

71

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MISCELLANEOUS PUBLICATION

No. 71

**Bibliography of hydrological
and sedimentological studies in the
Manukau and Waitemata Harbours,
Auckland.**



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by T. M. Hume

Water Quality Centre
Ministry of Works and Development
Hamilton

WELLINGTON 1984

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T. M. HUME

Water Quality Centre, Ministry of Works and Development, Hamilton, New Zealand.

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*This annotated bibliography brings together references
concerning the hydrology and sedimentology of the
Manukau and Waitamata Harbours, Auckland, New Zealand.*

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PREFACE

This bibliography deals with the marine hydrology and sedimentology of the Manukau and Waitemata Harbours, Auckland, New Zealand. The material included bears on the coastal problems of erosion and sedimentation, sediment mining and the disposal of wastes, these being matters of interest to the National Water and Soil Conservation Authority. The bibliography contains references on coastal morphology, bathymetry, sediments, geology and soils (where they relate to sediment provenance), sea-level, tides, winds, currents, dispersion, water quality (especially salinity, temperature and suspended sediments) and coastal engineering.

This bibliography updates and expands an earlier bibliography prepared by Hume (1980). It complements a bibliography of oceanography and sedimentology for the Northland-Auckland coast prepared by Hume and Harris (1981) which excluded the Manukau and Waitemata Harbours. This bibliography includes material published before February 1984.

The references are set out by author in alphabetical order. To most have been added a short annotation describing the scope and usefulness of the work and the data content. Many biological references for example, contain valuable oceanographic or sediment data. Annotations are not given if the title is self explanatory or if the listing was not sighted. References may have been excluded if they were "newsy" or popular, or if they repeated information in other references listed. The references are also listed in a subject index. The majority of places named in the bibliography are shown on maps (pp. 9-14).

The fields of hydrology and sedimentology are broad ones and it is difficult to draw sharp dividing lines between items to be included and those to be excluded from the bibliography. For instance, references to catchment geology are included where the rocks are source material for harbour sediments. Sedimentological and hydrological information outside the harbour entrances are referenced when relevant to harbour processes. No attempt has been made to include all references that incidentally include information in the field and this applies especially to studies of biology and water quality. The bibliography includes both published and unpublished material such as books, theses, serials, reports, charts, maps and other data. In addition to these sources however, the search revealed authority and government agencies files contain a considerable amount of miscellaneous technical data and background information that for practical reasons is not cited in the bibliography.

The sources of 302 references are tabulated below :

<u>Published</u>	<u>Total %</u>
Authorities and Government Agencies (serials, charts)	11
Journals (serials)	13
Conference Papers	1
Books	<1
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	26

Unpublished

Consultant Reports	12
Authorities and Government Agencies (reports, charts)	54
University Theses	7
University Reports	1
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	74

The distribution is interesting because it highlights the large source of unpublished information available from various sources that are rarely included in reference lists and bibliographies.

Attention is drawn to the four topics whose inclusion is impractical and which are in any case being handled by specialists who are the best sources of information:

- Sea levels : In addition to measurements being made at the major harbours, there are many others, sometimes 'ad hoc' made by a variety of agencies. The Hydrographic Office of the Royal New Zealand Navy has a New Zealand Tidal Library which holds microfilm copies of tidal gauge charts and results of harmonic tidal analyses.
- Bathymetry : More detailed charts at varying scales, used to prepare referenced charts, are available by arrangement with the Hydrographer of the Royal New Zealand Navy and the Hydrographer of the Auckland Harbour Board.

- Aerial Photography : Apart from the Department of Lands and Survey, there are several organisations which hold aerial photographs of the coast. Amongst these are Aero Services (New Zealand) Ltd, New Zealand Aerial Mapping, Whites Aviation Ltd, Air Logistics, and the New Zealand Forest Service.
- Satellite Imagery : Satellite-sensed images of coastal waters are available. The central authority handling these is the Physics and Engineering Laboratory of the Department of Scientific and Industrial Research, distribution being made by the Department of Lands and Survey, Wellington.

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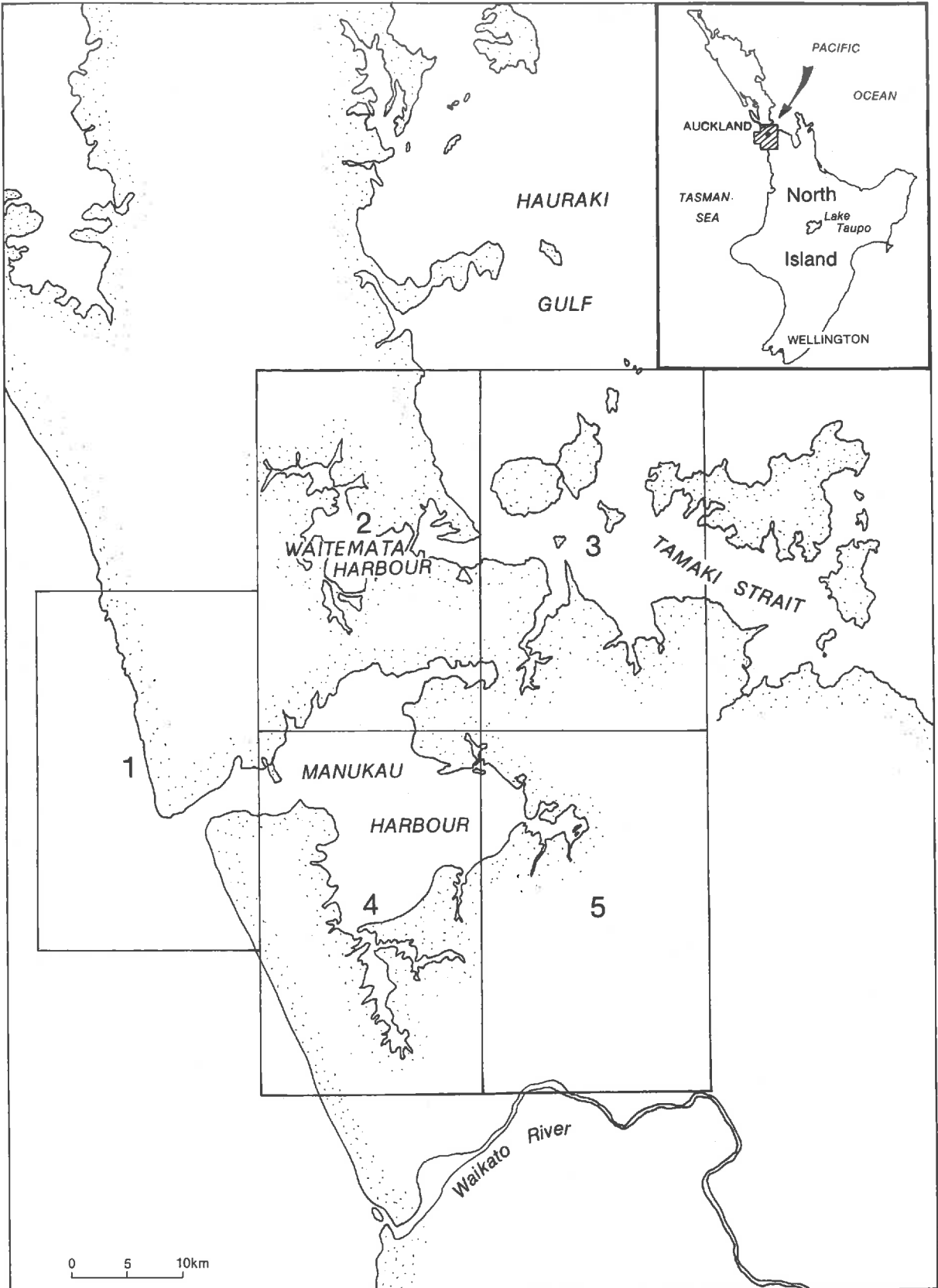
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ACKNOWLEDGEMENTS

The author is indebted to Catherine Schicker and Brett Moore who provided valuable assistance in the preparation of this bibliography while employed as University Vacation Workers at the Water Quality Centre.

