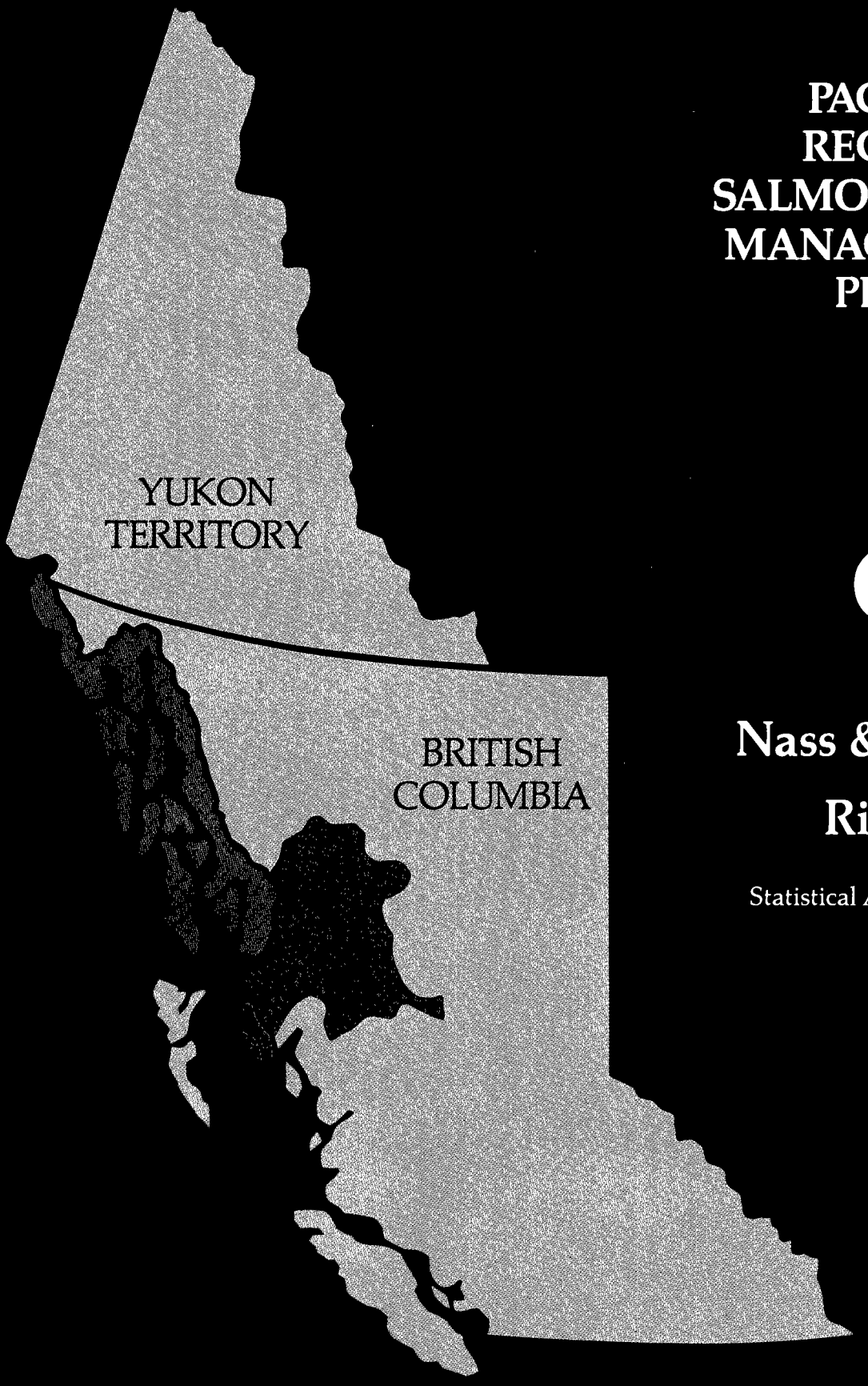

PACIFIC REGION SALMON STOCK MANAGEMENT PLAN

C

Nass & Skeena Rivers

Statistical Areas - 3, 4 & 5

DISCUSSION DOCUMENT

1986

Fisheries and Oceans | Pêches et Océans

Canada

CONTENTS

PACIFIC REGION SALMON STOCK MANAGEMENT PLAN

VOLUME C

NASS AND SKEENA RIVERS

STATISTICAL AREAS 3, 4 AND 5

Department of Fisheries and Oceans

1986

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Your file Votre référence

Our file Notre référence

Summer 1986

TO: THE READER

This discussion document was prepared to replace the April, 1985, edition of the Pacific Region Salmon Resource Management Plan. This edition differs from the original in title, in format, and in the inclusion of additional management options.

The title has been changed to the Pacific Region Salmon Stock Management Plan to make clear the distinction between stock management and fleet management. This document contains options for managing salmon stock production and harvest to make best use of the salmonid resource. It is hoped that a first edition of a Salmon Fleet Management Plan will be published by mid-1987. That document will contain options for managing the salmon fishing fleet to make best use of the labour, capital and other resources that are employed in harvesting the salmonid resource.

This edition was prepared in a new format to encourage review and comment by area, and to facilitate a regular revision process. This volume is one of twelve dealing with salmonid stocks by geographical area (individual or small groups of Statistical Areas) and by species (for Chinook and Coho salmon). Discussed in this volume are the salmon resources of the Nass and Skeena Rivers.

This document contains information on the status of salmon stocks, habitat, and fisheries, and a detailed discussion of some of the management problems that exist. Its purpose is to present existing information to provide a context for some management and enhancement options that have been suggested to rebuild the salmon resources. The local and specialized knowledge of advisors and others familiar with the Nass and Skeena Rivers is vital to improving existing options, creating new ones if necessary, and to choosing the best possible combination of options to form the basis of our long-term management plans.

Pending such a review, no endorsement of the analysis or proposals contained in this document is implied or intended. Rather, I see a consultative process being applied to develop long-term management plans using the Salmon Stock Management Plan as a basis for discussion. Please approach this document constructively strengthening its weaknesses and building on its strengths. Working together, we can develop a plan to manage the Pacific salmon resource to the detriment of none and for the benefit of all.

Yours truly,

P.S. Chamut

P.S. Chamut
Director General
Fisheries - Pacific

Canada

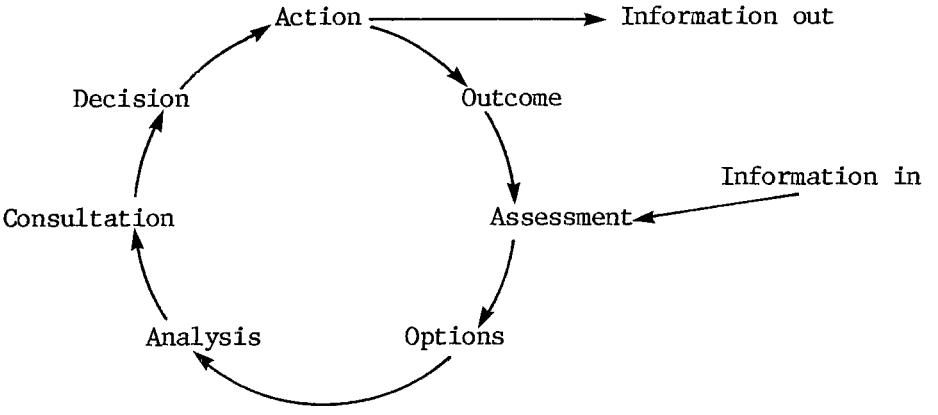
FOREWORD

This document contains plans for managing Pacific salmon fisheries. No decisions have yet been taken on these plans; they remain options from which to choose a direction for the future of Pacific salmon fisheries. Starting soon, but probably extending over a long period and subject to review and revision, decisions will be made in concert by all parties with an interest in the resource. The Salmon Stock Management Plan has been produced to motivate discussion and assist the decision-making process by identifying current strategies and problems, stating goals, and describing means by which they might be achieved.

The genesis of this document can be found on the first page of the Pearse Report, where the most serious criticism of the Department of Fisheries and Oceans was identified as, "the lack of cohesive, consistent, and forward-looking policies and programs with respect to fisheries management, enhancement, and environmental protection".* The Department has responded to this criticism, and to the subsequent recommendations made by Pearse,** by devoting considerable effort and resources, beginning in mid-1984 and continuing to date, to the production of the Salmon Stock Management Plan.

Nevertheless, this document is not finalized; in fact, it probably can never be finalized. The Salmon Stock Management Plan has been written as a discussion document that will evolve over time as the planning cycle, illustrated below, proceeds.

The Planning Cycle



* P.H. Pearse, Turning the Tide: A New Policy for Canada's Pacific Fisheries, (Ottawa, Supply and Services Canada, (1982), p.1.

**Pearse, p. 39.

Past actions and outcomes of salmon management are documented and assessed in this report. New ideas and options for future management strategies are also analysed and will be the subject of informal and formal consultation. In this way, options can be transformed into decisions to take new and different actions leading to better outcomes. Because fisheries in general, and salmon fisheries in particular, are susceptible to rapid change, these outcomes will, in turn, generate renewed discussions as the cycle continues. The Salmon Stock Management Plan, then,is a record of management planning and action that is intended to motivate and facilitate this planning cycle.

This document contains information on the status of salmon stocks, habitat, and enhancement. As well, it discusses in some detail the fisheries that exist in each area, management problems, and options to rebuild our salmon resource by management and enhancement. The Salmon Stock Management Plan is a diverse document that will continue to evolve through annual updates to incorporate new information, assess performance, review objectives, identify problems, describe strategies, and analyse new options for managing salmon stocks. It should be read in this spirit. It is a document that is meant to stimulate thought and discussion with a view to generating interesting and useful new ideas that will find their way back into the document.

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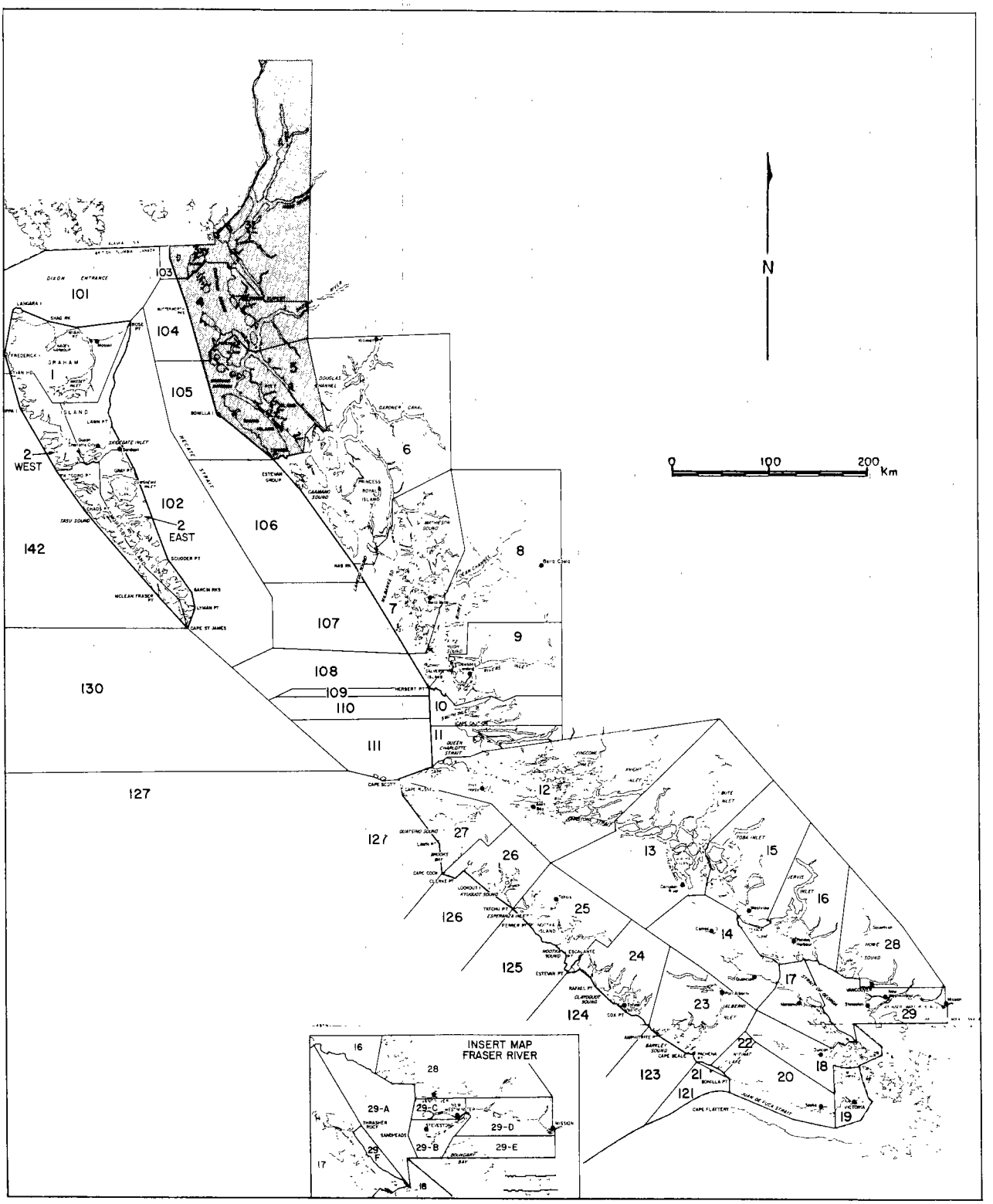

Figure 1. Department of Fisheries and Oceans Statistical Areas, British Columbia.

STATISTICAL AREAS 3, 4 AND 5

This volume of the Pacific Region Salmon Stock Management Plan addresses Statistical Areas 3, 4 and 5 (Figure 1), which together produce about 40% of the annual average catch of salmon in the North Coast of B.C., and a mean of 15% of total harvest on a province-wide basis.[1] This area is the second major salmon producing area in the province. Areas 3, 4, and 5 are discussed in single volume because management of the fisheries in these three areas is integrated and co-ordinated since Skeena sockeye and pink salmon are the target stocks in the outer Area 3, Area 4 and upper Area 5 fisheries.

1. STATISTICAL AREA 3

Statistical Area 3 is the most northerly of all the marine statistical areas adjacent to the British Columbia coast (Figure 1). The area includes the six salmon-producing regions shown in Figure 2: Nass River, Portland Inlet, Portland Canal, Observatory Inlet, Work Channel and the coastal streams. Major sockeye and pink fisheries operate off Dundas Island and throughout Portland Inlet. A detailed description of present stock status, fishing patterns, habitat status and distribution of disease agents is provided in Appendices Ia, IIa, IIIa and IV, respectively.

Some of the streams in Area 3 are of glacial origin, particularly the tributaries to the upper Nass River (above Brown Bear Creek). The rugged topography of the area creates natural stream barriers to salmon migration. Flows are unstable, although fluctuations in discharge rates are not as extreme as in other more exposed regions of the coast.[2] Logging has occurred on approximately 50% of the streams in Area 3 since the 1930's, and a network of logging roads was built in the lower Nass during the 1950's. The Stewart/Cassiar Highway, constructed in the 1960's and 1970's, provides access to the upper Nass River. Mining operations were developed at Stewart near the head of Portland Canal in the 1920's, and at Kitsault on Alice Arm of Observatory Inlet in the 1930's. However, the mines are not currently active. There are several small communities in Area 3 along the Nass River, as well as at Port Simpson and Stewart.

1.1 Stock Description

Statistical Area 3 contains 16 actively-managed stocks and 110 passively-managed stocks. The actively-managed stocks include one sockeye, seven pink,

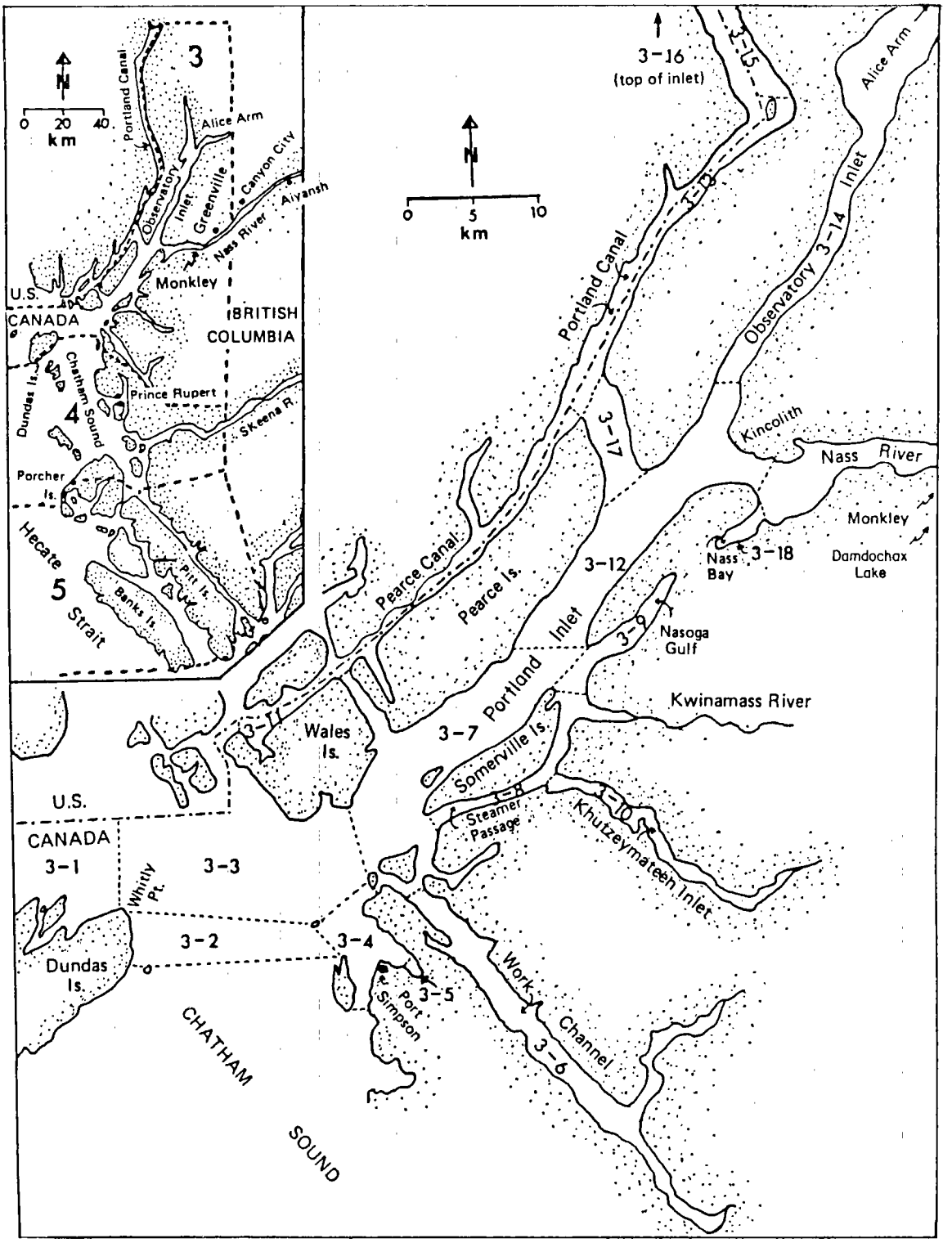

Figure 2. Statistical Area 3, showing Department of Fisheries and Oceans Management Units.

and eight chum stocks. The salmon spawning streams are shown in Figure 3 and Table 1.

The Nass River supports all of the sockeye stocks found in Statistical Area 3, and the Meziadin Lake stock represents approximately 60 - 85% of all Nass sockeye. The Meziadin stock is actively managed in Statistical Areas 1, 3 and 4, and intercepted by Alaskan fisheries at Noyes Island and Cape Fox (Figure 4). The Meziadin stock passes through these fisheries from late May to late July, and most of the escaping adults are counted as they pass through a fish ladder adjacent to Meziadin Falls between early July and mid-September. Escapement of sockeye through the Meziadin fence has increased since the mid-1960's, and averaged over 183,000 for the period from 1980-1984. The current escapement is over 91% of the target escapement level. The passively-managed sockeye stocks in the Nass River system appear to be declining or maintaining their small contribution to the total run.

The major pink stocks originate in the Kwinamass, Khutzeymateen, Iknouk and Ishkheenickh rivers (Figure 3). These rivers support both odd- and even-year pink. Although returns to the Kwinamass and Khutzeymateen are largest in even years and returns to the other two rivers are highest in odd years. These stocks are primarily harvested by fisheries in Portland Inlet. Recent tagging studies[3] have shown that there is significant interception of these stocks in the Area 1 troll fishery and Alaskan fisheries at Noyes Island and Cape Fox (Figure 5). Escapement estimates for 1980-84 suggest that the above four rivers account for approximately 80% of the annual 300,000 pink escapement to Area 3 streams, and recent escapements are very close to the targets set by fishery managers.

Portland Canal and Observatory Inlet contain all the actively-managed chum stocks in Statistical Area 3. These stocks are harvested by terminal fisheries and interception fisheries in Portland Inlet, Observatory Inlet, Hastings Arm, Area 4 and the Alaskan fisheries at Cape Fox and Noyes Island. Observatory Inlet chum stocks are expected to produce 50% of the target escapement, but Portland Canal chum stocks are severely depressed at this time. The total Area 3 chum escapement averaged only 36,000 during the 1980-1984 period.

No individual chinook stocks are actively managed in Area 3. Due to the depressed levels of all chinook stocks, no directed fisheries have existed since 1979. Approximately 30 chinook stocks in Area 3 are harvested incidentally in the S.S.E. Alaskan net (Noyes Island, Cape Fox, and Clarence Straits) and troll

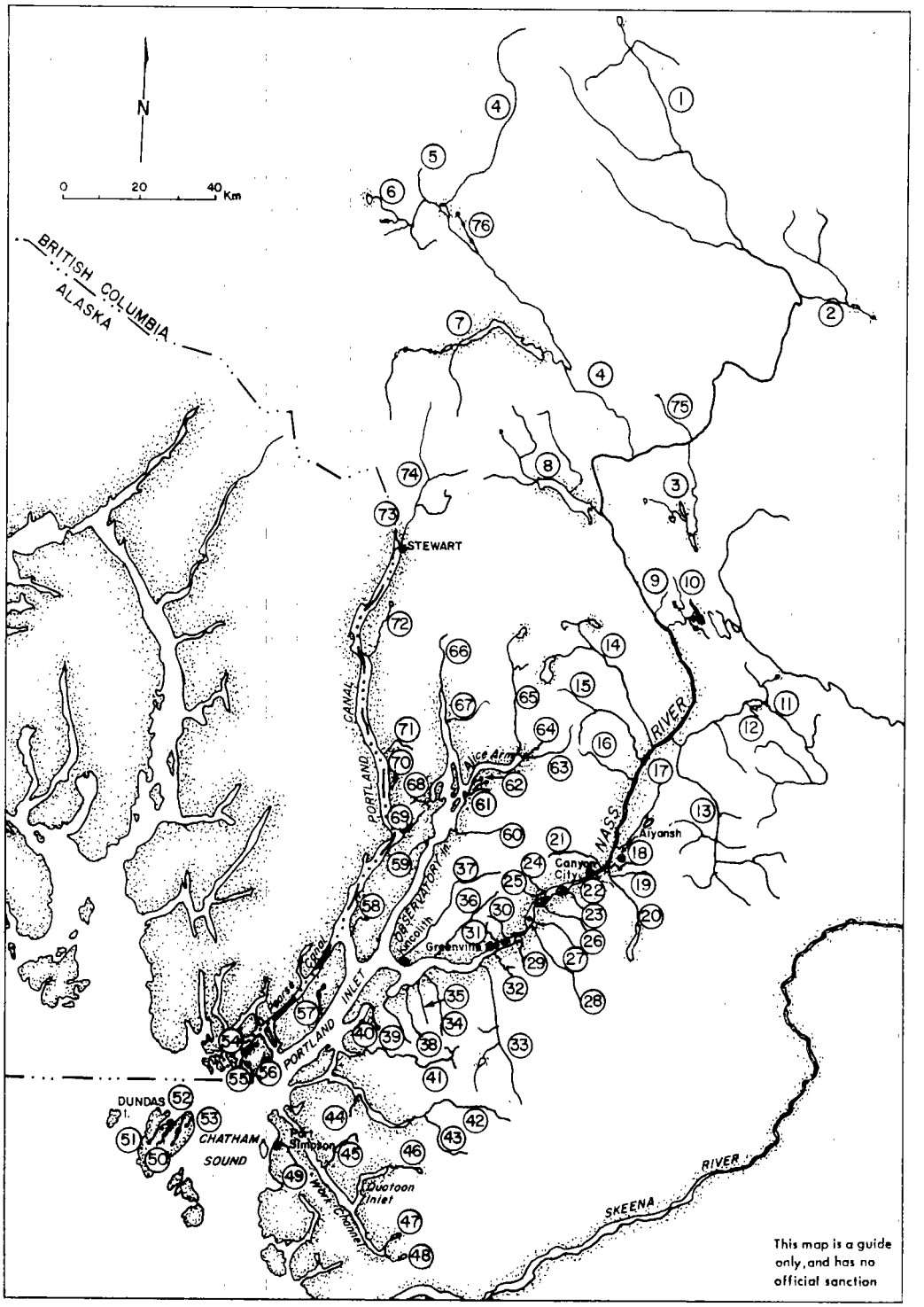

Figure 3. Major salmon spawning streams in Statistical Area 3 (see Table 1 for key to streams.

Table 1. Key to salmon spawning streams in Statistical Area 3, Nass River, as shown in Figure 3. (Gazetteer names in capital letters, local names in parentheses).

No.	Stream Name	No.	Stream Name
53	(American Bay Creek)	26	KWINEYARK CREEK
31	ANLIYEN CREEK (Bony Creek,		(Kwinyard Creek, Kwinyarh Creek)
	5 Mile Creek)	48	LACHMACH RIVER
27	ANSEDAGAN CREEK	47	LEVERSON LAKE SYSTEM
74	BEAR RIVER		(Leverson Creek)
4	BELL-IRVING RIVER	57	(Lizard Creek)
69	BELLE BAY CREEK	12	(McKnight Creek)
62	(Bessie Creek)	56	(Manzanita Cove Creek,
7	BOWSER RIVER AND LAKE		Stonehouse)
10	BROWN BEAR CREEK	8	MEZIADIN LAKE SYSTEM
51	(Brundige Creek)	40	(Nasoga Gulf Creek)
34	BURTON CREEK	1	NASS RIVER — MAINSTEM
	(Barton Creek)	67	OLH CREEK
68	CASCADE CREEK	76	OWEEGIE CREEK AND LAKE SYSTEM
39	CHAMBERS CREEK	61	(Perry Bay Creek)
11	CRANBERRY CREEK	32	QUILGAUW CREEK
2	DAMDOCHAX RIVER AND LAKE	73	(Rainny Creek)
	(Blackwater River)	70	ROBERSON CREEK (Maple Bay,
30	DISKANGIEG CREEK		Robertson, Cascade)
	(5 Mile Creek)	75	SALADAMIS CREEK
58	(Dogfish Bay Creek)	59	(Salmon Cove Creek)
71	DONAHUE CREEK	50	(Sandy Bay Creek)
45	ENSHESHESE RIVER (Slide Bay)	17	SEASKINNISH CREEK
38	(Flewin Creek, Nass Harbour	21	SHUMAL RIVER
	Creek, Flowin Creek)	5	SNOWBANK CREEK
72	GEORGIE RIVER	60	STAGOO RIVER (Indian River)
18	GINGIT CREEK	49	STUMAUN CREEK
29	GINLULAK CREEK	6	TEIGEN CREEK
19	GITZYON CREEK	15	TCHITIN RIVER
36	IKNOUK RIVER	46	TOON RIVER
63	ILLIANCE RIVER	55	(Tracy Creek)
33	ISHKEENICKH RIVER	44	(Tsampanaknok Bay Creek,
42	KATEEN RIVER		Sam Bay Creek)
43	KHUTZEYMATEEN RIVER	20	TSEAX RIVER (Tseax Slough,
37	KINCOLITH RIVER		"A" Frame)
14	KINSKUTCH RIVER	54	(Turk Creek, Cannery Creek)
13	KITEEN RIVER	9	VAN DYKE CREEK
65	KITSAULT RIVER	22	(Vetter Creek, Vetter Sloughs)
28	KSEDIN RIVER	25	WEGILADAP CREEK
	(Kwiniek River)	35	WELDA CREEK
16	KSHADIN RIVER	52	(Whitley Point Creek)
	(Kseaden Creek)	64	WILAUKS CREEK (McGuires Slough)
66	KSHWAN RIVER	24	WILYAYANOOTH CREEK
3	KWINAGEESE RIVER AND BONNY CREEK	23	ZOLZAP CREEK
41	KWINAMASS RIVER		(Zolzap Slough)

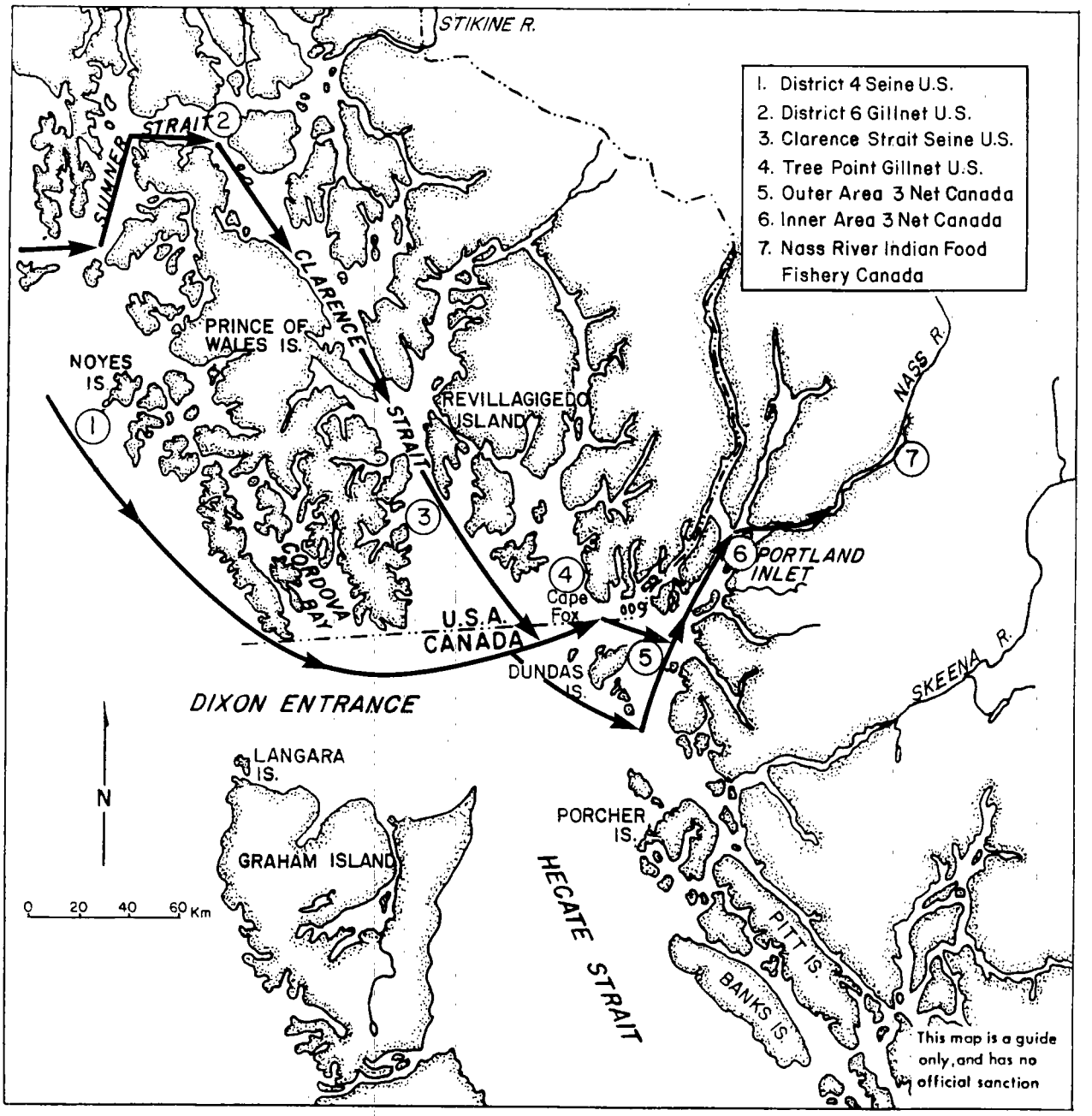

Figure 4. Migration routes of Nass River sockeye salmon stocks.

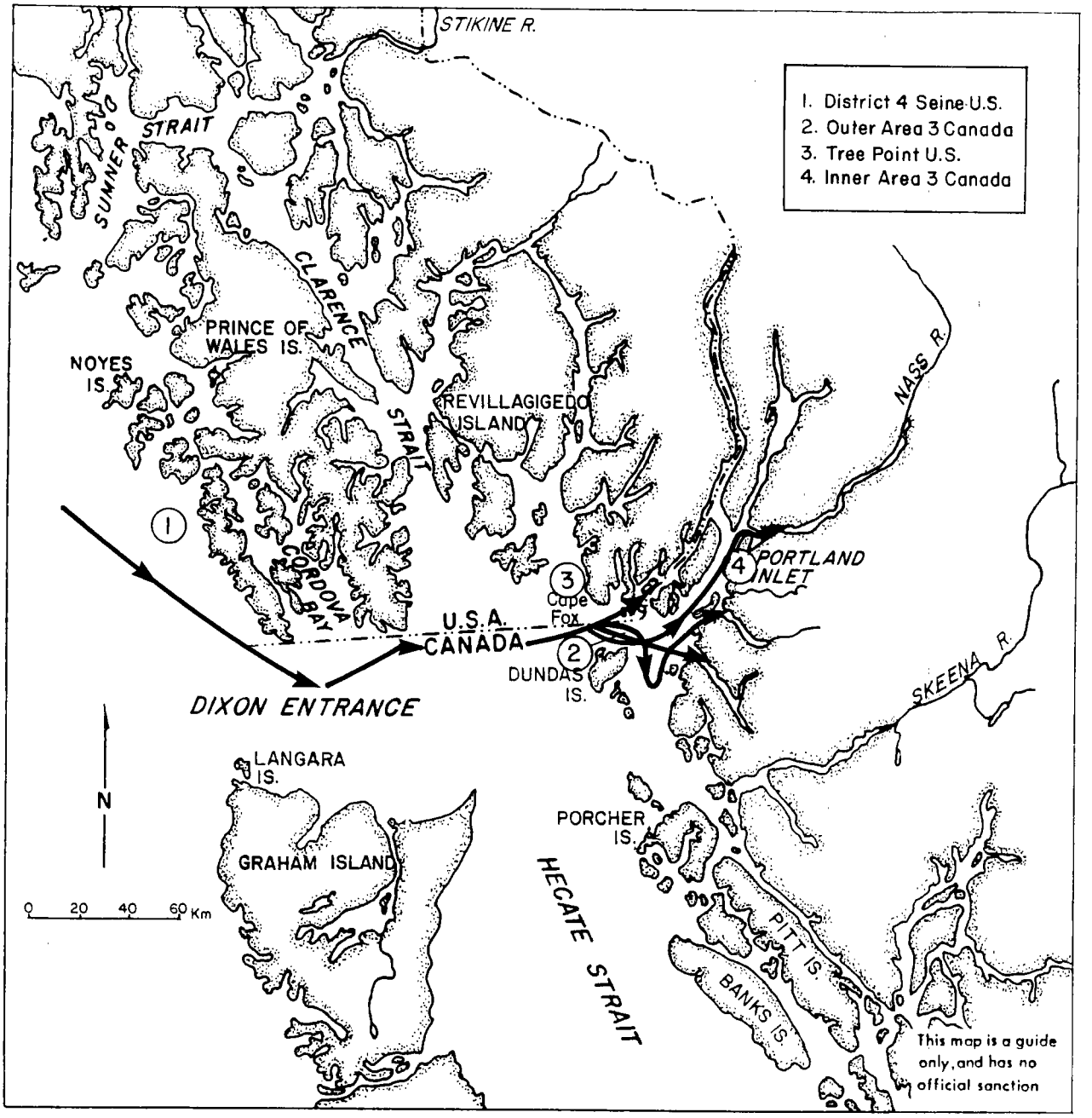

Figure 5. Migration routes of major even-year pink salmon stocks returning to Area 3.

fisheries, and the northern British Columbia net and troll fisheries (Areas 1, 3, 4 and 5). The timing of these fisheries varies from stock to stock although one or more stocks are likely taken in all fisheries during the season. Nass chinooks are intercepted in the Area 3 fishery during June and July, while Portland Inlet stocks are intercepted in July and August. Recent (1980–1984) escapement estimates for the major stocks (Kwinamass, Khutzeymateen, Damdochax, Cranberry, Ishkheenickh, Kwinageese, Meziadin and Tseax) are well below levels recorded in the 1960's and 1970's.

No individual coho stocks are actively managed in Area 3. In total, there are 63 stocks and 34 of these occur within the Nass River drainage. Coho stocks are believed to be intercepted in the Alaskan fisheries at Cape Fox and Noyes Island, and also in the S.S.E. Alaskan troll fishery. Canadian fisheries that intercept these stocks are the Area 1, 3, 4 and 5 gillnet, seine and troll fisheries. However, the time of entry of these stocks to the various fisheries is not known. Escapement estimates for coho are difficult to obtain due to the variability in time of entry and period that these stocks remain in each system prior to spawning. Coho escapements in Area 3 have been relatively stable over the past 15 years, and are actually increasing in some areas. This is most likely attributable to a shortening of the fishing season in recent years; fewer fishery openings have been permitted after the first week in September and the time of peak escapement for most coho stocks is late September.

The Nass River also supports substantial populations of summer run steelhead trout, although there is limited information on these stocks.

1.2 Fisheries

In Area 3, management is primarily directed at Nass River sockeye and Portland Inlet pink salmon stocks. The target escapement is determined for each species, and the fisheries are managed to achieve these levels. Target escapement is also estimated for other species, but management of these salmon stocks is largely designed to reduce their interception in fisheries directed at sockeye and pinks.

The sockeye fishery usually begins in mid- to late June. Abundance is determined from the Nass River test fishery and in-season catch estimates. Beginning in mid- to late July, pink salmon abundance becomes the primary management indicator for determination of fishery openings. The concerns regarding depressed

chum stocks limit fishing opportunities in terminal areas such as Observatory Inlet.

Area 3 is divided into four smaller management areas, with each including several Management Units (M.U.): Dundas Island and Chatham Sound (M.U. 3-1, 3-2 and 3-4); Portland Inlet and approach area (M.U. 3-3, 3-7, 3-9, 3-12 and 3-17); Observatory Inlet (M.U. 3-14); and Portland Canal (M.U. 3-11, 3-13, 3-15 and 3-16). Depending on target stock(s) and the timing and abundance of incidental stocks, these areas can be opened simultaneously or independently of each other. Within each area, small refinements may occur in-season such as the closing of M.U. 3-9 in Portland Inlet and the approach area if Kwinamass stocks are weak, or moving stream-mouth fishing boundaries seaward. Management of the outer portion of Area 3 (M.U. 3-1 to 3-4) is co-ordinated with management in Area 4 and targets on returning Skeena sockeye and pink salmon.

Area 3 supports both seiners and gillnetters, although the proportions of species catch by gear type have changed over the past two decades. During the 1960's, gillnetters caught the largest proportion of sockeye, chum, coho and chinook. However, seiners presently harvest the highest proportion of all species. Gillnets are permitted to be used first in Area 3 (this is currently the last week in June), while seines may not be used until mid-July. Both gillnetters and seiners operate in the same areas, except for M.U. 3-12, which is for gillnets only. Current management strategies specific to individual species are described in the following sections. Descriptions of the management strategies during 1983 and 1984 seasons are reported in Kadowaki et. al (1984)[4] and Jantz (1985).[5]

1.2.1 Sockeye Salmon

Sockeye stocks returning to the Nass River are the target of commercial fisheries in Area 3. They are composed predominantly of Meziadin and, to a much lesser extent, Upper Nass stocks (Bowser, Damdochax and Fred Wright lakes). These stocks begin entering the fishing areas in May, and peak abundance occurs by the end of June or the first week in July. The majority of Nass River sockeye are usually through the outside fishing areas by mid-July (M.U. 3-1 to 3-4), although substantial numbers may still be present in inside areas (M.U. 3-7 and 3-12). In-season escapement estimates are provided primarily by a gillnet test fishery on the lower Nass River. Escapement and catch data, in combination with run timing information, determine the fisheries pattern until mid-July.

Skeena River sockeye also migrate through Area 3 and may be taken by fisheries in this region. Enhanced Babine stocks (Pinkut) appear in Area 3 by the first week of July. By mid-July, both Pinkut and Fulton stocks are present and catches in the outside of Area 3 (M.U. 3-1, 3-2 and 3-4) may be composed mainly of these stocks. Skeena sockeye abundance normally declines by the end of July.

Sockeye are also harvested by six Indian bands in food fisheries in Area 3 located near Port Simpson and Kincolith in tidal waters and near Greenville, Canyon City, Aiyansh and Kitwancool in non-tidal waters.

1.2.2 Pink Salmon

Pink salmon returning to Area 3 are divided into seven stock groups for management of fisheries: Kwinamass, Khutzeymateen, Work Channel (three stocks), Iknouk, Ishkheenickh, Observatory Inlet (five stocks) and Coastal (four stocks). These pink stocks and stock aggregates are the target of fisheries in Area 3. Of these stocks, the Kwinamass and Khutzeymateen are the first to enter the commercial fishery, while the Iknouk, Ishkheenickh and Coastal stocks are the latest to reach Area 3. However, from the end of July to roughly the third week in August, the timing of runs overlap and forces the fisheries (with the possible exception of coastal stocks) to be managed as one stock. The largest stocks (Khutzeymateen, Kwinamass, Ishkheenickh and Iknouk) form the basis of most management decisions. Where practical, fisheries are managed for specific stocks and, when weaknesses in stock strength are detected, adjacent management units may be closed or inlet boundaries changed to reduce exploitation rates.

As with sockeye, Skeena River pinks also migrate through Area 3, and may be the target species in particular weeks and areas. Skeena pinks are assumed to enter Area 3 by the third week of July, while Area 4 coastal pinks may still be present in Area 3 by the first week in September. Area 4 pink stocks are thought to be largely confined to the outer parts of Area 3 (M.U. 3-1, 3-2 and 3-4). Southeast Alaskan pink stocks also migrate, in part, through Area 3. Their timing in the region overlaps with that of Area 3 stocks, and Alaskan pinks are present in varying proportions from the end of July to the end of August.

1.2.3 Chum Salmon

In Area 3, chum stocks are divided into two stock aggregates which could be managed separately: Portland Canal (four stocks) and Observatory Inlet (five stocks). Generally, fisheries in Area 3 are not specifically directed at chums; chum catches are usually incidental in the sockeye and pink fisheries. The size of Portland Canal (M.U. 3-11, 3-13 and 3-15) and Observatory Inlet (M.U. 3-14) chum runs could be estimated by a commercial fishery, but these openings would only occur at the same time that other areas were open for harvest of sockeye or pinks. The exploitation rates for stocks taken incidentally are sufficiently high to harvest all surplus chums. In-season chum stock assessment is based on run expectations, incidental catches, and stream and sanctuary escapement observations.

1.2.4 Chinook Salmon

There are no commercial net fisheries specifically for Nass River chinook stocks. Seine fisheries in Area 3 are delayed to protect chinooks, while gillnet fisheries have mesh restrictions to reduce their interception. The chinooks enter Area 3 in April, and are usually through the Area by mid-July. Six Indian bands intercept chinooks in sockeye food fisheries within Area 3: the Port Simpson and Kincolith bands in tidal waters, and the Greenville, Canyon City, Aiyansh and Kitwancool bands in non-tidal waters. Catches by these fisheries have remained stable in response to concerns about the depressed nature of these stocks. Tidal and non-tidal sport fisheries in Area 3 also target on chinook salmon although the origin of stocks taken in recreational fisheries is unknown.

1.2.5 Coho Salmon

There are no commercial net fisheries specifically for coho in Area 3; all catches are incidental to sockeye and pink harvests. Any management is indirectly applied by limiting exploitation rates in sockeye and pink fisheries. Coho are also harvested in the Indian food fisheries and sport fishery.

1.3 Current Enhancement Activities

The Kincolith hatchery is the only enhancement facility in Statistical Area 3. The small hatchery targets on the Kincolith chinook and coho stocks, and plans

to release approximately 300,000 fry annually. Projected adult returns generally range from 1400 to 1500. In addition, a fishway, located about 0.5 km up the Meziadin River, was built in 1966 to assist sockeye in bypassing a series of falls. Incubation boxes for coho are also present on the Tseax River.

