SKEENA REGION FISHERIES MANAGEMENT STATEMENT

BY

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PREFACE

The purpose of this regional planning statement is to provide long-term direction for fisheries management in the Skeena region. This is accomplished through analysis of fish production, fishery utilization and management strategies over the next 10 to 20 years. Because it is forward looking, this regional planning statement provides guidelines for management but is not a blueprint. It is intended to provide a relatively coarse level of data analysis and a broad management perspective. The statement has been prepared using existing data within a tight time schedule. An explicit decision was made to produce a sound regional analysis quickly rather than a flawless document slowly.

Educated guesses were applied where data were missing and opinion was substituted for fact in the absence of facts. However, the guesses and opinions were obtained from experienced managers and biologists and will gradually be replaced by better information as it becomes available. For these reasons this regional statement should be interpreted with care and constructive criticism is invited by the author.

The value of this document will be in its use by fisheries managers at the Provincial and regional levels. The statement should permit the translation of provincial program goals and objectives into regionally meaningful plans with indentifiable targets, strategies, timetables and resource requirements. At the same time, the regional statement will allow the preparation of the five strategic plans to move ahead more quickly and will permit more orderly development and management of the regional fisheries resource.

This regional statement will be updated annually with the completion of each sub-regional strategic plan followed by a total revision when all the sub-regional strategic plans in the region are completed.

SUMMARY

The Skeena fisheries management statement presents a broad overview of the fisheries resources (supply) to be found throughout the region. Current and future angling activity (demand) is discussed as are the implications of existing and/or potential supply shortfalls.

Skeena Region occupies approximately one quarter of the total area of British Columbia. It is largely undeveloped and its fisheries resources are, in the main, only lightly exploited. However, problems do exist or have the potential to erupt. Careful, committed management can solve these problems and, given the necessary support, will ensure the continued health of Skeena fisheries well into the future.

It is apparent that the immediate concern of fisheries managers in Skeena is that of anadromous fisheries, in which harvest rates on some major steelhead stocks are approaching and sometimes surpassing maximum allowable harvest levels. On the other hand, nonanadromous stream fisheries are generally underutilized although cutthroat trout in S.W. Skeena require management attention. Generally speaking, surplus fish production exists in large lakes throughout the region. However, there is a potential problem in the southern part of the region with regard to lake trout, rainbow trout and cutthroat trout which management must address. The opportunity to enhance fish production is greatest in small lakes, particularly near human settlements where local demand is high.

Management activities are priorized, along with the strategies required in each activity to meet the future demands of anglers in Skeena Region. Regional manpower needs are outlined and the required support services are identified.

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INTRODUCTION

The sportfish resource of Skeena Region is among the last in the Province of British Columbia to become fully developed and exploited. This large region is relatively remote, sparsely populated, and largely inaccessible. Fish habitats are many and varied. Unfortunately, however, low productivity combined with increasing resource use conflicts, both within fisheries and in other resource areas, are quickly changing this region from its status of having "unlimited" sport fishing potential only 20 years ago, to a region that may, in the next decade, have serious problems.

Skeena Region encompasses an area of approximately 300,000 km^2 stretching from the Central Interior Plateau (125° longitude) to and including the Queen Charlotte Islands, and from 53° north latitude to the Yukon border (Figure 1). There are seven major drainage systems in the region - two Arctic (Yukon and Liard) and five Pacific (Taku, Stikine, Nass, Skeena and Nechako-Fraser). The region has a population of about 90,000, of which the vast majority live in communities situated along the one major highway (Route 16) that traverses the southern most part. Skeena has a large native Indian population, with reserves and villages scattered throughout the region, usually associated with major fish-bearing waters.

Fig. 1

SKEENA REGION SHOWING PLANNING UNIT DIVISIONS

The economy of the area is based on primary (extractive) resource use. Foresty, mining and commercial fishing dominate, while various forms of agriculture (primarily ranching) are carried out in the southern interior portion of the region. Recreation in all its forms is of primary importance in Skeena, and sport fishing in particular makes a significant contribution to the economy. Major sport fish in the region include coho and chinook salmon, steelhead, rainbow, cutthroat, Dolly Varden, and lake trout. Other species of some note include whitefish, kokanee, burbot, brook trout, and Arctic grayling. Skeena Region is perhaps best known for its salmon and steelhead fisheries, and, in fact, several individual fish stocks in the region are known throughout the world for their size, quality and/or angling experience provided.

From 1970 to 1980, angling activity in Skeena doubled to approximately 570,000 angler days (Table 1). In most cases, "surplus" fish stocks were more than adequate to handle the increase and, in fact, can withstand further increases in angling activity. However, some important fisheries will reach a crossroads in the 1980's (some already have). Anadromous stocks in particular will come under increased pressure from all harvesting sectors, and are further threatened by habitat loss as a result of such major, proposed hydro-electric developments as Alcan's Kemano Completion project and the Stikine-Iskut project. Habitat loss may also occur upon development of some major mineral properties, such as Klappan and Telkwa coal and Sustut copper. Improved transportation routes into the heart of the region (Stewart-Cassiar) will bring increasingly heavy pressure to bear on fragile resident fish stocks inhabiting cold, unproductive habitats.

Table 1. 1980 Angling activity in B.C. by region

	Angler Days		
Region	B.C. Residents	Non-Residents	Total
Vancouver Island	522,500	45,900	568,400
Lower Mainland	670,700	18,300	689,000
Thompson-Nicola	858,600	153,900	1,012,500
Kootenay	919,700	184,100	1,103,800
Cariboo	550,300	130,800	681,100
Skeena	487,200	81,900	569,100
Omineca-Peace	558,300	59,900	618,200
Okanagan	679,900	56,100	736,000
Province of B.C.	5,247,200	730,900	5,978,100
Skeena Region as % of B.C.	9.3%	11.2%	9.5%

Source: Fresh Water Sport Fishing in British Columbia: An overview of the 1980 National Survey of Sports Fishing (M. Stone, 1982).

Fisheries managers in Skeena during the next decade will have as their task the maintenance and preservation of a sport fishery based almost entirely upon native, wild fish stocks. Steelhead were of primary importance during the 1970's and they will continue to be so in the 1980's we continue to plan, negotiate, and manage for their survival in the face of habitat loss and user group conflicts. As well, however, more management effort must be directed to supplying fish (by artificial production) to areas where demand is fast approaching supply.

Sub-regional Breakdown

Skeena Region is divided into five "planning" units (Figure 1). Except for Queen Charlotte Islands which is a geographically distinct division, the units are based on logical groupings of major watersheds. Skeena-Nass unit includes all of the waters that flow to the region's mainland coast. Ootsa encompasses the headwaters of the Nechako watershed. Although the Dease and Stikine drain in opposite directions, they occupy the same "basin" in terms of human and resource development. The Atlin Lake system and Taku River are similarily aligned.

Goals and Objectives

The goal of the Provincial Fisheries Management Program is to produce maximum economic, cultural, recreational and scientific benefits for present and future generations of British Columbians by:

a) maintaining all native and desirable introduced species of fish at optimum levels of distribution, abundance and health, and protecting or enhancing essential freshwater habitat, and

b) providing an equitable distribution of opportunities for a wide variety of socially acceptable uses of fish by all segments of society.

Within the context of these goals, the primary objectives of fisheries management in Skeena Region are to:

1. Provide a recreational fishery with the widest possible range of angling opportunities and experiences consistent with the desires of anglers and with the capacity of the fisheries resources of the Region.

2. Maintain the wild fish populations of the region through vigourous protection of habitat and through careful planning and consultation regarding resource use conflict.

3. Prepare for and accommodate increasing angler demand through planning and implementation of such fisheries mangement activities as inventory, research, angler regulation, and enhancement.

4. Ensure the continued viability of a steelhead trout sport fishery in Skeena through careful management based on an intensive program of collection, analysis and reporting of relevant biological and social information.

SUPPLY OF FISH

Resource Base

Within the five planning units of Skeena Region, fish habitats have been broadly categorized as large lakes, small lakes, resident rivers, and anadromous rivers (Table 2). Large lakes (and reservoirs) are those with a surface area greater than 400 hectares, while anything less is obviously a small lake (or reservoir). Anadromous rivers are those which support a fishery for steelhead, salmon and/or anadromous cutthroat and Dolly Varden. Resident rivers, then, are those which support a known sportfishery on non-anadromous fish stocks such as Dolly Varden, cutthroat, rainbow trout and grayling.

Productivity, as measured by total dissolved solids (T.D.S.) in concert with climate (length of growing season), is generally low to moderate throughout the region. On average, T.D.S. values are below 100 ppm for all habitat types except for some small lakes in the interior plateau area where values may approach 200 ppm.

i) Large Lakes and Reservoirs

One hundred and thirty lakes with surface area exceeding 400 hectares have been identified in Skeena Region. No one planning unit can be singled out as having the majority of these; suffice to say that Queen Charlotte Islands have the least (6) while Ootsa contains the greatest amount of large lake habitat in relation to planning unit size. Ootsa also contains the only large reservoir system in the region - the Ootsa-Eutsuk lake chain which is impounded by Alcan's Kenney Dam. These large, remote lakes provide an excellent rainbow trout fishery to a small number of anglers.

Table 2. Fish habitats in each planning unit of Skeena Region.

Planning Unit	Large Lakes & Reservoirs	Small Lakes & Reservoirs[1]	Anadromous Rivers[2]	Resident Rivers[3]
Skeena-Nass	46	724	1254 km	170 km
Ootsa	32	609	0 km	0 km
Queen Charlotte Islands	6	145	101 km	0 km
Atlin-Taku	23	467	100 km	50 km
Dease-Stikine	19	242	228 km	170 km
Skeena Totals	126	2187	1683 km	390 km

1 Does not include many thousands of potholes, beaver ponds, etc ....

2 Length of known fishery on anadromous stocks.

3 Length of known fishery on nonanadromous stream stocks; stream-based fisheries targetting on migrating (spawning) lake stocks not included.

Skeena-Nass has almost 50 large lakes. Many of these form the headwater storage basins of the important salmon and steelhead-bearing tributaries of the Skeena River (Babine, Morice, Lakelse, Kitsumkalum) and the Nass (Meziadin). The interior lakes contain a rainbow/char species mix and can be prolific fish producers (particularly the lakes in the Babine watershed). Coastal lakes (Lakelse, Kitwanga) are primarily cutthroat fisheries. In Dease-Stikine, large lakes are either rainbow (Stikine) or char/grayling (Dease). The large lake chain at the head of the Iskut River supports a major rainbow trout fishery. The large lakes in the Atlin-Taku unit are primarily in the Yukon watershed and therefore contain a char/whitefish/grayling species mix.

ii) Small Lakes

Over 2000 small lakes have been "counted" in Skeẽna Region. Many of these have never been seen by fisheries staff, let alone surveyed. In fact, there are major sport fisheries proceeding on many small lakes of which little or no information is available on harvest, recruitment or even species composition! In the southern part of the region, numerous, pristine lakes are annually "opened up" by new logging roads and shortly thereafter a sport fishery develops. This is particularly true in Ootsa and the eastern part of Skeena-Nass where small rainbow trout lakes are quite prevalent.

