POTENTIAL PACIFIC COAST OIL PORTS:

A COMPARATIVE ENVIRONMENTAL RISK ANALYSIS

VOLUME II - SUPPLEMENTARY APPENDICES

A Report By

Fisheries and Environment Canada

Working Group on West Coast

Deepwater Oil Ports

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PREFACE

The appendices which appear herein are intended as technical and methodological supplements to a previous volume entitled "Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis".

While that first volume was heavily edited for conciseness and comprehensiveness, this one underwent very little editing. Consequently, some of the appendices are lengthy and detailed. However, they could be of benefit to those who wish to appreciate more of the background to the overall study methodology and data sources.

Bibliographic references appearing in the text of this appendices volume can be found in the Selected Bibliography located at the end of Volume I and Volume II.

Should further technical detail or clarification be sought for specific portions of Volume II, authors identified following each appendix or libraries of the following agencies can be contacted:

Atmospheric Environment Service
Canadian Wildlife Service
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Fisheries and Marine Service
Institute of Ocean Sciences
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Pacific Environment Institute

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APPENDIX I

SOME MARINE ENVIRONMENTAL EFFECTS OF OIL POLLUTION

The marine environmental effects of oil pollution have been frequently summarized in the literature on the subject, e.g., Hoult, 1969; NATO, 1970; Cowell, 1971; NAS, 1973, 1975; Peters, 1974; API, 1977; GESAMP, 1977; Vernberg et al, 1977. Perhaps the greatest knowledge on the effects of a major spill in Canada originated from the East Coast disaster of the tanker ARROW in February, 1970 (MOT, 1970). The METULA spill off Tierra del Fuego occurred in conditions similar to those existing on this coast; MESA in Boulder, Colorado is presently researching that spill.

In spite of such research, there is still not a consistent, clear and comprehensive understanding of the ecological impacts of spilled oil. This is no doubt due in large part to the considerable number of variables involved, such as type of oil, sea state, shoreline characteristics, latitude and others. Depending on these variables and on slick area size, oil spill cleanups can be extremely costly with the breakup of a modest-sized tanker (50,000 tons), leading to cleanup costs of several million dollars (Sittig, 1974). A small spill of about 100 tons in outer Burrard Inlet from the collision of the British freighter ERAWAN and the Japanese freighter SUN DIAMOND on September 25, 1973, cost in excess of half a million dollars for cleanup, because of the rather aesthetically sensitive area (Caulfeild Cove) that was heavily affected. Another complication, as demonstrated by the ecological aftermath of the TORREY CANYON cleanup along the southwestern coast of England in 1967, is that the effects of emulsifiers, detergents and other cleanup chemicals on marine life can be far more devastating than the effect of oil itself (Smith, 1968). Alternatively, the relatively small (400 ton) oil spill from the Panamanian motor vessel VANLENE in a remote part of Barkley Sound on west Vancouver Island exhibited rather minimal ecological impact (Quayle, 1974). As a result of experience on oil spill cleanup procedures, particularly in the United Kingdom, the Inter-Governmental Maritime Consultative Organization has issued a manual on oil pollution with practical information on means of dealing with oil spillages (IMCO, 1972).

A number of factors must be taken into consideration when assessing the impacts of an oil spill. Oil is far from being a unique chemical compound with specific physical and chemical characteristics. It is a mixture of many constituents, each having different chemical properties and composition. For example, the crude oil from Alberta is considered to be "sweet" (low sulfur content), whereas that from Prudhoe Bay is "sour" (high sulfur content). In the International Convention on the Prevention of Pollution from Ships (IMCO, 1973), an attempt was made to separate oils into two basic groups: white oils and black oils.

The white oils are generally the refined products, such as gasoline, kerosene and diesel fuel. They are the more volatile, lighter fractions which are removed first in petroleum refining. Although

usually more toxic to aquatic life than crude oil and the heavier fuel oils, they are short-lived when spilled because of rapid evaporation and dispersion on the water surface.

The black oils, consisting of crudes and such heavy fuel oils as Bunker C, are generally not acutely toxic to aquatic organisms, but are comparatively long-lived on the water surface when spilled. They form persistent tarry residues which may foul beaches for some time. Shorelines protected from wave action (low-energy beaches) may show evidence of an oil spill for as long as five years or more, as noted on the Nova Scotia coast following the ARROW oil spill (Vandermeulen and Gordon, 1976). The more exposed coastlines, where wave activity is generally continuous and often vigorous (high-energy beaches), will usually be cleansed of oil residues rapidly by natural flushing action.

Besides wave action, temperature is an important physical factor in the natural dispersion and degradation of oil. Bacterial activity may be slowed down to a virtual standstill at sub-freezing temperatures. There is a big difference in the rate with which oil degrades by bacterial action in the tropics and in Arctic regions. Again, the experience of the ARROW oil spill, which occurred in the latter part of the winter of 1969-70 when ice and snow were still present, demonstrated the effects of shore ice and low temperature to the Canadian Atlantic Coast oil clean-up team. Fortunately, sub-freezing temperatures are comparatively rare along the Pacific Coast, but there have been winters of freezing conditions in nearshore coastal waters for periods of a week or more.

I.1 FISHERIES

The impacts of oil on fisheries are usually most severe in estuaries and other coastal waters. By far the most acute effects occur where egg and larval stages of fish and other aquatic organisms are exposed to petroleum hydrocarbons. Studies have shown that certain hydrocarbon fractions, such as benzene, can be particularly lethal to eggs and larvae of herring and anchovy (Struhsaker et al, 1974). Even crude oils have been shown to be quite toxic to eggs and larvae of Atlantic species of cod, herring and plaice (Kuhnhold, 1972). It should be noted that losses to fisheries may not be limited to fish killed directly or indirectly by oil, but could also include progeny that would have entered the fisheries had the potential spawners not been killed or reproductive behaviour impaired. In some cases, particularly for salmonids, impacts from a serious spill could last for decades.

In relation to the fisheries on the British Columbia Coast, the principal impact of an oil spill would be on the spawning of Pacific herring, Clupea harengus pallasi. This species spawns in intertidal eelgrass and other vegetation, as well as on shore rocks when no vegetation is available. It may spawn any time from late January to early July, although peak spawning occurs from the last week in February to the third week in April. As a rule, spawning occurs later in the season on the north coast of British Columbia than on the south coast. Herring eggs require about 20 days to hatch and are usually most sensitive to pollutants during the first four days of incubation.

Although there is no experimental information on the effects of crude oil on Pacific herring eggs or larvae, the results of Kuhnhold (1972) are a good indication that crude oil would be toxic to them. Because of the habit of Pacific herring of spawning in intertidal and shallow subtidal zones, it could be expected that herring eggs would be exposed to high concentrations of oil in the event of an oil spill. If an oil spill were to cover clusters of herring eggs, 100% mortality might be anticipated. Not only would the oil film be directly toxic, but it also could block respiration of the eggs. Moreover, it is known that once herring eggs start to die, adjacent eggs are adversely affected because of the release of hatching enzymes so that, in effect, a chain reaction is initiated.

If an oil spill occurred after the herring eggs were hatched, there could still be severe damage to local stocks because of the impact on the larvae. During the first two or three weeks of larval life, the herring are essentially planktonic, drifting with nearshore currents in the upper metre of water (usually in the surface 15 cm during the first few days). They are extremely vulnerable to petroleum hydrocarbons at this stage. Herring-roe-on-kelp would be rendered unmarketable in the event of contamination by an oil spill. While this represents only a small proportion of the total herring production on the B.C. coast, it must be taken into special consideration, because it supports a native Indian fishery, particularly in the Queen Charlotte Islands area.

Adult herring would probably be the least susceptible of the life stages to the adverse effects of an oil spill. However, because of the present character of the herring fishery wherein the product is primarily roe for export as human food, there could be a tainting problem arising from the exposure of adults to even traces of oil in the water. A major oil spill would probably require closure of the local herring fishery to avoid producing a tainted product.

Salmonids, on the average, would be less vulnerable to a coastal oil spill than Pacific herring. However, because of their anadromous nature and the fact that they spend considerable time in estuaries and other coastal waters on their seaward migration, they could be adversely affected by oil or oil dispersants. The estuarine and other nearshore nursery areas for juvenile salmonids could be rapidly covered by oil from a nearshore spill, with the oil not only being toxic to the young salmonids themselves, but equally as important, also destroying the food organisms on which they feed. Adult migration to spawning grounds could also be disrupted if hydrocarbons interfered with chemical homing pattern cues.

The groundfish resources along the B.C. coast would be expected to be one of the fisheries least affected by an oil spill. Again, the impact would be greatest on egg and larval stages. English sole, Parophrys vetulus, have pelagic eggs which sometimes float right at the surface and would be extremely vulnerable to an oil film. Lingcod, Ophiodon elongatus, usually spawn in deep water, but occasionally lay clusters of eggs in the shallow subtidal or lower intertidal zones. Under these circumstances, the eggs would be quite vulnerable to oil pollution. Larvae of all groundfish species would be seriously affected by an oil spill, if they spent any time in the upper five metres.

A major effect on groundfish could stem from the use of sinking agents, such as stearated chalk and treated sand, to combat oil pollution. In such an event the bottom fishes and their habitats, as well as fishing activity, would be affected in the same way as in disposal of solids and contained waste (Waldichuk, 1961). Although stearated chalk (Craie de Champagne) was used extensively off the French coast following the TORREY CANYON disaster, its further use elsewhere has been discouraged because of the adverse ecological impacts that it has had on the benthos and benthic habitats. On the British Columbia coast, Pacific cod, Gadus macrocephalus, an important commercial species, could be seriously affected by oil-sinking agents because it lays its eggs on the bottom in deep water at some distance offshore.

Shrimp and prawn resources could be affected by oil as well as by agents used to disperse or sink it. In the larval stages, these crustaceans are near the surface and could suffer directly from oil toxicity. Crabs in shallow water may suffer direct adverse effects from a spill and, in most instances of even light exposure to petroleum products, the flesh would become tainted and inedible. This was found to be the case with crabs (plus clams and oysters) following the deisel oil spill in Nanoose Bay on March 9, 1972 (F. Bernard, personal communication). In time, given clean water, such shellfish could cleanse themselves of petroleum hydrocarbons, but a heavy spill of oil on a beach could first destroy shellfish populations because of smothering and toxicity.

The British Columbia coast has populations of other invertebrate species most of which are unexploited at the present time. There are large populations of mussels, Mytilus edulis, on the inside coast and the much larger M. californianus on the exposed outer coast. Except in special cases, these species are unutilized for human food. Virtually the whole coast has beds of abalone, Haliotis kamtchatkana, which are exploited, and sea urchins, Strongylocentrotus franciscanus, now being considered for commercial production. There are two main areas of scallops, Patinopecten caurinus: one around Rose Spit on the northeast side of Queen Charlotte Islands and the other in Trincomali Channel, between Active Pass and Mayne Island in the Gulf Islands. Small areas along the whole B.C. coast are used for breeding by the squid, Loligo opalescens, which is not harvested at present. There are also scattered populations on the coast of sea cucumbers, Parastichopus californicus, and octopi, Octopus spp. The habitats of all species of invertebrates could be affected by an oil spill, but probably the major impact would be on the eggs and larvae, which are pelagic in most cases.

Apart from the various biological impacts of oil described in this section, there are, of course, considerable social and economic implications with respect to commercial and recreational fisheries. (These are dealt with in social and economic portions of Volume I.)

I.2 ECOSYSTEMS

There have been few careful studies conducted on the effects of oil on marine ecosystems. This is in part owing to the fact that oil spills seldom allow adequate preparation for "before" investigations, so

that "after" studies can have an adequate basis for comparison. However, some oil spills have occurred in areas where scientific teams could be brought quickly into action to examine all aspects of the marine pollution problem. The ARROW oil spill was one of these (MOT, 1970) and certain studies on the effects of this spill continued for several years after the incident occurred (Vandermeulen and Gordon, 1976). No emulsifiers were used on this oil spill and there was no evidence of high mortality of intertidal flora and fauna or of fish and plankton. However, there was localized damage to such intertidal life as crabs, limpets and algae, probably through smothering (Thomas, 1973). A summary of major oil spills followed by studies of their biological impact is given in the National Academy of Sciences report "Petroleum in the Marine Environment" (1975).

One of the earliest oil pollution studies was on the effects of a 60,000 barrel diesel oil spill by the TAMPICO MARU on the coast of Baja California, Mexico (North, 1967). This was a devastating oil spill, with massive destruction of intertidal and shallow subtidal animals, because of the high toxicity of diesel oil. A curious alteration of the ecosystem apparently occurred as a result of the destruction of sea urchins, which graze on young shoots of kelp and other aquatic vegetation. A luxuriant growth of seaweeds developed within months of the oil spill because of reduction in grazing by urchins. The biota was generally 90% restored after 3 or 4 years, but the relative abundance of certain species remained somewhat changed even after 12 years (Mitchell et al, 1970).

The intensive studies on the effects of the TORREY CANYON oil spill in 1967 off the southwest coast of England have been noted already (Smith, 1968). There was very high mortality of intertidal shore life (invertebrates and algae), mainly due to the use of toxic emulsifiers. Fisheries and plankton were apparently unaffected, but some 10,000 birds were killed.

A spill of 4,500 barrels of No. 2 fuel oil from the FLORIDA at West Falmouth, Massachusetts, in September, 1969, led to some intensive studies by scientists from the Woods Hole Oceanographic Institution (Blumer and Sass, 1972; Blumer et al, 1973). They found severe pollution of the sublittoral zone, with a 95% kill of all fauna including many fish, worms, molluscs, crabs, lobsters and other invertebrates. The local shellfish industry was severely affected and Wild Harbor was still closed to shellfish fishing in May, 1974.

The effects of oil pollution on flora and fauna in the Black Sea have been reported by Mironov (1972). He noted that oil products are toxic to phytoplankton and that there are differences in sensitivity between species. He found that oil and oil products at 0.001 ml/l accelerated the death of zooplankton, but generally the reduction in survival times of these tiny marine animals at this concentration of oil was less than 20%. Developing fish eggs were found to be highly sensitive, and eggs of Rhombus maeoticus died on the second day in sea water containing oil and oil products in concentrations of 10^{-4} and 10^{-3} ml/l.

Straughan (1976) conducted a study on the sublethal effects of natural chronic exposure to petroleum in the marine environment off the coast of Southern California where there are natural oil seeps. The marine ecosystem off Coal Oil Point, an area of natural oil seepage into Santa Barbara Channel, was compared with control sites where there was no chronic exposure to oil. Petroleum hydrocarbons were found in tissues of some, but not all, marine animals in the Coal Oil Point area. There was no evidence for continued accumulation of petroleum hydrocarbons in the tissues of marine organisms off Coal Oil Point. No effects on growth or reproduction were demonstrated in the mussel, Mytilus californianus, the barnacles, Balanus glandula and Chthamalus fissus, the abalone, Haliotis rufescens, H. corrugata, H. fulgens and H. sorenseni, or the sea urchin, Strongylocentrotus purpuratus. A reduction of brooding rate was noted in the barnacle, Pollicipes polymerus, and an increased tolerance to oil was observed in M. californianus, as confirmation of findings following the Santa Barbara oil spill. The Coal Oil Point study was designed basically in terms of inter-species comparison rather than as a comparative community study. There is obviously still a great need for further careful study of the effect of oil spills on marine communities.

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APPENDIX II

OCEANOGRAPHIC FEATURES OF THE WEST COAST OF BRITISH COLUMBIA

II.1 NORTHEAST PACIFIC OCEAN

To examine the physical oceanography of the coastal waters of British Columbia, it is first necessary to have some understanding of the water properties and large-scale oceanic processes of the adjacent ocean, the subarctic east Pacific.

Water Properties

In the subarctic Pacific, the water column can be characterized by three distinct layers or "zones" (Doe, 1955):

- the surface or seasonal zone about 100 meters deep with variable temperature and essentially constant salinity. The water properties here vary with season and location. Near the coast, the salinity of the surface zone decreases and becomes less uniform due to runoff from the land. A continuous salinity gradient is found in the surface zone somewhat further off the coast.
- the halocline layer beneath the surface zone, which is approximately 60 meters thick. The temperature changes little but the salinity increases rapidly with depth. This transitional layer is quite stable with little transfer of water.
- a lower zone where both temperature and salinity change gradually with depth to the bottom.

Currents and Large Scale Circulation

The surface circulation of the northeast Pacific for summer and winter is shown in Figures II.1 and II.2. The principal oceanic current to influence the West Coast of B.C. is the Alaskan gyre which diverts north from the eastward-flowing subarctic current (at about 45°N in winter) and flows along the coast of Vancouver Island. It continues past the Queen Charlottes and subsequently circulates counterclockwise around the entire shoreline of the Gulf of Alaska to the Aleutian Islands. At this point, it divides with one branch turning south to join the subarctic current again and one branch flowing to the Bering Sea through the Aleutian Islands. In the summer, the Alaskan gyre appears to turn north closer to 50°N, so that the west coast of Vancouver Island is more influenced by the south-flowing California current. Both the Alaska and California currents are weak and easily influenced by storms and strong winds. The California current especially tends to be variable in speed and direction (Boisvert, 1969). The northward flow of the Alaska current is stronger in the winter.

The Davidson current is not a permanent ocean current, but rather a seasonal surface current, flowing northward in a narrow strip

approximately 64 kilometers wide along the coasts of California and Oregon from October to March - the most pronounced flow occurring in January. It can attain speeds of up to 100 cm/sec and may penetrate Vancouver Island coastal waters; winter current measurements (Huyer and Huggett, 1976) 25 and 50 kilometers off Tofino on the west coast of Vancouver Island show a persistent northward surface flow with an average net speed of 25 cm/sec in December and January. The Davidson current may be caused partly by the southeast winter coastal winds and partly by the California undercurrent. The California undercurrent (Halpern, 1977) is a narrow poleward current approximately 50 kilometers wide which occurs over the continental slope below 200 meters between California and Vancouver Island. It brings southern water into the intermediate waters (i.e., below 200 meters) of the immediate coastal region. Calculated dynamic topographies from oceanographic data (e.g., Doe, 1955) generally show the surface movement off Vancouver Island, Juan de Fuca and Queen Charlotte Sound to be dominated by slow (<5 cm/sec) eddies and meanders.

Upwelling

Lighthouse and weathership data show relatively cold, saline water near the surface off Vancouver Island during the summer, especially during periods of northwest winds, which suggests upwelling. Doe (1955) deduced from his data that water upwelled from as deep as 200-300 meters. Pickard (1967) attributed annual deep inflow into some inlets on the west coast of Vancouver Island in late summer to the onshore movement of high salinity water due to upwelling. The divergence caused by the northwest winds may also enhance the southeast-setting current along the outer coast of Vancouver Island in summer. Along the west coast of the Queen Charlottes, upwelling may occur in summer owing to northwest winds causing a weak, narrow, variable current to the southeast immediately adjacent to the coast.

Crean (1967) points out that transport away from the coast in summer is much smaller off the Queen Charlottes than off Vancouver Island, so that the effect on a south-flowing current is probably similarly reduced.

II.2 SOUTH COAST OF BRITISH COLUMBIA

A description of the oceanography of the south coast is complicated by the existence of several distinct oceanographic domains separated geographically and characterized by different water properties. This description, therefore, will first give a brief account of some of the more prominent features of the circulation, and then categorize the prevailing oceanographic conditions for regions in the southern area.

Currents and Circulation

Figures II.3 and II.4 show the general seasonal surface circulation pattern in the Straits of Georgia and Juan de Fuca. The dominating influence is the freshwater discharge from the Fraser River which causes the development of an estuarine circulation. In general, there is a net seaward transport of surface waters with an approximate net speed of 10 to 20 cm/sec through Haro Strait and the Strait of Juan

de Fuca (Webster, 1977; Huggett, 1976; Fissel, 1976). The strongest residual currents in Juan de Fuca are found in the centre of the Strait and decrease to either shore (Huggett, 1976). In eastern Juan de Fuca, due south of the San Juan Islands, the surface circulation is more confused, but the net motion is probably seaward.

In the Strait of Georgia itself, surface motion is also more complicated. Studies by Tabata and Giovando (1970) and Tabata (1972) show that Fraser River water usually enters the Strait from the main (south) channel as a well-defined surface jet and often crosses the Strait to Porlier Pass before turning southward. Both studies also detected a clockwise circulation from Porlier Pass northward, then eastward toward the mainland shore between Burrard Inlet and the South Arm for periods of half a day and longer, although currents in this region are generally weak (Giovando, personal communication). A northward current seems to persist from the North Arm of the Fraser around Point Grey into outer Burrard Inlet, even during ebb tide (Tabata, 1972). Surface currents off Point Roberts are variable and seem to show no persistent direction of flow. The dominant direction of subsurface flow (deeper than 70 meters) in Juan de Fuca and Haro straits is toward the Strait of Georgia in response to the estuarine outflow on the surface. Subsurface currents in the southern Strait of Georgia are more complicated but generally northerly (Tabata, 1972).

The residual surface currents are strongly influenced by local wind conditions, which vary a great deal seasonally, as does the freshwater discharge of the Fraser.

Tidal currents are important to the circulation of the southern region. Two daily ebbs and floods cause strong currents in some restricted passages such as those in the Gulf and San Juan Islands, Boundary Pass and northern Haro Strait (4 knots) and First and Second Narrows in Burrard Inlet (5 knots). The tidal currents in most passages including Juan de Fuca Strait are reversing, with the predominant direction of flow along the main axis of the channels.

Along the west coast of Vancouver Island, there is a northwestward surface drift in winter, partly due to the convergence of oceanic waters caused by southeast winter winds. This flow may also be a continuation of the Davidson current described previously. In summer, the surface waters off Vancouver Island have a weak net southward drift, perhaps partly due to divergence of waters away from the coast caused by northwest winds.

Water Properties

The Strait of Juan de Fuca which extends from Cape Flattery to Victoria is characterized by a two-layer water column. The upper layer has a net seaward motion and is composed of brackish water from local runoff and well-mixed water from the San Juan Islands. The deep water is of oceanic origin and has a net inflow.

The Gulf Islands region includes the southern Strait of Georgia, the Gulf and San Juan Islands and the basin of Juan de Fuca east of Victoria. It is characterized by intense tidal mixing.

The central Strait of Georgia lies off Vancouver between Howe Sound and Point Roberts. The main feature of this region is the freshwater outflow from the Fraser which creates a low salinity surface layer, especially in summer. Renewal of deep water between 200 and 300 meters can occur throughout the year. The intrusions seem to originate in the Gulf Islands region with internal waves being conspicuous, particularly between the mouth of the south arm of the Fraser and the Gulf Islands.

Between the central Strait of Georgia and Discovery Passage, tidal currents are weak. During June and July, freshwater runoff from large rivers at the heads of inlets causes a strong halocline to develop.

In the northern Inside Passage between the north coast of Vancouver Island and the mainland, tidal mixing is intense and the water column tends toward homogeneity. In Queen Charlotte Strait, however, an upper layer is formed from local runoff and mixed water from Johnstone Strait. Beneath this is a layer of water which intrudes from Queen Charlotte Sound.

II.3 NORTH COAST OF BRITISH COLUMBIA

Along the north coast, oceanographic information is still sparse. The typical distribution of water properties has been derived from synoptic cruises. Owing to lack of long-term current measurements, circulation patterns could only be inferred from dynamic heights, isentropic analyses, short time-series current measurements, drift bottle recoveries and known wind and tidal mechanisms.

Currents and Circulation

Figures II.5 and II.6 show the general surface circulation pattern along the northern B.C. coast. The chief mechanisms affecting the surface circulation are winds, tides, freshwater discharges and oceanic processes such as large-scale currents. In winter, the dominant driving force is the southeast wind. The strength, persistence and long fetch of this wind, especially from November to February, cause a convergence of surface waters toward the mainland coast and a subsequent northward flow along the coast through Hecate Strait. The direction of the wind channelled northward through the Strait strengthens the flow. This flow continues seaward along the north shore of Dixon Entrance (Crean, 1967), then northward along the coast of southeastern Alaska. (During the periods of light southeast winds, such as spring and fall, the general movement tends to be northward through Clarence Strait). Direct evidence of this northward flow was seen by Thompson and VanCleve (1936) in their drift bottle experiments. This current is probably a continuation of the Davidson current, which flows northwestward along the Oregon coast and west coast of Vancouver Island, and then may move into Queen Charlotte Sound. The Alaskan gyre may contribute to the net northward flow in Hecate Strait, and reinforces the relative current caused by the convergence of oceanic surface water and the direct action of the southeast wind along the outer coast of the Queen Charlottes in winter.

In spring, the southeast winds subside; by summer the northward flow in Hecate Strait is greatly reduced. But the increased freshwater discharge and relaxation of the convergence of the previous winter (Crean, 1967) tend to flush out the surface layers of Chatham Sound and Dixon Entrance seaward, causing an intrusion of cool, saline water into Dixon Entrance at depth. In summer, the westerly winds may cause increased net inward flow into Dixon Entrance along the north shore of Graham Island.

A feature of the net tidal motion in this region (Crean, 1967) is a cyclonic vortex set up in Dixon Entrance by the meeting of the tides from Dixon Entrance and Queen Charlotte Sound in northern Hecate Strait. This cyclonic gyre tends to circulate waters within Dixon Entrance, out along the north shore and in along the south shore. It is more apparent in times of light wind and runoff, as these factors can suppress the characteristics of the vortex completely. Other features of tidal motion are the tidal currents encountered in the region of Chatham Sound and the Skeena estuary, where current speeds can exceed 4 knots in constricted passages, and even flood currents at the mouth of the Skeena can exceed 2 knots.

Water Properties

A major influence on the oceanography of the north coast region is runoff from the Nass and Skeena Rivers into Chatham Sound, and to a lesser extent, from the smaller rivers along the coast between Prince Rupert and Vancouver Island. In the spring, the freshwater runoff begins to increase owing to snow-melt in the mountains - peak runoff usually occurs in June. This increased volume of freshwater decreases the surface salinity of the whole area, although most of the brackish water coming from Chatham Sound escapes seaward along the north shore of Dixon Entrance or northward through Clarence Strait. A secondary maximum in freshwater discharge occurs in October. This flow usually finds its way northward through Clarence Strait (Crean, 1967). In winter, the halocline sinks owing to increased wind mixing and the thermocline decays owing to winter cooling and wind mixing. Dixon Entrance and Hecate Strait are well-mixed and are nearly isothermal to the bottom at this time and through to early spring.

In review, there are two known features of advection which can alter temperature and salinity on the north coast. The first is the northward surface flow through Hecate Strait in winter, which introduces relatively warm, saline water from further south into the area of Chatham Sound, northern Hecate Strait and eastern Dixon Entrance; the second is the flushing of freshwater seaward out of Dixon Entrance in summer, causing a deeper intrusion of cool, saline water.

PREPARED BY: A. Ages, Institute of Ocean Sciences.

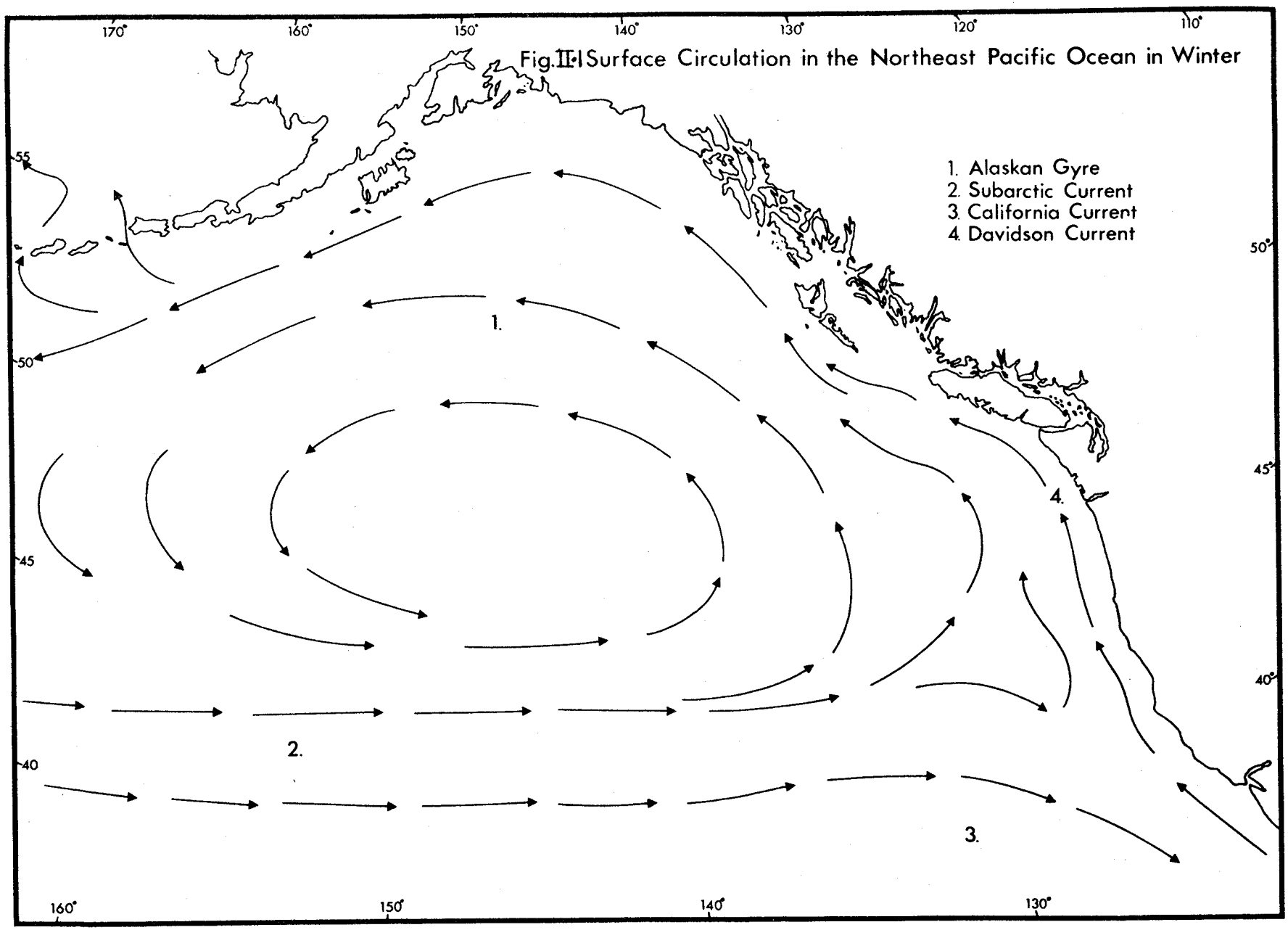
Fig. II-1 Surface Circulation in the Northeast Pacific Ocean in Winter
1. Alaskan Gyre
2. Subarctic Current
3. California Current
4. Davidson Current
170°
160°
150°
140°
130°
120°
110°
55
50
45
40
1.
2.
3.
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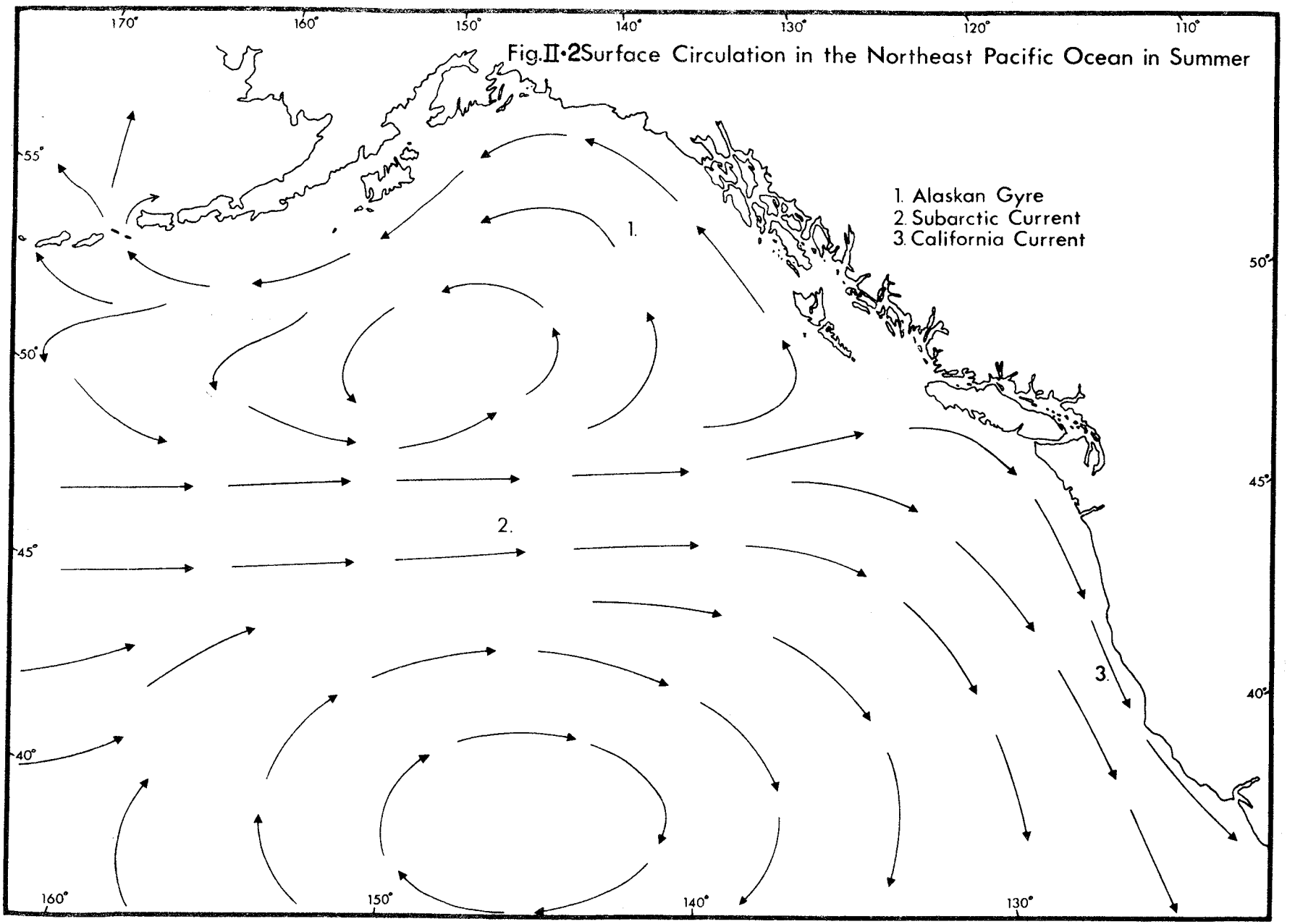

Fig.II·2Surface Circulation in the Northeast Pacific Ocean in Summer

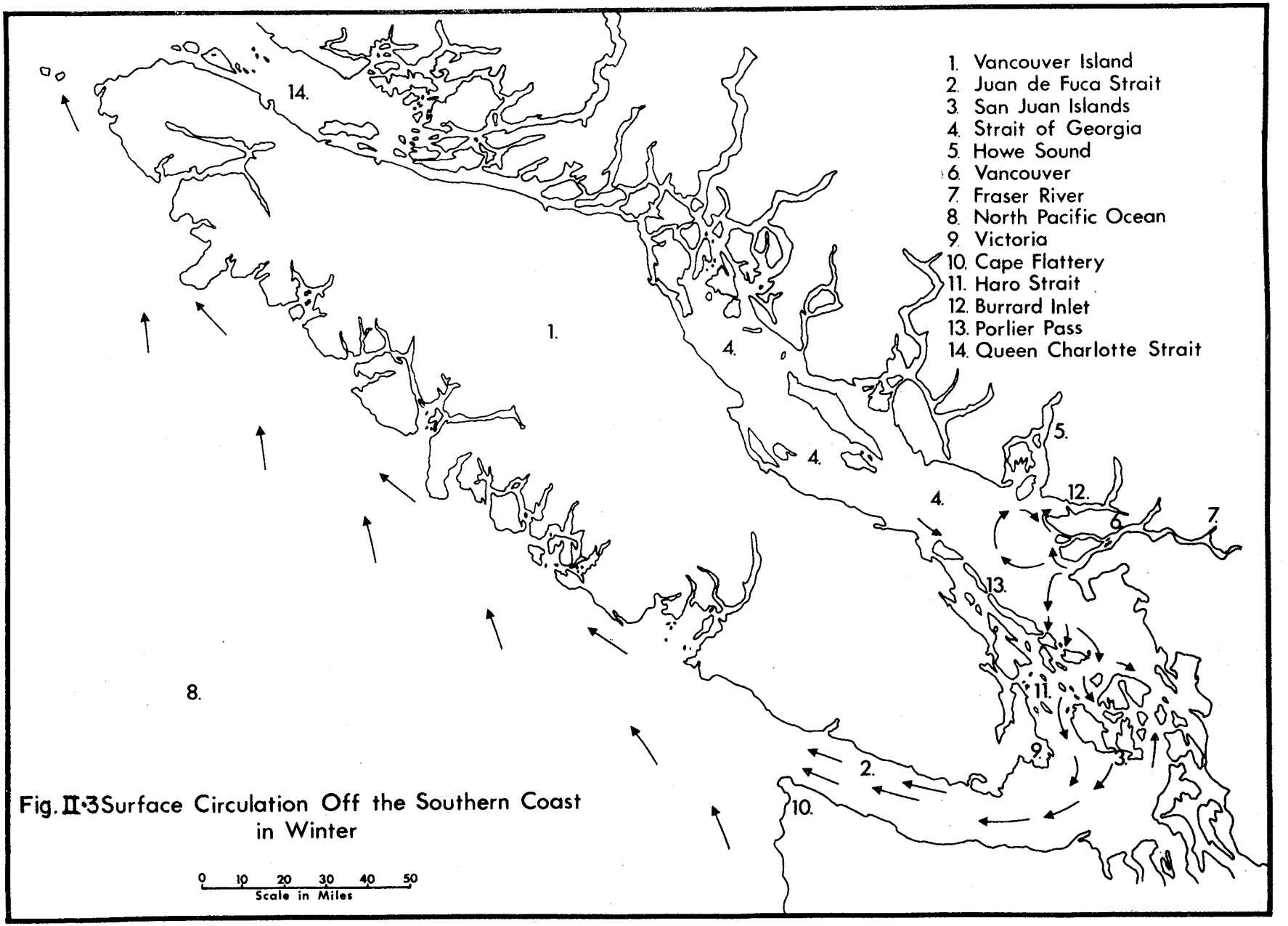

Fig. II-3 Surface Circulation Off the Southern Coast in Winter

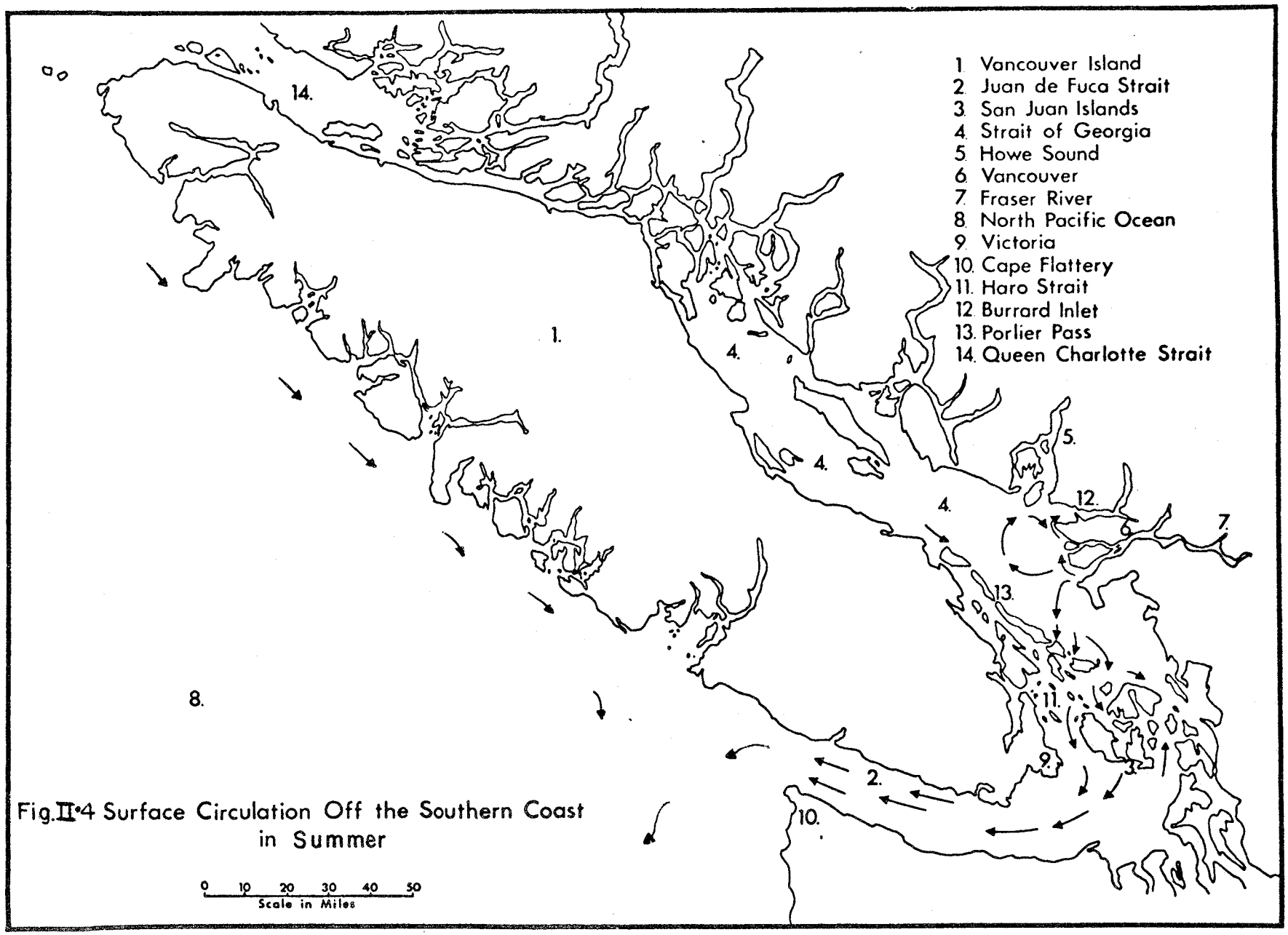

Fig. II-4 Surface Circulation Off the Southern Coast in Summer

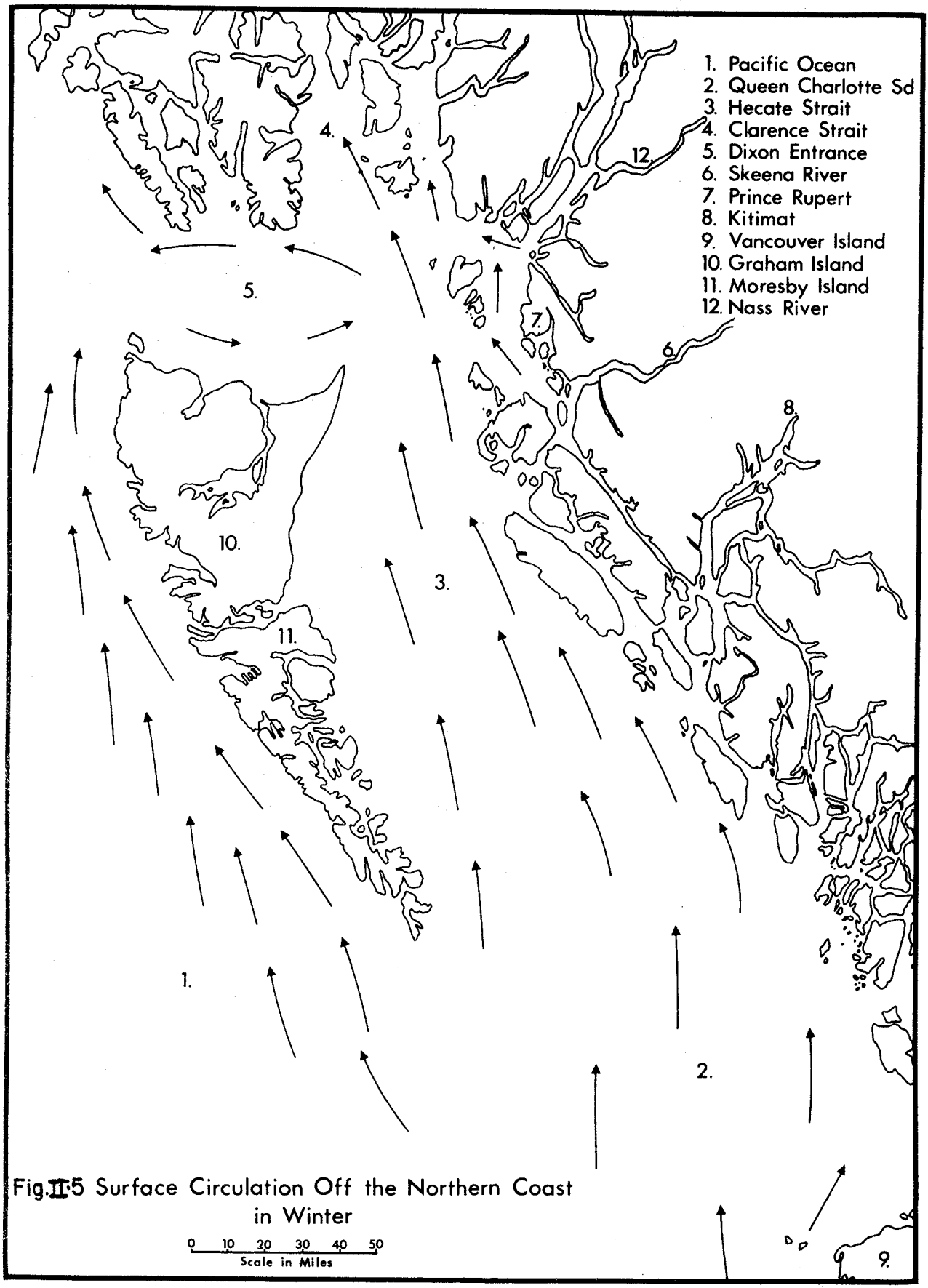

Fig. II-5 Surface Circulation Off the Northern Coast in Winter

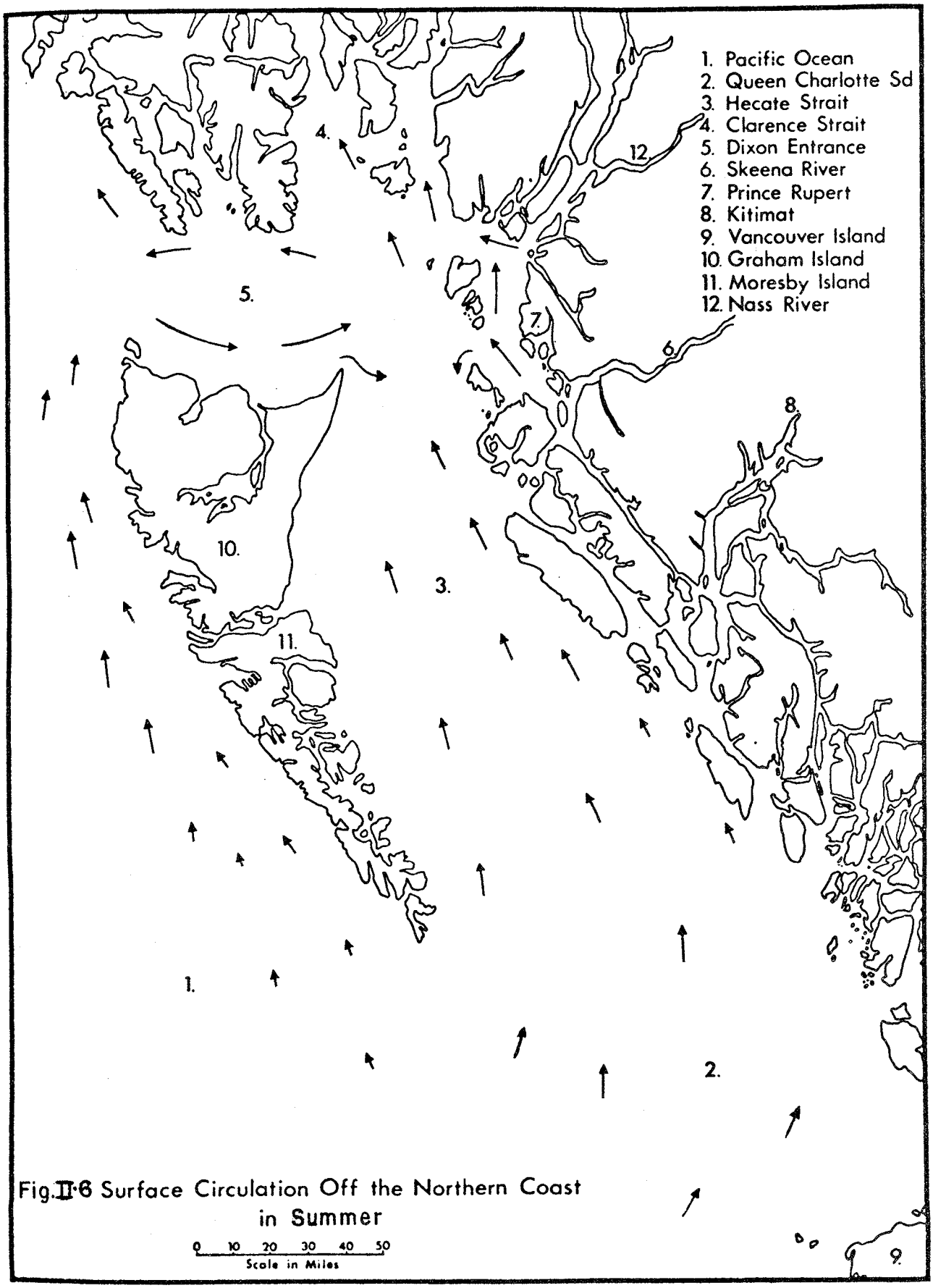

Fig. II-6 Surface Circulation Off the Northern Coast in Summer

APPENDIX III

AIR EMISSIONS

This appendix presents a preliminary investigation into the effects of a hypothetical 500,000 bpd (barrels per day) oil port located at Kitimat, B.C.

Oil port pollutant emission rates were first estimated and compared with existing Kitimat air pollutant discharge rates. It was determined that significant increases could occur over a 36 hour period for sulfur dioxide (+24%), the oxides of nitrogen (+400%) and hydrocarbons (+480%). Maximum resulting total emissions into the Kitimat airshed were then compared with those estimated to have occurred in the Greater Vancouver Regional District (G.V.R.D.) during 1970. It was found that on a unit area basis, the emissions of NO_x and hydrocarbons would be of similar magnitude for the two airsheds. Since air quality objectives in the G.V.R.D. have been violated by such emissions, it was concluded that similar violations could occur in the Kitimat airshed, although some of the hydrocarbon emissions from the proposed port would be innocuous because of their low photochemical reactivity.

It was further stated that the Kitimat and G.V.R.D. airsheds could not be directly compared owing to different mesoscale meteorology and because baseline air quality/meteorology monitoring would have to be conducted at Kitimat to ascertain the assimilative capacity of its airshed. The acceptability of the proposed emissions could then be assessed with some degree of confidence and, if necessary, emission control steps could be recommended.

While this air emissions analysis was specific to a port located at Kitimat, the calculated emissions would be identical, of course, at other port sites on the coast. Conclusions about the ultimate environmental effects of these emissions would require, therefore, site-specific knowledge of atmospheric dispersion characteristics.

III.1 POLLUTANT EMISSION RATES

In order to estimate the discharge at oil terminals of pollutants to the atmosphere, it was necessary to make reasonable assumptions about tanker fleet composition and terminal facility configuration. Emission calculations were based on source emission factors that were developed for a similar oil report entitled "The Alaskan Oil Disposition Study: Potential Air Quality Impact of a Major Off-Loading Terminal in the Pacific Northwest", U.S. Environmental Protection Agency, Region X, March, 1977. The emission rates used in that E.P.A. report are in fair agreement with those in other studies.

Tanker Fleet Composition

For a 500,000 barrel per day oil port, the tanker fleet was assumed to be comprised of two tanker sizes - 160,000 DWT and 80,000 DWT - having port call frequencies of 12 and 4 calls per month, respectively.

Since the fleet could be composed of both old and new vessels, it was assumed that 50% of the ships in both size ranges, would have fully segregated ballast. It was further assumed that only the 160,000 DWT tankers having segregated ballast would have an inert gas system and sequential purging capability. (The inert gas system takes a portion of a ship's exhaust, scrubs it and passes it into the cargo tanks being unloaded, so that the oxygen concentration in those tanks is kept below the lower explosive limit. Purging is a procedure used to remove hydrocarbon vapour from empty cargo tanks and is considered to be a non-routine operation.)

The main source of hydrocarbon emissions from a tanker would normally be from the ballasting of non-segregated tanks. The addition of ballast water to these tanks displaces hydrocarbon vapours left by the crude oil. For the purpose of this study, the E.P.A. assumption of ballasting to 20% DWT was used.

As unloading tankers burn fuel oil to power their off-loading pumps, they emit a flue gas containing carbon monoxide, hydrocarbons, nitrous oxide, sulfur dioxide and particulates. Such emissions are based on a sulfur-in-fuel-oil concentration of 1.5%.

Terminal Facility Configuration

The crude oil transfer and storage facility was assumed to be comprised of nine tanks, each with a capacity of 600,000 barrels. These tanks would be 270' in diameter and of the double-floating roof-type with perimeter tube seal. The major atmospheric emissions would be from evaporative hydrocarbon losses (standing storage plus withdrawal losses). Minor hydrocarbon emissions would also occur from pump and valve leakage and from small crude oil spills. An odor nuisance problem could exist if the oil contained an appreciable quantity of volatile sulfur compounds such as hydrogen sulfide and mercaptans.

The crude oil pumping station located near the tank farm would probably be powered by electric motor drive and hence would not be a significant source of emissions.

Annual Pollutant Emissions

From the above assumptions and previously cited E.P.A. emission factors, it was next possible to estimate atmospheric emissions stemming from oil port activities. Annual emissions, based on the previously specified tanker fleet composition and operation, were compared with existing Kitimat emissions as in Table III.1. It can be seen that significant increases of SO_2, NO_x, and hydrocarbon emissions to the Kitimat airshed could occur.

