Skeena Fisheries

Skeena Region Fisheries Management Statement

by

M.R. Whately

B.C. Ministry of Environment
Fisheries Branch
Smithers, B.C.

Skeena Fisheries Report No. 83-07
March, 1984
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P/FR/SK/46
WHATELY, M. R.
SKEENA REGION FISHERIES
MANAGEMENT STATEMENT
BJKS c. 1 mm SMITHERS

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SKEENA REGION FISHERIES MANAGEMENT STATEMENT

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</tbody>
</table>
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 identifiable 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 prioritized, 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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SKEENA REGIONAL FISHERIES STATEMENT

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 only twenty years ago of having "unlimited" sportfishing potential, to a Region that may, in the next decade, have serious problems.

Skeena Region encompasses an area of approximately 300,000 km² 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 - one Arctic (Liard) and six Pacific (Yukon, Taku, Stikine, Nass, Skeena and Nechako-Fraser). The Region has a population of about 90,000 people, of which the vast majority live in communities situated along the one major highway (Route 16) that traverses the southernmost part of the Region. Skeena has a large Indian population, with reserves and villages scattered throughout the Region, usually associated with major fish-bearing waters.
The economy of the area is based on primary (extractive) resource use. Forestry, 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

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

Skeena Region

as % of B.C. 9.3% 11.2% 9.5%

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 as we continue to plan, negotiate, and manage for their survival in the face of habitat loss and user group conflict. As well, however, more management effort must be directed to supplying more 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 similarly 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 vigorous 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 management 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.

1) 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.

<table>
<thead>
<tr>
<th>Planning Unit</th>
<th>Large Lakes</th>
<th>Small Lakes &amp; Reservoirs</th>
<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skeena-Nass</td>
<td>46</td>
<td>724</td>
<td>1254 km</td>
<td>170 km</td>
</tr>
<tr>
<td>Ootsa</td>
<td>32</td>
<td>609</td>
<td>0 km</td>
<td>0 km</td>
</tr>
<tr>
<td>Queen Charlotte</td>
<td>6</td>
<td>145</td>
<td>101 km</td>
<td>0 km</td>
</tr>
<tr>
<td>Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlin-Taku</td>
<td>23</td>
<td>467</td>
<td>100 km</td>
<td>50 km</td>
</tr>
<tr>
<td>Dease-Stikine</td>
<td>19</td>
<td>242</td>
<td>228 km</td>
<td>170 km</td>
</tr>
</tbody>
</table>

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 targeting 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, Kitumkalum) 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 Skeena 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 targeting 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.


\(^2\)Example: Steelhead Harvest Analysis. Brit. Col. Fish and Wildlife Branch
Table 3. Effort, catch (harvest) and success rates by species in Skeena Region.

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>EFFORT</th>
<th>SUCCESS</th>
<th>CATCH (HARVEST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow trout</td>
<td>285,000</td>
<td>1.2</td>
<td>353,200</td>
</tr>
<tr>
<td>Summer steelhead (K)</td>
<td>29,400</td>
<td>0.1</td>
<td>3,900</td>
</tr>
<tr>
<td>Winter steelhead (K)</td>
<td>10,600</td>
<td>0.1</td>
<td>1,500</td>
</tr>
<tr>
<td>Cutthroat trout</td>
<td>57,000</td>
<td>1.9</td>
<td>112,600</td>
</tr>
<tr>
<td>Lake trout</td>
<td>40,600</td>
<td>1.0</td>
<td>40,600</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>40,000</td>
<td>1.7</td>
<td>67,100</td>
</tr>
<tr>
<td>Coho salmon</td>
<td>50,900</td>
<td>0.2</td>
<td>11,050</td>
</tr>
<tr>
<td>Chinook salmon</td>
<td>28,500</td>
<td>0.2</td>
<td>6,200</td>
</tr>
<tr>
<td>Other¹</td>
<td>28,000</td>
<td>3.1</td>
<td>88,100</td>
</tr>
<tr>
<td></td>
<td>570,000</td>
<td>1.2</td>
<td>684,200</td>
</tr>
</tbody>
</table>

Summer steelhead (K+R)²    | 29,400 | 0.4     | 11,500          |
Winter steelhead (K+R)³    | 10,600 | 0.4     | 4,400           |

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>
<thead>
<tr>
<th>Species</th>
<th>LARGE LAKES</th>
<th>SMALL LAKES</th>
<th>ANADROMOUS RIVERS</th>
<th>RESIDENT RIVERS</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow trout</td>
<td>218200</td>
<td>152700</td>
<td>0</td>
<td>0</td>
<td>285000</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
<td>40000</td>
<td>15900</td>
<td>40000</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>30500</td>
<td>61900</td>
<td>18500</td>
<td>37600</td>
<td>57000</td>
</tr>
<tr>
<td>Lake trout</td>
<td>40500</td>
<td>40500</td>
<td>100</td>
<td>100</td>
<td>40000</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>3900</td>
<td>800</td>
<td>3900</td>
<td>2000</td>
<td>40000</td>
</tr>
<tr>
<td>Coho salmon</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50900</td>
</tr>
<tr>
<td>Others</td>
<td>16400</td>
<td>49200</td>
<td>9600</td>
<td>28700</td>
<td>28000</td>
</tr>
<tr>
<td>Totals</td>
<td>309500</td>
<td>305100</td>
<td>98900</td>
<td>268900</td>
<td>570000</td>
</tr>
<tr>
<td>Percent (catch)</td>
<td>44%</td>
<td>39%</td>
<td>6%</td>
<td>11%</td>
<td>100%</td>
</tr>
<tr>
<td>Percent (effort)</td>
<td>54%</td>
<td>17%</td>
<td>22%</td>
<td>7%</td>
<td>100%</td>
</tr>
</tbody>
</table>
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.

---

\(^1\)Examples: 1) Annual Reports. Field Services Branch, D.F.O.
Table 5. Total production and maximum allowable harvest to the sport fishery, Skeena region.