Fish culture has not been a major management tool in Skeena; only twelve small lakes in the above two units have a history of rainbow trout introductions. At the present time the region stocks four lakes in Ootsa (one with brook trout) and four in Skeena-Nass.

Small lakes in the Dease-Stikine unit (242) abound in either rainbows or grayling; whereas many small lakes in the Taku River watershed are prolific rainbow trout producers to a small, fly-in angler clientele.

iii) Anadromous Rivers

All planning units except Ootsa contain streams that support sport fisheries on salmon, steelhead, and sea-run cutthroat. The Skeena River is second only to the Fraser River in terms of total production of salmon and steelhead. Also within the Skeena-Nass unit are the Nass and Kitimat Rivers, and a myriad of smaller coastal systems. The most productive systems are those with large, headwater lakes which provide the stable flows and moderate temperatures that are prerequisite to viable salmon and steelhead stocks.

iv) Resident Rivers

Resident rivers are those that support a known, nonanadromous sport fishery. In many cases resident rivers will be the same as anadromous rivers; i.e. they support fisheries on both anadromous and nonanadromous stocks. The major species of this habitat type are Dolly Varden, cutthroat trout, and Arctic grayling. The latter species is of prime importance in the Dease River. Dolly Varden are very plentiful throughout the region, but are primarily fished in tributaries of the Skeena and Nass Rivers as are cutthroat. Minor fisheries for Dolly Varden exist on the Stikine and Taku mainstems.

Throughout this exercise, an attempt was made to determine the origin of fish contributing to a resident stream fishery. If a known stream fishery is closely associated with a lake system or the fish are known to be lake stock, then those fish were allocated to the lake fishery. Thus, for example, there were no resident rainbow stream fisheries identified in the Ootsa unit as all stream fisheries were determined to be targetting on lake stock.

Fish Production

Fish production in every region of the Province was determined from a common base: the 1980 National Survey of Sport Fishing (NSSF). To be more precise, the NSSF was used as the source for the one basic statistic - total regional angler effort - upon which much of the ensuing information on angler catch and total fish production was estimated.

The total amount of angler effort attributed to Skeena was 570,000 angler-days (Table 1) and was apportioned to each planning unit by habitat type and by species. Total harvest (catch) was determined by applying success rates derived from various angler surveys conducted regionally[1] or provincially[2]. Summaries of effort, success, and harvest by species and of the species effort/catch apportionment by habitat type are presented below (Tables 3 and 4). Detailed tables may be found in Appendix I.

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[1]Example: A Creel Survey of the Lakelse Lake Cutthroat Trout Sport Fishery, June-August, 1979. Hatlevik, et al, 1981.

[2]Example: Steelhead Harvest Analysis. Brit. Col. Fish and Wildlife Branch

Table 3. Effort, catch (harvest) and success rates by species in Skeena Region.

SPECIES	EFFORT	SUCCESS	CATCH (HARVEST)	
Rainbow trout	285,000	1.2	353,200	
Summer steelhead (K)	29,400	0.1	3,900	
Winter steelhead (K)	10,600	0.1	1,500	
Cutthroat trout	57,000	1.9	112,600	
Lake trout	40,600	1.0	40,600	
Dolly Varden	40,000	1.7	67,100	
Coho salmon	50,900	0.2	11,050	
Chinook salmon	28,500	0.2	6,200	
Other[1]	28,000	3.1	88,100	
	570,000	1.2	684,200	
Summer steelhead (K+R)	29,400	0.4	11,500	2
Winter steelhead (K+R)[3]	10,600	0.4	4,400	2

1 Includes Kokanee, burbot, whitefish, grayling, pike
2 Incidence of steelhead catch and release is significant, and is included here for comparative purpose.
3 Kill and release.

Table 4. Sportfish catch and angler effort by species and habitat type in Skeena Region

	LARGE LAKES		SMALL LAKES		ANADROMOUS RIVERS		RESIDENT RIVERS		TOTALS	
Species	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch	Effort	Catch
Rainbow trout	218200	152700	66800	200500	0	0	0	0	285000	353200
Steelhead	0	0	0	0	40000	15900	0	0	40000	15900
Cutthroat	30500	61900	18500	37600	5400	10500	2600	2600	57000	112600
Lake trout	40500	40500	100	100	0	0	0	0	40600	40600
Dolly Varden	3900	800	3900	2000	0	0	32200	64300	40000	67100
Coho salmon	0	0	0	0	50900	11000	0	0	50900	11000
Others	16400	49200	9600	28700	0	0	2000	10100	28000	88000
Totals	309500	305100	98900	268900	124800	43600	36800	77000	570000	694600
Percent (catch)		44%		39%		6%		11%		100%
Percent (effort)	54%		17%		22%		7%		100%	

Current production estimates (population sizes), if not already known[1], were determined by dividing total catch by exploitation rates as estimated by regional fisheries staff. Maximum allowable harvest was then determined by applying maximum allowable harvest rates to current production estimates. Current exploitation and maximum allowable harvest rates are found in Appendix I.

Total current production in Skeena Region is estimated to be approximately 8.6 million fish (Table 5). Approximately 45% of this production is attributed to large lakes, 34% to small lakes, 12% to anadromous rivers and 9% to resident rivers. Maximum allowable harvest is estimated to be approximately 3 million fish for all species, throughout the region.

The greatest amount of sport fish production (80%) is located in the two southern-most planning units of Skeena-Nass and Ootsa. Large lakes alone in these two units account for over 3 million fish. In Skeena-Nass, the preferred species are rainbow and cutthroat trout, and lake char. Of the total large lake production in this unit of almost 1.1 million fish however, these species represent only about 50%. In other words, one-half of the total large lake production in Skeena-Nass is taken up by non-target or incidental species ("Others") such as whitefish, burbot, and in some cases, kokanee (Appendix I). When "Others" are omitted from the Ootsa large lake production totals, it is seen that the two preferred species - rainbows and lake trout - account for less than 30% of the total.

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[1]Examples: 1) Annual Reports. Field Services Branch, D.F.O.
2) Skeena Steelhead Model. Unpubl. Data Rept. Brit. Col. Fish and Wildlife Branch.

Table 5. Total production and maximum allowable harvest to the sport fishery, Skeena region.

	Large Lakes	Small Lakes	Anad Rivers[1]	Res. Rivers	Total
Skeena-Nass					
Production	1073800	971200	589300	635700	3270100
Max. All. Harvest	424600	339400	46600	190300	1001000
Ootsa					
Production	2160400	1389000	-	-	3549400
Max. All. Harvest	994400	489300	-	-	1483700
Q.C.I.					
Production	54700	171000	311200	-	536900
Max. All. Harvest	16400	51300	32800	-	100500
Atlin-Taku					
Production	186500	103500	83500	49700	423200
Max. All. Harvest	77700	43200	7100	31700	149700
Dease Lake					
Production	410700	265400	15500	100400	792000
Max. All. Harvest	180900	89700	2400	47000	320000
Total					
Production	3886200	2900100	999500	785900	8571600
Max. All. Harvest	1694100	1012900	88900	25900	3054900

[1]In this table, maximum allowable harvest applies only to the sport fishery, which occurs after the commercial and Indian harvests, resulting in extremely low M.A.H. levels. See Appendix I for total maximum allowable harvest levels.

Small lake production is greatest in Ootsa (1.4 million fish), followed by Skeena-Nass (.97 million) and Dease-Stikine (.27 million). The single most important species in Ootsa is rainbow trout, and in fact, Ootsa has the greatest capacity for rainbow trout production in the region (approximately 1 million).

Anadromous fish production is greatest in Skeena-Nass (.6 million). This unit accounts for almost 60% of the total regional production of steelhead, coho, chinook, and sea-run cutthroat trout. The production of steelhead in Skeena-Nass is estimated to be approximately 70,000 fish, of which slightly more than 50% is summer-run fish. The maximum allowable sport harvest, however, is extremely low for summer steelhead, reflecting the heavy exploitation on these fish by other user groups (commercial and Indian fisheries). The same is also true for coho and chinook salmon whose primary use is commercial, although the sport fishery is of major importance. It will be noted that although there is considerable capacity to produce coho in Skeena-Nass, the maximum allowable harvest to the sport fishery is nil (Appendix I). Chinook fair somewhat better due to conservation measures imposed upon the commercial sector.

Queen Charlotte Islands support approximately 30% of total regional anadromous fish production. The vast majority of this production is represented by coho salmon (.25 million).

Atlin-Taku (Taku River) supports an anadromous production of approximately 80,000 fish of which coho are again the predominant species. However, as in Skeena-Nass, heavy commercial exploitation on coho results in a maximum allowable harvest to the sport fishery of zero. Chinook and steelhead on the other hand, show the benefits of reduced exploitation in the fishery and virtually no habitat disruption in this remote northern system.

The Dease-Stikine unit has limited capacity for anadromous production; all of it being concentrated in the Stikine River and tributaries downstream of the Grand Canyon. Much of the production of steelhead and chinook goes to the Alaskan and domestic (riverine) commercial fisheries.

Ootsa, of course, maintains no anadromous sportfish production.

Resident river sportfish production is greatest in Skeena-Nass, followed by Dease-Stikine, and Atlin-Taku. Most of the production in Skeena-Nass is represented by Dolly Varden. Arctic grayling are the primary species in Atlin-Taku (Yukon drainage) and in Dease-Stikine (Dease River). According to previously discussed criteria, it was determined that no resident river sportfish production occurs in either Queen Charlotte Islands or Ootsa planning units.

The small lakes of Skeena-Nass and Ootsa represent the best opportunities for production enhancement in Skeena. Stocking of barren lakes with rainbows or brook trout is presently proving highly successful. Also, quick gains in production can be realized through rehabilitation of coarsefish lakes and subsequent restocking with trout.

Enhancement of anadromous sport fish in Skeena-Nass and Queen Charlotte Islands is almost entirely dependant upon hatchery production. The potential for this type of production is limited only by cost. In terms of steelhead, the stocking of hatchery - reared fry into barren or underutilized habitat is currently proceeding in both units and new opportunities are continually being sought and researched.

DEMAND FOR ANGLING

Current Angling Activity

According to the National Sportfish Survey (1980) Skeena Region supports 570,000 angler days, or 9.5% of the provincial total of 6 million angler days. This effort comes from: Skeena residents- 385,800 (66%), residents of other regions- 101,400 (18%), and residents of other parts of Canada or abroad- 81,900 (14%).

Not surprisingly, most of the angling effort in Skeena is directed toward the two most accessible areas - Skeena Nass and Ootsa (Table 6). Atlin-Taku attracts the least amount of effort; this unit is quite probably the most remote and isolated area in the province. The Queen Charlotte Islands are also remote, but not isolated in the sense that access is readily available (albeit expensive). The sparsely populated Dease Lake area is traversed by the Stewart-Cassiar Highway which, as an alternate to the Alaska Highway, attracts an increasing number of tourists annually.

Generally throughout the region, large lake fishing predominates. Large lakes provide a variety of angling opportunities in terms of species mix and fish size. Catch success rates are moderate, access easy and human development often quite close. Small lakes, on the other hand, are less accessible and largely undeveloped, but often provide good catch success rates in single-species fisheries. Small lakes support 17% of the region's angling activity while 54% is attributable to large lakes. Small lakes, however, produce almost 40% of the total annual sport fish harvest (catch) in the region, only slightly less than that of large lakes (44%) (Table 6).

