Project 740062

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It is evident from a recent Environment Canada report (Hoos, 1975) that the Prince Rupert-Skeena estuary area has the potential for continued, large-scale development. It is equally clear, however, that although environmental stresses imposed by this growth may be considerable, they cannot adequately be assessed on the basis of our current knowledge of prevailing coastal physical, chemical, and biological regimes.

The Prince Rupert-Skeena estuary region is a major centre for both the fishing/fish processing and forest products industry. As Prince Rupert is a transportation centre for the northwestern part of British Columbia, not only are docking facilities currently being expanded, but consideration also has been given to the erection of a major bulk loading facility. Furthermore, as the city is relatively close to coal resources in the interior of the province, it has been suggested as an alternative site for the development of a major steel mill proposed for British Columbia by Japanese interests. The growing industrialization and urbanization of the area has, in turn, markedly increased the sources of water pollution which now include sewage, fish processing plants, pulp mills, log handling and storage facilities, a chemical and cement plant, and shipping. In addition, burgeoning construction within the Prince Rupert area has increased demand for gravel and sand, local resources of which are rapidly dwindling (Clague, 1976).

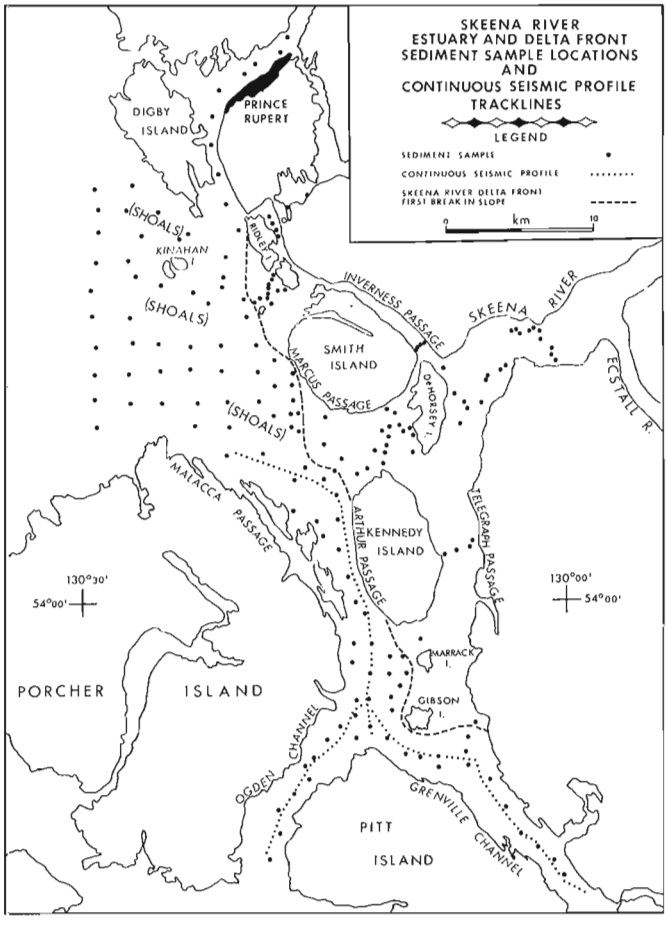

Figure 49.1. Location map.

A marine geology research program of the Prince Rupert-Skeena estuary area was initiated in 1974 to produce information, which ultimately can be applied to studies of vital coastal ecosystems, coastal and estuarine land use, pollutant dispersal and accumulation, and permit an assessment of offshore sand and gravel resources. A total of 210 sediment samples were collected from the sea floor off the delta front, from the lower reaches of the Skeena River channels, and from small beaches and basins in the vicinity of Ridley Island (Fig. 49.1). In addition, approximately 50 km of continuous seismic profiles were obtained along Grenville and Ogden Channels and along Arthur and Malacca Passages (Fig. 49.1).

Operations were carried out from the C.S.S. William J. Stewart (June 17 to 23) during a Canadian Hydrographic Service survey of Skeena River, from the C.S.S. Laymore (August 12 to 24) during a biological survey of various estuaries (under the direction of Dr. C. Levings of the Pacific Environment Institute), and from the C.F.A.V. Endeavour (August 25 to 30).

Over half of the collected samples have now been grain size analyzed, and a few remarks can be made about the estuarine-marine geological environment of the Prince Rupert-Skeena River area.

The lower reaches of the Skeena River channels cut across plutonic, metamorphic, and sedimentary rocks (Hutchison, 1967). In general they are floored by 0.250 mm mode sands which accumulate to form extensive bars. Megaripples, commonly having amplitudes and wave lengths as great as 0.5 m and 10 m, respectively, are produced on the surface of these bars by currents which can attain velocities in excess of 3 knots (150 cm per sec.) (Figs. 49.2 and 49.3 D, E, F). Scouring along the deeper portions of some channels is sufficient to sweep away all but gravel-sized matter (Figs. 49.2 and 49.3 I).