Maximum Short-Term Pollution Emissions

In order to study the possible extent of a pollution episode, maximum short-term emissions were examined. These could hypothetically occur when two 160,000 DWT tankers were in port at the same time (both tankers having non-segregated ballast). Since the average

TABLE III.1 ANNUAL KITIMAT AIR EMISSIONS (TONNES)

Source	SO_2	NO_x	TSP	HC	CO	Others
Kitimat (Existing)						
1. Domestic Heating and Vehicular (a)	110	240	45	1200	3500	(580-Gaseous fluorides)
2. Alcan Smelter (b)	6150	-	10,000	-	-	
3. Eurocan Pulpmill (b)	2800	(c)	1,500	-	-	110 (TRS odor) (d)
Total Existing	9000	240	11,000	1200	3500	
Oil Port (Estimated)						
1. Tanker Combustion	800	360	90	30	14	
2. Tanker Ballasting/Venting	-	-	-	930	-	
3. Tank Farm	-	-	-	500	-	(TRS odor?) (d)
Total Oil Port	800	360	90	1500	14	
% Increase Over Existing Sources	9%	150%	0.8%	125%	0.4%	

Notes:

(a) Data taken from: B.C. Research. 1970. Environmental Pollution Studies, Air Quality in British Columbia, Vancouver, B.C.
(b) Data obtained from provincial Pollution Control Branch permits.
(c) NO_x emission from the pulpmill could be significant, but is not known.
(d) TRS odor is the emission of volatile hydrogen sulfide and organic sulfur gases, expressed as total reduced sulfur.

turn-around-time of a tanker would be 36 hours, it was expected that any pollution episode would most likely occur when the above situation coincided with adverse meteorological conditions of inversions and stagnation, for at least the same duration. Table III.2 compares calculated maximum short-term oil port emissions with those reported to already exist in Kitimat. Also included for purposes of comparison are 1970 emissions from the Greater Vancouver Regional District (G.V.R.D.).

III.2 DISCUSSION OF ESTIMATED POLLUTANT EMISSIONS

Both Table III.1 (Annual Emissions) and Table III.2 (Maximum Short-Term Emissions) show that the significant pollutants arising from oil port acitivity are sulfur dioxide (SO_2), nitrogen oxides (NO_x) and hydrocarbon (HC).

Sulfur Dioxide Emissions

Current ambient SO_2 levels at Kitimat are below detectable limits (0.01 ppm), according to the B.C. Pollution Control Branch. The Kitimat monitoring instrument is operated periodically and is located 1.5 miles north of town centre. Reviewing the relative source strengths given in Table III.2, it is unlikely that an oil port would cause a significant change in the ambient level of SO_2 at the monitoring station. In other words, at this time there is no indication that the capacity of the Kitimat airshed for SO_2 would be strained by the addition of an oil port. Further monitoring with a mobile unit, during adverse meteorological conditions, would be required to verify this statement.

Existing Kitimat industrial SO_2 emissions occur both as an elevated point-source (Eurocan) and as a more diffuse, ground-level source (Alcan). They are located on the west side of the airshed and under the influence of prevailing north-south winds, bypass the town of Kitimat. Hence, ambient monitoring as now practiced would not detect the maximum existing ground-level concentration.

The previously cited E.P.A. report considered the interaction of tanker smoke plumes with surrounding elevated terrain. Their simple modelling, based on maximum emissions from a 1,000,000 bpd port during very adverse meteorological conditions (wind 2.5 m/s, stability class E), showed that the ambient SO_2 concentration at the point of impingement could be in the order of 1,000 micrograms/m^3, or more, and hence could violate U.S.A. standards. In the case of a Kitimat oil port (500,000 pbd), maximum emissions would be 50% less but, if similar assumptions were made with respect to meteorological conditions and topography, then it is possible that federal and provincial air quality objectives could be exceeded.

Whether the E.P.A. modelling assumptions are applicable to Kitimat would require a more in-depth, site-specific study.

Hydrocarbon and Nitrous Oxide Emissions

Table III.1 shows that an oil port would double the existing annual emissions of hydrocarbons (HC) and oxides of nitrogen (NO_x) into

TABLE III.2 MAXIMUM 36 HOUR KITIMAT EMISSIONS (TONNES)

Source	SO_2	NO_x	TSP	HC	CO	Others
Kitimat (Existing) (a)	37	1	45	5	14	
Oil Port (b)	9	4	1	24	0.2	
Total Kitimat Airshed	46	5	46	29	14	
GVRD (1970) (c) (Vehicular & Domestic Heating)	25	95	15	330	1800	

Notes:

(a) Prorated from annual emissions (Table III.1), assuming no seasonal variability.
(b) Estimate based on two 160 MDWT tankers in port, both ballasting and one sequentially purging. Major oil spill not included.
(c) Prorated from annual emissions as reported in B.C. Research (1970).

TABLE III.3 AMBIENT POLLUTANT LEVELS FOR VANCOUVER (micrograms/m^3)

Pollutant	Vanier Park (Measured, 1969-1970)	Maximum Acceptable Levels (Federal Objectives)
Carbon Monoxide		
1 hour	25,000 (0.1% frequency)	15,000 - 35,000
Annual	2,450	
Oxides of Nitrogen		
1 hour	1,670 (0.1% frequency)	400
24 hour	134 (20% frequency)	200
Annual	117	100
Hydrocarbons		
1 hour	6,656 (peak)	(EPA - Max. 3 hr: 160)
Sulfur Dioxide		
1 hour	453 (peak)	450-900
Annual	26.6 (mean over study period)	30-60

the Kitimat airshed. The main impact of these pollutants arises from their role in the generation of photochemical smog, as for example, in Los Angeles and, to a lesser extent, in Vancouver. Its formation requires enough reactants, an adequate reaction time and sufficiently strong sunlight. In the Vancouver region, these conditions are occasionally met during summer months when a stagnant anticyclonic air mass forms an inversion lid over the Lower Mainland. A coastal land-sea breeze mechanism sets in during these stagnant synoptic conditions which causes pollutants to accumulate within the airshed. This phenomenon also likely occurs at Kitimat.

Table III.2 compares the expected maximum Kitimat airshed emissions with those known to exist in the Greater Vancouver Regional District during 1970. While the G.V.R.D. emissions are an order of magnitude greater than those at Kitimat, it is recognized that the G.V.R.D. airshed is considerably larger. If the area of the Kitimat airshed were taken as 5 x 20 = 100 square miles and that of the G.V.R.D. as 2,000 square miles, then on a unit area basis, the two sheds would have a comparable emission rate with respect to HC and NO_x.

Table III.3 shows that, while air quality of the G.V.R.D. as measured at Vanier Park during 1969-70 was generally acceptable when compared to Canadian ambient air quality objectives, there were times when the levels of NO_x and HC were excessive. Hence, it would seem reasonable to conclude that there would be times when air quality in the Kitimat airshed would exceed federal and provincial air quality objectives.

However, there are two additional factors to consider. First, the volatile hydrocarbon emissions evolved from crude oil would consist mainly of low molecular weight paraffinic species which have a reduced reactivity for photochemical smog generation. Second, the geographic characteristics of Kitimat and Vancouver are very dissimilar and have different effects on pollutant dispersion. In Vancouver, the predominant effect contributing to high pollutant levels is the occurrence of a land-sea breeze which tends to move pollutants about within the basin. Kitimat, on the other hand, is at the end of Douglas Channel and in a rather narrow valley. Hence, during periods of stagnation and clear sky, it can be expected that local dispersion would be strongly influenced by mountain-valley circulation effects. Data for Kitimat from the Atmospheric Environment Service indicate that surface-based inversions are quite frequent overnight and in the early morning in all seasons, and also through the day in spring and summer. This phenomenon limits dispersion and is conducive to high concentration fumigations during inversion break-up.

Available monitoring data, although limited, indicate that the ambient SO_2 levels in Kitimat are presently acceptable, even though, according to Table III.2, existing SO_2 emissions are large relative to those in the G.V.R.D. This fact would suggest that dispersion conditions in the Kitimat airshed are such that no gross build-up of pollutants is occurring. Fumigations, if they have occurred, have not been detected by the existing SO_2 monitor, possibly owing to its remote location.

Since the Kitimat airshed experiences more precipitation and less solar insolation than Vancouver, there would be on the average less of a tendency for photochemical smog episodes to occur. During the critical months of July and August, the Kitimat townsite usually experiences 27 days of measurable precipitation and 376 hours of bright sunshine. The respective figures for Vancouver airport are 14 days of measurable precipitation and 561 hours of bright sunshine. An increase in precipitation increases the washout of airborne pollutants.

Although an indication of air pollution can be obtained from existing information, a more in-depth investigation will be necessary before a sufficiently reliable estimate can be made of the degree of airshed degradation resulting from oil port activities.

III.3 MITIGATION MEASURES

The previous section discussed the potential air quality degradation that could occur in the Kitimat airshed as a result of oil port activities. Maximum probable pollutant emission rates were used in order to put an upper limit on such an impact. It was seen that the major sources of emissions would be SO_2 and NO_x from tanker combustion and hydrocarbon vapours from tanker ballasting and terminal storage tank losses. This section discusses mitigation measures relative to the sources of emissions.

Reduction in Tanker Combustion Emissions

The SO_2 emissions could be reduced by firing only low sulfur (0.5%) oil by tanker while in port. This mitigation would reduce SO_2 emissions by 60-70%. It would entail separate fuel tanks, and therefore retrofitting costs on older vessels, along with a system of in-port inspection.

The emission of NO_x is favored by a high flame temperature and an excess of air in a ship's boilers, and theoretically can be reduced by controlling these two parameters. In actual practice, this form of control is difficult, as there is a tendency for soot and CO emissions to increase as excess air and/or flame temperature are reduced. Available data would indicate that NO_x reduction in the order of 65% is feasible, but would require major modification to the boilers of existing vessels. Since stack emissions of NO_x are very sensitive to boiler control, the vessels would probably require a fairly sophisticated automatic control system. In addition, some form of flue gas monitoring could be required by a port authority. New domestic carriers could be required to have their boilers certified to meet an NO_x emission standard when and if such a standard is promulgated.

Mitigation of Purging and Ballasting Emissions

Purging of tanker cargo tanks is done to remove hydrocarbon vapor prior to entry for maintenance reasons. It could be banned, at least in port, if a suitable ordinance and inspection system existed. It should be noted that purging emissions have been excluded in the

emissions estimates under the assumption that vessels would have inert gas systems. It has been further assumed that purging from other vessels without inert gas systems need not be carried out in port, but could be done at sea.

Hydrocarbon emissions arising from ballasting operations could be eliminated by requiring vessels to have fully segregated ballast tanks. This regulation would incur major retrofit costs for many existing vessels. The U.S. Coast Guard presently requires segregated ballast on new American tankers greater than 70,000 DWT and has proposed a similar requirement for foreign vessels. But a recent (June, 1977) meeting of the Intersessional Working Group on Tanker Safety and Pollution Prevention failed to show much international support for the American proposal. An alternative, as suggested by Italy and Germany, would require existing vessels to operate with "load on top" (LOT), in lieu of retrofitting vessels with segregated ballast systems. This would necessitate crude oil washing facilities. Both segregated ballast and LOT operations would result in an increase in tanker traffic in direct proportion to the reduction in tanker capacity.

Mitigation of Tank Farm Emissions

Tank farm emissions can be minimized through the use of double floating roof storage tanks, as assumed in this study. It has also been reported that recent tests on the use of secondary seals have shown that such seals can further reduce emissions. Mitigation would therefore require that storage tanks be built and maintained to certain standards, although standards would be difficult to enforce, as there are no effective emission testing procedures for large floating roof tanks.

Tank farm emissions could be further mitigated through the use of a vapor recovery or vapor scrubbing system which would involve covering the tanks with a fixed roof. The head-space of all tanks would then be manifolded to a line passing to the scrubber or recovery unit, although problems could arise from the large fluctuations in gas flow rate and consumption.

III.4 CONCLUSIONS

This preliminary investigation of the ramifications of a hypothetical oil terminal located at Kitimat, B.C., indicates that such a facility could lead to a significant deterioration of airshed quality. Whether or not such deterioration would be environmentally acceptable or to what degree emission control would be required, are not yet known.

Field data therefore would be needed on the dispersive characteristics of the airshed, as simple modelling would be unreliable in such complex terrain. Such a baseline study would have to be carried out well in advance of the planning/construction of the port. It would involve fixed and mobile pollutant monitoring and meteorological data gathering stations. A correlation between adverse meteorological conditions, ambient air quality and pollutant emission rates could thereby be established. Only in this manner could reliable predictions be made on potential airshed quality deterioration, and appropriate decisions made on what mitigating steps would be required to maintain an acceptable level of air quality.

It must be noted of course, that, while this report has only considered Kitimat as a potential terminal for Alaskan crude, it would also be applicable to other proposed deepwater oil port sites.

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APPENDIX IV

ENVIRONMENTAL CONCERNS OF OIL PIPELINE CORRIDORS AND FACILITIES

The first section of this appendix consists of a general review of the environmental concerns relative to oil pipeline corridors and facilities. The second section applies these considerations to the specific pipeline and terminal possibilities outlined in Chapter 6 of the first volume of this report. Chapter 6 also contains a map indicating the principal pipeline corridors referred to in this appendix.

It is generally considered that many of the major impacts of pipeline development can be overcome. However, this would be true only on the basis of detailed study of a corridor to identify potential problems; strict guidelines and effective monitoring of construction activities; and a practical education program for construction workers on a continuing basis.

IV.1 GENERAL REVIEW OF PIPELINE CORRIDOR ENVIRONMENTAL CONCERNS

The physical effects of pipeline construction, operation and maintenance appear to be fairly well documented. Knowledge of the biological effects, however, is rather general for birds and wildlife other than economically important species. Impacts of crude oil spills on riverine and land ecosystems also are relatively unknown and detailed research in cleanup technology appears to be lacking.

Physical Environmental Concerns

The physical environment consists of landforms, bedrock and surficial materials, water, climate and the physical qualities of vegetation. All these landscape components are inter-related; valley shape and orientation are controlled by the configuration of bedrock and unconsolidated deposits; and regional climate and topography provide a characteristic pattern of vegetation and local climate.

A. Landforms

Valley bottoms and lower slopes are usually the most feasible locations for pipeline corridors, but they contain the greatest diversity of physical environments. Valley configuration can range from narrow, steep-sided, v-shapes to wide, flat-bottomed, gently sloping u-shapes. The latter is usually more favourable, since it allows for a greater distance between the river, corridor and steeper slopes. Steep-sided valleys often provide an unsuitable topography for corridor location. Upper valley slopes are sources of avalanches, landslides, debris flows and excessive water volumes.

B. Bedrock and Surficial Materials

Valley bottom materials are extremely variable in their distribution, extent and character. They include recent alluvial deposits (fans and floodplains) ranging from well-sorted, fine sands to

poorly sorted boulders and gravel; organic deposits in areas of local ponding (bogs, swamps and fens); glacio-fluvial deposits of stratified fine sands to large cobbles; lacustrine silts and clays; and glacial tills of rather heterogeneous textures - all of these deposits having unique properties which require individual interpretation for pipeline corridor location. For example, extensive glacio-fluvial terraces are often particularly suitable locations, as they are flat, stable, well-drained, easily excavated and valuable sources of aggregate and bedding material. On the other hand, lacustrine silts situated in areas with a high water table are less favourable owing to their potential for slumping. Similarly, organic deposits are unsuitable as foundation material, since they often settle upon loading, have poor seismic stability and high water tables. Bedrock, which is less frequent in valley bottom locations, provides an excellent foundation, but frequently requires blasting to accommodate a pipeline. Floodplain and alluvial fans should be avoided owing to their natural potential for high water tables and shifting water courses.

C. Water and Climate

Corridor selection should avoid unnecessary stream crossings, but when necessary, should cross at sites where stream bank stability concerns are minimal, e.g., where there are moderately fine-textured till deposits, bedrock or relatively stable outwash deposits. Disturbance of unstable stream bank materials could lead to accelerated erosion, increased sedimentation and the potential for river scouring problems.

The regional and local climatic regime along a pipeline corridor should be known, and plans should allow for maximum and minimum values of the many parameters.

D. Vegetation

Vegetation structure and distribution are useful physical attributes to consider during the selection, construction and maintenance of a pipeline corridor. Vegetation can be an effective aesthetic feature for reducing the visual impact of a pipeline, and it can contribute substantially to the stabilization of stream bank materials. Certain vegetation can be effective for controlling the rate of spread of fire through a potential corridor.

Vegetation must also be looked at in the light of its significance as a habitat, food source, rarity, uniqueness and scenic value.

Biological Environmental Concerns

There are also general biological considerations which must be recognized prior to pipeline alignment. Besides the specific facets identified below, it must be remembered that all living resources are part of a very interdependent system in which any impact on one part often impacts on the rest.

A. Fish (anadromous and resident)

Migration routes and times (anadromous fish) must be identified so that stream crossings by pipeline and equipment may be adjusted accordingly.

Spawning grounds must be located so that stream crossings are downstream of them. If this is impossible, the incubation period of the eggs must be known to prevent impacts due to sedimentation, bed disruption and lessening of water quality.

Rearing areas should be identified (many anadromous species spend early stages of life in freshwater), so that construction activities which would lessen water quality can be curtailed in those areas. This includes the siting of construction camps, equipment storage, other activity which might cause siltation, stream blockage, oxygen depletion, toxic material discharge or temperature change of a freshwater body.

Overwintering areas - These are applicable to water bodies of higher elevation and/or latitude which are subject to ice formation during part of the year. Fish tend to concentrate where there is a sustained food source and sufficient oxygen replenishment of the water. Near the end of winter, the balance may be most critical so that any disruption could have serious consequences. This implies that any construction activities which would cause oxygen depletion, stream flow blockage, toxic chemical discharge or thermal changes would have to be strictly regulated.

B. Wildlife

1. Ungulates (moose, deer, caribou, elk, sheep, goats)

High capability ungulate ranges, i.e., areas which can provide sufficient food for concentrations of animals, are scarce in the province and any significant encroachments could have serious impacts. Of further concern at the site-specific level are the identification of mineral licks within a corridor.

Range - Although all ungulate range is of importance, there are certain seasonal areas which must be considered critical to their life cycles.

Winter range - High capability winter range is scarce in the province and any alienation or disruption would have significant impacts both regionally and provincially. Such activities as aggregate pit operations, access road construction, construction camp operations, storage areas, pumping stations and tank farms could disturb winter ranges.

Calving areas - These areas are critical to some ungulate species and any disturbances such as noise, blasting, road building or trench excavation would have impacts in the short term, while siting of pumping stations and tank farms would have long-term impacts.

Migration routes - Some of the larger ungulates (moose, deer, caribou) tend to migrate on a recurring seasonal basis. Migrations would be vulnerable to disruption, if construction activities were poorly timed.

2. Others

Other species of wildlife which would be of concern are the major predators (bears, wolves, cougars, wolverines), the major furbearers, and the wildlife serving as a principal food source for carnivores. Several aspects that warrant further study include bear denning sites, wolf nursery areas, critical habitat for important furbearers and regional distribution of predator-food species.

C. Birds

1. Migratory (waterfowl)

In British Columbia, the areas of prime waterfowl habitat are very limited and any pipeline construction which would infringe on these areas could have significant impacts.

Nesting areas - Many of the migratory species nest on the ground or on the foreshore of water bodies and thus are highly susceptible to disturbances such as pipelines across marshes, along lakeshores and river banks and the placement of pumping stations.

Growth stages - A number of migratory waterfowl (notably geese) go through a moulting season which renders them flightless for a period of time. Any pipeline construction activity around such areas of bird concentrations could cause undue stress at certain times of year.

Staging-resting areas - Activities such as blasting, borrow pit operations, right-of-way clearing and trench excavation could have impacts on staging-resting areas. Also, the placement of construction camps, equipment and fuel storage areas, pumping stations and tank farms could have similar effects.

2. Raptors (eagles, hawks, falcons, owls)

Because of these birds' position at the top of the food chain, they can be significantly disturbed by disruptions of their food source. Major raptors adapt poorly to disturbances such as clearing, noise, water pollution, aircraft and burning of debris. Some of the raptor species are considered rare and endangered, and undue stress could significantly affect them.

Nesting areas - Tree-nesting raptors (ospreys, bald eagles) are perhaps the most susceptible to direct pipeline construction impacts.

Others (passerines, shorebirds, insectivorous birds, non-game birds and game birds).

Any of these birds would be of concern if they were locally significant for recreation (e.g., hunting) or for ecological reasons (e.g., unique nesting areas).

Socio-Economic Concerns

A. Regional Concerns

Before the location of a pipeline corridor is determined, potential disruptions to the social and economic life of communities near it should be considered. Basic lifestyles of established communities should be maintained at least at their present level and the resources on which they depend should remain intact.

1. Lifestyles

Traditional lifestyles of small communites can easily be altered by the influx of a large temporary population as is the case when a pipeline is developed. Established income and recreational opportunities and the quality of social services, such as public health, might deteriorate. The cost of living would probably increase. If local people objected to the development and felt resentment towards temporary residents associated with the project, there could be a disruption of community life.

People who depended on natural resources for their livelihood such as trappers, outfitters and fishermen, might find their source of income disappearing if the pipeline were to affect fish and wildlife adversely.

2. Economy

In order to accommodate a large transient population, a community's public funds would be burdened in attempts to provide necessary utilities, housing, transportation, communication, administration and education services. Also, the increased size of the labour force could exceed the number of workers actually needed for pipeline construction, putting additional pressures on social and welfare community resources.

Pipeline development might give only a short-term boost to the local economy. It could prove disruptive of long-term stability in local business or industry; the market for local goods and services could fluctuate drastically and there could be a greater than normal turnover in local jobs because salaries would be better than the local economy could afford.

B. National and Provincial Concerns

1. Salmonid Enhancement

In the next five years, the federal government will spend up to $150 million in the Salmonid Enhancement Program. This program is intended to double the annual value of the commercial salmon catch and to greatly expand recreational fishing opportunities. Other freshwater game fish such as steelhead and cutthroat trout will also be affected. Included in the program are the construction of spawning channels, hatcheries and fishways and the rehabilitation of impaired natural habitats. Any adverse effects from the development of a pipeline corridor on any of these or on the fisheries resource itself would be directly contrary to the goals of the Salmonid Enhancement Program.

2. Archaeological and Historic Sites

Archaeological and historic sites are an important part of national and provincial heritage. As non-renewable resources, these sites could be permanently damaged by pipeline construction. Although there is an active program of archaeological inventorying taking place in British Columbia, the same cannot be said for historic sites.

Most of the sites thus far identified occur along natural corridors, lake shores and river banks. This obviously can conflict with pipeline development as pipelines follow the same paths. Further historic sites will probably be found on exploration and fur trade routes such as those along the Peace, Thompson and Fraser rivers.

3. Land Use and Land Status

Recreation

Areas of high recreational use and high potential for future use could be disturbed, by affecting either the fishery resource, water quality or the wilderness character of an area.

Access

There is general concern over the effects of increased access for people into previously inaccessible areas such as alpine meadows which are sensitive to trampling. There are potential impacts on fish and wildlife resources from increased user pressures.

Special land status

Agricultural Land Reserves, Ecological Reserves, Parks and Indian Reserves are protected by legislation and should be avoided by pipeline corridors. It should also be noted that

owing to the current issue of native land claims, there is the possibility of changes in Indian Reserve boundaries in the future.

Project-Related Concerns

A. Construction Activities

The following concerns relate to actual pipeline construction activities. These, at a minimum, should be investigated and their potential for impacts ascertained.

1. Wastes, Toxins, Noise and Air Pollution Concerns

Wastes - include landfills, sewage, hydrostatic and radiographic liquids, anti-corrosion liquids, pipecoating wastes and oils or greases. Problems could arise in their impact on health, groundwater, surface drainage, fish, wildlife and vegetation.

Toxins - include pesticides, herbicides and chronic toxic chemical releases at fuel storage areas. Concerns would include potential impacts on fish, wildlife, birds, vegetation and water quality.

Noise - includes blasting, equipment use and pumping stations. Difficulties could arise at certain times of the year in critical areas such as winter ranges and nesting areas.

Air Pollution - includes that from pumping stations and dustfall from blasting, construction work and burning of wastes. Concerns would arise where air pollution would affect health, wildlife and vegetation.

2. Direct Construction Concerns

a) access road construction and maintenance near watercourses, at temporary water crossings, on steep-sided slopes, and where blasting is required in prime waterfowl, fish and wildlife habitats.

b) right-of-way clearing and slash burning that would have impacts on stability of slopes, habitat, drainage or could create a fire hazard.

c) aggregate source location and mining that could affect habitat, slope stability, water quality, reclamation and aesthetics.

d) construction camp location that could affect habitat, water quality and available water supply.

3. Education, Contingency and Restoration Plans Concerns

a) the adequacy of education programs to inform construction personnel of problems and how to overcome them.

b) the flexibility, reliability and adequacy of contingency plans for accidental spills, fires (especially during the dry season) and unexpected engineering difficulties.

c) the adequacy and efficiency of plans for reclamation, revegetation and erosion prevention.

B. Monitoring of Pipeline Activities

This is of considerable importance, as it is generally felt that many pipeline problems can be reduced through an effective and cooperative environmental monitoring program. Monitoring should commence with pre-construction activities and continue into the maintenance phase to ensure that environmental design specifications are adhered to. Documentation and assessment of the efficiency of these specifications are required in order to verify and improve predictions of environmental impact. The knowledge thus gained can be applied to future pipeline projects and may indicate areas where constraints could be eased or more rigidly applied.

C. Oil Spill Impacts and Cleanup Technology

The concern here is obvious, for if one must accept the statistical probabilities of oil spills during the life of a pipeline, then one must know how effectively spill impacts can be mitigated.

1. Aquatic Spills (rivers, lakes)

Movement of a spill in a river is determined largely by currents and, in some cases, by wind. Therefore, accurate and reliable information on currents must be available to predict the direction and speed of a spill. Present cleanup technology requires the spill to be contained early and near shore, mostly through the use of booms. Once oil has moved into fast-moving or turbulent waters, effectiveness of recovery is minimal.

Movement of spills in a small lake is determined by the current between the inlet and outlet drainages. In a larger lake, it would be more wind-influenced. Accurate knowledge of lake current and wind information would therefore be needed. Present technology includes primarily the use of booms for oil containment and pumps or skimmers for removal. Oil originating outside a lake system on the inlet drainage would have to be contained before reaching the outlet. Critical problems could arise if the oil spill flowed into an ice-covered lake.

Hydrocarbon saturation from a direct oil spill into a water body is determined by the number of soluble compounds in the crude. Its impacts tend to be dependent on concentrations of toxic substances that enter the water body. Generally, the highly toxic substances are the most soluble. In rivers, islands, bars and areas subject to eddies or back-currents are highly susceptible to oil spills, while in lakes, deltas, sheltered bays, inlets and shorelines are the most vulnerable.

Research on the effects of dissolved oil compounds on freshwater fish, plants and animals is still largely lacking.

2. Land Spills

The movement of oil on land is dependent on slope, viscosity of the crude oil and absorbency of the ground around a spill. Present cleanup technology is either by fire, soil dyke or pumping.

Fire is generally used to burn off surface accumulations, leaving the subsurface relatively unaffected. Fire also brings with it the hazards of air pollution and the release of toxic gases plus the risk of spreading during the dry season. Presently, there is little detailed knowledge of the full consequences to the environment of burning oil.

Soil dykes are used on slopes or when oil is flowing toward a water course. The oil behind the dyke is pumped and removed to storage facilities.

Besides the above, pumping is also used in areas of high water tables such as bogs. The spill is contained so that water and oil may be pumped into a separation facility.

The drawbacks of the last two methods are that they require some specialized equipment to be available on short notice. The reliability of such methods for a long pipeline is therefore questionable.

Vegetation, ground-dwelling wildlife (burrowers) and some birds would be affected most by a spill on land. Perhaps potentially more critical would be the contamination of subsurface water and its subsequent flow into watercourses.

Currently, the detailed effects of crude oil spills on non-Arctic plants and animals are largely unknown.

D. Tank Farm Facilities

These facilities create their own special concerns:

Space - The size of a tank farm is dependent on required storage capacity. Concerns arise where such space is at a premium or is highly valued for other uses such as agriculture.

Access - Where a selected area does not have adequate access, there are concerns relating to the impacts of providing that access.

Servicing - Considerable environmental concerns would appear if a selected area did not have the capability to handle the large electrical, water and waste demands of a tank farm and its related facilities.

Environmental - Tank farms may pose problems of air pollution, terrain disruption (to provide soil dykes around tanks) and potential water quality impacts.

Natural hazards - A tank farm situated in an area susceptible to natural hazards could be of concern, e.g., siting on an area of high water table, potential earthquake, slope instability or flooding potential.

IV.2 ENVIRONMENTAL CONCERNS PERTINENT TO SPECIFIC PIPELINE CORRIDORS AND TERMINALS

This section reviews the environmental concerns related to the various pipeline corridor and terminal alternatives outlined and mapped in Chapter 6 of Volume I. There are three parts to the section: the first reviews the assumptions and limitations of each environmental parameter; the second provides details on the concerns specific to each prospective pipeline corridor; and the third reviews environmental considerations at the various marine terminal sites.

Assumptions and Limitations of Selected Environmental Parameters

This report has considered only those marine terminal sites on the British Columbia coast that would have associated pipelines crossing the province. American ports and the port at Esquimalt on Vancouver Island were not reviewed. As well, the pipeline corridor originating from Roberts Bank and Port Moody was not assessed as it was assumed that existing Trans Mountain Pipeline Company facilities could be used.

The corridor originating from Britannia Beach was reviewed only to Kamloops where it could join with an existing oil pipeline right-of-way up the North Thompson River Valley. The Bella Coola-South Corridor to Little Fort would also end where it intercepted the existing right-of-way.

In this sub-section, the environmental factors are divided into the following categories:

Physical
A. Terrain-Surficial Materials
B. Hydrology

Biological
C. Fisheries
    1. Anadromous
    2. Resident
D. Wildlife
    1. Ungulates
    2. Other
E. Wildfowl
    1. Game
        - Upland
        - Migratory (waterfowl)
    2. Other

Socio-economic
F. Recreation

G. Land Status
   1. Indian Reserves
   2. Agricultural Land Reserves
   3. Parks and Government Reserves
   4. Ecological Reserves
H. Land Use
I. Access

In detail, the scope and limitations of these parameters were as follows:

A. Terrain and Surficial Materials

The features used in outlining areas of potential concern included general terrain morphology, slope, width and shape of valleys, presence of exposed bedrock, soil depth to bedrock, type and stability of surficial material, sites of previous slides and slumps and seismic hazards. As an example, bedrock outcrops and shallow till over bedrock in a narrow, steep-sided, confined valley were noted as possible limitations for a pipeline, while steep slopes of glacio-lacustrine silts and clays or active floodplains could be of concern owing to their potential instability. No relative values or sensitivities were assigned to the various concerns: first, because only general alignments of corridors were considered; and second, because the level of information available for each corridor was inconsistent.

B. Hydrology

Potential hydrological concerns occur in areas of deep river scour, disrupted drainage, high water tables, floodplains and on river banks which are unstable due to active erosion or fine-textured surficial materials. Owing to lack of specific information, the identification of possible problem areas are simply identified as stream crossings and floodplains, i.e., stream crossings were considered to have potential problems of river scour, bank instability, etc.

C. Fisheries

1. Anadromous

Major salmon-producing streams parallelled or crossed by pipeline corridors were of potential concern. No relative values or sensitivities were assigned to these streams. Most streams supporting anadromous fish involve the federal Fisheries and Marine Service; thus, it was assumed that that Service could provide more comprehensive fisheries information as required.

2. Resident

Streams and lakes parallelled or crossed by pipeline corridors and which support major resident fish populations were

valued as important. The provincial Fish and Wildlife Branch would have more detailed information as required.

D. Wildlife

1. Ungulates

Very high capability areas indicated by Class 1, 1W or 2W, are lands which could provide winter range and year-round range with little or no limitations to ungulates. Winter ranges provide habitat on which animals from surrounding areas depend during a critical stage of their life cycle.

High capability areas are rated as Class 2 or 3W - lands which would provide slight to moderate limitations to ungulates (winter or summer).

Moderate to high capability indicated areas of Class 3 - lands of moderate limitations to ungulates.

Class 4 lands were not recorded, though in many areas they could be considered locally significant.

Data gaps existed specifically for the Bella Coola region.

2. Other Wildlife

Information on other wildlife species, e.g., bear, cougar, and their food species, was not collected. Some information on game species is available through the provincial Fish and Wildlife Branch.

E. Wildfowl

1. Game

a) Upland

Information on upland game species (pheasant, grouse, etc.) was not collected. The Fish and Wildlife Branch has information on such birds.

b) Migratory (waterfowl)

Waterfowl lands ranged from Class 1 - no significant limitations to the production of waterfowl to Class 3 - slight limitations. Class 3M lands are important as migration or wintering areas and were also included in the prime category.

Class 4 capabilites within the Coastal Mountains could be of local significance and were therefore deemed important.

No Canada Land Inventory (CLI) was available for the Bella Coola region.

2. Other Wildfowl

This includes raptors, passerines and other birds for which information was not collected. The federal Canadian Wildlife Service and the provincial Fish and Wildlife Branch may be able to provide information on such birds.

F. Recreation

Recreation lands in the "high" C.L.I. designation ranged from those having a very high natural capability to support intensive recreational activities to those with moderately high recreational capability.

Areas which offered concentrations of recreational facilities were also identified.

The Bella Coola region lacked CLI recreation capability information.

G. Land Status

The designations which follow represent areas of potential concern, which have been protected or reserved for specific uses by legislative or administrative means.

1. Indian Reserves

Because of the public issue of native land claims, there is the possibility that changes in Indian Reserve boundaries could occur in the future.

2. Agricultural Land Reserves

These land reserves were established by provincial legislation on the basis of highest capability agricultural lands in the province. They are administered by the B.C. Land Commission which controls their type of use.

3. Parks and Government Reserves

Parks are protected in varying degrees under provincial legislation.

Government reserves are generally established under provincial statute for a particular use (recreation, agriculture, etc.) to protect them from alienation until a specific use can be officially established.

4. Ecological Reserves

These reserves were established to protect special ecological areas of the province. At present about 80 have been officially declared. There are many others which have been proposed, but were not included in this review.

5. Others

This includes Forest Reserves, Tree Farm Licence Reserves, Watershed Reserves and archaeological sites.

Very little information was available for archaeological resources. Those archaeological sites which have been identified were noted as areas of potential concern. The lack of archaeological data was not considered critical because designated archaeological sites are protected by legislation under which pipeline companies would be required to report archaeological findings during construction.

H. Land Use

Very little up-to-date land use information was available for this overview. However, broad land use characteristics were identified where possible. Few were noted as areas of potential concern because:

- The major emphasis was on land status which to a large extent determines land use.
- Areas likely to be most affected would be high-use or capital-intensive areas; information on these was either not available or was too detailed for this review.
- It was assumed that existing utility corridors would be used through settled areas and, where not feasible, some form of negotiation and/or compromise would take place.

I. Access

Potential environmental concerns includes areas where either construction or upgrading of access routes would have to be undertaken. Particular problems would arise where severe terrain constraints or significant environmental values were present.

Potential Concerns of Specific Pipeline Corridors

The main sources of information for this section were the Canada Land Inventory (CLI) and the British Columbia Land Inventory (BCLI) for values on ungulates, waterfowl and recreation along each corridor. (The locations of the pipeline corridors in this study are shown in Figure 6.2.1 - Volume I.)

A. Terrain - Surficial Materials

SQUAMISH*-KAMLOOPS - Rugged terrain of Coast Mountains traversed via narrow, steep-sided valleys for 100+ miles; thinly mantled bedrock outcrops along corridor; potential instability on lowland terrain and lower end of Squamish Valley due to active floodplain and extensive alluvial fans.

* Subsequent to the completion of the major part of this report, Britannia Beach was substituted for Squamish as an alternate marine terminal site.

	- Fraser Valley north of Lillooet has steep, erosional river banks and terrace scarps. - Pavilion Valley is a narrow, confined, steep-sided corridor with talus slopes and rock outcrops. - North side of Kamloops Lake has frequent steep rock outcrops and fan deposits.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Rugged terrain of Coast Mountains is penetrated by narrow, steep-sided valleys for approximately 85 miles; shallow till over bedrock and frequent rock outcrops; potential instability of floodplain deposits and alluvial fans in lower Bella Coola Valley. - Interior Plateau region has organic deposits near lakes in Tatla Lake area. - Fraser Valley between Chilcotin and Riske River mouths is deeply incised, with steep valley sides. - North of Riske Creek, along Fraser River and in San Jose River Valley, glaciolacustrine deposits of Fraser Basin occur. - North Thompson Valley near Little Fort is deeply incised; river banks are steep.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Potential instability of floodplain deposits and alluvial fans in lower Bella Coola Valley; rugged terrain of Coast Mountains penetrated by narrow, steep-sided Bella Coola Valley; deposits of shallow till and exposed bedrock. - Potential instability in glaciolacustrine materials of Fraser Basin south of Prince George below 3000 feet elevation. - Potential instability when crossing steeply-sloping Fraser River banks. - West Road River and Chilako River valleys east of Telegraph Ranges are within Fraser Basin; glaciolacustrine deposits.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Shallow till over bedrock with slide potential in mountainous terrain on Tsimpsean Peninsula; floodplain and alluvial fan deposits in Skeena Valley and Kitimat Valley bottom-lands; potentially unstable marine clay sediments in lower Kitimat Valley; rugged terrain of Coast and Hazelton mountains is traversed via narrow, steep-sided valleys for approximately 115 miles along Skeena Valley and about 70 miles via Zymoetz-Telkwa route; shallow colluvium and frequent bedrock exposures; slide hazards along route through Hazelton Mountains. - Potential instability of glaciolacustrine deposits along Endako River and Fraser Lake, along Nechako and Chilako rivers and at crossing of entrenched Fraser River north and south of Prince George, and Salmon River. - Kitimat-Prince Rupert area is in a seismic zone of high risk.
PRINCE GEORGE - B.C./ALTA. BORDER	- Potential instability of glaciolacustrine materials in Fraser Basin, particularly at stream crossings of entrenched Fraser and Salmon rivers and some of their deeply incised tributaries.

- Potential instability of floodplain and fan deposits in Rocky Mountain Trench.
- Potential instability of glaciolacustrine materials around Sinclair Mills and from McKale River to south of Raush Valley in Rocky Mountain Trench.
- Fraser Valley east of Tete Jaune Cache is narrow and restricted with steep valley sides and shallow till over bedrock and exposed bedrock.
- Organic deposits in Moxley Creek area of Trench.

B. Hydrology

SQUAMISH-KAMLOOPS	- All stream crossings are of concern. - Squamish-Cheakamus Rivers have flood and rechannelling potential. - Corridor parallels Fraser River for approximately 20 miles and the Thompson River for approximately 50 miles.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- All stream crossings of concern. - Crosses Fraser River between Chilcotin River mouth and Williams Lake. - Corridor parallels Bella Coola River for approximately 60 miles.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Stream crossings, especially in glaciolacustrine and fan deposits, are of importance. - Crosses Fraser River between West Road River mouth and Prince George.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Flashflood potential due to heavy precipitation. - Flood potential of the Skeena, Zymoetz and Telkwa rivers. - All stream crossings of concern. - Bulkley, Endako and Nechako rivers are parallel most of their length. - Prince George - Hazelton alternative follows Skeena River for approximately 180 miles.
PRINCE GEORGE-ALTA. BORDER	- Stream crossings, especially in glaciolacustrine deposits, warrant attention.

C.1 Fisheries - Anadromous

SQUAMISH-KAMLOOPS CORRIDOR	- Squamish and Cheakamus rivers support valuable salmon populations. - Fraser River is an extremely valuable salmon migration route. - Thompson River has valuable salmon spawning runs. - Corridor parallels the Fraser River for 20 miles and the Thompson River for 50 miles. - Other anadromous fish spawning streams are Stawamus and Mamquam rivers near Squamish, Lillooet and Green rivers at Pemberton, Birkenhead River, Gates River, Seton Lake and River, Bonaparte and Deadman rivers-tributaries of the Thompson River.

BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Bella Coola, Necleetsconnay and Dean rivers support valuable salmon spawning populations. - Fraser River is an extremely valuable salmon migration stream. - Chilcotin and Chilko rivers support anadromous fish populations. - North Thompson River is valuable salmon spawning stream.
BELLA COOLA-PRINCE GEORGE (NORTH (CORRIDOR)	- Bella Coola, Necleetsconnay and Dean rivers support anadromous fish populations. - West Road and Chilako rivers have salmon runs. - Corridor crosses Fraser River somewhere between West River mouth and Prince George. - Fraser River is an extremely valuable salmon migration stream.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Skeena River system supports extremely valuable spawning salmon populations. - Kitimat, Bulkley, Endako, Stellako, Nechako and Chilako rivers support large anadromous fish populations. - Stuart and Salmon rivers have anadromous fish runs.
PRINCE GEORGE-ALBERTA BORDER	- Fraser River is an extremely valuable salmon migration route; upstream of Raush Valley, Fraser River also supports spawning salmon. - Willow, McGregor and Bowron rivers support anadromous fish runs. - In Rocky Mountain Trench, Slim Creek, Torpy, Markill, Goat, Fleet, McKale, Dore, Holmes and McLennan rivers support spawning salmon populations.

C.2 Fisheries - Resident

SQUAMISH-KAMLOOPS	- High resident fish values in the Squamish, Cheakamus and Gates rivers. - Cayoosh and Horlick creeks support resident fish. - Important resident fish populations on the Fraser, Pavilion, Bonaparte, North Thompson, Deadman and Tranquille rivers. - Hat Creek has important stocks. - Pavilion, Crown, Turquoise and McLean lakes are stocked. - North Thompson River is also stocked.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- All tributaries of the Bella Coola and Atnarko rivers have important resident fish populations. - Hotnarko Lake has potential residential fisheries. - Kappan, Anahim and Nimpo lakes have extremely important resident fisheries. - Chancellor, One Eye, Tatla lakes and area - extremely important. - Chilcotin-Chilko River systems - extremely important resident fisheries. - Williams, Chimney and Lac La Hache lakes - extremely important.

- All of Bridge Creek to Roe Lake - important resident fish populations.
- Judson, Deka, O'Neil and Fawn creeks - important fisheries populations.
- Bridge-Sheridan Lakes and other lakes of the area are stocked or have a potential fishery.
- Dog Creek - extremely important.
- Rhinetta and Eakin creeks and tributaries have potential fisheries or resident fish populations.

BELLA COOLA-PRINCE GEORGE (NORTH (CORRIDOR)
- Young Creek has resident fish populations.
- Dean River and tributaries have important resident fish populations.
- Whole of West Road River system - extremely important.
- Fraser River to Prince George - extremely important.

PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE
- Skeena and Kitimat rivers and tributaries - very important resident fisheries.
- Lakelse Lake and creeks running into it - important resident fish populations.
- Valuable resident fishery in the Bulkley, Morice and Endako rivers.
- Decker Lakes - extremely important.
- Burns Lake has resident fish populations.
- Stellako River - important rearing area for resident fish.
- Nechako River and its tributaries - very important resident fisheries.
- Fraser River - extremely important resident fish populations.

PRINCE GEORGE-ALBERTA BORDER
- Tabor Lake and Creek - important resident fishery.
- Salmon, Willow and associated streams - very important resident fish populations.
- Bowron River has significant resident stocks.
- Resident fish populations around Dome Creek area.
- Fraser River throughout the Rocky Mountain Trench has significant resident fish populations.
- Moose and Yellowhead lakes support resident fish populations.
- Little information available on smaller rivers and streams throughout this corridor.

D.1 Wildlife - Ungulates (Moose, Deer, Caribou, Elk, Sheep, Goats)

SQUAMISH-KAMLOOPS CORRIDOR
- Moderate capability ungulate range near Squamish.
- Moderate and high capabilities around Pemberton, the west and north shore of Seton Lake and the north shore of Duffy Lake.
- Small areas of high capability on Cayoosh Creek near Lillooet.
- High capability at high elevations along Hat Creek and the Bonaparte River to Cache Creek (valley bottoms are of moderate capability).

- High to very high capability at higher elevations south of the C.P. railroad tracks near Kamloops.
- Small areas of high to very high capability east of Cache Creek.
- Extensive very high capability (with lesser high capability of areas along north side of Kamloops Lake).
- Moderate capability from east Kamloops Lake to Kamloops.

BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)

- Narrow band (valley bottom) high capability along the Atnarko River (very high capability southwest of Hotnarko Lake).
- High capability around the shores of Anahim and Nimpo lakes with moderate capability between them.
- Very high capability areas east of McClinchy Creek and south of Towdystan.
- High capability to Kleena Kleene.
- Valley bottoms from One Eye Lake, along Tatla Lakes and the Chilanko River, support very high capability ungulate ranges.
- Extensive very high capability along the Chilcotin and Chilanko River valleys to Hanceville.
- Higher elevations of the above two support high and moderate capability ranges.
- From Hanceville to the Fraser River, the Chilcotin River Valley has high capability.
- Fairly extensive area of very high capability west of and to Alkali Creek mouth.
- High capability ranges at locations along the Fraser River between Alkali Creek mouth and Chimney Creek.
- Extensive high and moderate capabilities around Williams Lake and Chimney and Alkali creeks.
- Very extensive high capability areas along corridor through the Sheridan-Bridge-Lac des Roches systems (small area of very high capability east of Roe Lake).

BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)

- Band of high capability ungulate range following the valley bottom of the Dean River.
- Small area of very high capability east of Johnny Lake.
- High capability around Tatelkuz Lake (very high along the Chedakuz Creek mouth).
- Very high capability along the valley bottom of the Chilako River to Prince George (areas of high capability on the upper levels of east shore south of Mud River).
- Extensive area of very high to high capability around the confluences of the West Road, Euchiniko and Nazko rivers (includes Euchiniko Lakes).
- Very high capability around Pantage Lake, while West Road River to Tako Creek has high capability.
- West Road River to Fraser River to Prince George has a continuous band of very high to high capability ranges.
- Extensive moderate to high capabilities around Prince George.

PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- High capability area from Alastair Lake to the Skeena River. - High capability ungulate areas on both banks of the Skeena to Hazelton, then the length of the Bulkley River Valley to Fort Fraser. - Very high capabilities east of Tyhee Lake and Walcott. - High capability ranges on the Zymoetz and Lower Telkwa valleys including Limonite Creek. - High capability in narrow bands along the Nechako, Stuart and Salmon rivers. - Moderate to high capability between Fort Fraser and Salmon Valley (extensive).
PRINCE GEORGE-ALBERTA BORDER	- Narrow band of high capability along the Fraser River east of Summit Lake to Sinclair Mills. - Moderate to high capability along Aleza Lake and the Upper Fraser. - Moderate capability along the lower Willow River; Bowron River has a narrow band of high capability. - The Rocky Mountain Trench to Dome Creek has moderate to high capability along the Fraser River. - Dome Creek to Yellowhead Pass - a fairly wide band along the course of the river (more extensive on the east side). - Small area of very high capability from Moose Lake to the Alberta border.

D.2. Wildlife - Other

Information not collected.

E.1 Wildfowl - Game (upland/migratory)

Upland game bird information not collected.

Migratory game birds (waterfowl)

SQUAMISH-KAMLOOPS CORRIDOR	- Prime waterfowl wintering capability on Squamish estuary. - Prime waterfowl migration/staging area along upper Hat Creek bottomlands (Finney Lake and Creek). - Prime migration/staging area along Thompson River east of Kamloops Lake.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Prime migration/staging area in Anahim Lakes system of Dean River. - Small prime areas in Tatla Lake system and on small lakes in middle portion of Chilcotin Valley. - Large prime area northeast of Riske Creek. - Prime capability on small lakes in Chimney Lake area and along San Jose River.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	Prime migration/staging area in Anahim Lakes area of Dean River. - Prime migration/staging capability around Pelican Lake in Euchiniko River system.

PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Small areas of prime waterfowl migration/staging capability at mouths of rivers flowing into lower Skeena River, on Kitimat estuary and around Lakelse Lake. - Small prime area in Nechako Valley east of Vanderhoof and on Swamp Lake northwest of Prince George.
PRINCE GEORGE - ALBERTA BORDER	- No prime waterfowl capabilities along this corridor.

E.2 Wildfowl - Other

Information not collected.

F. Recreation

SQUAMISH-KAMLOOPS CORRIDOR	- Small areas of high capability on valley bottom lands adjacent to lakes and river mouths from Squamish to Lillooet. - Squamish delta has several boating facilities. - Squamish to Lillooet has several campsites and prime areas, as well as boating facilities (especially on Seton Lake). - Very important skiing and resort area near Alta Lake. - Brohm, Stanley and Green lakes have high recreational values. - Small high capability areas at mouths of rivers entering the Fraser north of Lillooet and along lakeshores in Pavilion and Thompson valleys. - Several camping, picnic and boating facilities, especially at Pavilion and Kamloops lakes.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Anahim and Nimpo lakes have several camping and boating facilities. - High capability recreational areas along lower Big Creek and from its mouth, along the Chilcotin to the Fraser River. - High values along lakeshores in the San Jose River system and the Bridge Creek system. - Camping, picnicking and boating facilities at Williams Lake. - Ski hill to the south of Williams Lake. - Lac La Hache, 108 Mile, 103 Mile, 100 Mile House, Horse, Sheridan, Lesser Fish and Bridge lakes have extensive camping and boating facilities. - Ski hill at 100 Mile House. - Sheridan-Bridge Lake area very high recreational fishery.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- High capability along Dean River and shores of the larger lakes. - High capability along Tsacha Lake in the West Road River Valley. - High capability near the West Road River mouth.

PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- High capability along shoreline near Port Simpson and Lakelse Lake. - Rainbow Lake ski hill. - Camping, picnicking and boating facilities at Exchamsiks River and Lakelse Lake. - Complex of high/moderate capabilities on east Ridley Island, Kitsunkalum and Zymoetz River mouths, and the lower Lakelse and Kitimat rivers. - High capability along the Skeena and Bulkley rivers near Hazelton and in Bulkley Valley from Smithers to Morice River. - Camping, picnicking and some boating facilities along the Skeena and Bulkley River valleys. - High capabilities along Bulkley Lake and along sections of Decker, Burns, Tchesinkut and Fraser lakes. - The latter three lakes have boating, camping and picnicking facilities. - High capability around Cobb, Cluculz and Bednesti lakes in the Nechako system and the lakes northwest of Prince George. - Boating and picnicking facilities at Cluculz and Bednesti lakes.
PRINCE GEORGE-ALBERTA BORDER	- Large areas of high recreation capability around Tabor, Purden and Ste. Marie lakes. - Ski hill at Tabor Lake and boating facilities at Purden Lake. - Small high capability areas at confluences of Fraser and Robson rivers, along Robson Valley and at Yellowhead Lake. - Camping and boating facilities at Moose Lake and Robson River.

G. Land Status

1. Indian Reserves

SQUAMISH-KAMLOOPS CORRIDOR	- Indian Reserves (IR's) at the confluence of the Squamish and Cheakamus rivers. - Large reserve west of Lillooet Lake and the west end of Seton Lake. - Numerous small reserves in the Fraser Valley near Lillooet. - Several large IR's in the Pavilion, Lower Hat Creek and Bonaparte valleys. - Large IR at the confluence of the Deadman and Thompson rivers. - IR in the Medicine Creek corridor.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Large IR at the mouth of the Bella Coola River. - Two large IR's plus several smaller ones in the Alexis Creek area. - Large IR at Riske Creek. - Numerous small IR's northeast of Alkali Lake. - Large IR east of Williams Lake.

BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Large IR at the mouth of the Bella Coola River. - Series of small IR's in the Dean River Valley. - Series of small IR's along lakes in western portion of West Road River Valley plus small reserve near its mouth.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Very large IR on the Tsimpsean Peninsula south of Port Simpson. - Large IR at the mouth of Kitimat River. - Very small IR along the Skeena River. - Large IR at mouth of the Kitwanga River. - IR's along the Bulkley River south of Moricetown. - Small IR along Fraser River north of Prince George.
PRINCE GEORGE-ALBERTA BORDER	- Small IR's north of Prince George.

2. Agricultural Land Reserves

SQUAMISH-KAMLOOPS CORRIDOR	- Agricultural Land Reserves (ALR's) on small areas in the Squamish River delta to Brackendale. - ALR's on the Cheakamus River and along the Gates River to Anderson Lake. - ALR between Anderson and Seton lakes. - ALR's north and east of Lillooet. - Extensive ALR's in the upper and lower Hat Creek Valley and along the Bonaparte River. - Extensive ALR's in the Thompson Valley west of Kamloops.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- ALR's almost continuously from Bella Coola River to the lower Atnarko River Valley. - Very extensive ALR's in the Chilcotin-Chilko-Alexis Creek area, along the Chilcotin bottomlands, in the Big Creek and Riske Creek areas and on the Fraser Valley terraces. - Very extensive ALR's on the Fraser Plateau east of the Fraser River, on uplands around Williams Lake and in the Bridge Creek drainage. - ALR's along the San Jose River, Dog Creek and on the North Thompson terraces around Little Fort.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- ALR's almost continuously from Bella Coola River to the lower Atnarko River Valley. - No ALR designations along the Dean or West Road River drainages. - ALR's in the Chilako River Valley. - ALR's in the Fraser River Basin extending north from Hixon to Prince George. - Large ALR in the Beaverley Creek area east of the Chilako River.

PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- ALR's at intervals along Skeena River bottomlands to Hazelton. - ALR's around Kitimat. - ALR's around Lakelse Lake and River. - Continuous ALR on the Bulkley River bottomlands, extensive at Smithers and Round Lake. - ALR's at intervals along the Endako Valley. - Wide band of ALR from Fraser Lake to Prince George in the Nechako Valley. - ALR along the Stuart River lowlands.
PRINCE GEORGE-ALBERTA BORDER	- Large areas of ALR's throughout the Fraser Basin, including the uplands of the Fraser and Willow River valleys. - Continuous ALR's of the Fraser River lowlands throughout the Rocky Mountain Trench to Tete Jaune Cache. - ALR along Fraser River near its confluence with the Robson River.

3. Parks and Government Reserves

SQUAMISH-KAMLOOPS CORRIDOR	- Provincial Parks at Alice Lake, Brandywine Falls, around Alta Lake, Nairn Falls, Pemberton, Pavilion Lake and Savona.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Tweedsmuir Provincial Park. - Government Reserves on the north and south ends of Nimpo Lake. - Government Reserves west of Chilanko Forks. - Government Reserves along both banks of Chilcotin River to its confluence with the Fraser River. - Extensive Government Reserve on both banks of the Fraser River from confluence with Chilcotin north to part of Williams Lake River. - Cariboo Nature Park and Lac La Hache Park northwest of Lac La Hache. - Government Reserve on southwest shore of Horse Lake. - Three Government Reserves on Sheridan Lake and three on Bridge Lake. - Bridge Lake Centennial Park and Bridge Lake Park. - Government Reserve on the northeast shore of Lac des Roches.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Tweedsmuir Provincial Park.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Large Government Reserve around Prudhomme Lake. - Parks at Prudhomme and Lakelse lakes. - Park at Seeley Lake. - Government Reserve on Bunker Creek and just north of Moricetown at Graphite Creek. - Park at MacClure Lake. - Government Reserve at Rose Lake.

	- Park on southeast shore of Fraser Lake. - Government Reserve between Drywilliam and Fraser lakes. - Park at Buck Lake. - Parks at Bednesti and Cluculz lakes. - Small parks on the outskirts of Prince George.
PRINCE GEORGE-ALBERTA BORDER	- Government Reserves on Purden Lake. - Government Reserve on Fraser River north of Loos in the Rocky Mountain Trench. - Two parks around McBride. - Mount Robson Provincial Park.

4. Ecological Reserves

SQUAMISH-KAMLOOPS CORRIDOR	- Baynes Island on Squamish River. - Three miles northwest of Tranquille.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Ten miles south of Williams Lake.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Vicinity of Far Mountain. - Between the Coglistiko and Brezaeko rivers.
PORT SIMPSON/PRINCE RUPERT/KITIMAT-PRINCE GEORGE	- Skeena River near the Exchamsiks River. - Drywilliam Lake near Fraser Lake. - Nechako River.
PRINCE GEORGE-ALBERTA BORDER	- Sunbeam Creek, north of McBride.