1.4 Habitat Status

Habitat in Area 3 is discussed in the following sections for each of the major salmon-producing regions. Table 2 summarizes the number of streams that support salmon in each of these regions. More detailed information on habitat status in Area 3 is presented in Appendix 3.

1.4.1 Nass River

The Nass River was separated into the upper and lower Nass River at Brown Bear Creek for the habitat analysis. The upper Nass tributaries are primarily of glacial origin, while most (60%) of the lower Nass tributaries originate at lower elevations in heavily forested areas.[2]

Logging has occurred in areas adjacent to about half of the streams in both the upper and lower Nass and is ongoing. However, due to the slow rate of forest regeneration in the high alpine areas, the upper Nass area is not expected to sustain continuous logging. In the lower Nass, forest regeneration following early logging operations in the 1950's is well under way. Logging in these areas has resulted in low to moderate impact on fish habitat. Logging activity and beaver dams have altered rearing habitat for coho salmon in some small streams, and may have contributed to the decline of some stocks. Habitat is not considered a major factor in limiting salmon stocks from achieving target escapement levels.

1.4.2 Portland Inlet

Logging has occurred on about 20% of the streams draining into Portland Inlet and could increase in the future. The impact of past logging on habitat is rated as low to moderate. Current habitat is generally considered to be in good condition and is not expected to be the factor limiting salmon production despite the fact that pink salmon are the only stocks near target levels.

Table 2. Summary of streams supporting salmon populations in Area 3.

Major Salmon Producing Region	Sockeye			Coho			Chinook			Pink			Chum		
	Total Streams[a]	Signif. Streams[b]	% of MRE[c]	Total Streams[a]	Signif. Streams[b]	% of MRE[c]	Total Streams[a]	Signif. Streams[b]	% of MRE[c]	Total Streams[a]	Signif. Streams[b]	% of MRE[c]	Total Streams[a]	Signif. Streams[b]	% of MRE[c]
Upper Nass	6	4	99	6	4	95	4	4	100	0			0		
Lower Nass	7	3	98	20	9	90	7	7	100	17	7	85	14	4	80
Portland Inlet	0			5	4	99	5	5	100	11	6	99	6	2	94
Observation Inlet	0			3	3	100	1	1	100	7	6	98	8	5	99
Portland Canal	1	1	100	2	2	100	2	2	100	4	4	100	4	4	100
Work Channel	1	1	100	4	4	100	0			4	4	100	4	4	100
Coastal Area	0			0			0			7	3	90	0		
Total Area 3	15	9		40	26		19	19		50	30		36	19	

[a] Total number of streams historically supporting species indicated.
[b] Significant number of streams which historically have contributed most to production of species indicated.
[c] Percentage of maximum recorded escapement (MRE) is the percentage contribution of the significant streams to the total maximum recorded escapement.

1.4.3 Observatory Inlet

Most of the streams entering Observatory Inlet have glacial origins and are characterized by extreme flow fluctuations and high turbidity. There has been some logging in the area, and these operations have caused low to moderate impact on fish habitat. It is anticipated that logging activity will increase in the future. Kitsault Mine on Alice Arm operated periodically during the 1930's, 1940's, 1950's and in the early 1980's. However, the impact of mining on fish habitat has been localized. Although salmon escapement levels are well below target and historic levels, the declines in stocks are not attributed to habitat conditions.

1.4.4 Portland Canal

The Canada/U.S. border parallels the length of Portland Canal. Stewart, B.C. is located at the head of the inlet on the Bear River. Mining and port operations are the main industrial activities in the area. These activities have likely affected the habitat in the Bear River estuary, but the resulting changes are not sufficient to account for declines in salmon stocks. Development on the Bear River is likely to increase and could have a future effect on Bear River stocks. The remainder of this region is pristine.

1.4.5 Work Channel

Three of the four streams contributing to salmon production in the Work Channel area were logged in the 1960's and early 1970's. Logging activity resulted in low to moderate impact on fish habitat, although the area is recovering naturally. Small-scale logging may occur in the future. While all salmon stocks are at levels considerably lower than target, changes in habitat are not considered to be a major factor contributing to stock declines.

1.4.6 Coastal Streams

Seven streams on the mainland and Dundas Island support small stocks of pink and chum salmon. There has been some logging and urban-industrial development near Port Simpson on Stumaun Creek, and these activities have resulted in low to moderate impact on fish habitat. Further industrial development in this area is also anticipated.

1.5 Management Conflicts

Table 3 lists the major factors in the current management approach in Area 3 that may be responsible for reduced salmon production potential. Major production is lost through mixed-stock commercial fishing in Area 3 and interception fisheries in southeast Alaska. Environmental factors such as floods and freezing during egg incubation periods also reduce the productivity of many stocks. Management uncertainty can also affect fish production. Fisheries are managed based on estimates of stock size, spawning escapements, optimum escapements and run timing. Uncertainties associated with these data can lead to management decisions which result in a loss in production due to overharvesting. Sport and Indian food fisheries, particularly for chinook, can also constrain efforts to rebuild stocks.

Fishing plans recently negotiated between Canada and the U.S. will help reduce the interception problem with local stocks. These fishing plans will also change the approach to stock management and will reduce some of the mixed-stock harvest problems. Several sections of the recent agreement apply to Area 3 sockeye and pink stocks.

The U.S. will limit its purse seine fishery in District 4 prior to U.S. statistical week 31 to result in a maximum four-year total catch of 480,000 sockeye during the period 1985-1988. Its drift gillnet fishery in Districts 1A and 1B will also be limited to result in an average annual harvest of 130,000 sockeye. Canada will restrict its net fishery in Areas 3-1, 3-2, 3-3, 3-4, and 5-11 in a manner that will result in an average annual harvest of 900,000 pinks, and will limit its troll fishery in Area 1 such that the maximum two-year (1985 and 1986) total troll catch is 1 million pink salmon. However, when 300,000 pinks are harvested by trollers in Area 1 in any one year, sub-areas 101-2 north of 54° 35' latitude, 101-3 and 101-6 will be closed to pink salmon trolling. In some years, the result of the agreement will be to shift the fisheries in Canadian waters to more terminal areas to harvest Nass and Skeena area stocks.

In 1985, both Canada and the U.S. agreed to jointly reduce interception of these stocks to the extent practicable, and to undertake assessments that would identify possible measures to restore and enhance sockeye and pink stocks. On the basis of such an assessment, the Fisheries Departments of both countries shall jointly identify long-term plans to rebuild stocks.

Table 3. Factors which reduce production, and their estimated degree of effect on production of salmon species in Area 3.

Constraints	Degree of Effect on Salmon Stocks				
	Sockeye	Pink	Coho	Chum	Chinook
Mixed-stock fisheries	moderate	high	high	high	high
Alaskan interceptions	high	moderate	unknown	unknown	unknown
Indian food fishery	moderate	low	moderate	low	high
Sport fishery	low	low	moderate	low	moderate
Uncertainties - run size - optimum esp. - spawning esp.	moderate	moderate	moderate-high	high	high
Environmental factors	low	moderate	unknown	moderate	unknown
Seine catch of juvenile chinooks	-	-	-	-	high

1.6 Management Strategies for Stock Rebuilding

Sockeye returning to Area 3 are dominated by stocks from the Meziadin River system. Meziadin sockeye have higher productivity than non-Meziadin stocks[6], but since they are managed as a single unit, this approach results in less than optimum production from the non-Meziadin stocks. If the passively-managed sockeye stocks are to be rebuilt, the overall exploitation rate must be reduced to compensate for their lower productivity.

A similar mixed-stock problem exists among passively- and actively-managed pink stocks. Few of the pink stocks in Area 3 are depressed; escapements of most stocks are at or above target levels. The rebuilding of passive stocks would require that fishermen forgo catches of actively-managed pink stocks, and harvest pinks at a rate more appropriate to the less productive pink stocks. This mixed-stock harvest problem will not be reduced as a result of the Canada/U.S. agreement. The effect of setting limits to Canadian fisheries in Management Units 3-1, 3-2, 3-3 and 3-4 may, in some years, shift fishing effort to more terminal areas such as M.U. 3-7 and 3-12, as well as Statistical Area 4. However, the stocks are still mixed in these areas and will be harvested as stock aggregates. The major benefit of setting limits to the outside fisheries would be to include the Skeena-bound pinks in the stock aggregation thereby reducing the harvest Area 3 stocks.

The incidental harvest of chums in pink and sockeye fisheries is probably the most important factor depressing chum stocks in Statistical Area 3. A rebuilding program to increase chum escapements would require reductions in pink and sockeye catches, or additional area closures and mesh restrictions, or both. If chum stocks are rebuilt, harvest rates must not be allowed to exceed levels that are appropriate for chums. However, the merits of this management option require further investigation in view of the pink catch that would have to be forgone each year.

1.7 Future Stock Enhancement Activities

Future enhancement projects for Area 3 that are compatible with current management practices are described below in Sections 1.7.1 to 1.7.3. A number of additional enhancement options have also been identified (Sections 1.7.4 to 1.7.9);

however, these projects require future studies before the developments should proceed. The project numbers are from Lill et al. (1983).[7]

1.7.1 Clements Creek (Project No. 3-26)

A stream rehabilitation project has been proposed for Clements Creek and other feeder streams to the Bear River estuary. These efforts would be small scale and are not expected to produce major benefits.

1.7.2 Vetter River (Project No. 3-1E)

The Vetter River separates from the Tseax mainstem downstream of the upper Tseax Falls, and then passes over a 3-4 m falls. Below this point, the flow of the Vetter becomes subsurface below a lava bed; the length of channel that dries varies with the discharge of the river. This situation may result in the loss of juvenile coho, steelhead, and possibly chinook salmon, but has not been documented to date. Diversion of surface water back into the Tseax mainstem may be possible, or the Vetter River could be connected by a channel to the Nass.

1.7.3 Nass Stream Rehabilitation Package (Various Project No's.)

There are a number of small-scale steam improvement/maintenance projects that could assist in rebuilding of specific Nass River salmon stocks. Several that are currently acceptable include:

- Gingit Creek (3-2B): Annual beaver control (pinks and coho);
- Zoulzap Creek (3-3): Additional spawning habitat, beaver control (pinks);
- Diskangieg Creek (3-4): Stream debris clearance (coho);
- Kwinyarth Creek (3-9): Annual beaver control (pinks);
- McKnight Creek (3-13): Culvert repair (steelhead);
- Ginlukuk Creek (3-29): Spawning gravel addition (coho);
- Cranberry (3-31): Blasting of chute/rock (causing injuries to chinooks and coho).

1.7.4 Tseax River Chinook Hatchery (Project No. 3-1A)

Non-tidal sports fishing for chinook salmon has been an important and visible fishery for the past 15 years in the Nass area. The general decline in chinook abundance in British Columbia has affected Nass stocks to the point where angling has been drastically curtailed in most streams. Management actions have eliminated all directed commercial fisheries for Nass chinooks and reduced known domestic interception fisheries. These actions, coupled with the anticipated reduced troll catch in Alaska with the Canada/U.S. salmon treaty, are expected to eventually rebuild these stocks. However, there is a high demand for a quality recreational chinook fishery, and this demand can be met through enhancement assistance. The choice is essentially one of virtually closing the area to all chinook fishing and rebuilding stocks through this management action over the next two decades, or maintaining the high-value fishery while rebuilding at the same rate with SEP assistance.

There is a proposal to construct a central hatchery on the Tseax River near New Aiyansh. Chinook eggs would be taken from the Cranberry, Tseax and Ishkheenickh rivers, incubated and reared at the hatchery, and then outplanted back to the donor streams at appropriate times. Additional work would involve rock obstruction removal in the upper Tseax River to provide new spawning and rearing areas. Large amounts of warm, good quality water are available and there are at least four sites with gravity-feed potential to supply a facility.

The facility would have a capacity for 250,000 chinook eggs and produce about 185,000 3-4 g fry which may then be outplanted. This would result in a total adult production of 2000 to 4000 fish. Returning adults would be harvested in: (1) directed sports fisheries in the Ishkheenickh, Tseax and Cranberry rivers; (2) Indian food fisheries at the Nishga villages of Kincolith, Greenville, Canyon City and New Aiyansh; (3) Area 1 and 3 domestic commercial fisheries (as incidental catches); and (4) Alaskan commercial fisheries. Detailed technical evaluations of alternative hatchery sites are required, as well as engineering and biological field surveys.

1.7.5 Observatory Inlet Chum Facility (Project No. 3-22B)

The Observatory Inlet area supports four major chum stocks: Kitsault, Illiance, Stagoo and Kshwan. These have been major contributors to the commercial

fisheries in Area 3, both in the non-directed outside fisheries that target on pinks and in directed terminal harvests within Observatory Inlet. Pink salmon stocks in Area 3 have increased dramatically in recent years and provide an important portion of the coastal catch by seiners. The pink fishery has resulted in a high incidental catch of Observatory Inlet chums. Directed terminal fisheries for chums are now seldom possible and the stocks have become depressed due to their interception in outside fisheries. It is economically desirable to maintain the pink fishery, but at the same time, the loss of the chum stocks is costly because of their high value. Current chum escapements to all Observatory Inlet streams average 21,500 compared with an optimum of 45,300. The abundance of these stocks may be increased through enhancement.

There is a proposal to locate a central hatchery at Kitsault. Eggs would be taken from chums in the Illiance, Kitsault, Stagoo and Kshwan rivers, incubated and reared at the Kitsault facility, and outplanted to the donor streams. The Kitsault facility would be integrated with Portland Canal chum enhancement, most of the latter of which would be undertaken by Alaska. Production from the facility would contribute to seine and gillnet fisheries in: the lower portion of Area 3 (Dixon Entrance and Portland Inlet); Observatory Inlet terminal seine and gillnet fisheries (once stocks have been rebuilt); and Area 4 and Southeast Alaskan net fisheries (particularly the Tree Point gillnet fishery). The Observatory facility would produce approximately 80,000 - 90,000 adult chums and have a minor additional chinook and coho production.

The fishery which has caused the decline in Observatory chums is also partly responsible for a decrease in Portland Canal chum stocks. Most of these chum stocks are Alaskan. Portland Canal chums are primarily taken in the Tree Point gillnet fishery in Alaska, the Area 3 seine and gillnet fishery in Dixon Entrance and Portland Inlet, and very occasionally in the U.S. and Canadian portions of Portland Canal. Alaska is interested in enhancing Portland Canal chums, but is concerned about the potential for interception of enhanced stocks in Canadian fisheries. Other stocks with some potential for enhancement include Work Channel chums, particularly those from Quotoon Inlet. The latter stock is under consideration for enhancement by transplanting eggs above the falls.

Discussions have already taken place between Canadian and U.S. fisheries authorities on a joint Portland Canal and Observatory Inlet chum enhancement package. The threat of uncontrolled Canadian interception of Portland chums has

prevented Alaska from proceeding with enhancement to date, and experimental chum facilities in other parts of lower S.E. Alaska have recently been closed because of interception of fish in Canadian fisheries. The Canada/U.S. treaty will now facilitate development of a joint chum enhancement program along with appropriate fishing plans. It is expected that the actual conduct of the fisheries will generally remain as they are at the present time, although both catches and escapements will be improved. When surplus numbers of chums occur, they will be harvested by terminal fisheries in Portland Canal and Observatory Inlet as in the past. Canadian involvement in Portland Canal terminal fisheries would depend on Canadian contributions to chum production there but, in general, the agreed enhancement and management package would be designed to provide each country with the benefits of its own enhancement activities.

1.7.6 Bear River (Project No. 3-27)

There is little knowledge regarding the enhancement potential in the Portland Canal area. The only identified projects are of a minor nature and include the previously discussed Clements Creek stream rehabilitation project and the Bear River incubation project.

Installation/operation of incubation boxes or pits is proposed for the small feeder streams within the Bear Estuary area. The suggested source of brood stock would be chum salmon from the Fish River. A maximum of 3 million eggs has been recommended for the Fish River chum transplant incubation project. Presuming the release of unfed fry, about 20,000 adults should be produced from this number of eggs. This option requires further investigation since the Fish River is in Alaska.

1.7.7 Port Simpson-Quotoon (Project No. 3-20)

This project involves the transplant of eggs from the Toon River summer chum stock to an area above the obstruction on the Thulime River. Production from the enhancement program has been tentatively estimated at 3500 total adult chums from a transplant of 500,000 eggs.

1.7.8 Tseax River Rehabilitation (Project No. 3-1C)

The removal of an obstruction on the upper Tseax River is proposed. The upper Tseax Falls are a partial obstruction to upstream movements of pink and chinook salmon but not coho and steelhead. The migration barrier could be alleviated by blasting at the falls or by improving an existing side channel around the falls. However, engineering ground surveys are required to determine the most practical method of alleviation.

1.7.9 Additional Stream Rehabilitation Projects

Further studies are recommended to determine the feasibility and desirability of two stream rehabilitation projects. Production of coho salmon in Anliyen Creek (Project 3-8) may be improved through flood control or dyking. Stream rehabilitation and annual beaver control could enhance chum, coho and pink salmon in Ansedagan Creek (Project 3-28).

1.8 Results of Simulation Modelling of Management Options

The mixed-stock multi-fishery computer model described in Volume A of this report series was used to analyse the proposed management options for the North Coast. Fisheries in outer Area 3, Area 4 and upper Area 5 are managed to produce optimum harvests and escapements of Skeena sockeye and pink salmon stocks. Therefore, one complex stock-fisheries simulation (19 stocks, 17 fisheries) was developed to encompass all three areas since changes in management of fisheries in one area may affect stocks and fisheries in other areas. Management options in each area were compared to the current management regime. The model projections are discussed from an area perspective, although the implications of management options on stocks from other areas are described where applicable. Harvest rates, vulnerabilities and productivity estimates for the simulation modelling were derived from run reconstruction studies.

The current management scenario assumes that interception of salmon stocks occurs in U.S. fisheries and outside Canadian fisheries (Area 1 net and troll). Outer Area 3 (Management Units 3-1, 3-2 and 3-4) is managed in conjunction with Area 4 and upper Area 5 to an escapement target of one million Skeena sockeye. This management strategy is reflected in the model by simulation of a fishery with harvest rates of Skeena sockeye similar to those recorded in the past within

M.U. 3-1 to 3-4, and a fishery which combines Area 4 and 5 harvests to reach the escapement target. Local Area 3 sockeye stocks are also intercepted in the outside Area 3 fishery. The inner Area 3 (M.U. 3-12 and 3-7) fishery which targets on Meziadin sockeye is managed to an aggregate escapement target of 220,000. Pink salmon are intercepted in the sockeye fisheries because of the overlap in the timing of their migration. It was assumed for the model that one third of the pink salmon harvest occurred in sockeye fisheries. The Skeena pink salmon are managed in Area 3, 4 and 5 to an escapement target of one million. The model assumes historic harvest rates for 5% for Skeena pinks in Area 3-1 to 3-4. The local Area 3 pink stocks are more than twice as vulnerable in this fishery than are the Skeena stocks. Area 3 pinks are also harvested in Areas 3-12 and 3-7 to an aggregate escapement target of 375,000.

Chum salmon are intercepted in all these fisheries. It was assumed that the harvest was equally divided between sockeye and pink fisheries since the timing of chum salmon migration spans both periods. Native food fisheries target on sockeye salmon in all three areas. These fisheries were assumed to harvest to fixed ceilings of 20,000 in Area 3, 150,000 in Area 4 and 3500 in Area 5.

The results of the model simulations for the current management regime and various management options are summarized on Tables 4 to 6 and Figures 6 to 19. Predicted results for Area 3 stocks given the current management practices indicate that Meziadin sockeye would continue to overescape, while escapements of passively-managed sockeye stocks would decline. The average sockeye catch in Area 3 is projected to be 290,000, and total average sockeye catch for the North Coast would be 2.24 million.

The pink salmon escapement to Area 3 was predicted to average 320,000 which is about 90% of the escapement target (360,000) for the area. In the near future, escapement of some stocks such as Kwinamass, Khutzeymateen, Work Channel and Observatory Inlet and odd-year Iknouk/Ishkheenickh pinks would exceed targets, while the remainder of the stocks would remain at low levels. Over the 40-year simulation period, escapements of all pink stocks except those from Portland Canal were projected to approach target levels, and the latter would gradually increase to 60% of target. The average pink salmon catch in Area 3 was estimated at 350,000, compared to a total average pink salmon catch of 1.34 million in the North Coast.

Table 4. Summary of 40-year average catch and escapement of Canadian sockeye salmon for each Management Option in Area 3.

Catch and Escapement Area	Current Management	Option 1 (Increase Aggregate Escapement)	Option 2 (Increase Aggregate Escapement and Add Fence Fishery)	Option 3 (Fish Pink and Chum More Terminally)
Catch by Fishery				
U.S. Interception	320,000	320,000	320,000	320,000
Canadian Interception	55,000	55,000	55,000	55,000
Area 3	**290,000***	**250,000**	**330,000**	290,000
Area 4 + Upper Area 5	1,400,000	1,400,000	1,400,000	1,400,000
Lower Area 5	0	0	0	0
Indian Food Area 3	20,000	20,000	20,000	20,000
Indian Food Area 4	150,000	150,000	150,000	150,000
Indian Food Area 5	1,100	1,100	1,100	1,100
TOTAL CATCH	**2,240,000**	**2,200,000**	**2,270,000**	2,240,000
Escapements				
Area 3	**190,000**	**250,000**	**170,000**	190,000
Area 4	860,000	860,000	860,000	860,000
Area 5	1,600	1,600	1,600	1,600

* Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

Table 5. Summary of 40-year average catch and escapement of Canadian pink salmon for each Management Option in Area 3.

Catch and Escapement Area	Current Management	Option 1	Option 2	Option 3
Catch by Fishery				
U.S. Interception	150,000	150,000	150,000	150,000
Canadian Interception	**73,000***	73,000	73,000	**75,000**
Area 3	**350,000**	350,000	350,000	**300,000**
Area 4 + Upper Area 5	**740,000**	740,000	740,000	**830,000**
Lower Area 5	0	0	0	0
Indian Food Area 3	3,000	3,000	3,000	3,000
Indian Food Area 4	**22,000**	22,000	22,000	**23,000**
Indian Food Area 5	<50	<50	<50	<50
TOTAL CATCH	**1,340,000**	1,340,000	1,340,000	**1,380,000**
Escapements				
Area 3	**320,000**	320,000	320,000	**330,000**
Area 4	**800,000**	800,000	800,000	**835,000**
Area 5	**6,000**	6,000	6,000	**5,000**

* Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

Table 6. Summary of 40-Year average catch and escapement of Canadian chum salmon for each Management Option in Area 3.

Catch and Escapement Area	Current Management	Option 1	Option 2	Option 3
Catch by Fishery				
U.S. Interception	**3,000***	**4,000**	**4,000**	**4,000**
Canadian Interception	100	100	100	100
Area 3	**5,000**	**5,500**	**5,500**	5,000
Area 4 + Upper Area 5	**7,000**	**8,000**	**8,000**	**8,400**
Lower Area 5	0	0	0	0
Indian Food Area 3	<50	<50	<50	<50
Indian Food Area 4	100	100	100	100
Indian Food Area 5	600	600	600	600
TOTAL CATCH	**16,000**	**18,000**	**18,000**	**18,000**
Escapements				
Area 3	**9,100**	**13,000**	**13,000**	**14,000**
Area 4	1,400	1,400	1,400	1,400
Area 5	1,700	1,700	1,700	1,700

* Bold faced numbers indicate differences in catch or escapement of Options compared to the current management regime.

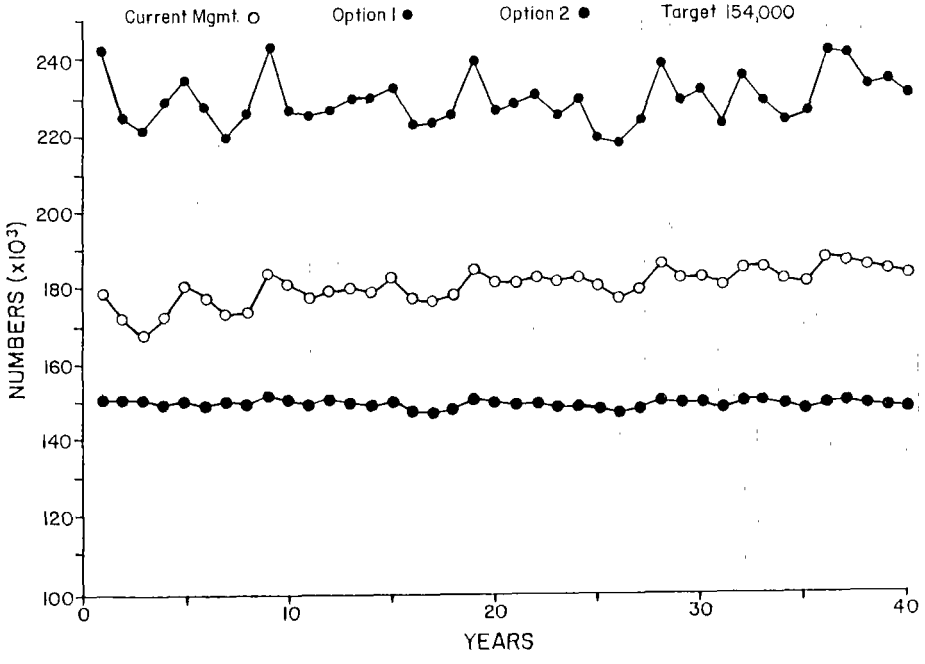

Figure 6. Projected escapements of Meziadin sockeye under current management, Option 1 (increase aggregate escapement) and Option 2 (Option 1 plus fence fishery).

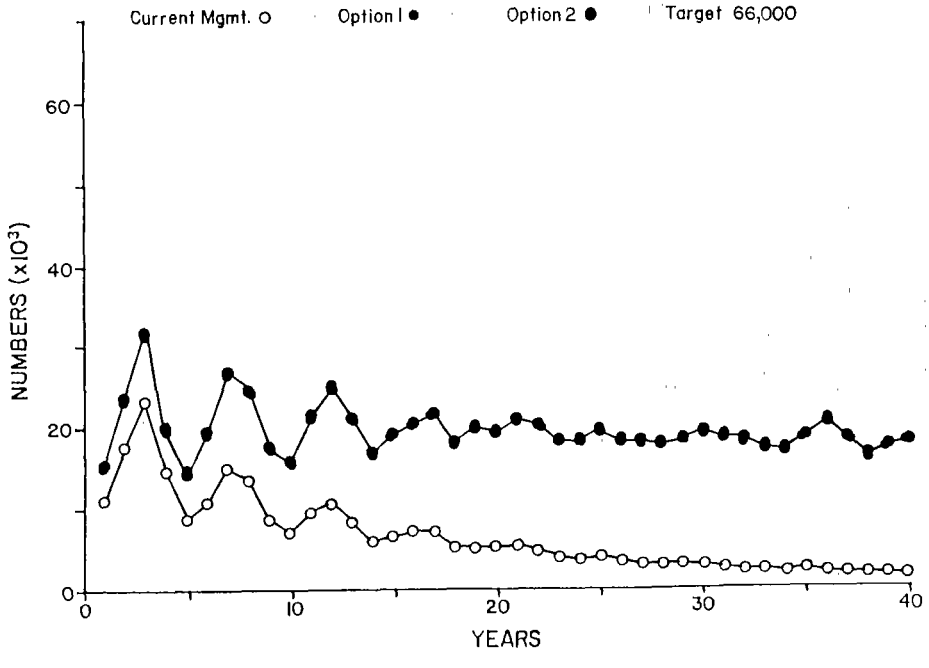

Figure 7. Projected escapements of non-Meziadin sockeye under current management and Options 1 and 2 (see above).

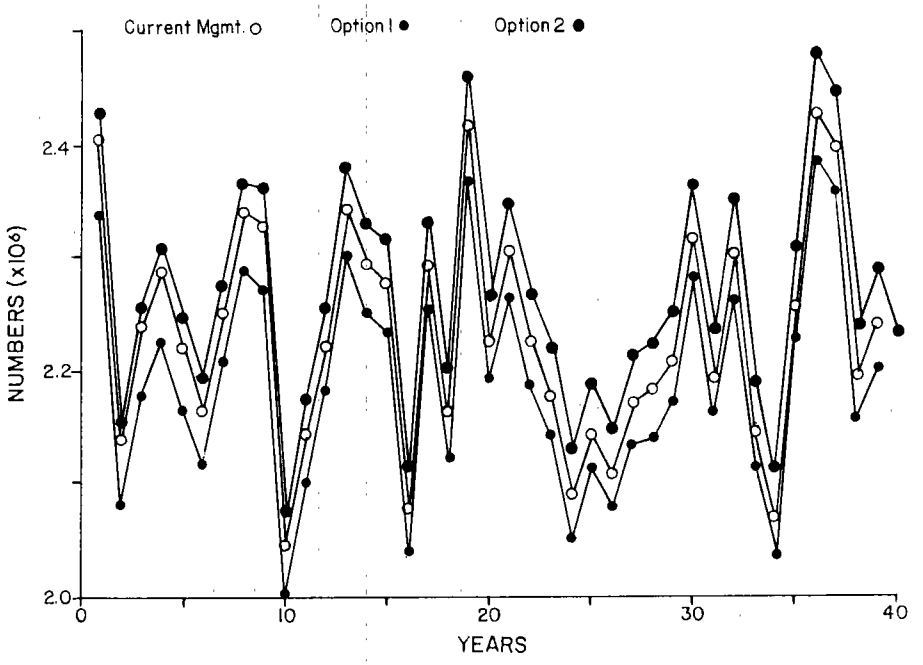

Figure 8. Projected catches of Area 3 sockeye under current management, Option 1 (increase aggregate escapement) and Option 2 (Option 1 plus fence fishery).

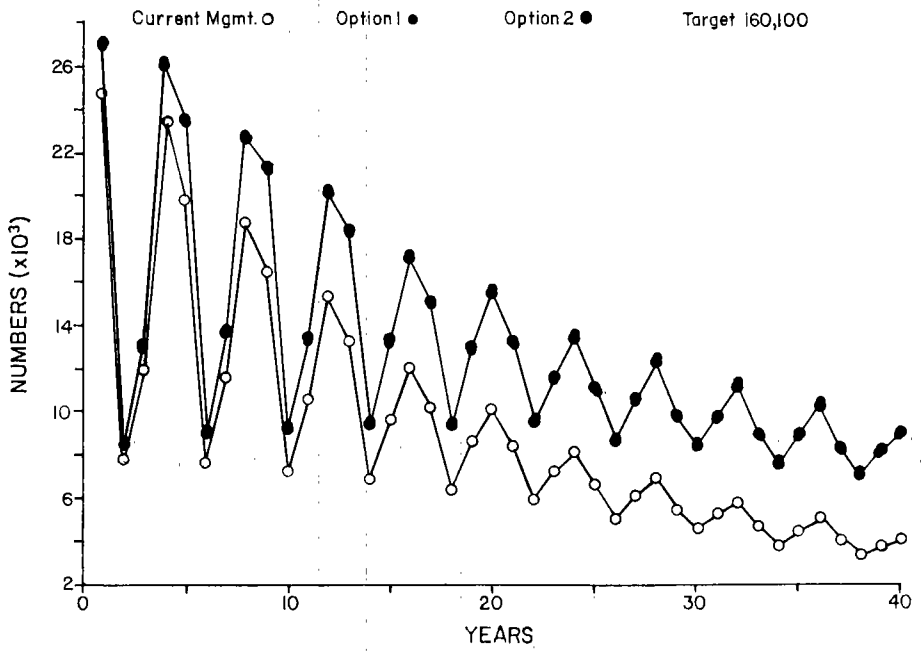

Figure 9. Projected escapements of Area 3 chums under current management and Options 1 and 2 (see above).

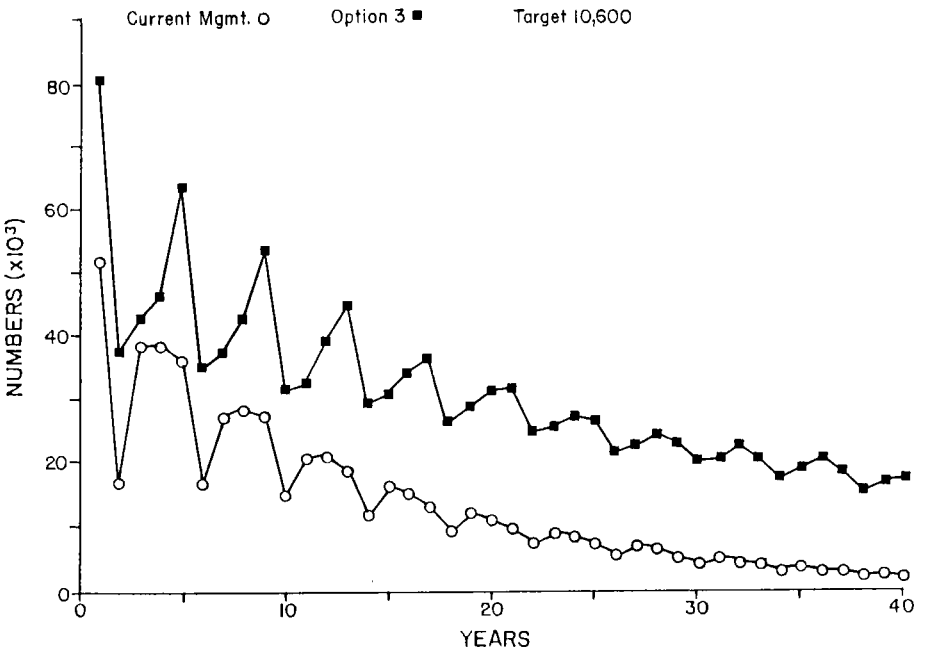

Figure 10. Projected escapements of Portland Canal chums under current management and Option 3 (fishing pinks and chums more terminally).

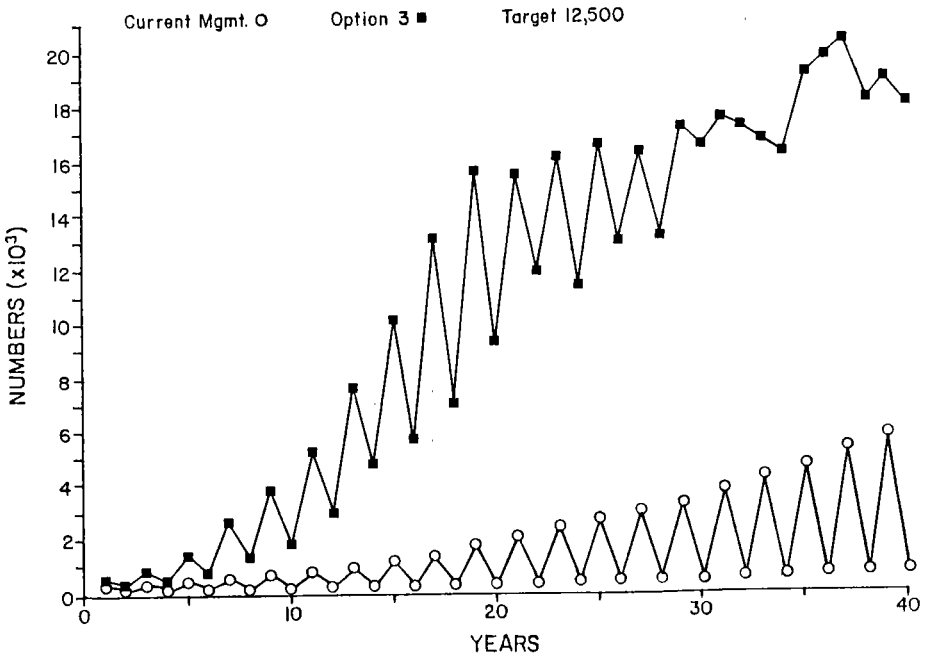

Figure 11. Projected escapements of Portland Canal pinks under current management and Option 3 (see above).

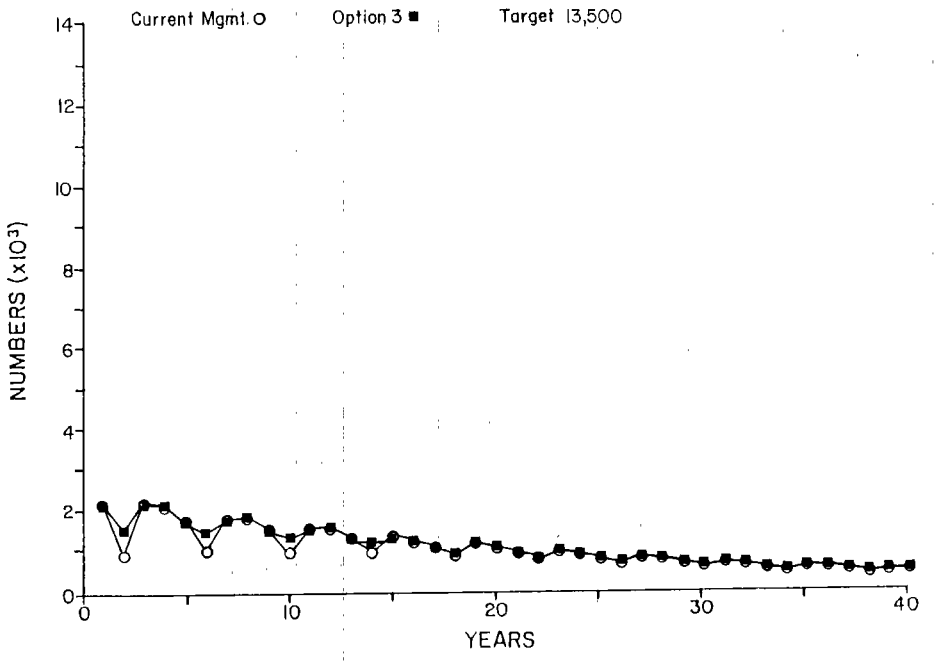

Figure 12. Projected escapements of Work Channel chums under current management and Option 3 (fishing pinks and chums more terminally).

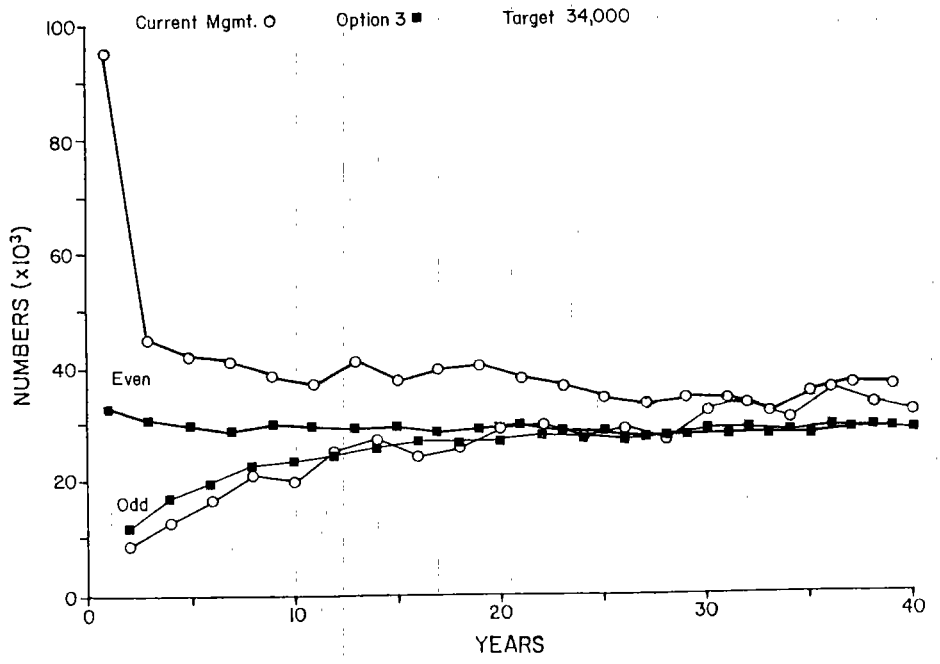

Figure 13. Projected escapements of Work channel pinks under current management and Option 3 (see above).

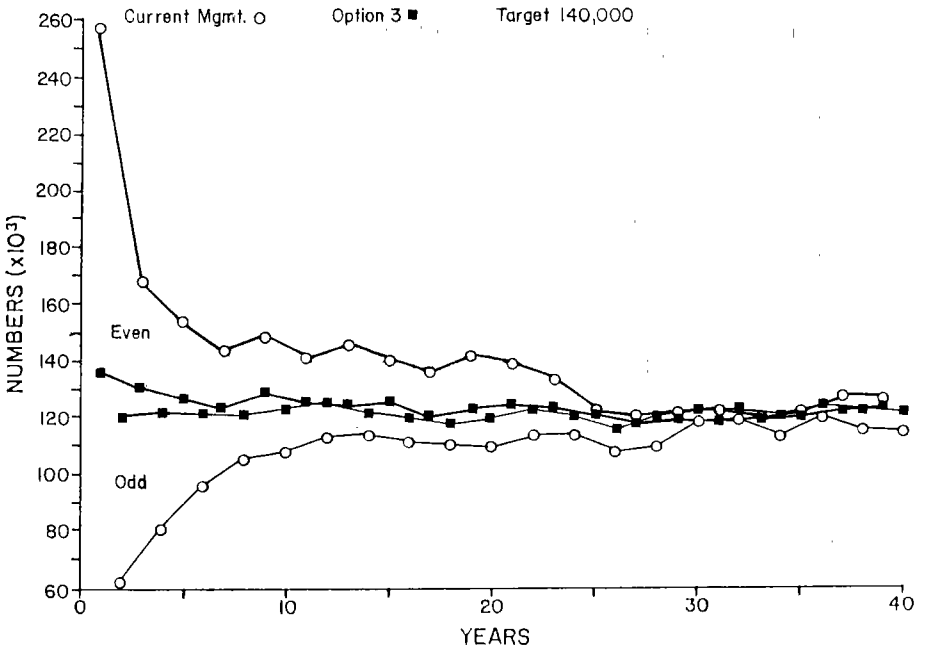

Figure 14. Projected escapements of Kwinamass/Khutzeymateen pinks under current management and Option 3 (fishing pinks and chums more terminally).

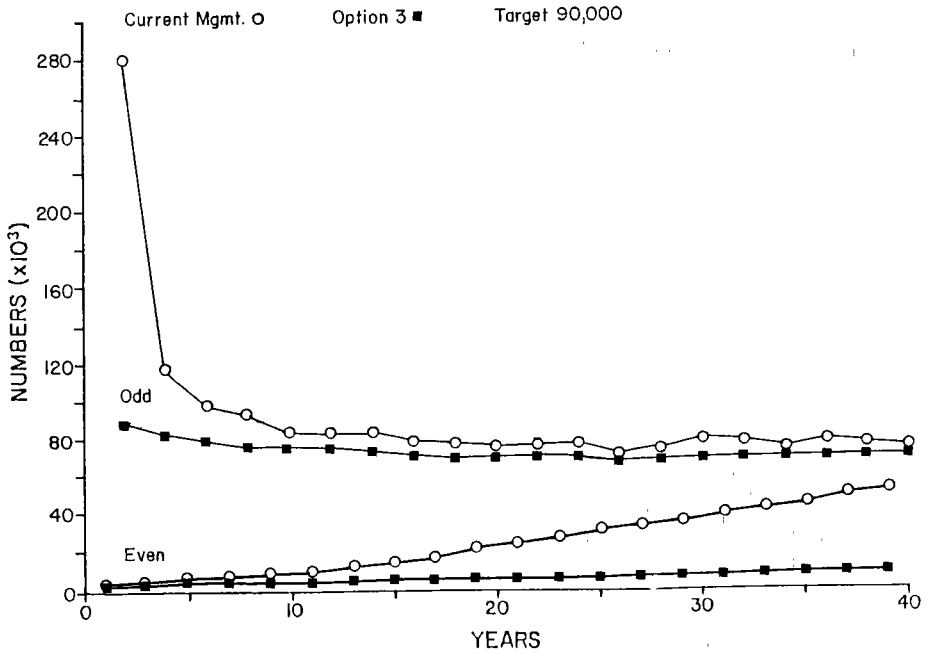

Figure 15. Projected escapements of Ishkheenickh/Iknouk pinks under current management and Option 3 (see above).