In the Skeena-Nass planning unit, the anadromous sport fishery is shown to be the single most important fishery, attracting slightly more than 37% of the total effort in the Unit. In fact, this fishery is second only to the large lake fishery in Ootsa in terms of heaviest use, regionally. It is this fishery, more than any other, for which the Skeena region is known, and about which Skeena residents concern themselves. In a survey of licenced anglers, Skeena residents were the only group to rank anadromous fish (coho and steelhead) high on their preferred sport fish list (Stone, 1982).

Seventy-five per cent of all the angling effort expended on the Queen Charlotte Islands is directed towards anadromous fish. This unit contains a wealth of opportunity for this kind of activity. Effort directed towards species inhabiting other habitat types is as yet small, in part because the opportunities are limited but primarily because of the great availability of salt water fisheries during much of the year.

Table 6. Angling Activity and Sport fish catch in Skeena Region

	SKEENA-NASS		OOTSA		Q.C.I		ATLIN-TAKU		DEASE-STIKINE		TOTALS	
	Angler Days	Total Catch	Angler Days	Total Catch	Angler Days	Total Catch	Angler Days	Total Catch	Angler Days	Total Catch	Angler Days	Total Catch
LARGE LAKES	111565	122438	166350	149210	2280	5472	6632	10071	22619	17894	309477 (54%)	305085 (44%)
SMALL LAKES	48345	117280	40250	120750	570	1710	1725	5175	8069	24006	98959 (17%)	268921 (39%)
ANAD RIVERS	115215	36685	-	-	8650	6200	700	585	250	185	124815 (22%)	43655 (6%)
RES. RIVERS	33925	65285	-	-	-	-	738	2488	2088	9238	36750 (7%)	77011 (11%)
TOTALS	309050 (54%)	341688 (49%)	206600 (36%)	269960 (40%)	11500 (2%)	13382 (1%)	9826 (2%)	18319 (3%)	33026 (6%)	51323 (7%)	570000	694672

Catch = Kill + Release

Resident stream sport fisheries account for 6% of the effort in Skeena Region, and almost all of that (92%) occurs in Skeena-Nass. The primary species are Dolly Varden and cutthroat. Arctic grayling fisheries predominate in the Dease River watershed in the Dease-Stikine Unit.

The total annual catch of sport fish in Skeena Region is estimated to be 0.7 million. An average regional success rate could then be said to be 1.2 fish per angler day ($0.7 \times 10^6 / 0.57 \times 10^6$). However, success rates vary so markedly among species and habitat types that this one overly simplistic statistic would totally mask the characteristics of each fishery and the desires of Skeena anglers. For example, the catch success rate on steelhead in the Q.C.I. unit is 0.65 fish per day. In light of the 1.2 fish per day regional average, steelhead catch success on the Islands is dismal. In fact, however, the steelhead fishery on the Islands relative to other steelhead fisheries throughout the Province is highly successful.

In Skeena-Nass, the success rates on winter steelhead (0.32), summer steelhead (0.39), coho and chinook (0.20) are also well below the regional "average". However, as pointed out earlier, these anadromous fisheries attract more angler effort than any other fishery in the unit.

Generally throughout the region, angler success on large lakes is approximately one fish per angler day; while on small lakes it is 2.7 fish per angler day. Success in resident stream fisheries is about 2.1 fish per day.

Future Demand for Angling

Projections of angling demand in Skeena Region to 1990 are based on trend information gathered for the ten year period 1970 to 1980, and refined by forecasted economic activity and best guesses of experienced regional fisheries staff. (See Appendix II for methodology). It is estimated that demand in Skeena Region in the year 1990 may range between 703,018 to 891,355 angler days, an increase of 23% to 56%, respectively, over the 1980 level of 570,000 angler days. A best estimate on the part of fisheries staff in Region was a 29% increase (Table 7).

It is not expected that the distribution of demand among units will change very much. Skeena-Nass and Ootsa will continue to be the focal point of angling activity, simply because of population. However, activity will increase proportionally in other units, due primarily to vastly improved transportation routes.

Table 7. 1990* Angling demand in Skeena Region by planning unit, and habitat type.

	ANGLER DAYS					
	Skeena-Nass	Ootsa	Q.C.I.	Atlin-Taku	Dease-Stikine	Total
Large Lakes	143874	212397	2950	8517	29586	397324
Small Lakes	62623	54629	737	2249	10531	130769
Anad Rivers	149147	-	11209	1198	313	161867
Res. Rivers	43789	-	-	959	2729	47477
Total	399433	267026	14896	12923	43159	737437

*Based on 29% increase over current 570,000; a best guess estimate by fisheries staff.

ANALYSIS OF SUPPLY AND DEMAND

Based on a projection of approximately 0.74 million angler days in 1990, it appears that current fish production of 8.5 million in Skeena is more than ample to maintain current success rates while accommodating the projected increase in angler-days. However, oversimplified statements such as the above tend to mask supply problems currently affecting specific stocks (eg. Skeena summer steelhead); problems that will intensify under increased activity.

In order to determine the impact of future demand on the availability of sport fish, an analysis was done on each habitat type within each planning unit. The analysi assumed that fish production would remain constant; i.e. current production was projected to 1990. The estimates of angler demand at 123%, 129%, and 156% of current levels were used; and the harvest was projected by means of two success rates: (1) current catch per day, and (2) a target success rate.

The target success rate for all habitat types except anadromous rivers was set at 2.0 fish per day, which was in keeping with the stated objective of the Inland Fisheries Enhancement Program. (It will be noted however, that there are instances in the region where current success rates exceed the target.) Target success rates for anadromous rivers varied according to the level of analysis (between planning units and among species).

The analysis generally showed that current fish production is in fact capable of withstanding increased angling activity in most parts of the region and in most habitat types. (Summary tables are presented in Appendix III.) However, some expected anomolies appeared, primarily in the Skeena-Nass unit.

Skeena-Nass currently supports 50% of the total regional effort and contributes approximately 50% of the total sport fish catch (Table 6). Large lakes support a considerable proportion of this effort, and under increased demand it is seen that the target success rate of 2.0 fish per day cannot be attained, unless there is a shift in emphasis from the currently preferred cutthroat, rainbow, and lake trout to another species (kokanee) (Table 8).

Rivers do not have the production capability of lakes, least of all in the Skeena-Nass unit. Sustaining specific anadromous stocks have long been a problem in this unit due primarily to over-harvest in any one or a combination of harvest sectors. Increased activity can be accommodated at current success levels (average 0.24 fish per day), provided that the increased activity is focused on species other than chinook, coho or summer steelhead (ie. winter steelhead).

Notwithstanding some quite conservative assumptions incorporated into the analysis, current effort on summer steelhead is apparently only slightly less than the stock can safely withstand (Table 9), whereas winter steelhead can accommodate increased effort at the target success rate of 1.0 fish per day. Note that in this scenario, the definition of "success rate" is "kill rate". In other words, the summer steelhead fishery in Skeena-Nass cannot withstand increased angler effort unless that effort is translated into increased steelhead catch and <u>not</u> harvest (kill).

Table 8. Analysis of large lake supply and demand, Skeena Nass planning unit. Based on 29% increased angler demand.

	All species*		Ct, Rbt, Lt only	
	1980	1990	1980	1990
Angler days	111600	143900	110000	141700
Success rate				
current	1.1	1.1	1.1	1.1
target		2.0		2.0
supply=demand		2.9		1.3
Harvest				
current	122400	157900	117700	151700
target		287700		283400
supply=demand		424600		188400
Max Allowable Harvest		424600		188400
Surplus/(Shortfall)				
at current rate		266700		36700
at target rate		136900		(-95000)

*Includes kokanee, whitefish

Table 9. Analysis of total steelhead supply and demand, Skeena-Nass - planning unit. Based on 29% increased angler demand.

	Winter Steelhead		Summer Steelhead	
	1980	1990	1980	1990
Angler Days	7600	9800	29200	37700
Success Rate*				
Current	0.11	0.11	0.13	0.13
Target		1.00		0.13
Supply=Demand		1.70		0.11
Harvest (kill)				
Current	800	1100	3800	4900
Target		9800		4900
Supply=Demand		16700		4000
Max. All Harvest		16700		4000
Supply(Shortfall)				
at current rate		15600		(-900)
at target rate		6900		(-900)

*Success Rate = Kill Rate

Currently, angler catch (kill plus release) success rates on summer steelhead approach 0.4 fish per day. Increased angler demand can be accommodated provided that the "kill rate" does not exceed 0.11 fish per day (Table 9). In this case the proportion of killed fish in the total catch will decline as the incidence of steelhead release (angler self-enforced or regulated) increases (Table 10).

Table 10. Analysis of summer steelhead supply and demand, Skeena-Nass planning unit. Based on 29% increased angler demand. (Total catch = kills plus releases)

	Angler Days	Success Rate (kill + release)	Total Catch	Kill Rate (maximum)	Kills	Kills as % of Catch
1980	29200	0.39	11388	0.13	3796	33.3
1990	37688	0.39[1]	14698	0.11[2]	4000	27.2
1990	37688	0.50[3]	18834	0.11[2]	4000	21.2

[1]1990 projections at current success rate.
[2]Rounded, from 0.1061
[3]1990 projections at target success rate.

A problem currently exists within the resident river sportfishery in the Skeena-Nass. Again, the perponderance of Dolly Varden masks the declining fortunes of cutthroat trout throughout the unit, which are apparently being over-harvested.

The above analysis basically shows that most of the region, with the exception of the Skeena-Nass planning unit, can support increased angler effort at the 129% level. At the highest level of projected angler demand (156%) the problems in Skeena-Nass, with regard to lake trout, summer steelhead, and cutthroat trout will intensify. As well, however, shortfalls will begin to emerge in Ootsa (rainbows and lake trout in large lakes) and in Q.C.I. (steelhead). Problem spots are already evident in these latter two planning units, but they are small enough to be masked by the broad-brushing of the regional-level analysis, as are localized, potential supply problems in Stikine-Dease (large lake rainbows).

REGIONAL FISHERIES MANGEMENT STRATEGIES

The supply/demand analysis discussed in the preceding section indicates that management efforts should be concentrated in the Skeena-Nass unit where the over-riding concern will be that of anadromous fisheries, as it has been for the past decade. In addition, the analysis has indicated that supply shortfalls may occur in large lake fisheries and in resident stream fisheries, also within the Skeena-Nass planning

unit. A regional level supply/demand analysis will not highlight specific problems, and it is known that each of the other planning units within Skeena region has or will have site-specific supply shortfalls as well. Therefore, management in Skeena Region will be conducted on an area-priority basis, with Skeena-Nass receiving most attention, followed by the other units where allocation of management effort will depend upon the resources available to and capabilities of regional fisheries staff.

With the above in mind, it is proposed to briefly discuss each of the main fishery types (large lake, small lake, anadromous and resident stream) in terms of management options that may be applied to avert or solve existing or potential supply shortfalls.

