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Inventory of Marine Surficial Geology, Sedimentology, Geomorphology,
Quaternary Paleontology and Palaeoecology, Geochemistry and
Related Studies of the Pacific Regions of Canada

PART I

Coastal Zone of British Columbia, and adjacent waters off
Washington and Southeast Alaska

PART II

Continental Rise and Abyssal Regions of the N.E. Pacific Ocean

by

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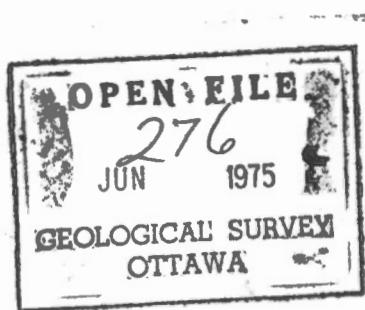
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ABSTRACT

This report is an inventory of marine geologic and related reports for the coastal and offshore regions of the Pacific margin of Canada. The scope is limited to those studies dealing with sediments, processes or events of the Quaternary Period including the Recent Epoch. About 1,850 papers, reports, memoranda, theses and maps have been uncovered to date of which one third are of American origin--bridging international waters more often than not. The bibliographies are subdivided into a Part I-coastal and inside waterway zone, and a Part II-offshelf-abyssal region. About 1,550 entries are listed in the former while less than 300 titles have been uncovered for the latter. Of the former, industry (including consultants) and government agencies have yielded more than 25% each of the titles, whereas in the latter the deep-sea exploration is almost totally an academic research enterprise. In Part I, a concerted effort has been directed in the acquisition of information about the 18 critical estuaries under review by the Estuary Working Group within the Department of Environment Canada. The reports and titles uncovered in this inventory are plotted as to their geographic extent on maps covering Parts I and II of this summation and are keyed to the bibliographies using a note number system. Geologic sampling of the surficial sediments of the coastal marine environment was found to be more extensive than anticipated, and analyses of about one half of the several thousand sample locations are on record - though not always in published format. About 1,200 short cores taken from the Vancouver Island Shelf, Queen Charlotte Sound and Hecate Strait regions are in storage with the Geological Survey of Canada awaiting a second phase of detailed examination and analysis. This and other information is a useful base for the eventual preparation of preliminary sediment maps. Ironically, sampling of the deep-sea environment is sparse; yet, several maps have been prepared by American and Russian investigators to yield at least a style or pattern of sedimentation on the Abyssal and Continental Rise regions lying westward of the Canadian coast.

INTRODUCTION

The Geological Survey of Canada is currently expanding its programme of marine geological investigations on the British Columbia coast and Continental Shelf, Slope and Rise regions. Subsurface bedrock geologic work has been underway for a number of years, but, with minor exception, surficial or unconsolidated sediment examination by the Survey has only recently begun; this bibliography is concerned with the surficial and geomorphic aspect though some bedrock or other discipline-oriented studies inevitably include information on the Quaternary. The reference list provides a basis by which various marine geoscience groups and research scientists can evaluate future requirements, avoid duplication of effort, and maximize the utilization of or sharing of existing data and samples.

Studies of marine sediments are usually inter-disciplinary in approach; thus a review of related scientific research was essential to the inventory task. Substantial research contributions have been made by some western universities, several federal government departments, industry and consultants as well as local governmental agencies. Although many of these oceanographic and geotechnical projects have considered the marine geologic environment, there still exists large information voids when compared to the status of other related oceanographic research. However, the full spectrum of the various marine geological research disciplines appears to have been tested in at least one locale or geologic environment. In order to fully appreciate the extent and disciplinary limitations of previous work for the British Columbia and adjacent American coastal areas, and their off shelf regions, inventory maps have been prepared, showing in outline the geographic limits of these endeavours.

Beyond the edge of the Continental Shelf the study of the marine environment is of a different character and is a much more expensive undertaking. Logistics usually require the investigation to be confined to either the

shallow or the deep regions, and few studies attempt to integrate the results of both environments due to complexities not only in the physical effort but also to the unpredictable changes in the intervening Continental Slope region. Thus for the purposes of this bibliographic inventory it was advantageous to divide the task into a Part I "coastal-inside waterway zone" and a Part II "off shelf-abyssal region" with studies of the transitional Continental Slope region usually listed with and illustrated in each part. About 600 entries of Part I were listed by Ricker (1974-see Appendix I) as a preliminary endeavour to encourage participation in this edition of the inventory, and in a note by Ricker (1974-see Part I) the type and extent of geologic endeavours were summarized. Taking in the subsequent contributions and continuing the search into lengthy published bibliographies listed in Appendix I the revised Part I inventory now stands in excess of 1,500 entries. Part II, herein, is an initial release and due to time constraints is not complete. Cross referencing of reports listed in Part II are incomplete and many of the entries were not examined. Of the 300 odd Part II entries, about one third are additional American Continental Shelf and Slope investigations which could not be illustrated within the geographic limits of the Part I map. The listing of these farther-afield studies was undertaken in order to provide continuity and an understanding of the efforts that have and will continue to take place along the international frontiers. Yakutat Bay, Alaska is of unique interest in this regard because the sea has now invaded British Columbia due to a rather dramatic disappearance of glacier ice in a submerged fjord.

Illustrated on the Part II map is the region to be mapped by Canadian government organizations including the Geological Survey. At present, the entrance to the Strait of Juan de Fuca and the northern Strait of Georgia are undergoing sedimentological as well as other hydrographic and geophysical surveys. With the exception of the Juan de Fuca sheet, each series of maps

will cover two degrees of longitude by one degree of latitude on a scale of 1:250,000 using a Universal Transverse Mercator (UTM) projection. Efforts for this bibliography have been concentrated on this region of Natural Resource Charting, but in the deep-sea environment, especially, the studies have tended to be much larger in scope and not even the extensive coverage region shown in the Part II map can illustrate their geographic limits in some cases.

ACKNOWLEDGEMENT

The inventory of surficial marine geologic investigations was the idea of Dr. R. J. Fulton before the embarkation of the Geological Survey of Canada into such a field program. The writer was retained under a Personal Service Contract to the Survey in order to carry out this task and was later granted a term employment to complete the task--a never ending one as soon born out. The vast experience of one of British Columbia's classic oceanographers, Dr. Neal Carter (see Appendix I), was utilized to begin the effort. The vast reprint files of Dr. J. Luternauer, the numerous aggressive library acquisitions of Miss M. Akehurst, and the contributions by several government agencies, industrial consultants and academic staff members of several universities account for much of the effort in the report. The response by industry, consultants and other agencies to a questionnaire on these matters was most rewarding. Of special note are the contributions of Mr. M. Church (Dept. Geography, U.B.C.), Mrs. L. Hoos and Dr. C. Levings (Pacific Environment Inst., Can. Dept. Environment), Dr. D. Ellis (Dept. Biology, Univ. Victoria), Mr. W. Dirnnan (B.C. Dept. Lands, Forests and Water Resources), and Messrs. R. Roberts and E. Collias (Dept. Oceanography, Univ. Washington). Finally, the support staff of the Geological Survey of Canada, Vancouver were faced with the assembly of this vast amount of information. I thank them all for the cheerful atmosphere in which this report preparation took place.

PART I - Scope of Bibliography and Inventory Map

This inventory includes references to studies of the coastal and Shelf areas of British Columbia, northern Washington and southeastern Alaska. The portions of the Washington Shelf, Puget Sound and southeast Alaska are covered in the National Resource Charting System and are therefore considered important because future marine mapping programmes may be based on System meridional boundaries which extend to latitudes 48°N and 56°N. Integration with American geologic analyses is thus important even though the style of mapping and the type of study may be at variance. Canadian mapping in the coastal marine geologic environment north of the International boundary near 56°N is not likely to be carried out despite the forementioned anomaly at Yakutat Bay.