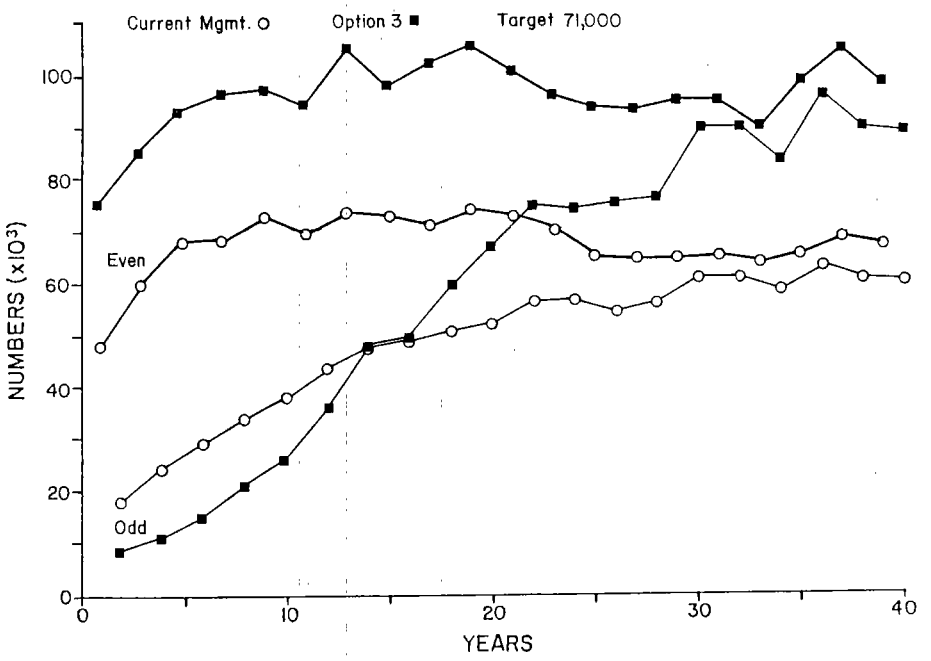

Figure 16. Projected escapements of passively-managed Portland Inlet pinks under current management and Option 3 (fishing pinks and chums more terminally).

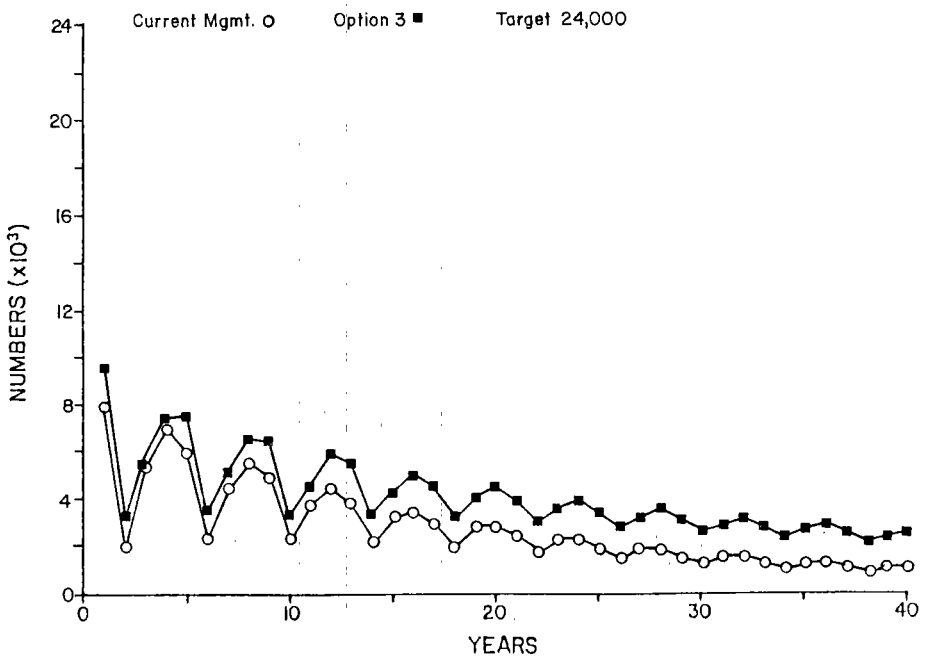

Figure 17. Projected escapements of Portland Inlet chums under current management and Option 3 (see above).

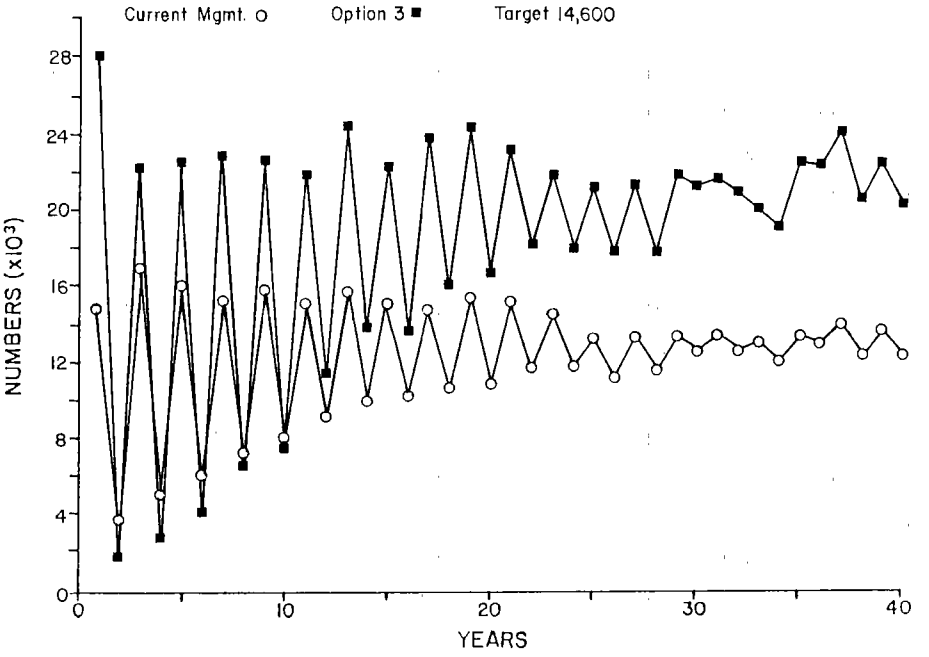

Figure 18. Projected escapements of Observatory Inlet pinks under current management and Option 3 (fishing pinks and chums more terminally).

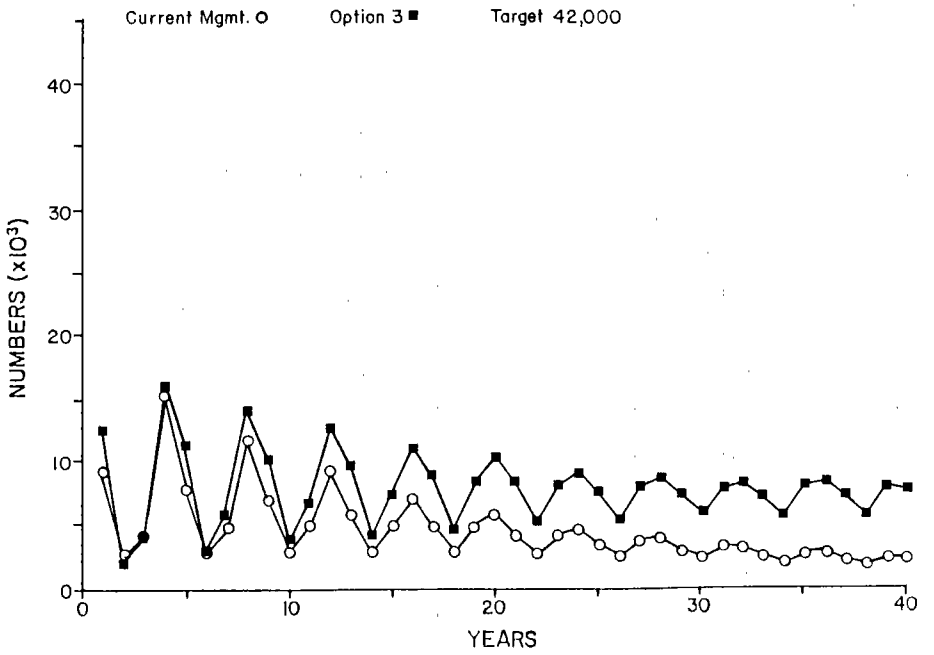

Figure 19. Projected escapements of Observatory Inlet chums under current management and Option 3 (see above).

Under the existing management regime, chum salmon escapements in Area 3 are projected to decline to less than 5% of the target. Average escapement over the 40-year simulation period would be 9100 spawners compared to the aggregated target of 84,400. The average chum catch in Area 3 was estimated at 5000 while the average total chum catch in the North Coast would be 16,000.

The net present value (NPV)* of the projected 40 years of catch under current management conditions discounted at 10% was estimated at $499.3 million.

Two options have been suggested for sockeye salmon management in Area 3. Option 1 involves the harvest of Area 3 sockeye stocks at a rate directed by non-Meziadin stocks as opposed to the current management regime where the harvest rate is directed by the abundance of Meziadin stocks. This strategy was achieved by increasing the aggregate escapement target for Area 3 sockeye. The model predicts that escapement of sockeye to the Meziadin River would increase to about 230,000 spawners (Figure 6). However, the decline in non-Meziadin stocks would be arrested and escapements would stabilize at about 30% of the target (Figure 7). The average catch of sockeye in Area 3 was estimated at 250,000, which is 40,000 less than in the current management scenario (Figure 8). The net present value* of the projected catch in Option 1 was $490.6 million or $8.7 million less than with current management.

Option 2 examines the potential for recovering some of the forgone catch in Option 1 by harvesting the surplus Meziadin sockeye at a fence. This strategy would maintain Meziadin escapements at the target and keep non-Meziadin stocks at a stable level. The average catch in Area 3 increases in this management scenario to 330,000, which is about 15% higher than under the current management scenario (Table 4, Figure 8). The net present value* of this management approach was estimated at $503.7 million, $4.4 million more than with current management. This net present value estimate considers the deterioration in quality of fish harvested at the fence, although fish quality studies should be initiated to refine these estimates.

Both management options would have negligible effects on Area 3 pink salmon escapement or catch, since most of the harvest pressure on pinks occurs later in

* NPV of the projected 40 years of harvest, discounted at 10% per year.

the season (Table 5). However, both Options 1 and 2 would result in slightly higher chum escapements to Area 3 (Table 6, Figure 9).

The catch of chum salmon would initially be lower than under the current management regime, but would increase because incidental catch in the sockeye fishery would decline with time in response to the increased average escapements. This is predicted to result in a total average catch of 18,000 chums, which is slightly higher than catch projected in current management scenario (Table 6).

With the exception of a marginal increase in the chum catch, these proposed options would not affect either escapements or catches of salmon in Areas 4 or 5.

A management alternative for pink and chum salmon was evaluated as Option 3. Under the current management strategy, the Area 3 fisheries are directed at active pink salmon stocks. However, chum stocks are being kept at low levels and escapements are projected to decline further. Option 3 examines the strategy of moving the pink salmon fisheries to more terminal areas to reduce interception of passive stocks, and managing some of those terminal fisheries for chum stocks rather than pink salmon. This strategy was achieved during the modelling by eliminating the outer Area 3 pink fisheries and creating terminal pink fisheries in the Kwinamass/Khutzeymateen area, the head of Portland Inlet and Work Channel, as well as terminal chum fisheries in Portland Canal and Observatory Inlet. Pink and chum escapements to Area 3 are projected to increase from 320,000 and 9100 in the current management scenario to 330,000 and 14,000 in Option 3, respectively (Tables 5 and 6). The changes in each stock group are discussed below.

Portland Canal chum salmon escapements are expected to continue to decline (Figure 10). Although their escapement would be marginally higher than under current management conditions, the chum stock would remain well below (<1%) the target level of 6600. These simulation modelling results suggest that the low and variable productivity, and minor interceptions in outside fisheries is preventing the rebuilding of Portland Canal chum stocks. These chum stocks would not likely be able to sustain the higher harvest rates that would occur if the proposed American chum enhancement facility was developed. Pink salmon stocks, however, are expected to rebuild and should provide harvestable surpluses in the future (Figure 11). These surpluses could be harvested as an incidental catch in chum fisheries

* NPV of the projected 40 years of harvest, discounted at 10% per year.

directed at enhanced stocks if the U.S. facility is developed. If this option is implemented, Canada's contribution of surplus pink salmon production should be considered in the joint international planning of this fishery.

Management Option 3 would have no effect on Work Channel chum escapements, which are expected to remain at low levels and continue to decline over time (Figure 12). Pink salmon escapements to Work Channel would only vary slightly from the current management regime in that escapements of even-year pinks are projected to be at target since the surplus would be harvested in the terminal fishery (Figure 13).

In Portland Inlet, the two main stock groups are the Kwinamass/Khutzeymateen and Ishkheenickh/Iknouk. The even-year Kwinamass/Khutzeymateen and odd-year Ishkheenickh/Iknouk stocks overescape under the current management situation. However, with more terminally-located fisheries, the surplus could be harvested and escapements would be maintained near target levels (Figures 14 and 15). In the off-cycle years, Kwinamass/Khutzeymateen odd-year stocks are expected to rebuild faster under Option 3 because they would not be harvested unless a surplus was available. In contrast, under current management regime, they would be intercepted in fisheries targeting on the larger Ishkheenickh/Iknouk stocks. Under both the current management and Option 3 strategies, the even-year Ishkheenickh/Iknouk stocks would be intercepted in other fisheries and therefore would not rebuild. The passively-managed pink stocks in Portland Inlet are projected to attain target escapement levels under current management conditions, but even-year stocks would overescape under the Option 3 scenario (Figure 16). Strategies in Option 3 are predicted to marginally increase chum escapements to Portland Inlet, but stocks would still continue to decline (Figure 17).

When Observatory Inlet is managed as a terminal chum fishery (Option 3), even-year pinks are expected to overescape, while returns of odd-year stocks would increase to the target within 15 years and would exceed this level in subsequent later years (Figure 18). Chum escapements which are projected to decline under current management would stabilize at between 15 to 20% of the target level in Option 3 (Figure 19). The escapements of chum salmon stocks could be increased to target levels by developing the proposed Canadian chum salmon enhancement facility in Observatory Inlet. The modelling results suggest that local pink stocks would probably be capable of withstanding the harvest pressure directed at enhanced chum salmon.

The average escapement of pink salmon to Area 4 is expected to increase from 800,000 to 835,000 in response to management changes associated with Option 3. Average pink salmon escapements in Area 5 would decrease from 6000 to 5000 due to increased interceptions in the Skeena pink fishery. Chum escapements to Areas 4 and 5 would not be affected by Management Option 3.

Under Option 3 management strategies, the pink salmon catch in Area 3 is projected to decline from the 350,000 fish expected with current management to 300,000 (Table 5). Part of this decline is attributed to elimination of the catch of passing Skeena pinks, since the outer Area 3 pink salmon fishery is assumed to be closed in Option 3. However, this forgone catch in Area 3 is more than recovered in Area 4 where the pink catch is predicted to increase from 740,000 to 830,000. Total average catch of Canadian pink salmon in the North Coast is expected to increase to 1.38 million in Option 3, compared with 1.34 million in the current management regime.

The average chum salmon catch in Area 3 is not expected to change from the 5000 fish anticipated in the current management. However, a greater portion of the catch in Option 3 would be local stocks because interception of passing Skeena stocks would be minimized. The catch of chum salmon in Area 4 also increases (7000 to 8400) because interception in Area 3 would be minimized, while harvest pressure in Area 4 increases in response to the higher abundance of pink salmon. Total average catch of chum salmon in the North Coast increases from 16,000 to 18,000 with Option 3.

The net present value* of Option 3 was estimated at $503.5 million, a $4.2 million increase over the current management figure. Although this estimate accounts for deterioration in the quality of the catch, fish quality studies should be conducted to refine the estimated degree of change. The model that was used for these simulations does not consider American salmon stocks. Currently (current management conditions), a high proportion of the catch in Area 3 is comprised of American fish. Under Option 3, this interception would be reduced, and the total catch of chum and pink salmon would probably decline. These factors should be considered when evaluating options and determining Canada's position in international negotiations.

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* NPV of the projected 40 years of harvest, discounted at 10% per year.

2. STATISTICAL AREA 4

Statistical Area 4 includes most of Chatham Sound, and is bounded by the mouth of the Skeena River and mainland coast to the east, and Stephens and Dundas islands to the west (Figure 20). Almost all major salmon stocks harvested in Area 4 originate in some part of the Skeena River watershed (Figures 21 and 22, Tables 7 and 8). Major sockeye and pink fisheries operate throughout Chatham Sound and are concentrated at the mouth of the Skeena. Detailed tables of present stock status, current fishing patterns, habitat characteristics and distribution of disease agents are provided in Appendices Ib, IIb, IIIb and IV, respectively.

With the exception of some tributaries to the lower Skeena River that are downstream of Terrace, headwaters of the Skeena originate in alpine areas, and many tributaries are glacial. The climate is characteristic of the north-central interior, having cool winters with moderate to heavy snowfall and warm summers. High stream discharges in June correspond to the period of peak snow melt. Flows in the upper river tributaries are relatively stable, while the lower river basin is more affected by coastal weather and is subject to flash floods during late fall and early winter.

The Skeena drainage basin has been the site of development since the turn of the century when the transcontinental railway line was linked to Prince Rupert. Since this time, settlement, logging and mining have occurred throughout the drainage. Settlement is concentrated along the Skeena River with major communities at Smithers, Hazelton, Terrace and Prince Rupert. Prince Rupert is also the site of a major port and various industrial developments. About 40% of the forested areas within the Skeena drainage basin have been logged and the remaining forested area will be logged over the next 20 years. Mining operations are concentrated in the Babine Lake area.

2.1 Stock Description

Statistical Area 4 supports five actively-managed sockeye stocks, nine actively-managed pink stocks, and 14 passively-managed stock groups.

Sockeye stocks in this Statistical Area are arbitrarily divided into two categories for management purposes: Babine stocks and non-Babine stocks. Only the Babine stocks are actively managed. Approximately 90% of the total annual

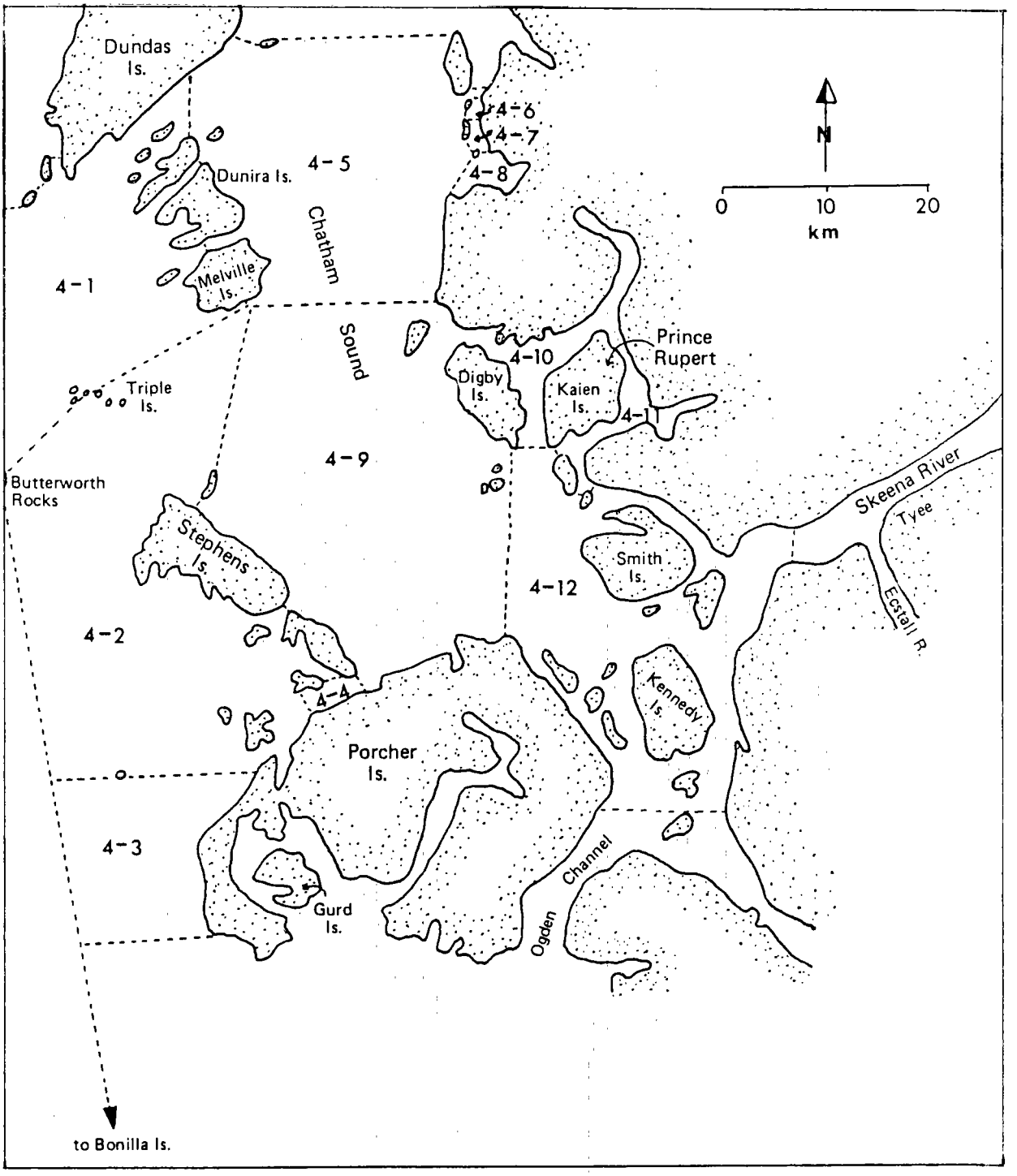

Figure 20. Statistical Area 4, showing DFO Management Units.

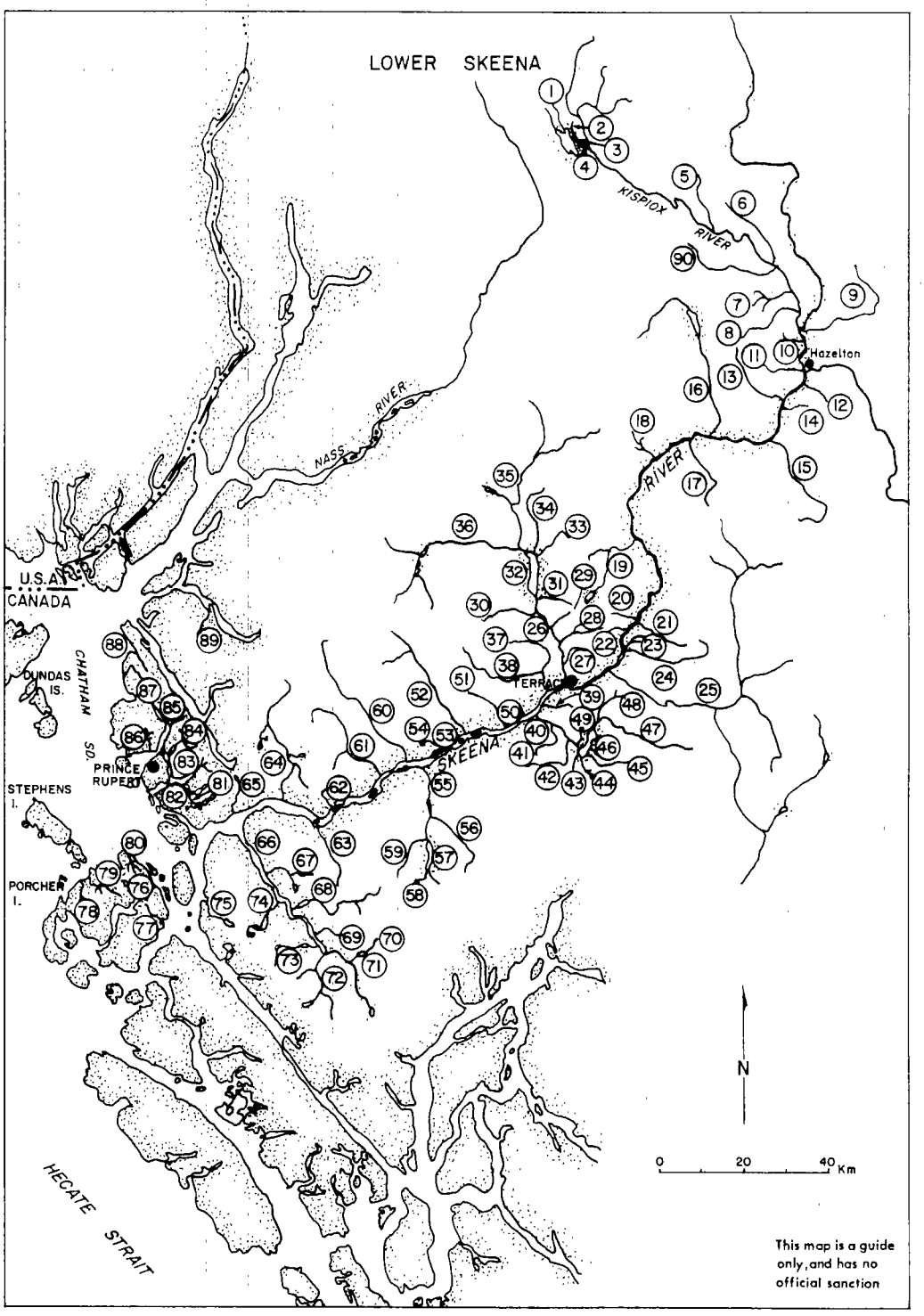

Figure 21. Major salmon spawning streams in the Lower Skeena area (for key to streams see Table 7).

Table 7. Key to salmon spawning streams in the Lower Skeena area of Statistical Area 4, as shown in Figure 21. (Gazetteer names given, local names in parentheses).

No.	Stream Name	No.	Stream Name
57	Alastair Lake	36	Kitsumkalum River - Upper (Beaver River)
39	Alwyn Creek		
43	Andalas Creek	32	Kitsumkalum Lake
54	(Anderside Creek)	16	Kitwanga River (Kitwancool)
68	Big Falls Creek	24	Kleanza Creek (Gold Creek)
13	Burdick Creek (Burdock, Stoney Creek)	82	Kloiya River (Cloyah Creek)
		62	Kwinitsa Creek
35	Cedar River (Beaver River)	87	(Lahou Creek, Pearl Harbour Creek)
12	Chicago Creek	40	Lakelse River
21	Chimdemash Creek	28	Lean-To Creek
34	Clear Creek	69	(Lockenby Creek)
44	Clearwater Creek	21	Lowrie Creek (Lowery Creek)
3	(Club Creek - Lower)	91	McCully Creek
2	(Club Creek - Upper)	65	McNeill River (Green River)
42	Coldwater Creek	86	McNichol Creek
14	Comeau Creek (Carnaby Creek)	74	Madeline Creek (Gibraltar Creek)
5	Cullon Creek (Grouse Creek)	56	Magar Creek (Dog Tag Creek)
8	Date Creek (Dale Creek)	75	Moore Cover Creek
27	Deep Creek	73	Muddy Creek
83	Denise Creek	6	Murder Creek (Beirness Creek, Beirnes Creek)
81	(Diana Creek)		
33	Douglas Creek (Dry Creek)	77	Oona River
66	Ecstall River	17	(Price Creek)
37	Erlandsen Creek	45	Schulbuckhand Creek
60	Exchamsiks River	63	Scotia River
52	Extew River	51	Shames River
53	(Extew Slough)	50	(Shames Slough)
1	(Falls Creek)	20	Shannon Creek (Nicholson Creek)
19	(Fiddler Creek)	84	Shawatlan River
55	Gitnadoix River	9	Shegunia Creek
29	Glacier Creek	85	Silver Creek
10	(Glen Vowell Creek)	23	Singlehurst Creek (Swede Creek)
31	Goat Creek	48	Sockeye Creek
67	Hayward Creek (Beaver Creek)	58	Southend Creek
11	Hazelton Creek (Cedar Creek)	72	Sparkling Creek (Clearwater Creek)
7	(Heavenor Creek, McQueen Creek)	76	Spiller River
49	(Herman Creek)	30	Star Creek
46	(Hot Springs Slough)	4	Stephens Creek
80	Humpback Creek (Humpback Bay Creek)	88	Stumaun Creek (Simpson Creek)
		9	(Tsamspanaknok Bay Creek, Sam Bay)
70	Johnston Creek	79	Useless Creek (Big Useless Creek)
71	Johnston Lake	78	Useless Creek (Little Useless Creek)
59	Kadeen Creek	41	White Creek
61	Kasiks Creek	47	Williams Creek
64	Khyex River	18	Wilson Creek
15	Kitseguecla River	38	Zymagotitz River
26	Kitsumkalum River - Lower	25	Zymoetz River

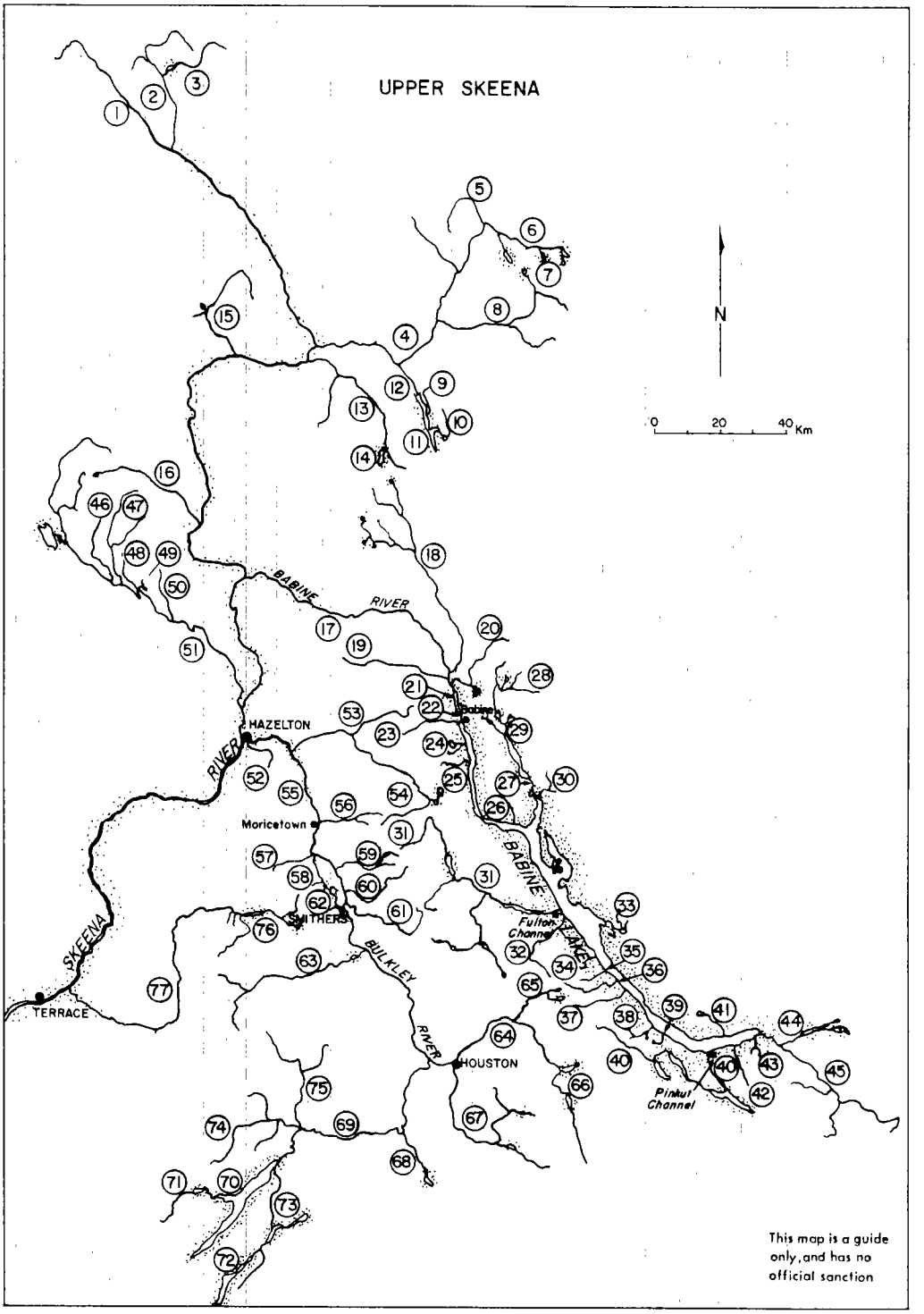

Figure 22. Major salmon spawning streams in the Upper Skeena area (for key to streams see Table 8).

Table 8. Key to major salmon spawning streams in the Upper Skeena area of Statistical Area 4 as shown in Figure 22. (Gazetteer names given, local names in parentheses).

No.	Stream Name (or alternative)	No.	Stream Name (or alternative)
8	Asitka River and Lake	14	Motase Lake
10	Azuklotz Creek	46	Nangeese Creek
17	Babine River - Lower	72	Nanika River
22	Babine River - Upper	71	Nanika Lake
11	Bear Lake	19	Nichyeskwa River
12	Bear River	18	Nilkitkwa River
33	Big Loon Creek (Wright)	21	Nilkitkwa Lake
20	Boucher Creek (McDonald)	25	(Nine Mile Creek)
67	Buck Creek	67	Owen Creek
55	Bulkley River below Houston	36	Pierre Creek
64	Bulkley River above Houston	40	Pinkut Creek
61	Canyon Creek (Cass Carr)		(15 Mile, Anderson)
56	Causqua Creek (Fish)	59	Reiseter Creek (Two Bridges)
48	Clifford Creek	65	Richfield Creek (Findley)
38	Cross Creek (Pendleton)	9	Salix Creek
60	Driftwood Creek	44	Shass Creek (Grizzly)
39	(Donalds Creek)	1	Skeena River
24	(Five Mile Creek)	49	Skunsnat Creek
26	(Forks Creek)	15	Slamgeesh River and Lake
42	(Four Mile Creek)	34	(Sockeye Creek)
31	Fulton River	7	Spawning Lake (Solo Creek)
44	Gullwing Creek (Six Mile, Wiggins)	13	Squingula River
		52	Station Creek
54	Harold Price Creek	53	Suskwa River
30	(Hazelwood Creek)	4	Sustut River and Lake
50	Ironsides Creek	45	Sutherland River (Beaver)
6	Johanson Creek and Lake	47	Sweetin River
62	Kathlyn Creek (Chicken)	32	Tachek Creek
35	(Kew Creek)	29	Tahlo River - Lower
51	Kispiox River	28	Tahlo River - Upper (Salmon)
3	Kluayaz Creek and Lake	63	Telkwa River
2	Kluatantan River	43	(Telzato Creek) (Monica)
16	Kuldo Creek	73	Thautil River
66	Maxan Creek	58	Tobaggan Creek
5	Moosevale Creek	57	Trout (Sheddy)
69	Morice River	23	Tsezakwa Creek (Trail)
70	Morice Lake	37	Twain Creek
27	Morrison Creek (Hatchery)		

escapement of Skeena sockeye are counted at the Babine fence as they migrate upstream to spawning areas in and adjacent to Babine Lake. Details regarding run timing and interception fisheries have been provided in International Tagging Program[3] and run reconstruction[6,8,9] reports. In general, Babine sockeye pass through major fisheries in the area between late June and early August, and spend 18-30 days in fresh water prior to reaching the Babine fence. Major migration routes of Skeena sockeye stocks are shown in Figure 23).

Sockeye escapement through the Babine fence has increased dramatically since the completion of the Fulton and Pinkut spawning channels in 1968. From 1980-1984, the average annual escapement to the Babine fence was over 1 million and in excess of the target escapement. However, most of this escapement consisted of enhanced stocks and therefore, even though the aggregate escapement goal was exceeded, escapement goals were not achieved for all stocks in the area.

Actively-managed pink stocks include even- and odd-year runs to the Babine, Lakelse and Kitwanga rivers and coastal systems, as well as odd-year runs to the Kispiox River. All Skeena pink stocks are currently larger in the odd-year cycles, although even-year stocks were dominant prior to the 1960's. Odd-year and even-year average pink escapements to the above rivers in recent years were 1,669,000 and 734,000, respectively. Major migration routes for the even-year pink stocks are shown in Figure 24. There are insufficient tagging data to allow adequate documentation of the migration routes of the odd-year pink stocks. Available information suggests that recent escapements have approached or exceeded target escapements for most actively-managed Skeena pinks. On the other hand, many of the passively-managed pink stocks are below their target escapements.

Area 4 is not a major chum producing area. The Ecstall River and the mainstem of the Skeena River are the primary spawning areas for chum salmon. Neither of these stocks is actively managed because their run timing and distribution overlap with both the sockeye and pink fisheries.

Area 4 has seven major chinook stocks distributed throughout the Skeena River drainage basin, although none of these stocks is actively managed. However, steps have been taken in the management of current fisheries in Area 4 to reduce the incidental catch of all chinook stocks. Chinook escapements to all stream systems are well below historic levels, but have improved slightly in recent years. Since

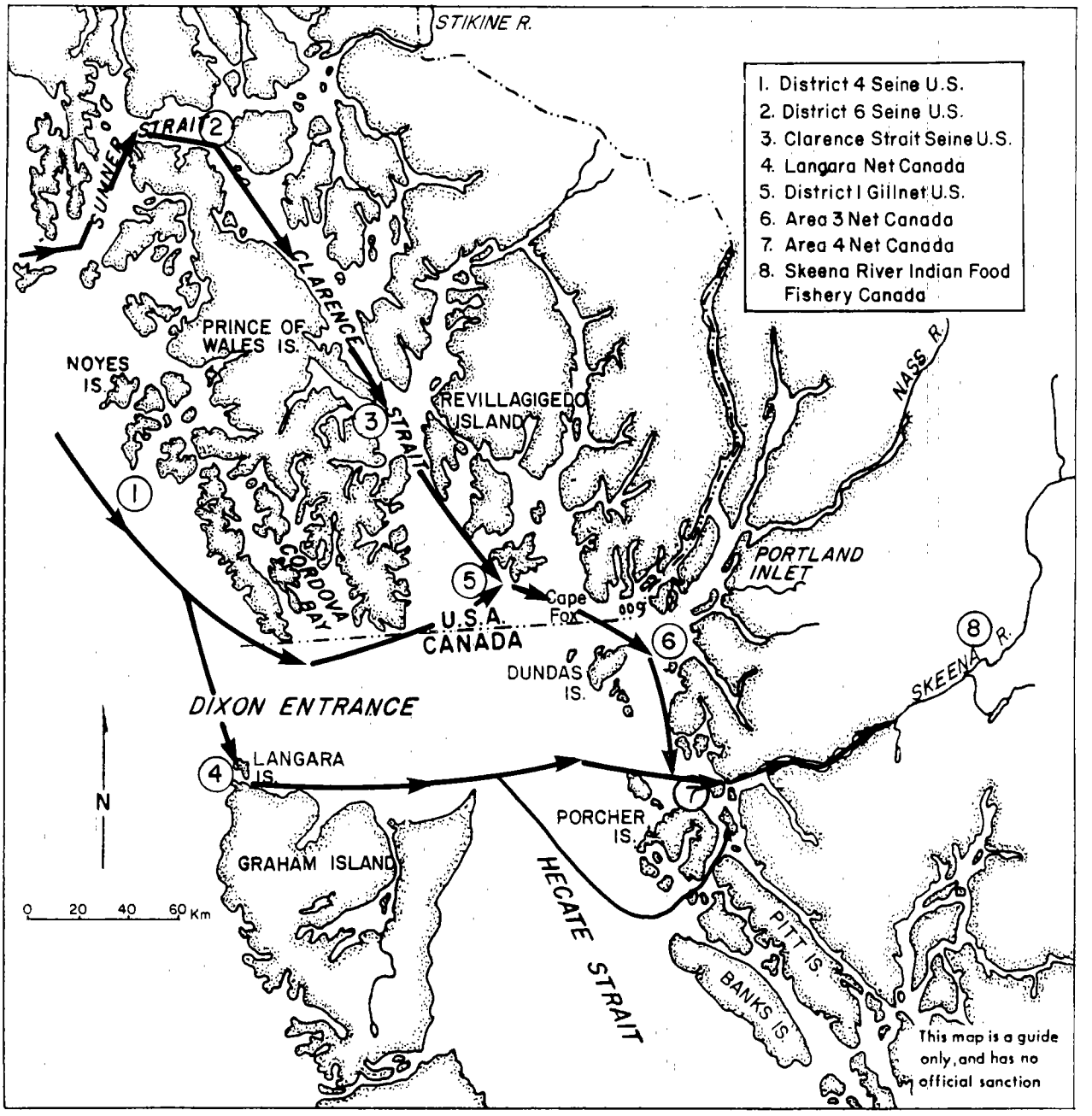

Figure 23. Migration routes of Skeena River sockeye salmon stocks.

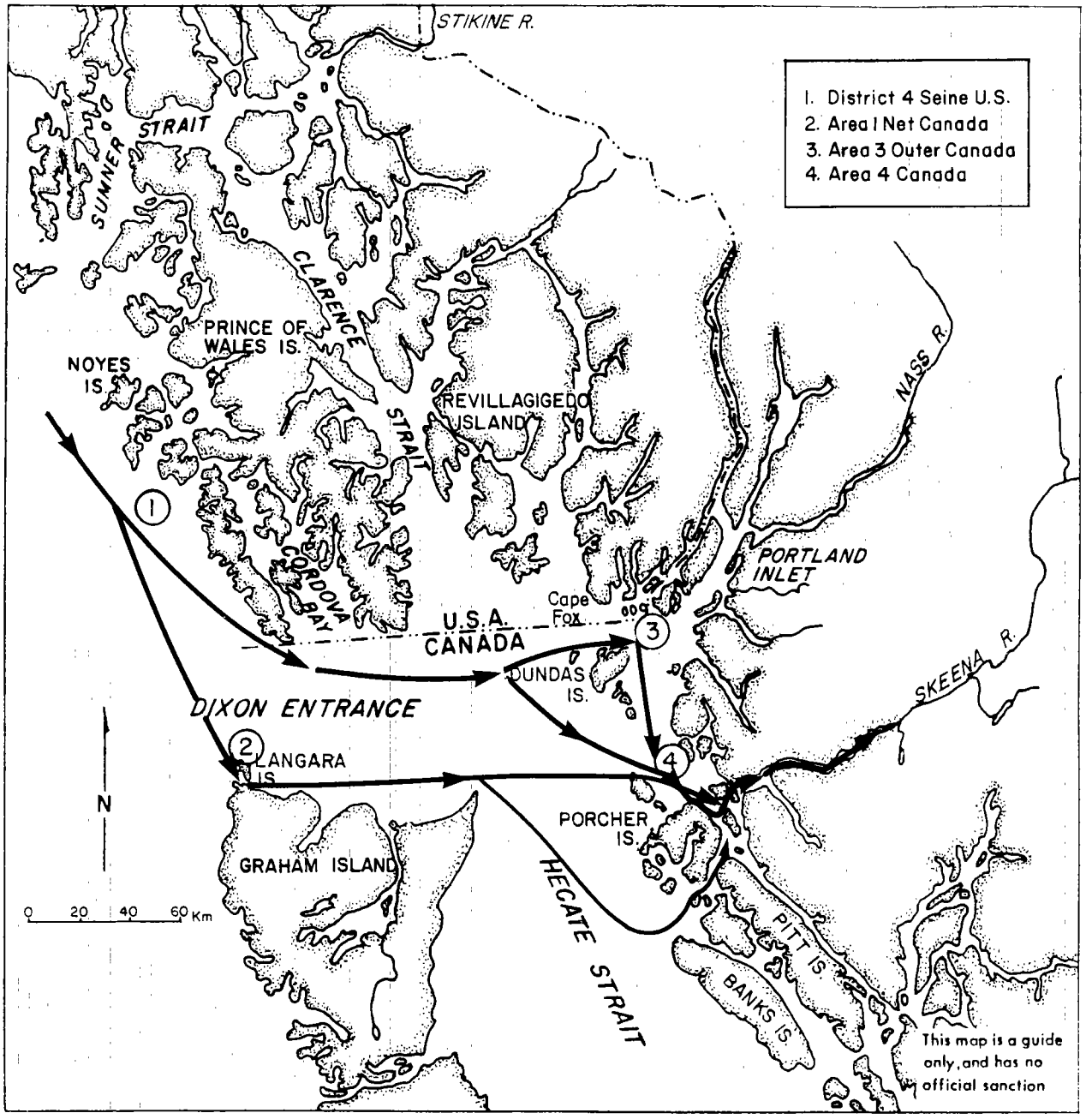

Figure 24. Migration routes of Skeena River even-year pink salmon stocks.

the timing of chinook migration corresponds with the timing of the sockeye fisheries, high incidental catches of these stocks still occur.

Coho-producing stream systems are found throughout the Skeena River drainage, as well as in most small coastal streams. No individual stocks are actively managed. Escapement estimates indicate that coho stocks are seriously depressed in Area 4, and one of the causes of the decline is the sockeye and pink fisheries, which have high incidental catches of coho.

The summer run of steelhead to the Skeena River is composed of 19 stocks, each with its own life-history characteristics and migration timing. The major stocks spawn in the Lakelse, Kitsumkalum, Zymoetz, Bulkley/Morice, Suskwa, Kispiox, Babine and Sustut systems. Migration of steelhead into the Skeena begins in the first week of July, peaks in the second and third week in August, and continues until the middle of September. Due to the timing of steelhead migration, they are intercepted in commercial fisheries that target on sockeye and pink stocks. From 1963 to 1984, the average run of steelhead to the Skeena was estimated at 37,000 fish, with peaks of 55,000 in 1966 and 85,000 in 1984.[10]

2.2 Fisheries

In Area 4, fisheries are managed to provide optimum escapements of major sockeye and pink stocks destined for the Skeena River. However, in an attempt to protect the minor (usually less productive) stocks, exploitation rates in certain times and areas are restricted. This results in surplus escapements of the more productive stocks in some years.