5. Others

SQUAMISH-KAMLOOPS CORRIDOR	- Unknown.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Military Training Area (26,000 acres) north of Riske Creek. - Archaeological sites extremely frequent in Cariboo region, particularly along the Fraser River.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Tree Farm Licence Reserve in the Fraser Valley area near confuence of West Road River. - No archaeological sites data.

PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Watershed Reserve around Woodworth Lake northeast of Prince Rupert. - Skeena and Smithers Forest Reserves. - Tree Farm Licence Reserves on the Kitsumkalum and Kitimat River basins. - Tree Farm Licence Reserve on the Fraser Valley north of Prince George. - Numerous archaeological sites in Port Simpson area. - A few archaeological sites on Ridley Island and at Kitimat. - Major archaeological sites at the confluence of the Bulkley and Telkwa rivers and in the Quick-Deep Creek area of Bulkley Valley. - High density archaeological area in the lower Stellako Valley. - Sites in Cluculz Creek area of Nechako Valley. - Bird sanctuary at Vanderhoof.
PRINCE GEORGE-ALBERTA BORDER	- Tree Farm Licence Reserve in the Fraser Valley north of Prince George. - Archaeological sites in the Willow River Valley and in the McBride area of the Fraser Valley.

H. Landuse

SQUAMISH-KAMLOOPS CORRIDOR	- Harbour uses on the Squamish delta. - Primary land use is forest utilization and related processing. - Settlements are confined to valley lowlands through the Coast Mountain region. - Agricultural uses along North Thompson River and Kamloops Lake.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Primarily agriculture (grazing) and forestry. - Settlements in valley bottoms.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Some forestry. - Few settlements.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- Port uses at Prince Rupert. - Aluminum smelter and pulp mill at Kitimat. - Primarily forestry (more intensive around Prince George) with agriculture of local significance. - Mining at Endako. - Settlements along major river and lake systems.
PRINCE GEORGE-ALBERTA BORDER	- Settlements along valley bottoms. - Some agriculture of local significance.

I. Access

SQUAMISH-KAMLOOPS CORRIDOR	- Gravel roads through Coast Mountains at Birkenhead, Seton River and Cayoosh Creek valleys may require improvements. - No access road along Seton Lake to Lillooet, but a rail line runs along this section. - Gravel road along Hat Creek-Medicine Creek corridor may require improvements.
BELLA COOLA-LITTLE FORT (SOUTH CORRIDOR)	- Gravel road through Coast Mountains, along Bella Coola, Atnarko and Young valleys may require upgrading, particularly as no rail line exists to the Interior. - No adequate road access along upper Atnarko and Hotnarko River valleys. - No adequate road access in upper Chilanko River Valley. - Gravel roads in Tatla Lake and Chilcotin River valleys may require upgrading. - Gravel roads along Alkali/Dog Creek may need improvements. - Gravel roads between 100 Mile House and Little Fort may require upgrading.
BELLA COOLA-PRINCE GEORGE (NORTH CORRIDOR)	- Narrow, winding gravel road through Coast Mountains could need improvements. No adequate road access in upper Atnarko and Hotnarko River valleys - no rail link with Interior. - No adequate road access in Upper Dean River Valley and most of West Road River Valley. - No roads along Fawnie Creek corridor through Fawnie and Nechako ranges to Euchiniko River Valley.
PORT SIMPSON/ PRINCE RUPERT/ KITIMAT-PRINCE GEORGE	- No road exists along Tsimpsean Peninsula between Prince Rupert and Port Simpson. - No roads exist in Williams Creek or upper Telkwa River valleys and no adequate road exists in Zymoetz or Kitseguecla River valleys; however, there is a gas pipeline right-of-way through Zymoetz, Limonite and Telkwa valleys. - Inadequate road access through Nukko Lake system northwest of Prince George.
PRINCE GEORGE-ALBERTA BORDER	- Gravel roads and trails through upland extension of Quesnel Highlands, east of Fraser River, provide inadequate access.

Review of Environmental Considerations at Marine Terminal Sites

Environmental information in this sub-section is presented for the general upland area surrounding each marine terminal site associated with a selected pipeline corridor. Although only 150 acres (approximately) are required for a marine terminal (including storage tanks and associated facilities), it is conceivable that with service

roads and associated stimulated developments, the upland area affected could be more extensive.

Several terminal sites have been excluded (Port Moody, Esquimalt, Cherry Point, Burrows Bay and Port Angeles) either because they are not on Canadian soil, because they already have existing facilities or because they would act as transshipment points with different design characteristics.

Port Simpson

Port Simpson is a small Indian community of approximately 1,200 people situated at the north end of Tsimpsean Peninsula in the Hecate Lowland. The topography on the east side of Port Simpson harbour, where land could be available for a dock site and tank farm, rises gently to an elevation of 800 feet. Ridges and swales are characteristic of the micro-topography of the area. Bedrock is overlain by colluvium, which is generally less than five feet thick. Pockets of organic deposits greater than five feet thick are found further inland. Soils are primarily podzols, with lithic fibrisols overlying the areas of organic substrate.

Coastal forest species of western hemlock, western red cedar and amabilis fir are largely non-merchantable, although pockets of commercial timber can be found.

A small stream, Stumaun Creek, which flows into the head of Port Simpson harbour, supports a small salmon population. Stumaun estuary and some of the shore flats are significant waterfowl migration and wintering areas; upland areas have no waterfowl capability.

There are no significant ungulate or agricultural capabilities in the upland area. Shorelines have a moderately high capability for outdoor recreation, while further upland capabilities are moderate.

Numerous archaeological sites have been discovered on the northern end of Tsimpsean Peninsula, particularly in the Port Simpson area.

No roads or railways connect Port Simpson to other communities on the Peninsula. Rail access from Prince Rupert would require approximately 35 miles of rail line along the steep western slopes of Work Channel. A road connecting Prince Rupert to Port Simpson would require about 19 miles of construction along the centre of Tsimpsean Peninsula.

Ridley Island

Ridley Island, situated to the south of Kaien Island and immediately east of Port Edward, is approximately two miles long and one mile wide. There appears to be sufficient suitable land for a dock site and tank farm on its western side. Ridley Island has relatively low relief with a microtopography of ridges and swales. Bedrock, where it is not exposed, is overlain by colluvium less than five feet thick and pockets of thicker organic deposits. Surface and internal drainage towards the interior of the Island is imperfect to poor.

Coastal forest vegetation predominates with coastal muskeg occurring on wetter sites further inland. The major tree species are western red cedar and lodgepole pine; timber is generally non-merchantable.

Canada Land Inventory information indicates that there is no capability for waterfowl production on the Island. No agricultural capability exists and ungulate capability is moderate. The deer population is locally significant.

Two archaeological sites have been discovered on the northwestern side of the Island.

Ridley Island is vacant Crown land; there are no communities, utilities or services. However, a pipeline from a pulpmill on Watson Island runs across the northern tip of Ridley to discharge effluent into the outer channel. Rail access to the Island could be extended from an existing rail line on Kaien Island.

Kitimat

Kitimat, a town of 13,000 people, is situated at the mouth of Kitimat River which flows into the Kitimat Arm of Douglas Channel. The gently sloping river delta is confined by mountainous terrain rising steeply from the valley bottom. Surficial materials are primarily alluvial deposits underlain by glacio-marine sediments. The limited soils information indicates that shallow sand and gravel soils underlain by soft clay are predominant in the delta region. High water tables are common.

The major forest species in this part of the Coastal Western Hemlock zone are: western hemlock and amabilis fir on well-drained sites, western red cedar in areas with high water tables and sitka spruce on alluvial soils. Much of the mature timber at low elevations has been logged; exceptions are on very wet sites and along streams.

Agricultural capabilities in the area range from Class 5 with severe limitations that restrict production, to perennial forage crops and to Class 7 with no capability for arable culture or permanent pasture. Major limitations are excess water and stoniness. Most Class 5 lands could improve to a higher class with drainage.

Agricultural Land Reserves are located along the south side of Hirsch Creek and along the east side of Kitimat River north of the municipal boundary.

Lands in the Kitimat area have a limited capability to support ungulates. The Kitimat River estuary is a prime waterfowl migration and wintering area; no capability for waterfowl exists further upland.

The Kitimat River and its tributaries, Anderson and Hirsch creeks and Little Wedeene and Wedeene rivers, support important salmon spawning populations. The Kitimat River estuary provides a rearing area critical to the life cycle of five species of salmon.

The Kitimat River delta has a mixture of moderately high to moderate outdoor recreation capability ratings under the Canada Land Inventory. Further inland, recreation capabilities are moderately low.

An archaeological site has been discovered near the mouth of Kitimat River and other findings are considered possible.

An Indian Reserve of approximately 370 acres is located on the east bank of Kitimat River near its mouth. A Tree Farm Licence Reserve encompasses the entire area.

Major industrial activities include an aluminum smelter, pulp mill and dock facilities, located on the west side of Kitimat River delta, while a railway and major paved highway connect Kitimat to the Interior.

Bella Coola

Bella Coola is a community of approximately 2,300 people situated at the mouth of the Bella Coola River which drains into North Bentinck Arm at the head of an eighty-mile-long fiord. The Bella Coola and Necleetsconnay rivers meet to form a gently sloping delta which is confined by steep mountainous terrain. Suitable sites for a marine terminal can be found on the level terrain in the delta.

Surficial deposits are primarily alluvial sediments on the river bottomlands with glacial till predominant at higher elevations. No soils information is available.

In this Coastal Western Hemlock zone, a heavy cover of Douglas fir, western hemlock and western red cedar predominates. Red alder and broadleaf maple are abundant in logged areas, while black cottonwood and sitka spruce occur primarily on alluvial soils.

No Canada Land Inventory information exists for ungulates, waterfowl or recreation and no agricultural capability information was available for use in this review. However, almost all the land on the Bella Coola River delta outside the municipal boundary has been placed in an Agricultural Land Reserve.

There is potential for archaeological resources in the Bella Coola area.

Forestry and farming are the primary landuses; there are no significant industrial activities. A secondary gravel road connects Bella Coola to the Interior, but owing to narrow, winding road conditions in some areas, traffic restrictions are in effect. The area does not have a rail link.

Britannia Beach

Britannia is a small community of about 800 people and is situated on the eastern shore of Howe Sound approximately 10 miles south of Squamish. The topography in the vicinity of Britannia Creek, which

drains the area, is relatively flat to moderately sloping. A very short distance further inland, slopes rise precipitously. The amount of suitable land available for a marine terminal is limited.

Surficial materials consist of alluvial deposits on Britannia Creek's small deltaic fan and glacial outwash deposits on the remaining level land. Slump-prone areas occur on the steep upland slopes. Soils are predominantly podzols.

The area has been highly disturbed and thus upland vegetation is minimal.

The Canada Land Inventory indicates moderate limitations to the production of ungulates. There are no agricultural or waterfowl capabilities. Lands in the vicinity of Britannia Beach have a moderate capability for outdoor recreation.

Land use has been dominated by a now-closed copper mine operation, and a large, active gravel-pit operation. The area is served by a major paved highway and railway.

Roberts Bank

Roberts Bank is located at the western edge of the Fraser River delta (bordering on the Strait of Georgia) and is bounded in the north by the south arm of the Fraser River and in the south by the Point Roberts uplands. It lies within the District Municipality of Delta.

It is low-lying with a flat to gently undulating surface. Micro-relief is provided by sloughs and man-made drainage ditches and dykes. Surficial materials are a mixture of medium to moderately fine-textured marine and alluvial deltaic deposits. These deposits, over 50 feet thick, are poorly drained with high water tables. Soils have approximately four-foot profiles and are classed as gleysols which are known for their instability during seismic shocks. Because of extensive alteration of the area by agricultural development, native vegetation in the upland area is minimal. There is, however, a limited distribution of various broadleaf trees including cottonwood, alder, willow and broadleaf maple.

Ungulate capabilities in the vicinity of Roberts Bank are insignificant. Very small intertidal streams which are important sources of nutrients for the Roberts Bank salt marshes (a critical fish and waterfowl feeding ground) originate in the upland area. The Canada Land Inventory has rated the entire area as a significant waterfowl migration and wintering area. A 700-acre waterfowl sanctuary is situated on the northwestern portion of Westham Island.

Westham Island and a parcel of land adjoining Canoe Pass have Class 1 capabilities for agriculture (no significant limitations to crop production). Classes 2 and 3, which are predominant in the remainder of the Roberts Bank uplands, have slight to moderate limitations due to excess water. Pockets of Class 4 land (severe limitations for crop production) are scattered throughout. The entire Roberts Bank area is within the provincial Agricultural Land Reserve.

Under the Canada Land Inventory classification, the shoreline area has a high capability for outdoor recreation, while further upland, recreation capabilities are moderate.

An Indian Reserve of approximately 700 acres borders the Strait of Georgia in the southwest portion of the Roberts Bank area. Archaeological sites have been discovered in the vicinity of Canoe Pass and the Tsawwassen ferry causeway.

Land in the vicinity of Roberts Bank is primarily used for commercial crop production for which it is extremely valuable. Roberts Bank superport, a bulk-loading coal port facility located to the southwest, is the major industrial activity. Four thousand acres of backup land, which have been expropriated for use in conjunction with this activity, are currently being leased for farming purposes. To the south of the superport, a major causeway and ferry terminal provides ferry services to Vancouver Island. A rail line services the bulk-loading coal facility, while an extensive highway network links Roberts Bank to Vancouver and other urban centres.

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APPENDIX V

AN ALTERNATIVE ENVIRONMENTAL RISK RATING SYSTEM

As indicated in Chapter 7 of Volume I of this report, an alternative method of rating environmental risk was originally developed for purposes of this comparative port study. Because results of that method correlated very highly with the results presented in Volume I, only the one method (based on modified Fisheries Statistical Area ratings allocated on a route basis) was detailed in the first volume. This appendix describes the alternative method.

The principal difference in the alternate system was the application of "route segments" in determining environmental risk, i.e., each port/route alternative was divided into discrete 40 nautical mile segments for each of which was derived seasonal slick areas. These slick areas were rated for biological, economic and social resources, while each segment was rated for navigational risk. Then the RESOURCE INDICES were multiplied by the NAVIGATIONAL RISK INDEX to derive the BIOLOGICAL, ECONOMIC and SOCIAL RISK INDICES associated with each segment/slick area. These segment/slick indices were finally combined into route indices by adding segment/slick index values on a route basis (Table V).

Detailed derivation of the indices is described for the alternate method in the following sections.

V.1 NAVIGATIONAL RISK INDEX

The NAVIGATIONAL RISK INDEX was calculated along each route by rating such factors as winds, visibility, currents, water depths, passage widths, course changes and shipping density in relation to a design tanker of 325,000 DWT with a draught of 85 feet and a breadth of 175 feet.

The rating method was identical to that used in Chapter 7 of Volume I, but final computation of the index was by route segment/slick area. A description of the computation procedure follows:

- Each route segment was rated for each of the seven parameters (Tables V.1.1 and V.1.2).
- The ratings estimated for two seasons (October to April representing winter, and May to September representing summer) were weighted in each route segment. Weights were decided on by a group of Department of Fisheries and the Environment staff as an indication of the relative importance of each of the navigational risk factors. Initially, the staff members subjectively evaluated the seven risk parameters assigning them different relative values between a low of 6 and a high of 20. They determined that the standing of each route segment in relation to the others was not significantly

TABLE V SEGMENT AND ROUTE NUMBERS AND NAMES

Route Number	Route Name	Number of Segments	Segment Number
1	Port Simpson (Dixon)	3	1 2 3
2	Ridley Island (Dixon)	3	1 2 4
3	Kitimat (Dixon, Principe)	6	1 2 5 8 12 9
4	Kitimat (Outer Coast, Hecate, Principe)	11	6 10 13 15 17 18 14 7 8 12 9
5	Kitimat (Outer Coast, Hecate, Caamano)	9	6 10 13 15 17 16 11 12 9
6	Bella Coola (Outer Coast, North Passage)	10	6 10 13 15 17 19 20 23 24 25
7	Bella Coola (Outer Coast, South Passage)	11	6 10 13 15 17 19 21 22 23 24 25
8	Kitimat (Hecate, Principe)	8	15 17 18 14 7 8 12 9
9	Kitimat (Hecate, Caamano)	6	15 17 16 11 12 9
10	Bella Coola (North Passage)	7	15 17 19 20 23 24 25
11	Bella Coola (South Passage)	8	15 17 19 21 22 23 24 25
12	Port Angeles (Outer Coasts, Juan De Fuca)	14	6 10 13 15 17 26 27 28 29 30 31 32 33 34
13	Esquimalt (Outer Coasts, Juan De Fuca)	14	6 10 13 15 17 26 27 28 29 30 31 32 33 35
14	Burrows Bay (Outer Coasts, Juan De Fuca)	15	6 10 13 15 17 26 27 28 29 30 31 32 33 36 37
15	Cherry Point (Outer Coasts, Juan De Fuca, Rosario)	15	6 10 13 15 17 26 27 28 29 30 31 32 33 36 38
16	Cherry Point (Outer Coasts, Juan De Fuca, Haro)	16	6 10 13 15 17 26 27 28 29 30 31 32 33 36 39 40
17	Roberts Bank (Outer Coasts, Juan De Fuca, Haro)	16	6 10 13 15 17 26 27 28 29 30 31 32 33 36 39 41
18	Port Moody (Outer Coasts, Juan De Fuca, Haro)	17	6 10 13 15 17 26 27 28 29 30 31 32 33 36 39 41 42
19	Britannia Beach (Outer Coasts, Juan De Fuca, Haro)	17	6 10 13 15 17 26 27 28 29 30 31 32 33 36 39 41 43
20	Port Angeles (Juan De Fuca)	5	30 31 32 33 34
21	Esquimalt (Juan De Fuca)	5	30 31 32 33 35
22	Burrows Bay (Juan De Fuca)	6	30 31 32 33 36 37
23	Cherry Point (Juan De Fuca, Rosario)	6	30 31 32 33 36 38
24	Cherry Point (Juan De Fuca, Haro)	7	30 31 32 33 36 39 40
25	Roberts Bank (Juan De Fuca, Haro)	7	30 31 32 33 36 39 41
26	Port Moody (Juan De Fuca, Haro)	8	30 31 32 33 36 39 41 42
27	Britannia Beach (Juan De Fuca, Haro)	8	30 31 32 33 36 39 41 43

TABLE V.1.1 WINTER NAVIGATIONAL RISK VALUES BY ROUTE SEGMENT

Segment Number	Winds	Visibility	Currents	Water Depths	Passage Widths	Course Changes	Shipping Density	TOTAL	Seasonal Navigational Risk (Scaled against 114 and Adjusted for Odd Lengths)
	(12.0)*	(18.0)	(14.0)	(20.0)	(17.0)	(15.0)	(18.0)	(114.0)	(100)
1	7.2	.0	.0	.0	4.2	.0	.0	11.4	10.0
2	7.2	.0	.0	.0	8.5	.0	4.5	20.2	17.7
3	7.2	10.8	2.8	15.0	12.7	7.5	.0	56.0	36.9
4	7.2	7.2	2.8	15.0	17.0	7.5	4.5	61.2	40.3
5	7.2	3.6	.0	10.0	8.5	3.8	9.0	42.0	36.9
6	7.2	.0	.0	.0	.0	.0	.0	7.2	6.3
7	7.2	3.6	.0	15.0	8.5	7.5	.0	41.8	36.7
8	7.2	14.4	5.6	10.0	12.7	3.8	9.0	62.7	55.0
9	4.8	18.0	2.8	5.0	12.7	3.8	.0	47.1	41.3
10	7.2	3.6	.0	.0	4.2	.0	.0	15.0	13.2
11	7.2	7.2	2.8	10.0	8.5	3.8	.0	39.4	34.6
12	4.8	14.4	2.8	.0	12.7	15.0	.0	49.7	43.6
13	7.2	7.2	.0	.0	4.2	.0	.0	18.6	16.4
14	7.2	.0	.0	.0	4.2	.0	.0	11.4	10.0
15	7.2	7.2	.0	.0	4.2	.0	.0	18.6	16.4
16	7.2	.0	.0	.0	.0	.0	.0	7.2	6.3
17	7.2	.0	.0	.0	.0	.0	.0	7.2	6.3
18	7.2	.0	.0	.0	4.2	3.8	.0	15.2	13.3
19	7.2	.0	.0	.0	.0	.0	.0	7.2	6.3
20	4.8	.0	.0	15.0	8.5	.0	.0	28.3	24.8
21	4.8	.0	2.8	15.0	12.7	.0	.0	35.3	31.0
22	4.8	7.2	5.6	15.0	8.5	3.8	.0	44.8	9.8
23	4.8	10.8	5.6	10.0	12.7	3.8	.0	47.7	41.8
24	4.8	10.8	5.6	20.0	12.7	11.2	.0	65.2	57.2
25	4.8	14.4	2.8	.0	12.7	3.8	.0	38.5	8.4
26	4.8	.0	.0	.0	4.2	.0	.0	9.0	7.9
27	4.8	.0	.0	.0	4.2	.0	.0	9.0	7.9
28	4.8	.0	.0	.0	4.2	.0	.0	9.0	7.9
29	4.8	3.6	.0	.0	.0	.0	.0	8.4	7.4
30	4.8	3.6	.0	.0	4.2	.0	.0	12.6	11.1
31	4.8	3.6	.0	15.0	4.2	.0	.0	27.6	24.3
32	2.4	3.6	.0	5.0	4.2	.0	4.5	19.7	17.3
33	2.4	.0	2.8	.0	4.2	.0	18.0	27.4	24.1
34	2.4	.0	2.8	.0	8.5	3.8	4.5	21.9	4.8
35	4.8	3.6	2.8	15.0	8.5	7.5	.0	42.2	14.1
36	2.4	.0	.0	15.0	8.5	.0	4.5	30.4	13.3
37	4.8	7.2	5.6	15.0	8.5	3.8	.0	44.8	19.7
38	7.2	10.8	11.2	25.0	12.7	11.2	9.0	87.2	76.5
39	4.8	7.2	11.2	20.0	12.7	7.5	13.5	76.9	67.5
40	4.8	7.2	5.6	5.0	8.5	.0	.0	31.1	6.8
41	2.4	.0	2.8	.0	4.2	7.5	9.0	25.9	22.8
42	2.4	7.2	11.2	25.0	21.2	3.8	18.0	88.8	38.9
43	4.8	7.2	2.8	.0	12.7	.0	4.5	32.0	14.1

* () Weightings

TABLE V.1.2 SUMMER NAVIGATIONAL RISK VALUES BY ROUTE SEGMENT

Segment Number	Winds	Visibility	Currents	Water Depths	Passage Widths	Course Changes	Shipping Density	TOTAL	Seasonal Navigational Risk (Scaled against 114 and Adjusted for Odd Lengths)
	(12.0)*	(18.0)	(14.0)	(20.0)	(17.0)	(15.0)	(18.0)	(114)	(100)
1	.0	3.6	.0	.0	4.2	.0	.0	7.8	6.9
2	.0	3.6	.0	.0	8.5	.0	4.5	16.6	14.6
3	2.4	10.8	2.8	15.0	12.7	7.5	.0	51.2	33.7
4	2.4	7.2	2.8	15.0	17.0	7.5	4.5	56.4	37.1
5	.0	3.6	.0	10.0	8.5	3.8	9.0	34.8	30.6
6	.0	3.6	.0	.0	.0	.0	.0	3.6	3.2
7	2.4	3.6	.0	15.0	8.5	7.5	.0	37.0	32.5
8	4.8	10.8	5.6	10.0	12.7	3.8	9.0	56.7	49.7
9	2.4	7.2	2.8	5.0	12.7	3.8	.0	33.9	29.7
10	.0	7.2	.0	.0	4.2	.0	.0	11.4	10.0
11	2.4	7.2	2.8	10.0	8.5	3.8	.0	34.6	30.4
12	2.4	10.8	2.8	.0	12.7	15.0	.0	43.7	38.4
13	.0	7.2	.0	.0	4.2	.0	.0	11.4	10.0
14	2.4	3.6	.0	.0	4.2	.0	.0	10.2	9.0
15	2.4	7.2	.0	.0	4.2	.0	.0	13.8	12.1
16	2.4	3.6	.0	.0	.0	.0	.0	6.0	5.3
17	2.4	3.6	.0	.0	.0	.0	.0	6.0	5.3
18	2.4	3.6	.0	.0	4.2	3.8	.0	14.0	12.3
19	2.4	3.6	.0	.0	.0	.0	.0	6.0	5.3
20	.0	3.6	.0	15.0	8.5	.0	.0	27.1	23.8
21	.0	3.6	2.8	15.0	12.7	.0	.0	34.1	30.0
22	.0	7.2	5.6	15.0	8.5	3.8	.0	40.0	8.8
23	2.4	10.8	5.6	10.0	12.7	3.8	.0	45.3	39.7
24	2.4	7.2	5.6	20.0	12.7	11.2	.0	59.2	51.9
25	2.4	7.2	2.8	.0	12.7	3.8	.0	28.9	6.3
26	2.4	3.6	.0	.0	4.2	.0	.0	10.2	9.0
27	.0	3.6	.0	.0	4.2	.0	.0	7.8	6.9
28	.0	3.6	.0	.0	4.2	.0	.0	7.8	6.9
29	.0	3.6	.0	.0	.0	.0	.0	3.6	3.2
30	.0	7.2	.0	.0	4.2	.0	.0	11.4	10.0
31	.0	7.2	.0	15.0	4.2	.0	.0	26.4	23.2
32	.0	10.8	.0	5.0	4.2	.0	4.5	24.5	21.5
33	2.4	7.2	2.8	.0	4.2	.0	18.0	34.6	30.4
34	.0	.0	2.8	.0	8.5	3.8	4.5	19.5	4.3
35	2.4	3.6	2.8	15.0	8.5	7.5	.0	39.8	13.3
36	.0	.0	.0	15.0	8.5	.0	4.5	28.0	12.3
37	2.4	3.6	5.6	15.0	8.5	3.8	.0	38.8	17.0
38	2.4	3.6	11.2	25.0	12.7	11.2	9.0	75.2	66.0
39	2.4	3.6	11.2	20.0	12.7	7.5	13.5	70.9	62.2
40	2.4	3.6	5.6	5.0	8.5	.0	.0	25.1	5.5
41	.0	.0	2.8	.0	4.2	7.5	9.0	23.5	20.7
42	2.4	3.6	11.2	25.0	21.2	3.8	18.0	85.2	37.4
43	2.4	3.6	2.8	.0	12.7	.0	4.5	26.0	11.4

* () Weightings

changed by different value ranges, i.e., relative risk was insensitive to the weighting scheme chosen. The weighting value agreed on for each parameter was the maximum possible for that parameter, except in those cases not in conformance with TERMPOL standards, e.g., water depth and passage width for segment 42 (Vancouver harbour). These weighted values were totalled by segment for each season. (Tables V.1.1 and V.1.2). Several of the segments which were not the full 40 nautical miles in length, e.g., some final approach segments, were decreased in value in proportion to their shorter lengths. (Tables V.1.1 and V.1.2).

- Seasonal segment totals were scaled down to 100 from 114, where 114 represented the total for the maximum weightings (Tables V.1.1 and V.1.2).
- Seasonality was removed by averaging winter and summer values proportionately (Table V.1.3).
- These annually adjusted figures were scaled to 100 to derive the NAVIGATIONAL RISK INDEX by segment (Table V.1.3).

V.2 OIL SPILL MOVEMENT

To rate the biological, economic and social resource values in relation to geographic locales, slick areas were calculated from the mid-points of the route segments. The values of the resources within each slick area were the ratings used to derive BIOLOGICAL, ECONOMIC and SOCIAL RESOURCE INDICES by segment (as described in the next section). This section first details how spill areas were calculated.

On the basis of global historic information on tanker accidents causing oil pollution, and recognizing that very rarely does damage to a tanker result in the total loss of cargo, a 50,000 ton spill was chosen for a major slick in coastal waters. As most significant environmental damage occurs in the earlier stages of a spill because of the toxicity of unevaporated, volatile fractions in the oil, and because of limited mechanical degradation of the oil, the time period for each slick area was identified as seven days. Furthermore, a uniform volume/duration of spill was selected in order to provide a common basis of comparison between spill sites. To more accurately determine slick movement over seven days, one further simplifying assumption was made: that oil would leak from the damaged vessel continuously over the seven day period so as to fully cover all tidal cycles.

As the dominant factors in the movement of oil slicks are winds and currents (viscous spreading playing a relatively minor role), slick areas were delineated by adding submarine currents to surface drift induced by winds. Such drift was assumed to take place at a rate of three percent of the wind speed, a value generally accepted as most representative. Owing to marked seasonal differences in atmospheric and oceanic regimes, slick drift patterns were developed for December, representative of the October to April period, and for July, representative of the period from May to September. (Refer to Figures 9.3.1 and 9.3.2 in Volume I.)

TABLE V.1.3 NAVIGATIONAL RISK INDEX BY SEGMENT

Segment No.	Seasonal Navigational Risk (Scaled from 114 and Adjusted for Odd Lengths)		NAVIGATIONAL RISK INDEX By Segment (Annually Adjusted and Scaled to 100)
	Winter	Summer	
1	10.0	6.9	12
2	17.7	14.6	23
3	36.9	33.7	49
4	40.3	37.1	54
5	36.9	30.6	48
6	6.3	3.2	7
7	36.7	32.5	48
8	55.0	49.7	73
9	41.3	29.7	51
10	13.2	10.0	16
11	34.6	30.4	46
12	43.6	38.4	57
13	16.4	10.0	19
14	10.0	9.0	13
15	16.4	12.1	20
16	6.3	5.3	8
17	6.3	5.3	8
18	13.3	12.3	18
19	6.3	5.3	8
20	24.8	23.8	34
21	31.0	30.0	42
22	9.8	8.8	13
23	41.8	39.7	57
24	57.2	51.9	76
25	8.4	6.3	10
26	7.9	9.0	12
27	7.9	6.9	10
28	7.9	6.9	10
29	7.4	3.2	8
30	11.1	10.0	15
31	24.3	23.2	33
32	17.3	21.5	26
33	24.1	30.4	37
34	4.8	4.3	6
35	14.1	13.3	19
36	13.3	12.3	18
37	19.7	17.0	26
38	76.5	66.0	100
39	67.5	62.2	91
40	6.8	5.5	9
41	22.8	20.7	30
42	38.9	37.4	53
43	14.1	11.4	18

Winds

To develop meaningful drift patterns spanning seven days of oil movement, it was necessary to examine the strength and persistency of wind regimes over that period of time. Typical transport distances had to be estimated based on such considerations as the occurrence of significant winter storms along all parts of the British Columbia coast, and the development of persistent summer westerlies in Juan de Fuca Strait. Hourly wind data collected at a few well-exposed weather stations representative of coastal regions such as the Strait of Georgia, Juan de Fuca Strait, the west coast of Vancouver Island and Hecate Strait were obtained for December and July for the five year period from 1971 to 1975. Winds were partitioned into regimes featuring such trends as upcoast southeasterlies and downcoast northwesterlies. Such an approach was feasible because wind directions along the British Columbia coast are in most cases strongly influenced by the orientation of the coastline, major mountain ranges and coastal inlets. Cases were then selected for December and July for each of the five years which would have resulted in the greatest oil slick drift in each of the prevailing directions. In many cases, this involved consideration of advance, retreat and re-advance during the week involved, although in other cases a given wind regime persisted for the entire week selected. Resulting values were then averaged for each of the two seasons over the five year period. Finally, values were multiplied by the percentage frequency of occurrence of winds from each of the sectors considered.

The above analysis provided appropriate slick drift vectors for use in the major coastal waterways. More detail was added to the pattern through a more easily performed analysis of long-term wind normals for a total of 33 coastal wind stations. Drift vectors in various dominant wind directions were calculated based upon mean wind speeds and frequencies of occurrence of associated winds from various sectors (i.e., north, northwest and west versus east, southeast and south). Seven day oil drift vectors resulting from winds were determined as the product of the percentage frequency of winds from the sector, their mean speed, the number of hours per week and the drift factor of three percent mentioned earlier.

Currents

Current data were derived from a variety of published sources dating as far back as 1921 and from a large number of unpublished papers and data records. Federal government reports provided the bulk of the data. Descriptions of general circulation patterns were produced by the Institute of Ocean Sciences, Patricia Bay, B.C. The data obtained were in several forms: current meter observations, drift pole and drift bottle observations, descriptions of circulation from temperature, salinity, and pressure records, and tidal current information from aerial photographs and nautical charts.

Eight-point current roses were constructed from near-surface (three metres to 20 m) current meter data. (In some restricted passages, only four-point current roses were constructed to show long-stream and cross-stream motion.) The percent frequency and average current speed in

each direction were used to determine an average 24 hour drift in that direction, based on the period of observation. Progressive vector diagrams of the current meter data gave a better idea of actual repetitive daily cycles of motion and the persistence of average drift in a particular direction.

Wherever possible, typical current roses were derived separately for summer and winter, although data were often only available for one season. In these cases, an extrapolated current rose was constructed for the other season based on knowledge of similar oceanographic regions, seasonal changes in freshwater discharge, rainfall and large scale current systems, pressure difference calculations, drift bottle observations and tidal currents. Where there was more than one year of data for a season at a certain station, the current roses were averaged over several sets of data. As far as possible, data records of at least one month duration were used for averaging, in order to cover the full monthly range of spring (large) and neap (small) tides. On the basis of these various methods, current roses were constructed for all available stations for summer and winter. From these, the average resultant daily drift was calculated, with regions of no recorded data being interpolated from neighbouring stations.

Final Slick Area Development

Oil slick drift patterns were developed using a combination of various wind drift vectors and residual current vectors on a day-by-day basis over seven day periods in winter and summer. In cases where currents and prevailing winds acted in the same direction, additive vectors indicated substantial oil motion in that direction, e.g., up the coast in winter. In other cases, persistent winds in one direction were opposed by subsurface currents in the opposite direction, thereby much reducing the motion that could have resulted by either factor acting alone. In all cases, it was necessary to assess wind and current patterns away from sites of measurement and to apply subjective judgement in order to produce a reasonable and consistent set of oil slick drift patterns for all the route segments under consideration in the study. Secondary factors in such judgement included tidal currents in passages, coastal topography, overall circulation patterns and the Coriolis effect caused by the earth's rotation. The final slick areas derived are therefore "envelopes" for areas contacted by oil during the spill period; they do not in fact represent the physical extent of slicks at any one point in time. (Volume I illustrates the various slick areas by season in Figures 9.3.1 and 9.3.2.)

The BIOLOGICAL, ECONOMIC and SOCIAL RESOURCE INDICES derived in the following sections were based on local shorelines and open waters within each slick envelope.

V.3 BIOLOGICAL RESOURCE INDEX

The BIOLOGICAL RESOURCE INDEX was compiled in an attempt to combine factors not readily identifiable in monetary terms, such as nearshore biological capability, salmon escapements, other fisheries stocks, marine-associated birds and marine mammals.

The rating method was identical to that used in Chapter 7 of the first volume, except for the fact that final computation of the index was by route segment/slick area. The five biological factors were combined as follows (Table V.3.1):

- Scaled to 100 to give a common basis for weighting, with 100 representing the highest segment rating for each biological rating component.
- Weighted (biological capability - 1.000, salmon escapements - .875, other fisheries stocks - .875, marine-associated birds - .750, marine mammals - .375) through a consensus of the research biologists who were involved in developing the individual rating factors.
- added together for total seasonal slick area values,
- annually adjusted to remove the non-critical seasonality factor, and
- scaled to 100 to derive the BIOLOGICAL RESOURCE INDEX by segment.

V.4 ECONOMIC RESOURCE INDEX

The ECONOMIC RESOURCE INDEX was derived by distributing seasonal economic resource values on a route segment/slick area basis, adjusting these to annual averages and scaling to 100 (Table V.4.1).

V.5 SOCIAL RESOURCE INDEX

The SOCIAL RESOURCE INDEX was derived by distributing seasonal social resource values on a route segment/slick area basis, adjusting these to annual averages and scaling to 100 (Table V.5.1).

V.6 FINAL RISK INDICES

The final BIOLOGICAL, ECONOMIC and SOCIAL RISK INDICES were derived by multiplying the NAVIGATIONAL RISK INDEX (by segment) by each of the RESOURCE INDICES (by segment/slick area), apportioning on a route basis and scaling to 100, with 100 representing the highest resource risk values (Table V.6.1).

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TABLE V.3.1 BIOLOGICAL RESOURCE INDEX (By Segment)

Scaled to 100 and Weighted Ratings

Slick No.	Biological Capability		Salmon Escapements		Other Fisheries Stocks		Marine-Associated Birds		Marine Mammals		Total Biological		BIOLOGICAL RESOURCE INDEX By Segment (Annually Adjusted and Scaled to 100)
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	
1	17	4	18	5	1	0	75	7	6	25	117	41	40
2	2	23	1	0	0	0	27	27	9	25	39	75	25
3	93	100	37	88	3	28	7	55	6	38	146	309	100
4	93	97	37	53	3	26	7	48	6	38	146	262	91
5	29	41	2	1	0	0	20	20	6	25	57	87	32
6	21	0	0	0	0	0	7	1	9	25	37	26	15
7	49	5	13	1	13	0	7	7	6	38	88	51	34
8	64	48	16	4	13	18	7	1	6	25	106	96	48
9	94	66	81	28	0	10	34	48	6	25	215	177	93
10	37	15	18	5	5	0	20	20	9	38	89	78	40
11	63	20	15	1	0	0	7	1	9	25	94	47	35
12	100	58	9	4	3	0	14	1	6	25	132	88	53
13	39	11	29	3	4	0	27	14	9	38	108	66	43
14	18	0	4	0	0	0	7	20	9	12	38	32	16
15	46	20	8	1	0	0	20	14	9	38	83	73	37
16	0	0	0	0	0	0	7	20	9	12	16	32	10
17	67	0	10	0	25	0	27	1	9	12	138	13	40
18	0	0	0	0	0	0	7	7	3	12	10	19	7
19	0	0	0	0	0	0	7	1	3	12	10	13	5
20	29	3	30	0	60	0	7	7	9	38	135	48	46
21	18	0	3	0	58	0	7	1	9	38	95	39	34
22	31	18	3	2	23	0	7	1	9	38	73	59	32
23	51	36	45	16	40	0	7	7	9	38	152	97	60
24	59	32	88	4	25	88	7	7	6	25	185	156	81
25	73	46	79	28	8	88	7	7	6	25	173	194	85
26	0	0	0	0	0	0	7	1	3	12	10	13	5
27	0	0	0	0	0	0	14	7	12	25	26	32	13
28	21	0	1	0	0	0	48	7	12	25	82	32	29
29	46	0	11	0	2	0	75	1	23	25	157	26	48
30	58	0	19	0	10	0	68	7	38	25	193	32	59
31	60	0	20	0	52	0	62	7	23	25	217	32	65
32	45	26	49	6	88	2	75	14	9	38	266	86	90
33	27	16	56	6	1	2	48	7	12	25	144	56	50
34	42	18	8	8	1	2	41	20	12	25	104	73	43
35	42	18	12	1	1	2	41	14	9	25	105	60	40
36	30	16	20	4	1	2	48	14	9	25	108	61	41
37	64	43	22	8	1	2	55	27	6	25	148	105	61
38	72	43	14	6	1	2	34	20	6	25	127	96	53
39	48	18	6	1	1	2	48	14	6	25	109	60	42
40	70	41	23	8	7	6	34	34	9	38	143	127	64
41	35	43	14	4	20	3	27	75	9	25	105	150	58
42	26	30	37	83	0	0	7	62	6	25	76	200	59
43	28	36	37	83	0	0	7	68	6	25	78	212	63

TABLE V.4.1 ECONOMIC RESOURCE INDEX (By Segment)

Slick No.	Winter Total	Summer Total	Annually Adjusted	ECONOMIC RESOURCE INDEX Scaled to 100
1	2,235.7	1,047.0	1,743	1
2	1,576.5	15,476.4	7,371	1
3	108,351.9	120,458.8	113,555	16
4	55,908.6	54,624.5	55,455	8
5	41,818.1	22,444.5	33,807	5
6	1,958.8	1,074.3	1,594	1
7	47,894.7	3,384.0	29,419	4
8	8,815.0	30,729.6	17,959	2
9	13,424.3	11,069.1	12,462	2
10	2,935.8	1,618.4	2,391	1
11	9,342.7	4,721.6	7,431	1
12	13,312.5	11,053.9	12,391	2
13	2,841.7	1,454.9	2,268	1
14	13,210.1	1,184.7	8,219	1
15	2,275.7	1,530.3	1,969	1
16	5,514.0	1,302.8	3,768	1
17	5,138.4	7,748.4	6,234	1
18	2,094.2	4,069.8	2,921	1
19	8,155.7	7,663.5	7,962	1
20	14,793.9	6,588.6	11,396	2
21	15,625.0	8,717.7	12,769	2
22	8,151.6	8,667.1	8,378	1
23	13,638.3	12,109.0	13,021	2
24	10,697.3	7,044.3	9,191	1
25	10,906.1	10,510.9	10,758	1
26	16,149.3	2,216.8	10,368	1
27	7,905.3	2,103.0	5,499	1
28	5,972.5	4,570.6	5,397	1
29	11,837.0	6,273.3	9,536	1
30	26,902.0	6,977.0	18,639	3
31	96,564.9	9,459.9	60,413	8
32	171,986.5	18,851.7	108,432	15
33	41,105.0	15,048.6	30,308	4
34	30,037.0	22,615.3	26,988	4
35	42,492.9	36,482.4	40,051	5
36	41,241.9	36,638.3	38,134	5
37	100,832.9	113,429.7	106,229	15
38	125,821.4	100,224.2	115,340	16
39	96,305.5	44,419.4	74,827	10
40	418,107.9	386,120.4	405,392	56
41	787,991.6	642,919.7	728,697	100
42	449,555.0	983,508.1	672,693	92
43	260,393.8	710,991.7	448,524	62

TABLE V.5.1 SOCIAL RESOURCE INDEX (By Segment)

Slick No.	Winter Total	Summer Total	Annually Adjusted	SOCIAL RESOURCE INDEX Scaled to 100
1	.94	.68	2	1
2	.36	7.43	4	2
3	61.77	69.50	65	27
4	29.71	29.71	29	12
5	22.97	10.53	17	7
6	.99	-	1	1
7	24.15	2.34	15	6
8	37.32	33.51	36	15
9	63.63	52.82	59	24
10	4.89	1.97	4	2
11	32.70	10.36	23	9
12	58.11	47.15	54	22
13	6.18	2.10	5	2
14	9.52	-	6	2
15	3.91	1.62	3	1
16	-	-	-	-
17	5.61	-	3	1
18	-	-	-	-
19	-	-	-	-
20	34.61	.90	21	9
21	31.79	-	19	8
22	18.91	7.89	14	6
23	39.14	37.48	39	16
24	43.84	26.91	37	15
25	44.76	43.27	44	18
26	-	-	-	-
27	-	-	-	-
28	1.28	-	1	1
29	6.15	-	4	2
30	32.10	-	19	8
31	114.38	-	67	27
32	214.36	16.64	132	54
33	36.19	10.25	25	10
34	19.15	10.90	16	7
35	23.48	14.88	20	8
36	20.15	10.22	16	7
37	45.66	48.00	47	19
38	55.63	43.08	51	21
39	47.13	19.60	36	15
40	168.18	124.40	150	61
41	260.57	223.19	245	100
42	134.27	289.96	200	82
43	88.51	285.85	171	70

TABLE V.6.1 RISK INDICES (By Route)

Route No.	BIOLOGICAL RISK INDEX (Scaled to 100)	ECONOMIC RISK INDEX (Scaled to 100)	SOCIAL RISK INDEX (Scaled to 100)
1	7	8	12
2	30	5	6
3	69	6	34
4	79	7	34
5	60	3	25
6	73	3	22
7	74	4	24
8	71	6	33
9	52	3	25
10	65	3	22
11	67	3	23
12	55	10	25
13	57	11	26
14	65	14	30
15	83	27	43
16	79	26	42
17	85	51	63
18	100	100	100
19	90	62	74
20	37	9	24
21	40	9	25
22	47	13	29
23	66	26	42
24	62	24	41
25	67	49	62
26	83	99	98
27	73	61	72

APPENDIX VI

NEARSHORE PHYSICAL CLASSIFICATION

The nearshore biological capability values presented in Volume I of this report were first derived from nearshore physical classifications. This approach was used because it was recognized that data on nearshore biological capability was sparse for much of the B.C. coast, but that it could be approximated by relating it to identifiable shoreline physical characteristics. This appendix details the origins of the nearshore physical classifications.

The initial stages of the program required topographical maps of various intertidal and subtidal areas of B.C., including Dixon and Browning entrances, Principe and Douglas channels, Cape St. James to Caamano Sound, Queens and Fitz Hugh sounds, Burke Channel, North Bentinck Arm, the west coast of Vancouver Island and Juan de Fuca, Rosario and Haro straits. Throughout the course of the study, additional areas were identified and mapped.

As time and financial constraints did not permit detailed on-site field investigations of intertidal and subtidal areas, a method of sampling using photogrammetric and aerial surveys was developed. To later extract information concerning biological capabilities from these surveys, a classification system for nearshore physical features was established. Shoreline types, zones, substrates and slopes were classified according to the following system:

- Three shoreline types were identified: open coast, defined as shoreline not protected from prevailing winds by major headlands or islands; protected coast, defined as shoreline shielded from prevailing weather part or most of the time by headlands or offshore islands; and, channel coasts, defined as being protected shores along channels, inlets, passages and narrow sounds.
- Four shoreline zones were identified: the intertidal zone, defined as the area between mean low and mean high tide; the beach zone, defined as the spray zone between mean high tide and continuous terrestial vegetation; the supratidal zone, defined as the area immediately above the beach; and, the estuarine zone, defined as the area at the mouths of rivers, visible as gravel bars and mud flats.
- Four classifications of shoreline substrate were identified: bedrock, coarse grain, fine grain and estuarine.
- Three degrees of slope were established: flat, evidenced by a wide intertidal zone; gradual, evidenced by a narrow intertidal zone; and, steep, illustrated by a very narrow or no intertidal zone.

- The presence of offshore reefs and islets and evidence of human activity were also noted throughout the survey. In particular, indications of human habitation included town sites, industrial or commercial activities, log storage grounds, ports, marinas and recreational areas.

Along the coasts examined, one mile segments of shoreline were sampled at five mile intervals. Using 1:250,000 topographical maps, sample points were chosen randomly by drawing straight lines between points of land and marking five mile sample points along those lines. Having established these specific sample sites, stereo pairs of available aerial photographs were examined for determination of nearshore physical features.

All the sampling was conducted between the period April - June, 1977, using various sources of information. Information on the Queen Charlotte Islands and the west coast of Vancouver Island (from Cape Sutil to Saanich Peninsula) was obtained from existing provincial government air photographs (scale 1/4" = 1 mile). Information specifically on the Prince Rupert Harbour area was obtained using federal Department of Public Works aerial photos (scale 1" = 400'). Information on the San Juan Island, Haro and Rosario Strait areas was obtained using State of Washington, Department of Natural Resources aerial photographs (1/4" = 1 mile). As no complete record of aerial photos of Fitz Hugh Sound, Burke Channel, Bella Bella, Bella Coola, Principe Channel, Douglas Channel or Caamano Sound existed at the time of the study, the nearshore physical features of these areas were determined by low level (600') aircraft field reconnaissance. Detailed information on the east coast of Vancouver Island was gathered from an earlier Department of Fisheries and the Environment foreshore inventory of that area.

Once obtained, all information was coded according to a legend (Table VI.1) onto the original 1:250,000 topographical maps. In turn, this information was transferred and reduced to the 8 1/2 x 11 format found on the following pages of this appendix. Lastly, the data were summarized by physical classification percentages for various coastal regions of B.C. and are presented following the aforementioned maps.

While only the intertidal portion of the classification system was used in developing the resource risk indices, the total nearshore physical scheme is presented here because of its possible utility for other purposes.

