in particular should not be compromised. Therefore, only specific areas of the region are to be made accessible for recreational pursuits and only activities sensitive to the natural and cultural significance of the area's resources are to be permitted (Yukon Renewable Resources, 1990*b*; Greater Kluane Regional Land Use Planning Commission, 1992).

During a 1988-89 review of the *Kluane National Park Reserve Management*

Plan proposals were made to permit increased road travel in the Park and to introduce air access to remote areas (Environment Canada Parks Service, 1988). In spite of the potential economic gain associated with such an increase in access to the park's visual wilderness qualities, both the federal and territorial governments determined that the Kluane National Park Reserve "is a critical, but underplayed, drawing card for the Yukon" (Yukon Territorial Government, 1989:2) and as such should have its wilderness qualities preserved and protected (Environment Canada Parks Service, 1990). This means that although the KNPR is recognized as being of significance to the GKR's ability to attract visitors and help sustain the local economy, it is seen as serving this purpose only as a wilderness area. Therefore, selected areas in and around the Park are to be exploited for their aesthetic qualities based upon past uses, relative sensitivity, and low impact accessibility (Environment Canada Parks Service, 1989*b*).

Although efforts have been made to limit the development-related impacts on local water resources, success has not been complete. Human-induced water quality impacts are observable in areas such as Kathleen Lake and heavily used day access hiking trails, in or bordering on the Park (Brenneman, *pers. comm.*, 1993). In spite of these negative impacts associated with aesthetic resource exploitation in the GKR, the overall detriment to water resources is effectively minimized by employing access regulations which, as shown to work elsewhere by Slocombe (1993), compromise of development and wilderness values to foster desirable tourism related revenues and environmental protectic ..

3.3.6 Fisheries

The fishery resource of the GKR is abundant and diverse. The current use of fishery resources in the GKR may be broken down into five sectors: 1) First Nations subsistence, 2) domestic 3) sport, 4) commercial, and 5) commercial sport operations (de Graff and McEwan, 1989). Each of these sectors combines to create the GKR fishery. As Figure 3.1 illustrates, fisheries in the Yukon are concentrated in the southern portions of the Yukon River watershed in the Dezadeash, Kusawa, Kathleen and Kluane Lake drainage areas and in the northern section of the Alsek watershed or the Tatshenshini drainage area. Although fishery production is small in comparison to the rest of Canada, it is important to Yukon First Nations and other local people as a source of food, employment and income.

There are a number of factors to be weighed when planning for the future and management of this important water related resource. It should first be noted that the range of fisheries operating in the GKR has the potential to exert a significant impact upon water and related land resources. While each sector places individual demands on the fishery resource, it is essential that fishery management consider these demands as a cumulative whole and manage them based on this information. This is because, similar to recreational access to water resources, excessive fishery activity may result in over-harvesting and could potentially exceed the ability of water systems to absorb and adapt to changes and result in resource degradation. Typical of northern ecosystems, "low levels of

natural production in northern latitudes limit the yearly sustainable yield of the freshwater fisheries" (Fox *et al.*, 1983:22). Therefore, the determination of annual allowable harvest is essential to the avoidance of stock depletion. Further, activities such as placer mining and hydroelectric generation, which can place additional limitations on the already low levels of natural production, should be managed to consider their impact on other such uses.

Another constraint affecting fisheries development is the fact that the resource is shared not only territorially, but also internationally. Some critics of the international salmon sharing arrangements feel that the portion of the Yukon River salmon catch allocated to the United States is so significant that Canadians' conservation efforts have no positive effect (Fox *et al.*, 1983). This may be part of the reason that little energy is dedicated to encouraging conservation of northern Canadian fisheries. A further explanation for this lack of fishery conservation is that due to the resource's territorial importance, users are reluctant to reduce their involvement for fear of losing access permanently at a later date. Because of this there is considerable effort made in lake stocking programs and hatcheries. While these types of programs are beneficial, it is suggested they should be accompanied by or perhaps even be a part of a conservation program.

Although economically and socially important, the Yukon fishery, like other instream water resource uses, has not been afforded a great deal of protection from competing activities such as placer and quartz mining,

hydroelectric power development, road-building and land development (deGraff and McEwan, 1989). While this has historically been a problem with the legal and administrative arrangements for Yukon water resources management, some progress has recently been made in this area.

The following chapters will therefore present a thorough analysis of the institutional arrangements for water management in the territory as well as provide recommendations for their modification and ability to minimize resource use and management conflict.

Chapter Four Institutional Analysis

4.1 Introduction

As described in Chapter One, an institutional analysis of water management must consider both legal and administrative conditions as well as the intrinsic qualities of their interdependent relationship. In order to clarify this relationship and understand its implications for the integration of water management in the Yukon this Chapter will provide discussion of water-specific and water-related resource management legislation and agencies. The legal and administrative arrangements for water management in the Yukon will be analyzed by employing an analytic framework. This analytic framework was developed through findings from the literature review conducted in Chapter Two of this thesis. The structure of the analytic framework and the results of its application will be shown and discussed in following sections of this Chapter.

This analysis is intended to facilitate an understanding of past and present territorial water management scenarios. By understanding previous problems, the need for and value of recent innovations will be made clear. Similarly, unresolved issues may be identified and their potential solutions explored. To this end a brief historical overview of territorial water management issues will be provided. This will be followed by an examination of the legal and administrative tools devised for problem remediation. The analysis is structured in this way to allow parallels to be drawn between management agencies, their activities, powers and

mandates, and the objectives, limits and opportunities for integrative change of relevant legislative mechanisms. Following this investigation required remedial measures will become apparent as will the potential strengths and weaknesses of the evolving Yukon water management regime.

4.2 Historical Overview

In 1898 the federal government of Canada passed the *Yukon Act*, thereby separating the Yukon Territory from the Northwest Territories. Prior to the formation of the in-territory Department of Indian Affairs and Northern Development (DIAND) in 1948, the Yukon was administered by the Ottawa-based federal government. In its role as administrator of most Yukon lands, waters and resources, DIAND became a quasi-provincial agency. As such it was charged with the coordination of federal policies, programs, legislation and agencies in the Yukon on behalf of the Government of Canada. Early DIAND efforts were focused on the development of a northern economic base and the promotion of the territory's natural resources. This mission led to some dissension between different sectors of the Yukon economy and their often conflicting demands on local water resources.

Historically, Yukon water management conflict has been predominantly a placer mining and fisheries conflict, described by some as the battle between gold and fish (Christensen, 1983; Thompson *et al.*, 1986). This is a factor of the territorial significance of these two water-related resource uses and the inability of

pertinent legal and administrative arrangements to adequately address the differences between them. In 1906, eight years after the start of the Klondike Gold Rush, the *Yukon Placer Mining Act* (YPMA) was introduced to improve the management of this previously under-regulated industry. Although placer mining is a water-intensive industry, no specific reference to such water-use issues as quantity, effluent standards or the allocation of the right to use water was included in the YPMA. In essence, this exclusion meant that if the placer claim staking guidelines outlined in the YPMA were adhered to a placer operator was entitled to use as much water as considered necessary for the operation of that undertaking. This continued to be the practice until the 1970s. The weak regulation of placer mining water uses was likely due to both the strength of the industry and the fact that the protection of northern water resources was not then a priority issue for the government of Canada.

Following this period of government inaction, the 1970s witnessed the introduction of environmental legislation including the *Canada Water Act* (CWA), *Canada Fisheries Act* (CFA) and *Northern Inland Waters Act* (NIWA). Prior to the introduction of NIWA in 1972, the CWA was the management tool applied to most Canadian water issues. This meant that although northern water resources were typically more ecologically sensitive and generally less disturbed than most other Canadian waters, there was no northern-specific legislation in place to ensure their adequate management. In response to growing environmental concerns and water management problems arising from northern resource

development, the federal Government introduced NIWA. This Act was intended to control environmental costs associated with the extensive resource exploration and development then occurring and provide a water management tool capable of addressing northern-specific issues (O'Reilly, 1984).

As Table 4.1 indicates, NIWA is a federally legislated Act which came into effect in 1972 to provide clear and specific federal avenues of power and regulation for the management of northern-Canadian freshwater resources. While NIWA did not include explicit provisions for the protection of instream water and related resource uses such as fisheries and recreation, it did provide a framework

Table 4.1 Legislative Framework

Document	Level	Date	Purpose	Flexibility & Review	Relation to Water Management	Emphasis on Integration
YPMA	Federal	1906	Original placer industry regulation	Limited	None	None
CFA	Federal	1970	Manage & protect freshwater fisheries & fish habitat	Limited	Good but peripheral	Moderate
NIWA	Federal	1972	Manage northern water resources, create regulatory management agency	Limited	Direct	None
CPA	Federal	1986	Provide mechanisms for establishment & management of National Parks	Limited	Indirect	Limited
YWA	Federal	1992	Replace & improve upon NIWA, enhance environmental management & manage water on a Yukon-specific basis	Moderate	Direct	Present: Limited. Potential: Strong
YPA	Interagency, Intergovern-mental	1993	Amend and clarify CFA Sections 35 & 36, regulate placer industry & provide fishery protection	Good	Good but peripheral	Strong

YPMA - Yukon Placer Mining Act CFA - Canada Fisheries Act NIWA - Northern Inland Waters Act
CPA - National Parks of Canada Act YWA - Yukon Waters Act YPA - Yukon Placer Authorization

for northern Canadian-specific water management. NIWA further provided an opportunity to address pressing placer mining-related water management

questions not answered by the YPMA and CWA. This was accomplished by NIWA's superseding the vague provisions for water resources management established in the YPMA and the tenuous ones outlined by the CWA.

Under NIWA the management of inland freshwater resources in the Yukon was delegated to DIAND. The Act also created the Yukon Territory Water Board (YTWB), a branch of DIAND, to assist in water management. Section 10 of NIWA states the objects of the YTWB to be:

> to provide for the conservation, development and utilization of the water resources of the Yukon Territory...in a manner that will provide the optimum benefit therefrom for all Canadians and for the residents of the Yukon Territory...in particular (R.S., c 28, 1972:5).

This mandate has proven to be a burden for both the YTWB and DIAND as it emphasizes the need to both conserve and promote the use of territorial water resources. The broad nature of this mandate was likely intended to permit desired economic growth in the Yukon during the 1970s while providing some, albeit secondary and implicit, recognition of the need to address water-related environmental issues such as increased stream sediment loads and fish habitat alteration.

Water use for a placer operation, formerly subject only to weak regulation, became a licensable activity under NIWA. As such the quantity of use and quality of discharge were subject to YTWB established conditions. Although this provided an opportunity for the regulation of placer-related water uses, the Board was unable to issue licenses at the pace required to meet seasonally influenced

demands of many small and mobile placer operations. Attempting to address this problem, the Board began to issue water use authorizations to those placer applicants not using water in excess of 50,000 gallons per day or not operating for more than 270 days of the year (MacLeod, 1977). Seen as a violation of the Board's powers, this issuance of authorizations was challenged in court in 1984 and subsequently terminated (Pearse *et al.*, 1985).

The YTWB encountered further problems during this period including charges of conflict of interest between DIAND and Water Board members (Rueggeberg and Thompson, 1984; Percy, 1988). It was suggested that a member of DIAND, the parent agent of the YTWB, could not always be expected to make the unbiased decisions required of a member of the non-partisan Water Board. Further, it was noted that Board members occasionally discussed license conditions with applicants prior to license issuance, thereby further compromising non-partisan responsibility. The first of these criticisms resulted in members of government departments being declared ineligible for YTWB membership. The second charge was resolved by requiring that Board members refrain from discussing pending licenses with their applicants. These changes served to clarify the YTWB's mandate and reduce its scope of operation to what was then seen as being a more practical and less controversial level.

Agency legitimacy benefitted from these decisions since it was determined that YTWB's decisions were legally binding. Because of these resolutions the Board came to be considered a quasi-judicial body. A final NIWA-related water

management problem arose from the fact that water use priorities, intended to be used in the determination of water rights and license issuance, were never formally established. As a result, water management problems arose. These included the failure to adequately protect instream water uses as well as difficulties in determining instances of third party compensation. These shortcomings were best addressed through legislative amendment or change.

It should be noted that the persistent conflict between fishery and placer interests was not eliminated by NIWA induced adjustments to the Yukon water management regime. Indeed, this persistent conflict remained as did the failure to secure protection for instream users and adversely affected third parties. However, NIWA did spawn a process of reform in Yukon water management and in the regulation of the placer mining industry which has led to the recent introduction of new federal fishery and placer mining legislation. Given the knowledge afforded by this hindsight review, it may be said that NIWA, originally intended to deal with water quality and quantity issues, represents the beginning of an evolution of the northern economy, resources and the management of important local water resources.

Between the 1972 enactment of NIWA and its replacement in 1992 by the *Yukon Waters Act* (YWA), a number of noteworthy developments occurred in territorial resource administration. Changes concerning the role of NIWA and the YTWB have been discussed above. Therefore a brief look at the continuing evolution of the management and regulation of water-related resources and

territorial socioeconomic conditions will help in determining the impetus for recent water management changes. This understanding will in turn offer insight into the determination of measures necessary to improve the territorial water management regime.