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

1In 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>
<thead>
<tr>
<th></th>
<th>SKEENA-NASS</th>
<th>OOTSA</th>
<th>Q.C.I</th>
<th>ATLIN-TAKU</th>
<th>DEASE-STIKINE</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Angler Days</td>
<td>Total</td>
<td>Angler Days</td>
<td>Total</td>
<td>Angler Days</td>
<td>Total</td>
</tr>
<tr>
<td>LARGE LAKES</td>
<td>111565</td>
<td>122438</td>
<td>166350</td>
<td>149210</td>
<td>2280</td>
<td>5472</td>
</tr>
<tr>
<td></td>
<td>(54%)</td>
<td>(44%)</td>
<td>(50%)</td>
<td>(44%)</td>
<td>(53%)</td>
<td>(46%)</td>
</tr>
<tr>
<td>SMALL LAKES</td>
<td>48345</td>
<td>117280</td>
<td>40250</td>
<td>120750</td>
<td>570</td>
<td>1710</td>
</tr>
<tr>
<td></td>
<td>(17%)</td>
<td>(39%)</td>
<td>(26%)</td>
<td>(26%)</td>
<td>(36%)</td>
<td>(37%)</td>
</tr>
<tr>
<td>ANAD RIVERS</td>
<td>115215</td>
<td>36685</td>
<td></td>
<td></td>
<td>8650</td>
<td>6200</td>
</tr>
<tr>
<td></td>
<td>(22%)</td>
<td>(6%)</td>
<td></td>
<td></td>
<td>(31%)</td>
<td>(41%)</td>
</tr>
<tr>
<td>RES. RIVERS</td>
<td>33925</td>
<td>65285</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(7%)</td>
<td>(11%)</td>
<td></td>
<td></td>
<td>(11%)</td>
<td>(11%)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>309050</td>
<td>341688</td>
<td>206600</td>
<td>269960</td>
<td>11500</td>
<td>13382</td>
</tr>
<tr>
<td></td>
<td>(54%)</td>
<td>(49%)</td>
<td>(36%)</td>
<td>(40%)</td>
<td>(2%)</td>
<td>(1%)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th>Skeena-Nass</th>
<th>Ootsa</th>
<th>Q.C.I.</th>
<th>Atlin-Taku</th>
<th>Dease-Stikine</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large Lakes</strong></td>
<td>143874</td>
<td>212397</td>
<td>2950</td>
<td>8517</td>
<td>29586</td>
<td>397324</td>
</tr>
<tr>
<td><strong>Small Lakes</strong></td>
<td>62623</td>
<td>54629</td>
<td>737</td>
<td>2249</td>
<td>10531</td>
<td>130769</td>
</tr>
<tr>
<td><strong>Anad Rivers</strong></td>
<td>149147</td>
<td>-</td>
<td>11209</td>
<td>1198</td>
<td>313</td>
<td>161867</td>
</tr>
<tr>
<td><strong>Res. Rivers</strong></td>
<td>43789</td>
<td>-</td>
<td>-</td>
<td>959</td>
<td>2729</td>
<td>47477</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>399433</td>
<td>267026</td>
<td>14896</td>
<td>12923</td>
<td>43159</td>
<td>737437</td>
</tr>
</tbody>
</table>

*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 (e.g., 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 analysis 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 anomalies 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 (i.e. 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 not harvest (kill).
Table 8. Analysis of large lake supply and demand, Skeena Nass planning unit. Based on 29% increased angler demand.

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

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

<table>
<thead>
<tr>
<th></th>
<th>Winter Steelhead</th>
<th>Summer Steelhead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler Days</td>
<td>7600</td>
<td>9800</td>
</tr>
<tr>
<td>Success Rate*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Target</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Supply=Demand</td>
<td>1.70</td>
<td>0.11</td>
</tr>
<tr>
<td>Harvest (kill)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>800</td>
<td>1100</td>
</tr>
<tr>
<td>Target</td>
<td>9800</td>
<td>4900</td>
</tr>
<tr>
<td>Supply=Demand</td>
<td>16700</td>
<td>4000</td>
</tr>
<tr>
<td>Max. All Harvest</td>
<td>16700</td>
<td></td>
</tr>
<tr>
<td>Supply(Shortfall)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>at current rate</td>
<td>15600</td>
<td></td>
</tr>
<tr>
<td>at target rate</td>
<td>6900</td>
<td></td>
</tr>
</tbody>
</table>

*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)

<table>
<thead>
<tr>
<th>Angler Days (kill + release)</th>
<th>Success Rate</th>
<th>Total Catch</th>
<th>Kill Rate (maximum)</th>
<th>Kills</th>
<th>Kills as % of Catch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.39</td>
<td>11388</td>
<td>0.13</td>
<td>3796</td>
<td>33.3</td>
</tr>
<tr>
<td>1990</td>
<td>0.39(^1)</td>
<td>14698</td>
<td>0.11(^2)</td>
<td>4000</td>
<td>27.2</td>
</tr>
<tr>
<td>1990</td>
<td>0.50(^3)</td>
<td>18834</td>
<td>0.11(^2)</td>
<td>4000</td>
<td>21.2</td>
</tr>
</tbody>
</table>

\(^1\)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 MANAGEMENT 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 necessary 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 Ootsa. 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. Similarly, Arctic grayling abound in streams 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 MANAGEMENT PRIORITIES AND REQUIRED RESOURCES

As mentioned in the two preceding 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 allotment 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 accommodate 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 prioritized 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 almost all habitat types.
<table>
<thead>
<tr>
<th>PRIORITIZED ACTIVITIES</th>
<th>MANAGEMENT STRATEGIES</th>
<th>REQUIRED SUPPORT</th>
<th>REGIONAL FISHERIES STAFF&lt;sup&gt;3&lt;/sup&gt; (MAN-YEARS)</th>
<th>IMPLICATIONS OF NOT IMPLEMENTING STRATEGIES AND/OR NOT SATISFYING ANGLER DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anadromous Fisheries Management</td>
<td>Interagency negotiation, Regulation, Stock assessment, Fishery monitoring, Creel census, Habitat inventory</td>
<td>Enforcement, Habitat Protection, Habitat Improvement, Fish Culture, Research</td>
<td>4.5, 6</td>
<td>Overfishing, resulting in stock declines or extinction. Loss of habitat; reduced production. More regulations (closures); loss of opportunities. Dissatisfied resident and non-resident anglers, reduced tourism, negative impact on guiding industry.</td>
</tr>
<tr>
<td>2. Small Lake Management</td>
<td>Inventory, Regulation, Stock enhancement, Habitat enhancement</td>
<td>Fish Culture, Habitat Protection, Enforcement, Habitat Improvement, Aquatic Studies</td>
<td>1.5, 1.5</td>
<td>Reduced opportunity. Inability to satisfy demand increases. Dissatisfied local anglers.</td>
</tr>
<tr>
<td>3. Large Lake Management</td>
<td>Habitat inventory, Regulation, Stock assessment, Habitat enhancement</td>
<td>Enforcement, Habitat Protection, Aquatic Studies, Habitat improvement, Research</td>
<td>1, 3</td>
<td>Reduced production. Lower success rate.</td>
</tr>
<tr>
<td>4. Resident Stream Fisheries</td>
<td>Regulation, Stock Assessment</td>
<td>Habitat Protection, Enforcement</td>
<td>0, 0.5</td>
<td>More regulations (closure). Loss of habitat.</td>
</tr>
</tbody>
</table>