PREPARED BY: R. Bell-Irving, Fisheries and Marine Service

TABLE VI.1 NEARSHORE PHYSICAL CLASSIFICATION LEGEND

SHORELINE TYPE

O - open shoreline
P - protected shoreline
C - channel shoreline
X - offshore reefs

SHORELINE ZONE	SUBSTRATE	SLOPE
I - intertidal	6 - bedrock	1 - flat
B - beach	7 - coarsegrain	2 - gradual
S - supratidal	8 - finegrain	3 - steep
E - estuarine	9 - estuarine	

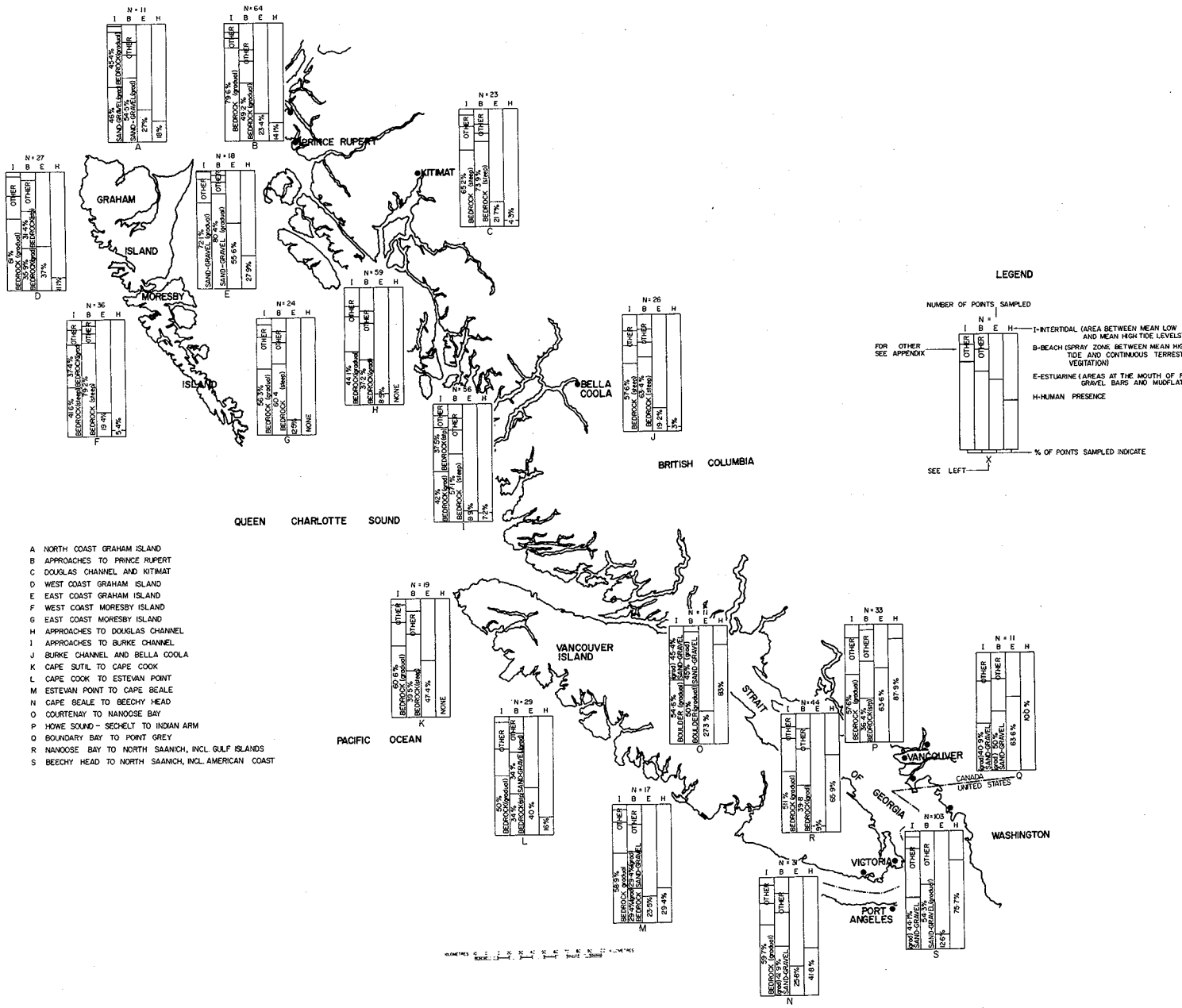
H - human activity

h - habitation
i - industrial or commercial
r - recreational

Example: $[O_x][I6_1][B7_2][S6_3][E_9]$ Hir means:

outer coast with reefs
flat bedrock intertidal
gradual boulder beach
river mouth with estuarine deposits
industrial and recreational activity

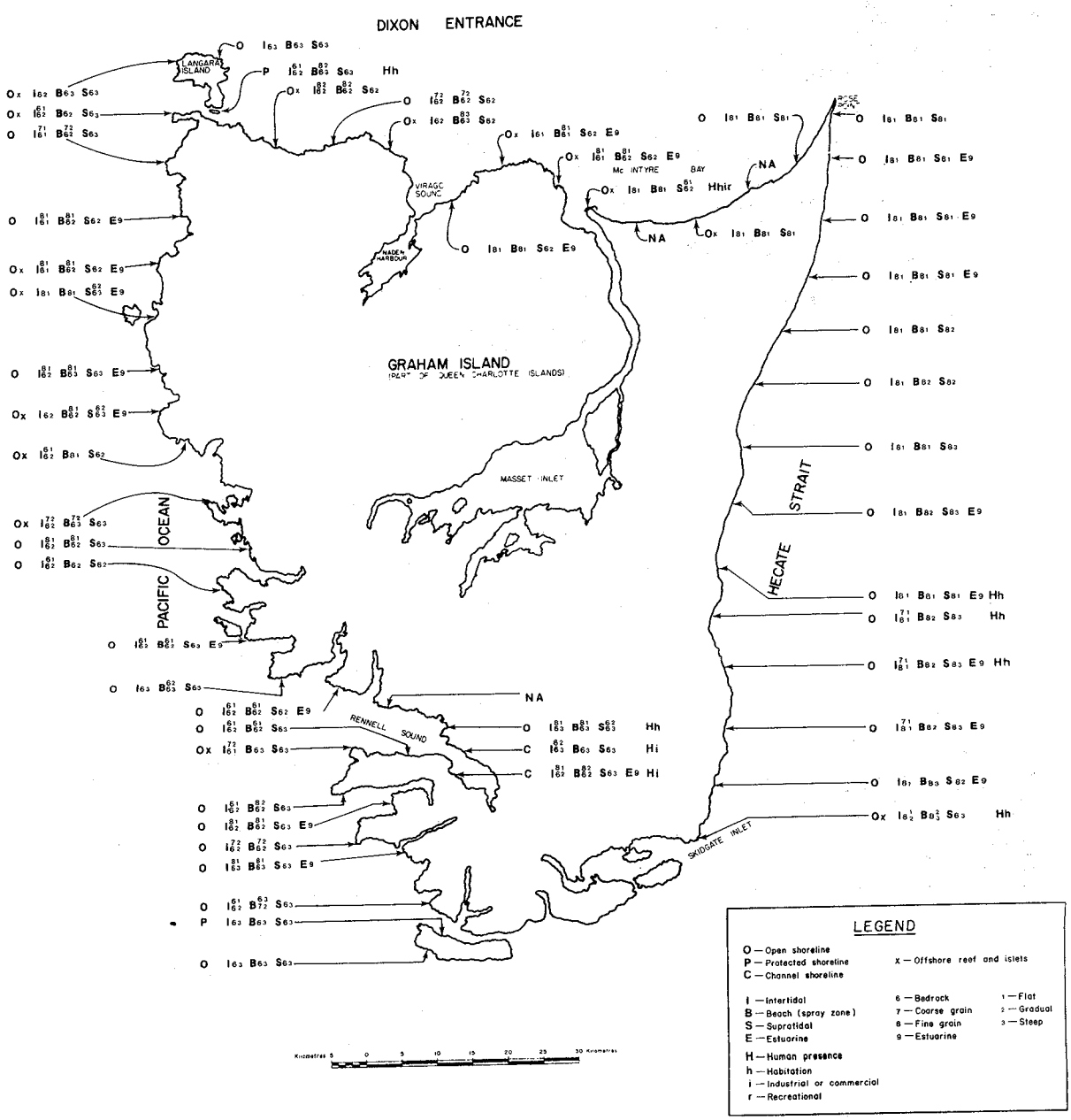
SUMMARY OF B.C. NEARSHORE PHYSICAL CLASSIFICATION



A NORTH COAST GRAHAM ISLAND
B APPROACHES TO PRINCE RUPERT
C DOUGLAS CHANNEL AND KITIMAT
D WEST COAST GRAHAM ISLAND
E EAST COAST GRAHAM ISLAND
F WEST COAST MORESBY ISLAND
G EAST COAST MORESBY ISLAND
H APPROACHES TO DOUGLAS CHANNEL
I APPROACHES TO BURKE CHANNEL
J BURKE CHANNEL AND BELLA COOLA
K CAPE SUTIL TO CAPE COOK
L CAPE COOK TO ESTEVAN POINT
M ESTEVAN POINT TO CAPE BEALE
N CAPE BEALE TO BEECHY HEAD
O COURTENAY TO NANOOSE BAY
P HOWE SOUND - SECHELT TO INDIAN ARM
Q BOUNDARY BAY TO POINT GREY
R NANOOSE BAY TO NORTH SAANICH, INCL. GULF ISLANDS
S BEECHY HEAD TO NORTH SAANICH, INCL. AMERICAN COAST

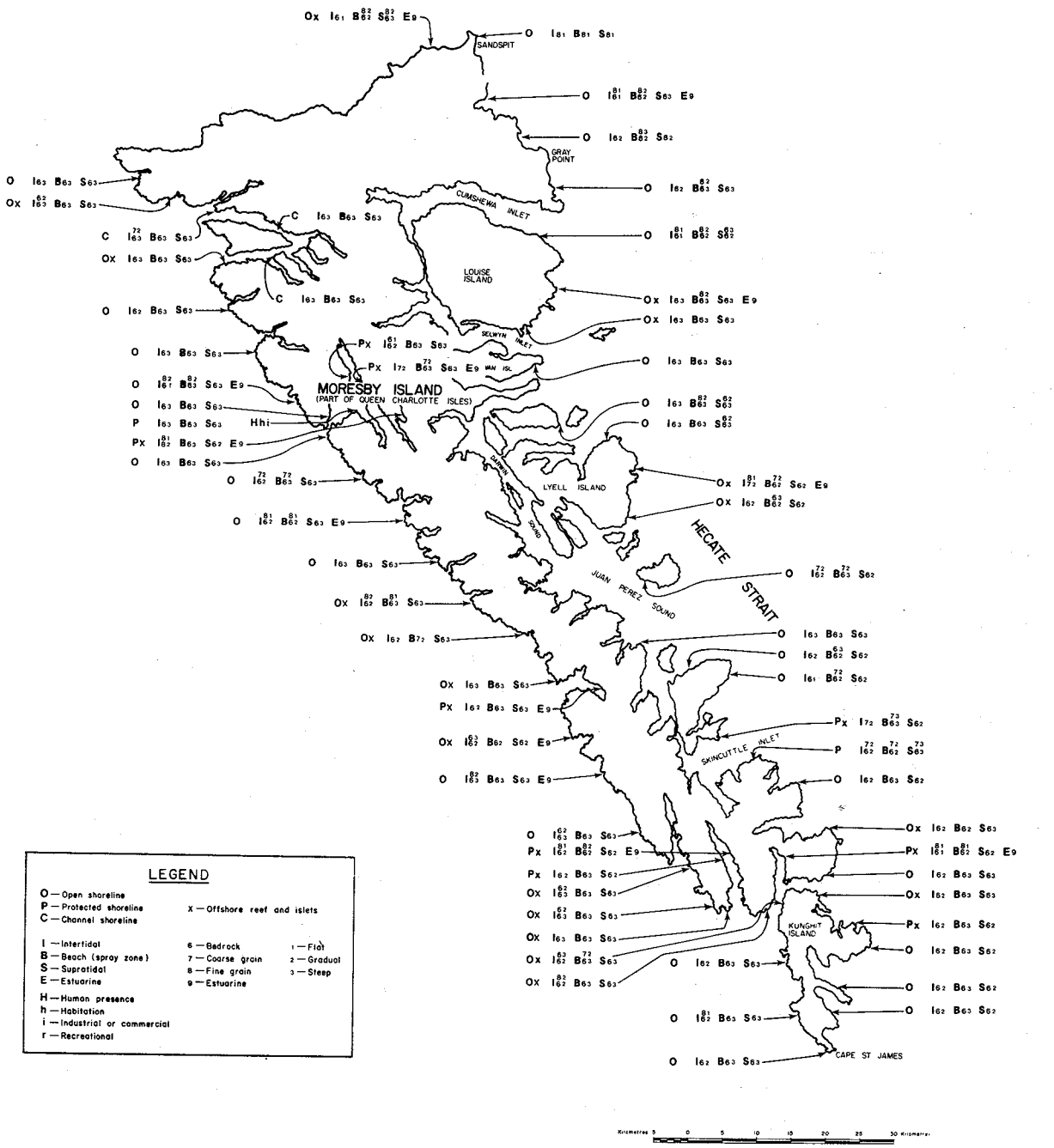
NEARSHORE PHYSICAL CLASSIFICATION

GRAHAM ISLAND-(QUEEN CHARLOTTE ISLANDS)



NEARSHORE PHYSICAL CLASSIFICATION

EAST & WEST COAST MORESBY ISLAND—
(QUEEN CHARLOTTE ISLANDS)



LEGEND

O — Open shoreline
P — Protected shoreline
C — Channel shoreline

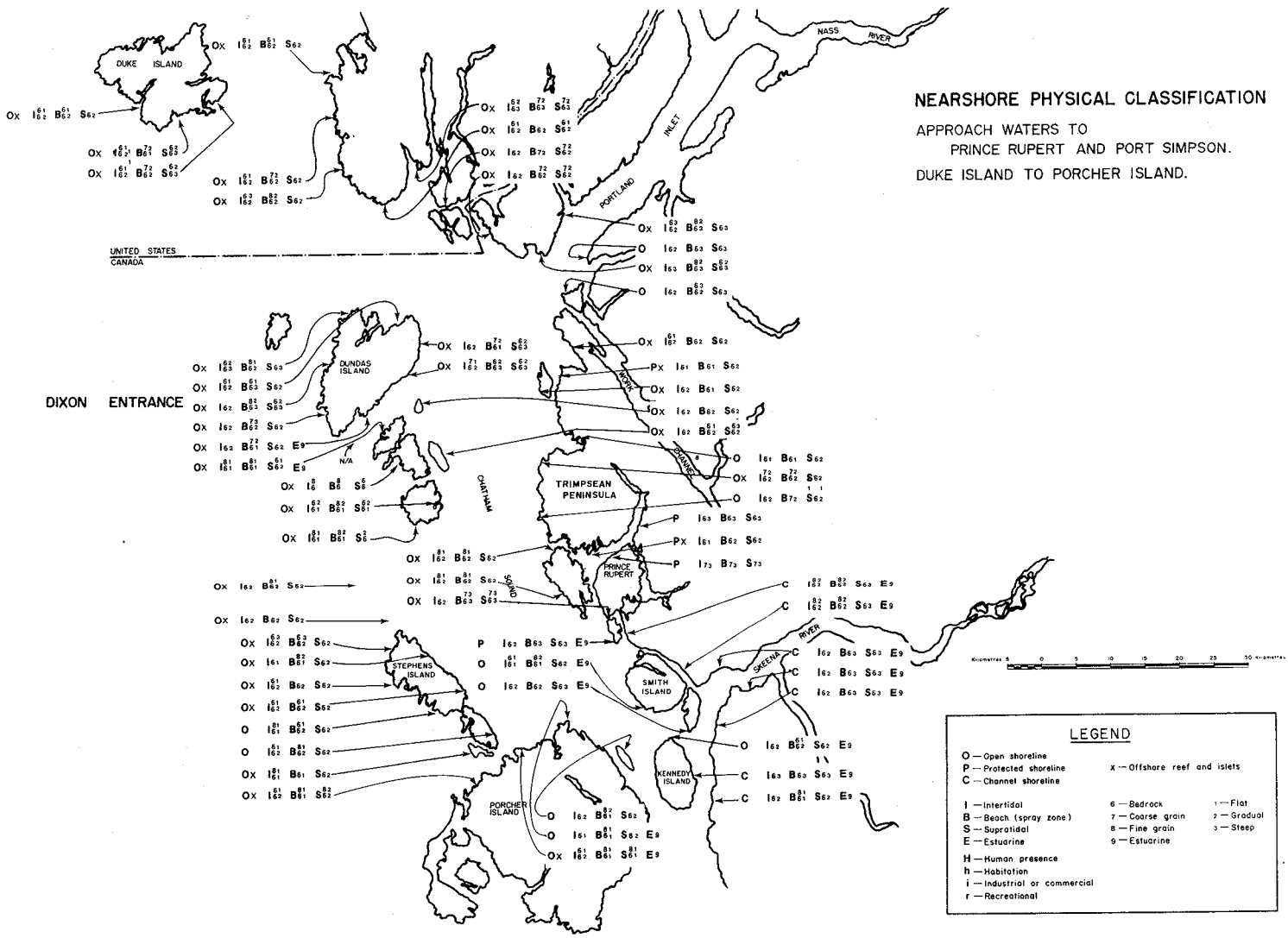
X — Offshore reef and islets

I — Intertidal
B — Beach (spray zone)
S — Supratidal
E — Estuarine

6 — Bedrock
7 — Coarse grain
8 — Fine grain
9 — Estuarine

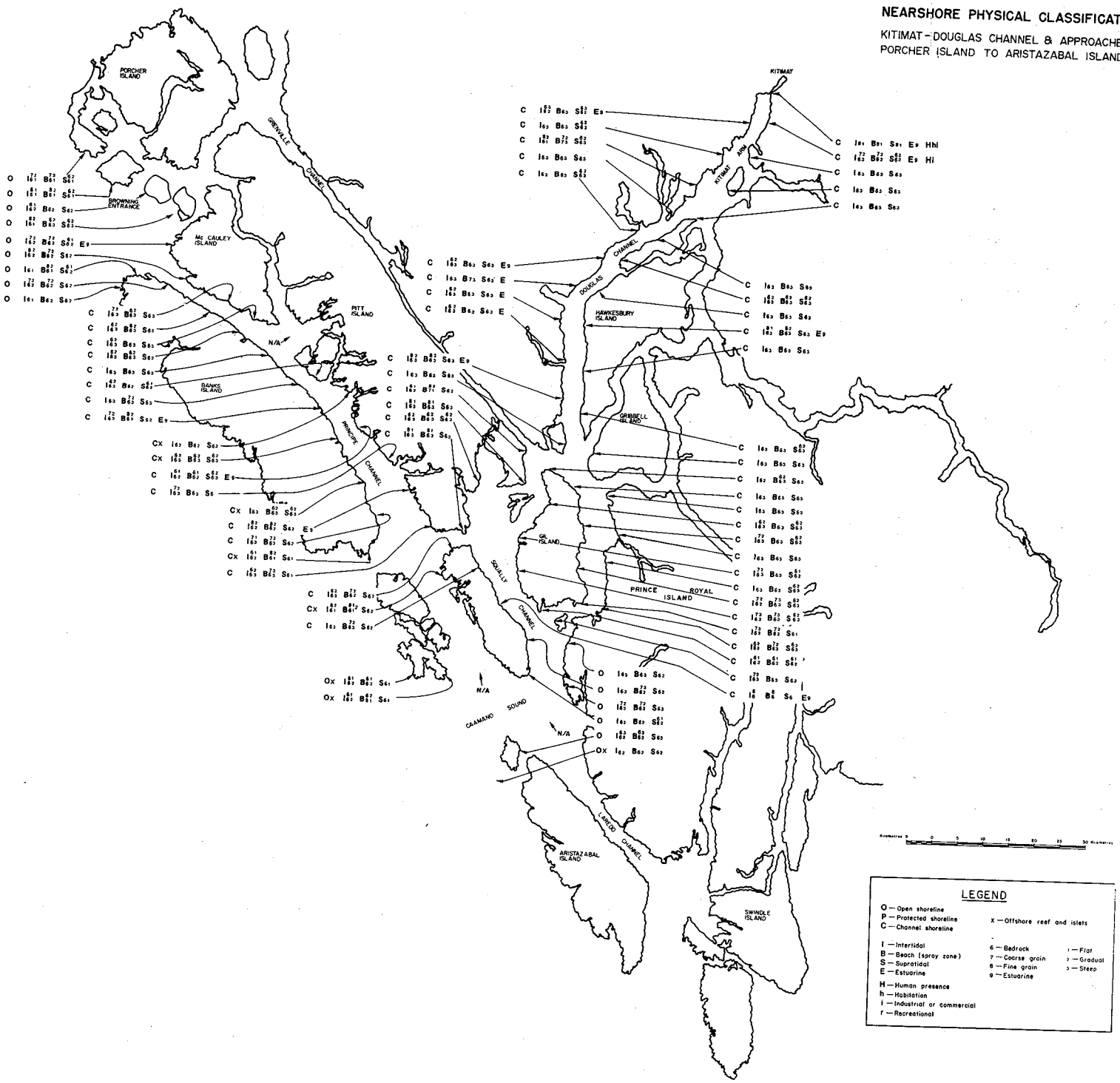
1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational


NEARSHORE PHYSICAL CLASSIFICATION
APPROACH WATERS TO
PRINCE RUPERT AND PORT SIMPSON.
DUKE ISLAND TO PORCHER ISLAND.
DUKE ISLAND
UNITED STATES
CANADA
DIXON ENTRANCE
DUNDAS ISLAND
N/A
CHATHAM
TRIMPSEAN PENINSULA
PRINCE RUPERT
SOUND
STEPHENS ISLAND
PORCHER ISLAND
SMITH ISLAND
KENNEDY ISLAND
PORTLAND
INLET
NASS
RIVER
SKEENA
RIVER
CHANNEL
WORK
Kilometres 5 0 5 10 15 20 25 30 Kilometres
LEGEND
O — Open shoreline
P — Protected shoreline
C — Channel shoreline
x — Offshore reef and islets
I — Intertidal
B — Beach (spray zone)
S — Supratidal
E — Estuarine
6 — Bedrock
7 — Coarse grain
8 — Fine grain
9 — Estuarine
1 — Flat
2 — Gradual
3 — Steep
H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

KITIMAT - DOUGLAS CHANNEL & APPROACHES
PORCHER ISLAND TO ARISTAZABAL ISLAND



LEGEND

O — Open shoreline
P — Protected shoreline
C — Channel shoreline

X — Offshore reef and islets

I — Intertidal
B — Beach (spray zone)
S — Supratidal
E — Estuarine

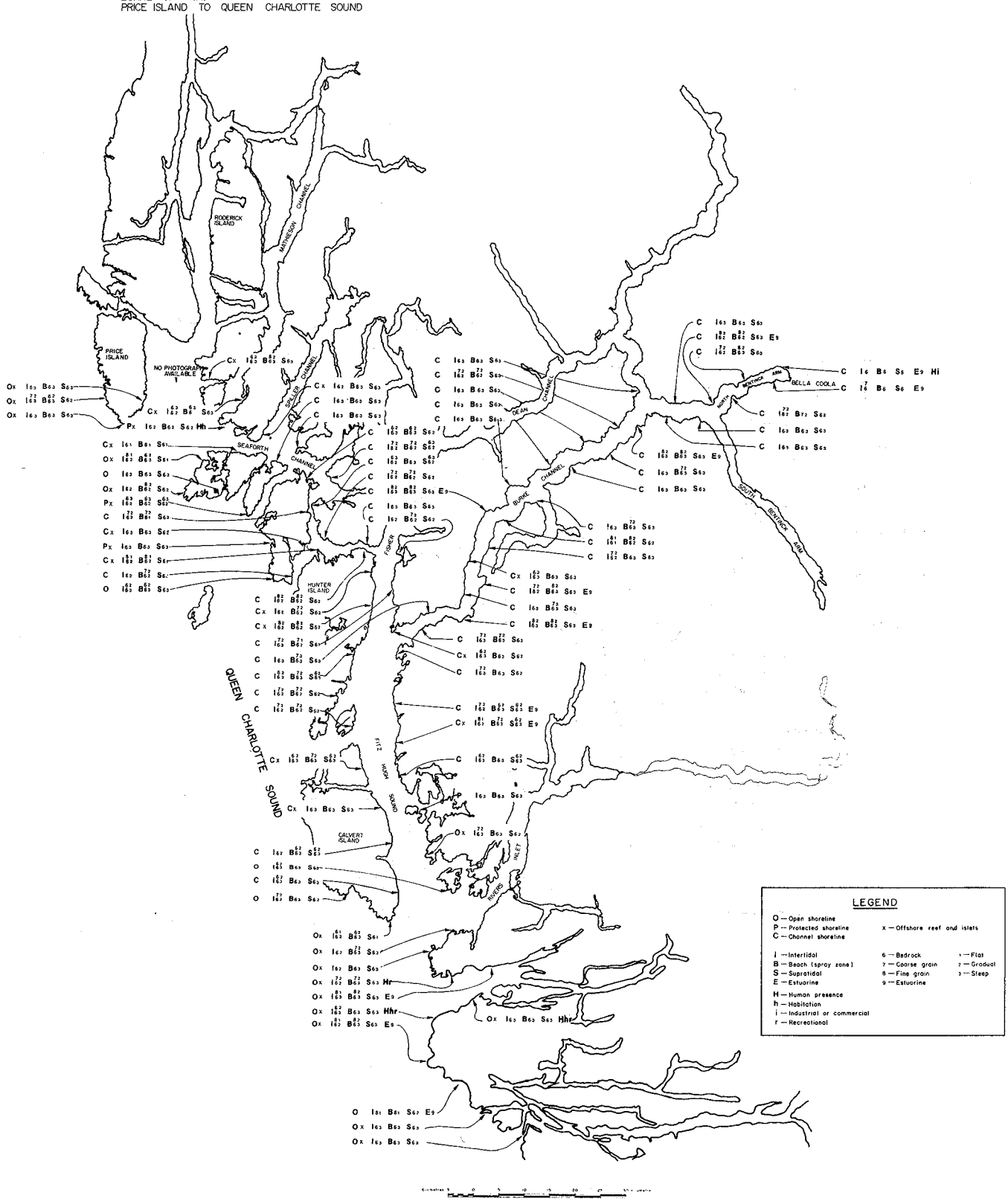
6 — Bedrock
7 — Coarse grain
8 — Fine grain
9 — Estuarine

1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

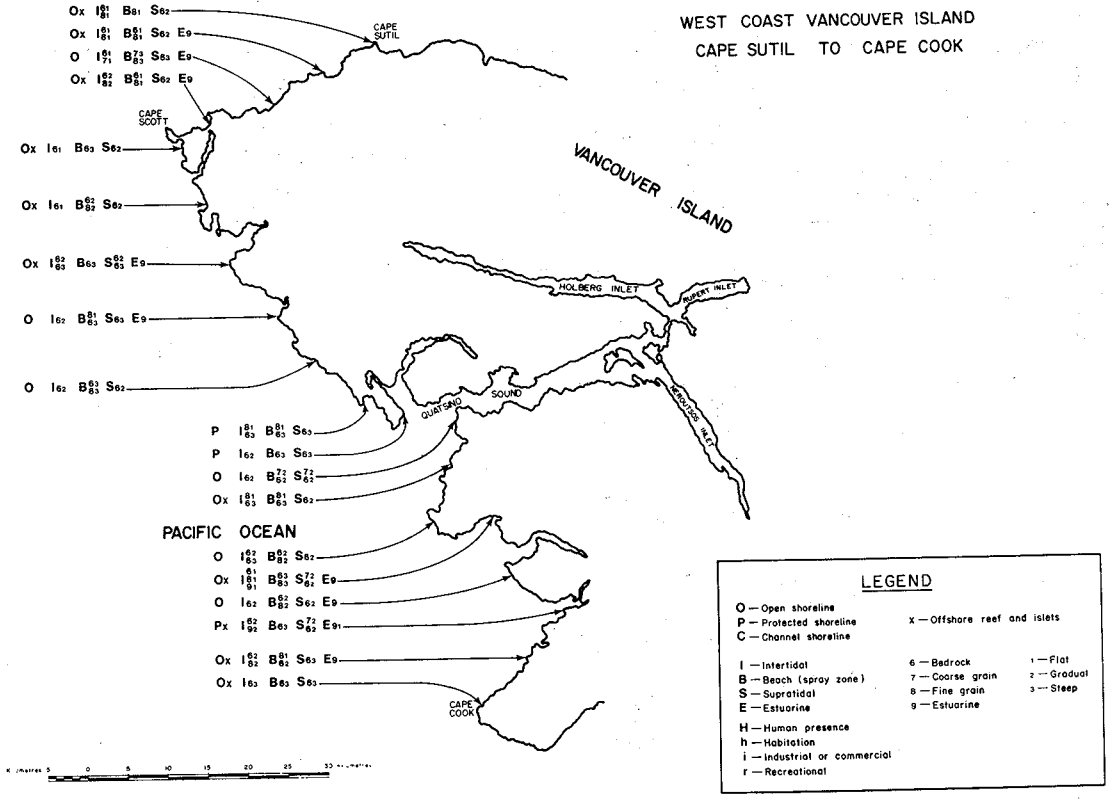
BELLA COOLA
BURKE CHANNEL AND APPROACHES
PRICE ISLAND TO QUEEN CHARLOTTE SOUND



NEARSHORE PHYSICAL CLASSIFICATION

WEST COAST VANCOUVER ISLAND

CAPE SUTIL TO CAPE COOK



LEGEND

O — Open shoreline
P — Protected shoreline
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x — Offshore reef and islets

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E — Estuarine

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9 — Estuarine

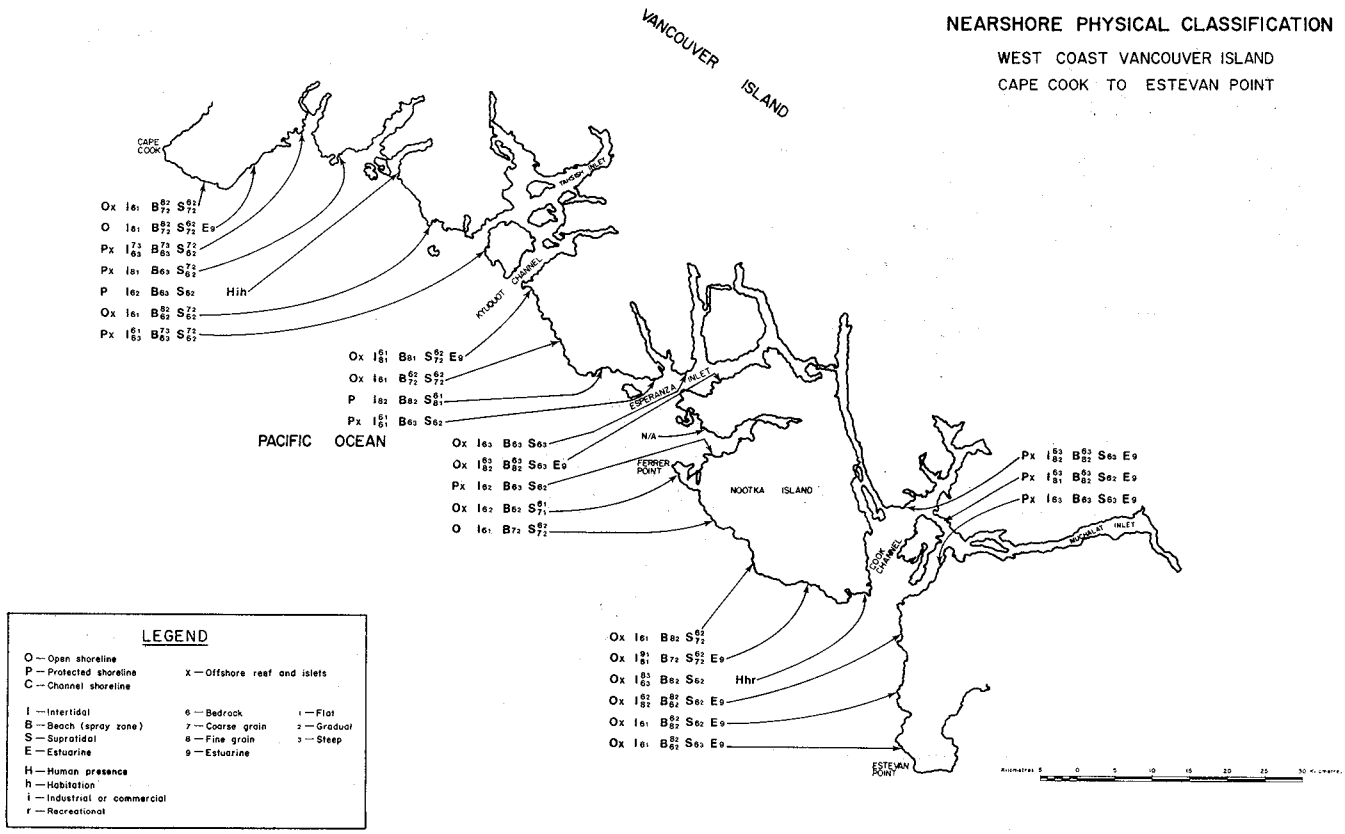
1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

WEST COAST VANCOUVER ISLAND

CAPE COOK TO ESTEVAN POINT



LEGEND

O — Open shoreline
P — Protected shoreline
C — Channel shoreline
X — Offshore reef and islets

I — Intertidal
B — Beach (spray zone)
S — Supratidal
E — Estuarine

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7 — Coarse grain
8 — Fine grain
9 — Estuarine

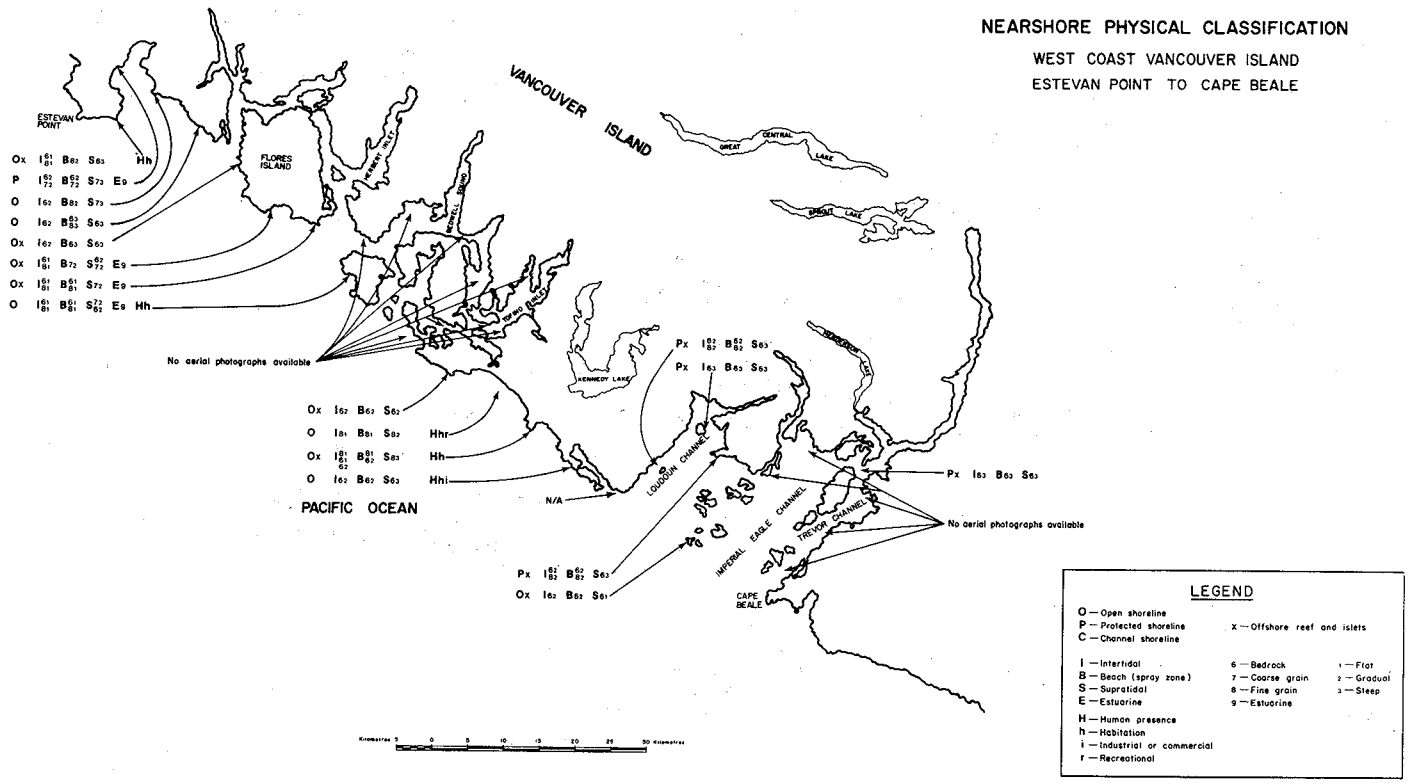
1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

WEST COAST VANCOUVER ISLAND

ESTEVAN POINT TO CAPE BEALE



LEGEND

O — Open shoreline
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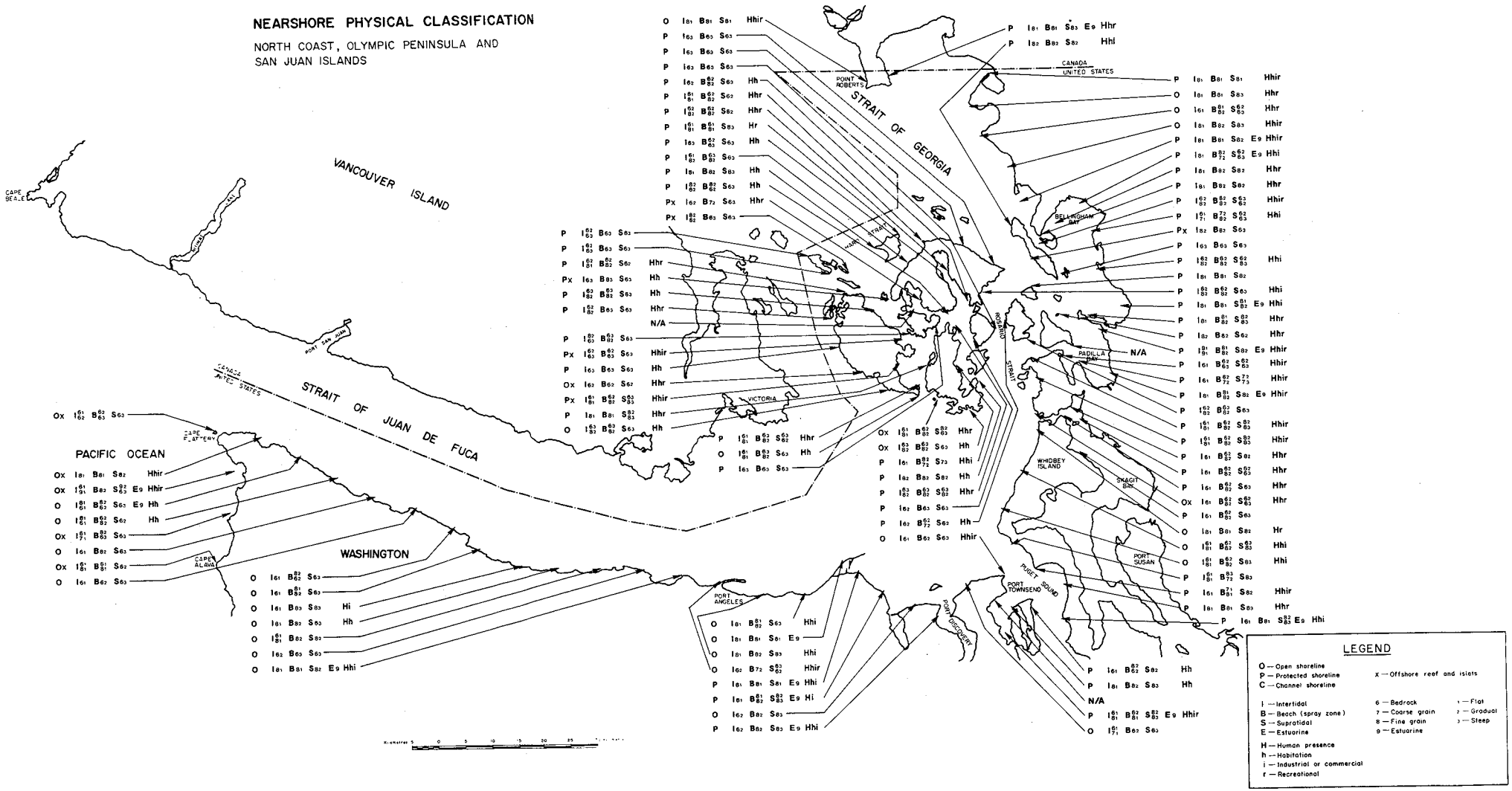
9 — Estuarine

1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

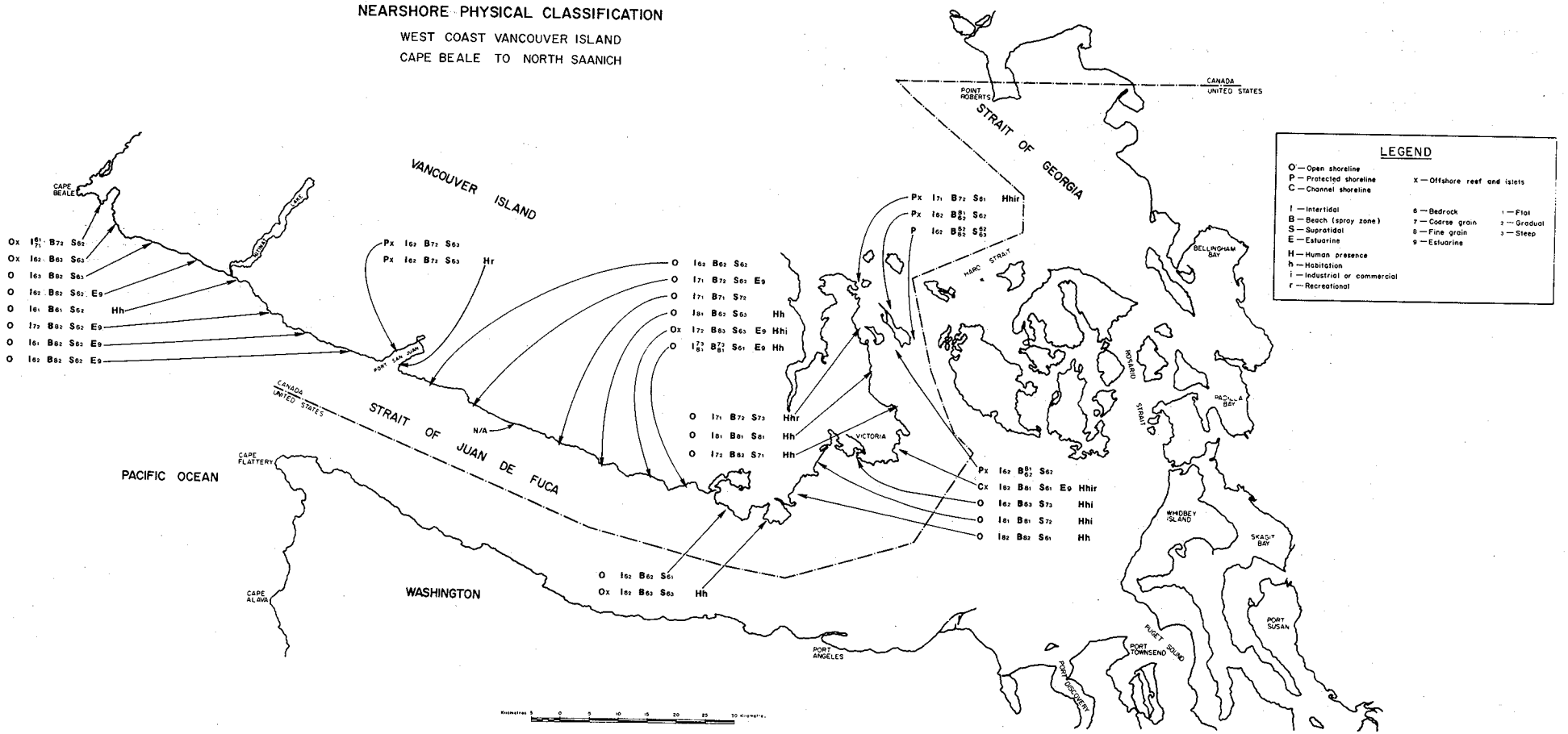
NORTH COAST, OLYMPIC PENINSULA AND
SAN JUAN ISLANDS



NEARSHORE PHYSICAL CLASSIFICATION

WEST COAST VANCOUVER ISLAND

CAPE BEALE TO NORTH SAANICH



LEGEND

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X — Offshore reef and islets

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B — Beach (spray zone)
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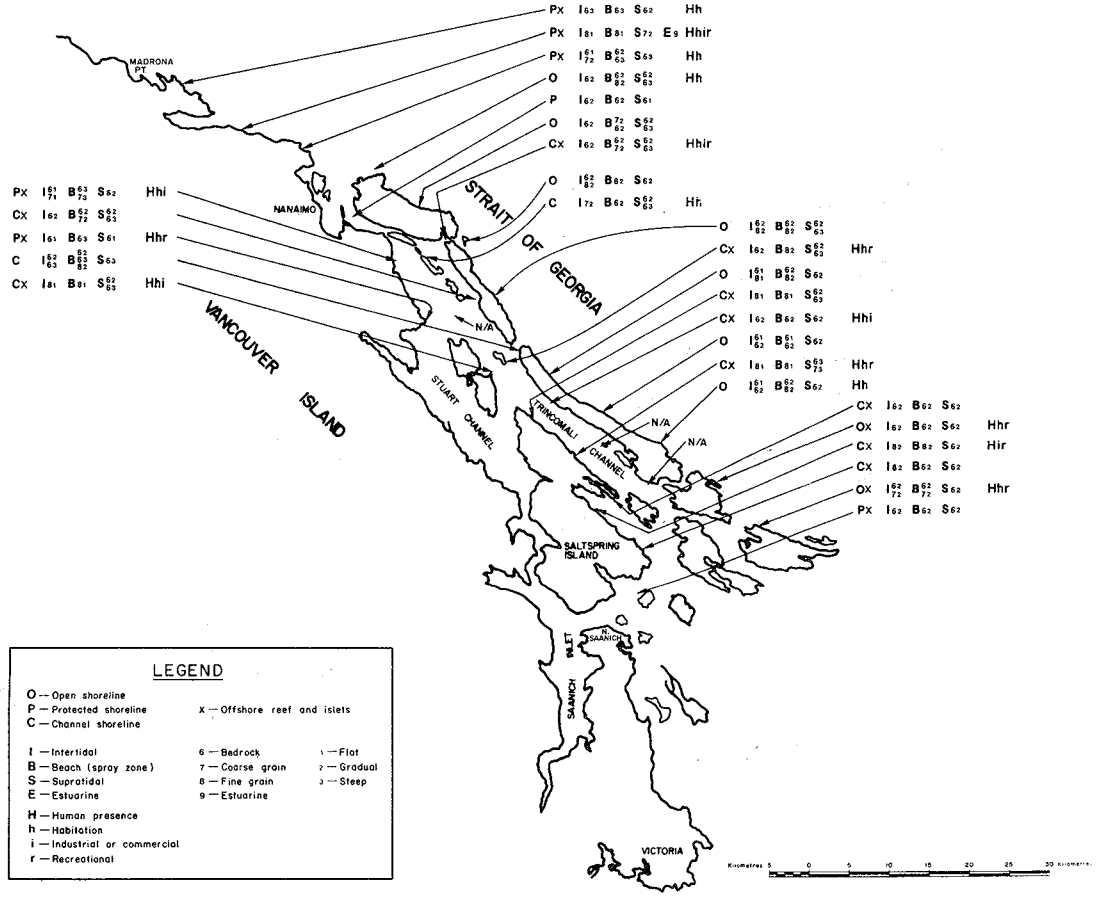
E — Estuarine
H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

6 — Bedrock
7 — Coarse grain
8 — Fine grain
9 — Estuarine

1 — Flat
2 — Gradual
3 — Steep

NEARSHORE PHYSICAL CLASSIFICATION

EAST COAST VANCOUVER ISLAND
NORTH SAANICH TO MADRONA POINT



LEGEND

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I — Intertidal
B — Beach (spray zone)
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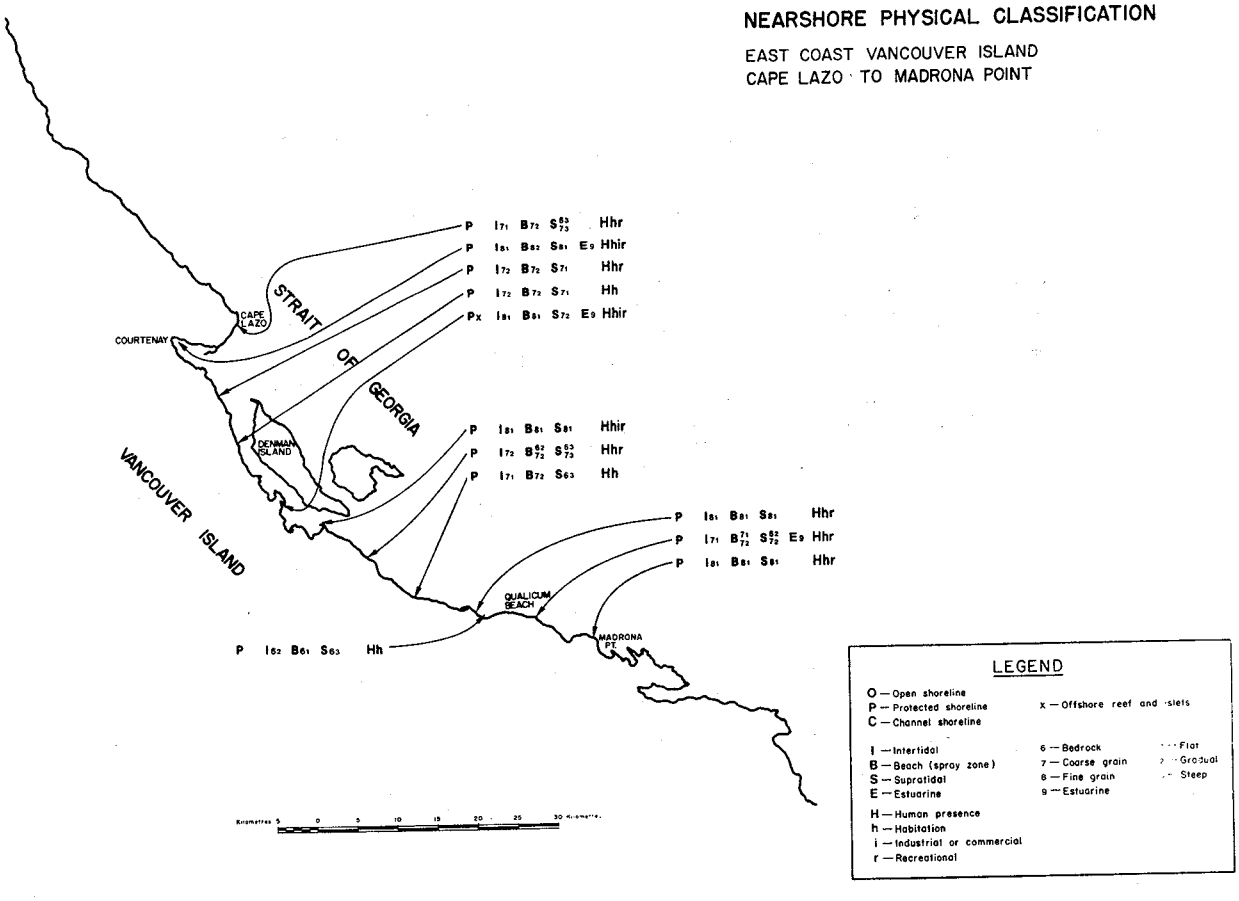
8 — Fine grain
9 — Estuarine

1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

EAST COAST VANCOUVER ISLAND
CAPE LAZO TO MADRONA POINT



LEGEND

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I — Intertidal
B — Beach (spray zone)
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E — Estuarine

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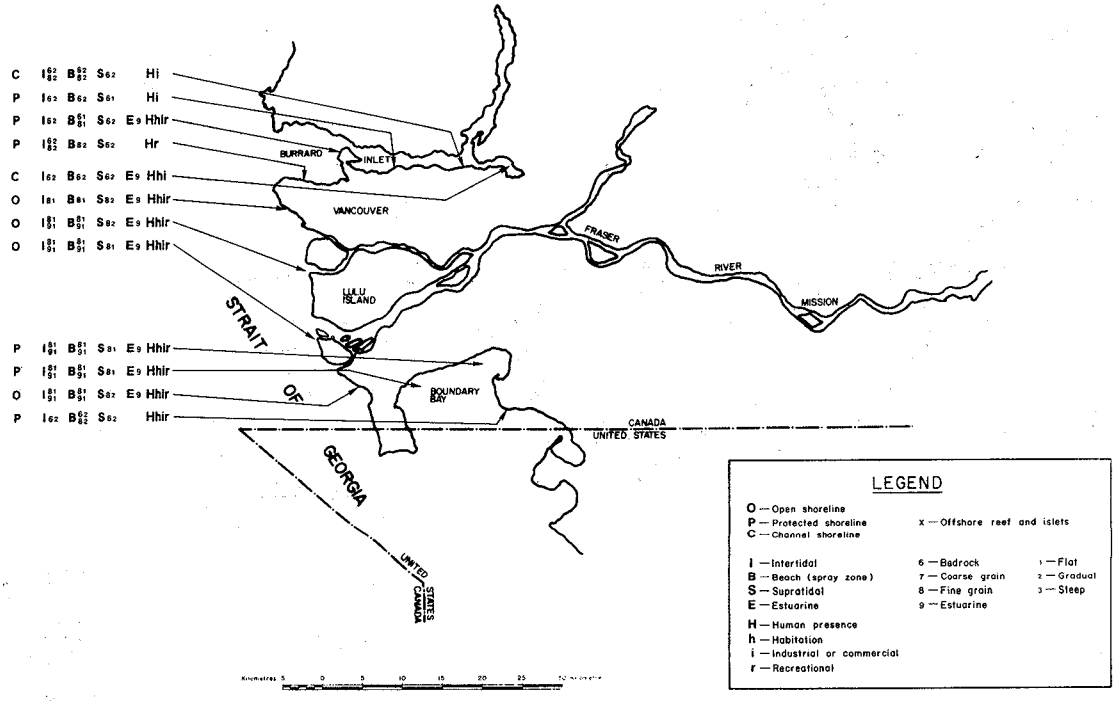
7 — Coarse grain
8 — Fine grain
9 — Estuarine

- - - Flat
? — Gradual
/ — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

FRASER RIVER DELTA
BURRARD INLET TO BOUNDARY BAY



LEGEND

O — Open shoreline
P — Protected shoreline
C — Channel shoreline
x — Offshore reef and islets

I — Intertidal
B — Beach (spray zone)
S — Supratidal
E — Estuarine

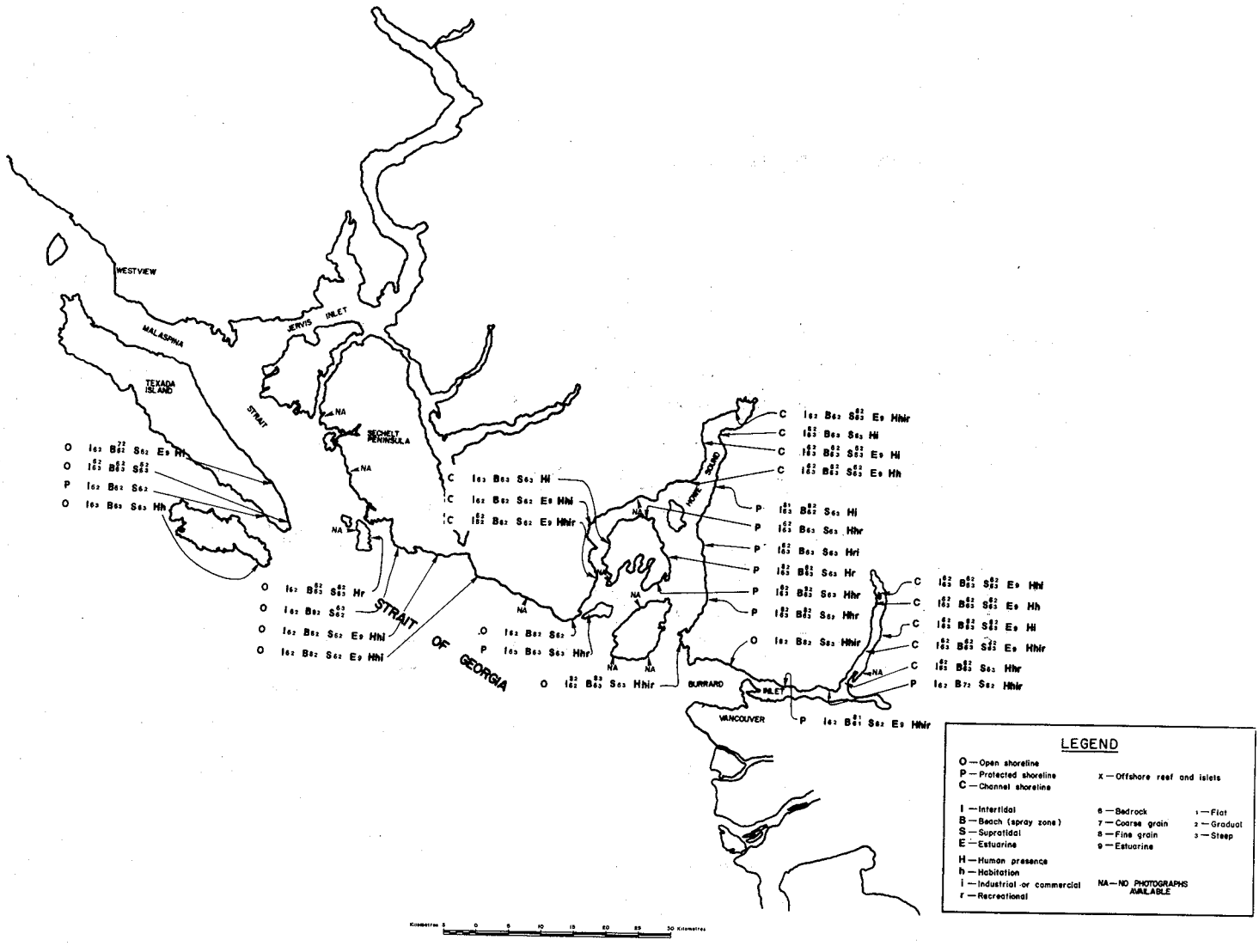
6 — Bedrock
7 — Coarse grain
8 — Fine grain
9 — Estuarine

1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NEARSHORE PHYSICAL CLASSIFICATION

SECHELT, HOWE SOUND AND INDIAN ARM
TEXADA ISLAND TO VANCOUVER



LEGEND

O — Open shoreline
P — Protected shoreline
C — Channel shoreline
X — Offshore reef and islets

I — Intertidal
B — Beach (spray zone)
S — Supratidal
E — Estuarine

6 — Bedrock
7 — Coarse grain
8 — Fine grain
9 — Estuarine

1 — Flat
2 — Gradual
3 — Steep

H — Human presence
h — Habitation
i — Industrial or commercial
r — Recreational

NA — NO PHOTOGRAPHS AVAILABLE

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

NORTH COAST QUEEN CHARLOTTE ISLANDS

LANGARA ISLAND TO ROSE SPIT

N = 11

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		45.0%
Ox		54.0%
P		9.0%
Px		
C		
Cx		
I6	1	22.7%
	2	22.7%
	3	9.0%
I7	1	
	2	4.5%
	3	
I8	1	45.5%
	2	4.5%
	3	
B6	1	
	2	12.5%
	3	18.1%
B7	1	
	2	4.5%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	54.5%
	2	9.0%
	3	9.0%
S6	1	4.5%
	2	59.0%
	3	18.1%
S7	1	
	2	
	3	
S8	1	25.0%
	2	
	3	
E9		27.0%
Hh		9.0%
Hi		
Hr		
Hhi		
Hhr		
Hhir		9.0%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

APPROACH TO PRINCE RUPERT

N = 64

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		18.8%
Ox		59.3%
P		3.1%
Px		1.6%
C		11.0%
Cx		
I6	1	21.8%
	2	57.8%
	3	8.5%
I7	1	0.78%
	2	0.78%
	3	1.56%
I8	1	5.4%
	2	1.56%
	3	
B6	1	18.75%
	2	30.46%
	3	17.96%
B7	1	
	2	9.37%
	3	3.12%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	7.81%
	2	10.93%
	3	
S6	1	3.90%
	2	60.93%
	3	27.34%
S7	1	
	2	2.34%
	3	2.34%
S8	1	0.78%
	2	0.78%
	3	
E9		23.43%
Hh		6.25%
Hi		4.68%
Hr		
Hhi		
Hhr		
Hhir		3.12%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

APPROACH TO KITIMAT - DOUGLAS CHANNEL

N = 23

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		
Ox		
P		
Px		
C		91.3%
Cx		8.7%
I6	1	2.1%
	2	19.6%
	3	65.2%
I7	1	
	2	
	3	2.1%
I8	1	6.5%
	2	2.1%
	3	2.1%
B6	1	
	2	6.5%
	3	73.9%
B7	1	
	2	4.3%
	3	6.5%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	4.3%
	2	2.1%
	3	2.1%
S6	1	
	2	15.2%
	3	80.4%
S7	1	
	2	
	3	
S8	1	4.3%
	2	
	3	
E9		21.7%
Hh		
Hi		4.3%
Hr		
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