The Inventory Map enclosed with this facet of the report shows as a base the limits of the Continental Shelf and Slope as well as other major physiographic features (lakes, rivers, ice caps, etc.). Plotted on the base map are major earthquake epicentres (Richter scale magnitude of 5 or greater), locations of permanent field research and monitoring stations, and areas of field scientific activity. For the latter, a distinction has been made between projects where one or more parameters are mapped within an area as opposed to projects where the scientific effort is directed to research not requiring an areal organization of results. Studies are variable in geographic scope and definitions; some are large with precise boundaries, whereas others have only approximate boundaries; some represent a one station, track line, or transect operation. Others are so diffuse that boundaries are ephemeral or transitional. The methods of review are given in Ricker (1974-see Appendix I) and will not be repeated herein. Map symbols and reference notes indicate the type of study undertaken in the appropriate geographic area and the notes are keyed to the bibliography. Hence, it is possible to determine the contents of a bibliographic entry by referring to the appropriate

map note.

In the Strait of Georgia, increasing utilization of this rich marine resource and adjacent land has resulted in a vast number of studies by many levels of government, geotechnical and environment consultants, industry, other agencies and institutions. This area is, therefore, shown on a larger scale inset map. Notwithstanding, there is current concern over the use and abuse of many deltaic river estuaries scattered along the British Columbia coastline. The Department of Environment of Canada is conducting detailed oceanographic and environmental investigations on the 17-18 most important of these - some of which discharge into the Strait of Georgia. As a contribution to the efforts of the Estuarine Working Group of the Department of Environment, these estuaries are located on the map along with an inventory of geotechnical and related oceanographic work performed on each. Bibliographies have also been assembled for each estuary by various branches of the Department of Environment, but their contents are usually related to their own special discipline of work. Those consulted for this compilation include Marles et al (1973) and provisional lists prepared by the Pacific Environment Institute and by the Lands Directorate (see Appendix I).

A special supplement map of Part I has been added to this report to show the areas of short core sampling by Shell Canada Ltd. About 3,000 sites were sampled; of which 1,200 cores have been forwarded to the Geological Survey of Canada for analysis; the remainder have been briefly described on a hand specimen basis. Dr. B. Cameron of the Survey is currently studying the Foraminifera in the bottom 5 cm. of each core and has carried out a granulometric analysis on this interval as well. The writer has scanned most of the cores in the course of cataloguing for long term storage. Cursory impressions of the lithologies in the cores are as follows: Vancouver Island Shelf locales are either a monotonous green silty to sandy mud or a grayish silt capped by a pebbly diamicton with intact molluscan and other

varieties of shells; sparse samples indicate a similar situation in Queen Charlotte Sound (see also Luternauer entries); and Hecate Strait cores are invariably of coarse sands with numerous bioclastic components. The latter may indicate a region of final wastage of Fraser Glaciation ice (Late Pleistocene) and a following period of high energy erosional environment which may even persist at the present time.

Other sources of unpublished sediment data include numerous environmental marine monitoring projects and the localized Urban Geology Data Banks at Victoria and Vancouver--Geological Survey projects completed in 1972 in cooperation with industrial and municipal government agencies. A record of sediment collecting expeditions is given in Appendix II and a few Abyssal locations are also included even though the intent of the tabulation was to show coastal sources of information. One will notice the ever increasing amount of sampling in the recent years. In the past, sampling collections were almost exclusively a domain of the British and Canadian Hydrographic Surveys and the U. S. Coast and Geodetic Survey. The majority of these samples were described in only hand specimen form and were then plotted in non-technical terminology on hydrographic charts in hundreds or thousands of notations. Appendix II excludes these sampling missions though such notations may be invaluable in areas of sparse analyzed sediment control in some future geotechnical endeavour. The Hydrographic Surveys have excellent bibliographies and index maps of their charts, tables and marine notices and, hence, are not repeated for this inventory. Not to go unnoticed are the published hand-specimen described samples of the Fisheries Research Board (FRB) of Canada. About two thousand records are given in the Bernard et al entries alone though unfortunately most of their samples have since been destroyed in a warehouse fire. Though many sample locations have been plotted on the accompanying maps the FRB sample points by sheer density could not be plotted--however, most major tracts of British Columbia's coastal waters

are represented in this series of descriptions.

PART I - Disciplines Represented in the Bibliography

As previously stated marine surveys are more often than not an interdisciplinary venture. Also, marine geology was not a viable science on its own prior to 1950 (or even 1960) for the coastal regions of British Columbia. However, terrestrial geologists, physical oceanographers and others have made token commitments to understand this environment in order to put their own particular study into an encompassing geologic framework. An important facet in the study of marine surficial geology in glaciated areas is the stratigraphic tie with Pleistocene (and to a lesser extent Holocene) sequences mapped on the adjacent terrestrial landscape. Therefore, appropriate marine-adjacent geologic reports have been included in the bibliography as shown on the Part I map.

In Ricker (1974-see Appendix I) about one half of the references were found to be geologically oriented, and the vast majority of other listings were of at least some geologic application. This revised and updated bibliography yields about the same ratio of geological to non-geological oriented investigations though this was maintained only by a healthy influx of geotechnical entries which had been almost a total hiatus in the first edition of Part I. The following revised Table I accounts for the relative input of each discipline into this Part I bibliography which is comprised of approximately 1,550 entries.

Those disciplines in Item A below have been extensively searched and checked for cross references and probably represents at least 80% of the available literature. However, there is a total absence of geotechnical consultant reports in the pre-1950 era. The information in Item B is probably more than 50% complete but archaeology entries in particular were not at all fully explored. Within the limitations set for this report,

TABLE I Discipline Origin of Relevant Surficial Marine Geological Information.

A. Geological - Geotechnical Studies

Marine Sedimentology Including Suspended Sediments	7.3%
Geomorphology, Quaternary Tectonics, Special Bathymetry	3.9%
Geochemistry of Sediments, Interstitial Water Chemistry	4.9%
Geophysics - CSP, Seismology, Acoustics of Sediments	3.2%
Economic Resource Study-Surficial Sediments (Terrestrial or Marine)	1.0%
Coastal Geotechnical Engineering, Foundation Design (Marine)	15.7%
Fluvial Sediments, Processes, Hydrology, River Training, etc.	4.4%
Terrestrial Surficial Geology, Glaciation, Geological Reconnaissance	5.3%
Multi-faceted of above Sub-disciplines	5.6%
Sub total	51.3%

B. Biological - Archaeological Studies

Palaeoecology, Sediment-Benthic Fauna, Forams, etc.	5.2%
Paleontology (Marine & Terrestrial), Benthic Vegetation	1.8%
Applied Biology - Renewable Resource Inventory	1.4%
Archaeology	0.7%
Sub total	9.2%

C. Oceanography - Hydrography

Physical Water Studies - Circulation, Tides, Currents	9.8%
Water Column Chemistry	2.6%
Sub total	12.4%

D. Interdisciplinary Studies

Water Pollution Control, Monitor and Design	10.7%
Land Use, Development, Environmental Impact	8.7%
Interdisciplinary Basic Research	7.7%
Sub total	27.1%

entries for Item C are fairly complete though water column chemistry reports were generally limited to the so-called heavy metal studies and many of these of an older methodological nature were bypassed. For the Interdisciplinary category the writer checked the extensive card file of the British Columbia Pollution Branch at Victoria, B. C. As there is a year (or longer) time lag in insertion of titles into this file the water pollution group of studies cannot be complete and prior to 1957 pollution studies were not a requirement by law nor was there any regulation requiring the submission of a pollution study. Reports on file at their office as listed in this bibliography are available for public perusal within the confines of their library only. Other Item D group reports or entries are not so easily obtained and "Basic Research" entries are a subjective classification where the writer feels that the report or paper in question has dealt with two or more disciplines on an equal basis. On the whole, Item D probably includes at least 50% of the available or known investigations. The above estimations apply to Canadian waters only.