Fishing plans are based on the forecast of total stock size and open days are calculated as a function of the target escapement for each week, predicted effort and the catchability coefficient. Cumulative catch and escapement during the season are combined with pre-season estimates to forecast the run size. This forecast, in addition to the target escapement and predicted effort, is used to determine the number of days that fishing is permitted during each week that a fishery is open. Escapements are estimated by a gillnet test fishery on the lower Skeena River.

In general, fishing is not permitted prior to the first week in July to conserve the depressed early Skeena sockeye and chinook stocks. Fishing is

normally scheduled for the first week in July to coincide with the run of the enhanced sockeye stocks. Directed fisheries focus on pinks from early August until the end of August. The fisheries are managed according to the abundance of sockeye and pinks returning to the Skeena River. Pre-season weekly escapement targets determine the amount of fishing effort that is permitted. The management strategies for individual species are discussed below.

Area 4 is divided into a number of Management Units although virtually all Management Units are open during the commercial fishery. Area subunits are not opened or closed independently of each other. The exceptions to this strategy are the closure of M.U. 4-4 to all gear types during the weeks that seiners are permitted in Area 4, and late in the season when coastal pinks are the target stocks. During the harvest of coastal pinks, the inside areas of Area 4 may be closed to conserve Skeena pinks, coho, and possibly late runs of sockeye, while the outside areas are open to allow the harvest of coastal stocks.

Area 4 is currently a gillnet fishery area, although seiners are allowed to operate during the peak of the run of enhanced sockeye stocks (usually the third to fourth week of July). The number of days of seine fishing permitted depends on run size. In years when sockeye are abundant, seiners may be permitted to fish for more than one week. Recently, seiners have also been allowed to harvest pinks when gillnetters have not been capable of exploiting the available surplus, or were reluctant to harvest pinks because of the high degree of effort for a low value catch.

2.2.1 Sockeye Salmon

Sockeye from Pinkut Creek and the Fulton and Babine rivers are the major stocks harvested by the commercial net fishery in Area 4. Other stocks are caught incidentally. Sockeye catches in this fishery usually peak in the third to fourth week of July and then rapidly decline. Openings are not allowed to exceed four days per week. In addition, a "window" or closure in the fishery is implemented (usually after the second day of fishing) to permit the faster-migrating species such as steelhead and chinooks to pass through the area of the fisheries. The fishery is then continued for the remaining two days.

The recent Canada/U.S. agreement will set a ceiling on Alaskan interception fisheries for Canadian sockeye stocks prior to U.S. statistical week 31. This

should allow more fish of Canadian origin to enter Area 3 and 4, and may necessitate more intensive fishing efforts in the future.

2.2.2 Pink Salmon

Pink stocks returning to Area 4 can be divided for management purposes into three major stock groupings on the basis of run timing: early runs (Babine, Kitwanga, Kispiox, Upper Skeena), mid-season runs (Lakelse, Kitsumkalum and Skeena mainstem) and late runs (Coastal). These groupings are sufficiently separated by time (or area) to permit directed fisheries. Each run grouping can also be separated to some extent by time and/or area to allow for further directed fisheries. As for sockeye, weekly escapement targets are set and the fishery is managed to achieve these weekly levels. In-season run strength is estimated by the Skeena River test fishery.

The recent Canada/U.S. agreement, which provides a ceiling on Canadian catches in the Area 1 troll fishery and in net fisheries within Management Units 3-1, 3-2, 3-3, 3-4, and 5-11, will result in the need for increased catches in Area 4 during some years.

2.2.3 Chum Salmon

There are only a few chum stocks in Area 4 (Coastal and mainstem Skeena). Any chum catches are incidental to sockeye and pink catches, since there are no directed fisheries for chum stocks. Management is mainly confined to mesh size restrictions in gillnet fisheries to minimize chum catches and thus avoid overexploitation of these stocks.

2.2.4 Chinook Salmon

Net fisheries for chinooks have been discontinued since the early 1970's. More recently, specific sub-areas in this Statistical Area have been closed to fishing during times when seiners are permitted in Area 4. Other restrictions such as banning beach tie-offs for seines in certain areas, the "window openings" noted earlier, and mesh size restrictions have also been implemented to protect chinook stocks.

2.2.5 Coho Salmon

Coho stocks in Area 4 are depressed, and there are no directed coho fisheries. Coho catches are incidental to sockeye and pink catches. These stocks are managed primarily by limiting the exploitation rate in fisheries specifically for sockeye and pink salmon.

2.2.6 Steelhead Trout

Steelhead are harvested coincidentally in several fisheries, including high seas, Alaskan, Area 3 and 4, native and in river sport fisheries. Harvest rates in Area 4 commercial fisheries between 1963 and 1984 ranged between 24.7% in 1970 to 47.7% in 1964 and 1983. The average catch in this period was 13,000 fish. Harvest rates appear to have increased by about 5% in recent years. The native fishery has shown the most dramatic increase in exploitation rates of steelhead, with a peak catch of about 15,000. The steelhead catch by recreational fishermen has declined from 1966 to 1984 and now averages only 3000 fish per year. The decline in the sport catch is attributed to both regulatory measures and angler co-operation. An overall harvest rate of 50% in all fisheries has been identified as acceptable based on the limited information on productivity of steelhead and the response of the stocks to past harvest rates. However, while this rate is considered acceptable for steelhead stocks on the whole, the effects of harvest strategy should be addressed on an individual stock basis. The migration timing of the Bulkley/Morice and Sustut and Bear stocks overlaps with the timing of enhanced Skeena sockeye while other steelhead stocks arrive between the peak in sockeye and pink salmon returns.[10]

2.3 Current Enhancement Activities

The Pinkut and Fulton sockeye spawning channels are the most important salmon enhancement facilities in Statistical Area 4. The three channels (two at Fulton and one at Pinkut) have been in operation since the late 1960's, and are currently the major contributors to the Area 4 commercial sockeye fishery. All three channels are in tributaries to Babine Lake. Together the three channels have capacity for the incubation of 300 million eggs annually, and release approximately 152 million sockeye fry. The predicted annual returns to the channels are about 1.5 million adults. Approximately half of the Area 4 sockeye escapement is to these spawning channels. In fact, the high productivity of the Pinkut and Fulton

enhanced sockeye stocks has made it difficult to manage some of the other non-enhanced Area 4 sockeye stocks with migration timings that coincide with those of the Pinkut and Fulton stocks. Several other small enhancement facilities also contribute to the Area 4 fishery (Table 9), and fishways have been constructed on the Salmon River and at Moricetown Falls to facilitate the upstream movement of salmon.

2.4 Habitat Status

For the purposes of the following discussion, habitat in Area 4 can be divided into the upper Skeena and lower Skeena drainages at Shannon Creek near Hazelton. Table 10 indicates the number of streams supporting salmon stocks in these two regions. More detailed information on habitat status within this Statistical Area is presented in Appendix III.

2.4.1 Upper Skeena

The upper Skeena region includes the Bulkley, Morice, Babine, Upper Skeena and Upper Kispiox drainages and includes 71 salmon-producing streams.[11] Most of the systems include lakes, which act as buffer and lead to relatively stable flows during spring melt.

Logging has occurred in the area since the 1920's. Generally, the impact of these operations on fish habitat has been low to moderate, although siltation and debris accumulation have created some localized problems. Projections for the next 20 years include the logging of 65% of the forested area within the upper Skeena watershed.[2] As co-operation between DFO and the forest industry improves, the impact of future logging operations will be minimized.

Mineral deposits are located throughout the upper Skeena region. The most important sustained operations are copper mines in the vicinity of Babine Lake. Since Babine Lake in the most important sockeye salmon rearing habitat in the Skeena system, the effect of these mines on fish habitat must be adequately monitored and minimized to the extent possible. Other mining developments that may have a localized impact on fish habitat include Equity Mines in Houston and the potential coal development near Telkwa.

Table 9. Production by small enhancement facilities in Area 4 (production capacity based on SEP biostandards).

Facility	Species	Production Capacity		Target Stock(s)
		Releases	Returns	
Terrace Hatchery	coho	50,000	750	Copper
	chinook	330,000[a]	2,400	Kitsumkalum, Cedar Copper
Kispiox Hatchery	coho	85,000	3,900	Kispiox
	chinook	103,000[b]	580	Kispiox
Toboggan Creek Hatchery	coho	100,000	1,500	Toboggan
	chinook	85,000[c]	725	Morice
Fort Babine Hatchery	coho	30,000	4,500	Babine
	chinook	90,000[d]	1,240	Babine
Eby Strait Hatchery	coho	530,000	8,500	Lakelse

[a] 200,000 fry released in spring, 75,000 released in fall, 55,000 released as yearlings.
[b] 50,000 fry released in spring, 53,000 released in fall.
[c] 60,000 fry released in spring, 25,000 released as yearlings.
[d] 45,000 fry released in fall, 45,000 released as yearlings.

Table 10. Summary of streams supporting salmon populations in Area 4.

		Upper Skeena Watershed	Lower Skeena Watershed	Total
Sockeye:	Total Streams[a]	46	26	72
	Significant Streams[b]	27	11	38
	% MRE[c]	99	91	
Coho:	Total Streams	47	69	116
	Significant Streams	19	36	55
	% MRE	94	94	
Chinook:	Total Streams	14	21	35
	Significant Streams	6	11	17
	% MRE	97	93	
Pink:	Total Streams	16	61	77
	Significant Streams	11	27	38
	% MRE	98	97	
Chum:	Total Streams	4	32	36
	Significant Streams	1	8	9
	% MRE	90	85	

[a] Total number of streams historically supporting species indicated.

[b] Significant number of streams which have historically contributed most to production of species indicated.

[c] Percentage of maximum recorded escapement (MRE) is the percentage distribution of the significant streams to the total maximum recorded escapement.

The proposed Kemano Completion hydroelectric development could have moderate to severe effects on habitat in the Morice River system if the project were approved. Application of the project was withdrawn in 1984 because of economic reasons; however, it could be reactivated at any time.

Fish habitat quality in the upper Skeena watershed is generally not considered to be a major factor limiting salmon production.

2.4.2 Lower Skeena

The lower Skeena region downstream from Hazelton has 88 streams that support salmon.[12] There are fewer lakes associated with these drainages, and although the interior areas are characterized by a relatively temperate climate, the streams closer to the coast are subject to heavy rainfall and periodic flooding. The effects of high variability in flows have been compounded by the impact of logging near Terrace.[2]

Past logging activities in this region have been extensive (60% of salmon streams) but are expected to continue on a lower scale in the future.[2] The effect of logging on fish habitat has generally been moderate, although there has been a high impact in localized areas. Gradual recovery of watersheds is anticipated as forest regeneration progresses. Coho is the species most likely to be affected by habitat changes associated with the logging because of their widespread distribution during the rearing stage. However, due to the nature of the impact of logging on coho habitat such as accumulation of debris, there is potential for small stream restoration projects to improve the production capacity. Scouring and unstable flows resulting from logging activities have likely contributed to the deterioration of pink and chum spawning habitat and/or mortalities during incubation. Sockeye habitat has probably been the least affected by logging activities.

Community development has had a localized impact on fish habitat near Terrace. Port and industrial developments at Prince Rupert have likely had an effect on estuary habitat, although this cannot be defined, quantified or directly related to stock declines. Expansion of the port facilities is proposed for the future. Since the railway and highway are immediately adjacent to the mainstem Skeena there is a high potential risk of spills of hazardous chemicals. Such spills could have a severe effect on lower river habitat and salmon stocks.

In general, therefore, deterioration of fish habitat has probably contributed to stock declines in the lower Skeena region.

2.5 Management Conflicts

The major conflicts that DFO management personnel must resolve for Area 4 include problems caused by mixed-stock fisheries and various management uncertainties. These conflicts are discussed below.

2.5.1 Management Uncertainties

Run Size Run size is estimated using a combination of pre-season forecasts, and cumulative catch and escapement data. The accuracy of pre-season forecasts is very poor. As a result, in-season indicators are extremely important in managing the fishery. Escapement is estimated by a gillnet test fishery on the lower Skeena River. On the average, the estimate of sockeye escapement is within 20% of the actual value, while pink escapement estimates are within 30%. Upstream, sockeye escapement is determined by the counting of fish passing through the Babine fence, while escapements of other species are estimated from ground and aerial surveys of streams. The errors in these estimates affect the decisions related to specific fisheries; fish may be forgone when run size is underestimated and, conversely, fisheries may take place that should not have when run size is overestimated.

Spawning Escapements Estimates of sockeye escaping to the Babine Lake system are very reliable. As noted earlier, each passing sockeye is counted at a fence across the Babine River. Roughly 90% of the Skeena sockeye escapement spawns in the Babine Lake system. This high degree of reliability is in contrast with estimates for other species. Spawning escapements are estimated mainly by ground surveys, although some fixed-wing aircraft and helicopter surveys are conducted. The reliability of these methods is uncertain, and the results at best reflect relative abundance rather than the actual value. Escapements of coho are probably the most poorly estimated of all salmon stocks because of their widespread temporal and spatial distribution.

Target Escapements Estimates of the target escapement for sockeye and pink salmon are derived from standard stock-recruitment analyses. Estimates for other species are from surveys conducted by Fishery Officers, and are largely based on available habitat and some assumed spawning and/or rearing capacity. The methods

employed in these surveys is not standardized and varies among officers. Accurate estimates of catch and escapement are a fundamental requirement for determination of optimum or target escapements through stock and recruitment analysis.

Timing The timing of sockeye runs for aggregate stocks is determined from weekly catch and escapement data. The migration timing of individual sockeye and pink stocks is estimated from the results of the current International Tagging Program[3] and previous tagging programs. Estimates of run timing for other species are inferred from catches, test fisheries and information on spawning time. For most of the salmon species and many of the minor sockeye stocks, timing information is sparse and can only be considered a "best guess".

Area 3 Interceptions Sockeye and pinks (probably other species as well) destined for the Skeena migrate through Statistical Area 3, and are harvested there by commercial fisheries in this area. The proportion of Skeena fish in Area 3 varies annually but, in some years, the numbers present in Area 3 can be quite high. In the case of Skeena stocks, the fisheries in outer Area 3 are managed in conjunction with those in Area 4.

Southern Southeast Alaska Interceptions The recent Canada/U.S. agreement includes fishing plans that will significantly control major sockeye interception areas in S.E. Alaska. Very large catches of pink salmon occur in Alaskan fisheries and about 5% of these fish are thought to be bound for Area 4 streams.

2.5.2 Mixed-Stock Fisheries

As discussed earlier, there are substantial overlaps in the migration timing of different Area 4 salmon stocks. Thus, when one stock is the target of a fishery, other stocks will be harvested incidentally. Because each stock has a different rate of productivity, the harvest rate cannot always match the optimal rate for each stock. In Area 4, the mix of stocks with different productivity rates has been further complicated by the production of enhanced sockeye stocks from the spawning channels in Babine Lake.

The Fulton and Pinkut systems currently have adult escapements from four to six times higher than those observed prior to the construction and operation of the spawning channels. The increased numbers of adults returning to the channels has resulted in more intensive fisheries in Area 4 to harvest the surplus. Although

the additional exploitation is confined to times of peak abundance of the enhanced stocks, there are still fish from unenhanced stocks in the fishing areas during this period. These stocks appear to be harvested at levels that are too high to permit rebuilding.

In some years, large returns of pink salmon create mixed-stock problems with chum, coho and steelhead runs. The overlap between pink and sockeye stocks has caused some difficulty in recent years when one stock is harvestable and others require some conservation measures. Although the directed chinook net fishery on the Skeena has been discontinued, a substantial number of chinooks are incidentally taken during the sockeye fishery. These are the mid- to late-running chinooks migrating to the Kitsumkalum, Ecstall, Babine and Morice rivers.

2.6 Stock Rebuilding Potential

Management of sockeye fisheries in Area 4 involves a compromise between producing target escapements of the major and most productive sockeye stocks, and achieving target escapements of the smaller and less productive stocks. Exploitation rates of enhanced sockeye stocks are lower than required to obtain the target escapement, but even so, the less productive stocks are depressed. Given current fishing patterns and the desire to optimize the sustainable yield for the entire area, these less productive stocks will remain depressed.

2.7 Management Strategies for Stock Rebuilding

Strategies for rebuilding stocks include reducing the management uncertainties and addressing the mixed-stock harvest problems described earlier in Section 2.5.

2.7.1 Management Uncertainties

Measures for reducing management uncertainties are described first:

1. Improve in-season escapement estimates: Improvements to the in-season test fishery escapement index can and should be made for both sockeye and pink stocks.

2. Improve stock identification and timing information: The identification of specific stocks in commercial fisheries (especially depressed stocks selected

for rebuilding) needs to be improved. At present the tagging studies conducted as part of the Canada/U.S. agreement provide much of this information.

2.7.2 Mixed-Stock Harvest

As mentioned previously, all fisheries directed at Skeena salmon stocks along their migration routes involve mixed-stock harvests. Those fisheries which should be modified include:

1. Alaska net (Noyes Island, Clarence Strait, Cape Fox);
2. Northern B.C. incidental net and troll (Area 1);
3. Northern B.C. directed net (Secondary Area 3 and 5, Primary - Area 4); and
4. Indian Food Fishery (Area 4 and in-river fisheries).

Options for stock rebuilding involve the modification of harvest rates and strategies in these fisheries. The current management strategy is to produce an aggregate escapement of the target stocks. Options for rebuilding include:

1. Modification of aggregate escapement goals to increase escapement of non-target stocks;

2. Modification of the operation of enhancement facilities on Babine Lake to reduce the harvest pressure in the mixed-stock fisheries in Area 4 by decreasing the surplus of enhanced fish.

3. Exploitation of enhancement opportunities for non-target stocks so they can withstand the current harvest rates.

A mixed-stock harvest problem also occurs when early pinks are abundant and late-migrating sockeye are not abundant or, conversely, when pinks are substantially less numerous than sockeye. The trade-offs between harvest of sockeye and pinks should be evaluated to provide managers with guidance in making in-season decisions. This assessment is currently in progress.

2.8 Future Stock Enhancement Activities

A relatively large number of enhancement projects has been proposed in Statistical Area 4. Projects viewed as being compatible with current management practices and their project number from Lill et al. (1983) are briefly described below.[7]

2.8.1 Upper Babine River Spawning Channel (Project No. 4-1B)

The Upper Babine River has historically been one of the major sockeye producers in the Babine Lake system. Escapements to the upper river have ranged from as many as 411,000 to as few as 33,000 spawners. In recent years, escapement have been declining and the 1980-1984 average was 110,000. By comparison, 1970-1979 average escapement to the Upper Babine River was 175,000, while the 1960-1979 average was 176,000. Recent declines have been attributed to increased exploitation by the intensive commercial fisheries directed at enhanced Fulton River and Pinkut Creek sockeye stocks. In an attempt to rebuild this declining stock to optimum levels, a 7000-m^2 un-manned spawning channel at Fort Babine has been proposed. The increased survival associated with spawning channels may be adequate to offset the high exploitation rates on this stock. This channel would have the capacity to produce 46,000 adult sockeye.

2.8.2 Morrison River Channel (Project No. 4-3)

In recent years, this tributary of Babine Lake has had sockeye escapements that are well below historical levels. Average escapements have declined from about 20,000 in the 1960's to 10,000 in the 1970's, while the average for the 1980's has decreased to only 3900. The decline is the result of the increase in fishing effort for the enhanced Fulton and Pinkut stocks. A 1000-m^2, flow-controlled side channel has been proposed for the Morrison River. The main objective of this project would be to increase the productivity of the system through improved egg-to-fry survival rates. The channel could produce about 7500 adult sockeye.

2.8.3 Fort Babine CEDP Expansion (Project No. 4-1A)

Chinook and coho stocks in the Babine River have declined dramatically from historic levels; some of the lowest escapements to date were recorded in the early

1980's. In response to this situation, a CEDP project was initiated at Fort Babine in an effort to supplement the natural production of this system. At present, the facility has an egg target of 50,000 for both chinook and coho salmon. It is proposed to expand the existing facility to handle an additional 250,000 chinook and coho eggs in cassette incubators and floating raceways. This expansion of the existing CEDP facility would result in a total adult production of 4000 to 5000 chinooks and coho.

2.8.4 Upper Skeena Central Facility (Fulton River)(Project No. 4-1D)

There is a proposal to use the existing infrastructure at the DFO Fulton River facility in the development of a central hatchery to enhance Babine, Morice and Bear chinook stocks. It is anticipated that cooperative programs can be established with the Toboggan Creek and Fort Babine CEDP groups. Chinook fry would be out-planted back into the various donor systems at varying sizes up to 5 g.

2.8.5 Kispiox CEDP Expansion (Project No. 4-24A)

The Kispiox River, like most Skeena tributaries, supports chinook and coho stocks that are presently depressed. Average chinook escapements in the Kispiox River have declined from 7500 during the 1950's to 500 during the 1980's. Average coho escapements during this same period have declined from 4200 to 340. The decline of these stocks has been primarily attributed to their interception in the northern troll fishery and Area 4 commercial fishery. In addition, large numbers of these fish are caught in sport and native food fisheries on the Skeena River. An expansion of the existing CEDP hatchery to increase chinook and coho capacity has been proposed in order to accelerate the rebuilding of these stocks.

2.8.6 Kispiox Fishway (Project No. 4-24B)

As described above, coho escapements to the Kispiox River have been seriously depressed in recent years. There is an obstruction upstream of the Nangeese confluence on the Kispiox River, limiting access to 30 km of potential habitat above the migration barrier. Construction of a 4-m rock fishway is proposed to alleviate this partial obstruction.

2.8.7 Kitsumkalum CEDP Expansion (Project No. 4-33)

The Kitsumkalum River has historically been the major chinook producer in the Skeena River system. This stock is particularly important from the perspective of recreational fisheries because it has consistently produced much larger fish than all other chinook stocks in the Skeena, as well as most of the Pacific coast. Chinook escapements to the Lower Kitsumkalum River have not declined as in other systems; this is believed to be due primarily to the early timing of the run of this stock, the majority of which passes through the commercial fishing area before intense fishing activities begin. At the present time, two CEDP facilities are located on the Kitsumkalum. The major facility is located on Deep Creek, and the smaller is at Site II. Expansions of both these facilities are proposed to accommodate additional chinooks (Cedar, Copper and Kitsumkalum stocks) and coho. The objectives of this expansion are:

1. To increase escapements, and ultimately production, of chinooks in the Cedar, Copper and Kitsumkalum rivers and coho in the Kitsumkalum River to optimum levels; and

2. To tag chinooks and possibly coho for the collection of information that can be used for fisheries management.

2.8.8 Kitsumkalum Side Channels (Project No. 4-33)

The Lower Kitsumkalum River has several side channels that are currently not utilized by salmon and steelhead. Rehabilitation of a total of 8 km of habitat on three of these side channels has been proposed. This would provide additional rearing and spawning area for both coho and steelhead. The project could possibly be combined with the Kitsumkalum CEDP operation.

2.8.9 Area 4 Stream Rehabilitation Package

There are a number of small-scale stream improvement/maintenance projects proposed for Area 4. These include:

- Maxan Lake: Storage (coho, chinook, steelhead; Project No. 4 - 7);
- Owen Creek: Annual beaver control (coho; Project No. 4 - 13);
- Morice River: Borrow pit rehabilitation (coho; Project No. 4 - 14);
- Skeena Sloughs: Improve access (pink, chum, coho; Project No. 4 - 18);
- Sandhilla Creek: Culvert access (coho, steelhead, pink; Project No. 4 - 21);
- Clifford Creek: Culvert access (coho; Project No. 4 - 27);
- McQueen Creek: Log jam removal (coho; Project No. 4 - 29);
- Goat and Glacier Creeks: Gravel buildup removal (coho; Project No. 4 - 35);
- Alwyn Creek: Annual beaver control (coho; Project No. 4 - 39);
- Prudhome Creek: Blasting/fishway repair (coho, sockeye; Project No. 4 - 47B);
- Exstew/Esker Slough: Rehabilitation (pink, chum plus chinook and coho rearing; Project No. 4 - 40).

2.8.10 Projects Requiring Further Study

Several other enhancement opportunities for Area 4 have been identified, but require further study before development should proceed. These projects are described below with project numbers from Lill et al. 1983.[7]

2.8.10.1 Morice/Nanika

There are a number of related initiatives which have the potential to significantly affect sockeye production from this system. These could include:

1. Reduction of Moricetown native food fishery;

2. Ongoing fertilization of Morice Lake (Project No. 4 - 11C); and

3. Installation and operation of an incubation system to result in higher egg-to-fry survival within the Nanika River.

At present, however only a technical review of existing data is recommended.

2.8.10.2 Stream Rehabilitation Programs

- Moricetown:	Fishway modifications (all species except chum; Project No. 4 - 11D);
- Buck Creek:	Stream improvement (all species except chum; Project No. 4 - 9);
- Canyon Creek:	Storage development (coho, steelhead; Project No. 4 - 17);
- Williams Creek:	Log jam removal (sockeye, coho; Project No. 4 - 34F);
- Khyex River:	Stream clearance, barrier removal (all species except sockeye; Project No. 4 - 33);

2.8.11 Steelhead Enhancement

The M.O.E. Fisheries Branch is undertaking a fry stocking program for three to five years to rebuild the Bulkley/Morice steelhead stocks. Fry stocking above obstructions should not be viewed as a mitigative measure to compensate for increased exploitation rates, because the fundamental productivity of the mainstem and tributary stocks has not changed, despite interceptions of steelhead in commercial fisheries. The rebuilding program is an interim measure to maintain stock levels until interceptions by the commercial fishery can be reduced.

Potential enhancement opportunities that would lead to habitat improvement have been identified, such as maintaining a constant flow in side channels during winter. The latter technique remains in the developmental stage, but could be explored should funds and expertise be dedicated to this method of enhancement.

2.9 Results of Simulation Modelling of Management Options

As indicated in Section 1.8, the large North Coast stock-fishery model was used to evaluate the potential implications of management options for Area 4 in terms of escapements and catches. From an Area 4 perspective, current management conditions include the consideration of interception fisheries on Skeena stocks in Alaska, Area 1 and Area 3. Fisheries in Area 4 include an early sockeye fishery

managed to an escapement target of one million sockeye, and a later pink salmon fishery managed to an escapement target of one million pinks. Due to overlap in the migration timing of these stocks, it was assumed for the modelling that one third of the pink salmon would be vulnerable to the sockeye fishery. The timing of chum salmon migration overlaps equally with the sockeye and pink salmon fisheries.

Under current management conditions, the escapements of actively-managed Skeena sockeye stocks would average about 840,000 spawners, which exceeds the target of 770,000 (Figure 25). Escapements of passively-managed Area 4 sockeye stocks were projected to gradually decline from 16% of target to 10% of target (Figure 26). The average catch of sockeye in Area 4 and upper Area 5 was estimated at 1.4 million, which is equivalent to about 60% of the total sockeye catch (2.24 million) in the North Coast (Table 11, Figure 27).

Pink salmon escapement to Area 4 is predicted to remain relatively stable, averaging 800,000 spawners (Table 12, Figure 28) with actively-managed stocks at 50% of target and passively-managed stocks at less than 20% of target. Over half (740,000) of the total North Coast catch of pink salmon (1.34 million) would be harvested in Area 4 and Upper Area 5 (Figure 29 and Table 12). Chum salmon escapements to Area 4 are projected to decline rapidly to less than 1% of target (Figure 30). Incidental chum salmon catch in Area 4 and upper Area 5 was predicted to average 7000, or about half of the total chum catch (16,000) in the North Coast (Table 13).

Management Option 1 for the Skeena system was directed at rebuilding the non-Babine sockeye stocks by increasing the aggregate sockeye escapement target. This objective is achieved when the aggregate target is increased to 1.5 million spawners (Figure 26). This aggregate escapement target corresponds closely with the sum of the capacity of the spawning channels (770,000) and the optimum escapement for Skeena sockeye (800,000 to 900,000 spawners) estimated from a stock recruitment relationship which was derived prior to enhancement.[13] Although Option 1 is expected to result in higher Babine sockeye escapements, which exceed the target by about 550,000 fish (Figure 25), passively-managed sockeye stocks are projected to start rebuilding immediately and would increase to within 70% of the target within 40 years. Pink salmon escapements were also predicted to be higher by about 50,000 spawners than under current management conditions because fewer pinks would be intercepted in the sockeye fisheries. Chum salmon escapements were predicted to be marginally higher than under current management but would continue to decline.

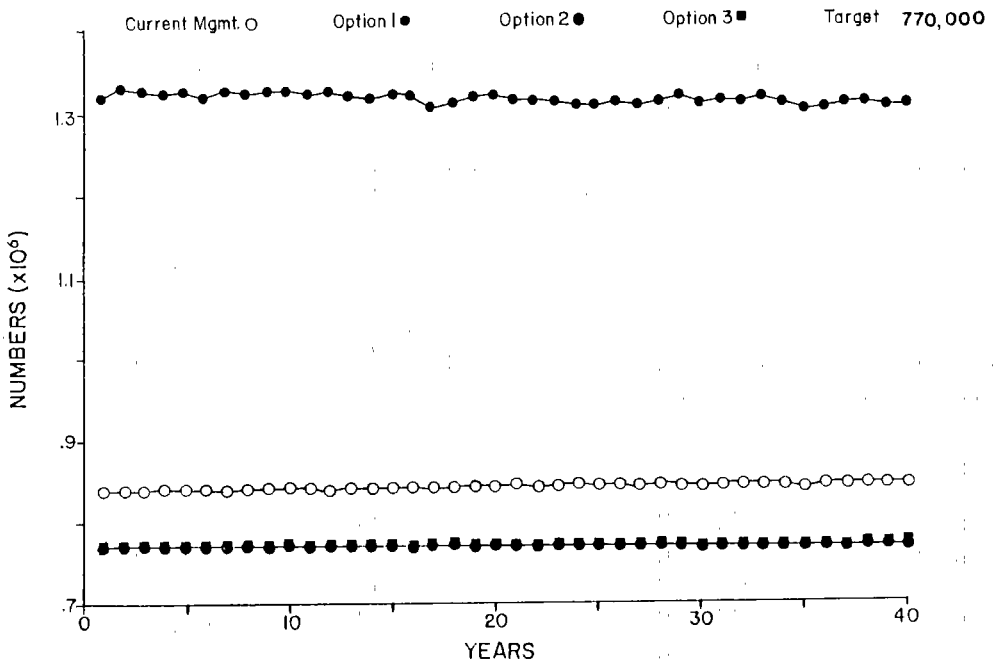

Figure 25. Projected escapements of actively-managed Skeena sockeye under current management, Option 1 (increased sockeye target), Option 2 (Babine fence fishery) and Option 3 (Option 1 plus 2).

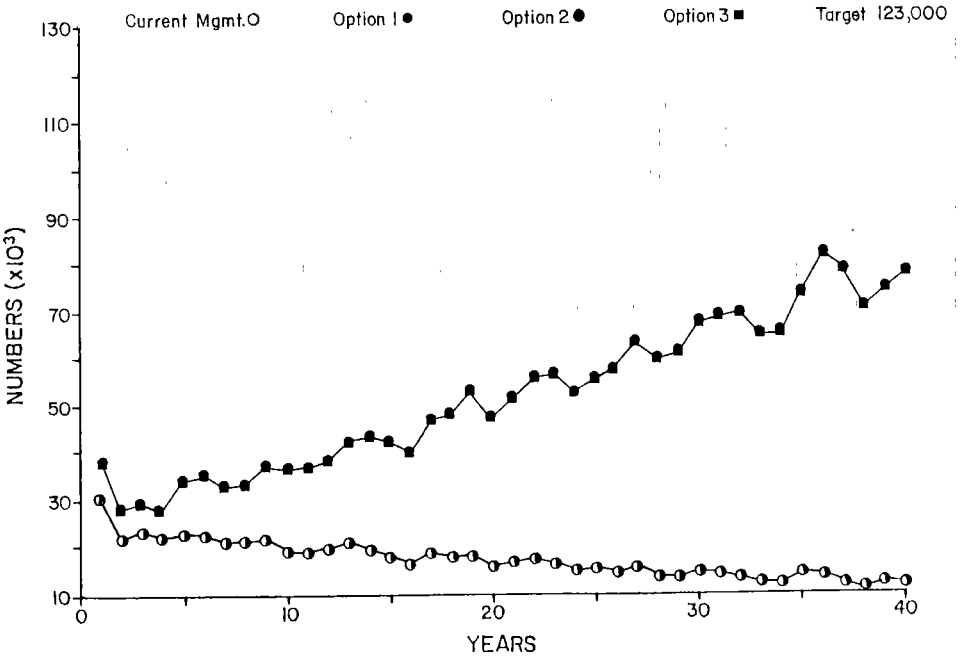

Figure 26. Projected escapements of passively-managed Skeena sockeye under current management and Options 1, 2 and 3 (see above).

Table 11. Summary of 40-year average catch and escapement of Canadian sockeye salmon for each Management Option in Area 4.

Catch and Escapement Area	Current Management	Option 1 (Increased sockeye target)	Option 2 (Current Management plus Babine fence fishery)	Option 3 (Option 1 plus Babine fence fishery)	Option 4 (Increased pink target)
Catch by Fishery					
U.S. Interception	320,000	320,000	320,000	320,000	320,000
Canadian Interception	**55,000**	**56,000**	55,000	**56,000**	**55,000**
Area 3	**290,000**	**300,000**	290,000	**300,000**	290,000
Area 4 & Upper Area 5	**1,400,000**	**930,000**	**1,500,000**	**1,500,000**	**1,400,000**
Lower Area 5	**0**	**1,300**	**0**	**1,300**	**0**
Indian Food Area 3	20,000	20,000	20,000	20,000	20,000
Indian Food Area 4	150,000	150,000	150,000	150,000	150,000
Indian Food Area 5	1,100	1,100	1,100	1,100	1,100
TOTAL CATCH	**2,240,000**	**1,780,000**	**2,340,000**	**2,350,000**	**2,240,000**
Escapements					
Area 3	190,000	190,000	190,000	190,000	190,000
Area 4	**860,000**	**1,370,000**	**790,000**	**820,000**	860,000
Area 5	**1,600**	**2,400**	1,600	**2,400**	**1,600**

Note: Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

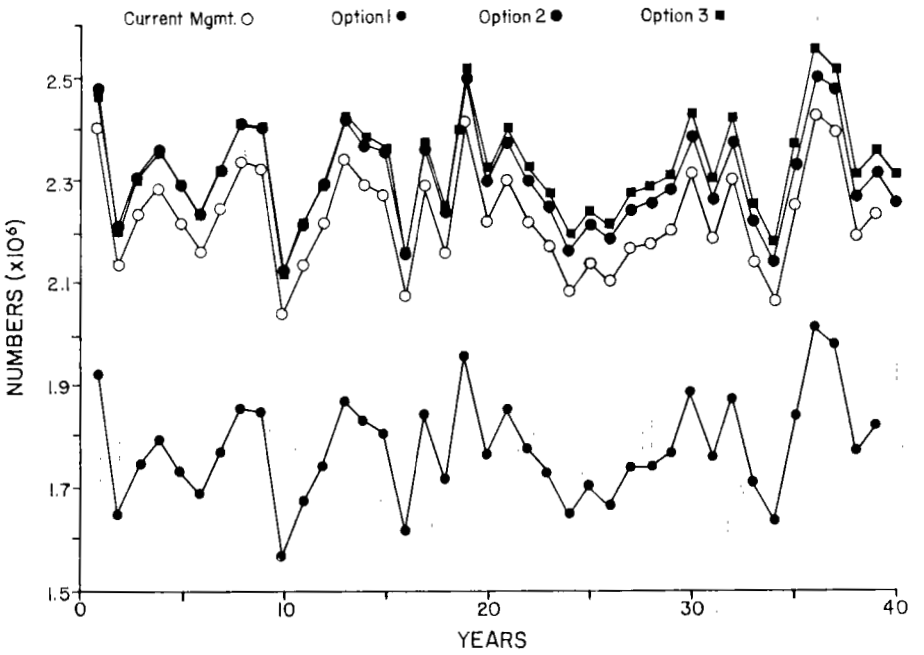

Figure 27. Projected catches of Area 4 sockeye under current management, Option 1 (increased sockeye target), Option 2 (Babine fence fishery) and Option 3 (Option 1 plus 2).

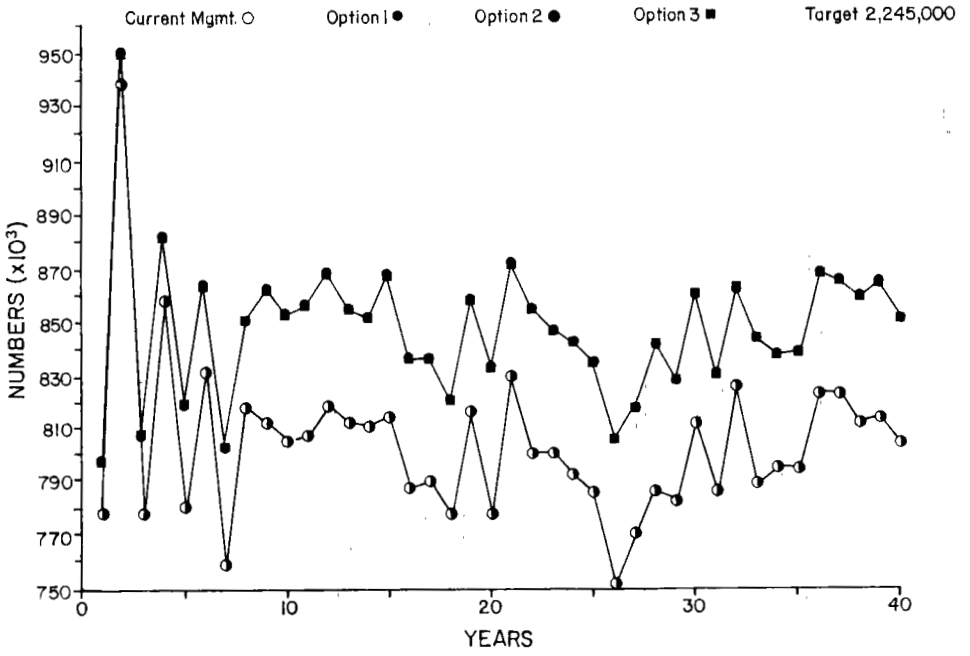

Figure 28. Projected escapements of Area 4 pinks under current management and Options 1, 2 and 3 (see above).

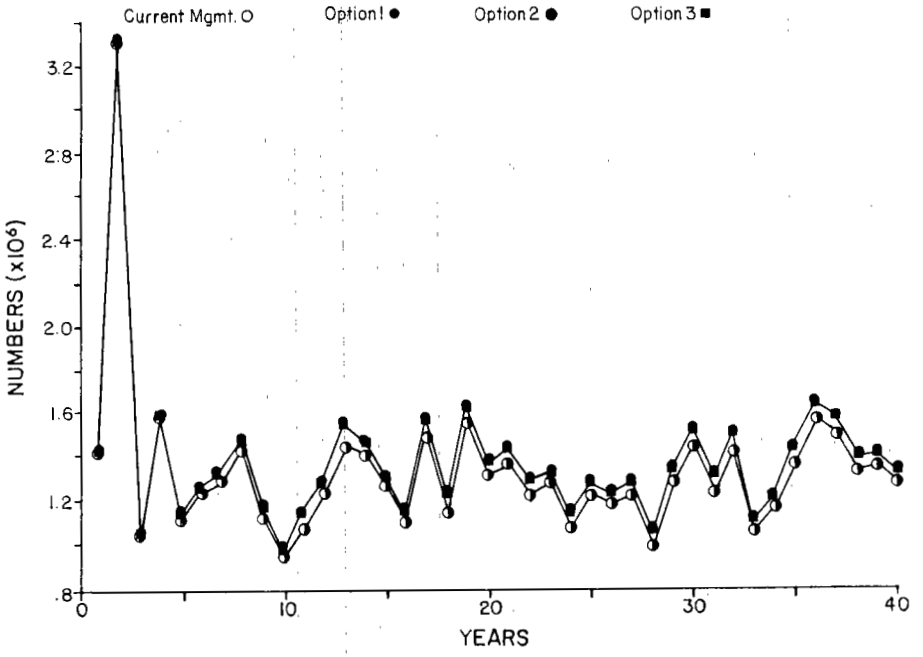

Figure 29. Projected catches of Area 4 pinks under current management, Option 1 (increased sockeye target), Option 2 (Babine fence fishery) and Option 3 (Option 1 plus 2).

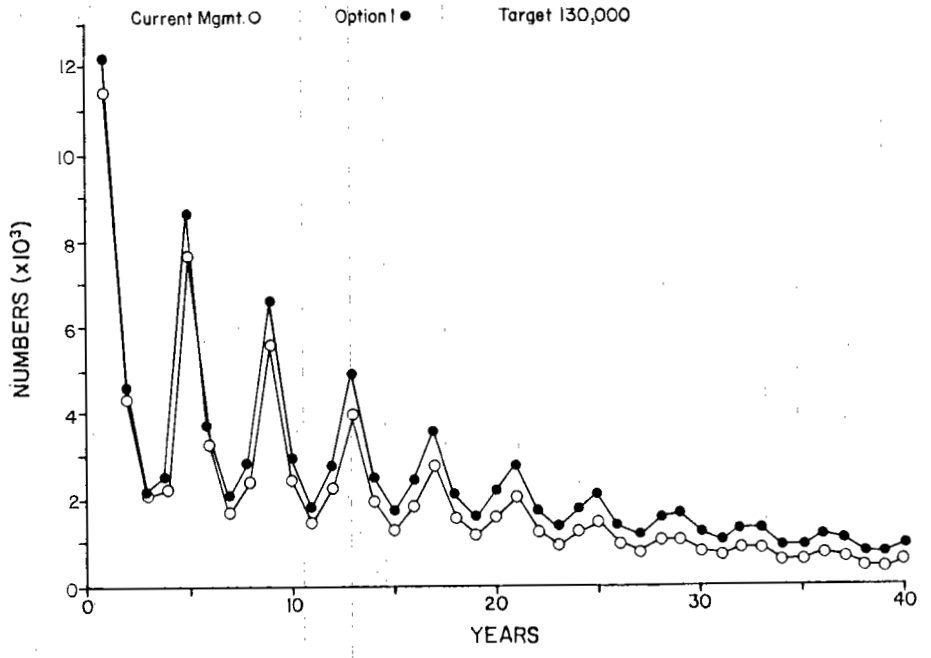

Figure 30. Projected escapements of Area 4 chums under current management and Option 1.

Table 12. Summary of 40-year average catch and escapement of Canadian pink salmon for each Management Option in Area 4.

Catch and Escapement Area	Current Management	Option 1	Option 2	Option 3	Option 4
Catch by Fishery					
U.S. Interception	**150,000**	**155,000**	150,000	**155,000**	**256,000**
Canadian Interception	**73,000**	**76,000**	73,000	**76,000**	**123,000**
Area 3	**350,000**	**360,000**	350,000	**360,000**	**450,000**
Area 4 & Upper Area 5	**740,000**	**770,000**	740,000	**770,000**	**1,220,000**
Lower Area 5	**0**	**3,000**	**0**	**3,000**	**3,000**
Indian Food Area 3	**3,000**	**4,000**	3,000	**3,500**	**3,500**
Indian Food Area 4	**22,000**	**15,000**	22,000	**15,000**	**46,000**
Indian Food Area 5	<50	<50	<50	<50	75
TOTAL CATCH	**1,340,000**	**1,380,000**	1,340,000	**1,380,000**	**2,100,000**
Escapements					
Area 3	320,000	320,000	320,000	320,000	320,000
Area 4	**800,000**	**850,000**	800,000	**850,000**	**1,690,000**
Area 5	**6,000**	**5,500**	6,000	**5,500**	**14,000**

Note: Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

Table 13. Summary of 40-year average catch and escapement of Canadian chum salmon (from Areas 3, 4, 5) for each Management Option in Area 4.

Catch and Escapement Area	Current Management	Option 1	Option 2	Option 3	Option 4
Catch by Fishery					
U.S. Interception	**3,000**	3,000	3,000	3,000	**4,000**
Canadian Interception	100	100	100	100	100
Area 3	5,000	5,000	5,000	5,000	**6,000**
Area 4 & Upper Area 5	7,000	7,000	7,000	7,000	7,000
Lower Area 5	**0**	**800**	0	**800**	0
Indian Food Area 3	<50	<50	<50	<50	<50
Indian Food Area 4	100	100	100	100	200
Indian Food Area 5	600	600	600	600	600
TOTAL CATCH	**16,000**	**17,000**	16,000	**17,000**	**18,000**
Escapements					
Area 3	**9,100**	**10,000**	9,100	**10,000**	**11,000**
Area 4	**1,400**	**1,700**	1,400	**1,700**	**2,100**
Area 5	**1,700**	**2,000**	1,700	**2,000**	**2,000**

Note: Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

Option 1 is not expected to affect escapements in Area 3. Minor changes in escapements to Area 5 would occur because interception of these stocks in Area 4 would be reduced.