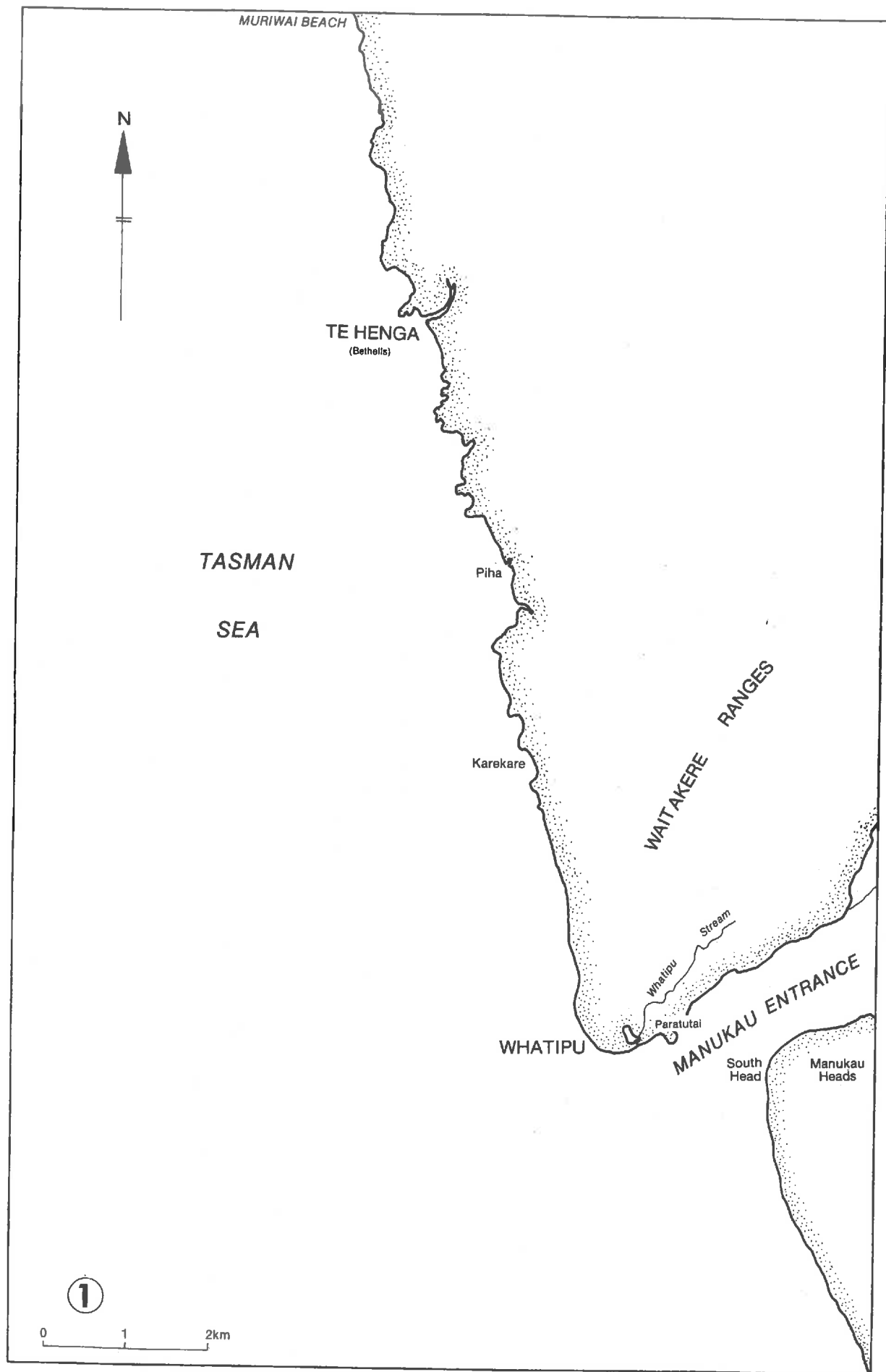
Thanks are extended to those institutions that permitted searches through their files and libraries for published and unpublished information, and to Dr R Agnew and M Gregory for comments on the bibliography.

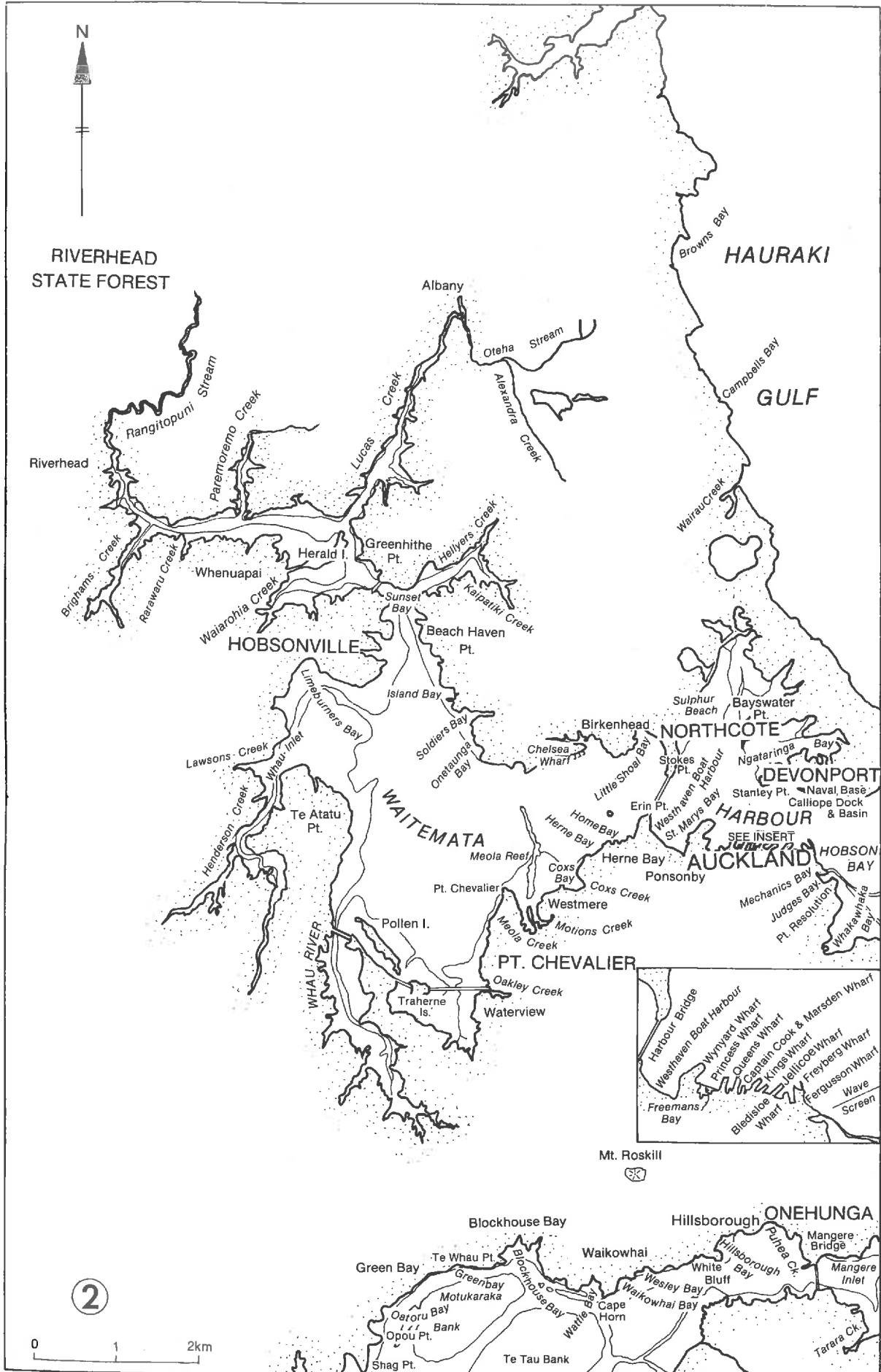
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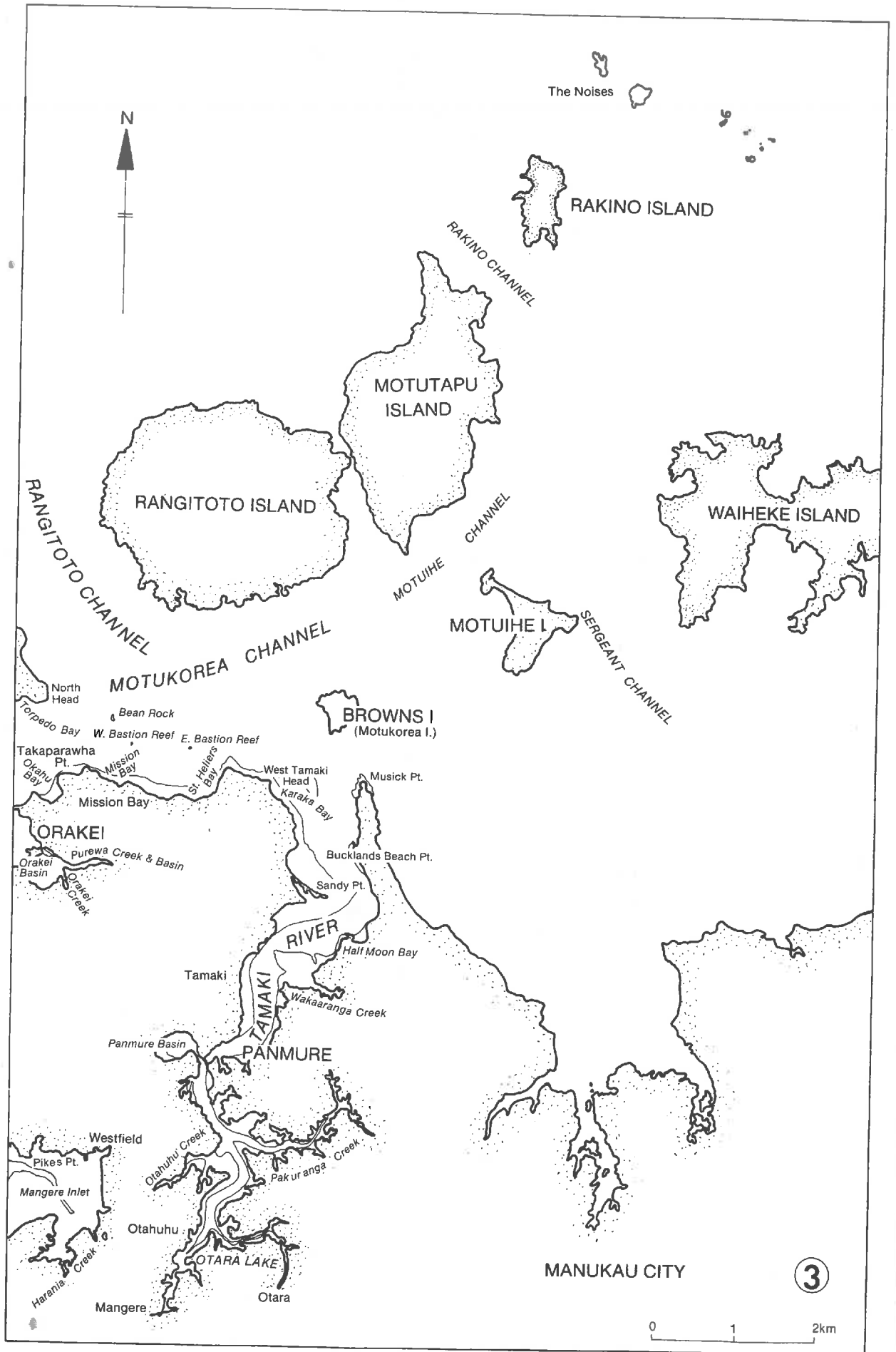


