EXPECTANCY-VALUE THEORY AS A TOOL IN RESOURCE ANALYSIS AND MANAGEMENT: A STUDY OF THE MOTIVATIONS OF SALMON ANGLERS ON THE SALMONIER RIVER

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by

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ABSTRACT

With the increasing popularity of recreational angling in Newfoundland and Labrador, a need to better understand both the biophysical and human components of this fishery has been identified. To exclude the human dimension will undoubtedly lead to future conflicts. This study examined human dimensions associated with salmon anglers on the Salmonier River. It then explored how this dimension can be used for bettering the management of the Salmonier River.

To fully understand anglers, the motivations of the angler must be investigated. This study explored two components of angler motivation: importance of selected incentives for angling and the expectancy of obtaining these incentives. These components were combined using expectancy-value theory to obtain a better picture of the motivations of Salmonier River salmon anglers. Along with motivation, the behaviours of the anglers, and their attitudes toward selected management options are needed to improve management in recreational angling. These issues were also investigated in this study.

A self-administered mail-back questionnaire was handed to anglers at selected intercept sites on the Salmonier River. This questionnaire was used to elicit responses to motivational, behavioural and attitudinal statements concerning salmon angling on the Salmonier River. A response rate of 77.4 percent (n=397) was attained.

Using expectancy-value theory, anglers were categorized as either primarily

catch motivated (33 percent of respondents), or primarily non-catch motivated (67 percent of respondents), depending on their motivation scores. Results showed that anglers who had higher catch motivated scores: were statistically more likely to fish sections of the Salmonier River offering good salmon pools; fished for salmon more days during the season; and were less opposed to development along the Salmonier River, than non-catch motivated anglers. Catch and release angling was opposed by a majority of both motivational groups.

Implications from this study are that sections of a river can be managed to maximize the satisfaction of anglers, and minimize any potential conflict resulting from management decisions. The differences existing between sections suggest that traditional blanket approaches to management will not be as successful as section specific management. As fish populations fluctuate and interest continues to grow in the sport of salmon angling, there will be a need to perform follow up studies on the Salmonier River. It is recommended that longitudinal research and monitoring take place to ensure the best management for both the salmon and the anglers of the Salmonier River.

DEDICATION

For

the ethical

angler, for

whom the

enjoyment

of others

is an

important

part of their

angling experience.

ACKNOWLEDGEMENTS

Although only one name appears in the title of this thesis, a cast of hundreds contributed to its completion. At this point I would like to thank the more pivotal of this cast, without whom this thesis would have been much less enjoyable to undertake, and more difficult to finish.

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expertise. Thanks also goes to my fellow masters student Steve Bonnell, who drove home the statement, "So What?".

I am deeply indebted to my supervisor Dr. Alistair Bath. Over my three years of study with Alistair, the importance of, and need for, the human dimension in resource management has been made clear. His high standards, expertise, professionalism, and support have been much appreciated.

To the 397 anglers who returned my survey I offer my sincere thanks. It is the views and cooperation of people such as these that are needed for the successful management of the recreational salmon industry in Newfoundland and Labrador.

To my parents, Norman and Violet, and my wife's parents Dr. and Mrs. Duffy, I would like to extend thanks for the support they have given over my years as a student.

I must thank my dog Floyd who patiently waited under my desk as I typed past the time for her walk. Our walks helped me crystallize much of the conclusions found in this thesis.

My deepest (to the point of immeasurability) thanks goes to my wife Mandy. Over seemingly endless assignments, papers and research, Mandy understandingly waited. Mandy, the wait is over. Let's get on with it!

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CHAPTER 1
INTRODUCTION

1.0 OVERVIEW

In the past, resource management has emphasized the resource and often excluded the people who had a stake in it. The result of this has often been detrimental to the people closest to the resource. In recent years, however, the need for a human dimensions component in resource management has been identified (Christensen and Clarke, 1983; Fazio and Rattcliff, 1989; McCool and Ashor, 1986; Norman et al., 1989; Stroufe, 1991). Despite this identification of need, the human component has often been overlooked in many resource issues, including recreational fisheries management in Newfoundland. Those closest to the recreational fisheries resource, anglers, have rarely been consulted in management decisions.

Addressing the human dimension component in resource management can mean several things; economic issues, social issues, behavioural issues and management issues. Such research can take many forms: willingness to pay (Adamowicz et al., 1993), crowding (Hammitt, 1983), visitor and local satisfaction (Herrick and McDonald, 1992; Holland and Ditton, 1992), education (Spencer and Spanger, 1992) and conflict management (Gramann and Burdge, 1981). To effectively understand these human dimensions issues, it is necessary to obtain baseline data. Such data offer a starting point from which the effects of various subsequent management actions and policies can be measured. Baseline data allow managers the opportunity to assess

changes in attitudes and behaviours (both economic and environmental) which may occur as the nature of the resource and management environment changes. Identifying and understanding issues and concerns of stakeholders prior to policy changes and management actions can minimize conflicts and ensure successful implementation of subsequent management plans. The importance of knowing the motivations, behaviours, knowledge, and attitudes of the affected public can, therefore, be very beneficial for the management of the resource.

As resource management is a political decision-making process, understanding the public and managing the public is of utmost importance. As the public is increasingly demanding a role in the decision-making process in Newfoundland, there is a need for groups to be onside with management decisions for successful management actions. For sustainability of a resource, the views of the affected public or publics must be taken into account. It is important, therefore, for the managers of a resource to assess current knowledge and attitudes, address issues and concerns and gain consent from an informed public. Mitchell (1993) suggests that such perception and attitude studies are an important area of investigation for geographers.

Complete analysis of natural resources seeks to understand the two components of the resource, biophysical and human (Mitchell, 1993). Analysis of the biophysical characteristics of the resource is the work of physical geographers. The processes through which the resource is, could be, or should be, allocated requires an

understanding of those managing and using the resource. This understanding of process, and its relation to the fundamental characteristic of the resource, is work which has been carried out by behavioural geographers (Golledge and Stimson, 1987) and is known as human dimensions research.

The resource activity central to this study is salmon angling. Recreational angling introduces the components of outdoor recreation and leisure into the resource analysis picture. Wall (1981) has identified two justifications for recreation to be investigated by geographers:

> 1) Spatial organization of land and water uses, and the conflicts associated with them are of interest to geographers.
>
> 2) Recreation necessarily includes people who create patterns of movement in relation to the recreation being studied.

In addition to Wall's justifications for geographers to study recreation, are two reasons proposed by Jackson (1989):

> 1) Recreational resources vary in quantity, location and quality and, therefore, act as a set of opportunities from which people may choose. Recreation opportunities are perceived and evaluated by different people in different ways. A choice process then results, whereby the perception of the recreation resource is associated with the behaviours of the recreationist.
>
> 2) Recreation can occur outdoors and can, therefore, be both affected by, and have an effect on the environment. Different management strategies, and competing resource uses other than recreation must be considered. These competing resource strategies and uses can affect the quality of the recreation environment. To fully understand the recreation capabilities, the perception of the quality of the environment by the person partaking in the activity must be understood.

From the justifications given by Wall and Jackson, recreation in general and recreational angling in particular can be seen to be a concept worthy for the investigation of behavioural geographers. This investigation can complete a recreational resource manager's repertoire by adding the human dimension to the resource picture.

Human dimensions work specific to fisheries management has been carried out in many places around the world. The quality of the angling experience in New Zealand (Tierney and Richardson, 1992), angling substitution choices in Texas (Choi et al., 1994), conflict between recreational anglers and outfitters in Ontario (McKercher, 1992), behaviours and values of trout anglers in Michigan (Gigliotti and Peyton, 1993), and fishing trip satisfaction in Minnesota (Spencer, 1993), all stand as examples of human dimensions work in recreational fisheries. Such focused human dimensions research has not been conducted in Newfoundland and Labrador; such research is essential for successful fisheries management.

The recreational fishing industry in Newfoundland and Labrador has been identified as having great potential for contributing to the overall economy of the Province (Buchanan et al., 1994). This will only occur if managers know who the users are, and what these people want from the activity. The largest group of users in Newfoundland are resident anglers. These anglers must be considered in the management equation, along with the non-resident angler. Data from **The Importance of Wildlife to Canadians** (Filion et al., 1991) showed that Newfoundland anglers (and

Newfoundlanders in general) are different from anglers in the rest of Canada. Newfoundlanders angled more days per year than anglers in any other province, and the rate of participation in Newfoundland angling was higher than in any other province. Newfoundland anglers were below the national average in relation to the amount spent on angling per year. Newfoundland had the lowest percentage of any provincial population expressing an interest in joining a conservation organization. This lack of interest has implications for the angling associations of the Province which promote conservation measures such as catch and release angling. Table 1.1 shows how Newfoundland compared to national averages on the aforementioned dimensions relating to recreational angling.

Table 1.1: Selected Findings From **The Importance of Wildlife to Canadians** (1991)

Selected Dimension	Nfld	Canada
Percent of population participating in recreational angling	38.4	26.4
Average number of days of angling by participant	17.2	14.4
Average yearly expenditure in angling (dollars)	424	502
Percent of population expressing interest in joining or contributing to a wildlife related organization	25.0	29.9
Percentage of population willing to pay to protect habitat for abundant wildlife	48.7	60.4

(Source: Filion et al., 1991)

As the activity of angling has grown steadily over the last three decades (Brown, 1991; DFO, 1996a), the recognition of the need for managers to manage

people has become more apparent (Bryan, 1982; Ditton, 1977; Voiland and Duttweiler 1984; Larkin, 1988; Matlock et al., 1988; Hahn, 1991). The recognition of this need to include people in the management equation has often erroneously meant the summarization of all anglers into the "average angler". This angler, however, does not exist (Hendee, 1974; Bryan, 1982; Ditton 1977; Nielsen, 1985; Loomis and Ditton, 1987; Peyton and Gigliotti, 1989). The recognition of the fact that an average angler does not exist has lead to human dimension studies which have attempted to identify anglers by their attitudes, motivations and behaviours.

The construction of typologies of anglers has been one method to try and determine who anglers are. Typologies of anglers have been developed around specialization (Bryan, 1977, 1979; Manfredo and Anderson, 1982; Hummel and Foster, 1986; Hahn, 1991; Quinn, 1992), satisfaction (Holland and Ditton, 1992), membership in fishing organizations (Gigliotti and Peyton, 1993), and motivation (Moeller and Engelken, 1972; Ditton et al., 1990; Fedler and Ditton, 1994). Without studies investigating the nature of anglers, the wants and desires of anglers cannot be determined. The human component of fisheries management, therefore, helps complete the repertoire of knowledge needed by the manager of a fishery. An understanding of the human component is especially important today, as the emphasis of fisheries management shifts away from maximum yield to optimum sustainable yield (Hahn, 1991). Optimum sustainable yield places restrictions on anglers previously not

encountered in maximum yield management strategies, and therefore the potential for conflict is greater.

Along with the recognition of the nonexistence of the "average angler", one must recognize the uniqueness of individual watersheds. In Newfoundland this has been identified by the consideration of the Model River program for the Humber, Gander and Eagle Rivers. With the recognition of the importance of watershed management in Newfoundland comes the increasing importance of the stakeholders in the watersheds. Ultimately, the success of watershed management will depend on the knowledge of, and the involvement of, the stakeholders in the watershed.

On the Salmonier River, the location of the research for this study, salmon anglers compose one of the major stakeholder groups. A better understanding of this group's motives, attitudes, and behaviours will aid in determining the most appropriate management strategies for the Salmonier River. This work is needed to complement biophysical studies of the Salmonier river area completed by Liverman and Hall (1994).

Proaction, as opposed to reaction, with regards to resource management, is the underlying philosophy for management agencies today. For proaction to take place, an understanding of how the stakeholders associated with the resource will react to management strategies must be known. For fisheries managers, prediction of angler reaction to management actions such as catch and release, requires site specific data

dealing with angler motivations and satisfactions (Fedler, 1984). As the "average angler" does not exist, extrapolating data from broad provincial or national surveys on angling, to the watershed level, increases the chances of conflict and negates the whole proactive approach advocated by management agencies.

1.1 OBJECTIVES

The goal of this study was to investigate the motivations of salmon anglers fishing the Salmonier River. The degree to which different motivations were linked to angling behaviours, and attitudes toward different management strategies, was then investigated.

Four specific objectives were identified to meet the over-all goal:

1) To identify, document and analyse: the importance of selected incentives for salmon angling for anglers fishing the Salmonier River; the expectancies of anglers on the Salmonier River; the knowledge of Salmonier River anglers; the behaviours of Salmonier River anglers; and the attitudes toward selected management options of Salmonier River anglers.

2) To identify, document and analyse the different subgroups within the angling population fishing the Salmonier River, based on catch and non-catch motivations, as defined by the use of expectancy-value theory.

> (H_1) A majority of anglers will be motivated for non-catch reasons because of the relatively low productivity of the Salmonier River.

3) To identify, document, and analyse the behavioural differences between the catch and non-catch motivated groups. Motivational differences may be a function of age, angling effort, angling preferences and perceived ability. It is expected that anglers motivated for catch reasons will:

(H_2) have fished fewer seasons;
(H_3) have spent fewer seasons on the Salmonier;
(H_4) be younger;
(H_5) spend more days per season salmon angling;
(H_6) spend more days per season on the Salmonier River salmon angling;
(H_7) indicate higher catch rates;
(H_8) perceive themselves to be equally, or more skilled anglers;
(H_9) prefer to fish for salmon, rather than other species of fish;
(H_{10}) fish more accessible sections of the Salmonier River.

4) To identify, document and analyse the differences between the two motivational groups' attitudes toward selected management strategies.

(H_{11}) Catch motivated anglers will show more opposition than non-catch motivated anglers to management options which would limit their ability to catch fish.
(H_{12}) Non-catch motivated anglers will be more opposed to management options which would negatively impact the surroundings of the Salmonier River.

1.2 JUSTIFICATION

In their article "Understanding Angler Motivations in Fisheries Management" Fedler and Ditton (1994) note several implications for further motivation research. Three of these implications are of relevance to this study. Fedler and Ditton (1994) note that little is likely to be learned from surveys of angler populations. At the subpopulation level, however, variation between groups, "suggests a need for further understanding of angler motivations on the basis of species sought and fishing mode" to determine market segments. "Recognizing these segments and ensuring their experience preferences are met will result in the maintenance, growth, and support of that segment" (Fedler and Ditton, 1994). The river specific nature of this study ensured that

market segments of Salmonier River salmon anglers could be identified.

Fedler and Ditton (1994) also note that shifts in motives as the species sought or mode of fishing changed, had been untested at the time of their study. This study examines both motives and behaviours, and thereby provides baseline data for any future studies into these topics.

The third, and most central, implication of Fedler and Ditton's (1994) paper is the, "need to look beyond angler motivations to understand whether they translate into behavioural choices". The linkage of motivation and behaviour, and of motivation and attitude, were main objectives of this research. This linkage was tested using a chi-squared goodness-of-fit test. This also addressed the need identified by Fedler and Ditton (1994) to use statistics, other than descriptive statistics, in the investigation of angler motivations.

1.3 SUMMARY

The understanding of the human component is a necessary requirement for the successful implementation of any resource management plan. To ignore it, and only look at the biological components of the resource, leaves out a key factor in resource management, people. This study enables the managers of the Salmonier River to better understand this human component. This can then translate into better management plans, as a representative view of the anglers of the river can be included.

Understanding human dimensions goes beyond simple descriptive statistics. There is a need to delve into the social-psychological literature to investigate theories relating to these dimensions. Mitchell (1993) has identified a lack of theoretical development in resource management and analysis research. This study uses expectancy-value theory of motivation as its base, as it provides a more complete definition of motivation than has traditionally been used in recreational angling research. A more complete definition of a central human dimension, such as motivation, can aid in understanding the behaviours and attitude of anglers.

This study provides baseline data which will enable the monitoring of the motivations, attitudes, and behaviours of anglers as conditions affecting the Salmonier River change. Behaviours and satisfaction of anglers will undoubtedly change as the number of anglers fishing, and the number of salmon going up the river change. The baseline data gathered will allow for the identification, and possible mitigation, of any potential conflict which might arise due to change.

Central to any sound resource management today is public involvement. Indeed, in many resource policies such as environmental impact assessments, it is a required component. For sound resource decision making, the issues and concerns of the publics involved must be taken into consideration. This study provided this opportunity to the angling public involved with the Salmonier River. While this study was not prepared for any particular manager or management agency, the potential for the inclusion of the

views of Salmonier anglers in future management decisions now exists. With the issues and concerns identified, managers will be better prepared to address these issues, as the motivations of one affected public will be known.

While this proposal was specific to the Salmonier River, the methods used will be able to be replicated by other watershed/salmonoid associations across the Province, for the development of their management plans. The model used to understand the motivations of the anglers will be able to be applied to other areas in Newfoundland and Labrador, thus facilitating management and research in these areas.

1.4 THESIS STRUCTURE

The chapter following this introduction (Chapter 2) provides an overview of salmon angling in Newfoundland in general, and on the Salmonier River in particular. A complete understanding of the Salmonier River area is required to grasp issues unique to the Salmonier River. Also, the study area chapter provides information which was necessary to conduct a field methodology which would provide accurate and reliable data for analysis.

Chapter 3 reviews literature pertaining to human dimensions in recreational fisheries. This chapter focuses on previous research on the motivations of anglers as well as research into issues relevant to management in recreational angling. The motivational theory literature (Chapter 4) reviews concepts and theories deemed

necessary for a complete investigation of the reasons why people fish for salmon. Much of the theory reviewed in Chapter 4 is found to be absent in the human dimension literature reviewed in Chapter 3.

The field methodology chapter (Chapter 5) outlines the methodology used to collect the data for this study. A review of the survey design, and survey execution is provided. Chapter 6 presents the findings resulting from the field and survey methodology of Chapter 5. Results from the Salmonier River survey in this chapter are presented in the form of means, frequencies and percentages. Findings relating to the importance of angling, expectancies, behaviours and attitudes toward various management options, are presented.

Chapter 7, Statistical Methodology, outlines the steps required, and performed, to undertake the higher order statistics performed in this research. This methodology was required to differentiate between two groups of anglers motivated by different incentives and expectancies relating to salmon angling on the Salmonier River. A comparison between the behaviours and attitudes of these two groups toward selected management options is presented in Chapter 8. These comparisons are undertaken using chi-square goodness of fit tests.

Chapter 9, Discussion and Conclusion, highlights the findings from Chapters 6 and 8, and integrates the literature reviewed in Chapters 3 and 4. Examples of how this study has filled methological and theoretical information gaps are provided. As well,

examples of how findings from this research can be used to further the management of the recreational angling industry in Newfoundland and Labrador are offered. The chapter concludes with future directions for motivational research in recreational angling.

CHAPTER 2
STUDY AREA

2.0 INTRODUCTION

> This king of the sporting fish is abundantly found in the numerous rivers of the Island and, no river being leased, the angler may select any of the Island's numerous waterways and gain his heart's desire (Palmer, 1927).

In his book **The Salmon Rivers of Newfoundland**, Palmer (1927) described in detail 86 "good" salmon rivers on the Island of Newfoundland, and mentioned another 135 rivers offering possibilities for salmon (*Salmo salar*). The **1996 Newfoundland and Labrador Angler's Guide** (DFO, 1996b) identifies a total of 177 scheduled (i.e. licensed) rivers on both the Island and Labrador portions of the Province. While the selection of rivers for the salmon angler is still great, the quality and quantity of the salmon available to be caught has undoubtedly declined. "During 1924, in less than one month, a sportsman caught 116 salmon and 14 grilse, total weight of 1228 pounds" on the Great Codroy River (Palmer, 1927). This one 'sportsman' therefore had a catch rate of approximately 4.3 salmon per rod day. The catch per rod day reported by DFO for the 1995 season on the Great Codroy River was 0.27 (DFO, 1996b). Changes such as this show a need for a close examination of the recreational salmon fishery in Newfoundland. This study, in part, undertakes this task by examining one of the more heavily fished rivers in Newfoundland, the Salmonier River.

2.1 SALMON RIVERS OF NEWFOUNDLAND

The recreational angling industry in North America has been steadly increasing

over the last 30 years (Brown, 1991). This increase has included the recreational salmon fishery in Newfoundland, as can be noted by the upward trend in the number of anglers since 1959 (Figure 2.1). The over 100% increase in the number of licenses sold since 1959 far outweighs the 20% increase in the Newfoundland population over the same period. Thus, population increase must be viewed as secondary to the growing popularity of salmon angling in accounting for the increased number of anglers on Newfoundland's rivers. These added anglers undoubtedly have been placing more, and new, pressures on the rivers, and salmon stocks of Newfoundland. Figure 2.2 shows the ten most heavily fished rivers in Newfoundland. While physically larger rivers such as the Gander, Exploits and Humber, are able to accommodate a larger number of anglers, and provide a higher catch rate for anglers (Table 2.1), the larger number of recreational anglers in past decades has undoubtedly had an effect on the salmon going up river to spawn.

TABLE 2.1 : Angling Statistics For The Six Most Heavily Fished Newfoundland Salmon Rivers In 1995

RIVER	ROD DAYS	CATCH	CATCH/ROD DAY
Gander	12215	3284	0.27
Exploits	9789	2939	0.30
Humber	6855	2763	0.40
Terra Nova	6042	900	0.15
River of Ponds	4966	2140	0.43
Salmonier	4190	537	0.13

(Source: DFO, 1996b)

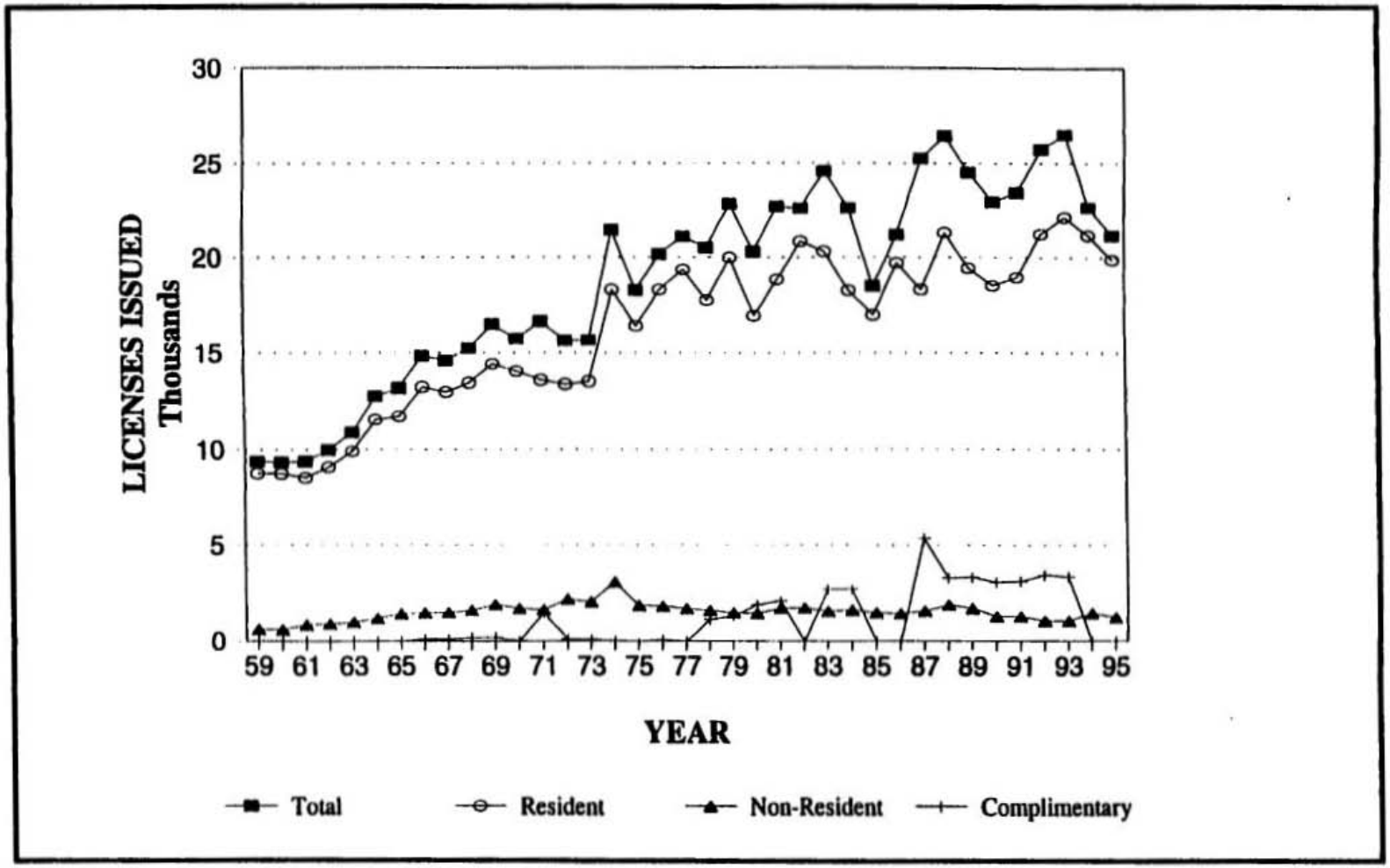

Figure 2.1 Salmon Angling Licenses Issued in Newfoundland 1959-1995 (Based on: DFO 1996a)

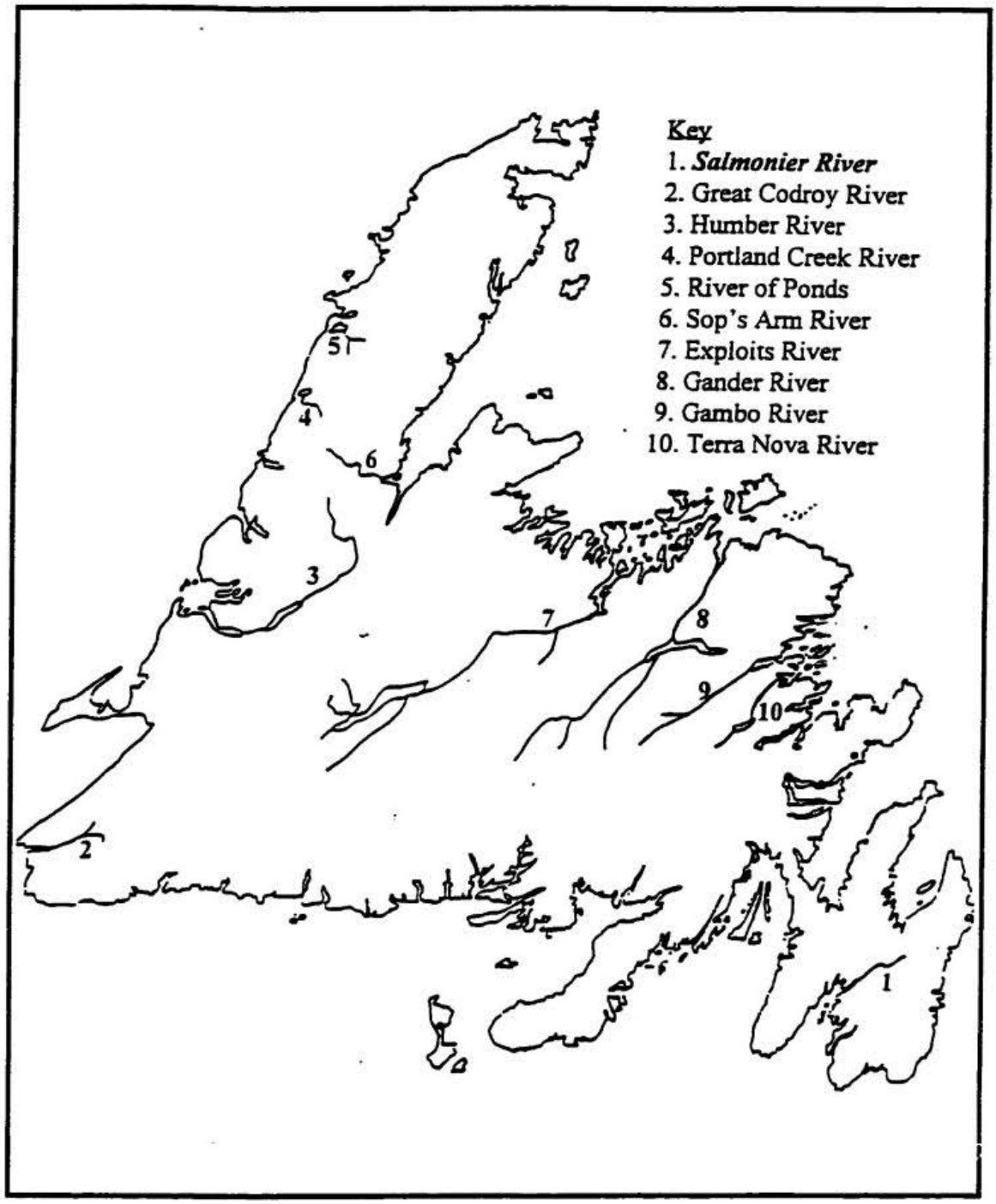

Figure 2.2 Ten Most Heavily Fished Rivers in Newfoundland (Based on: DFO 1996b)

2.2 SALMON RIVERS OF THE AVALON PENINSULA

Of the 177 scheduled salmon rivers in Newfoundland, 20 are located on the Avalon Peninsula (Figure 2.3). These 20 rivers are within a one and a half hour drive of 45.6% (n=251 523) of the population of the Province (Statistics Canada, 1992).There are no data from DFO, or other sources, to suggest, however, that 46% of all salmon anglers reside on the Avalon Peninsula. Catch rates and number of rod days for these twenty rivers vary greatly, with some rivers offering much more angling success to anglers than others. Table 2.2 provides angling statistics for the seven most heavily fished rivers on the Avalon Peninsula.

TABLE 2.2: Angling Statistics For The Seven Most Heavily Fished Avalon Peninsula Salmon Rivers In 1995

RIVER	ROD DAYS	CATCH	CATCH/ROD DAY
Salmonier	4190	537	0.13
Biscay Bay	1715	498	0.29
Northwest Trepassey	1688	231	0.14
Branch	970	269	0.28
North Harbour River	923	119	0.13
Little Salmonier	555	195	0.35
Northeast Placentia	544	135	0.25

(Source: DFO, 1996b)

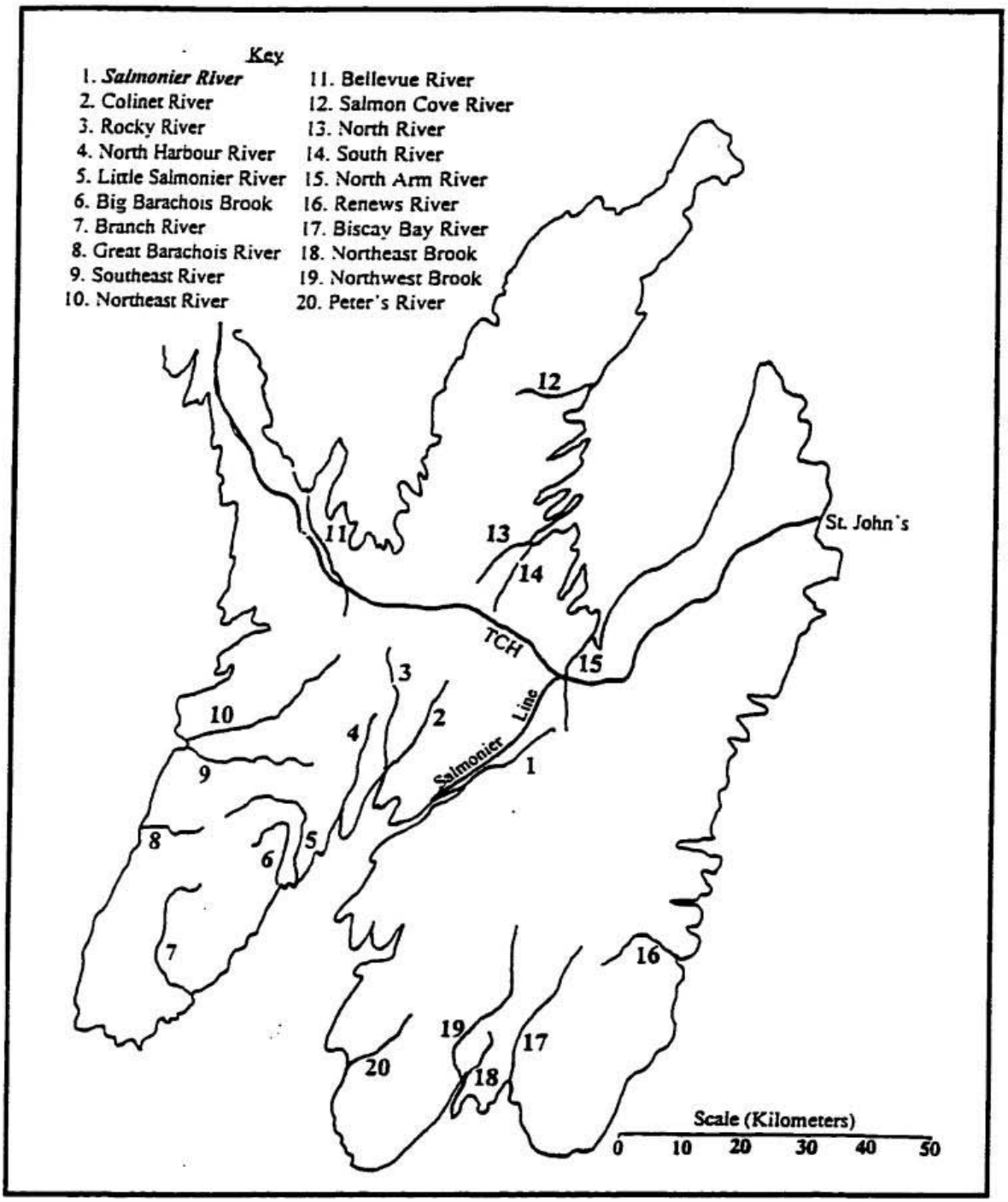

Figure 2.3 Salmon Rivers of the Avalon Peninsula (Based on: DFO, 1996b)

2.3 THE SALMONIER RIVER

> This river being in close proximity to St. John's by motor car, many local anglers visit its various pools during the season. Salmon ranging in weight from 5 to 15 lbs. are caught in abundance (Palmer, 1927).

Located less than 60 kilometers from St. John's, the Salmonier River is the major scheduled river on the Avalon Peninsula. In 1995, the Salmonier River had twice the number of rod days of any other river on the Avalon Peninsula with 4190. Overall, the Salmonier River was the sixth most heavily fished river in the Province in 1995.

The Salmonier watershed has a length of 27 kilometers, drains 257 square kilometers and drops 320 meters over its length (Porter et al., 1974). The headwaters of the Salmonier River are located in the Avalon Wilderness Area. The river enters Salmonier Arm at the head of Placentia Bay at the community of St. Catherine's (Figure 2.4). A sketch of the Salmonier River, made by Palmer in 1927, remains true today in its physical aspects, however, some of the toponomy has changed over the intervening 69 years. Salmonier Pond is now known as Pratt's Pond, and Governor's Falls was originally known as Lower Falls.

The Salmonier River runs roughly parallel to the Salmonier Line (Route 90). The Salmonier Line is accessed off of the Trans Canada Highway, 54 kilometers from St. John's and extends south for 26 kilometers to the community of St. Catherine's at the mouth of the Salmonier River. It is from the Salmonier Line that access to the Salmonier River is achieved.

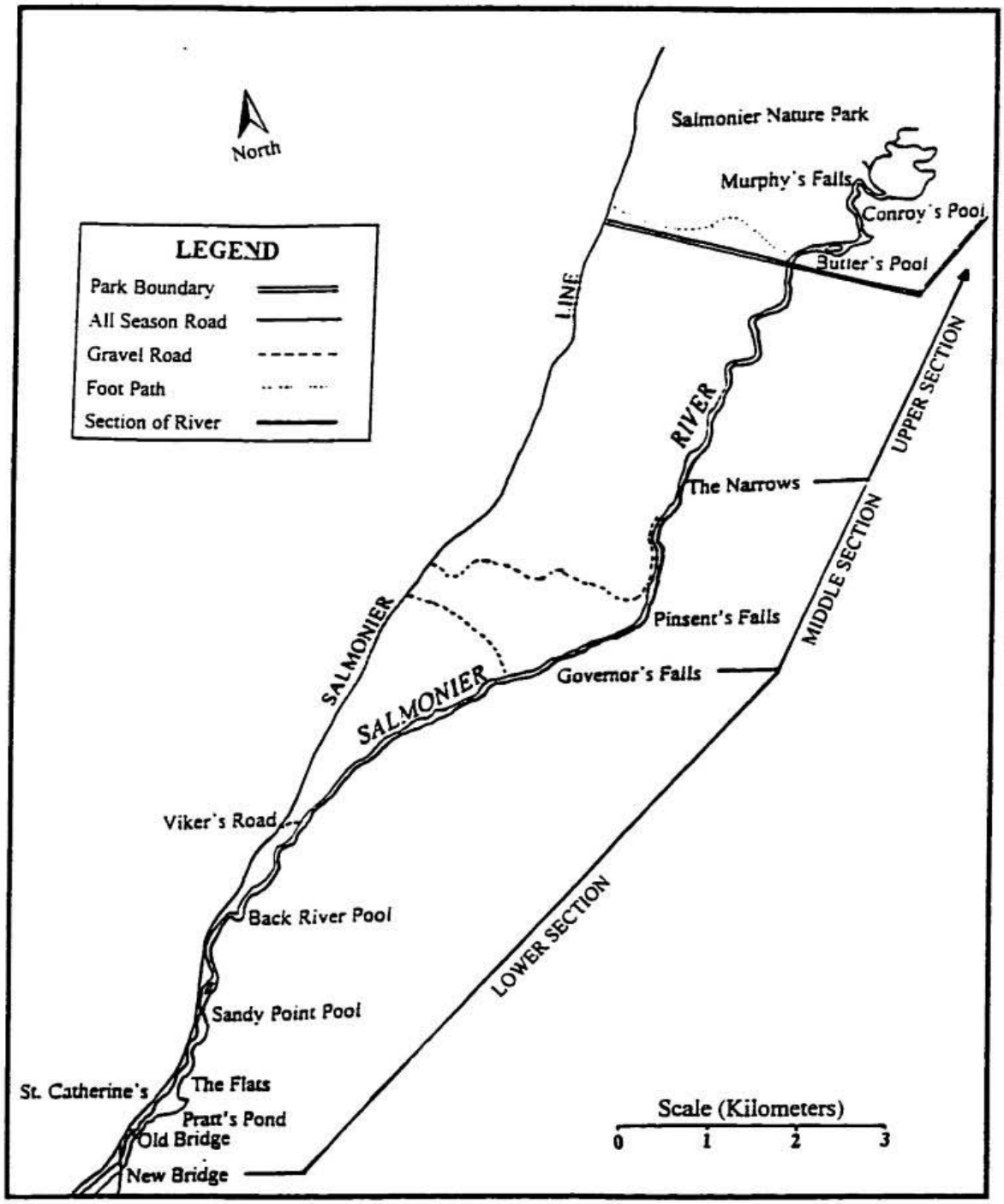

Figure 2.4 Map of the Salmonier River (Based on: DFO, 1996a)

For management purposes the Federal Department of Fisheries (DFO) has divided the Salmonier River into three sections. The lower section extends from the mouth of the river at St. Catherine's to below Governor's Falls. The middle section runs from Governor's Falls to the Narrows. The upper section extends from above the Narrows to include the Headwaters of the Salmonier River system. Each of these sections, including their access points and salmon pools, are now described in turn.