Although the Yukon Territorial Government (YTG) has comparatively little authority over resource administration, it has been active both independently and in cooperation with the federal government in attempting to prepare for future responsibilities. Further, the YTG has attempted to provide an avenue of participation for Yukoners who feel disenfranchised by federal management of many territorial interests. To this end the YTG and federal government combined efforts and initiated the *Yukon Development Strategy* in 1986. Designed to ascertain Yukoners' economic development aspirations, the study indicated a desire to maintain a mix of extractive and non-extractive resource use activities. Industry representatives suggested that the regulation and operation of the important Yukon placer industry would benefit from clearer environmental protection requirements. The study also indicated a need to work toward resolving the placer-fishery conflict. Finally, it noted benefits existed in relation to the broadening of Water Board powers to set license conditions (Thompson *et al.*, 1986).

Another important interdepartmental and intergovernmental initiative to be noted is the 1988 *Yukon Fishery Protection Authorization* (YFPA). The YFPA was designed by a committee composed of federal Fisheries and Environment

appointees and DIAND, YTG, Water Board and placer industry representatives. The Authorization was the first attempt at placer industry regulation to move beyond the proposal stage since the introduction of regulatory opportunities contained in NIWA. By initiating a solution to the contentious placer-fishery dispute, the YFPA made a valuable contribution to the evolution of the territorial water management framework. Most notably, the designers of the YFPA recognized the need to provide clearer industry requirements for environmental regulation. Though only intended to serve as a transitional document during the design of a permanent counterpart (to be discussed later), the Authorization clearly embodied important and overdue innovations for placer regulation.

Acting unilaterally in an attempt to be legislatively equipped for the possible addition of new resource management responsibilities, the YTG has created two environmental management documents. Released in 1990, the *Yukon Conservation Strategy* is a statement of YTG objectives concerning territorial resource conservation and development. This document is not legally binding, rather it serves as a broad written policy and objective statement. As a result, the Strategy is not a required reference for government decision makers and the current territorial government does not endorse its contents. The *Yukon Environment Act*, completed in 1991, was intended to provide the YTG with an instrument to guide the development and use of resources in their control. One Act objective was to provide a mechanism for the integrated consideration of the Yukon's natural environment and socioeconomic base, similar to the aim of the

integrated approach to water management suggested by this author. However, like the Conservation Strategy this legislation is not endorsed by the current territorial government and therefore has yet to be enacted. In spite of the lack of government recognition afforded these documents, they remain potentially useful tools for resource management and administration. Their importance increases when one considers the likelihood that many responsibilities currently under the federal realm will eventually become YTG powers.

4.2.1 Yukon Water Management Integration: 1970-90

The preceding analysis indicates the need for a revision of some fundamental components of the Yukon water management framework. Perhaps less clear is the degree of integration characteristic of this early phase of water administration. Table 4.2 is provided to clarify this and to illustrate the opportunities for enhanced integration. Drawing upon the normative components of the integrated approach to water management introduced in Chapter Two, it is evident that although the introduction of NIWA provided for northern-specific water management, it was far from the integrated scenario being sought here. Prior to analyzing how this approach can be better incorporated in the Yukon it is necessary to examine the institutional arrangements pertaining to territorial water management today.

Table 4.2 Integration in the Historical Context: 1970-90

Theoretical (Normative) Components of Integrated Water Management	Met	Not Met
•consideration of land and water resource interactions		✓
•attempt to incorporate water management into attainment of local socioeconomic objectives		✓
•understanding of environmental linkages and cumulative use effects		✓
•interagency communication and cooperation for information exchange and shared objectives	✓	
•comprehension of value of maintaining mix (balance) of resource uses		✓
•fair and equitable protection of all resource uses		✓
•multiple interest representation and avenue for public/affected party involvement	✓	
•planning component in place		✓
•selected management unit suitable for detailed study		✓
•decisions/outcomes flexible and subject to review	✓	

4.3 Water Management and the Yukon Waters Act

One important component of the institutional arrangements for Yukon water management are legal instruments such as acts, regulations and authorizations. Whether formed and enacted at federal, territorial, regional or intergovernmental levels, these documents are the tools which dictate how water and related resources can legally be managed and utilized. Although they require government ministries and planning and licensing boards to realize their intended objectives, legislative mechanisms are important social tools. As such, legislation should be indicative of the desires and expectations of the people it affects. Unfortunately, due to a number of political and socioeconomic factors which will be illustrated during this analysis, this is not always the case.

Since administrative arrangements and agencies are responsible for the interpretation and application of mandates, policies and objectives, it is necessary that they be included in an institutional analysis of water resources management.

This inclusion will foster insight concerning the source of differences which exist between water resource management theory and practice as well as how these discrepancies may be reduced to introduce a more integrated approach to water resources management. To this end, the following sections will provide an examination of existing legal and administrative arrangements for water management in the Yukon.

4.3.1 Yukon Waters Act

The YWA was enacted by the federal government on June 23, 1992 to manage sensitive territorial water resources and their uses on a Yukon-specific basis. Further, the YWA is seen as a continuation of the attempt to foster progress in the management of northern water resources begun by NIWA in 1972. As shown in Table 4.1, the YWA, an environmental management document concerned specifically with the management of Yukon water resources, was introduced to replace and improve upon its predecessor, NIWA. While the YWA has not been in place long enough to permit a full assessment of its successes or failures, several associated positive and negative features are discernible.

NIWA was a federal government attempt to address northern Canadian water management issues. However, due to intensifying demands on the resource, controls deemed acceptable in the 1970s were rendered inadequate by the middle to late 1980s. Therefore the drafting of new legislation intended to rectify emerging and persistent problems associated with NIWA and its application

included input from DIAND and Water Board members as well as other affected parties. These concerns focused on problems associated with the ability, or lack thereof, to establish water license requirements able to address persistent and controversial issues such as security deposits to compensate adversely affected third parties and undertaking abandonment and closure practices. Mining interests, especially seasonally-operating placer miners, perceived this as an opportunity to improve the processing time for the completion of their licenses. Conservationists expressed a desire to see improvements in the environmental screening of licenses as they believed that under NIWA processes the environmental impacts of many licenses were improperly scrutinized. In order to best understand the changes which materialized in the YWA, the remainder of this section will discuss significant changes from NIWA to the YWA and their implications for water management and integration in the Yukon.

4.3.1.1 Security Deposits

The first major evolutionary addition found in the YWA pertains to security deposits. Formally required as part of a water license for uses with the potential to adversely affect people and/or the quality of the environment, security deposits are a preventative mechanism introduced in NIWA. Under Section 13 of NIWA a security deposit could be established for a value of up to $100,000 or ten percent of the capital cost of the operation, whichever was greater. This money was to be held by the government and returned when

authorities were satisfied no damage to the above mentioned parties had occurred. However, the fact that security deposits were often returned prior to the discovery that remedial measures were required for site restoration has meant that the government has often been forced to bear cleanup costs without compensation (MacLeod, 1977). Further, security deposits have not always been sufficient to cover necessary remediation costs.

While the rationale for requiring security deposits has not changed under the YWA, the amount to be held has. Section 17 of the YWA permits the YTWB to determine the value of a deposit by considering the applicant's ability to pay, the past performance of the licensee, the nature of the undertaking and the likelihood of negative impacts being generated. By allowing the Board greater freedom to determine security deposit requirements, it is possible amounts will be higher than in the past. As a result, licensees may be compelled to exercise more caution when using the water right granted them. Further, Section 17 allows the Board to retain a security deposit for damages caused by an activity either in compliance with or in violation of water license conditions.

It should be noted that although security deposits may be required as part of any water license granted by the YTWB they are most commonly associated with mining and hydroelectric-related water licenses. This is because such water uses are often accompanied by significant alterations in the land-water relationship and therefore disturbances to the water regime. In attempting to more convincingly mitigate externalities in this way the YWA introduces an

implicit degree of integration between water and land use activities. However, the addition of more stringent measures concerning security deposits will be best able to make such a contribution to the integration of water management if water use undertakings are closely scrutinized prior to the refund of a licensee's deposit.

4.3.1.2 Third Party Compensation

As mentioned above, NIWA relied upon water-use priorities to aid in licensing decisions. Unfortunately, these priorities were never clearly established. This meant that the ability to prove rights-of-priority to resource access was not conclusively outlined and the determination of an affected third party's right to compensation was complicated. This problem greatly diminished the intended effect of Section 26 of NIWA: to provide an avenue of recourse to parties adversely affected by the activities of a licensed water user. In order to clarify this issue, Section 26 of the NIWA has been replaced by Section 30 of the YWA and all mention of water use precedent and priority has been removed.

The formerly vague and ambiguous determination of parties entitled to compensation found in Section 11(2) of NIWA has been replaced by Section 14(4) of the YWA. This Section explicitly describes those parties entitled to compensation in the event that their resource access is affected by the activities of a licensed water user. These improvements allow an injured party to more easily pursue compensation, either from a government held security deposit or lawsuit. Although this refinement is not intended to foster greater integration in water

management practices, the deterrent qualities accompanying it should, similar to the effect of security deposits, encourage heightened consideration of the impacts and implications of water use activities.

4.3.1.3 Abandonment and Closure

Environmental degradation resulting from abandonment and improper operation closure methods has historically been a problem in the Yukon. Under NIWA no specific requirements existed to regulate mine closure and there were no deterrent penalties in place (aside from security deposit retention) to cover environmental clean-up and site restoration costs. The addition of Section 39 in the YWA is intended to remedy this shortcoming. This section outlines the conditions which constitute improper undertaking closure and abandonment. It also explains, in relation to closure and abandonment scenarios, both how and when monies set aside as security deposits may be utilized. As a result of this clarification, it is now possible for legal measures to be taken against parties whose abandonment or closure of a water use undertaking results in damage to people and/or the environment.

Operating in conjunction with Section 39 is YWA Section 15(1) which allows specific conditions concerning future closing or abandonment to be included in a water use license. This addition to the YWA replaces the vague Section 12(1) of NIWA and thereby strengthens the regulation of undertaking closure and abandonment. While the so-called 'abandonment clause' of the

YWA is not explicitly intended to enhance the integration of water management, it does implicitly recognize the value of doing so. This is evidenced by the awareness that land based activities may adversely impact water systems, a fundamental element of the integrated approach to managing water resources.

4.3.1.4 Additional Changes

While the alterations discussed above are seen as being most significant, a number of further changes to the Yukon water management regime have also been introduced with the enactment of the YWA. Among these additions, several are considered improvements, while one is seen as being a potential source of controversy. One significant improvement is the fact that the tighter controls and more specific requirements relating to security deposits, compensation and abandonment combine to introduce the opportunity for stricter enforcement of Act requirements (Latoski, *pers. comm.*, 1993). Further, YWA Sections 37 and 39 provide new enforcement powers. These Sections pertain to the rights and authorities of field inspectors, important to the improvement of Act compliance. This new emphasis is likely a response to environmental concerns and past problems such as high sediment discharge levels and excessive withdrawal rates which, due to inadequate enforcement powers, were unenforceable through NIWA. Indeed, it is thought that YWA improvements relating to enforcement will allow DIAND to move toward stricter enforcement for the first time in ten to fifteen years (Sherstone, *pers. comm.*, 1993).

Another change to the YWA water management regime is designed to streamline the water licensing procedure. Whereas NIWA required that license applications for major water use undertakings be reviewed by the Minister of DIAND as well as the YTWB, Section 14(1) of the new Act grants responsibility for the screening of license applications to the Water Board. While the Minister must still approve applications for major (Class A) undertakings such as large-scale mining operations, hydroelectric projects or sewage facilities, the Board is now responsible for both the initial screening of these applications and the processing of all other (Class B) licenses, a majority of which are placer mining related. It is hoped that by providing a single-window framework for the water use screening and licensing procedures that the time required to complete an application will be reduced (Doering, *pers. comm.*, 1993).

Under NIWA, instream water uses were afforded no formal protection or recognition. This omission was seen as a problem since instream uses such as fisheries and recreational activities were therefore unable to secure the access to water resources enjoyed by licensed users. Similar to the case under NIWA, applications not involving the alteration of stream channels or the removal of water therefrom are still seen as being 'instream' uses, and therefore non-licensable. However, two important additions are found in the YWA which may provide these unprotected uses with some degree of security. The first of these changes is found in Section 14(4)(b)(iii) which states that persons whose access to an instream water use is affected by a licensed water user are entitled to

compensation. Such specific mention of the instream users rights was not previously found in NIWA. Further specificity has been added in Section 15(2)(c) of the YWA which requires the YTWB to make an effort to minimize a licensed undertaking's negative impacts to instream users. The level of compliance with this clause is dependant upon Water Board interpretation and license condition-setting. If seen as a water management priority, these improvements can also provide strong protection to instream water uses. As the first explicit mention of instream water uses found in Yukon water management legislation, the potential benefits of these additions are significant and should not be ignored.

While a number of the additions found in the YWA assign increased authority and responsibility to the YTWB, it should not be assumed that its powers are absolute. Although the Board does enjoy a considerable degree of autonomy, the introduction of YWA Section 13 carries with it the potential to seriously limit this freedom. Section 13 allows the Minister of DIAND, the Water Board's parent agency, to give the YTWB written policy directions concerning the fulfilment of their duties. This discretionary power did not exist under NIWA and at the time of writing has yet to be used. This addition is likely intended to help avoid the attachment of unfair or unreasonable conditions to a water use license and is not expected to be applied under normal circumstances. The abuse of this authority would include such unfavourable outcomes as a strained interagency relationship and decreased public support for the Board. This is because Water Board legitimacy and public support depend upon autonomy,

something which would be negatively affected were Ministerial guidance applied.