WEST COAST QUEEN CHARLOTTE ISLANDS

LANGARA ISLAND TO BUCK POINT

N = 27

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		59.0%
Ox		29.6%
P		3.7%
Px		
C		7.4%
Cx		
I6	1	24.0%
	2	37.0%
	3	16.6%
I7	1	1.8%
	2	1.8%
	3	
I8	1	18.5%
	2	1.8%
	3	
B6	1	5.5%
	2	31.4%
	3	31.4%
B7	1	
	2	5.5%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	22.2%
	2	3.7%
	3	
S6	1	
	2	27.7%
	3	72.0%
S7	1	
	2	
	3	
S8	1	
	2	
	3	
E9		37.0%
Hh		3.7%
Hi		
Hr		
Hhi		
Hhr		
Hhir		7.4%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

WEST COAST QUEEN CHARLOTTE ISLANDS

BUCK POINT TO CAPE ST. JAMES

N = 36

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		41.6%
Ox		27.7%
P		2.7%
Px		19.4%
C		8.3%
Cx		
I6	1	2.7%
	2	34.7%
	3	41.6%
I7	1	
	2	6.9%
	3	
I8	1	6.9%
	2	6.9%
	3	
B6	1	
	2	5.5%
	3	79.2%
B7	1	
	2	8.3%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	4.2%
	2	2.7%
	3	
S6	1	
	2	13.8%
	3	86.1%
S7	1	
	2	
	3	
S8	1	
	2	
	3	
E9		19.4%
Hh		
Hi		2.7%
Hr		
Hhi		
Hhr		
Hhir		2.7%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

EAST COAST GRAHAM ISLAND - QUEEN CHARLOTTE ISLANDS

N = 18

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		88.9%
Ox		11.1%
P		
Px		
C		
Cx		
I6	1	8.3%
	2	11.1%
	3	
I7	1	8.3%
	2	
	3	
I8	1	69.4%
	2	2.7%
	3	
B6	1	
	2	5.6%
	3	2.7%
B7	1	
	2	
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	38.8%
	2	41.6%
	3	11.1%
S6	1	
	2	
	3	14.6%
S7	1	
	2	
	3	
S8	1	27.7%
	2	25.0%
	3	27.7%
E9		55.6%
Hh		16.7%
Hi		5.6%
Hr		5.6%
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

EAST COAST QUEEN CHARLOTTE ISLANDS

GRAY POINT TO CAPE ST. JAMES

N = 24

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		54.2%
Ox		29.2%
P		4.2%
Px		12.5%
C		
Cx		
I6	1	8.3%
	2	48.0%
	3	27.1%
I7	1	
	2	10.4%
	3	
I8	1	6.3%
	2	
	3	
B6	1	
	2	18.8%
	3	60.4%
B7	1	
	2	10.4%
	3	2.1%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	2.1%
	2	6.3%
	3	
S6	1	
	2	56.3%
	3	41.7%
S7	1	
	2	
	3	2.1%
S8	1	
	2	
	3	
E9		12.5%
Hh		
Hi		
Hr		
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

APPROACH TO KITIMAT

PRINCIPE CHANNEL, CAAMANO SOUND

N = 59

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		13.6%
Ox		17.0%
P		
Px		
C		51.0%
Cx		13.6%
I6	1	11.9%
	2	32.2%
	3	31.3%
I7	1	.84%
	2	7.6%
	3	4.2%
I8	1	3.4%
	2	3.4%
	3	
B6	1	5.9%
	2	31.3%
	3	32.2%
B7	1	.84%
	2	9.3%
	3	4.2%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	3.4%
	2	7.6%
	3	
S6	1	16.9%
	2	50.0%
	3	27.9%
S7	1	
	2	
	3	
S8	1	
	2	
	3	
E9		8.5%
Hh		
Hi		
Hr		
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

APPROACH TO BELLA COOLA

LAMA PASSAGE, SEAFORTH CHANNEL, FITZHUGH SOUND

N = 56

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		3.6%
Ox		34.0%
P		3.6%
Px		3.6%
C		16.1%
Cx		8.9%
I6	1	2.7%
	2	39.3%
	3	37.5%
I7	1	
	2	9.8%
	3	
I8	1	6.3%
	2	2.7%
	3	
B6	1	
	2	20.5%
	3	57.1%
B7	1	
	2	8.9%
	3	1.8%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	6.3%
	2	3.6%
	3	
S6	1	8.9%
	2	38.4%
	3	50.9%
S7	1	
	2	
	3	
S8	1	
	2	
	3	
E9		8.9%
Hh		1.8%
Hi		
Hr		5.4%
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

APPROACH TO BELLA COOLA

BURKE CHANNEL, BENTICK ARM

N = 26

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		
Ox		
P		
Px		
C		96.1%
Cx		3.8%
I6	1	1.9%
	2	13.4%
	3	57.6%
I7	1	
	2	11.5%
	3	1.9%
I8	1	1.9%
	2	11.5%
	3	
B6	1	
	2	9.6%
	3	63.4%
B7	1	
	2	11.5%
	3	5.7%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	
	2	13.4%
	3	
S6	1	
	2	7.6%
	3	92.3%
S7	1	
	2	
	3	
S8	1	
	2	
	3	
E9		19.2%
Hh		
Hi		3.0%
Hr		
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

WEST COAST VANCOUVER ISLAND

CAPE SUTIL TO CAPE COOK

N = 19

CLASSIFICATION

		PERCENTAGE OF OCCURRENCE
O		31.6%
Ox		52.6%
P		10.5%
Px		5.2%
C		
Cx		
I6	1	21.1%
	2	39.5%
	3	15.8%
I7	1	2.6%
	2	
	3	
I8	1	13.2%
	2	5.2%
	3	
I9	1	
	2	2.6%
	3	
B6	1	5.2%
	2	13.2%
	3	39.5%
B7	1	
	2	2.6%
	3	2.6%

CLASSIFICATION

		PERCENTAGE OF OCCURRENCE
B8	1	21.1%
	2	7.9%
	3	7.9%
B9	1	
	2	
	3	
S6	1	
	2	57.9%
	3	34.2%
S7	1	
	2	7.9%
	3	
S8	1	
	2	
	3	
E9		47.4%
Hh		
Hi		
Hr		
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

WEST COAST VANCOUVER ISLAND

CAPE COOK TO ESTEVAN POINT

N = 25

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		12.0%
Ox		52.0%
P		8.0%
Px		36.0%
C		
Cx		
I6	1	32.0%
	2	18.0%
	3	22.0%
I7	1	
	2	
	3	2.0%
I8	1	8.0%
	2	14.0%
	3	2.0%
I9	1	2.0%
	2	
	3	
B6	1	
	2	14.0%
	3	34.0%
B7	1	
	2	16.0%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	
	2	34.0%
	3	
B9	1	
	2	2.0%
	3	
S6	1	4.0%
	2	50.0%
	3	20.0%
S7	1	2.0%
	2	22.0%
	3	
S8	1	2.0%
	2	
	3	
E9		40.0%
Hh		
Hi		4.0%
Hr		4.0%
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

WEST COAST VANCOUVER ISLAND

ESTEVAN TO CAPE BEALE

N = 17

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		29.4%
Ox		41.0%
P		5.8%
Px		23.5%
C		
Cx		
I6	1	11.8%
	2	47.1%
	3	11.8%
I7	1	
	2	2.9%
	3	
I8	1	20.6%
	2	5.9%
	3	
B6	1	5.9%
	2	23.5%
	3	23.5%
B7	1	
	2	8.8%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	14.7%
	2	14.7%
	3	2.9%
S6	1	5.9%
	2	11.8%
	3	47.1%
S7	1	
	2	11.8%
	3	11.8%
S8	1	
	2	5.9%
	3	5.9%
E9		23.5%
Hh		17.6%
Hi		5.8%
Hr		5.8%
Hhi		
Hhr		
Hhir		

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

EAST COAST VANCOUVER ISLAND

CAPE BEALE TO BEECHY HEAD

N = 31

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		67.7%
Ox		25.8%
P		
Px		6.4%
C		
Cx		
I6	1	32.3%
	2	27.4%
	3	3.2%
I7	1	9.6%
	2	6.4%
	3	1.6%
I8	1	17.7%
	2	
	3	
I9	1	1.6%
	2	
	3	
B6	1	4.8%
	2	22.6%
	3	6.4%
B7	1	3.2%
	2	12.9%
	3	1.6%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	6.4%
	2	35.5%
	3	6.4%
B9	1	
	2	
	3	
S6	1	6.4%
	2	29.0%
	3	50.0%
S7	1	
	2	3.2%
	3	
S8	1	
	2	6.4%
	3	3.2%
E9		25.8%
Hh		19.4%
Hi		9.6%
Hr		3.2%
Hhi		
Hhr		
Hhir		9.6%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

EAST COAST VANCOUVER ISLAND

COURTENAY TO NANOOSE BAY

N = 11

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		18.2%
Ox		
P		72.7%
Px		9.1%
C		
Cx		
I6	1	
	2	
	3	
I7	1	27.3%
	2	27.3%
	3	
I8	1	45.5%
	2	
	3	
B6	1	
	2	4.5%
	3	
B7	1	4.5%
	2	45.5%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	36.4%
	2	9.1%
	3	
S6	1	
	2	9.1%
	3	18.2%
S7	1	18.2%
	2	13.6%
	3	4.5%
S8	1	36.4%
	2	
	3	
E9		27.3%
Hh		18.2%
Hi		
Hr		
Hhi		
Hhr		54.5%
Hhir		27.3%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

HOWE SOUND AREA

SECHELT TO INDIAN ARM

N = 33

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		30.3%
Ox		
P		30.3%
Px		3.0%
C		30.3%
Cx		6.0%
I6	1	
	2	57.6%
	3	31.8%
I7	1	
	2	
	3	
I8	1	1.5%
	2	9.1%
	3	
B6	1	1.5%
	2	30.3%
	3	36.4%
B7	1	
	2	4.5%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	1.5%
	2	24.2%
	3	1.5%
S6	1	
	2	42.4%
	3	54.5%
S7	1	
	2	
	3	
S8	1	
	2	
	3	3.0%
E9		63.6%
Hh		12.1%
Hi		18.2%
Hr		6.1%
Hhi		12.1%
Hhr		15.2%
Hhir		24.2%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

EAST COAST VANCOUVER ISLAND INCLUDING GULF ISLANDS

NANOOSE BAY TO NORTH SAANICH

N = 44

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		18.0%
Ox		9.0%
P		6.8%
Px		18.0%
C		9.0%
Cx		38.6%
I6	1	13.6%
	2	37.5%
	3	7.0%
I7	1	
	2	8.0%
	3	7.0%
I8	1	18.2%
	2	9.1%
	3	
B6	1	2.3%
	2	37.5%
	3	11.4%
B7	1	3.4%
	2	13.6%
	3	2.3%

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	13.6%
	2	16.0%
	3	
S6	1	4.5%
	2	48.9%
	3	33.0%
S7	1	
	2	6.8%
	3	5.7%
S8	1	
	2	1.1%
	3	
E9		9.0%
Hh		25.0%
Hi		11.4%
Hr		20.5%
Hhi		
Hhr		
Hhir		9.0%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

FRASER RIVER

POINT ROBERTS TO POINT GREY

N = 11

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		36.4%
Ox		
P		45.5%
Px		
C		18.2%
Cx		
I6	1	
	2	36.4%
	3	
I7	1	
	2	
	3	
I8	1	31.8%
	2	9.1%
	3	
I9	1	22.7%
	2	
	3	
B6	1	
	2	27.3%
	3	
B7	1	
	2	
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	31.8%
	2	18.2%
	3	
B9	1	22.7%
	2	
	3	
S6	1	9.1%
	2	36.4%
	3	
S7	1	
	2	
	3	
S8	1	27.3%
	2	27.3%
	3	
E9		63.6%
Hh		
Hi		27.3%
Hr		
Hhi		
Hhr		
Hhir		63.6%

NEARSHORE PHYSICAL CLASSIFICATION SUMMARY

SOUTH COAST VANCOUVER ISLAND

BEECHY HEAD TO NORTH SAANICH

&

WEST COAST STATE OF WASHINGTON

N = 103

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
O		21.3%
Ox		6.7%
P		6.5%
Px		6.5%
C		
Cx		1.9%
I6	1	19.4%
	2	20.4%
	3	11.7%
I7	1	2.9%
	2	1.0%
	3	
I8	1	31.5%
	2	12.6%
	3	
I9	1	.5%
	2	
	3	
B6	1	.5%
	2	18.9%
	3	18.4%
B7	1	.5%
	2	6.8%
	3	

CLASSIFICATION		PERCENTAGE OF OCCURRENCE
B8	1	21.8%
	2	32.5%
	3	.5%
B9	1	
	2	
	3	
S6	1	2.9%
	2	13.1%
	3	37.9%
S7	1	
	2	2.9%
	3	3.4%
S8	1	6.3%
	2	17.5%
	3	16.5%
E9		12.6%
Hh		15.5%
Hi		17.5%
Hr		24.3%
Hhi		
Hhr		
Hhir		18.4%

APPENDIX VII

SALMON ESCAPEMENTS

In several sections of Volume I of this report, salmon were reported as being relatively vulnerable to oil spills, particularly in their juvenile stage. Since there are very few estimates made of the number of juvenile salmonids produced by streams in B.C., it was decided to use the abundance of adult spawners reaching the natal stream as an indicator of juvenile abundance. The method used to derive such figures is presented in this appendix.

Since the early 1930's, the Fisheries and Marine Service has maintained a record of spawning escapements for most British Columbian salmon streams. Inasmuch as there are escapement records for more than 2500 streams, it was decided that the most manageable way of presenting the information was to summarize the escapement data for all streams within each of the 29 statistical or management areas of the coast, as shown on the summary pages following this introduction. First, the highest escapement for each species for each stream in each statistical area was recorded as a reflection of the potential productivity of the stream. Then, an arbitrary numerical definition of escapement significance was determined for each species. These subjective definitions were as follows:

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
Sockeye	<500	500 - 5,000	>5,000
Chinook	<100	100 - 5,000	>5,000
Coho	<100	100 - 5,000	>5,000
Pink	<2,000	2,000 - 25,000	>25,000
Chum	<2,000	2,000 - 25,000	>25,000

Though subjective, this classification of significance took into account the average commercial value of each species, the ratio of catch to escapement and relative recreational significance. From this information, it was then possible to tabulate by species the number of streams falling into each category for each statistical area and map stream locations and species importance. Tabulations and maps are presented on the following pages of this appendix.

Although this classification of significance scheme was not used in the development of resource risk indices, it was prepared as a means of summarizing the large data volume available on salmon escapements on the West Coast.

PREPARED BY: R. Bell-Irving, Fisheries and Marine Service

ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 1.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1	2	4
CHINOOK			1
COHO		7	8
PINK	1	3	11
CHUM	3	5	3

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 1)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AIN RIVER & LAKE SYSTEM	7,500		7,500	75,000	125,000
2	AWUN RIVER & LAKE	7,500		1,500	35,000	35,000
3	DATLEMAN RIVER	25		1,500	100,000	1,000
4	DAVIDSON CREEK			60,000	100,000	5,000
5	DINAN CREEK			2,000	35,000	400
6	HEILLEN RIVER			7,500	7,500	
7	JALLUN RIVER	3,500		15,000	75,000	
8	KUMDIS RIVER			7,500	1,000	
9	LIGNITE CREEK			15,000	100,000	5,000
10	MAMIN RIVER	750		5,000	100,000	
11	McLINTON CREEK			1,500	35,000	3,500
12	NADEN RIVER & LAKE SYSTEM	50,000		50,000	175,000	75,000
13	SANGAN CREEK			3,500	3,500	1,000
14	STANLEY CREEK			5,000	3,500	4,000
15	YAKOUN RIVER & LAKE SYSTEM	25,000	15,000	35,000	800,000	15,000
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 2W.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1	1	1
CHINOOK			
COHO	7	35	1
PINK	16	19	10
CHUM	4	49	8

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 2W)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BONANZA CREEK				70,000	
2	BOOMCHAIN BAY			300	20,000	10,000
3	BOTANY BAY			200		10,000
4	BOTANY INLET (HEAD)			1,000		30,000
5	BOTANY INLET (OUTER)			50	50	1,500
6	BOTTLE INLET CREEK			200	300	20,000
7	BROWNS CABIN CREEK			2,000	100,000	20,000
8	BUCK CHENNEL				900	10,000
9	CANOE PASS CREEK			100	5,000	50,000
10	CELESTIAL RIVER				25,000	5,000
11	CLAPP BASIN CREEK					2,500
12	COATES RIVER					5,000
13	DAWSON HARBOUR (E)			7,500	7,500	35,000
14	DAWSON INLET (W)			400	1,200	8,000
15	DOUGLAS INLET (HEAD)			50	200	6,000
16	DOUGLAS INLET (RIGHT)					2,000
17	EDWARDS CREEK					3,500
18	FLAMINGO CREEK			500	500	20,000
19	FLAT CREEK			1,200	15,000	75,000
20	GIVENCHY ANCHORAGE			400	500	3,500
21	GOLD (MITCHELL) HARBOUR			50	7,500	15,000
22	GOSKI CREEK					3,500
23	GREGORY CREEK				34,000	
24	HOBBS CREEK					2,000
25	INDIAN BAY(CLONDARD BAY) CREEK			50	200	2,500

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	INSKIP CREEK				3,500	7,500
27	KAISUN CREEK			500	120,000	3,500
28	KANO INLET (HEAD)			200	30,000	5,000
29	KANO INLET (OUTER)			200	7,500	200
30	KOOTNEY INLET (NORTH)			1,500	7,500	50,000
31	KOOTNEY INLET (SOUTH)			200	3,500	4,500
32	LOMGON CREEK			750	300	7,500
33	LOUSCONNE CREEK			1,500	4,000	20,000
34	MACE CREEK			2,000		120,000
35	MERCER CREEK	7,000		1,500	20,000	35,000
36	MOUNTAIN RIVER			50	400	8,000
37	MUDGE INLET					3,500
38	NESTO INLET (OUTER)					5,000
39	NESTO INLET (INNER)					8,000
40	NEWCOMBE					
41	OTARD BAY			300	35,000	75
42	PEEL INLET (HEAD)			750	7,500	15,000
43	PEEL INLET (1ST LEFT H.)			750		15,000
44	PEEL INLET (2ND L.H.)			200	2,500	15,000
45	PORT LOUIS					2,500
46	RILEY CREEK			400	100,000	13,500
47	RENNEL CREEK				200	3,500
48	ROCKRUN CREEK				3,500	4,000
49	SEAL INLET			1,000	15,000	15,000
50	SECURITY INLET (L.H.)			3,500	60,000	15,000
51	SECURITY INLET (HEAD)			3,500	35,000	7,500
52	SHIELDS CREEK			100		7,500
53	SPERM BAY CREEK					2,500
54	STAKI CREEK			200	750	7,500
55	STEEL CREEK					10,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	TARTU INLET (HEAD)			200	23,000	7,500
57	TARTU INLET (OUTER)			200	35,000	3,500
58	TASU CREEK	25		1,000	10,000	100,000
59	TROUNCE			3,500	400	15,000
60	TROUNCE (REAR)			50	400	3,500
61	WEST NARROWS CREEK			400	25,000	15,000
62	WRIGHT (FAIRFAX) CREEK	2,000		3,500	750	7,500
63	YAKOUN TRAIL			30	1,500	15,000
64	YAKULANAS CREEK					1,500
65						
66						
67						
68						
69						
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						
81						
82						
83						
84						
85						

ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 2E.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1		2
CHINOOK		1	
COHO	9	57	10
PINK	31	23	13
CHUM	19	49	14

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 2E)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALDER ISLAND CREEK			100	3,000	1,500
2	ANNA INLET CREEK				900	200
3	ARROW CREEK			300	3,500	3,500
4	BAG HARBOUR CREEK			6,000	4,000	35,000
5	BELIJAY BAY CREEK			50	200	6,000
6	BIG GOOSE BAY			1,500	20,000	15,000
7	BREAKER BAY CREEK			7,000	16,500	
8	BURNABY NARROWS CREEK					2,000
9	CARMICHAEL CREEK					3,000
10	CARPENTER BAY CREEKS (2)			750	800	15,000
11	CHADSEY CREEK			1,500	500	10,000
12	COLLISON CREEK			750	750	1,750
13	COPPER RIVER	35,000		35,000	150,000	400
14	CRESCENT INLET			2,000	30,000	12,000
15	DANA CREEKS (3)			200	75	30,000
16	DASS CREEK			100	10	750
17	DEENA RIVER			14,000	200,000	75,000
18	EAST NARROWS CREEK				7,500	7,500
19	ECHO HARBOUR CREEK			5,000	14,000	5,000
20	FANNY CREEK					1,000
21	FORGOTTEN CREEK			200	50	2,500
22	GEORGE BAY CREEK			500	700	35,000
23	GRAY BAY CREEK			500	600	500
24	GRAYS CABIN CREEK (OUTLOOK)			250	750	3,500
25	HAANS CREEK			3,500	15,000	15,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	HARRIET BAY CREEK			400	750	20,000
27	HEATER HARBOUR CREEK			750		3,000
28	HONNA RIVER			1,500	50,000	35,000
29	HUSTON CREEK			200	50	35,000
30	HUTTON INLET (L.H. CREEK)			75	2,500	8,000
31	HUTTON INLET (HEAD)			75	20,000	12,000
32	INDIAN CABIN CREEK			400	200	7,500
33	ISLAND BAY CREEKS			400		15,000
34	ISLAND BAY CREEK (R.H.)			750		5,500
35	IKEDA BAY CREEK			1,000	25	10,000
36	JEDWAY CREEK			75		3,500
37	JUNGLE CREEK			600		
38	KOSTAN INLET CREEK			150	100	2,200
39	KOYA BAY CREEK			200	8,000	2,500
40	LAGOON BAY CREEK			6,000	3,000	40,000
41	LITTLE GOOSE CREEK			2,000	8,000	8,000
42	LONGARM CREEK			750	35,000	100,000
43	LUXANA CREEK			50	750	700
44	McMILLAN CREEK			300	1,000	300
45	MARKER CREEK			75		2,000
46	MATHERS CREEK	20,000	100	20,000	100,000	50,000
47	MOODY CREEK			400		1,700
48	MOORE CREEK			50		6,500
49	MUD BAY CREEK					2,000
50	OYSTER COVE CREEK			3,000	5,500	70,000
51	PACOFI CREEK			200	700	4,000
52	PALLANT CREEK	300		50,000	100,000	100,000
53	POWRIVCO CREEK			120	750	15,000
54	RASPBERRY COVE CREEK				400	1,500
55	RICHARDSON CREEK			100	750	7,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	SACHS CREEK			3,500	14,000	1,500
57	SALMON RIVER			75,000	100,000	7,500
58	SALTSPRING BAY			400	400	3,500
59	SANDY CREEK			150		1,500
60	SCUDDER POINT CREEK			500	27,500	400
61	SECTION COVE (MAIN CREEK)					300
62	SECTION COVE (MIDDLE CREEK)					250
63	SECTION COVE (CABIN CREEK)					
64	SEDMOND RIVER			5,000	7,500	35,000
65	SEDGWICK BAY CREEK			750	400	15,000
66	SEWELL INLET (R.H.)					
67	SEWELL INLET CREEK (1ST L.H.)			750	400	3,500
68	SEWELL INLET CREEK (HEAD)			5,000	2,000	30,000
69	SEWELL INLET CREEK (2ND L.H.)			200		3,500
70	SEWELL INLET 3RD R.H.			40	200	800
71	SKAAT HARBOUR CREEK (CENTRE)			400		15,000
72	SKAAT HARBOUR CREEK (L.H.)			750	1,000	9,000
73	SKAAT HARBOUR CREEK (R.H.)			400		1,500
74	SKEDANS CREEK			7,500	175,000	750
75	SLATECHUCK CREEK			1,500	15,000	35,000
76	SOUTH BAY CREEK			2,500	10,000	10,000
77	SOUTH COVER CREEK (2)			2,000	200	2,000
78	TAKELLY COVE CREEK					10,000
79	TANGLE COVE CREEK			3,500	1,500	15,000
80	TAR ISLAND GATE CREEK			1,500	20,000	7,500
81	TARUNDL CREEK			1,500	500	10,000
82	TLELL RIVER			75,000	100,000	
83	THURSTON HARBOUR CREEK			400	2,300	9,000
84	WATERFALL CREEK			25	40	5,000
85	WERNER BAY SOUTH			1,000	33,000	5,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
86	WERNER BAY NORTH (2 STREAMS)			2,000	10,000	20,000
87	WERNER BAY S.L.H.			500	20,000	5,000
88	WINDY BAY CREEK			400	100,000	3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 3. (LOWER NASS)

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE		2	
CHINOOK		6	
COHO		14	1
PINK		11	7
CHUM	4	9	5

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 3 (LOWER NASS)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BEAR RIVER	2,500		3,500	7,500	7,500
2	BURTON CREEK				40,000	750
3	CASCADE RIVER			400	7,500	3,500
4	CHAMBERS CREEK		1,500		15,000	800
5	DOGFISH CREEK			500		35,000
6	DONAHUE CREEK		400		3,500	4,000
7	ENSHESHESE RIVER			1,500	35,000	6,000
8	GEORGIA RIVER		1,500	15,000	7,500	15,000
9	ILLIANCE RIVER			3,500	35,000	3,500
10	KHUTZEYMATEEN RIVER		3,500	3,500	75,000	35,000
11	KINKOLITH RIVER		400	1,500	35,000	1,500
12	KITSAULT RIVER		750	2,000	3,500	35,000
13	KSHWAN RIVER			1,500	35,000	25,000
14	LAMACH CREEK			1,500	7,500	3,000
15	LEVERSON CREEK	750		1,500	15,000	3,500
16	NASS HARBOUR CREEK					
17	SIMPSON CREEK			750	7,500	
18	STAGCO RIVER				15,000	70,000
19	TOON RIVER			1,500	35,000	35,000
20	TRACY CREEK			200	8,000	200
21	TURK CREEK					
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 3. (UPPER NASS)

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	3	3	6
CHINOOK	3	5	5
COHO	4	21	4
PINK	9	9	3
CHUM	11	5	1

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 3 (UPPER NASS)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AMERICAN CREEK	NO RECORDS AVAILABLE				
2	ANLIYEN CREEK			200		
3	ANSEDAGAN CREEK			750	3,500	7,500
4	BELL-IRVING RIVER	NO RECORDS AVAILABLE				
5	BITTER CREEK	NO RECORDS AVAILABLE				
6	BOWSER RIVER	42,045				
7	CRANBERRY RIVER		3,500	3,500	1,500	
8	DAM DOCHAX CREEK	12,000	75,000			
9	DISKANGIEG CREEK			1,800		
10	ELOWIN CREEK					7,500
11	FORKWINYARK CREEK			50		
12	GINGIT CREEK	15,000		750	3,500	750
13	GINLULUK CREEK			3,500	50	50
14	GITZON CREEK	100	400	750	1,500	400
15	HANNA CREEK	NO RECORDS AVAILABLE				
16	HORN CREEK	NO RECORDS AVAILABLE				
17	ISHKEENISH	50	3,500	7,500	35,000	1,500
18	KEADEN CREEK	NO RECORDS AVAILABLE				
19	KINSKUCH RIVER		30	50	50	
20	KITEEN RIVER		1,500	3,500		
21	KONICUS CREEK	NO RECORDS AVAILABLE				
22	KOTSINTA CREEK	NO RECORDS AVAILABLE				
23	KSEDIN RIVER			400	3,500	1,500
24	KWINACEESE RIVER	15,000	7,500	400		
25	KWINATAHI RIVER	NO RECORDS AVAILABLE				

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	KWINHAK CREEK			3,500	3,500	250
27	MCKNIGHT CREEK			125		
28	MCLEOD CREEK	NO RECORDS AVAILABLE				
29	MANZANITA COVE CREEK			200	5,000	
30	MEZIADIN RIVER	235,000	5,000	8,500	86	
31	MEZIADIN LAKE	235,000	5,000	8,500	86	
32	NASOGA GULF CREEK				1,000	
33	NASS RIVER	271,400	1955000	41,100	236,100	121,700
34	OWEEGEE RIVER	250	500	600		
35	OWL CREEK					800
36	QUILGAUW CREEK			200		
37	RAINY CREEK			250		
38	SAILYSOUT CREEK	NO RECORDS AVAILABLE				
39	SANSIXMOR CREEK	NO RECORDS AVAILABLE				
40	SEASKINNISH CREEK	500	7,500	3,500	3,500	3,500
41	SHUMAL RIVER		UK	UK	UK	
42	SLOWMALDO CREEK	NO RECORDS AVAILABLE				
43	SNOWBANK CREEK		UK	UK		
44	STENSTROM CREEK	NO RECORDS AVAILABLE				
45	STROHN CREEK	NO RECORDS AVAILABLE				
46	STUMAUN RIVER			750	7,500	
47	SURPRISE CREEK	NO RECORDS AVAILABLE				
48	TAFT CREEK	NO RECORDS AVAILABLE				
49	TAYLOR RIVER	NO RECORDS AVAILABLE				
50	TCHITIN RIVER		10	50		
51	TKNOUK		100		35,000	2,000
52	TODD CREEK	NO RECORDS AVAILABLE				
53	TREATY CREEK	NO RECORDS AVAILABLE				
54	TSEAX RIVER	3,500	7,500	15,000	8,000	3,500
55	VETTER CREEK			2,500	700	1,700

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	WEGILIDAP CREEK			50	200	50
57	WEST TAYLOR CREEK	NO RECORDS AVAILABLE				
58	WILYAYAANOOTH CREEK				300	
59	YAZA CREEK	NO RECORDS AVAILABLE				
60	ZORDZAP SLOUGH			250	15	500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 4. (LOWER SKEENA)

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	2		3
CHINOOK	1	8	
COHO	1	15	2
PINK	2	12	7
CHUM	8	4	

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 4 LOWER SKEENA)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BEAVER CREEK	400				
2	BIG FALLS CREEK		75		1,500	200
3	BIG USELESS CREEK			1,500	35,000	
4	CLEARWATER CREEK		2,500		5,000	
5	KLOYIA (CLOYA) CREEK		1,500	1,500	4,000	400
6	DENIS CREEK			400	3,500	3,000
7	DIANA CREEK	10,000	400	7,500	400	25
8	ECKSTALL RIVER	250	3,500	3,500	25,000	20,000
9	GIVRALTAR CREEK				7,500	1,500
10	HUMPBACK BAY CREEK			400	30,000	
11	JOHNSON CREEK		3,500	1,000	4,500	1,500
12	JOHNSTON LAKE	7,500	200	75		100
13	KYEK RIVER		750	7,500	60,000	10,000
14	LAHON (PEARL HARBOUR) CREEK			3,500	200,000	
15	LITTLE USELESS CREEK			400	15,000	
16	LOCKERBY CREEK			1,500	7,500	75
17	MOORE COVE CREEK			3,500	130,000	
18	MUDDY CREEK				3,500	
19	McNICOL CREEK			1,500	7,500	
20	OONA RIVER			3,500	50,000	
21	SHAWTATAN CREEK	7,500	200	3,500	2,000	200
22	SILVER CREEK			1,500	3,500	7,500
23	SPILLER CREEK			1,500	40,000	
24						
25						

ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 4 (UPPER SKEENA)

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	16	29	28
CHINOOK	15	28	5
COHO	9	86	13
PINK	36	17	12
CHUM	23	5	

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 4 UPPER SKEENA)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALLISTAIR LAKE	7,500		7,500		
2	ALWYN RIVER			25		
3	ANDESIDE CREEK				750	1,500
4	ANDULUS CREEK	150		500		
5	ASITKA LAKE	300		25		
6	ATNA LAKE	500				
7	AZUKLOTZ CREEK	4,000		400		
8	UPPER BABINE RIVER	12,000	2,500	3,000	20,000	100
9	UPPER BABINE RIVER 3&4	302,000	16,000	12,500	297,000	15
10	UPPER BABINE RIVER 2	127,000		4,500		
11	BABINE RIVER 1	183,000		4,500		
12	BABINE LAKE	143,000				
13	BEAR LAKE	15,000		750		
14	BEAR RIVER	6,000	50,000	2,000	15,000	
15	BEIRNESS CREEK			300	1,000	
16	BIRDFALL CREEK					
17	BOUCHER (MacDONALD) CREEK	4,000		200	800	
18	BUCK CREEK		50	600	100	
19	BUCKLEY BELOW HOUSTON	1,500	500	5,000	30,000	
20	BUCKLEY ABOVE HOUSTON	600	2,000	75,000	500	
21	BURDOCK (STONEY) CREEK			75	1,000	
22	CANYON CREEK			400		
23	CARR CREEK			400		
24	CAUSQUA CREEK				800	
25	CEDAR CREEK			1,000	5,000	

STREAM No.	STREAM NAME	SPECIES SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	CEDAR RIVER	3,000	1,500	2,000		25
27	CHICAGO CREEK			100	750	
28	CHINDEMASH CREEK		NO FISH	OBSERVED		
29	CLEAR CREEK	1,500	400	1,500		
30	CLEARWATER CREEK	400		3,500		
31	CLIFFORD CREEK			400		
32	CLUB CREEK UPPER	2,500	100	2,000		
33	CLUB CREEK LOWER	3,500		1,500		
34	COHO CREEK	1,200		3,500		
35	COMEAU CREEK			300	300	
36	CROSS CREEK	5,000				
37	CULLON CREEK		25	400	1,500	
38	DATE CREEK		50	400	400	500
39	DEEP CREEK		400	1,500	3,500	200
40	DOG TAG CREEK		25	750	400	750
41	DONALDS CREEK	800				
42	DRIFTWOOD CREEK			300		
43	DRY CREEK	500		750		
44	DUTI RIVER					
45	EXCHAMSIKS RIVER	400	300	3,500	7,500	200
46	EXSTEW RIVER	200	200	3,500	1,500	25
47	EXSTEW SLOUGH				100,000	750
48	FALLS CREEK	15,000		400		
49	FIDDLER CREEK		200	750	1,500	200
50	FINDLAY CREEK		100	300		
51	FIVE MILE CREEK	400				
52	FORKS CREEK	1,000				
53	FOUR MILE CREEK	11,000				
54	FULTON RIVER	274,426		1,500		
55	FULTON SPAWNING CHANNEL [1]	26,031				

STREAM No.	STREAM NAME	SPECIES SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	FULTON SPAWNING CHANNEL [2]	112,062				
57	GITNADOIX RIVER		750	35,000	7,500	3,500
58	GLACIER CREEK	750		750		
59	GLEN VOWEN CREEK			200	200	
60	GOAT CREEK	400	25	400		
61	GOSHNELL CREEK			5,000		
62	GRIZZLY (SHASS) CREEK	30,000		150		
63	GROUSE CREEK		50	500	1,000	
64	HATCHERY CREEK	60		200		
65	HAYWARD CREEK			200	5,000	
66	HAZELTON CREEK				1,500	
67	HEAVNER CREEK			500	3,000	
68	HERMAN CREEK			1,500	1,500	
69	IRONSIDE CREEK			3,500		
70	JOHANSEN LAKE	600		75		
71	KADEEN CREEK			3,500		
72	KASIKS RIVER		400	7,500	1,500	400
73	KATHLYN (CHICKEN) CREEK		800		2,500	60
74	KEW CREEK	400				
75	KISPIOX RIVER		15,000	35,000	750,000	15,000
76	KITSEGUKLA RIVER		25	3,500	300	
77	LOWER KITSUMGALLUM RIVER		7,500	7,500	25	1,500
78	KITSUMGALLUM LAKE	1,500				
79	UPPER KITSUMGALLUM (BEAVER) RIVER	1,500	400	7,500		
80	KITWANGA RIVER	400	700	750	235,000	6,000
81	KLEANZA (GOLD) CREEK		25	750	10,000	400
82	KLUAYAZ CREEK	600		300		
83	KLUATANTAN RIVER	50				
84	KULDO CREEK					
85	KWINITZA RIVER			75	1,200	

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
86	LAKELSE RIVER	6,000	400	75,000	1,321,000	5,000
87	LEAN TO CREEK		25	400	200	
88	LOWRY CREEK				750	
89	McCULLEY CREEK		75	400	200	200
90	McDONNEL LAKE AREA (EXT. OF 76)	6,000	200	3,500		
91	McQUEEN CREEK			750	200	
92	MALLOCH CREEK					
93	MAXAN CREEK	300		500		
94	MORICE LAKE	300				
95	MORICE LAKE	3,000	15,000	10,000	50,000	
96	MORRISON (HATCHERY) CREEK	35,000		800		
97	MOSQUE RIVER					
98	MOTASE LAKE	3,000		200		
99	MURDER CREEK			500		
100	NANGEESE RIVER		200	1,500	750	
101	NANIKA RIVER	75,000	400	500		
102	NICHOLSON CREEK			100	300	
103	NILKITKWA RIVER	400	250	400		
104	NINE MILE CREEK	4,000		100	940	
105	NITCHYESKWA RIVER		800	1,000	2,000	
106	OWEN CREEK			400	12	
107	PIERRE (TILTICNA) CREEK	80,000		200		
108	PINKUT SPAWNING CHANNEL	63,261				
109	PINKUT (15 MI.)(ANDERSON) CREEK	144,540		800		
110	PRICE CREEK			75	6,000	25
111	REISETER CREEK			400		
112	SALIX CREEK	500		200		
113	SCHULBUCKHAND (SCULLY) CREEK	6,800		450	75	200
114	SCOTIA RIVER			400	100,000	
115	SEALEY CREEK			1,000	5,000	

STREAM No.	STREAM NAME	SPECIES SOCKEYE	CHINOOK	COHO	PINK	CHUM
116	SHAMES SLOUGH				100,000	400
117	SHEEDY CREEK			300	3,000	
118	SHEQUNIA RIVER		75	400	750	
119	SHELAGYOTE RIVER					
120	SHILAHOV RIVER					
121	SICINTINE LAKE	150				
122	SIX MILE (GULLWING) CREEK	4,800				
123	SKEENA RIVER		1,500		500,000	3,500
124	SKUNSNAT CREEK			750		
125	SLANGEESH RIVER	500			120	
126	SOCKEYE CREEK	7,500	25	1,500		
127	SOUTHEND CREEK	35,000		7,500		
128	SPAWNING LAKE	200				
129	SPRING CREEK		75	750		
130	SQUINGULA RIVER					
131	STAR CREEK		25	200		
132	STATION CREEK			75	3,500	
133	STEVENS CREEK	1,500	750	3,500		
134	SUSKWA (BEAR) RIVER		400	2,500	100	
135	SUSTUT LAKE	3,000		300		
136	SWEDE CREEK				2,000	50
137	SWEETIN RIVER		400			
138	TACHEK CREEK	6,800				
139	TAHLO RIVER	24,600				
140	UPPER TAHLO (SALMON) CREEK					
141	TELKWA RIVER			1,200		
142	TETZALTO CREEK	900				
143	THAUTIL RIVER			300		
144	TOBOGGAN CREEK			2,000	1,800	
145	TSEZAKA (TRAIL) CREEK			50		

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
146	TWAIN (TWIN) CREEK	21,000				
147	WILLIAMS CREEK	21,000	25	1,500	1,500	200
148	WILSON CREEK			75	400	
149	ZYMAGOTITZ (ZIMACORD) RIVER		200	3,500	7,500	750
150	ZYMOETZ (COPPER) RIVER		1,500	3,500	35,000	400
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 5.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1	15	9
CHINOOK		1	
COHO		46	6
PINK	11	33	7
CHUM	31	15	

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 5)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALPHA CREEK			1,500	15,000	400
2	ANDREW LEWIS CREEK			1,500	7,500	75
3	BARE BAY SYSTEM (KOORYET LAKE)	7,500		1,500	35,000	3,000
4	BEAVER CREEK			3,500	15,000	
5	BILLY CREEK			1,500	10,000	
6	BOLTON CREEK	1,500		750	5,000	3,500
7	BONILLA ARM CREEKS	15,000		15,000	67,000	10,000
8	CAPTAINS CAVE CREEKS	1,500		1,500	15,000	1,500
9	CRIDGE LAGOON CREEK	7,500		3,500		200
10	CURTIS INLET CREEK	15,000		4,000	30,000	500
11	DEADMANS CREEK			750	3,500	400
12	DEER LAKE CREEK	3,500		3,000	10,000	1,500
13	ENDHILL CREEK	7,500		7,500	29,000	1,500
14	FALSE STUART CREEK			750	7,500	
15	GALE LAKE SYSTEM (KEECHA LAKE)	7,500		2,500	17,000	1,000
16	HEAD CREEK			400	60,000	25
17	HEAVENOR INLET CREEK	750		7,500	3,500	4,000
18	INDIAN HARBOUR			2,000	750	500
19	KA-ALB CREEK			200	15,000	
20	KENZUWASH CREEK	1,500		1,500		750
21	KLEWNUGGET CREEK	400		1,500	750	750
22	LITTLE DOG CREEK					
23	KITKATLA CREEK	3,000		3,500	20,000	750
24	KUMEALON CREEK		400	3,500	120,000	1,500
25	LAGOON CREEK				200	7,500

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	LEWIS CREEK	1,500		1,500	200	200
27	LOWE LAKE SYSTEM	35,000		10,000		
28	MARKLE CREEK			400	1,500	400
29	MIKADO LAKE SYSTEM	5,000		1,500	8,000	1,000
30	MINKTRAP LAKE SYSTEM	15,000		1,500	3,000	75
31	MONCKTON INLET STREAMS	1,500		400	400	750
32	NEWCOMBE HARBOUR STREAM			100	4,000	1,500
33	OAR POINT CREEK			1,000	2,000	3,500
34	PORT STEVENS CREEK			3,500	700	750
35	CANYON CREEK			1,500	15,000	25
36	QUINSTANSTA LAKE SYSTEM	15,000		7,500	12,000	8,000
37	PA-AAT (SALMON) RIVER			3,500	35,000	1,500
38	RAWLINSON ANCHORAGE CREEK			1,000	15,000	5,000
39	RYAN CREEK	3,500		1,500	15,000	3,500
40	SALT LAKE CREEK			3,500	20,000	400
41	SERPENTINE CREEK					
42	SEVEN MILE CREEK			1,500	9,000	9,000
43	SHAW CREEK			1,500	8,000	1,800
44	SHENEEZA CREEK	4,500		700	4,000	300
45	SKULL CREEK			1,500	20,000	6,000
46	SNASS CREEK			750	750	
47	SPENCER CREEK	1,500		1,500	1,500	750
48	STEWART CREEK			200	2,000	3,500
49	TABLE BAY CREEK	1,500		3,500	15,000	7,500
50	THREE MILE CREEK	750		1,500	1,500	750
51	TOWARTZ CREEK			400	3,500	1,500
52	UKSETTERYEARTS CREEK			750	1,500	750
53	UNION PASS LAKE SYSTEM	3,500		7,500	3,500	7,500
54	UN-NAMED CREEK				3,500	
55	WEST CREEK			400	18,000	

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	WILSON INLET CREEK			200	5,000	5,000
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 6.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	7	29	7
CHINOOK	10	16	4
COHO	6	79	21
PINK	22	52	35
CHUM	41	52	16

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 6)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AALTANASH RIVER		400	3,500	1,500	3,500
2	ADLER CREEK			3,500	15,000	4,000
3	ARGYH CREEK			750	750	400
4	ARNOUP CREEK			1,500	100,000	7,500
5	BARNARD CREEK			750	35,000	3,500
6	BIG TILLHORNE RIVER			400	7,500	750
7	BIG WADEENE RIVER		10,000	5,000	50,000	50,000
8	BISH CREEK		460	15,000	100,000	15,000
9	BLEE CREEK			750	75,000	3,500
10	BLACKROCK CREEK			200	9,500	3,500
11	BLOOMFIELD CREEK	3,500		3,500	15,000	1,500
12	BRIM RIVER		3,500	7,500	35,000	15,000
13	BUSLEY CREEK	750		1,500	3,500	750
14	CARTWRIGHT CREEK	1,500		750	1,500	750
15	CHAPPLE CREEK			3,500	15,000	15,000
16	CHIST		1,000	5,000	2,000	1,000
17	CLIFFORD CREEK	1,500		1,500	1,500	7,500
18	CRAB RIVER			750	2,500	3,500
19	DALA RIVER		7,500	7,500	80,000	50,000
20	DALLAIN CREEK	1,500		1,500	1,500	750
21	DALLY CREEK			750	7,500	1,500
22	DEEP BAY CREEK	1,500		3,500	40,000	1,500
23	DEEP CREEK & TRIBS.	4,000		1,500	41,000	3,500
24	DEVIL CREEK			400	2,000	750
25	DOME (HEADCREEK) CREEK			3,500	12,000	15,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	DON CREEK	750	25	1,500	27,000	700
27	DOUGLAS CREEK	750		7,500	3,500	1,500
28	EAGLE CREEK			25	15,000	1,500
29	EAGLE CREEK & TRIB.	3,500		9,000	18,000	17,500
30	EAST ARM & TRIB.			500	3,500	1,500
31	EMSLEY CREEK					
32	ESTEVAN CREEK			750		1,500
33	EVELYN CREEK	3,500	25	3,500	75,000	7,500
34	EVINRUDE CREEK	750		750	200	750
35	FALLS RIVER			100	400	75
36	FIFER COVE CREEK	25			7,500	750
37	FISHERMANS COVE (ANGLERS) CREEK			200	2,000	3,500
38	FLUX CREEK	3,500		5,000	7,500	15,000
39	FOCH CREEK		400	3,500	15,000	40,000
40	FURY CREEK	750		1,500	36,000	1,500
41	GILL CREEK			1,500	14,000	1,500
42	GILTOYEE CREEK		200	7,500	35,000	9,000
43	GOAT COVE CREEK			300	800	1,500
44	GREEN INLET RIVER			5,300	100,000	15,000
45	GULL CREEK	400		1,500	7,500	7,500
46	HARTLEY BAY CREEK	1,500		3,500	7,500	1,500
47	HIRSCH CREEK		750	3,500	35,000	35,000
48	HOTSPRING CREEK			200	7,500	8,000
49	HUGHES (DEER) CREEK			3,500	35,000	7,500
50	HUMPHREYS CREEK		75	800	15,000	7,500
51	INDIAN RIVER	3,500	25	15,000	75,000	1,200
52	KEMANO RIVER	400	3,000	35,000	200,000	125,000
53	KHUTZE RIVER	25	1,500	7,500	75,000	40,000
54	KILDALA RIVER		1,500	4,000	75,000	20,000
55	KILTUISH RIVER		400	15,000	50,000	100,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	KISKOSH RIVER		25	3,500	50,000	6,000
57	KITIMAT RIVER (MAIN STREAM)	7,500	20,000	30,000	200,000	60,000
58	KITKIATA RIVER & LAKE	5,800	25	7,500	275,000	9,000
59	KITLOPE RIVER & TRIB.	175,000	7,500	35,000	75,000	100,000
60	KLEKANE RIVER			7,500	15,000	7,500
61	KWA-KWA CREEK	15,000		7,500	1,500	1,500
62	KWASEE (KAWESAS) RIVER		200	3,500	35,000	35,000
63	LAGOON (WEETEEANE) CREEK	3,000		3,500	20,000	7,500
64	LIMESTONE CREEK	6,000		3,500	25,000	7,500
65	LINNEA CREEK			1,500	3,500	7,500
66	LITTLE TILLHORNE RIVER				1,500	400
67	LITTLE WADEENE RIVER	25	3,500	3,500	15,000	15,000
68	MARMOT COVE CREEK			3,500	15,000	7,500
69	MARSHALL CREEK			200	3,500	1,500
70	MEYERS PASS CREEK			75	800	1,500
71	MOSS (KIHESS) CREEK			25	400	400
72	McDONALD CREEK	3,500		7,500	2,000	3,500
73	McKAY (LITTLE) CREEK		25	750	1,500	7,500
74	McMICKING CREEK				1,500	8,000
75	NALBELLAH (NALBEELAH) CREEK		25	750	100,000	15,000
76	NIAS RIVER			1,500	7,500	7,500
77	OSMENT CREEK			400	1,500	3,500
78	PACKE CREEK	1,500		3,500	35,000	35,000
79	PENN CREEK & TRIBS.			1,000	1,500	750
80	PERIL RIVER			2,200	1,500	1,500
81	POWLES CREEK	750		1,500	7,500	1,500
82	PRICE CREEK	7,500		15,000	6,000	35,000
83	PYNE CREEK			5,000	50,000	20,000
84	QUAAL RIVER	5,000	400	25,000	220,000	35,000
85	QUIGLEY CREEK	1,500		1,500	7,500	1,500

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
86	RIORDAN RIVER			750	7,500	1,500
87	ROLAND CREEK			15,000	3,500	3,500
88	RONALD CREEK			750	7,500	1,500
89	SALMON CREEK	750		7,500	3,500	1,500
90	SCOW BAY CREEK		75	3,500	75,000	7,500
91	SENTINEL CREEK	1,500		1,500	1,500	3,500
92	SODA CREEK	100	75	700	75,000	15,000
93	STANNARD CREEK	3,500		9,000	35,000	7,500
94	STEEP CREEK			3,500	1,500	750
95	TALAMOOSA CREEK	7,500		7,500	3,500	1,500
96	TAYLOR CREEK			25	750	750
97	TRAHEY CREEK			1,500	7,500	3,500
98	TRENAMAN CREEK			2,000	900	1,500
99	TSAYTIS RIVER		3,500	3,500	15,000	35,000
100	TURN CREEK			1,500	40,000	35,000
101	TURTLE CREEK			25	18,000	1,500
102	TYLER CREEK			3,500	35,000	15,000
103	WAHOO RIVER		1,500	3,500	15,000	7,500
104	WALE CREEK TRIB.	1,000		15,000	5,000	3,500
105	WAUGH (WATHL) CREEK			750	7,000	3,500
106	WEETEEAN CREEK	1,500		3,500	3,500	15,000
107	WEEWANIE CREEK			3,500	15,000	3,500
108	WEST ARM CREEK	200		750	1,500	750
109	WEST CREEK	1,500		3,500	7,500	3,500
110	WINDY ISLAND CREEK			20	2,000	2,000
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 7.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	7	14	2
CHINOOK	3		
COHO	3	42	2
PINK			
CHUM	14.	28	10

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 7)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BIG CREEK				20,000	5,000
2	BOLIN BAY CREEK			400	7,500	3,500
3	BOTTLENECK CREEK			1,500	15,000	3,500
4	BULLEY BAY CREEK				1,000	7,000
5	BULLOCK CHANNEL STREAMS				7,500	7,500
6	CANYON CREEK				1,000	3,000
7	CARTER RIVER			1,500	35,000	15,000
8	CHAMISS CREEK				12,000	3,500
9	CLATSE CREEK	12		200	60,000	35,000
10	COOPER INLET CREEKS	1,500		2,000	35,000	35,000
11	DEER PASS LAGOON CREEK	300		150		1,500
12	DUTHIE CREEK			750	35,000	7,500
13	FALLIS CREEK				3,500	35,000
14	GEISH CREEK			100	400	3,500
15	GOAT BUSHU CREEK			75	750	1,500
16	GORILLA CREEK			200	400	7,500
17	GULLCHUCK HEAD STREAM			3,500	45,000	35,000
18	JAMES BAY CREEK			750	7,500	7,500
19	KODJUSDIS RIVER	5,000		15,000	12,000	15,000
20	KAINET RIVER	1,500	25	2,000	100,000	100,000
21	KILDIDT CREEK	750		750		
22	KILDIDT LAGOON CREEK			1,500	700	5,000
23	KORICH CREEK			75	7,500	1,500
24	KWAKUSDIS RIVER	3,500		3,000	40,000	40,000
25	LAGOON CREEK	3,500		1,500	1,500	750

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	LEE CREEK			750	15,000	3,500
27	LORD RIVER			400	3,500	7,500
28	McLOUGHLIN BAY CREEK	3,500		750	3,000	400
29	McPHERSON CREEK			75	2,000	3,500
30	MARY COVE CREEK	22,000		750	750	750
31	MUSSEL RIVER	25	75	3,500	95,000	75,000
32	NAMELESS CREEK			400	75,000	20,000
33	NEEKAS CREEK			800	200,000	150,000
34	PINE CREEK	750		2,500	15,000	1,500
35	POISON COVE CREEK			750	4,000	15,000
36	QUARTCHA CREEK			3,500	15,000	10,000
37	ROSCOE CREEK	25		7,500	35,000	75,000
38	SALMON BAY CREEK			400	35,000	15,000
39	SANS PEUR PASSAGE CREEKS	400		750	2,000	
40	SCHRIBNER'S CREEK			400	4,000	4,000
41	SHIP POINT LAGOON CREEK	800		750	2,000	1,500
42	SOUND POINT LAGOON CREEK	750		1,500		7,500
43	STEWART INLET CREEK			800	500	200
44	TINKEY RIVER	7,500		3,500	4,000	5,000
45	TOM BAY CREEK			200	1,500	1,500
46	TROUP PASSAGE CREEK	750		3,500	3,500	8,000
47	TUNO CREEK (WEST)	3,000		1,000		
48	TUNO CREEK (EAST)	3,000		800		300
49	WALKER LANE CREEK				1,500	3,500
50	WATSON BAY CREEK			150	15,000	3,500
51	WATT BAY CREEK	400		1,000	300	100
52	WINDFALL CREEK				300	4,000
53	WINDY BAY CREEK			200	1,500	1,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 8.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	4	4	4
CHINOOK		3	2
COHO	11	21	5
PINK	3	13	12
CHUM	1	20	8

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 8)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ASEEK RIVER			1,500	15,000	3,500
2	ATNARKO & BELLA COOLA RIVERS	150,000	35,000	75,000	1750,000	90,000
3	CAMP CREEK				750	1,500
4	CANNERY BAY CREEK					7,500
5	CASCADE CREEK	75		1,500	7,500	35,000
6	DEAN RIVER	1,500	7,500	15,000	35,000	35,000
7	DEEP BAY RIVER				1,500	7,500
8	ELCHO HARBOUR CREEK			3,500	35,000	35,000
9	EUCOTT BAY CREEK			400	15,000	15,000
10	EVANS INLET (3 STREAMS)			25	35,000	7,500
11	FISH EGG CREEK	400		400		
12	FRENCH (MANS) CREEK			1,500	15,000	3,500
13	GREEN RIVER			400	15,000	7,500
14	HOOKNOSE CREEK	3,500		1,500	35,000	7,500
15	JENNY BAY (3 STREAMS)			400	75,000	7,500
16	KILTICK CREEK			400	1,500	3,500
17	KIMSQUIT BAY	3,500		3,000	3,500	60,000
18	KIMSQUIT RIVER	15,000	3,500	7,500	40,000	85,000
19	KISAMEET RIVER	3,500		1,500	35,000	3,500
20	KOEYE RIVER	7,500		7,500	125,000	15,000
21	KWATLENA RIVER			400	7,500	7,500
22	KWATNA RIVER	200	1,500	15,000	125,000	35,000
23	MARTIN CREEK			3,500	3,500	12,000
24	NAMU RIVER	7,500		3,500	3,500	2,000
25	NECLEETSCONNY RIVER	25		3,500	35,000	15,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	NOOCK RIVER		750	1,500	10,000	15,000
27	NOOTUM RIVER			3,500	35,000	35,000
28	SAGER CREEK			750	7,500	3,500
29	SKOWQUILTZ RIVER			1,500	7,500	7,500
30	TALEOMY RIVER			1,500	3,500	3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 9