2.3.1 Upper Section

Access to the upper section of the Salmonier River is gained 12.8 kilometers from the Trans Canada Highway (TCH). This access point is located at the southern boundary of the Salmonier Nature Park. Anglers are expected to obtain a permit to travel through the park. A section of road on the west side of the Salmonier Line at this point is available for parking for approximately 15 vehicles. Access to Butler's Pool, Conroy's Pool and Murphy's Falls from this point is made by an approximately three kilometer walk through black spruce and fir forest and across several bogs/fens. No motorized vehicles are allowed along this trail as it runs through the Salmonier Nature Park. The walk to the Salmonier River from this point takes anywhere from thirty-five minutes to an hour, depending on a person's pace. A large number of windfalls across the trail makes this walk difficult. A warden's cabin and four privately owned cabins are found on the river around the pools in this section.

2.3.2 Middle Section

Access to the middle section of the Salmonier River is gained by way of one of two unpaved roads, one of which leads to Pinsent's Falls, and the other which leads to Governor's Falls. The access to Pinsent's Falls is located 17.8 kilometers down the Salmonier Line from the TCH. At this point an unmaintained woods road, 2.8 kilometers long, leads to a parking area suitable for approximately ten vehicles. The road itself is very rough requiring the crossing of two brooks. For this reason most anglers accessing the river through this point drive four wheel drives, pick-ups or all terrain vehicles. Most anglers accessing this point by car, park on the Salmonier Line, and walk in the road, however, some anglers do drive their cars down the road. A walk of about 300 meters is required to access the river at Pinsent's Falls from the parking spot at the end of the road. Two private cabins and a warden's cabin are located at Pinsent's Falls. A longer walk of approximately a kilometer from the parking spot is needed to reach the Narrows.

The other access point to the middle section is through the Governor's Resort. The turn-off for the Governor's Resort is found 18.4 kilometers down the Salmonier Line. A maintained dirt road at this point leads down to the parking area for Governor's Falls. While the road actually extends to within 100 meters of the river, vehicle access was restricted to the area above the resort. A walk of approximately a half of a kilometer must be taken from the parking area, through the Governor's Resort

(which was closed during the 1996 angling season) to access the river. The resort itself consists of a hotel and fifteen cabins. A nine hole golf course was under construction at the resort during the 1996 salmon season. The route for anglers to the river was not altered by the location of the resort.

The middle section contains the first falls which cause salmon going up the river to hold up. For this reason it is a popular area for many salmon anglers. The middle section is also known for its litter, and conflict between anglers. The large number of anglers fishing this section leads to crowding, "hogging" of prime fishing locations, and the occasional fight. It is because of these reasons that many other anglers avoid angling the middle section of the Salmonier River.

2.3.3 Lower Section

The lower section of the Salmonier River is accessed through many points as the Salmonier Line runs parallel with, and not too distant from, the river. The most northerly access in the lower section is through Viker's Road, 21.3 kilometers from the TCH. Viker's Road is two hundred meters long and leads from the Salmonier Line down to the river. Most anglers choose to park at the head of the road and walk down to the river. A parking area suitable for approximately ten cars exists just off of the Salmonier Line on Viker's Road.

The remaining portion of the lower section is accessed at various points along

the Salmonier Line. Anglers tend to access the river at places where salmon pools are known to exist. These pools are: Back River Pool, 21.9 kilometers from the TCH; Sandy Point Pool, 24.4 kilometers from the TCH; the Flats, 24.8 kilometers from the TCH; the pool at the Old Bridge, 25.4 kilometers from the TCH and the pool under the New Bridge at the mouth of the river, 25.9 kilometers from the TCH. Anglers accessing these pools park on the Salmonier Line and do not have to walk more than 50 meters to reach the river.

2.4 ANGLING STATISTICS FOR THE SALMONIER RIVER

Statistics from DFO show several trends for salmon angling on the Salmonier River. The angling effort on the Salmonier River has increased considerably since 1952 (Figure 2.5). Up to the early 1970s there was a sharp increase in the number of rod days for the Salmonier River. These then declined rapidly during the latter 1970s. This decline may have been caused by crowding, lower catches, a shift in preferred summer activities, or a combination of all of these factors. With no human dimension work having been done over this time period, one can only speculate. Since the early 1980s the number of rod days recorded has once again been increasing.

The number of small salmon (less than 63 centimeters in length) which have been caught on the Salmonier has fluctuated over the past 42 years (Figure 2.6). Figure 2.7 shows the number of small salmon caught in each section of the Salmonier for the

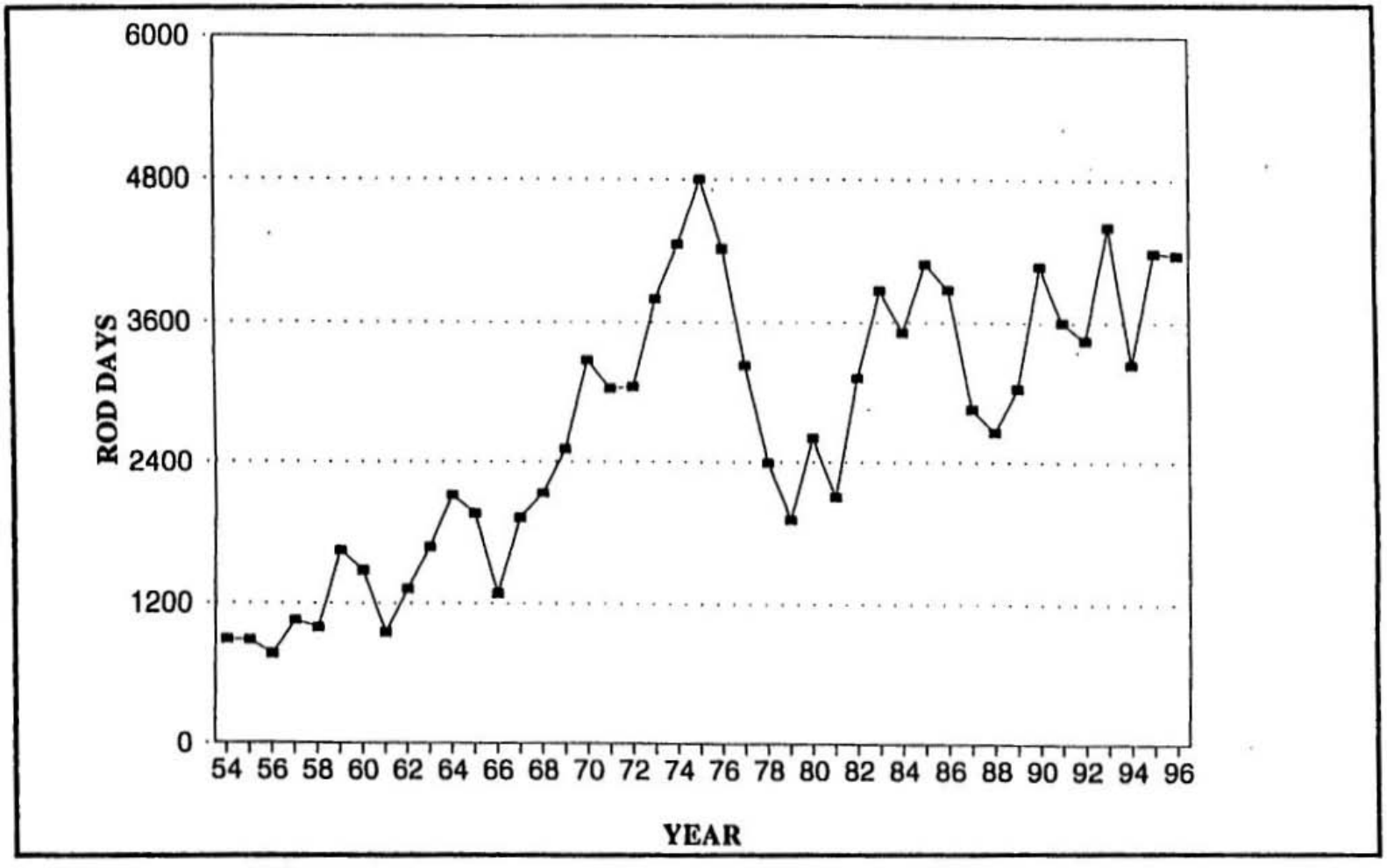

Figure 2.5 Angling Effort on the Salmonier River 1954-1996 (Based on: DFO, 1996a)

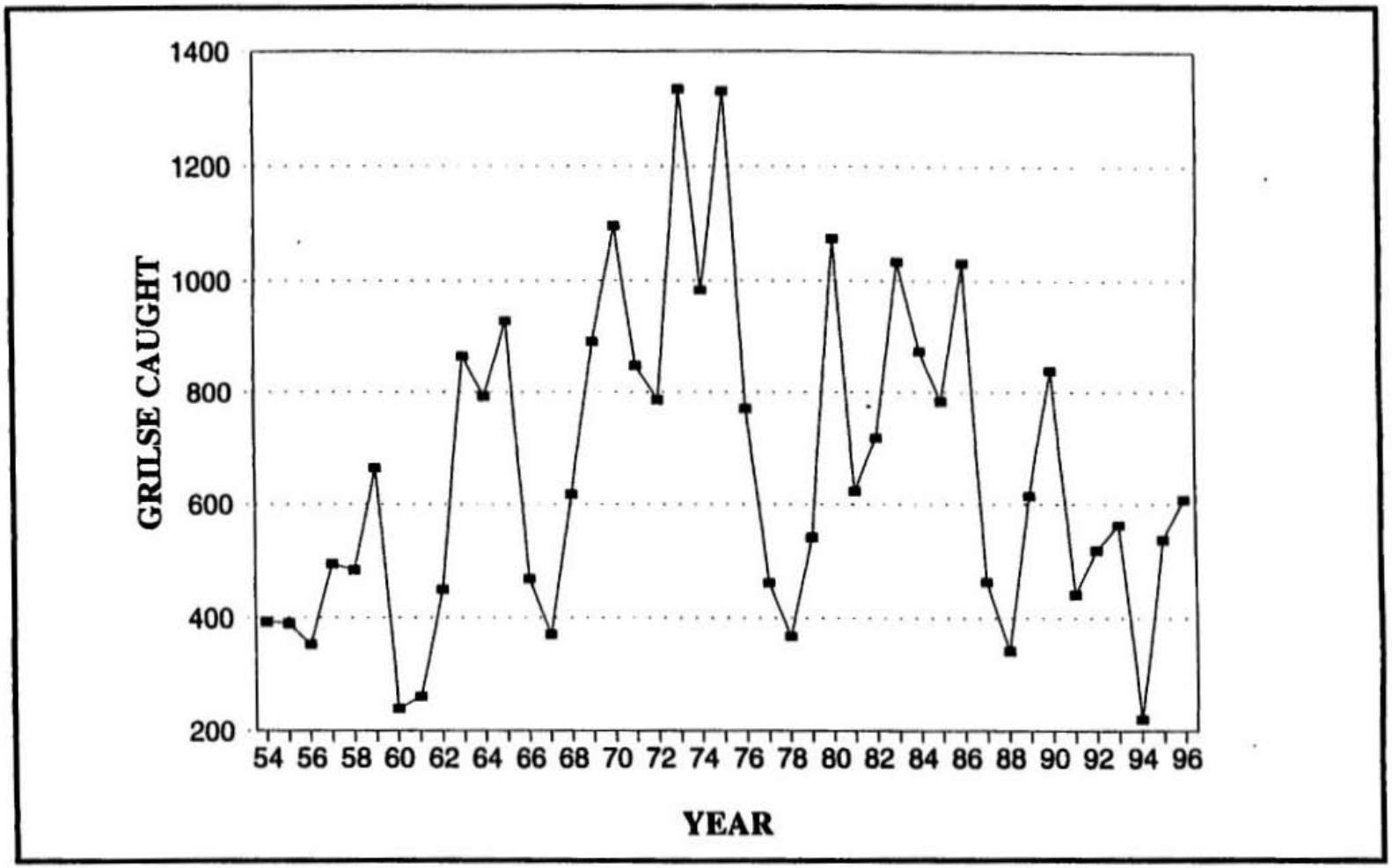

Figure 2.6 Grilse Caught on the Salmonier River 1954-1996 (Based on: DFO, 1996a)

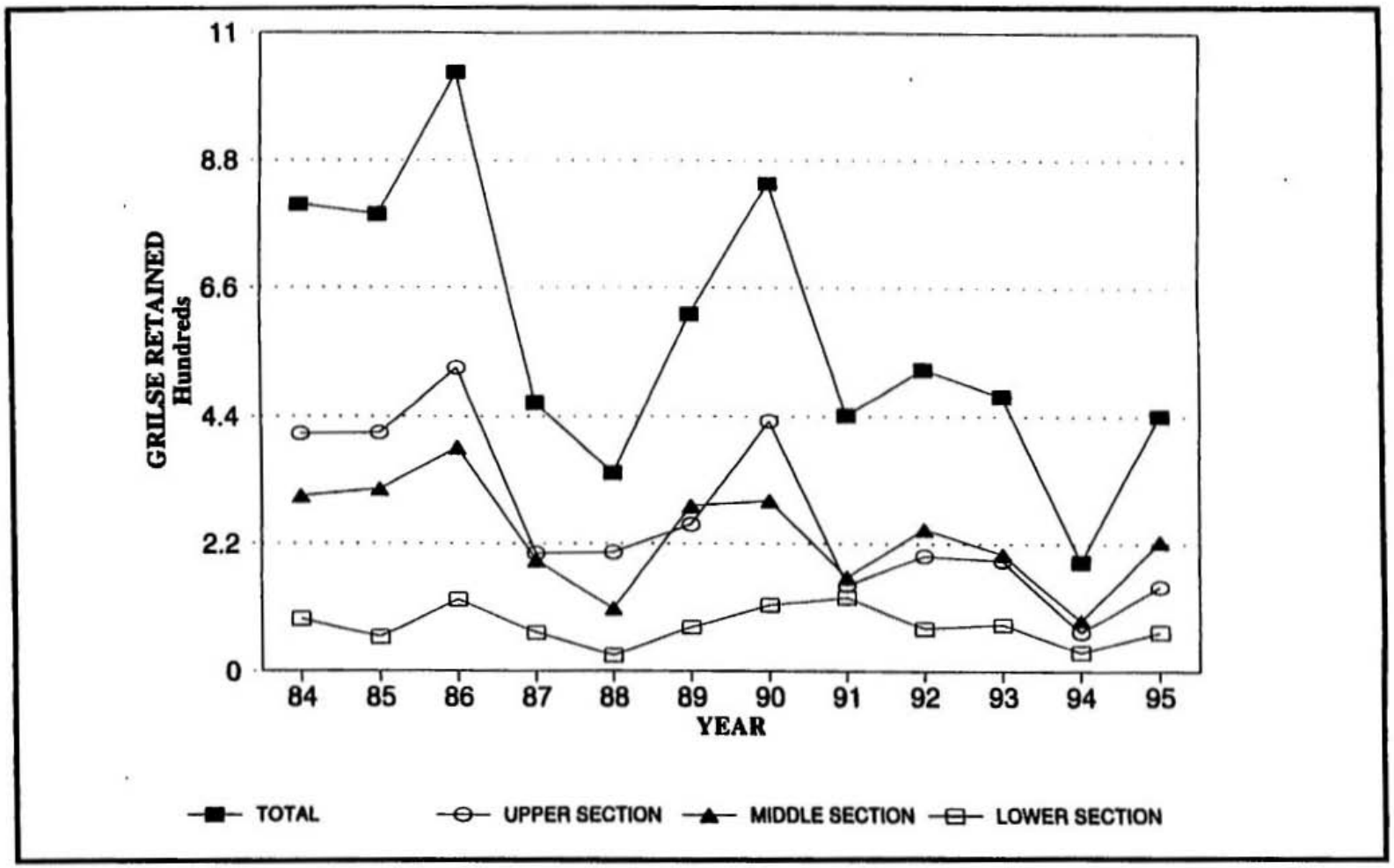

Figure 2.7 Grilse Retained on the Salmonier River by Section 1984-1995 (Based on: DFO, 1996a)

years 1984 to 1996. Large salmon have not played a large role in the angling on the river in the last 42 years. Between 1980 and 1995, for example, only 26 large salmon were reported caught (DFO, 1996a). While the number of salmon caught on a river can depend on factors other than the number of salmon in the river (e.g. bag limits or the length of the season), angling effort combined with catch numbers can give an indication of the productivity of a river. Figure 2.8 shows how the catch per rod day on the Salmonier River has been declining over the last 42 years.

Based on angling statistics between 1966 to 1969 the first salmon enter the Salmonier River between June 11 and June 17, the last fish enter the river between August 23 and August 29. The peak of the run is from July 6 to July 13 (Porter et al., 1974). Expert opinion indicates that these dates are still the same in 1996.

2.5 CLIMATE OF THE SALMONIER LINE

Climate conditions play an important role in salmon angling, and by association the collection of data about, or from anglers. If not enough rain falls, rivers can be closed by DFO due to low water levels. Too much rainfall on the other hand, can cause water levels to be such that salmon are not as likely to "fly" (i.e. go after a fly). Also, high water levels result in salmon not "holding up" in pools traditionally fished by anglers. These two factors decrease the desirability of a salmon river for many anglers, and lessen the likelihood of them angling. Table 2.3 outlines selected climatic

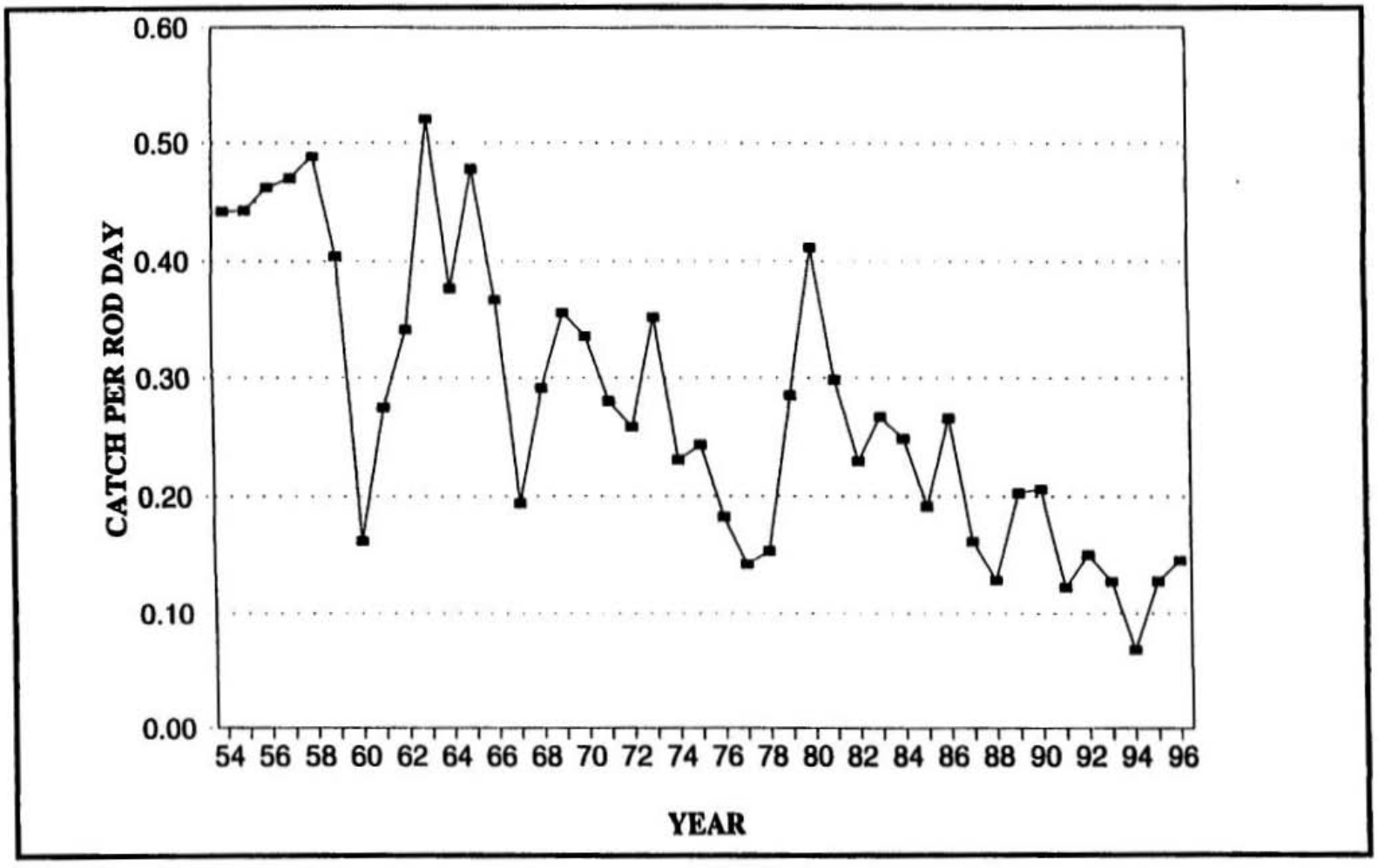

Figure 2.8 Catch per Rod Day on the Salmonier River 1954-1996 (Based on: DFO, 1996a)

conditions for the Salmonier River area. These statistics are compiled at the Salmonier Nature Park.

TABLE 2.3: Summer Climate Normals For Salmonier Area

	MONTH		
	JUNE	JULY	AUGUST
Daily maximum temperature (Celsius)	15.8	20.1	19.7
Daily minimum temperature (Celsius)	5.8	10.4	10.9
Total rainfall (millimeters)	90.9	86.9	124.3
Days with rain	9	9	11

(Source: Environment Canada, 1982)

2.6 COMMUNITIES IN THE SALMONIER RIVER AREA

The only community to actually border on the Salmonier River is St. Catherine's. Statistics Canada socioeconomic data for St. Catherine's, however, is combined with that of Mount Carmel and Mitchell's Brook. These two communities are located five kilometers south of St. Catherine's. Between the 1986 and 1991 census, these communities saw a decline in population of 4.9% from 651 to 619 people. Of the 619 people 235 were in the labour force (Statistics Canada, 1994). The communities in 1991 had an unemployment rate of 40.4% (Statistics Canada, 1994). This high level of unemployment allows many of the local residents to have time for recreational angling, should they choose to participate. No data to confirm, or refute this was available from

DFO.

One hundred and eighty private households existed in the three communities in 1991 (Statistics Canada, 1994). Ten of these dwellings were rented, and 170 were owned. The average household income for Mount Carmel-Mitchell's Brook-St. Catherine's was $38,100 (Statistics Canada, 1994).

Undoubtedly, a more important factor than the community of St. Catherine's for the recreational salmon fishery are the many cabins located in the area. The Salmonier Line area has 536 registered cabins (Newfoundland Government Services and Lands, 1996). This total includes lease to own, grant, and leased lands containing cabins. Inspection of this data set found that the cabins located on the Salmonier River itself were not included in these figures. This was as a result of these cabins being owned outright by the owners, and not being on Crown Land. The large number of cabins in the area provides ample accommodation for many people visiting the Salmonier Line. With cabins being associated with leisure time, the possibility for many of the people utilizing these cabins to fish for salmon while at the cabin is great. Both the cabins and the communities in the area provide local pressure and ease of access to the Salmonier River. A question concerning where people stay while fishing the Salmonier was examined in this study.

CHAPTER 3
HUMAN DIMENSION IN RECREATIONAL ANGLING LITERATURE

3.0 INTRODUCTION

Human dimension research in recreational angling includes behavioural, managerial and economic approaches. The economic literature deals with issues such as economic analysis (Swanson and McCollum, 1991) and estimating recreational demand (Peterson and Cordell, 1991). While important to a full understanding of angling, this was not an approach taken by this study. The aim of this study was to explore relationships between the motivations of Salmonier River salmon anglers and their attitudes toward management options, and between anglers motivations and their behaviours. This chapter reviews previous literature pertaining to these topics. From this review, the strengths and deficiencies of past human dimensions research in recreational angling are noted, thus giving direction to the motivational research undertaken in this study. One of the main issues to arise in this review is the lack of a concise understanding of what constitutes motivation. The purpose of this chapter is to determine what is needed to add rigour to motivational research relating to angling. To achieve this, an examination of past motivational research, along with how this research has been suggested to be used in recreational angling management is explored.

3.1 HUMAN DIMENSION RESEARCH IN RECREATIONAL ANGLING

The term angling includes a very broad range of activities. This fact is a result

of the many different species of fish, and means of catching fish available to anglers. Associated with angling is a broad spectrum of people with differing motivations, behaviours and resource requirements (Holland, 1985). The recognition of this spectrum of anglers has lead to the identification of the diversity between anglers and their activities, and the realization of the nonexistence of an average angler (Bryan, 1977; Loomis and Ditton, 1987). As a result of this diversity, anglers should be considered a collection of subgroups, with different objectives and expectations (McFadden, 1969; Bryan, 1976; Allen and Donnelly, 1985; Fedler and Ditton, 1994).

The diversity of anglers has enabled managers and researchers to identify subgroups of anglers within angling populations. This identification of subgroups enables decision-makers to better understand the people involved, the effects of angler decisions, and the effects different segments of fishing populations have on a resource (Ditton et al., 1978). Allen and Donnelly (1985), for example, have shown that strong relationships exist between social units of participation and reasons for participation. Thus, depending on which group one is fishing with (e.g. family or friends), the incentives and expectations for participation may vary.

The identification of subgroups of anglers has lead to the development of typologies of anglers. Typologies of anglers are useful as they provide a method of dealing with the diversity of public preferences (Manfredo and Anderson, 1982). These typologies also can give managers a means of allocating resources for each group's

preferred activity (Manfredo and Anderson, 1982). Typologies are, therefore, a useful tool for the manager of recreational fisheries.

One of the more prevalent methods of identifying and categorizing anglers has been specialization (Bryan, 1977; Manfredo and Anderson, 1982; Hahn, 1991). Bryan's frequently cited paper, "Leisure value systems and recreational specialization: the case of trout fishermen" (1977) contends that specialization reflects commitment to a sport and this commitment, in the case of angling, indicates the value of the fishing experience to an individual. Specialization is, ".. a continuum of behaviour from the general to the particular, reflected by the equipment and skills used in the sport and activity setting preferences" (Bryan, 1977). Since Bryan's (1977) study, many studies have supported his concept of angler specialization (Fedler and Ditton, 1986; Absher and Collins, 1987; Siemer et al, 1989; Steel et al., 1990; Hahn, 1991). These studies have focussed on a variety of different species of fish and angling populations.

Some researchers, however, have questioned the use of specialization to differentiate angling groups (Ditton et al., 1992; Connelly et al., 1990a; Dawson et al.,1991b). Ditton et al. (1992) noted that Bryan's concept of specialization follows a logic which has the levels of specialization defined by, and measured by, the same variables. Examination of the specializations of anglers show that it is predominantly behaviour which defines the level of specialization, with attitudes and motivations being examined based on these behaviours (Gill, 1980; Bryan, 1983; Chipman and

Helfrich, 1988). Dawson et al. (1991a) note that specialization is a hierarchial typology, and that anglers in fact are part of a continuum which does not form clearly defined hierarchial groups. This conclusion was made from studies of anglers on New York's Salmon River. The Salmon River study suggests that the concept of specialization may not be appropriate for some segments of anglers (Dawson and Brown, 1989; Connelly et al., 1990a). Many anglers who fished for a variety of species, expressed different values and expectations when fishing for specific species (Dawson and Brown, 1989; Connelly et al., 1990a).The specialization concept, therefore, has been seen as too simplistic (Connelly et al., 1990a).

Motivation has been used as a means of developing a typology of anglers (Driver and Cooksey, 1977; Phillips and Ferguson, 1977; Buchanan et al, 1982; Manfredo and Anderson, 1982). Phillips and Ferguson (1977) defined three groups of Wyoming anglers based on their catch motivations, ignoring motives which did not relate directly to the catching of salmon, such as escaping the regular routine . Driver and Cooksey (1977) segmented Michigan and Pennsylvania anglers into six subgroups based on eight dimensions of motivation. Using cluster analysis Manfredo and Anderson (1982) found six subgroups of wilderness anglers. Buchanan et al. (1982) segmented anglers into groups based on a preference to catch either "trophy" fish, "wild" fish or a limit of fish. While these studies used the term motivation, they did not research the subject from the theoretical approach used in this thesis. Each of these

studies examined only motivations related directly to the catching of fish, and did not consider the non-catch motives of anglers. It was the goal of this study to use both catch and non-catch motivations to investigate Salmonier River salmon anglers. This review now looks at "motivation" as it has been used in past research relating to recreational angling.

3.2 MOTIVATIONS FOR ANGLING

Connelly et al. (1990a) suggest that there is a need to better account for the expectations and multi-dimensionality of angler motivations (Connelly et al., 1990a). Recreational behaviour has as antecedents: motivation, socio-economic factors, and attitude (Jackson, 1989). There is a need, therefore, to identifiy the motivations of anglers, one antecedent of behaviour, to more fully understand angling behaviour. From a practical stand point, a manager needs to know how different angling subgroups differ in motivation and attitude, as well as behaviour. Knowledge that some anglers prefer to fly fish, rather than use a spinner, is of little use to a manager. On the other hand, knowledge of why an angler uses an artificial fly, rather than bait, can tell something about the motivations of the angler, which could then provide a basis for managerial decisions.

Fedler and Ditton (1994) identify three reasons why knowledge of the motivations of anglers are important: they are basic to the explanations and predictions

of angling behaviour; there is a need to know how much the factors which motivate anglers vary with different conditions and angling groups; and so managers can more effectively develop angler programs and services. The tying of motivation to attitudes of anglers toward management options, and to behaviour was an objective of this study. This linkage will increase the ability of managers to anticipate angler responses to management decisions.

Two theories have been suggested for investigating motivations in recreational angling: Personal investment theory (PIT) and expectancy-value theory. PIT uses the centrality of fishing to an angler to categorize anglers (Siemer and Brown, 1994). This method uses behaviours to determine motivations for angling. An alternative to this behavioural model is expectancy-value (EV) theory. EV theory includes both the importance of incentives for angling and the probability of those incentives being fulfilled (Dawson et al., 1991b). Expectancy-value theory views cognitive processes as central to the behaviour decision making/involvement process experienced by anglers (Dawson et al., 1991b). Expectancy-value theory is the theory used to investigate the anglers from this study, and is explained in detail in chapter four.

While Dawson et al. (1991b) discuss the usefulness of expectancy theory, they emphasize the expectancy of catch-related incentives. They note that an angler may change location or fishing strategy to increase the expectancy of the catch. This is especially so for salmon and steelhead which are relatively difficult to catch (Dawson et

al., 1991b). They suggest that angler expectancy has to be relative to species, tackle and setting. While this is certainly true, Dawson et al. (1991b) do not take into account the expectations of other motivations, such as solitude or family recreation, which may be as central to the angler as the particular fish being pursued.

Expectancy-value theory uses two components to define motivation: the importance of an incentive, and the expectancy of that incentive being fulfilled. Past motivational research in recreational angling has used only one component to define motivation: the importance of the incentive. For this reason, that which has traditionally been explored as motivation in recreational fisheries research, is considered to be the importance of an incentive for this study. This chapter now reviews the incentives traditionally investigated as motivation in recreational angling research.

3.2.1 Incentives For Angling

Much of the early research into motivations for angling has been done by Driver (Knopf et al., 1973; Driver and Knopf, 1976; Driver and Cooksey, 1977). These studies used single item indicators of incentive which have since been accepted as reliable and valid (Driver and Cooksey, 1977) and have become the standard statements used to determine the motivations of all types of anglers. These standard statements have also enabled the comparison of studies across regions and between

broad angling groups.

Incentives for angling have been divided into intrinsic and extrinsic components based on catch and non-catch incentives respectively (Holland and Ditton, 1992). The catch-related incentives are specific to angling and cannot be pursued in other activities. The non-catch incentives can be pursued through many different activities including for example, sailing and hiking (Loomis and Warnick, 1991). Fedler and Ditton (1994) have divided the angling motivational indicator questions into five general categories: general psychological and physiological; natural environment; social; fisheries resource; and skill and equipment (Fedler and Ditton, 1994). Table 3.1 outlines these statements, which include all but two of the incentive statements used in this study. "To catch a limit of fish", and "to catch and release a salmon" were the other incentive statements used.

To say that the incentive behind angling is the fish, is simplistic and incomplete. Recreational angling has been considered a form of tension management (Spaulding, 1970), a means of strengthening bonds between family and friends (Cheek and Burch, 1976), and primarily as a contemplative and solitary activity (U.S. Outdoor Recreation Resources Review Commission, 1962). Other studies have shown that the catching of a fish is but one component of the activity of angling which leads to a successful trip (Driver and Cooksey, 1980; Graefe, 1980; Buchanan 1983; Loomis and Ditton, 1987) These studies are consistent with the findings of Hendee and Bryan (1978), Fedler

TABLE 3.1 Incentives For Angling

Non-Catch Incentives	Psychological and Physiological	•to get away from the daily routine •for relaxation •to experience new and different things •for physical exercise
	Natural Environment	•to be outdoors •to experience natural surroundings •to be close to the water
	Social	•to get away from other people •for family recreation •to be with friends
Catch Incentives	Fishery Resource	•for the challenge or sport of fishing •for the experience of the catch •to obtain fish for eating •to catch a trophy fish
	Skill and Equipment	•to develop skills •to test my equipment

(After Fedler and Ditton, 1994)

(1984), Hudgins (1984), Siemer and Brown (1994), which support the contention of multiple fishing satisfactions and motivations. It is a combination of both catch and non-catch incentives which contributes to angler motivation and satisfaction (Holland and Ditton, 1992; Fedler and Ditton, 1994).

Angling, regardless of species desired, or the area fished, is basically the same activity. It involves an angler, a means of catching a fish, a body of water, and the opportunity to catch a fish. However, the motives for engaging in the activity, the style of participation, and the resulting experiences can vary dramatically from one area, or

species, to another (Clarke and Stankey, 1979; Fedler and Ditton, 1994). Angling, therefore, is a situational activity. This situational nature necessitates the examination of both catch and non-catch incentives for angling, and the importance of these incentives in any angling situation.

In a review of 17 different angling populations and angling subpopulations, Fedler and Ditton (1994) found that psychological-physiological incentives were rated highly across all of the 17 studies. Natural environment incentives were rated moderately to very high by most anglers. Catch-related incentives varied significantly, with anglers targeting larger fish indicating the challenge of fishing and the experience of the catch as being very important. The findings of seven studies investigating incentives for angling are outlined in Table 3.2.

From Table 3.2, the importance of different catch and non-catch incentives is shown to vary with species fished, and/or location. Anglers fishing in tournaments, or angling for species which are expected to put up a good fight (e.g. shark), tended to place at least one catch motive higher than non-catch incentives. With the Atlantic salmon world renowned for its fight when hooked (Wulff, 1958; Anderson, 1985), the importance of catch incentives should be most important for at least a proportion of Salmonier River anglers.

Other studies which have concluded that catch-related activities are more important than non-catch-related activities for the anglers studied include: Sewell and

Table 3.2: Main Incentives for Angling from Selected Studies

	STUDY	ANGLING GROUP	MAIN INCENTIVES FOR FISHING (ranked from highest to lower incentives)
STUDIES WITH A CATCH INCENTIVE RANKED HIGHEST	Ditton and Loomis (1988)	Texas Offshore Tournament Anglers	•challenge of the catch •escape •experience of the catch •relaxation
	Ditton et al. (1978)	Texas Charter Boat Anglers	•fish to eat •experience of the catch •relaxation •escape
	Fisher and Ditton (1993)	Texas Shark Anglers	•experience of the catch •relaxation •challenge of the catch •natural surroundings
	Ditton and Fisher (1990)	Atlantic Billfish Tournament Anglers	•challenge of the catch •experience of the catch •relaxation •outdoors •close to the water
STUDIES WITH A NON-CATCH INCENTIVE RANKED HIGHEST	Fedler (1989)	Maryland Trout Anglers	•relaxation •outdoors •escape •natural surroundings •challenge of the catch
	Hunt et al. (1991)	Texas Catfish Anglers	•relaxation •escape •outdoors •natural surroundings
	Hunt et al. (1991)	Texas Black Bass Anglers	•relaxation •escape •outdoors •natural surroundings

(Adapted from Fedler and Ditton, 1994)

Rostron (1970); Stroud (1976); Vaske et al. (1982); Buchanan (1983); Graefe and Fedler (1986); Loomis and Ditton (1987); Chipman and Helfrich (1988); Spencer (1993); and Siemer and Brown (1994). These studies demonstrate that catch incentives must be included in any investigation of motivation for anglers.

In contrast to the studies showing catch incentives as most important are those which find anglers fishing predominantly for non-catch reasons. Ley (1967), Addis and Erickson, (1969) Moeller and Engelken (1972), Knopf et al. (1973), Bryan (1974), Bryan (1976), Kennedy and Brown (1976), Ditton et al. (1978), Wellman (1979), Graefe (1980), Smith (1980), Dawson and Wilkins (1981), Witter et al. (1982), Falk et al. (1983), Henry and Virgona (1984), Holland (1985), Falk et al. (1989), Schramm and Dennis (1993), and Siemer and Brown (1994) all found angling groups or sub-groups which indicated non-catch incentives as more important than catch incentives.

It is important to note from Table 3.2 that the groups examined are more or less homogenous. This is in contrast to studies such as the **Importance of Wildlife to Canadians** (Filion, 1991) which looks at "anglers" in general, and does not differentiate between sub-populations such as ice fishermen and salmon anglers. Angling surveys which tend to generalize provincial or state anglers (e.g. Ditton et al., 1991; Fedler, 1989) tend to show that non-catch incentives are higher than catch incentives. If a species not known for its fight or challenge is the predominant species of several fished, there is a good chance that non-catch incentives will be more

important for anglers. The need, therefore, is to be species and river specific. Motivational results from population studies are artificial as they are an aggregate of diverse angler groups within the populations (Fedler and Ditton, 1994). Researchers therefore should not generalize population results from national or provincial surveys to subpopulation angler groups, such as salmon anglers on the Salmonier River.

Brown and Ross (1982) found that a variety of desired incentives were considered by anglers in Colorado when deciding which stream to fish. This is consistent with the idea that different settings would be utilized by anglers to realize different recreational experiences. Brown and Ross (1982) also found that different experiences which are desired for any one setting preference are not equally weighted. Stream anglers accessing remote settings, for example, desired the experience of escaping personal pressures more than for escaping physical pressure.

A study demonstrating the situational nature of angling was undertaken by Loomis and Ditton (1987), comparing sport and tournament anglers. Loomis and Ditton (1987) found significant differences between incentives for the two groups of anglers. Of the catch incentives, the tournament anglers were significantly higher on all but the incentive for obtaining fish. Of the non-catch incentives, the only significant difference was on the incentive scores concerning fishing with family and with friends. Tournament anglers preferred to fish with friends, while sport anglers indicated a preference to fish with family (Loomis and Ditton, 1987). These findings of Loomis

and Ditton (1987) are similar to those of Spencer (1993), who found that angler satisfactions varied with anglers with different characteristics. Undoubtedly, within every angling group, there is also a portion of anglers who wish to get away from everyone, to fish alone.