The margins of the river channels generally are floored by organic-rich silty or plastic clay or muddy gravels (Figs. 49.2 and 49.3 C, G, H). Broad, sandy flats lie at the edge of Skeena Delta, which extends in a discontinuous fashion for approximately 30 km from Ridley Island to Gibson Island (Figs. 49.1 and 49.3 A, B). Along the delta front a generally sharp transition is evident from channel sand to ocean basin muds (Figs. 49.4 and 49.5). At the mouth of the river between Kennedy Island and Marrack Island, however, sandy sediment extends farther into deeper water,

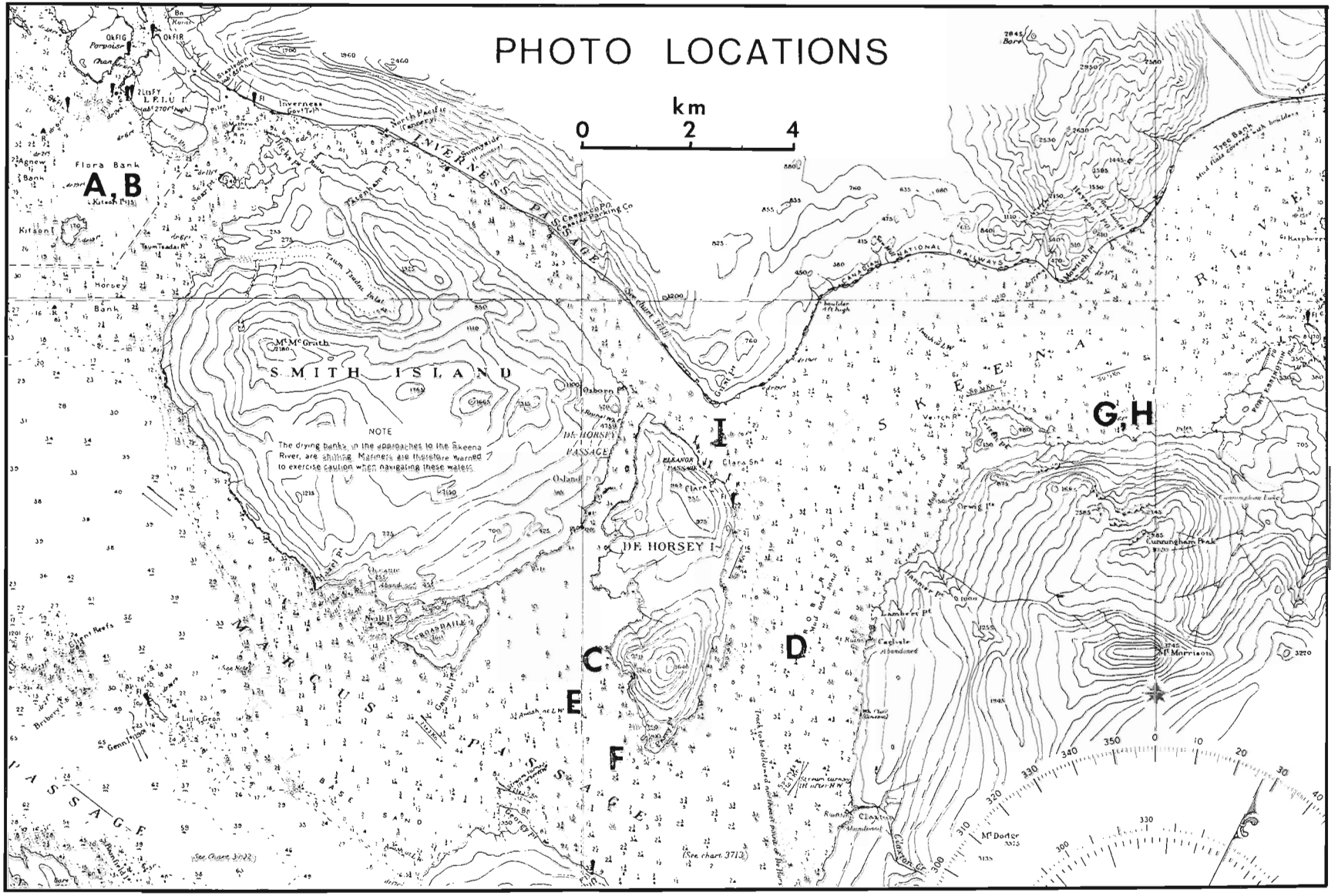

Figure 49. 2. Locations of photographs in Figure 49. 3. Base map: Canadian Hydrographic Service Chart No. 3735.