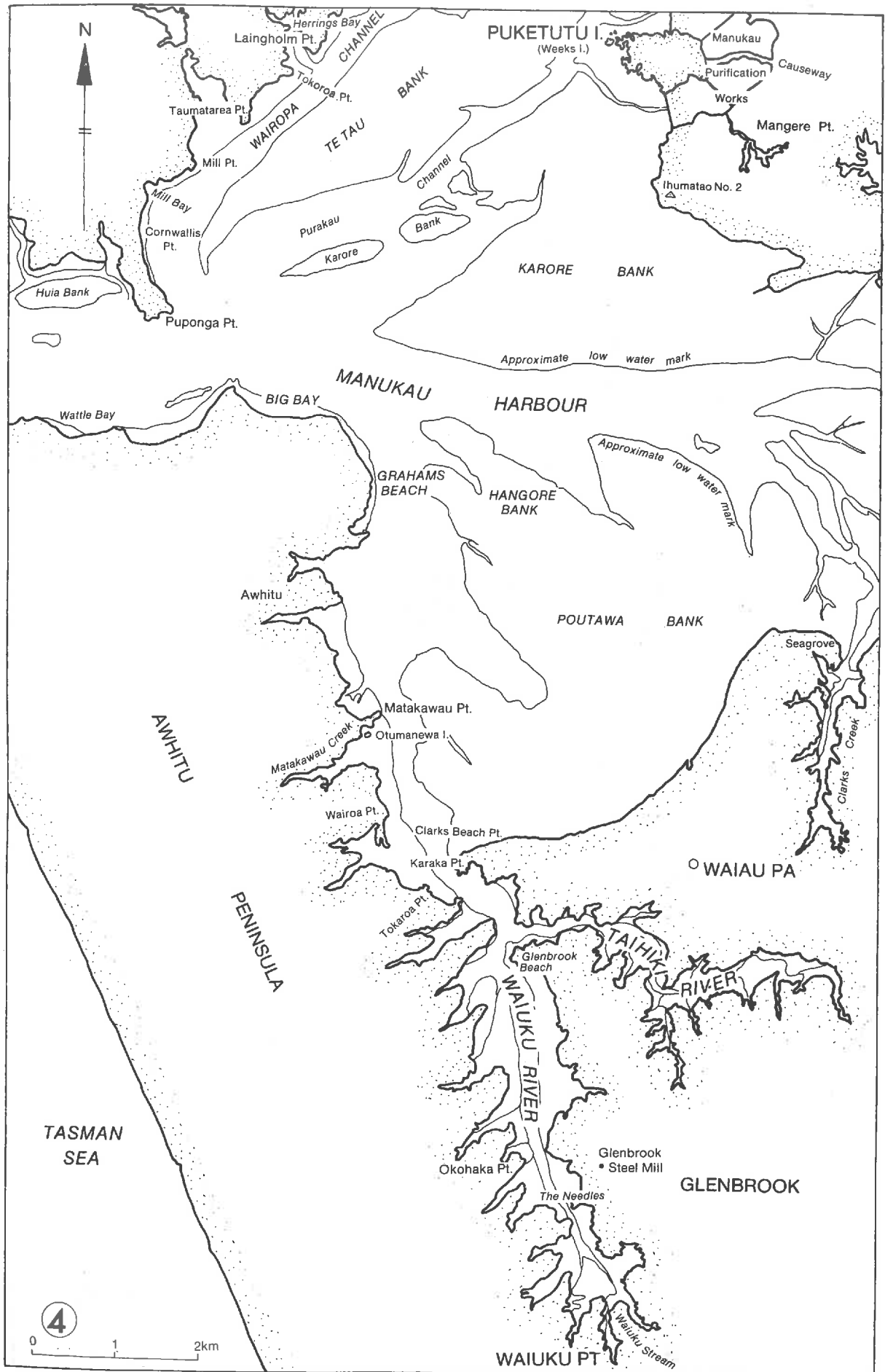
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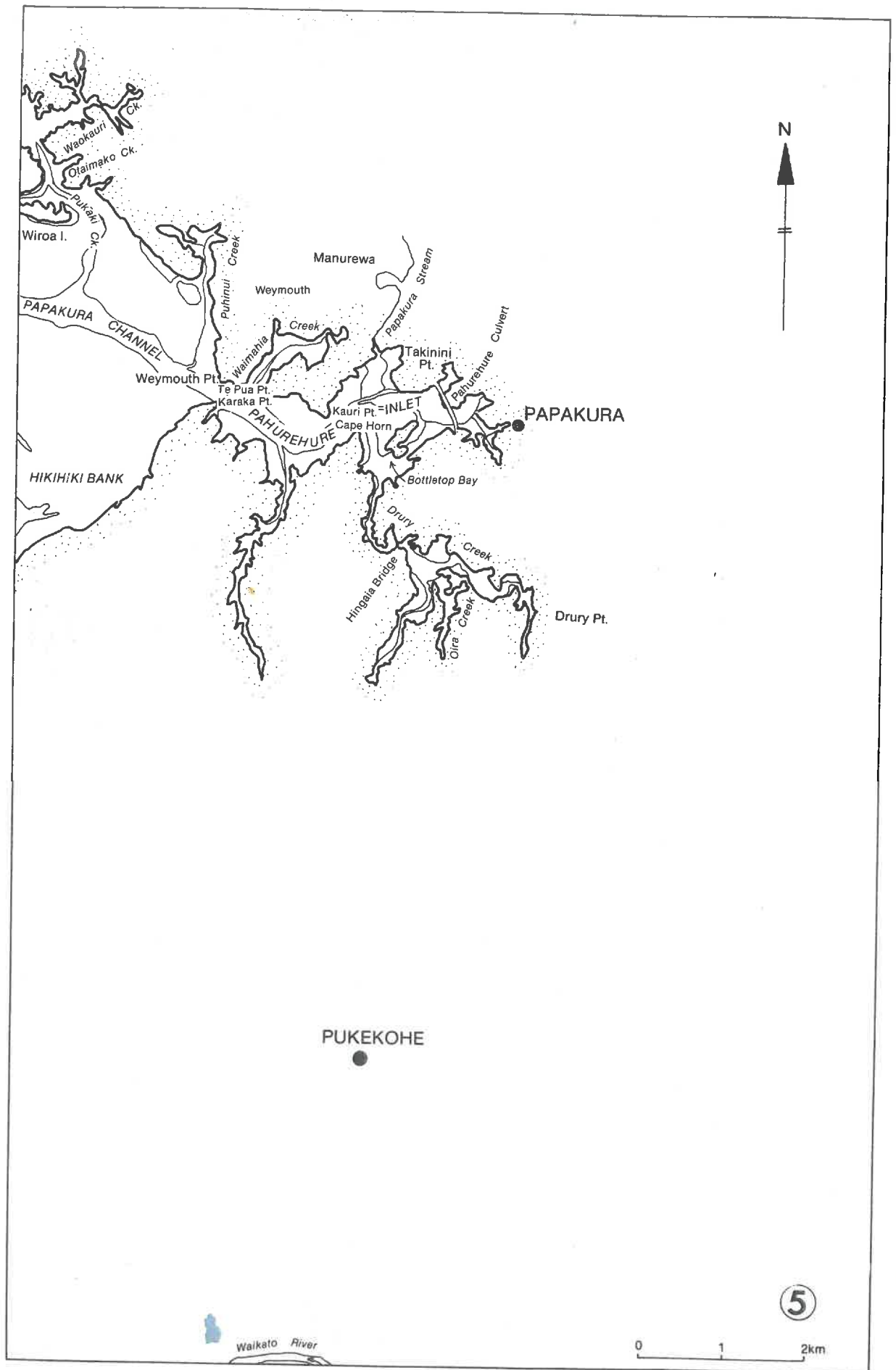
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Discusses tidal and meteorological factors contributing to higher than normal tides observed in the Kaipara and Manukau Harbours in July 1965.
- 2 AGNEW, R. 1973 : Coastal disturbances affecting the North Island of New Zealand. Paper presented to the Conference on Coastal Engineering, Sydney. May 1973.