Large Lake Management

Skeena Region has in excess of one hundred large lakes with, generally speaking, a vastly underutilized sport fish resource. Many of these lakes however, are remote and/or relatively inaccessible which basically means that most angling pressure is directed towards a few accessible, developed lakes. These are primarily located in the southern part of the Region, in Skeena-Nass and Ootsa units, and include such lakes as Lakelse, Kitwanga, Babine, Francois, etc. Other large lakes of consequence in other units include the Kiniskan chain (Dease-Stikine) and Atlin Lake. It is in these site - specific instances that shortfalls might occur and where management must be applied.

Towards the coast, the prevalent fisheries are for cutthroat trout. In the short term, rather severe restrictions will have to be implemented on lakes such as Lakelse to forestall declining fish stocks in the face of increasing demand in the Terrace-Kitimat area. In the longer term, enhancement of stream habitat (spawning, rearing) will be researched and, where applicable, implemented.

Inland, where the species mix is rainbow and lake trout, angler regulation is again the short term solution to potential supply shortfalls.

In all cases, however, inventory must be the priority strategy to be employed. To this point, the region has not been able to build the necesary information base upon which to develop management plans for large lakes. Habitat (stream) surveys are required to determine enhancement opportunities for rainbow using tributaries of large lakes. Lake trout biology, particularly age, growth and habitat selection, is largely unknown. Creel census is required to refine angler use data and to define angler demand for a range of opportunities such as "trophy" fisheries, or large bag limits on small fish.

In summary:

1. Basic inventory and creel census is required on large lakes throughout the region, but by order of priority - Skeena-Nass and Ootsa, followed by Dease-Stikine, Atlin-Taku, and Q.C.I.

2. Strict angler regulation in the short term and habitat enhancement in the longer term are options that must be applied to large lake cutthroat fisheries in Skeena-Nass.

3. Catch restriction may be required on specific lake trout stocks in Skeena-Nass and Ootsa.

Implementation of the above strategies will require 30% of management resources.

Small Lakes Management

There is quite obviously no shortfall in terms of small lakes in Skeena Region. Once again however, site specific problems are evident in the two southern planning units of Skeena-Nass and Ootsã. Specifically, many small lakes located close to population centers are heavily infested with coarse fish. In the next ten years, management efforts will be directed to rehabilitating a few of these key waters with a view to creating some readily accessible, highly available "urban" fisheries.

Other strategies currently utilized within small lakes management generally depend upon the stocking program and habitat improvement. Although the stocking program in Skeena is miniscule, several of the lakes provide exceptional fisheries. This program will slowly expand in the next decade as suitable (barren) bodies of water are identified. Again, the criteria by which a barren lake is selected for stocking is its proximity to a population center. Enhancement or creation of spawning habitat in many of these instances has been and will continue to be researched and implemented as a means of reducing dependance upon hatchery stock.

Beyond the easily travelled portion of Skeena Region, many hundreds of lakes remain unknown insofar as regional inventory records are concerned. In the Dease-Stikine and Atlin-Taku units airborne anglers can and sometimes do reap large harvests of rainbow trout and Arctic grayling from numerous named and nameless lakes. Similarly, isolated small lakes in the southern part of the region suddenly become accessible by means of ever-expanding logging road networks. Sport fisheries develop overnight and, in some cases, collapse in a matter of two or three years as quantity of fish demanded exceeds supply, complicated by some constraint on adequate recruitment (lack of spawning habitat). The strategies in these circumstances are inventory, and in the rare case, a rotational closure to allow a severely depleted fishery to recover.

In Summary:

1. Supply/demand analysis shows no apparent shortfall in this habitat type, although site specific problems do occur.
2. Small lake management will concentrate on providing good rainbow/brook trout fisheries close to urban centers by means of chemical rehabilitation and identification and stocking of barren lakes.
3. Inventory is required in all remote areas of Skeena, with priorities being Skeena-Nass and Ootsa.
4. Angler management may be required in some instances of too heavy demand.

Implementation of the above strategies will require 15% of management resources.

Anadromous Fisheries Management

As mentioned previously, anadromous fisheries will be the main focus of management effort in Skeena. In Skeena-Nass, the greatest problems facing managers are dual jurisdiction, mixed stock commercial fisheries, and uncontrolled Indian and sport fisheries. Dual jurisdiction, of course, refers to the fact that Department of Fisheries and Oceans manages tidal fisheries and sport fisheries on salmon in nontidal waters. Insofar as the latter fishery is concerned, no further mention will be made.

The priority species here is summer steelhead trout. This fish is in high demand by anglers, resident and non-resident alike. Unfortunately the steelhead angler must be satisfied with the small harvestable surplus that remains after a substantial harvest by commercial and Indian gill nets. In fact, there is at present no room for increasing summer steelhead kill by any harvest sector.

The management strategy for steelhead in Skeena-Nass has been one of negotiating with the other management agency and the Indians for a reduced non-sport exploitation of steelhead. These negotiations have been coupled with intensive stock assessment and identification work, primarily on the Skeena and tributaries, in addition to the implementation during the last decade of stringent angler kill restrictions. More recently, and as one of the outcomes of the stock assessment work, enhancement of individual steelhead stocks by means of stocking fry into selected underutilized or barren habitats in headwater areas has commenced. Generally speaking, however, increased production

of summer steelhead will never approach a level where harvest restrictions will be relaxed. The strategy of reducing steelhead kill, while maintaining or improving upon total angler catch success (kill plus release) will be the priority management prescription. Furthermore, in the coming decade, assessment and stringent protection of individual summer steelhead stocks will continue on the Skeena, and expand into the Nass.

Although considerable surplus apparently exists in terms of winter steelhead and sea-run cutthroat stocks, an inventory and research program, particularly on the Queen Charlotte Islands and in the heavily fished areas of the lower Skeena Valley, has been implemented and will continue in order that the management prescriptions, when required, are well in hand.

In all cases, habitat protection is of paramount importance in terms of maintaining viable steelhead and cutthroat stocks.

In summary:

1. Summer steelhead will continue to be the priority item in Skeena fisheries management.

2. Management strategies include: negotiation for reduced exploitation rates by other user groups, continued strict angler catch regulations (kills must be reduced; the release ethic is emphasized), intensive stock assessment, and enhancement.

3. Stock assessment and habitat inventories relating to winter steelhead and cutthroat in Q.C.I. and coastal areas of Skeena-Nass will continue.

Implementation of above strategies will require 55% of management resources.

Resident Stream Fisheries

Throughout most of the region, Dolly Varden char are readily available in most river environments and are angled extensively on the Skeena River watershed and to a lesser extent in the Nass. Similarily, Arctic grayling abound in steams of the upper Stikine watershed and in the Yukon drainage basin. The small sport fishery that currently utilizes these fish can easily expand without creating noticeable supply shortfalls. Habitat protection is the one management strategy of importance, in light of the destructiveness of northern mining practices and construction of transportation routes.

In the southern part of the region, resident cutthroat trout have declined to a point where supply is not sufficient even now to satisfy angling activity at acceptable success rates. Although much future angler demand can be diverted elsewhere (Dolly Varden, sea run cutthroat, lake fisheries) it is imperative that strategies be developed to at least maintain existing levels of production. Minimum size limits have been implemented for the protection of cutthroat (as well as steelhead juveniles); additional measures may involve reduced catch limits and/or closures. Baseline inventory is certainly required.

In summary:

1. Significant surpluses exist throughout the region in terms of Dolly Varden char and in the north, Arctic grayling.
2. Cutthroat trout in Skeena-Nass require stringent regulatory measures; inventory and assessment of these stocks is mandatory.

Implementation of above strategies will require 5% of mangement resources.

- FISHERIES MANGEMENT PRIORITIES AND REQUIRED RESOURCES

As mentioned in the two preceeding sections, fisheries management in Skeena will be directed primarily towards the three southern planning units of Skeena-Nass, Ootsa, and Q.C.I. with the heaviest emphasis being placed on the former. The success of the management strategies outlined earlier in accommodating demand increases and/or in alleviating current supply shortfalls in these units will depend upon an adequate regional budget and the necessary staff. As well, the regional program cannot succeed without the support from the "service" sections; namely enforcement, fish culture, research, habitat improvement, habitat protection, inventory, and information and education.

Anadromous fisheries (steelhead) management will be the primary activity of Skeena fisheries staff in both Skeena-Nass and Q.C.I. where even current levels of angler effort (and that of other users) are creating supply shortfalls. The strategies involved in this activity include the design and strict enforcement of angler regulations, intensive annual stock assessment, fishery monitoring, habitat inventories, and enhancement. Successful implementation of these strategies, in total, will probably maintain the status quo in terms of providing anglers with the opportunity to pursue their favourite fish. Regional allottment of manpower to this activity is currently insufficient; the activity requires at least 1.5 additional fisheries man-years, plus one additional man-year for enforcement of regulations.

Although the supply/demand analysis did not indicate a problem with small lakes in Skeena, it is known that supply shortfalls exist in specific areas (primarily near population centers). Coincidentally, it is in these small lakes that region can achieve the quickest and most noticeable gains with regard to satisfying angler demand. The current strategy in these areas is stocking with hatchery product, primarily to pure culture (previously barren) lakes. In order to accommodate future demand increase in these site-specific areas, the expensive strategy of "rehabilitating" coarsefish lakes must be implemented. The resources required to continue small lake management in Skeena include no less than the current level of regional commitment, plus a commitment by fish culture to provide the necessary hatchery stock. (A list of present and future lake stocking requirements can be found in Appendix IV.)

The analysis of supply and demand indicated potential shortfalls in large lake fisheries primarily in Skeena-Nass, but also in Ootsa and, in site-specific instances, Dease-Stikine. The species of concern here are cutthroat trout in the west, and rainbows and lake trout in the east and north. The key to large lake management in Skeena must be baseline inventory of habitat, trout and char biology, and surveys of angler use on selected, priority lakes such as Lakelse, Babine, and Francois. In the short term, angler regulation must provide the solution to supply shortfalls (particularly as regards lake trout), while the long term view must be towards enhancement of rainbow habitat.

In order to accomplish the above, significant additional funds and staff will be required by region along with a commitment from the service functions (enforcement, inventory, habitat improvement primarily). Regional fisheries management would require at least two additional man-years to begin to address the large lake issue.

Resident river management will focus on cutthroat trout in the Skeena-Nass planning unit. This species cannot accomodate any increase in angler demand. The strategy here will be angler regulation as well as a continuing program of stock assessment. The regional fisheries program will require a minimum of one-half man-year to address resident stream fisheries.

The minimum resources required by regional fisheries management to address current shortfalls in supply and future increases in demand are 4 additional technical man-years, 1.5 to anadromous fisheries, 2 to large lake management and a minimum of .5 man-years to resident stream fisheries. In addition, a greater enforcement capability is required to enforce regulations currently in place and new regulations designed to accommodate increased angler demand. It is suggested that two man-years, directed solely toward fisheries concerns, would satisfy the enforcement requirement (A. Ackerman, pers. com.). Finally, there is a requirement for a well staffed and funded habitat protection section to address concerns that transcend all planning unit and habitat type boundaries. Habitat protection requires an additional two man-years to address specific fisheries concerns (A. Edie, pers. com.).

The above activities, strategies and resource requirements are priorized and outlined in Table 11. The costs of not being able to deal with shortfalls or increased demand are also tabulated.

The foregoing section has dealt largely with the problem areas in Skeena fisheries. These problems are not insoluble if region is provided with the capability to implement the necessary management strategies. Throughout the region as a whole however, the fisheries resource is in good shape with surplus production available in all planning units, and in <u>almost</u> all habitat types.

