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THE NATIVE COMMERCIAL FISHERIES AND THE  
POTENTIAL IMPACTS OF OIL SPILLS NEAR OR EN ROUTE  
TO KITIMAT, PORT ANGELES AND CHERRY POINT

REGIONAL PROGRAM REPORT 78-22

by

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Prepared for:  
West Coast Oil Ports Inquiry  
A. R. Thompson, Commissioner  
Vancouver, B.C.

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## ABSTRACT

Available information on the importance of commercial fishing to Indian people in British Columbia is documented and analyzed. Due to data availability, attention is focused on the salmon species. In 1976, there were approximately 1700 Indian fishermen and 800 Indian owned or operated salmon vessels in B.C. These figures represent, respectively, 15% and 15.9% of the total number of fishermen and total number of fishing vessels in B.C.

Indian involvement in commercial fishing is extremely diverse. Some of the most successful fishermen on the coast are Indians, as are some of the poorest fishermen. In general, Indian seine fishermen in Johnstone Strait do quite well, while Indian fishermen owning or operating small gillnet and troll vessels who reside in the north coast, central coast and west coast of Vancouver Island are less fortunate.

Native people are heavily employed as shoreworkers in fish processing plants in Masset, Prince Rupert and Bella Bella. Native ownership of fish processing plants in Port Simpson, Bella Bella and Ucluelet is also significant.

The potential impact of oil spills on routes to proposed oil ports is estimated under pessimistic and optimistic sets of assumptions. Under the pessimistic scenario, in terms of harvesting sector impacts, it was found that the Kitkatla, Hartley Bay, Kitimat, Klemtu and Bella Bella bands would be most affected by spills near or en route to Kitimat; the Fraser River bands would be most affected by oil spills near or en route to Port Angeles; and Johnstone Strait bands would be most affected by oil spills near or en route to Cherry Point. (In terms of the processing sector impacts, oil spills near or en route to Kitimat would affect native

shoreworkers in Bella Bella and Prince Rupert/Masset, and processing plant throughput in Bella Bella. Oil spills near or en route to Port Angeles or Cherry Point would not affect native shoreworkers, but would affect throughput in the native owned plant in Ucluelet.) Under the optimistic scenario, all these impacts would be substantially lower.

The impact of oil spills would be greatest in the north and central coast areas as Indian bands in these areas rely heavily on commercial fishing for income and employment.

## RÉSUMÉ

Le rapport compile et analyse les données qu'on possède sur l'importance de la pêche commerciale pour les Indiens de la Colombie-Britannique. Les données accumulées nous permettent de nous concentrer sur le saumon. En 1976, on comptait en Colombie-Britannique environ 1 700 pêcheurs indiens et 800 bateaux de pêche appartenant à des Indiens ou équipés par eux. Ces chiffres représentent respectivement 15 p. 100 et 15,9 p. 100 du nombre total de pêcheurs et de bateaux de pêche dans la province.

La participation des autochtones à la pêche commerciale varie considérablement. Quelques-uns sont parmi les plus prospères, tandis que d'autres sont parmi les plus défavorisés. En général, les seigneurs indiens dans le détroit Johnstone réussissent très bien, tandis que ceux qui possèdent ou équipent de petits bateaux, pêchant à la traîne et au manet, et qui demeurent sur les côtes nord, centrale et ouest de l'île Vancouver sont beaucoup moins prospères.

Les autochtones travaillent en grand nombre sur la côte, dans les usines de transformation du poisson, à Masset, Prince-Rupert et Bella-Bella. Plusieurs usines à Port-Simpson, Bella-Bella et Ucluelet appartiennent également à des Indiens.

À partir d'hypothèses pessimiste et optimiste, on évalue les incidences éventuelles d'un déversement le long du trajet des pétroliers vers les ports qu'on propose de construire. Dans une optique pessimiste des incidences sur les zones poissonnières, on a déterminé qu'un déversement près de Kitimat ou sur le trajet des pétroliers qui s'y rendent affecterait particulièrement les bandes de Kitkatla, de Hartley-Bay, de Kitimat, de Klemtu et de Bella-Bella; les bandes du Fraser souffriraient le plus d'un déversement près de Port-Angeles ou le long du trajet qui y mène; les bandes du détroit Johnstone seraient le plus affectées par un déversement près de Cherry-Point ou sur le trajet qui y conduit.

En ce qui a trait aux incidences sur les installations de traitement, on estime qu'un déversement pétrolier près de Kitimat ou sur le trajet qui y mène affecterait les travailleurs

autochtones côtiers de Bella-Bella, Prince-Rupert/Masset, de même que les usines de traitement de toute la région de Bella-Bella. Un déversement près de Port-Angeles ou de Cherry-Point ou sur le trajet qui conduit à ces deux ports n'affecterait pas les travailleurs côtiers mais aurait une incidence sur le fonctionnement de l'usine autochtone d'Ucluelet. L'hypothèse optimiste suppose, quant à elle, des conséquences beaucoup moins dommageables.

Les incidences d'un déversement pétrolier seraient le plus désastreuses le long de la côte nord et du centre, puisque la subsistance et l'emploi des bandes indiennes qui y vivent sont intimement liés à la pêche commerciale.

## TABLE OF CONTENTS

	Page
ABSTRACT	i
RESUME	iii
TABLE OF CONTENTS	v
LIST OF TABLES	viii
WEST COAST OIL PORTS INQUIRY	ix
1 INTRODUCTION	1
2 PRESENT STATUS OF NATIVES IN COMMERCIAL FISHERIES	2
2.1 <u>The Primary Fishery-Overview</u>	3
2.1.1 The Salmon Fishery	3
2.1.2 The Herring Fishery	4
2.1.3 Other Fisheries	4
2.2 <u>Characteristics of the Native Fleet</u>	4
2.2.1 By Geographic Region	4
2.2.2 By Home Port	7
2.3 <u>The Mobility of the Native Fleet</u>	12
2.3.1 Overview	12
2.3.2 Native Fleet Mobility - Data Analysis	13
2.3.3 Native Fleet Mobility Relative to the B.C. Fleet	16
2.4 <u>Native Involvement in the Fish Processing Industry</u>	18
2.4.1 Overview	18
2.4.2 Native Ownership of Processing Operations	19
2.4.3 Throughput of Native Owned Operations	20
2.4.4 Future Native Involvement in the Industry	22
3 FUTURE NATIVE INVOLVEMENT IN THE COMMERCIAL FISHERIES AS MAY DEVELOP WITH SALMONID ENHANCEMENT	24
3.1 <u>The Primary Sector</u>	24
3.1.1 Overview	24

3.1.2	Distribution of Enhanced Incomes Within the Native Fleet	25
3.2	<u>The Secondary Sector</u>	27
3.2.1	The Direct Employment Impact	27
3.2.2	The Associated Increases in Shoreworker Income	28
3.2.3	Potential Increases in Native Plant Throughput and Net Revenue	28
3.3	<u>Future Involvement of Natives in the Enhancement Program</u>	31
4	THE POTENTIAL IMPACT OF OIL SPILLS TANKER MOVEMENTS ON THE NATIVE COMMERCIAL FISHERIES	33
4.1	Analytical Assumptions	33
4.1.1	Possible Areas of Impact	33
4.1.2	Effects of Oil on the Fisheries Resources and of Tanker Movements on Commercial Fishing	33
4.1.3	Hypothetical Oil Spills and the Effects on Commercial Fishing	36
4.1.4	Tanker Traffic and the Effects on Commercial Fishing	37
4.2	<u>The Impact on the Primary Native Fishery</u>	37
4.2.1	The Current Native Salmon Fishery	37
4.2.2	The Future Salmon Fisheries Given Enhancement	37
4.2.3	The Non-Salmon Fisheries	40
4.2.4	The Impact of Tanker Movements	41
4.2.5	The Relative Impact of Oil Spills on the Native versus Non-Native Fleets	43
4.3	<u>The Impact on Native Participation in Processing</u>	44
4.3.1	The Current Fisheries	44
4.3.2	The Future Salmon Fisheries With Enhancement	45
4.4	<u>The Possible Effect on Future Native Involvement in SEP</u>	45
5	SUMMARY	49

APPENDIX I:	Methodology for Estimating Losses in Native Salmon Income Due to Oil Spills	52
APPENDIX II:	Methodology for Estimating Increases in Native Fleet Salmon Incomes With Enhance- ments and losses Due to Oil Spills	55
APPENDIX III:	Methodology for Estimating Losses in Native Shoreworker Income and Employment in Prince Rupert/Masset and Bella Bella	56 ST
APPENDIX IV:	Methodology for Estimating Losses in Native Shoreworker Income, and Plant Throughput as may Have Developed with S.E.P.	59
INFORMATION SOURCES		61



## LIST OF TABLES

Table		Page
1	Native Indian Participation in the B.C. Salmon Fishery	5
2	Total Gross Income by Geographic Region, 1974	8
3	The Characteristics of the Licensed Salmon Fleet, by Home Port	9
4	Native Salmon Fleet Movement, by Home Port, 1974	15
5	Total B.C. Salmon Fleet Movement, by Geographic Location, 1976	17
6	Estimated Number of Salmon Processed, by Location, 1976	21
7	Gross Wholesale Value of Salmon, by Species and Area	21
8	Estimated Annual Value of Salmon Processed, by Location, 1976	22
9	Projected Increases in Annual Native Fleet Incomes with Enhancement by 2007	26
10	Proposed Production to the Industry, by Species and Processing Location in 2007	29
11	Plant Throughput and Net Revenue Generated Through Enhanced Salmon Production in 2007	30
12	The Impact of Oil Spills on the Native Salmon Fleet, With Present Harvests and Projected Harvest	38/39
13	The Impact of Oil Spills on Native Involvement in Fish Processing With Projected Harvests and With Projected Harvests With S.E.P.	48/49

## LIST OF FIGURES

Figure 1:	Proposed Tanker Routes and Impacted Indian Bands	33
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## WEST COAST OIL PORTS INQUIRY

In March 1977, Dr. Andrew R. Thompsen was commissioned by the Government of Canada to inquire into the environmental, social and navigational safety aspects of a proposed oil port at Kitimat, B.C. and the broader Canadian concerns and issues related to west coast oil tanker traffic.

The Inquiry hearings were adjourned in November 1977 because there was then no active application in Canada for a west coast oil port. The Commissioner summed up his findings to that point and presented his Statement of Proceedings to the Minister of Fisheries and the Environment and the Minister of Transport on February 23, 1978.

The Ministers subsequently announced that "the Federal Government sees no need for a west coast oil port now or in the foreseeable future and doubts that the benefits of establishing such a port would be sufficient to offset the danger of risking a major oil spill". Consequently, the Inquiry did not continue.

This report contains material which was prepared for the Inquiry but was not examined due to the termination of the Inquiry.

This report was prepared under contract and does not necessarily represent the views and policies of the Department.

## 1. INTRODUCTION

This report has two main purposes. The first purpose is to report on native participation in commercial fishing and processing and to analyse the mobility of the native fleet as compared to the non-native fleet. The second purpose is to discuss the implications regarding the relative impacts of (hypothetical) oil spills and tanker-related problems in various areas along the B.C. coast on native versus non-native vessels\*, and on native participation in fish processing.

The analytical approach is in three parts. The first part is a brief summary of the present status of native participation in the primary and secondary fishing sectors. This information is presented on a regional and where possible, home port area specific basis. Included in this part will be a mobility analysis of the native versus non-native fleets. This part is largely a review of information which has been generated previously, although some "new" data will be included. The second part will report on future native participation in the fisheries as might develop with salmonid enhancement. Again this will

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\*NOTE: This issue is extremely important. There presently exists very little hard statistical information on commercial fishing fleet mobility, particularly on the native compared to the non-native fishing fleets. Consequently, all concerned parties have strong opinions on the possible impacts of oil spills on commercial fishing and the fisheries resource, but these opinions are often unsupported by rigorous data. Instead, they simply reflect personal bias, speculation or observation. Such opinions may be valid, but from a purely objective viewpoint they are not the most satisfactory form of evidence. What is required is a comprehensive data base which contains relevant statistical information, allowing statements which are presented to the Inquiry by fishing industry participants to be evaluated according to their accuracy and appropriateness by Inquiry staff.

consist of a review of available information generated for SEP, supplemented by "new" data. The third part will analyse the potential impacts of hypothetical oil spills and tanker-related problems on the native fishing fleet, and native participation in fish processing.\*\* These impacts will be discussed in the context of both the relative mobility of the native vis-à-vis non-native fleets and (to the extent possible) of the area's/band's economic dependence on the primary and secondary fisheries for income and employment.