When comparing the components which made a river important to trout and salmon anglers, Teirney and Richardson (1992) found that importance of a river for trout anglers was determined by high catch rates, large fish, extensive fishable water and peaceful scenic surroundings. In contrast, salmon rivers were valued primarily for the sheer size of the fish, with surroundings playing an insignificant role in the overall importance of the river (Teirney and Richardson, 1992). This substantiates the findings of Martinson and Shelby (1992), where tolerance for encounters with other anglers were higher for salmon anglers than trout anglers. Manfredo and Conroy (1980) also found that catch incentives were important as they found that salmon anglers were more likely to fish at locations that were known to provide high catch rates. For this reason, salmon anglers are more likely to expect to encounter other anglers than in other types of angling (Manfredo and Conroy, 1980). From the findings of these studies pertaining to salmon, it is expected that on the Salmonier River, catch-related incentives should rank high among the incentives for salmon anglers.

The importance of the fish to salmon anglers is also noted by the fact that salmon anglers had a preference of fishing in the lower regions of a river (Teirney and

Richardson, 1992). This preference stems from the fact that the salmon in the lower regions are recent arrivals to the river, and had not been fished as much as those further up river. Indeed, the overall focus of salmon angling in New Zealand is the salmon itself (Teirney and Richardson, 1992). Teirney and Richardson (1992) surmise that the hope for many salmon anglers of landing a fish, or having an occasional success, is important in determining the value of a New Zealand salmon river's value.

Similar to the findings in New Zealand were those of Lowery (1978), who found that among Oregon salmon anglers, the primary incentive for angling was "to get food". The concept of salmon as food may stem from the traditional view of salmon as an important food source for the angler (Smith, 1980).

The studies presented here have shown that the importance of catch and non-catch incentives for angling are situational. Depending on the location, subgroup of angler, or type of fish being caught, the relative importance of catch and non-catch incentives vary. There is a need, therefore, to look within an angling group, to determine subgroups based on motivation. This investigation of motivation within angling groups enables managers to recognize that the average angler does not exist, even on the river, or watershed, level. This understanding can be accomplished by examining the catch and non-catch motivations of anglers. One can then determine the proportions of anglers motivated to a greater part by catch or non-catch motives. These two groups can then be investigated to see if and how these motivational differences

translate into attitudinal and behavioural differences.

While the situational nature of angling has been noted (Fedler and Ditton, 1994), few studies emphasize expectancy, the situational component provided by the angler. It was the intent of this study to add expectancy to the investigation of motivations of anglers, thereby gaining a better understanding of motivations for angling relative to the Salmonier River. Indeed, both the importance and expectancy of incentives are required for the theoretical research undertaken in this study.

It is important to note here that while Fedler and Ditton (1994) note the importance of not generalizing to the subgroup, no attempt on their, or other researchers, part to investigate the importance of catch and non-catch motivations within angling subgroups has been undertaken. Motivational theory has not been used to its greatest potential. By adding expectancy, the potential of motivational research can be increased.

3.2.2 Expectancies Of Anglers

It is important to recognize that different streams attract different types of anglers (Palmer 1988), and these anglers will have different attitudes and motivations. Clarke and Downing (1984) found that forest users in accessible recreational settings were less likely to be annoyed by management activities such as grazing or logging, than forest users in primitive settings. Similarly anglers fishing a pristine area could be

more opposed to development than anglers fishing near or in a community. As rivers are linear features, with different sections offering different experiences to the angler, consideration that the expectations of anglers will be different along the river, must be noted in fisheries research. This is the case, as anglers can use different sections of a river to obtain different desired outcomes. The premise behind examining the different sections of the Salmonier River, to determine if they are used by different angling subgroups (H_{10}), comes as a result of these diverse expectations.

Hudgins and Davies (1984) compared the satisfactions of anglers in two different river drainages with considerably different river catch rates. They found that the satisfaction ratings did not differ between rivers. That which did differ was their expectation for success. Lower expectations in the less productive river gave satisfactions similar to anglers with higher expectations for success in the other river (Hudgins and Davies, 1984). While looking at satisfaction and not motivation, Hudgins and Davies (1984) do show that expectations differ from river to river and should be considered in an examination of anglers.

Connelly et al. (1990a) found that goals and expectations of anglers can change over the course of a day of fishing. These changing goals and expectations resulted when different sections of a river were fished by different methods, for different fish. One possible explanation for these changing goals is that a person may be a novice in one environment but an expert in another, despite the activity remaining the same

(Schreyer, 1982). This comes as a result of the angler's knowledge of the area and the resource. Changing goals may come as a result of fulfilling certain expectations. Once a fish has been caught, for example, relaxation may become the dominant goal. The temporal and spatial nature of angling calls for situation specific research (Connelly et al., 1990).

Martinson and Shelby (1992) compared trout and salmon anglers in New Zealand and found that differences occurred between the two groups in relation to expectations. They found that encounter norms differed both between salmon anglers and trout fishermen, and between salmon anglers fishing different rivers. Those salmon anglers angling the more accessible salmon rivers were found to have higher expectations for encounter norms, and were more tolerant to larger numbers of anglers, than anglers fishing less accessible rivers (Martinson and Shelby, 1992).

The studies presented here show the need for expectancy to be included in an investigation of anglers. Dawson et al. (1991b) note that "expectancy theory appears to hold some promise to integrate motivational research with a more comprehensive theoretical base, so that implications will be more apparent for fishery and recreation managers" (Dawson et al., 1991b). It is with this in mind that an understanding of motivation as a management tool is now considered.

3.3 ANGLER MOTIVATION AND MANAGEMENT

The rationale for a behavioural/motivational approach to management, as opposed to a solely biophysical approach, stems from the need for managers to both protect a resource, and provide users with a variety of opportunities (Ditton et al., 1978; Propst and Lime, 1982; McCool et al., 1984). Propst and Lime (1981) propose that information on the types of physical resource and the social characteristics which influence user satisfaction must be known. This information is obtained by identifying the characteristics (including motivation) that are most important for satisfying experiences in different activities and settings (Propst and Lime, 1981).There is a need to look beyond motivation, however, to see if motivations translate into behavioural choices. With a better understanding of how motivation relates to behaviour, managers can more easily anticipate angler response to management actions and can ensure that the angling experiences expected by anglers are met (Fedler and Ditton, 1994).

A behavioural approach for the study of fisheries management policies has been identified in many studies (Bryan, 1977; Dawson and Wilkins, 1981; Ditton et al., 1978; Moeller and Engelken, 1972; Hampton and Lackey, 1976; Carpenter et al., 1977; Smith, 1980; Hudgins, 1984; Schoolmaster and Frazier, 1985; Miranda and Frese, 1991). These studies indicate the need for fisheries managers to manage recreational fisheries based on a variety of social aspects, including angling motivations and behaviour, along with the fish.

Fisheries managers need a valid site-specific information base dealing with angler motivations and satisfactions to predict angler response to management actions (Fedler, 1984). A recreational setting can be defined as a place where the combination of physical-biological, social and managerial characteristics, or attributes, gives that place value as a location for a leisure activity (Clarke and Stankey, 1979). An understanding of how recreationists choose settings, and how they evaluate them, can give managers a better grasp of how motivational decisions affect user evaluations of a site. These evaluations include the site's ability to accommodate particular activities, as well as provide different experiences (McCool et al., 1984). An understanding of why people choose to fish a particular river, i.e. their motivations for angling that river, can help manage various experiences sought by the angler.

Traditionally, management decisions concerning Atlantic salmon in Newfoundland have been made by the Federal Department of Fisheries. This has been the case as salmon are an anadromous fish, one which migrates between fresh and salt waters. The move in recent years has been toward community/association management of the rivers and fish. This approach to management is included in the Fisheries Act (Bill C-62) and is expected to act as "the cornerstone for developing a new relationship between DFO and fisheries stakeholders" (DFO, 1996c). The Model River System, which is at present being initiated on the Humber, Eagle and Gander Rivers in Newfoundland, is an example of this new type of partnership. Community/association

management constitutes what is known as special fisheries management (AFS, 1995). Regulations in special fisheries are unique to the river in which they are implemented and can cause conflict between managers and users, and between different river users. In the case of different river users this can be both between different subgroups of anglers, and between anglers and non-anglers.

In the past, conflict has arisen due to the failure to include the human component from the management of fisheries, or from a misunderstanding of the concepts human dimensions entail (Matlock et al. 1988; Ditton and Fedler, 1989; Peyton and Gigliotti 1989). For comprehensive management decision-making to occur, an attempt to integrate an understanding of both the fish and the angler pursuing the fish should be undertaken (Ditton et al., 1978; Propst and Lime 1982). Knopf et al. (1973) stated that four topics must be addressed when angling is evaluated: the resource; the activity; economic considerations; and participant behaviour. While each of these four topics should be addressed by managers, the importance given to each is seldom equal. Indeed, depending on the agenda of the managing agency, any one of these topics can have much higher priority than the others. In areas with little or no economic growth, such as Newfoundland, economic considerations often take precedent, at the expense of the angler and the resource. While more anglers may be better for an area economically, too many anglers may be detrimental environmentally. Indeed, too many anglers can cause crowding, which may in fact deter anglers from

fishing, or returning to fish, a particular river.

Economic research should consider angler motivations, to ensure that conflict is minimized for the manager, and satisfactions are maximized for the angler. For example, a license fee may increase revenues for managers. However, if the motivations of anglers can be satisfied on a nearby river which does not charge a fee, revenues may not be as high as the manager expects, or requires. In the end, considering the motivations of anglers should have positive economic effects, by maintaining or increasing the satisfactions of anglers.

Awareness that people management is as important as resource management is not sufficient to produce an adequate research base capable of dealing with human responses to management actions (Voiland and Duttweiler, 1984; Ditton and Fedler, 1989). Knowledge of the factors recreationists consider is needed to facilitate the management techniques managers must use in matching supply with demand. This ensures that quality recreation opportunities will exist for the recreationist (Clarke and Downing, 1984). A better understanding of anglers by managers helps to manage angling resources consistently with expectations of anglers. It also aids the private sector in providing facilities, services and equipment which enhance angling experiences (Brown and Siemer, 1991). These expectations should be addressed, but not to the point of jeopardizing the resource.

Information on the incentives and expectations of anglers can help fishery

managers determine which management alternatives will meet, redirect, or change angler expectations and incentives (Dawson and Wilkins, 1980; Brown, 1987; Gale, 1987; Dawson et al., 1991a). If satisfying anglers is to be a management goal, managers must consider which policies will be most effective for specific groups of anglers (Spencer, 1993). Identification of the subgroups of anglers fishing a particular river can help accomplish this goal.

Research has identified the need for the examination of angler responses to regulatory measures to be context specific (Palmer, 1988; Ditton and Fedler, 1989). The type, amount, and obtrusiveness of managerial activities, shapes the nature of a recreational setting. These activities can lead to a change in the kind of place it is, and can hinder the objectives of recreationists (McCool et al., 1984). Fisheries managers affect the desirability and availability of lakes and streams to anglers by regulating methods of fishing, retention sizes and season lengths (Manfredo and Anderson, 1982). It is important to consider the motives of anglers before management decisions are made, to ensure that the desirability of an area is maintained.

Conflict can occur between subgroups of anglers fishing the same river system, due to differing opinions toward management options. Highly specialized anglers fishing for small mouth bass in Virginia, for example, favoured more restrictive harvest regulations than less specialized anglers (Chipman and Helfrich, 1988). Differences of opinions need to be addressed before management decisions are made.

The study undertaken in this research attempts to identify these differences in relation to the differing motivations of anglers on the Salmonier River.

While recreationists make their own decisions, manager's actions do affect the places recreationists go (Clarke and Downing, 1984). Stroud (1976), for example, showed that fishing participation decreased markedly after the introduction of catch and release and size restrictions. Siemer and Brown (1994) speculated that a decrease in fish size or abundance would result in a decrease in fishing participation. Decreases such as these can come as a result of natural processes or managerial decisions. Managerial decisions which negatively affect the satisfaction of anglers can indirectly have negative biological effects on the fish being perused. Should catch and release be imposed on a river where a majority of anglers oppose it, the anglers may move to another river. This displacement of anglers could increase demands on the new river to the point that the integrity of the fish resource could be jeopardized. Also, the angling experience could be spoiled for anglers, due to increased crowding and fewer fish. Regulations must be suited to both the resource and to the users of that resource.

Angler perceptions, attitudes, and preferences are routinely sought over a wide range of issues, such as the need for, and suitability of, regulations (Dawson and Wilkins 1981; Renyard and Hilborn, 1986). This is done, in part, as uninformed decisions by fisheries managers could create disruptive management issues that damage the public image, and credibility of the fisheries management agencies (Peyton and

Gigliotti, 1989). The differences between what a manager recognizes as a satisfactory fishery, and what anglers expect from a fishing experience, are one cause of tension between the angling public and agencies (Hudgins and Davies, 1984). Again, an understanding of anglers can help managers understand one group for whom the fishery is being managed.

An example of a motivational approach to management policies concerned sectioning a portion of the Au Sable River in Michigan for catch and release fishing only (Gigliotti and Peyton, 1993). Gigliotti and Peyton (1993) used the incentives and behaviours of trout anglers belonging to fisheries organizations, and anglers who did not belong to organizations as the basis of their study. Gigliotti and Peyton (1993) found that anglers who belonged to organizations were much more in favour of the catch and release policy than those who did not belong to a fishing organization. They also found that members of fishing organizations were less likely to indicate "catching fish to eat" as an incentive to fish. Tournament and sport fishermen have also been shown to respond differently to various policy changes, particularly those related to a reduction in permissible catch (Loomis and Ditton, 1987). Findings such as those of Gigliotti and Peyton (1993) and Loomis and Ditton (1987) can be used by fisheries managers to reduce, or avoid, conflict between different angler groups. As catch and release becomes more of a factor in salmon angling in Newfoundland (GRMA, 1995), studies into the behaviours and motivations of salmon anglers can likewise be beneficial

for managers for lessening conflict between anglers.

In relation to conflict between anglers and non-anglers, a study by Gramann and Burdge (1981) examined conflict between anglers and water skiers. Gramann and Burdge (1981) found differences in motivation between anglers who perceived conflict and anglers who did not perceive conflict. Significant differences were found between the two groups of anglers in their incentives for escape, and doing things with their family. Those not perceiving conflict indicated escape as less of an incentive to fish, and doing things with their family more important, than those perceiving conflict (Gramann and Burdge, 1981). Understanding choices in recreation, therefore, is important for managers as it can help them recognize when specific recreation goals and objectives can be achieved, without unnecessarily constraining the management of other resources (Clarke and Downing, 1984; Lee et al., 1988). Managers can also use a knowledge of motives to direct users to alternative locations on a river, or to another river that better meets the angler's needs and expectations (Buchanan et al., 1982; Martinson and Shelby, 1992).

While motivational research can provide information about the angler to the manager, it can also aid the manager in determining what information needs to be communicated to the angler. Knowledge of the motivations of anglers can aid in the changing of expectations of anglers to better fit the reality of what is available (Martinson and Shelby, 1992). Expectations can then be changed by education

programs, which provide accurate catch rate, and size, information for a particular fishing area (Dawson and Wilkins, 1980). To be successful in the education of anglers, one must first know what the expectations and incentives of the angler are.

Community leaders and fisheries managers need accurate information on anglers which will aid in choices which will benefit anglers and residents (Siemer and Brown, 1994). Royce (1983) notes that a challenge for fisheries managers is to deliver information to the fishing public that will lead to greater satisfaction. Managers have a problem in maintaining satisfaction among anglers with unrealistic expectations for catch rates (Spencer and Spanger, 1992). Realistic expectations can be communicated to anglers once the unrealistic expectations are known. A well-informed public will have a more realistic perspective on what can be expected from a natural resource (Loftus, 1987). As noted by Spencer and Spanger (1992), the expectations often considered exclude non-catch expectations. The fulfilment of solitude for an angler can be as central for satisfaction for an angler as the fish itself, and should be considered by the fisheries manager.

Public communication is becoming an increasingly complex challenge facing fisheries professionals (Royce, 1983). This being said, at least one study has shown that few recreational users learn about an area through information from agencies (Clarke and Downing, 1984). Informal contacts, most often family and friends, are the most important source of information about opportunities for anglers (Clarke and

Downing, 1984).

It is important to note that opinions and motivations of anglers are not fixed and can change over the lifetime of the angler (Connelly et al., 1990b). Changes in these dimensions of angling show the need to constantly monitor the motivations, attitudes and behaviours of anglers. While issues oriented surveys may adequately portray where a given group of anglers stand on a particular issue at a specific point in time, fisheries agencies need a broad information base for comprehensive planning efforts to be effective (Brown and Siemer, 1991). There is a need to see if, and how, the motivations and attitudes of angler groups change over time. While the Salmonier River survey was a "one shot" study, it does provide base line data for researchers and managers to use in the future.

Diversity should be an important concern for fishery managers in allocating resources among competing interests (Loomis and Ditton, 1987). Managers need to know what is desired by the angler, and provide several variously demanded products, rather than just providing catch opportunities. Without management based on product differentiation, the diversity of sportfishing could be lost (Hendee, 1974; Holland and Ditton, 1992). The acknowledgement of both catch and non-catch motivations of recreational fisheries aids in the product differentiation of salmon angling for managers.

If one takes the point of view that the product of recreational fishing is the

opportunity to catch fish, and not the fish itself (Crutchfield, 1962), then managers need not provide a spectrum of experiences for the angler. If, however, one takes the position of this study that there are a host of experiences, both catch-related and non-catch-related, then managers must know what the motivations of the users of the resource are. Management plans that include considerations of the angler and seek to inform anglers about the reasons for regulations are more likely to succeed both socially, and biologically (Quinn, 1992).

3.4 SUMMARY

This literature review has shown how the human dimensions component of recreational angling is a component which must be investigated for a complete understanding of the angling resource. To ignore this aspect of the resource, or to work under the assumptions of an "average angler", will undoubtedly lead to conflict for fisheries managers. A knowledge of the motivations of anglers on the Salmonier River will enable a better understanding of the relationship between management policies and the major stakeholder on the river, salmon anglers.

Most studies of motivation relating to recreational angling have been limited to statements of importance, which are equated with motivation. The situational component of expectancy has often been neglected due to the level of study (i.e. provincial or state wide studies, rather than watershed or river studies). When

expectancy has been included, it predominantly relates to catch incentives and not non-catch incentives. This study now turns to expectancy-value theory, which was used to develop a more complete understanding of the motivations of anglers on the Salmonier River.

CHAPTER 4
MOTIVATION THEORY

4.0 INTRODUCTION

The previous section demonstrated that motivational research involving anglers has, to a large part, been limited to an investigation of incentives for fishing, with no examination of the expectancies relating to these incentives (eg. Driver and Cooksey, 1977; Fedler, 1989; Holland and Ditton, 1992; Fedler and Ditton, 1994; Hunt and Ditton, 1996). The underlying premise of this study is that individual watersheds are comprised of different and often unique components. These unique characteristics necessitate the inclusion of expectancies of anglers to better understand motivations for angling.

The need to maintain some coherence with past "motivational" research dealing with angling, however, is necessary. This coherence enables the comparison of angling both spatially and temporally. Thus, a blending of past motivational research, with concepts and theory from social-psychological research, is needed to improve upon the investigation of motivations for recreational angling. This chapter examines the theories and concepts of motivation which are seen as relevant to this study, and indicates which components from these theories can be used to complement past research.

4.1 MOTIVATION

Kleinginna and Kleinginna (1981) identified 102 defining or criticizing

statements concerning motivation. Depending on the emphasis and direction of the study, motivation means different things to different researchers. One current definition of motivation is, "the concept we use when we describe the forces acting on, or within, an organism to initiate and direct behaviour" (Petri, 1990). The forces relating to why people salmon angle, and the behaviour resulting from these forces are the basis of this study.

Motivation has been addressed from three different approaches: the biological approach; the drive, incentive approach; and the cognitive approach (Madson, 1974). The biological approach is the work of biologists and was therefore not taken here. This study deals with both the incentive and cognitive approaches to motivation. Motivation from an incentive approach looks at goals and objects which motivate behaviour (Tolman, 1967). Motivation from a cognitive approach requires an intellectual process within a person, and includes analysis and interpretation of the environment around the person (Feather and O'Brien, 1987)

Research in motivation has been used to explain the intensity of behaviour, and to indicate the direction of behaviour (Maehr and Kleiber, 1987). Motivation also helps explain why behaviours occur in one situation and not in others, and helps in the prediction of behaviour (Weiner, 1980; Petri, 1990). The importance of behaviour to the understanding of motivation is made explicit from these examples of how motivational research can be used. Indeed, it has been stated that, "the study of

motivation begins and ends with the study of behaviour" (Maehr and Braskamp, 1986). It is the intent of this study to examine the extent to which behaviour, as well as attitude can be explained through the study of motivation. It is important to note here that similar behaviours by different people (e.g. a day of fishing) may be associated with notably different internal patterns of motivation (McCaslin, 1990). From this fact it can be seen that people fishing a river, while all pursuing a similar behaviour, may in fact be motivated by a variety of different incentives.

At least three different levels of analysis can be identified in the study of motivation: physiological analysis involving the brain structures involved in the triggering of motivation; individual analysis aiming at understanding motivational changes that occur to a person as a result of internal or external conditions; and social analysis looking at situational factors which influence our behaviours (Tubbs et al., 1993). Analysis involving brain structures is the work of medical researchers, while individual analysis is conducted by clinical psychologists. This research looks at the social levels of analysis, by combining the motivations of anglers to gain a better understanding of the factors which influence angling behaviour. These motivations can be used to differentiate between anglers based on catch and non-catch motivations. This differentiation can then to be used to determine if different motivations of anglers translate into different behaviours and attitudes.

Before attempting to develop a framework to investigate the motivations of

anglers, one must first understand the concept of motivation, and the subtleties of several concepts associated with it.

4.2 MOTIVATION IN LEISURE RESEARCH

Leisure has been defined as time in which one is relatively free to choose what to do after work, sleep and necessary personal household chores have been completed (Schreyer, 1986; Wall, 1989). The activities in which one undertakes during this time is known as recreation (Wall, 1989). In contrast to this view of leisure is the view of leisure as a state of mind. Leisure in this view is, "an experience that results from recreational engagements" (Driver and Toucher, 1970). This view of leisure as experience, rather than activity, is best researched from a behavioural point of view, in which psychological outcomes are explored to find the meaning behind the experience (Manning, 1986). It is this behavioural approach which has lead to investigation of motivation in recreation. By adopting this approach, angler motivations can be linked to attitudes toward management options, as well as angling behaviours.

Different motivations, attitudes and behaviours are exhibited by recreationists, depending on the recreation activity undertaken, the location of the activity, and the timing of the activity (Shafer 1969; Bryan 1977; Graefe 1980). It is for this reason that human dimension research is needed to fully understand a recreational activity, such as salmon angling, and those partaking in the activity.

Motivations in leisure have been defined as the psychological outcomes one

desires from a recreational experience (Driver and Knopf, 1976; Fedler, 1984). This definition leaves out any tangible outcomes (such as the fish in the case of angling) which often are as central to the experience of angling as any psychological outcome. The importance of the fish in angling has been debated in the recreation fishing literature (Matlock et al. 1988; Ditton and Fedler, 1989; Peyton and Gigliotti, 1989). If one acknowledges the centrality of the fish to the angler, as one necessarily must for at least a portion of the angling public, one must go beyond the psychological construct of motivation to include the more tangible elements of the activity. The statements of importance traditionally used in recreational angling research have acknowledged this need by including both catch and non-catch elements. A majority of previous work in angler motivation, however, has lacked a theoretical compass.

In his book **A Psychology of Leisure**, Neulinger (1974) identified motivation as one of three variables necessary for a distinction between leisure and non-leisure; perceived freedom and the goal of the leisure activity being the other variables. Perceived freedom is determined by the amount of internal and external control one feels he or she has over their own destiny. The more external control exerted on the person, the less perceived freedom (Neulinger, 1974). This relates directly to management options which necessarily constrain leisure to some extent.

The goal of a leisure activity can be either instrumental or final. An activity with an instrumental goal is one which is carried out to achieve another final goal

(Neulinger, 1974). Tying a salmon fly, for example, would be an instrumental goal for achieving the final goal of catching a salmon. Another term for goal is incentive. For the purpose of this research, goal and incentive are considered to be the same.

Motivation, unlike perceived freedom, which can have outside constraints, is very much a personal affair (Neulinger, 1974). A person's motivation toward a leisure activity depends in part on their knowledge and perception of the activity in a particular setting. Knowledge and perception of an activity leads to expectancies for that activity at a specific location. The concept of expectancy, therefore, must be included in studies of motivation concerning recreational angling. Expectancy adds the situational component neglected in most motivational research into recreational angling. The expectations of an angler fishing a world class salmon river, such as the Gander River in the wilderness of central Newfoundland, would not be the same as those of an angler fishing Rennies River, a small trout river which runs through the city of St. John's.

The singular term motivation is in part a misnomer as there are at least two types of motivation which combine to give an overall motivation: intrinsic and extrinsic (Neulinger, 1974; Staw, 1976; Maehr and Kleiber, 1987). Intrinsic and extrinsic motivations are similar to instrumental and final goals. The difference, however, is that motivation concerns reasons for participation, while goals concern the activities to achieve leisure. Intrinsic motivation is motivation for the sake of participating in the activity itself. In contrast, extrinsic motivation seeks a desired outcome or pay-off from

the activity (Neulinger, 1974; Staw, 1976; Singer et al., 1993). A person who fishes primarily for the purpose of socialization is driven by intrinsic motivation. The angler who fishes to catch a trophy fish is driven by extrinsic motivation. Extrinsic and intrinsic motivations are not mutually exclusive, however, as one could fish for both the socialization aspect, and for the chance to catch a fish.

Similar to Neulinger's differentiation of intrinsic and extrinsic motivations are the motivations used in much of the recreational fishing literature. The distinction here is not between intrinsic and extrinsic motivation, but between catch-related and non-catch-related motivations. Whereas developing angling skills would be seen as an intrinsic motivation for salmon angling, using the categorization of catch and non-catch motivations it would be considered a catch-related motive. The use of catch and non-catch motives was determined to be more useful from a management perspective for this study, therefore, these categories were chosen. The elements used in catch and the non-catch categories are discussed in the previous chapter (Chapter 3).

4.3 CONCEPTS IN MOTIVATION

4.3.1 Incentive and Importance

Incentive is the term used to describe a goal or object which motivates one for a particular reason (Tolman, 1967; Ferguson, 1976; Weiner, 1980; Petri, 1990). Incentives as motives have been a useful tool in the explanation of behaviour. The

reasons traditionally used to determine motivations in recreation fishing (Fedler and Ditton, 1994) have in fact been incentives for fishing. For example, fishing for relaxation has the goal of relaxation as an incentive.

Incentives are not fixed and differ from situation to situation (Bandura, 1989). This is an important fact in the study of motivation of anglers as each river or lake will have its own unique characteristics. This fact means that incentives to fish will vary both spatially and temporally. For example, if one is attempting to show a child how to catch a fish, the incentive value of catching a fish may be higher than if the same angler was fishing by himself. The incentive for fishing by oneself may have more to do with solitude than the fish. Incentives, therefore, are a central part of determining behaviour.

Closely related to incentive is the concept of meaningfulness. Klinger (1977) felt that objects, events and experiences which are emotionally important to a person, will be sought by that person. Thus, the more meaningful an object, event, or experience is, the higher the incentive value, and the more likely the person will pursue this incentive. If family recreation is emotionally important to an angler, it will have a high incentive value for the angler.

Another term closely associated to incentive is importance. Importance has been used to refer to "the perceived importance of an attribute for a person" (Fishbein and Ajzen, 1975). As with incentive, it could be argued that it is importance which has

traditionally been used in fisheries research to define motivation for anglers. Feldman and Fishbein (1963) note that the use of importance in referring to the perceived importance, is highly related to the polarity of the person's attitude, with both highly positive and highly negative attributes being seen as important. From the work of Fishbein and Ajzen (1975), importance is a measure of the value of an attribute to a person. In the case of this study, importance refers to a measurement of the incentives relating to recreational angling.

Examination of the traditional statements of incentive for angling finds none as negative. All are to a greater or lesser extent positive reasons for angling. This fact stems from the concept of leisure, where leisure is a decision of relatively free choice, not forced choice, accomplished in the person's spare time (Schreyer, 1986; Wall, 1989). One would not choose to spend leisure time trying to attain goals which would be seen as negative.

From this discussion of importance and incentive, importance can be seen to be a measure of incentive. This is the standpoint taken for the purposes of this study. The response to an incentive statement (i.e. not at all important to very important) is the importance of the incentive in question to the angler.

4.3.2 Value and Valence

Feather (1982) defines values as:

> organized summaries of experience that capture the focal, abstracted qualities of past encounters, that have a normative or oughtness quality about them, and that function as criteria or frameworks against which present experience can be tested... But they are not affectively neutral abstract structures. They are tied to our feelings and can function as general motives (Feather, 1982).

This definition indicates that value goes deeper in the human psyche than incentives. The concept of "oughtness" ties values to norms, thereby involving a degree of goodness-badness with them. This fact also differentiates values from needs, as values are more able to be verbalized and closer to conscious awareness than many underlying needs (Feather, 1992).

Feather (1992) treats values not only as generalized beliefs, but also as motives. Values, along with needs, influence people's actions. "The values that people hold affect their initiation of new goal directed activities, the degree of effort that they put into an activity, how long they persist at an activity, in the face of alternative activities, the way they construe situations and how they feel when an activity is undertaken either successfully, or unsuccessfully, according to the standards that are set" (Feather, 1992). Values, therefore, influence motivated action, i.e. behaviour.

One of the major differences between incentive and value stems from the idea of values as relatively stable over a person's life (Rokeach, 1979). Incentives are more situational than values. It is this fact which makes incentive a more powerful concept in the determination of motivation where recreational angling is concerned. Incentives would be found to vary to a greater extent over species fished, time of year the angling

takes place, and the river fished. The following example helps to illustrate this. The value of fishing to an angler would not be affected by rain. However, the incentive to fish on a rainy day will change for an angler, depending on the strength of the motive to fish. As another example, incentive can change over the course of a fishing trip. One might have a high incentive value (importance) on catching fish at the beginning of a fishing trip. A few days into the trip, after several fish have been caught, this incentive may wane. The value of catching a fish, however, should have remained the same for the angler.

The centrality of a value to a person will determine the reaction to any interference to the value, both in feelings and in overt reaction. When central values are interfered with or questioned, or conversely satisfied and fulfilled, overt actions and feelings will be elicited (Rokeach, 1979; Schwartz and Bilsky, 1990). In recreational management this interference can be in the form of management options which can constrain or enhance the recreational activity. Depending on which group of motives (catch or non-catch) are more central to the person, the type of constraint will determine how strongly overt reaction, or feelings elicited will be. It is from this view of value that the hypothesis that management options will elicit different attitudes for anglers motivated by different reasons ($H_{11\text{-}12}$, Chapter 1) was derived. For example, management options which will interfere with non-catch motives, such as cabin development along rivers, should elicit stronger attitudes from non-catch anglers than

catch anglers. Conversely management options affecting catch motives, such as bag limits, should elicit stronger attitudes amongst catch motivated anglers.

The concept of value leads to a measure of value: the valence for a given situation. Valence is a subjective measure of the positive (attractive) or negative (aversive) value of objects, activities or outcomes in terms of its goal properties (Feather, 1992). Needs and values are two of several identified variables having effects on valences. The objective characteristics of possible events and outcomes, the difficulty of the task, the expected consequences that may follow a particular outcome, the amount of personal control that one can exert, the attributed causes of an outcome, and the moods and states of the person, are also identifiable variables affecting valence (Feather, 1992).

If it were the case that valences were the only component of motivation, people would always be motivated to action by the most positive of valences. In reality the component of expectation is needed to more fully explain motivated behaviour. Similarly, the situational nature of incentives, necessitates the inclusion of the concept of expectancy, for a more complete understanding of motivation.

4.3.3 Expectancy

Expectancy is an important concept when considering motivation. Expectancy stems from the assumption that behaviour is a function of one's estimation of obtaining

a valued goal, based upon past experiences. Expectations encompass beliefs about whether a particular action can be performed to some standard that defines a successful outcome, and beliefs about the various positive and negative consequences that may follow that outcome (Feather, 1992). Expectations are likewise important in recreational decision making. Relating to recreation, "Expectations serve as filters to narrow the range of activities and places that will be considered for a particular outing with a particular group. They are employed during pre-trip planning for weighting anticipated trade-offs among alternative possibilities of group composition, activity or experience and place" (Clarke and Downing, 1984). The level of satisfaction from a recreational outing is therefore determined, in part, by the closeness that the pre-trip expectations are met by the actual outcomes (Roggenbuck and Schreyer, 1977).

The beginnings of expectancy theory in motivation can be traced to Tolman's theory of Purposive Behaviour (1932). For Tolman, behaviour was persistent and always directed toward, or away from, a specific goal. Behaviours formed a consistent pattern of responses, were not random, and took the shortest or easiest path to attaining the goal (Tolman, 1932). Thus, to fully understand a behaviour, one had to know both the goal of the behaviour and the possible means of reaching this goal.

Stemming from Tolman's purposive behaviour was the idea that people learn behaviours which lead to the attainment of goals (Tolman 1932). These learned behaviours are determined by cognitive expectancies which include the expectancy that

certain behaviours lead to certain goals, and the expectancy that specific goals can be found in particular locations. Thus, if one expects that fishing can lead to relaxation, and that a particular river can provide relaxation, the learned behaviour of fishing on that river could result.

In social-psychological theory, the emphasis for expectancy is placed on the person. The fact that the environment contains (or lacks) elements which may determine if a successful action can be achieved, is secondary. "People act of their beliefs about what they can do, as well as their beliefs about the likely effects of various actions. The effects of outcome expectancies on performance motivation are partly governed by self-beliefs of capabilities" (Bandura, 1988). The individual is responsible for the outcome (success or failure), anticipates unambiguous knowledge of results, and knows that there is some degree of uncertainty or risk (McClelland, 1961). While the angler in this study is ultimately responsible for the outcome, he or she must first evaluate the environment to determine if the necessary components for success are available. This subjective evaluation of the environment needs to be included in any analysis of expectancy in recreational angling. To date human dimensions research in fisheries has not explored these issues.

Bandura (1977, 1989) believes that efficacy expectations, beliefs about one's ability to reach a goal, determine how much effort one expends and how long one persists in the face of obstacles. The goal itself influences behaviour. Goals that are

specific, moderately difficult, and seen as attainable in the near future are likely to cause a person to persist in attaining them, and lead to increased efficacy expectations if they are reached successfully (Bandura, 1977, 1989). Thus, the angler who thinks that he or she has a good chance of catching a salmon on the Salmonier River should fish more, attain success by catching a salmon, and thereby increase perceptions of self-efficacy. These anglers may consider themselves more skilled than other anglers (H_8).

In determining whether a successful outcome can be achieved, "the constraint of actions by beliefs about what is, or is not possible in relation to personal capabilities and environmental demands, and by beliefs about the structure of means-end relations must be considered" (Feather, 1992). This statement shows the importance of acknowledging both the environmental and human component in examining expectancy. Whether or not an expectancy was related to self belief, or from availability of the environment, was not central to this study. A general expectancy question was used to determine the probability of an expected goal being achieved. It was assumed that both environmental and ability expectancies would have been considered in each statement of expectancy, completed by the anglers in this study.

In research relating to motivation and the prospect of finding a job, Feather and O'Brien (1987) used the variable "control-optimism" to describe the expectancy variable. This variable linked the confidence about finding a job with feelings of

control and self efficiency. In a similar vein, the term "ability-availability" is used in this study to describe the expectancy of attaining the stated goal. In contrast to Feather's expectancy variable, "ability-availability" relates to both the ability of an angler and the availability of the incentive. For example, the statement concerning the expectancy to catch a salmon would depend on both the individual skill and the availability of salmon on the Salmonier River. The two expectancies are, therefore, included in the one variable.

This section now looks at the combination of the concepts of incentive, value, and expectancy. These concepts are used in expectancy-value theory, a theory which is seen as a means of investigating the motivations of anglers on the Salmonier River.

4.4 EXPECTANCY-VALUE THEORY OF MOTIVATION

Of the many different theories concerning motivation, expectancy-value theory (EV) shows much promise in bettering the understanding of the motivations of anglers. EV theory had its beginnings in the theories of Tolman (1932) and Lewin (1938) who postulated that a person's motivated behaviour is a function of the person's needs, and the value of goals available in the environment to fulfill these needs. Expectancy-value theory has served well to identify important elements of recreation behaviour (McCool et al., 1984). It highlights "the human experiences from recreational engagements as the key product of recreation management efforts, rather than the traditional measures

of acres designated, facilities built or participation recorded" (McCool et al. 1984).

Expectancy-value theory suggests that people participate in particular activities, in particular settings, to realize a group of psychological outcomes which are known, expected and valued (Korman, 1974; Manning, 1986). While a psychological outcome can be known through learning, learning itself does not necessarily translate into behavioural actions. The addition of motivation is necessary for learning to be transmitted into performance (Bandura, 1989).

Expectancy-value theory, "provides a means of bridging the gap between knowing and doing. It relates a person's behaviour in a situation to the expectations that the person holds, and to the person's subjective valuation of the outcomes that may occur following the action" (Feather, 1992). As the stated purpose of this research is to link angler motivations to angling behaviour, expectancy-value theory provides a possible means of finding this linkage.

Motives in EV theory are used to explain social learning theory (Rotter, 1954; Bandura, 1969, 1977, 1978, 1989) and achievement theory (Atkinson, 1953,1964; Atkinson and Birch, 1978; Feather 1965, 1969, 1982, 1992; Feather and O'Brien, 1987). The general characteristics of these theories are noted in Figure 4.1, which outlines the development of EV theory. Each of these theories add to a more complete theory of motivation in relation to recreational fisheries, and for this reason both were considered in this study.