Table 11. Fisheries Management priorities, strategies, and required resources in Skeena Region

PRIORIZED ACTIVITIES	MANAGEMENT STRATEGIES	REQUIRED SUPPORT[1,2]	REGIONAL FISHERIES STAFF[3] (MAN-YEARS) CURRENT STAFF ALLOCATION	REGIONAL FISHERIES STAFF[3] (MAN-YEARS) FORECASTED MINIMUM STAFF REQUIREMENT	IMPLICATIONS OF NOT IMPLEMENTATING STRATEGIES AND/OR NOT SATISFYING ANGLER DEMAND
1. Anadromous Fisheries Management	Interagency negotiation Regulation Stock assessment Fishery monitoring Creel census Habitat inventory	Enforcement Habitat Protection Habitat Improvement Fish Culture Research	4.5	6	Overfishing, resulting in stock declines or extinction. Loss of habitat; reduced production More regulations (closures); loss of opportunities Dissatisfied resident and non-resident angleres, reduced toursim, negative impact on guiding industry.
2. Small Lake Management	Inventory Regulation Stock enhancement Habitat Enhancement	Fish Culture Habitat Protection Enforcement Habitat Improvement Aquatic Studies	1.5	1.5	Reduced opportunity Inability to satisfy demand increases Dissatisfied local anglers
3. Large Lake Management	Habitat inventory Regulation Stock assessment Creel census Habitat enhancement	Enforcement Habitat Protection Aquatic Studies Habitat Improvement Research	1	3	Reduced production Lower success rate
4. Resident Stream Fisheries	Regulation Stock Assessment	Habitat Protection Enforcement	0	0.5	More regulations (closure) Loss of habitat

[1] Enforcement requires 2 additonal man-years to meet fisheries concerns.
[2] Habitat Protection requires 2 additional man-years to meet fisheries concerns.
[3] Fisheries staff as of December 31, 1983.

GLOSSARY OF TERMS

Anadromous	- fish that leave the ocean to ascend fresh water streams to spawn.
Angler day	- all or part of any day spent fishing.
Current Exploitation rate	- the percentage of the current production of a fish stock which is caught and killed in a given year. "Current" refers to most recent 4-5 year average.
Fish Production	- number of fish in a stock that lie within the range of sizes customarily considered useable (catchable), with natural mortality already taken into account.
Harvest	- Fish caught and killed.
Maximum Allowable Exploitation rate	- The percentage of the current population of a fish stock that may be continually harvested under existing conditions, calculated on an annual basis.
Maximum Allowable Harvest	- The number of fish that may be continuously harvested under existing conditions, calculated an on annual basis.
Non-resident	- a person residing outside of B.C.
Resident	- a resident of the Province of British Columbia.
Stock	- a population ~~of~~ one species of fish which inhabits a particular habitat, tends to spawn at a place or time separate from other stocks.
Success rate	- number of fish harvested per angler day unless otherwise indicated as fish killed, plus fish caught and released.

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APPENDICES

APPENDIX I

Development of Current Production, Harvest and Angling Activity for the Skeena Regional Fisheries Statement.

1. Angling activity by species and by planning unit.

   The estimate of total angler effort in Skeena Region (570,000 angler days) as provided by the 1980 National Sportfish Survey was apportioned to each planning unit according to the species within that unit (Table I-1). The apportionment was based on steelhead harvest analysis, the 1980 N.S.S. and knowledge of experienced fisheries staff.

2. Angling activity by species, habitat type, and planning unit.

   In each planning unit, total angling activity attributed to each species was apportioned to the various habitat types (Table I-2). Again, the sources for this exercise were the N.S.S., steelhead harvest analysis, and local experience.

3. Current harvest by species, habitat type and planning unit.

   Given the allocation of angling activity in Table I-2, harvest was calculated by mulitplying angler days by the appropriate success rate (kill/angler day) (Table I-3). Since success rates varied markedly among habitat types and between planning units, specific success rates were used to generate the harvests in Table I-3. Average success rates by species were provided in the text (Table 3). The success rates were based on various regional creel surveys, the Steelhead Harvest Analysis and staff experience.

4. Current exploitation and maximum harvest rates.

Very little data exists on current exploitation rates, except in the case of salmon and steelhead. Much of the data shown in Table I-4 was based primarily on estimates by regional staff of the apparent health of the stocks and the degree of pressure exerted on them. Understanding maximum harvest rates (also shown in Table I-4) assisted in determining current exploitation rates by providing a bench mark. (Is the stock overfished or underfished? By how much?)

Maximum harvest rates for salmon and summer steelhead take into account the commercial fishery and the Indian fishery, i.e. the harvestable surplus available to an angler prior to escapement has been largely removed.

5. Current production, maximum allowable harvest and unutilized (surplus) production by species habitat type and planning unit.

Current production (stock size was determined by the formula: current production = harvest - exploitation rate. Maximum allowable harvest was then determined by multiplying the current production by the maximum exploitation (harvest) rate (Table I-4). By subtracting current harvest from maximum allowable harvest, a figure for surplus, or unutilized production was achieved (Tables I-5, I-6).

Table I-1. Angler days by species and planning unit (%).

	S-N	Oo	Q.C.I.	A-T	D-S	REGION
Rbt	82,650	171,000	---	2850	28,500	285,000
	(29)	(60)	---	(1)	(10)	
Sthd	36,800	---	3000	100	100	40,000
	(92)	---	(7.5)	(0.25)	(0.25)	
Ct	51,300	---	5700	---	---	57,000
	(90)	---	(10)	---	---	
Lt	20,000	17,600	---	2500	500	40,600
	(49)	(43)	---	(6)	(2)	
DV	39,200	---	---	400	400	40,000
	(98)	---	---	(1)	(1)	
Co	48,000	---	2800	100	---	50,900
	(94)	---	(6)	(-)	---	
Ck	27,250			500	150	28,500
	(97.5)	---	---	(2)	(0.5)	
Other	3,250	18,000		3375	3,375	28,000
	(12)	(64)	---	(12)	(12)	
TOTALS	309,050	206,600	11,500	9,825	33,025	570,000
	(54)	(36)	(2)	(2)	(6)	

Table I-2. Angling activity by species, habitat type and planning unit.

	SKEENA-NASS					OOTSA				
	Large Lake	Small Lake	Anad. River	Res. River	Total	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	57855	24795	-	-	82650	136800	34200	-	-	171000
Steelhead	-	-	36800	-	36800	-	-	-	-	
Cutthroat	28215	17955	2565	2565	51300	-	-	-	-	
Lake trout	20000	-	-	-	20000	17600	-	-	-	17600
Dolly Varden	3920	3920	-	31360	392[illegible]	-	-	-	-	
Coho	-	-	48000	-	48000	-	-	-	-	
Chinook	-	-	27850	-	27850	-	-	-	-	
Other	1575	1675	-	-	3250	11950	6050	-	-	18000
TOTAL	111565	48345	114215	33925	309050	116350	40250	-	-	206600

	Q.C.I.					ATLIN-TAKU				
Rainbow	-	-	-	-	-	2137	713	-	-	2850
Steelhead	-	-	3000	-	3000	-	-	100	-	100
Cutthroat	2280	570	2850	-	5700	-	-	-	-	-
Lake trout	-	-	-	-	-	2500	-	-	-	2500
Dolly Varden	-	-	-	-	-	-	-	-	400	400
Coho	-	-	2800	-	2800	-	-	100	-	100
Chinook	-	-	-	-	-	-	-	500	-	500
Other	-	-	-	-	-	2025	1012	-	338	3375
TOTAL	2280	570	8650	-	11500	6662	1725	700	738	9825

Table I-2. Angling activity by species, habitat type and planning unit (cont'd).

DEASE-STIKINE

	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	21375	7125	-	-	28500
Steelhead	-	-	100	-	100
Cutthroat	-	-	-	-	-
Lake trout	400	-	-	-	400
Dolly Varden	-	-	-	400	400
Coho	-	-	-	-	-
Chinook	-	-	150	-	150
Other	844	844	-	1687	3375
TOTAL	22619	7969	250	2087	32925

Table I-3. Current harvest by species, habitat type and planning unit.

Species	Success Rate	S-N	Oo	Q.C.I.	A-T	D-S	Total
LARGE LAKES							
Rainbow	0.7	40499	95760	-	1496	14963	152718
Steelhead	0	-	-	-	-	-	-
Cutthroat	2.0	56430	-	5472	-	-	61902
Lake trout	1.0	20000	17600	-	2500	400	40500
Dolly Varden	0.2	784	-	-	-	-	784
Coho	0	-	-	-	-	-	-
Chinook	0	-	-	-	-	-	-
Other	3.0	4725	35850	-	6075	2531	49181
TOTAL		122438	149210	5472	10071	17894	305085
SMALL LAKES							
Rainbow	3.0	74385	102600	-	2137	21375	200497
Steelhead	0	-	-	-		-	-
Cutthroat	2.0	35910	-	1710		-	37620
Lake trout	0	-	-	-		-	-
Dolly Varden	0.5	1960	-	-		-	1960
Coho	0	-	-	-		-	-
Chinook	0	-	-	-		-	-
Other	3.0	5025	18150	-	3037	2531	28743
TOTAL		117280	120750	1710	5174	23906	268820

Table I-3. Current harvest by species, habitat type and planning unit. (cont'd).

ANADROMOUS RIVERS (Success rates)

Species	S-N	Oo	Q.C.I.	A-T	D-S	Total
W. Sthd (k)	836(.11)	-	630(.21)	-	-	1466
S. Sthd (k)	3796(.13)	-	-	35(.35)	35(.35)	3866
Cutthroat	7696(3.0)	-	2850(1.0)	-	-	10545
Coho	9600(0.2)	-	1400(0.5)	50(0.5)	-	11050
Chinook	5570(0.2)	-	-	500(1.0)	150(1.0)	6220
TOTAL	27497	-	4880	585	185	33147

RESIDENT RIVERS (Success rates)

Cutthroat	2565(1.0)	-	-	-	-	2565
Dolly Varden	62720(2.0)	-	-	800(2.0)	800(2.0)	64320
Other	-	-	-	1687(5.0)	8437(5.0)	10124
TOTAL	65280(2.0)	-	-	2487	9237	77009

Table I-4. Current angler exploitation and maximum allowable harvest rates, Skeena Region.