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE		1	12
CHINOOK	5	5	1
COHO	3	17	2
PINK	6	5	6
CHUM	5	5	2

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 9)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALLARD (NORTH ARM) CREEK			400		7,500
2	AMBACK (QUAP) CREEK	75,000		400	1,000	
3	ASKLUM (ASHLUN) CREEK	35,000	25	25	750	
4	BEAVER CREEK	3,500		3,500	750	600
5	CHUCKWALLA RIVER		750	3,500	75,000	10,000
6	CLYAK-YOUNG-NEIL RIVERS		50	20,000	175,000	15,000
7	DALLARY (DALLAC) CREEK	100,000	200	750	5,000	
8	GENNESEE RIVER	75,000		75	3,500	
9	INDIAN (INZIANA) RIVER	125,000		200		
10	JOHNSTON CREEK			7,500	35,000	1,500
11	KILBELLA RIVER		1,500	400	200,000	200
12	LOCKHART GORDON CREEK			1,500	400	15,000
13	MARKWELL (MACHMELL) CREEK	12,000				
14	MacNAIR CREEK			700	1,500	7,500
15	MILTON RIVER			300	35,000	1,500
16	NEKITE RIVER		60	3,500	40,000	50,000
17	NICKNAQUEET (SAWMILL) RIVER			25	3,500	200
18	NOOKINS (NECHANZ) RIVER	75,000	400	400		
19	OWIKENO LAKE	35,000		2,000		
20	SHUMAHALT (SHEEMAHANT) RIVER	75,000	50	3,500		
21	TZEEISKAY CREEK				3,500	
22	TZEO (CHEO) RIVER	35,000	25	400	25	
23	WHONNOCK (WANNOCK) RIVER FLATS	100,000	7,500	3,500	7,500	75,000
24	WAUKWASH (WASH WASH) RIVER	100,000	1,500	1,500		
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 10.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1		2
CHINOOK		1	
COHO	1		7
PINK	2		
CHUM		1	1

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 10)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	COHO (BOSWELL) CREEK			400	25	
2	DELEBAH-CANOE RIVER	50,000		3,500		
3	DOCEE (GOAT) RIVER	200	3,500	400		
4	DSULUTH-DSULISH CREEK			400		
5	MARGARET CREEK			25		
6	SMOKEHOUSE (GEELUCK) RIVER	100,000		400		
7	TAKUSH RIVER			1,500		35,000
8	WALKUM RIVER			600	1,000	7,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 11.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE			
CHINOOK	1		
COHO	4	13	
PINK	1	1	
CHUM	5	10	2

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 11)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BAMFORD-LEE CREEKS			750		3,500
2	CHIEF NOWLEY CREEK			1,500		7,500
3	DRIFTWOOD(VILLAGE BAY)CREEK			1,500		15,000
4	EVA CREEK			1,500	3,500	1,500
5	JAP CREEK			75		20,000
6	LASSITER BAY CREEK			75		200
7	PACK LAKE SYSTEM			3,500		15,000
8	QUASHELA RIVER			400		7,500
9	RAINBOW CREEK			250	100	3,500
10	SCHWARTZENBERG LAGOON(NUGENT) CREE			100		25
11	SEYMOUR RIVER			3,500		35,000
12	TAATT (SALMON) RIVER			5,000		50,000
13	WAAMTX (BELIZE) CREEK			400		3,500
14	WARNER BAY CREEK			1,500		8,000
15	WAUMP CREEK & ALLISON RIVER		25	1,500		11,000
16	NAWATLE CREEK			25		25
17	WADEFORD CREEK			75		1,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 12.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	5	3	8
CHINOOK	5	9	3
COHO	5	37	19
PINK	21	14	18
CHUM	28	24	10

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 12)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ADAM RIVER	400	750	7,500	130,000	3,500
2	AHNUHATI RIVER	750	750	15,000	100,000	35,000
3	AHTA RIVER	25		3,500	40,000	40,000
4	AHTA VALLEY CREEK			7,500	7,500	35,000
5	BARNARD CREEK		25	75		750
6	BOUGHEY BAY CREEK			750	750	400
7	BRADLEY CREEK			250	175	
8	BUGHOUSE BAY CREEK			7,500		3,500
9	CALL CREEK			750	750	4,500
10	CARRIDEN BAY CREEK			200	3,500	
11	CHARLES CREEK			1,500	3,500	15,000
12	CLUKEWE RIVER			3,500	49,000	7,500
13	COHOE CREEK			400		
14	CRACROFT CREEK			400		25
15	EMBLEY RIVER			7,500	100,000	3,500
16	FRANKLIN RIVER		1,500	3,500		3,500
17	FULMORE RIVER	10,000	200	6,000	3,500	5,500
18	GILFORD CREEK			3,500	750	1,500
19	GLENDALE CREEK	7,500	25	7,500	220,000	55,000
20	HEALTH LAGOON CREEK			1,500	200	750
21	HOEYA SOUND CREEK			750	15,000	1,500
22	HUASKIN CREEK			1,500	100	1,000
23	HYDE CREEK			1,500	12,500	1,500
24	JENNIS BAY CREEK			1,500	5,000	25
25	KAKWEIKEN RIVER	15,000	750	75,000	800,000	75,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	KAMANO BAY CREEK			400	22,500	1,500
27	KEOGH RIVER	7	25	35,000	150,000	15,000
28	KINGCOME RIVER	3,500	7,500	75,000	275,000	75,000
29	KLINAKLINI RIVER	7,500	15,000	15,000	7,500	75,000
30	KOKISH RIVER		400	15,000	7,500	3,500
31	KWALATE CREEK		200	3,500	3,500	1,500
32	LULL CREEK			75	3,500	3,500
33	McALISTER CREEK				200	25
34	MACKENZIE SOUND CREEK	15,000		1,500	1,500	15,000
35	MAPLE COVE CREEK			400	400	400
36	MARION CREEK					7,500
37	MATSUI CREEK				750	400
38	MILLS CREEK			3,500	15,000	3,500
39	NAHWITTI RIVER	15,000		7,500	110,000	3,500
40	NEW VANCOUVER CREEK			25	1,500	25
41	NIGGER CREEK				200	75
42	NIMMO BAY CREEK			3,500	200	15,000
43	NIMPKISH RIVER	150,000	15,000	35,000	15,000	100,000
44	PORT HARVEY LAGOON CREEKS					200
45	POTTS LAGOON CREEK			200		75
46	PROTECTION POINT CREEK			1,500	750	400
47	QUATSE RIVER	7,500		15,000	150,000	15,000
48	RICHMOND BAY CREEK			750		
49	ROBBERS NOB CREEK		25	400	200	75
50	SCOTT COVE CREEK			1,500	750	1,500
51	SHELTER BAY CREEK			75		400
52	SHOAL HARBOUR CREEK			3,500	400	15,000
53	SHUSHARTIE RIVER	3,500		7,500	35,000	1,500
54	SIM RIVER		750	3,500	1,500	3,500
55	SIMOON SOUND CREEK					1,500

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	SONGHEES CREEK			400	3,500	1,500
57	STANDBY RIVER	200		3,500	75,000	7,500
58	SULLIVAN BAY CREEK			1,500		400
59	THIEMER CREEK			5,000	75	3,500
60	TSITIKA RIVER			3,500	30,000	7,500
61	TSULQUATE RIVER			1,500	37,000	3,500
62	TUNA RIVER		25	8,000	1,500	1,500
63	VINER SOUND CREEK	25		3,500	35,000	75,000
64	VIOLA CREEK			200		
65	WAHKANA BAY CREEK			1,500		3,500
66	WAKEMAN RIVER		3,500	15,000	700,000	20,000
67	WALDON CREEK			25	25	75
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 13.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	8	1	2
CHINOOK	4	8	5
COHO	22	33	7
PINK	13	14	12
CHUM	10	23	9

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 13)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AMOR DE COSMOS CREEK		200	1,500	130,000	7,500
2	APPLE RIVER	200	1,500	3,500	50,000	75,000
3	CAMELEON HARBOUR CREEK			750	20,000	7,500
4	CAMPBELL RIVER	200	8,000	3,500	10,000	15,000
5	CHONAT CREEK			200	400	3,500
6	CHRISTIE CREEK			3,500	750	3,500
7	CUMSACK RIVER		750	3,500	7,500	7,500
8	DREW CREEK			200	25	7,500
9	EVANS CREEK			200		3,500
10	FANNY BAY CREEK			400	3,500	400
11	FRASER CREEK	25	25	200	7,500	3,500
12	FREDERICK ARM CREEK			750	3,500	3,500
13	GRANITE BAY CREEK			400	15,000	3,500
14	GRASSY CREEK			750	200,000	400
15	GRAY CREEK			750	15,000	3,500
16	HANSON'S CREEK			25		750
17	HEMMING LAKE CREEK			750	400	3,500
18	HEYDON CREEK	7,500	25	3,500	35,000	75,000
19	HOMATHKO RIVER		15,000	15,000	7,500	75,000
20	HYACINTHE CREEK		25	3,500	1,500	35,000
21	KANISH CREEK			400	7,500	1,500
22	KNOX BAY CREEK			400	750	200
23	MENZIES CREEK			1,500	3,500	1,500
24	MOHUN CREEK		25	3,500	7,500	3,500
25	OPEN BAY CREEK			400	750	7,500

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	ORFORD RIVER	25	7,500	3,500	100,000	100,000
27	PHILLIPS RIVER	15,000	1,500	7,500	175,000	75,000
28	PYE CREEK			75	1,500	3,500
29	QUATAM RIVER	2	1,500	7,500	75,000	15,000
30	QUINSAM RIVER	200	264	12,000	30,000	3,500
31	READ CREEK			3,500	30,000	3,500
32	SALMON RIVER	25	3,500	9,000	35,000	35,000
33	SIMMS CREEK			1,500	200	200
34	SOUTHGATE RIVER	25	15,000	7,500	7,500	75,000
35	STAFFORD RIVER		200	750	35,000	3,500
36	SWANSKY CREEK			4,000	25	1,500
37	TEAQUAHAN RIVER		7,500	3,500	7,500	7,500
38	THURSTON CREEK			200	750	750
39	VILLAGE BAY CREEK	750		7,500	750	35,000
40	WAIATT CREEK			400	1,500	15,000
41	WHITEROCK PASSAGE CREEK			400		400
42	WORTLEY CREEK			500	90,000	3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 14.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	5		
CHINOOK	1	4	1
COHO	1	19	6
PINK	8	2	3
CHUM	6	10	4

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 14)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ANNIE (SHAW'S) CREEK			75		
2	BLACK CREEK			15,000		
3	CHEF CREEK			1,500		200
4	COAL CREEK (WILFRED)			750	25	3,500
5	COOK CREEK			750	25	7,500
6	COUGAR CREEK			3,500	200	7,500
7	CRAIG CREEK			400		
8	ENGLISHMAN RIVER	75	115	3,500	3,500	35,000
9	FILLANGLEY CREEK			600		
10	FRENCH CREEK		25	7,500	750	7,500
11	KITTY COKMAN CREEK			1,500		25
12	LITTLE RIVER			1,500		
13	McNAUGHTON CREEK			750		7,500
14	MILLARD CREEK			750	750	200
15	NILE CREEK			750	1,500	1,500
16	OYSTER RIVER		200	35,000	100,000	15,000
17	PUNTLEDGE RIVER	400	15,000	15,000	100,000	75,000
18	BIG QUALICUM RIVER	25	2,411	4,859	11,900	139,900
19	LITTLE QUALICUM RIVER	200	1,500	7,500	1,500	104,775
20	ROSEWALL CREEK			750		15,000
21	TRENT RIVER			1,100		1,500
22	TSABLE RIVER			3,500	750	21,000
23	TSOLUM RIVER	25		15,000	100,000	5,000
24	WASHER CREEK			150		50
25	WATERLOO CREEK			200		15,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	WOODS CREEK			300		
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 15.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1		
CHINOOK	1	2	3
COHO	1	7	5
PINK	5	2	4
CHUM	3	7	3

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 15)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BREM RIVER		2,000	10,000	35,000	7,500
2	FORBES RIVER			40	3,500	7,500
3	KLITE RIFER		7,500	7,500	35,000	15,000
4	OKEOVER CREEK			200	12	7,500
5	PENDRELL SOUND CREEK			200	40	750
6	REFUGE COVE LAKE	25		750		1,500
7	SALT LAGOON			750		3,500
8	SLIAMMON CREEK		25	1,200	400	35,000
9	SMALL CREEK			750	200	3,500
10	TAHUMMING RIVER			750	500	400
11	THEODOSIA RIVER		100	7,500	3,500	35,000
12	TOBA RIVER		12,000	35,000	75,000	75,000
13	TOBA RIVER (LITTLE)		8,000	10,000	35,000	15,000
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 16.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1		2
CHINOOK	1	2	
COHO	5	14	4
PINK	4	5	3
CHUM	5	14	4

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 16)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ANGUS CREEK			750	25	7,500
2	BRITTAIN RIVER			1,500	3,500	7,500
3	CARLSON CREEK			25	750	5,000
4	DAYTON CREEK			200		2,000
5	DESERTED RIVER			6,000	100,000+	35,000
6	DORISTON CREEK			70		750
7	GRAY CREEK			200	1,500	3,500
8	JEFFERD CREEK			200	1,500	3,500
9	KELLY CREEK			200		3,500
10	LANG CREEK			3,500	3,500	15,000
11	LOIS RIVER			75		600
12	MYRTLE CREEK			50		1,500
13	PENDER HARBOUR CREEKS			1,500		16,000
14	SAKINAW LAKE SYSTEM	16,000		7,500		3,500
15	SALTERY BAY CREEK			200	3,000	35,000
16	SECHELT CREEK			50	3,500	3,500
17	SKWAWKA RIVER		100	15,000	200,000	35,000
18	SNAKE BAY CREEK			750		3,500
19	STORM BAY CREEK			100		3,500
20	TZOONIE RIVER	7,500	400	10,000	75,000	35,000
21	VANCOUVER RIVER		25	3,000	15,000	8,000
22	WEST LAKE CREEK	500		300		500
23	WHITTAL CREEK			250		1,500
24						
25						

ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 17.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1		
CHINOOK		1	1
COHO	2	11	2
PINK	3	1	
CHUM	6	6	3

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 17)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BLOODS CREEK			200		75
2	BONELL CREEK			400		15,000
3	BONSALL CREEK			7,500		3,500
4	BUSH CREEK			1,500		15,000
5	CHASE RIVER			650		170
6	CHEMAINUS RIVER		200	7,500	25	100,000+
7	DEPARTURE CREEK			200		25
8	HOLLAND CREEK			750	2	35,000
9	KNARSTON CREEK			200		25
10	NANAIMO RIVER	25	7,500	15,000	1,500	100,000+
11	NANOOSE CREEK			1,350		13,000
12	PORTERS CREEK			48		750
13	ROCKY CREEK			65		1,500
14	STOCKING CREEK			100		7,500
15	WALKERS CREEK			750		3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 18

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE			
CHINOOK		1	1
COHO		2	2
PINK			
CHUM	1	2	1

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 18)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	COWICHAN RIVER		15,000	75,000		250,000
2	FULFORD CREEK			500		100
3	KOKSILAH RIVER		1,000	35,000		15,000
4	SHAWNIGAN CREEK			1,500		3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 19 & 20

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE		1	
CHINOOK	1	2	1
COHO	1	8	3
PINK	1	2	
CHUM	1	6	3

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 19&20)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AYAN CREEK (STONEY)			400		7,500
2	COAL CREEK (KIRBY)			750		7,500
3	COLQUITZ CREEK			400		
4	DEADMAN'S CREEK (CRAIG FLOWER)			750		400
5	DeMAMIEL CREEK			7,500		35,000
6	GOLDSTREAM RIVER		25	3,500		35,000
7	GORDON RIVER		3,500	15,000	1,500	3,500
8	JORDAN RIVER			1,500	7,500	3,500
9	MUIR CREEK					
10	SANDHILL CREEK			25		
11	SAN JUAN RIVER	3,500	7,500	35,000	3,500	3,500
12	SOOKE RIVER		1,500	3,500		35,000
13	TUQWELL CREEK			400		3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 22 & 23

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	2	1	3
CHINOOK	13	5	2
COHO	4	35	5
PINK	9	1	
CHUM	22	20	5

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 22&23)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ASH RIVER					
2	BEAVER CREEK					
3	CANOE PASS CREEK			200		1,500
4	CARNATION CREEK			1,500	75	4,200
5	CATARACT CREEK		2	25		1,500
6	CHEEWHAT CREEK	1,500		1,500		400
7	CHINA CREEK		200	1,500		1,500
8	COLEMAN CREEK		25	700		1,500
9	CONSINKA (WOOD) CREEK			400		1,500
10	COEUR D'ALENA CREEK		55	750		750
11	COUSE CREEK		25	750		3,500
12	CAYUSE CREEK		25	750		3,500
13	DEER CREEK					
14	DOOBAH RIVER			400		3,500
15	DUTCH HARBOUR CREEK (MAIN)			750		7,500
16	DUTCH HARBOUR CREEK (SM.)			400		1,500
17	EFINGHAM RIVER		25	3,500		15,000
18	FRANKLIN RIVER		75	750	25	1,500
19	FREDERICK CREEK			400		3,500
20	HENDERSON (ANDERSON) CREEK	75,000	1,500	3,500	400	35,000
21	HILLIER CREEK					3,500
22	HOBITON RIVER	7,500		750		7,500
23	HALFORD CREEK			75		3,500
24	KITSUCKSIS CREEK					
25	KLANAWA RIVER		75	750		750

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	JOLLY CREEK					
27	LITTLE MAGGIE CREEK			400		750
28	LOST SHOE CREEK			750	400	400
29	LUCKY CREEK		25	400		1,500
30	MacTUCH CREEK		25	400		750
31	MAGGIE RIVER	25		7,500		1,500
32	MERCHANTILE (MILL) CREEK					1,500
33	NAHMINT RIVER		7,500	3,500	1,500	1,000000
34	NITINAT RIVER	25	3,500	7,500	200	110,000
35	PIPESTEM CREEK			400		7,500
36	PACHENA RIVER			3,500		1,500
37	POETT NOOK CREEK			750		1,500
38	ROGER CREEK					
39	SALMON RIVER			400	25	7,500
40	SANDY CREEK					750
41	SARITA RIVER		1,500	15,000	1,500	70,000
42	SECHART CREEK			25		750
43	SNUG BASIN CREEK			400		3,500
44	SOMASS RIVER	260,000	15,000	130,000	3,500	15,000
45	SPROAT RIVER					
46	SUGSAW (GRAPPLER) CREEK			750		7,500
47	STAMP RIVER					
48	TOQUART RIVER		200	35,000	1,500	35,000
49	TOQUART RIVER (L. FORK)			200		15,000
50	TWO RIVERS EAST			400		7,500
51	TWO RIVERS WEST		25	400		7,500
52	UCHUCK (SILVER) CREEK		25	3,500		7,500
53	USELESS CREEK					
54	USELESS INLET CREEK			75		750
55	VERNON BAY CREEK			200		400

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	WEINTER CREEK					
57	WEST (WALLACE) CREEK		25	200		2,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 24.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	1	2	5
CHINOOK		11	
COHO	1	24	2
PINK	5	5	
CHUM	5	19	2

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 24)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ATLEO CREEK			7,500	200	75,000
2	BAWDEN BAY CREEK			750		15,000
3	BEDWELL RIVER		1,500	1,500	3,500	7,500
4	BULSON CREEK					25
5	CECILIA CREEK	800		800		800
6	CLAYOGUOT ARM	35,000				
7	CLAYOGUOT RIVER	7,500		7,500		
8	COLD CREEK	7,500		25		
9	CONE CREEK					3,500
10	CYPREO RIVER		750	4,500	400	7,500
11	MAROLD CREEK			300		3,500
12	MESQUIAT LAKE CREEKS	75		3,500		7,500
13	MOOTLA KOOTLA CREEK			750		200
14	HOTSPRINGS COVE CREEK			400		7,500
15	ICE RIVER		1,500	1,500		15,000
16	INDIAN RIVER			3,500		5,000
17	IRVING RIVER		2,000	3,500	3,500	3,500
18	KOOTOWIS RIVER			1,500		3,500
19	UPPER KENNEDY RIVER	7,500		3,500		
20	LOWER KENNEDY RIVER		1,500			3,500
21	KENNEDY LAKE	35,000		1,500		
22	MEGIN RIVER	3,500	1,500	3,500	3,500	15,000
23	MOYHEA RIVER		750	3,500	7,500	15,000
24	RILEY'S COFE CREEK			200		1,500
25	SUTTON'S MILL CREEK			750		1,500

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	SYDNEY RIVER		750	1,500	3,500	3,500
27	TOFINO CREEK		750	1,500		3,500
28	TRANQUIL CREEK		750	3,500	200	35,000
29	WHITEPINE COVE CREEK			200		3,500
30	WARNE BAY CREEK			750	25	3,500
31	WAFFA RIVER		200	400	400	7,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 25.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	6	3	1
CHINOOK	11	16	2
COHO	6	23	6
PINK	18	14	1
CHUM	6	26	3

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 25)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	APPLE CREEK			3,500	25,000	7,500
2	BARR CREEK			25	200	400
3	BRODRICK CREEK		25	400	7,000	3,500
4	BURMAN CREEK	400	7,500	7,500	165000	15,000
5	CANTON GORGE CREEK		600	3,500	1,500	15,000
6	CHUM CREEK		25	400	6,000	7,500
7	CONUMA CREEK	25	3,500	7,500	3,500	35,000
8	DESERTED CREEK	400	750	750	200	15,000
9	EHATISAT			25	200	400
10	ESCALANTE RIVER					3,500
11	ESPINOSA RIVER		400	750	3,500	7,500
12	GOLD RIVER	7,500	7,500	10,000	3,500	10,000
13	HOISS CREEK		50	750	750	3,500
14	HOUSTON RIVER		25	75	25	800
15	INNER BASIN RIVER		25	1,500	200	35,000
16	JACKLAH CREEK		200	400	25	800
17	KENDRICK CREEK		25	75	200	1,500
18	KLEEPTEE CREEK		200	400	800	15,000
19	LEINER CREEK		750	7,000	12,000	20,000
20	LORD CREEK			75		3,500
21	MAMAT CREEK		75	3,500	750	7,500
22	MARVINAS BAY CREEK			750	400	3,500
23	MOOYAH BAY CREEK		400	750	7,500	15,000
24	McCURDY CREEK			75	25	200
25	OKTWANCH RIVER	10,000	25	750		

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	OWOSSITSA CREEK	1,500	100	750	1,500	15,000
27	PARK RIVER	1,500	200	750	1,500	20,000
28	PORT ELIZA NO. 1		75	400	6,000	7,500
29	PORT ELIZA NO. 2		25	750	2,500	7,500
30	SILVERADO CREEK		25	400	75	7,500
31	SUCWOA RIVER	25	1,500	3,500	3,500	15,000
32	TAHSIS RIVER	2	1,500	15,000	17,000	35,000
33	TLUPANA RIVER		400	750	200	6,000
34	TAOWWIN RIVER		750	3,500	800	17,000
35	ZEBALLOS RIVER	200	750	7,500	17,000	15,000
36	ZEBALLOS (LITTLE) RIVER		900	3,500	11,000	3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 26.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	3	2	
CHINOOK	8	9	1
COHO	3	16	2
PINK	10	18	1
CHUM	4	13	5

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 26)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AMAI RIVER		25	1,500	75	7,500
2	ARTLISH RIVER		3,500	7,500	750	5,500
3	BATTLE RIVER		75	1,500	7,500	7,500
4	CACHALOT CREEK			25		2,000
5	CHAMISS RIVER	75	25	1,500	400	20,000
6	CLANNINICK RIVER		25	750	1,500	35,000
7	ELAINE CREEK		25	400		3,500
8	JANSEN LAKE CREEK	3,500	25	3,500	200	750
9	KAOUK RIVER		3,500	3,500	3,500	15,000
10	KAPOOSE RIVER					250
11	KASHUTL RIVER		200	1,500	750	7,500
12	KAVWINCH RIVER		750	1,500	100000	15,000
13	KAYOUK (KIOUTI) RIVER		25	1,500	750	7,500
14	MALKSOPE RIVER		400	3,500	3,500	35,000
15	McKAY COVE CREEK		400	200	200	3,500
16	NARROWGUT RIVER	11	200	750	15,000	7,500
17	NASPARTI RIVER		75	750	400	3,500
18	OUOUKINSH RIVER		400	750	7,500	20,000
19	POWER RIVER	3,500	1,500	3,500	3,500	3,500
20	TATCHU RIVER			50	3,500	400
21	TAHSIS RIVER	200	7,500	7,500	3,500	31,000
22	YAKU BAY CREEK			34	1,600	200
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 27.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	4	3	1
CHINOOK	4	6	1
COHO	9	36	8
PINK	9	6	3
CHUM	28	31	1

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 27)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AHWHICHAOLTO CREEK (U)			700		3,000
2	AHWHICHAOLTO CREEK (L)			350		5,500
3	BEAR CREEK			250		6,000
4	BUCK CREEK			400		750
5	CANOE CREEK	1,100		550	1,500	1,200
6	CAPE COOK CREEK			400		750
7	CAPE SCOTT CREEK			75		400
8	CLAYGHLE CREEK		25	250	200	6,500
9	CAYUSE CREEK			300		450
10	CLEAGH RIVER					400
11	CLEESKLAGH (6MILE) CREEK			500		3,100
12	COLONIAL (MAIN) CREEK		300	750		3,500
13	COLONY CREEK			7,500		
14	CULLEET CREEK			500		300
15	DENAD (GAATO) CREEK			450		7,500
16	DOMINIC CREEK			750		3,500
17	EAST CREEK		1,000	2,200	15,000	3,500
18	FISHERMAN RIVER	3,500		7,500	10,000	3,500
19	GALATO (DEVIL CLUB) CREEK			25		4,000
20	GLEERUP (3MILE) CREEK			25		25
21	GOODSPEED (SPRUCE) CREEK		1,100	4,500	400	5,000
22	HATHAWAY (HALFWAY) CREEK			500	50	2,300
23	HAWISNAKWI CREEK			75		400
24	HEAD (MARG) RIVER			30		1,500
25	HUSHAMU (PEARSON) CREEK			25		200

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	ILSTAD CREEK					1,500
27	JIMS CREEK	15		1,500	1,000	11,000
28	JOHNNY CREEK			100		2,500
29	KEWQUODIE RIVER			1,200	7,500	7,500
30	KLASKISH RIVER		300	3,500	3,500	10,000
31	KLAYINA (TENAAD) CREEK		25	600		7,500
32	KLOOTCHLIMMIS RIVER			1,100	8,000	3,500
33	KOPRINO RIVER			3,500	50,000	7,500
34	KWAKWESTA (SAWMILL) CREEK			100		4,000
35	KWATLEO (BROWNING) CREEK			8,500	35,000	7,500
36	LEESON LAKE CREEK			200		3,500
37	LEWIS CREEK			50		100
38	MACJACK CREEK	150		3,500		3,500
39	MAHATTA RIVER	9,000	200	15,000	7,500	1,100
40	MARBLE RIVER	2,000	7,500	20,000	1,500	2,500
41	MONKEY CREEK			1,000		10,000
42	MONTGOMERY CREEK					3,500
43	McNIFFE (DUCK) CREEK			1,500		1,500
44	NEQUILTPAALIS CREEK					400
45	NUKNIMISH (APPLE) CREEK			150		2,300
46	PEGATTEM (2 MILE) CREEK			75		450
47	QUASHTIN CREEK			100		3,500
48	QUATSINO SD CREEK	25				1,125
49	RONNING CREEK			750		200
50	RUPERT (COETKWASS C.)RIVER					200
51	SAN JOSEF RIVER		400	15,000	750	2,000
52	STEPHENS (COAL HARBOUR) CREEK			1,000	60	500
53	TEETA RIVER			550		300
54	UTLAH CREEK		40	100		10,000
55	WANOKANA (CRAWFORD) CREEK		25	450		600

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	WASHLAWLIS (LAGOON) CREEK			300		500
57	WAUKAAS (WAUKANAS) CREEK			7,500	40,000	1,500
58	YOUGHPAN (PRICES) CREEK			50		150
59	KEITH RIVER	150		7,500	750	7,600
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 28.

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	3		
CHINOOK	1	5	1
COHO	7	10	4
PINK	5	4	4
CHUM	15	10	4

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000-25000	> 25000
CHUM	< 2000	2000-25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 28)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ASHLU CREEK		2,000	3,500	7,000	8,000
2	CAPILANO RIVER	4	1,100	40,000	3,500	3,500
3	CHAPMAN CREEK			200	7,500	3,500
4	CHASTER CREEK			5		750
5	CHEAKAMUS RIVER		3,500	15,000	555,000	75,000
6	EAGLE HARBOUR CREEK					25
7	FLUME CREEK					75
8	INDIAN RIVER	75		3,500	200,000	35,000
9	LANGDALE CREEK					200
10	LONG BAY CREEK					3,000
11	LYNN CREEK			400	75	400
12	McKAY CREEK			75		
13	McNAB CREEK			350	3,500	1,500
14	McNAIR CREEK			25		25
15	MAMQUAM RIVER	12	1,500	8,000	100,000+	45,000
16	MANNION CREEK					750
17	MOSQUITO CREEK			75		
18	NELSON CREEK					1,500
19	OULETTE CREEK					4,000
20	PILLCHUCK CREEK			1,500		750
21	RAINY RIVER			75	25	25
22	ROBERTS CREEK			75		3,000
23	SEYMOUR RIVER		6	3,500	1,500	3,500
24	SHOVELNOSE CREEK		200	3,500	2,500	3,500
25	SQUAMISH RIVER		30,000	75,000	350,000	200,000

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	STAWAMUS RIVER			900	750	750
27	TWIN CREEK					200
28	WAKEFIELD CREEK			75		1,500
29	WEST BAY CREEK					2,400
30	WILLIAMSON CREEK					4,000
31	WILSON CREEK			750		750
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 29 (Lower Fraser)

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE		1	1
CHINOOK		1	
COHO		12	3
PINK	4	6	
CHUM	4	7	

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 29 Lower Fraser)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALOUETTE RIVER (NORTH)			750	3,500	3,500
2	ALOUETTE RIVER (SOUTH)			1,500	15,000	7,500
3	BRUNETTE RIVER			3,500		
4	BLANEY CREEK			200	400	1,500
5	CAMPBELL RIVER			7,500		1,500
6	COQUITLAM RIVER			1,500	7,500	7,500
7	JENKINS CREEK			750	400	25
8	KANAKA CREEK			400	7,500	3,500
9	McDONALD CREEK			200	400	750
10	NICOMEKL RIVER			7,500		
11	PITT RIVER (UPPER)	75,000	3,500	7,500	7,500	3,500
12	SALMON RIVER			3,500		
13	SERPENTINE RIVER			3,500		
14	SILVER CREEK (WIDGEON SLOUGH)	1,500		1,500	7,500	3,500
15	WEST CREEK			1,500	400	3,500
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ESCAPEMENT SUMMARY

FISHERIES AND MARINE SERVICE

STATISTICAL AREA 29(Upper Fraser)

SPECIES	NO. OF STREAMS		
	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	30	25	46
CHINOOK	32	50	10
COHO	15	57	14
PINK	27	11	8
CHUM	31	10	6

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	< 500	500—5000	> 5000
CHINOOK	< 100	100—5000	> 5000
COHO	< 100	100—5000	> 5000
PINK	< 2000	2000–25000	> 25000
CHUM	< 2000	2000–25000	> 25000

MAXIMUM RECORDED ESCAPEMENT FIGURES

(FISHERIES AND MARINE SERVICE STATISTICAL AREA 29, Upper Fraser)

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ADAMS RIVER	3,000,000	7,500	7,500	53	
2	UPPER ADAMS RIVER	200		3,500		
3	ALBREDA RIVER					
4	AMERICAN CREEK	400	75	750	400	75
5	ANDERSON CREEK	25	25	25	2,500	
6	ANDERSON LAKE	3,500	25			
7	ANKWILL CREEK	15,000				
8	ANSTEY RIVER	1,500	750			
9	ANTLER CREEK		NO RECORDS AVAILABLE			
10	ATCHELITZ CREEK	25		200		25
11	BARRIER RIVER	200	400	1,500		
12	BEAVER RIVER		NO RECORDS AVAILABLE			
13	BESSETTE RIVER		25	2,500		
14	BIG SILVER CREEK	7,500	750	200	7,500	3,500
15	BIVOUAC CREEK	15,000				
16	BLANCHET CREEK		NO RECORDS AVAILABLE			
17	BLUE RIVER		NO RECORDS AVAILABLE			
18	BONAPARTE RIVER		400	3,500	1,750	
19	BONE CREEK		NO RECORDS AVAILABLE			
20	BOUCHIER CREEK			75	200	750
21	BOULDER CREEK		75	750		
22	BOWRON RIVER	35,000	1,500			
23	BRIDGE RIVER	25			7,500	
24	BROOKFIELD CREEK					
25	CAMERON CREEK					

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
26	CAPTAIN CREEK					
27	CARIBOO RIVER					
28	CAYOOSH CREEK		NO RECORDS AVAILABLE			
29	CHEHALIS RIVER	400	7,500	15,000	100,000+	75,000
30	CHILAKO RIVER		400			
31	CHILCOTEN RIVER		1,500			
32	CHILKO RIVER	500,000	7,500			
33	CHILLIWACK RIVER	750	1,500	75,000	225,000	75,000
34	CHUN CREEK		NO RECORDS AVAILABLE			
35	CLEARWATER RIVER	75	7,500	3,500	25	
36	COGBURN CREEK	200	200		75	750
37	COHO CREEK			600		
38	COLDWATER RIVER		1,500	7,500		
39	COQUIHALLA RIVER	7,500	400	1,500	35,000	750
40	CROW CREEK	750				
41	CUNNINGHAM CREEK		NO RECORDS AVAILABLE			
42	DEADMAN'S CREEK		3,500	3,500	400	
43	DOG CREEK		NO RECORDS AVAILABLE			
44	DORE CREEK		NO RECORDS AVAILABLE			
45	DOUGLAS CREEK	750	25	75		75
46	DRIFTWOOD RIVER	75,000	25			
47	DUNVILLE CREEK			200		
48	DUST CREEK	10,870				
49	EAGLE RIVER	10,148	3,500	7,500		
50	EAST CREEK	200		25		
51	ELK CREEK			900		
52	ELKIN CREEK		NO RECORDS AVAILABLE			
53	ENDAKO RIVER	3,500				
54	FELIX CREEK				750	
55	FIFTEEN MILE CREEK	920				

STREAM No.	STREAM NAME	SPECIES SOCKEYE	CHINOOK	COHO	PINK	CHUM
56	FINN CREEK	1,500	3,500	3,500		
57	FISHTRAP CREEK					
58	FIVE MILE CREEK	3,500				
59	FLEMING CREEK		7,500			
60	FONTONIKO CREEK		NO RECORDS AVAILABLE			
61	FORFAIR CREEK	75,000				
62	FORSYTHE CREEK	5,830				
63	FRYPAN CREEK	10,600				
64	GATES CREEK	15,000	400	15,000		
65	GLUSKIE CREEK	15,000				
66	GOAT RIVER		10			
67	GRANITE CREEK			750		
68	HAGGEN CREEK		NO RECORDS AVAILABLE			
69	HARRISON RIVER	42,778	75,000	7,500	645,476	110,000
70	HARVEY'S CREEK		NO RECORDS AVAILABLE			
71	HATCHERY CREEK	1,500		75	200	1,500
72	HATCHERY (FISH TRAP) CREEK			400		
73	HAWKINS CREEK			200	25	200
74	HICKS CREEK			2,200		50
75	HOPE SLOUGH			75		
76	HORSEFLY CREEK	160,000	400			
77	HUNTER CREEK	400	25	400	1,500	300
78	INCHES CREEK			750	75	3,500
79	INDIANPOINT CREEK		NO RECORDS AVAILABLE			
80	JAMES (BAD) CREEK		NO RECORDS AVAILABLE			
81	JONES CREEK	400	75	400	7,500	3,500
82	KAZCHEK CREEK	15,676	75			
83	KEITHLY CREEK		NO RECORDS AVAILABLE			
84	KELLY (CLAYBURN) CREEK			200	25	25
85	KIMBALL CREEK					

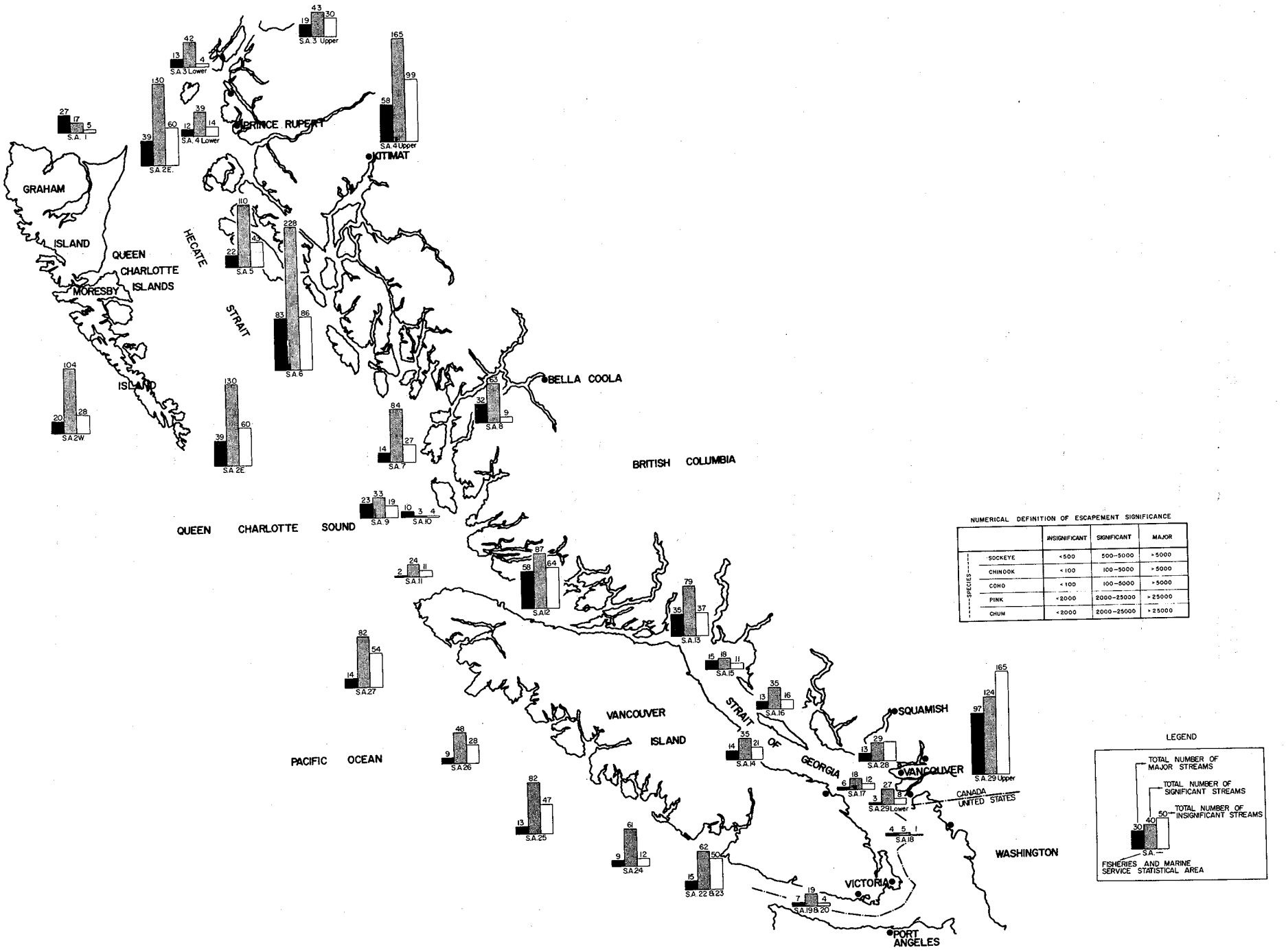
STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
86						
87	KUZKWA CREEK	35,000	75			
88	KYNOCK CREEK	100,000+				
89	LEGACE CREEK			25	40	750
90	LEMIEUX CREEK	25	400	3,500		
91	LEMPRIERE CREEK		NO RECORDS AVAILABLE			
92	LEO CREEK	15,000				
93	LION CREEK			7,500		
94	LITTLE RIVER	125,000	3,500			
95	LITTLE HORSEFLY RIVER	355	75			
96	LORENZETTI CREEK	25		1,500	3,500	273
97	LOUIS RIVER	75	750	75,000		
98	LUCKAKUCK CREEK			200		400
99	MAD RIVER		25	75		
100	MANHOOD RIVER		NO RECORDS AVAILABLE			
101	MANN CREEK		NO RECORDS AVAILABLE			
102	MARIA SLOUGH	400	400	1,500	200	1,500
103	MARSHALL CREEK			25		
104	MATTHEW RIVER					
105	McGREGOR RIVER	1,500	750			
106	McKINLEY CREEK		NO RECORDS AVAILABLE			
107	McKLENNAN CREEK		NO RECORDS AVAILABLE			
108	MIAMI SLOUGH			200		
109	MIDDLE RIVER	330,000	25			
110	MITCHELL RIVER	7,500				
111	MOMICH RIVER	1,000	25	750		
112	MOOSE RIVER		NO RECORDS AVAILABLE			
113	MORKILL RIVER		400			
114	MORRIS CREEK	15,000	75	1,500	15,000	3,500
115	MYSTERY CREEK	25	25	25		200

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
116	NADINA RIVER	75,000	25			
117	NAHATLATCH RIVER	75	750	15,000	750	
118	NARROWS CREEK	35,000				
119	NAZKO RIVER		NO RECORDS AVAILABLE			
120	NECHAKO RIVER	25	3,500			
121	NICOLA RIVER	200	7,500	3,500	3,500	
122	NICOMEN SLOUGH			1,500	7,500	15,000
123	NITHI CREEK	1,500				
124	NORRISH (SUICIDE) CREEK			1,500	7,500	3,500
125	OKANAGAN RIVER	75,000	200	75		
126	ORMOND CREEK	3,500	25			
127	OTTER CREEK		NO RECORDS AVAILABLE			
128	PAULA CREEK	7,500				
129	PINCHI CREEK	7,500	25			
130	POINT CREEK	750				
131	POPKUM CREEK			200	3,500	
132	PORTAGE CREEK	35,000	750	400	7,500	
133	PURCELL CREEK			200		
134	PIE CREEK			200		
135	QUESNEL RIVER	200	3,500			
136	RAFT RIVER	7,303	1,500	3,500		
137	REG CHRISTIE CREEK			200		
138	ROSETTE CREEK	100,000+				
139	ROULEAU CREEK			200		75
140	RUBY CREEK			25	700	25
141	SAKENICHE RIVER	7,000	75			
142	SALMON RIVER (KAMLOOPS)	25	1,500	7,500		
143	SALMON RIVER (PRINCE GEORGE)		750			
144	SANDPOINT CREEK	3,500				
145	SCOTCH CREEK	15,000	25	750		

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
146	SEEBACH CREEK		NO RECORDS AVAILABLE			
147	SELLER CREEK		NO RECORDS AVAILABLE			
148	SETON CREEK	35,000	750	1,500	100,000	
149	SETON LAKE		NO RECORDS AVAILABLE			
150	SEYMOUR RIVER	75,000	400	750	750	
151	SHALE CREEK	3,500				
152	LOWER SHUSWAP RIVER	35,000	15,000	7,500		
153	MIDDLE SHUSWAP RIVER	1,872	1,500	1,500		
154	SILVER CREEK	750	75	400	3,500	400
155	SILVERY (BORDEN) CREEK			400		
156	SILVERDALE CREEK		400	750	3,500	1,500
157	SINMAX (PASS) RIVER	750		750		
158	SLEESE (SILICIA) CREEK		75	1,500	7,500	200
159	SLIM CREEK		1,750			
160	SLOQUET (SPRING) CREEK	75	200	200	200	200
161	SPANISH CREEK		NO RECORDS AVAILABLE			
162	SPIUS CREEK		1,200	3,500		
163	SPUZZUM CREEK	15,000	3,500	750	750	75
164	SQUAKUM CREEK			750	750	15,000
165	STAVE RIVER	1,500	200	1,500	7,500	75,000
166	STEIN RIVER	25	25	25	200	
167	STELLAKO RIVER	250,000	7,500			
168	STEWART CREEK			75		
169	STUART RIVER		400			
170	SUCCER CREEK	15,000	400	750	3,500	400
171	SULWEIN (WOODRUFF) CREEK		NO RECORDS AVAILABLE			
172	SUMAS RIVER			750	75	400
173	SUMMIT CREEK					
174	SWELTZER CREEK	7,500	25	1,500	75,000	75,000
175	SWIFT (COTTONWOOD) CREEK		3,500			

STREAM No.	STREAM NAME	SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
176	SWIFT RIVER					
177	TACHIE RIVER	107,000	25			
178	TASEKO RIVER	35,000	750			
179	TATHAM (BELLS) CREEK			1,500		200
180	THOMPSON CREEK			200		1,500
181	SOUTH THOMPSON RIVER	100,000+	15,000	1,500	400	
182	THOMPSON RIVER	1,600	3,500	400	300,000	
183	NORTH THOMPSON RIVER	400	3,500	1,500		
184	TIPELLA SLOUGH	25	25	200		1,500
185	TORPHY RIVER		1,500			
186	TWENTY MILE CREEK	1,000	200	200	200	400
187	TWENTY-FIVE MILE CREEK	1,000				
188	UNCHA CREEK	200				
189	VEDDAR RIVER	200	200	35,000	250,000	90,000
190	WEAVER CREEK	35,000	25	7,500	7,500	3,500
191	WENDEL CREEK		NO RECORDS AVAILABLE			
192	WESTROAD (BLACKWATER) RIVER		1,500	200		
193	WHONOCK CREEK			400	7,500	3,500
194	WILKINSON CREEK			75		200
195	WILLOW RIVER (PRINCE GEORGE)		750			
196	WORTHS CREEK			400	25	7,500
197	YALE CREEK	750	75	200	200	75
198	VALOKOM RIVER	400	75			
199						
200						
201						
202						
203						
204						
205						

SUMMARY OF B.C. SALMON STREAM ESCAPEMENT SIGNIFICANCE



NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT	SIGNIFICANT	MAJOR
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

LEGEND

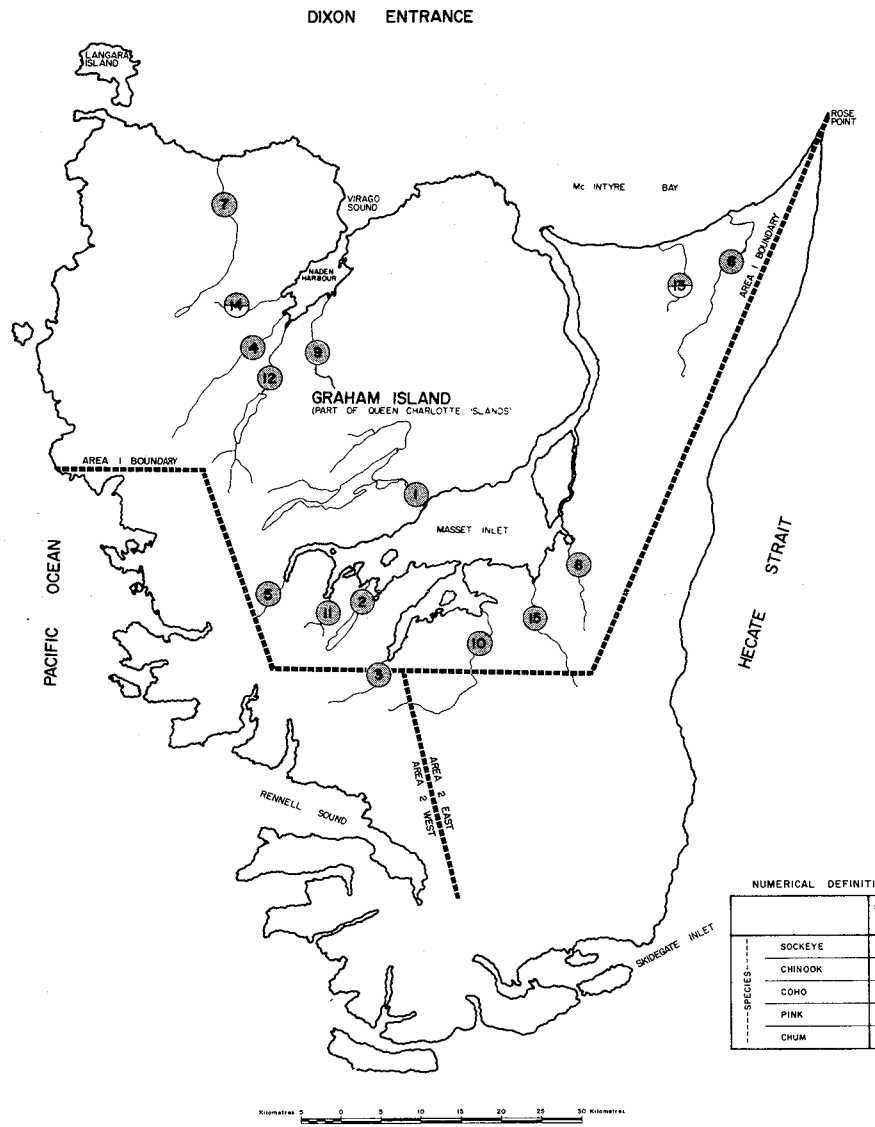
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 1

INDEX

AREA 1

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AIN RIVER & LAKE SYSTEM	●		●	●	●
2	AWUN RIVER & LAKE	●		●	●	●
3	DATLEMAN RIVER	○		◑	●	○
4	DAVIDSON CREEK			●	●	◑
5	DINAN CREEK			◑	●	○
6	HEILLEN RIVER			●	◑	
7	JALLUN RIVER	◑		●	●	
8	KUMDIS RIVER			●	○	
9	LIGNITE CREEK			●	●	◑
10	MAMIN RIVER	◑		●	●	
11	McLINTON CREEK			●	●	◑
12	NADEN RIVER & LAKE SYSTEM	●		●	●	●
13	SANGAN CREEK			◑	●	○
14	STANLEY CREEK			●	●	●
15	YAKOUN RIVER & LAKE SYSTEM	●	●	●	●	○



LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

		INSIGNIFICANT ○	SIGNIFICANT ◑	MAJOR ●
SPECIES	SOCKEYE	<500	500–5000	>5000
	CHINOOK	<100	100–5000	>5000
	COHO	<100	100–5000	>5000
	PINK	<2000	2000–25000	>25000
	CHUM	<2000	2000–25000	>25000

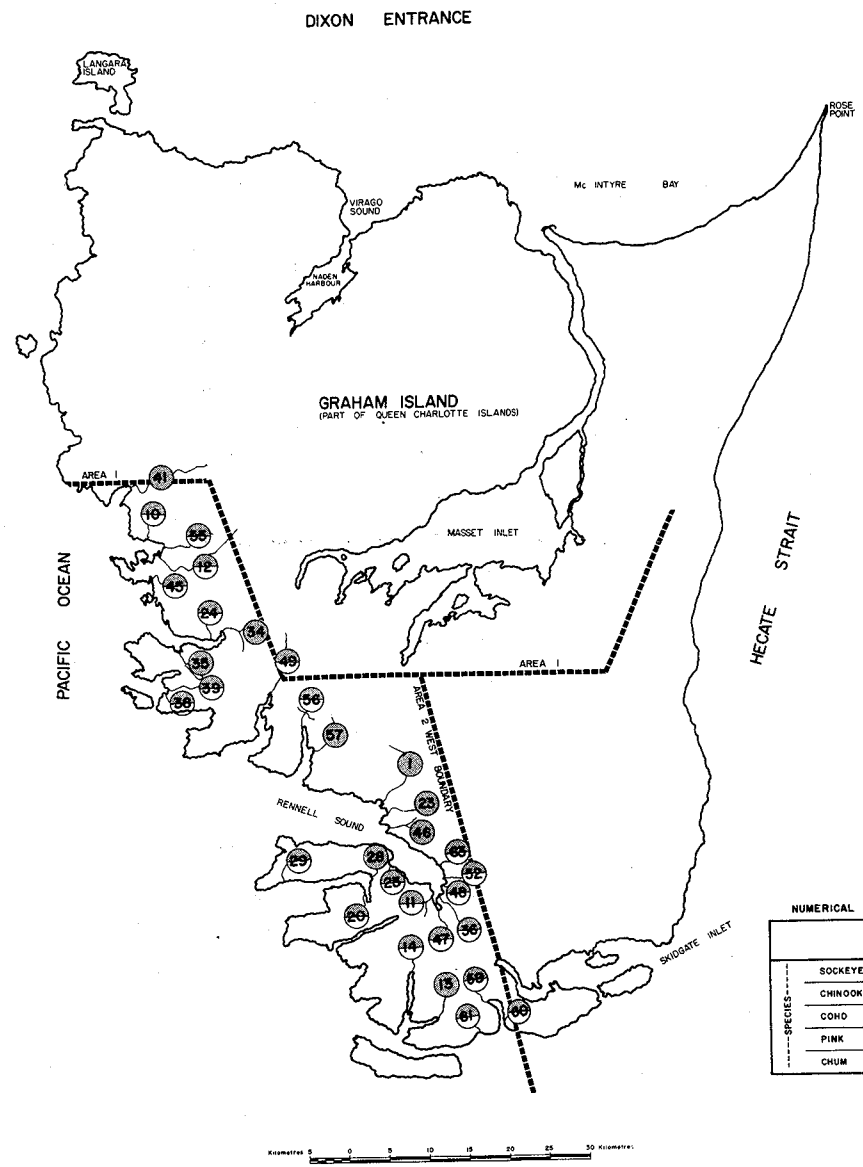
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 2 WEST (SHEET 1)