2. PRESENT STATUS OF NATIVES IN THE COMMERCIAL FISHERIES

2.1: The Primary Fishery-Overview:

Native participation in the British Columbia commercial fisheries declined gradually from 1964 to 1970, and has (apparently) stabilized since 1971. Presently, status native fishermen number roughly 1700, or approximately 15% of the total number of licensed commercial fishermen.<sup>1</sup> This figure represents approximately 3.2% of the total status Indian population of 52,000, and 51% of the on-reserve population of 33,000, in 1976. It also represents a very significant 12.6% of the total number of 13,620 native people in the labour force in 1976. Considering that unemployment of natives has averaged between 50% and 60% in recent years, it can be seen that the commercial fishery provides a major source of income and employment to Indian people, particularly in the northern British

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\*\*NOTE: It should be noted that the primary level of analysis will be the entire native fleet, although the available data will make it possible to identify the bands most affected by oil spills in certain areas of the coast.

<sup>1</sup>Source: D.F.E. internal statistics, 1976

Columbia regions.<sup>2,3</sup>

In terms of number of vessels, native participation dropped rapidly from 1964 to 1970. Since 1971 the number of native owned and operated vessels has declined at a rate consistent with the general drop in the total fleet size because of the Salmon Vessel License Control Program. The total number of native owned and operated vessels has presently stabilized at roughly 15.9% of the total commercial fleet of 5400 vessels, exclusive of herring punts. While the number of Indian owned or operated vessels has decreased both in absolute numbers and relative to the total fleet, the native share of the total value of the commercial catch has not. The native share of landings has ranged between \$6.4 million and \$18.8 million or 11.0% and 14.4% of the total annual catch, in the period 1971 to 1975. This range in landed value is due to year-to-year fluctuations in individual species run sizes.

2.1.1: The Salmon Fishery:

Indians are involved in all sectors of the salmon fishery, although they are particularly well represented in the seine and gillnet fleets, and less so in the troll fleet. The salmon fishery remains the most important to natives, accounting for \$12.1 million, or 90.5% of the total value of the native catch, in 1974. However, the introduction of the herring roe fishery in 1972, with the corresponding unlimited entry and lower fee provisions for native

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<sup>2</sup>Sources: D.I.A.N.D. internal statistics and Canada Census Small Area Summaries, 1976.

<sup>3</sup>It should be noted that all statistical data on native participation in commercial fishing deals with status Indians, thereby excluding the large non-status population. Little is known about non-status Indians in the fishery.

fishermen, has somewhat decreased their dependence on salmon fishing. Native participation in the salmon fleet is detailed in Table 1. It should be noted that only vessels in the income-reporting fleet are indicated, thereby excluding both unlicensed vessels and licensed vessels which did not operate in a given year.

2.1.2: The Herring Fishery:

Although the herring fishery was re-opened in 1972, significant native involvement did not occur until 1974; this, despite the special entry provisions and reduced licence fees for Indian fishermen. In 1973, 19 Indian seine vessels and 40 gillnet vessels were reported as having participated in this fishery. In 1974 natives became heavily involved in herring fishing. In 1976, Indian fishermen held 348 herring gillnet licenses and 26 seine licenses, comprising 24.5% and 12.1% respectively of the total herring fleet size. In 1976 native fishermen caught nearly \$1.2 million in herring products.

2.1.3: Other Fisheries:

There are few exclusively non-salmon vessels which are owned or operated by native fishermen. Little information is available on these vessels. It deserves mention that the majority of salmon vessels do operate in one or more non-salmon fisheries, and the trend into more versatile operations appears to be continuing. In 1974, native fishermen caught approximately \$194,000, or 2.5% of the total landed value of non-salmon species. In 1975 this increased to \$550,000, or 5.4% of the total catch.

2.2: Characteristics of the Native Fleet:

2.2.1: By Geographic Region:

There exist significant differences in the various Indian fishing fleets, particularly the native salmon fleet.

TABLE 1Native Indian Participation in the B.C. Salmon FisheryNumber of Vessels

YEAR	SEINE			GILLNET			TROLL			*
	NATIVE	B. C. TOTAL	%	NATIVE	B. C. TOTAL	%	NATIVE	B. C. TOTAL	%	
1970	111	426	26.1	671	3504	19.1	195	2271	8.6	
1972	128	396	32.3	543	3046	17.8	187	2090	8.9	
1974	128	526**	24.3	500	3120	16.0	142	1564	9.0	
1975	134	483	27.7	513	2930	17.5	153	1615	9.5	

\* The vessel categories are SEINE: any vessel reporting landings on seine gear.

GILLNET: any vessel, except seiners, reporting landings on gillnet gear.

TROLL: any vessel, except seiners and gillnetters, reporting landings on troll gear.

\*\* The number of seine vessels in 1974 is considered to be overestimated.

Some of the most successful fishermen on the coast are natives, as are some of the poorest fishermen. It has been noted that a small number of native seine fishermen account for the majority of the native catch.<sup>3</sup> This implies that many native gillnet and troll fishermen, particularly those operating rental vessels, remain in the lower income brackets. In particular, in 1974 it is estimated that the 96 predominately seine and large gillnet native vessels from the Johnstone Strait region, comprising 12% of the active native fleet, accounted for fully 30% of the total landed value of the native fleet salmon catch.

To facilitate the description of local fleet characteristics the B.C. coast was divided into eight geographic regions, each region representing a grouping of statistical catch areas. For brevity, only an overview of the native fleets has been presented here. Those readers wishing further information should consult the reference below.<sup>4</sup>

The Queen Charlotte Indian bands, Masset and Skidegate, operate a small troll fleet and generally fish in local waters (areas 1, 2E and 2W). The Nass and Skeena Indians operate the majority of the Indian gillnet fleet, including a large number of company rental vessels. These vessels generally fish in local waters (areas 3, 4 and 5), although some of the larger vessels fish as far south as Johnstone Strait (areas 12 and 13). Central Coast bands operate all types of salmon vessels, with the gillnet

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<sup>3</sup>M. Friedlaender, 'Economic Status of Native Indians in B.C. 1964-1973', F&MS, 1975, chapter 2.

<sup>4</sup>W. McKay, 'A Socio-Economic Analysis of Native Indian Participation in the B.C. Salmon Fishery', F&MS, 1977, chapter 2.



fleet fishing in local waters (areas 7, 8, 9 and 10) and the seine and troll fleets fishing both north coast and Johnstone Strait waters. Bands in the Johnstone Strait region operate large seine vessels in the north, central, Johnstone Strait and Georgia Strait (areas 14-18) regions. A significant number of these vessels are rented from processing companies. Georgia Strait bands operate small gillnetters and combination gillnet-troll vessels in local waters, although there are now a few larger Indian seine boats in this region. This fleet, however, remains very small. West Coast Vancouver Island bands operate both large and small trollers along the entire west coast of the Island (areas 20-27). Fraser River bands operate numerous gillnet vessels and some seine vessels in several southern B.C. regions.

This information is summarized statistically in Table 2.

2.2.2: By Home Port:

Statistical information on native participation and performance in the salmon fishery, the major native fishery, is available for 1974 on a band specific basis. To preserve the confidentiality of the individual Indian bands, and to maintain the compatibility of these data with the catch data available for the commercial fleet, the native information is reproduced here at the home port level only.<sup>5</sup> Table 3 sets out the characteristics

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<sup>5</sup>If the confidentiality aspects of these data are eventually resolved, and D.F.E. authorizes the release of the native information to the Inquiry, then the band level data can be found in W. McKay, op. cit., (preliminary draft). Appendices II, V, and VII.

TABLE 2

TOTAL GROSS INCOME BY GEOGRAPHIC REGION - 1974  
(VESSELS REPORTING SALMON LANDINGS)

GEOGRAPHIC REGION	NUMBER OF VESSELS	NUMBER OF LICENSED FISHERMEN	TOTAL BAND POPULATION	AVERAGE VESSEL VALUE (\$)	AVERAGE GROSS RETURNS (\$)	GROSS RETURNS PER FISHERMEN (\$)	GROSS RETURNS PER CAPITA* (\$)
1) Queen Charlotte Is.	37	88	1489	17,014	15,225	6401	378
2) Nass	172	326	3882	15,028	12,448	6567	552
3) Skeena	145	221	4760	19,093	13,165	8637	401
4) Central Coast	139	275	3620	24,030	14,889	7525	572
5) Johnstone Strait	96	363	3243	84,624	33,545	9795	1096
6) Georgia Strait	23	60	5167	10,483	5,491	2104	24
7) West Coast Vancouver Island	108	190	3454	21,235	9,937	5648	664
8) Fraser	39	50	1959	15,354	8,872	6920	177

\*Calculated using Total Band Population as of December 31, 1974

TABLE 3

THE CHARACTERISTICS OF THE LICENSED NATIVE SALMON FLEET  
BY HOME PORT AREA - 1974

HOME PORT	NUMBER OF INDIAN BANDS WITH AT LEAST ONE COMMERCIAL FISHERMAN	NUMBER OF NATIVE* FISHERMEN	NUMBER OF LICENSED** SALMON VESSELS			GROSS REVENUES FROM SALMON FISHING (\$'000)
			Rented	Private	Total	
2	2	88	2	36	38	324
3	5	326	76	96	172	1,937
4	10	164	99	24	123	966
5	1	57	15	17	32	430
6	2	70	10	16	26	471
7	2	135	25	79	104	926
8	1	67	5	53	58	373
9	1	3	-	1	1	-
12	7	247	16	32	48	1,425
13	2	109	16	28	44	1,321
14	2	7	-	7	7	170
15	1	8	-	2	2	7
16	1	4	-	5	5	6
17	5	31	-	13	13	68
18	3	7	-	5	5	2
19	5	16	-	4	4	16
20	2	2	-	1	1	-
22	1	12	-	2	2	2
23	5	43	1	37	38	1,276
24	3	100	3	54	57	381
25	3	14	-	5	5	44
26	1	22	-	17	17	80
27	1	3	-	1	1	13
28	1	1	-	1	1	-
29	5	38	4	36	40	235
<hr/>						
GRAND TOTAL	72	1,574	272	572	844	10,471

Source: D.F.E. internal statistics, 1974.

\*Not all licensed vessels participate in the fishery. This fleet is therefore larger than that presented in Table 2.

\*\*Does not include Indian fishermen categorized under the D.I.A.N.D. General classification.

of the native fleet by home port.<sup>6</sup>

From Table 3 it can be seen that the majority of native involvement in the commercial fishery is in the northern, central, Johnstone Strait and West Coast Vancouver Island regions. It is estimated that between 25% and 30% of natives in the labour force in these areas are involved in commercial fishing.<sup>7</sup> This percentage is probably much higher in the Nass region (home port 3) and the central coast region (home ports 7 and 8). Native fishermen in these regions comprise a large component of the total commercial fishery. Many of these native settlements rely almost exclusively on commercial fishing as a source of employment and income as there are no employment alternatives available.

In other regions, notably the Queen Charlotte Islands (home ports 2E and 2W), the Skeena (home ports 4 and 5) and the West Coast of Vancouver Island (home ports 20-27), while fishing remains quite important economically, employment in other primary industries, such as logging and fish processing provide some job alternatives. Indeed, many native fishermen supplement their fishing incomes by working in these industries when commercial fishing is closed or is yielding few returns.

As mentioned previously, native participation in the fisheries has declined from past levels. There are

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<sup>6</sup>This footnote is presented on page 11.

<sup>7</sup>Source: Unemployment Insurance Commission, 'Unemployment and Labour Force by Postal Code', (special computer run for D.F.E., 1977).