Species	Planning Unit	Current Exploitation Rates				Maximum Harvest Rates			
		Lakes		Rivers		Lakes		Rivers	
		Large	Small	Anad.	Res.	Large	Small	Anad.	Res.
Rainbow	S-N	20	20	-	-	35	30	-	30
	Oo	15	10	-	-	40	30	-	30
	QCI	-	-	-	-	-	-	-	-
	A-T	10	5	-	-	30	30	-	30
	D-S	10	10	-	-	35	30	-	30
Steelhead (summer)	S-N	-	-	9.5	-	-	-	10	-
	Oo	-	-	-	-	-	-	-	-
	QCI	-	-	-	-	-	-	-	-
	A-T	-	-	1	-	-	-	46	-
	D-S	-	-	1	-	-	-	16.7	-
Steelhead (winter)	S-N	-	-	2.5	-	-	-	50	-
	Oo	-	-	-	-	-	-	-	-
	QCI	-	-	15	-	-	-	50	-
	A-T	-	-	-	-	-	-	50	-
	D-S	-	-	-	-	-	-	50	-
Cutthroat	S-N	20	15	5	20	30	30	10	25
	Oo	-	-	-	-	-	-	-	-
	QCI	10	1	5	-	30	30	10	30
	A-T	-	-	-	-	-	-	10	-
	D-S	-	-	-	-	-	-	10	-
Lake trout	S-N	20	-	-	-	25	25	-	-
	Oo	20	-	-	-	25	25	-	-
	QCI	-	-	-	-	-	-	-	-
	A-T	5	-	-	-	25	25	-	-
	D-S	5	10	-	-	25	25	-	-

Table I-4. Current angler exploitation and maximum allowable harvest rates, Skeena Region.

Species	Planning Unit	Current Exploitation Rates				Maximum Harvest Rates			
		Lakes		Rivers		Lakes		Rivers	
		Large	Small	Anad.	Res.	Large	Small	Anad.	Res.
Dolly Varden	S-N	5	5	-	10	30	30	30	30
	Oo	-	-	-	-	30	30	30	30
	QCI	-	-	-	-	30	30	30	30
	A-T	-	-	-	5	30	30	-	30
	D-S	-	-	-	5	30	30	30	30
Coho	S-N	-	-	3.9	-	-	-	0	-
	Oo	-	-	-	-	-	-	-	-
	QCI	-	-	0.6	-	-	-	10	-
	A-T	-	-	0.1	-	-	-	0	-
	D-S	-	-	-	-	-	-	-	-
Chinook	S-N	-	-	4.8	-	-	-	9	-
	Oo	-	-	-	-	-	-	-	-
	QCI	-	-	-	-	-	-	0	-
	A-T	-	-	5	-	-	-	55	-
	D-S	-	-	1.2	-	-	-	15	-
Other	S-N	1	2.5	-	-	50	50	-	50
	Oo	2.5	5	-	-	50	50	-	50
	QCI			-	-	50	50	-	50
	A-T	5	5	-	5	50	50	-	50
	D-S	1	5	-	10	50	50	-	50

Table I-5. Current fish production and unutilized surplus in Skeena, by habitat type.

Species	Production	Maximum Harvest	Current Harvest	Surplus
LARGE LAKES				
Rainbow	1005481	383090	152717	230373
Cutthroat	336870	101061	51902	39159
Lake trout	246000	61500	40500	21000
Dolly Varden	15680	4704	784	3920
Other	2281125	1140563	49181	1091382
TOTAL	3885156	1690918	295084	1385834
SMALL LAKES				
Rainbow	1654425	496382	200498	295830
Cutthroat	530100	159030	37620	121410
Lake trout	1000	250	100	150
Dolly Varden	39200	11760	1960	9800
Other	675375	337687	28744	308943
TOTAL	2900100	1005055	268922	736133

Table I-5. Current fish production and unutilized surplus in Skeena, by habitat type (cont'd).

Species	Production	Maximum Harvest	Current Harvest	Surplus
ANADROMOUS RIVERS				
Summer sthd	46500	6100	3866	2234
Winter sthd	37600	18820	1466	17354
Cutthroat	21900	21090	10545	10545
Coho	565000	25000	11050	13950
Chinook	139500	17905	6220	11685
TOTAL	810500	88915	29667	46768
RESIDENT RIVERS				
Cutthroat	8550	2138	2565	-427
Dolly Varden	659200	197760	64320	133440
Other	118125	59063	10126	48937
TOTAL	785875	258961	77011	181950

Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit.

LARGE LAKES

SKEENA-NASS

Species	Prod.	Max. Harvest	Current Harvest	Surplus
Rainbow	202493	70872	40499	30373
Cutthroat	282150	84645	56430	28215
Lake trout	100000	25000	20000	5000
Dolly Varden	15680	4704	784	3920
Other	472500	236250	4725	231525
TOTAL	1072823	421471	122438	299033

OOTSA

Species	Prod.	Max. Harvest	Current Harvest	Surplus
Rainbow	638400	255360	95760	159600
Lake trout	88000	22000	17600	4400
Other	1434000	717000	35800	681150
TOTAL	2160400	994360	149210	845150

Q.C.I.

Cutthroat	54720	16416	5472	10944
TOTAL	54720	16416	5472	10944

ATLIN-TAKU

Rainbow trout	14963	4489	1496	2993
Lake trout	50000	12500	2500	10000
Other	121500	60750	6075	54675
TOTAL	186463	77739	10071	67668

DEASE-STIKINE

Rainbow trout	149625	52369	14963	37406
Lake trout	8000	2000	400	1600
Other	253125	126563	2531	124031
TOTAL	410750	180931	17894	163038

Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit (cont'd).

SMALL LAKES

SKEENA-NASS

Species	Prod.	Max. Harvest	Current Harvest	Surplus
Rainbow	371925	111578	74385	37193
Cutthroat	359100	107730	35910	71820
Dolly Varden	39200	11760	1960	9800
Other	201000	100500	5025	95475
TOTAL	971225	331568	117280	214288

OOTSA

Species	Prod.	Max. Harvest	Current Harvest	Surplus
Rainbow	1026000	307800	102600	205200
Other	363000	181500	18150	162250
TOTAL	1389000	489300	120750	368550

Q.C.I.

Cutthroat	171000	51300	1710	49590
TOTAL	171000	51300	1710	49590

ATLIN-TAKU

Rainbow trout	42750	12825	2138	10688
Other	60750	30375	3038	27338
TOTAL	103500	43200	5175	38025

DEASE-STIKINE

Rainbow trout	213750	64125	21375	42750
Lake trout	1000	250	100	150
Other	50625	25313	2531	22781
TOTAL	265375	89688	24006	65681

Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit (cont'd).

ANADROMOUS RIVERS

SKEENA-NASS

Species	Prod.	Max. Harvest	Current Harvest	Surplus
W. sthd.	33440	16720	836	15884
S. sthd.	40000	4000	3796	204
Cutthroat	153900	15390	7695	7695
Coho	245000	0	9600	-9600
Chinook	117000	10530	5570	4960
TOTAL	589340	46640	27497	19143

Q.C.I.

Species	Prod.	Max. Harvest	Current Harvest	Surplus
W. sthd.	4200	2100	630	1470
Cutthroat	57000	5700	2850	2850
Coho	250000	25000	1400	23600
TOTAL	311200	32800	4880	27920

ATLIN-TAKU

Sthd.	3500	1600	35	1565
Coho	70000	0	50	-50
Chinook	10000	5500	500	5000
TOTAL	83500	7100	585	6515

DEASE-STIKINE

Sthd.	3000	500	35	465
Chinook	12500	1875	150	1725
TOTAL	15500	2375	185	2190

Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit (cont'd).

RESIDENT RIVERS

SKEENA-NASS

Species	Prod.	Max. Harvest	Current Harvest	Surplus
Cutthroat	8550	2138	2565	-427
Dolly Varden	627200	188160	62720	125440
TOTAL	635750	190298	65285	125013

ATLIN-TAKU

Species	Prod.	Max. Harvest	Current Harvest	Surplus
Dolly Varden	16000	4800	800	4000
Other	33750	16875	1688	15188
TOTAL	49750	21675	2488	19188

DEASE-STIKINE

Dolly Varden	16000	4800	800	4000
Other	84375	42188	8438	33750
TOTAL	100375	46988	9238	37750

APPENDIX II

Analysis of Supply and Demand, 1990

1. Methodology for projection of future demand.

The socioeconomic section of the Ministry of Environment used the following two sport fishing surveys as data sources for forecasting trends:

(i) The Value of Freshwater Sport Fishing in British Columbia (prepared for the B.C. Fish and Wildlife Branch by Pearse Bowden Economic Consultants Ltd.). (Source of data for 1970.)

(ii) Freshwater Sport Fishing in British Columbia: An overview of the 1980 National Survey of Sport Fishing (M. Stone, Socioeconomic Section, Planning Branch, Ministry of Environment.). (Source of data for 1980.)

The factors used to estimate 1990 demand were:

(i) Population of angler residence areas.
(ii) Active anglers as a proportion of resident population.
(iii) Angler days per active angler.
(iv) Percent of angler days spent in Skeena relative to total angler days spent in B.C.

The above four factors were applied to four angler residence areas: Skeena, B.C. residents outside of Skeena, non-resident Canadians, and non-Canadians. The following formula was then applied:

Total population in residence area in 1990
X ratio of active anglers to population
X number of angler days per active angler
X percent of angler days spent in Skeena relative to total B.C. angler day.
= 1990 angler days in Skeena.

Skeena Residents:

	1970	1980	1990
(a) Total population Skeena	75211	89470	112567

(b) Active anglers as per cent of population

	1970	1980	1990
Active anglers	8072	15500	
Population	75211	89470	
Active anglers/population	10.7%	17.3%	21.0%
	Regional guess		17.3%*

* Regional staff assumed that no appreciable increase in this proportion would occur in the 1980's.

(c) Angler days per angler

	1970	1980	1990
Angler days spent in B.C.	163900	372500	
Active anglers	8072	15500	
Angler days/angler	20.3	24.1	26.0
	Regional guess		24.1*

* Again, no appreciable increase was forecast.

(d) Proportion of time spent in Skeena

	1970	1980	1990
Angler days in Skeena	151400	338800	
Angler days in B.C.	163900	373500	
Skeena days/total days	92.4%	90.7%	89.0%
	Regional guess		90.7%

* Regional staff assumed no further reduction in times spent locally.

B.C. Residents Outside of Skeena:

	1970	1980	1990
(a) Population of remainder of B.C.	2053729	2596474	3243888

(b) Active anglers as a percent of population

	1970	1980	1990
Active anglers	174028	245600	
Population	2053729	2596474	
Active anglers/population	8.5%	9.5%	10.0%

(c) Angler days per angler

	1970	1980	1990
Angler days spent in B.C.	2566700	4177900	
Active anglers	174028	245600	
Angler days/angler	14.7	17.0	19.0
	Regional guess		17.0*

(d) Proportion of time spent in Skeena

	1970	1980	1990
Angler days in Skeena	54500	88400	
Angler days in B.C.	2566700	4177900	
Skeena days/total days	2.1%	2.1%	2.1%

Non-resident Canadians:

	1970	1980	1990
(a) Angler days in B.C.	145000	373000	500000
(b) Angler days in Skeena	8000	38300	
Angler days in B.C.	145000	373000	
Skeena days/B.C. days	5.5%	10.3%	14%

Non-Canadians:

	1970	1980	1990
(a) Angler days in B.C.	332800	289400	250000
(b) Angler days in Skeena	28400	36000	
Angler days in B.C.	332800	289400	
Skeena days/B.C. days	8.5%	12.4%	15%

A juvenile component in each residence category was also incorporated into the determination of future demand. The relationship was expresses as percent of juveniles/adult angler:

Skeena residents	13.9%
Other B.C. residents	15.4%
Non-resident Canadians	11.8%
Non-Canadians	8.5%

The calculation of future angling demand in Skeena Region is shown in Table II-1.