4.3.1.5 Unaddressed Issues

While the YWA clearly contains a number of distinct improvements over its predecessor several concerns have not been addressed. Avenues for third party compensation, security deposits and environmental protection have been broadened, enforcement and compliance measures enhanced, and instream user rights provided some protection. This is not the case for issues pertaining to mandate clarification, policy formation, and resource conservation. In order to understand the significance of these issues the remainder of this section will include a brief analysis of each.

The statement of an agency's purpose and objectives and its mandate, was identified in Chapter Two as being important to the determination of activities and opportunities for integration. The YTWB mandate provided earlier in this Chapter has been transferred verbatim from NIWA to the YWA. Mandate objectives require the conservation, protection and promotion of water use to be addressed by one agency, the YTWB. The somewhat contradictory requirements of this assignment have resulted in uncertainty as to how the YTWB is to fulfil its mandate.

The YTWB mandate was likely transferred unchanged in order that the potential flexibility of Water Board activities not be limited. By affording the Board greater freedom it is possible for the decision making rationale and license

requirements to adapt and respond to changing social objectives and trends in resource demand. However, because of its complex assignment the Water Board presently reviews each license application in isolation. This incremental approach fails to exploit the benefits offered by precedent-setting similar water licenses. Further, an ad hoc approach to water management decision making limits the level of integration possible. This is because the degree of consideration that may be given matters such as the cumulative effects of a proposed undertaking in relation to others, either existing or proposed, is restricted.

Also absent from the YWA is any mention of water management policy and/or objectives. Agency policy and water management objectives need not be seen as formal, written or constraining elements of resource management. Instead they should be considered informal and adaptive mechanisms used to facilitate more integrated water management. The foundation of a decision making guide will allow consideration of external factors such as the interrelationships between land and water resources and social objectives. Unfortunately, it appears that in the case of the Yukon neither a formal nor informal water management policy exists (Sherstone, *pers. comm.*, 1993). Like the isolated treatment of each water license decision mentioned above, the lack of policy contributes to non-integrative, incremental decision making.

A final omission from the new Yukon water management structure is the failure to provide an opportunity for the issuance of conservation licenses. Section 14(c)(i) of NIWA, retained in the YWA as Section 18(c)(i), requires that a

licensable undertaking must involve a use of water. This is a function of both YTWB mandate and the fact that licenses are issued only for water uses, considered in the YWA Section 2 to be those activities which include the obstruction or removal of water from or the alteration of the watercourse. Whereas a conservation-oriented license applicant may seek access to a licensed water right to protect water quality or a local fish or wildlife habitat, it would not presently be seen as a licensable undertaking unless it met the requirements outlined in Section 18(c)(ii) and fit the definition established in Section 2 of the YWA and described above. Because of this, no non-use water licenses have been granted in the Yukon. One issued license is referred to as a conservation license because its sole objective is seen as being the protection and enhancement of waterfowl habitat (Doering, *pers. comm.*, 1993). The irony of this conservation designation is that it is only through the engineered alteration of natural water-flow that the activity is considered licensable.

The YWA appears able to address a number of the most pressing water management needs in the Yukon. However, it also seems that this legislative mechanism for social change does more to enhance water management enforcement measures and resource user protection and compensation than it does to aid in the improvement of integration of water management with environmental protection and socioeconomic planning objectives. In order to better understand how this problem may be circumvented an examination of the administrative structure and agencies responsible for implementing the YWA is

necessary.

4.3.2 Department of Indian Affairs and Northern Development

Acting as the federal government's representative in northern resource management DIAND is responsible for the administration of a majority of territorial land and water resources. As mentioned, prior to the 1970s DIAND was involved in the promotion of northern economic and resource development. This focus changed following the introduction of environmental management legislation in the 1970s. At that time DIAND broadened its focus to address issues such as the protection of instream water uses, placer industry regulation and water and land use management. As Figure 4.1 illustrates, DIAND, as it relates to natural resource management, consists of a Northern Affairs Program with Renewable and Non-Renewable Resource Branches. The Renewable Resources Branch includes Water, Land, and Forest (currently being devolved) Resource Divisions as well as the YTWB. The Non-Renewable Resources Branch is made up of a Mineral Resources Division, further broken down to include Sections for Placer and Quartz Mining and Mineral Development.

Although each division of DIAND is responsible for overseeing the planning and management of its respective resource, information needs and objectives often coincide and objectives occasionally conflict. Therefore, the coordination of efforts and mutual understanding of objectives is necessary to ensure the sound management of Yukon water resources and the fulfilment of

departmental objectives. Unfortunately, it appears as if inter-division communication has historically been weak and unable to facilitate the integration required to best manage sensitive northern aquatic and terrestrial resources (Chambers, *pers. comm.*, 1993). This is partially attributable to the somewhat arbitrary and vague assignment of sub-agency function which has resulted from the lack of legislated mandate within DIAND's divisions. A symptom of the failure to legislatively mandate Departmental sections is that many activities are based on water management legislation (Sherstone, *pers. comm.*, 1993). This reliance has arisen because water management legislation is seen as being a

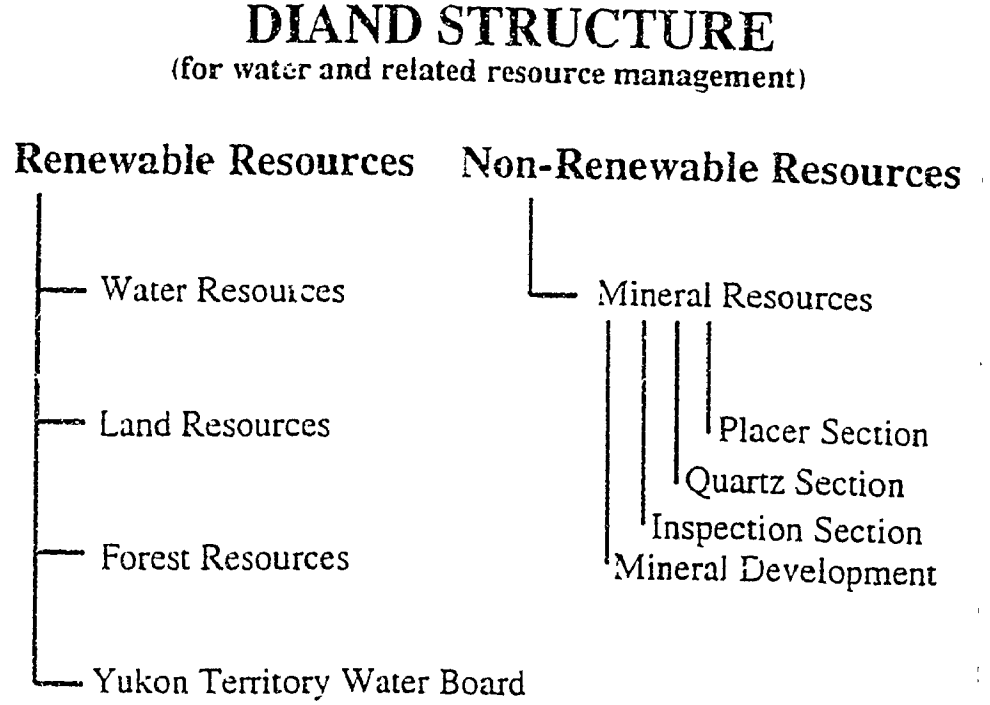

Figure 4.1 DIAND Structure

strong and unifying tool for the fulfilment of agency objectives. Unfortunately it also results in an overlap of efforts.

While all of these bodies are essential to the successful development of an integrated water management strategy the most important vehicles for the achievement of this goal are the Water Resources Division (WRD) and the YTWB. The WRD is charged with two main functions, to assist in the management and regulation of Yukon freshwaters and to provide technical and scientific assistance and information to the Water Board (see Table 4.3). The fulfilment of these functions is aided by the development of a database concerning territorial waters. This information is derived from a number of water quality monitoring programs. Division research efforts are concentrated on the monitoring of community sewage facility effluent discharges and seasonal variations of major rivers such as the Yukon and Alsek. This work is considered necessary for the protection of water quality and the ensurance that water license conditions and requirements are met. The WRD recently commenced research intended to provide an understanding of the effect which global atmospheric pollutants have on sensitive northern aquatic environments (Whitley, *pers. comm.*, 1993). The wide range of information being pursued by WRD staff will benefit DIAND and the YTWB in managing water resources since adequate information is vital to informed decision making.

Whereas it is apparent that the WRD is fulfilling its duty to assist the YTWB, the remainder of its role in water management decision making is less

Table 4.3 Administrative Framework

Agency	Level	Empowered by:	Mandate	Policy	Function	Integrative Mechanisms	Responsible to:	Structure	Role of Public
DIAND	Federal	DIAND Act	No formal mandate	None	Administer & run federal programs and activities in the north	Limited	Minister of DIAND	Renewable & Non-Renewable Resource Branches	Limited opportunities available
WRD	Federal	Informal assignment	No formal mandate. Informal designation of responsibility only	None	Provide YTWB with scientific data & information & assist in decision making	Limited	Head of Renewable Resources & Minister of DIAND	Policy, Planning and Scientific sections	Limited opportunities available
YTWB	Federal	YWA	Legislated to administer conservation, use & development of Yukon waters	None	Regulate most water use activities, addressing quality and quantity issues	Considerable	Minister of DIAND	Chairperson & four to nine government appointed part-time members	Strong potential though not fully exploited
YPC	Inter-agency, inter-governmental	YPA	Charged by YPA to advise Ministers of DIAND & DFO re: placer regulation	None	Oversee usefulness & implementation of YPA, review classifications & advise DIAND & DFO Ministers.	Moderate	Minister of DIAND & DFO	Chairperson & one member from DIAND, DFO, DOE & KPMA	Involvement limited to placer operators
MRD	Federal	Informal assignment	No formal mandate. Informal designation of responsibility only	None	Monitor industry activities, conduct periodic in-field operation reviews & share information to aid enforcement.	Limited	Head of Non-Renewable Resources & Minister of DIAND	Placer & Quartz Mining, Mineral Rights & Development Sections and Inspection Unit	Limited opportunities available
DFO	Federal	CFA	No formal mandate	None	Implement Canada Fisheries Act, evaluate water license applications, protect fish & fish habitat	Limited	Minister of DFO	Field inspectors, policy makers	Limited opportunities available

DIAND - Department of Indian Affairs and Northern Development WRD - Water Resources Division YTWB - Yukon Territory Water Board
YPC - Yukon Placer Committee MRD - Mineral Resources Division DFO - Department of Fisheries and Oceans

clear. Although not officially mandated to participate in water management decision making, the WRD is unofficially required to guide the making of such decisions to ensure they meet public and government expectations. The combination of this considerable (and ambiguous) responsibility and lack of an official mandate has resulted in the WRD's inability to clearly determine their role. It appears these shortcomings, combined with the lack of water management decision making policy, have resulted in sometimes erratic and de facto decision making within the WRD (Sherstone, *pers. comm.*, 1993).

These difficulties became most prevalent during the period of water management administered under NIWA. It is hoped that the improvements found within the YWA will enable problems such as the lack of Division direction and policy, an unclear role in decision making and inadequate enforcement measures to be resolved (Sherstone, *pers. comm.*, 1993). While the YWA does not explicitly offer a solution to the lack of WRD policy and direction, its Yukon-specific focus may facilitate more local input, important to policy formation and the management of water and other natural resources (Chambers, *pers. comm.*, 1993). Additionally, in order that the increased YTWB license screening responsibility and streamlining changes are successfully implemented it is necessary that communication between the Water Board and the Division improve as this will provide a more clearly defined avenue of involvement for the WRD. Finally, the increased opportunities for enforcement provided by the YWA are expected to allow the WRD a more direct opportunity to be involved in the shaping of water

management decisions than was previously the case.

4.3.3 Yukon Territory Water Board

As Table 4.3 indicates, the YTWB is a federally controlled, semi-autonomous entity. It is endowed with a quasi-judicial or legally binding authority to license a range of territorial water uses. By administering both water quality and quantity issues, the YTWB has the ability to foster greater water management integration. Compared to the isolated administration of these duties in most other Canadian water management regimes, this dual assignment is rare. While the Water Board has been performing its licensing duties under the same mandate since the 1972 introduction of NIWA, several important changes have recently occurred. Unlike YTWB mandate clarifications which evolved through court decisions, these evolutionary shifts have arisen due to new powers found in the YWA.

The YTWB is the agency with the greatest responsibility for implementing previously discussed changes introduced in the YWA. As such it is necessary to evaluate how these changes are interpreted and how they affect Board activities and agenda. Further, since the YTWB has the potential to introduce greater integration to water management activities it is useful to examine how this may best be accomplished. The remainder of this section will outline how legislative changes can be applied by the YTWB to contribute positively to the ongoing evolution of water management in the Yukon.