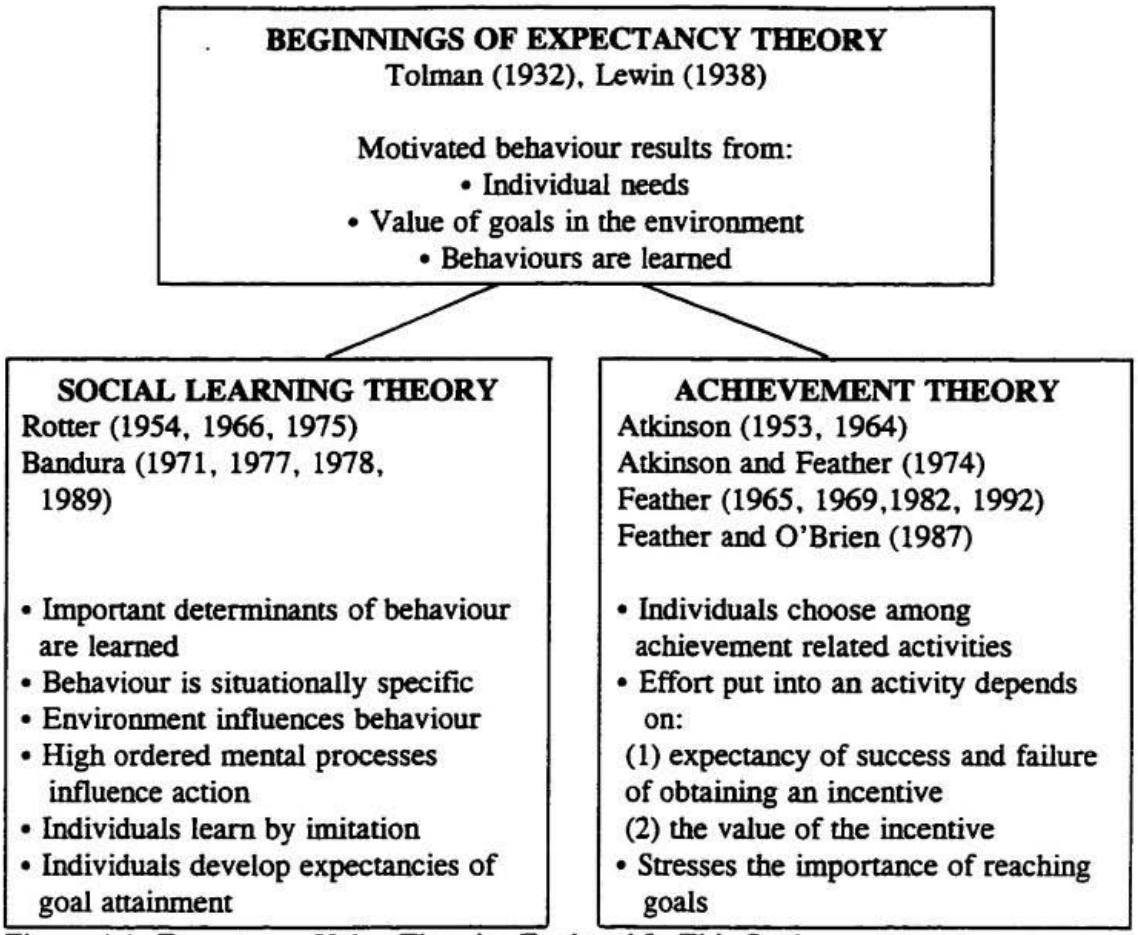

Figure 4.1: Expectancy Value Theories Explored In This Study

Incentive, one of the variables measured in this study, is also considered in achievement theory (Atkinson, 1964). In achievement theory the tendency to approach an achievement goal is a function of the product of: the need for achievement or the motive of success; the probability of success; and the incentive value of success. Also included in this theory is the fear of failure, where the tendency to avoid failure is the product of: the motive to avoid failure; the probability of failure; and the incentive

value of failure (Atkinson and Birch, 1978; Feather, 1992). Achievement theory, due to the six variables needed to determine a motivational score, was deemed too complex for the purposes of this study. It does demonstrate, however, that incentive can be used in combination with probability of success (expectancy) to determine motivation.

Social learning theory examines and attempts to explain the internal and external (social) factors which influence the acquisition and regulation of behaviour (Bandura, 1978). It proposes that learning is a psychological function involving a continuous interaction between behavioural, cognitive and environmental influences (Bandura, 1978). Social learning theory is both behaviouristic in that it emphasises the consequences of behaviour and cognitive as it considers that people interpret past events to set goals for themselves (Bandura, 1977, 1989). An angler's decision to return to a river on which he or she previously had a successful trip, serves as an example of this link between cognition and behaviour. Thus, learning can occur through interaction with the environment, through observations of the actions of others, and from the consequences of those actions.

Expectancy-value theory, as means of investigating social learning theory, has four basic concepts (Rotter, 1954):

> 1) Values are relative. People compare one situation against another to determine the value of the second situation (eg. an angler can compare time spent fishing with time spent at work).
>
> 2) A person makes subjective estimates which causes him/her to develop expectations of obtaining a goal (eg. a skilled angler should have higher

expectations for catching a fish than a novice).

3) Expectations are determined by situational factors which are determined by past similar situations (eg. if an angler has success on a river one time, the expectation could be high for catching a fish on a return trip).

4) Reactions in new situations will be based on generalized expectations from the past (eg. an angler who is used to catching large salmon may not be satisfied on an unfamiliar river, unless it provides the opportunity to catch large salmon as well).

Each of these concepts are at work in the realm of motivations for recreational angling. Anglers compare fishing experiences both temporally and spatially. Based on these comparisons one develops expectations of obtaining goals such as catching a fish. Anglers relate past experiences at selected rivers or pools to develop expectations for the present. And finally, an angler who is new to a river will develop expectations based upon his or her own abilities, and knowledge of expectations in similar angling situations.

For social learning to be transmitted into performance, there must be expectancies that a goal will be reached and that the expected outcome will have value for the person (Cofer and Appley, 1964). Motivation in expectancy-value theory is therefore a function of the value placed upon an act and the probability of that act being able to be carried out (Rotter, 1954):

$$\text{MOTIVATED BEHAVIOUR} = \text{VALUE} \times \text{EXPECTANCY}$$

When a variety of behaviours are available to an individual, the behaviour with

the greatest (Expectancy x Value) value should be the behaviour chosen. Rotter's (1954) formula does not take into account the fact that people often act on impulse, neglecting to weigh the pros and cons of their choices. This is less of a problem in this study as the overriding behaviour, salmon angling on the Salmonier River, has been made by the angler. This study did not look at other possible activities the angler could have substituted for salmon angling on the Salmonier River, but rather what the main motivation (catch or non-catch) for fishing the Salmonier River was.

Another shortcoming of Rotter's equation is that for any one behaviour, there can be a variety of different values and expectancies. Angling, for example, includes both catch and non-catch-related motives. These different motives combine to determine if a person will decide to fish in a particular location or not. If, for example, one placed a high value on solitude while angling, and knew that the probability of solitude while angling on a particular lake was low, the motivation to fish on that lake for solitude would also be low. This could then translate into the decision of not fishing at that particular lake. The reason why this "could" and not "would" translate into such a behaviour, is the fact that other motives, both catch and non-catch, must be considered when determining the likelihood of a person fishing at a particular location.

4.5 SYNTHESIS OF THE LITERATURE

From this review of theory and concepts pertaining to motivation, it has been

demonstrated that the investigation of motivation requires more than just an understanding of the importance of an activity. Expectations relating to the activity must also be noted. It is with this in mind that the concept of an importance-expectancy (IE) measure for salmon angling has been devised. The goal of this study is to determine if groups defined by this measure, do in fact translate into groups with different behaviours and attitudes.

Based upon the theoretical background found in this section, it is expected that four motivational variables will determine two different subgroups. These variables are non-catch incentives, non-catch expectations, catch incentives, and catch expectations. By using these variables, different behaviours and attitudes are hypothesised to exist between the different motivational groups (Figure 4.2). Figure 4.2 shows the relationship between variables tested in this study in a continuous loop, as behaviours and attitudes will lead to new outcomes, experiences and consequences. These outcomes, experiences and consequences can potentially change the importance of angling incentives, as well as the expectations for angling a salmon river.

Dawson et al. (1991) have devised a similar cognitive map of the expectancy theory model as it relates to recreational angling (Figure 4.3). While Dawson et al.'s model contains many of the components investigated in this study, it was decided that a more focused model was required (Figure 4.2). Dawson et al.'s cognitive scheme, for example, does not differentiate between the individual catch and non-catch components

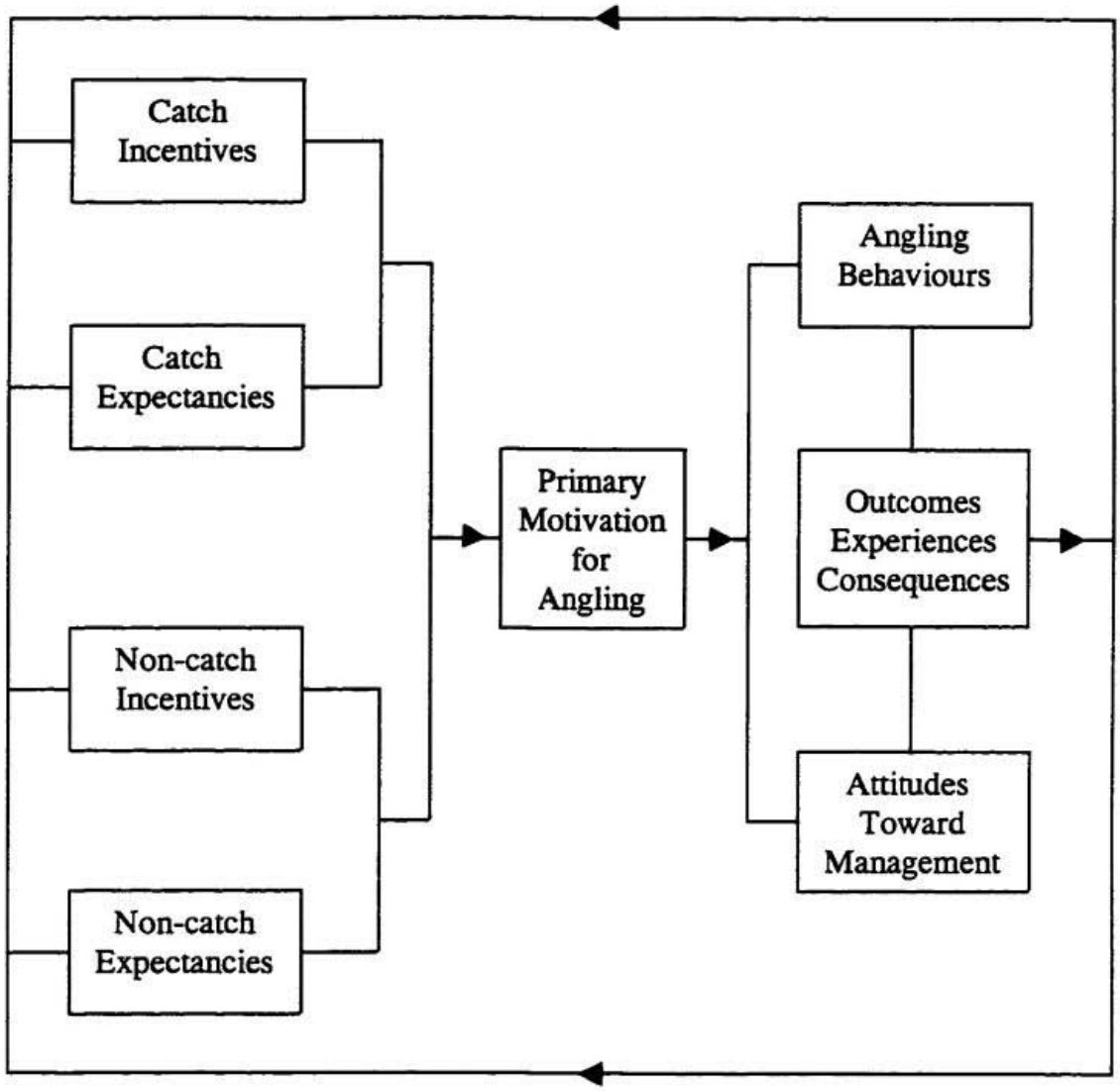

Figure 4.2: Relationship Between the Components of Angling Motivation Investigated in this Study, and the Behaviours and Attitudes which Result

of motivation. The model used for this study highlights the need for both expectancy and importance components of recreational angling, and also differentiates between catch and non-catch motivations. Dawson et al. (1991) do, however, include intrinsic and extrinsic rewards derived from angling. They, therefore, include the component of satisfaction in their cognitive map, a component only marginally explored in this study.

A component which is not included by Dawson et al. (1991) is attitude. Attitude toward management options was a primary area of investigation for this study, as the applied nature of resource management necessitates a knowledge of the attitudes of resource users. By linking motivation to attitudes towards specific management issues, managers can not only gain an indication of support for many management options, but also understand why this support exists.

Based upon the expectancies and incentives of Salmonier anglers, two groups of anglers will be defined: those motivated to a greater extent by catch motives and those motivated to a greater extent by non-catch motives. The placing of anglers into these groups will depend on the values of their catch and non-catch motive scores.

If:

$$\Sigma(I_{nc} \times E_{nc}) > \Sigma(I_c \times E_c)$$

the angler will be assigned to the non-catch motivated group.

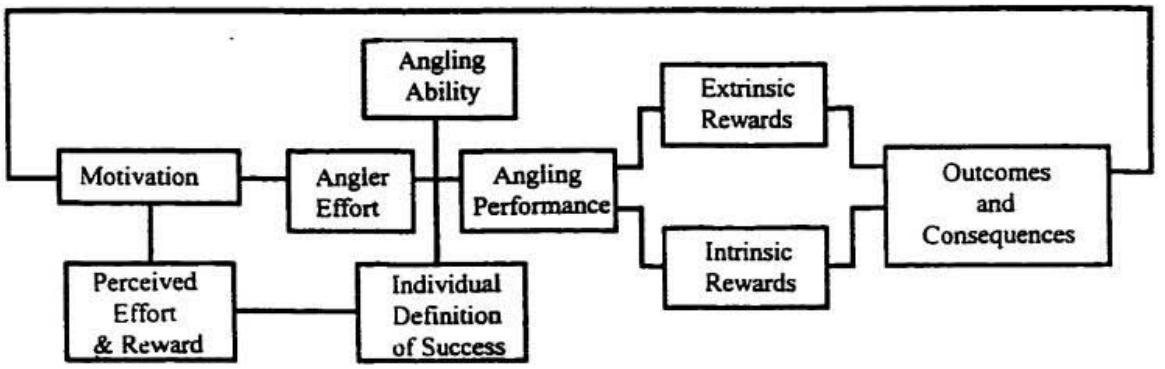

Figure 4.3: Expectancy Theory Model of Angler Behaviour (Dawson et al., 1991)

If:

$$\Sigma(I_c \times E_c) > \Sigma(I_{nc} \times E_{nc})$$

the angler will be assigned to the catch motivated group. Where:

I_c = Incentive of catch motive
E_c = Expectancy of catch motive
I_{nc} = Incentive of non-catch motive
E_{nc} = Expectancy of non-catch motive

4.6 CONCLUSIONS

Dawson et al. (1991a) have noted that anglers are best identified along a continuum, rather than in discrete units. A spectrum of anglers from high catch/low non-catch motives to anglers with high non-catch/low catch motives undoubtedly exists. This study does not have as a goal the investigation of this spectrum. It does, however, seek to investigate differences in attitude and behaviour of anglers motivated for different reasons. This study should not, therefore, be seen as a development of a typology, but as an investigation into the motivations of anglers on the Salmonier

River.

The goal in EV theory is to determine why people act as they do, thereby determining their motives. Similarly, this study attempts to determine if different motivations (catch and non-catch) for salmon angling on the Salmonier River translate into different behaviours and attitudes. For this study the overriding behaviour, salmon angling on the Salmonier River, has been identified. The need, therefore, is to determine what the main motivation for fishing the Salmonier River is, i.e. catch or non-catch. The question which naturally arises from this identification of motivation is, whether anglers motivated for different reasons, differ in behaviour and attitude?

The purpose of this study was not to investigate EV theory per say, but to use it as a means of differentiating between anglers. For this reason, strict adherence to EV theory was not pursued. Statements of importance were substituted for statements of value. This substitution was done to give an indication of how central each incentive was to the angler. Self-evaluation and environmental expectations were not separated, but both were considered to be included in the statements of expectancy. Negative valences were not investigated, as it was determined that the angler had freely chosen the activity. Keeping these points in mind, the general theme of EV theory was maintained, while at the same time more practical considerations concerning recreational angling were incorporated. The result, based on these assumptions, is the concept of Importance-Expectation (IE) used in this study.

CHAPTER 5
METHODOLOGY

5.0 INTRODUCTION

"Survey research is a long established method of geographic field research" (Sheskin, 1985), with examples of survey use found in studies of: natural hazard perception (Burton et al., 1970), travel behaviour (Monroe and Halvorson, 1980), cognitive distance (MacEachren, 1980), economic geography (McConnell, 1979) and recreation (Jackson, 1985). Related to fisheries management, "angler surveys are now being used... widely and may involve telephone, mail or aerial surveys in addition to the traditional on site surveys" (Pollock et al., 1994). Examples of human dimension survey research in fisheries issues include work on specialization (Bryan, 1977; Chipman and Helfrich, 1988; and Ditton et al., 1992), motivation (Driver et al., 1984) and angling participation (Adams et al., 1993). This study of motivations, attitudes and behaviours of recreational anglers fits both into the recreational aspect of geographic inquiry, and the human dimension aspect of recreational fisheries management.

As a means of determining opinions of anglers, surveys "may be used to evaluate angler attitudes toward harvest opportunities, seasonal closures, bag limits, stocking, habitat enhancement, and other management programs... social and economic surveys help managers assess the value of fishing to anglers and to local regional economies" (Pollock et al., 1994). With little inquiry into human dimensions in recreational fisheries in Newfoundland and no inquiry having been done on the Salmonier River, a survey was determined as an appropriate means to study the

attitudes of salmon anglers on the Salmonier River.

This chapter will follow the outline for survey research process given by Sheskin (1985). The chapter will include a discussion of: the survey mechanism; sampling frame; sampling issues; questionnaire development; survey logistics; and survey execution.

5.1 SURVEY MECHANISM

Sheskin (1985) identified five different survey mechanisms: personal interviews, mail surveys, telephone surveys, intercept surveys and dual survey mechanisms. As a means of obtaining data on socio-economic data and opinions on angling issues, mail surveys have been identified as a simple and cost effective method (Lowery, 1978; Harris and Bergersen, 1985; Williams et al., 1986; Brown, 1991; Pollock et al., 1994). A mail survey constituted a portion of the survey mechanism of this study. The standard methodology for mail back surveys is Dillman's (1978) total design method (TDM). To use the TDM, as this study did, one must have the address of the respondent to carry out follow up mailings. The fact that no list of names of anglers on the Salmonier River existed necessitated the use of a dual survey mechanism: intercept-mail. Anglers were intercepted before or after fishing on the Salmonier River, given a survey, and their address was elicited.

A second factor leading to the choice of the mail survey was the issue of

intrusiveness. As opinions of the importance of solitude and getting away from others were variables tested in this study, it was decided that a personal interview of 127 questions (the number of questions on the Salmonier Angler Survey) could have lessened the enjoyment of the day of angling for anglers. The intercept of the angler, handing of the survey and elicitation of the anglers address, took on average less than two minutes. This detracted little from the recreational experience of the angler. Indeed, some anglers when approached stated that they did not have time to fill out a survey at that time. Upon learning of the mail back nature of the survey, however, they were willing to participate in the study.

5.2 SAMPLE FRAME

Fowler (1988) defines a sample frame as, "the set of people that has a chance to be selected, given the sampling approach that is chosen". In the case of this study, anglers intercepted at access points to the Salmonier River comprised the set of people with a chance of selection. Intercept surveys do not require a sampling frame (Sheskin, 1985), but can provide sampling frames for telephone and mail surveys (Pollock et al., 1994). A spatio-temporal sampling frame is recommended for access point surveys. These frames consist of all the days available for fishing and all the points of access (Pollock et al., 1994). When nothing is known about the temporal patterns of the fishery, selection without replacement is advised. When fishing effort is greater at

different times than others, stratification of sampling effort is advised (Pollock et al., 1994). With data from DFO (1996a) showing that the angling effort changed over the course of an angling season (Figure 5.1), it was determined that a stratified sample was needed. The method of sample selection is examined in the section 5.3.2.

5.3 SAMPLING ISSUES

5.3.1 Sample Size

Sheskin (1985) has identified five factors in the determination of the sample size of a survey: cost, time, geography, level of accuracy and sub group analysis. Of these five factors, the window of available time for obtaining a sample of anglers was the overriding factor for this study. While the catch and retain angling season was scheduled to last from June 22 to September 15, 1996, variables outside of the control of the study necessitated obtaining as many potential respondents as possible during the early days of the angling season. Variables identified which could affect the ability to contact anglers on the river included: the end of the main run of salmon; closure of the Salmonier River due to low water conditions; and poor weather conditions.

Department of Fisheries statistics from 1984 to 1995 indicated that the number of anglers fishing the Salmonier River is considerably less at the end of July than at the beginning (Figure 5.1). This decrease in the number of anglers fishing the Salmonier River stems from the fact that once the main run of salmon has gone up the river, most

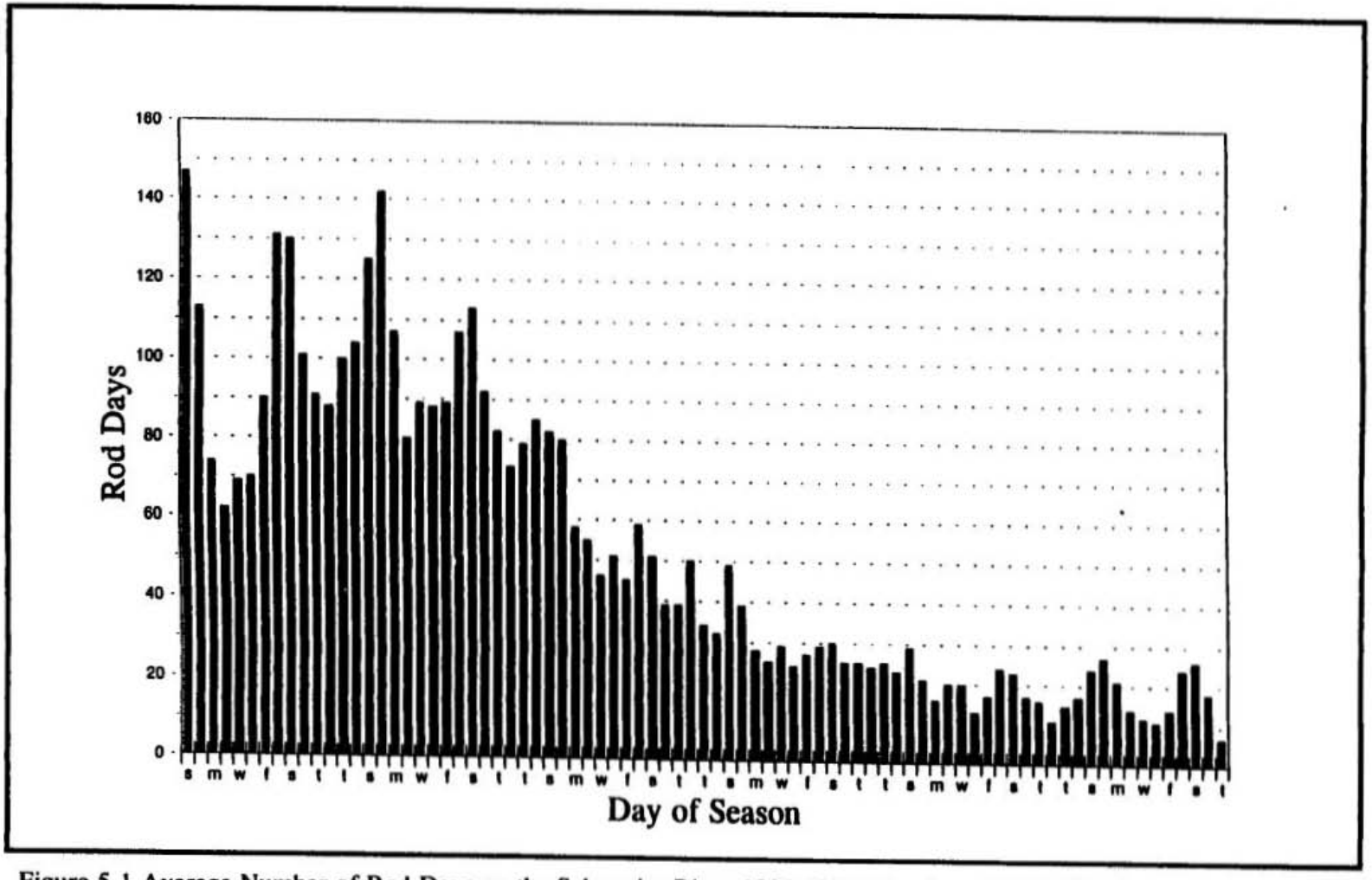

Figure 5.1 Average Number of Rod Days on the Salmonier River 1984-1995 (Based on: DFO, 1996a)

anglers do not fish the Salmonier River.

Closure of the Salmonier River due to low water levels has occurred in two of the last three years for at least a portion of the season. Closure of the river would have eliminated the possibility of obtaining anglers to participate in the study. As opposed to dry conditions, it was not known if poor (i.e. cold, windy, rainy weather) would detract anglers from going to the Salmonier River to fish. A study investigating the cancellation of the sampling of anglers during inclement weather in Texas, found that the percentages of interviews lost from this action would be less than 4% of the total (Spiller et al., 1988). The conclusion reached by Spiller et al. (1988) was that the cancellation on these days was a positive action, as the personnel hours and operating expenses could be redirected to more conducive sampling days. The potentially short angling season on the Salmonier River, however, did not afford this luxury to this study.

While low water levels were identified as a reason for a shortened intercept survey period prior to the season, high water levels were not. For the 1996 season extremely high water levels early in the season meant that the salmon were able to go up the Salmonier River earlier than usual. The total rainfall in the first six days of July 1996, 125.8 mm, was greater than the average normal rainfall for the entire month 106.2 mm (Environment Canada, 1996). The total rainfall for the month of July was twice the normal (212.2 mm as compared with 106.2 mm). This heavy rainfall

translated into fewer anglers fishing the river, and fewer surveys than anticipated being distributed.

Costs played the next major factor in the determination of the sample size, as no outside funding was obtained for this study. In kind support from the supervisor of the principal investigator came in the form of printing, stamps, money for gas, and the use of three students for 80 hours of work each. As weekends early in the season are traditionally the heaviest fished periods on the Salmonier (Figure 5.1), these students were used for the first five weekends during the season. This was done to maximize the potential number of anglers contacted.

Limited money for gasoline also affected the number of times which the approximately 120 Km round trip could be taken. Again it was decided to maximize trips up to the fifth weekend of the season, when the majority of anglers fished the Salmonier River. Money was put aside for exploratory trips during the remaining part of the season. These exploratory trips were to ensure that, as in past seasons, few anglers fish during the months of August and September. This was verified to be the case during the 1996 angling season as well.

Geographically, the more dispersed a population is, the larger the necessary sample size (Sheskin, 1985). The focused nature of this study, i.e. salmon anglers on one specific river, meant that larger numbers of contacts were not as important to obtain as compared to other studies such as **The Importance of Wildlife to Canadians**

(Filion et al., 1991).

To achieve the level of accuracy which is the standard in research studies, 95 % confidence level with a ± 5% confidence interval, a minimum of 384 responses are necessary (Sheskin, 1985). Most researchers try to obtain about 400 completed surveys, as some results must be discarded during analysis (Sheskin, 1985). The "total design method" (TDM) of Dillman, used in this study, averages a response rate of 74%, with no response rate less than 50% (Dillman, 1978). These facts gave a target of between 540 and 800 surveys to be handed out. At the end of the intercept portion of this research, a total of 513 anglers had been given a survey.

5.3.2 Sample Selection

Data for this study were obtained from both an intercept survey and from a self administered mailback survey. The procedure for each of these survey mechanisms is discussed here.

An intercept survey involves either the distribution of a self administered form, or the personal interviewing of users of a given facility (Sheskin, 1985). In this study both the distribution of a survey and personal interviewing took place. The personal interview was limited to determining the angler's name, and mailing address. The interview took, on average, less than two minutes. This length was in keeping with the recommendation of the Tourism and Recreation Research Unit (1983) which

recommend either a two minute short questionnaire, or a five to ten minute longer questionnaire. Brevity was seen as important as the study wanted to be as unobtrusive to the fishing experience of the angler as possible.

Sampling effort can be allocated three ways: uniformly across all sampling units, by expert opinion, or by assigning sampling effort proportional to the angling effort (Stanovick and Nielsen, 1991). Sampling proportional to the angling effort increases the number of anglers contacted per unit of effort by concentrating sampling in stratum with high levels of angling (Malvestuto, 1983; Stanovick and Nielsen, 1991), and was used for this study. As no listing of the anglers fishing the Salmonier River was available, the sampling procedure was determined prior to the salmon season from examination of DFO statistics. The rod days statistics for the Salmonier River over the past 12 years constituted the raw data. DFO has broken down these data by day and for each of the three sections of the Salmonier River (DFO, 1996a). Figure 5.1 graphically indicates the average number of rod days starting at the first day of the catch and retain season. For all but one season (1991) this opening day has been on a Saturday.

As the dates of the opening of the season vary from year to year, it was decided to match the first Saturday of each season to determine the average numbers of anglers on each day. The average number of rod days were calculated assuming no closure of the river due to quotas being reached or closure due to low water levels. This was done

as no catch quota existed for the 1996 angling season and closures due to low water levels were beyond the control of this study.

The average number of rod days for the Salmonier river as a whole was found to be 4301. Seventy-six percent of these rod days, or 3428, occur during the first five weeks of the angling season. The remaining 24%, or 1053 rod-days, occur in the remaining portion of the season, which is approximately eight weeks long. These data clearly showed the need to maximize effort during the first five weeks of the season.

A rod day is defined as one angler fishing for a portion of one day at one place. Thus, these statistics show absolute numbers of anglers and not necessarily the number of different anglers fishing a river. One angler, for example, could be counted at one section of a river, move to another section that same day, be counted again, and account for two rod days. Similarly one angler could fish two different days and be counted twice. Conversely, an angler might not be counted at all, if he or she was not seen by the river warden. For this reason, there is a potential for a number of the anglers fishing after the first five weeks to have already been contacted in the first five weeks. The best indicator for determining the numbers of anglers returning to the river to fish, was the number of anglers asked to take a survey who had already been contacted. This is discussed in the field results section of the results chapter.

To determine the sampling effort for each of the three sections of the river (Upper, Middle and Lower), the average number of rod days for each of the sections

was found. Table 5.1 indicates the average number of rod days and the percentage of the total for each section.

Table 5.1: Rod Days By Section Of The Salmonier River

SECTION of SALMONIER	AVERAGE NUMBER of ROD DAYS (1984-95)	PERCENT OF TOTAL ROD DAYS
Upper	1061	24.7%
Middle	1723	40.1%
Lower	1517	35.2%

(Source: DFO, 1996a)

With the aid of the three student assistants, each of the three access points and the Lower section of the river could be sampled 100% on Saturdays and Sundays. Weekdays saw the principal investigator intercepting anglers for one half of that day using two stage sampling. Two stage sampling first determines the day of sampling and then determines whether the sample will take place in the morning or afternoon (Pollock et al., 1994). It was decided that each work week during the first four weeks of the season would be considered a stratum from which to be sampled. This decision came as a result of the uncertainty of the river remaining open from week to week. From the DFO data indicating the percent of total rod days, each of the sections were sampled approximately proportional to the percentage of the total rod days. As Pinsent's and Governor's Falls were both located in the Middle section of the river, sampling of anglers occurred one day a week at each location. The Lower section was

sampled twice a week and the Murphy's Falls access to the Upper section was sampled once a week. The method of sampling one site per day is the method of choice in fisheries surveys when there are five or less sites (Hayne, 1991; Pollock et al., 1994).

To determine the secondary sampling unit (i.e. AM or PM) from Monday to Thursday, a coin toss determined the sample time. With regards to the Lower section, if AM was determined for the first sample day, the second sample of the week would take place in the PM. Fridays were systematically sampled in the PM as it was considered the beginning of the weekend with higher numbers of anglers fishing in the evening. The result of this system of sampling was the schedule shown in Table 5.2.

Table 5.2: Schedule of Sampling on Weekdays

Monday	Tuesday	Wednesday	Thursday	Friday
no sample taken	AM Upper	AM Pinsent's	AM Governor's	PM Lower
PM Upper	AM Pinsent's	PM Lower	AM Lower	PM Governor's
PM Lower	AM Governor's	PM Pinsent's	PM Upper	PM Lower
AM Lower	AM Pinsent's	PM Lower	AM Governor's	PM Upper

Stratification into a series of time blocks, as done for this study, allows a regular allocation of clerk time and spreads sampling more evenly over the sampling

period (Hayne, 1991). The method of stratification used here was similar to that of a roving creel study undertaken on Pomme de Terre Lake in Missouri (Dent and Wagner, 1991). Dent and Wagner (1991) stratified weekdays and weekends, as well as work periods throughout the day.

In addition to the principal investigator, on four occasions one or two of the student assistants were able to assist on weekdays. These days allowed for the sampling of the Middle section four more times and the Upper section once. Table 5.3 shows the comparison of the percent sample for each section along with the percent rod days for each section. A sample period consisted of either a morning or evening session. Weekend sampling, therefore, obtained two sampling periods per site per day.

Table 5.3: Percent Sampling Periods By Section Of The Salmonier River

SECTION	AVERAGE PERCENT ROD DAYS	PERCENT SAMPLE PERIODS
Upper	24.7%	26.6%
Middle	40.1%	45.6%
Lower	35.2%	27.8%

Based on 79 sampling periods where a sampling period is half a day

The slight over sampling of the Upper and Middle sections of the Salmonier, came as a result of the high water levels on the Salmonier River during the salmon season. The higher than ususal water levels enabled salmon to swim more easily to the

upper reaches of the river. Thus, the anglers likewise moved up the river to fish where the salmon were. Table 5.4 shows the 1996 rod days as compared with the normal, and the sample periods for the study.

Table 5.4: Comparison Of Rod Days: Average, Actual And Sample

SECTION	PERCENT ROD DAYS AVERAGE	PERCENT ROD DAYS 1996	PERCENT SAMPLE DAYS
Upper	24.7%	29.8%	26.6%
Middle	40.1%	42.2%	45.6%
Lower	35.2%	28.0%	27.8%

While it was initially decided to travel to the Salmonier River each day for the first five weeks, the early run of salmon meant that the numbers of anglers fishing the Salmonier River dropped dramatically. This fact made it not worthwhile to travel 120 km to the river each day to obtain two or three new participants for the study. One random weekend day and site was chosen to be sampled for each of the sixth, seventh and eighth weeks. This sampling attempt resulted in two new surveys being handed out and six repeat anglers being intercepted, thus no further trips were taken to the Salmonier River after August 10.

A combination of two intercept contact methods were used due to the nature of the alignment of the Salmonier River to Route 90. Three point access sites exist in the Middle and Upper regions of the river. The Lower section of the river runs within

sight of Route 90, thus making access available at a series of points. A point access method was used in the Middle and Upper regions of the Salmonier River, at the access points for Governor's Falls, Pinsent's Falls and Murphy's Falls.

A modified bus route method was used for the Lower section of the river. Bus route surveys were developed for fisheries with many access points spread over a broad area (Robson and Jones, 1989; Jones et al., 1990). Routes are usually set up to be travelled over one day (Pollock et al., 1994) with each site visited for a specific amount of time, and departed on a precise schedule (Jones and Robson, 1991). The Lower section of the Salmonier River runs from the mouth of the Salmonier, four kilometers north to Viker's Road. The first day of sampling found that the main parking areas for the Lower section were at Viker's Road, and at the Flats. These sites were found to be much more heavily utilized than other areas of the river (i.e. Back River Pool, Sandy Point, the Old Bridge and the New Bridge). For this reason the Flats and Viker's Road were used as terminus points for the bus route.

One of these two terminus sites were randomly chosen each sampling day. The principal investigator would remain at this site for 45 minutes, then drive the four kilometers between them over a period of 15 minutes. Forty five minutes would then be spent at the other terminus and then the four kilometers would be driven over again, back to the starting point. Any anglers seen at their car between these two terminus points were approached and asked to participate in the study. One concern of the bus

route method is the travel time between access points. This is often 'lost' sampling time (Pollock et al., 1994) which can incorporate hours of potential sampling time (Jones and Robson, 1991). In the case of this study, the travel time between sites was still part of the sample time and enabled the sampling of anglers, which is not the case of a traditional bus route survey.

Two concerns identified in angler surveys are duplication and avidity bias (Pollock et al., 1994). In the case of this study duplication was avoided, as anglers would indicate if they had already been approached by an investigator at a previous time. A check of the names and addresses of all anglers once the field work had been completed also ensured that duplication had not taken place. Avidity bias results when anglers are sampled proportional to their frequency of fishing, and not with equal probability (Pollock et al., 1994). This was avoided by the random method of access point selection discussed previously.

5.4 QUESTIONNAIRE DEVELOPMENT

Sheskin (1985) suggests that any serious questionnaire development should evolve over at least four to six weeks and should follow an eight step procedure (Figure 5.2).

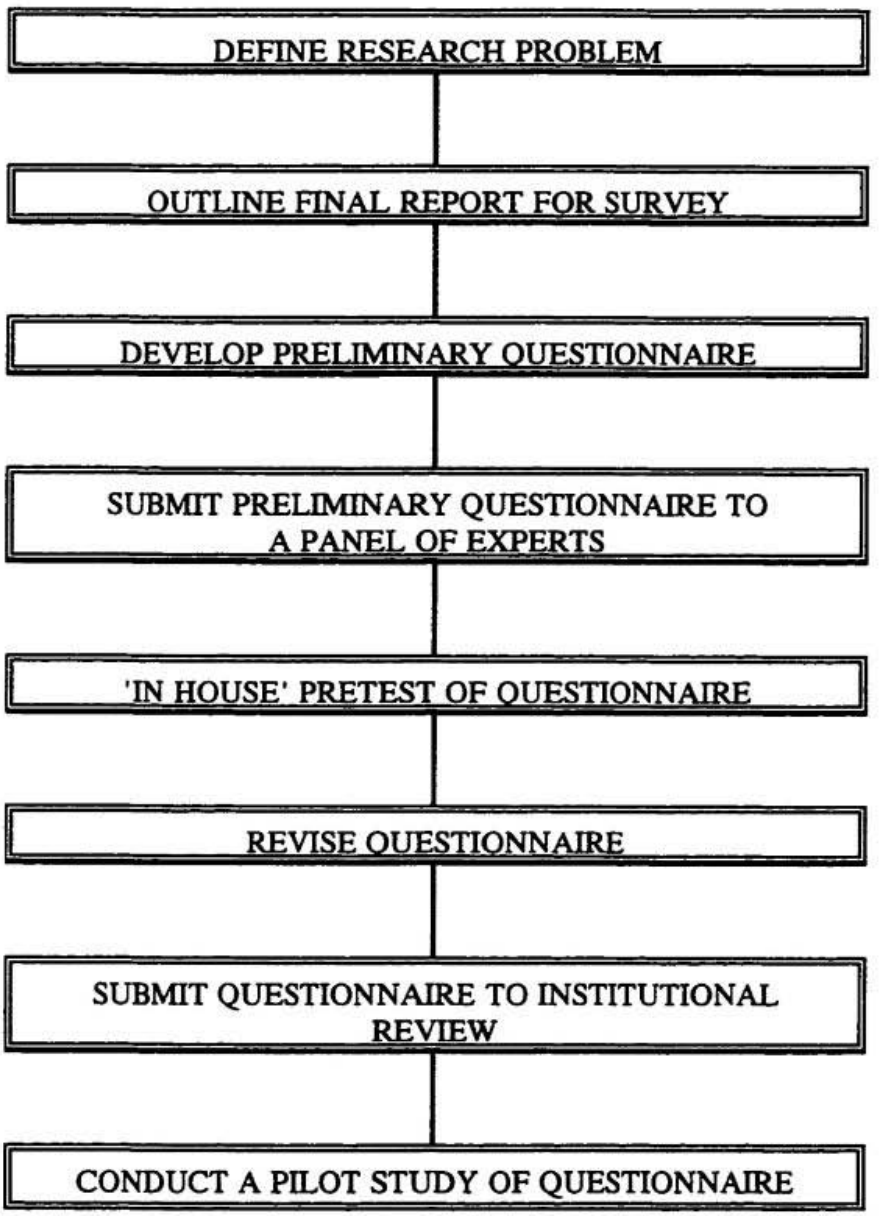

Figure 5.2: Questionnaire Development Model (Sheskin, 1985)

Initial development of the questionnaire began eight months prior to the development of the survey instrument with meetings with The Atlantic Salmon Federation, The Gander River Management Association and a member of the Economic Recovery Commission of Newfoundland. These meetings indicated a need for the investigation of the attitudes of anglers towards various management issues facing the recreational salmon fishery.