<sup>1</sup> Enforcement requires 2 additional man-years to meet fisheries concerns.
<sup>2</sup> Habitat Protection requires 2 additional man-years to meet fisheries concerns.
<sup>3</sup> 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 on an annual basis.

Non-resident - a person residing outside of B.C.

Resident - a resident of the Province of British Columbia.

Stock - a population on 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.
LIST OF REFERENCES


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 multiplying 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.

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 benchmark. (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 (%).

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

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<thead>
<tr>
<th></th>
<th>SKEENA-NASS</th>
<th></th>
<th></th>
<th>OOTSA</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>TOTAL</th>
</tr>
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<tbody>
<tr>
<td>Rainbow</td>
<td>57855</td>
<td>24795</td>
<td>-</td>
<td>-</td>
<td>82650</td>
<td>136800</td>
<td>34200</td>
<td>-</td>
<td>171000</td>
</tr>
<tr>
<td>Steelhead</td>
<td>-</td>
<td>-</td>
<td>36800</td>
<td>-</td>
<td>36800</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>28215</td>
<td>17955</td>
<td>2565</td>
<td>2565</td>
<td>51300</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lake trout</td>
<td>20000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20000</td>
<td>17600</td>
<td>-</td>
<td>-</td>
<td>17600</td>
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<tr>
<td>Dolly Varden</td>
<td>3920</td>
<td>3920</td>
<td>-</td>
<td>-</td>
<td>31360</td>
<td>3920</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Coho</td>
<td>-</td>
<td>-</td>
<td>48000</td>
<td>-</td>
<td>48000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chinook</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>27850</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>1575</td>
<td>1675</td>
<td>-</td>
<td>-</td>
<td>3250</td>
<td>11950</td>
<td>6050</td>
<td>-</td>
<td>18000</td>
</tr>
<tr>
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<td>48345</td>
<td>114215</td>
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<td>309050</td>
<td>116350</td>
<td>40250</td>
<td>-</td>
<td>206600</td>
</tr>
</tbody>
</table>

|               | Q.C.I.      |             |               | ATLIN-TAKU |                  |           |             |               |       |
| Rainbow       | -           | -           | -             | -         | 2137        | 713       | -           | -             | 2850  |
| Steelhead     | -           | -           | 3000          | -         | 3000        | -         | -           | 100           | 100   |
| Cutthroat     | 2280        | 570         | 2850          | -         | 5700        | -         | -           | -             | 2500  |
| Lake trout    | -           | -           | -             | -         | 2500        | -         | -           | -             | 400   |
| Dolly Varden  | -           | -           | -             | -         | 2800        | -         | -           | 100           | 100   |
| Coho          | -           | -           | 2800          | -         | 2800        | -         | -           | -             | 500   |
| Chinook       | -           | -           | -             | -         | 2025        | 1012      | -           | -             | 338   |
| Other         | -           | -           | -             | -         | -           |           | 3375        | -             | 3375  |
| TOTAL         | 2280        | 570         | 8650          | -         | 11500       | 6662      | 1725        | 700           | 738   |
Table I-2. Angling activity by species, habitat type and planning unit (cont'd).

<table>
<thead>
<tr>
<th>Species</th>
<th>Large Lake</th>
<th>Small Lake</th>
<th>Anad. River</th>
<th>Res. River</th>
<th>Total</th>
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<tbody>
<tr>
<td>Rainbow</td>
<td>21375</td>
<td>7125</td>
<td>-</td>
<td>-</td>
<td>28500</td>
</tr>
<tr>
<td>Steelhead</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lake trout</td>
<td>400</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>400</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Coho</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Chinook</td>
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<td>-</td>
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<tr>
<td>Other</td>
<td>844</td>
<td>844</td>
<td>-</td>
<td>1687</td>
<td>3375</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>22619</strong></td>
<td><strong>7969</strong></td>
<td><strong>250</strong></td>
<td><strong>2087</strong></td>
<td><strong>32925</strong></td>
</tr>
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</table>
Table I-3. Current harvest by species, habitat type and planning unit.

<table>
<thead>
<tr>
<th>Species</th>
<th>Success Rate</th>
<th>S-N</th>
<th>Oo</th>
<th>Q.C.I.</th>
<th>A-T</th>
<th>D-S</th>
<th>Total</th>
</tr>
</thead>
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<tr>
<td>Large Lakes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow</td>
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<td>40499</td>
<td>95760</td>
<td>-</td>
<td>1496</td>
<td>14963</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>2.0</td>
<td>56430</td>
<td>-</td>
<td>5472</td>
<td>-</td>
<td>-</td>
<td>61902</td>
</tr>
<tr>
<td>Lake trout</td>
<td>1.0</td>
<td>20000</td>
<td>17600</td>
<td>-</td>
<td>2500</td>
<td>400</td>
<td>40500</td>
</tr>
<tr>
<td>Dolly Varden</td>
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<td>784</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>784</td>
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<td>Coho</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>3.0</td>
<td>4725</td>
<td>35850</td>
<td>-</td>
<td>6075</td>
<td>2531</td>
<td>49181</td>
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<tr>
<td>Total</td>
<td></td>
<td>122438</td>
<td>149210</td>
<td>5472</td>
<td>10071</td>
<td>17894</td>
<td>305085</td>
</tr>
</tbody>
</table>

| 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).