The catch of sockeye salmon would decline substantially due to the higher escapement target. Average sockeye catch in Area 4 and upper Area 5 would decline from 1.4 million to 930,000, while average total catch in the North Coast would decline from 2.24 to 1.78 million. The pink salmon catch would increase from 1.34 million to 1.38 million, while the change in chum salmon catch would be negligible. The net present value (NPV)* declines from $499.3 million under current management to $414.6 million under Management Option 1. This decreased value is attributable to the decline in catch of sockeye salmon resulting from a higher escapement target for Area 4.

The value of the fishery could be increased if an additional fishery were established at the Babine fence to harvest the surplus fish. Options 2 and 3 include a fence fishery which operates under current management and Option 1 management conditions, respectively. Escapements projected under Option 2 are the same as under current management, with the exception that the actively-managed Skeena sockeye are consistently at the target level. The passively-managed Skeena sockeye continue to decline as predicted in the current management regime. Escapements projected under Option 3 are the same as for Option 1, except that Babine sockeye are held at target levels. The passively-managed sockeye stocks are expected to increase at the same rate as in Option 1. Projected average catches for Option 2 and 3 are similar to catches in the current management scenario and Option 1, respectively, with the exception that the sockeye catch in Area 4 increases to 1.5 million due to the additional harvest at the fence. The results of the modelling indicate that even when reduced quality of the catch at the fence is taken into consideration, the NPV* of the fishery is $511.3 million and $505.8 million under Management Options 2 and 3, respectively. Both values exceed the estimated NPV* of $499.3 million in the current management scenario. Option 3 has a lower NPV because a greater portion of the catch is harvested at the fence and has a lower quality. However, this option does allow the rebuilding of passively-managed sockeye stocks.

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*net present value of the projected 40 years of harvest, discounted at 10% per year.

Management Option 4 was directed at increasing pink salmon escapements in the Skeena watershed to the target level. Currently, the fishery is managed for an escapement target of one million pink salmon, although the individual targets for each system (Lakelse, Babine, Kitwanga, Kispiox and the passively-managed stocks) total 2.2 million fish. Option 4 involves increasing the escapement target for pink salmon in the Skeena to 2.2 million. Under this management strategy, the escapement of actively-managed pink salmon stocks would approach 90% of target levels (Figure 31), while passively-managed stocks would begin to rebuild (Figure 32). The total average escapement of pinks to Area 4 would increase from 800,000 to 1,690,000 spawners. Increasing the aggregate escapement target in Area 4 and upper Area 5 would reduce interception of pink salmon originating in Area 5. Therefore, average escapements of Area 5 pinks would increase from 6000 spawners to 14,000 spawners. Although escapement levels would be higher, Area 5 pink stocks would continue to decline as projected under current management. The average chum salmon escapements in all three areas would increase slightly because of reduced interceptions in the pink salmon fishery (Table 13).

The average catch of pink salmon would increase in all fisheries due to increased production from the additional spawners (Table 12). Although the pink salmon catch under Option 4 would be less than under current management conditions in the first few years, catches would increase over time (Figure 33). The total average catch of pinks in the North Coast would increase from 1.34 million under the current management regime to 2.10 million in Option 4. The catch of chum salmon would increase slightly from 16,000 under the current management regime to 18,000 in Option 4 (Table 13). The NPV* of the harvest in Option 4 was estimated at $532.8 million, which is $33.5 million more than in the current management regime.

2.10 Results of Simulation Modelling of Enhancement Options

Two projects are proposed for the enhancement of sockeye in the Skeena River system: one on the upper Babine River, and the other on the Morrison River. Both stocks are part of the actively-managed sockeye stock aggregate that is most important to the Skeena River fishery. The upper Babine River stock returns slightly later than the enhanced Fulton and Pinkut stocks, while the run timing of

*Net present value of the projected 40 years of harvest, discounted at 10% per year.

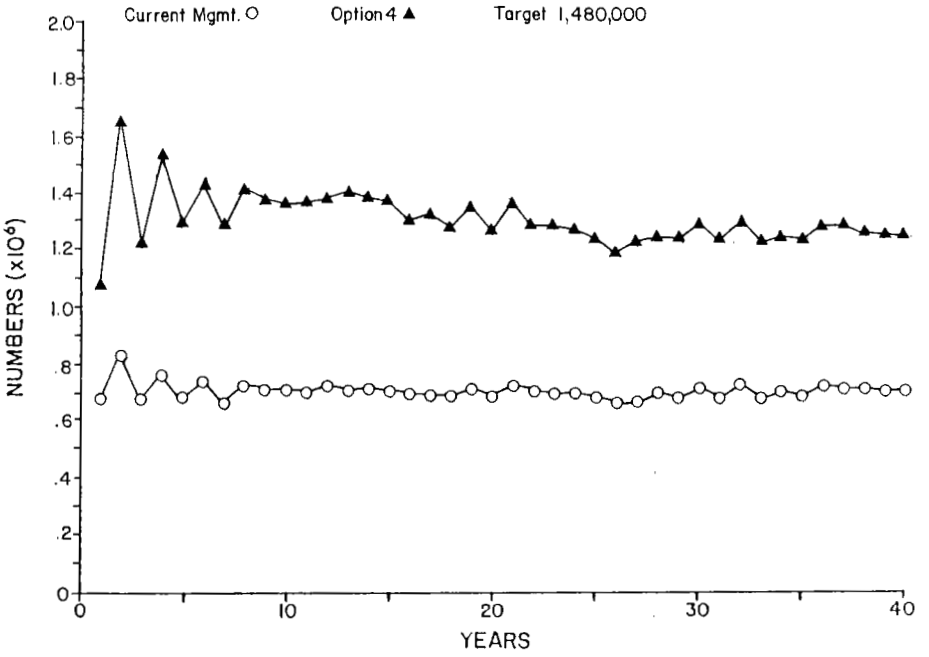

Figure 31. Projected escapements of actively-managed Skeena pinks under current management and Option 4 (increased pink target).

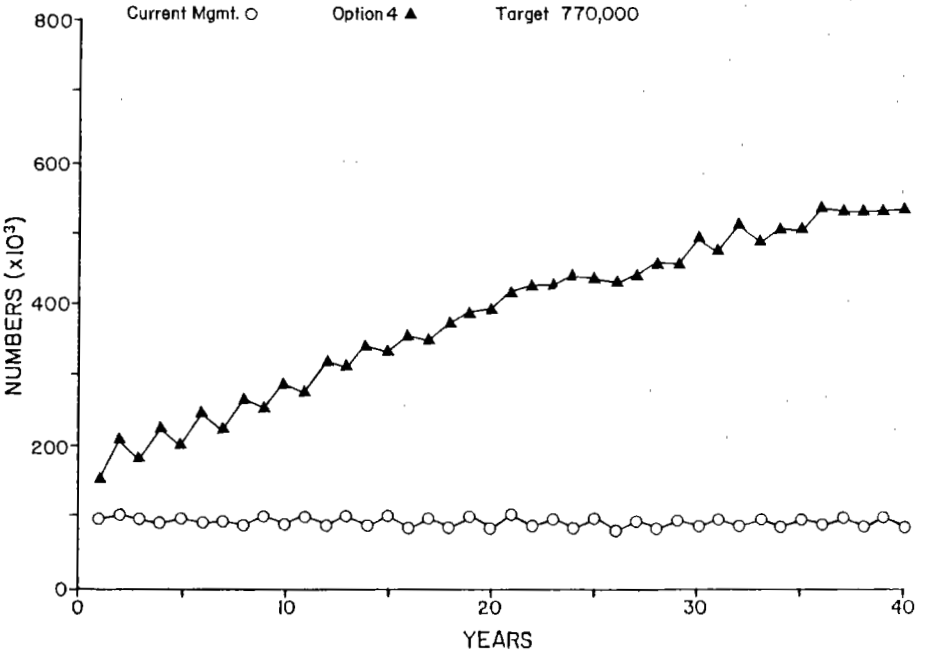

Figure 32. Projected escapements of passively-managed Skeena pinks under current management and Option 4 (see above).

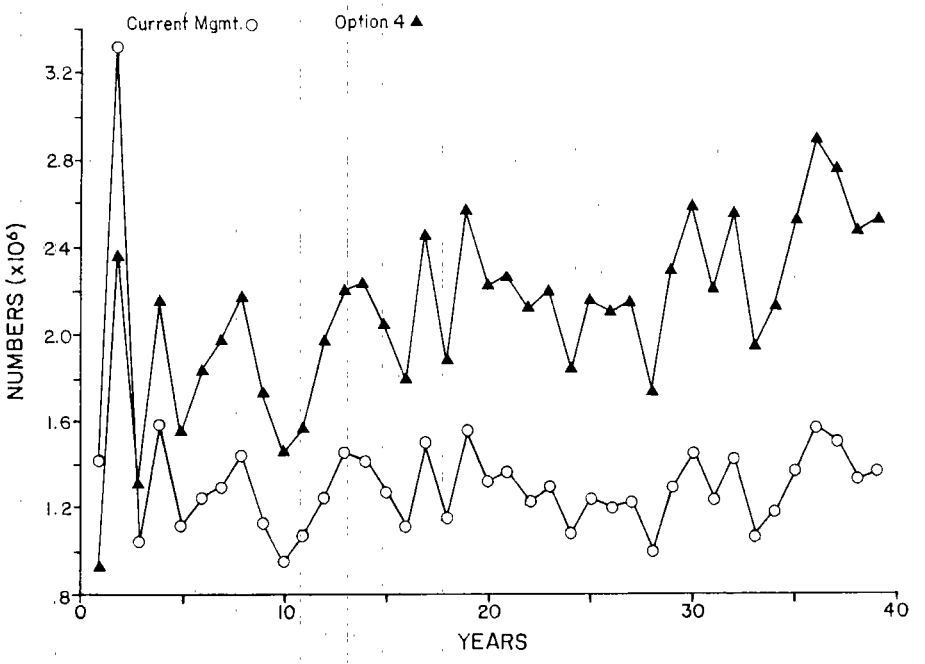

Figure 33. Projected catches of Area 4 pinks under current management and Option 4 (increased pink target).

the Morrison River stock is precisely between these two stocks. Both of the projects involve development of unmanned spawning channels to increase the productivity of stocks, thereby allowing them to withstand the harvest pressure directed at Fulton and Pinkut stocks.

The simulation for the upper Babine River spawning channel assumes an additional production of 46,000 sockeye salmon, but this project is not predicted to change escapement levels of any stocks. The actively-managed Babine sockeye stocks would continue to exceed escapement targets, even though the target was increased by 15,000 spawners to account for the capacity of the new channel (Figure 34). Passively-managed sockeye stocks would decline as predicted in the current management regime (Figure 35). The average catch of sockeye salmon would increase by 40,000 in response to the additional enhanced production (Figure 36, Table 14).

Most chinook stocks pass through the commercial fishery prior to the Babine and Morrison River sockeye migrations and, therefore, interception of chinooks is not expected to change as a result of enhancement of sockeye stocks. However, several steelhead stocks are present in the fishery at this time. Therefore, enhancement of the Babine and Morrison River sockeye stocks could have adverse effects on some steelhead stocks. Changes in harvest strategies should consider the implications to steelhead. Under this enhancement strategy, the NPV* increases from $499.3 million in the current management scenario to $507.1 million. The Morrison River enhancement project would be smaller and produce an additional 7400 sockeye salmon. It is not expected to significantly affect escapement or catch of sockeye to the Skeena River system.

At present, there are only limited opportunities for enhancement of non-Babine sockeye stocks. Therefore, any immediate increases in the size of these stocks will have to rely on management action.

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*net present value of the projected 40 years of harvest, discounted at 10% per year.

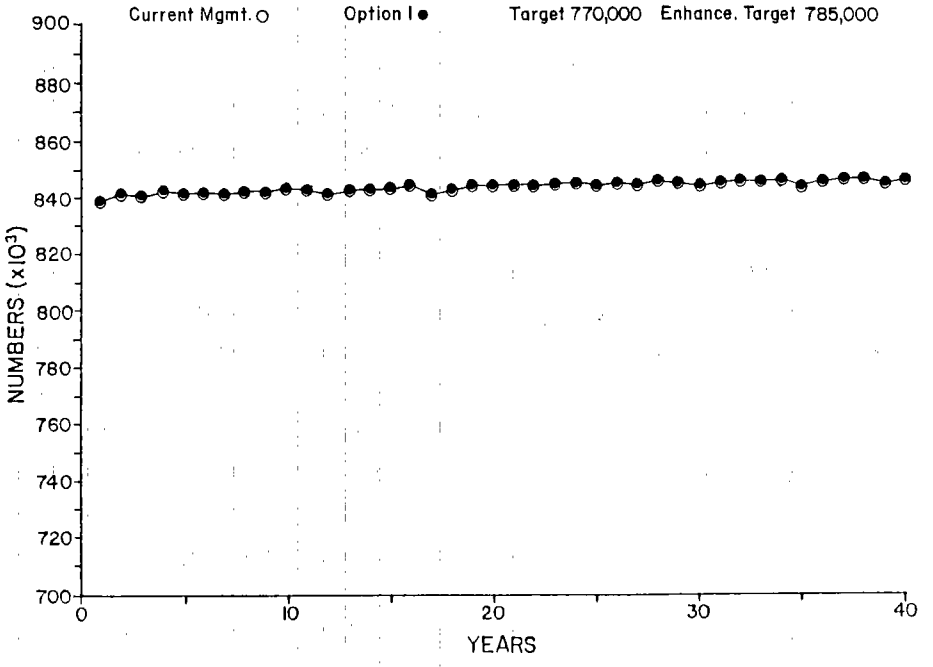

Figure 34. Projected escapements of actively-managed Skeena sockeye under current management and Enhancement Option 1 (upper Babine spawning channel).

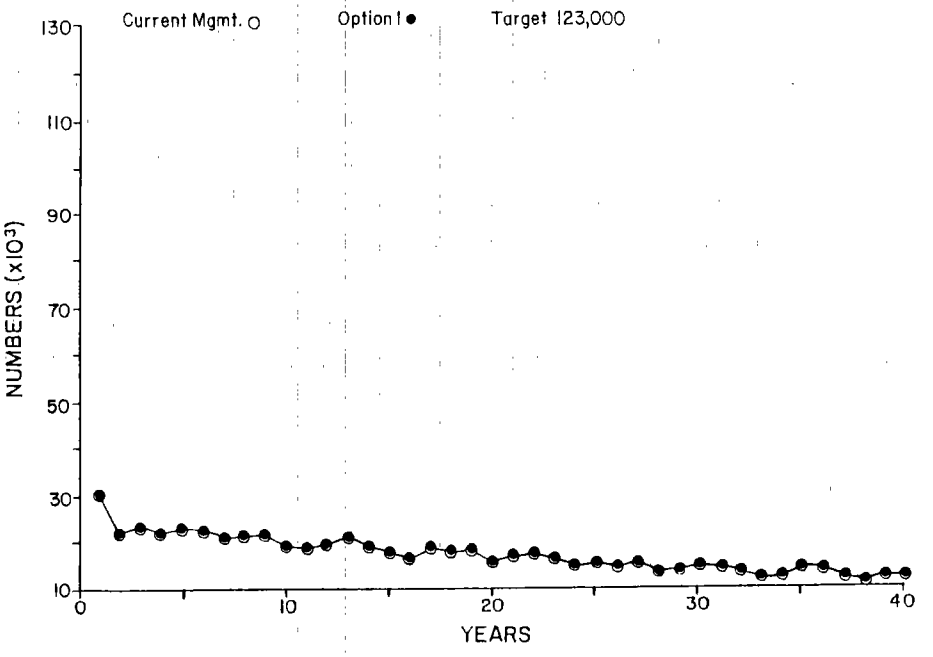

Figure 35. Projected escapements of passively-managed Skeena sockeye under current management and Enhancement Option 1 (see above).

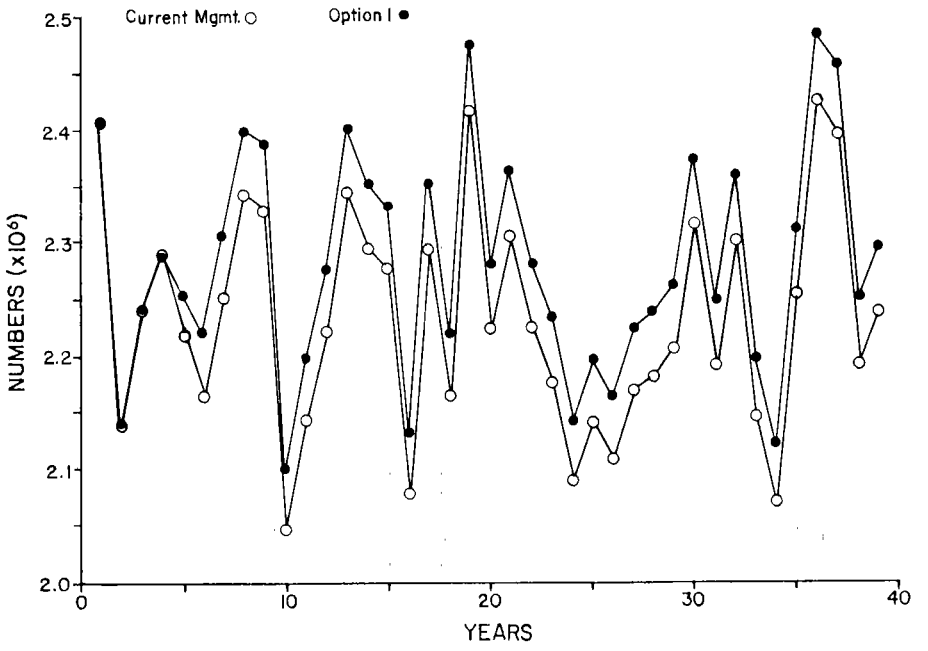

Figure 36. Projected catches of Area 4 sockeye under the current management regime and Enhancement Option 1 (Upper Babine spawning channel).

Table 14. Summary of 40-year average catch and escapement of Canadian sockeye salmon under Current Management and Enhancement Option 1 in Area 4.

Catch and Escapement Area	Current Management	Enhancement Option 1 (Upper Babine Channel)
Catches by Fishery		
U.S. Interception	320,000	320,000
Canadian Interception	**55,000**	**56,000**
Area 3	**290,000**	**295,000**
Area 4 & Upper Area 5	**1,400,000**	**1,435,000**
Lower Area 5	0	0
Indian Food Area 3	20,000	20,000
Indian Food Area 4	150,000	150,000
Indian Food Area 5	1,100	1,100
TOTAL CATCH	**2,240,000**	**2,280,000**
Escapements		
Area 3	190,000	190,000
Area 4	860,000	860,000
Area 5	1,600	1,600

Note: Bold faced numbers indicate differences in catch or escapement of the enhancement compared to the current management regime.

3. STATISTICAL AREA 5

Statistical Area 5 includes Pitt Island, Banks Island and the southern end of Porcher Island (Figure 37 and Table 15). The two primary salmon-producing areas in this region are Principe Channel between Banks and Pitt Islands, and Grenville Channel between Pitt Island and the mainland. Sockeye and pink salmon fisheries operating in the region are directed primarily at passing Skeena stocks. Detailed information on present stock status, current fishing patterns, habitat status and distribution of disease agents are provided in Appendices Ic, IIc, IIIc and IV, respectively.

Area 5 is comprised mainly of offshore islands. The topography is less rugged than other areas along the coast, and watershed elevations are generally lower. Natural vegetation along the inside channels is mature forest and on the outer islands is scrub forest and muskeg. Rainfall is heaviest in the winter and lowest in the summer. Streams in the area are short and dependent on regular precipitation to maintain flows adequate for fish production. Very little industrial development has occurred in the area. Only a few streams have been logged and the remainder are pristine. The major community in Area 5 is Kitkatla Village on Dolphin Island with a population of 500. Several homesteaders have settled in the area.

3.1 Stock Description

There are 89 sockeye, pink and chum stocks in the area.[14] Although most of these stocks are passively managed during the fishing season, several small pink stocks are actively managed in late summer by opening or closing terminal net fisheries. An overview of the salmon stocks found in Area 5 is provided in the following sections by species.

3.1.1 Sockeye Salmon

All 19 sockeye stocks found in Area 5 are small, with recent escapements of less than 2000 fish to any lake system. Eleven sockeye stocks are found in Principe Channel. The stocks approach through two principal migratory routes. Approximately 80% of the sockeye come from the north via Noyes Island (Alaska) and Statistical Area 4, while the remaining 20% migrate through Area 1 from the northwest. Area 5 sockeye runs occur from early June to early August, and peak in

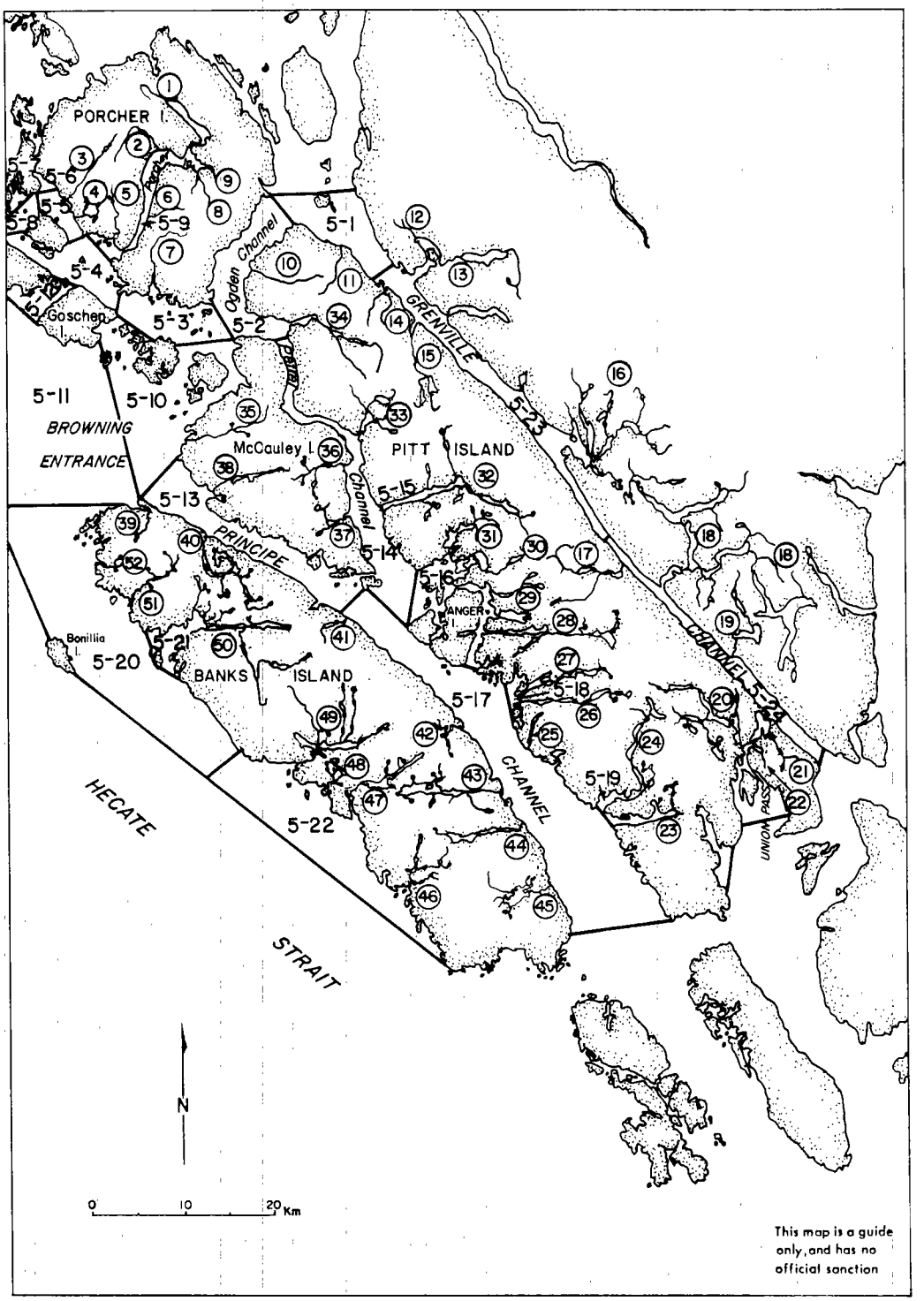

Figure 37. Statistical Area 5, showing DFO Management Units and salmon spawning streams (see Table 15 for key to streams).

Table 15. Key to salmon spawning streams in Statistical Area 5, as shown in Figure 37.

No.	Stream Name (or alternative)	No.	Stream Name (or alternative)
10	Alpha Creek (Alph Bay Creek)	43	Kooryet Creek (Kooryet Lake System; Bare Bay Creeks)
49	Banks Lake (Banks Lake System Quitonsta Lake System, Quitonsta Creek)	11	Kubas Creek (Salmon River)
19	Belowe Creek (Seven Mile Creek; Belowe Lake Creek)	13	Kumealon Creek (Kumealon River)
7	Billy Creek (Billy Bay Creek)	12	(Kumealon Lagoon Creek; North Kumealon Creek)
42	(Bolton Creek)	22	(Lagoon Creek; Union Pass Creek)
50	(Bonilla Arm Creeks; Kingkown Inlet Creeks)	47	(Lewis Creek; Waller Bay Creek)
34	(Captain Cove Creek)	18	(Lowe Inlet System; Lowe Inlet Creeks)
28	Curtis Creek (Curtis Inlet Creek)	31	(Markle Inlet Creek; Markle Creek)
39	(Deadman Inlet Creek; Deadman Creek)	26	(Mikado Lake System; Mikado Creek)
45	(Deer Lake Creek; Deer Point Creek)	23	(Monckton Inlet Creeks)
24	(Devon Lake System; Mink Trap Lake System)	33	(Newcombe Harbour Creeks)
40	(Endhill Creek; Endhill Bay Creek)	25	(Oar Point Creek)
14	(False Stewart Creek; Stuart Bight Creek)	15	Pa-aat River (Salmon River; Kubas River)
1	Foote Creek (Salt Lagoon Creek; Beaver Creek)	5	Phoenix Creek (Andrew Lewis Creek)
35	(Hankin Creek; Ka-Alb Creek)	2	Porcher Creek (North Canyon Creek; Canyon Creek)
9	(Head Creek)	24	(Port Stephens Creek)
32	(Hevenor Inlet Creeks)	52	(Rawlinson Anchorage Creek)
48	(Indian Harbour Creek; Foul Bay Creeks)	37	(Ryan Creek)
44	Keecha Creek (Gale Lake System)	36	(Shaw Creek)
46	(Kenzuwash Creeks)	29	(Sheneeza Creek)
38	(Keswar Inlet Creek; Table Bay Creek)	51	Skull Creek; Keneegibaal Creek)
3	Kitkatla Creek	4	(Snass Creek; Snaas Point Creek)
16	(Klewnuggit Inlet Creeks; Klewnuggit Creeks)	41	(Spencer Creek)
		21	(Stewart Creek; Stewart River)
		17	(Three Mile Creek; Salter Lake Creek)
		20	(Union Passage Lake System; Tsimtack Lake System)
		6	(West Creek)
		30	(Wilson Inlet Creek; Wilson)
		8	(Wolf Creek; Creek Opposite Salt Lagoon)

mid-June. Recent management estimates suggest that sockeye production in all Area 5 systems is depressed. The 1980-1984 average escapement for all Area 5 sockeye-producing streams was approximately 17,400, which is only 35% of the target escapement for the area.

3.1.2 Pink Salmon

The most productive of the 40 pink stocks in the region originate in upper Grenville Channel streams. The next most productive areas are Porcher Inlet and Ogden Channel between Porcher and Pitt Islands. These three areas account for approximately 70% of the 160,000 even-year and the 110,000 odd-year pink escapement. Pink stocks approach Area 5 by three principal migratory routes: from the north through Hecate Strait; from the southeast through Area 1; and from near Noyes Island (Alaska) and then through Areas 1 and 4. The timing of spawning migrations of Area 5 pinks is from early August to mid-September, and peaks in late August. Escapement estimates suggest that all Area 5 pink stocks are depressed. The 1980-1984 average escapements were only 50% and 39% of the target escapements for even-year and odd-year stocks, respectively.

3.1.3 Chum Salmon

There are 30 chum stocks in Area 5 and all are currently depressed. None of the Area 5 streams that support chum stocks had an escapement of more than 2000 fish during the period from 1980 to 1984. The total average chum escapement for all Area 5 streams was approximately 7300, which is only 20% of the target level for the area.

3.1.4 Chinook Salmon

Streams in Area 5 have extremely limited potential for supporting chinook salmon. There are only two chinook stocks present in the area and the annual escapements of each stock are about 25 spawners.

3.1.5 Coho Salmon

There are 54 coho stocks in Area 5. Escapement of these stocks is well below historical levels and has not achieved the target level of 55,500 since the 1960's. For example, the average escapement during the period from 1980 to 1984 was

about 11,000 coho. There are no fisheries directed at these stocks although large incidental catches of coho do occur in the fisheries for pinks during August and September.

3.2 Fisheries

From about the first to second week in July to mid-August, the Area 5 fishery is based on the abundance of Skeena River sockeye and pink stocks migrating through the area. Consequently, openings in Area 5 generally occur at the same time as openings in Area 4. During this period, local stocks are managed to reduce exploitation rates and, at the same time, permit fisheries for the more abundant Skeena stocks. Target escapements are established for all local stocks. Management is not shifted to local stocks until the Skeena stocks are through Area 5. At this time (usually mid- to late August), pinks, chums and coho are the predominant species taken in the Area 5 fishery. Management is directed mainly at pink stocks, and various Management Units are closed to protect local chum and coho stocks. Area 5 is generally closed to net fishing by mid-September.

Area 5 is divided into two areas for the purpose of fisheries management. One area includes the major channels believed to be migration routes for Skeena stocks (M.U. 5-1, 5-2, 5-3, 5-10, 5-11 and 5-12), while the second area includes the inlets and bays where local stocks predominate (M.U. 5-4 to 5-9, 5-13 to 5-17, 5-20, 5-22, and 5-23). Commercial fisheries in the second group of areas may be opened periodically throughout the season to assess local stock abundance (e.g., at the top of Principe Channel, Petrel Channel, Ogden Channel, Porcher Inlet and the northwest shore of Banks Island).

Area 5 supports both gillnet and seine fisheries. Gillnetters currently catch the majority of the sockeye, coho and chum, while seiners harvest most of the pinks and chinook. Although the proportion of species caught by each gear type has fluctuated, it has remained relatively stable over the years. The only exception to this is a decline in the proportion of pinks taken in gillnets. Gillnetters and seiners operate in the same areas, although gillnetters usually begin fishing in the end of June or early July, while seiners begin in mid-July. The current fisheries management strategy for each species is discussed below.

3.2.1 Sockeye Salmon

Virtually all of the sockeye stocks in Area 5 are depressed and, therefore, directed fisheries are not currently proposed in fishing plans. These stocks run earlier in Area 5 than do Skeena sockeye, although overlap in the migration timing does occur, and local sockeye are incidentally harvested in the fisheries for Skeena stock. The abundance of local sockeye stocks is assessed at the time of Indian food fisheries in early June and by Fishery Officers' observations of abundance in local inlets and spawning streams later in the year.

3.2.2 Pink Salmon

Until mid-August, catches of local pinks are incidental in fisheries for Skeena pinks. By the third to fourth week of August, Skeena stocks are largely through the fisheries in Area 5, and management is directed toward local pink stocks. No stock or stock aggregate consistently forms the basis of the commercial fishery. The abundance of each stock is assessed from information on catch and escapement and depending on which stock(s) is abundant, specific Management Units are opened or closed to maximize the harvest of the target stock(s) and avoid interception of non-target stocks.

3.2.3 Chum Salmon

Until the end of August, catches of chums occur incidentally during the harvest of Skeena sockeye and pinks. By the end of August, local chum stocks arrive in the fishing area. However, recent information suggests that the chums may arrive earlier, but delay migration into the local streams by remaining in the major inlets and channels. A large proportion of the chums harvested in July - August are expected to be passing stocks bound for the Central Coast and possibly Area 4. No local chum stock or stock aggregate is consistently the target of commercial fisheries. Abundant stocks are harvested by regulating the opening of Management Units to limit fishing to those areas where the target stock is predominant and other stocks are less abundant.

3.2.4 Chinook Salmon

There are only two chinook stocks in Area 5. All chinook catches are incidental, and are composed of passing stocks. Recently, early openings of the

chinook fishery in Management Units 5-20 and 5-22 of Area 5 were closed to net fishing to reduce the relatively high chinook catches. In additional, openings of the seine fisheries have been delayed to mid-July to further reduce interceptions of chinooks and to coincide with openings for seiners in other northern areas.

3.2.5 Coho Salmon

Coho stocks in Area 5 are considered depressed and, consequently, there are no fisheries directed specifically at this species. Coho catches are incidental, and management of these stocks consists of reducing the rate of coho exploitation during directed pink fisheries.

3.3 Current Enhancement Activities

There are no salmon enhancement facilities in Statistical Area 5. The major components of the Area 5 sockeye stock originate from Union Pass and Bonilla, Curtis, Lowe and Devon lakes. Lowe Lake was initially enriched in 1979, and Bonilla, Curtis, and Devon lakes were fertilized in 1980. The nutrient enrichment programs for all four lakes have continued since these dates.

3.4 Habitat Status

This section describes the habitat status of salmon-producing streams in Area 5. Table 16 summarizes the number of streams supporting salmon stocks in each sub-area. More detailed information on habitat status in Area 5 is presented in Appendix III.

Statistical Area 5 is generally a pristine area of the B.C. coast, although a few streams in the region have been affected by logging operations (Kumealon Creek in the upper Grenville area, Alpha Creek near Ogden Channel, Foot Creeks in the Porcher Inlet area and the Devon Lake system in Principe Channel). A major impact on fish habitat in these streams occurred as a result of poor logging practices in the 1940's.[2] This was particularly evident in Kumealon Creek where there was considerable erosion, silting and disruption of spawning habitat[2] and downstream of Devon Lake where spawning area was completely lost as a result of transporting logs down the river. The Moore Lake area in the Union Passage Lake system on South Pitt Island was logged in 1965 and likely affected sockeye spawning habitat although no effects were documented. Although the streams have stabilized with time, the

Table 16. Summary of streams supporting salmon populations in Area 5.

Sub-Area	Sockeye			Coho			Chinook			Pink			Chum		
	Total Streams[a]	Signif. Streams[b]	% of MRE[c]	Total Streams	Signif. Streams	% of MRE	Total Streams	Signif. Streams	% of MRE	Total Streams	Signif. Streams	% of MRE	Total Streams	Signif. Streams	% of MRE
Outside Banks Island	4	2	91	6	4	89	0			6	3	98	6	3	95
Upper Principe Channel	2	2	100	2	2	100	0			2	2	100	2	2	100
Mid-Lower Principe Channel	11	8	93	15	9	91	0			12	5	82	15	6	84
Petrel Channel	2	1	99	3	3	100	0			4	4	100	4	4	100
Upper Grenville Channel	0			5	3	92	1	1	100	6	4	99	3	0	
Lower Grenville Channel	3	2	99	7	4	95	0			8	4	82	8	4	88
Ogden, Kitkatla and Browning	0			8	8	100	0			9	8	99	6	2	85
Porcher Inlet	0			4	2	93	0			5	5	100	1	0	
Total Areas	22	15		50	35		1	1		52	35		45	21	

[a] Total number of streams historically supporting species indicated.
[b] Significant number of streams which have historically contributed most to production of species indicated.
[c] percentage of maximum recorded escapement (MRE) is the percentage contribution of the signficant streams to the total maximum recorded escapement.

degradation of fish habitat likely contributed to the decline in one of the two chinook stocks known to occur in Area 5 (Kumealon Creek), as well as to the decline of coho stocks in these logged streams. There is currently active logging occurring on North Kumealon Creek, Porcher Creek and in Kxngeal Inlet. Fish habitat in other Area 5 streams known to support salmon stocks has remained relatively unchanged. Development has not occurred elsewhere in the region, and low summer flow appears to be the most important factor that affects habitat potential in this area.[2] Although escapement levels of all stocks are generally well below recorded maxima, there is no evidence to suggest that habitat changes are responsible for declines in stocks although historic logging may have contributed to declines in some stocks.

3.5 Management Conflicts

Table 17 provides a list of conflicts in the current management of Statistical Area 5 salmon stocks and provides estimates of their effects on the production of each species. The mixed-stock fishery for Skeena stocks, primarily in Ogden Channel and Browning Entrance, can cause significant reductions in the production of local stocks. This reduction is probably greatest for sockeye, since there is considerable overlap in migration timing with Skeena sockeye stocks, and less for pinks, since there are some differences in run timing of the two stocks. However, the results of recent tagging studies indicate that Area 5 pinks arrive earlier than previously expected, and then hold in various locations where they are intercepted in the fisheries for Skeena pinks.[3] Uncertainty in spawning escapements and in migration timing during the season also reduce the potential for increased production of these stocks. With the exception of the Indian food fishery, which has a moderate impact on local sockeye, all other potential conflicts are expected to have little effect on production of these stocks.

3.6 Stock Rebuilding Potential

The potential for rebuilding sockeye stocks is poorly defined, since it may not be possible to achieve the target escapement of 50,000 through changes in harvest patterns and effort. There may be a greater potential to rebuild pink and chum stocks, although rebuilding these stocks of both species may be impossible because of the necessary trade-off between pink or chum catches.

Table 17. Factors which reduce production, and their estimated degree of effect on production of salmon species in Area 5.

Factors	Effects on Salmon Stocks			
	Sockeye	Coho	Pink	Chum
Mixed-stock fishery	moderate	moderate-high	moderate	moderate-high
Uncertainty				
Run size	high	high	high	high
Optimum escapement	high	high	high	high
Spawning escapement	high	high	high	high
Timing	high	high	high	high
Indian food fishery	moderate	low	low	low
Environmental	moderate-high	low	moderate-high	moderate-high

3.7 Management Strategies for Stock Rebuilding

Strategies for rebuilding stocks include reducing both management uncertainties and mixed-stock harvests.

3.7.1 Management Uncertainties

Management in Area 5 has been severely hampered in the past by the lack of knowledge related to key management variables (Table 17). Information regarding the abundance of local stocks and the timing of runs is required to improve stock assessment. Management options that would provide some of this information include the initiation of a test fishery with chartered gillnetters to evaluate the quality and abundance of local stocks, and the installation of sockeye counting fences on Bonilla, Devon and Curtis lakes to assess migration timing and improve the reliability of spawning escapement estimates.

3.7.2 Mixed-Stock Harvest

The harvest of mixed Skeena stocks (primarily in Ogden Channel and Browning Entrance) significantly reduces the potential for increased production of local stocks. Forgoing some catch of Skeena stocks in these locations would allow the area to be managed on a more stock-specific basis, particularly since these fish could be harvested in the Area 4 fishery. It is anticipated that recovery of forgone catch in Area 4 fisheries would be 100% effective for sockeye, but only 50-75% effective for pinks. The management of local stocks could be improved by such a step because it would reduce some of the management uncertainty. However, there are disadvantages associated with relocating the fisheries for sockeye and pinks from Area 5. One of these is the increased catchability of stocks that reside in the terminal fishing areas for longer periods of time and, therefore, are more vulnerable to commercial gear. In addition, fish quality generally decreases as salmon stocks approach their natal stream. Some of these disadvantages can be reduced, in part, by implementing appropriate fishing boundaries, and by additional in-season information on fish movements.

Another option would be to manage areas such as Ogden Channel or Browning Entrance to achieve harvest rates that are appropriate for the local stocks. Although attractive in principle, this strategy would be difficult to implement

because it would be virtually impossible to differentiate between local and Skeena stocks in such areas.

3.8 Future Stock Enhancement Activities

In Statistical Area 5, poor quality habitat, low abundance of brood stock, inaccessibility, and constraints to fisheries limit the potential for enhancement opportunities. The options identified for Area 5 are restricted to stream rehabilitation, which largely involves the addition of spawning gravel to streams where good quality spawning habitat is severely limited or absent.

Poor quality habitat may be depressing the productivity of Area 5 stocks. In addition, local sockeye, chum and pink stocks are intercepted in varying proportions in fisheries for the more abundant and productive Skeena stocks. The combination of incidental mixed-stock harvests and low natural productivity is likely responsible for the present low escapements. Increasing returns of local stocks may be best achieved by reducing interception fisheries in Area 5 and by improving spawning habitats.

Specific enhancement opportunities that have been proposed for Area 5 include improvement of spawning habitat in Porcher Inlet streams (Project No. 5-1B), Curtis Creek (Project No. 5-2) and Kumealon Inlet (Project No. 5-8).[7] These three projects involve replacement or addition of gravel to various sites where good quality habitat is presently unavailable. In Porcher Inlet, enhancement is directed at pink and coho salmon, while it is aimed at sockeye salmon in Curtis Creek. In Kumealon Inlet, enhancement is directed primarily at pinks and includes side channel development as well as habitat improvement. These projects could be operated as a community development project with the Kitkatla Band, but have a high risk since their success depends on higher escapements than currently exist. Although enhancement activities are not recommended until Area 5 stocks are rebuilt, this decision should be reviewed in the future, particularly if enhancement priorities change. The various enhancement options were not modelled due to the limited information available for specific stocks.

3.9 Results of Simulation Modelling of Management Options

As described in Section 1.8, the stock-fishery model was used to evaluate the

potential effects of management options on catch and escapement of Area 5 salmon stocks. The results of the modelling are summarized in Tables 18 to 20 and depicted in Figures 38 to 41. In the current management scenario, Area 5 stocks are intercepted in Alaska, Area 1, Area 3, Area 4, Ogden Channel and Browning Entrance within Area 5. Discrete fisheries on local stocks occur when there is a surplus to harvest. However, stocks have been generally below target escapement, and these local fisheries have not been consistently open. In the current management scenario, the fisheries in Area 4 and upper Area 5 are combined because management in these areas is co-ordinated to achieve the escapement targets of Skeena sockeye and pink salmon. Lower Area 5 supports the discrete fisheries that focus on local stocks when surpluses occur.

Under current management conditions, Area 5 sockeye, pink and chum salmon stocks would decline and escapements would be less than 1000 spawners of each species within 20 years (Figures 38 to 40). Average escapements over the 40-year simulation were projected to be 1600 sockeye, 6000 pink and 1700 chum salmon spawners. The local fisheries in Area 5 would not be opened because stock levels are below target and declining. The average catch in Area 4 and upper Area 5 under this current management scenario would be 1.4 million sockeye, 740,000 pinks and 7000 chum salmon. The net present value (NPV)* of the current management scenario is estimated at $499.3 million. Management Option 1 involves the closure of the fisheries in Ogden Channel and Browning Entrance, where interception of Area 5 stocks is high. The local surplus of fish could be harvested in terminal fisheries. Higher harvest rates in Area 4 would recover the forgone Skeena sockeye and pink catches from upper Area 5. This strategy is simulated in the model by separating the Area 4 and 5 fishery, and by reducing the vulnerability of Area 5 stocks in the Area 4 fishery. Area 4 sockeye and pink salmon fisheries would be managed to escapement targets for Skeena stocks, while the Area 5 fisheries would be managed to escapement targets of local sockeye and pink salmon stocks.

Results of the modelling indicate that sockeye salmon escapements would remain well below the target of 50,000 and would continue to decline under Management Option 1 conditions. Escapement levels would average 6000 spawners, which is considerably higher than in current management conditions (Figure 38; Table 18). The total average catch of sockeye salmon would remain relatively

*net present value of the projected 40 years of harvest, discounted at 10% per year.

Table 18. Summary of 40-Year average catch and escapement of Canadian sockeye salmon for each management Option in Area 5.

Catch and Escapement Area	Current Management	Option 1 (Closure of Ogden Channel and Browning Entrance)	Option 2 (Mangement of chums rather than pinks)
Catch by Fishery			
U.S. Interception	320,000	320,000	320,000
Canadian Interception	55,000	55,000	55,000
Area 3	290,000	290,000	290,000
Area 4 + Upper Area 5	1,400,000	1,400,000*	1,400,000*
Lower Area 5	**0**	**300****	**700****
Indian Food Area 3	20,000	20,000	20,000
Indian Food Area 4	150,000	150,000	150,000
Indian Food Area 5	**1,100**	**2,000**	**2,000**
TOTAL CATCH	2,240,000	2,240,000	2,240,000
Escapements			
Area 3	190,000	190,000	190,000
Area 4	860,000	860,000	860,000
Area 5	**1,600**	**6,000**	**6,000**

* Represents catch in Area 4 only.
** Represents catch in all of Area 5.