From these meetings the research problem was defined and a list of possible questions to investigate the problem was drafted. The preliminary questionnaire was fashioned after angler surveys conducted in Texas (Riechers et al., 1991; Ditton et al., 1990), and Canada (Filion et al., 1991). The survey instrument modified questions so as to be specific to the Salmonier River. This was done as it was felt that attitudes toward different topics would be different for different rivers. The knowledge section of the survey comprised of three different components. The largest of these concerned regulations and other information which was found in the **1996 Newfoundland and Labrador Angler Guide** (DFO, 1996b) This guide was supposed to accompany every anglers license, therefore, every angler should have had access to the answers to these questions. A question on the survey determined if the angler did in fact receive this guide. The second knowledge component comprised of questions concerning the physiology of the salmon. These questions were taken from angler books specific to salmon angling (Wulff, 1958; Anderson, 1985; Anderson, 1990). The final knowledge

section concerned the Salmonier River itself, and was designed from the expert opinion of long time anglers of the Salmonier River.

The preliminary questionnaire was reviewed by Dr. Alistair Bath of the Geography Department of Memorial University and Rick Maddigan, acting president of the Salmonoid Association of Eastern Newfoundland (SAEN). This multidimensional review resulted in a revision of the questionnaire which was then 'in house' pretested in the Department of Geography at Memorial University. Colleagues in the department completed the survey, and pointed out any questions which they had difficulty understanding. Several grammatical changes were made following this 'in house' test.

With the in house test completed, the survey was pilot tested. A "pilot study is a complete run through of the entire survey process and is conducted with a sample of respondents selected in the same manner as for the main survey" (Sheskin, 1985). As the angling season was not open at the time of pretesting, selecting respondents in the same manner as the main survey was not possible. To wait for this time would have cut considerably into the possible sample period. To emulate the study, a group of salmon anglers were asked to complete the survey. This group consisted of anglers who both: opposed and supported catch and release; were members and non-members of angling clubs; were blue and white collar workers, as well as students. The ages of these people ranged from 13 to 54. The pretest was completed by 12 anglers. Resulting from this pretest was the addition of choices for some questions, and the rewording of some

questions. This survey was then sent to the Ethics Committee of Memorial University which decided that the survey and study did not require official approval from the University. The revised survey was once again examined by the panel of experts, thus completing the steps suggested by Sheskin (1985).

The result of this eight step process was a 127 variable survey instrument (Appendix 1). The survey was comprised of six different sections: incentives for angling; angling related behaviours; attitudes towards selected fisheries management issues; expectancies for angling on the Salmonier River; knowledge of angling related questions; and a socio demographic section. Both open ended and closed ended questions were asked.

Open ended questions were asked where the number of potential answers were high. The open ended question, "What is your favourite river in Newfoundland?" for example elicited 50 different responses. Other questions such as "Where do you sleep while you fish the Salmonier River?" included the option 'other' to attempt to be inclusive of possible responses which were not identified in the pretesting.

Attitudinal questions were asked using a seven point Likert scale. This odd numbered scale allowed for the option of a neutral response to questions relating to management options. While Nunnally (1957) showed that an even number of responses may give a more accurate understanding of attitudes, it was decided that not all management options or reasons for fishing may be relevant to all anglers. The neutral

option was therefore added to gain more accurate data. The Likert scale used for incentives for angling ranged from 'not at all important' to 'very important'. The opinion statements about management issues ranged from 'strongly oppose' to 'strongly support'. The behavioural section determining the use of different sources of angling information ranged from 'no use' to a 'great deal of use'.

Following the method of survey design suggested by Sheskin (1985), the most important questions, in this case dealing with incentives for angling, were placed first on the survey. The survey placed socio-demographic questions at the end to lessen the chance of offending a respondent by sensitive questions of age, income or schooling (Sheskin, 1985). This format is followed to ensure the saliency of the questionnaire is seen by the angler from the outset.

The final survey was printed on light blue paper in booklet form. The introduction letter on the front of the survey was signed by the principal investigator with a hard tipped blue pen, on a hard surface. This left an imprint on the survey, showing the angler that the signature was written and not stamped. This conforms with the personalization suggested by Dillman (1978) to help increase the response rate.

To add a saliency component to the front of the survey, an icon of a fish hooked on a fly was placed at the top of the front page (Figure 5.3). This same icon was used in all correspondence with the angler: postcards, second and third mailings of the survey, and the letters accompanying the follow up surveys. This made all

correspondence with the angler instantly identifiable, and reminded the angler of their agreement to participate in the study.

Figure 5.3: Icon Used For Identification Of Survey Related Materials

5.5 SURVEY LOGISTICS

The quality of an interview study depends, to a great extent, upon the quality of the interviewers (Sheskin, 1985). For intercept surveys with self administered forms, concern over the appearance of the interviewers and their training for questions about the survey must be raised (Sheskin, 1985). Fowler (1988) suggests two personal characteristics for sound interviewers: a confident assertiveness, and a knack for instantly engaging people personally. To these characteristics Sheskin (1985) adds the need of interviewers not to violate the norms of ethical behaviour in survey research. Each of the three students assisting in this study were chosen, in a large part, due to their possession of these characteristics.

The student interviewers for this study ranged in age from 22 to 24 and all were in the final year of the Geography Program at Memorial University. None of these

students had previous interviewing experience. This lack of experience was not seen as a concern, as more experienced interviewers have been found to be more casual in how they read their questions than new interviewers (Bradburn and Sudman, 1979). This can result in added bias entering the survey process (Fowler and Mangoine, 1990).

Two of the interviewers were male and one female. Studies have shown female interviewers to have a higher response rate than male interviewers (Fowler and Mangione, 1990). This study did not follow this trend. Refusal rates for participating in the study for all of the interviewers was insignificant (one refusal of 514 contacts).

Training of interviewers is an important aspect of the data collection process (Fowler and Mangione, 1990). These sessions enable interviewers to have fewer non-responses on sensitive questions and typically higher overall response rates (Billet and Looseveldt, 1988). For this study interviewers were given a morning session of training. This single session of training is not abnormal as "many surveys ... utilize interviewers who have received less than one day of general interviewing training" (Fowler and Mangione, 1990). During the training, the purpose of the study was reviewed along with an overview of the study area. Potential problems while interviewing were identified and possible solutions to deal with these problems were offered. The interviewers were given copies of the survey instrument prior to the training session and were encouraged to communicate any problems or concerns they might have with the survey.

Supervision is an important aspect of the interviewing process (Fowler, 1988). In this study supervision was not possible. In lieu of this, follow up meetings at the end of each day identified any problems or concerns of the interviewers. Because of the high rate of repeat anglers, the principal investigator met many anglers who had been intercepted by the students. At no time was any mention made of problems with the interviewing process.

The importance of consistency and limiting interviewer effects has been identified in the interviewing process (Fowler, 1988). For this reason, a standard introduction was written and this script was followed by each of the interviewers.

5.6 SURVEY EXECUTION

The execution of this study consisted of two parts, the intercept at the river and the total design method of Dillman (1978). This section looks at each part in turn.

As escaping others has been noted as a reason for angling (Driver and Knopf, 1976), anglers were intercepted at their vehicles, rather than on the river. This minimized any disruption to the fishing experience of the angler.

The next to pass rule was used in the intercepting of anglers at access points. This is the best method to use to select a respondent for intercept surveys (Sheskin, 1985). As an angler passed a predetermined object or imaginary line, he or she was approached and asked to take a survey. Upon acceptance and acquisition of his or her

address, the next angler to cross the imaginary line was approached. In the case of a group of anglers, the first to cross the imaginary line would be asked to take a survey. Due to the dispersed nature of anglers leaving the river most anglers seen leaving the river were asked to participate in the study. This dispersed nature also meant that bias of the interviewer in choosing the participant was low.

In the case of the Lower section of the river, while parked at one of the terminus points, the next to pass rule was followed. While the four kilometers were being driven, any angler seen at his or her car, was approached on foot, and asked to participate in the study.

Expert opinion from seasoned anglers of the Salmonier River indicated that the first anglers access the river before daylight, to ensure their spot on the river at dawn. This early hour was unfeasible to sample. Background research also indicated that a small portion of anglers would be exiting the river between 0600 hrs and 0700 hrs with the majority leaving after 0800 hrs. With this in mind, attempts were made to have the interviewers at the access points before 0730 hrs on weekends. The first two days of weekend interviewing lasted throughout the day and indicated that between 1300 hrs and 1600 hrs few anglers exited or accessed the river. This information led to the decision to sample from 0730 hrs to 1300 hrs, take the afternoon off, and resume sampling from 1600 hrs until dusk, which averaged around 2100 hrs. Thus, each of these sampling periods were approximately five hours in length. Expert opinion also

indicated that some anglers fished the river weekdays before work. For this reason, the sampling on weekdays began at 0600 hrs to catch anglers before they returned home for work. Each of these five hour sessions was considered a "Sample Day" for the purpose of this study.

Short intercept interviews can, "create a sense of involvement which leads them to complete the subsequent longer survey" (Sheskin, 1985). This fact, combined with the high percentage of return anglers who were reminded of the study each time they saw one of the interviewers, may have increased the response rate. Indeed, the interviewers became a source of information for the anglers about numbers of anglers on the river and fish caught. This relationship between angler and interviewer may have increased the response rate. Care was taken in discussions with anglers not to give any indication of the personal attitudes towards the issues being studied.

The survey, which had been placed in an unsealed stamped white envelope was handed to the participant. The use of white envelopes rather than manila, and colourful adhesive postage stamps are methods identified to increase response rates (Sheskin, 1985). The angler was handed the envelope in a manner that the stamps on the envelope could be seen, and at the same time the prepaid nature of the study was mentioned. On the back flap of each envelope was the hand written message "Thank you, Peter". This added a personal touch and followed the method used by Bath (1993) to increase response rate. Two stamps were placed on each envelope, a 40 cents and 5

cents to make up the full postage. These were adhesive stamps and not postage paid, following the suggestion of Dillman (1978). On rainy days, the survey and letter were placed in a clear plastic bag to ensure the survey stayed dry. As anglers were contacted for the most part at their vehicle, most surveys went right into the vehicle and did not require the plastic bag.

5.7 COMPLETE DESIGN METHODOLOGY

With the survey having been accepted by the angler the second portion of the study execution took place. This roughly followed the total design method of Dillman (1978). Dillman's approach stresses the importance of professionalism, personalization, honesty, directness and attention to detail in survey work to minimize nonresponse. TDM follows the following steps: first mailing, post card, second mailing, third mailing and a follow up phone call.

The intercept nature of this study meant that the first mailing was replaced by the short interview and acceptance of the survey at the access points to the river. This was carried out of necessity due to the lack of a sampling frame. An outcome of this method was a more personal approach, a dimension recommended by Dillman (1978). The survey would be associated with a person rather than a voice on the telephone asking to participate in a survey. One definite positive result of this method was a very low refusal rate to participate in the study. Of the 514 different anglers asked to take a

survey, only one declined. This refusal came from a middle-aged male at the access to Pinsent's Falls, and happened to be the first person asked to participate in the study.

The second step of the TDM requires a combination thank you/reminder post card (Appendix 2) to be sent to all anglers taking a survey. Dillman (1978) recommended this postcard being sent out one week after the survey had been sent. The daily handing out of surveys would have created a logistical nightmare had this been done for each survey. It was decided therefore to have a mass mailing of postcards sent to all anglers contacted up to the Thursday of each week, on the Friday of that same week. This allowed at least three full days (Friday, Saturday, and Sunday) for the anglers to have the survey before receiving the reminder.

The third step of Dillman's TDM requires a second mailing of the survey to all anglers who had not returned their survey. This took place two weeks after the postcard had been sent and three weeks after the angler had been given the survey. This mailing included a letter (Appendix 3) indicating the importance of the study and offering the possibility of the subject having lost their survey. This letter was signed in blue ink by the principal investigator. Nine of the second mailings were returned undeliverable due to incomplete addresses, or the person having moved. Attempts made to obtain the complete addresses of these people were to no avail.

The fourth step of Dillman's method requires a third mailing of the survey to all non-respondents following the second survey. This occurred in one mass mailing to all

non-respondents on September 10, ten weeks after the first postcard had been sent and five weeks after anglers from the fifth week had been contacted. This mailing also included a letter (Appendix 4) indicating the importance of their views and explained how their responses may in fact be different from other respondents. This letter was also signed by the principal investigator in blue ink.

The final step in Dillman's Total Design Method is a telephone follow-up survey to a sample of the non-respondents to the survey. With the final response rate of 77.4% from the mailings and a limited budget, this was deemed as unnecessary and not feasible for this study.

CHAPTER 6
FIELD AND SURVEY RESULTS

6.0 INTRODUCTION

This chapter looks at the results from the returned 1996 Salmonier River Salmon Angler surveys. Of the 513 surveys handed out, 397 were returned for a response rate of 77.4 percent. The chapter first examines the field results of the returned surveys, and then examines the results of the responses to the six major sections of the survey: incentives for angling; expectancies of anglers fishing the Salmonier River; angling behaviours and preferences; attitudes towards various angling management tools; knowledge of salmon issues; and socio-economic findings. A more detailed analysis of the data, with linkages to the literature, and implications for fisheries managers, occurs in the chapters which follow.

6.1 FIELD RESULTS

A major concern of any survey research is the entry of bias into the results. Field results are examined to determine if any results must be questioned due to bias in the collection of data. Also, examination of the field results can aid future research by noting where modifications in the research methodology can result in more sound sampling procedures. This section looks at response rates and the issue of repeat anglers on the Salmonier River.

6.1.1 Response Rates to the Study

When examining the response rates across the three sections of the Salmonier River, a chi-square-goodness of fit test determined that the lower section had a statistically higher ($p=0.0191$) response rate than the middle and upper sections (Table 6.1). This was probably due to the fact that the principal investigator handed out all of the questionnaires in the Lower section. Undoubtedly, the importance of the study would be communicated to a greater extent by the principal investigator than one of the student assistants. This fact is also noted in Table 6.2, where the principal investigator had a higher response rate than the student assistants. A chi-square test on the returned surveys likewise found a statistically significant difference between administrators of the survey ($p=0.0023$). With the principal investigator removed from this goodness of fit test, no differrence ($p=0.8814$) was found between the three assistants. While statistically different, no bias was expected to have occurred from the higher response rate to surveys given out by the principal investigator.

Table 6.1: Response Rate By Section Of The Salmonier River

SECTION	SURVEYS OUT	SURVEYS BACK	% RETURN
Lower Section	202	169	83.7%
Middle Section	215	158	73.5%
Upper Section	96	70	72.9%

Table 6.2 Response Rate By Investigator

INVESTIGATOR	# SAMPLE PERIODS	# of SURVEYS OUT	# of SURVEYS BACK	PERCENT RETURN
Principal Investigator	37	256	210	82.0%
Assistant 1	15	87	65	74.7%
Assistant 2	17	92	66	71.7%
Assistant 3	13	78	56	71.8%

The usefulness of second and third mailings are duly noted in Table 6.3. As only nine surveys were given out in the fifth week, only the first four weeks are analysed for the effects of second and third mailings. The second mailing increased the response to the survey an average of 22.1%, with the range going from a high of 26.8% for the third week to 17.6% for the fourth week. The average increase resulting from the third mailing of the survey was 5.8%, with a range from 2.8% for the third week to 11.8% for the fourth week. Overall, the second mailing increased the response by 23.8% and the third mailing increased the overall response by 4.7%. While the third mailing did not increase the sample considerably, it did provide the study with enough usable surveys to reach the 95% confidence level with a $\pm$ 5% confidence interval desired for statistical analysis.

One possible explanation for the higher final response rate for anglers given a survey in the first week, than those given a survey in the fourth week (Table 6.3) is

repeat anglers. Anglers contacted in the first week had more chances to be reminded in following weeks about the survey when they returned to the river to fish. Anglers of the fourth week would only have had one extra week to come into contact with someone handing out the survey.

Table 6.3 Response Rate By Week Of Survey

SURVEYS HANDED OUT	% RESPONSE AFTER POST CARD	% RESPONSE AFTER SECOND MAILING	% RESPONSE AFTER THIRD MAILING
WEEK ONE n=224	49.1% n=110	75.9% n=170	80.4% n=180
WEEK TWO n=138	52.2% n=72	70.3% n=97	74.6% n=103
WEEK THREE n=108	50.0% n=54	76.8% n=83	79.6% n=86
WEEK FOUR n=34	35.3% n=12	52.9% n=18	64.7% n=22

As found in other studies (Dawson and Brown, 1989; Connelly et al., 1990b; Ditton et al., 1991; Hunt and Ditton 1996) the number of women angling was considerably less than the number of men (Table 6.4). However, response rates for both groups were comparable, with no statistical difference between groups ($p=0.8934$).

Table 6.4 Response Rate By Gender

GENDER	# PARTICIPATING IN SURVEY	% TOTAL SAMPLE	# SURVEYS RETURNED	% RETURN RATE
MALE	492	95.9%	381	77.4%
FEMALE	21	4.1%	16	76.2%

6.1.2 Repeat Anglers in the Study

The percentage of anglers contacted over the angling season a subsequent time, after they had taken a questionnaire, increased dramatically as the season went on (Table 6.5). By the fifth week over 63% of all anglers contacted had already taken a survey. This, in part, lead to the decision to cease going to the Salmonier River to hand out surveys after the fifth week.

Table 6.5 Percent Repeat Anglers By Week

WEEK	# ANGLERS CONTACTED	# REPEAT ANGLERS	% REPEAT ANGLERS
WEEK ONE	283	59	20.8%
WEEK TWO	250	112	44.8%
WEEK THREE	226	116	51.8%
WEEK FOUR	68	34	50.0%
WEEK FIVE	19	12	63.2%

Analysis of response rates between sections of the river found that the

percentage of repeat anglers was higher for the Upper section than the Lower and Middle sections (Table 6.6). A chi-square goodness of fit test found that this difference was statistically different ($p=0.0234$). Ease of access is probably the reason for this finding. Anglers can easily access the Lower section, and therefore many different anglers could access the river here. The Upper and Middle sections require more of an effort to access them. Because of this, an angler willing to access these sections once, would probably be willing to access them several times over the run of a season. This would be done to fish the better pools of the Salmonier River which are located in the Upper and Middle sections.

Table 6.6 Percent Repeat Anglers By Section Of The Salmonier River

SECTION	# ANGLERS CONTACTED	# REPEAT ANGLERS	% REPEAT ANGLERS
Lower	305	103	33.8%
Middle	362	147	40.6%
Upper	179	83	46.4%

6.2 SURVEY RESULTS

The concept of the "average angler" can be misleading and thus, can lead to ineffective management of a recreational fisheries resource. This "average angler" is often derived from national or provincial statistics, and is then used in the design and/or evaluation of management decisions at the watershed, or river, level. Accordingly, the averages presented in the following sections are specific to salmon

anglers of the Salmonier River, and are therefore defined spatially, temporally, and by species fished. These sections provide useful insight in the form of baseline data on this group of recreational anglers, and could therefore be used for more effective management of salmon angling on the Salmonier River.

6.2.1 Incentives For Salmon Angling

The initial section of the survey dealt with the importance of different incentives for salmon angling. This choice followed the suggestion of Sheskin (1985) to begin a survey with a topic salient to the respondent. The statements used were the same as those suggested, and used by Fedler and Ditton (1994). Eighteen different incentives for angling were evaluated by the respondents on a seven point scale ranging from "not important at all" (1), to "very important" (7). From highest to lowest, the mean response of each incentive for salmon angling is presented in Table 6.7. All importance questions are deemed to be accurate at a confidence level of 95 percent with a confidence interval of $\pm$ 5 percent.

While the catch incentive of "the excitement of the catch " resulted in the highest overall mean score, two thirds of the top nine incentives were non-catch-related. Five of the nine incentives with the lowest scores, on the other hand, were catch-related.

Table 6.7: Mean Item Scores For Incentives For Salmon Angling, where a value of 1.0 indicates not at all important and 7.0 indicates very important

INCENTIVE	Mean Score	Standard Deviation
Excitement of the catch	6.48	1.03
To be outdoors	6.19	1.22
For relaxation	6.14	1.26
For the challenge or sport	5.90	1.42
To get away from the regular routine	5.81	1.43
To experience natural surroundings	5.67	1.48
To develop angling skills	4.79	1.89
To be with friends	4.83	1.78
For physical exercise	4.97	1.78
To be close to the water	4.55	1.96
To experience new and different things	4.40	1.93
To obtain a salmon for eating	4.37	1.94
To land a "trophy" salmon	4.00	2.26
For family recreation	3.85	2.12
To get away from other people	3.83	2.14
To catch a limit of salmon	3.67	2.15
To catch and release a salmon	3.19	1.96
To test my equipment	2.92	1.84

The frequencies of the incentive statements are now examined along the following domains: catch-related incentives, social incentives, psychological/

physiological incentives, and incentives relating to the natural environment. Fedler and Ditton (1994) use these categories and an additional category called skill and equipment. For the purpose of this study skill and equipment are included in the catch category. The social, psychological/physiological, and natural environment incentives are combined later in this study to become the non-catch incentives.

6.2.1.1 Catch-related Incentives For Salmon Angling

The catch-related incentive with the highest mean response was also the incentive with the overall highest mean response: "for the excitement of the catch". Seventy-three percent of anglers indicated that this was very important, with 93 percent giving a value of 5, 6 or 7, resulting in a mean score of 6.48. Only seven percent indicated that this was "not at all important" to "somewhat important" (values 1,2,3,4).

Eighty-three percent of respondents indicated that "the challenge or sport" was more than somewhat important as an incentive for salmon angling, with 47 percent indicating very important. Approximately 17 percent indicated that as an incentive to fish, challenge was not at all to somewhat important. Along with the indication of the importance of challenge or sport, the importance of salmon as a food is made clear from the responses to, "Obtaining a fish for eating". A minority of anglers (30 percent) indicated that this was less than somewhat important as an incentive for fishing. Forty-eight percent responded with a value of greater than somewhat important, while 23

percent indicated somewhat important.

The importance of the skill involved in salmon angling is noted by 64 percent of anglers indicating that developing skills was more than somewhat important. Ten percent of respondents saw developing angling skills as not at all important as an incentive for angling salmon.

As an incentive to fish for salmon, landing a trophy salmon was fairly evenly divided amongst anglers. Twenty-three percent indicated that this was very important, and 25 percent indicated that this was not at all important. Approximately a third of anglers indicated that "catching and releasing a salmon" was not at all important as an incentive for salmon angling. A minority of anglers (23 percent) gave a response greater than somewhat important, while twenty-seven percent chose somewhat important as their response to catching and releasing a salmon.

Of all the incentives for salmon angling provided, testing equipment had the lowest mean response. Sixty-two percent of anglers indicated that this was less than somewhat important, with 34 percent indicating that it was not important at all. Only six percent indicated that this was very important.

6.2.1.2 Social Incentives For Salmon Angling

For Salmonier anglers, fishing with friends was seen as a greater incentive to fish than fishing with family. Sixty percent of anglers responded with a value of greater

than somewhat important, with 21 percent indicating very important to being with friends. Nineteen percent indicated that this was less than somewhat important, and of these only eight percent said it was not at all important. The mean response for this incentive was 4.83 of a possible 7.0.

Responses to "for family recreation" were fairly evenly divided amongst anglers. Seventeen percent indicated very important, while 23 percent indicated not at all important. The largest group of anglers (44 percent) indicated a value of three, four or five, near the central response of somewhat important (4). The resulting mean response was just less than 4 at 3.85.

The mean response for the incentive to get away from other people, 3.83, was slightly lower than the mean response for family recreation. As an incentive to get away from other people, over a quarter (26 percent) indicated this as not at all important. Still, 40 percent indicated that this was more than somewhat important with 15 percent indicating very important.

6.2.1.3 Psychological/Physiological Incentives For Salmon Angling

The psychological/physiological motive for salmon angling "for relaxation" was seen as more than somewhat important by 87 percent of respondents, and had the third highest mean response of any incentive at 6.14. Nine percent indicated that this was somewhat important and only four percent indicated that it was less than somewhat

important. Closely related to relaxation is the incentive, "escaping the regular routine". Eighty-four percent indicated more than somewhat important to escaping the regular routine, with 42 percent indicating very important. Less than three percent indicated that escaping the regular routine was not at all important as an incentive for salmon angling.

A minority of anglers (19 percent), indicated that the motive of physical exercise was less than somewhat important. Twenty percent of Salmonier anglers indicated a value of 4 (somewhat important) while the majority (60 percent) deemed physical exercise to be more than somewhat important. Twenty-one percent saw exercise as very important. The resulting mean response was 4.97 out of a possible 7.0.

Of the psychological/physical incentives for salmon angling, "to experience new and different things" was the incentive of least importance, yet it still had a mean response greater than somewhat important at 4.40. Forty-nine percent of anglers, however, responded greater than somewhat important to this incentive. Only 13 percent indicated that this was not at all important as an incentive for salmon angling.

6.2.1.4 Natural Environment-related Incentives For Salmon Angling

"To be outdoors" was the main incentive for angling of the natural environment incentives, and the second most important incentive overall. Eighty-nine percent

indicated the outdoors as being more than somewhat important, with 60 percent indicating very important. Eleven percent indicated that this was somewhat or less important as an incentive for fishing. Closely related to the incentive "to be outdoors", is the incentive "to experience natural surroundings". The difference between the two is the component of nature, as one can be outdoors in a city and not be in "natural surroundings". "To experience natural surroundings" was deemed very important by 39 percent of respondents, with 81 percent indicating more than somewhat important. Less than 20 percent responded somewhat important or less to natural surroundings as an incentive for salmon angling.

A quarter of Salmonier anglers responded very important to the incentive "to be close to the water". Fifty percent of anglers chose responses of greater than somewhat important, while 29 percent responded with values less than somewhat important to being close to the water. As the Salmonier River provides many opportunities to get close to the water, it is not surprising that a majority of anglers deem getting close to water as important.

6.2.2 Expectancies Of Salmonier River Anglers

To determine what salmon anglers expect from the Salmonier River, similar statements to those used in the incentive section were used. This section asked how strongly the angler agreed or disagreed with statements of expectation for attaining the

associated incentive on the Salmonier River. Responses were based on a seven point Likert scale where "strongly disagree" had a value of 1 and "strongly agree" had a value of 7. The choice of a neutral expectation was offered with a value of 4. Table 6.8 lists the mean responses to these expectation statements from highest to lowest.

The following description of the frequencies of responses, follows the format used in the section dealing with the importance of incentives for salmon angling: catch expectancies, social expectancies, psychological/physiological expectancies, and nature expectancies. Overall, the mean scores of the expectancies were higher than those relating to the similar statements of importance. In general, non-catch expectancies ranked higher than catch expectancies. This was expected due to the Salmonier River not being a very productive river in terms of salmon.

6.2.2.1 Catch Expectancies

Of the catch-related expectancies, "to enjoy the challenge or sport" was the most expected, with a mean response of 6.19. Ninety percent of anglers agreed with this statement, with 55 percent strongly agreeing. Less than four percent disagreed with the challenge expectancy. A similar percentage of anglers (87 percent) agreed that they would expect to enjoy the experience of the catch. Despite a smaller percentage of anglers agreeing, the percentage of those who strongly agreed was higher at 61 percent. Only six percent of respondents disagreed with the experience expectation.

Table 6.8. Mean Item Scores for Expectancies of the Salmonier River, where 1.0 indicates a value of strongly disagree and 7.0 indicates strongly agree

Statement of Expectancy	Mean	Standard Deviation
To be able to enjoy the outdoors	6.52	0.90
To be able to relax	6.37	1.00
To be able to escape the regular routine	6.20	1.08
To enjoy the challenge or sport	6.19	1.14
To enjoy the experience of the catch	6.17	1.31
To be able to experience the natural surroundings	6.13	1.18
To be able to be close to the water	5.77	1.45
To be able to develop skills	5.62	1.48
To be able to be with friends	5.56	1.43
To be able to enjoy family recreation	5.19	1.66
To experience new and different things	5.14	1.55
To obtain a salmon for eating	5.02	1.85
To get a good physical workout	4.99	1.71
To be able to test equipment	4.54	1.79
To be able to get away from other people	4.46	1.93
To be able to catch a limit of salmon	4.34	2.01
To catch a "trophy" salmon	3.95	1.97
To catch and release a salmon	3.44	2.02

Approximately 63 percent of anglers expect to obtain a salmon for eating from the Salmonier River. In contrast to the two previously discussed catch-related expectancies, however, only 30 percent strongly agreed. Eighteen percent disagreed with this catch expectancy, while 37 percent were neutral. The resulting mean response for this expectancy was 5.02.

The expectancy of the ability to test angling equipment had the greatest percentage of respondents answering neutral (32 percent), and had a mean response slightly above the central value at 4.54. Twenty-one percent disagreed and 47 percent agreed with this expectancy. Of those in agreement, 21 percent strongly agreed.

The percentage of respondents agreeing with the expectancy of catching a limit of salmon was 44 percent, with 23 percent strongly agreeing. This contrasts with the 14 percent who strongly disagree with the expectancy of catching a limit of salmon. A further 15 percent disagreed with this expectancy, while 27 percent were neutral. In regards to catching a trophy salmon on the Salmonier River, 36 percent disagreed, while 35 percent agreed. Of the respondents, 16.7 percent strongly disagreed, while 17.4 percent strongly agreed. Twenty nine percent of anglers were neutral. The mean response for the expectancy of catching a trophy salmon was just under the neutral choice of four at 3.95, while the expectancy of catching a limit of salmon was just above the neutral choice at 4.34.

The expectancy of anglers to catch and release a salmon on the Salmonier River

was the lowest of the catch-related expectancies. Forty three percent disagreed, and of these 31 percent strongly disagreed. Of the 30 percent who agreed only 10 percent strongly agreed. Twenty-seven percent of respondents were neutral to the catch and release expectancy. The mean response for this incentive was the lowest of all the expectancies at 3.44.

Seventy-six percent of anglers expect the development of skills while fishing the Salmonier River. Of those agreeing 39 percent strongly agreed. Seven percent of anglers disagreed and 24 percent were neutral to the Salmonier as a river on which they could expect to develop their skills.

6.2.2.2 Social Expectancies

The expectancy for the ability to be with friends while fishing the Salmonier River was agreed to by 76 percent of anglers. Only eight percent of respondents disagreed with this expectancy, while 16 percent held neutral views. Of those agreeing, 34 percent strongly agreed. For the expectancy of enjoying family recreation, a similar percentage strongly agreed, 35 percent. Overall, however, a smaller percentage of anglers (60 percent) agreed with the expectancy to enjoy family recreation. Twenty-nine percent of respondents were neutral on the expectancy of family recreation, and only 11 percent disagreed.

The expectancy for the ability to get away from others on the Salmonier River

was the lowest of the social expectancies. Despite this, a majority of anglers, 48 percent, agreed with this expectancy, with 21 percent strongly agreeing. Of the 26 percent who disagreed, 12 percent strongly disagreed. Twenty-five percent answered neutral to this expectancy statement.

6.2.2.3 Psychological/Physiological Expectancies

The highest mean value of the psychological/physiological expectations, and the second highest expectancy overall, was the expectation for relaxation. Ninety-three percent of anglers expect to be able to relax while fishing on the Salmonier River, with 62 percent strongly agreeing with this expectation. Less than two percent of anglers disagreed with this statement and five percent were neutral. Despite relaxation being a highly subjective concept, a majority of anglers still agreed that they expected to achieve it on the Salmonier River.

A high expectation was also placed on the Salmonier River's ability to allow the angler to escape the regular routine, with 91 percent agreeing. While fewer anglers strongly agreed to this than the expectation of relaxation, a majority, 54 percent again strongly agreed. As with relaxation, less than two percent of respondents disagreed with the expectation of escape.

Eleven percent of Salmonier anglers disagreed with the expectation of experiencing new and different things, while 62 percent agreed. Twenty eight percent

of those agreeing strongly agreed and 27 percent were neutral. As with the case of the other psychological/physiological expectations a majority of anglers (59 percent) expected to get a good physical workout from fishing the Salmonier River. Sixteen percent disagreed with this expectation and 25 percent were neutral. Twenty-eight percent strongly agreed with the expectation of physical exercise.

6.2.2.4 Natural Environment Expectancies

The expectation of enjoying the outdoors was the statement of expectation with the highest mean response. Ninety-five percent of anglers agreed with the expectation of enjoying the outdoors while salmon angling on the Salmonier River. This was strongly agreed to by 71 percent of respondents. Only one percent disagreed with this expectation, while four percent were neutral. Eighty-eight percent agreed with the expectation of enjoying the natural surroundings with 54 percent of these responding strongly agree. Less than four percent disagreed with this statement while ten percent were neutral.

A much higher percent of respondents responded neutrally to the expectation of being able to get close to the water, 23 percent. Despite this, 77 percent agreed with this expectation, with 47 percent responding strongly agree. Less than seven percent disagreed with the expectation of the ability to get close to the water.

6.2.3 Angling Behaviours Of Salmonier Salmon Anglers

An effort was made to ask behavioural questions which were based on actual behaviours, rather than behavioural intent for this section. As well, only questions directly related to salmon angling were asked to ensure the saliency of the questionnaire to respondents. This behavioural section has been categorized into four sections: skill and experience, equipment, information sources for salmon angling, and favourite rivers.

6.2.3.1 Skill and Experience

Almost half (48 percent) of the anglers surveyed felt that they were equally skilled compared with other salmon anglers. Twenty-seven percent of anglers thought that they were more skilled than others, while 25 percent felt that they were less skilled. The determination of skill was self-assessed and based on a seven point scale where one was "less skilled" and seven was "more skilled". Five percent of anglers indicated a value of 1 and five percent indicated 7. Similarly, six percent answered 2 and six percent gave 5 as their level of skill.

Eighty percent of anglers indicated that they had a salmon license in 1995. The range of the number of days fished was from 0 to 90 days with the mean number of days these anglers fished being 13 days. Eighty-seven percent of respondents indicated that they fished 20 days or less in 1995. When the Salmonier River was specified, 88

percent said that they averaged 20 days or less fishing on this river. The mean number of days spent on the Salmonier River was 11 days.

Results showed that the mean number of seasons fished was greater than the number of seasons which they had fished the Salmonier River. The mean number of seasons fished was 11 while the mean number of seasons fished on the Salmonier River was eight. This difference was due in part to the fact that while only nine percent of anglers indicated that this was their first season of angling, 17 percent said that it was their first season on the Salmonier River. Another possible explanation for this difference is the migration of people from the outports to St. John's and surrounding communities for work and school. These anglers would have learned to fish on rivers other than the Salmonier River. Eight percent of anglers indicated that they had been salmon angling for over 30 years, while five percent had been fishing the Salmonier for over 30 years.

The mean number of salmon caught by respondents in 1995 was four, with a median response of two. Thirty-one percent indicated that they did not catch a salmon in the 1995 season while 17 percent said that they had caught one salmon. Eighty-nine percent of anglers caught ten or less fish in the previous salmon season, eight percent caught between ten and 19 salmon and three percent caught 20 or more salmon. The majority of anglers (63 percent) indicated salmon as their species of preference for angling in the summer. Brook/mud trout was preferred by 18 percent, while 11 percent

had no preference. The remaining preferences were divided amongst brown trout (four percent), sea trout (four percent) and rainbow trout (one percent).

The largest group of anglers (42 percent) indicated that they like to fish with friends. Twenty-six percent like to fish with family and friends together while 12 percent like to fish just with family. These findings substantiate the preferences of anglers to fish with friends over family, found in the incentive section.

One-fifth of respondents like to fish by themselves and less than one percent like to fish with a guide. Seventeen percent of respondents noted that they would not like to share their favourite pool with any other anglers. The median response to the number of anglers one would like to share a favourite pool with was two. Ninety-six percent would like to have four or less anglers sharing their pool. As for the maximum number of anglers they would want to see on their favourite pool, the median response was three. Eight percent indicated that they would not want any other anglers on their favourite pool. Ninety-six percent of anglers indicated that they would want ten or less anglers on their pool. Two percent said that it did not matter how many people were on their favourite pool.

The mean distance travelled by anglers to the Salmonier River was 78 kilometers. Eighty-eight percent of anglers indicated that they lived within 80 kilometers of the Salmonier River. Sixty percent of anglers indicated that they had a favourite pool on the Salmonier River. Once parked, the average distance walked by

those having a favourite pool on the Salmonier River was 2.6 kilometers. Nine percent of anglers indicated that they walked less than one kilometer to their favourite pool. The greatest percentage of anglers walked one kilometer (32 percent), and 90 percent walked five kilometers or less.

The greatest distance travelled by any of the anglers with the primary intent to fish for salmon was 3000 kilometers. Sixty percent indicated that the greatest distance travelled was less than 500 kilometers. Thirty-one percent travelled more than 500 kilometers but less than 1000 kilometers, and nine percent travelled more than 1000 kilometers. Sixty-four different rivers were given as the destination of these angling trips, and all but three of these were located in the Province of Newfoundland and Labrador.

A day trip was indicated by 43 percent to be the longest trip to the Salmonier River to fish for salmon in 1995. Eighteen percent said that they spent one overnight on the Salmonier, while nine percent stayed two nights. Eight percent stayed three or more nights, while 23 percent did not fish the Salmonier in 1995. Most anglers (45 percent) sleep at home when they fish the Salmonier River. Twenty-six percent stay in their own, or a friend's, cabin. Five percent stay in trailers and 18 percent in tents. While not given as a choice, "on the rocks" was given as a response by four percent of anglers. These anglers wait on the rocks near the river for first light, thus obtaining preferred spots on a particular pool. Twelve percent of all respondents indicated that

they owned a cabin between the Trans Canada Highway and St. Catherine's. As for the longest trip anywhere in Newfoundland and Labrador to fish salmon, 43 percent had trips of three or more nights, 15 percent of two nights, 11 percent of one night, 17 percent took a day trip, and 16 percent never fished in 1995.

6.2.3.2 Equipment

Central to salmon angling is the fly used to attract the salmon. Over half of the Salmonier anglers indicated that they did not make any of their own salmon flies. Sixteen percent said that they made some of their flies. Eleven percent indicated that they made most of their flies and 20 percent made all of their own flies. The number of flies taken by anglers ranged from one to 800, with a mean value of 68 flies.

The type of hook on which the fly can be tied can be barbed or barbless. Sixty eight percent said that they had never used barbless hooks. To gauge the frequency of barbless hook use for catch and release, a seven point Likert scale was used ranging from never (1) to always (7). The option of "not practising catch and release " was also given. Thirty-seven percent indicated that they did not practice catch and release and thirty-two percent indicated never using barbless hooks for catch and release. Nineteen percent gave a value of four or more, with eight percent always using barbless hooks.

The replacement value of salmon gear belonging to the Salmonier River anglers ranged from $35 to $5000. Eighteen percent indicated that their gear was worth $200

or less. Twenty- seven percent placed a value between $201 and $400, 33 percent between $401 and $800, 13 percent between $801 and $1200, and nine percent placed the value of their equipment over $1200. The mean value of the angling equipment was found to be $642.

6.2.3.3 Sources of Information for Salmonier Anglers

A variety of different information sources on salmon angling were evaluated on a seven point Likert scale ranging from "no use" (1), to "great deal of use" (7). Table 6.9 gives the mean response to each of these different sources of information.