Discusses sea level changes related to tsunami, meteorological and other causes.
- 3 ALEXANDER, W.G. 1947 : The effects of the Upper Auckland Harbour reclamation scheme on the depths in Rangitoto Channel by means of a working tidal model. Unpublished M.E. thesis, University of Auckland.

Discussion, analysis and results of tidal model experiments undertaken to determine the effect of reclamation on currents and siltation in the Rangitoto channel. Float tests and sediment movement simulations were carried out. Contains photos, tidal records, maps and model design.
- 4 ANDERSON, F.W.; GRANGE, K.R. 1976 : Bibliography of scientific studies of Manukau Harbour, Auckland. *Miscellaneous Publication N.Z. Oceanographic Institute* 74 : 16 p.

Includes references relating to the harbour itself as well as its catchment and surrounding open coast.
- 5 APPLIED GEOLOGY ASSOCIATES, 1980 : Preliminary report on the foreshore and nearshore sand and shingle resources of the Auckland region. Report prepared for the Auckland Regional Authority, Auckland. March 1980. 18 p.

A brief summary of existing information covering the geology, sediment source and transport, and history of coastal sand and shingle extraction in the Auckland area.
- 6 APPLIED GEOLOGY ASSOCIATES, 1982 : Coastal sand and shingle resources of Auckland and Northland. Report prepared for the Auckland Regional Authority, Auckland. April 1982. 115 p. + appendices + maps.

Summarises regional geology, nature and source of coastal sediments and shoreline sensitivity. The availability, nature and industrial use of sediments and minerals is described and the effects of exploitation assessed. Minor reference to the Waitemata and Manukau Harbours.
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reports and plans re Whau and Tamaki routes. Wilson and Horton Ltd, Auckland. 55 p.

- 8 AUCKLAND HARBOUR BOARD, 1963 : Manukau Harbour entrance. Surveys of bar. 1844-1961. Drawing A680/1 of 5 December 1963.
- 9 AUCKLAND HARBOUR BOARD, 1964 : Bathymetry of Waiuku River - the Needles to Waiuku (soundings and prickings). Drawing Z11/44A of February 1964. Scale 1 inch = 400 feet.
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Includes data on sedimentation and drift for 1961 and 1963 and climatic and wave data.
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- 14 AUCKLAND HARBOUR BOARD, 1967 : Free float (tidal current) observations - Tamaki River. Drawing HT 2/1 1967. Scale 1 inch = 5 chain.
- 15 AUCKLAND HARBOUR BOARD, 1967 : Onehunga east of Mangere Bridge (Bathymetry), Outboard Boating Club reclamation : siltation survey. Drawing H5/6a. Scale 1 inch = 100 feet.
- 16 AUCKLAND HARBOUR BOARD, 1968 : Bathymetry of Tamaki River - Half Moon Bay to Panmure Bridge. Drawing H2/12 of March 1968. Scale 1:4800.
- 17 AUCKLAND HARBOUR BOARD, 1968 : Bathymetry of Tamaki River - Brown's Island to Half Moon Bay. Drawing H2/13 of April 1968. Scale 1:4800.
- 18 AUCKLAND HARBOUR BOARD, 1969 : Bathymetry of Tamaki River - Otara Creek to Southern Motorway Bridge. Drawings H2/13 A and B of 18 November 1969. Scale 1 inch = 200 feet.
- 19 AUCKLAND HARBOUR BOARD, 1970 : Bathymetry of Whau River. Sheet 1 - Whau Motorway Bridge to Roberts Rd; Sheet 2 - Roberts Rd to Avondale Rd; Sheet 3 - Avondale Rd to Canal Rd. Drawings H4/9 of April 1970. Scale 1 inch = 200 feet.
- 20 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Tidal stream observations in the vicinity of Puketutu Island. Drawings HT 5/1/1 - HT 5/1/7 of 7 December 1970. Scale 1:18000.

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 - 22 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Tidal stream observations (Purakau Channel to White Bluff). Drawing HT 5/1/2 of 7 December 1970. Scale 1:18000.
 - 23 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Tidal stream observations (Puketutu Island to White Bluff). Drawing HT 5/1/3 of 7 December 1970. Scale 1:18000.
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 - 26 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Tidal stream observations (Puketutu Island to Purakau Channel). Drawing HT 5/1/6 of 7 December 1970. Scale 1:18000.
 - 27 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Tidal stream observations (Puketutu Island to Mangere Inlet). Drawing HT 5/1/7 of 7 December 1970. Scale 1:18000.
 - 28 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Puketutu Island area. Estimated tidal stream pattern at half ebb tide. Drawing HT 5/1/8 of 14 December 1970. Scale 1:18000.
 - 29 AUCKLAND HARBOUR BOARD, 1970 : Manukau Harbour. Puketutu Island area. Estimated tidal stream pattern at half flood tide. Drawing HT 5/1/9 of 14 December 1970. Scale 1:18000.
 - 30 AUCKLAND HARBOUR BOARD, 1970 : Datum Transfer Admiralty Method. West Tamaki Beacon. Drawing HT 2/5 of April 1971.
 - 31 AUCKLAND HARBOUR BOARD, 1971 : Waitemata Upper Harbour. Tidal stream observations (Whau Inlet to Kauri Point). Drawing HT 4/2/1 of 25 August 1971. Scale 1 inch = 400 feet.
 - 32 AUCKLAND HARBOUR BOARD, 1971 : Waitemata Upper Harbour. Tidal stream observations (Whau Inlet to Kauri Point). Drawing HT 4/2/2 of 26 August 1971. Scale 1 inch = 400 feet.
 - 33 AUCKLAND HARBOUR BOARD, 1971 : Waitemata Upper Harbour. Tidal stream observations (Kauri Point). Drawing HT 4/2/3 of 4 November 1971. Scale 1 inch = 400 feet.
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- 39 AUCKLAND HARBOUR BOARD, 1972 : Bathymetry of Upper Waitemata Harbour, northern area. Drawing H 4/17/1 of 15 June 1972. Scale 1:5000.
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- 44 AUCKLAND HARBOUR BOARD, 1972 : Waitemata Upper Harbour. Tidal stream observations (Island Bay to Kauri Point). Drawing HT 4/3/2 of 4 February 1972. Scale 1 inch = 400 feet.
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- 46 AUCKLAND HARBOUR BOARD, 1972 : Waitemata Upper Harbour. Tidal stream observations (Kauri Point to Wynyard Wharf). Drawing HT 4/4/2 of 4 February 1972. Scale 1 inch = 400 feet.

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- 47 AUCKLAND HARBOUR BOARD, 1972 : Waitemata Upper Harbour. Tidal stream observations (Whau Inlet to Meola Reef). Drawing HT 4/5 of 3 February 1972. Scale 1 inch = 400 feet.
 - 48 AUCKLAND HARBOUR BOARD, 1973 : Bathymetry of Fergusson Wharf to West Bastion Reef. Drawing H 1/37 of February 1973. Scale 1:5000.
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Discusses past reclamations in the Waitemata Harbour, their advantages, disadvantages and implications for future use. Contains maps of areas reclaimed.
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 - 57 AUCKLAND HARBOUR BOARD, 1973 : Tidal volumetric gauging at Waterview Motorway Bridge - Spring ebb flow, 22 March 1973. Data held by Auckland Harbour Board.
 - 58 AUCKLAND HARBOUR BOARD, 1974 : Bathymetry of Rangitoto Channel. Drawing H 1/40 of February 1974. Scale 1:5000.
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 - 60 AUCKLAND HARBOUR BOARD, 1974 : Bathymetry of Mangere Bridge to White Bluffs. Drawing H 5/15 of 19 September 1974. Scale 1:5000.
 - 61 AUCKLAND HARBOUR BOARD, 1974 : Chart of abnormal high tides recorded at Auckland, Waitemata Harbour during the period 1925 - 1973.

Drawing S 90/24 of 25 January 1974.