Note: Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

Table 19. Summary of 40-Year average catch and escapement of Canadian pink salmon for each management Option in Area 5.

Catch and Escapement Area	Current Management	Option 1 (Closure of Ogden Channel and Browning Entrance)	Option 2 (Mangement of chums rather than pinks)
Catch by Fishery			
U.S. Interception	**150,000**	**155,000**	**155,000**
Canadian Interception	**73,000**	**77,000**	**74,000**
Area 3	**350,000**	**360,000**	**360,000**
Area 4 + Upper Area 5	**740,000**	**750,000***	**760,000***
Lower Area 5	**0**	**6,000****	**3,000****
Indian Food Area 3	3,000	3,000	3,000
Indian Food Area 4	**22,000**	**23,000**	**23,000**
Indian Food Area 5	**<50**	**200**	<50
TOTAL CATCH	**1,340,000**	**1,370,000**	**1,380,000**
Escapements			
Area 3	320,000	320,000	320,000
Area 4	**800,000**	**820,000**	**820,000**
Area 5	**6,000**	**50,000**	**10,000**

* Represents catch in Area 4 only.
** Represents catch in all of Area 5.

Note: Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

Table 20. Summary of 40-Year average catch and escapement of Canadian chum salmon for each management Option in Area 5.

Catch and Escapement Area	Current Management	Option 1 (Closure of Ogden Channel and Browning Entrance)	Option 2 (Mangement of chums rather than pinks)
Catch by Fishery			
U.S. Interception	**3,000**	**4,000**	**4,000**
Canadian Interception	**100**	**400**	**400**
Area 3	5,000	5,000	5,000
Area 4 + Upper Area 5	**7,000**	**10,000***	**10,000***
Lower Area 5	**0**	**500****	**7,000****
Indian Food Area 3	<50	<50	<50
Indian Food Area 4	100	100	100
Indian Food Area 5	**600**	**3,000**	**3,000**
TOTAL CATCH	**16,000**	**23,000**	**29,000**
Escapements			
Area 3	**9,100**	**8,800**	**8,700**
Area 4	**1,400**	**2,100**	**2,000**
Area 5	**1,700**	**27,000**	**20,000**

* Represents catch in Area 4 only.
** Represents catch in all of Area 5.

Note: Bold faced numbers indicate differences in catch or escapement of options compared to the current management regime.

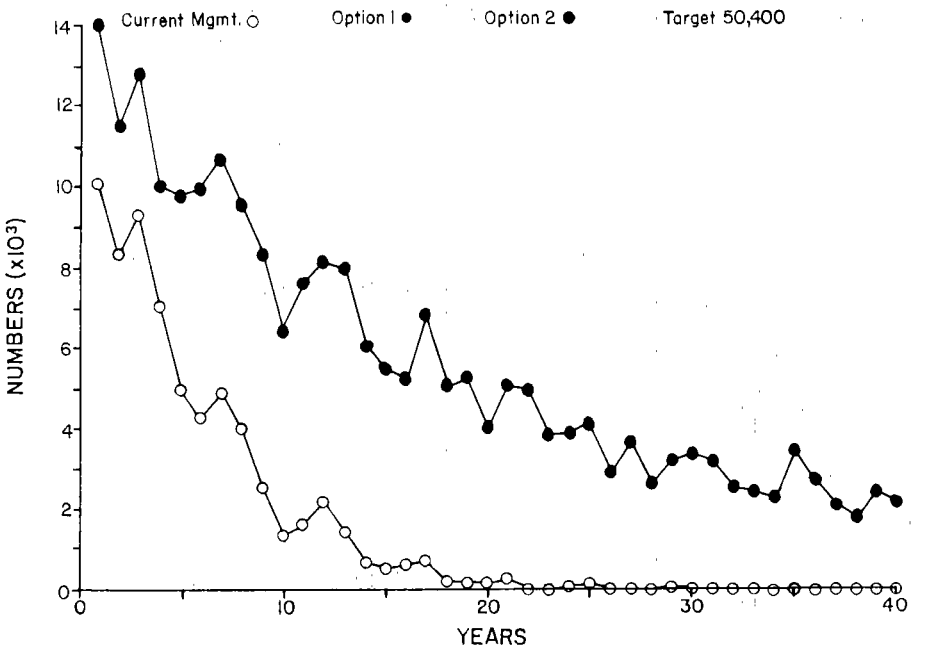

Figure 38. Projected escapements of Area 5 sockeye under current management and Options 1 and 2 (see text for details of options).

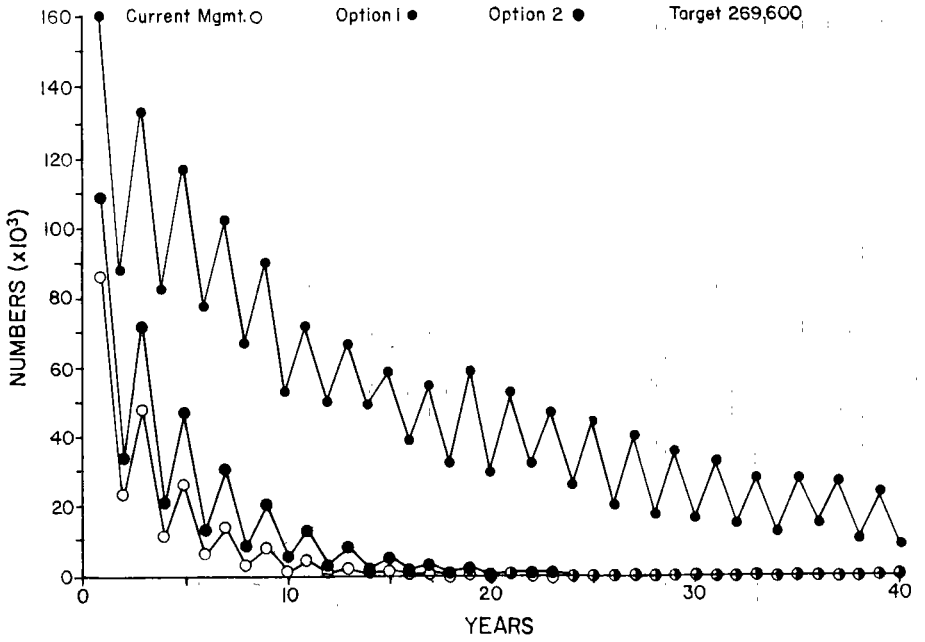

Figure 39. Projected escapements of Area 5 pinks under current management and Options 1 and 2.

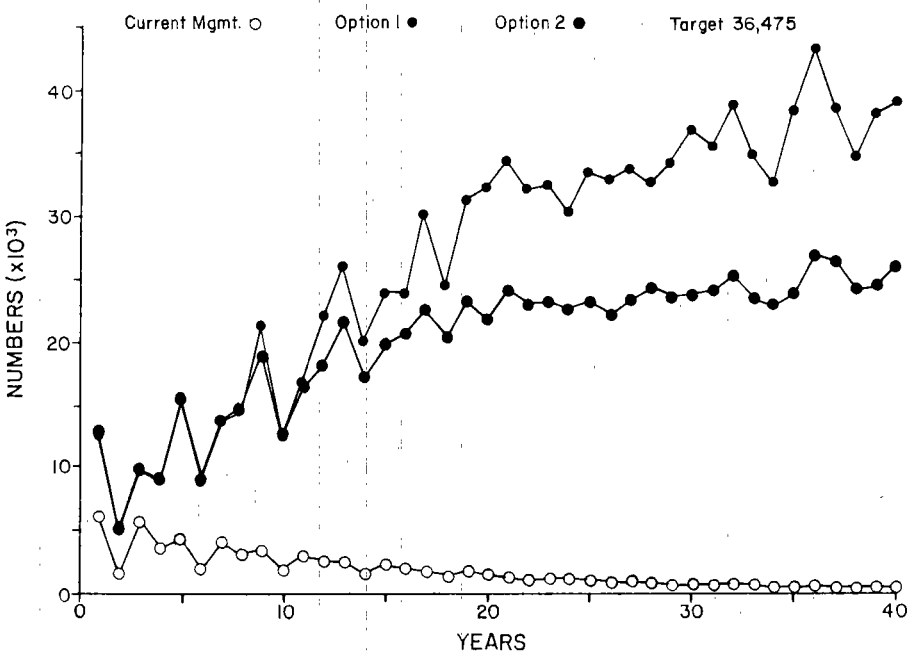

Figure 40. Projected escapements of Area 5 chums under current management and Options 1 and 2 (see text for details of Options).

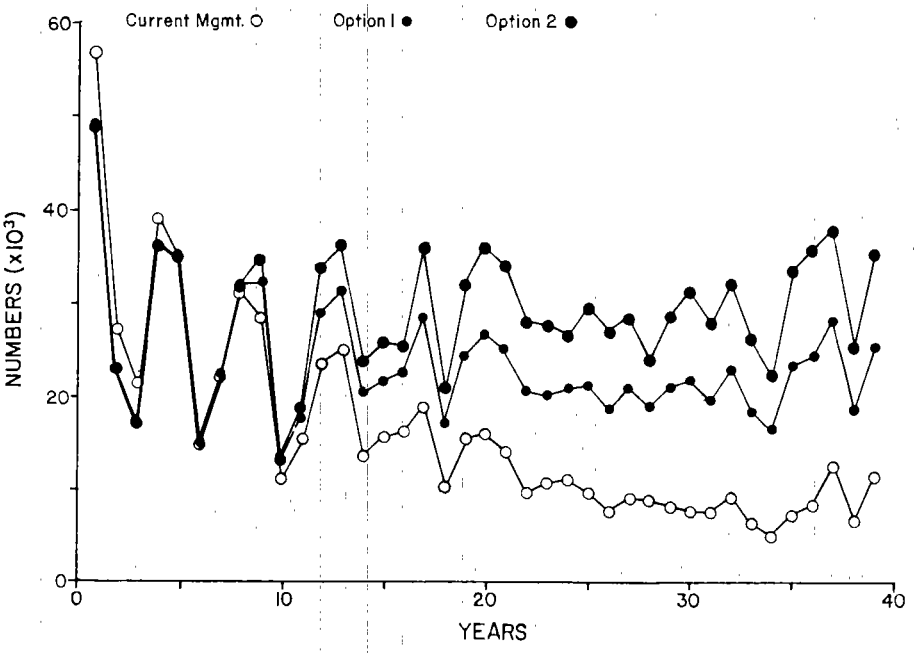

Figure 41. Projected catches of Area 5 chums under current management and Options 1 and 2.

stable, although small changes in individual fisheries would be apparent (Table 18). The average catch of sockeye in Area 4 is estimated at 1.4 million, which is equivalent to the combined catch for Area 4 and upper Area 5 under current management. Local sockeye fisheries in Area 5 would operate periodically in years of surplus production and the catch would average 300. The average sockeye catch in the native food fishery is predicted to increase from 1100 to 2000. Although the natives currently harvest about 3500 sockeye, catches are expected to decrease as the size of stocks declines. Low productivity and high interception of Area 5 stocks limit the rebuilding potential of Area 5 sockeye stocks and will continue to do so even if interceptions in Upper Area 5 are reduced.

Average pink salmon escapement to Area 5 is projected to substantially increase from 6000 to 50,000 spawners. Although escapement levels are predicted to be higher than with current management, stocks are projected to decline and stabilize at about 10% of the target (270,000) (Figure 39). Pink salmon escapement to Area 4 is projected to increase from an average of 800,000 spawners under current management conditions to 820,000 spawners, as a result of eliminating the upper Area 5 fishery (Table 19). The average catch of pink salmon in Area 4 is estimated at 750,000, which is slightly higher than the combined catch of 740,000 for Areas 4 and 5 under current management. The average pink catch in Area 5 is predicted to increase to 6000, while catch in other fisheries is also projected to be higher. The total catch of pinks in the area would increase from 1.34 million with current management to 1.37 million in Management Option 1 (Table 19).

Chum salmon escapements to Area 5 are projected to increase substantially over current management conditions, with the average escapement increasing from 1700 to 27,000 spawners (Table 20). The stocks would rebuild to the target of 36,500 spawners within 30 years (Figure 40). Results of the modelling also indicate that chum salmon escapement to Area 4 would increase slightly, while escapement to Area 3 would decline. Average chum catch in Area 4 would increase to 10,000 compared to 7000 for Area 4 and 5 combined in the current management regime. Higher catches of chum salmon are attributable to increased interception of Area 3 chums that are not intercepted in Area 5 fisheries and increased chum production from the Skeena and Area 5 stocks. Average interception in the local Area 5 fisheries is estimated at 500. The catch of chum salmon in other fisheries is predicted to increase also. The total chum catch in the area is estimated at

23,000 in contrast to 16,000 under current management (Figure 41). The NPV* of the harvest resulting from Option 1 is estimated at $501 million, compared to $499.3 million in the current management scenario.

Management Option 2 was directed at managing the later Area 5 fishery for chum salmon rather than the pink salmon fishery. Option 2 is similar to Option 1 in that it assumes that the Ogden Channel and Browning Entrance fisheries would be closed. Local Area 5 fisheries would be managed to the required escapement of sockeye and chum stocks. Results of the modelling indicate that the effects of Option 2 management strategies on sockeye escapement and catch would be the same as those predicted for Option 1 (Table 18, Figure 38). Pink salmon escapements would average 10,000 spawners, which is substantially lower than the 50,000 spawners projected for Option 1, and only marginally higher than the 6000 spawners under current management conditions (Table 19, Figure 39). The total catch of pink salmon in the area would be slightly higher than under current management and Option 1, and would average 1.38 million.

Chum salmon stocks are projected to rebuild to 60% of the target (Figure 40), with escapement averaging 20,000. The catch of chum salmon would be similar to that predicted in the current management regime and Option 1 for the first 10 years, but would be higher in later years as stocks rebuild (Figure 41). Average chum salmon catch in Area 5 was estimated at 7000, while catch in Area 4 was estimated at 10,000 (Table 19). The total catch is projected to average 29,000, compared to 23,000 in Option 1 and 16,000 under current management. The NPV* of Option 2 is estimated at $501.8 million, which is $2.5 million and $0.8 million more than in the current management regime and Option 1, respectively.

This preliminary evaluation of management options for Area 5 indicates that aggregate stock levels could be increased if interception fisheries in Ogden Channel and Browning Entrance were eliminated. Although salmon escapements would be higher than under current management conditions, only chum salmon stocks are projected to rebuild. Aggregate sockeye and pink stocks are not expected to rebuild to target levels for Area 5. However, it is possible that some of the stronger individual stocks could be rebuilt if discrete local fisheries in Area 5 were managed to the abundance of local stocks. A more detailed model of such

*net present value of the projected 40 years of harvest, discounted at 10% per year.

fisheries in terminal areas would provide a better basis for evaluation of this management strategy. This would require separation of individual stocks or smaller aggregate stock groups and information regarding their migration timing and routes. This management approach would permit evaluation of the potential for rebuilding specific stocks and identify specific areas that are capable of supporting consistent terminal fisheries. Trade-offs between pink salmon and chum salmon fisheries could be evaluated effectively on a more local level. The information required for this analysis would also be useful in reducing management uncertainty, which is currently a problem associated with fisheries management in this area.

4. SUMMARY

Management of fisheries in Statistical Areas 3, 4 and 5 are closely related and co-ordinated since these fisheries are driven primarily by Skeena sockeye and pink salmon stocks. A mixed-stock multi-fishery model using 19 stocks and 17 fisheries was developed to evaluate management and enhancement options. The options are generally directed at reducing mixed-stock fisheries and minimizing management uncertainty.

Currently, sockeye and pink salmon fisheries in Area 3 are managed, in part, for passing Skeena stocks and for local stocks. Although escapement of the actively-managed Meziadin sockeye stock exceeds the target level, the passively-managed sockeye stock is gradually declining. Two management options for sockeye salmon in Area 3 were evaluated. Option 1 was directed at stabilizing the passively-managed sockeye stock by increasing the escapement target, which would also increase escapement of the actively-managed stocks to the Meziadin system. The reduced catch of sockeye would result in a lower net present value (NPV)* of $8.7 million. Management Option 2 is similar to Option 1 but includes a fence fishery to harvest the surplus production to the Meziadin and recover the costs associated with maintaining the passive sockeye stocks. The NPV* of Option 2 is $4.4 million more than under current management conditions.

Escapement of the two major pink salmon stock groups (even-year Kwinamass/Khutzeymateen and odd year Ishkheenickh/Iknouk) also exceed the target level, while

*net present value of the projected 40 years of harvest, discounted at 10% per year.

other pink salmon stocks remain below target. Area 3 chum salmon stocks, which are intercepted in Area 3 fisheries, are at very low levels and are presently declining. Management Option 3 examines the strategy of moving pink salmon fisheries to terminal areas and targeting the fisheries on actively-managed stocks. Results of the modelling indicate that this strategy would result in an overall increase in pink and chum salmon escapement. Although chum escapements are improved, they remain well below target, which suggests that enhancement is the only option for rebuilding chum stocks. The NPV* of Option 3 is $4.2 million more than under the current management regime.

Skeena River sockeye and pink salmon are the major stocks that form the basis of commercial fisheries in the North Coast. Both stocks are managed to escapement targets of one million fish. Escapements of the actively-managed Skeena sockeye exceed the target level, while escapements of the passively-managed Skeena sockeye are declining. Three management options for sockeye salmon in Area 4 were evaluated. Option 1 was directed at rebuilding the passively-managed sockeye stocks by increasing the aggregate escapement target. However, this would also result in an increase in the escapement of the actively-managed stocks, which exceed the target. The total North Coast catch would decline and result in a NPV* $84.7 million less than under current management. Options 2 and 3 include a fence fishery on the Babine River to harvest the surplus actively-managed sockeye under current management and Option 1 conditions, respectively. Although Option 2 results in the highest NPV ($511.3 million)*, which is $12 million more than in the current management scenario, passively-managed sockeye stocks continue to decline. Option 3 provides a benefit of $6.5 million over the current management regime, and also allows passively-managed sockeye stocks to rebuild.

Pink salmon escapements to the Skeena are relatively stable, but are below target because the fishery is managed to a target of one million spawners, while the total aggregate target is 2.2 million spawners. Management Option 4 was directed at managing pink salmon to a higher aggregate escapement. Escapement of actively-managed pink stocks would approach target, while passively-managed stocks would begin rebuilding. Under this strategy, chum salmon escapements would also reach higher levels. Total catch of pink salmon in the North Coast would increase

*net present value of the projected 40 years of harvest, discounted at 10% per year.

substantially and, thereby, increase the NPV* by $33.5 million over that predicted in the current management scenario.

The major fisheries in Area 5 occur in Ogden Channel and Browning Entrance and are directed at passing Skeena sockeye and pink salmon stocks. Terminal fisheries of Area 5 stocks are only open when local surpluses exist. Area 5 sockeye, pink and chum salmon stocks are currently depressed, and results of the modelling predict a further decline in these stocks. Therefore, the option of eliminating the Ogden Channel and Browning Entrance fisheries and directing Area 5 fisheries on local stocks was evaluated. In the simulation, earlier fisheries were managed for Area 5 sockeye, while later fisheries were managed for pink salmon (Option 1) or chum salmon (Option 2). Although sockeye and pink salmon escapements were higher than under the current management regime, stocks continued to decline. Chum salmon escapements increased under both Option 1 and 2 management conditions, exceeded target escapements when fisheries were directed at pink stocks, and stabilized at 60% of the target escapement when fisheries were directed at chum stocks. Total catch of pink and chum salmon in the North Coast was higher in both options than in the current management scenario. The NPV's* of Options 1 and 2 exceed the NPV of current management by $1.7 million, and $2.5 million, respectively. This preliminary evaluation indicates that Area 5 chum salmon stocks have the potential to rebuild. Rebuilding potential of individual sockeye, pink and chum salmon stocks could be evaluated by modelling separate stocks or smaller stock aggregates.

Because the fisheries in Statistical Areas 3, 4 and 5 are closely integrated and interdependent, management changes in one area may affect stocks and fisheries in other areas. The effects of various management and enhancement strategies were evaluated separately in the present model; however, combinations of options may produce different escapements and catches than predicted by simply summing the results of individual model projections. Therefore, if recommended management or enhancement strategies include options that have implications to stocks and fisheries in different areas, the present model should be modified to allow re-evaluation of possible effects on escapement and catch levels.

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*net present value of the projected 40 years of harvest, discounted at 10% per year.

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6. GLOSSARY

Actively-Managed Stocks – salmon stocks that receive priority with regard to management decisions governing the fisheries; that is, they will cause a fishery to be altered if conservation measures are required. Actively-managed stocks are usually abundant, economically valuable stocks.

Backplanting – returning artificially-propagated fry/smolt to site of origin (see "satelliting").

Bar fishery – a fishery from a sand bar in a river.

Beach tie-off – securing the end of a seine net by tying the end to a tree or rock on a beach while the net is fed out from the seine boat.

Boat-day – one boat involved in fishing for one day or portion thereof.

Box boundaries – boundaries of an area in an inlet or strait between which fishing is not permitted, to protect pre-spawning adult fish. See also "Stream Boundaries".

Bunt mesh – the bottom strip of mesh in a seine net. Regulations govern the size of the bunt mesh so that (in theory) small fish can escape as the seine is pursed.

Buy-back program – a publicly-funded purchase of existing fishing licences and associated boats for the purpose of retiring the fishing capacity of the vessel from the fleet.

By-catch – catch of non-target species.

Carcass weir – device, usually a fence, across a stream or channel where drifting or spent fish accumulate and can be enumerated and removed.

Cassette incubator – container consisting of numerous compartments, each large enough for one or a few salmonid eggs, enclosed with a porous cover to permit water flow. Used for incubating eggs in a river or lake environment.

Catch ceiling – a regulatory constraint on the maximum number of fish which can be caught by a particular fishery.

Catch per drift – catch during one drift of a gillnet.

Catchability coefficient (q) – the fraction of a fish stock caught by a defined unit of fishing effort.

CEDP – Community Economic Development Project.

Clean-up fisheries – usually terminal, single-stock fishery intended to take fish surplus to escapement requirements at the end of the run.

Closures – termination of a fishery in a specified area during a specified time.

Counting weir – device, usually a fence, used to temporarily stop migrating adult salmonids to permit enumeration.

Cycle – refers to life cycle of salmon from egg to spawning adult.

Cyclic dominance – the tendency for each sockeye spawning area to produce larger numbers of fish in some years and not in others. The dominant cycle years are repeated every four years in the Fraser River. Others have 5 year cycles.

Dead pitching – pitching salmon carcasses on to stream banks to count them and/or recover tags.

Directed fishery – commercial fishery directed at a specific stock by time or space.

Discount rate or **social discount rate** – a factor that is used like an interest rate to reduce values occurring in the future to their equivalent value in the present. Discount rates are used in the calculation of net present values (NPV).

Diversion rate – the proportion of returning salmon (generally referring to sockeye salmon) that returns, for example, to the Fraser via Johnstone Strait.

Donor stocks – particular population of salmonids from which eggs and/or milt are taken for the purpose of enhancing the same population or for transplanting to other streams.

Drifted gill net – a gill net fished without anchor or attachment to shorelines.

Effort response – a change in the number of active fishermen (effort) in response to a change in catch success.

Emergence – stage in salmonid's life when incubation is complete and young fish emerge from the gravel and begin to swim actively in search of food.

Enhancement – techniques used to increase the production of salmonid stocks through intervention by man. May pertain to fish culture techniques, stream improvements, etc.

Enumeration fence – see "counting weir".

Environmental loss – loss of potential escapement causing failure to meet target escapement, because of environmental variability affecting survival rates (ocean processes, flooding, freezing, etc.).

Enzootic – of a disease, peculiar to or constantly present in a locality.

Epizootic – of a disease, temporarily prevalent.

Escapement – number of fish which survive all fisheries and are estimated to be on the spawning grounds.

Exploitation rate – the probability that a fish will die from fishing during a specified period. Also, the proportion of a group of fish (usually total stock) that are removed by fishing during a period.

Exploratory opening – see Test Dip Fishery.

EXPO '86 – transportation and communications exposition to be held in Vancouver in 1986. It is expected to attract large numbers of tourists to British Columbia.

Fishery – a fish harvesting activity that is defined by some combination of gear, area, time and/or target species.

Fixed catch approach – management strategy used in a mixed-stock fishery where the catch is held to an absolute number (catch ceiling). The underlying assumption is that stock abundance is increasing or stable, otherwise the ceiling has to be adjusted. (The latter strategy then resembles the fixed harvest rate approach.)

Fixed harvest rate approach – management strategy used in mixed-stock fishery. It is assumed that harvest rate can be fixed at a constant level (proportion of the available stocks) by constraining time spent fishing or the amount of fishing gear used in a given area for a given time.

Flow storage works – dam or works to store water during high-flow periods for release during low-flow periods.

Forgone catch – fish in excess of those expected to return to spawn in a given stock, and therefore not caught, resulting in escapement higher than target.

Fry – a stage in the life of a fish from the time it starts actively swimming and feeding to age 14 days.

Gurdie – a winch that is used to raise and lower trollers' lines.

Hails on the grounds – counts made by Fishery Officers on patrol vessels or charter patrolmen hailing commercial fishermen while on fishing grounds.

Hanging lakes – lakes formed by glacial scour, frequently above valley bottom or fjord.

Harvest rate – the harvest proportion of a particular group of fish in a specified area over a specified time (also defined by species, sex, cohort, harvesting fishery, etc.).

Incidental catch – catch of fish other than the target species.

Incubator – a unit constructed to hold fertilized eggs until hatching or emergence.

Index stock – salmon stock deemed to be representative of adjacent salmon stocks. High quality data are usually gathered for this stock.

Indicator stock – see "index stock".

Inside/Outside – refers to inside (e.g., Johnstone Strait) and outside (West Coast and Juan de Fuca Strait) of Vancouver Island.

Interception fishery – a fishery which captures (intercepts) fish from a number of stocks (i.e., is not stock-specific). This term is often used to refer to international interceptions, but in this report it is often defined synonymously with mixed-stock fishery. Although mixed-stock problems may result from interception fisheries the two are not really synonymous. The intentive understanding of interception fishery is that it differs from terminal fisheries in that stocks are intercepted before reaching their natal streams. It could be possible to have an interception fishery on a single stock.

IPSFC – International Pacific Salmon Fisheries Commission.

Key stock – a large or otherwise important salmon stock for which better quality data are available or will be obtained in the future, equivalent to an indicator or index stock.

Key stream – a stream in which one or more key (index) salmon stocks spawn.

Known-stock fishery – commercial fishery targeted on a specific stock of salmon.

Mainstem – principal course of river.

Management to escapement – management of fisheries in a manner that ensures (within technical limits) that the target escapement reaches the spawning area.

Management uncertainty loss – loss of potential escapement to a fishery causing failure to meet target escapement, because of inaccurate estimation of run size or escapement.

Mean return rate - a measure of average spawning yield, (yield may be in juvenile/adult/spawner/juvenile/adult catch, etc.). See also productivity.

Migrant releases - release from hatchery of salmonids that are smolted and will migrate downstream.

Mixed-harvest loss-failure - loss of potential escapement to incidental harvest in mixed-stock fishery. This can only be considered a loss if it results in less than target escapement.

Net present value (NPV) - abbreviation for "present value of net economic benefits". Future streams of project benefits and costs are estimated and the difference is the future stream of net economic benefits. This stream is translated into a present value by discounting future values by the social discount rate. The resulting figure is called the "net present value". In the Salmon Stock Management Plan the future stream of benefits and costs are calculated over a period of 40 years. The only costs considered are those for harvesting and processing (management, capital and operating costs are not included).

Objective - a statement of intent about resource use that is specified with respect to species, area, fishery, or resource uses.

Odd/Even - refers to discrete pink runs which occur in either odd or even years.

Open sets - refers to seine sets where a skiff or running line is used to bring the end of the net back to the boat rather than tying off at the shore.

Opening - date and time set by DFO for the commencement of a specific fishery.

Optimum escapement - an estimate of the numbers of spawners that will meet (but not exceed) the capacity of the river system.

Outplanting - see "transplanting".

Passively-managed stocks - salmon stocks not directly managed but affected incidentally as the result of active management of other stocks. The fishery will not be altered to protect these stocks, by definition.

Pathogenesis – the origin and development of a disease.

Pieces – individual fish (in a commercial catch).

Pink corridor – this is a boundary regulation in Johnstone Strait to conserve Johnstone Strait and Strait of Georgia pink stocks while fishing for Fraser River sockeye. A ribbon boundary closes the shore on the mainland side of the strait in a half mile wide strip from tidewater. The ribbon strip switches to the Vancouver Island side of the Strait at Chatham Point, and continues to end of fishing area. This regulation is usually in place during the first three weeks in August.

PIP – Public Involvement Project.

Policy – a statement of intent about resource use that has a national or regional scale.

Pre-migrant – young salmon prior to migration downstream to marine environment.

Presmolt – usually pertains to salmonid species that rear for extended periods of time (one year or more) in fresh water; the stage during which the fish is a yearling but has not yet smolted.

Production – the number of fish produced, often used in a stock-specific sense or for a particular enhancement project.

Production release – release of salmonids, usually high numbers, from an enhancement facility, that have been raised using standard fish culture techniques (as opposed to experimental releases).

Productivity – the rate of production, usually in terms of returning adults per spawner (stock specific).

Qualla – refers to external chum colour (and therefore quality). Falls between brights (high quality) and darks (low quality. Also known as semi-brights.

Raceway – rectangular fish-rearing containers with high exchange rates of water and vertical walls.

Rack fisheries - commercial fishery targeted on excess hatchery stock. This may occur at the hatchery, and does not necessarily require boats.

Ribbon boundary - a specified boundary parallel to a shore of an inlet or pass which is closed to fishing to protect a portion of the migrating salmon.

Satelliting - an enhancement strategy whereby eggs and milt from a particular salmonid stock are incubated and reared in a central facility or different stream, then returned to donor stream.

Scale pattern analysis - analysis of the patterns on scales of fish to distinguish between stocks and to identify age composition.

Sea pen - net enclosures suspended in sheltered saltwater bays containing salmon for rearing purposes.

Semi-bright - see "qualla".

SEP biostandard - criteria used to estimate production of salmonid reproduction in the wild or in various types of enhancement facilities. Includes estimates of fecundity and survival during each life stage for each species.

Shaker abundance - numbers of undersized salmon available for capture by sport and commercial fishermen.

Shaker catch - numbers of undersized salmon caught and released by sport and commercial fishermen.

Shaker mortality - shakers which do not survive the catch and release process.

Silver bright - type of mature salmon (chum) which has a silvery appearance, and is classified as top quality in the fishing industry.

Smolts - a juvenile salmon that has undergone or is undergoing physiological and behavioural changes in preparation for migration from fresh to salt water.

Spawning channel - an artificial channel constructed for returning adults to spawn in, with ideal gravel and flow conditions.

Squishers - undersized fish caught by commercial seine fishermen which are gilled in the net, and then crushed as the net is wound onto the drum.

Stock - fish of a single species that spawn in a particular geographical area at th same time.

Strategy - a collection of management actions for meeting an objective.

Straying - returning adults which stray from normal migration route and spawn in an area different from the one in which they originated.

Stream boundaries - boundaries of an area around the mouth of a river within which fishing is not permitted, to protect pre-spawning adult fish. See also Box Boundaries.

Subdominant year - the second highest production year of a stock (see "cyclic dominance").

Subyearling - stage in salmonid's life during the first year of rearing prior to the end of the calendar year (see "yearling").

Surplus to escapement - the number of returning salmon beyond estimated optimum or target escapement. These fish are available for harvest and therefore constitute the allowable catch.

Systemic - of the bodily system as a whole.

Target - refers to the level of escapement at which management plans are aimed. It is the best estimate of "optimum" currently available.

Terminal fisheries - fishery conducted near the head of inlets or mouths of rivers where discrete stocks can be fished.

Test dip fishery - one-day opening of commercial fishery to assess stock strength.

Test harvest loss - loss of potential escapement causing failure to meet target escapement, because of test fishery operation conducted to estimate run size.

Total stock – catch plus escapement.

Transplanting – releasing hatchery-raised juveniles in a stream other than the one in which the parent stock originated.

Upwelling gravel box – box filled with gravel for incubating salmonid eggs with water flowing through from bottom to top.

Voluntary emergence – pertains to incubation of fish eggs in an artificial container where fry swim out of incubation media of their own volition. In non-voluntary systems, fry are manually transferred from incubating container.

Window – a period of time during which an activity occurs.

Yearling – a stage in a salmonid's life reached when a new calendar year begins during juvenile rearing period (a subyearling becomes a yearling on January 1st).

APPENDIX I

PRESENT STOCK STATUS IN STATISTICAL AREAS 3, 4 AND 5

AREA 3

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Nass River										
Sockeye										
Active										
Meziadin R. & L.	133,750	78,255	150,806	142,000	214,193	250,000	170,000	200,000	60% Age 4 40% Age 5	2.4 + 1.2
Passive										
Bowser R. & L.	-	17,933	32,354	6,235	30,000	10,000	10,000	20,000	60% Age 4 40% Age 5	1.7 + 2.3
Damdochax R. & L.	12,500	6,250	7,300	2,000	500	5,000	500	20,000		
Kwinageese R. & L.	60,000 only 1 yr. ess.	7,500	7,270	800	7,000	15,000	2,000	20,000		
Gingit Cr.	4,950	2,695	2,757	3,000	2,500	1,000	2,000	10,000		
Others - Passive (11 Streams)[1]	572	437	277	1,260	1,625	67	569	13,750		

[1] Bear R., Brown Br. Cr., Gitzyon Cr., Ishkeenickh R., Kwinamass R., Leverson L., Oweegee Cr., Seaskinnish Cr., Tseax R., Vetter, Zolzap.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Portland Canal[1]										
Chum - Active (4 stocks)	4,027	10,424	3,739	107	53	50	44	10,600	15% Age 3 80% Age 4 5% Age 5	1.8 ± 1.0
Pink - Odd[2] (5 stocks) Passive	25	8,110	2,458		50		267	9,300	100% Age 2	2.2 + 2.1
Pink - Even[2] (5 stocks) Passive	75	12,450	13,121	160		150		12,500		

[1] Portland Canal Chum Systems: Bear R., Donahue Cr., Georgie R., Roberson Cr.

[2] Portland Canal Odd and Even Pink Stocks: Bear R., Georgie R., Donahue Cr., Roberson Cr., Belle Bay Cr.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Observatory Inlet										
Chum										
Active										
Stagoo R.	10,383	9,500	13,250	1,500	1,500	500	12,000	15,000	15% Age 3 80% Age 4 5% Age 5	1.8 + 1
Kshwan R.	4,028	1,171	7,250	20,000	4,000	10,000	10,000	15,000		
Kitsault R.	5,520	5,325	6,980	8,600	3,700	800	5,300	7,000		
Illiance R.	8,653	3,855	3,650	3,000	500	400	2,500	5,000		
Passive (Even)										
4 stocks[3]	433	1,018	4,487	1,025		150		3,300		
Pink - Odd										
(7 stocks)[4]	2,239	2,447	7,605		138		568	7,500	100% Age 2	2.2 + 2.1
Pink - Even										
(7 stocks)[4]	2,264	6,850	21,183	824		6,799		14,500	100% Age 2	2.2 + 2.1

[3] Observatory Inlet Passive Chum Stocks: Ohl Cr., Perry Bay Cr., Wilauks Cr.

[4] Observatory Inlet Pink Stocks: Cascade Cr., Illiance R., Kitsault R., Kshuan R., Salmon Cove Cr., Stagoo Cr., Willauks Cr.

Inlet boundaries may be manipulated to target on any excesses available.

AREA 3

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Work Channel										
Chum										
Passive										
(4 stocks)[1]	14,415	12,019	8,746	3,299	1,598	2,599	2,419	16,000	15% Age 3 80% Age 4 5% Age 5	1.8 + 1
Pink - Odd										
(4 stocks)[1]	8,238	14,365	13,825		3,024		6,520	19,000		
Pink - Even										
(4 stocks)[1]	31,160	31,000	24,250	14,000		45,000		28,000		

[1] Work Channel Chum & Odd & Even Pink Stocks: Ensheshese R., Toon R., Lachmach R., Leverson Lake System.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Portland Inlet										
Chum										
Passive (6 stocks)[1]	5,606	13,033	15,618	10,519	3,208	5,096	8,021	24,200	15% Age 3 80% Age 4 5% Age 5	1.8 + 1
Pink - Odd										
Active										
Iknouk R.	0	9,140	23,400		60,000		300,000	60,000	100% Age 2	2.2 + 2.1
Kwinamass R.	12,460	58,000	36,200		60,000		80,000	80,000		
Khutzeymateen R.	4,880	16,850	7,000		15,000		30,000	20,000		
Passive (8 stocks)[2]	13,618	32,934	19,500		22,449		60,250	30,500	100% Age 2	2.2 + 2.1
Pink - Even										
Active										
Kwinamass R.	14,400	75,000	89,000	40,000		200,000		100,000	100% Age 2	2.2 + 2.1
Khutzeymateen	11,800	53,200	27,200	20,000		80,000		40,000		

[1] Portland Inlet Chum Stocks: Khutzeymateen R., Lizard Cr., Kwinamass R., Kincolith R., Iknouk R., Chambers Cr.

[2] Portland Inlet Passive Odd Pink Stocks: Dogfish Bay Cr., Manzanita Cove Cr., Lizard Cr., Nasoga Gulf Cr., Kincolith R., Flewin Cr., Chambers Cr., Welda Cr.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Passive Pink (9 stocks)[1]	8,259	29,133	46,725	27,900		48,099		37,000	100% Age 2	2.2 + 2.1
Nass River										
Chum (14 stocks)[2]	5,326	2,720	10,208	3,539	768	7,050	3,430	20,300	15% Age 3 80% Age 4 5% Age 5	1.8 + 1
Pink - Odd										
Active Ishkheenickh R.	6,943	12,967	15,600		30,000		200,000	30,000	100% Age 2	2.2 + 2.1
Passive - Odd (16 stocks)[3]	21,274	15,960	5,612		6,915		38,698	28,200	100% Age 2	2.2 + 2.1
Pink - Even										
Active Ishkheenickh R.	7,500	4,863	3,780	2,000		1,500		25,000	100% Age 2	2.2 + 2.1
Passive - Even (16 stocks)[3]	6,527	8,899	7,330	6,444		3,959		24,600	100% Age 2	2.2 + 2.1

[1] Portland Inlet Passive Even Pink Stocks: Dogfish Bay, Manzanita Cove, Lizard, Nasoga Gulf, Tsampanaknok Bay, Kincolith, Flewin, Chambers, Welda.

[2] Lower Nass R. Chum Stocks: Burton, Ishkheenickh, Nass-mainstem, Ginlulak, Ansedagan, Wegeladap, Wilyayanooth, Zolzap, Vetter, Tseax, Gitzyon, Gingit, Seaskinnish, Ksedin.

[3] Nass River Passive Odd & Even Pink Stocks: Burton, Diskangeg, Nass-mainstem, Ginlulak, Ansedagan, Wegiladap, Wilyayanooth, Zolzap, Vetter, Tseax, Gitzyon, Gingit, Seaskinnish, Ksedin, Kinskuch, Cranberry.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Coastal										
Chum (5 stocks)[1] Passive	200	388	NR	200	26	151	149		15% Age 3 80% Age 4 5% Age 5	1.8 + 1
Pink - Odd (4 stocks)[2] Passive	1,426	905	3,500		57					
Pink - Even (7 stocks)[3] Passive	1,301	3,207	21,155	16,900		34,500			100% Age 2	2.2 + 2.1

[1] Coastal Chum Stocks: Brundige, Sandy Bay, Tracy, Turk, Stumaun.
[2] Coastal Odd Pink Stocks: Brundige, Sandy Bay, Tracy, Turk, Stumaun, Whitly Pt.
[3] Coastal Even Pink Stocks: Brundige, Sandy Bay, Tracy, Turk, Stumaun, Whitly Pt. & America Bay.

AREA 4

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Sockeye										
Active										
Fulton R.	82,333	113,082	274,832	112,658	442,000	400,000	393,000	280,000	60% Age 4 40% Age 5	3.7 ± 1.0
Pinkut Cr.	24,253	44,429	76,320	56,655	250,000	150,000	134,000	130,000		
Babine R. (Upper & Lower)	182,750	256,280	214,851	158,815	90,000	128,947	81,000	250,000		
Babine L.	42,000	65,000	116,398	164,852	578,134	417,000	257,193	100,000		
Babine Trib.[1]	81,811	82,406	70,319	9,382	12,894	25,148	9,447	200,000		

[1] Babine Tributaries (Sockeye) - Boucher, Donald Cr., Five-Mile Cr., Four-Mile Cr., Bull Wine Cr., Morrison Cr., Nichyeskwa R., Nilkitkwa R., Nine-Mile Cr., Pendelton Cr., Pierre Cr., Grizzly Cr., Sutherland R., Tachek Cr., Tahlo Cr. Upper, Telzato Cr., Twain Cr.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Passive										
Non-Babine Stocks										
Lakelse[2]	7,678	23,184	3,470	13,505	7,345	14,000	8,835	25,000	60% Age 4 40% Age 5	2.0 ± 1.0
Kitsumkalum[3]	4,131	2,828	2,847	650	475	1,375	1,020	12,000		
Kisplox[4]	4,740	3,946	4,205	850	2,000	3,150	-	20,000		
Morice[5]	17,706	2,192	2,034	650	1,300	3,000	4,025	15,000		
Bear[6]	10,137	3,624	6,633	1,400	1,220	500	-	30,000		
Alastair[7]	22,300	8,440	4,175	15,000	900	4,750	20,000	25,000		
Others[8]	10,163	9,449	7,993	1,900	4,500	9,800	925	45,000		
TOTAL	76,805	53,663	31,357	33,955	17,740	36,575	34,805			

[2] Lakelse Streams: Andalas Cr., Clearwater Cr., Lakelse R., Schubuckhand Cr., Sockeye Cr., Williams Cr.
[3] Kitsumkalum Streams: Cedar R., Clear Cr., Douglas Cr., Upper Kitsumkalum R., Kitsumkalum L.
[4] Kisplox Streams: Upper Club Cr., Lower Club Cr., Falls Cr., Stephens Cr.
[5] Morice Streams: Atna L., Bulkley R., Morice L., Morice R., Nanika R.
[6] Bear Streams: Azuklotz C., Bear L., Bear R., Johanson L., Motase L., Saltx Cr., Sustut L.
[7] Alastair System: Alastair L., Southend Cr.
[8] Other Sockeye Producers: Diana Cr., Johnston L., Kitwanga R., Shawatlan R., Zymoetz R., Slamgeesh R.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Pinks - Odd										
Active										
Lakelse R.	181,400	450,200	410,000		700,000		1,250,000	500,000	100% Age 2	2.2 + 2.1
Babine R.	22,420	67,360	152,955		130,390		504,000	200,000		
Kitwanga R.	144,000	118,000	157,000		110,000		235,000	275,000		
Kispiox R.	420,000	70,800	257,600		130,000		180,000	400,000		
Kitsumkalum R.	NR	6,300	70,000		50,000		100,000	100,000		
Passive - Odd										
Upper Skeena[1] Stocks (above Kitwanga)	15,541	16,865	26,888		13,919		51,239	100,000	100% Age 2	2.2 + 2.1
Lower Skeena Stocks[2] (below Kitwanga)	92,115	280,923	87,124		31,550		213,000	500,000		
Coastal Stocks[3]	74,301	60,704	43,624		19,450		49,754	170,000		

[1] Upper Skeena Pink Stocks: Bear R., Bulkley R., Chicago Cr., Cullon Cr., Pate Cr., Glen Vowel Cr., Gosnell Cr., Hazelton Cr., Kathlyn Cr., Kitsequecla R., McCully Cr., Morice R., Murder Cr., Nangeese R., Nichveskwa R., Shegunia R., Station Cr., Suskwa R., Sweetin R., Toboggan Cr., Trout Cr.

[2] Lower Skeena Pink Stocks: Andeside Cr., Cedar Cr., Clearwater Cr., Coldwater Cr., Deep Cr., Dog Tag Cr., Erlandsen Cr., Exchamsiks R., Exstew R. & Sc., Fiddler Cr., Gitnadoxx R., Herman, Kadeen Cr., Kazlks R., Kitsumkalum R., Kleanza Cr., Kwinitsa Cr., Leanto Cr., Lowrie Cr., Madeline Cr., McNeil Cr., Muddy Cr., Price Cr., Scotia R., Schulbuckhand Cr., Shames Sc., Skeena Mainstem, Sparkling Cr., Star Cr., Swede Cr., Thornhill Cr., White Cr., Wilson Cr., Zymaiotitz R., Zymoetz R.