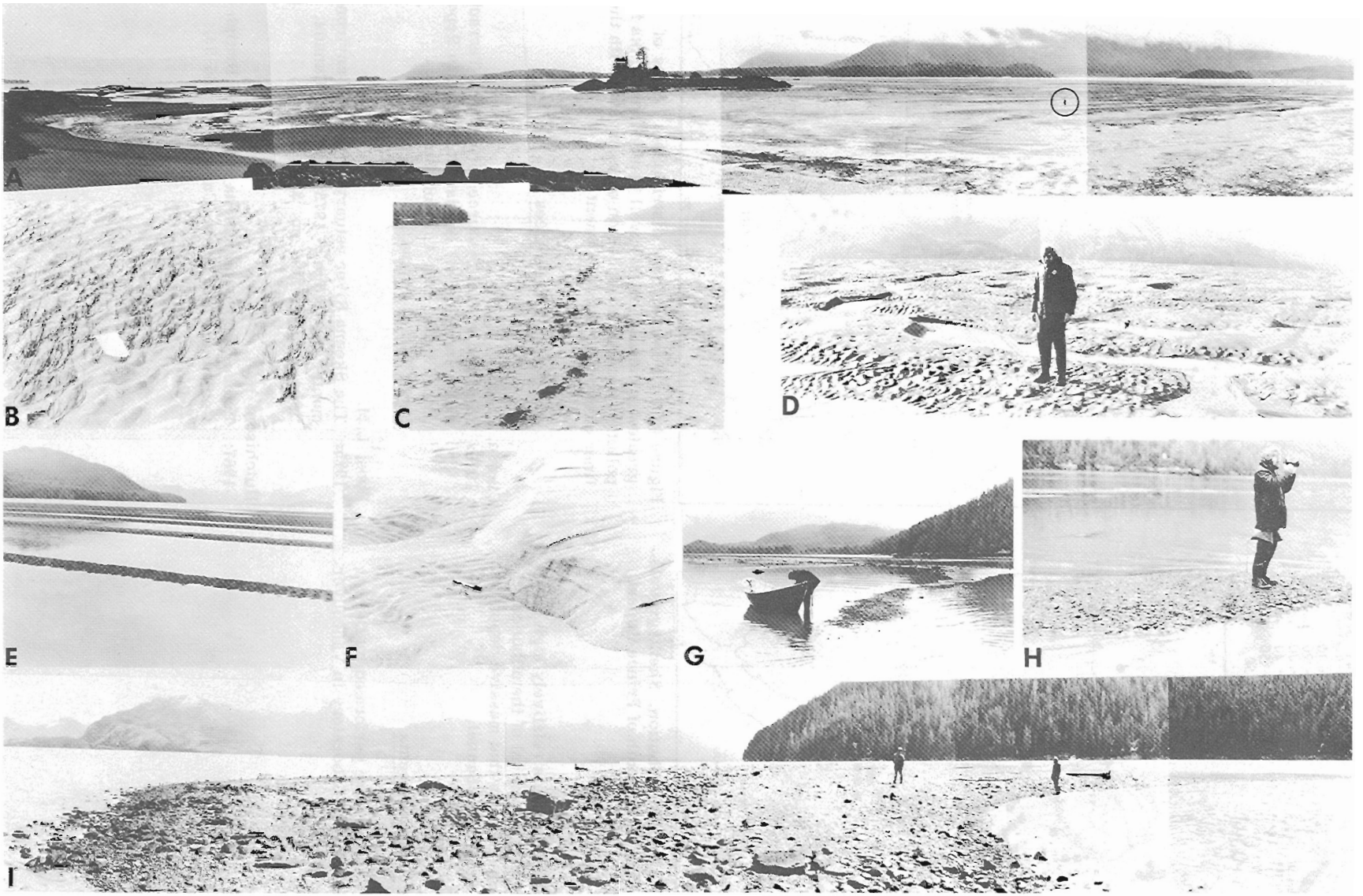

Figure 49. 3 (A) Looking north along Flora Bank. This extensive sand bank lies at the mouth of Inverness Passage and is considered to be a vital nursery and feeding ground for fish (Hoos, 1975). The surveyor is circled.

(B) Representative view of the surface character of Flora Bank showing rippled sand surface and ecologically vital eelgrass (Zostera marina). A Fisheries Service study indicates that Flora Bank supports over 50 per cent of the total eelgrass in the Skeena estuary (Hoos, 1975).

(C) Typically flat, muddy beach common along margin of Skeena estuary river channels.

(D, E) Megarippled sands along channels.

(F) Avalanche face of megaripple with fine gravels at its base.