<table>
<thead>
<tr>
<th>Species</th>
<th>S-N</th>
<th>Oo</th>
<th>Q.C.I.</th>
<th>A-T</th>
<th>D-S</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. Sthd (k)</td>
<td>836(.11)</td>
<td>-</td>
<td>630(.21)</td>
<td>-</td>
<td>-</td>
<td>1466</td>
</tr>
<tr>
<td>S. Sthd (k)</td>
<td>3796(.13)</td>
<td>-</td>
<td></td>
<td>35(.35)</td>
<td>35(.35)</td>
<td>3866</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>7696(3.0)</td>
<td>-</td>
<td>2850(1.0)</td>
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<td>-</td>
<td>10545</td>
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<tr>
<td>Coho</td>
<td>9600(0.2)</td>
<td>-</td>
<td>1400(0.5)</td>
<td>50(0.5)</td>
<td>-</td>
<td>11050</td>
</tr>
<tr>
<td>Chinook</td>
<td>5570(0.2)</td>
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<td>150(1.0)</td>
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<td><strong>TOTAL</strong></td>
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<td>-</td>
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**ANADROMOUS RIVERS** (Success rates)

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<tbody>
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<tr>
<td>Dolly Varden</td>
<td>62720(2.0)</td>
</tr>
<tr>
<td>Other</td>
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<td>65280(2.0)</td>
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**RESIDENT RIVERS** (Success rates)

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<th>Success Rate</th>
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<tr>
<td>Dolly Varden</td>
<td>800(2.0)</td>
</tr>
<tr>
<td>Other</td>
<td>8437(5.0)</td>
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<td><strong>TOTAL</strong></td>
<td>2487</td>
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<table>
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Table I-4. Current angler exploitation and maximum allowable harvest rates, Skeena Region.

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<th>Planning Unit</th>
<th>Current Exploitation Rates</th>
<th>Maximum Harvest Rates</th>
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<td></td>
<td>Lakes</td>
<td>Rivers</td>
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<tr>
<td></td>
<td>Oo</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>QCI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>A-T</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>D-S</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Steelhead (summer)</td>
<td>S-N</td>
<td>-</td>
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<td></td>
<td>Oo</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>QCI</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>A-T</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>D-S</td>
<td>-</td>
<td>-</td>
</tr>
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<td>Steelhead (winter)</td>
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<td>Oo</td>
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<td>-</td>
</tr>
<tr>
<td></td>
<td>QCI</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>A-T</td>
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<tr>
<td></td>
<td>D-S</td>
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<td>-</td>
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<tr>
<td>Cutthroat</td>
<td>S-N</td>
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<td>15</td>
</tr>
<tr>
<td></td>
<td>Oo</td>
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<tr>
<td></td>
<td>QCI</td>
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</tr>
<tr>
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<td>D-S</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lake trout</td>
<td>S-N</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Oo</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
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<td>QCI</td>
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### Table I-4. Current angler exploitation and maximum allowable harvest rates, Skeena Region.

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<thead>
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<th>Planning Unit</th>
<th>Current Exploitation Rates</th>
<th>Maximum Harvest Rates</th>
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<td>Dolly Varden</td>
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<tr>
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<td>Oo</td>
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</tr>
<tr>
<td></td>
<td>QCI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>A-T</td>
<td>-</td>
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<tr>
<td></td>
<td>D-S</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Coho</td>
<td>S-N</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Oo</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>QCI</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>D-S</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chinook</td>
<td>S-N</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Oo</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>QCI</td>
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<tr>
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<td>A-T</td>
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</tr>
<tr>
<td></td>
<td>D-S</td>
<td>-</td>
<td>-</td>
</tr>
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<td>Oo</td>
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<td>D-S</td>
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Table I-5. Current fish production and unutilized surplus in Skeena, by habitat type.

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<thead>
<tr>
<th>Species</th>
<th>Production</th>
<th>Maximum Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
</tr>
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<tbody>
<tr>
<td><strong>LARGE LAKES</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow</td>
<td>1005481</td>
<td>383090</td>
<td>152717</td>
<td>230373</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>336870</td>
<td>101061</td>
<td>51902</td>
<td>39159</td>
</tr>
<tr>
<td>Lake trout</td>
<td>246000</td>
<td>61500</td>
<td>40500</td>
<td>21000</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>15680</td>
<td>4704</td>
<td>784</td>
<td>3920</td>
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<tr>
<td>Other</td>
<td>2281125</td>
<td>1140563</td>
<td>49181</td>
<td>1091382</td>
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<td><strong>TOTAL</strong></td>
<td>3885156</td>
<td>1690918</td>
<td>295084</td>
<td>1385834</td>
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</table>

| **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).

<table>
<thead>
<tr>
<th>Species</th>
<th>Production</th>
<th>Maximum Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANADROMOUS RIVERS</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Summer sthd</td>
<td>46500</td>
<td>6100</td>
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<td>2234</td>
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<tr>
<td>Winter sthd</td>
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<td>18820</td>
<td>1466</td>
<td>17354</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>21900</td>
<td>21090</td>
<td>10545</td>
<td>10545</td>
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<tr>
<td>Coho</td>
<td>565000</td>
<td>25000</td>
<td>11050</td>
<td>13950</td>
</tr>
<tr>
<td>Chinook</td>
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<td>17905</td>
<td>6220</td>
<td>11685</td>
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<tr>
<td>TOTAL</td>
<td>810500</td>
<td>88915</td>
<td>29667</td>
<td>46768</td>
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</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>Production</th>
<th>Maximum Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENT RIVERS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutthroat</td>
<td>8550</td>
<td>2138</td>
<td>2565</td>
<td>-427</td>
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<td>Dolly Varden</td>
<td>659200</td>
<td>197760</td>
<td>64320</td>
<td>133440</td>
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<td>59063</td>
<td>10126</td>
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Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit.

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<th>Species</th>
<th>SKEENA-MASS</th>
<th>LARGE LAKES</th>
<th>OOTSA</th>
<th>ATLIN-TAKU</th>
<th>DEASE-STIKINE</th>
</tr>
</thead>
<tbody>
<tr>
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<td>70872</td>
<td>40499</td>
<td>30373</td>
<td>Rainbow</td>
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<td>56430</td>
<td>28215</td>
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<tr>
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<td>100000</td>
<td>25000</td>
<td>20000</td>
<td>5000</td>
<td>Other</td>
</tr>
<tr>
<td>Dolly Varden</td>
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<td>4704</td>
<td>784</td>
<td>3920</td>
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<td>4725</td>
<td>231525</td>
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<td>421471</td>
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<td>299033</td>
<td>Rainbow trout</td>
</tr>
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<td></td>
<td>Lake trout</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Other</td>
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<td>14963</td>
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<td>400</td>
<td>1600</td>
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<tr>
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<td>2531</td>
<td>124031</td>
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<td>17894</td>
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</table>
Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit (cont'd).