[3] Denise Cr., Humpback Bay Creek, Lahou Creek, McNichol Creek, Moore Cove Creek, Oona River, Shawatlan River, Silver Creek, Spiller River, Useless Creek (Big Useless Creek), Useless Creek (Little Useless Creek), Kloiya River.

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Pinks - Even										
Active										
Lakelse R.	305,000	695,000	405,000	300,000		140,000		500,000	100% Age 2	2.2 + 2.1
Babine R.	12,940	48,080	105,872	326,466		100,032		200,000		
Kitwanga R.	92,000	75,500	179,000	35,000		110,000		275,000		
Kispiox R.	73,333	28,000	9,500	5,000				100,000		
Passive - Even										
Other Upper Skeena[1] Stocks (above Kitwanga)	9,025	7,087	4,514	655		3,368		100,000	100% Age 2	2.2 + 2.1
Lower Skeena Stocks[2] (Below Kitwanga)	52,262	98,768	134,602	14,876		6,682		500,000		
Coastal Stocks[3] combined active	160,087	146,592	71,047	60,150		79,538		170,000		

[1] Upper Skeena Pink Stocks: Bear R., Bulkley R., Chicago Cr., Cullon Cr., Date Cr., Glen Vowel Cr., Gosnell Cr., Hazelton Cr., Kathlyn Cr., Kitsequecla R., McCully Cr., Morice R., Murder Cr., Nangeese R., Nichyeskwa R., Shegunia R., Station Cr., Suskwa R., Sweetin R., Toboggan Cr., Trout Cr.

[2] Lower Skeena Pink Stocks: Andesite Cr., Cedar R., Clearwater Cr., Coldwater Cr., Deep Cr., Dog Tag Cr., Erlandsen Cr., Exchamsiks R., Exstew R. & Sc., Fiddler Cr., Gitnadoxx R., Herman, Kadeen Cr., Kasiks R., Kitsumkalum R., Kleanza Cr., Kwinitsa Cr., Leanto Cr., Lowrie Cr., Madeline Cr., McNeil Cr., Muddy Cr., Price Cr., Scotia R., Schulbuckhand Cr., Shames Sc., Skeena Mainstem, Sparkling Cr., Star Cr., Swede Cr., Thornhill Cr., White Cr., Wilson Cr., Zymaiotitz R., Zymoetz R.

[3] Denise Creek, Humpback (Bay Creek), Lahou Creek, Kiolya River, McNichol Creek, Moore Cove Creek, Oona River, Shawatlan River, Silver Creek, Spiller River, Useless Creek (Big Useless Creek), Useless Creek (Little Useless Creek).

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Chum										
Ecstall R.	6,150	7,500	7,200	15,000	8,000	4,000	700	30,000	15% Age 3 80% Age 4 5% Age 5	1.8 ± 1
Other[4]	16,690	14,430	14,897	8,195	1,357	579	917	70,800		

[4] Other Skeena Chum Stocks: Andeside Cr., Date Cr., Deep Cr., Denise Cr., Dog-Tag Cr., Exchamsiks R., Exstew Sc., Fiddler Cr., Gitnadol R., Johnston Cr., Kasiks R., Khyex R., Kispiox R., Kitsegukla R., Kitsumkalum R., Kitwanga R., Kleanza Cr., Kloiya Cr., Lakelse R., McCully Cr., Shames Sc., Silver Cr., Skeena R., Sparkling Cr., Zymagotitz R., Zymoetz R.

AREA 5

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Outside Banks Isl.										
Sockeye (Kingkown Inlet, Quitonsta, Waller)	9,776	9,365	11,733	5,500	3,500	2,000	3,600	18,300	60% Age 4 40% Age 5	1.5 ± 1.0
Chum (Kingkown Inlet, Indian Hb, Quitonsta, Skull Ck)	6,960	2,191	11,890	3,700	1,400	3,200	750	11,500	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9
Pink - Even (Kingkown, Skull)	11,480	5,825	31,240	10,000	-	300	-	14,700	100% Age 2	1.3 ± 1.2
Pink - Odd (Kingkown, Skull)	1,595	1,435	1,947	-	750	-	575	14,700	100% Age 2	1.3 ± 1.2

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Upper Principe										
Sockeye (Endhill, Keswar, Curtis, Devon, Mikado, Sheneeza, Spencer)	16,392	24,311	12,328	6,900	7,500	15,100	4,650	12,300	60% Age 4 40% Age 5	1.5 ± 1.0
Chum (Endhill, Keswar, Sheneeza, Markle In., Mikado)	2,432	2,546	1,344	1,000	200	550	210	3,550	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9
Pink - Even (Endhill, Keswar, Curtis, Devon, Mikado, Spencer)	21,500	20,205	28,782	25,000	-	3,700	-	28,500	100% Age 2	1.3 ± 1.2
Pink - Odd (Endhill, Keswar, Curtis, Devon, Mikado, Spencer)	8,933	7,285	14,159	-	16,700	-	1,900	28,500	100% Age 2	1.3 ± 1.2

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Lower Principe										
Sockeye (Criooe Inl., Deer, Keecha, Kooryet)	8,479	11,677	2,763	500	700		600	11,600	60% Age 4 40% Age 5	1.5 ± 1.0
Chum (Deer, Keecha, Kooryet)	1,363	697	909	-	-	-	-	5,600	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9
Pink - Even (Bolton, Deer, Keecha, Kooryet)	25,945	13,200	17,600	22,000	-	500	-	15,200	100% Age 2	1.3 ± 1.2
Pink - Odd (Bolton, Deer, Keecha, Kooryet)	6,105	3,735	18,683	-	8,300	-	1,700	15,200	100% Age 2	1.3 ± 1.2
Petrell Channel										
Sockeye (Ryan Ck)	NR	1,215	169	-	-	-	-	1,100	60% Age 4 40% Age 5	1.5 ± 1.0
Chum (Hevenor Inl., Newcombe Hb, Ryan, Shaw, Wilson)	5,309	3,424	1,538	2,500	50	2,750	2,320	2,500	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Petrel! Channel (cont'd.)										
Pink - Even (Hevenor Int., Newcombe Hb, Ryan, Shaw)	10,650	19,363	17,120	27,500	-	12,800	-	18,000	100% Age 2	1.3 ± 1.2
Pink - Odd (Hevenor Int., Newcombe Hb, Ryan, Shaw)	3,929	5,975	5,525	-	3,800	-	13,800	18,000	100% Age 2	1.3 ± 1.2
Upper Grenville										
Chum (Klewnuggit Int., Kumealon, Pa-aat)	1,730	937	215	-	-	-	-	1,300	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9
Pink - Even (False Stewart, Kumealon, North Kumealon, Pa-aat R.)	32,250	89,000	73,960	26,000	-	19,500	-	90,200	100% Age 2	1.3 ± 1.2
Pink - Odd (Same as even)	33,305	38,800	28,145	-	35,000	-	10,500	90,200	100% Age 2	1.3 ± 1.2
Lower Grenville										
Sockeye (Lowe Int. Hartley Bay, Tsimtack L.)	5,395	11,623	9,142	4,000	4,000	2,000	3,500	11,700	60% Age 4 40% Age 5	1.5 ± 1.0
Chum (7 stocks)[a]	22,985	8,211	6,779	150	670	500	-	8,100	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9

PRESENT STOCK STATUS

Stocks	Escapements Ave. 1950-59	Ave. 1960-69	Ave. 1970-79	1980	1981	1982	1983	Target	Age Structure	Rate of Return ($\bar{x} \pm S^2$)
Lower Grenville (cont'd.)										
Pink - Even (7 stocks)[a]	31,364	41,805	22,261	10,000	-	1,000	-	20,000	100% Age 2	1.3 ± 1.2
Pink - Odd (7 stocks)[a]	25,976	3,239	10,562	-	1,700	-	1,100	20,000	100% Age 2	1.3 ± 1.2
Ogden, Kitkatla & Browning										
Sockeye (Captain Cove Cr.)	450	760	529	400	300	350	100	1,200	60% Age 4 40% Age 5	1.5 ± 1.0
Chum (Captain Cove Cr., Kitkatla, Rawlison Ane)	2,428	1,386	1,964	1,000	-	320	270	3,500	15% Age 3 80% Age 4 5% Age 5	1.9 ± 1.9
Pink - Even (8 stocks)[b]	41,345	53,730	52,488	50,500	-	22,775	-	51,500	100% Age 2	1.3 ± 1.2
Pink - Odd (8 stocks)[b]	18,180	24,500	17,485	-	28,450	-	20,550	51,500	100% Age 2	1.3 ± 1.2
Porcher Inlet Pink - Even (Foote, Head, Porcher, West, Wolf)	26,300	57,150	47,430	37,500	-	6,625	-	32,500	100% Age 2	1.3 ± 1.2
Pink - Odd (Foote, Head, Porcher, West, Wolf)	15,255	20,856	5,032	-	14,200	-	31,200	32,500	100% Age 2	1.3 ± 1.2

a) Belowe Cr., Stewart Cr., Black Rx. Cr., Tsimtack L., Turn Cr., Turtle Cr., Tuwartz Cr.

b) Alpha Cr., Captain Cove Cr., Billy Cr., Kitkatla Cr., Phoenix Cr., Deadman Cr., Ka-Alb Cr., Rawlison

APPENDIX II

CURRENT FISHING PATTERNS
IN STATISTICAL AREAS 3, 4 AND 5

CURRENT FISHING PATTERNS IN AREA 3

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
June 10 - 16	*Sockeye - Meziadin	[1]Chinook - Nass R. & Others	I.F.F.	GN	I.F.F., Nass Test Fishery Expectations
June 17 - 23	*Sockeye - Meziadin	Chinook - Nass R. & Others	I.F.F.	GN	I.F.F., Nass Test Fishery, Cape Fox catch & expectations
June 24 - 30	*Sockeye - Meziadin	Chinook - Nass Others[1]	3-3,7,12 & 17	GN	IFF, Nass test fishery, Cape Fox catch data, expectations.
June 1 - 7	*Sockeye - Meziadin	Sockeye - Pinkut Chum[1]- Portland Canal stocks Chinook[3]- Nass & Others	3-3,7,12 & 17 & 3-1,2,4 if not weak & 3-11,13 & 15 if not weak	GN	IFF, Nass test fishery, catch to date, tagging info. Skeena test fishery, expectations.
	Sockeye - Pinkut	Sockeye - Meziadin Chum[1]- Portland Canal stocks Chinook[1]- Nass & Others	3-1,2 & 4 & 3-3,7,12&17 if not weak & 3-11,13&15 if not weak	GN	IFF, Skeena test fishery, catch to date, Nass test fishery, expectations, tagging info.
	Chum[1]- Portland Canal stocks		3-11, 13 & 15 & 3-1,2&4 if Pinkut not weak & 3-3, 7,12&17 if Meziadin not weak.	GN	Cape Fox catch, expectations, tagging info., IFF, Nass & Skeena T.F.

* Denotes target stock which drives the Area 3 fishery during each week.

[1] Area 3 chinook stocks: Nass R. - Cranberry, Dampochax, Ishkeenickh, Kiteen, Kwinageese, Meziadin, Oweegee, Tseax & Nass - mainstem.
Others - Georgie, Khutzeymateen, Kincolith, Kitsault & Kwinamass.

[2] Portland Canal chum stocks: Bear R., Donahue Cr., Georgie R., Roberson Cr.

CURRENT FISHING PATTERNS IN AREA 3

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
July 8 - 14	*Sockeye - Meziadin	Sockeye - Pinkut Chum[1]- Portland Chinook[3]- Nass & Others	3-3,7,12&17 &3-1,2&4 if not weak &3-11, 13&15 if not weak	GN	Nass & Skeena T.F., Catch to date, IFF, Tagging info., expectations.
	*Sockeye - Pinkut	Sockeye - Meziadin Chum[1]- Portland Chinook[3]- Nass & Others	3-1, 2&4 &3-3,7,12&17 if not weak &3-11,13&15 if not weak	GN	Skeena & Nass T.F., Catch to date, tagging info., IFF, expectations.
	Chum[1]- Portland Canal stocks		3-11,13&15 &3-3,7,12&17 if Meziadin not weak & 3-1,2&4 if Pinkut not weak	GN	Catch to date, tagging info., IFF, expectations, Nass & Skeena T.F.
July 15 - 21	*Sockeye - Meziadin	Sockeye - Pinkut & Fulton Chum[1]- Portland Chum[2]- Observatory Pink - Kwinamass Pink - Khutzeymateen	3-12 & 17 &3-1,2&4 if not weak &3-11, 13&15 if not weak &3-14 if not weak &3-3, 7&9 if not weak " " " " "	GN & SN in 3-12	Nass & Skeena T.F., catch to date, tagging info., expectations.
	*Sockeye - Pinkut & Fulton	Sockeye - Meziadin Chum[1]- Portland Chum[2]- Observatory Pink - Kwinamass Pink - Khutzeymateen	3-1,2&4 &3-12,&17 if not weak &3-11,13&15 if not weak &3-3,7&9 if not weak " " " " "	GN & SN only in 3-12	Skeena & Nass T.F., Catch to date, tagging info., expectations.
	Chum[1]- Portland Canal stocks		3-11,13&15; &3-12&17 if Meziadin not weak; &3-1,2&4 if Pinkut & Fulton not weak; &3-14 if Observatory not weak; &3-3, 7&9 if Kwinamass not weak &3-3,7&9 if Khutzeymateen not weak.	GN & SN only in 3-12	Catch to date, tagging info., expectations, Nass & Skeena T.F.

* Denotes target stock which drives the Area 3 fishery during each week.

[1] Portland Canal chum stocks: Bear R., Donahue Cr., Georgie R., Roberson Cr.

[2] Observatory Inlet chum stocks: Illiance R., Kitsault R., Kshwan R., Stagoo R., Wiauks Cr.

[3] Stocks on front page.

CURRENT FISHING PATTERNS IN AREA 3

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
July 15-21 (cont'd.)	Chum[2]- Observatory Inlet stocks		3-14 &3-12&17 if Mezladin not weak; &3-1,2&4 if Pinkut & Fulton not weak; &3-11,13&15 if Portland not weak; &3-3,7&9 if Kwinamass not weak; &3-3,7&9 if Khutzeymateen not weak	GN & SN GN only in 3-12	Catch to date, tagging info., expectations, Nass & Skeena T.F.
	*Pink - Kwinamass	Sockeye - Mezladin Sockeye - Pinkut & Fulton Chum[1]- Portland Chum[2]- Observatory Pink - Khutzeymateen	3-3, 7&9 &3-12&17 if not weak &3-1,2&4 if not weak &3-11,13&15 if not weak &3-14 if not weak	GN & SN GN only in 3-12	Catch to date, tagging info., expectations, Nass & Skeena T.F.
	*Pink - Khutzeymateen	Sockeye - Mezladin Sockeye - Pinkut & Fulton Chum[1]- Portland Chum[2]- Observatory Pink - Kwinamass	3-3, &7 &3-12&17 if not weak &3-1,2&4 if not weak &3-11,13&15 if not weak &3-14 if not weak &3-9 if not weak	GN & SN GN only in 3-12	Catch to date, tagging info., expectations, Nass & Skeena T.F.
July 22 - 28	Sockeye - Mezladin	Sockeye - Fulton Chum[1]- Portland Chum[2]- Observatory Pink - Kwinamass Pink - Khutzeymateen & Work Channel[3]	3-12 & 17 &3-1,2&4 if not weak &3-11,13&15 if not weak &3-14 if not weak &3-3,7&9 if not weak 3-3 & 7 if not weak	GN & SN GN only in 3-12	Nass test & Skeena T.F., catch to date, tagging info., expectations Mezladin fishway counts.
	*Sockeye - Fulton	Sockeye - Mezladin Chum[1]- Portland Chum[2]- Observatory Pink - Kwinamass Pink - Khutzeymateen & Work Channel[3]	3-1,2&4 &3-12&17 if not weak &3-11,13&15 if not weak &3-14 if not weak &3-3,7&9 if not weak 3-3&7 if not weak	GN & SN GN only in 3-12	Skeena & Nass T.F., catch to date, tagging info., expectations.
	Chum[1]- Portland Canal stocks		3-11,13&15 &3-12&17 if Mezladin not weak; &3-1,2&4 if Fulton not weak; &3-14 if Observatory not weak; &3-3,7&9 if Kwinamass not weak; &3-3&7 if Khutzeymateen not weak & Work channel	GN & SN GN only in 3-12	Catch to date, tagging info., expectations, Nass & Skeena T.F.

* Denotes target stock(s) which drive the Area 3 fishery during each week.

[1] Portland Canal chum stocks: Bear, Donahue, Georgie, Roberson.

[2] Observatory Inlet chum stocks: Illiance, Kitsault, Kshwan, Stagoo & Wiauks.

[3] Work Channel pink stocks: Ensheshese R., Lachman R., & Toon R.

CURRENT FISHING PATTERNS IN AREA 3

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
July 22 - 28 (cont'd.)	Chum[3]- Observatory Inlet stocks		3-14 &3-12&17 If Mezladin not weak; &3-1,2&4 If Fulton not weak; &3-11, 13&15 If Portland not weak; &3-3,7&9 If Kwinamass not weak; 3-3&7 If Khutzeymateen and Work[4] not weak	GN & SN GN only In 3-12	Catch to date, tagging info., expectations, Nass & Skeena.
	*Pink - Kwinamass	Sockeye - Mezladin Sockeye - Fulton Chum[3]- Portland Chum[2]- Observatory Pink - Khutzeymateen & Work Channel[4]	3-3,7&9 &3-12&17 If not weak &3-1,2&4 If not weak &3-11,13&15 If not weak &3-14 If not weak 3-3&7 If not weak	GN & SN GN only In 3-12	Catch to date, tagging info., esc. indications, Nass & Skeena T.F.
	*Pink - Khutzey-mateen & Work Channel[4]	Sockeye - Mezladin Sockeye - Fulton Chum[3]- Portland Chum[2]- Observatory Pink - Kwinamass	3-3&7 &3-12&17 If not weak &3-1,2&4 If not weak &3-11,13&15 If not weak &3-14 If not weak &3-9 If not weak	GN & SN GN only In 3-12	Catch to date, tagging info., esc. indications, Nass & Skeena T.F.
July 29 - Aug 4	Sockeye - Fulton & Babine R.	Pink - Kwinamass Pink - Khutzeymateen & Work[4] Pink[1]- Iknouk, Ishkeenickh & Observatory[5]	3-1, 2&4 3-3,7&9 If not weak 3-3 & 7 If not weak 3-3,7,12&17&11 If not weak	GN & SN GN only In 3-12	Catch to date, tagging info., Skeena T.F., expectations.
	*Pink - Kwinamass	Sockeye - Fulton & Babine Pink - Khutzey/Work[4] Pink[1]- Ikn-Ishk-Obs	3-3,7&9 &3-1,2&4 If not weak 3-3&7 If not weak &3-12&17&11 If not weak	GN&SN GN only In 3-12	Catch to date, tagging info., esc. indications, Skeena T.F.
	*Pink - Khutzey-mateen & Work Channel[4]	Sockeye - Fulton & Babine Pink - Kwinamass Pink[1]- Ikn/Ishk/Obs[5]	3-3&7 &3-1,2&4 If not weak &3-9 If not weak &3-12&17&11 If not weak	GN&SN only In 3-12	Catch to date, tagging info., esc. indications, Skeena T.F.
	Pink[1]- Iknouk, Ishkeenickh, Observatory Canal[5]	Sockeye - Fulton & Babine Pink - Kwinamass Pink - Khutzey/Work[4]	3-12&17&11 &3-1,2&4 If not weak &3-3,7&9 If not weak 3-3&7 If not weak	GN&SN only In 3-12	Catch to date, tagging info., esc. indications, Skeena T.F.

* Denotes target stock(s) which drive the Area 3 fishery during each week.

[1] Also includes passive smaller Area 3 systems (Chambers Cr., Dogfish Bay Cr., Kincolith R., Stumaun Cr., Tseax R.)

[2] Observatory Inlet chum stocks: Illiance, Kitsault, Kshwan, Stagoo & Wiauks.

[3] Portland Canal chum stocks: Bear, Donahue, Georgie & Roberson.

[4] Work Channel pink stocks: Ensheshese, Lachman & Toon.

[5] Observatory Inlet pink stocks: Illiance R., Kshwan R., Salmon Cove Cr., Stagoo R. & Wiauk Cr.

CURRENT FISHING PATTERNS IN AREA 3

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
Aug 5 - 11	*Pink - Kwinamass, Khutzeymateen & Work Channel[3]	Pink[1]- Iknouk, Ishkeenickh & Observatory[2] Pink - Babine, Kispiox & Kitwanga	3-3, 7 & 9 &3-12&17&11 if not weak &3-1,2&4 if not weak	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info., Skeena T.F.
	Pink[1]- Iknouk, Ishkeenickh & Observatory[2]	Pink - Kwin/Khut/Work Pink - Bab/Kis/Kit	3-11,12&17 &3-3,7&9 if not weak 73-1,2&4 if not weak	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info., Skeena T.F.
	*Pink - Babine, Kispiox & Kitwanga	Pink - Kwin/Khut/Work Pink[2]- Ikn/Ishk/Obs.	3-1,2&4 &3-3,7&9 if not weak &3-11,12&17 if not weak	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info., Skeena test, expectations.
Aug 12 - 18	*Pink - Iknouk Ishkeenickh & Observatory	Pink - Khutzeymateen & Work Pink - Lakelse	3-3,7,11,12&17 &3-3,7 if not weak &3-1,2&4 if not weak	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info., Skeena T.F.
	Pink - Khutzeymateen & Work	Pink[1]- Ikn/Ishk/Obs.[2] Pink - Lakelse	3-3&7 if not weak &3-11,12&17,3&7 if not weak; &3-1,2&4 if not weak	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info., Skeena T.F.
	*Pink - Lakelse	Pink - Khutz/Work Pink[1]- Ikn/Ishk/Obs.[2]	3-1,2&4 &3-3&7 if not weak &3-3,7,11,12&17 if not weak	GN&SN GN only in 3-12	Catch to date, Skeena T.F., expectations, tagging info.
Aug 19 - 25	*Pink[1]- Iknouk, Ishkeenickh	Pink[4]- Area 3&4 Coastal Pink[2]- Observatory	3-3,7,11,12&17 &3-1,2&4 if not weak &3-14	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info.
	Pink[4]- Area 3&4 Coastal stocks	Pink[1] - Ikn/Ishk Pink[2] - Observatory	3-1,2&4 &3-3,7,11,12&17 if not weak; &3-14 if not weak	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info.
	Pink[2]- Observatory Inlet stocks	Pink[1]- Ikn/Ishk Pink[4]- Area 3&4 Coastal	3-14 3-3,7,11,12&17 if not weak; &3-1,2?4 if not weak.	GN&SN GN only in 3-12	Catch to date, esc. indications, tagging info.

* Denotes target stock(s) which drive the Area 3 fishery during each week.
1 Also includes smaller passive inside Area 3 stocks (Chambers, Dogfish Bay, Kincolith, Tseax).
2 Observatory pink systems: Illiance R., Kshwan R., Salmon Cove Cr., Stagoo R., Wiauks Cr.
3 Work Channel pink systems: Ensheshese, Lachmach & Toon.
4 Area 3 Coastal: Brundige Cr., Manzanita Cove Cr., Sandy Bay Cr., Tracy Cr., Stumann Cr., Turk Cr., & Whitly Pt. Cr.
Area 4 Coastal: Estall R., Humpback Cr., Pearl Harbour Cr., McNichol Cr., Moore Cove Cr., Oona R., Silver Cr., Spiller R., Big Useless Cr.

CURRENT FISHING PATTERNS IN AREA 3

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
Aug 26 - Sept 1	*Pink[1]- Iknouk, Ishkeenickh	Pink[4]- Area 3&4 Coastal Pink - Observatory[2]	3-3,7,11,12&17 &3-1,2&4 if not weak &3-14 if not weak	GN&SN GN only in 3-12	Esc. Indications, catch to date.
	Pink[4]- Area 3&4 Coastal stocks	Pink[1]- Ikn/Ishk Pink[2]- Observatory	3-1,2&4 &3-3,7,11,12&17 if not weak; &3-14 if not weak		Esc. Indications, catch to date.
	Pink[2]- Observatory Inlet stocks	Pink[1]- Ikn/Ishk Pink[2]- Area 3&4 Coastal	3-14 &3-3,7,11,12&17 if not weak; &3-1,2&4 if not weak	GN&SN GN only in 3-12	Esc. Indications, catch to date.
Sept 2 - 8	Pink[1]- Iknouk, Ishkeenickh	Pink[3]- Area 3&4 Coastal	3-3,7,11,12&17 &3-1,2&4 if not weak	GN&SN GN only in 3-12	Esc. Indications, catch to date.

* Denotes target stock(s) which drive the Area 3 fishery during each week.

1 Also includes smaller passive inside Area 3 stocks (Chambers, Dogfish Bay, Kincolith, Tseax).

2 Observatory pink systems: Illiance R., Kshwan R., Salmon Cove Cr., Stagoo R., Wiauks Cr.

3 Work Channel pink systems: Ensheshese, Lachmach & Toon.

4 Area 3 Coastal: Brundige Cr., Manzanita Cove Cr., Sandy Bay Cr., Tracy Cr., Stumann Cr., Turk Cr., & Whitly Pt. Cr.
Area 4 Coastal: Estall R., Humpback Cr., Pearl Harbour Cr., McNichol Cr., Moore Cove Cr., Oona R., Silver Cr., Spiller R., Big Useless Cr.

CURRENT FISHING PATTERNS IN AREA 4

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
June 17 - 23	*Sockeye - Early Skeena Stocks[1]	Chinook - Skeena[2] Stocks	I.F.F.	GN	Skeena test fishery, I.F.F., expectations.
June 24 - 30	*Sockeye - Pinkut	Sockeye - Early[1] Skeena Stocks Chinook - Skeena[2] Stocks	I.F.F.	GN	Skeena test fishery, I.F.F., expectations. Area 3 catch, Cape Fox catch.
	*Sockeye - Early[1] Skeena Stocks	Sockeye - Pinkut Chinook - Skeena[2] Stocks		GN	Same as above.
July 1 - 7	*Sockeye - Pinkut	Sockeye - Early Chinook[4] - Skeena	4-1,2,3,4,5,8,9&12	GN	Skeena test fishery I.F.F., tagging info., & expectations, catch to date.

* Denotes target stock(s) which drives the Area 4 fishery during each week.

[1] Early Skeena Sockeye Stocks: Alastair L., Lakelse System, McDonnell L. Sys., Morice L. Sys., Bear L. Sys., and Babine Main Lake Trib. (Five-Mile, Four Mile, Morrison, Nine-Mile, Pierre, Grizzly, Socrese, Sutherland, Tachek, Tahlo, Telzato and Twain).

[2] Major Skeena Chinook Stocks: Morice, Kisplox, Bulkley, Bear, Babine, Kitsumkalum, Ecstall, Lakelse, Zymoetz, Skeena Mainstem.

CURRENT FISHING PATTERNS IN AREA 4

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
July 8 - 14	*Sockeye - Pinkut	Sockeye - Fulton Chinook[4] - Skeena	4-1,2,3,4,5,8,9&12 4-1,2,3,4,5,8,9&12	GN GN	Skeena test fishery, I.F.F., catch to date, tagging info., expectations.
	*Sockeye - Fulton	Chinook[4] - Skeena Sockeye - Pinkut	4-1,2,3,4,5,8,9&12 4-1,2,3,4,5,8,9&12	GN GN	Same as above.
July 15 - 21	*Sockeye - Fulton	Sockeye - Pinkut Chinook[4] - Skeena	4-1,2,3,5,8,9& 4-12	GN&SN GN only	Same as above.
	*Sockeye - Pinkut	Chinook[4] - Skeena Sockeye - Fulton	4-1,2,3,5,8,9& 4-12	GN&SN GN only	Same as above.
	*Sockeye - Fulton	Pink - Babine, Kitwanga, Kispiox, [1]Upper River Stock Chinook[4] - Skeena	4-1,2,3,4,5,8,9&12 4-1,2,3,5,8&9&12 GN only	GN only or GN&SN	Skeena test fishery, catch to date, tagging info., expectations, Babine River fence counts.
	Pink - Babine, Kitwanga, Kispiox, [1]Upper River Stocks	Sockeye - Fulton Chinook[4] - Skeena	4-1,2,3,4,5,8,9&12 4-1,2,3,4,5,8,9&12	GN only or GN&SN	Same as above
July 29 - Aug 4	Sockeye - Babine River	Pink - Babine, Kitwanga, Kispiox, [1]Upper River Stock	4-1,2,3,4,5,8,9&12 4-1,2,3,5,8,&9&12 GN only	GN only or GN&SN	Same as above.

* Denotes target stock(s) which drive the Area 4 fishery during each week.

[1] Upper River Pink Stocks: Bulkley R., Morice R., Bear R., Station Cr., Price Cr.

[2] Lower River Pink Stocks: Coldwater Cr., Deep Cr., Exchamsiks R., Gitnapolx R., Kasiks R., Knyex R., Kleanla Cr., Kwinitsa R., Scotia R., Shames Slough, Skeena Mainstem, Zymagotitz R., Zymoetz R.

[3] Coastal Pink Stocks: Denise R., Ecstall R., Hayward Cr., Humpback Cr., Johnston Cr., Pearl Harbour Cr., Lockscay Cr., McNichol Cr., Gibralter Cr., Moore Cove Cr., Oona R., Silver Cr., Sparkling Cr., Spiller R., Big Useless Cr., Little Useless Cr.

[4] Skeena Chinook Stocks: Morice, Kispiox, Bulkley, Bear, Babine, Kitsumkalum, Ecstall, Lakelse, Zymoetz, Skeena Mainstem.

CURRENT FISHING PATTERNS IN AREA 4

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
July 29 - Aug 4 (cont'd)	*Pink - Babine Kitwanga, Kispiox, [1]Upper River Stocks	Sockeye - Babine R.	4-1,2,3,5,8&9&12 GN only 4-1,2,3,4,5,8,9&12	GN&SN or GN only	Same as above.
Aug 5 - 11	*Pink - Babine, Kitwanga, Kispiox, [1]Upper River Stocks	Pink - Lakelse, Kitsumkalum, [2]Lower River Stocks	4-1,2,3,4,5,8,9&12 4-1,2,3,5,8&9&12 GN only	GN only or GN&SN	Skeena test fishery, catch to date, tagging info., expectations, Babine fence counts, esc. surveys.
	*Pink - Lakelse, Kitsumkalum, [2]Lower River Stocks	Pink - Babine, Kitwanga, Kispiox, [1]Upper River Stocks	4-1,2,3,5,8,9&12 4-1,2,3,5,8&9&12 GN only	GN only or GN&SN	Same as above.
Aug 12 - 18	*Pink - Lakelse, Kitsumkalum, [2]Lower River Stocks	Pink - Coastal[3] Stocks	4-1,2,3,4,5,8,9&12 4-1,2,3,5,8&9&12 GN only	GN only or GN&SN	Same as above.
	Pink - Coastal[3] Stocks	Pink - Lakelse, Kitsumkalum, [2]Lower River Stocks	4-1,2,3,4,5,8,9&12 4-1,2,3,5,8&9,&12 GN only	GN only or GN&SN	Same as above.

* Denotes target stock(s) which drive the Area 4 fishery during each week.

[1] Upper River Pink Stocks: Bulkley R., Morice R., Bear R., Station Cr., Price Cr.

[2] Lower River Pink Stocks: Coldwater Cr., Deep Cr., Exchamsiks R., Gitnapolx R., Kasiks R., Knyex R., Kleanla Cr., Kwinitsa R., Scotia R., Shames Slough, Skeena Mainstem, Zymagotitz R., Zymoetz R.

[3] Coastal Pink Stocks: Denise R., Ecstall R., Hayward Cr., Humpback Cr., Johnston Cr., Pearl Harbour Cr., Lockscay Cr., McNichol Cr., Gibralter Cr., Moore Cove Cr., Oona R., Silver Cr., Sparkling Cr., Spiller R., Big Useless Cr., Little Useless Cr.

[4] Skeena Chinook Stocks: Morice, Kispiox, Bulkley, Bear, Babine, Kitsumkalum, Ecstall, Lakelse, Zymoetz, Skeena Mainstem.

CURRENT FISHING PATTERNS IN AREA 4

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
Aug 19 - 25	*Pink - Coastal[3] Stocks	Pink - Lakelse, Kitsumkalum, [2]Lower River Stocks	3-1,2,3,4,5,8,9&12	GN	Skeena test fishery, catch to date, tagging info., esc. surveys, expectations.
	Pink - Lakese, Kitsumkalum, [2]Lower River Stocks	Pink - Coastal[3] stocks	3-1,2,3,4,5,8,9&12	GN	Same as above.
Aug 26 - Sept 1	*Pink - Coastal[3] Stocks		3-1,2,3,4,5,8,9&12	GN	Same as above.

Window Openings
Seine Restrictions

* Denotes target stock(s) which drive the Area 4 fishery during each week.

[2] Lower River Pink Stocks: Coldwater Cr., Deep Cr., Exchamsiks R., Gitnapoix R., Kasiks R., Knyex R., Kleanla Cr., Kwinitsa R., Scotia R., Shames Slough, Skeena Mainstem, Zymagotitz R., Zymoetz R.

[3] Coastal Pink Stocks: Denise R., Ecstall R., Hayward Cr., Humpback Cr., Johnston Cr., Pearl Harbour Cr., Lockscay Cr., McNichol Cr., Gibralter Cr., Moore Cove Cr., Oona R., Silver Cr., Sparkling Cr., Spiller R., Big Useless Cr., Little Useless Cr.

CURRENT FISHING PATTERNS IN AREA 5

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
June 17 - 23	*Sockeye - Local Stocks[1]	Sockeye - Early[2] Skeena Stocks	I.F.F.	GN	I.F.F., expectations Skeena T.F.
June 24 - 30	*Sockeye - Local Stocks[1]	Sockeye - Pinkut Sockeye - Early[2] Skeen Stocks Chum - Passing[3]	I.F.F.	GN	I.F.F., expectations Skeena T.F., esc. indications.
	*Sockeye - Pinkut	Sockeye - Local[1] Stocks Sockeye - Early[2] Skeena Stocks Chum - Passing[3]	5-1,2,3,10&12 &5-13,17,20,22&23 if not weak	GN	Same as above.
July 1 - 7	*Sockeye - Pinkut	Sockeye - Local[1] Stocks Chum - Passing[3]	5-1,2,3,10,11&12 &5-13,17,20,22&23 if not weak	GN	Same as above.
	Sockeye - Local Stocks	Sockeye - Pinkut Chum - Passing[3]	5-10,11,12,13,20, 22&23 &5-1,2&3 if not weak	GN	Same as above.
July 8 - 14	*Sockeye - Pinkut & Fulton	Sockeye - Local[1] Stocks Chum - Passing[3] Stocks	5-1,2,3,10,11&12 &5-13,17,20,22&23 if not weak	GN	Same as above.
	Sockeye - Local[1] Stocks	Sockeye - Pinkut & Fulton Chum - Passing[3] Stocks	5-10,11,12,13,17,20, 22&23 &5-1,2&3 if not weak	GN	Same as above.
July 15 - 21	*Sockeye - Fulton & Pinkut	Sockeye - Local[1] Stocks Chum - Passing[3] Stocks	5-1,2,3,10,11&12 &5-13,17,20,22&23 if not weak	GN & SN	Same as above.
	Sockeye - Local[1] Stocks	Sockeye - Pinkut & Fulton Chum - Passing[3] Stocks	5-13,17,20,22&23 5-1,2,3,10,11&12 if not weak	GN & SN	Same as above.

* Denotes target stock(s) which drives the Area 5 fishery during each week.

[1] Local sockeye stocks: Outside Banks Isl., Principe Ch., Grenville Ch. (Breakdown in App. I).

[2] Early Skeena sockeye stocks: Alastair L., Lakelse Sys., McDonell L. Sys., Morice L. Sys., Bear L. Sys., & Babine L. Trib. stocks (not Pinkut & Fulton) - list in Area 4 package.

[3] Passing chum stocks not known but likely Central Coast stocks.

[4] Upper Skeena Pink stocks: Babine, Kitwanga, Kisplox, Bulkley, Morice, Bear, Station, Price.

CURRENT FISHING PATTERNS IN AREA 5

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
July 22 - 28	*Sockeye - Fulton	Sockeye - Local Stocks[1] Pink - Upper Skeena Stocks[4] Chum - Passing Stocks	5-1,2,3,10,11&12 &5-13,17,20,22&23 if not weak	GN & SN	Same as above.
	Pink - Upper Skeena Stocks[4]	Chum - Passing St.[3] Sockeye - Fulton Sockeye - Local Stocks[1]	3-1,2,3,10,11&12 &3-13,17,20,22&23 if not weak	GN & SN	Catch to date, expectations, esc. Indications, Skeena T.F.
July 29 - Aug 4	*Sockeye -	Pink - Upper[4] Skeena Stocks Sockeye - Local[1] Stocks Chum - Passing[3]	3-1,2,3,10,11&12 &3-13,17,20,22&23 if not weak	GN & SN	Catch to date, Skeena T.F., esc. Indications, expectations.
	*Pink - Upper[4] Skeena Stocks	Sockeye - Sockeye - Local[1] Stocks Chum - Passing[3]	3-1,2,3,10,11&12 &3-13,17,20,22&23 if not weak	GN & SN	Same as above.

* Denotes target stock(s) which drives the Area 5 fishery during each week.

[1] Local sockeye stocks: Outside Banks Isl., Principe Ch., Grenville Ch. (Breakdown in App. I).

[2] Early Skeena sockeye stocks: Alastair L., Lakelse Sys., McDonell L. Sys., Morice L. Sys., Bear L. Sys., & Babine L. Trib. stocks (not Pinkut & Fulton) - list in Area 4 package.

[3] Passing chum stocks not known but likely Central Coast stocks.

[4] Upper Skeena Pink stocks: Babine, Kitwanga, Kisplox, Bulkley, Morice, Bear, Station, Price.

CURRENT FISHING PATTERNS IN AREA 5

FISHING WEEK	TARGET STOCK(S) <Tail End of Run >Peak Week	INCIDENTAL CATCH	"STANDARD" FISHING AREAS	GEAR	PRIMARY MANAGEMENT CONSIDERATIONS
Aug 5 - 11	*Pink - Upper[1] & Lower Skeena[2]	Chum - Passing Stocks Pink - Local[3] Stocks	5-1,2,3,10,11&12	GN & SN	Same as above.
Aug 12 - 18	*Pink - Lower Skeena Stocks[2]	Pink - Local Stocks[3]	5-1,2,3,10,11&12 &5-4,9,13,14,17,20&23 if not weak	GN & SN	Same as above.
	Pink - Local Stocks[3]	Pink - Lower Skeena Stocks[2]	5-4,9,13,14,17,20&23 &5-1,2,3,10,11&12	GN & SN	Same as above.
Aug 19 - 25	*Pink - Local Stocks[3]	Pink - Lower Skeena[2] & Coastal[4]	5-1,2,3,4,10,11,12,13 14,17,20&23	GN & SN	Same as above.
Aug 26 - Sept 1	*Pink - Local Stocks[3]	Chum - Local Stocks[5]	Any or all of above depending on strengths or weaknesses of each stock.	GN & SN	Same as above.
Sept 2 - 8	*Pink - Local Stocks[3]	Chum - Local Stocks[5]	Same as above.	GN & SN	Same as above.

* Denotes target stock(s) which drives the Area 5 fishery during each week.

1 Upper Skeena pink stocks: Babine, Kitwanga, Kisplox, Bulkley, Morice, Bear, Station, Price.

2 Lower Skeena pink stocks: Coldwater Cr., Deep Cr., Exchamles R., Gitnadolx R., Kasiks R., Knyex R., Kleaza Cr., Kwinitsa R., Scotia R., Shames Slough, Skeena Mainstem, Zymagoltz R., Zymetz R., Lakelse, Kitsumkalum.

3 Local pink stocks: Outside Banks Isl., Principe Ch., Petrel Ch., Grenville Ch., Ogden Ch., Kitkatla & Porcher Inlets (breakdown in Appendix I).

4 Area 4 Coastal pink stocks: Denise Cr., Ecstall R., Hayward Cr., Humpback Cr., Johnston Cr., Pear Hb. Cr., Lockerby Cr., McNichol Cr., Gibcaltor Cr., Moore Cove Cr., Oona R., Silver Cr., Sparkling Cr., Spiller R., Big Useless Cr., Little Useless Cr.

5 Local chum stocks: Outside Banks Isl., Principe Ch., Petrel Ch., Grenville Ch., Ogden Ch., Kitkatla & Porcher Inlets (breakdown in Appendix I).

APPENDIX III

HABITAT STATUS IN STATISTICAL AREAS 3, 4 AND 5

INTRODUCTION

The habitat information tables were prepared by Howard Paish and Associates under contract to the Department of Fisheries and Oceans. Each table summarizes habitat status for one species in one Sub-area (e.g., Rivers Inlet Sockeye, Gardner Canal Pink, Cumshewa Chum). These sub-area summaries form the basis for the Habitat Overview in the Salmon Stock Management Plan.

The purpose of the Habitat Overview is to link stock and escapement information to information on habitat status and development. Each table has five sections:

1. Stock Group
2. Stock Data
3. Management Style
4. Habitat Notes
5. Summary

The Stock Group section identifies the stock or group of stocks by species and management unit covered in the table. The Stock Data section summarizes current, target, and maximum recorded escapements in an attempt to link stock status, (current escapement) to habitat status and potential (target and maximum recorded escapements). The Management Style Section indicates whether the stock is actively or passively managed.

The Habitat Notes describe the historic and current status of habitat and the future outlook. This information facilitates interpretation of the Stock Data linking actual and potential stock production to habitat status. The production potential of the natural habitat, and of only improved habitat are also indicated. Source materials for the Habitat Notes are given in parentheses and elaborated upon in the Data Source sheets that follow the tables.

The Summary section contains subjective gradings of habitat in terms of ability to achieve current targets, current status and future outlook, and the production potential from natural and improved habitat.

HABITAT INFORMATION TABLE

STOCK GROUP Upper Nass Sockeye Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	406	209	211

MANAGEMENT STYLE

Active 1*

Passive 5

No. of Streams 6

No. of Significant Streams 4

(99 % of MRE)

HABITAT NOTES

Dominated by Meziadin river.
Upper Nass produces 95% of Area 3 sockeye.

Historic Status	Moderate natural flow fluctuations. Glacial origins. Beaver dams on several rivers. Logging, with low to moderate impacts, (GWG/SEP) on about 50% of streams. Fishway on Meziadin.
Current Status	Low to moderate logging. (GWG/SEP) Stable.
Future Outlook	Increase in logging activity planned. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	Potential for additional fish passage facilities. (SRMP) Beaver dam removal.

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		High

* 70% of target.

HABITAT INFORMATION TABLE

STOCK GROUP Upper Nass Coho Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	12.6		3.6

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 6

No. of Significant Streams 4

(95 % of MRE)

HABITAT NOTES

Historic Status	Moderate natural flow fluctuations. Glacial origins. Beaver dams on several rivers. Logging, with low to moderate impacts, (GWG/SEP) on about 50% of streams.
Current Status	Low to moderate logging. Stable.
Future Outlook	Increase in logging activity planned. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	Beaver dam removal.

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is probably not a significant factor in stock decline.(P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Nass Chinook Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	11.7		2.7

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 6

No. of Significant Streams 4

(100 % of MRE)

HABITAT NOTES

Historic Status	Moderate natural flow fluctuations. Glacial origins. Beaver dams on several rivers. Logging, with low to moderate impacts, (GWG/SEP) on about 50% of streams.
Current Status	Low to moderate logging. Stable.
Future Outlook	Increase in logging activity planned. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	Beaver dam removal.

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is probably not a significant factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Nass Sockeye Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	12.5	11	2.7

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 7

No. of Significant Streams 3

(98 % of MRE)

HABITAT NOTES

Dominated by Gingit Creek.

Historic Status	Glacial stream origins. Some flow instability and natural silt load. Considerable beaver acitivity - mixed impacts. Logging on 40% of streams. Remainder pristine.
Current Status	Stable. (P)
Future Outlook	Possible resumption of logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

HABITAT INFORMATION TABLE

STOCK GROUP Lower Nass Chinook Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	20.9		2.8

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 7

No. of Significant Streams 7

(100 % of MRE)

HABITAT NOTES

Historic Status	Glacial stream origins. Some flow instability and natural silt load. Considerable beaver acitivity - mixed impacts. Logging on 40% of streams. Remainder pristine.
Current Status	Stable. (P)
Future Outlook	Possible resumption of logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

HABITAT INFORMATION TABLE

STOCK GROUP Lower Nass Coho Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	50.7		7*

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 20

No. of Significant Streams 9

(90 % of MRE)

HABITAT NOTES

Historic Status	Glacial stream origins. Some flow instability and natural silt load. Considerable beaver activity - mixed impacts. Logging on 60% of streams. Remainder pristine.
Current Status	Ongoing logging. (GWG/SEP)
Future Outlook	Continued logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
	Medium-High	High	High	

Habitat change in small streams may have contributed to stock decline. (P)

* Current escapement data may be questionable, especially for Tseax River.