<sup>6</sup>These income statistics in Table 3 must be interpreted with caution, as in many cases the registered vessel owner does not live in the home port area. It has also been assumed that all revenues from fishing will accrue to the native fishermen. However, many of these native vessels are rented from fish processing companies which assess a fixed rental fee (in the case of rental gillnetters) or a variable fee of 4/11 of the landed value of catch (in the case of rental seiners). Much of the fishing revenue will thus be realized by persons or corporations outside the home port area.

To provide some hard information on the extent of non-resident vessel owners, a random sample of the entire commercial fleet was taken from the 1976 licensing statistics. The registered home ports of these vessels were then cross-referenced against the vessel owners' permanent residence as stated on the commercial fisherman's personal license application. This information is summarized in the following table.

HOME PORT	% OF TOTAL FLEET WITH NON-RESIDENT OWNERS	% OF THE 'NON-RESIDENT' FLEET WHICH IS NATIVE		ESTIMATED NO. OF NATIVE VESSELS WITH NON-RESIDENT OWNERS WHICH ARE	
		(OWNED)	(RENTED)	(OWNED) (NATIVE)	(RENTED) (COMPANY)
3	20	100	0	19	0
4	50	0	90	0	45
7	20	100	0	16	0
8	20	0	100	0	5
14	10	2	0	n/sig	0
15	10	8	0	n/sig	0

Source: D.F.E. internal statistics, 1976

It should be noted that no information is available on native crew members' residences. However, it is assumed that most crew members live in the home ports of the vessels, and that the majority of their earnings will remain in these areas. This is potentially very important as, in the case of seine vessels, the crew's share is a very substantial 7/11 of the landed value of catch. (One further complication is that some native seine vessels have non-native crew members, and vice versa. No statistical data is available, nor can it be developed).

Clearly, in the Nass, Skeena and Central Coast home ports a significant amount of fishing revenues is not realized by native fishermen living in these regions. These revenues accrue to native fishermen permanently living in Vancouver, or as corporate income, to fish processing companies headquartered in Vancouver.

Finally, these income statistics in Table 3 are gross earnings net of bonus payments and exclusive of fixed or variable costs or income taxes. They therefore represent the upper limit of native fishing incomes in these home ports.

numerous factors involved.<sup>8</sup> All these factors have spelled economic hardship for many native fishermen, particularly those in the remote, inaccessible regions where there is no broad economic base. The lack of suitable (or, in some cases, any) alternative employment opportunities simply supports the argument that commercial fishing remains extremely important to native people, both as a source of economic livelihood and of social and cultural well-being.

2.3: The Mobility of the Native Fleet:

2.3.1: Overview:

The native fleet is generally viewed to be considerably less mobile than the non-native fleet,<sup>9</sup> both overall and within the various gear categories. There are two reasons cited for this low mobility. The first is that the native fleet is generally not as technologically sophisticated, nor in as good physical condition, as the non-native fleet. Thus many native vessels are not capable of operating in open or rough waters and/or travelling from one area of the coast to another area. This is certainly valid for the native rental gillnet fleet which is comprised largely of small vessels in generally poor condition, for certain components of the native owned gillnet fleet, and for much of the native west coast troll fleet as well.<sup>10</sup> This reason is not considered valid for the native seine fleet,

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<sup>8</sup> Readers are referred to W. McKay, op. cit., pp. 1-17 to 1-19, for further explanation.

<sup>9</sup> Personal discussions with (a) Lonnie Hindle, Former Coordinator, Native Brotherhood of B.C., (b) J. Garcia, Pacific Trollers Ass'n., (c) J. Sewid, IFAP Administration Board, and (d) D.F.E. personnel.

<sup>10</sup> Although the IFAP program evaluations have suggested that native gillnet vessels are now as capital intensive as the total B.C. gillnet fleet. See W. McKay, 'A Brief History and Evaluation of the B.C. Indian Fishermen's Assistance Program', (unpublished), F&MS, 1976.

however, as many of these vessels are large, capital intensive units capable of operating anywhere on the coast. The second reason for the observed low native fleet mobility, which is probably of greater relevance to a part of the native seine fleet and some components of the native gillnet and troll fleets, is that a great many native fishermen prefer to fish in local waters; this, despite the vessels' capability of fishing in other coastal waters. These native fishermen, in keeping with their traditional fishing habits, prefer to fish at a more relaxed pace than non-natives. If the fish aren't available in traditional fishing grounds, these native fishermen will wait for the fish to appear, rather than travelling to other fishing areas.<sup>11</sup>

#### 2.3.2: Native Fleet Mobility - Data Analysis:

As mentioned in the Introduction, there is presently a lack of adequate, detailed statistical data regarding native fleet movements. The information presented in this section is adapted from the same source as the information on native participation in the salmon fishery, section 2.2.2.<sup>12</sup> These mobility statistics deal only with the salmon fishery,

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<sup>11</sup>Readers are referred to a policy paper put out by the Nimpkish (Alert Bay) Indian Band in July, 1975, which clearly (and eloquently!) states the reasons for these mobility observations. This paper is available from J. Robinson, Program Administrator, IFAP Program, D.F.E.

<sup>12</sup>This information was developed for various socio-economic studies undertaken for the Salmonid Enhancement Program. As such, all catch information at the statistical area level was aggregated and presented on a 'grouped statistical area basis'. Although the native catch data could be developed for specific statistical areas from the existing computer printouts, time has not permitted this. (In section 4, potential impacts of oil spills on the native fleet, the native catch information for certain home port fleets is available on a statistical area basis, and is used in this context.)

again because of data availability. Because the salmon fishery is the major fishery for native fishermen, and the fishery in which fishing fleet movements are most pronounced, these statistics should give a reasonable illustration of overall native fleet movements, by home port fleet, in an indicative year. These data are derived from 1974 catch statistics,<sup>13</sup> and are detailed in Table 4. They indicate the percentage of the total native home port fleet income accounted for by salmon catches in each of the eight statistical area groupings. These figures clearly confirm that the major areas of native fishing activity occur in northern, central coast and Johnstone Strait waters. Landings in these regions account for a very substantial 82.2% of the total native income from salmon fishing. Catches in areas 20-24, the west coast of Vancouver Island, are not as large as in the three regions mentioned above, but they are very important to the local native troll fleet based in this region.

Of more relevance to the analysis, however, is the observation that the majority of the native home fleets operate extensively (and in some cases, exclusively) in local waters near to the fishermen's Indian reserves. This is particularly true of the native gillnet and gillnet-troll fleets in home ports, 2, 3, 4, 6, 7, 8, 14, 15, 17 and 18, the native troll fleets in home ports 23, 24, 25 and 26, and the seine fleet in home port 13. The large native seine fleet in home port 17, the extremely small native troll fleet in home port 27, and the gillnet and seine fleet in home port 29 are significantly more mobile

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<sup>13</sup>Although 1974 salmon catches were close to the historical averages, the use of any single year's data inevitably leads to some distortion because of the individual salmon species spawning cycles and the resultant effect on specific riversystem's yearly production.



TABLE 4

NATIVE SALMON FLEET MOVEMENT, BY HOME PORT, 1974

(Percentage of total native home fleet income accounted for by salmon catches in each statistical area grouping)

HOME PORT	NO. OF BANDS REPORTING INCOME	AREAS										TOTAL*
		1-5	6-11,30	25-27	22-24	12,13	14-18	29	20			
2	2	89.3+	6.2	-	4.0	0.1	0.3	0.2	-	100.1		
3	5	83.6+	9.8	1.8	0.3	2.1	0.6	0.8	1.0	100.8		
4	6	89.6+	9.6	-	0.1	0.4	-	-	0.1	99.8		
5	1	81.5+	17.0	-	0.1	1.0	0.1	-	0.1	99.8		
6	2	31.2+	59.2+	-	-	4.9	1.6	1.8	-	99.7		
7	2	3.2	87.2+	-	-	2.8	1.5	0.5	4.9	100.1		
8	1	0.1	98.7+	-	0.7	0.5	-	-	-	100.0		
12	7	12.3	26.7+	3.6	7.2	40.5+	8.7	0.4	1.0	100.4		
13	2	1.8	6.7	-	0.2	83.3+	5.7	0.3	1.9	99.9		
14	1	-	-	-	-	10.2	82.5+	7.3	-	100.0		
15	1	3.4	15.9	-	-	72.9+	2.9	4.9	-	100.0		
16	1	-	-	-	-	-	59.1+	40.9	-	100.0		
17	4	10.5	17.9	15.0	42.2+	7.7	6.7	-	-	100.0		
18	2	-	-	-	-	-	59.7+	40.3+	-	100.0		
19	2	-	-	-	-	-	100.0+	-	-	100.0		
23	3	4.3	1.0	9.5	84.9+	-	-	-	-	99.7		
24	3	4.7	5.4	7.8	72.4+	9.5	0.2	-	-	100.0		
25	1	-	-	91.0+	8.0	1.0	-	-	-	100.0		
26	1	-	-	98.7+	-	-	-	1.3	-	100.0		
27	1	29.7+	9.8	60.5+	-	-	-	-	-	100.0		
29	4	9.8	13.8	11.0	4.7	-	4.8	44.1	11.4	99.6		
TOTAL	52	36.2	23.3	2.4	6.1	23.3	3.9	1.7	3.1	100.0		

Source: S.E.P. Indian Catch Distribution Model, 1974.

\*NOTE: Numbers do not sum to 100.0 in all cases due to rounding.

+Indicates major regions of native home fleet catches; that is, regions accounting for at least 25% of the native home fleet's income.

than the other native fleets. It is felt that this greater mobility is due to two related factors. First, these vessels tend to be larger, in better condition, and with more sophisticated electronic and safety equipment than the other native vessels. Secondly, these native fishermen tend to have a more aggressive attitude towards fishing than other natives. In the case of large privately owned vessels, the owner generally has a large amount of capital invested and a heavy mortgage commitment to a financial lending agency. Thus the owner will attempt to maximize his production by operating as much as possible in order to meet his outstanding loan commitments. In the case of large rental vessels the processing companies insist that the vessels are used to their greatest potential, and encourage this production by generous bonus payments to skippers for high quantities of landings.

2.3.3: Native Fleet Mobility Relative to the B.C. Fleet:

There is no comparable mobility information readily available on the non-native fleet. There is some published information on the total B.C. fleet movements in 1975,<sup>14,15</sup> although this information is not in exactly the same format as the native fleet information. It does, however, give some indication of the relative mobilities of the native versus total B.C. salmon fleets. This data is set out in Table 5.

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<sup>14</sup>W. McKay, op. cit., page 2-10. The computer printout lodged in the Inquiry's library, which details fish catches in 1976 by statistical area, should be consulted for a more comprehensive B.C. fleet mobility analysis.

<sup>15</sup>1975 is a very poor year to use for the fleet mobility analysis because the usual fishing patterns were distorted by an industry strike which closed the fishery for several weeks during the summer.

TABLE 5

TOTAL B.C. SALMON FLEET MOVEMENT, BY GEOGRAPHIC REGION, 1975

(Percentage of total geographic region fleet income accounted for by salmon catches in each statistical area grouping)

GEOGRAPHIC REGION	AREAS 1-5	AREAS 6-11,30	AREAS 25-27	AREAS 20-24	AREAS 12-13	AREAS 14-18	AREAS 28,29	AREA 20	TOTAL*
	Queen Charlotte Islands	92.0+	3.9	1.5	1.0	-	1.4	-	-
Nass	90.0+	8.7	0.3	0.6	-	0.3	-	-	99.9
Skeena	79.0+	6.8	1.8	9.1	-	3.1	-	-	99.8
Central Coast	5.4	93.3+	0.2	0.4	-	1.0	-	-	100.1
Johnstone Strait	10.3	28.9+	12.4	7.6	28.1+	10.6	0.3	2.2	100.4
Georgia Strait	11.8	11.7	14.0	39.8+	5.8	14.7	1.1	1.0	100.1
West Coast									
Vancouver Island	3.5	1.4	20.1	72.9+	-	0.9	0.7	0.9	100.4
Fraser	17.2	15.9	9.7	11.2	17.1	2.9	4.9	20.9	99.8

\*Numbers do not sum to 100.00% in all cases due to rounding.