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- 66 AUCKLAND HARBOUR BOARD, 1975 : Bathymetry of Henderson Creek. Drawing H 4/23 of November 1975. Scale 1:5000.
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- Contains a brief review of hydrography, tidal currents and streams and sedimentation within the basin.
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- Small report on the likely effects on sedimentation and hydraulics within the proposed development areas of the Boatharbour. Geology, topography and hydrography are discussed in terms of dredging and future changes.
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- Contains some comment on water quality and its relation to pollution, siltation, scouring, tidal fluctuation and wave action. Also mentions hydrology and ecology generally.
- 70 AUCKLAND HARBOUR BOARD, 1978 : Current velocity and water slope measurements made in the vicinity of Mangere Bridge and White Bluffs in 1978. Data held by Auckland Harbour Board.
- 71 AUCKLAND HARBOUR BOARD, 1978 : Manukau Harbour Plan. Part 1 Policy (104 p.) and Part 2 Supplementary papers (244 p. + appendix). Report compiled by Auckland Harbour Board and Auckland Regional Authority study group with contributions by various authors.
- Part 2 includes a paper reviewing the hydrology of the Manukau and Waitemata Harbours including changes in the bars at the entrance to the Manukau Harbour, and a brief review

of mineral resources of the Manukau Harbour.

- 72 AUCKLAND HARBOUR BOARD, 1978 : Waitemata Upper Harbour. Tidal stream observations (Meola Reef to Watchman's Island). Drawing HT 4/4/3 of 23 May 1978. Scale 1 inch = 400 feet.
- 73 AUCKLAND HARBOUR BOARD, 1978 : Tidal volumetric gauging at Mangere Bridge - Spring ebb flow 19 June 1978. Data held by Auckland Harbour Board.
- 74 AUCKLAND HARBOUR BOARD, 1979 : Entrance to Pahurehure Inlet, Manukau Harbour (Cross section and Datum transfer). Drawing HT 5/3 of 11 January 1979.
- 75 AUCKLAND HARBOUR BOARD, 1979 : Statement of intent and discussion of environmental effects - Westhaven Boatharbour Development. Prepared for Commission for the Environment, Wellington. 15 p. + appendices.
- Some discussion of aspects of reclamation proposals and dredging effects on water quality, ecology, and hydraulics.
- 76 AUCKLAND HARBOUR BOARD, 1979 : Survey details of Whau Approaches Channel cooling water outlet site. Drawings H 4/29 and HT 4/11 of 15 August 1979.
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- 78 AUCKLAND HARBOUR BOARD, 1979 : Whau River Approaches. Tidal stream observations (Whau Inlet to Birkenhead Wharf). Drawing HT 4/10 of 18 January 1979. Scale 1 inch = 400 feet.
- 79 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Tamaki River - Brown's Island to Panmure Bridge. Drawing H 2/27 of June 1981. Scale 1:10000.
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- 81 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Wairopa Channel - East of 41 Buoy. Drawing H 5/28, Sheet 2 of March 1981. Scale 1:1000.
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- 83 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Papakura Channel - vicinity of Pukaki Creek. Drawing H 5/32 of January 1981. Scale 1:5000.
- 84 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Papakura Channel. Drawing H 5/33 of January 1981. Scale 1:25000.
- 85 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Wairopa Channel - Puponga

Point to Taumatarea Point. Drawing H 5/34 of January 1981. Scale 1:10000.

- 86 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Wairopa Channel - Tokoroa Point to Blockhouse Bay. Drawing H 5/35 of January 1981. Scale 1:10000.
- 87 AUCKLAND HARBOUR BOARD, 1981 : Bathymetry of Wairopa Channel - Cape Horn to White Bluff and part Purakau Channel. Drawing H 5/36 of January 1981. Scale 1:5000.
- 88 AUCKLAND HARBOUR BOARD, 1983 : Bathymetry of channel to Henderson Creek. Drawing H 4/42 of August 1983. Scale 1:5000.
- 89 AUCKLAND HARBOUR BOARD, 1983 : Bathymetry of Soldiers Bay to Greenhithe Bridge. Drawing H 4/43. Scale 1:5000.
- 90 AUCKLAND HARBOUR BOARD, 1983 : Bathymetry of Huia Banks. Drawing H 5/37/1 of May 1983. Scale 1:10000.
- 91 AUCKLAND HARBOUR BOARD, 1983 : Bathymetry of entrance to Wairopa Channel. Drawing H 5/41A of May 1983. Scale 1:5000.
- 92 AUCKLAND HARBOUR BOARD, 1983 : Bathymetry : Enlargements to previous surveys of Wairopa Channel. Drawing H 5/41/B of May 1983. Scale 1:5000.
- 93 AUCKLAND HARBOUR BOARD, 1983 : Bathymetry of Waiuku River - Compiled from Z 11/44 A, B and C. Drawing H 5/42. Scale 1:15000.
- 94 AUCKLAND HARBOUR BOARD, AUCKLAND REGIONAL AUTHORITY, 1975 : Waitemata Harbour Plan. Auckland Harbour Board, Auckland Regional Authority, Auckland. 104 p.

Explains the planning responsibilities and process and the use and development of the harbour. Contains maps and a review of reclamations.
- 95 AUCKLAND REGIONAL AUTHORITY : Daily water temperature records from Mangere Bridge 1960 - present. Data held by Works Division, Auckland Regional Authority, Auckland.
- 96 AUCKLAND REGIONAL AUTHORITY, 1970 : Preliminary report on the Waitemata Harbour. Auckland Regional Authority, Auckland.

Discusses the need for detailed surveys for future use and development of space within the harbour. Surveys covering hydrology, ecology and scenic amenity aspects are recommended.
- 97 AUCKLAND REGIONAL AUTHORITY, 1972 : Investigation of dispersion of effluent from Manukau Treatment Works. Internal Report, Works Division, Auckland Regional Authority, Auckland. 20 March 1972.

Results and discussions of several investigations of discharges of effluent. Radio-isotope tracers, floats and

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water sampling were used to indicate movement and dilution of effluent discharges of the north-west and south-west outlets. Results include coliform counts, salinity readings, phytoplankton numbers, depth and temperature recordings, tidal flow patterns and cross sections of effluent concentration. Water quality standards are discussed. Description and aerial photographs of algae concentrations.

- 98 AUCKLAND REGIONAL AUTHORITY, 1974 : Waitemata Harbour Study - Water quality survey. Report prepared by Works Division, for the Waitemata Harbour Study, Auckland Harbour Board, Auckland Regional Authority, Auckland. April 1974. 114 p.

Describes present and future problems of development on water quality. Data on leachates from rubbish tips and their effect on water quality are discussed in some detail. Includes maps, tables and diagrams.

- 99 AUCKLAND REGIONAL AUTHORITY, 1980 : Upper Waitemata Harbour Catchment Study - estuarine hydrology and sedimentology. Parts A, B and C. Working Report No. 8, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

Part A - see Williams, B.L. (1980).
Part B - outlines numerical methods and water quality and hydraulic models as applied to the Upper Waitemata Harbour estuarine system. Looks at progress and future proposals of these models. Appendices of model mathematical analyses. Models application to Lucas Creek are discussed.
Part C - looks at sediment sources, distribution, rates, character, texture and chemistry related mainly to Lucas and Hellyers Creeks. Contains maps of sediment characteristics.

- 100 AUCKLAND REGIONAL AUTHORITY, 1981 : Upper Waitemata Harbour Catchment Study - Hydrology of the catchment. Parts A, B and C. Working Report No. 26, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

Looks at hydrological effects of urbanisation, hydrology of the catchment and freshwater inflow into the Upper Harbour. Contains data on river gaugings, rainfall characteristics, flood peak estimates and freshwater inflows from tributaries, e.g., Lucas Creek.

- 101 AUCKLAND REGIONAL AUTHORITY, 1982 : Student Projects Vol. 2 - Parts A, B, C and D. Working Report No. 35, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

Reports on effects of industry, cowsheds and horticulture in the area effecting the catchment water quality. Swamps role as a pollutant filter is discussed. Graphs, tables and maps.

- 102 AUCKLAND REGIONAL AUTHORITY, 1982 : Treatment plant performance data. Reports from Auckland Regional Authority Research Advisory Sub-

committee, Auckland. pp. 98-106.

Contains data on average flows, BODs, coliform readings, residues, pH and organic nutrients of the Manukau and other treatment plants over 1981/82.