As was shown in Figure 4.1, the YTWB is a branch of DIAND Renewable Resources. Due to its quasi-judicial status and the legislative arrangements governing its operation, the Water Board, unlike other DIAND divisions which are closely tied to the Department and are responsible to the Minister, is afforded considerable decision making and operational autonomy. The Water Board therefore enjoys liberties not freely available to other DIAND Divisions. These freedoms relate to mandate interpretation, the formation of operational policy, and establishment of water license conditions. Unfortunately, it appears these opportunities are not fully exploited, a shortcoming which critics suggest has resulted in a narrow mandate interpretation and an inadequate use of discretionary powers relating to water license conditions (Percy, as cited in Flather 1989; Ross, 1991).

The YTWB's current mandate interpretation dictates its activities be limited to licensing and regulating water uses. Whereas the Board contends its function should remain a regulatory one (Doering, *pers. comm.*, 1993), its broad mandate provides opportunities for involvement in vital water management functions such as policy formation, resource-use planning and dispute resolution. It can also contribute to the fulfilment of community and regional objectives through an integrated approach. Questions of mandate interpretation and Board role reveal the greatest difference between resource management theory (Board potential) and practice (Board activities). Given the YTWB's significance to the water management process, it is necessary to determine why the Board takes such

a narrow view of its responsibilities and how this may be overcome to introduce greater integration to territorial water management.

It appears the YTWB's myopic perception of its task is a result of two factors, shortage of human and financial resources and an unclear perception of direction and purpose. The first of these points, underfunding, is common to most government bodies. The YWA requires that the Board consist of between four and nine members, up to six of which may be appointed by the Minister of DIAND and as many as three by the Leader of the YTG. Further, the Act specifies that an office and staff be provided to assist the Board fulfil its duties. Although these measures are intended to ensure that adequate administrative resources are available for water licensing procedures, such is not always the case. This is because Water Board appointees work only part-time and often have no prior knowledge of Board operations or water management issues, practices and needs. A further problem is that the Board is faced with peaks in license application submissions when seasonal undertakings such as placer mines close during winter months (Doering, *pers. comm.*, 1993). These peaks tax the depth and quality of assessment given each application, thereby restricting the level of analysis. It is clear the Board would benefit from a number of adjustments, particularly a membership more familiar with water management issues, better comprehension of YTWB procedures, heightened awareness of YWA subtleties, and a less seasonally influenced workload.

The second factor contributing to narrow mandate interpretation relates to

conditions under which the Board developed and operated during the period governed by the NIWA. At that time, mandate interpretation, though officially left to the discretion of Board members, was unofficially allowed to evolve under the influence of external factors. This is because uncertainty relating to powers of the new water management legislation and the YTWB's regulatory function meant both the regulator and regulated were unclear of the extent of management powers. This confusion eventually resulted in a clarification of the YTWB's function and powers through court challenges and industry (primarily mining) protest. During this period, the YTWB underwent a decisive and dynamic evolution. While the previously discussed developments contributed to a better general comprehension of Board authority further adjustments followed.

The unclear and unstable atmosphere in which the YTWB developed was obviously not conducive to the broad mandate interpretation or progressive decision making agenda required to best manage Yukon water resources. As the Board adapted to these required alterations it adopted a conservative view of its function, likely to avoid future conflict. However, as is now evident, this narrow perception fails to exploit adequately the recently expanded range of powers and opportunities available to the Water Board. If the YTWB is to fulfil its potential contribution in the management of Yukon waters, a re-evaluation of its mandate and activities is required.

Although many YWA derived changes have been identified, several are of particular importance to the Water Board. The most significant of these is the

assignment of greater responsibility to the Board. These rights include the legislated power to attach license conditions for security deposits, third party compensation and mine abandonment discussed in the preceding section. This means that whereas in the past the Board may have voluntarily opted to attach such terms to a license without legal certainty, they are now a legislated component of the licensing process. Not only is this expected to enhance the legitimacy of and compliance with license conditions, but it should also prompt the Board to more readily apply these discretionary powers. However, if this addition is to make a positive contribution it must be applied fairly and consistently. While these changes are notable, the fact that elements of the YWA grant the YTWB greater independence from DIAND also merits inspection.

Water license screening procedures formerly required that Board members work with the WRD and Department of Fisheries and Oceans (DFO) in order to fulfil environmental screening requirements. This arrangement was seen as a constraint to Board autonomy since it limited the ability to independently assess license needs and determine necessary remedial conditions. In order to enhance independence and decrease application completion time, the YWA assigns greater screening authority to the Board. This modification is expected to serve a dual purpose since while ensuring greater Board autonomy it will also require informal interagency integration be promoted and maintained so that necessary information exchange occurs. Continued information sharing is essential given non-expert Board membership. Without the assistance of DIAND inspectors and scientists

and outside consultants, the YTWB could not make informed decisions.

Since integration is necessary not only in the consideration of resources and socioeconomic factors but also among management and regulatory bodies, this modification is seen as providing positive input to the management of Yukon waters. However, creating a need for improved interagency communication far from ensures the avoidance of typical problems such as conflicting agendas, project redundancy and inefficient use of time and human resources. Therefore, if integrative mechanisms found in the YWA and the YTWB are to be fully exploited other avenues for their emergence must be created.

One such possibility arises from the potential down-sizing of DIAND which will result in the need to better utilize departmental resources. As the high cost of governing the Yukon becomes difficult to rationalize in the eyes of the Canadian public, down-sizing is seen as a necessity. As a consequence of staff and budget reductions it will become less practical to attempt numerous individually managed projects and studies. The anticipated result of a reduced scale of operations is that greater integration will occur when formerly separated agencies such as the Water and Land Resources Divisions are forced to work together to achieve mutually beneficial objectives (Chambers, *pers. comm.*, 1993).

While the time-scale for DIAND down-sizing is not yet established, it is apparent that one possible opportunity for reducing federal government costs in the Yukon is the gradual devolution of administrative responsibilities. Although federal payments contribute to YTG based administrative activities it is possible

they may be less than the cost of federal administration. Therefore this is seen as an attractive method by which to reduce the overall cost of governing the Yukon and one which may be applied to an already considerably autonomous entity such as the YTWB. Although no plans presently exist for the devolution of the YTWB, this is a possibility worthy of consideration and one whose benefits will be discussed in the following Chapter.

It should be noted that although the YTG continues to accept greater responsibility for the management of territorial lands and resources, a majority of responsibility remains in the hands of the federal government. Although officially responsible for the management of most Yukon lands and resources, the federal government recognizes the benefits of continuing the slow process of devolution of responsibilities to territorial authorities. Communication between these two levels of government is maintained to ensure that should responsibility be transferred, the receiving body will be familiar with and able to undertake operation of this task.

4.4 Water-Related Legislation and Agencies

As has been illustrated, the YWA is intended to deal with a number of water and related resource management issues. This is a result of the interrelationships which exist between terrestrial and aquatic ecosystems and resource uses. In order to respond to the uncertainties inherent in the management of Yukon water resources, the integrated approach being proposed

here recognizes the need to consider such interrelationships. By considering water resources and the institutional arrangements for their administration as well as the use and regulation of related resources such as minerals, fish and wilderness, this research endeavours to determine the opportunities and barriers to the integration of water resources management.

4.4.1 Mining Industry Regulation

Following several inconclusive reviews of the Yukon placer mining industry, it was determined in 1988 that industry regulation was in need of improvement. Therefore, the federal and territorial governments established the Yukon Placer Implementation Review Committee (IRC) and charged it with the task of determining the nature of these improvements. Composed of a mutually agreed upon chairperson and four members, one each from the Klondike Placer Miners Association, the YTG as well as the DFO and DIAND, the IRC was instrumental in drafting the *Yukon Placer Authorization* (YPA) (Canada, 1993*a*). The YPA was signed into effect in June, 1993 to replace the previously ambiguous Sections 35 and 36 of the CFA (concerning fishery habitat alteration and the deposit of deleterious substances respectively) as they related to placer mining. Previous attempts to strengthen placer regulation generated boisterous criticism and charges that proposed changes were more intent on damaging the industry than in protecting water quality and instream water uses (Klondike Placer Miners Association, 1979; Yarronton, 1982). To alter this perception and ensure greater

industry compliance with regulatory measures, the IRC recognized the need to create an approach that established clear and fair regulatory requirements.

To this end, the YPA's regulatory measures are based on area specific stream classifications. The Authorization provides an opportunity for industry and conservation interests to co-exist while not obviating one for the sake of the other. Stream classifications address such issues as the present environmental state of an area, the economic significance of that region, natural sediment load in a discharge-receiving water body and the importance of local fish presence to territorial species populations. Further, the YPA contains built-in flexibility which allows for the review of stream classifications and provides an avenue of recourse for parties who feel unfairly affected by conditions of the Authorization. In order that the regulatory improvements generated by the YPA find their way into water use regulation, its requirements are to be incorporated into water licenses.

Interestingly, although intended primarily to regulate the placer mining industry, the YPA contains explicit recognition of the need to work toward an integrated approach. This is best illustrated in the document's introduction which states that "an integrated approach is needed to ensure placer mining can continue to contribute to the Yukon and Canadian economies" (Canada, 1993*a*:1). This is to be accomplished by basing industry regulations on the wide range of socioeconomic and environmental considerations outlined above and by recognizing the need to include social objectives in the planning and management of this controversial but significant sector of the Yukon economy.

By establishing a framework for placer mining regulation developed and endorsed by industry, fishery, DIAND, Department of the Environment and YTG officials, it appears the IRC has fulfilled its assignment. Through clarification of the expectations of placer operators the YPA eliminates the ambiguities and conflicting requirements which formerly existed among the Placer Mining, Fisheries and Yukon Water Acts. In so doing the Authorization creates an opportunity to integrate the management of land and water resources, as they relate to placer mining. By eliminating persistent problem areas, an atmosphere likely to foster successful industry regulation is finally created. However, similar to the YWA, the YPA is a new legislative tool. Therefore, its future successes and failures are difficult to assess. The accuracy of this determination will benefit from the examination of the administrative agents responsible for its implementation, review and application.

4.4.2 Mining Industry Administration

In order to ensure that the Placer Authorization is successfully implemented and continues to serve a sound regulatory function in the future, the IRC, formerly a temporary body, has been reborn as the Yukon Placer Committee (YPC). The YPC becomes a permanent body responsible for the arbitration of any future disputes arising from YPA requirements. Structured similarly to its predecessor, the YPC is an intergovernmental, interagency and multiple interest entity directed to serve an advisory role and make recommendations to the

Ministers of DIAND and the DFO (Table 4.3). By working in cooperation with the DFO and Mineral Resources Division (MRD) of DIAND the Committee is designed to ensure that conditions for and levels of compliance with the YPA are equitable and satisfactory for all parties.

The MRD, part of DIAND's Non-Renewable Resources Branch, is responsible for overseeing enforcement and regulatory aspects of the Yukon's mining industry (see Table 4.3). This responsibility includes the task of conducting seasonal inspections of mining operations aimed at increasing compliance with water license conditions and industry regulations. To this end, inspectors from the MRD's Placer Mining Section evaluate water use operations to determine levels of compliance with the YWA, YPMA, and the CFA. This information is then disseminated to the YTWB, DIAND and DFO. By making information available violations can be identified and regulatory and enforcement steps taken as required.

As it relates to water management, the MRD acts primarily as an industry enforcement body. Whereas the YPC serves as something of a placer industry-water management integrator under the auspices of the YPA, the MRD does so by way of its inspection-dissemination function. This is a vital facet of the Division since without it the goal of generating compliance with any water or related resource management implement would be greatly hindered and the effectiveness of recent institutional improvements reduced.

4.4.3 Fisheries

The federal government presence in Yukon water management, although concentrated in DIAND, includes an important contribution from the DFO. Acting under the authority of the CFA, fisheries personnel have traditionally been involved in the study of issues involving fisheries and industrial activities, waste deposition and water quality problems. Sections 35 and 36 of the CFA empower Fisheries agents to require that any (non-placer) water use activity either altering or depositing a deleterious substance into a fish habitat be terminated. Though considerable, this power has seldom been used as a deterrent. It appears however that the problem has been at least partially remedied with the superseding of CFA Sections 35 and 36 (as they relate to placer mining) by the YPA. This change is considered an amendment of the CFA and should not be seen as a reduction in the role of the DFO agents or the Act itself. The fact that non-compliance with Placer Authorization requirements is seen as an offence punishable under the Fisheries Act supports the notion of amendment, not replacement.

Since the YPA amendment applies only to instances of fishery-placer mining conflict, the original authority of the CFA Sections 35 and 36 remains unchanged. In any other instances involving water uses which impact fish and fish habitat these two sections provide the most significant opportunities for protection. These powers authorize DFO personnel to pursue fishery safeguards against parties using water for such things as community withdrawals, agriculture,

livestock grazing, hydroelectric power generation or recreational purposes. Unfortunately, the right to seek protection does not guarantee that it is sought whenever necessary. It is therefore up to DFO officials and water users to create innovative mechanisms such as the YPA which provide Yukon fisheries with adequate protection. One opportunity for future consideration is the notion of devolving more fishery management and regulatory authority to the YTG. Regardless of the need for further progress, recent improvements in placer industry regulation show that the DFO and CFA do, where the will exists, serve as potential integrators of water management in the Yukon.