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<th>Species</th>
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<th>Current Harvest</th>
<th>Surplus</th>
<th>Species</th>
<th>Prod.</th>
<th>Max. Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
</tr>
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<td>102600</td>
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<td>Cutthroat</td>
<td>359100</td>
<td>107730</td>
<td>35910</td>
<td>71820</td>
<td>Other</td>
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<td>18150</td>
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<td>11760</td>
<td>1960</td>
<td>9800</td>
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<td>120750</td>
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<td>214288</td>
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</tr>
</tbody>
</table>

| Q.C.I.          |       |              |                |         | ATLIN-TAKU      |       |              |                |         |
| Cutthroat       | 171000| 51300        | 1710           | 49590   | Rainbow trout   | 42750 | 12825        | 2138           | 10688   |
| Other           |       |              |                |         | Other           | 60750 | 30375        | 3038           | 27338   |
| TOTAL           | 171000| 51300        | 1710           | 49590   | 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).

<table>
<thead>
<tr>
<th>Species</th>
<th>Prod.</th>
<th>Max. Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
<th>Species</th>
<th>Prod.</th>
<th>Max. Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
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<td>W. sthd.</td>
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<td>2100</td>
<td>630</td>
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<td>S. sthd.</td>
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<td>4000</td>
<td>3796</td>
<td>204</td>
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<td>57000</td>
<td>5700</td>
<td>2850</td>
<td>2850</td>
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<td>Cutthroat</td>
<td>153900</td>
<td>15390</td>
<td>7695</td>
<td>7695</td>
<td>Coho</td>
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<td>1400</td>
<td>23600</td>
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<td>311200</td>
<td>32800</td>
<td>4880</td>
<td>27920</td>
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<td>Chinook</td>
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<td>5570</td>
<td>4960</td>
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</tr>
<tr>
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<td>46640</td>
<td>27497</td>
<td>19143</td>
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<table>
<thead>
<tr>
<th>Species</th>
<th>Prod.</th>
<th>Max. Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sthd.</td>
<td>3500</td>
<td>1600</td>
<td>35</td>
<td>1565</td>
</tr>
<tr>
<td>Coho</td>
<td>70000</td>
<td>0</td>
<td>50</td>
<td>-50</td>
</tr>
<tr>
<td>Chinook</td>
<td>10000</td>
<td>5500</td>
<td>500</td>
<td>5000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>83500</td>
<td>7100</td>
<td>585</td>
<td>6515</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species</th>
<th>Prod.</th>
<th>Max. Harvest</th>
<th>Current Harvest</th>
<th>Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sthd.</td>
<td>3000</td>
<td>500</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Chinook</td>
<td>12500</td>
<td>1875</td>
<td>150</td>
<td>1725</td>
</tr>
<tr>
<td>TOTAL</td>
<td>15500</td>
<td>2375</td>
<td>185</td>
<td>2190</td>
</tr>
</tbody>
</table>
Table I-6. Current fish production and unutilized surplus in Skeena by habitat type and by planning unit (cont'd).

<table>
<thead>
<tr>
<th>SKEENA-NASS</th>
<th>RESIDENT RIVERS</th>
<th>ATLIN-TAKU</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong></td>
<td><strong>Prod.</strong></td>
<td><strong>Max. Harvest</strong></td>
</tr>
<tr>
<td>Cutthroat</td>
<td>8550</td>
<td>2138</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>627200</td>
<td>188160</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>635750</td>
<td>190298</td>
</tr>
</tbody>
</table>

| 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:

\[ \text{Total population in residence area in 1990} \times \text{ratio of active anglers to population} \times \text{number of angler days per active angler} \times \text{percent of angler days spent in Skeena relative to total B.C. angler day.} \]

= 1990 angler days in Skeena.
Skeena Residents:

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population Skeena</td>
<td>75211</td>
<td>89470</td>
<td>112567</td>
</tr>
</tbody>
</table>

(b) Active anglers as per cent of population

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active anglers</td>
<td>8072</td>
<td>15500</td>
<td>21.0%</td>
</tr>
<tr>
<td>Population</td>
<td>75211</td>
<td>89470</td>
<td>17.3%</td>
</tr>
<tr>
<td>Active anglers/population</td>
<td>10.7%</td>
<td>17.3%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>

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

(c) Angler days per angler

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days spent in B.C.</td>
<td>163900</td>
<td>372500</td>
<td>26.0</td>
</tr>
<tr>
<td>Active anglers</td>
<td>8072</td>
<td>15500</td>
<td>24.1</td>
</tr>
<tr>
<td>Angler days/angler</td>
<td>20.3</td>
<td>24.1</td>
<td>Regional guess</td>
</tr>
</tbody>
</table>

* Again, no appreciable increase was forcast.

(d) Proportion of time spent in Skeena

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days in Skeena</td>
<td>151400</td>
<td>338800</td>
<td>90.7%</td>
</tr>
<tr>
<td>Angler days in B.C.</td>
<td>163900</td>
<td>373500</td>
<td>90.7%</td>
</tr>
<tr>
<td>Skeena days/total days</td>
<td>92.4%</td>
<td>90.7%</td>
<td>Regional guess</td>
</tr>
</tbody>
</table>

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

B.C. Residents Outside of Skeena:

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population of remainder of B.C.</td>
<td>2053729</td>
<td>2596474</td>
<td>3243888</td>
</tr>
</tbody>
</table>

(b) Active anglers as a percent of population

<table>
<thead>
<tr>
<th>Year</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active anglers</td>
<td>174028</td>
<td>245600</td>
<td>10.0%</td>
</tr>
<tr>
<td>Population</td>
<td>2053729</td>
<td>2596474</td>
<td>9.5%</td>
</tr>
<tr>
<td>Active anglers/population</td>
<td>8.5%</td>
<td>9.5%</td>
<td>10.0%</td>
</tr>
</tbody>
</table>
(c) Angler days per angler