Table 6.9: Source of Information For Salmon Anglers, where 1 equated no use and 7 equated to a great deal of use

Source of Information	Mean	Standard Deviation
Own past experience	5.90	1.57
Comments and opinions of others	5.03	1.61
DFO information	4.31	1.83
Television shows	3.49	1.98
Books	3.43	1.92
Sport shops	3.19	1.79
Magazine articles	3.15	1.73
Newspaper articles	3.10	1.71
Fishing clubs/associations	2.39	1.80

Related to the use of these materials were the findings that 85 percent of anglers do not subscribe to an angling magazine, and eight percent of Salmonier anglers were members of fishing associations or clubs. As well, 89 percent of anglers received the **1996 Angling Guide for Newfoundland and Labrador** provided by DFO. All anglers (100%) are supposed to receive this guide when they purchase their license.

6.2.3.4 Favourite River

Thirty-five percent of Salmonier River anglers identified the Salmonier River as their favourite river to fish salmon. Twenty-five percent indicated that they had no favourite river while the remaining 40 percent indicated one of 50 other rivers in Newfoundland and Labrador as their favourite. Of these 50 rivers, the Humber River was the most favoured, as it was chosen by 6.3 percent of respondents. The Humber River was followed by: the Gander River (5.1 percent), North West Trepassey (4.8 percent), Biscay Bay (2.0 percent), North Harbour River (1.8 percent) and the Exploits River (1.5 percent). As for the reason for favouring a river other than the Salmonier, "lots of salmon" was the main reason with 32 percent choosing this response. This was followed by location (27 percent), large salmon (nine percent), scenery (six percent), and people (six percent). Lack of crowding was not given as a response, however, eight percent wrote in this response in the other space. Twelve percent indicated "other" without indicating what "other" was.

To compare their favourite river to the Salmonier, a seven point Likert scale, with one being "about the same", four "better" and seven "considerably better", was used. Forty-three percent of those choosing a river other than the Salmonier said that their favourite was considerably better than the Salmonier. Sixty-four percent gave a value of five or greater to their favourite river. Sixteen percent gave the response of better, while 19 percent indicated between about the same and better. When asked to rate the Salmonier River on a scale of one to ten, where one was a poor day of fishing and ten an excellent day, the mean response was 4.9. Thirty-five percent gave a value greater than five with only 3 percent indicating nine or ten. Forty percent gave a value of less than five with 11 percent giving a value of one or two. Twenty-five percent of respondents rated a day of fishing on the Salmonier at five.

6.2.4 Management Issues

Attitudes toward management issues were elicited by both open, and closed ended questions. Twenty-two different management options were rated on a seven point Likert scale where one was "strongly oppose", four "neutral" and seven "strongly support". Each management option was asked specifically concerning the Salmonier River.

The frequencies of the responses to the management tools, along with the related open ended questions, are now discussed under the different types of

management which they imply: catch-related options, quota/license-related options, habitat/salmon-related options, and development-related options.

6.2.4.1 Catch-related Management Options

Many of the catch-related issues examined in this study concerned catch and release angling. Of the five catch and release statements, four had a mean response of less than four (Table 6.10). The only catch and release issue to have a mean response above four (indicating support) was the use of barbless hooks for catch and release fishing. Sixty-five percent supported this, with 49 percent strongly supporting it. Eighteen percent of anglers opposed this to some degree while 17 percent were neutral.

The only other catch-related option which was favoured by a majority of anglers was a fall fishery. A fall salmon season was opposed by 25 percent of anglers and supported by 49 percent of anglers. Twenty-five percent were neutral on the issue of a fall fishery.

The remaining catch and release issues had mean responses in the lower end of the Likert scale (indicating opposition). The option with the most support of these catch and release issues came for allowing catch and release after a quota was filled. Twenty percent strongly supported this, 40 percent strongly opposed while 13 percent were neutral. A catch and release season before the catch and retain season was strongly opposed by 55 percent and strongly supported by 12 percent. Sixty-three percent

Table 6.10: Mean Responses to Catch-related Management Options, where 1.0 represents strongly oppose and 7.0 represents strongly support

Management Option	Mean	Standard Deviation
Allowing only barbless hooks when practising catch and release	5.25	2.16
A fall salmon season	4.44	2.14
Allowing catch and release once the quota has been filled	3.48	2.42
A catch and release season before the catch and retain season	2.74	2.23
Designating selected pools as catch and release only	2.58	2.04
Designating certain weekdays as catch and release only	2.18	1.76

opposed catch and release before the catch and retain season, 23 percent supported it and 14 percent were neutral. Designating selected pools as catch and release was opposed by 66 percent of anglers with 54 percent strongly opposing. Strong support for catch and release pools came from eight percent of anglers with a total of 18 percent supporting it to some degree and 16 percent indicating a neutral response.

Catch and release on selected weekdays was opposed by 74 percent of anglers, with 61 percent strongly opposing. Fifteen percent were neutral on this issue while the remaining 11 percent supported catch and release weekdays. Overall, 86 percent of the anglers of the Salmonier River thought that four or less salmon should be allowed to be caught and released on any given day. Thirty-two percent of anglers thought that no

salmon should be caught and released, three percent thought one fish, 18 percent two fish, three percent three fish, and 29 percent four fish. The remaining anglers (14 percent) thought that five or more fish should be allowed to be caught and released in a day, with two percent of all respondents stating catch and release should be unlimited.

Thirty-five percent of Salmonier salmon anglers agreed that the current regulation of six fish being retained in a season was the best number of salmon to be retained. Twenty-nine percent thought that the limit should be 10 fish. The mean weight indicated by Salmonier anglers of a "trophy" salmon for the Salmonier was found to be 8.8 pounds. Sixty-seven percent of anglers would not buy a trophy tag for the Salmonier River. Of those who would buy a tag the mean amount willing to be paid was fourteen dollars. Over half of respondents (52 percent) thought that the current length of 63 centimeters was the best length over which salmon should be released. Thirty-five percent thought that this was too small with 12 percent thinking that it was much too small. Thirteen percent felt that 63 centimeters was too long, with only one percent thinking it was much too long a length for retaining a salmon on the Salmonier River.

6.2.4.2 Quota/License-Related Management Options

Table 6.11 indicates that support for quotas on individual rivers was greater than quotas for provincial angling zones. Sixty-two percent supported individual river

quotas, while 58 percent supported provincial quotas. Similar percentages, 19 percent for provincial quotas and 20 percent for individual rivers, opposed these quotas.

Table 6.11: Mean Responses to Quota/License Management Options, where 1.0 represents strongly oppose and 7.0 represents strongly support

Management Option	Mean	Standard Deviation
Quotas for individual rivers	5.01	2.09
Quotas for provincial angling zones	4.89	2.06
Accompaniment of non-resident anglers by a guide	4.79	1.92
Limits on the number of rods allowed at specific pools at one time	4.31	2.18
Split season use of tags	2.72	2.09
License fees for individual rivers	2.21	1.79

While supporting individual river quotas, a fee for the Salmonier River was opposed by 72 percent of anglers with 59 percent strongly opposing these fees. Nineteen percent were neutral to the fee management option, and six percent strongly supported river fees.

Split season use of tags was opposed by 65 percent of anglers with 51 percent strongly opposing them. Twenty percent supported and 15 percent were neutral on the split use of tags. Fifty-two percent of anglers supported the use of a guide for non resident anglers, while 19 percent were opposed and 29 percent were neutral.

Closely related to the catch and release pools was the issue of limiting the

number of rods on any pool at one time. Forty six percent supported this strategy, 25 percent were neutral and 29 percent were opposed. Of the salmon anglers responding, 22 percent strongly opposed and 25 percent strongly supported limits on the number of rods on pools.

6.2.4.3 Habitat/Salmon-Related Management Options

Six statements related directly to habitat/salmon management options for the Salmonier River (Table 6.12). The stocking of salmon was supported by 72 percent of anglers with 51 percent strongly supporting the strategy. Twenty percent were neutral and nine percent opposed. In contrast to this, 52 percent of anglers were opposed to introducing pacific salmon to the Salmonier River. Twenty-four percent favoured such an introduction, 12 percent of these strongly, while 24 percent were neutral.

The closure of the offshore commercial salmon fishery was supported by 65 percent of anglers with 48 percent strongly supporting this management tool. Thirteen percent opposed a closure of the offshore to some degree, with five percent strongly opposing. Twenty-three percent of respondents were neutral on closing the offshore fishery. The selective catching of surplus fish on the Salmonier by nets was strongly opposed by 85 percent of respondents. Only three percent were in any way supportive to this measure while five percent were neutral.

The idea of improving habitat for salmon was supported by 87 percent of

anglers, 10 percent were neutral. Only three percent of anglers were opposed to improving salmon habitat on the Salmonier River. Closure of the Salmonier River when water levels get low was supported by 88 percent of anglers. Seven percent opposed low water closures, while five percent were neutral.

Table 6.12 Mean Responses to Habitat/Salmon Management Options, where 1.0 represents strongly oppose and 7.0 represents strongly support

Management Option	Mean	Standard Deviation
Closing rivers when water levels get too low	6.23	1.46
Improving existing salmon habitat	6.22	1.27
Stocking salmon	5.65	1.75
Closing the offshore commercial salmon fishery	5.41	1.83
Introducing Pacific salmon	3.08	2.16
Selective catching of surplus fish in rivers by nets for commercial use	1.44	1.23

6.2.4.4 Development Management Options

Similar to improving salmon habitat is the non-disturbance of the existing habitat. Four issues: cabin development, hydro development, golf course development and the use of "sea-doos" were examined to investigate feelings towards these management options.

The strongest support was for limiting cabin development along the Salmonier

River. Seventy percent supported this with 54 percent strongly supporting it. Eleven percent were strongly opposed to limiting cabin development while 13 percent were neutral. While it is unlikely that hydro development will occur on the Salmonier River in the near future, Pinsent's Falls was one of 160 sites in Newfoundland considered by Newfoundland Hydro for small hydro development (Shawmont, 1986). Limiting hydro development on the Salmonier River was supported by 68 percent of anglers. Nineteen percent were opposed and 14 percent neutral towards limiting hydro development. Twenty one percent were opposed to limiting "sea-doos", 63 percent in favour and 17 percent responded neutral. The limitation of golf course development was the least opposed of the habitat management options, however, 55 percent were supportive of this strategy. Twenty one percent were opposed to limiting golf course development, while 25 percent were neutral.

Table 6.13 Mean Responses to Development Management Options, where 1.0 represents strongly oppose and 7.0 represents strongly support

Management Option	Mean	Standard Deviation
Limiting cabin development along rivers	5.50	2.06
Limiting hydro development	5.36	2.15
Limiting the use of "sea-doos"	5.14	2.24
Limiting golf course development	4.88	2.15

6.2.5 Angler Knowledge of Salmon Regulations, Habitat and Physiology

Salmonier River salmon anglers were asked questions concerning: regulations, salmon physiology, and the Salmonier River itself. Seven of the eleven questions asked had answers which could be found in the **1996 Angler Guide For Newfoundland and Labrador** (DFO, 1996b), which is supposed to accompany every license. The first question asked for the recovery time required for a salmon after being caught, before it should be released back into the river. Of all the questions, this was answered most correctly, with over three quarters (76 percent) knowing that the answer was "as long as the salmon requires". Five percent answered incorrectly while 20 percent answered not sure.

Nineteen percent of respondents correctly identified 18 degrees Celsius as the temperature at which catch and release angling should be ceased. Sixty-seven percent responded not sure while 15 percent gave an incorrect answer. Almost half of the respondents (49 percent) knew that a salmometer is a length and weight table devised by the Atlantic Salmon Federation. Thirty-six percent were not sure and 15 percent answered incorrectly to the salmometer question.

Over two thirds (69 percent) of anglers did not know that there are 177 scheduled rivers in Newfoundland and Labrador. Approximately one-third of anglers (31 percent) answered not sure to the question of the distance down stream from an obstacle which salmon must jump. Thirty-two percent answered correctly while five

percent thought that there was no minimum distance.

Two of the three questions concerning the physiology of salmon were answered correctly by a majority of anglers. Sixty-one percent knew that the age of a salmon can be determined by one of its scales, while 53 percent of respondents knew that salmon can jump vertically up to 12 feet. Thirty percent of anglers were not sure about the age of salmon being determined from scales while 9 percent thought that age could not be determined from a scale. Thirty-five percent of respondents were not sure how high a salmon could jump, while 12 percent thought that 12 feet was incorrect. The physiological question answered most poorly concerned the distance which a salmon can see through the water. Four-fifths (80 percent) answered "not sure" to the sight question. Only six percent gave the correct answer of 15 meters. Twelve percent gave answers less than 15 meters and 2 percent thought that a salmon could see 21 meters through the water.

Sixty-one percent of anglers knew that they were allowed to catch a maximum of six salmon in one day. Seventeen percent chose two salmon, 9 percent chose five salmon and 3 percent thought there was no limit. Only 10 percent of respondents answered "not sure" to the daily catch limit question. Thirty-one percent of anglers did know that according to DFO, 537 salmon were caught on the Salmonier River in 1995. Sixty percent were uncertain of the number caught.

The main run of salmon having ended by the end of July was correctly

identified by 44 percent of respondents. Nineteen percent identified the first week of July, while 14 percent thought the main run of salmon ended in August.

6.2.6 Socio-economic Findings

Sections on the questionnaire concerning schooling and income had high percentages of non-response. Almost nine percent of respondents did not give their level of schooling, while 20% did not indicate their level of income. Several returned surveys had remarks questioning the use of income and schooling in a study of salmon angling. As well, several anglers told the principal investigator that they would not be sending in their survey because of these questions. General results to these questions are presented here, but further analysis will not be undertaken due to the high levels of non-response.

Of those who answered the schooling question, 89% indicated that they had at least high school. Fifty-six percent of respondents indicated that they had completed some studies beyond the high school level. A majority of respondents (47%) indicated that their household income was between twenty and fifty thousand dollars a year. Fourteen percent of respondents had household incomes less than twenty thousand dollars and 39% indicated incomes greater than fifty thousand dollars.

Respondents ranged in age from 15 to 75 years. Thirty percent of anglers were less than 30 years old, 50 percent were between 30 and 49 years old, and 20 percent

were 50 or older. The mean age of anglers on the Salmonier River was 37.9 years.

6.3 CONCLUSION

The descriptive results found in this chapter can be of great value for the management of salmon angling on the Salmonier River. The spatial, temporal, and species specific context of the data presented, gives a better picture of angling on the Salmonier River than more general angling surveys. Broad generalizations (in the form of means) for an entire group, however, can give the impression that only one group are utilizing the resource, i.e. an "average angler". The more detailed analysis in the chapters which follow shows that managers must not fall into the "average angler" trap. Managers must recognize that different groups of anglers with differing motivations can be found using the same resource.

CHAPTER 7
STATISTICAL METHODOLOGY

7.0 INTRODUCTION

While frequency runs, with their associated measures of standard deviation, mean, mode and median, can tell much about a group being studied, the purpose of this research was to go beyond these measures, to look for explanations for groups, linkages between variables, and to test hypotheses. Before such testing can take place, preliminary steps must be taken. These steps include: screening the data, data preparation, and choosing the appropriate statistical tests. By taking these steps, the researcher helps ensure proper and accurate analysis of the data.

7.1 DATA PREPARATION AND CHECKING

Tabachnick and Fidell (1996) note that before any statistical analysis of data is undertaken, several issues concerning the data must be considered: accuracy of data entry, missing data, assumptions on which statistical procedures are based, transformation of variables, outliers, and perfect or near perfect correlations. "Consideration and resolution of these issues before the main analysis is fundamental to an honest analysis of the data" (Tabachnick and Fidell, 1996).

7.1.1 Accuracy of the Data File

When data files are large, as was the case of this study, the method of screening for accuracy involves the examination of the descriptive statistics for the variables

(Tabachnick and Fidell, 1996). For the purpose of this study the univariate descriptive procedure of SPSS FREQUENCIES was performed. As suggested by Tabachnick and Fidell (1996), all continuous variables were checked to be within range, the means and standard deviations were checked to be plausible, discrete variables were checked to be within range, and the program for missing variables examined to ensure values were coded accurately. The results from this process are found in Chapter 6.

7.1.2 Missing Data

"Missing data is one of the most pervasive problems in data analysis" (Tabachnick and Fidell, 1996). This noted, Tabachnick and Fidell (1996) state that, "the pattern of missing data is more important than the amount missing. Missing values scattered randomly through a data matrix pose less serious problems". Tabachnick and Fidell (1996) offer five methods for handling missing data. Two of these alternatives were chosen to deal with missing data in this study.

Examination of the data found that the missing data was random, with no one question to be used in the analysis having more than 3.1% of the cases missing (n=12). The variable associated with this number of missing cases dealt with the importance of catching and releasing a salmon. While catching and releasing a salmon was included in the incentives for angling section of the survey, it was not one of the incentives noted by Fedler and Ditton (1994) (see Table 3.1), nor was it identified as

an incentive in the pretesting stage of the survey design. Catch and release is therefore discussed in the context of management options, rather than as an incentive for angling for the remainder of this thesis.

Omitting cases with a missing variable is the most frequently used method of handling missing data (Tabachnick and Fidell, 1996). Respondents who left out a complete section (for example the expectancy section) of the survey were removed from the analysis (n=7). The removal of these seven cases brought the number of missing cases for any one variable down to 1.3% (n=5). Examination of these cases showed that these were randomly distributed and would not pose a bias to the results.

Tabachnick and Fidell (1996) recommend the elimination of any cases which have at least one missing variable. Examination of the data revealed that this would have resulted in the removal of 79 cases or 20.7% of the returned questionnaires. This was thought to be too many cases to be eliminated, therefore, an alternative method was sought. Each of the 79 cases were examined to identify any case which had a more than random array of missing cases. An example of how this was accomplished is now offered in relation to the incentive section of the questionnaire. If a respondent answered only two or three of the incentive for angling questions, the assumption was made that the respondent had misread the question. Instead of noting the importance of each statement, only the most important statements had been circled. Examination of the importance, expectancy and management options sections in this manner lead to a

further nine cases being removed. Removal of cases by this method left the study with 380 cases with which to perform the statistical analysis.

A second method of handling missing data is to estimate the data. This can be carried out by prior knowledge, or by the use of the mean response. Using the mean response has the advantage that the mean for the distribution as a whole does not change, however, it has as a drawback decreasing the variance (Tabachnick and Fidell, 1996). A further drawback identified by the researcher was that a mean response may not give an accurate picture of a person's attitude. This lack of accuracy results from the fact that people often either agree or disagree with a statement. A mean response from a group, therefore, does not translate to a person's possible attitude, and is not indicative of a group's true attitude. This is similar to finding a mean response to the bivariate male/female choice. This noted, it was decided that, as any one variable relating to the importance or expectancy of fishing was but one component of fourteen in the case of the catch motivations, and twenty for the non-catch motivations, the use of the mean was the best method to retain cases. Therefore, for missing values in the importance and expectancy sections, the total group mean was used to replace any missing values.

Prior knowledge, a second method of estimating missing data, is used when a missing value is replaced by using a well educated guess (Tabachnick and Fidell, 1996). This can be combined with the use of the mean, by replacing missing values for

groups/categories with the mean response for that category. For the purpose of this study, if an angler was deemed to have a higher catch than non-catch motivation, the mean response for the management option, or behaviour, for the catch group was substituted for missing values. "This procedure is not as conservative as inserting overall mean values and not as liberal as using prior knowledge" (Tabachnick and Fidell, 1996)

7.1.3 Assumptions of the Data

For this study, it was determined that a goodness-of-fit-test would be appropriate to test the data. Goodness-of-fit tests address geographic research questions in which an actual or observed frequency distribution is compared with some expected frequency distribution (McGrew and Monroe, 1993). As the data to be analysed in this research were organized by nominal categories with absolute frequency counts in each category, a chi-square goodness-of-fit test was chosen.

The assumptions underlying the use of the chi-square test have been outlined by Silk (1979):

> 1) The expected values (E) and observed values (O) are in the form of frequencies or counts obtained in a number of categories. Percentages, proportions or rates per thousand, etc. must not be used, unless a special version of the test is employed.
>
> 2) The sum of the frequencies must be greater than 20 and, preferably, greater than 40.

3) In any one category, the expected frequency should not normally be less than five. However, if there are five or more categories, then not more than 20% of the expected frequencies may be less than five, and there should be no category with an expected frequency less than one.

4) Whatever systematic variations exist in the observations, there should also be a component which may be regarded as independent and random.

An examination of the data indicated a necessity to transform the data to meet some of these assumptions. These transformations are discussed in the following section.

7.1.4 Transformation Of The Variables

Tabachnick and Fidell (1996) discuss transformation of data primarily in terms of normalizing the data. In the case of this study, where attitudes are being determined, normalization is not a consideration. Three groups of attitudes can generally be determined for any one topic in which attitudes are associated: opposition to or disagreement with a topic; support for or agreement with a topic; or, neutrality or non-concern towards a chosen topic. Thus, transformation to a normal curve was not desirable, and in many cases impossible due to the bivariate nature of many topics considered in this research.

The modified expectancy-value theory being tested in this study necessitated the combination of variables of expectancy and importance (Feather, 1992). For each of the 17 motivational components used, one score was developed by combining the

incentive statement and its associated expectancy statement. As stated, the expectancy statements were asked in a seven point likert scale format to maintain consistency throughout the survey. This was done to reduce the difficulty of the interpretation of the questionnaire for the respondents. Responses for the expectancy questions were recoded to indicate the probability of the likelihood of the motivation being achieved. This transformation resulted in a score of 7 being recoded to 1.0, 6 to 0.833, 5 to 0.666, 4 to 0.50, 3 to 0.333, 2 to 0.167, and 1 to 0.0. This transformation allowed for the likelihood of a motivation being achieved to be from zero to one hundred percent.

The next step in the transformation of variables was to multiply the importance value by the percent expectancy (Feather, 1992). As the analysis did not focus on one of these motivations in particular, but rather on a combination of catch and non-catch motivations, the score for a combination of catch motivations, $\Sigma(I_c \times E_c)$, was compared with a score arrived from the non-catch motivations, $\Sigma(I_{nc} \times E_{nc})$. This method of combining like motivations is similar to that used in a study by Singer et al. (1993). In their study of career aspirations of psychology students, Singer et al. (1993) , combined the scores of seven intrinsic outcomes to arrive at an intrinsic valence score. They also derived an extrinsic valence score by combining eight extrinsic outcomes.

To determine the catch motivational score, the following seven motivations were used: developing skills, testing equipment, obtaining a salmon to eat, excitement/experience of the catch, landing a "trophy" salmon, catching a limit of

salmon, and the challenge or sport of salmon angling. The motivation of "catching a limit of salmon" was added to the incentives noted by Fedler and Ditton (1994) (see Table 3.1), as this incentive was identified during the pretesting stage of the survey design. The reliability of the combining of these variables was checked by using SPSS RELIABILITY using Cronbach's alpha. The reliability was found to be 0.6784. This is above 0.60 which is considered acceptable for grouping variables (Nunnally, 1970). The total score of the catch motives was then divided by 49, to arrive at a final score out of one for each angler.

To determine the non-catch score, the following ten motivations were used: for relaxation, to be outdoors, for family recreation, to experience new and different things, to be close to the water, to get away from other people, to be with friends, to experience natural surroundings, to get away from the regular routine and for physical exercise. SPSS RELIABILITY for grouping these ten variables gave an alpha of 0.7379, again above the 0.60 standard deemed acceptable by Nunnally (1970). The total score of the non-catch motivations was then divided by 70 to arrive at a score out of one. Division of both the catch and non-catch scores to arrive at a score out of one enabled a direct comparison of both categories of motivations for each angler.

To ensure that the assumptions for the chi-square test were met for the management options, examination of the frequencies of the management variables was undertaken. This examination showed the necessity of the transformation of the

management tool choices. While the management options were originally measured on a seven point likert scale ranging from strongly opposing to strongly supporting each statement, the variables were recategorized into one of three groups; support, opposition, or neutrality toward the management option. This transformation ensured that, for a majority of the variables examined, no cell had less than five cases, a requirement for the chi-square test. While this transformation caused the loss of the degree of support or opposition for each management tool, it did ensure that the assumptions for the chi-square test were maintained.

7.1.5 Outliers

Outliers are cases with such extreme values on one variable or a combination of variables that they distort statistics (Tabachnick and Fidell, 1996). Univariate outliers were sought in the data by examining the frequencies of the variables used in the chi-square test. The examination of the data set found no univariate outliers among the variables to be tested.

The determination of any multivariate outliers is accomplished by the computation of Mahalanobis distance for each case. The Mahalanobis distance for a case is the distance of a case from the centroid of the remaining cases, where the centroid is the point created by the means of all the variables (Tabachnick and Fidell, 1996). To determine the Mahalanobis distance for all cases, SPSS REGRESSION with

the sub command MAHAL was used. This command identifies the ten cases with the largest Mahalanobis distances. Mahalanobis distance was evaluated as chi-square with the probability of the case being an outlier at $p<0.001$, and with the degrees of freedom being the number of variables examined ($df=56$). As two groups (catch and non-catch motivated) were identified for analysis in this study, multivariate outliers were considered for each group separately. The critical χ^2 for this study at alpha=0.001 and for 56 df is >83.2522. Any case with a χ^2 value larger than 83.2522 is a multivariate outlier. The largest χ^2 value for the catch motivated anglers was found to be 78.9531 and therefore no case was deemed to be an outlier. For the non-catch anglers one value of χ^2 was found to be greater than the critical value ($\chi^2=88.3696$), therefore this case had to be removed from analysis, bringing the total number of cases available for study to 379.

7.1.6 Correlation of the Variables

A final consideration during the data screening process was multicollinearity and singularity. Multicollinearity and singularity are only problematic when matrix inversion is involved. As a chi-square test does not require the rotation of matrices, multicollinearity and singularity did not have to be taken into account for this analysis.

CHAPTER 8
RESULTS FROM STATISTICAL ANALYSIS

8.0 INTRODUCTION

This chapter presents the results derived from the statistical procedures explained in the Statistical Methods Chapter (Chapter 7). Results from four different analyses are presented: the division of the anglers into catch and non-catch motivational groups; an examination of the differences between motivational groups across each of the 17 motivations studied; an examination of the differences between the two motivational groups in relation to selected variables relating to behaviours and attributes of anglers; and the examination of the differences between the two motivational groups in relation to the management options. Results are presented in this chapter, with discussion and analysis being undertaken in the discussion chapter (Chapter 9). The variables used in this analysis were chosen for their suitability to test the hypotheses offered in the introduction of this study.

8.1 SUB-GROUP DELINEATION BY MOTIVATION

Following the methods outlined in the statistical methods chapter (Chapter 7) and the motivational theory chapter (Chapter 4), the population of anglers on the Salmonier River were grouped into one of two groups, depending on their catch and non-catch motivational scores. It must be emphasized that the placing of an angler in one of these groups does not exclude the other category of motivations for the angler,

as there are many motivations for salmon angling on the Salmonier River. The placing of an angler in one motivational group depended solely on which score was higher.

From assigning two motivation scores to each angler, it was found that 67.8 percent (n=257) of the Salmonier River anglers had a higher non-catch motivational score than catch motivational score. The remaining 32.2 percent of anglers (n=122) were placed in the catch motivational group, which had higher catch motivational scores than non-catch scores.

On determining the composition of these two groups it was decided to reexamine the relative importance of the 18 incentives for salmon angling offered in the survey. Differences in the order of importance and the scores placed on each incentive are noted in Table 8.1.

From table 8.1 it can be seen that the importance of incentives vary between groups. The relative importance of catch-related incentives are higher for the catch motivated anglers than the non-catch motives. This would be expected, however, as incentive was one of the variables used to define the two groups. As motivation is deemed to be a combination of incentive and expectancy for this study, statistical differences in the incentives alone was not undertaken. Statistical analysis on the complete concept of motivation, which includes both incentive and expectancy is examined in the following section.

Table 8.1: Ranking of the 18 Incentive By Catch and Non-catch Motivated Anglers (Numbers in brackets indicate the mean score where 7 represents a response of very important and 1 represents a response of not at all important).

CATCH MOTIVATED	NON-CATCH MOTIVATED
For the excitement of the catch (6.76)	To be outdoors (6.46)
For the challenge or sport (6.40)	For relaxation (6.42)
To be outdoors (5.64)	For the excitement of the catch (6.36)
For relaxation (5.58)	For the natural surroundings (6.00)
To escape the regular routine (5.58)	To escape the regular routine (5.93)
To develop skills (5.37)	For the challenge or sport (5.66)
To catch a salmon to eat (5.22)	For friendship (4.96)
To catch a trophy salmon (5.09)	For physical exercise (4.96)
To catch a limit of salmon (5.03)	To be close to the water (4.82)
For the natural surroundings (4.98)	To develop skills (4.77)
For friendship (4.59)	To experience different things (4.59)
For physical exercise (4.43)	For family recreation (4.11)
To experience different things (4.04)	To get away from others (3.94)
To be close to the water (3.96)	To catch a salmon to eat (3.93)
To get away from others (3.56)	To catch a trophy salmon (3.53)
To test equipment (3.43)	To catch and release a salmon (3.16)
For family recreation (3.30)	To catch a limit of salmon (3.01)
To catch and release a salmon (3.29)	To test equipment (2.68)

8.2 INDIVIDUAL MOTIVATIONS BY MOTIVATIONAL GROUP

A cross tabulation of each motivational group across each of the 17 motivation scores found that there was a significant difference between groups across 14 of the 17 variables. The groups were compared in relation to the median possible response of 3.5 out of a total score of 7, for each individual motivation.

8.2.1 Catch-related Motivations

Each of the seven variables used to determine the catch motivation score were found to be significantly different between motivational groups. Motivations for: catching a limit of salmon ($p < 0.00001$), landing a trophy fish ($p < 0.00001$), catching a salmon to eat ($p < 0.00001$), for the excitement of the catch ($p=0.00002$), the challenge or sport ($p=0.00005$), testing equipment ($p=0.00193$), and developing angling skills ($p=0.01086$), were all found to have high chi-square scores (Appendix 5.1 thru 5.7).

8.2.2 Non-catch-related Motives

Of the ten non-catch motivational statements examined, all but three were found to be statistically different between motivational groups. To be outdoors ($p < 0.00001$), to experience natural surroundings ($p < 0.00001$), for relaxation ($p = 0.00001$), to be close to the water ($p=0.00004$), to get away from the regular routine

($p=0.00032$), for family recreation ($p=0.01424$) and for exercise ($p=0.02330$) were all found to be significantly different between motivational groups. The three motives which were found not to be significantly different across groups were: to experience different things ($p=0.06251$), for friendship ($p=0.24105$), and to get away from other people ($p=0.85216$). Thus, for both catch and non-catch groups, friendship was important for approximately 50% of each group, and getting away from others was not important for about 71% of each group. A majority of both catch and non-catch anglers did not view "to experience different things" as a motivation for salmon angling on the Salmonier River. Appendices 5.8 thru 5.17 highlights the differences noted in this section.

8.3 BEHAVIOURS AND ATTRIBUTES OF ANGLERS

Previous studies have shown that as anglers mature they tend to move away from the catch motive, toward the non-catch motives for fishing (Siemer and Brown, 1994; Siemer et al., 1989; Bryan,1977). Three chi-square tests were performed to test if the converse (that non-catch motivated anglers were older, and had been angling longer) was true. The results from chi-square tests of motivation by: seasons on the Salmonier (Appendix 5.18), seasons fished (Appendix 5.19) and age (Appendix 5.20), indicated that there was no statistical difference between motivational group over these three variables. This stated, there was a tendency for catch motivated anglers to have

fished the Salmonier River longer than the non-catch group ($p=0.05763$). This tendency was not noted in the number of seasons which anglers had fished for salmon ($p=0.96558$). Catch motived anglers on average fished a full season more (8.7 seasons) than non-catch anglers (7.5 seasons) on the Salmonier River, yet the difference between groups for angling in general was small, 10.7 seasons for catch motivated anglers and 10.4 seasons for non-catch motivated anglers. The average age was higher in the non-catch group (37.7 years) than in the catch group (36.6 years). All of these differences were, however, not significant at $p=0.05$.

Other angler behaviours examined were: the number of days fished, and the number of fish caught. A chi-square test was performed on the count of anglers in each motivation group indicating more, or less than, the overall mean response to these variables. As was hypothesised, catch motivated anglers were statistically different ($p=0.00316$) from non-catch motivated anglers in terms of the number of days per year fished (Appendix 5.21), and the number of days spent on the Salmonier River fishing for salmon ($p= 0.00048$) (Appendix 5.22). Catch motivated anglers spend an average of 13.4 days of a total of 15.0 in a season on the Salmonier, while non-catch anglers spent 9.6 days of a total average of 12.1 days each season on the Salmonier.

While the two groups were not statistically different ($p= 0.06497$) in relation to the number of fish caught in 1995, there was a trend toward more fish caught by the catch motivated group (Appendix 5.23). The data did not support the hypothesis that

catch motivated anglers thought themselves more skilled than non-catch motivated anglers ($p=0.10793$) (Appendix 5.24). It was noted, however, that there was a higher percentage of non-catch motivated anglers indicating less skilled than in the catch motivated group.

No statistical difference ($p= 0.49536$) was found between groups with reference to the preference of angling by oneself or with a group of people (Appendix 5.25). Approximately 20% of catch motivated anglers indicated a preference to fish alone compared to 17.6% of non-catch motivated anglers. The hypothesis that catch motivated anglers would have a significantly stronger preference to fish for salmon than non-catch motivated anglers (H_9) was not supported at alpha$=0.05$ ($p=0.05393$) (Appendix 5.26). When angling groups were compared to a preference for any species of fish or no species, a significant difference was found ($p=0.01568$) with a greater number of catch anglers indicating a preference for a fish than non-catch anglers (Appendix 5.27).

A final variable tested the location at which the anglers were intercepted. By comparing the two motivational groups across the three different sections of the river, it was found that there was a significant difference ($p=0.01444$) between the two groups. Catch motivated anglers were more inclined to fish for salmon in the middle section of the river (Governor's or Pinsent's Falls), than at the lower section or Murphy's Falls (Appendix 5.28).

8.4 OPINIONS TOWARDS SALMON MANAGEMENT OPTIONS

A total of 26 management options were tested to determine if there was a difference in the attitudes towards these options between the two motivational groups. Each of these management options were examined specifically in relation to the Salmonier River, and not for salmon angling in general. For ease of interpretation, these have been grouped into five different categories: Habitat/Salmon Management Options; Development Management Options; Catch-related Management Options, Quota Management Options; and Management Options Involving Fees. A separate section, dealing with opinions toward current management regulations, is found at the end of this chapter.

8.4.1 Habitat/Salmon Management Options

A series of variables relating to management which would have a direct effect on salmon, and the habitat in which they live, were offered for consideration to anglers. Even after transformation into three groups from the original seven, responses to some of these questions were such that chi-square goodness-of-fit tests could not be performed. This came as a result of the opinions of anglers being fairly unanimous in support for, or opposition to, the management option.

The response to improving salmon habitat had fewer than the required 20 respondents ($n=13$) in a column disagreeing with this management strategy (Appendix

5.29). The response, while not meeting the requirements of the chi-square test, does show the support of most anglers toward improving salmon habitat.

In a similar fashion to the management option of improving habitat, the strength of opposition towards catching surplus fish in the river with nets, was such that the requirements for the chi-square test could not be fulfilled. Less than 20 (n=18) anglers responded to the neutral choice and only 14 anglers indicated any degree of support for any such management option (Appendix 5.30). Support for closing rivers when water levels get too low also did not meet the requirements for the use of the chi-square test (Appendix 5.31). Support approached 90% for both the catch motivated group (87.7%) and the non-catch motivated group (87.9%).

Of the remaining three habitat management options, two were found not to be significantly different between motivational groups. While support for closing the offshore commercial fishery was higher for the non-catch motivated group (65%), than the catch motivated group (59.8%), the number of anglers in each group was not found to be statistically significant (p=0.55099) (Appendix 5.32). A higher percentage of catch motivated anglers than non-catch motivated anglers were opposed the stocking of salmon on the Salmonier River (Appendix 5.33). The difference between groups, however, was not significant (p=0.41706).

Of the habitat/salmon management options, the only significant difference between groups was found in relation to the introduction of Pacific salmon into the

Salmonier River ($p=0.02805$). While most anglers opposed this management option, support for it differed by 13 percentage points between motivational groups with just under 33% of catch motivated anglers and 20.2% of non-catch motivated anglers supporting this measure (Appendix 5.34).

8.4.2 Development Management Options

Development management options were those deemed to potentially have an effect on the regions in close proximity to the river, or on the river itself. It was in this group of management options that the greatest difference between motivational groups was found, with each of the four development management options being significantly different between groups.

The management option with the greatest significant difference between groups dealt with limiting cabin development (Appendix 5.35). While both groups showed a propensity to support such an option, support was significantly stronger from the non-catch motivated group than the catch group ($p=0.00740$). In a similar fashion a majority of anglers supported limiting the use of "seadoos" (Appendix 5.36), however, the opposition to such a management option was significantly higher from the catch motivated group than the non-catch motivated group ($p=0.00793$).

Support for limiting hydro development differed significantly between groups ($p=0.04647$). Seventy-three percent of non-catch motivated anglers were found to

support this management option while only 60.7 % of catch motivated anglers indicated some degree of support (Appendix 5.37). Twenty-nine percent of catch motivated anglers were opposed to some degree with the limiting of golf course development, as opposed to 17.1 % of non-catch motivated anglers (Appendix 5.38). The differences between groups was found to be significantly different ($p=0.03483$) for this management option.

8.4.3 Catch-related Management Options

A majority of the six catch-related management options dealt with the practise of catch and release salmon angling. Catch motivated anglers consistently had a higher degree of opposition to catch and release management options than the non-catch motivated anglers. Of the five management options relating to catch and release angling, only the selection of selected weekdays as catch and release (Appendix 5.39) differed significantly between groups ($p=0.02687$). While a majority of all anglers opposed this option, ten percent more catch anglers opposed it than non-catch motivated anglers.

The current practice of a catch and release season before the catch and retain season produced a probability of almost 1.0 ($p=0.95186$), with 63.1% of catch motivated anglers and 61.5% of non-catch motivated anglers opposing this practice on the Salmonier River (Appendix 5.40). While still not significantly different

(p=0.78042), both angling groups were less opposed to a catch and release season after a quota had been caught. The percentages of anglers opposed to this option were smaller at 51.6% and 49.0% for catch and non-catch motivated anglers respectively (Appendix 5.41).

The concept of catch and release pools on the Salmonier River was opposed by a majority of anglers, regardless of motivation. However, 21.3% of catch motivated anglers as compared with 16.3% of non-catch anglers supported this measure (Appendix 5.42). The difference between groups was not found to be statistically significant (p=0.10216).

Unlike many of the other management options relating to catch and release, the allowing of only barbless hooks for catch and release angling was supported by a majority of anglers (Appendix 5.43). The difference between groups was not found to be significant (p=0.49553). Support for a fall salmon fishery was greater amongst catch motivated anglers (53.3%) than non-catch motivated anglers (49.8%) (Appendix 5.44), however, the differences between groups was not found to be significant at the 0.05 level (p=0.49553).