INDEX

AREA 2W

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BONANZA CREEK				●	
2	BOOMCHAIN BAY			○	○	◐
3	BOTANY BAY			◐		◐
4	BOTANY INLET (HEAD)			◐		◐
5	BOTANY INLET (OUTER)			○	○	○
6	BOTTLE INLET CREEK			○	○	◐
7	BROWNS CABIN CREEK			◐	●	◐
8	BUCK CHANNEL				○	◐
9	CANOE PASS CREEK			◐	●	◐
10	CELESTIAL RIVER				●	◐
11	CLAPP BASIN CREEK					◐
12	COATES RIVER					◐
13	DAWSON HARBOUR (E)			◐	●	◐
14	DAWSON INLET (W)			○	○	◐
15	DOUGLAS INLET (HEAD)			○	○	◐
16	DOUGLAS INLET (RIGHT)					◐
17	EDWARDS CREEK					◐
18	FLAMINGO CREEK			◐	●	◐
19	FLAT CREEK			◐	●	◐
20	GIVENCHY ANCHORAGE			○	○	◐
21	GOLD (MITCHELL) HARBOUR			○	○	◐
22	GOSKI CREEK					◐
23	GREGORY CREEK				●	
24	HOBBS CREEK					◐
25	INDIAN BAY (CLONDARD BAY) CREEK			○	○	◐
26	INSKIP CREEK				●	◐
27	KAISUN CREEK			○	●	◐
28	KANO INLET (HEAD)			○	●	◐
29	KANO INLET (OUTER)			○	○	◐
30	KOOTNEY INLET (NORTH)			○	●	◐
31	KOOTNEY INLET (SOUTH)			○	●	◐
32	LOMGON CREEK			○	○	◐
33	LOUSCONNE CREEK			○	○	◐
34	MACE CREEK			○	○	◐
35	MERCER CREEK	◐		○	○	◐
36	MOUNTAIN RIVER			○	○	◐
37	MUDGE INLET					◐
38	NESTO INLET (OUTER)					◐
39	NESTO INLET (INNER)					◐
40	NEWCOMBE					◐
41	OTARD BAY			◐	●	◐
42	PEEL INLET (HEAD)			◐	○	◐
43	PEEL INLET (1ST LEFT H.)			◐	○	◐
44	PEEL INLET (2ND L.H.)			◐		◐
45	PORT LOUIS					◐
46	RILEY CREEK			◐	●	◐
47	RENNEL CREEK			◐	○	◐
48	ROCKRUN CREEK			◐	○	◐
49	SEAL INLET			◐	●	◐
50	SECURITY INLET (L.H.)			◐	●	◐



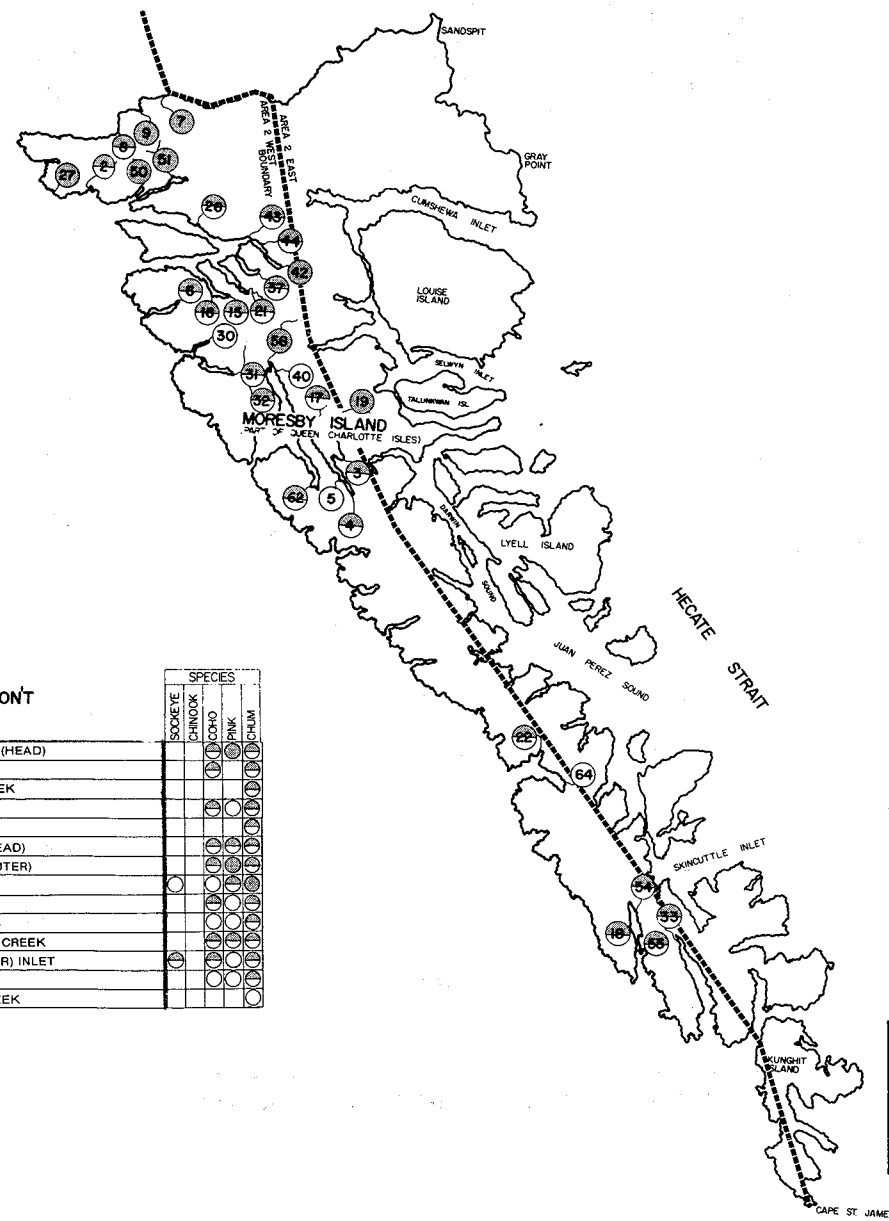
LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ◐	MAJOR ●
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 2 WEST (SHEET 2)



CON'T

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
51	SECURITY INLET (HEAD)					
52	SHIELDS CREEK					
53	SPERM BAY CREEK					
54	STAKI CREEK					
55	STEEL CREEK					
56	TARTU INLET (HEAD)					
57	TARTU INLET (OUTER)					
58	TASU CREEK					
59	TROUNCE					
60	TROUNCE (REAR)					
61	WEST NARROWS CREEK					
62	WRIGHT (FAIRFAR) INLET					
63	YAKOUN TRAIL					
64	YAKULANAS CREEK					

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ◍
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

Kilometres 5 0 5 10 15 20 25 30 Kilometres

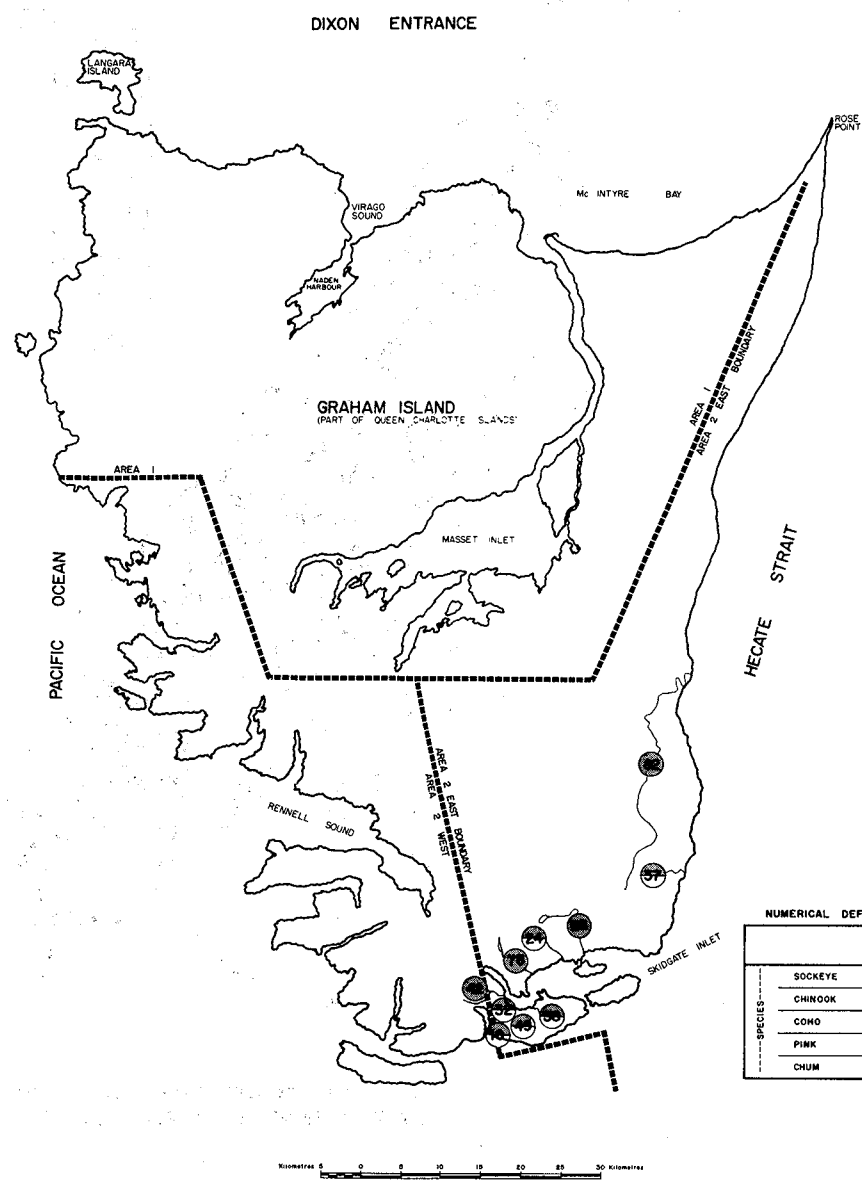
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 2 EAST (SHEET 1)

INDEX

AREA 2E

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALDER ISLAND CREEK			◔	◔	○
2	ANNA INLET CREEK				○	○
3	ARROW CREEK			◔	◔	◔
4	BAG HARBOUR CREEK			◔	◔	●
5	BELIJAY BAY CREEK			○	○	◔
6	BIG GOOSE BAY			●	◔	◔
7	BREAKER BAY CREEK			◔	◔	
8	BURNABY NARROWS CREEK					◔
9	CARMICHAEL CREEK					◔
10	CARPENTER BAY CREEKS (2)			◔	○	◔
11	CHADSEY CREEK			◔	○	◔
12	COLLISON CREEK			◔	○	○
13	COPPER RIVER	◔		◔	●	◔
14	CRESCENT INLET			◔	●	◔
15	DANA CREEKS (3)			◔	○	◔
16	DASS CREEK			◔	○	○
17	DEENA RIVER			◔	●	●
18	EAST NARROWS CREEK				◔	◔
19	ECHO HARBOUR CREEK			◔	◔	◔
20	FANNY CREEK					○
21	FORGOTTEN CREEK			◔	○	◔
22	GEORGE BAY CREEK			◔	○	●
23	GRAY BAY CREEK			◔	○	○
24	GRAYS CABIN CREEK (OUTLOOK)			◔	○	◔
25	HAANS CREEK			◔	◔	◔
26	HARRIET BAY CREEK			◔	○	○
27	HEATER HARBOUR CREEK			◔		◔
28	HONNA RIVER			◔	●	●
29	HUSTON CREEK			◔	○	●
30	HUTTON INLET (L.H. CREEK)			○	◔	◔
31	HUTTON INLET (HEAD)			○	◔	◔
32	INDIAN CABIN CREEK			◔	○	◔
33	ISLAND BAY CREEKS			◔		◔
34	ISLAND BAY CREEK(R.H.)			◔		◔
35	IKEDA BAY CREEK			◔	○	◔
36	JEDWAY CREEK			○		◔
37	JUNGLE CREEK			◔		
38	KOSTAN INLET CREEK			◔	◔	◔
39	KOYA BAY CREEK			◔	◔	◔
40	LAGOON BAY CREEK			◔	◔	◔
41	LITTLE GOOSE CREEK			◔	◔	◔
42	LONGARM CREEK			◔	●	◔
43	LUXANA CREEK			○	○	○
44	McMILLAN CREEK			◔	○	○
45	MARKER CREEK			○		◔
46	MATHERS CREEK	◔	◔	●	●	●
47	MOODY CREEK			◔		○
48	MOORE CREEK			○		◔
49	MUD BAY CREEK					◔
50	OYSTER COVE CREEK			◔	◔	◔



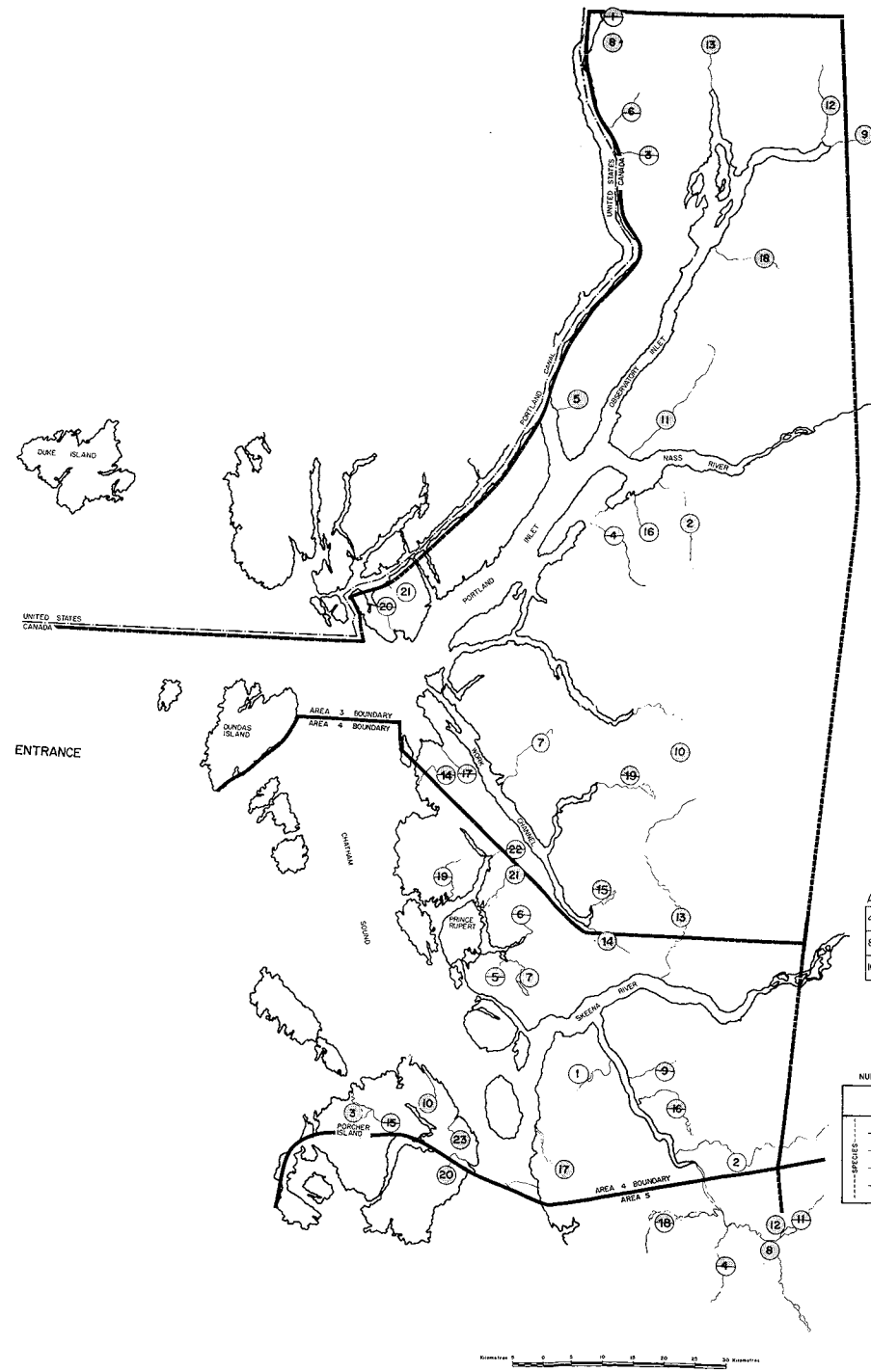
LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ◔	MAJOR ●
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 3 (LOWER NASS) AND 4(LOWER SKEENA)



INDEX

AREA 3 (LOWER NASS)

		SPECIES					
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BEAR RIVER					
2	BURTON CREEK					
3	CASCADE RIVER					
4	CHAMBERS CREEK					
5	DOGFISH CREEK					
6	DONAHUE CREEK					
7	ENSHESHESE RIVER					
8	GEORGIA RIVER					
9	ILLIANCE RIVER					
10	KUTZEYMATEEN RIVER					
11	KINKOLITH RIVER					
12	KITSAULT RIVER					
13	KSHWAN RIVER					
14	LAMACH CREEK					
15	LEVERSON CREEK					
16	NASS HARBOUR CREEK					
17	SIMPSON CREEK					
18	STAGOO RIVER					
19	TOON RIVER					
20	TRACY CREEK					
21	TURK CREEK					

INDEX

AREA 4 (LOWER SKEENA)

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BEAVER CREEK					
2	BIG FALLS CREEK					
3	BIG USELESS CREEK					
4	CLEARWATER CREEK					
5	KLOYIA (CLOYA) CREEK					
6	DENIS CREEK					
7	DIANA CREEK					
8	ECKSTALL RIVER					
9	GIVRALTAR CREEK					
10	HUMPBACK BAY CREEK					
11	JOHNSON CREEK					
12	JOHNSTON LAKE					
13	KYEK RIVER					
14	LAHON (PEARL HARBOUR) CREEK					
15	LITTLE USELESS CREEK					
16	LOCKERBY CREEK					
17	MOORE COVE CREEK					
18	MUDDY CREEK					
19	McNICOL CREEK					
20	OONA RIVER					
21	SHAWTATAN CREEK					
22	SILVER CREEK					
23	SPILLER CREEK					

AREA 3 (UPPER NASS)

11	MAJOR STREAMS
20	SIGNIFICANT STREAMS
7	INSIGNIFICANT STREAMS

AREA 4 (UPPER SKEENA)

43	MAJOR STREAMS
81	SIGNIFICANT STREAMS
16	INSIGNIFICANT STREAMS

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

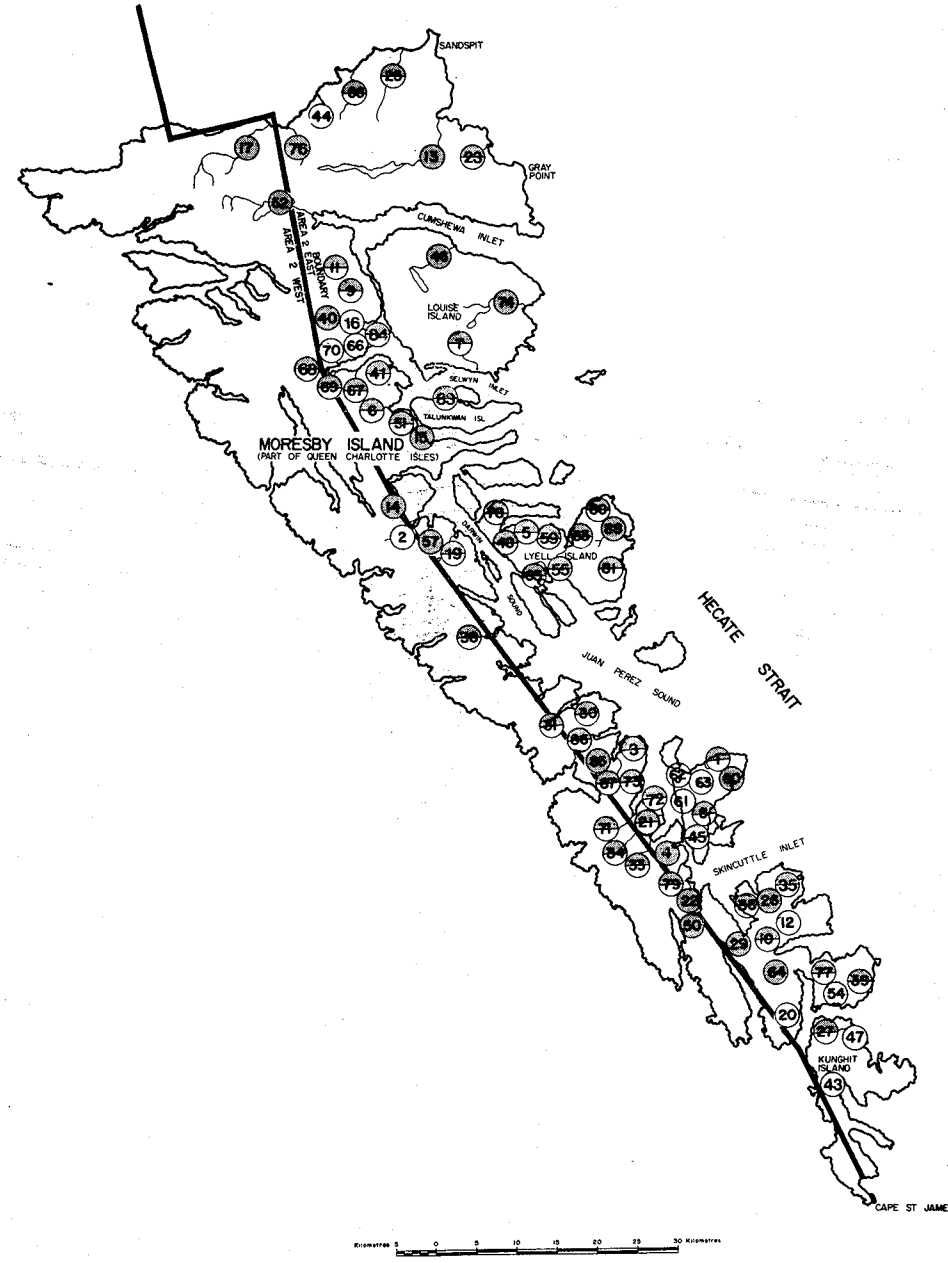
		INSIGNIFICANT	SIGNIFICANT	MAJOR
SPECIES	SOCKEYE	<500	500–5000	>5000
	CHINOOK	<100	100–5000	>5000
	COHO	<100	100–5000	>5000
	PINK	<2000	2000–25000	>25000
	CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 2 EAST (SHEET 2)

CON'T

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
51	PACOFI CREEK					
52	PALLANT CREEK					
53	POWRIVCO CREEK					
54	RASPBERRY COVE CREEK					
55	RICHARDSON CREEK					
56	SACHS CREEK					
57	SALMON RIVER					
58	SALTSPRING BAY					
59	SANDY CREEK					
60	SCUDDER POINT CREEK					
61	SECTION COVE (MAIN CREEK)					
62	SECTION COVE (MIDDLE CREEK)					
63	SECTION COVE (CABIN CREEK)					
64	SEDMOND RIVER					
65	SEDGWICK BAY CREEK					
66	SEWELL INLET (R.H.)					
67	SEWELL INLET CREEK (1ST L.H.)					
68	SEWELL INLET CREEK (HEAD)					
69	SEWELL INLET CREEK (2ND L.H.)					
70	SEWELL INLET 3RD R.H.					
71	SKAAT HARBOUR CREEK (CENTRE)					
72	SKAAT HARBOUR CREEK (L.H.)					
73	SKAAT HARBOUR CREEK (R.H.)					
74	SKEDANS CREEK					
75	SLATECHUCK CREEK					
76	SOUTH BAY CREEK					
77	SOUTH COVE CREEK (2)					
78	TAKELLY COVE CREEK					
79	TANGLE COVE CREEK					
80	TAR ISLAND GATE CREEK					
81	TARUNDL CREEK					
82	TLELL RIVER					
83	THURSTON HARBOUR CREEK					
84	WATERFALL CREEK					
85	WERNER BAY SOUTH					
86	WERNER BAY NORTH (2 STREAMS)					
87	WERNER BAY S.L.H.					
88	WINDY BAY CREEK					



LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ●
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

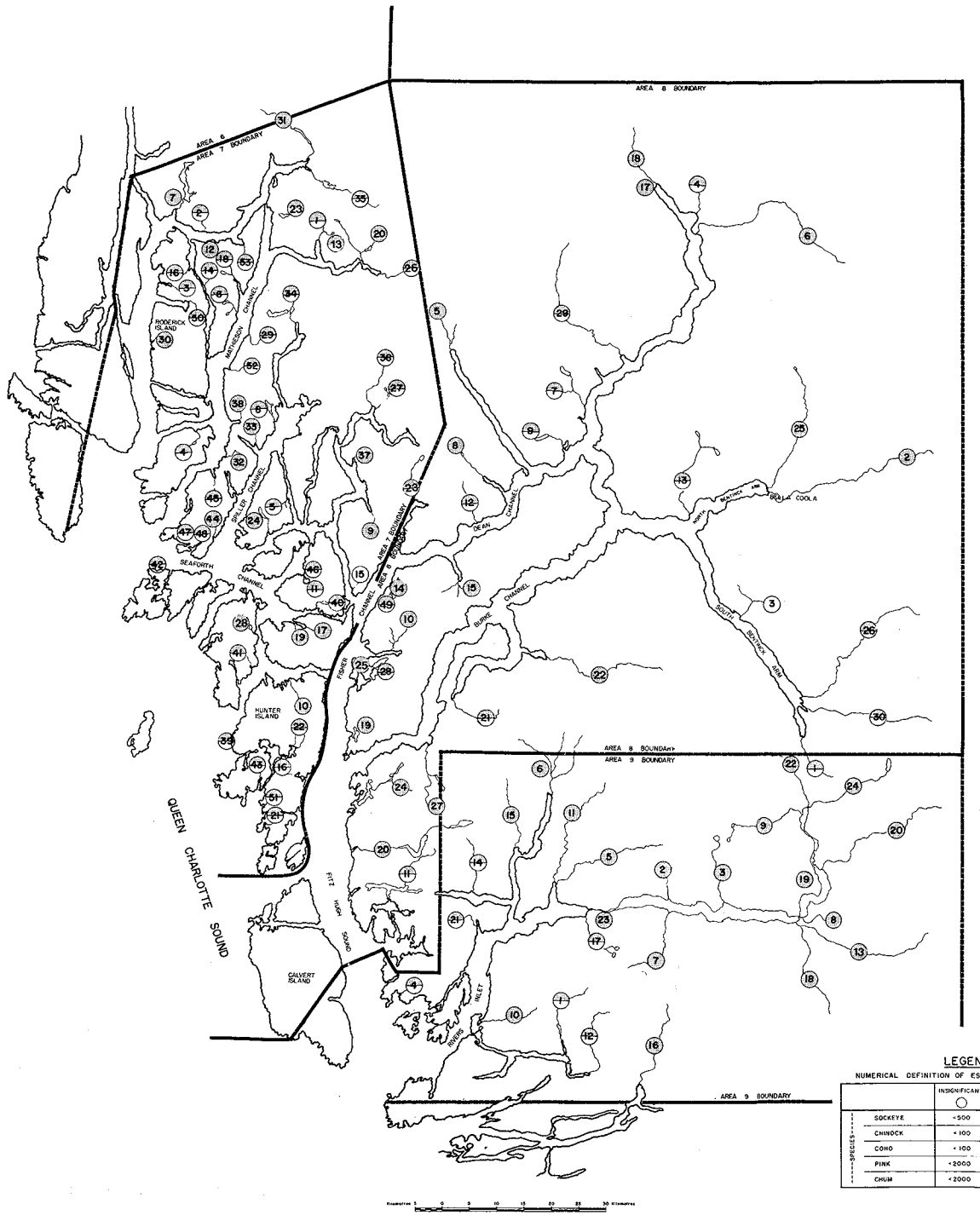
FISHERIES AND MARINE SERVICE STATISTICAL AREAS 7, 8 AND 9

INDEX
AREA 7

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BIG CREEK				⊖	○
2	BOLIN BAY CREEK				○	○
3	BOTTLENECK CREEK				⊖	○
4	BULLEY BAY CREEK					○
5	BULLOCK CHANNEL STREAMS				○	○
6	CANYON CREEK					○
7	CARTER RIVER				○	○
8	CHAMISS CREEK					⊖
9	CLATSE CREEK	○			○	○
10	COOPER INLET CREEKS	○			⊖	⊖
11	DEER PASS LAGOON CREEK	○			○	○
12	DUTHIE CREEK				⊖	⊖
13	FALLIS CREEK					○
14	GEISH CREEK				○	○
15	GOAT BUSHU CREEK				○	○
16	GORILLA CREEK				○	○
17	GULLCHUCK HEAD STREAM				○	○
18	JAMES BAY CREEK				○	○
19	KODJUSDIS RIVER	⊖			⊖	⊖
20	KAINET RIVER	⊖	○		⊖	⊖
21	KILDIDT CREEK	○			○	○
22	KILDIDT LAGOON CREEK				○	○
23	KORICH CREEK				○	○
24	KWAKUSDIS RIVER	⊖			⊖	⊖
25	LAGOON CREEK	⊖			○	○
26	LEE CREEK				○	○
27	LORD RIVER				⊖	⊖
28	McLOUGHLIN BAY CREEK	⊖			○	○
29	McPHERSON CREEK				○	○
30	MARY COVE CREEK	⊖			○	○
31	MUSSEL RIVER	○	○		⊖	⊖
32	NAMELESS CREEK				⊖	⊖
33	NEEKAS CREEK				⊖	⊖
34	PINE CREEK	⊖			⊖	⊖
35	POISON COVE CREEK				⊖	⊖
36	QUARTCHA CREEK				⊖	⊖
37	ROSCOE CREEK	○			⊖	⊖
38	SALMON BAY CREEK				⊖	⊖
39	SANS PEUR PASSAGE CREEKS	○			⊖	⊖
40	SCHRIBNER'S CREEK				⊖	⊖
41	SHIP POINT LAGOON CREEK	⊖			○	○
42	SOUND POINT LAGOON CREEK	⊖			○	⊖
43	STEWART INLET CREEK				○	○
44	TINKEY RIVER	⊖			⊖	⊖
45	TOM BAY CREEK				○	○
46	TROUP PASSAGE CREEK	⊖			⊖	⊖
47	TUNO CREEK (WEST)	⊖			○	○
48	TUNO CREEK (EAST)	⊖			○	○
49	WALKER LANE CREEK				⊖	⊖
50	WATSON BAY CREEK				⊖	⊖
51	WATT BAY CREEK	○			○	○
52	WINDFALL CREEK				○	○
53	WINDY BAY CREEK				⊖	○

INDEX
AREA 8

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ASEEK RIVER				○	○
2	ATNARKO & BELLA COOLA RIVERS	⊖	⊖	⊖	⊖	⊖
3	CAMP CREEK				○	○
4	CANNERY BAY CREEK				○	○
5	CASCADE CREEK	○			○	○
6	DEAN RIVER	⊖	⊖	⊖	⊖	⊖
7	DEEP BAY RIVER				○	○
8	ELCHO HARBOUR CREEK				⊖	⊖
9	EUCOTT BAY CREEK				⊖	⊖
10	EVANS INLET (3 STREAMS)				○	○
11	FISH EGG CREEK	○			○	○
12	FRENCH (MANS) CREEK				⊖	⊖
13	GREEN RIVER				⊖	⊖
14	HOOKNOSE CREEK	⊖			⊖	⊖
15	JENNY BAY (3 STREAMS)				⊖	⊖
16	KILTICK CREEK				○	○
17	KIMSQUIT BAY	⊖			⊖	⊖
18	KIMSQUIT RIVER	⊖	⊖	⊖	⊖	⊖
19	KISAMEET RIVER	⊖			⊖	⊖
20	KOEYE RIVER	⊖			⊖	⊖
21	KWATLENA RIVER				⊖	⊖
22	KWATNA RIVER	○	⊖		⊖	⊖
23	MARTIN CREEK				⊖	⊖
24	NAMU RIVER	⊖			⊖	⊖
25	NECLEETSCONNY RIVER	○			⊖	⊖
26	NOOCK RIVER				⊖	⊖
27	NOOTUM RIVER				⊖	⊖
28	SAGER CREEK				⊖	⊖
29	SKOWQUILTZ RIVER				⊖	⊖
30	TALEOMY RIVER				○	○



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AREA 9

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALLARD (NORTH ARM) CREEK				○	○
2	AMBACK (QUAP) CREEK	⊖		○	○	○
3	ASKLUM (ASHLUN) CREEK	⊖		○	○	○
4	BEAVER CREEK	○		○	○	○
5	CHUCKWALLA RIVER			○	○	○
6	GLYCK-YOUNG-NEIL RIVERS			○	○	○
7	DALLARY (DALLAC) CREEK	⊖		○	○	○
8	GENNESEE RIVER	⊖		○	○	○
9	INDIAN (INZIANA) RIVER	⊖		○	○	○
10	JOHNSTON CREEK			○	○	○
11	KILBELLA RIVER			○	○	○
12	LOCKHART GORDON CREEK			○	○	○
13	MARKWELL (MACHMELL) CREEK	⊖				
14	MacNAIR CREEK				○	○
15	MILTON RIVER			○	○	○
16	NEKITE RIVER			○	○	○
17	NICKNAQUEET (SAWMILL) RIVER				○	○
18	NOOKINS (NECHANZ) RIVER	○			○	○
19	OWIKENO LAKE	○		○	○	○
20	SHUMAHALT (SHEEMAHANT) RIVER	○	○	○	○	○
21	TZEEISKAY CREEK				○	○
22	TZEO (CHEO) RIVER	⊖			○	○
23	WHONNOCK (WANNOCK) RIVER FLATS	⊖		○	○	○
24	WAUKWASH (WASH WASH) RIVER	⊖		○	○	○

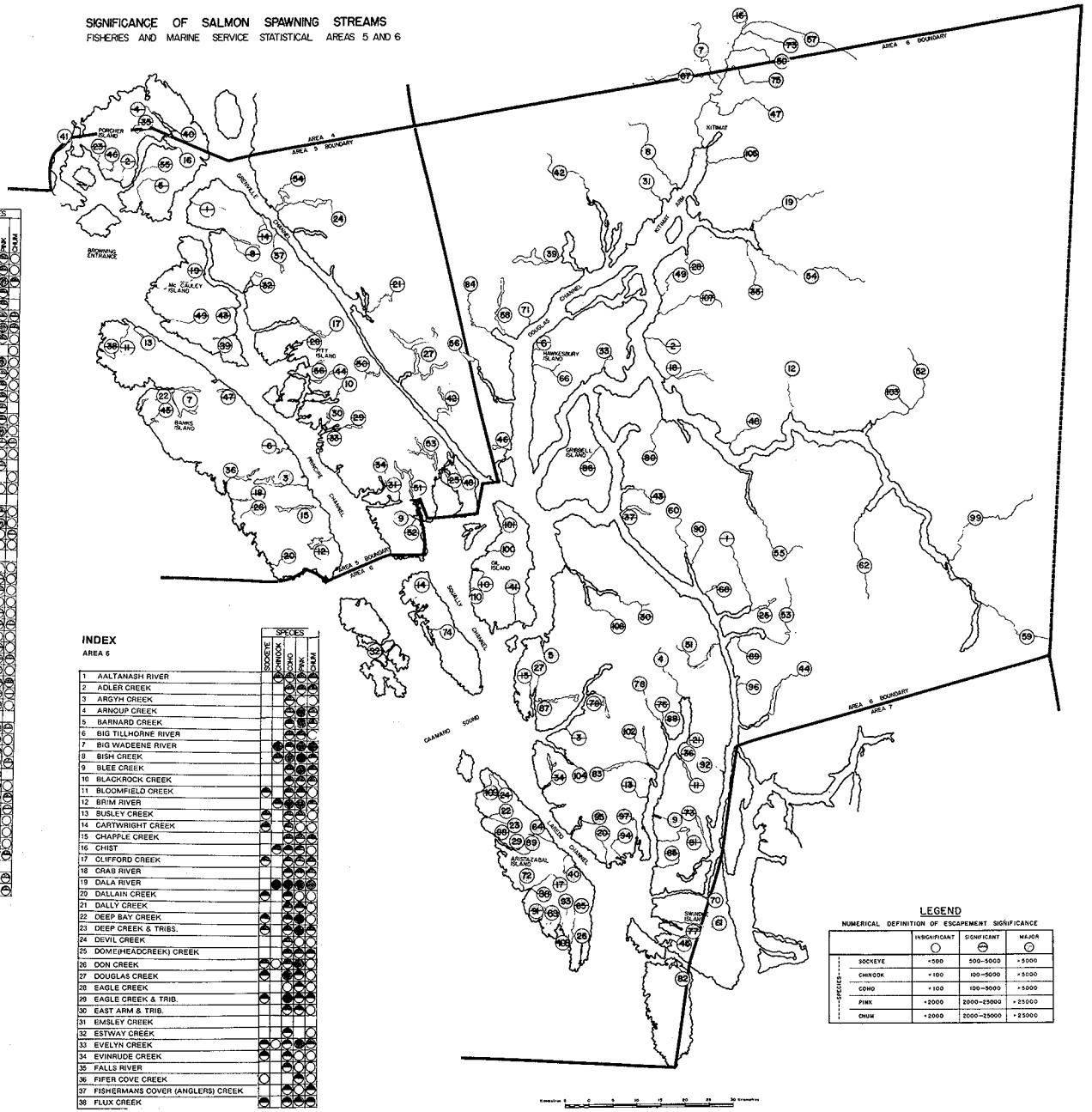
LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

		INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SPECIES	SOCKEYE	<500	500–5000	>5000
	CHINOOK	<100	100–5000	>5000
	COHO	<100	100–5000	>5000
	PINK	<2000	2000–25000	>25000
	CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 5 AND 6



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AREA 5

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALPHA CREEK					
2	ANDREW LEWIS CREEK					
3	BARE BAY SYSTEM (KOORYET LAKE)	⊖				
4	BEAVER CREEK				⊖	
5	BILLY CREEK					
6	BOLTON CREEK					
7	BONILLA ARM CREEKS	⊖				
8	CAPTAINS CAVE CREEKS	⊖				
9	CRIDGE LAGOON CREEK	⊖				
10	CURTIS INLET CREEK	⊖				
11	DEADMANS CREEK					
12	DEER LAKE CREEK					
13	ENDHILL CREEK	⊖				
14	FALSE STUART CREEK					
15	GALE LAKE SYSTEM (KEECHA LAKE)	⊖				
16	HEAD CREEK					
17	HEAVENOR INLET CREEK	⊖				
18	INDIAN HARBOUR					
19	KA-ALB CREEK					
20	KENZUWASH CREEK					
21	KLEWNUGGET CREEK					
22	LITTLE DOG CREEK					
23	KITKATLA CREEK	⊖				
24	KUMEALON CREEK		⊖	⊖		⊖
25	LAGOON CREEK		⊖	⊖		⊖
26	LEWIS CREEK	⊖				
27	LOWE LAKE SYSTEM	⊖				
28	MARKLE CREEK		⊖	⊖		⊖
29	MIKADO LAKE SYSTEM	⊖				
30	MINKTRAP LAKE SYSTEM	⊖				
31	MONCKTON INLET STREAMS	⊖				
32	NEWCOMBE HARBOUR STREAM					
33	OAR POINT CREEK					
34	PORT STEVENS CREEK		⊖	⊖		⊖
35	CANYON CREEK		⊖	⊖		⊖
36	QUINSTANSTA LAKE SYSTEM	⊖				
37	PA-AAT (SALMON) RIVER		⊖	⊖		⊖
38	RAWLINSON ANCHORAGE CREEK		⊖	⊖		⊖
39	RYAN CREEK	⊖				
40	SALT LAKE CREEK		⊖	⊖		⊖
41	SERPENTINE CREEK		⊖	⊖		⊖
42	SEVEN MILE CREEK		⊖	⊖		⊖
43	SHAW CREEK					
44	SHENEEZA CREEK	⊖				
45	SKULL CREEK		⊖	⊖		⊖
46	SNASS CREEK		⊖	⊖		⊖
47	SPENCER CREEK	⊖				
48	STEWART RIVER		⊖	⊖		⊖
49	TABLE BAY CREEK	⊖				
50	THREE MILE CREEK	⊖				
51	TOWARTZ CREEK		⊖	⊖		⊖
52	UKSETTERYEARTS CREEK		⊖	⊖		⊖
53	UNION PASS LAKE SYSTEM	⊖				
54	UN-NAMED CREEK		⊖	⊖		⊖
55	WEST CREEK		⊖	⊖		⊖
56	WILSON INLET CREEK		⊖	⊖		⊖

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AREA 6

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AALTANASH RIVER		⊖	⊖		⊖
2	ADLER CREEK		⊖	⊖		⊖
3	ARGYH CREEK		⊖	⊖		⊖
4	ARNOUP CREEK		⊖	⊖		⊖
5	BARNARD CREEK		⊖	⊖		⊖
6	BIG TILLHORNE RIVER		⊖	⊖		⊖
7	BIG WADEENE RIVER	●	●	●	●	●
8	BISH CREEK		⊖	⊖		⊖
9	BLEE CREEK		●	●		●
10	BLACKROCK CREEK		⊖	⊖		⊖
11	BLOOMFIELD CREEK	●	●	●	●	●
12	BRIM RIVER		●	●		●
13	BUSLEY CREEK	●	●	●	●	●
14	CARTWRIGHT CREEK	●	●	●	●	●
15	CHAPPLE CREEK		●	●		●
16	CHIST		●	●		●
17	CLIFFORD CREEK	●	●	●	●	●
18	CRAB RIVER		●	●		●
19	DALA RIVER		●	●		●
20	DALLAIN CREEK	●	●	●	●	●
21	DALLY CREEK		●	●		●
22	DEEP BAY CREEK	●	●	●	●	●
23	DEEP CREEK & TRIBS.	●	●	●	●	●
24	DEVIL CREEK		●	●		●
25	DOME(HEADCREEK) CREEK	●	●	●	●	●
26	DON CREEK	●	●	●	●	●
27	DOUGLAS CREEK	●	●	●	●	●
28	EAGLE CREEK		●	●		●
29	EAGLE CREEK & TRIB.	●	●	●	●	●
30	EAST ARM & TRIB.		●	●		●
31	EMSLEY CREEK		⊖	⊖		⊖
32	ESTWAY CREEK		●	●		●
33	EVELYN CREEK	●	●	●	●	●
34	EVINRUDE CREEK	●	●	●	●	●
35	FALLS RIVER		●	●		●
36	FIFER COVE CREEK	○	●	●	●	●
37	FISHERMANS COVER (ANGLERS) CREEK		●	●		●
38	FLUX CREEK	●	●	●	●	●

INDEX

AREA 6 CONT

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
39	FOCH RIVER		⊖	⊖		⊖
40	FURY CREEK	⊖				
41	GILL CREEK		⊖	⊖		⊖
42	GILTOYEE CREEK		⊖	⊖		⊖
43	GOAT COVE CREEK		⊖	⊖		⊖
44	GREEN INLET RIVER		⊖	⊖		⊖
45	GULL CREEK	⊖				
46	HARTLEY BAY CREEK	⊖				
47	HIRSCH CREEK		⊖	⊖		⊖
48	HOTSPRING CREEK		⊖	⊖		⊖
49	HUGHES (DEER) CREEK		⊖	⊖		⊖
50	HUMPHREYS CREEK		⊖	⊖		⊖
51	INDIAN RIVER	⊖	⊖	⊖		⊖
52	KEMANO RIVER	⊖	⊖	⊖		⊖
53	KHUTZE RIVER	⊖	⊖	⊖		⊖
54	KILDALA RIVER		⊖	⊖		⊖
55	KILTUISH RIVER		⊖	⊖		⊖
56	KISKOSIT RIVER		⊖	⊖		⊖
57	KITIMAT RIVER (MAIN STREAM)	⊖	⊖	⊖	⊖	⊖
58	KITKIATA RIVER & LAKE	⊖	⊖	⊖		⊖
59	KITLOPE RIVER & TRIB.	⊖	⊖	⊖		⊖
60	KLEKANE RIVER		⊖	⊖		⊖
61	KWA-KWA CREEK	⊖				
62	KWASEE (KAWESAS) RIVER		⊖	⊖		⊖
63	LAGOON (WEETEEANE) CREEK	⊖				
64	LIMESTONE CREEK	⊖				
65	LINNEA CREEK		⊖	⊖		⊖
66	LITTLE TILLHORNE RIVER		⊖	⊖		⊖
67	LITTLE WADEENE RIVER	⊖				
68	MARMOT COVE CREEK		⊖	⊖		⊖
69	MARSHALL CREEK		⊖	⊖		⊖
70	MEYERS PASS CREEK		⊖	⊖		⊖
71	MOSS (KIHESS) CREEK		⊖	⊖		⊖
72	McDONALD CREEK	⊖				
73	McKAY (LITTLE) CREEK		⊖	⊖		⊖
74	McMICKING CREEK		⊖	⊖		⊖
75	NALBELLAH (NALBEELAH) CREEK	⊖				
76	NIAS RIVER		⊖	⊖		⊖
77	OSMENT CREEK		⊖	⊖		⊖
78	PACKE CREEK	⊖				
79	PENN CREEK & TRIBS.		⊖	⊖		⊖
80	PERIL RIVER		⊖	⊖		⊖
81	POWLES CREEK	⊖				
82	PRICE CREEK	⊖				
83	PYNE CREEK		⊖	⊖		⊖
84	QUAAL RIVER	⊖	⊖	⊖		⊖
85	QUIGLEY CREEK	⊖				
86	RIORDAN RIVER		⊖	⊖		⊖
87	ROLAND CREEK		⊖	⊖		⊖
88	RONALO CREEK		⊖	⊖		⊖
89	SALMON CREEK	⊖				
90	SCOW BAY CREEK		⊖	⊖		⊖
91	SENTINEL CREEK	⊖				
92	SODA CREEK		⊖	⊖		⊖
93	STANNARD CREEK	⊖				
94	STEEP CREEK		⊖	⊖		⊖
95	TALAMOOSA CREEK	⊖				
96	TAYLOR CREEK		⊖	⊖		⊖
97	TRAHEY CREEK		⊖	⊖		⊖
98	TRENAMAN CREEK		⊖	⊖		⊖
99	TSAYTIS RIVER	⊖				
100	TURN CREEK		⊖	⊖		⊖
101	TURTLE CREEK		⊖	⊖		⊖
102	TYLER CREEK		⊖	⊖		⊖
103	WAHOO RIVER		⊖	⊖		⊖
104	WALE CREEK TRIB.	⊖				
105	WAUGH (WATHL) CREEK	⊖				
106	WEETEEAN CREEK		⊖	⊖		⊖
107	WEEWANIE CREEK		⊖	⊖		⊖
108	WEST ARM CREEK	⊖				
109	WEST CREEK		⊖	⊖		⊖
110	WINDY ISLAND CREEK		⊖	⊖		⊖

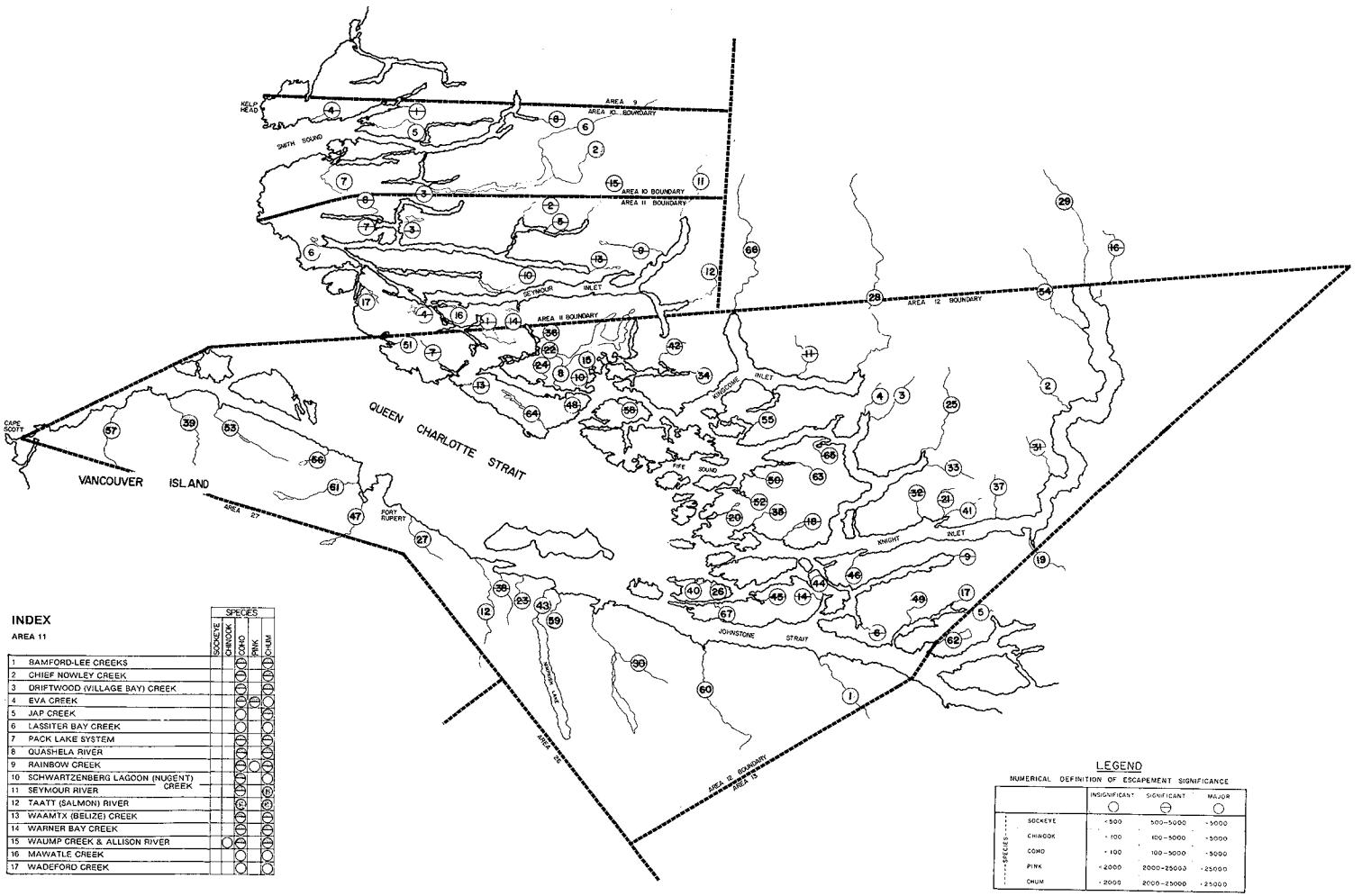
LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ⊙
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 10, 11 AND 12



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AREA 12

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ADAM RIVER	○	⊖	○	○	○
2	AHNUHATI RIVER	○	⊖	○	○	○
3	AHTA RIVER	○	⊖	○	○	○
4	AHTA VALLEY CREEK			○	○	○
5	BARNARD CREEK			○	○	○
6	BOUGHEY BAY CREEK			○	○	○
7	BRADLEY CREEK			○	○	○
8	BUGHOUSE BAY CREEK			○	○	○
9	CALL CREEK			○	○	○
10	CARRIDEN BAY CREEK			○	○	○
11	CHARLES CREEK			○	○	○
12	CLUKEWE RIVER			○	○	○
13	COHOE CREEK			○	○	○
14	ORACROFT CREEK			○	○	○
15	EMBLEY RIVER			○	○	○
16	FRANKLIN RIVER			○	○	○
17	FULMORE RIVER	○	⊖	○	○	○
18	GILFORD CREEK			○	○	○
19	GLENDALE CREEK	○	⊖	○	○	○
20	HEALTH LAGOON CREEK			○	○	○
21	HOEYA SOUND CREEK			○	○	○
22	HUASKIN CREEK			○	○	○
23	HYDE CREEK			○	○	○
24	JENNIS BAY CREEK			○	○	○
25	KAKWEIKEN RIVER	○	⊖	○	○	○
26	KAMANO BAY CREEK			○	○	○
27	KEOGH RIVER	○	⊖	○	○	○
28	KINGCOME RIVER	○	⊖	○	○	○
29	KLINAKLINI RIVER	○	⊖	○	○	○
30	KOKISH RIVER	○	⊖	○	○	○
31	KWALATE CREEK	○	⊖	○	○	○
32	LULL CREEK			○	○	○
33	McALISTER CREEK			○	○	○
34	MACKENZIE SOUND CREEK	○	⊖	○	○	○
35	MAPLE COVE CREEK			○	○	○
36	MARION CREEK			○	○	○
37	MATSUI CREEK			○	○	○
38	MILLS CREEK			○	○	○
39	NAHWITTI RIVER	○	⊖	○	○	○
40	NEW VANCOUVER CREEK			○	○	○
41	NIGGER CREEK			○	○	○
42	NIMMO BAY CREEK			○	○	○
43	NIMPKISH RIVER	○	⊖	○	○	○
44	PORT HARVEY LAGOON CREEKS			○	○	○
45	POTTS LAGOON CREEK			○	○	○
46	PROTECTION POINT CREEK			○	○	○
47	QUATSE RIVER	○	⊖	○	○	○
48	RICHMOND BAY CREEK			○	○	○
49	ROBBERS NOB CREEK			○	○	○
50	SCOTT COVE CREEK			○	○	○
51	SHELTER BAY CREEK			○	○	○
52	SHOAL HARBOUR CREEK			○	○	○
53	SHUSHARTIE RIVER	○	⊖	○	○	○
54	SIM RIVER	○	⊖	○	○	○
55	SIMOON SOUND CREEK			○	○	○
56	SONGHEES CREEK			○	○	○
57	STANDBY RIVER	○	⊖	○	○	○
58	SULLIVAN BAY CREEK			○	○	○
59	THIEMER CREEK			○	○	○
60	TSITIKA RIVER			○	○	○
61	TSULQUATE RIVER			○	○	○
62	TUNA RIVER			○	○	○
63	VINER SOUND CREEK	○	⊖	○	○	○
64	VIOLA CREEK			○	○	○
65	WAHKANA BAY CREEK			○	○	○
66	WAKEMAN RIVER	○	⊖	○	○	○
67	WALDON CREEK			○	○	○

INDEX

AREA 11

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BAMFORD-LEE CREEKS			○	○	○
2	CHIEF NOWLEY CREEK			○	○	○
3	DRIFTWOOD (VILLAGE BAY) CREEK			○	○	○
4	EVA CREEK			○	⊖	○
5	JAP CREEK			○	○	○
6	LASSITER BAY CREEK			○	○	○
7	PACK LAKE SYSTEM			○	○	○
8	QUASHELA RIVER			○	○	○
9	RAINBOW CREEK			○	○	○
10	SCHWARTZENBERG LAGOON (NUGENT) CREEK			○	○	○
11	SEYMOUR RIVER			○	○	○
12	TAATT (SALMON) RIVER			○	○	○
13	WAAMTX (BELIZE) CREEK			○	○	○
14	WARNER BAY CREEK			○	○	○
15	WAUMP CREEK & ALLISON RIVER		⊖	○	○	○
16	MAWATLE CREEK			○	○	○
17	WADEFORD CREEK			○	○	○

INDEX

AREA 10

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	COHO (BOSWELL) CREEK			○	○	
2	DELEBAH-CANOE RIVER	⊖	⊖	○	○	
3	DOCEE (GOAT) RIVER		⊖	○	○	
4	DSULUTH-DSULISH CREEK			○	○	
5	MARGARET CREEK			○	○	
6	SMOKEHOUSE (GEELUCK) RIVER	⊖		○	○	
7	TAKUSH RIVER			○	○	⊖
8	WALKUM RIVER			○	○	⊖