PART II - General Notes

Library research on Part II- Offshelf-abyssal regions is incomplete due to time limitations. Studies falling within the area of Canadian Natural Resource Charting (as outlined on Part II map) may be nearly complete for this inventory. However, deep-sea research on even a Quaternary geological nature may require a much more expansive research area in order to solve the problems, and much library time in a big facility will be required to sort out the ramifications. Much of the Canadian information on surficial sediments in this bibliography appears to be only a fragment of a bedrock or tectonic investigation, and only foreign expeditionary cruises have spent a concerted or directed effort on the Quaternary geological column; in this vain Russian titles have yet to be thoroughly researched and cross referenced and the

copious amounts of their literature may require extensive search and translation. Almost all research efforts in this field are of an academic direction through either universities or government funded research foundations or institutes.

On the accompanying Part II map about two thirds of the known research projects have been plotted with rather generous geographic limits and the vast array of named subsea features are shown in a diagrammatic fashion. Almost all projects involve the development of some mapped scientific parameter and thus this distinction (of mapping or not) is not made on the accompanying inventory map itself (Part I was so subdivided). Some American Shelf studies are shown on the Part II map as well because of the latitudinal limits in the Part I project -- a few entries are shown on both maps and their reference notation is not transferable from one series of map and bibliography to the other. Sample locations have not been shown on the Part II map though Appendix II gives some insight on this matter--it is a sparse situation of sampling despite the excellent maps produced to date.

The highlight of research to date in the deep water regions is the delineation of volcanic ash, turbidite and physiographic provinces of the sea floor and the recognition of active tectonism at present. The JOIDES drill hole (No. 177) off Paul River Ridge is the first and thorough attempt to analyze the complete (?) Quaternary section. Undoubtedly this event will lead to bigger research horizons in the near future, and no doubt this bibliography is already out dated in view of this and other considerations.

PART I
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OF
SURFICIAL MARINE SEDIMENTS
PACIFIC REGIONS OF CANADA

- Coastal Zone of British Columbia -
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The following entries were submitted by Cook, Pickering and Doyle Ltd. with omission of the year of investigation or exact title of the reports. All investigations have been accurately located on the map and are listed according to ascending note numbers. Prior to 1968 the company was known as Paul M. Cook Ltd., but for ease of this compilation the current partnership nomenclature is used.

Cook, Pickering and Doyle Ltd. _____. Soil report-Sturgeon Bank, Fraser Delta. Client report. Project No. 1582. Map note 1F.

Cook, Pickering and Doyle Ltd. _____. Roberts and Sturgeon Bank dredge investigation. Client report. Project No. 2348. Map note 1G. (tidal flat portion only).

Cook, Pickering and Doyle Ltd. _____. Soil report - Roberts Bank navigation towers. Client report. Project No. 2141. Map note 1G.

- Cook, Pickering and Doyle Ltd. _____. Soil report - Oak Street Bridge. for Phillips, Barratt, Hillier, Jones and Partners Ltd. Map note 1Q.
- Cook, Pickering and Doyle Ltd. _____. Fraser River studies - geotechnical investigations. Client report. Project No. 4084. Map note 1Q.
- Cook, Pickering and Doyle Ltd. _____. Soil report: Fraser - Surrey dock. Client report. Project No. 1414. Map note 1R.
- Cook, Pickering and Doyle Ltd. _____. Soil report: Fraser - Surrey dock. Client report. Project No. 2118. Map note 1R.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Annacis Island industrial estate. for Grosvenor International Holdings Ltd. and Laing Investments Ltd., Map note 1V.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Lafarge Cement Ltd., Fraser River. Client report. Project No. 1270. Map note 1V.
- Cook, Pickering and Doyle Ltd. _____. Soil report - C.N.R. ferry slip, Tilbury Is. for Canadian National Railways. Project No. 857. Map note 1W.
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- Cook, Pickering and Doyle Ltd. _____. Soil report - Woodfibre dock. for Rayonier Canada Ltd. Project No. 858. Map note 6E.
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- Cook, Pickering and Doyle Ltd. _____. Langdale ferry slip. Client data log. Project No. 1127. Map note 6K.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Ambleside, 15th to 27th Streets, West Vancouver. Client report. Project No. 1647. Map note 9C.
- Cook, Pickering and Doyle Ltd. _____. English Bay dredging. Client report. Project No. 646. Map note 13.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Third Beach, Stanley Park, Vancouver. Client report. Project No. 1032. Map note 13.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Third Beach, Stanley Park, Vancouver. Client report. Project No. 1064. Map note 13.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Second Beach, Stanley Park, Vancouver. Client report. Project No. 1148. Map note 13.
- Cook, Pickering and Doyle Ltd. _____. First Narrows dredging, Vancouver. Client report, Project No. 2007. Map note 13.

- Cook, Pickering and Doyle Ltd. _____. First Narrows - Burnaby shoal. Client report. Project No. 2345. Map note 13.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Vancouver Wharves Ltd. Client report. Project No. 1892. Map note 13B.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Vancouver Wharves Ltd. Client report. Project No. 1960. Map note 13B.
- Cook, Pickering and Doyle Ltd. _____. Soil report - dredging at Vancouver Wharves Ltd. for Swan Wooster Engineering Co. Project No. 2079. Map note 13B.
- Cook, Pickering and Doyle Ltd. _____. Soil report - Spanish Banks, Vancouver. Client report. Project No. 936. Map note 14.
- Cook, Pickering and Doyle Ltd. _____. soil investigation - Spanish Banks. Client report. Project No. 1079. Map note 14.
- Cook, Pickering and Doyle Ltd. _____. Kitsilano Yacht Club pilings. Client report. Project No. 1216. Map note 14.
- Cook, Pickering and Doyle Ltd. _____. Soil report- west end of False Creek. Client report. Project No. 1417. Map note 17.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Granville St. Bridge.for Pearson, Phillips and Barratt Ltd. Project No. 744. Map note 17.
- Cook, Pickering and Doyle Ltd. _____. False Creek dredge channel. Client report. Project No. 988. Map note 17.
- Cook, Pickering and Doyle Ltd. _____. Soil report- dredging in English Bay near False Creek, Vancouver. Client report. Project No. 1395. Map note 17.
- Cook, Pickering and Doyle Ltd. _____. Soil report- north end of Granville Bridge, Vancouver. Client report. Project No. 1560. Map note 17.
- Cook, Pickering and Doyle Ltd. _____. Soil report- False Creek. Client report. Project No. 2514. Map note 17.
- Cook, Pickering and Doyle Ltd. _____. Soil report- C.P.R. Piers area, Burrard Inlet. Client report. Project No. 561. Map note 18.
- Cook, Pickering and Doyle Ltd. _____. Soil report- C.P.R. Piers, foot of Granville St., Vancouver. Client report. Project No. 1713. Map note 18.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Port Moody dredge sampling. Client report. Project No. 1360. Map note 19.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Port Moody dredge sampling. Client report. Project No. 1382. Map note 19.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Port Moody Terminals. Client report. Project No. 642. Map note 19.
- Cook, Pickering and Doyle Ltd. _____. Port Moody Terminals. Client report. Project No. 853. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Port Moody Terminal. for Wright Engineering Ltd. Project No. 1330. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Port Moody Terminal. Client report. Project No. 2429. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Soil report- West dock extension, Port Moody. Client report. Project No. 1503. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Soil report- Port Moody. Client report. Project No. 1532. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Soil report- Ioco Wharf, Port Moody. Client report. Project No. 1958. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Soil report- Rocky Point Marina, foot of moody St., Port Moody. Client report. Project No. 2726. Map note 19.

Cook, Pickering and Doyle Ltd. _____. Soil report: #3 Roger's elevator, and water-front. Client report. Project No. 495. Map note 20.

Cook, Pickering and Doyle Ltd. _____. B.C. Sugar Refining Co. Ltd. Client report. Project No. 537. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil report. Vancouver Terminals, North Vancouver. Client report. Project No. 617. Map note 20.

Cook, Pickering and Doyle Ltd. _____. BoatWays, old North Vancouver ferry dock. Client report. Project No. 666. Map note 20.