4.4.4 Parks and Recreation

Another important development in the protection and conservation of Yukon water and other environmental resources was the 1972 establishment of a 22,015 square kilometre wilderness park in the southwestern corner of the territory. It has been suggested that the lands included in (or omitted from) the Kluane National Park Reserve (KNPR) were determined in part by a strong mining lobby (O'Reilly, 1984). However, that this protected area was established at all indicates the increasing environmental awareness characteristic of the public and government during the early 1970s. The inclusion of this large portion of the Greater Kluane Region in the park provides a significant level of environmental protection under the *National Parks of Canada Act* (CPA). Drawing on the powers of this act, the Canadian Parks Service has, with some evolving latitude in

objectives, managed KNPR as a wilderness area since its establishment. This is best reflected by the strict limitations placed upon development of and access to the park in past and current park management plans. Limiting human activity in the area is seen as benefitting the protection of outstanding wilderness qualities (Parks Canada, 1980, 1984; Canada Park Warden Service, 1987; Environment Canada Parks Service, 1990). Unfortunately, regulation of activities inside the park does not guarantee that externally derived negative impacts will not arise inside its boundaries.

This is a result of linkages between park and non-park areas. Problems such as increased sediment transport in some rivers flowing into KNPR caused by industrial activity, water quality degradation arising from sewage or other effluent discharge and flow regime disruptions owing to dams and diversions are examples of the effect of environmental linkages, usually between land and water resources. Therefore, although the CPA provides protection for aquatic and terrestrial resources inside KNPR, non-park environmental legislation does not stop external activities from creating internal impacts. As a result, the management and regulation of land and water uses around this sensitive wilderness area must address the role of linkages.

While KNPR comprises a majority of park land in the Greater Kluane Region, several territorially managed park areas do exist. Unlike federally administered parks which are afforded environmental protection under the CPA, territorial parks are not legislatively guarded. Instead, it is up to the YTG to

develop a parks policy. To this end the Renewable Resources Branch of the YTG developed the *Parks and Outdoor Recreation Policy, 1991* (Yukon Renewable Resources, 1991). Although intended to facilitate the preservation and management of natural and heritage resources within territorial parks, this policy statement is not supported by the current territorial government (McIntyre, *pers. comm.*, 1993). Therefore, territorial parks are not likely to receive the financial or human resources required to promote resource management and conservation and as a result offer little input to integrating water management at this time.

4.4.5 Non-Government Participants

The role played by non-governmental organizations (NGO) in the Yukon is of considerable importance. The Yukon Conservation Society (YCS) acts as the voice of a strong and growing territorial environmental movement while the Yukon Chamber of Mines (YCM) and the Klondike Placer Miners Association (KPMA) represent the interests of the economically important mining industry. Although their budgets and ideals differ, these three NGOs share a common objective. This is the desire to have their interests heard and to be included and represented in resource management decision making in the Yukon.

The YCS effectively represents territorial conservation interests by maintaining a cooperative relationship with agencies like the WRD and the YTWB. This enhances their legitimacy and encourages more cooperative and less adversarial interplay with resource administrators. Perhaps the most notable of

the YCS's accomplishments was its lawsuit against the YTWB which claimed the Board acted in conflict of interest. The outcome of this case resulted in the determination that the Board was a quasi-judicial body whose membership should not include government representatives. The YCS continues to lobby both the federal and territorial government to have its interests heard and is actively involved in promoting environmental awareness among Yukoners. With a belief in territorial resource administration based in the Yukon, this organization participates on local planning committees and uses YTWB public hearings to voice concerns over the allocation and use of local water resources.

As Yukon mining industry representatives, the KPMA and the YCM have long been involved in promoting the industry. More recently they have attempted to protect corporations and individuals from what they see as unfair and damaging attempts to strengthen industry regulation. As indicated by the fact that these NGOs are represented on regulatory planning bodies like the recent IPC, it is clear they are both powerful and respected groups whose interests are noted by resource administrators. In spite of this recognition, mining industry representatives claim regulations and environmental protection measures sometimes serve to deter further mineral exploration and development (Dougherty, *pers. comm.*, 1993). Though the industry is unstable and presently suffering through an economic downturn, it continues to provide considerable employment and economic opportunities, a fact stressed by both the KPMA and the YCM in their efforts to gain support for the parties they represent.

4.4.6 First Nations Involvement

Released in May of 1993 the *Umbrella Final Agreement* (UFA) (Canada, 1993*b*) is a First Nations land claims and resource rights settlement document which contains specific reference to Yukon water management. Although the potential implications of this work should not be overshadowed, it is important to recognize that its contents have yet to be finalized. Nonetheless, it is necessary that the contents be understood at this stage since they may be implemented as part of the territorial water management framework within the near future. The objective of water management as defined by the UFA is to "maintain the Water of the Yukon in a natural condition while providing for its sustainable use" (Canada, 1993*b*:183). This broad goal is to be fulfilled through the introduction of several potentially important changes described in the UFA.

The first and perhaps most potentially controversial and problematic of these developments pertains to mandatory First Nations representation on Yukon boards and committees. Section 14.4.1 of the UFA states that the Council for Yukon Indians shall appoint one third of the members of the YTWB. Although the Board has traditionally attempted to maintain First Nations membership in the past (Doering, *pers. comm.*, 1993), the UFA requires this level be expanded in the future. This in itself is not seen as a problem given the percentage of First Nations people as a component of total Yukon population. What has been identified as a potential difficulty is the shortage of qualified and interested First Nations community members to fill the increasing number of agency, board and

committee positions (Doering, *pers. comm.*, 1993; Sherstone, *pers. comm.*, 1993).

Further change to the water management regime is anticipated as a result of Section 14.9 of the UFA. This section requires that the YTWB consider the potential of licensed water uses to adversely affect First Nations traditional water uses. Similar to the requirement to consider a water uses potential impact on instream uses in the YWA the effectiveness of this clause will rely on the YTWB's willingness to expand its operative role in water planning and management. Indeed, without a broader outlook it is unlikely the Water Board will be able to address consider such a socially and politically sensitive issue.

4.4.7 Integration Under the YWA

Whereas the NIWA water management regime fulfilled only three ideals of integrated water management, the YWA scenario meets five (Table 4.4). The introduction of the YWA and YPA facilitates this advance. The consideration of land and water interactions is aided by the YPA. This is because its determination of allowable resource exploitation is partially based on these concerns. The effect of environmental linkages is also addressed by the YPA. By assessing the degree of placer exploitation allowable on a given stream the Authorization recognizes there is a finite limit which must be adhered to in order that other resource uses such as fisheries are not unfairly compromised. While the YWA is a significant evolutionary development in territorial water management the integrative changes it introduces mainly create opportunities for

administrative adaptation and do not serve to enhance integration on their own.

Table 4.4 Integration in the Contemporary Context: 1990-present

Theoretical (Normative) Components of Integrated Water Management	Met	Not Met
•consideration of land and water resource interactions	✓	
•attempt to incorporate water management into attainment of local socioeconomic objectives		✓
•understanding of environmental linkages and cumulative use effects	✓	
•interagency communication and cooperation for information exchange and shared objectives	✓	
•comprehension of value of maintaining mix (balance) of resource uses		✓
•fair and equitable protection of all resource uses		✓
•multiple interest representation and avenue for public/affected party involvement	✓	
•planning component in place		✓
•selected management unit suitable for detailed study		✓
•decisions/outcomes flexible and subject to review	✓	

4.5 Conclusion

The sensitive nature of Yukon waters and the often conflicting uses to which they are put dictate that water management needs to consider ways to regulate resource utilization and the effects of environmental linkages. This institutional analysis has illustrated the continuing evolution of territorial water management (Table 4.5). By gradually shifting away from a narrow approach which considered land and water resources apart from one another and socioeconomic features, an attempt is being made to consider resource interrelationships and social objectives. As a result of this attempted adaptation, new environmental management legislation has been introduced which changes water and related resources uses, their management and the framework for their administration. The advent of a new Yukon Waters Act, an expanded realm of authority for the Water Board, the introduction of opportunities for more

integrated resource management and the improved regulation of a controversial but important economic activity are notable products of this progression.

Table 4.5 Developments in Yukon Water Management

The NIWA Regime (1972 - 1990)		The YWA Regime (1990 - present)	
Problems:	Accomplishments:	Problems:	Accomplishments:
• weak regulation of placer industry • no protection of instream water user rights • narrow perception of YTWB mandate & activities • few opportunities for water management integration • failure to establish water use priorities • insufficient closure & abandonment requirements • poor security deposit & remediation allowances • inadequate enforcement powers • persistent placer-fishery conflict endures	• first northern-specific water management legislation • introduction of water use regulation in placer industry • formation of territorial water regulating agency • clarification & gradual refinement of YTWB role • initiated regulatory reform in placer industry • intergovernmental initiatives to determine territorial resource development	• narrow perception of YTWB mandate & activities • no recognized lead water management agency • failure to establish water management policy or objectives • no planning component in water resource management • license streamlining could inhibit application review & environmental screening • potential for conflicting & overlapping agency objectives within DIAND • cumulative effects & socioeconomic objectives not included in licensing process	• Yukon-specific water management legislation • improved placer industry regulation • legislative authority for YTWB set water license conditions expanded • first explicit recognition of instream user rights • improved enforcement opportunities for DIAND • expanded opportunities for water management integration • improved abandonment & closure requirements • stronger security & remediation measures • removal of unclear water rights priorities

However, insight gained from this evaluation reveals that room exists for further improvements to the management of water in the Yukon. A number of opportunities exist through which the level of integration may be heightened, public participation improved, duplication and redundancy of efforts reduced, theory moved closer to practice, and effectiveness enhanced. The nature of these possibilities and the avenues leading to their exploitation will be outlined in the remainder of this work. Discussion in the following Chapter will include recommendations and conclusions aimed at improving Yukon water management.

Chapter Five Discussion

5.1 Introduction

The introduction of the *Yukon Waters Act* (YWA) in 1992 creates opportunities for the improvement of water management in the territory. As shown, most of these possibilities arise from Act sections concerning the regulation of water uses. YWA advances serve to enhance compliance from water users in former trouble areas and help to clarify questions concerning priority and water use closure requirements. Although legitimation has benefited from water management changes found in the YWA, the reform of related legislation has led to additional improvements. Specifically, the 1993 introduction of the *Yukon Placer Authorization* (YPA) provided overdue improvements to placer industry regulation. Based on detailed stream classifications, the YPA amends the *Fisheries Act* (CFA) as it relates to placer mining in order to provide necessary fishery protection and permit the placer industry required water resources access. These two significant changes to the legislative arrangements for water management in the Yukon create opportunities for resource administrators, primarily the Yukon Territory Water Board (YTWB).

While presently central to the YTWB's water management agenda, the review and issuance of territorial water use licenses is just one of several mandated responsibilities. Although the YWA contains a number of Water Board related changes the agency's mandate is unchanged. The Board remains

empowered to address issues of water quality and quantity, as well as conditions of use. Further, the clarification of formerly unspecified Board responsibilities, especially those concerning the establishment of water license conditions, facilitates greater latitude in the fulfilment of regulatory tasks.

Legislative changes offer opportunities for the Board to adopt a more ambitious agenda and influential role in territorial water management decision making. However, the YTWB appears content to concentrate on licensing and regulatory activities. In order to capitalize on evolving institutional arrangements and create a more integrated framework for water management in the Yukon the Board must broaden its mandate interpretation. Therefore it is necessary to determine how this is to be accomplished and in which areas future Board activities should be directed.

The answers to these important water management questions are dependant upon both relevant legislative content and on the socioeconomic environment in which the YTWB operates. The remainder of this Chapter will outline several imperative but unaddressed water management needs. Having established these needs it will then be possible to illustrate opportunities for a shift to a more integrated water management approach in the Yukon. These recommendations will endeavour to exploit recent changes to the institutional arrangements for water management, thereby capitalizing on the public and political will responsible for their creation. To illustrate how recommended changes can serve to enhance integration in Yukon water management their

ability to meet the requirements outlined in Chapter Two will be assessed. It was shown in the previous Chapter that YWA-related changes to the water management structure rely on administrative evolution and adaptation to be implemented. Therefore the following recommendations are focused on exploiting such potential benefits.

5.2 Institutional Needs for Integration

Contemporary water management in the Yukon emphasizes water use regulation. As shown, this is a result of the socioeconomic environment in which legal and administrative arrangements have developed. Due to the historic emphasis placed on resource and economic development and the failure to establish territorial water management objectives, territorial water administration has been plagued by ad hoc and incremental decision making. This lack of direction has been accompanied by the failure to establish a lead water management agency. Further, the lack of clarity in management roles and agency mandate interpretation has resulted in an overall lack of policy formation and objective setting. One way to move toward the type of integrated water management being proposed here involves the establishment of a lead water management agency. This is seen as potentially helping create a more stable environment in which management agenda, goals and objectives can be developed.

Utilizing a lead agency approach is one of a number of possible ways to

enhance integration. While some authors advocate an institutional focus for addressing management problems (Fernie and Pitkethly, 1986), others argue against such a tactic (Walters and Holling, 1990). The advantages and disadvantages of a lead agency approach vary depending on the problem to be addressed and the management context. The benefits and potential draw-backs of adopting this approach in the Yukon will be enumerated in the following investigation and discussion.