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

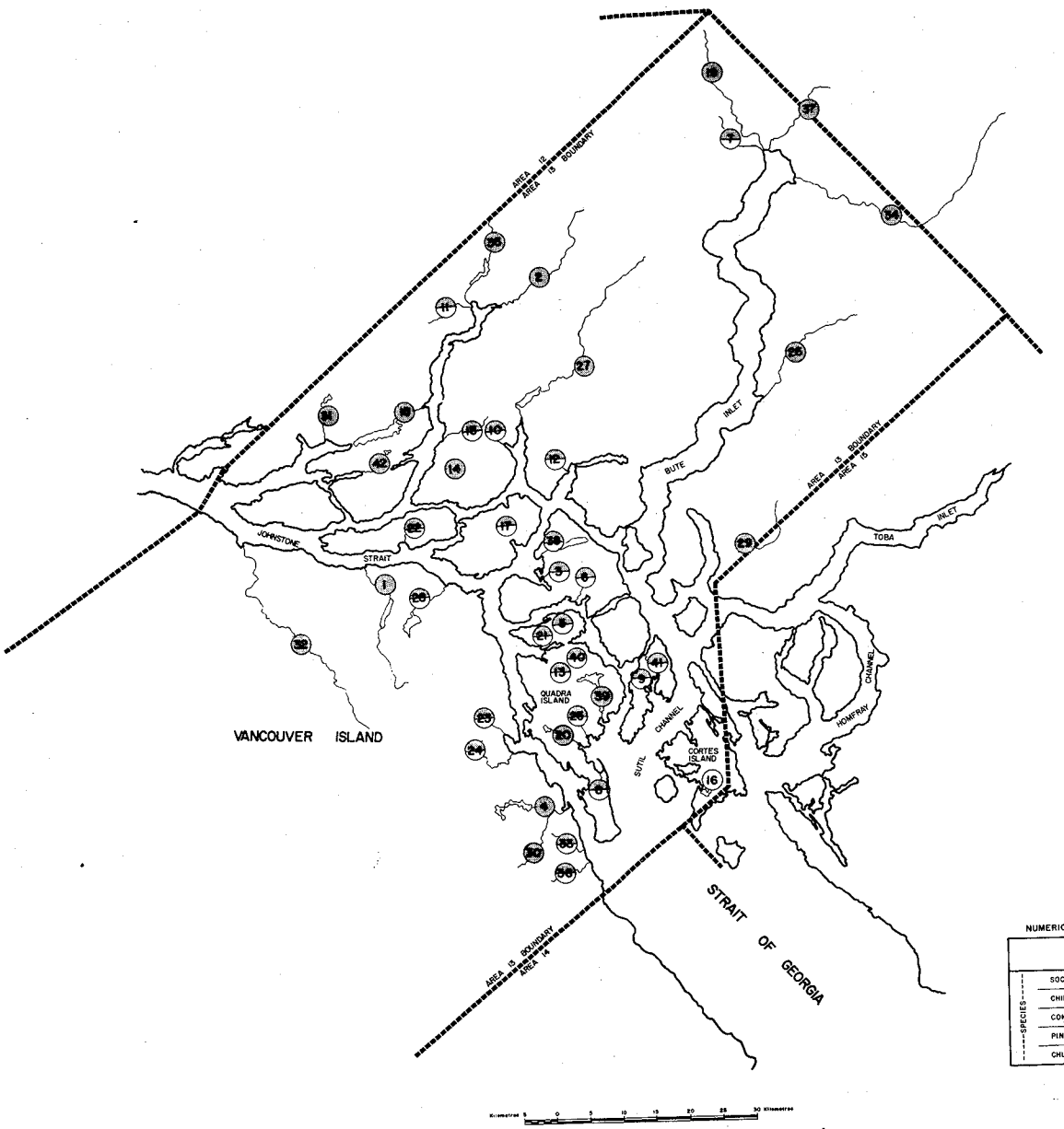
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 13

INDEX

AREA 13

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AMOR DE COSMOS CREEK					
2	APPLE RIVER	○				
3	CAMELEON HARBOUR CREEK					
4	CAMPBELL RIVER	○				
5	CHONAT CREEK					
6	CHRISTIE CREEK					
7	CUMSACK RIVER					
8	DREW CREEK					
9	EVANS CREEK					
10	FANNY BAY CREEK					
11	FRASER CREEK	○	○			
12	FREDERICK ARM CREEK					
13	GRANITE BAY CREEK					
14	GRASSY CREEK					
15	GRAY CREEK					
16	HANSON'S CREEK					
17	HEMMING LAKE CREEK					
18	HEYDON CREEK					
19	HOMATHKO RIVER					
20	HYACINTHE CREEK					
21	KANISH CREEK					
22	KNOX BAY CREEK					
23	MENZIES CREEK					
24	MOHUN CREEK					
25	OPEN BAY CREEK					
26	ORFORD RIVER					
27	PHILLIPS RIVER					
28	PYE CREEK					
29	QUATAM RIVER					
30	QUINSAM RIVER					
31	READ CREEK					
32	SALMON RIVER					
33	SIMMS CREEK					
34	SOUTHGATE RIVER					
35	STAFFORD RIVER					
36	SWANSKY CREEK					
37	TEAQUAHAN RIVER					
38	THURSTON CREEK					
39	VILLAGE BAY CREEK					
40	WAIATT CREEK					
41	WHITEROCK PASSAGE CREEK					
42	WORTLEY CREEK					



LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

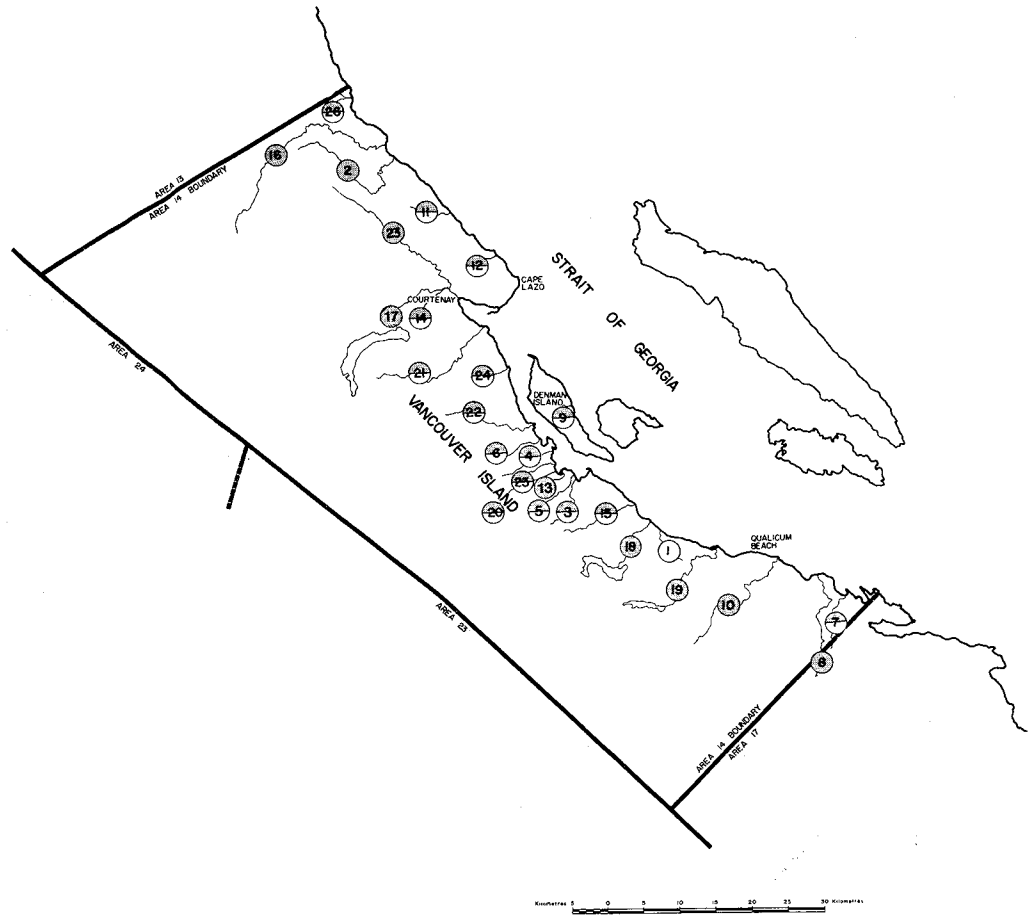
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 14

INDEX

AREA 14

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ANNIE (SHAW'S CREEK					
2	BLACK CREEK					
3	CHEF CREEK					
4	COAL CREEK (WILFRED)					
5	COOK CREEK					
6	COUGAR CREEK					
7	CRAIG CREEK					
8	ENGLISHMAN RIVER					
9	FILLANGLEY CREEK					
10	FRENCH CREEK					
11	KITTY COKMAN CREEK					
12	LITTLE RIVER					
13	McNAUGHTON CREEK					
14	MILLARD CREEK					
15	NILE CREEK					
16	OYSTER RIVER					
17	PUNTLEDGE RIVER					
18	BIG QUALICUM RIVER					
19	LITTLE QUALICUM RIVER					
20	ROSEWALL CREEK					
21	TRENT RIVER					
22	TSABLE RIVER					
23	TSOLUM RIVER					
24	WASHER CREEK					
25	WATERLOO CREEK					
26	WOODS CREEK					



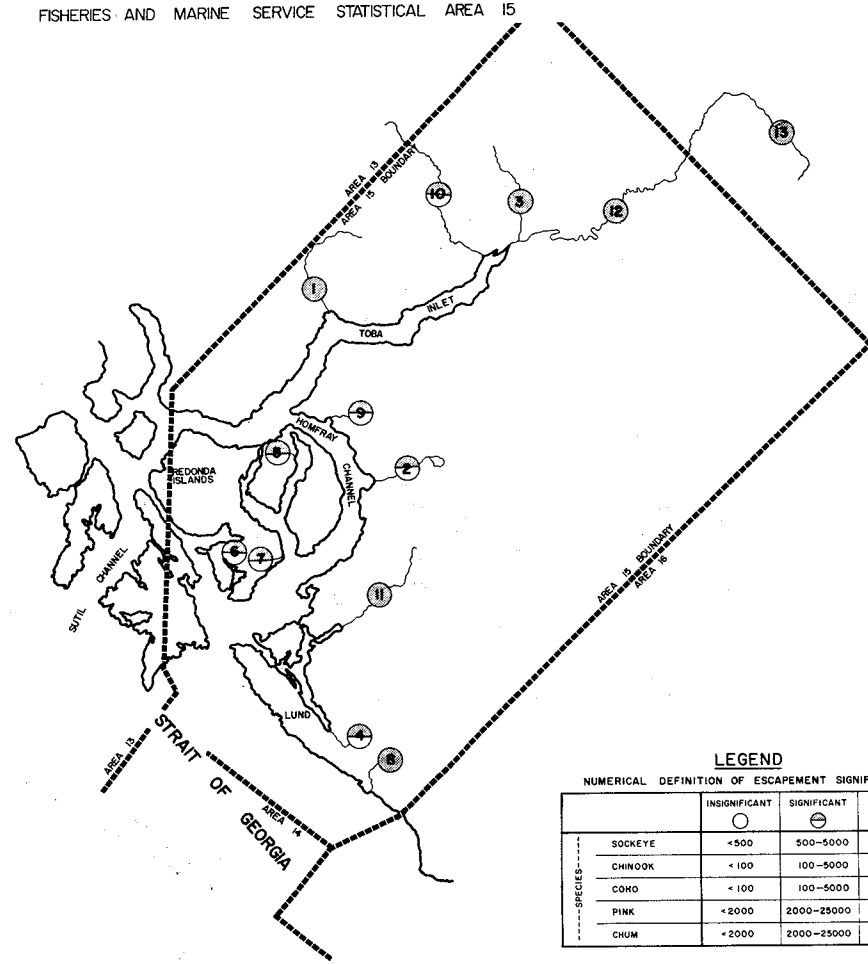
LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

		INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SPECIES	SOCKEYE	<500	500–5000	>5000
	CHINOOK	<100	100–5000	>5000
	COHO	<100	100–5000	>5000
	PINK	<2000	2000–25000	>25000
	CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 15



INDEX

AREA 15

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BREM RIVER		○	⊖	⊖	◍
2	FORBES RIVER			○	⊖	◍
3	KLITE RIVER		◍	◍	◍	◍
4	OKEOVER CREEK			⊖	⊖	◍
5	PENDRELL SOUND CREEK			⊖	○	◍
6	REFUGE COVE LAKE	○		⊖		○
7	SALT LAGOON			◍		◍
8	SLIAMMON CREEK		○	○	○	◍
9	SMALL CREEK			⊖	○	◍
10	TAHUMMING RIVER			⊖	○	○
11	THEODOSIA RIVER		◍	◍	◍	◍
12	TOBA RIVER		●	●	●	●
13	TOBA RIVER (LITTLE)		●	●	●	◍

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ◍
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

Kilometres 5 0 5 10 15 20 25 30 Kilometres

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 16 AND 28

INDEX

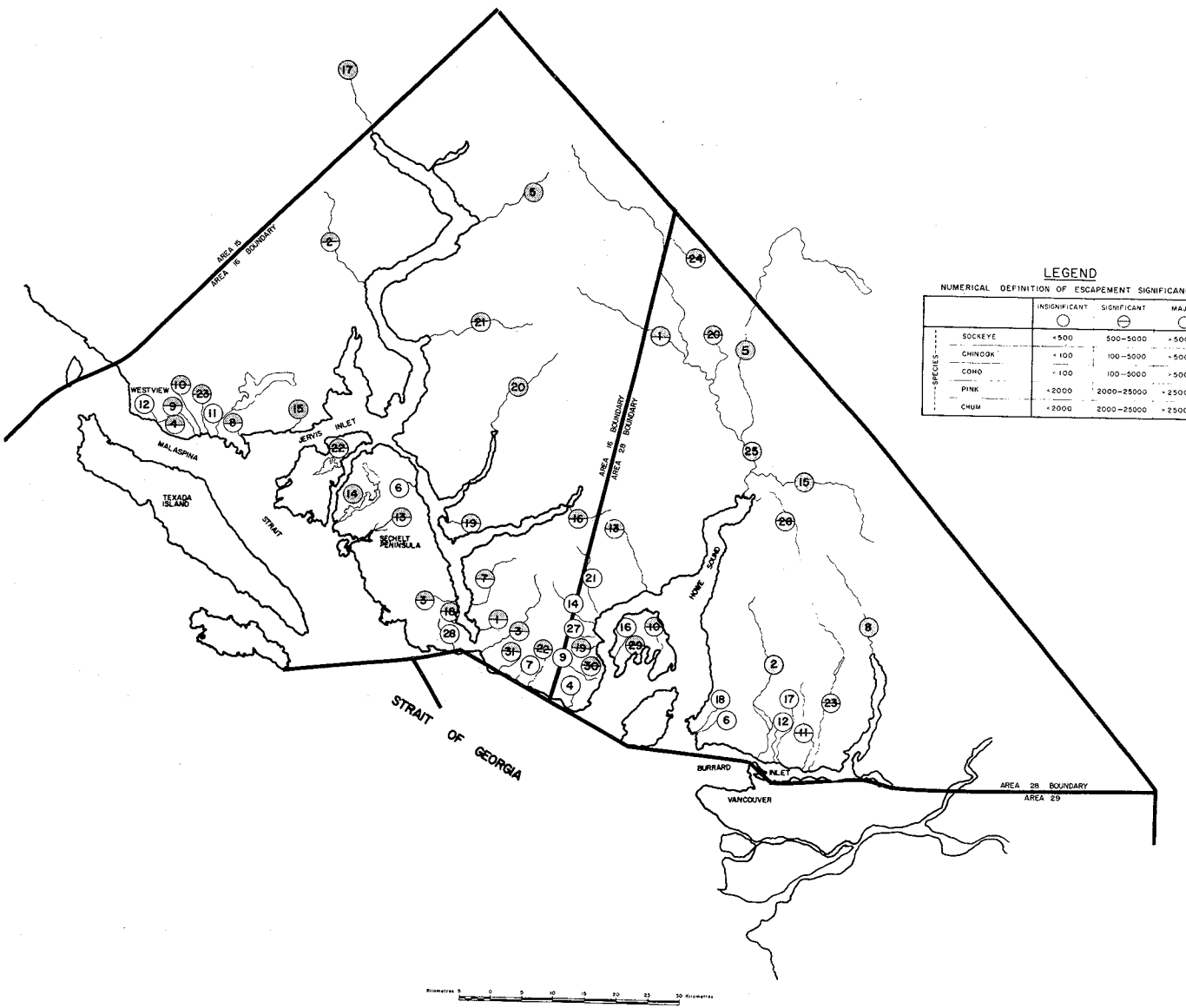
AREA 16

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ANGUS CREEK			◑	○	◑
2	BRITTAIN RIVER			◑	○	◑
3	CARLSON CREEK			○	○	◑
4	DAYTON CREEK			◑	○	◑
5	DESERTED RIVER			●	●	●
6	DORISTON CREEK			○	○	○
7	GRAY CREEK			◑	○	◑
8	JEFFERD CREEK			◑	○	◑
9	KELLY CREEK			◑	○	◑
10	LANG CREEK			◑	○	◑
11	LOIS RIVER			○	○	○
12	MYRTLE CREEK			◑	○	◑
13	PENDER HARBOUR CREEKS			○	○	○
14	SAKINAW LAKE SYSTEM	●		◑	○	◑
15	SALTERY BAY CREEK			◑	○	◑
16	SECHELT CREEK			○	○	◑
17	SKWAWKA RIVER		◑	●	●	●
18	SNAKE BAY CREEK			◑	○	◑
19	STORM BAY CREEK			◑	○	◑
20	TZOONIE RIVER	●	◑	●	●	●
21	VANCOUVER RIVER			○	○	○
22	WEST LAKE CREEK			◑	○	○
23	WHITTAL CREEK	○		◑	○	◑

INDEX

AREA 28

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ASHLU CREEK		◑	◑	○	◑
2	CAPILANO RIVER	○	◑	◑	○	◑
3	CHAPMAN CREEK			◑	○	◑
4	CHASTER CREEK			○	○	○
5	CHEAKAMUS RIVER		◑	●	●	●
6	EAGLE HARBOUR CREEK			○	○	○
7	FLUME CREEK					○
8	INDIAN RIVER	○		◑	○	◑
9	LANGDALE CREEK					○
10	LONG BAY CREEK					◑
11	LYNN CREEK			◑	○	◑
12	McKAY CREEK			○	○	○
13	McNAB CREEK			◑	○	○
14	McNAIR CREEK			○	○	○
15	MAMQUAM RIVER	○	◑	●	●	●
16	MANNION CREEK					○
17	MOSQUITO CREEK			○	○	○
18	NELSON CREEK					○
19	OULETTE CREEK					◑
20	PILLCHUCK CREEK			◑	○	○
21	RAINY RIVER			○	○	○
22	ROBERTS CREEK			◑	○	◑
23	SEYMOUR RIVER	○	◑	◑	○	◑
24	SHOVELNOSE CREEK		◑	◑	○	◑
25	SQUAMISH RIVER	●	●	●	●	●
26	STAWAMUS RIVER		◑	○	○	○
27	TWIN CREEK			○	○	○
28	WAKEFIELD CREEK			○	○	○
29	WEST BAY CREEK					◑
30	WILLIAMSON CREEK					◑
31	WILSON CREEK		◑			○



LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 17 AND 18

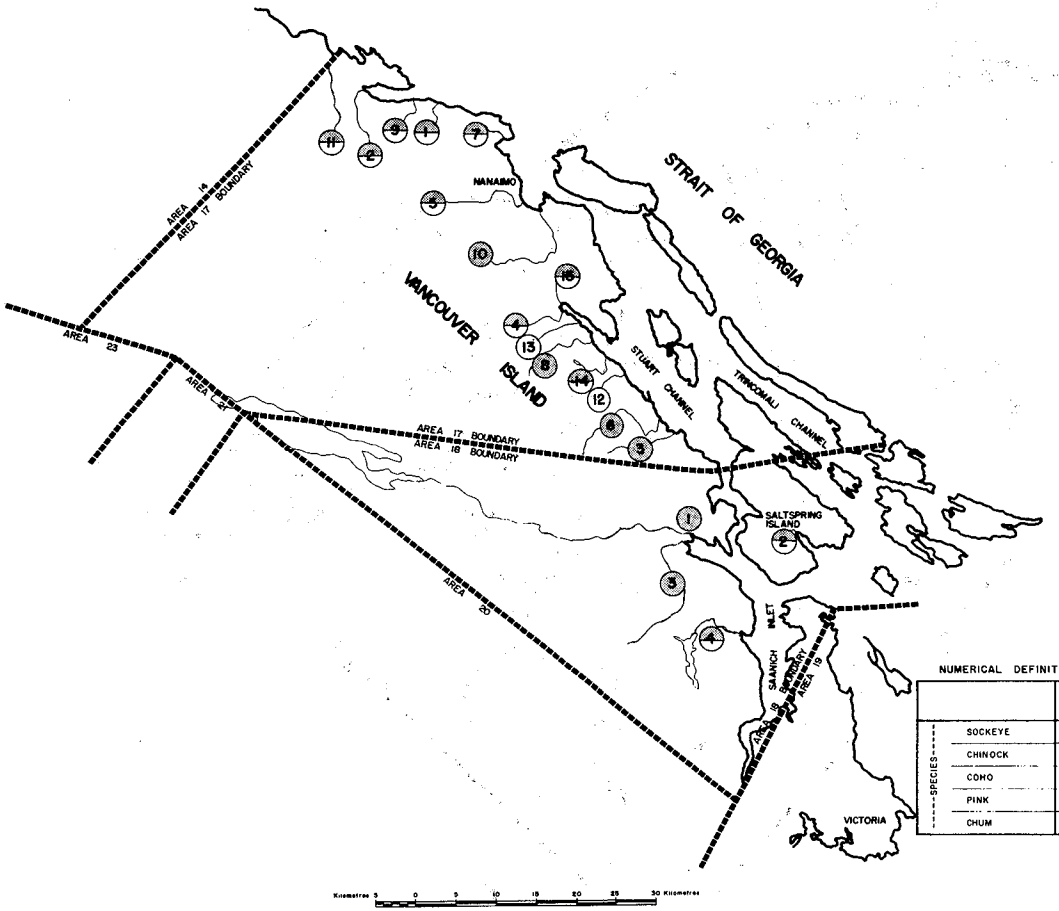
INDEX

AREA 17

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	BLOODS CREEK			◐		○
2	BONELL CREEK			◐		◍
3	BONSALL CREEK			◍		◍
4	BUSH CREEK			◐		◍
5	CHASE RIVER			◐		○
6	CHEMAINUS RIVER		◐	◐	○	◍
7	DEPARTURE CREEK			◐		○
8	HOLLAND CREEK			◐	○	◍
9	KNARSTON CREEK			◐		○
10	NANAIMO RIVER	○	◍	◍	○	◍
11	NANOOSE CREEK			◐		◐
12	PORTERS CREEK			○		○
13	ROCKY CREEK			○		○
14	STOCKING CREEK			◐		◍
15	WALKERS CREEK			◐		◍

AREA 18

	SPECIES				
	SOCKEYE	CHINOOK	COHO	PINK	CHUM
1 COWICHAN RIVER		◐	◍		◍
2 FULFORD CREEK			◐		○
3 KOKSILAH RIVER		◐	◍		◍
4 SHAWNIGAN CREEK			◐		◍



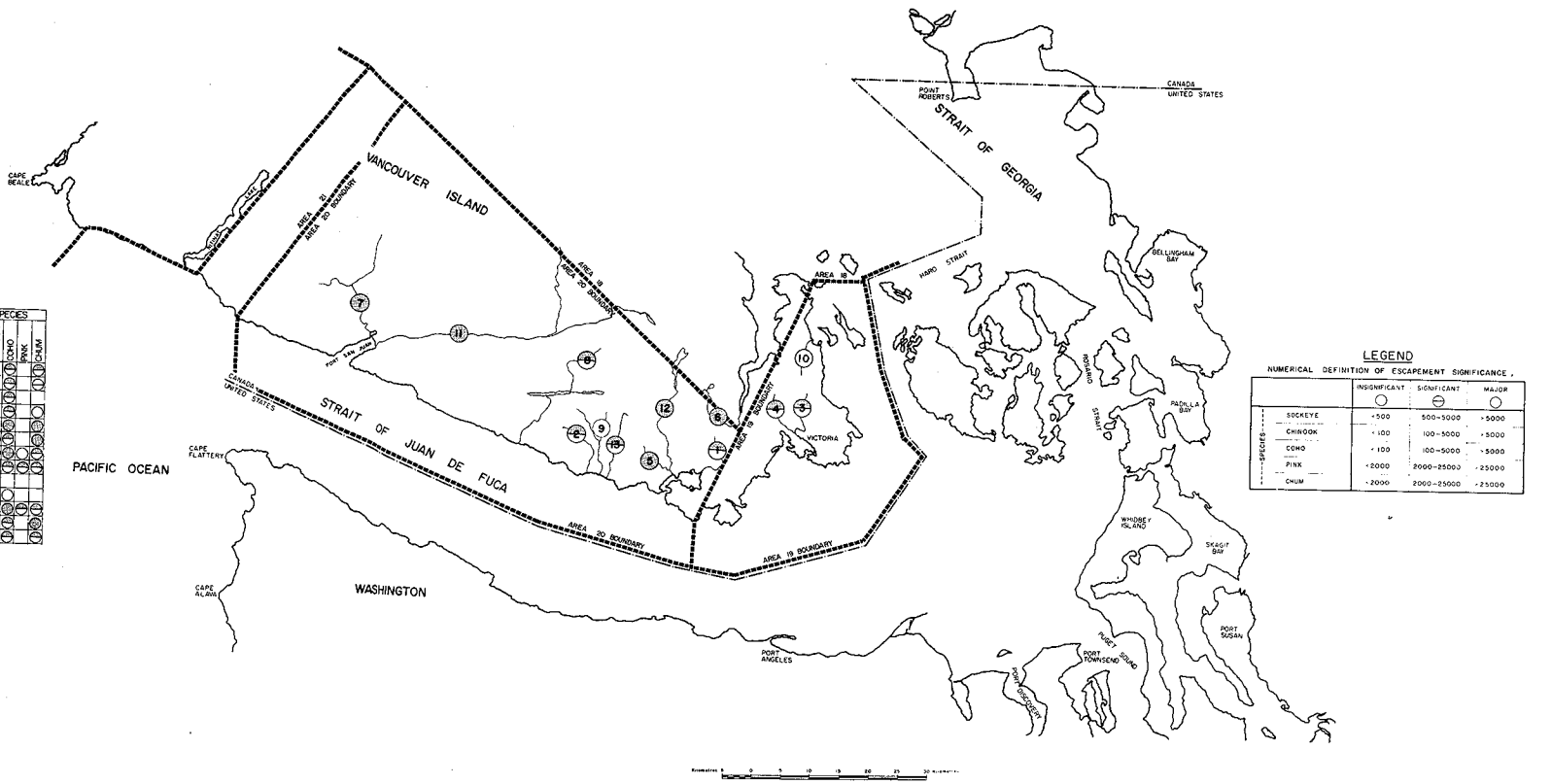
LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ◍
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 19 AND 20



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AREA 19 & 20

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AYAN CREEK (STONEY)			○	○	○
2	COAL CREEK (KIRBY)			○	○	○
3	COLQUITZ CREEK			○	○	○
4	DEADMAN'S CREEK (CRAIG FLOWER)			○		
5	DeMAMIEL CREEK			○	○	○
6	GOLDSTREAM RIVER					○
7	GORDON RIVER	○	○	○	○	○
8	JORDAN RIVER		○	○	○	○
9	MUIR CREEK			○		
10	SANDHILL CREEK			○		
11	SAN JUAN RIVER	○	○	○	○	○
12	SOOKE RIVER		○	○	○	○
13	TUGWELL CREEK		○	○	○	○

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE ,

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SOCKEYE	<500	500-5000	>5000
CHINOOK	<100	100-5000	>5000
COHO	<100	100-5000	>5000
PINK	<2000	2000-25000	>25000
CHUM	<2000	2000-25000	>25000

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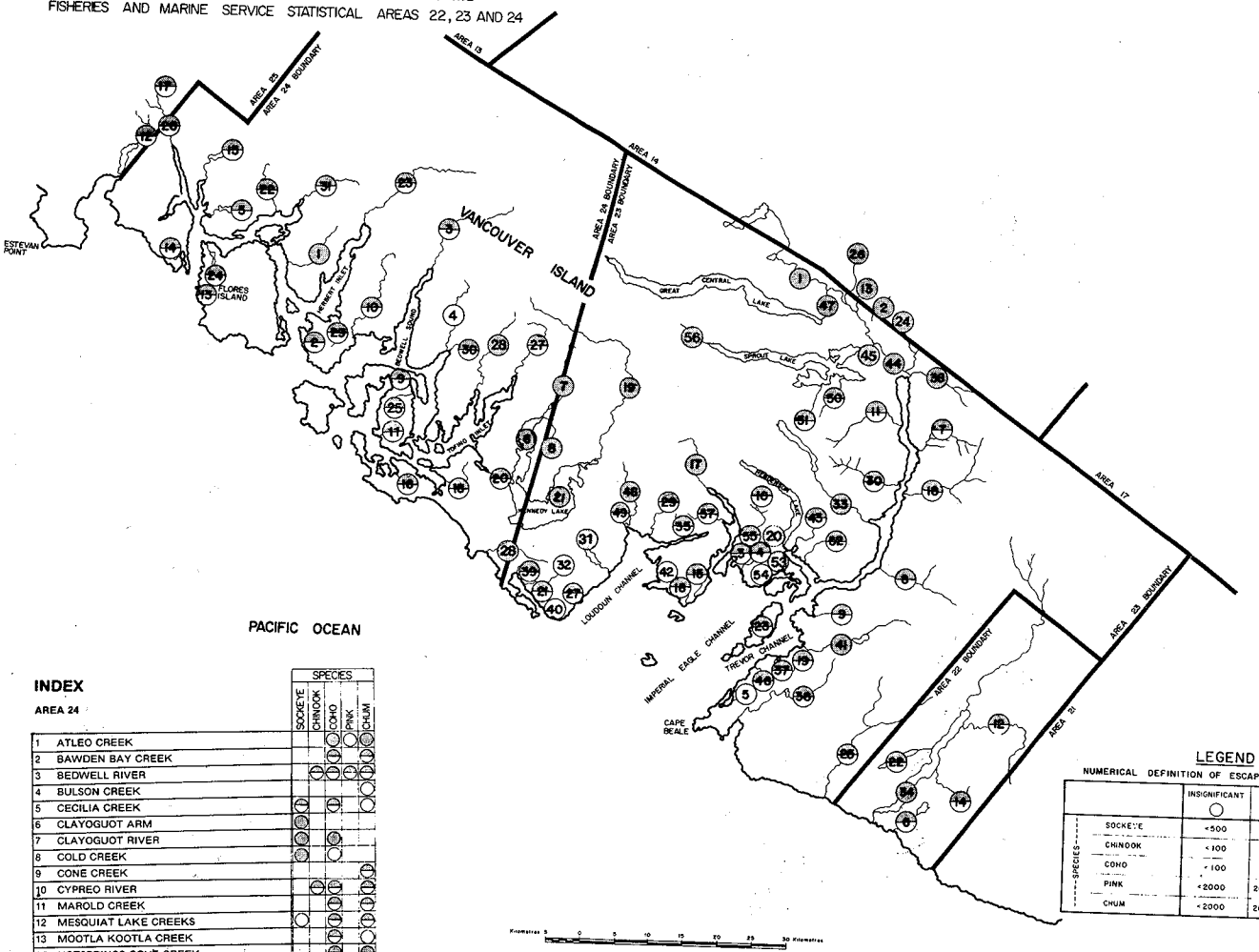
AREA 22 & 23

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ASH RIVER	◐	◐	◐	◐	◐
2	BEAVER CREEK	◐	◐	◐	◐	◐
3	CANOE PASS CREEK			●		○
4	CARNATION CREEK			●		●
5	CATARACT CREEK		○	○		
6	CHEEWHAT CREEK	●		●		○
7	CHINA CREEK		●	●		○
8	COLEMAN CREEK		○	●		○
9	CONSINKA (WOOD) CREEK			●		○
10	COEUR D'ALENA CREEK			●		○
11	COUSE CREEK		○	●		●
12	CAYUSE CREEK		○	●		●
13	DEER CREEK	◐	◐	◐	◐	◐
14	DOOBAH RIVER			●		●
15	DUTCH HARBOUR CREEK (MAIN)			●		●
16	DUTCH HARBOUR CREEK (SM.)			○		●
17	EFINGHAM RIVER		○	●		●
18	FRANKLIN RIVER		○	●	○	○
19	FREDERICK CREEK			●		○
20	HENDERSON (ANDERSON) CREEK	●	●	●	○	●
21	HILLIER CREEK					●
22	HOBITON RIVER	●		●		●
23	HALFORD CREEK			○		●
24	KITSUCKSIS CREEK	◐	◐	◐	◐	◐
25	KLANAWA RIVER		○	●	○	○
26	JOLLY CREEK	○	○	○	○	○
27	LITTLE MAGGIE CREEK			●	○	○
28	LOST SHOE CREEK			●	●	○
29	LUCKY CREEK		○	●		○
30	MacTUCH CREEK		○	●		○
31	MAGGIE RIVER	○		●		○
32	MERCHANTILE (MILL) CREEK			●		○
33	NAHMINT RIVER		●	●	○	●
34	NITINAT RIVER	○	●	●	○	●
35	PIPESTEM CREEK			●		○
36	PACHENA RIVER			●		○
37	POETT NOOK CREEK			●		○
38	ROGER CREEK	◐	◐	◐	◐	◐
39	SALMON RIVER			●	○	○
40	SANDY CREEK			●		○
41	SARITA RIVER		●	●	○	●
42	SECHART CREEK			○		○
43	SNUG BASIN CREEK			●		●
44	SOMASS RIVER	●	●	●	●	●
45	SPROAT RIVER	○	○	○	○	○
46	SUGSAW (GRAPPLER) CREEK			●		○
47	STAMP RIVER	◐	◐	◐	◐	◐
48	TOQUART RIVER		●	●		●
49	TOQUART RIVER (L. FORK)			●		●
50	TWO RIVERS EAST			●		●
51	TWO RIVERS WEST			●		●
52	UCHUCK (SILVER) CREEK		○	●		●
53	USELESS CREEK	◐	◐	◐	◐	◐
54	USELESS INLET CREEK			○		○
55	VERNON BAY CREEK			●		○
56	WEINTER CREEK	◐	◐	◐	◐	◐
57	WEST (WALLACE) CREEK		○	○		●

SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 22, 23 AND 24



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AREA 24

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ATLEO CREEK			○		◐
2	BAWDEN BAY CREEK			●		●
3	BEDWELL RIVER		●	●	○	●
4	BULSON CREEK			●		●
5	CECILIA CREEK	◐		●		●
6	CLAYOGUOT ARM	◐				
7	CLAYOGUOT RIVER	◐		●		
8	COLD CREEK	◐				
9	CONE CREEK					●
10	CYPREO RIVER		●	●		●
11	MAROLD CREEK			●		●
12	MESQUIAT LAKE CREEKS	○		●		●
13	MOOTLA KOOTLA CREEK			●		○
14	HOTSPRINGS COVE CREEK			●		●
15	ICE RIVER		●	●		
16	INDIAN RIVER			●		●
17	IRVING RIVER		●	●	●	●
18	KOOTOWIS RIVER			●		●
19	UPPER KENNEDY RIVER	◐		●		●
20	LOWER KENNEDY RIVER		●	●		
21	KENNEDY LAKE	◐				
22	MEGIN RIVER	◐	●	●	●	●
23	MOYHEA RIVER		●	●	●	●
24	RILEY'S COFE CREEK			●		●
25	SUTTON'S MILL CREEK			●		●
26	SYDNEY RIVER			●	●	●
27	TOFINO CREEK		●	●		●
28	TRANQUIL CREEK			●		○
29	WHITEPINE COVE CREEK			●		●
30	WARNE BAY CREEK			●		●
31	WAFFA RIVER		●	●	●	●

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ◐
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

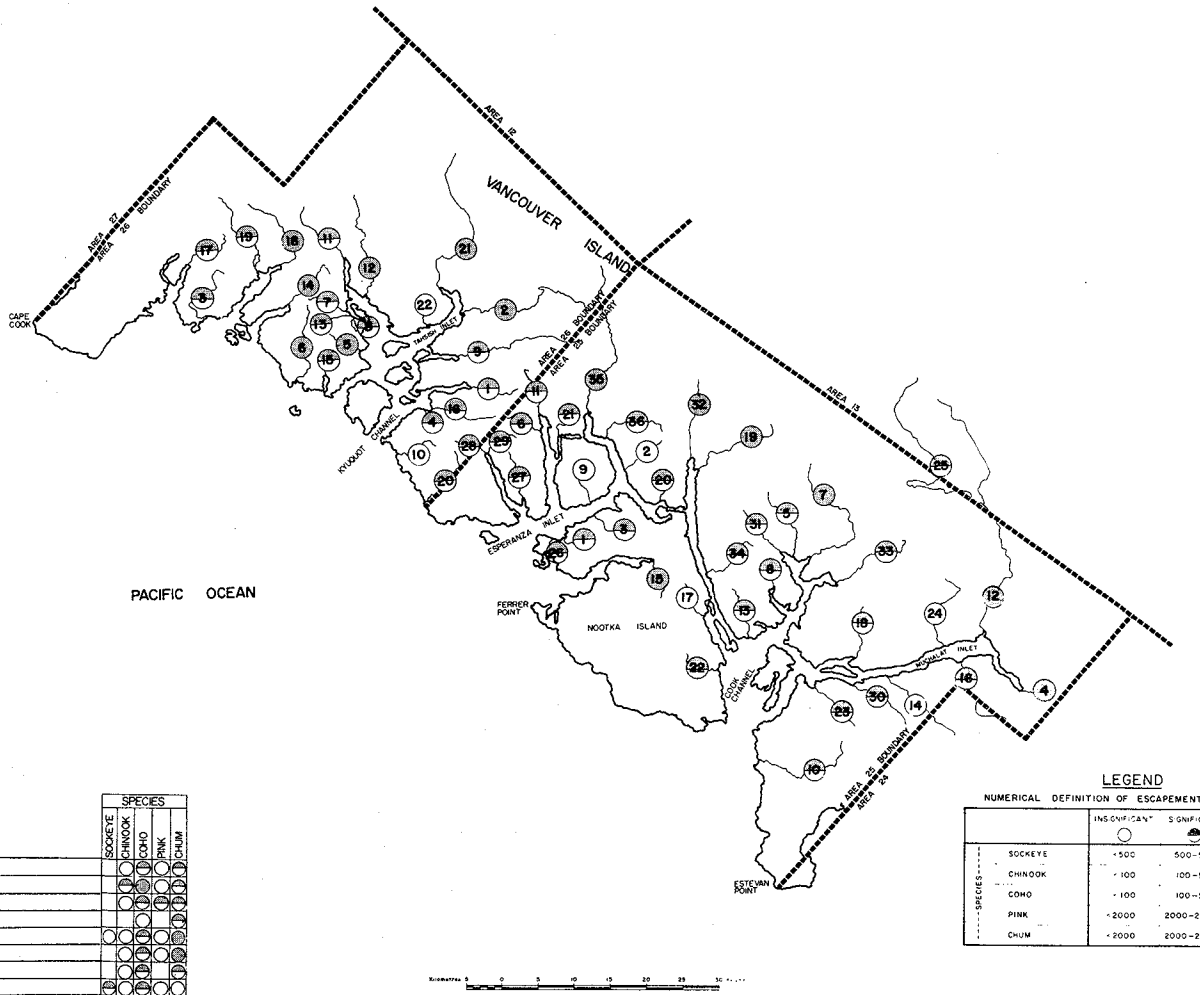
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREAS 25 AND 26

INDEX

AREA 25

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	APPLE CREEK			○	○	○
2	BARR CREEK			○	○	○
3	BRODRICK CREEK		○	○	○	○
4	BURMAN CREEK	○	○	○	●	●
5	CANTON GORGE CREEK			○	○	○
6	CHUM CREEK		○	○	○	○
7	CONUMA CREEK	○	○	○	●	●
8	DESERTED CREEK	○	○	○	○	○
9	EHATISAT			○	○	○
10	ESCALANTE RIVER			○	○	○
11	ESPINOSA RIVER		○	○	○	○
12	GOLD RIVER	●	●	●	●	●
13	HOISS CREEK		○	○	○	○
14	HOUSTON RIVER		○	○	○	○
15	INNER BASIN RIVER		○	○	○	○
16	JACKLAH CREEK		○	○	○	○
17	KENDRICK CREEK		○	○	○	○
18	KLEEPTEE CREEK		○	○	○	○
19	LEINER CREEK		○	○	○	○
20	LORD CREEK			○	○	○
21	MAMAT CREEK		○	○	○	○
22	MARVINAS BAY CREEK			○	○	○
23	MOOYAH BAY CREEK		○	○	○	○
24	McCURDY CREEK			○	○	○
25	OKTWANCH RIVER	●	●	●	●	●
26	OWOSSITSA CREEK	●	●	●	●	●
27	PARK RIVER			○	○	○
28	PORT ELIZA NO. 1			○	○	○
29	PORT ELIZA NO. 2			○	○	○
30	SILVERADO CREEK			○	○	○
31	SUCWOA RIVER	○	○	○	○	○
32	TAHSIS RIVER	○	○	○	○	○
33	TLUPANA RIVER			○	○	○
34	TAOWWIN RIVER			○	○	○
35	ZEBALLOS RIVER	○	○	○	○	○
36	ZEBALLOS (LITTLE) RIVER			○	○	○



INDEX

AREA 26

		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AMAI RIVER		○	○	○	○
2	ARTLISH RIVER		○	●	●	●
3	BATTLE RIVER		○	○	○	○
4	CACHALOT CREEK			○	○	○
5	CHAMISS RIVER	○	○	○	○	○
6	CLANNINICK RIVER			○	○	○
7	ELAINE CREEK		○	○	○	
8	JANSEN LAKE CREEK	●	○	○	○	○
9	KAOUK RIVER			○	○	○
10	KAPOOSE RIVER			○	○	○
11	KASHUTL RIVER		○	○	○	○
12	KAVWINCH RIVER		○	○	○	○
13	KAYOUK (KIOUTI) RIVER		○	○	○	○
14	MALKSOPE RIVER		○	○	○	○
15	McKAY COVE CREEK		○	○	○	○
16	NARROWGUT RIVER	○	○	○	○	○
17	NASPARTI RIVER		○	○	○	○
18	OUOUKINSH RIVER		○	○	○	○
19	POWER RIVER	●	●	●	●	●
20	TATCH RIVER			○	○	○
21	TAHSIS RIVER	○	○	●	●	●
22	YAKU BAY CREEK			○	○	○

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ◑	MAJOR ●
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

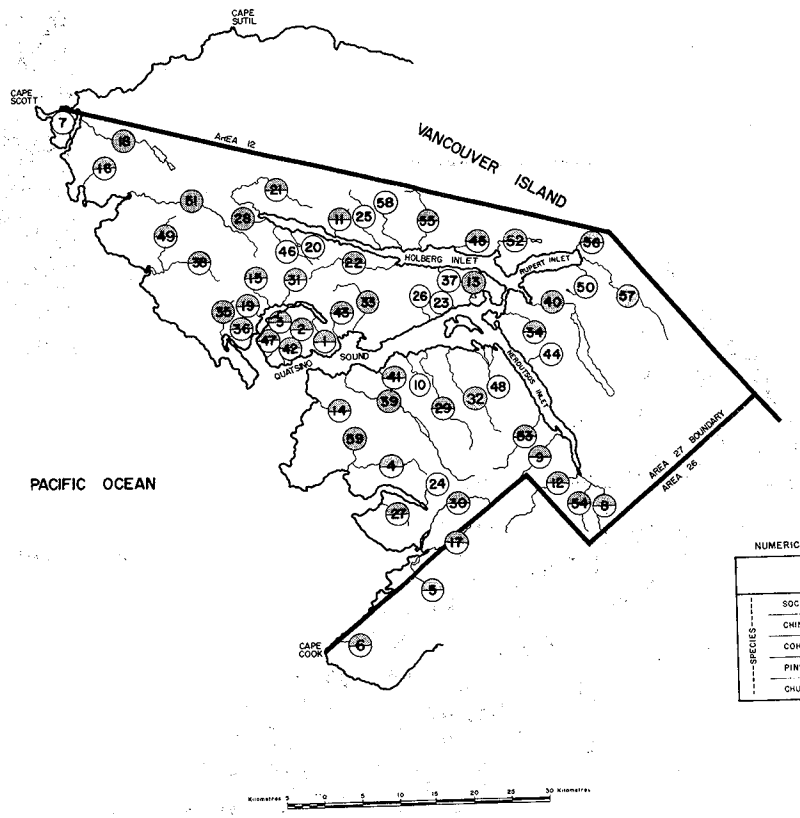
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 27

INDEX

AREA 27

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	AHWHICHAOLTO CREEK (U)			○		○
2	AHWHICHAOLTO CREEK (L)			○		○
3	BEAR CREEK			○		○
4	BUCK CREEK			○		○
5	CANOE CREEK	⊖		○	○	○
6	CAPE COOK CREEK			○		○
7	CAPE SCOTT CREEK			○		○
8	CLAYCHLE CREEK		○	○	○	○
9	CAYUSE CREEK			○		○
10	CLEAGH RIVER					○
11	CLEESKLAGH (6 MILE) CREEK			○		○
12	COLONIAL (MAIN) CREEK		⊖	○		○
13	COLONY CREEK			⊖		
14	CULLEET CREEK			⊖		○
15	DENAD (GAATO) CREEK			⊖		○
16	DOMINIC CREEK			⊖		○
17	EAST CREEK		⊖	⊖	⊖	⊖
18	FISHERMAN RIVER	⊖		⊖	⊖	⊖
19	GALATO (DEVIL CLUB) CREEK			○		○
20	GLEERUP (3 MILE) CREEK			○		○
21	GOODSPEED (SPRUCE) CREEK		⊖	⊖	○	○
22	HATHAWAY (HALFWAY) CREEK			⊖	○	○
23	HAWISNAKWI CREEK			○		○
24	HEAD (MARG) RIVER			○		○
25	HUSHAMU (PEARSON) CREEK			○		○
26	ILSTAD CREEK					○
27	JIMS CREEK	○		⊖	○	○
28	JOHNNY CREEK			⊖		⊖
29	KEWQUODIE RIVER			⊖	⊖	⊖
30	KLASKISH RIVER		⊖	⊖	⊖	⊖
31	KLAYINA (TENAAD) CREEK		○	⊖		⊖
32	KLOOTCHLIMMIS RIVER			⊖	⊖	⊖
33	KOPRINO RIVER			⊖	○	⊖
34	KWAKWESTA (SAWMILL) CREEK			⊖		⊖
35	KWATLEO (BROWNING) CREEK			⊖	⊖	⊖
36	LEESON LAKE CREEK			⊖		⊖
37	LEWIS CREEK			○		○
38	MACJACK CREEK	○		⊖		⊖
39	MAHATTA RIVER	⊖	⊖	⊖	⊖	○
40	MARBLE RIVER	⊖	⊖	⊖	○	○
41	MONKEY CREEK			⊖		⊖
42	MONTGOMERY CREEK					⊖
43	McNIFFE (DUCK) CREEK			⊖		○
44	NEQUILTPAALIS CREEK					○
45	NUKNIMISH (APPLE) CREEK			⊖		⊖
46	PEGATTEM (2 MILE) CREEK			○		○
47	QUASHTIN CREEK			⊖		⊖
48	QUATSINO SD CREEK	○				○
49	RONNING CREEK			⊖		○
50	RUPERT (COETKWASS C.) RIVER			○		○
51	SAN JOSEF RIVER		⊖	⊖	○	⊖
52	STEPHENS (COAL HARBOUR) CREEK			⊖	○	○
53	TEETA RIVER			⊖		○
54	UTLAH CREEK		○	⊖		⊖
55	WANOKANA (CRAWFORD) CREEK		○	⊖		○
56	WASHLAWLIS (LAGOON) CREEK			⊖		○
57	WAUKAAS (WAUKANAS) CREEK			⊖	⊖	⊖
58	YOUGHPAN (PRICES) CREEK			○		○
59	KEITH RIVER	○		⊖	⊖	⊖



LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

SPECIES	INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ○
SOCKEYE	<500	500–5000	>5000
CHINOOK	<100	100–5000	>5000
COHO	<100	100–5000	>5000
PINK	<2000	2000–25000	>25000
CHUM	<2000	2000–25000	>25000

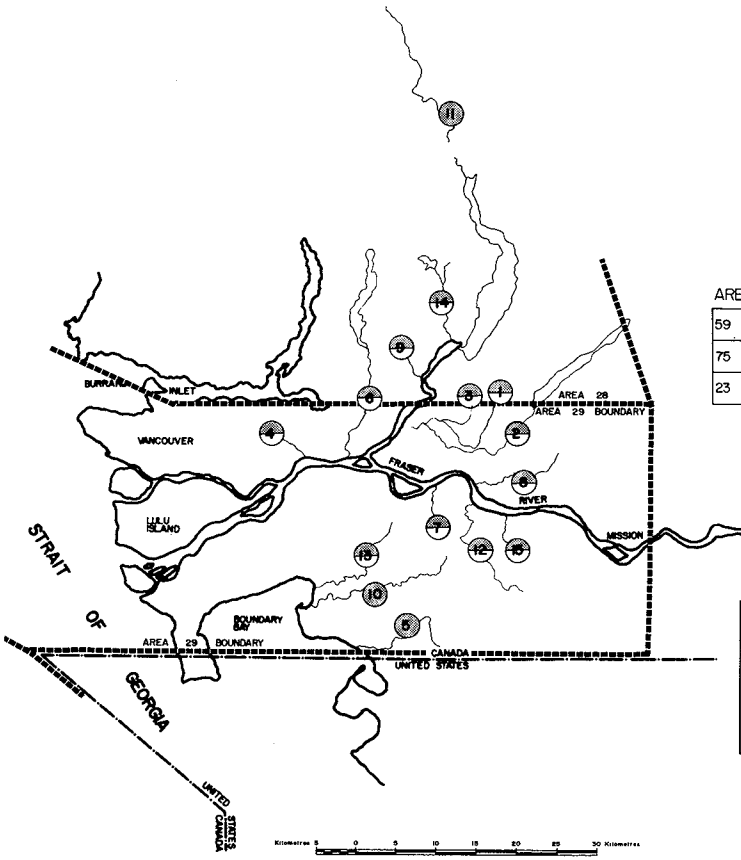
SIGNIFICANCE OF SALMON SPAWNING STREAMS

FISHERIES AND MARINE SERVICE STATISTICAL AREA 29 (LOWER FRASER)

INDEX

AREA 29

		SPECIES				
		SOCKEYE	CHINOOK	COHO	PINK	CHUM
1	ALOUTTE RIVER (N)			◐	◐	◐
2	ALOUTTE RIVER (S)			◐	◐	◐
3	BLANEY CREEK			◐	○	○
4	BRUNETTE RIVER			◐		
5	CAMPBELL RIVER			◐		○
6	COQUITLAM RIVER			◐	◐	◐
7	JENKINS CREEK			◐	○	○
8	KANAKA CREEK			◐	◐	◐
9	McDONALD CREEK			◐	○	○
10	MICOMEKL RIVER			◐		
11	PITT RIVER (UPPER)	●	●	◐	◐	◐
12	SALMON RIVER			◐		
13	SERPENTINE RIVER			◐		
14	SILVER CREEK (WIDGEAN SLOUGH)	◐		◐	◐	◐
15	WEST CREEK			◐	○	○



AREA 29 (UPPER FRASER)

59	MAJOR STREAMS	◍
75	SIGNIFICANT STREAMS	◐
23	INSIGNIFICANT STREAMS	○

LEGEND

NUMERICAL DEFINITION OF ESCAPEMENT SIGNIFICANCE

		INSIGNIFICANT ○	SIGNIFICANT ⊖	MAJOR ◍
SPECIES	SOCKEYE	<500	500–5000	>5000
	CHINOOK	<100	100–5000	>5000
	COHO	<100	100–5000	>5000
	PINK	<2000	2000–25000	>25000
	CHUM	<2000	2000–25000	>25000

APPENDIX VIII

SUPPLEMENTARY SOCIAL CONSIDERATIONS

Should a specific port development and tanker route eventually be designated for implementation on this coast, a number of special social considerations must be included in the pre-construction environmental impact statement stage. It would be necessary to identify protective measures for ensuring that archaeological and historic sites, unique recreation opportunities and special recreation uses would not be lost or damaged. Table VIII.1 arrays these features by coastal section, and the following subsections briefly detail them. (Juan de Fuca and North Puget Sound American sections were not included owing to limited time for data collection.)

VIII.1 ARCHAEOLOGICAL AND HISTORIC SITES

Data on archaeological sites on this coast were obtained from the Archaeological Office of the Provincial Heritage Conservation Branch; the numbers of sites were recorded for each section of the coastline (Table VIII.1). However, several qualifying statements must be made. First, the Archaeological Office is still in the process of inventorying sites in B.C. Second, once a site is discovered, additional work in the vicinity could uncover more sites so that a high number of sites might only show where digs have been going on over a period of time. Third, there are potentially thousands of undiscovered sites in bays and at river mouths along the length of the B.C. coast. Finally, based on present knowledge, no comprehensive qualitative comparison of coastal sites seems possible at this time.

Consideration of historic sites posed similar problems. The National Historic Sites Branch has designated some areas in coastal B.C. as historic (Table VIII.1) and has proposed several others. In addition, the Provincial Historic Sites Branch has done limited work in coastal areas and, while it may recognize a number of potential sites that should be protected, it is not in a position presently to provide a comprehensive designation of them.

VIII.2 UNIQUE RECREATION OPPORTUNITIES

Unique recreation opportunities are defined as areas that offer a recreation experience found nowhere else in the province. The quality of the recreation experience at these sites is enhanced by the fact that they are all located outside major population centres. Such sites are often known outside their purely local area and thus tend to be used by both British Columbians and non-residents alike. Examples of such opportunities are provided in Table VIII.1. A more thorough survey would be required to fully document the full range of unique recreation opportunities available on the West Coast.

VIII.3 SPECIAL RECREATION USES

In the present listing, special recreation uses of coastal B.C. were narrowed down to boating - fishing and beach activities. Diving and shellfishing were not included, because relatively few British Columbians participate in these pasttimes. As shown in Table VIII.1, key boating - fishing areas were noted by coastal section and beaches were identified and measured. As this list is not exhaustive, more detailed studies would be required to present all important areas.

PREPARED BY: P. Meyer, Fisheries and Marine Service

TABLE VIII.1 SUPPLEMENTARY SOCIAL CONSIDERATIONS

Coastal Section	Number of Archaeological Sites Identified	Designated National Historic Sites	Unique Recreation Opportunities	Boating-Fishing Areas	Beaches (statute miles)
Skeena-Queen Charlotte Islands	351		Naikoon		100
Mainland				X	
Kitimat-Stikine	33			X	
Central Coast			Rivers Inlet	X	3
Mt. Waddington					
Mainland (& Island)					
East Island					
West Island			Cape Scott Trail		10
Comox-Strathcona					
Mainland (& Islands)			Desolution Sound	X	
East Island	129			X	37
West Island		1		X	
Powell River	163				10
Sunshine Coast	63			X	5
Nanaimo	182	1		X	18
Cowichan Valley					
East Island	125			X	
West Island			West Coast Trail		
Capital	686	11		X	30
Alberni - Clayoquot	101	2	West Coast Trail Long Beach	X	8
Greater Vancouver	107	9		X	25.4
Squamish-Lillooet				X	

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