- 103 AUCKLAND REGIONAL AUTHORITY, 1983 : Review - Sediments of the Upper Waitemata Harbour. Upper Waitemata Harbour Catchment Study, Auckland Regional Water Board. 20 p.
- General review of estuarine sedimentology and environmental impact of future catchment change on the estuary. Aspects of sediment texture, erosion, accretion, stability and nutrients are reviewed. Trace elements and pollutants also discussed.
- 104 AUCKLAND REGIONAL AUTHORITY, 1983 : Review - Tidal flushing in the Upper Waitemata Harbour. Upper Waitemata Harbour Catchment Study, Auckland Regional Water Board, Auckland. 19 p.
- Reviews the hydrology and outlines in general terms a volume exchange model and a nutrient concentration model. Discussion includes dispersion of accidental spills, management of outfalls and nutrient trophic status.
- 105 AUCKLAND REGIONAL AUTHORITY; AUCKLAND HARBOUR BOARD, 1972 : Water quality standards applicable to the Waitemata Harbour. Report prepared for Waitemata Harbour Study by Civil Engineering Department, University of Auckland.
- Discusses water quality standards overseas and their application to Waitemata Harbour. Standards on temperature limits, coliform counts, salinity readings, nutrient and bacteria are mentioned. Standards for water use are also discussed.
- 106 AUCKLAND REGIONAL WATER BOARD, 1976 : Baseline data on water quality in the Auckland water region obtained in 1975 and 1976. Technical Publication No. 1. Auckland Regional Water Board, Auckland Regional Authority, Auckland. 84 p.
- Includes listings of field measurements of various water quality parameters including temperature, salinity, turbidity, DOs, BODs, chlorine readings, pH and coliforms for coastal areas in the Auckland water region. Also contains maps showing the classification proposed for, and that attained, at localities tested for water quality.
- 107 AUCKLAND REGIONAL WATER BOARD, 1977 : Baseline data on water quality in the Auckland water region obtained in 1976 and 1977. Volume II. Technical Publication No. 2. Auckland Regional Water Board, Auckland Regional Authority, Auckland. 55 p.
- As for Auckland Regional Water Board, 1976.
- 108 AUCKLAND REGIONAL WATER BOARD, 1978 : Preliminary study of twelve

localities subject to environmental pressure. Technical Publication No. 5. Auckland Regional Water Board, Auckland Regional Authority, Auckland.

This preliminary report covers a range of water body types and presents the existing water quality data for the areas studied. These areas include Hobson Bay, Blockhouse Bay, Point Chevalier, the Tamaki and Waiuku estuaries, the Whau River and the Upper Waitemata Harbour catchment. It also discusses the relationship between land use, hydrology, water quality and sources of pollution.

- 109 AUCKLAND REGIONAL WATER BOARD, 1979 : Regional water and soil resources survey. Volume 1 - Statement of water and soil resources for the Auckland water region. Technical Publication No. 13. Auckland Regional Water Board, Auckland Regional Authority, Auckland. October 1979. 137 p.

Includes a two page listing of tidal gaugings undertaken in the Auckland area. Appendices of meteorological, tidal, groundwater, and river gauging data. Some discussion of regional water quality.

- 110 AUCKLAND REGIONAL WATER BOARD, 1982 : Baseline data on water quality in the Auckland water region obtained from 1977-1981. Technical Publication No. 22. Auckland Regional Water Board, Auckland Regional Authority, Auckland. May 1982. 281 p.

Discusses methods used in the calculation of water quality index values and procedures for estimating long term water quality trends. Sites of fresh and saline long term water quality record are described and the monthly data collected between 1977-1981 are presented. Parameters include tidal times and heights, flow rates, dissolved oxygen, salinity, temperature, pH, BOD, turbidity and nutrients.

- 111 BARTER, T.P. 1976 : The Kaihu Group (Plio-Quaternary) of the Awhitu Peninsula, Southwest Auckland. Unpublished Ph.D. thesis, University of Auckland. 299 p.

Gives an account of the physiography and structure of Awhitu Peninsula, and describes the mineralogy provenance, sedimentology, palaeontology and post-depositional alteration of the Plio-Quaternary (Kaihu Group) sediments on the peninsula.

- 112 BARTRUM, J.A. 1917 : Concretions in the recent sediments of the Auckland Harbour, New Zealand. *Transactions and Proceedings of the N.Z. Institute* 49 : 425-428.

Describes the composition and formation of calcium carbonate concentrations which contain quartz and glauconite and recent diatoms, foraminifera and molluscs dredged up from St Georges Bay (since reclaimed), Auckland Harbour. Also mentions their origin and precipitation of calcium carbonate.

- 113 BECA CARTER HOLLINGS AND FERNER LTD, 1975 : Environmental impact report on Pikes Point East reclamation. Report prepared for Auckland Regional Authority and N.Z. Railways, December 1975. Various pagings.

Includes a report by biological consultants which discusses the present condition of sediments in Mangere Inlet and the likely effects that reclamation would have on sedimentation and tidal flows.

- 114 BECA CARTER HOLLINGS AND FERNER LTD, 1980 : Kingseat Hospital. Sewage treatment plant effluent monitoring report. Report prepared for Auckland Regional Water Board. 8 p. + appendix.

Describes monitoring of total coliform, faecal coliform, total phosphorus, total kjeldahl nitrogen, BOD, chloride and DO in the tidal Whatapaka Inlet (Clarks Creek) as part of sewage outfall investigations for the Kingseat Hospital.

- 115 BELL, W.L. 1950 : Sand and shingle in Auckland and Coromandel areas (Rabone Report). Unpublished internal report, Auckland District Office, Ministry of Works and Development. November 1950. (File 12/243). 29 p.

A visual assessment of the composition and state of beaches on the east coast of Northland, Auckland and Coromandel and the shores of the Manukau Harbour.

- 116 BIORESEARCHES LTD, 1976 : Aspects of the geology and water quality of Orakei Basin. Report for the Auckland City Council. 13 p.

Nutrients measured on one occasion.

- 117 BIORESEARCHES LTD, 1976 : The ecological impact of the proposed development of Auckland Thermal No. 1 at Waiiau Pa. Report (152 p.) and supplementary report (122 p.) prepared for N.Z. Electricity Department, (now Electricity Division, Ministry of Energy), Wellington.

Data on harbour surface temperature, salinity, dissolved oxygen, surficial sediment texture and reclamations.

- 118 BIORESEARCHES LTD, 1977 : Aspects of the ecology of the Waiuku River in the vicinity of the N.Z. Steel Mill at Glenbrook. Report for N.Z. Steel Ltd. 23 p.

Heavy metal content of sediments recorded.

- 119 BIORESEARCHES LTD, 1977 : The bacterial content of waters at Half Moon Bay. Combination of two reports for Broadlands Ltd. 11 p.

Data on surface temperature, salinity and dissolved oxygen.

- 120 BIORESEARCHES LTD, 1978 : The impact of the proposed West Harbour marina on the marine ecosystem. Report prepared for Bruce

Wallace and Partners. 17 p.

Data on suspended solids, salinity, temperature, dissolved oxygen, pH, BOD, nutrients and bacteria (Waitemata Harbour).

- 121 BIORESEARCHES LTD, 1978 : Preliminary report on nutrient investigations in Orakei Basin. Report prepared for the Auckland City Council. 17 p.

Nutrient measurements over 12 month period.

- 122 BIORESEARCHES LTD, 1979 : Investigations on the access channel to the proposed Herald Island marina. Report prepared for Sinclair-Johns Consultants. May 1979. 10 p.

Comments on hydrography, sedimentation and tidal circulation in the vicinity of Herald Island.

- 123 BIORESEARCHES LTD, 1979 : Pahurehure Inlet - Water quality and plankton data, 1978/79. Prepared for Ministry of Energy, Electricity Division, Wellington. Technical Bulletin No. 001, 1981. 52 p.

Salinity, temperature, BOD, DO, suspended solids, and nutrient data all presented on annual and diurnal graphs. No discussion of data.

- 124 BIORESEARCHES LTD, 1979 : Mangere Inlet - Water quality and plankton data, 1978/1979. Prepared for Ministry of Energy, Electricity Division, Wellington. Technical Bulletin No. 002, 1981. 172 p.

As for Bioreseraches Ltd, 1979 - Pahurehure Inlet.

- 125 BIORESEARCHES LTD, 1979 : Puketutu Island - Water quality and plankton data, 1978/1979. Prepared for Ministry of Energy, Electricity Division, Wellington. Technical Bulletin No. 003, 1981. 92 p.

As for Bioreseraches Ltd, 1979 - Pahurehure Inlet.

- 126 BIORESEARCHES LTD, 1979 : Tamaki River - Water quality and plankton data, 1978/1979. Prepared for Ministry of Energy, Electricity Division, Wellington. Technical Bulletin No. 004, 1981. 74 p.

As for Bioreseraches Ltd, 1979 - Pahurehure Inlet.

- 127 BIORESEARCHES LTD, 1979 : Whau Creek-Te Atatu - Water quality and plankton data, 1978/1979. Prepared for Ministry of Energy, Electricity Division, Wellington. Technical Bulletin No. 005, 1981. 168 p.

As for Bioreseraches Ltd, 1979 - Pahurehure Inlet.

- 128 BIORESEARCHES LTD, 1980 : Proposed expansion of existing iron and steel production facilities at N.Z. Steel Ltd. Report for N.Z. Steel Ltd. 123 p.

Tidal range and currents (drogues and dyes) measured. Data

includes temperature, salinity, dissolved oxygen, nutrients, chlorophyll-a, bacteria, suspended solids and secchi depth.

- 129 BIORESEARCHES LTD, 1981 : The benthic biota and sediments of the Upper Waitemata Harbour. Working Report No. 27, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

The data provide an indication of the association of benthic communities with sediment type and association of grain sizes with organic content.