5.2.1 Benefits of a Lead Agency Approach

The narrow vision applied to water management may be broadened through the establishment of an agency agenda and the resulting attempt to work toward socially desired goals and objectives. The ability to respond to changing social goals will require a flexible agenda which is able to guide decision making by clearly outlining acceptable activities. It is also necessary to recognizing the importance of maintaining a range of resource uses to provide necessary economic development and resource protection and conservation. The determination of acceptable levels of consumptive and conservation resource uses must also address the cumulative effects arising from both water and land resource use. This requires a recognition of water and land system interactions best achieved through interdepartmental cooperation. To this end the lead agency must initiate and stimulate the coordination of efforts and sharing of information. Lead agency determination and objective setting would benefit water management in the

Yukon where agency fragmentation results in ad hoc and conflicting management activities. By moving away from a predominantly regulatory outlook to a perception of responsibilities encompassing both a regulatory and planning role it will be possible to foster both continued territorial economic development and resource conservation. These are significant goals given the importance of extractive resource activities and wilderness-based tourism to the Yukon economy.

5.3 A Lead Agency for Yukon Water Management?

Having determined the benefits of a lead agency for Yukon water management it is necessary to determine the body best suited to this task and potential problems which need to be addressed to ensure this undertaking is a success. Discussion in the preceding chapter illustrated the roles and responsibilities of agencies with either direct or peripheral involvement in managing Yukon waters and indicated that a majority of water management responsibility is shared between the Department of Indian Affairs and Northern Development (DIAND) and the YTWB. Less apparent, however, is an indication of which body would most successfully fulfil the requirements of lead agency. To this end consideration must be given to the following agency features: structure, autonomy, governing legislation, mandate, realm of authority, ability to form operational policy, public support (and accompanying participation and agency legitimation), and operational and outcome or decision flexibility. These considerations are adapted from the analytical framework used to investigate

administrative arrangements in Chapter Four.

5.3.1 DIAND as Lead Agency

Composed of Renewable and Non-Renewable Resources Branches, DIAND's structure lends itself well to the consideration of aquatic-terrestrial resource use interactions necessary to improve water management integration. As a federal department, however, DIAND is ultimately required to satisfy national objectives through the guidance of the Minister and therefore does not enjoy operational autonomy or clear requirements accompanying explicit empowering legislation. Similarly to many Yukon water and resource management bodies, DIAND is not charged with an official mandate and instead attempts to respond to perceived needs in decision making and resource management. As the chief administrative agency in the territory DIAND has a far-reaching realm of authority and is able to operate under the powers of a number of federal acts, including the YWA. Although no formal barriers exist to DIAND's establishing an operational water management policy the Department's lack of mandate and unclear assignment of responsibilities has made the creation of one impossible. The fact that DIAND must attempt to meet national interests while also considering those interests of territorial residents is a source of dissatisfaction among many Yukoners. It is felt that the interests represented are generally those of southern, not northern, Canadians. As a result, DIAND does not receive a great deal of local public support. Finally, the activities and decisions of DIAND

tend to be inflexible due to limited access to review and reconsideration. This is a product of the fact that DIAND is a federal agency bound by legal constraints that serve to place limitations on agency legitimation and success.

5.3.2 YTWB as Lead Agency

The Water Board consists of government appointed members and an administrative office. While this structure does not readily lend itself to the consideration of land and water resource uses and interactions, other Board traits reduce the effect of this shortcoming. One such feature is the autonomous nature of the YTWB. Though ultimately responsible to the Minister of DIAND, the Board is afforded considerable operational freedom. This freedom is intended to avert the possibility of outside biases and interests being represented in legally binding Board decisions. Whereas DIAND is subject to Ministerial and Departmental decree for its guidance, the YTWB is officially formed and governed by the YWA. This document also provides the Board with an official, if somewhat broad and difficult, mandate, a rare charge in territorial resources management. In their mandated task of providing for the use, development and conservation of territorial waters, this agency is able to draw on a number of specific YWA powers. Indeed, though not as far reaching as those of DIAND, the YTWB does have extensive discretionary powers under the YWA. A further difference between these two agencies is found in their abilities to form and implement operational policy to assist in water management decision making.

While neither body has formed such a policy the structure, autonomy and mandate of the Water Board accommodate this eventuality much more readily than do DIAND's departmental affiliations and ambiguous responsibilities. As an autonomous entity comprised of both federally and territorially appointed members, the Board represents local and national interests. Further, it benefits from opportunities for public participation through required public license hearings which enhance agency legitimacy and generate public support for the YTWB. Finally, YTWB decisions contain built in flexibility through the public hearings and court appeal processes.

5.4 The Lead Agency Role in Water Resource Planning

Characterized by a number of positive features including a mandated agenda, autonomous decision making function, multiple party interest representation, and considerable public support, the Water Board appears well suited to act as the lead agency for water management in the Yukon. In order for the YTWB to successfully serve as an integrating body, however, a number of evolutionary changes are required.

The present lack of internal policy and narrow mandate interpretation act as barriers to the YTWB's becoming an effective and integrating central figure in territorial water management. It is proposed, therefore, that the Board develop an internal policy to help guide the decision making process. Such a policy is intended to help Board decisions reflect public expectations and socioeconomic

needs as closely as possible. As such it should be flexible and adaptive, capable of responding to evolving scenarios. This will enable it to better influence the mix of water uses within a given region and help guide socioeconomic development at a territorial level. Further, by influencing the composition of water uses, this integrative mechanism will allow the Board to encourage resource development or conservation in both particular economic sectors and geographic areas. While the formation of internal policy is an attractive way to enhance the level of integration in water management, making water a focal and influential element in territorial resource administration, the benefits identified here cannot be realized without a broader view of Board mandate.

Though it encompasses responsibilities ranging from the development of water resources to the promotion of their conservation, the YTWB presently perceives its mandate (and role in water management) as being limited to licensing and regulating water use activities. In order to integrate territorial water administration and accept the proposed lead agency function it is necessary that this perception be broadened to include a role in water use planning. The inclusion of a planning component in the Yukon water management framework would be accompanied by an improved ability to manage proactively rather than react to observed crises. A planning component would foster greater integration through the consideration of the interrelationships and cumulative effects of water and land uses. Therefore it is best implemented through the lead water management agency. The ability to manage proactively will coincide with efforts

aimed at addressing territorial socioeconomic needs and guiding resource use facilitated by policy formation and application.

Although forming agency policy, expanding areas of participation and providing a forum for resource planning are considerable responsibilities, the Board's broad base of legislated responsibilities should accommodate their assimilation. This can best be accomplished by realizing the significant opportunities for change introduced in the YWA, primarily increased discretionary powers and licensing responsibilities.

5.4.1 Disadvantages of the Lead Agency Approach

While it appears the role of lead water management agency would be well filled by the YTWB, the fact that it is a non-elected, non-expert panel implies a possible lack of accountability. This is a potential problem and one which has been raised when assessing the YTWB's status as water use regulator. It is likely that critics of the Water Board would argue against its serving as an autonomous decision making body and lead water management agency. Indeed, such critics will likely charge that the Board lacks accountability and that its decisions could be subject to outside influence. This criticism fails to consider that the Board is legislatively accountable to the Minister of DIAND who must authorize water licenses. Additionally, the Minister may now issue policy directives under powers created through the YWA.

Such criticism fails to recognize that any regulatory or decision making

body dealing with the public is potentially subject to outside influence. Indeed, it is hoped the Board will make decisions sensitive to changing socioeconomic and environmental needs within the Yukon. Moreover, to suggest that the YTWB will represent particular concerns is to ignore the fact that the body is composed of individuals selected to represent various government interests, among them fisheries, environment, DIAND, and First Nations. The fact that Board members are federal and territorial appointees further promotes representation of a broad base of interests. It should be noted the reason that government department members are ineligible for Board appointment is because this was determined (by a federal court) to potentially create a partisan rather than non-partisan decision making environment (Doering, *pers. comm.*, 1993). As a result, it is held that while not an elected body the YTWB is accountable to the Minister and provides the broad multi-interest representation necessary to ensure integrative water management decisions are made. It is stressed that the Board's non-expert composition does require close contact be maintained with DIAND technical and scientific experts and outside consultants. The provision of outside information and consultation on legal, technical and scientific matters will mitigate this structural weakness.

Although significant benefits to water management integration are achievable through the designation of a modified YTWB as lead water management agency, several outstanding issues must be addressed to maximize integrative potential. It is necessary to ensure integrative opportunities created by

institutional improvements in the persistent placer versus fishery problem be included in the new water management framework being devised here. Further, the geographic extent of the Yukon and the diverse range of uses and demands placed upon its waters imply the need to devise an appropriate scale on which to plan and manage water resources. Finally, it is important to consider how institutional arrangements for water management lend themselves to the eventuality of devolution to a territorial level since it is during this revitalization that any necessary preparations will most readily be made.

5.5 Achieving Integration

The YPA introduces an integrated approach to placer industry regulation and territorial fishery resource protection. Although the YPA is to be overseen by the Yukon Placer Committee and enforced by DIAND and federal fisheries personnel, the benefits of including Authorization requirements in YTWB issued water licenses have been recognized. This is because one of the YPA's objectives is to integrate placer industry operation with territorial socioeconomic planning and development. By implementing YPA contents with water licensing procedures the Board is effectively being granted further authority to oversee the development and use of territorial waters. Further, this gesture appears to be an implicit acknowledgement of the Board's ability to act as a unifying water management authority. As a result the Board can now draw upon the YWA and YPA for considerable discretionary power and enhanced integrative potential.

It is necessary that the integrative tools contained in the YPA such as stream-specific use conditions and mandatory remedial water and fishery protection measures be included in water use licenses. To obtain important field and technical data, Mineral Resources Division inspectors as well as DIAND and fisheries staff must be consulted regularly by the Board. These agents are presently responsible for conducting seasonal evaluations and collecting necessary information.

5.5.1 Management Scale

The geographic extent of the territory, the diverse nature of water resources and the array of socioeconomic complexes involved in their use are all constraints to water management in the Yukon. As a result territorial water management should be based on a scale which is able to consider the nature of the water resource and the people and activities placing demands upon it. It was determined earlier in this thesis that due to the rural population and type of resource uses that large watersheds are not ideal management units for the Yukon. Instead it was suggested that smaller management areas be defined based upon biophysical and socioeconomic considerations. This would enable the lead management agency to promote the integrated consideration of related needs and objectives characteristic of a particular area.

5.5.2 Devolution of the YTWB?

One persistent problem facing federally administered water management in the Yukon has been the difficulty of securing public input and participation. This has primarily been a result of the fact that Yukoners perceive management authorities as being less concerned with their interests than with national concerns such as energy exploration and resource development. However, because it contains territorially appointed members the YTWB has been able to establish a degree of public acceptance. Further, the autonomous operation of this body is recognizable as it frequently holds public hearings regarding controversial water license applications, providing a rare forum for local interest representation. The existing degree of public support which the Board receives is important when one considers the inevitable devolution of federal responsibilities to a territorial level. For devolution t › provide for successful management of Yukon waters it is necessary that an agency (or an Act) be recognized and accepted by Yukoners. This recognition and accompanying legitimation is vital since Yukoners, not federal authorities, will be responsible for overseeing resource administration under these conditions and with these tools.

Unlike some administrative bodies which must be completely restructured to operate under territorial authority the YTWB is more readily devolvable due to its autonomy and broad realm of authority. Given its small membership, administrative staff and budget the Board would require very little restructuring to be reborn as a Yukon-government body. Current membership includes

appointees from affected federal and territorial agencies and the ratio of each can easily be altered with subsequent transfers of authority to create a more representative panel. The time-frame for authority transfer is presently unclear. It has been suggested that the transfer of water resources management is unlikely to occur for some time due to the significance of the power and the implications it has for the regulation of other territorial resources such as fisheries, land, agriculture and recreation (Sherstone, *pers. comm.*, 1993). Regardless of this uncertain schedule, it is proposed that the YTWB, already operating with a considerable degree of autonomy and responsibility, can become a Yukon-run entity. Benefits of such a transfer will include the removal of operative constraints arising from the Board's affiliation with DIAND. This relationship has served to restrict activities in order to avoid potential conflicts of interest within the Department. Additional gains will be noticeable in the form of increased public support and legitimation of activities owing to the perception of the YTWB as a more powerful territorially-operated administrative agent.

Devolution of government responsibilities is a slow process requiring considerable negotiation and deal making between federal and territorial representatives. Because of this it is unclear when responsibility for water management will be transferred. Given political motivations such as administrative cost reductions and benefits which stand to be accrued it is apparent this change can and should occur in the foreseeable future.

5.6 Recommendations for Integrative Change

Analysis in Chapter Four determined that the Yukon Placer Authorization has introduced consideration of environmental linkages and the relationship between land and water resource uses. It was also evident that additional modifications were necessary in order for further integrative criteria to be met. The changes proposed here are intended to exploit opportunities created by the YWA. Recommendations and their intended effect are summarized in Table 5.1. The discussion and summary illustrate that the proposed recommendations are intended to help increase the level of water management integration in the Yukon while requiring a minimum of administrative structural alteration. It is hoped in exploiting the integrative opportunities identified in Chapter Four that operational level institutional concerns can be addressed to avoid the common difficulty of transferring resource management theory into practice. The following section will

Table 5.1 The Intended Effect of Proposed Recommendations

Recommended Change	Intended Effect of Proposed Change
•designate lead water management agency	•enhance legitimacy, allow broader mandate interpretation, aid communication/cooperation & create stable decision making environment
•create lead agency policy	•serve as benchmark in decision making & allow consideration of precedent set by previous similar cases
•introduce water management planning component	•understand state of resource & consider cumulative use effects, reduce ad hoc decision making & help achieve local objectives
•determine suitable planning unit	•allow detailed study of planning & management area to acquire necessary information & comprehension of needs, sensitivities etc.
•consider cumulative use effects in decisions	•help reduce chances of unexpected social/environmental impacts, enable determination of adequate & diverse range of resource uses
•permit & monitor a range of resource uses	•enable resource management to participate in achievement of socioeconomic objectives while providing resource protection

provide a specific indication of how these recommendations might appear in the Greater Kluane Region (GKR).