+Indicates major areas of geographic region fleet catches; that is, regions accounting for at least 25% of the fleet income.

From Table 5 it can be seen that the geographic regional fleets with very large native fleet components, notably the Queen Charlotte, Nass, Skeena, Central Coast and West Coast of Vancouver Island, display very low mobility. This observation certainly supports the native fleet-specific mobility information set out in Table 4. The case of the Johnstone Strait fleet is very interesting. From Table 4 it was seen that the native vessels from home port 13 (and to an extent, home port 12), display somewhat limited mobility. However, from Table 5, it appears that the entire Johnstone Strait fleet operates in many northern, central coast and west coast waters. This would seem to imply that the non-native component tends to operate in many areas of the coast while the native fleet operations are, for the most part, limited to waters close to the registered home ports. It is also evident that regions with very few native vessels, notably the Georgia Strait and Fraser regions, display very high fleet mobility. This is in keeping with the general view that the majority of non-native vessels tend to travel extensively from one fishing area to another.

This observed difference in native versus non-native fleet mobility has definite implications regarding the potential impacts of oil spills and tanker-related problems on native vis-à-vis non-native fishermen, as will be seen in section 4.

## 2.4: Native Involvement in the Fish Processing Industry

### 2.4.1: Overview:

Native people have historically been, and continue to be, significantly involved in the fish processing industry, particularly in the north (Prince Rupert, Port Simpson and Masset) and the central coast (Bella Bella and Namu). There are also a few natives employed in the small plant at Ucluelet on the west coast of Vancouver Island.

The actual number of native shoreworkers has declined in recent years because of the general consolidation of canning operations during the decade 1965-1975. In particular, the closure of two major northern plants and two central coast plants in 1969 displaced an estimated 720 native shoreworkers.<sup>15</sup> These natives were primarily from the Nishga, Bella Bella, Klemtu, Hartley Bay and Kitkatla bands. Currently there are approximately 1500 native people employed by the 11 processing plants in the north and central coast areas. This figure represents roughly 52% of the total employment in fish processing in the north.<sup>16</sup> Average annual earnings of native shoreworkers varies from location to location, ranging from (in 1972) \$1800 in the Prince Rupert and Skeena plants to \$2500 in the central coast and Masset plants. Total native earnings from employment in fish processing, in 1972, is therefore estimated at roughly \$2.8 million. All employment in fish processing is seasonal, with peaks occurring in March and April during the herring roe fishery, and again in July, August and September during the salmon fishery.

#### 2.4.2: Native Ownership of Processing Operations

It should also be mentioned that native fishermen now have managerial control and/or ownership of three processing plants in B.C. These are the former Millbanke plant at Bella Bella, now called the Central Native Fishermen's

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<sup>15</sup>N. Hall and P. Tong, 'Report of Joint Consultative Committee on Manpower - West Coast Fishing Industry', (unpublished), 1972.

<sup>16</sup>It should be noted that various estimates of native employment in processing, ranging from 60% to 70%, have been stated by both industry spokesmen (Bob Maxwell of the Fisheries Association of British Columbia) and Fisheries field officers in Prince Rupert.

Cooperative, owned and operated by 'high line' seine boat fishermen from the Alert Bay and Bella Bella bands, the former Canadian Fishing Company plant in Ucluelet also run by the Central Native Fishermen's Coop, and the financially insecure Port Simpson plant, supported by the provincial Department of Finance and operated by several Indian bands from Port Simpson, the Nass Valley and the Skeena River region. Other progressive Indian bands have expressed interest in entering into fish processing. Two examples are the Chemainus band which is proposing a dogfish operation, and the Nimpkish band in Alert Bay which is conducting economic feasibility studies on both an oyster rafting operation and a commercial aquaculture operation. Expansion of the Bella Bella plant is also under consideration.

#### 2.4.3: Throughput of Native Owned Operations

Statistical information on the annual value of throughput of each individual fish processing operation, including the native cooperatives, is filed in the D.F.E. head office. However, these data are considered confidential by D.F.E. administrators and will not be released to the inquiry. It is therefore necessary to employ an indirect methodology to determine the annual throughput value of native owned operations.<sup>17</sup> First, from current fisheries catch statistics it is estimated that 25% of salmon landings in statistical areas 6-11, destined for the canned market are processed in Bella Bella, 7.5% of the salmon landings in the south coast (areas 12-29) of B.C. destined for the fresh/frozen market are processed in Ucluelet and, because of the operational problems of the Port Simpson plant, no

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<sup>17</sup> It must be emphasized that no similar information can be developed by this method to determine the value of non-salmon processing.

salmon processing occurs in Port Simpson.<sup>18</sup> Second, the 1976 salmon catch statistics were analyzed to compute the total weight of each species of salmon which is processed in these various plants.<sup>19</sup> Finally, the total gross wholesale value of the plants' salmon processing production costs are computed using average 1976 wholesale prices per processed piece, by catching area.<sup>20</sup> These calculations are summarized below.

TABLE 6

Estimated Number of Salmon Processed, by Location, 1976  
( '000s pieces)

<u>Location</u>	<u>Sockeye</u>	<u>Pink</u>	<u>Chum</u>	<u>Chinook</u>	<u>Coho</u>	<u>Sthead</u>
Bella Bella	205	560	6.3	3.1	36.6	0.2
Ucluelet	17.7	37.5	81	109	183	0.3

TABLE 7

Gross Wholesale Value of Salmon, by Species and Area, 1976  
(\$/piece)

<u>Location</u>	<u>Sockeye</u>	<u>Pink</u>	<u>Chum</u>	<u>Chinook</u>	<u>Coho</u>	<u>Sthead</u>
Bella Bella	11.97	4.06	15.00	13.25	11.15	9.76
Ucluelet	7.90	4.32	12.15	23.31	8.44	11.76

<sup>18</sup>Source: Salmon species end-use survey of 1976 catch statistics, (D.F.E. Personnel, 1977).

<sup>19</sup>These numbers were determined based on historical splits, by salmon species, between the canned and fresh/frozen forms. See M. Shaffer, 'Employment and the Social Cost of Labour'. A report prepared for the Salmonid Enhancement Program, 1977, page 15, footnote.

<sup>20</sup>Source: Jay Barclay, Consulting Economist, SEP.

TABLE 8

Estimated Annual Value of Salmon Processed, by Location, 1976  
(\$000s)

<u>Location</u>	<u>Sockeye</u>	<u>Pink</u>	<u>Chum</u>	<u>Chinook</u>	<u>Coho</u>	<u>Sthead</u>	<u>Total</u>
Bella Bella	2454	2274	94.5	41.1	408	1.9	5274
Ucluelet	135	162	985	2541	1545	3.0	5370
							<u>10644</u>

From Table 8 it can be seen that the annual gross wholesale value of salmon processed in native owned plants was on the order of \$10.6 million in 1976. The net revenue (exclusive of corporate income taxes) generated from this production can be calculated by subtracting the costs of acquiring and processing the raw product. These costs have been determined by D.F.E. economists as approximately 95.3% of the gross wholesale value of salmon processed in the industry as a whole.<sup>21</sup> Assuming that this percentage is representative of the profit margin in the native plants as well, it is estimated that the native operations generated approximately \$0.50 million in net revenue in 1976. This probably provides an underestimate of the gross processed value and of the associated net revenue, as other marine products, in particular the very lucrative herring roe product, are also processed in these plants.<sup>21a</sup>

#### 2.4.4: Future Native Involvement in the Industry

The future of native participation in the fish processing industry is somewhat uncertain. At present, the number of native shoreworkers employed in northern and central

<sup>21</sup>Rob Morley, D.F.E. (personal communication). This cost factor includes a 10%/annum return on invested capital. In economic jargon, the calculated net revenue is thus excess profit, or economic rent.

<sup>21a</sup>Source: Blaine McEachern, Economist, D.F.E.



coast plants appears stable. However, many factors could result in future displacement of natives from the industry. Further consolidation of processing operations in major southern urban areas\*, major technological change resulting in a more capital intensive canning line operation, and greater involvement of recent Asian immigrants willing to work in less than pleasant conditions, particularly in the Prince Rupert plants, are all possibilities.

At the same time, it has been noted that some progressive Indian bands are becoming interested in direct ownership of processing operations. The extent of this future involvement will obviously depend on the economic feasibility of these operations including a steady supply of raw fish products.

Native participation in the processing industry, as might develop with enhancement, is outlined in section 3.

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\*It was learned from a fishing industry consultant (T. Knowles) that B.C. Packers Co. has been undertaking computer cost-effectiveness studies to determine the economic feasibility of transporting all raw fish products to their southern plants rather than processing fish caught in the northern areas in their northern plants. Although this is certainly not positive evidence, it does support the generally held view that the processing industry is not locationally stable.

3. FUTURE NATIVE INVOLVEMENT IN THE COMMERCIAL FISHERIES  
AS MAY DEVELOP WITH SALMONID ENHANCEMENT

3.1: The Primary Sector

3.1.1: Overview:

Native fishermen's involvement in the B.C. salmon fishing, as might develop with the enhancement program, is described in the reference cited.<sup>22</sup> This report concluded that substantial improvement in native vessel owners' (and native crew members') gross incomes could occur if the 1974 fleet mobility patterns were maintained with increased salmon stocks. Under this assumption the potential incremental increase in total native fleet gross income would be of the order of \$14.8 million (\$ 1976) annually by 2007, year 30 of the program. This represents an increase of roughly 125% over the 1974 native fleet salmon catch of \$11.4 million (\$ 1976).

These projections were considered optimistic, however, as it was noted that (a) the native fleet sectors were, in most cases, less mobile than their non-native counterparts and (b) not all of the incremental increase was expected to accrue to native fishermen. Rather, a portion of the increase would be realized by non-native crew members and processing companies (see footnote 6, on page 10). Under pessimistic assumptions, native fishermen were predicted to realize only 75%, or \$11.2 million, of the incremental increase, while under most likely assumptions native fishermen would realize 90%, or roughly \$13.3 million of the projected optimistic increase.

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<sup>22</sup>W. McKay, op. cit., chapter 3. Readers should refer to this report for a description of the underlying assumptions of the model used in projecting increases in native fleet incomes.

3.1.2: Distribution of Enhanced Incomes within the Native Fleet

It was noted in this study<sup>23</sup> that the probable distribution of benefits of the enhancement program was very slanted in favour of Indian bands which were presently well represented in the salmon fishery. It was seen that at least 80% of the incremental increase in native fleet catch income would be realized by 17 of the Indian bands presently engaged in the primary commercial fishery. Specifically it was computed that Johnstone Strait bands were predicted to realize 46.1% of the total increase, Nass Valley bands 14.1%, central coast bands 12.8%, Skeena River bands 10.0%, West Coast Vancouver Island bands 7.7%, Queen Charlotte bands 3.2%, Georgia Strait bands 3.1%, and Fraser bands 3.0%.

More detailed statistical information on projected increases in native fleet income was developed subsequent to the publication of this report. These data are detailed in Table 9, which indicates projected increases in native home port fleet earnings under optimistic, pessimistic and most likely assumptions.

The data in Table 9 certainly supports the previous findings that those bands which are presently well represented in commercial salmon fishing will realize most of the benefits from enhancement which are projected to accrue to native fishermen. In other words, relatively 'well-off' native fishermen will get richer, while poor native fishermen will probably not improve their economic positions to any significant degree.

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<sup>23</sup>Ibid., pages 3-7 and 3-8.