Cook, Pickering and Doyle Ltd. _____. B.C. Ice Wharf, Commissioner St., Vancouver. Client report. Project No. 862. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Jetty #3- foot of Rogers St. Client report. Project No. 960. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Jetty #3- foot of Rogers St. Client report. Project No. 1146. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil report. D.L.272, North Vancouver. Client report. Project No. 1853. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil report- Burrard Inlet near Second Narrows Bridge. Client report. Project No. 1966. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil report- D.L. 272, North Vancouver. Client report. Project No. 2074. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil report- D. L. 204, North Vancouver. Client report. Project No. 2210. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil investigation- Northland Navigation Co. Ltd., Commissioner St., Vancouver. Client report. Project No. 2330. Map note 20.

Cook, Pickering and Doyle Ltd. _____. Soil report- Northland Navigation Co. Ltd., Commissioner St., Vancouver. Client report. Project No. 2443. Map note 20.

- Cook, Pickering and Doyle Ltd. _____. Soil report- dock at foot of Nanaimo St., Vancouver. Client report. Project No. 2600. Map note 20.
- Cook, Pickering and Doyle Ltd. _____. Soil report- B.C. Sugar Refining Co. Ltd., landfill, Burrard Inlet. Client report. Project No. 3951. Map note 20.
- Cook, Pickering and Doyle Ltd. _____. Soil studies- Hooker Chemicals site, Burrard Inlet. for Hooker Chemicals Ltd. Map note 20.
- Cook, Pickering and Doyle Ltd. _____. Drill report- Nanaimo Assembly Wharf. Client report. Project No. 684. Map note 29B.
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- Cook, Pickering and Doyle Ltd. _____. Soil report- Nanaimo Harbour and Delta. for Nanaimo Harbour Comm. Project 3235. Map note 29B.
- Cook, Pickering and Doyle Ltd. _____. Report on dredging at Ladysmith. Client report. Project No. 371. Map note 32A.
- Cook, Pickering and Doyle Ltd. _____. Sechelt breakwater. for Dept. Public Works, Can. Project No. 1742. Map note 35G.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Finger dock, Patricia Bay, Saanich Inlet. for Dept. Environment, Can. Project No. 3877. Map note 52A.
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- Cook, Pickering and Doyle Ltd. _____. Soil report- Powell River dock. Client report. Project No. 214. Map note 76A.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Campbell River harbour. Client report. Project No. 2833. Map note 77A.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Kelsey Bay marina. Client report. Project No. 1587. Map note 83.
- Cook, Pickering and Doyle Ltd. _____. Soil report- Tahsis dock. Client report. Project No. 1093. Map note 84C.
- Cook, Pickering and Doyle Ltd. _____. Soil report- boat harbour, Port McNeill. for Dept. Public Works, Can. Project No. 1917. Map note 91

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The following entries were submitted by Klohn Leonoff Consultants Ltd., Vancouver, B. C. Each report has been given an approximate title and map note number in ascending order. With the exception of the Ripley and Associates entry (q.v.), dates of the investigations are not known to the author, though all entries occur between the years of 1950 and 1975. All other reports are listed under Klohn Leonoff Consultants Ltd., though the firm has had a sequence of name changes as follows: Ripley & Associates Ltd., Ripley Klohn and Leonoff Ltd., Ripley Klohn and Leonoff International Ltd.

- Klohn Leonoff Consultants Ltd. _____. Foundation investigations for plant site, South Arm, Fraser River, Lulu Island. Client report. in map note area 1G.
- Klohn Leonoff Consultants Ltd. _____. Foundation investigations for dykes on Fraser River and sea front, Lulu Island. client report. Map note 1G.
- Klohn Leonoff Consultants Ltd. _____. Wharf foundation analysis and investigation of river for dredging borrow material for an industrial plant site, South Arm, Fraser River at Delta, B. C. Client report. Map note 1H'.
- Klohn Leonoff Consultants Ltd. _____. Foundation investigation of sea front dykes, Delta, B. C. Client report. Map note 1H'.
- Klohn Leonoff Consultants Ltd. _____. Foundation investigations on river bank, rip rap study and river bottom dredging investigations for an industrial development at No. 3 Rd., South Arm, Fraser River . Client report. Map note 1H'.
- Klohn Leonoff Consultants Ltd. _____. Foundation investigation for Fraser River tunnel crossing at Deas Is. Client report. Map note 1M.
- Klohn Leonoff Consultants Ltd. _____. Foundation investigation for railway bridge approach to Lulu Island, Fraser Delta. Map note 1Q(?) or near 1V' (?).

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for dykes along Fraser River at South Westminster. Client report. Map note 1R.

Klohn Leonoff Consultants Ltd. _____. Foundation investigations for dykes and pump stations, Fraser River at Queensborough. Client report. Map note 1S.

Klohn Leonoff Consultants Ltd. _____. Foundation for thermal power plant at Port Mann. Client report. Map note 1T.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for power line crossing of Fraser River, Port Mann. Client report. Map note 1T.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for sewage treatment plant and investigation of Annacis Channel for dredge borrow material. Client report. Map note 1V.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for paper plant adjacent to North Arm of Fraser River at Burnaby. Client report. in Map note 1V.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for transmission line crossing of Fraser River between Richmond and Annacis Island. Client rept. Map note 1V.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for plant site adjacent to river, loading facility in river, and investigation for dredging in river, Tilbury Island, Fraser River. Client report. Map note 1W.

Klohn Leonoff Consultants Ltd. _____. Exploration for borrow potential in Mud Bay tidal area. Client report. Map note 2B.

Klohn Leonoff Consultants Ltd. _____. Investigation of submarine slide at Woodfibre dock. Client report. Map note 6E .

Klohn Leonoff Consultants Ltd. _____. Review of shore protection works after a severe storm, Squamish, B. C. Client report. Map note 6G.

Klohn Leonoff Consultants Ltd. _____. Study of slope failure above beach, precipitated by wave action, Gibsons, B. C. Client report. Map note 6L.

Klohn Leonoff Consultants Ltd. _____. Deep foundation investigations on the banks of the Fraser River for a proposed industrial plant, Fraser Mills area. Client report. Map note 11C.

Klohn Leonoff Consultants Ltd. _____. Foundation investigations for hotel in foreshore area of Coal Harbour. Client report. Map note 13A.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation on foreshore and alongside foreshore for proposed manufacturing plant, Coal Harbour, Vancouver. Client report. Map note 13A.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation for wharf and waterfront hangers, Jericho Beach, Vancouver. Client report. in Map note 15.

Klohn Leonoff Consultants Ltd. _____. Geotechnical appraisal of the Point Grey foreshore and scenic drive, English Bay, B. C. Client report. Map note 16.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation on beach at Spanish Banks, Vancouver. Client report. Map note 16.

Klohn Leonoff Consultants Ltd. _____. Foundation investigations and design of the Trans. Mountain terminal, Burrard Inlet, B. C. Client report. Map note 19.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation on foreshore for an oil terminal and refinery, North Burnaby. Client report. Map note 19A.

Klohn Leonoff Consultants Ltd. _____. Foundation investigation, Centennial Pier, Vancouver Harbour. Client report. Map note 20.

Klohn Leonoff Consultants Ltd. _____. Foundation design of the Saskatchewan Wheat Pool terminal wharf, Burrard Inlet, B. C. Client report. Map note 20.

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ADDENDUM: received March 27, 1975.

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APPENDICES

PART II
BIBLIOGRAPHY
OF
SURFICIAL MARINE SEDIMENTS
PACIFIC REGIONS OF CANADA

- Continental Rise and Abyssal Regions -

BIBLIOGRAPHY

to

Part II - Continental Rise and Abyssal Regions of the N.E. Pacific Ocean (with selected supplemental information on the Shelf of N.W. United States).