(G, H) Compacted muddy gravel beach at margin of channel.

(I) Mudflat on which has been dumped fill from a nearby source, most likely the floor of Inverness Pass (R. W. Sandilands, pers. comm.).

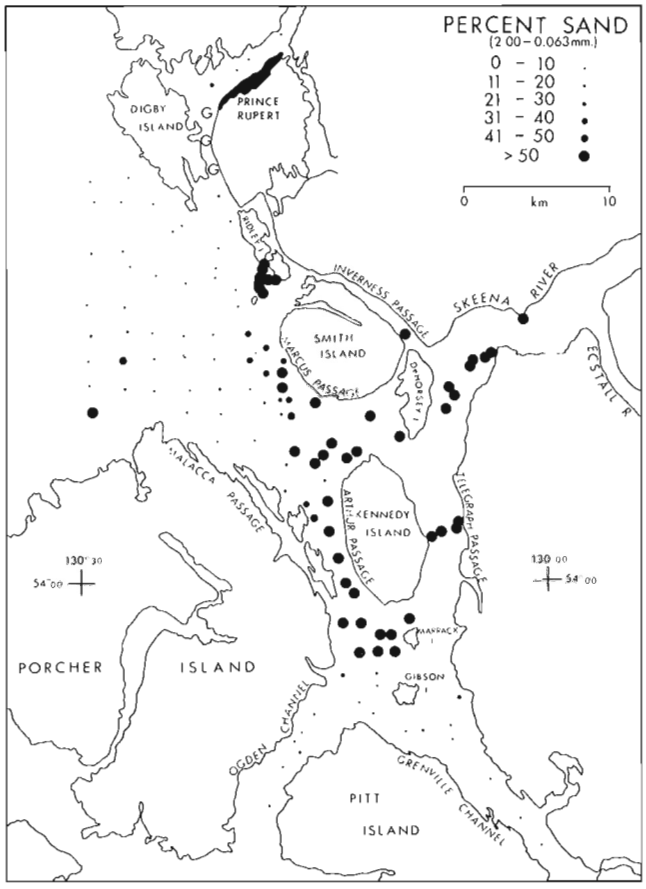

Figure 49. 4. Per cent sand distribution. Shelly gravels were collected at 40 m depth south of Prince Rupert at sites denoted "G".

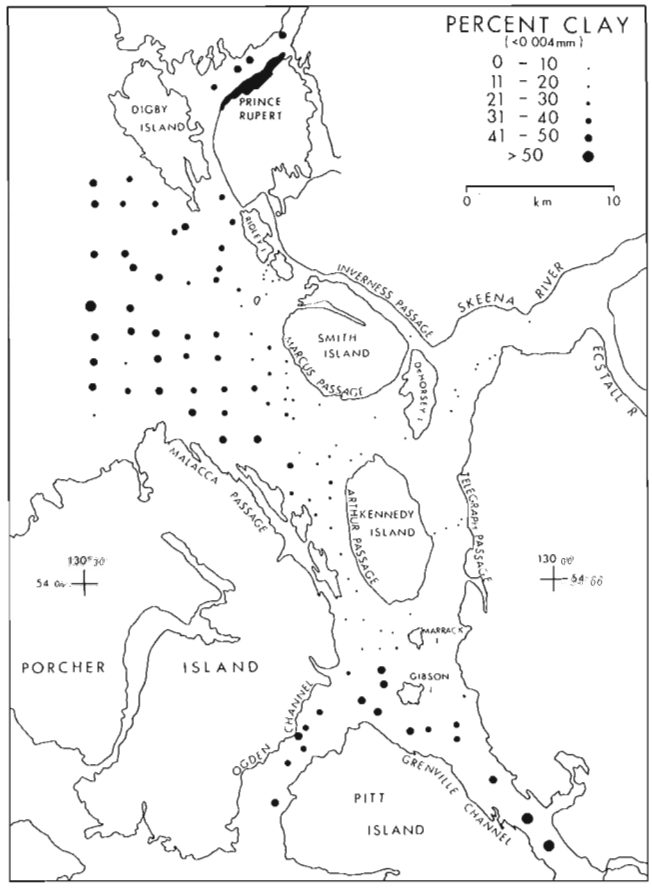

Figure 49. 5. Per cent clay distribution. Sites of greatest accumulation may well be dominant sinks for pollutant material absorbed on or associated with the finer component of the sediment.

suggesting that discharge here is relatively high. This agrees with a preliminary appraisal of the obtained seismic profiles which suggests that massive deposition has occurred all along Ogden Channel.

Acknowledgments

All grain size analyses were performed by Davis Swan at the Terrain Sciences Laboratory in Vancouver.

References

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