TABLE 9

PROJECTED INCREASES IN ANNUAL NATIVE HOME PORT FLEET  
EARNINGS WITH ENHANCEMENT BY 2007 (\$'000)

HOME PORT	NUMBER OF BANDS	BASE INCOME* (1976\$)	OPTIMISTIC (1976\$)	PESSIMISTIC (1976\$)	MOST LIKELY (1976\$)	INCREMENTAL INCREASE %
2	2	392	468	351	421	107
3	5	2,344	2,092	1,569	1,883	80
4	6	1,169	881	661	793	68
5	1	520	594	446	535	103
6	2	570	511	383	460	81
7	2	1,120	1,163	872	1,047	93
8	1	451	213	160	192	43
12	7	904	1,614	1,211	1,453	160
13	2	2,419	5,204	3,903	4,684	193
14	1	206	276	207	248	120
15	1	8	21	16	19	236
16	1	8	16	15	12	180
17	4	83	138	104	124	150
18	2	2	1	.75	.9	45
19	2	20	14	15	13	63
22	1	12	6.8	5.1	5.1	50
23	3	324	401	301	361	111
24	3	459	604	453	544	118
25	3	54	70	53	63	117
26	1	97	49	37	44	45
27	1	19	10	.75	9	47
29	4	284	438	329	394	139
TOTAL	55	1,140	1,479	1,109	1,331	117

\*Base income calculated using 1974 salmon incomes and inflating by an assumed 10% per annum inflation factor.

Source: Indian Catch Distribution Computer Model, 1977

3.2: The Secondary Sector:

3.2.1: The Direct Employment Impact:

Potential direct employment impacts of the enhancement program on native employment in the salmon processing industry have also been discussed in previous works.<sup>24</sup> To review, it was assumed that approximately 67.5% of the total shoreworker employment due to salmon processing in the Prince Rupert and Masset plants, and 100% of the employment in the Bella Bella plant, was native Indian.<sup>25</sup> It was further assumed that this figure would remain the same with enhancement. Under these assumptions it was estimated that there would be a direct increase of 14,000 man-days in annual native employment in the northern plants and 28,600 man-days in Bella Bella, by 2007, year 30 of the program.

The employment increase for the northern plants was considered optimistic because of the many factors that could conceivably reduce the number of native shoreworkers. Under pessimistic assumptions only 50%, or 84,500 man-days of the total direct employment increase in Prince Rupert and Masset would go to native people. Under the most likely assumptions, 60% or 101,400 man-days of the total increase would go to native people.<sup>26</sup>

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<sup>24</sup>Ibid., chapter 5. The analysis was restricted to the direct employment increase as it was assumed that the indirect impacts due to increased spending because of the higher incomes would not significantly affect native people.

<sup>25</sup>Because there are very few native people employed in the south coast area, the analysis was concerned with the central and north coast only.

<sup>26</sup>It should be noted that similar estimates of employment and income can be calculated for any year of the enhancement program.

3.2.2: The Associated Increase in Shoreworker Income:

Although not included in this report, the associated increase in native shoreworker earnings can also be calculated. Assuming an average hourly wage rate of \$9.20 per hour,<sup>27</sup> and an eight hour working day, the increase in annual direct native income in the Prince Rupert and Masset plants, under the most likely employment scenario, would be \$7.46 million by 2007. In Bella Bella the annual increase would be \$1.97 million by 2007.

3.2.3: Potential Increases in Native Plant Throughput and Net Revenue:

The methodology developed in section 2.4.3 can be altered in order to determine the potential increases in throughput and net revenue at the native owned processing plants. From the salmonid enhancement fish production model of January 1977, and the species end-use assumptions as mentioned previously, it is possible to estimate the total volume of salmon, by species, which will annually be processed in the Bella Bella and Ucluelet plants in 2007<sup>28</sup> (or, for that matter, any other stage of the program).

This information is detailed in Table 10.

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<sup>27</sup> Doug Alley, B.C. Packers, personal communication. (Includes vacation pay allowance and all fringe benefits).

<sup>28</sup> Again, because of the lack of historical production data, the Port Simpson operation is not included in this analysis.

TABLE 10

Proposed Production to the Industry,  
by Species and by Processing Location, in 2007\*  
(1000s pieces)

Location	Sockeye	Pink	Chum	Chinook	Coho
Bella Bella	133	547	111	16	34
Ucluelet	32	69	89	273	133

\*Based on 1976 salmon catch proportions of 13.0% sockeye, 32.5% pink, 40.6% chum, 4.4% chinook, and 9.5% coho in the central coast, and 19.7% sockeye, 21.3% pink, 17.3% chum, 25.0% chinook, and 16.6% coho in the south coast.

These allocations were then multiplied by the approximate gross wholesale value per piece to determine the potential increase in plant throughput. (Table 11)

To calculate the increase in net revenue, the net whole-sale values, by species, of salmon processed in these locations were calculated by taking the gross wholesale value and netting out the landed prices as paid to fishermen and the associated (incremental) processing costs,<sup>30</sup> and multiplying by the number of pieces of each species processed. (Table 11)

<sup>30</sup>As determined by D.F.E. personnel for SEP benefit-cost studies.

TABLE 11

PLANT THROUGHPUT AND NET REVENUE GENERATED THROUGH  
 ENHANCED SALMON PRODUCTION, BY LOCATION, IN 2007

LOCATION	VALUE	SOCKEYE	PINK	CHUM	CHINOOK	COHO	TOTAL (\$000s)
Bella Bella	Gross Wholesale Value/Pc	11.97	4.06	15.00	13.25	11.15	
	Gross Wholesale Value	1592	2220	1665	212	379	6068
	Landed Price/Pc	4.54	0.87	4.23	6.87	3.96	
	Associated Processing Costs/Pc	3.01	1.33	4.96	4.42	3.114	
	Net Wholesale Value/Pc	4.42	1.86	5.81	1.96	4.05	
	NET Wholesale Value	558	1017	645	31	138	2419
Ucluelet	GROSS Wholesale Value/Pc	7.90	4.32	12.15	23.31	8.44	
	GROSS Wholesale Value	253	298	1081	6364	1122	9118
	Landed Price/Pc	5.02	2.13	5.04	12.98	4.40	
	Associated Processing Costs/Pc	2.41	1.56	3.69	6.32	2.40	
	Net Wholesale Value/Pc	0.47	2.09	4.36	4.01	5.77	
	Net Wholesale Value	15	144	388	1095	767	2409
	TOTAL GROSS						15186
TOTAL NET						4828	



From Table 12 it is evident that the potential impact of the enhancement program in native Indian owned plants is substantial. The calculated increase in the value of plant throughput totals \$15.2 million annually, given attainment of full enhanced production in year 2007. The associated net revenues impact is \$4.8 million, annually, again a significant increase. Considering that these operations are located in very remote regions, with widespread poverty and unemployment, the increases would appear to constitute an unambiguous benefit for these communities.

3.3: FUTURE INVOLVEMENT OF NATIVES IN THE ENHANCEMENT PROGRAM:

It is not within the scope of this report to report on the potentiality of future native participation in the enhancement program and/or on enhancement projects.<sup>31</sup> Such involvement will depend to a high degree on future D.F.E. policies, and these policies will undoubtedly change over time as their effects are monitored.

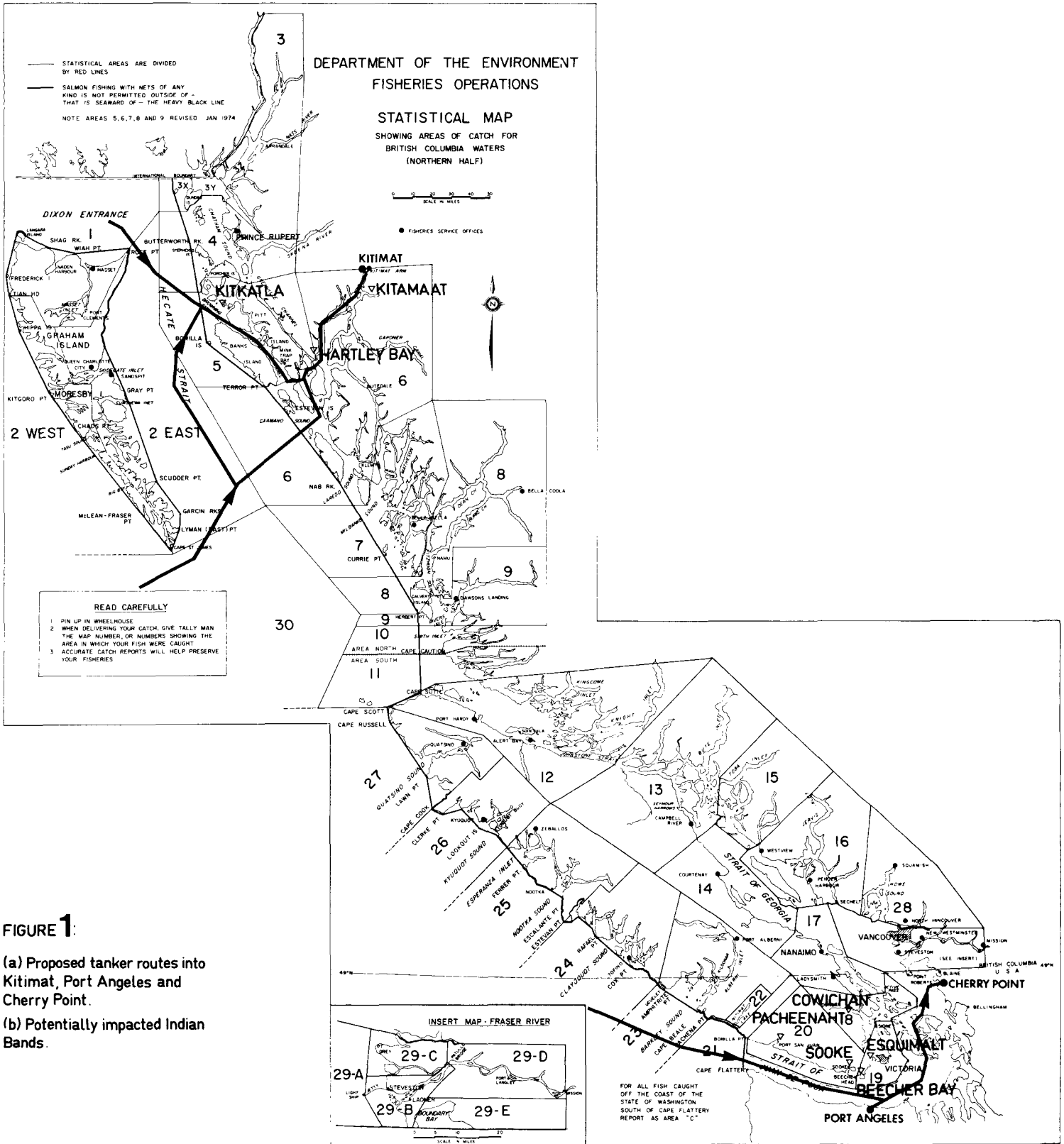
It should be realised, however, that a good deal of the program's short and long-term planning is focused on getting native people involved at all levels, including technical, professional and administrative employment. This planning includes hiring of natives on project construction jobs, a comprehensive program to train native people to operate and maintain enhancement facilities, and implementing economic development projects on Indian lands or in regions with large native populations. (One of these projects, on the Sliammon Indian reserve, even includes construction and operation of a production

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<sup>31</sup> Readers are referred to the SEP Native Program Working Group for more information.

facility, with the output to be harvested in the commercial fisheries.)

In summary all that can be said at present is that native people will very likely be heavily involved in the future in all aspects of the enhancement program. This point will be borne in mind, and elaborated upon, in the oil port impact analysis in section 4.



**FIGURE 1:**  
(a) Proposed tanker routes into Kitimat, Port Angeles and Cherry Point.  
(b) Potentially impacted Indian Bands.

4. THE POTENTIAL IMPACT OF OIL SPILLS AND TANKER MOVEMENTS ON THE NATIVE COMMERCIAL FISHERIES:

4.1: Analytical Assumptions:

4.1.1: Possible Areas of Impact:

There are three proposed sites for oil ports on the west coast currently under consideration for future construction or expansion. These are the proposed oil ports at Kitimat, B.C. and at Port Angeles, Washington and the existing port at Cherry Point, Washington. It is therefore theoretically possible that any area of the B.C. coastline could potentially be impacted in the event of oil spills and with tanker movements. However, reference to the D.F.E. statistical area map, with the indicated tanker routes (Figure 1) will readily confirm that the commercial fisheries in statistical areas 5 and 6 in the north, and areas 18, 20 and 29 in the south, along with any associated up-river fisheries, are the most likely areas of impact. The following native commercial fisheries' impact analysis will therefore focus on the possible effects of hypothetical oil spills and tanker movements in and through these areas.