5.6.1 Water Management Integration in the Greater Kluane Region

The GKR was described in Chapter Three as being characterized by a diversity of natural water systems and resource uses. Among the uses of water resources in the GKR, fisheries, recreation and placer mining have been identified as dominant. Because of the mix of demands upon regional waters, there exists the potential for conflict among users and impact arising from activities. It is therefore important that any program intended to regulate and manage the use of water resources in the GKR consider not only the isolated implications of these demands but also the potential cumulative effects arising from them. To this end, and to provide a practical interpretation of the possibilities of an integrated approach to water management, the remainder of this section will highlight the potential advantages of an integrated water management approach in the GKR as well as what is needed to facilitate its introduction.

The socioeconomic structure of the Greater Kluane Region is characterized by a growing tourism sector and an important transportation corridor. Biophysically it is predominantly a wilderness area, containing Kluane National Park Reserve (KNPR). Therefore when planning and managing the use of water resources in the Region it is necessary to address the importance of wilderness qualities to the economy in the form of tourism. Activities such as

fishing, swimming, boating and rafting require access to clean water. This requirement necessitates water management decisions pertaining to the GKR recognize the value of undegraded water for recreational opportunities. However, it also important that the socially desired mix of resource uses be maintained to provide opportunities for local peoples to pursue other activities. To this end concessions must be made to allow water uses such as placer mining, agriculture, energy generation and municipal water withdrawals and sewage facilities required access to regional water supplies. Implicit in recognizing the need to both conserve water resources and promote their use is awareness of the interrelationship between water and land resources, part of the integrated approach being proposed here. Further, such an integrated view provides the opportunity for water management to assist in the fulfilment of socioeconomic goals for the GKR and the Yukon.

The above mentioned interrelationships would be difficult to include in water resources management if a larger planning unit were used. This is because it would then be necessary to attempt to establish a balance among conflicting resource use activities such as placer mining, recreation, and fisheries on a territorial rather than regional scale. Although all of these activities are present in the GKR, their relative socioeconomic importance (and scale of operation) is such that accommodating each with the necessary level of water resource access is more realistically achievable.

By dividing the territory into areas of similar socioeconomic and

biopnysical structure it is possible to assess the mix of resource uses which will have a desirable and supportable effect on people and the environment. This was part of the basis for the *Greater Kluane Regional Land Use Plan* (Greater Kluane Regional Land Use Planning Commission, 1992), discussed in Chapter Two, which conducted a resource inventory and attempted to plan for the GKR by outlining a regional development proposal. The success of this approach can only be specula J upon since the plan has not received Ministerial approval and remains an unimplemented proposal. Conversely, guided by a flexible policy and empowered by the YWA, the YTWB has the authority to implement an informal, regionally-based water management strategy to guide resource use and development in the Yukon. In the GKR this approach would be characterized by water management decisions recognizing the need for mandated promotion of water development, use and conservation but, given the local importance of maintaining wilderness properties, also aware of the benefits offered by a cautious balance of each.

Examples of existing water management conflicts within the GKR include effluent leaks and unauthorized discharge from sewage lagoons, placer influenced increased sediment loads in rivers flowing into KNPR and degradation of water quality from recreational overuse. The first of these issues, contamination of surface and groundwater from sewage effluent, occurred at the Destruction Bay sewage lagoon in 1993 (anon, 1993). Since it is impossible to avoid the reoccurrence of such an event, conditions should be attached to this and similar

water use licenses to minimize damage and impacts in the eventuality of a future spill. This includes determining a way in which to guarantee that a spill or accidental discharge from this or any other sewage facility in the region be contained to avoid the creation of an impact on important fishery, recreation and community water uses in the area.

Increased sediment loads are a common by-product of placer mining. However, recent legislative reforms attempt to mitigate associated impacts on fish resources. In spite of these attempts it is possible violations and unexpected results will occur. It is suggested that where placer mining is proposed in areas of the GKR with important recreational uses that either the placer use be licensed with conditions to provide adequate water quality protection or deferred until it can be ensured that such impacts will not likely occur. This is particularly important in areas at KNPR margins where water flows into the park since this could potentially degrade sensitive wilderness qualities. As shown in Chapter Three placer deposits are concentrated in several areas of the GKR. Although these areas (primarily Fourth of July, Kimberly and Quill Creeks, Kluane and Dezadeash Lakes) are found near park margins, the potential disruption to tourism and wilderness values is mitigable. This is because the problem associated with high suspended sediment is reduced in the above mentioned creeks given the naturally high water-borne sediment levels from their glacial sources. Further, placer activity near the Kluane Lake area is less of a threat to tourism than to fisheries. The Kluane Lake system drains to the northwest and

away from KNPR but is home to an important territorial fishery. Dezadeash Lake, draining partially into KNPR is not glacially fed and is therefore subject to potential disturbances associated with considerable increases in sediment content.

To avoid impacts associated with placer mining in park areas it is suggested that water management decisions remain sensitive to the needs of local fishery and tourism inputs. This will require particular emphasis be placed on regulating and managing the total placer derived input to suspended sediment in the Kluane and Dezadeash Lake drainages (for reasons cited above). Such objectives are best met by the YTWB reviewing placer related licenses in this area and considering both the sensitive nature of the water resource and acceptable total levels of suspended sediment. By considering these factors it will be possible to affix license conditions necessary to avoid damage caused by cumulative affects of multiple placer operations. In doing so the Board can draw upon enhanced discretionary powers afforded by the YWA and YPA.

As already mentioned, regionally important fishery resources are concentrated around the Kluane Lake area. Aside from potential disturbance from placer activity the fishery must also coexist with recreational uses of the lake. This requires that numbers of recreational fishers and boaters be limited to avoid adversely affecting the lake's fish stocks. Further, the recreational importance of this area may require some trade-offs be made between local commercial fisheries and tourist sport fishing. This can be achieved through limiting the number of licenses issued for fishing in the area and by maintaining seasonal enforcement

measures to ensure compliance. These efforts will require the cooperation of fisheries personnel to ensure supportable levels of fishery exploitation, obtainable through the efforts of an integrating lead water management agency.

Recreational uses of water resources in the GKR also create potential problems for water management. As the tourism sector of the region expands it is becoming increasingly apparent that not all visitors place the same value on the wilderness qualities in the GKR. This is perhaps best evidenced in the Kathleen Lakes day-use area. Located near Haines Junction, this area has been designated as the primary recreation site in the vicinity of KNPR. Due to its accessibility the Kathleen Lakes site has been subject to water quality degradation from such sources as the indiscriminant dumping of waste from recreational vehicle sewage tanks (Brenneman, *pers. comm.*, 1993). Unfortunately, problems such as this are impossible to enforce out of existence. Remedial measures must therefore be provided in the form of adequate disposal facilities in the area as none presently exist. An integrated approach to water management would include cooperation between parks management staff and the YTWB to ensure problems such as this were addressed rather than simply accepted as seems to be the case at present.

5.7 Conclusion

It is evident that there exist benefits to be gained by establishing a lead water management agency for the Yukon. Further, as lead agent the YTWB appears able to introduce increased integration to territorial water management.

Board composition and autonomy imply it is able to serve as either a federal or territorial management entity depending on political will and the process of devolution. It has been suggested that the establishment of water management agency policy and agenda as well as the improvement of cooperation and information exchange between the YTWB, the Water and Mineral Resource Divisions of DIAND and the Department of Fisheries and Oceans be made priorities. This is because the fulfilment of these needs can in turn permit increased integration in water management through the consideration of interrelationships between land, water and socioeconomic properties at both a regional and territorial level. As Table 5.2 indicates, these recommendations offer an opportunity to move toward the fulfilment of the theoretical components of an integrated approach.

Table 5.2 Integration Following Proposed Recommendations

Theoretical (Normative) Components of Integrated Water Management	Fulfilled	Potential
•consideration of land and water resource interactions	✓	
•attempt to incorporate water management into attainment of local socioeconomic objectives		✓
•understanding of environmental linkages and cumulative use effects	✓	
•interagency communication and cooperation for information exchange and shared objectives	✓	
•comprehension of value of maintaining mix (balance) of resource uses		✓
•fair and equitable protection of all resource uses		✓
•multiple interest representation and avenue for public/affected party involvement	✓	
•planning component in place		✓
•selected management unit suitable for detailed study		✓
•decisions/outcomes flexible and subject to review	✓	

The preceding discussion has included a number of important recommendations intended to introduce greater integration to territorial

watermanagement. It is stressed that these recommendations are intended to work toward normative ideals of the integrated approach while maintaining an awareness of constraints. Operational constraints include such factors as variable political will and support and dynamic socioeconomic conditions. It is further stressed, therefore, that the changes proposed here are not panaceas but rather practical opportunities to enhance the level of integration characteristic of water management in the Yukon.

Chapter Six Conclusions

6.1 Introduction

This research has endeavoured to determine the opportunities for and benefits of exploiting recent developments in institutional arrangements for water management in the Yukon. In attempting to ascertain the opportunity for and benefits of an integrated approach to water management, five research objectives were developed. The first objective was to determine past and present areas of water demand and conflict, the second to ascertain the water management practices, policies and mandates of relevant agencies, while the third was to analyze agency interpretation and application of water resource management and related legislation. The fulfilment of the first three objectives provided an understanding of legislative and administrative mechanisms and related opportunities. It was then possible to pursue the final two objectives: exploration of the benefits and restrictions of integrated water resources management and a determination of the feasibility of applying integrated water resources management in the Yukon given existing legal and administrative arrangements.

The purpose of this thesis has been to determine past trends and recent developments in the institutional arrangements for water management in the Yukon and assess how they accommodate change oriented to integrating socioeconomic objectives with water resource management. This research has been based on a review of pertinent literature, discussion and interview with

persons involved in Yukon resource administration and analysis of associated legal and administrative arrangements.

The knowledge concerning general water management and institutional analysis concerns gained through preliminary literature and document analysis was applied to an investigation of the evolving territorial scenario. The progressively narrowing scope of analysis followed a course which gradually shifted from an analysis of water management in general to a more specific examination of Yukon and Greater Kluane Region (GKR) issues. By assessing the opportunities, constraints and benefits of applying an integrated approach to water management in the selected area it has been possible to assess the usefulness and practicability of this theoretical resource management concept.

The GKR, described in Chapter Three, was selected for detailed discussion for several reasons. The complex socioeconomic and biophysical structure of the Region provided an opportunity to assess a number of water and related resource uses. Further, owing to the existence of important local tourism, fishery and industrial water uses in the GKR it has been possible to assess persistent and emerging areas of water management conflict as well as potential solutions. While conflicts occasionally arose between dominant uses, additional stresses also arose from other resource applications. These areas of concern included placer mining, community sewage disposal, hydroelectric power generation and recreational overuse.

Recommendations were formulated and applied to GKR-specific water

management issues in Chapter Five. These suggested changes were based upon the results of the institutional analysis and were oriented to providing mechanisms to address water management needs in the GKR specifically and the Yukon in general. Particularly evident was the need to accommodate multiple water resource uses in the GKR. This need arose due to the diversity of water uses and potential for conflict in the event of inadequate resource administration. Further, the regional diversity in water uses is reflected in the GKR's socioeconomic structure, itself a complex organization of service, commercial, recreational and industrial activities. It was therefore proposed that a lead water management agency could assist in both protecting water resource access to a range of users while promoting non-conflicting use by considering the suitable degree and type of resource exploitation in a given area. It was proposed that such an integrated view of water management responsibilities in the GKR could facilitate the continued development, use and conservation of regionally important water resources, all mandated YTWB responsibilities.

The study of water management documents and agencies also benefited from this research approach since literature review findings aided in the formation of an analytical framework for the study. Finally, by attempting to ascertain the politics and nature of territorial water management evolution prior to conducting the institutional analysis per se, it was possible to understand the biases and conflicts acting to influence or restrain integrative change. From this understanding it has been possible to reveal trends in territorial water

management evolution as well as needs and possibilities for future growth.

6.2 Summary of Findings

By looking at the historic and ongoing development of Yukon water management this research has exposed a number of important findings. As Table 6.1 indicates, the evolution of water management in the territory has undergone several distinct periods of development. It is evident from this overview of developments that much has changed in the eighty-eight years following the introduction of the *Yukon Placer Mining Act*. While an attempt is being made to

Table 6.1 The Evolution of Yukon Water Management

Period	Date	Characteristics
•Initial policies	•1898 to 1906	•gold rush boom, extensive placer industry growth •introduction of Yukon Placer Mining Act in 1906
•Post-boom decline	•1906 to 1970	•down-sizing of economic operation, population out-migration •environmental degradation from industrial activity and resource development
•Early environmental management legislation	•early to mid 1970s	•response to environmental degradation in form of Canada Water Act in 1970 and Northern Inland Waters Act in 1972 •formation of Yukon Territory Water Board in 1972
•Economic instability	•late 1970s and 1980s	•no new pertinent legislation as unstable territorial economy attempts to adapt to uncertain world economy •refinement and clarification of existing institutional arrangements
•Current progress	•1990 to present	•attempt to revitalize institutional arrangements for Yukon water management and some industry regulation •introduction of Yukon Waters Act in 1992, Yukon Placer Authorization in 1993 and ongoing devolution of responsibilities

continue to promote the use of Yukon resources, including water, an awareness now exists that the type and extent of resource use must be controlled to ensure the long-term maintenance of ecological health.