About two thirds of the entries listed for the Part II marine surficial geology are illustrated on the accompanying map. However, almost no cross referencing of any of the entries given below has been undertaken, and thus the inventory for the offshelf-abyssal regions is incomplete by at least fifty percent. Furthermore, this compilation has by in large avoided general circulation and water column hydrographic and chemical studies; hence, this bibliography is of a more restricted geologic coverage than that of Part I. To ease illustration problems about one hundred shelf studies performed in American waters are listed in Part II rather than I. Therefore, taking this into consideration, the 200 odd entries on abyssal-offshelf topics is in actuality a token representation of what must be a much larger field of endeavour in the area covered by the Part II map.

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APPENDIX I

Bibliographies and Catalogues covering the Area of this Inventory
of Marine Sediment and Related Studies

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numerical data on fisheries of the 18 critical estuaries on
the British Columbia coast. Fisheries and Marine Service, Can.
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mentioned in its text and as shown on the Inventory Map).

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Ricker, K.E. 1974. Inventory of marine surficial geology, sedimentology, geomorphology, Quaternary paleontology and palaeoecology, geochemistry and related studies of the Pacific Shelf of Canada. Part I. Coastal areas of British Columbia, Washington and Alaska. Geol. Surv. Can., Open File No. 197: 46 pp.

Roberts, R.W. 1972. Sediment and rock samples from the marine environment that have been added to the sample collection of the Dept. Oceanography, University of Washington since 1965. Dept. Oceanog., Univ. Washington. Spec. Rept. No. 50: 51 pp.

Sears, M. and M. Swallow (Eds.). bi-monthly. Deep-Sea Research oceanographic abstracts and oceanographic bibliography section. Pergamon Press, Oxford, London.

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Washington Marine Atlas, 1972. North inland waters, Vol. 1; south inland waters, Vol. 2; north coast, Vol. 3; Beswick, R. (Ed.) Div. Surv. and Mar. Land Management, Dept. Natl. Res., Olympia, Washington. 19 plates per volume. Applicable to note areas 48 and 49 on inventory map.

Wass, E.F. 1974. Bibliography on geology, pedology, flora, vegetation analyses and recreation planning in the Greater Vancouver Regional District. Prepared for environmental baseline inventory for Lower Fraser Valley and Estuary.

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Woodruff, J.L. and D.A. McManus. 1966. Bottom sediment and rock samples (1954-1965) stored at the Department of Oceanography. Dept. Oceanography, Univ. Washington, Tech. Rept. No. 158: 51 pp.

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Washington, Univ. of. 1968. Technical reports from the Department of Oceanography. Sponsored by the Office of Naval Research. Reference A68-20: 30 pp.

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APPENDIX II. Checklist of Sediment Sampling Expeditions for the Coastal Waters of British Columbia ¹

YEAR	AGENT or SHIP: RESEARCHERS	No. of SAMPLE STNS.	GEOGRAPHIC REGIONS	LOCATION of RESULTS or SAMPLES
1885	Geol.Surv.Can. : Dawson	20	N. Vancouver Is., Strait of Georgia	Trans. Roy.Soc.Can. 4(4).
1888-90	U.S. Fish.Comm. : Townsend "Albatross"	61	Queen Charlotte St., S.E. Alaska, San Juan Is., S.Van.Is. Shelf, St. Georgia, for 1900(16) Abyssal regions.	Rept. U.S. Fish.Comm.
1891	U.S. Fish.Comm. : Townsend "Albatross"	37	St. of Juan de Fuca, Olympic - Van. Is. Shelf	ditto
1892	U.S. Fish.Comm.: Townsend "Albatross"	5	Continental Shelf and Slope	ditto
1893	U.S. Fish.Comm. : Townsend	6	Eastern Juan de Fuca Strait, Puget Sd.	ditto
1896	U.S. Fish.Comm. : Townsend	1	Olympic Shelf	ditto
1912-35	Biol.Bd.Can. at Nanaimo	ca.170 (sed?)	Gulf Is., St. Georgia, Vanc.Is. Shelf, Hesquiat, Queen Charlotte Is., Dixon Entrance	Nanaimo Biol. Stn. - see also Can. G. Res., 24:134-155; Fish.Res. Bd.Can. MS Rept. No. 920
1938-48	Univ. Wash.: Utterback, Sanderman, <u>et al</u>	81 grabs,cores	Puget Sound, San Juan Is., Skagit Bay, St. Georgia, St. Juan de Fuca, Pacific Shelf, Queen Charlotte Is., S.E.Alaska.	J.Mar.Res., vol. 1, 4, 7(1). Theses of Creagher, Reiner-teen, Burcham, Wilson, Blank
1950-52	Univ. Wash.: Wang	206 grabs,cores	E. Juan de Fuca, Puget Sd.	Wang's thesis
1951	SIO "Northern Holiday Cruise": Menard <u>et al</u>	16 cores	Gulf of Alaska - west of 138° long ⁴	Enbyks's (1960) thesis - Univ. Wash.
1951	IOUBC: Pickard	ca.100	British Columbia mainland fjords	IOUBC Data Rept. No. 20.
1951-52	IOUBC: Toombs	20	Bute Inlet	Toomb's thesis; Trans. Roy. Soc. Can.

1952-53	Univ. Wash. X FRB : Waldichuk	ca.100	St. Georgia, Channels N & S of Georgia, Juan de Fuca, Howe Sd., Bute and Toba Inlets.	Geol.Surv.Can., Vancouver - data file
1954-55	Univ. Wash. : Laevastu	14 (N of 48°N)	San Juan Is., Puget Sd., Juan de Fuca, Shelf, Abyssal	Univ.Wash. Dept.Oceanog. Tech. Rept. No. 50.
1954-55	Can.Comm. Oceanog. X POG : "Hecate Project" - Barber <u>et al</u>	75	Dixon Entrance, Hecate St., Queen Charlotte St.	POG Repts for 1954-1956.
1954-62	Univ. Wash. : Nayudu, Enbysk, "Brown Bear" Gross	200 cores (19° N of Lat. 48° & E of Long.138°)	Dixon Entrance, St. Juan de Fuca, Shelf, Slope, Rise, Abyssal Plain	Science, 146(3643). Internat. J. Ocean. Limnol 1(1) Mar. Geol., 1(3), 2 Nayudu, Enbysk theses.
1950's	Univ. Wash. : Bader	2 cores and grabs(?)	Puget Sound	Deep-Sea Res. 4:15-22. Acta Geochimica Cosmochimica 7:205-211.
1954-67	FRB - Inlets & Industrial Sites: Waldichuk <u>et al</u>	ca.15 ca.15 ca.15 ca.15	Alberni Inlet - Barkley Sd. Muchalat and Neroutsos Inlets Fisher and Douglas Channels, Chatham Sd. Fraser Delta, Burrard Inlet, St . Georgia, Howe Sound	FRB. MS Rept. No. 937 FRB MS Rept. No. 990(I) FRB MS Rept. No. 990(II) FRB MS Rept. No. 939
1954-56	Univ. Wash. : Wennekens	ca.200	S.St. of Georgia, St. Juan de Fuca, San Juan Is., Puget Sd.	PhD thesis - summary only. Samples in storage at Univ. Wash.
1956	IOUBC : Mathews (and Cox)	90	Dixon Entrance	IOUBC MS Rept. (Mathews) BA thesis (Cox)
1956-60	IOUBC : Gilmartin	ca.15	Indian Arm of Burrard Inlet	PhD thesis
1957	SIO - "Mukluk Expedition"	15 grabs and cores	Dixon Entrance, S.E. Alaska, Rise , Abyssal Plain	Mimeo Rept. - copy in data files G.S.C., Vancouver