4.1.2: Effects of Oil on the Fisheries Resources and of Tanker Movements on Commercial Fishing

There is no hard biological information readily available on the possible impacts of oil spills on fish. Nor is there any definite information on tanker routes and frequency into these proposed oil ports. It is therefore necessary to base the analysis on assumed impacts of oil and assumed tanker routes and frequency.

From discussions with the appropriate Inquiry staff,<sup>32</sup>

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<sup>32</sup>John Millen, Advisor, Environmental Phase (personal communication).

the following biological information was learned:

- 1) Oil does not cause salmon adult mortality, but it probably does taint the flesh if exposure is for a long enough period. This reduction in flesh quality, and the possibility of toxicity and of illness to consumers if eaten, would probably result in commercial fishing being closed. This closure would occur both in the area of the spill and in areas closer to the spawning grounds.
- 2) Oil does kill juvenile salmon; that is, salmon fry which are feeding in incubation grounds prior to migrating to the ocean. Obviously, this will not cause reductions in salmon available for harvest in the commercial fishery in the year of the spill, but it will result in reduced future returns of these particular salmon stocks which were affected, as juveniles, by the oil spill.
- 3) Oil does cause substantial shellfish mortality, as the oil is ingested into the fish through their feeding organs. Thus, oil spills will result in loss of both the present years' and the future years' availability of fish for harvest in the commercial fisheries.
- 4) Oil affects herring, both through tainting the flesh and through tainting the roe inside the female. It does not appear to kill the fish, nor does it result in substantial losses in future stocks. Thus, it is likely that the commercial herring fishery would be closed in that area during the period of the spill, but no long-term damage would occur.
- 5) The presence of oil in an area will close all commercial fisheries in that area, as obviously it is impossible for fishing vessels to operate in an oil spill. The oil spill may also result in other areas being closed to fishing if there is a chance that the migrating fish, notably salmon, were tainted by the oil. The length of these closures is dependent upon the extent of the spill.
- 6) The presence of tankers in an area or moving through an area during commercial fishing openings will not close the fisheries. However, it is possible that vessels which traditionally fish in these areas will curtail operations if the owners feel that there is danger of collision and of loss of ancillary fishing gear.

4.1.3: Hypothetical Oil Spills and the Effects on Commercial Fishing:

To maintain some degree of consistency among various fisheries impact studies,<sup>33</sup> six locations for oil spills are hypothesized for the B.C. coast. The locations in the north coast, and the impacted areas are:

- a) in Principe Channel (D.F.E. statistical area 5);
- b) in the lower reaches of Douglas Channel and/or at the proposed port site at Kitimat (area 6).

The locations in the south coast, and the impacted areas, are:

- a) in the Strait of Juan de Fuca and/or at the proposed port site at Port Angeles (area 20);
- b) at the Cherry Point site (area 18 and 29).

The possible impact on the native commercial fisheries of these oil spills is studied under two scenarios, optimistic and pessimistic:

The optimistic scenario assumes that a minor spill occurs during the fishing season which results in a loss of 10% of the present year's landed value of catch in that area. No losses in future year's salmon or herring stock occur, and the loss in future year's shellfish stocks are minimal.

The pessimistic scenario assumes that a massive spill occurs at the peak of the fishing season, causing a loss of 50% of the total landed value of catch in that area. Losses of future year's salmon stocks are significant, as are the losses in present and future years' shellfish harvests.

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<sup>33</sup>W. McKay, 'The Native Food Fisheries and the Possible Impacts of Oil Spills', 1977.

4.1.4: Tanker Traffic and the Effects on Commercial Fishing:

It is not considered necessary to attempt to quantify the impact on the native fisheries of tanker movements because of the many complex factors involved, not the least of which is the individual fisherman's decision whether to operate or not operate in an area where tankers are present. Instead the analysis of effects of tanker traffic will be mostly judgmental, based on available information on the condition of the native fleets and on their capability of moving to other coastal areas.

4.2: The Impact on the Primary Native Fishery:

4.2.1: The Current Native Salmon Fishery:

The potential impact of oil spills on the primary sector of the native commercial salmon fleet as a whole, given the present levels of harvest, is outlined in Table 12. Also identified in this table are those native regional fleets (and where possible, band fleets) primarily and secondarily impacted, and a short comment on the importance of the impact relative to the extent of the area's/band's dependence on commercial fishing. The methodology used in estimating these impacts is presented in Appendix I.

4.2.2: The Future Salmon Fisheries Given Enhancement:

It is extremely difficult to estimate the possible impact of oil spills on native fishermen's earnings with enhancement, as the program is not yet a reality. Thus no enhanced fish production is yet on-line.

Additionally, the enhancement scheme is planned as a phased program; the decision to continue with a further phase will depend on the economic (and biological) success of the previous phase. Presently, phase 1, construction of production facilities in the next 5 years up to 1982, is under planning. It is likely that the full enhanced

TABLE 12

THE IMPACT OF OIL SPILLS ON THE NATIVE SALMON FLEET,  
WITH PRESENT HARVESTS AND WITH PROJECTED ENHANCED HARVESTS

- 1) Impact with Present Level of Salmon Stocks;
- 2) Impact with Projected Level of Stocks in Year 10 of SEP;
- 3) Impact with Projected Level of Stocks in Year 30 of SEP.

LOCATION OF OIL SPILL	STAT. AREA	NATIVE FLEET LOSSES			REGIONS/BANDS AFFECTED		COMMENTS
		OPTIMISTIC (annual \$1976)	PESSIMISTIC (annual \$1976)	SECONDARILY	PRIMARILY		
Principe Channel	5	1) 50,000 2) negligible 3) 40,000	1) 200,000 2) 35,000 3) 175,000	Kitkatla (loss > 100,000 under pessimistic assumptions, both pre-sent and enhanced stocks)	Skeena area, Nass River and Kitamaat and Hartley Bay Bands	Fishing is extremely important to these bands as in most cases it is the principal (or only) economic base in the communities. The low mobility of the home ports 5 and 6 is of particular importance.	
Lower reaches of Douglas Channel or at proposed site at Kitimat	6	1) 75,000 2) 10,000 3) 60,000	1) 300,000 2) 50,000 3) 250,000	Kitamaat, Hartley Bay and Bella Bella. (Combined losses could exceed 250,000 of present earnings and 200,000 of projected earnings in year 30.)	Skeena area and Nass River bands	As above	



TABLE 12 (continued)

NATIVE FLEET LOSSES      REGIONS/BANDS AFFECTED

<p>Strait of Juan de Fuca or at Port Angeles</p>	<p>20</p>	<p>1) 20,000 2) negligible 3) 25,000</p>	<p>1) 75,000 2) 50,000 3) 100,000</p>	<p>Fraser River Bands</p>	<p>Nass River and Bella Bella fishermen</p>	<p>The Fraser River bands have alternative job opportunities as they live close to urban centers. However, many view commercial fishing as a traditional source of livelihood. The majority of the Nass and Bella Bella fishermen are 'high-liners' permanently resident in Vancouver.</p>
<p>Cherry Point</p>	<p>18</p>	<p>1) negligible 2) negligible 3) negligible</p>	<p>1) 50,000 2) negligible 3) 125,000</p>	<p>Qualicum and Johnstone Strait seine fishermen</p>	<p>Bella Bella seine fishermen and home port 19 bands</p>	<p>Fishing is economically important to the Johnstone Strait fishermen, but of lesser importance to the bands in Georgia Strait.</p>
<p>Cherry Point</p>	<p>29</p>	<p>1) 20,000 2) negligible 3) 30,000</p>	<p>1) 100,000 2) 50,000 3) 125,000</p>	<p>Fraser River and Georgia Strait gillnet and troll fishermen</p>	<p>Georgia Strait and Nass River fishermen</p>	<p>Commercial fishing is not of central importance to the Georgia Strait bands. As above, the Nass fishermen are permanently resident in Vancouver.</p>

production from facilities constructed in this phase, available for harvest in the commercial fisheries, will not be realized for ten years, until 1992. The full (15 year) program is meant to roughly double the harvestable salmon stocks in 30 years, by 2007.

For the purpose of estimating the possible effect of oil spills on enhanced production, the projected native fleet landings with enhancement in year 10 and year 30 of the program will be used in the analysis. The possible impacts on the native fleets are outlined in Table 12. The methodology used in estimating the fleet earnings losses is presented in Appendix II.

4.2.3: The Non-Salmon Fisheries:

As mentioned in part 2, the salmon fishery is the most important fishery for the native commercial fleet, accounting for roughly 90% of the total value of native population. The herring roe fishery is becoming increasingly important to native fishermen. Thus it would have been desirable to analyze the impact of oil spills on native herring fishing as well as salmon fishing. However, the necessary detailed data is not available.

From discussions with D.F.E. personnel it was learned that there is virtually no herring fishing in areas 20 or 29. There is a small food herring fishery in area 18 during the summer months. This fishery has little commercial value and, in any case, native fishermen are not believed to participate in this harvest.<sup>34</sup>

There is some herring fishing in area 5 and 6 in April, and some gillnet herring fishing in area 6 in March and

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<sup>34</sup>G. Alex Fraser, Economist, D.F.E.

April.<sup>35</sup> Native fishermen from Hartley Bay and Kitamaat very likely participate in the gillnet fishery in area 6, but the actual revenue derived from native fishing in this area is not known.<sup>36</sup> However, it is safe to say that because most of native commercial fishing occurs in the northern and central regions, herring fishing in area 6 would probably be quite important to the local Indian bands.

The impact of oil spills on other species of fish caught in the native commercial fisheries has not been determined, again because of the lack of data. These species are not particularly important to the native fleet as a whole, accounting for roughly 1.5% of the total native production in 1974. However, it is possible that a few of the native fishing communities in the southwest corner of Vancouver Island depend to some extent on groundfish and shellfish harvests in area 20 to supplement their revenues generated by salmon troll fishing.<sup>37</sup>

#### 4.2.4: The Impact of Tanker Movements:

Oil tankers moving through an area during commercial fishing activity may disrupt fishing in numerous ways, two of which are considered most important. First they may cause damage to a vessel or its ancillary gear through collision or through generating large washes. Secondly,

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<sup>35</sup>1976 D.F.E. catch statistics.

<sup>36</sup>An idea of the extent of native herring fishing in areas 5 and 6, and which bands participate, could be determined through an analysis of the 1976 catch information for vessels based in home ports 3, 5, 6, 7 and 8, which report herring landings in areas 5 and 6.

<sup>37</sup>Fisheries Field Officer, Victoria (personal communication).

and probably more important, their presence may result in some fishermen deciding not to fish in the area if they perceive a danger to themselves or their vessels. If these vessels are not capable of fishing in other waters because of size and condition, then obviously a loss in fishing revenues will be felt by the fishermen affected.

In the case of the native fleet, it was noted in sections 2.3.1 and 2.3.2 that most segments appear to display little movement; that is, native fishermen appear to fish predominantly in local waters near their reserves (with a few notable exceptions). Often this low mobility is due to preference on the part of the individual not to fish in other waters, but in some cases it is also due to fleet condition.

In terms of tanker movements in areas 5, 6 and 20, (there are not expected to be tankers moving through areas 18 or 29) it is possible to at least qualitatively state what might occur. Native vessels in home port 5 (Kitkatla), home port 6 (Hartley Bay and Kitamaat) and home port 7 (Bella Bella and Klemtu) tend to rely quite heavily on harvests in statistical areas 5 and 6 for fishing revenues. In particular, it was noted that Kitkatla fishermen catch roughly 40% of their fish in area 5, while Hartley Bay, Kitamaat, Klemtu and Bella Bella fishermen catch between 20% and 30% of their fish in area 6. Native fishermen from the Fraser area catch roughly 11% of their fish in area 20. In all cases, except for Bella Bella which has a few seine vessels, these fleets are comprised of small gillnet or gillnet-troll combination vessels. These vessels are not capable of operating in large waters. Consequently it can be inferred that if tanker movements were to curtail fishing activity in these areas, native

fishermen from these bands would suffer relatively harder than fishermen operating vessels in these areas at certain times of the year, but whole vessels clearly have the capability of moving to other fishing locations.