6.2.1 The Impetus for Change

This thesis has attempted to determine the potential benefits associated with the adoption of an integrated approach to water management. To this end several important discoveries have been made and needs identified. Given the interdependent relationship between legislative and agency components shown to exist in the Yukon, these findings relate to both legal and administrative mechanisms for territorial water management. Examples of water management conflicts and the relative importance of different water uses were provided in Chapter Three of this thesis through a description and analysis of the territory's GKR. Specifically, it has been noted that in the recent past water management issues in the Yukon have been dominated by a persistent conflict between placer mining and fishery interests. A number of other contentious issues have emerged, including questions of rights to compensation, resource access, enforcement opportunities and environmental degradation from improper closure or abandonment of undertakings. However, it is the placer versus fishery dispute which has tested institutional arrangements for water management in the Yukon the most, thereby prompting recent developments.

6.2.2 Contemporary Progression and Directions for the Future

Since the beginning of a placer industry review in 1988 the federal and territorial governments have exerted a considerable effort to remediate long-standing water management issues. The result has been the introduction of the

new *Yukon Waters Act* (YWA)(1992) and *Yukon Placer Authorization* (YPA) (1993), both intended to resolve chronic problems and initiate the next step in the nearly century-old history of territorial water management. This research has illustrated the implications and development potentials of this evolution. Legislative progression provides the Yukon Territory Water Board (YTWB), the primary territorial water management agency, with considerably expanded authority in water regulation and management.

The institutional analysis conducted in Chapter Four resulted in the formation of several recommendations concerning water management integration and the role of the YTWB. It is recommended that in order to best facilitate the integration of water management in the Yukon several needs must be filled. The first such need is the determination and establishment of a lead agency for water management. To this end the Water Resources Division of DIAND and the YTWB, the two agencies most involved in water management, were examined for their ability to assume this role. It was concluded that factors pertaining to autonomy, membership, mandate and legislated authority rendered the YTWB the more suitable lead agent.

It is important to remember that the introduction of a lead agency is not seen as a panacea for removing water management problems in the Yukon. Rather, analysis reveals that it is one way to limit potential future conflict and address outstanding issues. Benefits identified to accompany this approach included the ability to enhance interagency communication and cooperation and

reduce overlapping or conflicting goals and objectives. The fundamental criticism identified was that a lead agency could usurp an unrepresentative share of power in the water management and decision making process. This potential problem is not considered a threat in the case of the Yukon because the YTWB has been shown to possess desirable public interest representation through a broad range of interest representation and legislated responsibility to the Minister of DIAND.

Analysis also revealed that the integration of socioeconomic objectives with water management decision making would benefit from a flexible management policy (formal or informal) created by the lead agency and aimed at ensuring decisions are sensitive to regional and territorial needs and expectations.

Another identified need was the absence of a planning component in the Yukon water management regime. It was determined that this deficiency created a decision making environment not conducive to the consideration of cumulative effects produced by resource uses in a given area. Further, the lack of foresight associated with this incremental approach to water management decision making has been unable to proactively influence the mix of water use activities in a specific region. Such an ability is seen as beneficial in attempting to facilitate the promotion and fulfilment of local socioeconomic objectives. It has been recommended that the lead water management agency establish and maintain interagency communication to reduce redundancy and conflict of goals, programs and activities. Further, the lead agency, through continued cooperation with other resource management agencies such as DIAND (and its Water, Mineral and Land

Resources Divisions), the Department of Fisheries and Oceans, the Yukon Territorial Government and Parks Canada, can obtain necessary technical and scientific information for use in the decision making process.

The determination of a lead water management agency, formation of agency policy and introduction of a planning component to the water management regime are intended to help facilitate several benefits for water management in the Yukon. The first such benefit is related to mandate clarification. More specifically, it is anticipated that the assignment of lead water management responsibility will provide the YTWB with the latitude identified in Chapter Four as being necessary to broaden its mandate interpretation. In order to be a constructive development this change need be accompanied by the Water Board's exploitation of discretionary powers granted it under the YWA and YPA.

The changes recommended in this thesis are also aimed at fostering enhanced agency legitimation and support. YTWB composition allows it to represent a wide range of local and national interests. Therefore the Water Board presently receives greater public support and respect than most territorial resource management agencies. It is expected that lead agency designation would increase public recognition and support for the YTWB activities and decisions. The Water Board presently receives a reasonable level of respect and support from those agencies working in cooperation with it. However, it is conceivable that lead agency designation will enhance legitimacy and be accompanied by heightened Board stature and increased support from public participants, water

users and other resource management bodies.

A final benefit to be realized through the recommendations contained in this thesis is the potential to enhance agency flexibility. It was determined that the nature of the YTWB water licensing process created a flexible decision making environment in which a range of needs could be addressed. Decision making flexibility also benefits from the YTWB's ability to establish area and use-specific conditions by drawing upon its discretionary powers. It has also been established that as a semi-autonomous multi-interest agency the Board could be easily devolved to operate as a territorial water management entity, an advantageous quality given the identified possibility of such responsibility-transfer occurring.

6.2.3 The Integrated Approach in Review

A review of literature pertaining to integrated water management was provided in Chapter Two. The integrated approach to water management was shown to have grown out of general and evolving natural resource management paradigms. It was noted that early integrated water resource management approaches were concerned with water quality and quantity issues and with treating interactions between aquatic and terrestrial resource uses. Such recognition has been retained in contemporary integrated water management however increasing energy is also directed at establishing opportunities to address socioeconomic and environmental factors within the administrative realm. The

body of literature concerning integrated water management indicated a need to consider not only the degree of integration possible but also the level necessary. This is because the appropriate level of integration varies depending on institutional, socioeconomic and biophysical organization and structure. A failure to give these elements necessary attention was shown to lead to problems concerning implementation, legitimacy, effectiveness and participation, all detriments to the effectiveness of any resource management program.

In the context of Yukon water resources management the integrated approach is accompanied by a number of positive evolutionary developments. The review of conceptual works has identified several benefits of this approach in the Yukon. These benefits include the ability to address not only land and water resource interactions but also the potential for their use to affect change in the long-term development of a more stable and supportable socioeconomic base for the people of the Yukon Territory.

6.3 Conclusion

This research has provided an examination of the evolution of water management in the Yukon. The evolution of legal and administrative arrangements for water and related resource management has concentrated on important developments preceding significant institutional changes made in 1992 and 1993. By considering past water management issues before and during the institutional analysis it has been possible to identify those concerns that have been

addressed and those outstanding.

This institutional analysis identified past and present water management issues by illustrating water uses, conflicts and management needs in the socioeconomically diverse GKR. Based on analysis of the GKR and on the image of the Yukon water management regime gained through literature review, personal interviews and the analytic assessment of legal and administrative arrangements, several recommendations have been made to address outstanding needs. It has been proposed that a lead water management agency be designated. Guided by a flexible decision making policy, this body would then coordinate and oversee water resources planning and management and attempt to integrate socioeconomic needs and objects as part of the water management process. As such, water management integration could promote the contrasting objectives of Yukoners, these being resource and economic development as well as environmental management and resource conservation. By managing territorial water resources in this manner it would be possible to attend to the needs of all Yukoners rather than being forced to obviate the interests of any one for the sake of another.

A number of opportunities have been shown to exist for the introduction of more integrated water management in the Yukon. Arising from legislative change these opportunities are strongest for the Water Board. The integrated approach advocated here is one which will allow improved understanding of the interactions between land and water resources necessary to reduce long-standing resource

management conflicts such as that between territorially important placer and fishery interests. Further, integrated water management offers an opportunity to capitalize on the potential of water management to play a role in the fulfilment of socioeconomic objectives. Avenues for the realization of this possibility have been shown to include an attempt at influencing an economically and ecologically supportable mix of resource uses. Integrating the management of water resources is a complex task in theory. However, it may be realized operationally to an extent which enables the management of territorial waters to play an important and necessary role in the development of a more stable socioeconomic base in the future.

6.4 Limitations and Recommendations for Future Research

While this thesis research has attempted to be as thorough and exhaustive as possible, limitations exist and should be identified. First, since the author does not possess the qualifications or background to analyze pertinent legislation from a legal perspective, legislative analysis has been oriented to focus on potential operational impacts rather than on legal implications and subtleties. Second, due to the complexity, volume of literature and the significance of the subject, First Nations Land Claims Settlements and Self-Government Agreements have not been dealt with at length in this research. Although of interest to the author, it is felt that the subject of institutional arrangements and water management practices in the Yukon can be adequately addressed at this time without introducing

research topics more suitably examined in individual theses. Finally, given the recent nature of changes to the institutional arrangements for water management in the Yukon it is not anticipated that further substantive changes will occur in the near future. Therefore, an attempt has been made to deal with existing legislation and agencies when conducting analysis, forming recommendations and presenting conclusions.

Although this research has focused on specific elements of the institutional framework for water resource and related management in the Yukon, opportunities for a broader scope of analysis continually emerged. As a result the author has identified several interesting areas for further research. Although this research has identified opportunities for increased integration the author would have wished to devote more attention to an assessment of past Yukon planning activities such as the *Greater Kluane Regional Land Use Plan* in an attempt to determine the potential usefulness of community or regionally- based water planning and management. This objective was not pursued here since it was recognized that prior to such a determination it was necessary to first understand the implications of recent institutional developments.

Also of interest are First Nations land claims settlements and self-government agreements (Canada, 1993*b*&*c*), discussed briefly in Chapter Four. While these ongoing developments will ultimately have an impact on the administration of Yukon waters and other resources the uncertain outcome and complex nature of these efforts was seen as being beyond the scope of this

research. However, as the implications and opportunities associated with these historic First Nations agreements become more tangible their investigation would prove both interesting and valuable to water management. This is particularly true when one considers the potential impact these developments may have on the sociopolitical structure of the Yukon.

Appendix: Interview Questions and Subjects

1. What do you perceive as being the main water management issues to be addressed in the Yukon?

2. Are the existing legal and administrative arrangements able to facilitate the handling of these issues or are there further changes which would be beneficial?

3. What do you see as the main advantages of the new Yukon Waters Act as it relates to water management?

4. Do you feel the Yukon Placer Authorization will adequately address water management problems commonly associated with placer mining (eg. quality degradation, fish habitat alteration)?

5. Does the Yukon Placer Authorization have a wide enough focus to address all the water related issues of placer mining or might one describe this as the best achievable alternative given the complex nature of the relationship between the placer industry and water resource management?

6. Is there a policy or objective statement, either official or unofficial, which serves as a guiding principle for water management decision-making in the territory? in your agency?

7. If not do you see this as being a useful/valuable addition? Who is best suited to developing and implementing such a policy?

8. Do you think the regulatory role of the Yukon Territory Water Board is adequate or is there room for change, either toward greater or less responsibility for the Board?

9. Does the Water Board adequately fulfils its responsibilities as a non-partisan regulatory water licensing body or are modifications necessary?

10. Do you foresee any devolution of water resources management responsibility in the future?

11. Do you think sufficient attention is paid to the relationship between land and water resources in planning and management stages?

12. Do you think it would be possible to successfully develop an integrated strategy for water management in the Yukon? and implement it?

13. Is there adequate political will to incorporate changes needed to manage water resources in a more integrated fashion?

Interviews Conducted

Interview Subject	Position, Location and Date
Ray Brenneman	•Assistant Chief Warden, Kluane National Park Reserve. Haines Junction. August 4, 1993.
Bruce Chambers	•Director, Renewable Resources, Department of Indian Affairs and Northern Development. Whitehorse: August 18, 1993.
Judi Doering	•Manager, Water Board Secretariat, Yukon Territory Water Board. Whitehorse: August 12, 1993.
Al Dougherty	•President, Yukon Chamber of Mines. Whitehorse: August 19, 1993.
David Latoski	•Head, Placer Mining Section, Mineral Resources Division, Department of Indian Affairs and Northern Development. Whitehorse: August 6, 1993.
Jim McIntyre	•Director, Parks and Outdoor Recreation Branch. Department of Renewable Resources, Yukon Territorial Government. Whitehorse: July 20, 1993.
Alan Parkinson	•Supervisor, Environmental Assessment, Policy and Planning Division. Department of Renewable Resources, Yukon Territorial Government. Whitehorse: July 30, 1993.
Patrick Roach	•Scientist, Water Resources Division, Department of Indian Affairs and Northern Development. Whitehorse: August 3, 1993.
David Sherstone	•Regional Manager, Water Resources Division, Department of Indian Affairs and Northern Development. Whitehorse: August 18, 1993.
Bob Van Dijken,	•Past-President and Water Specialist, Yukon Conservation Society. Whitehorse: July 30, 1993.
Jerry Whitley	•Head, Water Quality Section, Water Resources Division, Department of Indian Affairs and Northern Development. Whitehorse: July 21, 1993.

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