1957	U.S. Navy Hydrographic Office	4 or greater	Puget Sd., Strait of Juan de Fuca	H.O. Misc.Pub.No.15359-85
1957	U. Wash. : Burns	49	Port Discovery of St. of Juan de Fuca	PhD thesis
1958	USSR "Vityaz Cruise"	14 (2 transects)	Shelf, Slope, Rise, Abyssal Plain	unpub.? Gershmanovich papers?
1958	UBC Geol. XS10 : Mathews & Shepard	43	Fraser Delta	Bull.Amer.Assoc.Pet.Geol., 46(8)
1959-60	Univ. Wash. : Sternberg	82 grabs & cores	Bellingham Bay	MSc thesis or Northwest Sci. 41(2)
1960	Univ. Wash : Burns	39	Port San Juan of Juan de Fuca St.	PhD thesis
1960	UBC Geol. : Northcote	ca.100	Mud Bay of Fraser Delta	MSc thesis
1960-61	FRB - "Scallop Surveys" : Quayle, Bernard	707	Dixon Entrance, Hecate St., Queen Charlottes, St. Georgia, Fraser Delta, Gulf Is., Victoria, S.Vancouver Is., Shelf, Quatsino Sd., Esperanza Inlets, Clayoquot Sd.	FRB MS Rept. No. 920
1960-62	IOUBC : Pickard, Cockbain	ca.600	St. Georgia, St. Juan de Fuca, Vanc. Is. Shelf, Queen Charlotte Sd., Vanc. Is. Inlets, Hecate St., Mainland fjords, Johnston St., San Juan Is.	IOUBC Data Repts. 20 & 22 see also: J.Fish.Res.Bd.Can. IOUBC MS Rept. No. 15.
1961	SIO "Leapfrog Expedition"	7 cores	Continental Slope & Rise off Dixon Entrance	Mimeo Rept. on file, GSC Vancouver, B.C.
1961	U. Wash. : Gucluer, Gross	50	Saanich Inlet	Gucleur's MSc thesis & pub. see also Roberts (1974)
1961-65	U. Wash. : Gross <u>et al</u>	125	Olympic - S. Vanc. Is. Shelf	J.Sed.Pet. 37(3) see also Roberts (1974)
1962-66	FRB - "Invertebrate Surveys" : Quayle, Bernard	497	Pacific Shelf & Slope of Brit.Col.	FRB MS Rept No. 920

1963	BACM Industries ³ : Golder, Brawner	48 cores	Boundary Bay of Fraser Delta	Swan Wooster Eng.Co. Rept. (1968) to Nat.Hbr.Bd.
1963-66	FRB - "Sediment monitor of pulpmill sites": Werner, Hyslop	74	Prince Rupert, Howe Sd., St. Georgia, Gulf Is., Cousins Inlet, Misc.Channels N. of Georgia St., Alberni Inlet, Gold River Estuary, Nerontsos Inlet - Quat- sino Sd., Kitimat.	FRB MS Rept. No. 963
1963-65	Univ. Wash. : Buddemier	2 cores, 1 grab	Saanich Inlet	PhD thesis
1963-74	FRB - "G.B. Reed" Groundfish cruise: Westrheim <u>et al</u>	ca.100	Vancouver Is. Shelf, Continental Slope, Queen Charlotte Shelf, Queen Charlotte Sd., St. Georgia, S.E. Alaska Shelf, St. Juan de Fuca, S.E. Alaska, Dixon Entrance, Queen Charlotte St., Smith Sd., Rivers Inlet, Quatsino Sd., Nootka Sd.	FRB Tech Rept. 67-3 and several subsequent MS and Tech. Repts.
1964	Univ. Alaska: Rae <u>et al</u>	19	Glacier Bay and Taku Inlet, Alaska ²	Inst. Mar. Sci. Rept.R65-4.
1964-65	Shell Canada Ltd.: Shelf Program	3000 cores	Vanc.Is. Shelf, Queen Charlotte Sd., Hecate St., E. Dixon Entrance	Data and 1200 cores are stored at the GSC, Vancouver
1964-65	U. Wash. : Peterson	5 cores & 7 grabs	Saanich Inlet, Continental Slope	PhD thesis
1964-66	U. Wash. : Anderson	46 cores	St. Juan de Fuca	PhD thesis
1965	FRB : Thomson	35-40 notations	Hecate St., Laredo Sd., Caamano Sd.	FRB Circ. No. 73
1965	U. Alaska :	5 grabs & cores	Portland Canal, Clarence St.	Data Sheets on file, GSC Vancouver. see also: Sharma (1970)
1965-67	U. Victoria - FRB : Ellis	132	St. Georgia, Victoria, Gulf Is., Burrard, Jervis Inlet, Barkley Sd., Sooke Basin, Tasu Sd. of Queen Charlotte Is.	FRB Tech. Rept. No. 59

1965-66	IOUBC Howe Sd. Proj. : Murray, Ricker	ca.150	Howe Sd.	Unpub. MS; Tenneco Oil Co. Field Guide
1965-66	IOUBC : Kellerhals, Murray	ca.40	Boundary Bay of Fraser Delta	Bull.Can.Pet.Geol. 17(1)
1965-67	U. Vic. : Dunnill, Ellis	42 grabs	Gulf Is.	Dunnill's MSc thesis. The Veliger, 12(2)
1966	IOUBC-GSC : Macdonald, Murray	68	Upper Jervis Inlet	GSC Paper 73-23 Macdonald's MSc thesis
1966	Univ. Wash. : Bennett <u>et al</u>	7	St. Juan de Fuca, Olympic Shelf	Univ. Wash. "TG Thompson" Cruise Rept. No. 8
1966	FRB : Sheldon	32	Outer Comox Hbr. of St. Georgia	Data on file, GSC, Vancouver
1966	FRB : Thomson	65-70 notations	Hecate St., Dixon Entrance, Caamano Sd., Queen Charlotte Sd.	FRB Circ. No. 82
1966	Univ. Wash. : Carson	4 cores (min.)	Juan de Fuca Canyon	Data on file, GSC, Vancouver
1966	Univ. Alaska : Rosenburg	60 grabs & cores	S.E. Alaska inlets	Inst.Mar.Sci. Rept. R66-6
1966	INARE - UBC : Levings	15	Burrard Inlet - Fraser Delta	MSc thesis; FRB Tech.Rept. No. 393.
1966-67	Univ. Wash. - USGS : Burnett	618	Olympic Shelf, St. Juan de Fuca	Burnett (1967), Hands (1968) Spec. Repts. & J. Sed. Pet., 43(3)
1966-67	FRB "Faunistic Survey" : Bernard <u>et al</u>	124 grabs, dredge, etc.	Gulf Is., Queen Charlotte Sd., Nootka Sd., Hesquiat, Barkley Sd., Clayoquot Sd.	FRB MS Rept. No. 975
1967	U. Vic. : Popham and Ellis	19 grabs	S. Gulf Is.	Popham's MSc thesis, or Mar.Biol., 8(3)
1967	UCLA X Univ. Wash. : Brown Nissenbaum, Kolodny, etc.	4 cores	Saanich Inlet	A.Geochim.Cosmochim., 36. Science, 189. theses(?)