4.2.5: The Relative Impact of Oil Spills on the Native versus Non-Native Fleets:

It has been seen that the native fleet is, in many cases, significantly less mobile than the non-native fleet.<sup>38</sup> Whether this observed low mobility is due to fleet conditions or to native fishermen's preference to operate in local waters is really irrelevant. What it does imply is that native fishermen will be affected relatively harder by fishing area restrictions or closures due to oil spills than their non-native counterparts, as a higher percentage of their earnings is derived from fishing in the impacted area.

In particular, for purposes of this analysis, it has been seen that Indian bands in home ports 5, 6 and 7 depend heavily on fishing in statistical areas 5 and 6 for their revenues. In the southern regions, while fishing is not as important as in the north, it has been noted that Indian bands in home ports 15, 16 and 29 rely on catches in area 29 for a high proportion of their total earnings. (This should be qualified by noting that only native vessels in home port 29 report substantial fish landings.)

For illustrative purposes, home port 29 provides a suitable example. The native fleet, comprised mostly of small gillnet vessels, reported 44.1% of their salmon landings in area 29 in 1974. It is calculated that non-

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<sup>38</sup>Within the data constraints.

native vessels, on the other hand, reported a maximum of 20.0% of their salmon landings in this area in the same year.<sup>39</sup>

Consequently, if the Fraser River fishery was to be closed for, say, 50% of the season because of oil spills and contamination, native fishermen stand to lose roughly 22% of their annual earnings, while the non-native fleet would lose a maximum of 10%. Similar situations would apply to the other coastal areas impacted by oil spills.

4.3: The Impact on Native Participation in Processing:

4.3.1: The Current Fisheries:

The major impact of oil spills on native involvement in fish processing will be felt in the loss of native shoreworker income and employment, and secondly in the loss of throughput and of corporate income at the native owned processing facilities. The major effects will, of course, be in the Prince Rupert/Masset and Bella Bella regions where native participation is most pronounced. Again, because of the lack of data, only the effects of salmon losses will be considered.

To estimate the potential losses of native shoreworker income and employment, it was necessary to access some unpublished studies which have been generated for SEP,<sup>40</sup>

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<sup>39</sup>R. Ion, 'Potential Regional Impact of SEP', (unpublished), D.R.E.E., 1977, a report prepared for the SEP Economics Working Group. This percentage was computed by reducing the total B.C. fleet salmon landings in this area by the ratio of number of native vessels to total number of vessels.

<sup>40</sup>M. Shaffer, op. cit.; and W. McKay and N. McIlroy, 'Economic Feasibility Guidelines for SEP Geographic Working Groups', (unpublished), 1977.

and to develop a methodology based on statistical information contained in these studies. This methodology is outlined in Appendix III.

Secondly, to estimate the loss of throughput and of net revenue at the native owned plants, the total throughput and income of these plants calculated in section 3.2.3, multiplied by a simple ratio of salmon catches in areas 5, 6, and 18, 20, and 29 to total salmon catches in respectively, the regions 1-5, 6-11 and 12-29 was used. These impacts are set out in Table 13.

4.3.2: The Future Salmon Fisheries with Enhancement:

The major impact of oil spills on native shoreworker income and employment, as might have developed with the enhancement program, will again be felt in the Prince Rupert/Masset and Bella Bella areas. It is possible that the presently financially troubled Port Simpson plant will have become more viable with the greater throughput due to enhanced stocks. In this case, losses of enhanced stocks will also impact on this operation. Impacts will also be felt in reductions in plant throughput and corporate income in the native owned plants at Bella Bella and Tofino.

The methodology for estimating these impacts is outlined in Appendix IV. The results are presented in Table 13.

4.4: The Possible Effect on Future Native Involvement in SEP:

In the potentially impacted areas there are several enhancement facilities under consideration for future construction. The major ones are in the Kitimat/Kemano Rivers system, and in the Georgia Strait region. As mentioned in section 3.3, there is presently a good deal of SEP program planning focused on getting native people





TABLE 13

THE IMPACT OF OIL SPILLS ON NATIVE INVOLVEMENT IN FISH PROCESSING WITH PRESENT HARVESTS AND WITH PROJECTED HARVESTS WITH SEP

1) Present Harvest Levels; 2) Harvest at Year 10 of SEP; 3) Harvests at Year 30 of SEP

LOCATION OF OIL SPILL	STAT. AREA	NATIVE SHOREWORKER IMPACT (LOSSES)			NATIVE PLANT IMPACT (annual \$1976)			COMMENTS
		OPTIMISTIC (income, annual, \$1976)	OPTIMISTIC (employment, annual, man-days)	PESSIMISTIC (income, annual, \$1976)	PESSIMISTIC (employment, annual, man-days)	OPTIMISTIC THROUGHPUT	PESSIMISTIC NET REVENUE	
Principe Channel	5	1) 20,000 2) 6,000 3) 50,000	1) 200 2) 100 3) 700	1) 80,000 2) 32,000 3) 250,000	1) 1,000 2) 500 3) 3,000	Very Little; (possible minor impact in Bella Bella)		Principal areas of impact will be Prince Rupert and to a lesser extent, Masset. Bands most affected will be from the Skeena and Nass areas.
Douglas Channel or Kitimat	6	1) 30,000 2) 7,000 3) 50,000	1) 400 2) 100 3) 600	1) 152,000 2) 35,000 3) 200,000	1) 2,000 2) 500 3) 3,000	1) 34,000 2) 25,000 3) 40,000	1) 10,000 2) 50,000 3) 75,000	As above, but includes losses of shoreworker income and employment in Bella Bella. Principal bands affected will be Bella Bella, Klemtu and Bella Coola. Impacts will also be felt by owners of Bella Bella plant through reductions in corporate income.
Cherry Point	18	Very Minimal				1) negl. 2) 50,000 3) 100,000	1) negl. 2) 15,000 3) 30,000	Impacts, which are probably overestimated, will be felt by the owners of the Ucluelet plant as reduced profits.
Strait of Juan de Fuca or at Port Angeles	20	Very Minimal				1) 60,000 2) negl. 3) 10,000	1) negl. 2) negl. 3) negl.	These owners are primarily from the Bella Bella and Alert Bay Bands.
Cherry Point	29	Very Minimal				1) 50,000 2) 50,000 3) 100,000	1) negl. 2) negl. 3) 25,000	As above.

involved in the program in the future. It is a virtual certainty that Indians will be employed at enhancement project sites in the labouring, technical and (later) professional skill categories. (It is conceivable some Indian bands will own/operate production facilities of their own.)

If the possibility of oil port development and/or oil spills in a given area causes SEP program planners to consider the relocation of a facility or facilities, then there could be an impact on the native people in that area who might have been employed on these projects. Admittedly, this is extremely speculative, and depends entirely on how program planners perceive the possible detrimental effects of oil spills on these projects. However, it is one more point which should be borne in mind in the impact analysis, and one which should be investigated further.

5. SUMMARY

This study has reported on native participation in the B.C. commercial fisheries, and has attempted to analyze the potential impact of oil spills and tanker-related problems on native participation in the primary and secondary sectors, both with and without salmonid enhancement. Due to data limitations, emphasis has focused on the salmon fisheries, although with suitable statistical information a similar type of analysis would be undertaken for the other commercially caught species. However, the analysis is considered to be reasonably representative of the possible total impact on native involvement in fishing because the salmon fishery accounts for roughly 90% of the total native fleet earnings, and an unknown but believed to be high proportion of the total earnings generated through native involvement in fish processing.

The impacts of oil spills on the native fleet and on native participation in fish processing occurring in and/or affecting D.F.E. statistical areas 5, 6, 18, 20 and 29 were quantified. It was found that, under the assumptions of the pessimistic scenario oil spills affecting these areas could result in native fleet losses, in the year of the spill, of greater than (respectively) \$200,000, \$300,000, \$56,000, \$75,000 and \$100,000 of present earnings; in native shoreworker earnings of \$880,000, \$152,000 \$0, \$0, and \$0; and in annual native plant throughput of \$0, \$150,000, \$20,000, \$300,000 and \$250,000. (The plant throughput figures for areas 18, 20 and 29 are considered to be somewhat over-estimated. See Appendix IV.)

The potential annual incremental losses of projected native fleet earnings, with enhancement, in 2007 could be greater than (respectively), \$175,000, \$250,000, \$125,000, \$100,000 and \$125,000; in native shoreworker earnings, \$250,000, \$125,000, \$0, \$0, and \$0, and in native plant throughput of \$0, \$175,000, \$500,000, \$40,000 and \$450,000. (Again, plant throughput figures for area 18, 20 and 29 are somewhat over-estimated.)

Under the assumptions of the optimistic scenario all these impact estimates would be substantially lower (see Tables 3 and 14).

In terms of distribution of the primary sector impacts, it was found that the Kitkatla, Hartley Bay, Kitamaat, Klemtu and Bella Bella bands would be most affected by spills near or en route to the proposed site at Kitimat; the Fraser River bands would be most affected by oil spills near or en route to the proposed Port Angeles site; and Johnstone and Georgia Strait bands would be most affected by oil spills near or en route to the Cherry Point site.

In terms of the secondary sector impacts, spills near or en route to Kitimat would affect native shoreworkers in Bella Bella and Prince Rupert/ Masset, and throughput in the native plant at Bella Bella. (It is possible these effects will be felt at the Port Simpson plant as well if this operation assumes steady production in the future.) Oil spills near or en route to Port Angeles or Cherry Point would not significantly affect native shoreworkers, but would affect throughput in the native plant at Ucluelet.

The possible impact of tanker movement was not quantified. Rather, the analysis was completely judgmental, using available information on active fleet mobility and vessel

size and condition. (See section 4.2.4.)

The possible extent of future native involvement in the enhancement program was described, and the impacts of oil port development and oil spills on this involvement was very briefly addressed. (See sections 3.3 and 4.4.)

It is not considered necessary to draw firm conclusions from this analysis. This study has simply laid out the possible detrimental effects of oil spills and tanker-related problems in different locations of the B.C. coast on the native commercial fisheries. These projections are based on extreme sets of economic and biological assumptions. It will remain up to the Inquiry process, including the inquiry staff and fishing industry participants to assess the accuracy and validity of these impact estimates and to draw their own interpretations, conclusions and implications.

APPENDIX IMethodology for Estimating Losses in Native Fleet Salmon  
Income Due to Oil Spills

In order to estimate the loss to the native fleet due to oil spills occurring in statistical areas 5, 6, 18, 20 and 29, it was first necessary to determine that portion of native home fleet revenues accounted for by salmon landings in these areas. Two basic data sources were used.<sup>1</sup> The first data source was the 1976 total fleet catch statistics by home port region, filed in the Inquiry office, as it was noted that all vessels in home ports 2, 3, 5, 6, 7, 8 and 9, and the majority in home port 4, were either native owned or operated. Thus it was possible to use the 1976 salmon income percentages by statistical catch area, to estimate the northern native fleet in home ports 12 to 29, a different data base was used, as there is a large number of non-native vessels based in these areas, which meant that the total B.C. fleet information was not suitable. From the 1976 SEP Indian Catch Distribution Model (TABLE 4) the percentage of native home port fleet income accounted for by salmon landings in the eight "grouped statistical areas" was determined. Next, to calculate the portion of fleet income due to salmon catches in the statistical areas 5, 6 and 18, a simple ratio of salmon landings in these statistical area to total salmon landings in, respectively, grouped areas 1-5, 6-11 and 14-18 was used.<sup>2</sup> (This calculation was not

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<sup>1</sup>Although we could be accused of mixing baseline data sources in the analysis, it is felt that because the northern areas are the most important to native commercial fishing, and because more accurate results are obtained, this procedure is warranted. (If the Inquiry succeeds in getting the native fleet data by statistical area from D.F.E., then, of course, these numbers should be recalculated using this information.)

<sup>2</sup>These factors, are respectively, 8.8% 6.5% and 1.4% based on 1976 catches.

necessary for areas 20 and 29, as these grouped areas are the same as the statistical catch areas.)