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days spent in B.C.</td>
<td>2566700</td>
<td>4177900</td>
<td></td>
</tr>
<tr>
<td>Active anglers</td>
<td>174028</td>
<td>245600</td>
<td></td>
</tr>
<tr>
<td>Angler days/angler</td>
<td>14.7</td>
<td>17.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Regional guess</td>
<td></td>
<td></td>
<td>17.0*</td>
</tr>
</tbody>
</table>

(d) Proportion of time spent in Skeena

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days in Skeena</td>
<td>54500</td>
<td>88400</td>
<td></td>
</tr>
<tr>
<td>Angler days in B.C.</td>
<td>2566700</td>
<td>4177900</td>
<td></td>
</tr>
<tr>
<td>Skeena days/total days</td>
<td>2.1%</td>
<td>2.1%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

Non-resident Canadians:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days in B.C.</td>
<td>145000</td>
<td>373000</td>
<td>500000</td>
</tr>
</tbody>
</table>

(b) Angler days in Skeena
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days in B.C.</td>
<td>145000</td>
<td>373000</td>
<td></td>
</tr>
<tr>
<td>Skeena days/B.C. days</td>
<td>5.5%</td>
<td>10.3%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Non-Canadians:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days in B.C.</td>
<td>332800</td>
<td>289400</td>
<td>250000</td>
</tr>
</tbody>
</table>

(b) Angler days in Skeena
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler days in B.C.</td>
<td>332800</td>
<td>289400</td>
<td></td>
</tr>
<tr>
<td>Skeena days/B.C. days</td>
<td>8.5%</td>
<td>12.4%</td>
<td>15%</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Skeena Residents</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>112567 (0.21)(26)(0.89)(1 + 0.139) = 623042</td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>112567 (0.173)(24.1)(0.907)(1 + 0.139) = 484848</td>
<td>386700</td>
</tr>
<tr>
<td>REGION</td>
<td>112567 (0.173)(24.1)(0.907)(1 + 0.139) = 484848</td>
<td></td>
</tr>
</tbody>
</table>

| **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) |          |

| **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.

<table>
<thead>
<tr>
<th></th>
<th>SKEENA-NASS</th>
<th></th>
<th>OOTSA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large Lake</td>
<td>Small Lake</td>
<td>Anad. River</td>
</tr>
<tr>
<td>Rainbow</td>
<td>71356</td>
<td>30581</td>
<td>0</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
<td>45274</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>34799</td>
<td>22145</td>
<td>3164</td>
</tr>
<tr>
<td>Lake trout</td>
<td>24113</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>4823</td>
<td>4823</td>
<td>0</td>
</tr>
<tr>
<td>Coho</td>
<td>0</td>
<td>0</td>
<td>59475</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
<td>34272</td>
</tr>
<tr>
<td>Other</td>
<td>2067</td>
<td>2151</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>137159</td>
<td>59700</td>
<td>142185</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Q.C.I.</th>
<th></th>
<th>ATLIN-TAKU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rainbow</td>
<td></td>
<td>ATLIN-TAKU</td>
</tr>
<tr>
<td>Rainbow</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>2812</td>
<td>703</td>
<td>0</td>
</tr>
<tr>
<td>Lake trout</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coho</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2812</td>
<td>703</td>
<td>10686</td>
</tr>
</tbody>
</table>
Table II-2. Angler effort (1990) by species, habitat type and planning unit - based on 123% of current (1980) levels cont'd.

<table>
<thead>
<tr>
<th></th>
<th>Large Lake</th>
<th>Small Lake</th>
<th>Anad. River</th>
<th>Res. River</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow</td>
<td>26363</td>
<td>8788</td>
<td>0</td>
<td>0</td>
<td>35151</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
<td>123</td>
<td>0</td>
<td>123</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lake trout</td>
<td>787</td>
<td>197</td>
<td>0</td>
<td>0</td>
<td>984</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>492</td>
<td>492</td>
</tr>
<tr>
<td>Coho</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
<td>176</td>
<td>0</td>
<td>176</td>
</tr>
<tr>
<td>Other</td>
<td>1055</td>
<td>1055</td>
<td>0</td>
<td>2109</td>
<td>4218</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>28205</strong></td>
<td><strong>10039</strong></td>
<td><strong>299</strong></td>
<td><strong>2601</strong></td>
<td><strong>41144</strong></td>
</tr>
</tbody>
</table>
Table II-3. Angler effort (1990) by species, habitat type and planning unit -based on 129% of current (1980) levels cont'd.

<table>
<thead>
<tr>
<th>Species</th>
<th>Large Lake</th>
<th>Small Lake</th>
<th>Anad. River</th>
<th>Res. River</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow</td>
<td>27654</td>
<td>9218</td>
<td>0</td>
<td>0</td>
<td>36872</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
<td>129</td>
<td>0</td>
<td>129</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lake trout</td>
<td>826</td>
<td>206</td>
<td>0</td>
<td>0</td>
<td>1032</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>516</td>
<td>516</td>
</tr>
<tr>
<td>Coho</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
<td>184</td>
<td>0</td>
<td>184</td>
</tr>
<tr>
<td>Other</td>
<td>1106</td>
<td>1106</td>
<td>0</td>
<td>2212</td>
<td>4425</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>29586</strong></td>
<td><strong>10531</strong></td>
<td><strong>313</strong></td>
<td><strong>2729</strong></td>
<td><strong>43158</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>SKEENA-MASS</th>
<th></th>
<th>OOTSA</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow</td>
<td>74850</td>
<td>32078</td>
<td>0</td>
<td>0</td>
<td>106928</td>
<td>176985</td>
<td>44246</td>
<td>0</td>
<td>0</td>
<td>221231</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
<td>47491</td>
<td>0</td>
<td>47491</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>36503</td>
<td>23229</td>
<td>3318</td>
<td>3318</td>
<td>66370</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lake trout</td>
<td>25294</td>
<td>0</td>
<td>0</td>
<td>40471</td>
<td>50589</td>
<td>25294</td>
<td>0</td>
<td>22197</td>
<td>0</td>
<td>22197</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>5059</td>
<td>5059</td>
<td>0</td>
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<td>35950</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>0</td>
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<td>0</td>
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<td>0</td>
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<td>Other</td>
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<td>TOTAL</td>
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<td>62623</td>
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<td>0</td>
<td>267026</td>
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</table>