1967	U. Wash. : Lie	6	St. Juan de Fuca	U.Wash. Spec. Rept. 50, Lie (1969)
1967	U. Wash "TG Thompson" Shelf Survey : Bennett <u>et al</u>	24	Olympic - S.Vanc. Is. Shelf, E.St. Juan de Fuca	Univ.Wash. T.T. Cruise Rept. 13
1967	FRB : Smith & Butler	124 hand descrip.	Fitzhugh Sd., Smith Sd., Hecate St., Queen Charlotte Sd.	FRB Circ. No. 85
1967	Univ. Alaska : Hoskin, Burrell	38 grabs & cores	Glacier Bay	Inst.Mar.Sci., Rept. 68-5
1967-68	Swan Wooster "Superport Study" : Paul M. Cook Ltd.	49 boreholes	Roberts & Sturgeon Banks - Fraser Delta	Cook (1967, 1968), Swan Wooster (1967, 1968). Data in GSC files, Vancouver
1967-69	IOUBC : Luternauer, Wiese	400 & a few cores and dredge hauls	Queen Charlotte Sd.	PhD and BSc theses
1967-69	FRB "Faunistic Survey" : Bernard <u>et al</u>	117	Brit.Col. Coast - data yet to be plotted	FRB MS Rept. No. 1082
1968	U. Vic. : Brooks	12	Victoria area, and scattered coastal locales to the N.	MSc thesis
1968	UBC Geol. : Bermner	25 (plus 320 beach samples)	Wreck Bay & Long Beach - Vancouver Is. Shelf	MSc thesis
1968	Univ. Wash. : Global Marine Co.	1 long overlapping core	Saanich Inlet	Buddeimer's thesis /or/ Nissenbaum <u>et al</u> (1972)
1968	Univ. Wash. : Lie, Kisker	4 stns.(3 grabs each site)	Olympic Shelf	Univ.Wash. Spec. Rept. No. 57. or Lie & Kisker (1970)
1968-69	IOUBC : Carter	353 grabs plus a few cores	Barkley Sd., S. Van. Is. Shelf	PhD thesis, or Can.J. Earth Sci., 10(4) & 11(5)

1968-70	Univ.Wash. : Carson	50 cores	Cascadia Abyssal Basin (Lat. 46° - 50° N)	PhD thesis plus subsequent publications
1969	Univ. Wash. : Woodin	2	W. San Juan Is.	PhD thesis or Univ.Wash. Spec. Rept. No. 56.
1969	Eurocan Pulp & Paper Ltd. : Cook <u>et al</u>	19 boreholes	Kitimat Delta	Consult. Rept.
1969(?)	U. Vic. : McCallum, Ellis	unknown	Bosun Bank - Gulf Is.	Unpub. Rept.
1969	Brit.Col. Forest Prod. Ltd.: Ellis	ca.35	Chemainus - Crofton area of Gulf Is.	Consult. Rept.
1969	FRB X UBC Geol. : Wiese	125	Fatty Basin and Useless Inlet (Barkley Sd.)	MSc thesis
1970	Brit. Col. For. Prod.: Ellis	35 (fibre analysis)	Chemainus - Crofton area of Gulf Is.	Consult.Rept.
1970	Wesfrob Mines Ltd. : Beak Consult. Ltd.	8 stns (3 samples each site)	Tasu Sd. of Queen Charlotte Is.	Brit. Col. Poll. Control Br Victoria (File No. 1288)
1970	IOUBC : Pharo	398 plus a few cores	South and Central Strait of Georgia	PhD thesis
1970	GSC X UBC : Tiffin <u>et al</u>	56 dredge sites	Central and Northern Vanc. Is. Shelf	GSC Data files, Vancouver
1970-72	Cap.Reg.Dist. : Balch <u>et al</u>	22	Victoria - Macaulay Point outfall	U.Vic. Rept. to Cap.Reg. Dist.
1970-71	Dison Developments Ltd. : Murray, Macdonald	21	Jordan River area of St. Juan de Fuca	Brit.Col.Poll. Control Br., Victoria (File 427-2)
1970-71	IOUBC : Barr	26 dredge sites	Rise and Continental Slope - off S. Vanc. Is.	PhD thesis

1970-72	Univ. Wash. : Barnard	49 grabs, cores & dredge sites	Continental Slope (46° to $48^{\circ}15'N$)	PhD thesis
1970-73	Univ. Wash. : Bothner, Piper	41 plus several cores	Bellingham Bay, Puget Sd.	Bothner's thesis
1971	Water Resources Service (B.C. Gov.): Dobrocky Sea TECH Ltd.	16 grabs (plus 3 SCUBA transects)	Jordan River beach area of St. of Juan de Fuca	Brit. Col. Poll. Control Br. Victoria (File 427-2)
1971	FRB : Thompson	13	Alberni Harbour	FRB MS Rept. No. 1188
1971	Cap. Reg. Dist. : Drinnan <u>et al</u>	5 analyses (plus many hand descr.)	Victoria	U.Vic. Rept. to Cap.Reg. Dist.
1971	UBC - Civil Eng. : Byrne, Finn <u>et al</u>	1 core	Central St. Georgia	Several papers - G.S.C. files, Vancouver
1971	OFY "Sea Bed Survey" : Goddard <u>et al</u>	139	Victoria	Rept. to Secretary State by Dept.Biol., Univ.Victoria
1971	GSC - "Parizeau" : Tiffin <u>et al</u>	86 dredge sites	S. Vanc. Is. Shelf	GSC data file - Vancouver
1971-72	U.Vic. - Goddard	8	Gulf Is., Victoria	MSc thesis
1971-74	Jordan River Mines : Dobrocky Sea TECH	ca.20 (time series)	Jordan River beach area of St. of Juan de Fuca	Brit. Col. Poll. Control Br., Victoria (File 427)
1971-73	Utah Const. Mining Co. : Evans <u>et al</u>	21 (time series)	Rupert and Holberg Inlets of Quatsino Sd.	Johnson's (1974) thesis; Brit. Col. Poll. Control Br., Victoria (File 427)
1971-73	UBC - Geol. : Johnson	63 grabs & cores	Rupert and Holberg Inlets of Quatsino Sd.	PhD thesis
1972	UBC - Geol. : Murray <u>et al</u>	80	Roberts and Sturgeon Banks - Fraser Delta	Luternauer & Murray (1973) Can.J. Earth Sci. 10(11)
1972	U.Vic. "Algal Resource Survey" : Austin <u>et al</u>	107 notations	Comox area of St. Georgia	GSC files, Vancouver

1972	Westwater Res. : Bawden <u>et al</u>	39 grabs & cores	Roberts and Sturgeon Banks - Fraser Delta	Westwater Res. (UBC), Rept. No. 1
1972	MacMillan Bloedal Ltd. : H. Paish Assoc. Ltd.	12 cores	Somass Delta of Alberni Hbr.	Brit. Col. Poll. Cont. Br., Victoria (File 1751-1)
1972	GSC - "Endeavour" : Tiffin	32 dredge sites	Vanc. Is. Shelf and Slope	GSC data file, Vancouver
1972	UBC - Geol. : Waslenchuk	34	Fraser Delta - Pt. Grey area of St. Georgia	BSc thesis
1972	Brit. Col. Res. Council : Great.Vanc.Sew.Drain.Dist.	42	Iona Is. area of Fraser Delta	Consult. Rept. to GVSDD.
1972	Utah Const. Mining Co. : Ellis	23 cores	Rupert Inlet of Quatsino Sd.	Consult. Rept. to Utah/or/ GSC files, Vancouver
1972-73	PEI : Thompson	120 plus 14 cores	Upper Howe Sound, Squamish Delta	FRB Tech. Rept. No. 396
1972-73	U.Vic. "Algal Resource Survey" : Austin <u>et al</u>	285 sediment notations	N. St. Georgia between Hornby Is. and Oyster River	GSC file, Vancouver
1972-74	PEI : Levings	47	Squamish Delta of Howe Sd.	FRB MS Rept. No. 1218.
1973	U. Wash. : Richards <u>et al</u>	5 cores	Narrows - Sechelt Inlets	Unpub.
1973	U.Vic. - Bamfield Mar. Stn. : Forman	15	Barkley Sd. (and 1 stn. In Gulf Is.)	GSC data file, Vancouver
1973	U.Vic. : Jones	7	Rupert & Holberg Inlets (Quatsino Sd.)	MSc thesis
1973	UBC Geol. Field School : Chase <u>et al</u>	183	Gulf Is.	GSC data file
1973	UBC Geol. : Whiticar	44	False Creek embayment of Burrard Inlet	BSc thesis
1973	UBC Geol. : Bourne	60	Port Moody of Burrard Inlet	BSc thesis
1973	UBC Geol. : Carne	53	Victoria Hbr.	BSc thesis