The equivalent 1974 native home fleet income due to salmon harvests in each of the five statistical areas was then calculated from Table 3. These incomes were inflated by a 10% per annum inflation factor to express them in 1976 dollars. They were further adjusted by 10% for gillnet and seine fleet landings, and 0% for troll landings, in order to reflect the value of bonus payments.

Next, it was necessary to determine the portion of home fleet income which actually accrued to native fishermen. First, to adjust for the fact that a portion of earnings from the rented vessels is realized by processing companies as rental fees, a simple ratio of number of rental vessels to total number of native vessels licensed in each home port, multiplied by an estimated rental fee of 10% of gillnet and troll vessel landings and 4/11 or 36.4% of seine vessel landings was used.<sup>3</sup>

Secondly, to adjust for the fact that some vessels in home ports 3 and 7 are owned by non-resident native fishermen, (see footnote 6, page 10) the total native fleet home port income figures in these regions were downward adjusted by a simple ratio of number of non-resident owned vessels to total number of native vessels.<sup>4</sup> (It should be noted that this calculation was not done when estimating the income loss to the native fleet as a whole, as these vessels are owned by native fishermen.)

These computations, although tedious, are necessary if one is to fully understand the magnitude of the impact of oil spills on native fishermen's earnings. The information is presented in the following table.

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<sup>3</sup>W. McKay, op. cit., page 1-10.

<sup>4</sup>In the absence of more accurate production data for these vessels.

PERCENTAGE AND VALUE OF NATIVE HOME PORT FLEET  
GROSS INCOME DUE TO SALMON CATCHES IN IMPACTED AREAS

(000s 1976)

HOME PORT	AREA 5 % VALUE		AREA 6 % VALUE		AREA 18 % VALUE		AREA 20 % VALUE		AREA 29 % VALUE	
2	0.7	2.7	0.8	3.1	-	-	-	-	0.1	0.8
3*	1.7	42.1 (37.5)	4.9	121.2 (107.8)	-	-	1.0	24.7 (21.9)	0.8	19.8 (17.6)
4	6.1	72.2	3.3	39.0	-	-	0.1	1.2	-	-
5	42.0	228.5	5.0	27.2	-	-	0.1	-	-	-
6	5.0	20.1	28.9	174.0	-	-	-	-	1.8	10.9
7*	-	-	20.7	250.0 (233.3)	4.4	53.2 (49.6)	4.9	59.2 (55.2)	0.5	6.0 (5.6)
8	-	-	0.7	3.4	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-
12	1.1	18.6	1.7	28.7	1.2	22.1	1.0	16.9	0.4	6.8
13	-	-	-	-	0.8	13.2	1.9	29.1	0.3	4.6
14	-	-	-	-	11.6	26.2	-	-	7.3	16.5
15	-	-	-	-	0.4	-	-	-	4.9	0.5
16	-	-	-	-	8.3	0.1	-	-	40.9	3.3
17	0.1	0.1	1.2	9.3	0.9	0.8	-	-	-	-
18	-	-	-	-	8.4	-	-	-	40.3	1.1
19	-	-	-	-	14.0	3.0	-	-	-	-
22	-	-	-	-	-	-	1.5	0.1	-	-
23	0.4	6.2	0.1	1.5	-	-	-	-	-	-
24	0.4	-	0.5	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	1.3	1.4
27	2.6	0.5	1.0	-	-	-	-	-	-	-
29	1.0	3.1	1.0	3.1	0.7	2.2	11.4	34.4	44.1	137.2

TOTAL  
NATIVE  
FLEET

404.1

660.5

120.8

165.6

208.9

\*These figures have not been adjusted to reflect non-resident ownership. The adjusted figures are in brackets below.

Finally, these figures were multiplied by 10% and 50% to calculate the loss in native home port fleet income under the, respectively, optimistic and pessimistic scenarios.



APPENDIX IIMethodology for Estimating Increases in Native Fleet  
Incomes With the Enhancement Program and the Losses  
Due to Oil Spills

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The procedure for estimating native fleet income losses because of losses of enhanced salmon stocks through oil spills is considerably less rigorous than the procedure for estimating losses of current stocks. This is because the data is much less accurate. The SEP Fish Catch Model, Fish Production Model and Indian Catch Distribution Model are all based on extremely tenuous assumptions. Consequently, it is pointless to be unreasonably exact with admittedly very sketchy data. Thus the analysis will look at the projected increases in the native fleet and home port fleet fishing revenues as produced in the SEP computer models. No subsequent adjustments for non-resident ownership, processing company vessel rental fees or bonus payments will be made.

The SEP Fish Catch Model is based on "grouped statistical areas", not statistical catch areas. Therefore, it is necessary to calculate the expected enhanced production in statistical areas 5, 6 and 18 in the same way as outlined in Appendix I. (Again, no adjustment is necessary for statistical areas 20 or 29.) The following table indicates the projected increases in total native fleet revenues, and in individual home port fleet revenues, in year 10 and year 30 of the program. These increases were calculated using the same catch percentages as in Appendix I.

INCREASES IN ANNUAL NATIVE HOME PORT FLEET EARNINGS  
WITH ENHANCEMENT IN 1992 AND 2007 (\$'000s)

HOME PORT	AREA 5		AREA 6		AREA 18		AREA 20		AREA 29	
	YEAR		YEAR		YEAR		YEAR		YEAR	
	10	30	10	30	10	30	10	30	10	30
						-		-		0.8
2	0.5	2.9	0.6	3.4	-	-	-	-	0.2	15.1
3	3.8	32.0	11.0	92.3	-	-	.23	18.8	1.8	15.1
4	10.4	48.4	5.6	26.2	-	-	.2	0.8	-	-
5	42.8	224.7	5.1	26.8	-	-	.4	0.5	-	-
6	3.4	23.0	19.7	132.9	-	-	-	-	1.2	8.3
7	-	-	49.7	216.7	10.9	46.1	12.2	51.3	1.2	5.2
8	-	-	0.3	1.3	-	-	-	-	-	-
12	6.0	16.0	9.2	24.7	2.3	17.4	5.4	14.5	-	5.8
13	-	-	-	-	15.8	37.5	33.7	89.0	5.9	14.1
14	-	-	-	-	12.9	28.8	-	-	8.1	18.1
15	-	-	-	-	-	-	-	-	0.4	0.9
16	-	-	-	-	0.5	1.0	-	-	1.5	4.9
17	-	0.1	-	1.5	-	1.1	-	-	-	-
18	-	-	-	-	-	-	-	-	-	0.4
19	-	-	-	-	0.3	1.8	-	-	-	-
22	-	-	-	-	-	-	-	0.1	-	-
23	0.6	1.4	0.2	0.4	-	-	-	-	-	-
24	0.8	2.2	1.0	2.7	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	0.4	0.6
27	-	0.2	1.4	0.9	-	-	-	-	-	-
29	1.4	3.9		3.9	1.1	2.8	15.3	44.9	59.1	173.8

TOTAL NATIVE FLEET	69.7	354.8	103.8	533.9	46.1	136.5	67.4	219.9	79.8	26.31
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APPENDIX III

Methodology for Estimating Losses of Native Shoreworker  
Income and Employment in Prince Rupert/Masset and  
Bella Bella

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From various sources, the following estimates of the shoreworker income generated per processed piece of salmon, by species, by catching area and processing location, have been computed:

CATCH AREA	PROCESSING LOCATION	INCOME GENERATED (\$)					
		SOCKEYE	PINK	CHUM	COHO	CHINOOK	STEELHEAD
1-5	Prince Rupert/ Masset	1.50	0.86	2.60	1.70	1.70	2.81
6-11	Bella Bella	1.68	0.86	2.59	1.65	1.65	2.70

NOTE: The different values reflect the different proportions of the species going into the canned and fish/frozen forms, and the different weights.

Secondly, following previous studies, it was assumed that all salmon caught in area 1-5, and 35% of salmon caught in 6-11, would be processed in the northern plants, while 25% of the salmon caught in areas 6-11 would be processed in the south. Thus, from the 1976 salmon catch statistics, it is possible to calculate the equivalent shoreworker income generated through processing salmon caught in areas 5 and 6, the areas with which we are concerned.

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\*The analysis is restricted to these two areas because there are very few native shoreworkers in fish processing elsewhere on the coast. Thus the analysis can be restricted to salmon losses in statistical areas 5 and 6 only.

CATCH AREA	INCOME GENERATED IN	SOCKEYE	PINK	CHUM ('000)	COHO	CHINOOK	TOTAL
5	Prince Rupert/ Masset	19	525	14	54	20	
(\$ X 1000)		28.5	45.2	36.4	9.8	34.0	253.9
6	Prince Rupert/ Masset	15	498	14	61	20	
(\$ X 1000)		7.9	150	12.7	36.3	11.9	218.8
	Bella Bella	6.3	107	9.1	25.2	8.3	155.9

Third, again following previous studies, we assume that, presently, 67.5% of the total shoreworker employment in Prince Rupert, and 100% in Bella Bella, is native Indian. We also assume an average wage rate of \$9.20/hour, and an average work day of 8 hours, in order to calculate the equivalent employment in man-day, by processing location.

CATCH AREA	PROCESSING LOCATION	TOTAL SHOREWORKER INCOME (\$000s)	NATIVE SHOREWORKER INCOME (\$000s)	NATIVE SHOREWORKER EMPLOYMENT (MAN DAYS X 1000)
Area 5	Prince Rupert/ Masset	234.9	159.2	2.16
Area 6	Prince Rupert/ Masset	218.8	147.7	2.01
	Bella Bella	155.9	155.9	2.12

Finally, to calculate the loss in native shoreworker income and employment under the optimistic and pessimistic scenarios, these figures are multiplied by 10% and 50% respectively.

APPENDIX IV

Methodology for Estimating Reductions in Native Shoreworkers  
Income and Employment, and Native Owned Plant Throughput and  
Corporate Income As Might Have Developed With SEP

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- 1) To estimate the impact of oil spills on native shoreworkers, as might have developed with the Enhancement program\*, the data presented in sections 3.2.1 and 3.2.2 were simply weighted by the proportion of salmon harvests accounted for by catches in areas 5 and 6 relative to grouped areas 1-5 and 6-11, respectively. These factors were calculated as 8.8% and 6.5%. The table below indicates the native shoreworker income and employment generated by (projected) incremental increases in salmon stocks in these areas, at 10 and 30 year stages of the Enhancement program.

AREA	PROCESSING LOCATION	THOUSAND OF MAN-DAYS OF EMPLOYMENT		EQUIVALENT INCOME IN THOUSANDS OF \$ 1976	
		10	30	10	30
5	Prince Rupert/ Masset	0.87	6.90	64.0	507.8
6	Prince Rupert/ Masset	0.54	4.26	39.7	313.5
6	Bella Bella	0.34	1.74	25.0	128.1

This methodology was also used to estimate losses in native plant throughput and net revenue as might have developed with increased catches (section 3.2.3). The only addition necessary is that the contribution of enhanced catches in areas 18, 20 and 29 to total throughput in the native plant at Ucluelet must be calculated.

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\* Only areas 5 and 6 were considered because there are few native shoreworkers employed in the south.

For all areas, a simple ratio of catch in that area to total catch in the south coast areas, 12-29, were used. The factors are, respectively, 0.9%, 12.7% and 10.5%. The results are tabulated below:

CATCH AREA	PROCESSING LOCATION	GROSS WHOLESALE VALUE OF PRODUCTION (\$000s)		NET REVENUE GENERATED (\$000s) YEAR	
		YEAR		10	30
		10	30	10	30
6	Bella Bella	248.0	394.0	99.1	157.0
18	Ucluelet	42.7	82.1	11.2	21.7
20	Ucluelet	602.0	1,158.0	159.0	306.0
29	Ucluelet	498.0	957.0	82.7	253.0

Finally, to calculate the loss in projected native fleet incomes with S.E.P. under the optimistic and pessimistic scenarios, these figures are multiplied by 10% and 50% respectively.

\* The figures for Ucluelet are probably overestimates as the majority of salmon caught in these areas are destined for the fresh/frozen market and would be processed in Victoria.

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