<p>|                | Q.C.I. |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
|----------------|--------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Rainbow        | 0      | 0                | 0                | 0                | 0                | 2765            | 922              | 0                | 129              | 0                |
| Steelhead      | 0      | 0                | 3872             | 0                | 3872             | 0                | 0                | 0                | 0                | 0                |
| Cutthroat      | 2950   | 737              | 3687             | 0                | 7374             | 0                | 0                | 0                | 0                | 0                |
| Lake trout     | 0      | 0                | 0                | 0                | 0                | 3097            | 0                | 0                | 0                | 0                |
| Dolly Varden   | 0      | 0                | 3650             | 0                | 3650             | 0                | 0                | 0                | 0                | 0                |
| Coho           | 0      | 0                | 3650             | 0                | 3650             | 0                | 0                | 0                | 0                | 0                |
| Chinook        | 0      | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                | 0                |
| Other          | 0      | 0                | 0                | 0                | 0                | 2655            | 1327             | 0                | 0                | 442              |
| TOTAL          | 2950   | 737              | 11209            | 0                | 14896            | 8517            | 2249             | 1198             | 959              | 12924            |</p>
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<tr>
<th></th>
<th>SKEENA-NASS</th>
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<td></td>
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<td>Rainbow</td>
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<tr>
<td>Cutthroat</td>
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<td>28078</td>
</tr>
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<td>Lake trout</td>
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<td>0</td>
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<tr>
<td>Dolly Varden</td>
<td>6115</td>
<td>6115</td>
</tr>
<tr>
<td>Coho</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
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<td>2728</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>173903</td>
<td>75694</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>Q.C.I.</th>
<th>ATLIN-TAKU</th>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Rainbow</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Steelhead</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cutthroat</td>
<td>3565</td>
<td>891</td>
</tr>
<tr>
<td>Lake trout</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dolly Varden</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Coho</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>3565</td>
<td>891</td>
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Table II-4. Angler effort (1990) by species, habitat type and planning unit - based on 156% of current (1980) levels cont'd.

<table>
<thead>
<tr>
<th>Species</th>
<th>Large Lake</th>
<th>Small Lake</th>
<th>Anad. River</th>
<th>Res. River</th>
<th>Total</th>
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<tbody>
<tr>
<td>Rainbow</td>
<td>33426</td>
<td>11142</td>
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<td>0</td>
<td>44568</td>
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<td>0</td>
</tr>
<tr>
<td>Lake trout</td>
<td>998</td>
<td>250</td>
<td>0</td>
<td>0</td>
<td>1248</td>
</tr>
<tr>
<td>Dolly Varden</td>
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<td>0</td>
<td>0</td>
<td>624</td>
<td>624</td>
</tr>
<tr>
<td>Coho</td>
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<td>0</td>
<td>223</td>
<td>0</td>
<td>223</td>
</tr>
<tr>
<td>Chinook</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2674</td>
<td>5348</td>
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<tr>
<td>Other</td>
<td>1337</td>
<td>1337</td>
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<td>3298</td>
<td>52167</td>
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</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>SKEENA-NASS--&quot;A&quot;*</th>
<th>Large Lakes</th>
<th>Small Lakes</th>
<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler-Days</td>
<td>111565</td>
<td>137159</td>
<td>48348</td>
<td>59700</td>
</tr>
<tr>
<td>Success Rate -</td>
<td>1.10</td>
<td>1.10</td>
<td>2.43</td>
<td>2.43</td>
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<tr>
<td>Current</td>
<td>2.00</td>
<td>2.00</td>
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<td></td>
</tr>
<tr>
<td>Target</td>
<td>3.10</td>
<td>5.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest -</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>122438</td>
<td>150526</td>
<td>117280</td>
<td>114826</td>
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<tr>
<td>Target</td>
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<td>119400</td>
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<td></td>
</tr>
<tr>
<td>Supply=Demand</td>
<td>424607</td>
<td>339408</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Allowable</td>
<td>424607</td>
<td>339408</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surplus/Shortfall</td>
<td>150289</td>
<td>220008</td>
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* Note: All species included in this analysis
Table III - 1(b). Analysis of supply and demand based on 23% increase.

<table>
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<th>SKEENA-NASS--&quot;B&quot;*</th>
<th>Large Lakes</th>
<th>Small Lakes</th>
<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
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</thead>
<tbody>
<tr>
<td>Angler-Days</td>
<td>109990</td>
<td>135092</td>
<td>46670</td>
<td>57549</td>
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<tr>
<td>Success Rate -</td>
<td>1.07</td>
<td>1.07</td>
<td>2.41</td>
<td>2.41</td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Supply=Demand</td>
<td>1.39</td>
<td>4.15</td>
<td>1.39</td>
<td>4.15</td>
</tr>
<tr>
<td>Harvest -</td>
<td>117713</td>
<td>144578</td>
<td>112255</td>
<td>138422</td>
</tr>
<tr>
<td>Current</td>
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<td></td>
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<td>Target</td>
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<td>115098</td>
<td>238908</td>
<td>20720</td>
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<tr>
<td>Supply=Demand</td>
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<td>238908</td>
<td>20720</td>
<td>20720</td>
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<tr>
<td>Maximum Allowable</td>
<td>188357</td>
<td>238908</td>
<td>20720</td>
<td>20720</td>
</tr>
<tr>
<td>Harvest</td>
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<td></td>
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<tr>
<td>Surplus/Shortfall</td>
<td>(-81827)</td>
<td>123810</td>
<td>9402</td>
<td>(-4190)</td>
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* 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.

<table>
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<tr>
<th>SKEENA-NASS--&quot;C&quot;* (STHD KILLS ONLY)</th>
<th>Wintersteelhead</th>
<th>Summersteelhead</th>
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<td>Angler-Days</td>
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<td>9348</td>
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<tr>
<td>Success Rate -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
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<td>0.11</td>
</tr>
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<td>Target</td>
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<td>0.13</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>836</td>
<td>1028</td>
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<tr>
<td>Target</td>
<td>9348</td>
<td>4669</td>
</tr>
<tr>
<td>Supply=Demand</td>
<td>16720</td>
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<tr>
<td>Maximum Allowable Harvest</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16720</td>
<td></td>
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<tr>
<td>Surplus/Shortfall</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>7372</td>
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Table III - 2. Analysis of supply and demand based on 23% increase.