2. Projection of future demand (1990) by species, habitat type and planning unit.

The three levels of projected demand increase (23, 29 and 56%) were applied to current (Table I-2) angler effort data. Future demand by species, habitat type and planning unit is shown in Tables II-2, II-3 and II-4.

Table II-1. Calculation of future angling demand in Skeena Region.

			1990	1980
1. Skeena Residents				
HIGH	112567 (0.21)(26)(0.89)(1 + 0.139)	=	623042	
LOW	112567 (0.173)(24.1)(0.907)(1 + 0.139)	=	484848	386700
REGION	112567 (0.173)(24.1)(0.907)(1 + 0.139)	=	484848	
2. Other B.C. Residents				
HIGH	3243888 (0.1)(19)(0.021)(1 + 0.154)	=	149364	
LOW	3243888 (0.095)(17)(0.021)(1 + 0.154)	=	126959	101400
REGION	3243888 (0.1)(17)(0.021)(1 + 0.154)	=	133641	
3. Non-Resident Canadians				
HIGH	500000 (0.14)(1 + 0.118)	=	78260	
LOW	500000 (0.103)(1 + 0.118)	=	57577	42800
REGION	500000 (0.14)(1 + 0.118)	=	78260	
4. Non-Canadians				
HIGH	250000 (0.15)(1 + 0.085)	=	40688	
LOW	250000 (0.124)(1 + 0.085)	=	33635	39100
REGION	250000 (0.15)(1 + 0.085)	=	40688	
				570000

5. Total Angling Effort

HIGH	891354	=	156% of 570000
LOW	703019	=	123% of 570000
REGION	737437	=	129% of 570000

Table II-2. Angler effort (1990) by species, habitat type and planning unit - based on 123% of current (1980) levels.

	SKEENA-NASS					OOTSA				
	Large Lake	Small Lake	Anad. River	Res. River	Total	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	71356	30581	0	0	101938	168724	42181	0	0	210905
Steelhead	0	0	45274	0	45274	0	0	0	0	0
Cutthroat	34799	22145	3164	3164	63272	0	0	0	0	0
Lake trout	24113	0	0	0	24113	21161	0	0	0	21161
Dolly Varden	4823	4823	0	38582	48227	0	0	0	0	0
Coho	0	0	59475	0	59475	0	0	0	0	0
Chinook	0	0	34272	0	34272	0	0	0	0	0
Other	2067	2151	0	0	4218	12598	9899	0	0	22497
TOTAL	137159	59700	142185	41745	380790	202483	52080	0	0	254563

	Q.C.I.					ATLIN-TAKU				
Rainbow	0	0	0	0	0	2636	879	0	0	3515
Steelhead	0	0	3691	0	3691	0	0	123	0	123
Cutthroat	2812	703	3515	0	7030	0	0	0	0	0
Lake trout	0	0	0	0	0	2953	0	0	0	2953
Dolly Varden	0	0	0	0	0	0	0	0	492	492
Coho	0	0	3480	0	3480	0	0	316	0	316
Chinook	0	0	0	0	0	0	0	703	0	703
Other	0	0	0	0	0	2531	1265	0	422	4218
TOTAL	2812	703	10686	0	14201	8120	2144	1142	914	12320

Table II-2. Angler effort (1990) by species, habitat type and planning unit - based on 123% of curent (1980) levels cont'd.

DEASE-STIKINE

	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	26363	8788	0	0	35151
Steelhead	0	0	123	0	123
Cutthroat	0	0	0	0	0
Lake trout	787	197	0	0	984
Dolly Varden	0	0	0	492	492
Coho	0	0	0	0	0
Chinook	0	0	176	0	176
Other	1055	1055	0	2109	4218
TOTAL	28205	10 39	299	2601	41144

Table II-3. Angler effort (1990) by species, habitat type and planning unit - based on 129% of current (1980) levels.

	SKEENA-NASS					OOTSA				
	Large Lake	Small Lake	Anad. River	Res. River	Total	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	74850	32078	0	0	106928	176985	44246	0	0	221231
Steelhead	0	0	47491	0	47491	0	0	0	0	0
Cutthroat	36503	23229	3318	3318	66370	0	0	0	0	0
Lake trout	25294	0	0	0	25294	22197	0	0	0	22197
Dolly Varden	5059	5059	0	40471	50589	0	0	0	0	0
Coho	0	0	62387	0	62387	0	0	0	0	0
Chinook	0	0	35950	0	35950	0	0	0	0	0
Other	2168	2257	0	0	4425	13215	10383	0	0	23598
TOTAL	143874	62623	149147	43789	399434	212397	54629	0	0	267026

	Q.C.I.					ATLIN-TAKU				
Rainbow	0	0	0	0	0	2765	922	0	0	3687
Steelhead	0	0	3872	0	3872	0	0	129	0	129
Cutthroat	2950	737	3687	0	7374	0	0	0	0	0
Lake trout	0	0	0	0	0	3097	0	0	0	3097
Dolly Varden	0	0	0	0	0	0	0	0	516	516
Coho	0	0	3650	0	3650	0	0	332	0	332
Chinook	0	0	0	0	0	0	0	737	0	737
Other	0	0	0	0	0	2655	1327	0	442	4425
TOTAL	2950	737	11209	0	14896	8517	2249	1198	959	12924

Table II-3. Angler effort (1990) by species, habitat type and planning unit - based on 129% of curent (1980) levels cont'd.

DEASE-STIKINE

	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	27654	9218	0	0	36872
Steelhead	0	0	129	0	129
Cutthroat	0	0	0	0	0
Lake trout	826	206	0	0	1032
Dolly Varden	0	0	0	516	516
Coho	0	0	0	0	0
Chinook	0	0	184	0	184
Other	1106	1106	0	2212	4425
TOTAL	29586	10531	313	2729	43158

Table II-4. Angler effort (1990) by species, habitat type and planning unit - based on 156% of current (1980) levels.

	SKEENA-NASS					OOTSA				
	Large Lake	Small Lake	Anad. River	Res. River	Total	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	90472	38774	0	0	129246	213925	53481	0	0	267406
Steelhead	0	0	57403	0	57403	0	0	0	0	0
Cutthroat	44122	28078	4011	4011	80222	0	0	0	0	0
Lake trout	30574	0	0	0	30574	26830	0	0	0	26830
Dolly Varden	6115	6115	0	48918	61147	0	0	0	0	0
Coho	0	0	75409	0	75409	0	0	0	0	0
Chinook	0	0	43454	0	43454	0	0	0	0	0
Other	2621	2728	0	0	5348	15973	12550	0	0	28524
TOTAL	173903	75694	180277	52929	482803	256728	66032	0	0	322760

	Q.C.I.					ATLIN-TAKU				
Rainbow	0	0	0	0	0	3343	1114	0	0	4457
Steelhead	0	0	4680	0	4680	0	0	156	0	156
Cutthroat	3565	891	4457	0	8914	0	0	0	0	0
Lake trout	0	0	0	0	0	3744	0	0	0	3744
Dolly Varden	0	0	0	0	0	0	0	0	624	624
Coho	0	0	4412	0	4412	0	0	401	0	401
Chinook	0	0	0	0	0	0	0	891	0	891
Other	0	0	0	0	0	3209	1604	0	535	5348
TOTAL	3565	891	13549	0	18005	10295	2719	1448	1159	15621

Table II-4. Angler effort (1990) by species, habitat type and planning unit - based on 156% of curent (1980) levels cont'd.

DEASE-STIKINE

	Large Lake	Small Lake	Anad. River	Res. River	Total
Rainbow	33426	11142	0	0	44568
Steelhead	0	0	156	0	156
Cutthroat	0	0	0	0	0
Lake trout	998	250	0	0	1248
Dolly Varden	0	0	0	624	624
Coho	0	0	0	0	0
Chinook	0	0	223	0	223
Other	1337	1337	0	2674	5348
TOTAL	35761	12729	379	3298	52167

APPENDIX III

Analysis of supply and demand.

1. Tables III-1 through III-5 ... 23% increase in angler demand.

2. Tables III-6 through III-10 ... 29% increase in angler demand.

3. Tables III-11 through III-15 ... 56% increase in angler demand.

Table III - 1(a). Analysis of supply and demand based on 23% increase.

SKEENA-NASS--"A"*	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	111565	137159	48348	59700	115215	142185	33925	41745
Success Rate -								
Current	1.10	1.10	2.43	2.43	0.24	0.24	1.92	1.92
Target		2.00		2.00		0.50		2.00
Supply=Demand		3.10		5.69		0.33		4.56
Harvest -								
Current	122438	150526	117280	114826	27497	33934	65285	90334
Target		274318		119400		71093		83490
Supply=Demand		424607		339408		46640		190298
Maximum Allowable Harvest		424607		339408		46640		190298
Surplus/Shortfall		150289		220008		(-24453)		106808

* Note: All species included in this analysis

Table III - 1(b). Analysis of supply and demand based on 23% increase.

SKEENA-NASS--"B"*	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	109990	135092	46670	57549	36800	45274	2565	3146
Success Rate -								
Current	1.07	1.07	2.41	2.41	0.13	0.13	1.00	1.00
Target		2.00		2.00		0.25		2.00
Supply=Demand		1.39		4.15		0.46		0.68
Harvest -								
Current	117713	144578	112255	138422	4632	5699	2565	3164
Target		270184		115098		11319		6328
Supply=Demand		188357		238908		20720		2138
Maximum Allowable Harvest		188357		238908		20720		2138
Surplus/Shortfall		(-81827)		123810		9402		(-4190)

* Note: "others" removed from lakes w & ss only in anad rivers cutthroat only in res rivers

Table III - 1(c). Analysis of supply and demand based on 23% increase.

SKEENA-NASS--"C"* (STHD KILLS ONLY)	Wintersteelhead		Summersteelhead	
	1980	1990	1980	1990
Angler-Days	7600	9348	29200	35916
Success Rate -				
Current	0.07	0.11	0.13	0.13
Target		1.00		0.13
Supply=Demand		1.79		0.11
Harvest -				
Current	836	1028	3796	4669
Target		9348		4669
Supply=Demand		16720		4000
Maximum Allowable Harvest		16720		4000
Surplus/Shortfall		7372)		(-669)

Table III - 2. Analysis of supply and demand based on 23% increase.

	OOTSA--"A" (ALL SPECIES)				OOTSA--"B" (LESS "OTHERS")			
	Large Lakes		Small Lakes		Large Lakes		Small Lakes	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	166350	202483	40250	52080	154400	189885	34200	42181
Success Rate -								
Current	0.90	0.90	3.00	3.00	0.73	0.73	3.00	3.00
Target		2.00		2.00		1.00		2.00
Supply=Demand		4.91		9.40		1.46		7.30
Harvest -								
Current	149210	181620	120750	156240	113360	139413	102600	126543
Target		404966		104160		189885		84362
Supply=Demand		994360		489300		277360		307800
Maximum Allowable Harvest		994360		489300		277360		307800
Surplus/Shortfall		589394		385140		87475		223438

Table III - 3. Analysis of supply and demand based on 23% increase.