- 130 BIORESEARCHES LTD, 1981 : The ecological impact of the proposed LPG terminal in the Manukau Harbour. Prepared for Liquigas Ltd. September 1981. 88 p.

Marine biota and sediments are described. Water quality data collected during both high and low water are presented, together with results of chemical analyses of sediments in the area of the proposed works. The utilisation of the area by wading birds is also discussed. The effects of sediment disturbance and effects of spillage on marine habitats are reviewed.

- 131 BOTHAM, L. 1983 : The Upper Waitemata Harbour Catchment Study. WASCO 36. Published for the National Water and Soil Conservation Organisation by the Water and Soil Division, Ministry of Works and Development, Wellington. 15 p.

A brochure outlining the scope and content of the Upper Waitemata Harbour Catchment Study.

- 132 BREHMER, K.O.H. 1976 : Planning for marinas in the context of district schemes with particular reference to Hauraki Gulf coast of Manukau City. Unpublished dissertation, Diploma of Town Planning, University of Auckland.

Outlines and discusses the legalities and history of proposed marinas at Half Moon Bay and Ngataringa Bay. Looks at alternative sites for marinas near the Tamaki River and in the Manukau Harbour. Contains photos before and after reclamations.

- 133 BRIGGS, I. 1982 : Assessment of the current trophic status of the Upper Waitemata Harbour. Working Report No. 33, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority.

Assesses the effects of tides, rivers and sediments on the microbiology in the harbour. Looks at trends down the harbour in nutrients, productivity, population numbers and biological activity.

- 134 BRITISH ADMIRALTY, 1854 : Waitemata River, North Island, New Zealand. 1:20,800. Chart surveyed by Commander B. Drury in 1854. British Admiralty, London.

Chart of Waitemata Harbour from Kauri Point to upper reaches

of Waitemata at Riverhead.

- 135 BRITISH ADMIRALTY, 1860 : Manukau Harbour. West Coast, North Island, New Zealand. 1:48,600. Chart surveyed by Commander B. Drury in 1853. British Admiralty, London.

Chart of Manukau Harbour and entrance.

- 136 BRITISH ADMIRALTY, 1935 : Manukau Harbour to Cape Egmont. 1:288,000, Waikato River and Aotea Harbour 1:36,500. Mokau River 1:24,300. Chart BA 2535. British Admiralty, London.

- 137 BRODIE, J.W. 1960 : Coastal surface currents around New Zealand. *N.Z. Journal of Geology and Geophysics* 3: 235-252.

Reports results of drift card experiments.

- 138 BROWN, R.M. 1969 : Molluscan survey of the Tamaki River, Waitemata Harbour, Auckland, August, 1968, at the site of the Otara Gas Turbine Power Station. Fisheries Technical Report 37. N.Z. Department of Scientific and Industrial Research, Wellington. 24 p.

Reports the likely effects of effluent cooling waters on estuarine molluscs. Some sediment data.

- 139 BRUCE WALLACE AND PARTNERS, 1973 : Report on the development of Pahurehure Inlet. Prepared for Papakura Borough Council, Auckland. 1973.

Discusses the present situation of the Pahurehure Inlet. Looks at reclamation and development proposals with reference to the effects on siltation and ecology.

- 140 BRUCE WALLACE AND PARTNERS, 1974 : Wakaaranga Creek Development : Environmental impact report. Report prepared for Manukau City Council, Auckland. Various pagings and illustrations and maps.

Wakaaranga Creek is a tidal inlet branching from Tamaki Inlet. The report includes a summary of tide levels for the area and a short appraisal of the effects on sedimentation if a tidal weir is constructed across the mouth of the creek.

- 141 BRUCE WALLACE AND PARTNERS, 1977 : Half Moon Bay Marina Ltd. Proposed extension to Half Moon Bay Marina : Environmental impact report. Report prepared for Half Moon Bay Marina Ltd. November 1977. 31 p. + appendices.

Contains several consultants reports as appendices describing water quality and sedimentation rates in the marina, wave climate of the area and the likely effect of marina extensions on the hydrology and sedimentation in the surrounding area.

- 142 BRUCE WALLACE AND PARTNERS, 1978 : City of Waitemata - Proposed marina

at West Harbour. Environmental impact assessment. Report prepared for City of Waitemata. September 1978. 19 p. + appendices.

Discusses hydrographic and water quality aspects of the existing (1978) and proposed changes in the environment around Herald Island. Siltation, tidal currents, wave action and freshwater drainage are discussed. Reports by A.J. Raudkivi and Bioreserches Ltd on hydrology and ecology respectively.

- 143 CAMPBELL, D.G. 1974 : Numerical simulation of pollution problems in rivers and estuaries. Unpublished Ph.D. thesis lodged in the Library, University of Auckland, New Zealand.

Develops a procedure for simulating two-dimensional tidal flow in a well-mixed estuary as well as predicting heat loss from the Waikato River using meteorological data. Combining the two numerical methods yields a suitable tool for water quality simulation in the shallow Auckland estuaries - Waitemata Harbour and Mangere Basin.

- 144 CAMPBELL, G.H.; MANN, B.; MUIR, M. 1982 : The natural environment of the Auckland Region : A bibliography and inventory. Published by the Environmental Auckland Region Organisation in association with the Auckland Regional Authority, Planning Department, Auckland. 470 p.

An annotated bibliography of published and unpublished material, a summary of current research, an inventory and maps 1:125,000.

- 145 CARRIG, J.A.; SPENCE, R.M. 1977 : Coastal planning in New Zealand. A preliminary bibliography to 1975. Ministry of Works and Development Library. 36 p.

References relevant to the general field of coastal planning in New Zealand specific related issues. Includes references to planning for lakes.

- 146 CARTER, L.; EADE, J.V. 1980 : Hauraki Sediments. *N.Z. Oceanographic Institute Chart, Coastal Series* 1:200,000.

- 147 CASSIE, R.M.; MICHAEL, A.D. 1968 : Fauna and sediments of an intertidal mudflat, multivariate analysis. *Journal of Experimental Marine and Biological Ecology* 2 : 1-23.

Discussion and results of 40 faunal quadrats taken at Karore Bank, 21 of which were analysed for grain size. Invertebrate species also studied and communities are correlated with sediment type and position.

- 148 CHAPMAN, V.J.; LARCOMBE, M.F. 1974 : Ecological report on the Hobson Bay region. Addendum to ecological report on the Waitemata Harbour. Auckland Regional Authority, Auckland Harbour Board, Auckland. 38 p.

Some general discussion of sediments.

- 149 CHAPMAN, V.J.; RONALDSON, J.W. 1958 : The mangrove and salt-marsh flats of the Auckland Isthmus. *Bulletin N.Z. Department of Scientific and Industrial Research* 125 : 79 p.

Describes the swamp vegetation and mangrove formations around the Auckland region. Looks at succession, geology and the soils around Manukau and Waitemata. Soils at Mangere, Pollen Island and Hobson Bay, are analysed in detail.

- 150 COCHRANE, G.R.; MALE, A.G.R. 1977 : Regional and seasonal patterns of stream sediment discharges along New Zealand coasts from Skylab and Landsat satellite imagery. *Proceedings of the N.Z. Ecological Society* 24 : 13-20.

Includes comment on circulation of the Manukau Harbour and Hauraki Gulf regions.

- 151 COMMISSION FOR THE ENVIRONMENT, 1973 : Bledisloe and Kings Wharves redevelopment scheme : Environmental impact audit. Commission for the Environment, Wellington. November 1973.

Short paragraphs outlining the problems of water pollution from reclamation, sewage reticulation and siting are discussed. Also a paragraph on possible beach instability from dredging and reclamation. Appendices of submissions assessing the report.

- 152 COMMISSION FOR THE ENVIRONMENT, 1974 : Hobson Bay marine park. Environmental impact audit. Commission for the Environment, Wellington. 10 p. + submissions (appendices).

Individual aspects of the scheme are reported. Concern is with the maintenance of new beaches, prevention of sedimentation and preservation of the ecology.

- 153 COMMISSION FOR THE ENVIRONMENT, 1975 : Mount Roskill to Wiri Motorway, Onehunga Bay section : Environmental impact audit. Commission for the Environment, Wellington. 7 p. + submissions.

Includes comments on potential hydrological changes due to the proposed reclamation.

- 154 COMMISSION FOR THE ENVIRONMENT, 1975 : Ngataringa Bay Devon Isles development : Environmental impact audit. Commission for the Environment, Wellington. 25 p. + submissions.

Contains comments on the movement of sediment in the vicinity of the development.

- 155 COMMISSION FOR THE ENVIRONMENT, 1976 : Auckland Regional Authority and N.Z. Railways Pikes Point east reclamation : Environmental impact audit. Commission for the Environment, Wellington. 9 p. +

submissions.

Includes comment on possible effects of reclamation on sedimentation and water quality, and a summary of past reclamations in the inlet area.

- 156 COMMISSION FOR THE ENVIRONMENT, 1976 : Fergusson Wharf extension, stage 3 : Environmental impact audit. Commission for the Environment, Wellington. 23 p. + submissions.