1973	Swan Wooster Co. :	?	Prince Rupert Hbr.	Consult. project for undisclosed client
1973	Utah Const. Mining	Ellis	24	Rupert & Holberg Inlets - Quatsino Sd. Consult. Rept.
1973	FRB - Nanaimo : Bernar		16	Fraser Delta foreslope FRB Internal Memo
1973	GSC - "Endeavour" : Tif	39 dredge sites		Queen Charlotte Sd. GSC data file, Vancouver
1973	Brit. Col. Res. Council Great.Vanc.Sew.Drain.l	?		Main Arm of Fraser River N.E. of Reifel Is. Consult. Rept.
1973	PEI : Levings	80 (plus beach sites)		Britannia & Port Mellon area of Howe Sd. Unpub. data
1973-74	PEI : Levings	59		Fraser Delta Unpub. data
1973-74	UBC Geol. : Bell	ca.70		Squamish Delta, Howe Sd. MSc thesis
1973-74	Oregon State Univ. : Scheidt	?		Olympic - Vanc. Is. Shelf MSc thesis project
1973-74	U.Vic. : McLennan	2 cores (time series)		Patricia Bay of Saanich Inlet BSc thesis
1973-75	PEI - GSC "Estuary Recce" - Levings, GSC staff	ca.150	Jervis Inlet head, Indian R. Delta (Burrard) Toba Inlet head, Wannock Delta (Rivers), Kitimat, Bella Coola, Skeena Deltas.	PEI and GSC data files
1974	Amer. Climax Ltd. : Dobrocky Sea TECH Ltd.	"many"	Alice Arm of Observatory Inlet	Consult. Rept.
1974	Brit. Col. Forest Products Ltd. : Dobrocky Sea TECH Ltd.	26 cores	Chemainus - Crofton area of Gulf Is.	Consult. Rept.
1974	U.Vic. : Grant <u>et al</u>	3	Barkley Sound	Syesis (to be published in 1975)
1974	GSC - NRC : Clague	503 plus 10 cores	N. Strait of Georgia and Comox Hbr.	GSC data files, Vancouver

1974	GSC : Luternauer	67 tidal flat (5 time series) 220 foreslope (2 time series)	Fraser Delta (Roberts and Sturgeon Banks), and Burrard Inlet (Spanish Banks).	GSC data files, Vancouver
1974	PEI : Otte (Levings)	41	Fraser Delta at Iona Is.	FRB Tech. Rept. (in prep.)
1974	DPW-MOT Airport Expansion: <u>Cook et al</u>	50 boreholes	Fraser Delta (Sturgeon Bank, Iona Is.)	Consult Rept.
1974	Utah Const. Mining Co. : Ellis	24	Rupert and Holberg Inlets	Annual Review Rept.
1974	PEI-UBC : Christie	ca. 50	Inner Sill area of Howe Sd.	MSc thesis project
1974	Brit.Col.Hydro : Thalassic Data Ltd.	27	St. Georgia (Texada Is. to Qualicum)	Consult. Rept.
1974	GSC : Luternauer	200 plus 3 cores	Skeena Delta and Chatham Sd.	GSC data files, Vancouver
1974	PEI : Levings, McDaniel	25	Maplewood Flats of Burrard Inlet	FRB. MS Rept.
1974	Imperial Oil Enterprises Ltd.: Littlepage (U.Vic.)	75stns (200 samples)	Victoria and circum Vanc. Is. at scattered locales	Locations in GSC data files, Vancouver
1975	Marine Resource Br. - B.C. Gov. : Conlan (U.Vic.)	ca.350 inter-tidal and subtidal	E. coast of Vancouver Island	MSc thesis
no dates	Various Clients : Cook Pickering and Doyle Ltd. ³	ca.450 bore-holes	Burrard Inlet (over 20-25 years)	Consult Repts.
"	"	10 boreholes	Portland Inlet and Canal	" "
"	"	17 boreholes	Queen Charlotte Is. (Tasu, Q.C.City)	" "
"	"	15 boreholes	Gold River area of Michalat Inlet	" "
"	"	23 boreholes	St. Georgia at Texada Is., Powell River, Sechelt	" "

no dates	Various Clients : Cook Pickering and Doyle Ltd.	18 boreholes	Gulf Is. at Nanaimo and Ladysmith Hbrs. Consult. Repts.		
"	"	40 boreholes	Howe Sd. at Woodfibre, Port Mellon, Langdale and Squamish Delta	"	"
"	"	11 boreholes	Prince Rupert Hbr.	"	"
"	"	28 boreholes	Queen Charlotte - Johnstone Straits at Alert Bay, Kelsey Bay, Port McNeill	"	"
"	"	29 boreholes	Barkley Sd. - Pt. Alberni Hbr.	"	"
"	"	15 boreholes	Saanich Inlet at Pat. Bay, Bamberton	"	"
"	"	15 boreholes	Campbell River - Discovery Passage	"	"
"	"	2 boreholes	Victoria Hbr.	"	"
"	"	ca.100 boreholes	Fraser Delta (excluding above Fraser Delta entries)	"	"

 no dates see explanatory
 notes 5 & 6:
 pp. A16 - A17

APPENDIX II. (cont'd)

Explanatory Notes:

- 1 The compilation does not include samples taken by the British Admiralty Surveys, Canadian Hydrographic Survey, U.S. Coast and Geodetic Surveys or the NOAA equivalent of the latter. Several thousand station positions taken over a continuous spectrum of time are to be considered on this omission. Some samples taken by the British Admiralty cruises are stored in the British Museum for examination but a catalogue on such has yet to be assembled. Coordinates of NOAA samples are to be forwarded to Vancouver offices of the Geological Survey of Canada in the near future. Sediment distribution maps, using hydrographic chart notations, have been assembled by: Shepard (1932, 1939) for the Juan de Fuca region, Waldichuk (1953, 1968) for the Strait of Georgia and Juan de Fuca regions, and by Mathews (1968) for Dixon Entrance.
- 2 Tarr Inlet of Glacier Bay, southeast Alaska is now advancing into British Columbia due to dramatic glacier retreat; hence, the interest in cataloguing samples from this locale. For surveys elsewhere along International Boundaries no attempt has been made to isolate the Canadian component of sampling because Natural Resource Charts encompass adjacent stretches of ocean under American jurisdiction.
- 3 Only a minor amount of consultant or industrial gathered data is shown in this compilation. The listings in the bibliography, however, will give some insight to the quantity of data involved if one uses the listings of Cook et al as an indicator.
- 4 Data for the Abyssal regions of the Pacific is diffuse and considered incomplete for this compilation. Several JOIDES drillholes, numerous seamount dredge hauls and deep trawls by several Commissions are omitted. Shelf data taken in the form of notations by the International Halibut Commission is also wanting.
- 5 Several works in progress have been excluded due to a lack of specific information on the amount and whereabouts of sampling.

6 Several geographic summaries of data exist. Roberts (1974) covers the known granulometrical analyzed data for Washington locales; McLean (unpub.) lists the borehole records for the Sea Island area of the Fraser Delta, and there are two catalogues on unanalyzed samples in storage at the Dept. Oceanography of the University of Washington.

7 Abbreviations and acronyms used in the tables:

DPW	- Canada, Dept. of Public Works
FRB	- Fisheries Research Board of Canada - as of 1971, only an organ of publication for the Fisheries and Marine Service of the Dept. of Environment.
GSC	- Geological Survey of Canada
INARE	- Institute Animal Resource Ecology, Univ. British Columbia
IOUBC	- Institute of Oceanography, Univ. British Columbia
MOT	- Canada, Ministry of Transport
NOAA	- U.S. National Oceanic Atmospheric Administration
NRC	- Canada, National Research Council
OFY	- Canada, Secretary of State, Opportunities for Youth program
PEI	- Canada, Dept. Environment, Pacific Environment Institute, West Vancouver, B.C.
POG	- Pacific Oceanographic Group, with FRB at Nanaimo, B.C.
SIO	- Scripps Institute Oceanography
UBC	- Univ. British Columbia
UCLA	- Univ. California at Los Angeles
Univ. Wash.	- Univ. Washington - usually the Dept. Oceanography
USGS	- U.S. Geological Survey
U.Vic.	- Univ. Victoria, Dept. Biology.