8.4.4 Quota Management Options

While neither provincial quotas, nor river quotas, were in place at the time of this research, both of these management options were supported by each motivational

group (Appendix 5.45 and Appendix 5.46). The degree of difference between groups was not found to be significant in the provincial quota option ($p=0.25998$), nor in the river quota option ($p=0.27259$).

The degree of opposition and support towards the use of split season tags was found not to be significantly different ($p=0.37374$) between motivational groups. Opposition to this management option was indicated by over two thirds of both the catch and non-catch motivated anglers (Appendix 5.47).

No clear consensus for opposition or support arose from the option of limiting the number of rods on pools at any one time (Appendix 5.48). This option had one of the highest neutral responses, with the percentage of neutral responses approximately the same for both the catch (23.8%) and non-catch (24.9%) anglers. The difference between groups across the three choices was not found to be significantly different ($p=0.53029$).

8.4.5 Management Options Involving Fees

Management options relating to fees for salmon angling, both for the opportunity to fish an individual river and for trophy tags, were at the time of this study, not in effect for any of the salmon rivers in Newfoundland and Labrador. It was not surprising, therefore, that opposition was greater than support for these fees. Opposition was greater from the non-catch group, than the catch group, to license fees

for individual rivers (Appendix 5.49). This difference, however, was not found to be significantly different ($p=0.80950$).

There was a high probability that the differences between motivational groups in relation to the option of buying a trophy tag for the Salmonier River was due to chance ($p=0.93308$). Analysis showed that 67.2% of catch motivated anglers and 66.8% of non-catch motivated anglers would not buy a trophy tag for the Salmonier River (Appendix 5.50).

While not an issue for the majority of anglers of the Salmonier River, the accompaniment of out of province anglers by a guide, would mean an increased fee for most non-resident anglers. As with the other fee management options, no significant difference was found between motivational groups ($p=0.91382$). Just over half of the anglers in each group supported such a management option (Appendix 5.51).

8.4.6 Opinions Toward Current Regulations

Three opinions were asked of anglers relating to current angling regulations. This was done to elicit opinions of anglers on the suitability of these options for the Salmonier River. These were examined in relation to the current regulation and what the angler thought the regulations should be.

A greater percentage of catch motivated anglers (63.1%) than non-catch motivated anglers (57.6%) expressed the opinion that the season bag limit should be

more than the current limit of six fish (Appendix 5.52). This difference, however, was not found to be significantly different (p=0.17097). This probability was much smaller than that found in relation to the current regulation of catching and releasing up to four fish in one day (p=0.71150). Of the catch motivated anglers, 53.3% thought that fewer than four fish should be caught and released, while 54.5% of non-catch anglers thought the number of fish should be less than four (Appendix 5.53).

A greater percentage of catch motivated anglers (40.2%) thought that the current length of 63 cm was too small for the Salmonier River, as opposed to 32.3% of non catch motivated anglers (Appendix 5.54). This difference did not lead to a significant difference between the two groups (p=0.30187).

8.5 CONCLUSION

The analysis from this section found that significant differences between anglers categorised into catch and non-catch motivational groups did exist in relation to some angling behaviours, attributes, and support/opposition for some management options. While not always statistically significant, a majority of behaviours and opinions were found to be different between the two motivational groups. Those behaviours, attributes and opinions to management options which were found to be significantly different are summarized in the following table (Table 8.2). Support, or lack thereof, for each of the 12 hypothesis presented in the introduction of this study are given in Table 8.3.

Table 8.2. Behavioural and Managerial Areas of Significant Difference Between Motivational Groups Fishing The Salmonier River

BEHAVIOUR/ATTITUDE	FINDING	χ^2	p
Average Number of Days on the Salmonier River	catch anglers average more days	12.17313	0.00048
Limiting Cabin Development	stronger support from non-catch anglers	9.81243	0.00740
Limiting the Use of Seadoos	stronger support from non-catch anglers	9.67528	0.00793
Days fished in 1995	catch anglers average more days	8.71320	0.00316
Location of Survey Intercept	more catch anglers fish the Middle section	8.47542	0.01444
Introducing Pacific Salmon	stronger support from catch anglers	7.14746	0.02805
Limiting Golf Course Development	stronger support from non-catch anglers	6.71434	0.03483
Catch and Release on Selected Weekdays	stronger opposition from catch anglers	6.23347	0.02687
Limiting Hydro Development	stronger support from non-catch anglers	6.13773	0.04647
Preference for a Species of Fish	more catch anglers show a preference	5.83816	0.01568

Table 8.3: Hypothesis Investigated in this Study

HYPOTHESIS	SUPPORTED?
(H_1) A majority of anglers will be motivated for non-catch reasons	YES
(H_2) Catch motivated anglers have fished fewer seasons	NO
(H_3) Catch motivated anglers have spent fewer seasons on the Salmonier	NO
(H_4) Catch motivated anglers are younger	NO
(H_5) Catch motivated anglers spend more days per season salmon angling	YES
(H_6) Catch motivated anglers spend more days per season on the Salmonier River salmon angling	YES
(H_7) Catch motivated anglers indicate higher catch rates	NO
(H_8) Catch motivated anglers perceive themselves to be equally, or more skilled anglers	NO
(H_9) Catch motivated anglers prefer to fish for salmon, rather than other species of fish	NO
(H_{10}) Catch motivated anglers fish more accessible sections of the Salmonier River	YES
(H_{11}) Catch motivated anglers will show more opposition than non-catch motivated anglers to management options which would limit their ability to catch fish	NO
(H_{12}) Non-catch motivated anglers will be more opposed to management options which would negatively impact the surroundings of the Salmonier River	YES

CHAPTER 9
DISCUSSION/CONCLUSION

9.0 INTRODUCTION

Human dimensions research relating to resources in general, and recreational angling in particular, is a relatively new concept in Newfoundland. A complete resource analysis should include the stakeholders of the resource. This chapter presents key findings of the human dimensions research undertaken for this study, and then looks at the implications of this research for the management of recreational salmon angling. The chapter concludes by providing future directions for research relating to recreational angling.

9.1 DISCUSSION OF FINDINGS

An underlying premise behind human dimension research relating to recreational angling is the non-existence of the "average angler". An understanding of the motivations for angling, as investigated in this study, aids in the negation of this person. Data collected from this research have been presented in two manners: a descriptive analysis of the responses to the returned questionnaires, and an analysis incorporating motivational theory. The descriptive analysis presents average responses, and frequencies of Salmonier River salmon anglers. The motivational analysis moves away from these statistics to give a more refined definition of the anglers of the Salmonier River.

The standard method of describing survey results from human dimension

research uses descriptive statistics, i.e. frequencies, means and modes (Ditton et al., 1996; Filion et al., 1994). These statistics provide managers with the baseline data necessary for a more complete inventory of a resource to be managed. While descriptive results are an integral part of reports to decision makers, human dimension studies should attempt to go beyond these statistics to find linkages between variables being tested. Past recreational angling research has used the human dimension "motivation" as a means of finding these linkages (Driver and Cooksey, 1977; Fedler, 1989; Holland and Ditton, 1992; Fedler and Ditton, 1994). These studies, however, have been limited to comparisons of means relating to incentives for angling, and have lacked an expectancy component. Expectancy is necessary for a full understanding of the concept of motivation (Bandura, 1989; Feather, 1992).

This study had as an objective the advancement of motivational research relating to recreational angling. By using a variation of expectancy-value theory, two motivational groups were defined: one motivated primarily by catch motivations and the other primarily motivated by non-catch motivations. This differentiation has enabled the identification of differences of both attitude and behaviour between the two groups identified. The following discussion demonstrates the differences in the "average salmon angler" on the Salmonier River, and the anglers defined by motivation. From the examination of both of these methods of investigation, the benefits of motivational research are shown. This section looks at both methods of

interpretation, indicating the benefits of managing for differently motivated anglers and not the average angler.

9.1.1 Motivations of Salmonier River Salmon Anglers

As a group, anglers on the Salmonier River indicated that their main incentive for fishing salmon was for the excitement of the catch. Being outdoors, and relaxation were the next most important incentives. These findings are similar to those of Fedler and Ditton (1994) who determined that a fish known for its fight (such as the Atlantic salmon) often has a catch-related incentive ranked as most important.

The situational nature of salmon angling was shown from the expectancies of anglers on the Salmonier River. Expectancies for angling on the Salmonier River were not ranked in the same order as the importance of the same incentives. The expectancy of non-catch incentives, such as the ability to be outdoors and for relaxation, were found to have the highest values. The expectancy of catch incentives were ranked lower with the catch incentive with the greatest expectancy being "for the challenge or sport". This expectancy was ranked fourth highest of all of the incentives investigated. These findings were expected as the productivity of the Salmonier River is fairly low, and therefore, expectancies relating to the catching of salmon should also have been low. When expectancies for an incentive are high, and these expectancies are met on a river, satisfaction for the angler will result. As providing quality recreation experiences is a

goal of recreation resource management, a full understanding of the expectancies of anglers is needed. This understanding will aid in providing satisfying recreational experiences for the angler.

The descriptive findings of expectancy and importance of incentives are necessary to give an overall picture of the anglers of the Salmonier River. When combined through the use of expectancy-value theory, however, these dimensions can provide added insight into the anglers of the Salmonier. The traditionally low productivity of the river leads to the hypothesis that the majority of anglers fishing the Salmonier River would be motivated primarily by non-catch motives, rather than catch motives (H_1). By using expectancy-value theory, this hypothesis was supported. Fewer anglers were motivated by catch motivations (33%) than non-catch motivations (67%). Traditional methods of motivational research, equating incentive to motivation, would have found a catch incentive to be the primary motive for angling the Salmonier River (i.e. the excitement of the catch). By defining motivation from the use of expectancy-value theory, a different picture of the motivations of anglers of the Salmonier emerges. This more complete definition of motivation helps move away from the average angler to give a better picture of the anglers of the Salmonier. The categorization of anglers into one of the two motivational categories found that anglers motivated for different reasons had different behaviours, and different attitudes toward various management options.

9.1.2 Behaviours of Salmonier River Salmon Anglers

When examined as a single population, the importance of salmon angling to Salmonier River salmon anglers is readily noted. The large number of anglers taking trips of over three nights to fish salmon, shows the importance of salmon angling as a summer activity. The fact that anglers average 13 days a year salmon angling, of which 11 days were spent on the Salmonier River, also shows the importance of salmon angling as a summer recreational activity. Thirteen days a year fishing salmon, account for a large percentage of the average number of days of angling for Newfoundlanders (17 days), as reported in **The Importance of Wildlife to Canadians** (Filion et al., 1994).

When looked at in the context of differing motivations, the number of days fished are found to differ between catch and non-catch motivated anglers. Catch motivated anglers were statistically likely to fish more days in the season, and spend more days on the Salmonier River than non-catch anglers. This was hypothesised (H_{5-6}), as catch motivated anglers would have to fish more to achieve satisfactions related to their main motivation for angling. Non-catch motivated anglers on the other hand could enjoy their prime motives in a variety of activities other than salmon angling. The enjoyment of the outdoors for example, could be obtained in a hike. This is supported by this study when examining where anglers fished. Statistically more

catch motivated anglers fished the Middle section of the Salmonier, which is accessible by woods road, than the Upper section, which is accessed by a 45 minute walk. This finding substantiates the difference between the two motivational groups. Catch motivated anglers are going to have fewer alternative activities to substitute than non-catch anglers, to achieve satisfactions related to catching a fish, and therefore should pursue salmon angling more than non-catch motivated anglers.

Salmon angling constitutes only one type of recreational angling available in Newfoundland, and occurs only during the summer months. The trouting season is longer, and includes both summer and winter seasons. The possibility exists that Salmonier River anglers are on the high participation end of the recreational anglers in the province, fishing more than the average of 17 days per year. The centrality of angling salmon for all anglers was noted by the fact the majority of anglers prefer to fish salmon over any other species during the summer. While no difference existed between motivational groups for a preference of fishing salmon over other species of fish, catch motivated anglers were statistically more likely to indicate a preference of some kind of fish to angle than non-catch motivated anglers. Thus, the importance of the fish can be seen to be greater to catch motivated anglers than to non-catch motivated anglers.

The importance of the location of the Salmonier River was noted by the mean distance travelled to the Salmonier being 78 kilometers. This places most anglers

within a 45 minute drive of the river. The importance of location also is substantiated by the fact that only 33% of respondents indicated the Salmonier River as their favourite river, and by the relatively low rating of the Salmonier (five out of a possible score of ten, where one was a poor day of angling and ten was an excellent day of angling). Non-catch incentives, along with the location of the Salmonier may be assumed to be the prime reasons for the anglers to fish the Salmonier River. Catch motives, such as the ability to catch trophy salmon, are secondary for most anglers.

Expectancy-value theory allowed for the investigation of motivations for angling different sections of the Salmonier River. Significant differences between angling groups were found when considering the section of river fished. This also showed the importance of the salmon to catch motivated anglers. The first quality pools reached by salmon are fished statistically more by catch motivated anglers than non-catch anglers. These pools are located in the Middle section of the Salmonier. This finding is similar to that of Teirney and Richardson (1992) who found that salmon anglers in New Zealand fish lower sections of rivers to better their chances of fishing for salmon fresh from the ocean. These fish would have been fished less and therefore, be more likely to be caught. The implications of catch motivated anglers fishing a particular section of the Salmonier River are discussed in section 9.2.3.

While the number of salmon caught was not statistically different between motivational groups, there was a tendency for catch motivated anglers to catch more

fish than non-catch motivated anglers. As catch motivated anglers fish more days, the opportunity to catch more fish should also occur. A reason why the catch difference is not statistically different may relate to the low catch per rod day for the Salmonier River.

Other studies have investigated if the importance of the catch diminishes with the aging of anglers (Loomis and Warnick, 1991). This changing of importance was hypothesised to be the case for this study (H_4). This hypothesis, however, was not supported in this research. Newfoundlanders have had a long tradition of being hunters and anglers. Long standing cultural traditions can often play more important parts in the actions of people than recent environmental/conservation concerns. These cultural traditions have implications for fisheries managers, and are discussed in section 9.3.

9.1.3 Attitudes of Salmonier River Salmon anglers

As with the behaviours discussed in the previous section, the attitudes of anglers were found to differ between motivational groups. The following discussion again shows the need to look beyond the average angler when investigating management options.

When examined as a group, some trends in the attitudes of Salmonier anglers could be noted: management options relating to catch and release were opposed by a majority of anglers; management issues which would increase the productivity of the

river, such as a closed offshore commercial fishery, and improving salmon habitat, were favoured by a majority of anglers; and maintaining both the natural surroundings, and the ability of catching salmon were priorities for most anglers responding to the questionnaire.

When the motivations of anglers are factored into the analysis, attitudinal differences relating to management options were found to exist. These differences were found primarily in the management options which would have an effect on the natural surroundings of the Salmonier River. Statistically more non-catch motivated anglers were opposed to development than catch motivated anglers. While activities such as cabin and golf course development, and the use of seadoos can have an impact on salmon stocks, this impact is indirect. These management options may not be perceived as a threat to catching a salmon by catch motivated anglers. These developments, however, would have a direct impact on the surrounding environment. Therefore, they were perceived by statistically more non-catch motivated anglers as impediments for their ability to obtain incentives like enjoying the outdoors, getting close to the water, or solitude.

A majority of management options which would have a direct impact on the ability of the angler to catch a salmon were not found to differ between the two motivational groups. This suggests a fairly homogenous group when this aspect of angling is being considered. Split season tags, a license fee for the Salmonier, and a

quota for the Salmonier, for example, were not favoured by either motivational group.

While no significant differences were found in options such as retaining more fish, there was a tendency for catch motivated anglers to want to retain more fish than non-catch anglers. The reason for the absence of significant differences in catch-related management options may be the river specific nature of the study. Knowledge of the relatively poor catch rates for the Salmonier may have meant that anglers did not consider it wise to allow higher bag limits, or retention of larger fish at this time.

Though catch motivated anglers were more opposed to catch and release management options, only one of these options was found to differ significantly between groups. This option was for catch and release on selected weekdays. The option of catch and release on selected pools was not significantly different between groups, however, there was a tendency for catch motivated anglers to oppose this more than non-catch motivated anglers. These findings indicate a tendency for catch motivated anglers to want to keep their catch, and shows the importance of the salmon for this group's angling enjoyment.

Catch and release is seen by many anglers as detrimental both to the salmon, and to anglers. It is seen as detrimental to salmon through fish mortality, and detrimental to anglers by the monopolizing of prime locations on salmon pools. The issues of fish mortality and "hogging" of pools were concerns communicated to the principal investigator during the research. Many anglers contacted during the research

indicated that catch and release, was not conducive for their angling enjoyment. The perception of many anglers was that the catching and releasing of a salmon lessened the likelihood of that salmon going after a fly at a later time. Catch and release was also perceived as resulting in the death of many salmon. From the perspective of access to the river, catch and release was seen as a means for anglers to remain in a prime location on the river, catching salmon and limiting access of other anglers to these prime locations.

Another catch-related management option which was found to be significantly different between groups was the introduction of Pacific salmon to the Salmonier River. Statistically more catch motivated anglers were found to desire this option than non-catch anglers. This relates once again to the importance of the catching of a salmon, regardless of species, for the catch motivated angler.

The use of a more substantial definition of motivation through the use of expectancy-value theory, and the use of human dimensions studies in general, are valuable for the understanding of anglers. The findings presented here have implications for different groups who have a stake in the recreational angling resource: anglers, human dimension researchers, and recreational fisheries managers.

9.2 IMPLICATIONS FROM THIS RESEARCH

Various issues have been raised from the research undertaken for this study.

This section examines some of the strengths and weaknesses of this study from methodological, theoretical and managerial points of view.

9.2.1 Methodological Issues

9.2.1.1 The Survey Method

While the 77.4% response rate achieved in this study indicates the strength of the research methods used, some considerations for future research have been noted. This section reviews the use of the intercept method as a means of obtaining a sample of anglers for human dimensions studies. This is considered in light of the research undertaken from this study, and the work of DFO.

The data used to determine the sampling frame for this study was the average number of rod days for the Salmonier River. Repeat anglers are not accounted for in this data. As was shown in the field results of this study, the number of repeat anglers was statistically different in the different sections of the river. Sampling proportional to the rod days is, therefore, not necessarily sampling proportional to the number of different anglers fishing a river. Only by undertaking an access survey can (or could) this have been noted. This finding in itself is important for fisheries managers. Repeat anglers give an indication of the dedication of the anglers fishing a section of a river. There are undoubtedly some special qualities to a section of a river, and of the anglers fishing that section, for an angler to fish the same section repeatedly.

Sections with a high percentage of repeat anglers differed from sections on the river, such as the Lower section, which had lower percentages of repeat anglers. Ease of access to the Lower section means more, and more varied anglers can access the river at these points. In this section of the river, it is much easier for an angler to have a quick try for a salmon, than in the Upper or Middle sections. If not happy with the conditions in the easily accessible section, the angler can move on to another part of the river, or to another nearby salmon river.

The finding that catch and non-catch anglers prefer different sections of the Salmonier River, is associated with the issue of repeat anglers. The anglers who choose to fish a more inaccessible section of river must have greater faith, or knowledge, that the conditions at the more inaccessible pools will be able to satisfy their needs, than those fishing the Lower section. Quality salmon pools, and/or scenic beauty, are undoubtedly identified by anglers seeking these qualities in different sections of the Salmonier River.

The nature of a rod day is such that one angler can be counted several times by different monitors during the same day, and thus account for too many rod days. In contrast to this, is the angler who is not counted at all. Anglers from this study accounted for 3841 rod days per year on the Salmonier River. This contrasts with DFO's estimate of 4169 rod days in 1996 for the Salmonier River. With an additional 22.6% of anglers not responding to the survey, and an unknown number of anglers not

included in the survey due to not being intercepted, the accuracy of DFO rod days should be put in question. By extension the number of salmon caught on the Salmonier should also be brought into question, as catch statistics are also kept by the same people who take the rod day statistics. Undercounting of anglers, and of salmon caught, can have repercussions for Salmonier River resources. An undercounting of anglers may give an inaccurate picture of the demands placed upon facilities, and the environment, around the Salmonier River. An undercounting of the number of salmon caught could potentially jeopardize the sustainability of salmon stocks on the river. Thus, for both catch and non-catch reasons accurate counts of anglers, and salmon caught, should be undertaken by DFO.

In part, the decision to use an intercept method for this study was made, as a list of names of anglers fishing the Salmonier was unavailable. There is a need for better accounting of who is fishing the rivers of Newfoundland. Many management agencies in the United States have large lists of anglers from which to draw samples of anglers. The intercept method used here, however, proved to be a good method of sampling, as it gave an indication of repeat anglers, yet was not biased by avidity of anglers.

A sample frame consisting of the names of anglers who return their angling logs each season, and indicate angling on the river in question, was another plausible means of obtaining subjects (Bull, 1997). Such a list was not available from DFO for this

study. The response rate of anglers returning these logs is between 55% and 60% (Cochrane, 1997, personal communication). These lists are from a season previous to the year of study. Changing conditions may mean that these anglers no longer fish the river in question. Data obtained from anglers on this list would have to acknowledge a bias in reporting its results. Anglers who return their stubs may in fact constitute a different type of angler from those who do not return their angling logs (Fisher, 1996). Thus, the intercept method is seen as a means of reducing bias in obtaining a sample of anglers, as each angler is given the same chance of being included in the study.

Another strength of the intercept method is interaction with anglers. This interaction enabled issues not identified during the design stage of the research to be noted. These issues included: a perception of a high mortality rate of salmon from catch and release angling; a problem with anglers foul hooking or "jigging" salmon; and concerns over a lack of wardens on the river watching for fisheries violations. Also, explanations for opposition, or support, toward issues such as catch and release could be noted from this interaction. Although space was left at the end of the questionnaire for additional comments, few comments were written. Thus, personal interactions with anglers aided in the understanding of attitudes toward selected management issues.

A drawback to the intercept method used in this study is the dependence on the angling season not being shortened. A shortened season, or the cancellation of an

angling season, could result from dry or hot conditions which would close the river to angling. The method, therefore, is a gamble. As no list of anglers was available, it was a necessary gamble for this study. If an intercept survey is used, all systems have to be ready to go at the start of the season, to ensure that a maximum number of anglers can be contacted. This intensive start was not seen as adding bias to this study, however, as the beginning of the season on the Salmonier River is when most angling occurs.

9.2.1.2 Representativeness of the Sample

The survey method used in this study enabled a wide variety of anglers to voice their opinions. Without a survey, it is often a local angling association which gets the most input in the issues concerning a fishery. This study found that anglers belonging to angling associations made up a minority (8%) of anglers on the river. This small percentage did not allow for tests to determine if members of these organizations were more in favour of catch and release, as was the case in a Michigan study (Gigliotti and Peyton, 1993). Similar to many lobby groups associated with resource issues, angling organizations often are not representative of the entire resource constituency. Many angling associations' mandates include conservation through the use of catch and release angling. The opposition of a majority of anglers to catch and release on the Salmonier River has been made clear from this study. This fact shows how angling associations do not accurately represent the views of anglers on the Salmonier River.

This non-representativeness has been noted on the Gander River, where a catch and release pool was implemented by the Gander River Management Association (GRMA). This was done despite a strong majority of Gander River anglers being opposed to catch and release pools on the Gander River (Bull, 1997).

The results from this study should not, however, cause alarm to angling associations. The information gained from this study can be used by these groups to understand what they must to do to bring other anglers on side with their policies. Angling associations can target anglers opposed to catch and release with information concerning proper catch and release methods. Angling associations could lessen some of the negative connotations associated with catch and release with this information, thereby increasing the number of anglers practising it. The fact that most anglers supported barbless hooks for catch and release angling, indicates some willingness by anglers to consider the issue. This would help the conservation of salmon stocks, and create a better rapport between angling groups and the majority of anglers.

9.2.2 Theoretical Issues

This study went beyond the use of simple descriptive statistics pertaining to anglers of the Salmonier River. By using an expectancy-value model, linkages between motivations for angling and angling behaviour, and between motivations and attitudes were found. As was demonstrated in the motivational literature review, a complete

understanding of motivation requires both the importance, and the expectancy of an incentive. The use of traditional incentives for angling, along with the situational nature of expectancy of these incentives for the Salmonier River, proved to be an asset in the investigation of motivation. Evidence of the strength of expectancy-value theory for describing the anglers of the Salmonier River has been presented in sections 9.1.2 and 9.1.3 of this chapter.

The assumption that the excitement of the catch is the most important incentive for all anglers on the Salmonier, which could be drawn from the descriptive statistics of this study, should not be accepted. Table 7.1 demonstrated that once anglers are categorized into catch and non-catch motivations, catch motivated anglers had a higher score for "the excitement of the catch" than the non-catch motivated anglers. The nature of averages means that a smaller group with high values can have a great effect on an average, which includes a larger group with lower values. This is one danger of a simple descriptive analysis of statements of incentive, so often used in "motivational" research (eg. Driver and Cooksey, 1977; Fedler, 1989; Holland and Ditton, 1992; Fedler and Ditton, 1994). This danger is lessened by using expectancy-value theory.

It could be debated that expectancy-value theory forces anglers into predetermined categories, as is done in the categorization used in specialization of anglers. Unlike specialization, however, which uses behaviours to investigate behaviours, this study used motivations to investigate behaviours and attitudes. As was

shown in sections 9.1.2 and 9.1.3, these motivations did translate into behavioural and attitudinal differences, which aid in the understanding of anglers on the Salmonier River.

Chipman and Helfrich (1988) have questioned using angler motivations to predict angler behaviour. Undoubtedly, the limited definition of motivation used in the past in recreational angling has given reason to doubt this use. Their apprehension for motivation stems in a large part from an incomplete definition of motivation, which has traditionally lacked the expectancy component. It is this expectancy component, along with an indication of the importance of different incentives for angling, which must be used to define motivation.

Feather (1992) notes that expectancy-value theory is not all inclusive in explaining behaviour. Behaviours are influenced by group pressures, social norms, task requirements, and other imposed conditions, as well as motivation. Behaviours are often restricted by the realities of the situation. The examination of management options in this study, has in part, addressed restrictions placed upon anglers. To attempt to investigate an exhaustive list of restrictions would make research theoretical to the point of impossibility for managers, and the practicality of expectancy-value theory could be lost.

Another consideration when examining behaviour is that many actions occur without much thought about expected consequences. Habit, and trial and error involve

minimum conscious reflection (Feather, 1992). Because of the non-constrained nature of leisure, little reflection as to why one is fishing would probably be the case for most anglers. The method used in this research, however, asked anglers to perform a conscious reflection of their motives for angling. This reflection resulted in a better understanding of recreational angling on the Salmonier River.

As has been noted by Feather (1992) expectation acts as a filter for place and activity. In this study both the activity and the place had been chosen by the anglers, i.e. salmon angling on the Salmonier River. The question to be answered was "Why the Salmonier River?". If this had of been a more general study, without the knowledge of place (i.e. which river fished) or activity (i.e. species of fish perused) as is carried out in broad based surveys such as the **Importance of Wildlife to Canadians** (Filion et al., 1994), the question of motivation would be too general. The river specific nature used in this examination of expectancy-value theory, shows its strength as a management tool for managers.

This study was conducted under the assumption that anglers would consciously, or unconsciously, include expectancies relating to both the resource and to angling skill. This may not have been the case for all anglers. It would have been more prudent to have stated this consideration at the beginning of the expectancy question. A more precise statement at the beginning of this section could have read, "Considering your angling ability, and the availability of resources on the Salmonier River, how strongly

do you expect to achieve the following on the Salmonier River?". This statement would ensure that both the self-efficy and environmental components of expectation, (i.e. "ability-availability") were considered by all anglers.

The theory and methods used in this study were chosen to be of practical value for the management of the salmon fishery on the Salmonier River. To answer the "So what?" question helps justify motivational research in a very pragmatic world. This chapter now turns to the practical/applied issues from the findings of this research.

9.2.3 Applied/Management Issues

The goals of recreation management should be: to provide benefits to the public; reduce conflict; and ensure that the integrity of a resource is not jeopardized (McCool et al., 1984). The identification of both catch and non-catch incentives shows that a broad spectrum of experiences need to be considered where recreational fisheries are concerned. To a large degree, this is accomplished through management actions by regulating agencies such as DFO. The attitudes of people toward these management actions will determine if the angler sees benefits from the management actions, and if satisfaction is obtained by the angler. This satisfaction will help determine the amount of conflict which may result, and whether or not the integrity of the resource will be maintained. Several considerations for the management of the Salmonier River arise from this study. These come in the form of information which was received from

anglers, and from information which might need to be conveyed to these same anglers. This information is needed to maintain a viable recreational experience on the Salmonier River.

Many of the management options offered to the anglers of this study related to catch and release angling. It was found that catch and release is not a popular option for a majority of anglers on the Salmonier. It was found to be even less popular for anglers motivated primarily for catch reasons. This being said, barbless hooks for catch and release was supported by a majority of anglers. Discussions with anglers during the summer indicated that one of the problems perceived with catch and release is mortality of fish once released. By combining these facts, it can be seen how the implementation of barbless hooks may lessen some of the perceived problems associated with catch and release. The fact that very few anglers on the Salmonier use barbless hooks, indicates that there is a need to educate anglers regarding the conservation benefits of these hooks.

While the perception of many anglers is that fish mortality is high from catch and release angling, studies such as those done by Tufts et al. (1996) do not substantiate this. When done properly, mortality of salmon after being released is very low. This fact, combined with the finding that DFO information is the best medium for conveying messages to anglers, may be used to change perceptions of anglers. This may cause some of the concerns relating to catch and release to be reduced.

A further concern identified with catch and release is the ability of anglers to stay in one spot and catch and release until four fish had been caught. Four salmon was the daily quota for catch and release set by DFO during this study. If one adds the two salmon which may be retained, a prime place on a river can be monopolized (hogged) for some time. Casual discussion with anglers angling the different sections indicated that this was not a large problem in the Upper section of the Salmonier, a section where fewer catch motivated anglers fish. This is further substantiated by the fact that statistically fewer catch motivated anglers fish in this section. The hogging of pools was indicated as a concern in the Middle section, where anglers tend to be more catch motivated. The use of the expectancy-value theory in relation to this problem, helps provide a rationale for the degree of "hogging" varying in different sections of the Salmonier River. This knowledge could be used by managers to customize regulations to reduce conflict, and maximize satisfactions of anglers in different sections of the Salmonier River.

The concern of hogging pools raises the issue of angler ethics. Many anglers indicated that they would not fish the Middle section because of the lack of angling ethics in the Pinsent Falls area. Voluntary rotation of pools, which occurs to a greater extent in the Upper section, is not very prevalent in the Middle section. This may be as a result of the greater number of catch motivated anglers fishing the Middle section.

With less money budgeted for enforcement of regulations on salmon rivers,

there is a need for sound angler ethics, and conservation, to be conveyed to anglers. With catch motivated anglers catching more fish than non-catch anglers, a message of conservation to this minority of anglers on the Salmonier may be needed to ensure that the salmon stocks remain in a state which will provide catch opportunities in future years. Communication of proper angler ethics may also lessen some of the social problems associated with the Middle section, such as litter and the hogging of pools.

The dissemination of information by management agencies such as DFO is important for developing conservation measures. This study found that the best method of imparting this information is by word of mouth. Of the media which may provide information to anglers, DFO materials are the most used. This being said, the knowledge of anglers of information provided to every angler in the angling guide (minus the 11% who never received the guide) was poor. There may be a need, therefore, for DFO to rethink the present angler guide, to produce a source of information for anglers which conveys conservation messages better and is more user friendly. This may better communicate issues that will maintain the integrity of the salmon stocks on the Salmonier River for years to come.

Knowledge of present angler behaviours can aid in encouraging anglers to shift away from harvest to an emphasis on resource conservation and appreciation. This may lead to more effective indirect angler management, and partially relieve the enforcement burden of direct angler regulations (Dawson et al., 1991a). It is important

to note, however, that these directions must be attempted with the support of the angling public. Without a knowledge of the angling public, managers may come up against a wall of opposition, and not be able to initiate these options.

The finding that anglers motivated for different reasons fish different sections of the Salmonier River has direct management implications. This is especially the case when combined with the knowledge that the attitudes toward development management options are statistically different between groups. Should it be decided that limited cabin development would be allowed on the Salmonier River, less disruption may occur where a concentration of catch motivated anglers fish, rather than in areas where the anglers tend to be more non-catch motivated. This must be looked at with caution however, as despite a significant difference in the development management attitudes, a majority of anglers regardless of motivation were opposed to such development.

Clarke and Downing (1984) note that access is a key factor in choice of selecting a recreational activity. This is undoubtedly so for Salmonier River anglers. Another equally, or possibly more important factor for some anglers, is the availability of salmon. Anglers fishing in the Middle section perceive that it is more accessible than the Upper section, yet it provides better pools for fishing than in the Lower section. Increasing access to the Upper section of the river could therefore change the type of anglers fishing there, and could lead to conflict. The development of all terrain vehicle trails to the Upper section could do just this. The crowding, occasional fight, and litter

found in the Pinsent Falls area could be avoided in the Upper section by maintaining the current level of low accessibility (inaccessibility) to the Upper section of the Salmonier River.

There is a need to recognize that people are creatures of habit when investigating the motivations of anglers. Recreationists form attachments to sites and return to favourite or preferred places again and again (Knopf, 1983). The question is, "will habit play a larger part in determining the behaviours of anglers if unfavourable management is implemented, or will they adapt to new unfavourable regulations?". Possible adaption methods available to the angler are the substitution of another river, or another activity for a disrupted activity. With six other salmon rivers within 30 kilometers of the Salmonier River, one or more of these may constitute viable alternatives for the angler. With only 33% of anglers indicating the Salmonier River as their favourite salmon river, and a total of 50 other rivers indicated as a favourite, the possibility of anglers fishing a river other than the Salmonier is great. If motives for angling can not be satisfied on the Salmonier, these anglers could go to other rivers in the area, make a longer trip to another river, or not salmon angle at all. Trouting, an activity which has less restrictive regulations, yet still provides catch incentives, could also serve as a substitute. These considerations should be noted by managers when designing and implementing management plans, and when making recreation resource management decisions for this river. Indeed, the variety of activities and rivers

available to anglers implies that management decisions for a single river should not be made in isolation. Managers need to look at the larger resource picture before decisions which will affect an angler's enjoyment are made.

Clarke and Downy (1984) found that forest recreationists varied in their "threshold of disruption" and their willingness to adapt to undesirable changes in place. Expectations and the availability of alternatives are key elements in understanding how thresholds operate to change patterns of actual use (Clarke and Downing, 1984). With many alternatives available to Salmonier River anglers, any management actions should consider this. Indeed, with the development of a golf course in the Salmonier River Valley, a person who owns a cabin in the area, and is looking for a recreational activity, will soon be able to substitute golf for salmon angling.

There is a danger in offering or discussing management issues which are not being considered for a river. These may cause unnecessary alarm amongst anglers. Introducing Pacific salmon, which was undertaken in other rivers on the Avalon Peninsula in the 1950s, and netting excess salmon, which occurs in northern British Columbia, are not considered for the Salmonier, and should not have been asked. At the same time, managers should not be hesitant to raise realistic issues which may cause concerns for anglers. Without knowing where the angling public stands on certain issues, management alternatives cannot be determined. Questions need to be realistic to the time and situation. They need to mirror issues being considered by

biologists to sustain the resource, and at the same time provide opportunities which will fulfil the satisfactions of anglers.

Watershed management groups should incorporate angler input before the writing and implementation of management plans. To do otherwise will undoubtedly require damage control as conflicts arise. If issues are not brought up to the public before being implemented, watershed agencies will be seen as operating under hidden agendas. The trust, so necessary for the successful management of watersheds, could be lost through the omission of these stakeholders' opinions.

9.3 FUTURE RESEARCH

The purpose of this study was to investigate the motivations of Salmonier River salmon anglers, and then see how these motivations related to behaviour and attitude. With no previous human dimension work having been done on the Salmonier, or any other river in Newfoundland, this study provides baseline data, and a new method of investigating the motivations of anglers. As the Salmonier and its anglers change, the percentages of catch and non-catch anglers could also change. Management issues and angler attitudes toward these issues will also change over time. If effective management is to occur, monitoring of these changes over time should take place.

Loomis and Ditton (1991) have found that demand for angling is not evenly distributed across age cohorts, and that distribution of demand by age group will shift

over time as the population age structure shifts. While this study did not find a significant difference in age structure between catch and non-catch anglers, longitudinal studies will be needed to see if this remains the case. As the population of Newfoundland ages there will undoubtedly be changes in the motivations and behaviours of anglers. Demands for ease of access for older anglers, for example, may become a concern for managers. The degree of many of these changes may, however, be moderated by the strong cultural traditions of Newfoundlanders. These traditions place a high value on the pragmatic aspects of a resource, such as a meal on the table. Only through longitudinal studies will any change be recognized, and managed for.

Longitudinal studies are also needed as salmon are a renewable resource. Seldom are renewable resources in a state of equilibrium. Fluctuations in the numbers of fish returning to spawn, both as a result of management practices and changing environmental conditions, necessitate follow up and continued analysis of the human component of the resource equation. Recognition of changing attitudes due to new and sometimes unpopular management actions, can facilitate the introduction of management policies seen as necessary for maintaining the integrity of a resource. An example of this need can be found in the investigation of catch and release angling on the Salmonier River.

Based on discussions with anglers and river wardens, this study has speculated on why catch and release is unpopular for many anglers on the Salmonier River. There

is a need to investigate, scientifically, why catch and release is not popular. Such an understanding could aid in the management of the river by obtaining baseline data on the rationale behind the beliefs concerning catch and release angling. On more productive rivers where problems of low numbers of salmon do not exist, such concerns about catch and release may be of less importance. On the Gander River for example, catch and release is not a management option needed to preserve the integrity of the salmon stocks. Catch and release on rivers such as the Gander would be more a matter of preference than necessity.

New management considerations are constantly being raised in relation to recreational fisheries. The creation of a golf course next to the Salmonier during the undertaking of this study acts as an example of this, and shows the need for longitudinal studies. The development of the golf course will bring more people to the area, possibly causing problems with parking and crowding. This may affect the non-catch motivations of anglers on the Salmonier. Also, the use of fertilizers on the golf course could potentially affect the river and the salmon in it, thus affecting the catch motives of anglers.

The proposed development of a nickel smelter in Placentia, 50 kilometers west of the Salmonier River, could also place pressures on the river, as some people may choose to live in the St. Catherine's area and commute to the smelter site. The smelter itself could potentially affect the river by acid rain, reducing the productivity of the

river. The example of the smelter shows how an undertaking distant from the Salmonier River can have an effect on both the catch and non-catch motives of anglers. It also shows the necessity to monitor the motives, behaviours and attitudes of anglers over time.

As funding becomes increasingly limited for wildlife agencies, less money will be available for enforcement of regulations on the Salmonier. It will be up to the anglers to ensure that the river's integrity is maintained. Sound angler ethics will be necessary to achieve this. The development/formation of these ethics will require education programs starting with school age children. Studies into the effectiveness of such programs will be needed to ensure that anglers go to rivers with conservation in mind. This ethic does not only relate to the catching of salmon but also to non-catch concerns such as the hogging of pools, litter, and pollution.

The theoretical methods developed for this study should be tested on a river which is known to have a high catch rate. A more productive river should have a higher percentage of anglers motivated for catch reasons than the Salmonier. An investigation into whether or not these catch motivated anglers are different in their behaviours and attitudes can be undertaken. This spatial investigation of the motivations of anglers will also further the investigation of motivational theory.