Q.C.I.	Large Lakes		Small Lakes		Large Lakes		Sthd(kills)only	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	2280	2812	570	703	8650	10686	3000	3690
Success Rate -								
Current	2.40	2.40	3.00	3.00	0.56	0.56	0.21	0.21
Target		2.00		2.00		1.00		0.50
Supply=Demand		5.84		14.59		3.07		0.57
Harvest -								
Current	5472	6749	1710	2109	4880	6029	630	775
Target		5624		1406		10686		1845
Supply=Demand		16416		10260		32800		2100
Maximum Allowable Harvest		16416		10260		32800		2100
Surplus/Shortfall		10792		8854		22114		255

Table III - 4. Analysis of supply and demand based on 23% increase.

ATLIN-TAKU	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	6663	8120	1725	2144	700	1142	738	914
Success Rate -								
Current	1.51	1.51	3.00	3.00	0.84	0.84	3.37	3.37
Target		2.00		2.00		1.00		2.00
Supply=Demand		9.57		20.15		6.22		23.71
Harvest -								
Current	10071	12273	5175	6432	585	954	2485	3078
Target		16240		4288		1142		1828
Supply=Demand		77739		43200		7100		21675
Maximum Allowable Harvest		77739		43200		7100		21675
Surplus/Shortfall		61499		38912		5958		19847

Table III - 5. Analysis of supply and demand based on 23% increase.

DEASE-STIKINE	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	22619	28205	8069	10039	250	299	2088	2601
Success Rate -								
Current	0.79	0.79	2.98	2.98	0.74	0.74	4.42	4.42
Target		2.00		2.00		1.00		2.00
Supply=Demand		6.41		8.93		7.94		18.07
Harvest -								
Current	17894	22313	24067	29867	185	221	9238	11508
Target		56410		20078		229		5202
Supply=Demand		180931		89688		2375		46988
Maximum Allowable Harvest		180931		89688		2375		46988
Surplus/Shortfall		124521		69610		2076		41786

Table III - 6(a). Analysis of supply and demand based on 29% increase.

SKEENA-NASS--"A"	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	111565	143874	48345	62623	115215	149147	33925	43789
Success Rate -								
Current	1.10	1.10	2.43	2.43	0.24	0.24	1.92	1.92
Target		2.00		2.00		0.50		2.00
Supply=Demand		2.95		5.42		0.31		4.35
Harvest -								
Current	122438	157896	117280	151917	27497	33595	62585	84267
Target		287748		125246		74574		87578
Supply=Demand		424607		339400		46640		190298
Maximum Allowable Harvest		424607		339400		46640		190298
Surplus/Shortfall		1368595		214162		(-27934)		102720

Table III - 6(b). Analysis of supply and demand based on 29% increase.

SKEENA-NASS--"B"	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	109990	141706	46670	60366	47491	2565	3318	
Success Rate -								
Current	1.07	1.07	2.41	2.41	0.13	0.13	1.00	1.00
Target		2.00		2.00		0.25		2.00
Supply=Demand		1.33		3.96		0.44		0.64
Harvest -								
Current	117713	151656	112255	145198	46327	5670	2565	3318
Target		283412		120732		11873		6636
Supply=Demand		188357		238908		20720		2138
Maximum Allowable Harvest		188357		238908		20720		2138
Surplus/Shortfall		(-95055)		118176		8847		(-4498)

* Note: "others" removed from lakes w & ss only in anad rivers cutthroat only in res rivers

Table III - 6(c). Analysis of supply and demand based on 29% increase.

SKEENA-NASS--"C"	Wintersteelhead		Summersteelhead	
	1980	1990	1980	1990
Angler-Days	7600	9804	29200	37668
Success Rate -				
Current	0.11	0.11	0.13	0.13
Target		1.00		0.13
Supply=Demand		1.71		0.11
Harvest -				
Current	836	1078	3796	4897
Target		9804		4897
Supply=Demand		16720		4000
Maximum Allowable Harvest		16720		4000
Surplus/Shortfall		6916		(-879)

Table III - 7. Analysis of supply and demand based on 29% increase.

	OOTSA--"A"				OOTSA--"B" (LESS "OTHERS")			
	Large Lakes		Small Lakes		Large Lakes		Small Lakes	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	116350	212397	40250	54629	154400	199182	34200	44246
Success Rate -								
Current	0.90	0.90	3.00	3.00	0.73	0.73	3.00	3.00
Target		2.00		2.00		1.00		2.00
Supply=Demand		4.68		8.96		1.39		6.96
Harvest -								
Current	149210	190513	120750	163887	113360	146239	102600	132738
Target		424794		109258		119182		88492
Supply=Demand		994360		489300		277360		307800
Maximum Allowable Harvest		994360		489300		277360		307800
Surplus/Shortfall		569566		380042		78178		219308

Table III - 8. Analysis of supply and demand based on 29% increase.

Q.C.I.	Large Lakes		Small Lakes		Anadromous Rivers		Sthd(kills)only	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	2280	2950	570	737	8650	11209	3000	3872
Success Rate -								
Current	2.40	2.40	3.00	3.00	0.56	0.56	0.21	0.21
Target		2.00		2.00		1.00		0.50
Supply=Demand		5.56		13.92		2.93		0.54
Harvest -								
Current	5472	7080	1710	2211	4880	6324	630	813
Target		5900		1474		11209		1936
Supply=Demand		16416		10260		32800		2100
Maximum Allowable Harvest		16416		10260		32800		2100
Surplus/Shortfall		10516		8786		21591		164

Table III - 9. Analysis of supply and demand based on 29% increase.

ATLIN-TAKU	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	6663	8517	1725	2249	700	1198	738	959
Success Rate -								
Current	1.51	1.51	3.00	3.00	0.84	0.84	3.37	3.37
Target		2.00		2.00		1.00		2.00
Supply=Demand		9.13		19.21		5.93		22.60
Harvest -								
Current	10071	12873	5175	6747	585	1001	2488	3233
Target		17034		4498		1198		1918
Supply=Demand		77739		43200		7100		21675
Maximum Allowable Harvest		77739		43200		7100		21675
Surplus/Shortfall		60705		38702		5902		19757

Table III - 10. Analysis of supply and demand based on 29% increase.

DEASE-STIKINE	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	22619	29586	8069	10531	250	313	2088	2212
Success Rate -								
Current	0.79	0.79	2.98	2.98	0.74	0.74	4.42	4.42
Target		2.00		2.00		1.00		2.00
Supply=Demand		6.12		8.52		7.59		21.24
Harvest -								
Current	17894	23406	24006	31331	185	232	9238	9787
Target		59172		21062		313		4424
Supply=Demand		180931		89688		2375		46988
Maximum Allowable Harvest		180931		89688		2375		46988
Surplus/Shortfall		121759		68626		2062		42564

Table III - 11. Analysis of supply and demand based on 56% increase.

SKEENA-NASS	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	111565	173903	48345	74694	115215	180277	33925	52929
Success Rate -								
Current	1.10	1.10	2.43	2.43	0.24	0.24	1.92	1.92
Target		2.00		2.00		0.50		2.00
Supply=Demand		2,44		4.48		0.26		3.60
Harvest -								
Current	122438	190851	117280	183626	27497	43025	65285	101856
Target		347806		151388		90139		105858
Supply=Demand		424607		339408		46640		190298
Maximum Allowable Harvest		424607		339408		46640		190298
Surplus/Shortfall		76801		188020		(-43499)		84440

Table III - 12. Analysis of supply and demand based on 56% increase.

	OOTSA--"A" (ALL SPECIES)				OOTSA--"B" (LESS "OTHERS")			
	Large Lakes		Small Lakes		Large Lakes		Small Lakes	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	116350	256728	40250	66032	154400	240864	34200	53352
Success Rate -								
Current	0.90	0.90	3.00	3.00	0.73	0.73	3.00	3.00
Target		2.00		2.00		1.00		2.00
Supply=Demand		3.87		7.41		1.15		5.77
Harvest -								
Current	149715	231055	198096	113360	113360	175831	102600	160056
Target		513456		132064		240864		106704
Supply=Demand		994360		489300		277360		307800
Maximum Allowable Harvest		994360		489300		277360		307800
Surplus/Shortfall		480904		357236		36496		201096

Table III - 13. Analysis of supply and demand based on 56% increase.

Q.C.I.	Large Lakes		Small Lakes		Anadromous Rivers		Sthd(kills)only	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	2280	3565	570	891	8650	13549	3000	4680
Success Rate -								
Current	2.40	2.40	3.00	3.00	0.56	0.56	0.21	0.21
Target		2.00		2.00		1.00		0.50
Supply=Demand		4.60		11.52		2.42		0.45
Harvest -								
Current	5472	8556	1710	2673	4880	7644	630	983
Target		7130		1782		13549		2340
Supply=Demand		16416		10260		32800		2100
Maximum Allowable Harvest		16416		10260		32800		2100
Surplus/Shortfall		9286		8478		19251		(-240)

Table III - 14. Analysis of supply and demand based on 56% increase.

ATLIN-TAKU	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	6663	10295	1725	2719	700	1448	738	1159
Success Rate -								
Current	1.51	1.51	3.00	3.00	0.84	0.84	3.37	3.37
Target		2.00		2.00		1.00		2.00
Supply=Demand		7.55		15.89		4.90		18.70
Harvest -								
Current	10071	15561	5175	8157	585	1210	2488	3907
Target		20590		5438		1448		2318
Supply=Demand		77739		43200		7100		21675
Maximum Allowable Harvest		77739		43200		7100		21675
Surplus/Shortfall		57149		37762		5652		19357

Table III - 15. Analysis of supply and demand based on 56% increase.

DEASE-STIKINE	Large Lakes		Small Lakes		Anadromous Rivers		Resident Rivers	
	1980	1990	1980	1990	1980	1990	1980	1990
Angler-Days	22619	32761	8069	12729	250	379	2088	3298
Success Rate -								
Current	0.79	0.79	2.98	2.98	0.74	0.74	4.42	4.42
Target		2.00		2.00		1.00		2.00
Supply=Demand		5.06		7.05		6.27		14.25
Harvest -								
Current	17894	28291	24006	37870	185	280	9238	14591
Target		71522		25458		379		6596
Supply=Demand		180931		89688		2375		46988
Maximum Allowable Harvest		180931		89688		2375		46988
Surplus/Shortfall		109409		64230		1996		40392

APPENDIX IV

Table IV-1. Current stocking list, Skeena Region (1983).

Species	Water	Planning Unit	No. Fish (fry)
Rainbow trout	Anzus L.	Oo	20000
	Borel L.	Oo	20000
	Helene L.	S-N	35000
	Kager L.	Oo	5000
	Ross L.	S-N	15000
	Round L.	S-N	50000
	Tyhee L.	S-N	50000
			195000
Brook trout	Bigelow L.	S-N	5000
	Call L.	S-N	5000
	Co-op L.	Oo	20000
			30000
Summer steelhead	Morice	S-N	100000
	Bulkley	S-N	40000
	Suskwa	S-N	170000
	Zymoetz	S-N	100000
			410000*
Winter steelhead	Pallant Cr.	QCI	15000
	Kitimat R.	S-N	40000
			55000

* This total does not reflect an annual production; these streams are stocked on alternate years.

Table IV-2. Potential fish culture production requirements; Skeena Region, 1990.

	1983	1990
Rainbow trout	195000 fry	300000 fry
Brook trout	30000 fry	50000 fry
Summer steelhead	410000 fry	1000000 fry
Winter steelhead	55000 fry	100000 fry