HABITAT INFORMATION TABLE

STOCK GROUP Lower Nass Chum Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	34.5	20.1	2.9

5.6 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 14

No. of Significant Streams 4

(80 % of MRE)

HABITAT NOTES

Historic Status	Glacial stream origins. Some flow instability and natural silt load. Considerable beaver activity - mixed impacts. Logging on 40% of streams. Remainder pristine.
Current Status	Stable.(P)
Future Outlook	Possible resumption of logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

HABITAT INFORMATION TABLE

STOCK GROUP Lower Nass Pink Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement	MANAGEMENT STYLE	
					Active 1*
					Passive 16
Thousands	103	54 - odd 0 - even	55 - odd & even		No. of Streams 17
					No. of Significant Streams 7
			146.6 odd 26.2 even	SRMP	(85 % of MRE)

HABITAT NOTES

Dominated by Ishkheenickh River, which accounts for 55% of target and MRE.

Historic Status	Glacial stream origins. Some flow instability and natural silt load. Considerable beaver activity - mixed impacts. Logging on 60% of streams. Remainder pristine.
Current Status	Ongoing logging. (GWG/SEP)
Future Outlook	Continued logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
	Medium-High	High	High	

* 55% of target.

HABITAT INFORMATION TABLE

STOCK GROUP Portland Inlet Chinook Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	9.7	8.5	1.2

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 5

No. of Significant Streams 5

(100 % of MRE)

HABITAT NOTES

Historic Status	Some natural turbidity and flow fluctuations. Natural log jams. Logging on 20% of streams. Low to moderate impacts.(GWG/SEP) Beaver activity.
Current Status	Unchanged.(P)
Future Outlook	Possible increase in logging activity.(GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	Re-introduction from Kincolith hatchery.(SRMP)

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		High

Assume stock augmentation. Habitat is not a significant factor in stock decline.(P)

HABITAT INFORMATION TABLE

STOCK GROUP Portland Inlet Coho Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	90.7	20	6.7*

MANAGEMENT STYLE Active ___ Passive ___

No. of Streams 5

No. of Significant Streams 4

(99 % of MRE)

HABITAT NOTES

Historic Status	Some natural turbidity and flow fluctuations. Natural log jams. Logging on 20% of streams. Low to moderate impacts.(GWG/SEP) Beaver activity.
Current Status	Unchanged.(P)
Future Outlook	Possible increase in logging activity.(GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		High

Habitat is not a significant factor in stock declines.

*Questionable current escapement data.

HABITAT INFORMATION TABLE

STOCK GROUP Portland Inlet Chum Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	50	22.3	6.4

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 6

No. of Significant Streams 2

(94 % of MRE)

HABITAT NOTES

Dominated by Khutzeymateen and Kwinamass River.

Historic Status	Some natural turbidity and flow fluctuations. Natural log jams. Logging on 20% of streams. Low to moderate impacts. (GWG/SEP) Beaver activity.
Current Status	Unchanged.(P)
Future Outlook	Possible increase in logging activity.(GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

No habitat reason for stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Portland Inlet Pink Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement	MANAGEMENT STYLE	
					Active 3*
					Passive 8
Thousands	451	195.2	217 - odd & even		No. of Streams 11
					No. of Significant Streams 6
			302.9 odd 255.2 even	SRMP	(93 % of MRE)

HABITAT NOTES

Dominated by Khutzeymateen, Kwinamass and Iknouk Rivers.

Historic Status	Some natural turbidity and flow fluctuations. Natural log jams. Logging on 20% of streams. Low to moderate impacts. (GWG/SEP) Beaver activity.
Current Status	Unchanged.(P)
Future Outlook	Possible increase in logging activity.(GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	Carefully conducted log jam removal.(P)

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

* 82% of target.

HABITAT INFORMATION TABLE

STOCK GROUP Observatory Inlet Chinook Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	.8	6	.1

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 1

No. of Significant Streams 1

(100 % of MRE)

HABITAT NOTES

Kitsault River.

Historic Status	Glacial system. Natural turbidity. Mining development in Kitsault area during late 1940's and 1950's. Resumption in early 1980's and now closed. Moderate logging activity with low to moderate impacts. (GWG/SEP)
Current Status	Logging ongoing. (GWG/SEP) Mine closed.
Future Outlook	No early resumption of mining. (P) Anticipate incresing logging activity. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	Hatchery introductions from Kincolith. (SRMP)

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	Medium-High	High		High

Augmentation assumed. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Observatory Inlet Coho Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	8.5	3.9	1.9

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 3

No. of Significant Streams 3

(100 % of MRE)

HABITAT NOTES

Kitsault River.

Historic Status	Glacial system. Natural turbidity. Mining development in Kitsault area during late 1940's and 1950's. Resumption in early 1980's and now closed. Moderate logging activity with low to moderate impacts. (GWG/SEP)
Current Status	Logging ongoing. (GWG/SEP) Mine closed.
Future Outlook	No early resumption of mining. (P) Anticipate increasing logging activity. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	Medium-High	High		

Habitat not a major factor in stock decline.(P)

HABITAT INFORMATION TABLE

STOCK GROUP Observatory Inlet Pink Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement	MANAGEMENT STYLE	Active ___
					Passive X
Thousands	37	14.7	4.4 - even & odd	No. of Streams	8
				No. of Significant Streams	6
			6.7 - odd 15.7 - even	(98 % of MRE)	

HABITAT NOTES

Historic Status	Glacial system. Natural turbidity. Mining development in Kitsault area during late 1940's and 1950's. Resumption in early 1980's, and now closed. Logging on 40% of watersheds, with low to moderate impacts. (GWG/SEP)
Current Status	Logging ongoing.(GWG/SEP) Mine closed.
Future Outlook	No early resumption of mining.(P) Anticipate increasing logging activity.(GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	High-Medium	High		Medium

HABITAT INFORMATION TABLE

STOCK GROUP Observatory Inlet Chum Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	92.8	43	23

21.1 - SRMP

MANAGEMENT STYLE

Active 4*

Passive 4

No. of Streams 8

No. of Significant Streams 5

(99 % of MRE)

HABITAT NOTES

Historic Status	Glacial system. Natural turbidity. Mining development in Kitsault area during late 1940's and 1950's. Resumption in early 1980's, and now closed. Logging on 40% of watersheds, with low to moderate impacts. (GWG/SEP)
Current Status	Logging ongoing.(GWG/SEP) Mine closed.
Future Outlook	No early resumption of mining.(P) Anticipate increasing logging activity.(GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Current Outlook	Natural Production Potential	Improved Production Potential
High	Medium-High	Medium-High		

* 98% of target.

HABITAT INFORMATION TABLE

STOCK GROUP Portland Canal Sockeye Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	3.5		.1

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 1

No. of Significant Streams 1

(100 % of MRE)

HABITAT NOTES

Minor stock in Bear River.

Historic Status	Glacial stream with natural turbidity and flow fluctuations. Urban and harbour development with moderate activity. (GWG/SEP)
Current Status	Ongoing harbour/port development. (GWG/SEP)
Future Outlook	Increasing development. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	Medium	Medium	Medium	

HABITAT INFORMATION TABLE

STOCK GROUP Portland Canal Chinook Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	1.9	.5	0*

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 2

No. of Significant Streams 2

(100 % of MRE)

HABITAT NOTES

Historic Status	Glacial rivers with natural turbidity and flow instability.
Current Status	Pristine.
Future Outlook	No change.
Natural Habitat Production Potential	
Improved Production Potential	Hatchery transplant potential.

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	?	High	High	

Habitat change is not a factor in stock declines. (P)

* Questionable data.

HABITAT INFORMATION TABLE

STOCK GROUP Portland Canal Coho Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	10.5		1.6

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 2

No. of Significant Streams 2

(100 % of MRE)

HABITAT NOTES

Bear and Georgie Rivers.

Historic Status	Glacial streams with natural turbidity and flow fluctuations. Urban and harbour development with moderate activity on Bear River. Georgie River pristine.
Current Status	Ongoing harbour/port development on Bear River. (GWG/SEP)
Future Outlook	Increasing development on Bear River. (GWG/SEP)(P)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High-Medium	High-Medium	High-Medium	

HABITAT INFORMATION TABLE

STOCK GROUP Portland Canal Chum Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	18.5	6.6	.06*

.07 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 4

(100 % of MRE)

HABITAT NOTES

Historic Status	Glacial streams with natural turbidity and flow fluctuations. Urban and harbour development on Bear River, with moderate activity. Remaining streams pristine.
Current Status	Ongoing harbour/port development on Bear River. (GWG/SEP)
Future Outlook	Increasing development on Bear River. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

* Questionable.

HABITAT INFORMATION TABLE

STOCK GROUP Portland Canal Pink Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	29.5	10.5 - odd 18.5 - even	.13 - odd & even .17 odd .31 even

MANAGEMENT STYLE: Active X / Passive ___

No. of Streams 4

No. of Significant Streams 4

SRMP (___ % of MRE)

HABITAT NOTES

Historic Status	Mostly turbid, unstable streams with glacial origins, and natural turbidity. Mining exploration. No other development.
Current Status	Virtually pristine.
Future Outlook	Possible logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High (?)	High		

Habitat change not a factor in stock declines. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Work Channel Sockeye Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	.4		.1

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 1

No. of Significant Streams 1

(100 % of MRE)

HABITAT NOTES

Minor stock on Leverson River.

Historic Status	Pristine.
Current Status	No change.
Future Outlook	No change.
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

HABITAT INFORMATION TABLE

STOCK GROUP Work Channel Coho Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	8	3.1	1.1

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 4

(100 % of MRE)

HABITAT NOTES

Historic Status	Some natural instability. Three of four streams logged in 1960's and early 1970's. Low to moderate impacts. (GWG/SEP)
Current Status	Forest area recovering. (P)
Future Outlook	Possible further logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High-Medium	High		

HABITAT INFORMATION TABLE

STOCK GROUP Work Channel Chum Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	47.5	13.5	2.2

2.5 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 4

(100 % of MRE)

HABITAT NOTES

Historic Status	Some natural instability. Three of four streams logged in 1960's and early 1970's. Low to moderate impacts. (GWG/SEP)
Current Status	Forest area recovering. (P)
Future Outlook	Possible further logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High-Medium	High		

HABITAT INFORMATION TABLE

STOCK GROUP Work Channel Pink Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	97.5	24.2 - odd 33.2 - even	13.9

MANAGEMENT STYLE: Active ___ Passive X

No. of Streams 4

No. of Significant Streams 4

SRMP: 4.7 odd, 27.1 even

(100 % of MRE)

HABITAT NOTES

Historic Status	Some natural instability. Three of four streams logged in 1960's and early 1970's. Low to moderate impacts. (GWG/SEP)
Current Status	Forest area recovering. (P)
Future Outlook	Possible further logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High-Medium	High		

HABITAT INFORMATION TABLE

STOCK GROUP Coastal Pink Area 3

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	37	19	9.4 - odd 18.5 - even

MANAGEMENT STYLE: Active ___ Passive X

No. of Streams 7

No. of Significant Streams 3

SRMP: 6.6 odd, 26.6 even (90 % of MRE)

HABITAT NOTES

Historic Status	Some low flow problems. Logging in 1950's and urban and industrial development on Stuman Creek. Low to moderate impacts. (GWG/SEP)
Current Status	Continued development. (GWG/SEP)
Future Outlook	Further development anticipated. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	Medium-High	Medium-High		

DATA SOURCES FOR HABITAT INFORMATION TABLES — STATISTICAL AREA 3

Maximum Recorded Escapement

Stream Catalogues: modified as described in the Introduction.

Hancock, M.J. and D.E. Marshall. 1984. Catalogue of spawning streams and spawning escapement of Statistical Area 3 (Nass River) including adjacent streams. Can. Data Rep. Fish. Aquat. Sci. #429.

Target/Optimum and Current Average Escapements

a) Pink, sockeye and chum: data source for subarea optimums was April 1985 SRMP. With the exception of several major producers, stream-specific optimum data were not available from the SRMP.

Limited stream-specific optimums were provided during the interviews, and those are included, on individual stream sheets. However, subarea optimums do not represent the sum of available stream-specific optimums.

b) For chinook and coho: the SRMP did not provide targets. However, some stream-specific targets were provided during interviews. The sum of these preliminary targets has been used to provide a very approximate subarea target on the substock information tables.

Current Average Escapements

Stream-specific current averages for the years 1979-83 were provided by DFO, Pacific Biological Station (See Information Sources). Subarea average current escapements are a sum of the stream-specific averages for streams above and below the MRE cutoff.

This was the only source of stream-specific, current averages for all 5 species available at the time of writing, and several concerns have emerged:

1. The subarea current escapements (1980-84) for pink, sockeye and chum in the April 1985 SRMP did not match the subtotals derived from the sum of stream-specific data noted above which cover 1979-83.

Also, the SRMP data may include significant current producers, whereas our data reflect important historic (and current) producers.

The SRMP subarea, and where available, stream-specific current escapement data are included on the Substock Summary and stream-specific information tables, but our discussion and analysis are based on the 1979-83 averages. Coho and chinook data were available only from the 1979-83 sources.

2. The 1979-83 data provided a 5-year average for pinks, without separating odd- and even-year runs.

   Odd and even current escapement data for subareas for 1980-84 provided in the SRMP are included on the substock summary tables, in addition to the 1979-83 data, which represent a single 5-year average. Where available, stream-specific odd/even current escapement data (1980-84) are included on stream-specific habitat information tables, and referenced to the SRMP.

Management Style

Active and passive management status were derived from the April 1985 SRMP, Volumes I and II.

Number of Streams and Stream Lists

Numbers of streams were derived from the Stream Catalogues, and the subarea organization data provided in the April 1985 SRMP, Volume II.

Unlike Areas 6 - 10, stream lists for each subarea were not available at the time of writing. Because complete subarea stream lists were not available, some of the minor producers listed in the Stream Catalogue are not included in our calculations of total number of producers in each subarea.

Habitat Notes

The Stream Catalogue provided most of the habitat information, supplemented by the April 1985 SRMP, GWG/SEP and interview information provided by Barry Huber and Barry Rosenberger, DFO, Prince Rupert, in March 1985. Information sources are referenced on habitat and substock summary information tables as described in the Introductory material and Information Sources.

HABITAT INFORMATION TABLE

STOCK GROUP Upper Skeena Sockeye Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	2,402	827	1,029

1,017 - SRMP

MANAGEMENT STYLE

Active 22*

Passive 24

No. of Streams 46

No. of Significant Streams 27

(99 % of MRE)

HABITAT NOTES

Primarily Babine system enhanced stocks.

Historic Status	Logging throughout major production areas since 1920's with low to moderate impacts and some local high impacts - (GWG/SEP) - mostly siltation and debris. Mining at Babine Lake since the 1960's has had minor localized impacts. (GWG/SEP) Agriculture, settlement and transportation development have had minor local impacts. (GWG/SEP)
Current Status	Major production facilities at Fulton River and Pinkut Creek. (SRMP) Stable forested areas are regenerating. (P)(I)
Future Outlook	No major new development anticipated. (P)(I) Possible Hydro impacts on Morice sytem. (P)
Natural Habitat Production Potential	At historic levels. (P)
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	High	High		

Stock levels dependent on Babine Lake facilities. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Skeena Chinook Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	77.3		17.8

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 14

No. of Significant Streams 6

(97 % of MRE)

HABITAT NOTES

Historic Status	Logging throughout major production areas since 1920's, with low to moderate impacts and some local high impacts - (GWG/SEP) mostly siltation and debris. Mining at Babine Lake since the 1960's has had minor localized impacts. (GWG/SEP) Agriculture, settlement and transportation development have had minor local impacts. (GWG/SEP)
Current Status	Stable forested areas are regenerating. (P)(I)
Future Outlook	No major new development. (P)(I) Possible hydro impacts on Morice sytem. (P)
Natural Habitat Production Potential	To historic levels. (P)
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High-Medium	High	High	

Habitat is not a major factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Skeena Coho Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	117.9		7.3*

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 47

No. of Significant Streams 19

(94 % of MRE)

HABITAT NOTES

Historic Status	Logging throughout major production areas since 1920's with low to moderate impacts and some local high impacts (GWG/SEP) - mostly siltation and debris. Mining at Babine Lake since the 1960's has had minor localized impacts. (GWG/SEP) Agriculture, settlement and transportation development have had minor impacts. (GWG/SEP)
Current Status	Stable forested areas are regenerating. (P)(I)
Future Outlook	No major new development. (P)(I) Possible hydro impacts on Morice sytem. (P)
Natural Habitat Production Potential	To historic levels. (P)
Improved Production Potential	Potential for small stream improvement. (P)

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	Medium-High

Habitat change may have had a limited effect on Coho production, but would not account for decline. (P)

* Questionable.

HABITAT INFORMATION TABLE

STOCK GROUP Upper Skeena Chum Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	5.5		.04

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 1

(90 % of MRE)

HABITAT NOTES

Very minor stock.

Historic Status	Logging throughout major production areas since 1920's, with low to moderate impacts and some local high impacts (GWG/SEP) mostly siltation and debris. Mining at Babine Lake since the 1960's has had minor localized impacts. (GWG/SEP) Agriculture, settlement and transportation development have had minor local impacts. (GWG/SEP)
Current Status	Stable forested areas are regenerating. (P)(I)
Future Outlook	No major new development. (P)(I) Possible hydro impacts on Morice sytem. (P)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High		

HABITAT INFORMATION TABLE

STOCK GROUP Upper Skeena Pink Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	1,155	700 - odd 400 - even	344 272.2 - even 557.4 - odd

MANAGEMENT STYLE

Active 2*

Passive 14

No. of Streams 16

No. of Significant Streams 11

(98 % of MRE)

HABITAT NOTES

Dominated by Babine stock.

Historic Status	Logging throughout major production areas since 1920's, with low to moderate impacts and some local high impacts - (GWG/SEP) mostly siltation and debris. Mining at Babine Lake since the 1960's has had minor localized impacts. (GWG/SEP) Agriculture, settlement and transportation development have had minor local impacts. (GWG/SEP)
Current Status	Stable forested areas are regenerating. (P)(I)
Future Outlook	No major new development. (P)(I) Possible hydro impacts on Morice sytem. (P)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

HABITAT INFORMATION TABLE

STOCK GROUP Lower Skeena Sockeye Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	122	71	28.8

22.4 - SRMP

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 26

No. of Significant Streams 11

(91 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability. Logging on about 60% of streams from 1960's on. Low to moderate impacts. (GWG/SEP) Some high impacts - mainly siltation and debris, but major producers not affected.
Current Status	Stable. Forested areas regenerating. (P)(I)
Future Outlook	Stable. No major increase in activity. (P)(GWG/SEP)
Natural Habitat Production Potential	To historic level. (P)
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	Medium-High	High		

HABITAT INFORMATION TABLE

STOCK GROUP Lower Skeena Coho Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	214.5		20

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 69

No. of Significant Streams 36

(94 % of MRE)

HABITAT NOTES

Historic Status	Some natural flow instability. Logging since late 1950's on about 60% of producing streams. Overall moderate impacts; high locally, including scouring, unstable flows, debris and siltation. (GWG/SEP) Some localized transportation and settlement development impacts.
Current Status	Logging continuing. (GWG/SEP)(I)
Future Outlook	Logging has probably peaked. Gradual recovery, with forest regeneration. (P)(I) Continuing flow instability. (I)
Natural Habitat Production Potential	Return to historic levels with better logging practices. (P)
Improved Production Potential	Probably plenty of scope for stream restoration. (P)

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	Medium-Low	Medium-High	High	

Coho have probably been affected most by habitat changes that have likely contributed to stock declines. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Skeena Chinook Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	40.3		11

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 21

No. of Significant Streams 11

(93 % of MRE)

HABITAT NOTES

Historic Status	Some natural flow instability. Logging since late 1950's on about 60% of producing streams. Overall moderate impacts; high locally, including scouring, unstable flows, debris and siltation. (GWG/SEP) Some localized transportation and settlement development impacts.
Current Status	Hatchery at Deep Creek. Logging continuing. (GWG/SEP)(I)
Future Outlook	Logging has probably peaked. Gradual recovery, with forest regeneration. (P)(I) Continuing flow instability. (I)
Natural Habitat Production Potential	Return to historic levels with better logging practices. (P)
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	Medium	Medium-High	High	

Habitat loss has probably contributed to stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Skeena Chum Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	67.7	70	9.1

28 - SRMP

MANAGEMENT STYLE

Active 1

Passive 31

No. of Streams 32

No. of Significant Streams 8

(85 % of MRE)

HABITAT NOTES

Lower and Upper Skeena chum are managed as one unit. Eckstall River is actively managed stock.

Historic Status	Some natural flow instability. Logging since late 1950's on about 60% of producing streams. Overall moderate impacts; high locally, including scouring, unstable flows, debris and siltation. (GWG/SEP) Some localized transportation and settlement development impacts.
Current Status	Logging continuing. (I)(GWG/SEP)
Future Outlook	Logging has probably peaked. Gradual recovery, with forest regeneration. (P)(I) Continuing flow instability. (I)
Natural Habitat Production Potential	Return to historic levels with better logging practices. (P)
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
Medium	Medium	Medium-High		

Habitat conditions have probably contributed to stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Skeena Pink Area 4

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	2,279	1,545 - odd 1,445 - even	783

MANAGEMENT STYLE: Active 2*

Passive 59

No. of Streams 61

No. of Significant Streams 27

SRMP: 563.8 even; 1,402 odd (97 % of MRE)

HABITAT NOTES

Dominated by Lakelse system.

Historic Status	Some natural flow instability. Logging since late 1950's on about 60% of producing streams. Overall moderate impacts; high locally, including scouring, unstable flows, debris and siltation. (GWG/SEP) Some localized transportation and settlement development impacts.
Current Status	Logging continuing. (GWG/SEP)(I)
Future Outlook	Logging has probably peaked. Gradual recovery, with forest regeneration. (P)(I) Continuing flow instability. (I)
Natural Habitat Production Potential	Return to historic levels with better logging practices. (P)
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
High	Medium-High	High		

DATA SOURCES FOR HABITAT INFORMATION TABLES — STATISTICAL AREA 4

Maximum Recorded Escapement

Stream Catalogues: modified as described in the Introduction material.

Hancock, M.J., A.J. Leaney-East and D. Marshall. 1983. Catalogue of salmon streams and spawning escapement of Statistical Area 4: i) Lower Skeena River ii) Upper Skeena River. Can. Data Rep. Fish. Aquat. Sci. #395.

Target/Optimum Escapement

a) Pink, sockeye and chum: data source for subarea optimums was April 1985 SRMP. With the exception of several major producers, stream-specific optimum data was not available from the SRMP.

Limited stream-specific optimums were provided during the interviews and these are included, on individual stream sheets. However, subarea optimums do not represent the sum of available stream-specific optimums.

b) For chinook and coho: the SRMP did not provide targets; however, some stream-specific targets were provided during interviews. The sum of these preliminary targets has been used to provide a very approximate subarea target on the substock information tables.

Current Average Escapements

Stream-specific current averages for the years 1979-83 were provided by DFO, Pacific Biological Station (See Information Sources). Subarea average current escapements are a sum of the stream-specific averages for streams above and below the MRE cutoff.

This was the only source of stream-specific, current averages for all 5 species available at the time of writing, and several concerns have emerged:

1. The subarea current escapements (1980-84) for pink, sockeye and chum in the April 1985 SRMP did not match the subtotals derived from the sum of stream-specific data noted above, for the years 1979-83.

   Also, the SRMP data may include significant current producers, whereas our data reflect important historic (and current) producers.

The SRMP subarea, and where available, stream-specific current escapement data are included on the substock summary and habitat information tables, but our discussion and analysis are based on the 1979-83 averages. Coho and chinook data were available only from the 1979-83 source.

2. The 1979-83 data provided a 5-year average for pinks, without separating odd- and even-year runs.

   Odd and even current escapement data for subareas for 1980-84 provided in the SRMP are included on the substock summary tables, in addition to the 1979-83 data, which represent a single 5-year average. Where available, stream-specific odd/even current escapement data (1980-84) are included on stream-specific habitat information tables, and referenced to the SRMP.

Management Style

Active and passive management status were derived from the April 1985 SRMP, Volumes I and II.

Number of Streams and Stream Lists

Numbers of streams were derived from the Stream Catalogues, and the subarea organization data provided in the April 1985 SRMP, Volume II.

Unlike Areas 6 - 10, stream lists for each subarea were not available at the time of writing. Because complete subarea stream lists were not available some of the minor producers listed in the Stream Catalogue are not included in our calculations of total number of producers in each subarea.

Habitat Notes

The Stream Catalogue provided most of the habitat information, supplemented by the April 1985 SRMP, GWG/SEP and interview information provided by Barry Huber and Barry Rosenberger, DFO, Prince Rupert, in March 1985. Information sources are referenced on habitat and substock information tables as described in the Introductory material and Information Sources.

HABITAT INFORMATION TABLE

STOCK GROUP Outside Banks Island Sockeye Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	35	12.3	3.1

3.5 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 2

(91 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not the cause of stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Outside Banks Island Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	58.7	14.7	0 - odd 3.3 - even .6 - odd

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 6

No. of Significant Streams 3

(98 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not the cause of stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Outside Banks Island Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	56	11.5	2.9

2.1 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 6

No. of Significant Streams 3

(95 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not the cause of stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Outside Banks Island Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	31		2.6

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 6

No. of Significant Streams 4

(89 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not the cause of stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Principe Sockeye Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	9	2.5	.7

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 2

No. of Significant Streams 2

(100 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Principe Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement	MANAGEMENT STYLE	
					Active ___
					Passive X
Thousands	50	8 - even & odd	2.4		No. of Streams 2
					No. of Significant Streams 2
			2.0 even 3.3 odd	SRMP	(100 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Principe Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	3	.3	.09

.75 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 2

No. of Significant Streams 2

(100 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Principe Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	9	-	1.1

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 2

No. of Significant Streams 2

(100 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Mid-Lower Principe Sockeye Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	66	21.4	6.4

8.7 - SRMP

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 11

No. of Significant Streams 8

(93 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Mid-Lower Principe Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	120	34.7	17.8

26.4 even
14.2 odd
SRMP

MANAGEMENT STYLE

Active ___
Passive X

No. of Streams 12

No. of Significant Streams 5

(82 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Mid-Lower Principe Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	18.4	8.8	1.7*

.46 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 15

No. of Significant Streams 6

(84 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

* 95% from Wilson Creek.

HABITAT INFORMATION TABLE

STOCK GROUP Mid-Lower Principe Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	22		1.8

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 15

No. of Significant Streams 9

(91 % of MRE)

HABITAT NOTES

Historic Status	Low summer flows.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Petrel Channel Sockeye Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	3.5	1.1	

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 2

No. of Significant Streams 1

(99 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability.
Current Status	Pristine.
Future Outlook	Unchanged. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

No habitat reason for stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Petrel Channel Pink Area 5

STOCK DATA

	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	38	18	9

11.6 even
8.1 odd
SRMP

MANAGEMENT STYLE

Active ___
Passive X

No. of Streams 4

No. of Significant Streams 4

(100 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability.
Current Status	Pristine.
Future Outlook	Unchanged. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

No habitat reason for stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Petrel Channel Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	14.3	2.5	.9

2.5 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 4

(100 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability.
Current Status	Pristine.
Future Outlook	Unchanged. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

No habitat reason for stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Petrel Channel Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	10.5		.14

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 3

No. of Significant Streams 3

(100 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability.
Current Status	Pristine.
Future Outlook	Unchanged. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

No habitat reason for stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Grenville Channel Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	180	Odd & Even 90.2	28.2

MANAGEMENT STYLE: Active ___ Passive ___

No. of Streams 6

No. of Significant Streams 4

55.8 even
27.7 odd
SRMP

(99 % of MRE)

HABITAT NOTES

Dominated by Kumealon Creek.

Historic Status	Natural flow fluctuations. Logging in 1940's - 50's. High impacts. (GWG/SEP)
Current Status	Stabilizing from logging. (P)
Future Outlook	Stable. (P)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat not considered a factor in stock declines. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Grenville Channel Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	3	1.3	.003

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 3*

No. of Significant Streams -*

(___% of MRE)

HABITAT NOTES

3 very minor stocks.
No stream sheets prepared.

Historic Status	
Current Status	
Future Outlook	
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential

* No stream sheets prepared.

HABITAT INFORMATION TABLE

STOCK GROUP Upper Grenville Channel Chinook Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	.4		0

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 1

No. of Significant Streams 1

(100 % of MRE)

HABITAT NOTES

Kumealon Creek.

Historic Status	Natural flow fluctuations. Logging in 1940's - 50's. High impacts. (GWG/SEP)
Current Status	Stabilized from logging. (P)
Future Outlook	Stable. (P)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	Low			

Appears to be permanent habitat effects on Chinook. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Upper Grenville Channel Coho Area 5

STOCK DATA

	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	10.3		.4

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 5

No. of Significant Streams 3

(92 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations. Logging on Kumealon Creek. High impacts. (GWG/SEP)
Current Status	Stabilized from logging. (P)
Future Outlook	Stable. (P)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	Low			

Likely permanent loss of coho habitat. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Grenville Channel Sockeye Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	39	11.7	3.4

4.5 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 3

No. of Significant Streams 2

(99 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat change is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Grenville Channel Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	36.7	Even & Odd 20	2.6

MANAGEMENT STYLE: Active ___ Passive X

No. of Streams 8

No. of Significant Streams 4

9.9 even, 2 odd — SRMP

(82 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat change is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Grenville Channel Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	31.2	8.1	1

MANAGEMENT STYLE Active ___ Passive X

No. of Streams 8

No. of Significant Streams 4

(88 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat change is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Lower Grenville Channel Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	23.8		2.9

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 7

No. of Significant Streams 4

(95 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat change is not a factor in stock decline. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Ogden, Kitkatla and Browning Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	116	Even & Odd 51	26.7

MANAGEMENT STYLE — Active X / Passive ___

No. of Streams 9

No. of Significant Streams 8

29.7 even
30.5 odd
SRMP

(99 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability. Logging on Alpha Creek in 1940's compounded natural instability. Remainder pristine.
Current Status	Virtually pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat not a factor in stock status. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Ogden, Kitkatla and Browning Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	8.1	3.5	.8

.56 - SRMP

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 6

No. of Significant Streams 2

(85 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability.
Current Status	Pristine.
Future Outlook	Unchanged. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat not a factor in stock status. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Ogden, Kitkatla and Browning Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	16.2		.38

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 8

No. of Significant Streams 8

(100 % of MRE)

HABITAT NOTES

Historic Status	Natural flow instability. Logging on Alpha Creek in 1940's compounded natural instability. Remainder pristine.
Current Status	Virtually pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat not a factor in stock status. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Porcher Inlet Pink Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	131	Even & Odd 32.5	19

MANAGEMENT STYLE: Active X / Passive ___

No. of Streams 5

No. of Significant Streams 5

25.3 even
22.7 odd
SRMP

(100 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations. One creek logged in 1940's with low impact. (GWG/SEP)
Current Status	Near pristine.
Future Outlook	Possible future logging. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat change is not a factor in stock status. (P)

HABITAT INFORMATION TABLE

STOCK GROUP Porcher Inlet Chum Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	1	.425	<.020

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams ___

No. of Significant Streams ___

(___% of MRE)

HABITAT NOTES

Very minor stock.

Historic Status	
Current Status	
Future Outlook	
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential

HABITAT INFORMATION TABLE

STOCK GROUP Porcher Inlet Coho Area 5

STOCK DATA	Maximum Recorded Escapement	Target/ Optimum Escapement	Current Average Escapement
Thousands	3.9		.09

MANAGEMENT STYLE

Active ___

Passive X

No. of Streams 4

No. of Significant Streams 2

(93 % of MRE)

HABITAT NOTES

Historic Status	Natural flow fluctuations.
Current Status	Pristine.
Future Outlook	No change. (GWG/SEP)
Natural Habitat Production Potential	
Improved Production Potential	

SUMMARY

Current Target Achievability	Current Status	Future Outlook	Natural Production Potential	Improved Production Potential
	High	High	High	

Habitat change is not a factor in stock status. (P)

DATA SOURCES FOR HABITAT INFORMATION TABLES — STATISTICAL AREA 5

Maximum Recorded Escapement

Stream Catalogues: modified as described in the Introduction material.

Britton, E.W., A.J. Leaney-East, D.J. Manzon and E.D. Marshall. 1982. Catalogue of salmon spawning streams and spawning escapements of Statistical Area 5 (Grenville-Principe). Can. Data Rep. Fish. Aquat.Sci. #320.

Target/Optimum Escapement

Stream-specific optimums were not available at the time of writing. Subarea optimums are as noted in the April 1985 SRMP.

Current Average Escapements

Stream-specific current averages for the years 1979-83 were provided by DFO, Pacific Biological Station (See Information Sources). Subarea average current escapements are a sum of the stream-specific averages for streams above and below the MRE cutoff.

This was the only source of stream-specific, current averages for all 5 species available at the time of writing, and several concerns have emerged as we used it:

1. The subarea current escapements (1980-84) for pink, sockeye and chum in the April 1985 SRMP did not match the subtotals derived from the sum of stream-specific data noted above which cover 1979-83.

   Also, the SRMP data may include significant current producers, whereas our data reflect important historic (and current) producers.

   The SRMP subarea, and where available, stream-specific current escapement data are included on the substock summary and stream-specific habitat information tables, but our discussion and analysis are based on the 1979-83 averages. Coho and chinook data were available only from the 1979-83 source.

2. The 1979-83 data provided a 5-year average for pinks, without separating odd-and even-year runs.

   Odd and even current escapement data for subareas for 1980-84 provided in the SRMP are included on the Substock information tables, in addition to the 1979-83 data, which represent a single 5-year average. Where available, stream-specific odd/even current escapement data (1980-84) are included on stream-specific habitat information tables, and referenced to the SRMP.

Management Style

Active and passive management status were derived from the April 1985 SRMP, Volumes I and II.

Number of Streams and Stream Lists

As described in the SRMP Volume II; Appendix I to Area 5.

Habitat Notes

The Stream Catalogue provided most of the habitat information, supplemented by the April 1985 SRMP and GWG/SEP. Information sources are referenced on habitat and substock information tables, as described in the Introductory material and Information Sources.

APPENDIX IV

DISTRIBUTION OF IMPORTANT SALMONID DISEASE AGENTS AND PARASITES IN STATISTICAL AREAS 3, 4 AND 5

DISTRIBUTION OF IMPORTANT SALMONID DISEASE AGENTS AND PARASITES IN STATISTICAL AREAS 3, 4 AND 5[1]

An introduction to the analysis of the distribution of salmonid disease agents and parasites in British Columbia is provided in Volume A. The introduction includes a discussion of data sources and notes on all of the important salmonid disease agents and parasites included in the analysis.

Within Statistical Areas 3, 4 and 5, a total of 113 samples were collected at 39 different locations (Table IV-1). The distribution of disease agents is shown in Figure IV-1.

In the Nass River system, the agents of furunculosis and enteric redmouth disease were found in pink salmon. Samples of sockeye taken in 1982 from Damdochax River, Bowser Lake, Meziadin Lake and Fred Wright Lake were tested only for Henneguya and this parasite was not found. Also, no Henneguya was found in small samples of pinks and coho taken from the Kincolith River and hatchery.

In the Skeena drainage, Henneguya was found in sockeye and coho from a number of locations in the Lakelse River system. In the Babine River, disease agents included furunculosis in chinooks, pinks and sockeye and BKD in pinks. In Babine Lake, the IHN virus was found in sockeye. The Fulton River hatchery had furunculosis bacteria in rainbow trout and IHN in sockeye. No disease agents were found in sockeye at the Pinkut spawning channel.

Henneguya cysts were found in sockeye taken from Bonilla Lake on Banks Island in Area 5. No Henneguya was found in sockeye from Low Lake.

Table IV-1. Distribution of salmonid disease agents and parasites in Statistical Areas 3, 4 and 5.[2,3,4].

Location			Findings* by Species**							
Area	Sample Site	Total No. Examined	No Disease	F	PKD	BKD	IHN	ERM	HEN	Other Disease
3	Bowser Lake	41	(No HEN in SK)							
3	Damdochax Lake	50	(No HEN in SK)							
3	Fred Wright Lake	53	(No HEN in SK)							
3	Kincolith Hatchery	4	(No HEN in SK)							
3	Kincolith Hatchery	4	(No HEN in SK)							
3	Meziadin Lake Fishway	50	(No HEN in SK)							
3	Nass River	4								CO
3	Nass River	28		PK				PK		PK
3	Nass River	1								SK
4	Babine Lake	118					SK			SK
4	Babine River	100		PK		PK				PK
4	Babine River	37		CN						CN
4	Babine River	100		SK						SK
4	Babine River Fence	98	(No HEN in PK)							
4	Babine River Fence	4	(No HEN in CO)							
4	Babine River Fence	160	(No HEN in SK)							
4	Babine River Fence	60	(No HEN in CN)							
4	Copper River	10								CN
4	Fish Farms	46								CN
4	Fulton River	306					SK			
4	Fulton River	117	RT	RT						RT
4	Fulton River	40	CN							CN
4	Fulton River	50	(No HEN in SK)							
4	Fulton River Hatchery	300					SK			
4	Kalum River & SEP	22								CO
4	Kalum River & SEP	56								CN
4	Kidprice L.	28								DV
4	Kidprice L.	34	RT							RT
4	Kidprice L.	74						DV		
4	Kidprice L.	169						RT		
4	Kildala River	30	CM							
4	Kildala River	30	PK							
4	Kildala River	60	CO							

* Disease/Agents and Parasites:

F - Furunculosis
PKD - Proliferative kidney disease
BKD - Bacterial kidney disease
IHN - Infectious hematopoietic necrosis
CS - Ceratomyxa shasta
HEN - Henneguya salminicola
ERM - Enteric redmouth disease

**Salmonid Species:

CN - Chinook
CM - Chum
CO - Coho
SK - Sockeye
PK - Pink
ST - Steelhead
RT - Rainbow Trout
DV - Dolley Varden
BR - Brown Trout

Table IV-1 (Continued)

Location			Findings* by Species**							
Area	Sample Site	Total No. Examined	No Disease	F	PKD	BKD	IHN	ERM	HEN	Other Disease
4	Kispiox R. near Hazelton	9	(No HEN in PK)							
4	Kispiox River	43	CN							
4	Kispiox River	10								CO
4	Kispiox River	87	CO							
4	Kispiox River	9								PK
4	Kispiox River & Hatchery	5								CO
4	Kloiya Creek Hatchery	35							CO	
4	Lakelse R. near Herman Cr.	32								
4	Lakelse R. near Terrace	32							SK	
4	Lakelse R.	34		CO					CO	
4	Morice River and Lake	3	CT							
4	Morice River and Lake	23	RT							
4	Morice River and Lake	18	ST							
4	Morice River and Lake	7	DV							
4	Pinkut Spawning Channel	140	SK							
4	Schulbuckhand Cr.	42							SK	
4	Skeena General Area	7	ST							
4	Skeena General Area					SK				
4	Skeena River	9								CO
4	Skeena River	11	CN							
4	Skeena River	10	Salmonids							
4	Skeena River	5	PK							
4	Southend Creek	50							SK	
4	Suskwa R.	10	ST							
4	Suskwa R.	8	RT							
4	Williams Cr. (Lakelse)	42							SK	
4	Zymoetz R.	13	ST							
5	Bonilla L. (Banks Island)	129							SK	
5	Lowe Lake	104	(No HEN in SK)							

* Disease/Agents and Parasites:

F - Furunculosis
PKD - Proliferative kidney disease
BKD - Bacterial kidney disease
IHN - Infectious hematopoietic necrosis
CS - Ceratomyxa shasta
HEN - Henneguya salminicola
ERM - Enteric redmouth disease

**Salmonid Species:

CN - Chinook
CM - Chum
CO - Coho
SK - Sockeye
PK - Pink
ST - Steelhead
RT - Rainbow Trout
DV - Dolley Varden
BR - Brown Trout

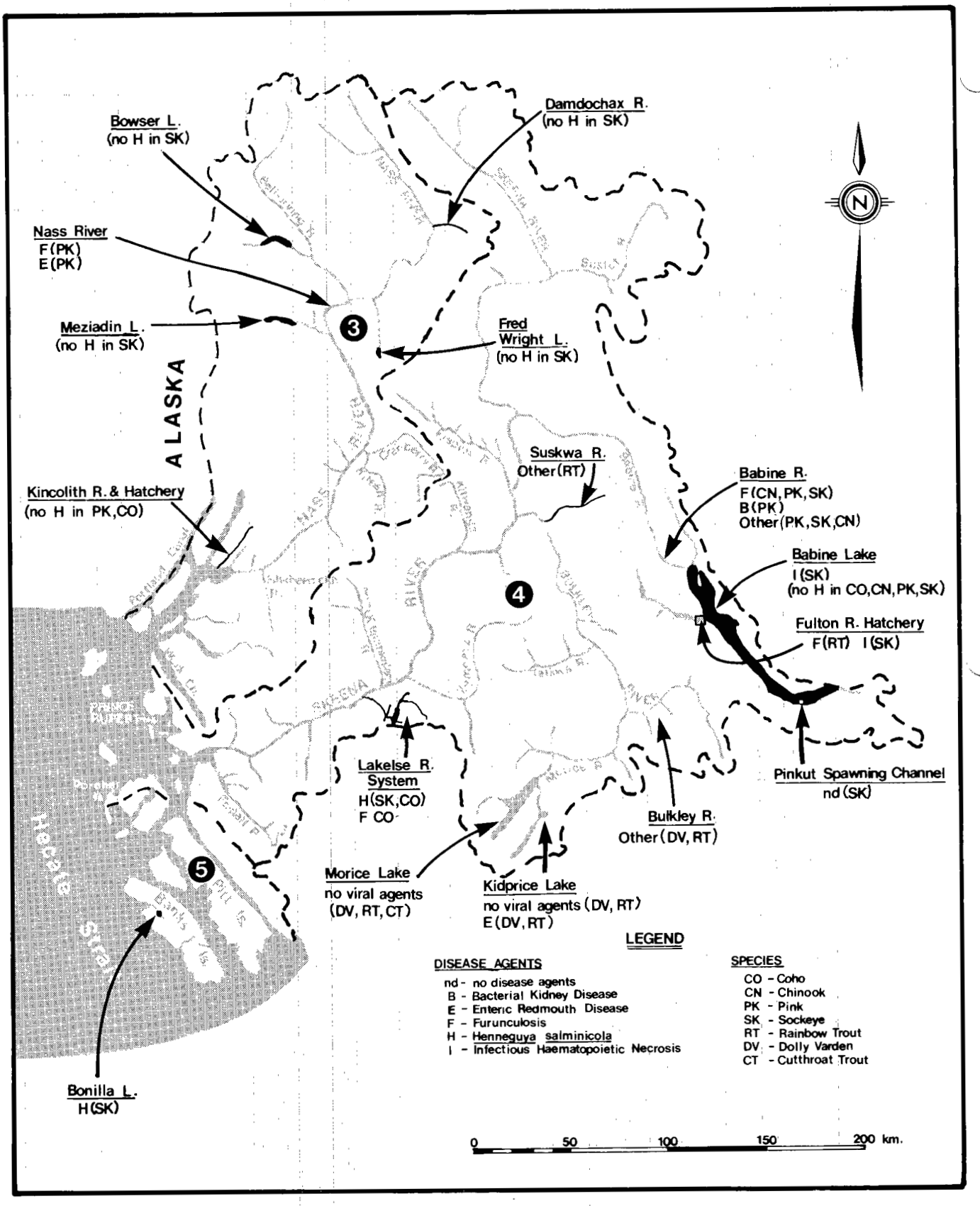

Figure IV-1. Distribution of important salmonid disease agents and parasites in Statistical Areas 3, 4 and 5.

REFERENCES

1. McDougal, R.D. and Associates. 1986. Distribution of important salmonid disease agents and parasites in the Queen Charlotte Islands. Prep. under contract for DFO in consultation with Fish Health and Diagnostics Section, Pacific Biol. Sta., Nanaimo, B.C.

2. DFO. 1985. Fish health data base. Updated September 1985. Can. Dep. Fisheries and Oceans, Vancouver, B.C.

3. Boyce, N.P., Z. Kabata and L. Margolis. 1985. Investigations of the distribution, detection, and biology of Henneguya salmonicola (Protozoa, Myxozoa), a parasite of the flesh of Pacific salmon. Can. Tech. Rep. Fish. Aquat. Sci. 1405: 55 p.

4. Envirocon Limited. 1984. Environmental studies associated with the proposed Kemano Completion Hydroelectric Development, Vol. 7. Fish diseases and parasite baseline information. Vancouver.