This study did not test if the expectations of anglers were realistic to the availability of the resource on the Salmonier River. This was not attempted as the

perception of an incentive's expectancy is of more importance, than the actual possibility of it being fulfilled for motivational theory. Future studies can look at the degree to which angler expectations are realistic. Should expectations not be realistic, education programs providing realistic expectations can be initiated, thereby increasing satisfactions of anglers. In contrast to this, conditions may be able to be changed to better meet the expectations of anglers, thus increasing angler satisfactions. The addition of a hatchery could for example increase the number of fish on a river, thus making the catch realities more in line with high catch expectations.

The findings from this study do not explain the processes in decision making. They do however, explain some of the reasons which might be relevant to forming overall motivations for angling on a particular river. Why anglers vary in attitude could be investigated through the use of an attitudinal scale such as the new environmental paradigm (NEP) (Dunlap and Van Liere, 1978; Edgell and Nowell, 1989). The NEP has been used to examine differences in attitudes between different resource users, and could be used in conjunction with the motivational theory of this study.

The issues section of this chapter (9.2) has alluded to other human dimension work which can result from this study. Substitution and satisfaction are directly related to the motivations of anglers, and could provide more information on the anglers of the Salmonier River. New management options, such as catch and release and the initiation of fees to fish the other salmon rivers in Newfoundland, will cause anglers to

reconsider the desirability of angling the Salmonier. Should anglers not be motivated primarily for catch incentives, there is the great possibility that they will choose to fish rivers without an added fee. This may place more angling pressure on rivers, such as the Salmonier, which are not currently considering a fee. Satisfactions from fishing the Salmonier and the substitutability of the Salmonier will undoubtedly change in years to come. These human dimension issues and others are ripe for investigation on the Salmonier River, and the other 176 salmon rivers in Newfoundland and Labrador.

Finally, the investigation of motivation for resource analysis can go beyond recreational angling. Other recreational resource related activities, such as moose hunting, could also be investigated using the methodology and theory used in this thesis. One can take this even further, and note that the need for human dimension work in resource analysis need not be confined to recreational activities. Investigation of motivations, attitudes, behaviours, and perceptions, in the context of human-environment relationships, will make a significant contribution to the advancement of geographical inquiry (Bunting and Guelke, 1979; Mitchell, 1993), and improve the management of resources for all stakeholders involved.

9.4 CONCLUSION

This study has aided in the understanding of anglers on the Salmonier River by investigating a more complete definition of motivation. Through this understanding, the

manner in which motivation relates to behaviour and attitude has been demonstrated. This in itself is of little use unless it can be translated into practical uses by managers of recreational fisheries. This study has also demonstrated how an understanding of motivation can aid in the management of the recreational salmon fishery on the Salmonier River.

Human dimension research is but one component needed for recreational resource management. Human dimension research should be cooperative, and coordinated, with research undertaken by physical scientists looking at the resource. This constitutes interdisciplinary research (Mitchell, 1993), and contrasts with the primarily single disciplinary research which occurs in Newfoundland today. While it is the actual resource which is being utilized, the users of the resource determine whether or not sustainability, or conservation, are achieved. Management of a resource depends on both management of the people, and management for the people. To ignore this fact will undoubtedly result in conflict between stakeholders in the resource. Sound human dimension research will aid managers in having a healthy resource to manage for generations to come. With new and changing conditions affecting any resource, the people with some stake in the resource must be consulted.

Peyton and Gigliotti (1989) have noted that the difficulty in integrating the human component with the biological component is the lack of communication between professionals with differing areas of expertise. Without cooperation however,

management plans will undoubtedly be limited to considerations of the resource, and at best, marginal considerations of the human component.

The rise of watershed management in Newfoundland will mean a host of differing regulations, custom designed for the watersheds in question. If these plans are not designed with the motivations of anglers fishing the watershed in mind, one desired outcome of the watershed management, the satisfaction of users, will be lost. Knowledge of the human dimension will be necessary for successful management. To manage by intuition will ultimately end in conflict, as will management for a vocal minority with an agenda different from the larger population.

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APPENDICES

APPENDIX 1
1996 SALMONIER RIVER ANGLER SURVEY

1996 SALMONIER RIVER ANGLER SURVEY

Dear Angler:

The Geography Department of Memorial University is conducting a study to learn more about salmon angling on the Salmonier River. We are interested in the motivations of anglers and the opinions of anglers towards different management strategies. With information from you, we hope to gain a better understanding of why people fish for salmon on the Salmonier River, thereby improving the management of the recreational salmon fishery.

Due to uncertainty in the number of anglers on the Salmonier River this season, **your** help is critical to the success of this study.

Please complete the questionnaire as soon as possible and return it in the stamped envelope provided. Your response to the questions will remain confidential and will never be associated with your name. If you have any questions please feel free to contact me at (709) 737-8998.

Thank you very much for your help.

Sincerely,

Peter Bull
Project coordinator

Below is a list of reasons why people fish for salmon. Please circle the number that indicates how important each item is to you as a reason for fishing.

	Not at all important						Very important
a) to be outdoors	1	2	3	4	5	6	7
b) for family recreation	1	2	3	4	5	6	7
c) to experience new and different things	1	2	3	4	5	6	7
d) for relaxation	1	2	3	4	5	6	7
e) to be close to the water	1	2	3	4	5	6	7
f) to obtain a salmon for eating	1	2	3	4	5	6	7
g) to get away from other people	1	2	3	4	5	6	7
h) for the excitement of the catch	1	2	3	4	5	6	7
i) to test my equipment	1	2	3	4	5	6	7
j) to be with friends	1	2	3	4	5	6	7
k) to experience natural surroundings	1	2	3	4	5	6	7
l) to develop my angling skills	1	2	3	4	5	6	7
m) to get away from the regular routine	1	2	3	4	5	6	7
n) to land a "trophy" salmon	1	2	3	4	5	6	7
o) for the challenge or sport	1	2	3	4	5	6	7
p) to catch my limit of salmon	1	2	3	4	5	6	7
q) for physical exercise	1	2	3	4	5	6	7
r) to catch and release a salmon	1	2	3	4	5	6	7

With how many other anglers would you **like** to share your favourite salmon pool on the Salmonier River (at one time)?

_____ Anglers _____ I have no favourite pool

What is the **maximum** number of anglers you would **want** to see on your favourite pool on the Salmonier River?

_____ Anglers

The following questions ask about fishing methods and habits. Please give the response which best describes you.

1. How do you compare your salmon angling ability to that of other salmon anglers?

Less Skilled			Equally Skilled			More Skilled
1	2	3	4	5	6	7

2. Did you have a salmon license last year?

Yes No

If yes, how many days did you fish for salmon last year and how many salmon did you catch (including catch and release)?

_____ Days _____ Salmon

3. How many seasons have you fished for salmon, including this season?

_____ Seasons

4. How many seasons have you been salmon angling on the Salmonier River, including this season?

_____ Seasons

5. On average, how many days a year do you spend on the Salmonier River fishing for salmon?

_____ Days

6. How many kilometers is it from your home to where you park to go fishing on the Salmonier River?

_____ Kilometers

7. Once parked, how many kilometers do you walk to get to your preferred fishing location on the Salmonier River?

_____ Kilometers ___ I have no preferred location

8. What is the greatest distance you have ever travelled, one way, (by car, plane, etc.) with the primary reason to fish for salmon?

_____ Kilometers Location/River _____

9. How many of your salmon flies do you tie?

(a) None (b) Some (c) Most (d) All

10. How many of your leaders do you make?

(a) None (b) Some (c) Most (d) All

11. What type of group do you most prefer to fish with? (mark only one answer please)

(a) By yourself
(b) Family
(c) Club / association
(d) Friends
(e) Family and friends together
(f) Guide

12. If you caught a tagged fish, would you report the tag?

Definately no	Probably no	No Opinion	Probably yes	Definately yes
1	2	3	4	5

13. Please estimate the replacement dollar value of your salmon angling equipment (rods, tackle, waders, flies, clothing etc.) excluding ATVs, boats and vehicles.

_____ Dollars

14. How many salmon flies do you take with you when you fish for salmon?

_____ Flies

15. Are you currently a member of a salmonid association or angling club?
Yes No

16. Do you subscribe to an angling magazine?
Yes No

17. What was the longest fishing trip you took on the Salmonier River to fish for salmon last year?
(a) Never fished (b) Day trip (c) One overnight (d) Two overnights (e) Three or more nights

18. Where do you sleep when you fish for salmon on the Salmonier River?
(a) Home (b) Own cabin (c) Friend's cabin (d) Trailer (e) Tent (f)Other _____

19. How many nights was your longest salmon angling trip to any river in Newfoundland or Labrador last year?
(a) Never fished (b) Day trip (c) One overnight (d) Two overnights (e) Three or more nights

What was the river? _____

20. a) If the Salmonier River is not your favourite salmon river, what is your favourite river in Newfoundland and Labrador for salmon angling? If the Salmonier River is your favourite, please go to question 21.

_____ _____ I have no favourite river

b) How far is this river from your home?

_____ Kilometers

c) What is the main reason for favouring this river? (Please choose only one reason)
a) Large salmon (b) Lots of salmon (c) Scenery (d) People (e) Location

f) Other Please state other reason _____

d) How would you compare the fishing experience of your favourite river to the Salmonier River?

About the same			Better			Considerably better
1	2	3	4	5	6	7

21. Which species of fish do you most prefer to fish for during the summer? (Please choose one type)
(a) Salmon (b) Brook / Mud trout (c) Brown trout (d) Arctic char
(e) No preference (f) Other_____

22. What would you consider to be the minimum weight of a "trophy" salmon on the Salmonier River?

_____ Pounds

23. Have you ever used barbless hooks?
Yes No

24. How often do you use barbless hooks for catch and release fishing?

Never						Always	I don't practice catch and release
1	2	3	4	5	6	7	8

To what extent do you make use of the following information for salmon angling?

	No use			Some use			Great deal of use
a) Comments and opinions of other anglers	1	2	3	4	5	6	7
b) Department of Fisheries information (brochures , etc)	1	2	3	4	5	6	7
c) Newspaper articles	1	2	3	4	5	6	7
d) Magazine articles	1	2	3	4	5	6	7
e) Sport shops	1	2	3	4	5	6	7
f) Fishing clubs/association	1	2	3	4	5	6	7
g) Television shows	1	2	3	4	5	6	7
h) Own past experience	1	2	3	4	5	6	7
i) Books	1	2	3	4	5	6	7

The following section deals with salmon management issues.

1. The current regulations require releasing salmon over 63 cm in length. For the Salmonier River, is this length

Much too small			The best length			Much too large
1	2	3	4	5	6	7

2. The current regulations have a limit of six salmon retained for a season. How many salmon do you think the limit should be?

_____ Salmon

3. Current regulations allow catch and release of four salmon per day. How many salmon do you think should be allowed to be caught and released in a day

_____ Salmon

4. How much would you pay in excess of the regular salmon license to have a "trophy" tag for a large salmon caught on the Salmonier River?

_____ Dollars _____ I would not buy a trophy tag

The following is a list of tools used to manage salmon in different regions of North America. Please indicate the degree to which you support or oppose each in relation to the **Salmonier River**. 1 = strongly oppose, 2 = moderately oppose, 3 = slightly oppose, 4 = neutral, 5 = slightly support, 6 = moderately support, 7 = strongly support.

	Strongly Oppose			Neutral			Strongly Support
a) Stocking salmon	1	2	3	4	5	6	7
b) Quotas for provincial angling zones	1	2	3	4	5	6	7
c) Improving existing salmon habitat	1	2	3	4	5	6	7
d) Allowing catch and release fishing once the quota is filled	1	2	3	4	5	6	7
e) Designating selected pools as catch and release only	1	2	3	4	5	6	7
f) Closing rivers when water levels get too low	1	2	3	4	5	6	7
g) Selective catching of surplus fish in rivers by nets for commercial use	1	2	3	4	5	6	7
h) Allowing only barbless hooks when practising catch and release fishing	1	2	3	4	5	6	7
i) Limiting cabin development along rivers	1	2	3	4	5	6	7
j) Quotas for individual rivers	1	2	3	4	5	6	7
k) Split season use of tags	1	2	3	4	5	6	7
l) Accompaniment of non-resident anglers by a guide	1	2	3	4	5	6	7
m) Designating certain weekdays as catch and release only	1	2	3	4	5	6	7
n) A catch and release season before the catch and retain season	1	2	3	4	5	6	7
o) Closing the offshore commercial salmon fishery	1	2	3	4	5	6	7
p) Limits on the number of rods allowed at specific pools at one time	1	2	3	4	5	6	7
q) Introducing Pacific salmon to rivers	1	2	3	4	5	6	7
r) License fees for individual rivers	1	2	3	4	5	6	7
s) A fall salmon season	1	2	3	4	5	6	7
t) Limiting golf course development along salmon rivers	1	2	3	4	5	6	7
u) Limiting hydro development	1	2	3	4	5	6	7
v) Limiting the use of "sea-doos"	1	2	3	4	5	6	7

The following section deals with angler expectations of the Salmonier River. Please indicate the degree to which you agree or disagree with each statement concerning the Salmonier River.

While fishing on the Salmonier River I expect that:

	Strongly disagree			Neutral			Strongly agree
a) I will be able to enjoy the outdoors	1	2	3	4	5	6	7
b) I will be able to enjoy family recreation	1	2	3	4	5	6	7
c) I will be able to experience new and different things	1	2	3	4	5	6	7
d) I will be able to relax	1	2	3	4	5	6	7
e) I will be able to be close to the water	1	2	3	4	5	6	7
f) I will be able to obtain a salmon for eating	1	2	3	4	5	6	7
g) I will be able to get away from other people	1	2	3	4	5	6	7
h) I will be able to enjoy the experience of the catch	1	2	3	4	5	6	7
i) I will be able to test my equipment	1	2	3	4	5	6	7
j) I will be able to be with friends	1	2	3	4	5	6	7
k) I will be able to experience natural surroundings	1	2	3	4	5	6	7
l) I will be able to develop my skills	1	2	3	4	5	6	7
m) I will be able to get away from the regular routine	1	2	3	4	5	6	7
n) I will be able to land a "trophy" salmon	1	2	3	4	5	6	7
o) I will be able to enjoy the challenge or sport	1	2	3	4	5	6	7
p) I will be able to catch my limit of salmon	1	2	3	4	5	6	7
q) I will be able to catch and release a salmon	1	2	3	4	5	6	7
r) I will get a good physical workout	1	2	3	4	5	6	7

Below are several statements about salmon and salmon angling. Please answer these to the best of your knowledge.

1. When releasing salmon the amount of time required for the fish to recover is:
a) Two minutes per pound of fish
b) Five minutes
c) One minute per five minutes of play
d) Ten minutes
e) As long as the fish requires
f) Not sure

2. According to DFO, catch and release angling should not be done when water temperatures reach:
a) 15 degrees celsius
b) 16 degrees celsius
c) 18 degrees celsius
d) 20 degrees celsius
e) Not sure

3. A salmometer is:
a) A length weight table devised by the Atlantic Salmon Federation
b) An electronic salmon counting devise developed by DFO
c) A devise to measure the amount of fight a salmon gives
d) None of the above
e) Not sure

4. The number of scheduled salmon rivers in Newfoundland and Labrador is:
a) 86
b) 127
c) 177
d) 203
e) Not sure

5. Angling is prohibited ____ meters down stream from an obstacle which salmon must jump.
a) No minimum distance
b) 5 meters
c) 23 meters
d) 30 meters
e) Not sure

6. The distance a salmon can see through the water is:
a) 1 meter
b) 7 meters
c) 15 meters
(d) 21 meters
(e) Not sure

7. The age of a salmon can be determined from its scales.
True False Not sure

8. A salmon can jump vertically up to 12 feet.
True False Not sure

9. By combining limits for catch and release, and catch and retain fishing, the maximum number of salmon that can be caught by an angler in one day this season is:
(a) 2 (b) 5 (c) 6 (d) 8 (e) No limit (f) Not sure

10. According to DFO, the number of salmon caught (including catch and release) on the Salmonier River in 1995 was:
a) 274
b) 537
c) 695
(d) 1034
(e) Not sure

11. On average, the main run of salmon on the Salmonier River ends:
(a) First week of July (b) End of July (c) Middle of August (d) End of August (e) Not sure

12. (a) On a Saturday, during the main salmon run on the Salmonier River, with how many anglers would you **expect** to share your favourite pool?

_____ Anglers _____ I would not fish at this time _____ I have no favourite pool

(b) How stressful is angling by this number of anglers to the salmon in the pool?

No stress						Extremely stressful	Not sure
1	2	3	4	5	6	7	8

(c) How much does this number of anglers take away from your fishing experience?

Nothing						A lot
1	2	3	4	5	6	7

13. In your view, is the number of salmon in the Salmonier River:
(a) Increasing (b) Decreasing (c) Remaining the same (d) Not sure

14. In your view, is the number of **large** salmon (over 63 cm) in the Salmonier River:
(a) Increasing (b) Decreasing (d) Remaining the same (d) Not sure

15. On a scale where 1 is a poor day of fishing and 10 is an excellent day of fishing, on average, how would you rate the Salmonier River?

Poor									Excellent
1	2	3	4	5	6	7	8	9	10

16. Did you receive an angler guide with your salmon license this year?
Yes No

The following questions will help us to know more about anglers on the Salmonier River. The information will be used only to compare the characteristics of this sample of anglers to those of the general population. The information provided will remain strictly confidential and you will not be identified by your answers.

1. Do you own a cabin between the Trans Canada Highway and St. Catherine's?
Yes No

2. What is your age? ____ Years

3. How many years of school did you complete, counting 12 years for high school graduation and 1 full-time year for each additional year of college, technical, vocational training or university?

_____ years

4. To the best of your knowledge, what was your total household income before taxes last year ?

(a) under $9999
(b) $10 000 to $19 999
(c) $20 000 to $29 999
(d) $30 000 to $39 999
(e) $40 000 to $49 999
(f) $50 000 to $59 999
(g) $60 000 to $69 999
(h) $70 000 to $79 999
(i) $80 000 to $89 999
(j) $90 000 to $99 999
(k) $100 000 and above

Your contribution to this effort is greatly appreciated. If you have additional comments concerning salmon angling, please write them in the space remaining. Please return your completed questionnaire in the stamped return envelope as soon as possible. Thank you.

APPENDIX 2
REMINDER POSTCARD

SALMONIER RIVER ANGLER SURVEY

You were recently given a survey concerning salmon angling on the Salmonier River. If you have completed and returned the survey, thank you. If you have not yet filled out the survey, please take a few minutes now to do so and return it in the self-addressed envelope provided with your survey. Your opinions concerning salmon angling are important, and I encourage you to voice them. Your answers will be kept in strict confidence. Thank you for your time and cooperation in this study.

Sincerely,

Peter Bull
Project Coordinator

APPENDIX 3
LETTER ACCOMPANYING FIRST FOLLOW-UP SURVEY

July **, 1996

Dear angler:

A few weeks ago you were given a survey concerning salmon angling. If you have already completed and returned it, please accept my sincere thanks. If you have not done so, please take the time to complete it today.

Your opinions on management concerns and the reasons why you fish the Salmonier River are needed to give an accurate picture of the recreational salmon fishery on the Salmonier River. Information from you will aid in the better management of the recreational fishery in future seasons.

Your cooperation in completing the questionnaire will be appreciated. Your response will remain confidential and will never be associated with your name. In the event that your questionnaire has been misplaced, a replacement is enclosed. Postage has been provided. You can simply fill it out and drop it into any mailbox.

Thank you for your help.

Sincerely,

Peter Bull
Project Coordinator

APPENDIX 4
LETTER ACCOMPANYING SECOND FOLLOW-UP SURVEY

September 10, 1996

Dear angler:

I am writing to you about the Salmonier River Angler Survey which you were given this past salmon season. The Geography Department of Memorial University would like to know about **your** opinions of the different salmon management strategies the Province uses, such as catch and release fishing and split season tags.

Although I have received a large number of completed surveys from other anglers, to date I have not heard from you. Often those who do not return surveys have quite different views from those who return their surveys. To accurately describe the views of all anglers, I need to hear from those anglers who have not responded to the survey.

I am writing you again because of the importance of each survey, including yours, to the usefulness of this study. As very few anglers were chosen for this study, **your** help is **critical** to its success.

Again I remind you that your responses are strictly confidential and will not be identified as belonging to you. Thank you for your contribution to the success of this study.

Sincerely,

Peter Bull
Project Coordinator

APPENDIX 5
RESULTS OF CHI-SQUARE GOODNESS-OF-FIT TESTS

Appendix 5.1. Motivation by Catching a Limit of Salmon (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	59 48.4	63 51.6	122 32.2
Non-catch Motivated	229 89.1	28 10.9	257 67.8
Column Total	288 76.0	91 24.0	379 100.0

Chi-Square = 75.27213
Significance $p < 0.00001$

Appendix 5.2. Motivation by Catching a Trophy Salmon (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	63 51.6	59 48.4	122 32.2
Non-catch Motivated	230 89.5	27 10.5	257 67.8
Column Total	293 77.3	86 22.7	379 100.0

Chi-Square = 67.57848
Significance $p < 0.00001$

Appendix 5.3. Motivation by Catching a Salmon to Eat (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	41 33.6	81 66.4	123 32.2
Non-catch Motivated	192 74.7	65 25.3	257 67.8
Column Total	233 61.5	146 38.5	379 100.0

Chi-Square = 59.01211
Significance $p < 0.00001$

Appendix 5.4. Motivation by The Excitement of the Catch (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	5 4.1	117 95.9	122 32.2
Non-catch Motivated	54 21.0	203 79.0	257 67.8
Column Total	59 15.6	320 84.4	379 100.0

Chi-Square = 18.00477
Significance p = 0.00002

Appendix 5.5. Motivation by the Challenge or Sport (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	10 8.2	112 91.8	122 32.2
Non-catch Motivated	67 26.1	190 73.9	257 67.8
Column Total	77 20.3	302 79.7	379 100.0

Chi-Square = 16.32469
Significance p = 0.00005

Appendix 5.6. Motivation by Testing Angling Equipment (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	87 71.3	35 28.7	122 32.2
Non-catch Motivated	218 84.8	39 15.2	257 67.8
Column Total	305 80.5	74 19.5	379 100.0

Chi-Square = 9.61461
Significance p = 0.00193

Appendix 5.7. Motivation by Developing Angling Skills (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	41 33.6	81 66.4	122 32.2
Non-catch Motivated	122 47.5	135 52.5	257 67.8
Column Total	163 42.9	216 57.0	379 100.0

Chi-Square = 6.48760
Significance p = 0.01086

Appendix 5.8. Motivation by Being Outdoors (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	27 22.1	95 77.9	122 32.2
Non-catch Motivated	14 5.4	243 94.6	257 67.8
Column Total	41 10.8	338 89.2	379 100.0

Chi-Square = 23.86795
Significance p < 0.00001

Appendix 5.9. Motivation by Experiencing Natural Surroundings (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	49 40.2	73 59.8	122 32.2
Non-catch Motivated	44 17.1	213 82.9	257 67.8
Column Total	93 24.5	286 75.5	379 100.0

Chi-Square = 23.72318
Significance p < 0.00001

Appendix 5.10. Motivation by Relaxation (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	35 28.7	87 71.3	122 32.2
Non-catch Motivated	26 10.1	231 89.9	257 67.8
Column Total	61 16.1	318 83.9	379 100.0

Chi-Square = 21.12919
Significance $p < 0.00001$

Appendix 5.11. Motivation by Being Close to the Water (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	75 61.5	47 38.5	122 32.2
Non-catch Motivated	100 38.9	157 61.1	257 67.8
Column Total	175 46.2	204 53.8	379 100.0

Chi-Square = 16.94849
Significance $p = 0.00004$

Appendix 5.12. Motivation by Escaping the Regular Routine (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	41 33.6	81 66.4	122 32.2
Non-catch Motivated	44 17.1	213 82.9	257 67.8
Column Total	85 22.4	294 77.6	379 100.0

Chi-Square = 12.92388
Significance $p = 0.00032$

Appendix 5.13. Motivation by Family Recreation (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	88 72.1	34 27.9	122 32.2
Non-catch Motivated	152 59.1	105 40.9	257 67.8
Column Total	240 63.3	139 36.7	379 100.0

Chi-Square = 6.00808
Significance p = 0.01424

Appendix 5.14. Motivation by Exercise (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	81 66.4	41 33.6	122 32.2
Non-catch Motivated	139 54.1	118 45.9	257 67.8
Column Total	220 58.0	159 42.0	379 100.0

Chi-Square = 5.14607
Significance p = 0.02330

Appendix 5.15. Motivation by Experiencing Different Things (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	82 67.2	40 32.8	122 32.2
Non-catch Motivated	147 57.2	110 42.8	257 67.8
Column Total	229 60.4	150 39.6	379 100.0

Chi-Square = 3.46960
Significance p = 0.06251

Appendix 5.16. Motivation by Friendship (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	61 50.0	61 50.0	122 32.2
Non-catch Motivated	112 43.6	145 56.4	257 67.8
Column Total	173 45.6	206 54.5	379 100.0

Chi-Square = 1.37442
Significance p = 0.24105

Appendix 5.17. Motivation by Getting Away From Other People (with 3.5 being the median possible answer)

Count Row %	≤ 3.5	> 3.5	Row Total
Catch Motivated	88 72.1	34 27.9	122 32.2
Non-catch Motivated	183 71.2	74 28.8	257 67.8
Column Total	271 71.5	108 28.5	379 100.0

Chi-Square = 0.03473
Significance p = 0.85216

Appendix 5.18. Motivation by Seasons Fished (11 Seasons being the mean number of seasons fished by anglers on the Salmonier River)

Count Row %	≤ 11 Seasons	≥ 12 Seasons	Row Total
Catch Motivated	79 64.8	43 35.2	122 32.2
Non-catch Motivated	167 65.0	90 35.0	257 67.8
Column Total	246 64.9	133 35.1	379 100.0

Chi-Square = 0.00186
Significance p = 0.96558

Appendix 5.19. Motivation by Seasons Fished On the Salmonier (with eight seasons being the mean number of seasons fished by anglers on the Salmonier River)

Count Row %	≤ 8 Seasons	≥9 Seasons	Row Total
Catch Motivated	75 61.5	47 38.5	122 32.2
Non-catch Motivated	183 71.2	74 28.8	257 67.8
Column Total	258 68.1	121 31.9	379 100.0

Chi-Square = 3.60434
Significance p = 0.05763

Appendix 5.20. Motivation by Age

Count Row %	≤ 25 years old	26 to 50 years old	≥ 51 years old	Row Total
Catch Motivated	25 20.5	78 63.9	19 15.6	122 32.2
Non-catch Motivated	44 17.1	173 67.3	40 15.6	257 67.8
Column Total	69 18.2	251 66.2	59 15.6	379 100.0

Chi-square = 0.71921
Significance p = 0.65920

Appendix 5.21. Motivation by Days Fished In 1995 (13 days being the mean number of days fished by all anglers on the Salmonier River)

Count Row %	≤ 13 Days	≥14 Days	Row Total
Catch Motivated	42 34.4	80 65.6	122 32.2
Non-catch Motivated	130 50.6	127 49.4	257 67.8
Column Total	172 45.3	207 54.7	379 100.0

Chi-Square = 8.71320
Significance p = 0.00316

Appendix 5.22. Motivation By Average Number of Days of Salmon Angling on the Salmonier (11 days equalling the mean number of days fished by all anglers on the Salmonier River)

Count Row %	≤ 11 Days	≥ 12 Days	Row Total
Catch Motivated	63 51.6	59 48.4	122 32.2
Non-catch Motivated	180 70.0	77 30.0	257 67.8
Column Total	243 64.1	136 35.9	379 100.0

Chi-Square = 12.17313
Significance p = 0.00048

Appendix 5.23. Motivation by Salmon Caught in 1995, including catch and release (4 salmon equalling the mean number of salmon caught by all anglers)

Count Row %	≤ 4 Salmon	≥ 5 Salmon	Row Total
Catch Motivated	56 45.9	66 54.1	122 32.2
Non-catch Motivated	144 56.0	113 44.0	257 67.8
Column Total	200 52.8	179 47.2	379 100.0

Chi-Square = 3.40584
Significance p = 0.06497

Appendix 5.24. Motivation by Angling Skill

Count Row %	Less Skilled	Equally Skilled	More Skilled	Row Total
Catch Motivated	23 18.9	64 52.5	35 28.7	122 32.2
Non-catch Motivated	74 28.8	114 44.4	69 26.8	257 67.8
Column Total	97 25.6	178 47.0	104 27.4	379 100.0

Chi-square = 4.45264
Significance p = 0.10793

Appendix 5.25. Motivation by Angling Group Preferred

Count Row %	Self	Group	Row Total
Catch Motivated	25 20.5	97 79.5	122 32.2
Non-catch Motivated	45 17.6	212 82.4	257 67.8
Column Total	70 18.5	309 81.5	379 100.0

Chi-square = 0.46486
Significance p=0.49536

Appendix 5.26 Motivation by Species of Fish Preferred

Count Row %	Salmon	Other Species	No Preference	Row Total
Catch Motivated	79 66.9	33 28.0	6 5.1	122 32.2
Non-catch Motivated	155 61.3	64 25.3	34 13.4	257 67.8
Column Total	234 63.1	97 26.1	40 10.8	379 100.0

Chi-Square = 5.84030
Significance p=0.05393

Appendix 5.27.Motivation by Preference of Fish

Count Row %	Preference	No preference	Row Total
Catch Motivated	112 94.9	6 5.1	118 32.2
Non-catch Motivated	219 86.6	36 13.4	253 67.8
Column Total	331 89.2	40 10.8	371 100.0

Chi-Square = 5.83816
Significance p = 0.01568

Appendix 5.28. Motivation by Location of Intercept

Count Row %	Lower Section	Middle Section	Upper Section	Row Total
Catch Motivated	43 35.8	60 50.0	17 14.2	121 32.3
Non-catch Motivated	119 46.9	87 34.3	48 18.9	254 67.7
Column Total	162 43.3	147 39.3	65 17.4	379 100.0

Chi-Square = 8.47542
Significance p = 0.01444

Appendix 5.29. Motivation by Improving Habitat

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	3 2.5	18 14.8	101 82.8	122 32.2
Non-catch Motivated	10 3.9	17 6.6	230 89.5	257 67.8
Column Total	13 3.4	35 9.3	331 87.3	379 100.0

* Test did not meet requirements for Chi-Square Goodness-of-fit

Appendix 5.30. Motivation by Selective Catching of Surplus Fish in Rivers By Nets for Commercial Use

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	111 91.0	5 4.1	6 4.9	122 32.2
Non-catch Motivated	236 91.8	13 5.1	8 3.1	257 67.8
Column Total	347 91.6	18 4.7	14 3.7	379 100.0

* Test did not meet requirements for Chi-Square Goodness-of-fit

Appendix 5.31. Motivation by Closing Rivers when Water Levels Get Too Low

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	5 4.1	10 8.2	107 87.7	122 32.2
Non-catch Motivated	21 8.2	10 3.9	226 87.9	257 67.8
Column Total	26 6.8	20 5.3	333 87.9	379 100.0

* Test did not meet requirements for Chi-Square Goodness-of-fit

Appendix 5.32. Motivation by Closing the Offshore Commercial Salmon Fishery

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	17 13.9	32 26.2	73 59.8	122 32.2
Non-catch Motivated	35 13.6	55 21.4	167 65.0	257 67.8
Column Total	52 13.7	87 23.0	240 63.3	379 100.0

Chi-Square = 1.19207
Significance p = 0.55099

Appendix 5.33. Motivation by Stocking Salmon

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	14 11.5	25 20.5	83 68.0	122 32.2
Non-catch Motivated	20 7.8	48 18.7	189 73.5	257 67.8
Column Total	34 9.0	73 19.3	272 71.7	379 100.0

Chi-Square = 1.74907
Significance p = 0.41706

Appendix 5.34. Motivation by Introducing Pacific Salmon To Rivers

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	56 45.9	26 21.3	40 32.8	122 32.2
Non-catch Motivated	143 55.6	62 24.1	52 20.2	257 67.8
Column Total	199 52.5	88 23.2	92 24.3	379 100.0

Chi-Square = 7.14746
Significance p = 0.02805

Appendix 5.35. Motivation by Limiting Cabin Development

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	30 24.6	19 15.6	73 59.8	122 32.2
Non-catch Motivated	33 12.8	33 12.8	191 74.3	257 67.8
Column Total	63 16.6	52 13.7	264 69.7	379 100.0

Chi-Square = 9.81243
Significance p = 0.00740

Appendix 5.36. Motivation by Limiting The Use Of "Seadoos"

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	36 29.5	20 16.4	66 54.1	122 32.2
Non-catch Motivated	41 16.0	44 17.1	172 66.9	257 67.8
Column Total	77 20.3	64 16.9	238 62.8	379 100.0

Chi-Square = 9.67528
Significance p = 0.00793

Appendix 5.37. Motivation by Limiting Hydro Development

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	29 23.8	19 15.6	74 60.7	122 32.2
Non-catch Motivated	38 14.8	32 12.5	187 72.8	257 67.8
Column Total	67 17.7	51 13.5	261 68.8	379 100.0

Chi-Square = 6.13773
Significance p = 0.04647

Appendix 5.38. Motivation by Limiting Golf Course Development

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	35 28.7	27 22.1	60 49.2	122 32.2
Non-catch Motivated	44 17.1	67 26.1	146 56.8	257 67.8
Column Total	79 20.8	94 24.8	206 54.4	379 100.0

Chi-Square = 6.71434
Significance p = 0.03483

Appendix 5.39. Motivation by Catch and Release Weekdays

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	99 81.1	10 8.2	13 10.7	122 32.2
Non-catch Motivated	179 69.6	47 18.3	31 12.1	257 67.8
Column Total	278 73.4	57 15.0	44 11.6	379 100.0

Chi-Square = 6.23347
Significance p = 0.02687

Appendix 5.40. Motivation by A Catch and Release Season Before the Catch and Retain Season

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	77 63.1	18 14.8	27 22.1	122 32.2
Non-catch Motivated	158 61.5	39 15.2	60 23.3	257 67.8
Column Total	235 62.0	57 15.0	87 23.0	379 100.0

Chi-Square = 0.09668
Significance p = 0.95186

Appendix 5.41. Motivation by Catch and Release after The Quota is Caught

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	63 51.6	17 13.9	42 34.1	122 32.2
Non-catch Motivated	126 49.0	33 12.8	98 38.1	257 67.8
Column Total	189 49.9	50 13.2	140 36.9	379 100.0

Chi-Square = 0.49584
Significance p = 0.78042

Appendix 5.42. Motivation by Catch and Release Pools

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	83 68.0	13 10.7	26 21.3	122 32.2
Non-catch Motivated	167 65.0	48 18.7	42 16.3	257 67.8
Column Total	250 66.0	61 16.1	68 17.9	379 100.0

Chi-Square = 4.56248
Significance p = 0.10216

Appendix 5.43. Motivation by Allowing Only Barbless Hooks When Practising Catch and Release

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	26 21.3	21 17.2	75 61.5	122 32.2
Non-catch Motivated	42 16.3	46 17.9	169 65.8	257 67.8
Column Total	68 17.9	67 17.7	244 64.4	379 100.0

Chi-Square = 1.39626
Significance p = 0.49751

Appendix 5.44. Motivation by A Fall Salmon Fishery

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	25 20.5	32 26.2	65 53.3	122 32.2
Non-catch Motivated	67 26.1	62 24.1	128 49.8	257 67.8
Column Total	92 24.3	94 24.8	193 50.9	379 100.0

Chi-Square = 1.40425
Significance p = 0.49553

Appendix 5.45. Motivation by Provincial Quotas

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	23 18.9	31 25.4	68 55.7	122 32.2
Non-catch Motivated	49 19.1	47 18.3	161 62.6	257 67.8
Column Total	72 19.0	78 20.6	229 60.4	379 100.0

Chi-Square = 2.69427
Significance p = 0.25998

Appendix 5.46. Motivation by Quotas for Individual Rivers

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	27 22.1	26 21.3	69 56.6	122 32.2
Non-catch Motivated	48 18.7	42 16.3	167 65.0	257 67.8
Column Total	75 19.8	68 17.9	236 62.3	379 100.0

Chi-Square = 2.57988
Significance p = 0.27529

Appendix 5.47. Motivation by Split Season Use of Tags

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	81 66.4	14 11.5	27 22.1	122 32.2
Non-catch Motivated	165 64.2	43 16.7	49 19.1	257 67.8
Column Total	246 64.9	57 15.0	76 20.1	379 100.0

Chi-Square = 1.96841
Significance p = 0.37374

Appendix 5.48. Motivation by Limits on the Number Of Rods Allowed at specific Pools at One Time

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	40 32.8	29 23.8	53 43.4	122 32.2
Non-catch Motivated	70 27.2	64 24.9	123 47.9	257 67.8
Column Total	110 29.0	93 24.5	176 46.5	379 100.0

Chi-Square = 1.26867
Significance p = 0.53029

Appendix 5.49. Motivation by License Fees for Individual Rivers

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	86 70.5	25 20.5	11 9.0	122 32.2
Non-catch Motivated	189 73.5	46 17.9	22 8.6	257 67.8
Column Total	275 72.6	71 18.7	33 8.7	379 100.0

Chi-Square = 0.42267
Significance p = 0.80950

Appendix 5.50. Motivation by Willingness to Buy a Trophy Tag

Count Row %	Yes	No	Row Total
Catch Motivated	38 32.7	78 67.2	116 31.6
Non-catch Motivated	84 33.2	169 66.8	253 68.4
Column Total	122 33.1	247 66.9	370 100.0

Chi-Square = 0.00705
Significance p = 0.93308

Appendix 5.51. Motivation by Accompaniment of Non-Resident Anglers by a Guide

Count Row %	Oppose	Neutral	Support	Row Total
Catch Motivated	22 18.0	35 28.7	65 53.3	122 32.2
Non-catch Motivated	51 19.8	73 28.4	133 51.8	257 67.8
Column Total	73 19.3	108 28.5	198 52.2	379 100.0

Chi-Square = 0.18025
Significance p = 0.91382

Appendix 5.52. Motivation by What the Season Bag Limit Should Be

Count Row %	< 6 Salmon	= 6 Salmon	> 6 Salmon	Row Total
Catch Motivated	3 2.5	42 34.4	77 63.1	122 32.2
Non-catch Motivated	18 7.0	91 35.4	148 57.6	257 67.8
Column Total	21 5.5	133 35.1	225 59.4	379 100.0

Chi-Square = 3.53249
Significance p = 0.17097

Appendix 5.53. Motivation by the Number of Salmon that Should be Allowed to be Caught and Released in a Day

Count Row %	< 4 Salmon	= 4 Salmon	> 4 Salmon	Row Total
Catch Motivated	65 53.3	33 27.0	24 19.7	122 32.2
Non-catch Motivated	140 54.5	75 29.2	42 16.3	257 67.8
Column Total	205 54.1	108 28.5	66 17.4	379 100.0

Chi-Square = 0.68075
Significance p = 0.71150

Appendix 5.54. Motivation by Salmon Length

Count Row %	Too Small	Best Length	Too Large	Row Total
Catch Motivated	49 40.2	55 45.1	18 14.8	122 32.2
Non-catch Motivated	83 32.3	135 52.5	39 15.2	257 67.8
Column Total	132 34.8	190 50.1	57 15.0	379 100.0

Chi-Square = 2.39549
Significance p = 0.30187