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<th></th>
<th>OOTSA--&quot;B&quot; (LESS &quot;OTHERS&quot;)</th>
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<td>Small Lakes</td>
<td>Large Lakes</td>
<td>Small Lakes</td>
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<tr>
<td>----------------</td>
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<td>-------------</td>
<td>--------------</td>
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<td>202483</td>
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<td>189985</td>
<td>42181</td>
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<td>Angler-Days</td>
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</tr>
<tr>
<td>Success Rate -</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Current</td>
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<td>1.00</td>
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<td>113360</td>
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<tr>
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<td>489300</td>
<td>277360</td>
<td>307800</td>
</tr>
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<td>Surplus/Shortfall</td>
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<td>87475</td>
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Table III - 3. Analysis of supply and demand based on 23% increase.

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<th>Large Lakes</th>
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<td>2.00</td>
<td>2.00</td>
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</tr>
<tr>
<td>Harvest -</td>
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<td>1710</td>
<td>2109</td>
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<tr>
<td>Current</td>
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<td>1406</td>
<td>10260</td>
<td>32800</td>
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<td>Target</td>
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<td>10260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply=Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Allowable</td>
<td>16416</td>
<td>10260</td>
<td>32800</td>
<td>2100</td>
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<tr>
<td>Harvest</td>
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</tr>
<tr>
<td>Surplus/Shortfall</td>
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<td>255</td>
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Table III - 4. Analysis of supply and demand based on 23% increase.

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<th>Resident Rivers</th>
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<td>8120</td>
<td>1725</td>
<td>2144</td>
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<td></td>
<td></td>
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<td>Current</td>
<td>1.51</td>
<td>1.51</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Target</td>
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<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Supply=Demand</td>
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<td>20.15</td>
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</tr>
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<td>Harvest</td>
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<td>10071</td>
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<td>16240</td>
<td>4288</td>
<td>1142</td>
<td>1828</td>
</tr>
<tr>
<td>Supply=Demand</td>
<td>77739</td>
<td>43200</td>
<td>7100</td>
<td>21675</td>
</tr>
<tr>
<td>Maximum Allowable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td>77739</td>
<td>43200</td>
<td>7100</td>
<td>21675</td>
</tr>
<tr>
<td>Surplus/Shortfall</td>
<td>61499</td>
<td>38912</td>
<td>5958</td>
<td>19847</td>
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Table III - 5. Analysis of supply and demand based on 23% increase.

<table>
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<th>DEASE-STIKINE</th>
<th>Large Lakes</th>
<th>Small Lakes</th>
<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler-Days</td>
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<td>28205</td>
<td>8069</td>
<td>10039</td>
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<td>2.98</td>
<td>2.98</td>
</tr>
<tr>
<td>Current</td>
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<td>2.00</td>
<td>6.41</td>
<td>8.93</td>
</tr>
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<td>Target</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Supply=Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td>17894</td>
<td>22313</td>
<td>24067</td>
<td>29867</td>
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<td>Current</td>
<td>56410</td>
<td>20078</td>
<td>89688</td>
<td>2375</td>
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Table III - 6(a). Analysis of supply and demand based on 29% increase.

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<th>Large Lakes</th>
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Table III - 6(b). Analysis of supply and demand based on 29% increase.

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<td>Maximum Allowable</td>
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<td>238908</td>
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* 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.

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

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<th>Large Lakes</th>
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<td>32800</td>
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Table III - 9. Analysis of supply and demand based on 29% increase.

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<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
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Table III - 10. Analysis of supply and demand based on 29% increase.

<table>
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<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
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<tr>
<td>Maximum Allowable</td>
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<td>Harvest</td>
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Table III - 11. Analysis of supply and demand based on 56% increase.

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<th>Resident Rivers</th>
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<td>Supply=Demand</td>
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<td>46640</td>
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Table III - 12. Analysis of supply and demand based on 56% increase.

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<th>OOTSA--&quot;B&quot; (LESS &quot;OTHERS&quot;)</th>
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Table III - 13. Analysis of supply and demand based on 56% increase.

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<th>Large Lakes</th>
<th>Small Lakes</th>
<th>Anadromous Rivers</th>
<th>Stnd(kills)only</th>
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<td>1710</td>
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<td>Harvest</td>
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Table III - 14. Analysis of supply and demand based on 56% increase.

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<th>Large Lakes</th>
<th>Small Lakes</th>
<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
</tr>
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</tr>
<tr>
<td>Surplus/Shortfall</td>
<td>57149</td>
<td>37762</td>
<td>5652</td>
<td>5652</td>
</tr>
</tbody>
</table>
Table III - 15. Analysis of supply and demand based on 56% increase.

<table>
<thead>
<tr>
<th>DEASE-STIKINE</th>
<th>Large Lakes</th>
<th>Small Lakes</th>
<th>Anadromous Rivers</th>
<th>Resident Rivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angler-Days</td>
<td>22619</td>
<td>32761</td>
<td>8069</td>
<td>12729</td>
</tr>
<tr>
<td>Success Rate -</td>
<td>0.79</td>
<td>0.79</td>
<td>2.98</td>
<td>2.98</td>
</tr>
<tr>
<td>Current</td>
<td>2.00</td>
<td>2.00</td>
<td>7.05</td>
<td>7.05</td>
</tr>
<tr>
<td>Target</td>
<td>5.06</td>
<td>5.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply=Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td>17894</td>
<td>28291</td>
<td>24006</td>
<td>37870</td>
</tr>
<tr>
<td>Current</td>
<td>71522</td>
<td>25458</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target</td>
<td>180931</td>
<td>89688</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply=Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Allowable</td>
<td>180931</td>
<td>89688</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvest</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surplus/Shortfall</td>
<td>109409</td>
<td>64230</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX IV

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

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

*This total does not reflect an annual production; these streams are stocked on alternate years.*
<table>
<thead>
<tr>
<th>Fish</th>
<th>1983</th>
<th>1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainbow trout</td>
<td>195000 fry</td>
<td>300000 fry</td>
</tr>
<tr>
<td>Brook trout</td>
<td>30000 fry</td>
<td>50000 fry</td>
</tr>
<tr>
<td>Summer steelhead</td>
<td>410000 fry</td>
<td>1000000 fry</td>
</tr>
<tr>
<td>Winter steelhead</td>
<td>55000 fry</td>
<td>100000 fry</td>
</tr>
</tbody>
</table>