Brief reference to effects of wharf extension with respect to hydraulics and reclamations.

- 157 COMMISSION FOR THE ENVIRONMENT, 1978 : Proposed extension to Half Moon Bay marina. Environmental impact audit prepared by Commission for the Environment, Wellington. 27 p. + submissions.

Discusses various recommendations, options, advantages and disadvantages of the proposed marina. Silting problems from construction, hydraulic effects and water quality are looked at generally. Consideration of a floating breakwater and its effects in the estuary are discussed in submissions.

- 158 CORNWELL, W.L. 1976 : Aggregate resources of the Auckland area. Report No. 2. Naturally occurring fine aggregate. Auckland Engineering Laboratory, Ministry of Works and Development. Report 76/9. 6 p. + appendices.

Notes on the origin, location and commercial use of east and west coast beach and harbour sands.

- 159 CORNWELL, W.L.; HIGH, R. 1975 : Investigations for a submarine tunnel beneath the Waitemata Harbour, Auckland, New Zealand. *2nd Australian-New Zealand Conference on Geomechanics Institution of Engineers, Australia*. National Conference Publication No. 75/4. pp. 218-222.

Reports results of seismic and drill hole surveys through recent unconsolidated and older indurated rocks.

- 160 DAVIE, LOVELL-SMITH AND PARTNERS, 1974 : Devon Isles - Ngataringa Bay : Environmental impact report. Report, commissioned by B.W. Robbins and Associates. Various pagings. 2 volumes with illustrations and maps. Includes bibliographies.

Contains a report by a consulting engineer describing tidal currents, siltation and flushing and the likely effects of the scheme on these parameters.

- 161 DAVIES, T.E. 1979 : Proposal for Hobson Bay. Unpublished dissertation, University of Auckland.

Discusses the recent history, existing conditions and proposals for restoration of the bay. Aspects of stormwater outfall and sewage systems, siltation and water quality are discussed.

- 162 DUNCAN, L. 1981 : Survey of water related recreation and environmental issues in the Upper Waitemata Harbour Catchment. Working Report No. 22, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority. 174 p.

Describes the recreational and environmental issues concerning the harbour waters, including water pollution problems and water recreation.

- 163 EADE, J.V. 1974 : Hauraki Bathymetry. *N.Z. Oceanographic Institute Chart, Coastal Series 1:200,000.*

- 164 ELDER, J.W. 1972 : Seiche activity in the Waitemata Harbour. Unpublished M.Sc thesis, University of Auckland.

Outlines the theory of water oscillations, and discusses oscillation measuring apparatus. Seiching in the harbour was analysed from past tide records and a computer simulation of a seiche. Contains numerical techniques and results.

- 165 ESLER, A.E. 1974 : Vegetation of the sand country bordering the Waitakere Range, Auckland : The southern beaches. *Proceedings of the New Zealand Ecological Society 21 : 72-77.*

Discusses lupin, marram and kikuyu species growing on sand country from Muriwai to Whatipu beach, mouth of the Manukau Harbour. Shows shoreline changes at Whatipu beach 1940-1973.

- 166 ESTCOURT, I.N. 1976 : Bibliography of scientific studies of New Zealand mainland estuaries, inlets, lagoons, harbours and fiords. *Miscellaneous Publication NZ Oceanographic Institute 75.* 40 p.

Lists published scientific work and some university theses, environmental impact reports and engineering reports.

- 167 FRASER THOMAS GUNMAN SHAW AND PARTNERS, 1979 : Foreshore protection, Conifer Grove, Takanini. Prepared for Conifer Grove Ltd, March 1977. 8 p. incl. photographs, maps and appendices.

- 168 FRASER THOMAS GUNMAN SHAW AND PARTNERS, 1981 : Report on stability of coastal gabion wall to Conifer Grove, Stages 9 and 10. Prepared for Conifer Grove Ltd, October 1981.

- 169 FURKETT, F.W. 1947 : Tidal compartments, their influence on dimensions of harbour entrance channels. *Proceedings of the N.Z. Institution of Engineers 33 : 195-211.*

Derives a relationship between the tidal compartment and the area of the entrance channel for estuaries including the Manukau and Waitemata Harbours.

- 170 GIBB, J.G. 1978 : Rates of coastal erosion and accretion in New Zealand. *N.Z. Journal of Marine and Freshwater Research 12 :*

429-456.

Includes rates of coastal erosion and accretion for the Manukau Barrier.

- 171 GOORD, D.L. 1972 : Preliminary report on harbour waters. Report prepared by the Engineers Department for the Waitemata Harbour Study, Auckland Harbour Board, Auckland Regional Authority, Auckland. February 1972. 18 p.

Discusses tides and tidal stream patterns of the Waitemata Harbour and their relevance to the functioning of the Port of Auckland.

- 172 GRANGE, K.R. 1977 : Littoral benthos - sediment relationships in Manukau Harbour, New Zealand. *N.Z. Journal of Marine and Freshwater Research* 11 : 111-123.

57 littoral situations were sampled in the Manukau Harbour for species composition, distribution, and abundance as part of a base-line ecological survey of the harbour. It was found that the community trophic structure is related to sediment grain size.

- 173 GRANGE, K.R. 1979 : Soft-bottom macrobenthic communities of Manukau Harbour, New Zealand. *N.Z. Journal of Marine and Freshwater Research* 13 : 315-329.

Classifies the dominant species into four benthic communities, separated by species composition, depth, sediment and possibly salinity.

- 174 GRANGE, K.R. 1982 : Macrobenthic communities at possible Combined-Cycle Power Station sites in Manukau and Waitemata Harbours, Auckland. *N.Z. Oceanographic Institute Oceanographic Summary* 19 : 20 p.

Five localities : Mangere Inlet, Puketutu, and Pahurehure Inlet in Manukau Harbour, and Whau Creek and Tamaki Inlet in Waitemata Harbour were sampled for soft bottom macrobenthos and sediments. Bio-communities are identified, ranked by species abundance and diversity. Susceptibility to biological disturbance of species is compared to assess the most acceptable cooling water option for each power station site.

- 175 GREGORY, M.R. 1978 : Accumulation and distribution of virgin plastic granules on New Zealand beaches. *N.Z. Journal of Marine and Freshwater Research* 12 : 399-414.

Describes how the imported feedstock of the local plastics industry finds its way into the marine environment from ships and wharves and how it is distributed by coastal currents and concentrates on beaches (includes Waitemata and Manukau Harbours and surrounds).

- 176 GREGORY, M.R. 1978 : The New Zealand shoreline and application of an oil spill vulnerability index. In "A minor oil spills workbook" (compiled by P. Hodder). Centre for Continuing Education, University of Waikato, Hamilton, and Commission for the Environment, Wellington. pp. 42-72.

Describes an oil spill vulnerability index for the New Zealand coast including the Waitemata and Manukau Harbours, developed on the basis of physical processes and shoreline characteristics, together with an understanding of the biological effects.

- 177 GREGORY, M.R.; THOMPSON, S. 1973 : A report on the geology of Auckland Harbour. Report prepared for the Waitemata Harbour Study, Auckland Harbour Board, Auckland Regional Authority, Auckland. 33 p.

Provides information on geologic structure and history, and geomorphology of the harbour.

- 178 GREIG, D.A. 1982 : Sediments and recent geological history of the Hauraki Gulf, Firth of Thames and Colville Channel, North Island, New Zealand. Unpublished M.Sc thesis, University of Auckland. 138 p.

Maps and description of sedimentology and recent history of the Hauraki Gulf, Firth of Thames and the Colville Channel. Includes bathymetry, sedimentary processes, sediment texture and facies descriptions.

- 179 HAMILL, P.F. 1979 : Beach sands of the Waitakere Ranges, Auckland West Coast. Unpublished M.Sc thesis, University of Auckland. 104 p. + appendices.

Investigates textural and compositional characteristics of beach sands between Muriwai and Whatipu. Trends in grain size and mineral content, together with a consideration of offshore water movements are used to develop a model for sediment sources and sinks and energy distribution along the coast.

- 180 HARRIS, T.F.W.; BARNETT, A.G. 1979 : Preliminary studies of Lucas Creek, Upper Waitemata Harbour Estuary. Unpublished internal report 79/4, Hamilton Science Centre (now named Water Quality Centre) Ministry of Works and Development. 22 p.

Assesses Lucas Creek for mathematical modelling. Data on salinity distribution, tidal excursion, maximum tidal velocities, residence times, conductivity, temperature and coefficient of dispersion. Contains maps and cross sections of the creek.

- 181 HARRISON AND GRIERSON AND PARTNERS, 1980 : Water and Soil Conservation Act 1967. Water Right Application : No. 2460. Report prepared for Franklin County Council. October 1980. 55 p.

Water right application to discharge treated domestic sewage effluent into the Drury Creek, Pahurehure Inlet. Contains measurements of tidal currents, tidal volume (at Hingaia Bridge) and dye dispersion in the upper part of the estuary.

- 182 HEATH, R.A. 1974 : Expected changes in harbour tidal parameters resulting from alterations to the harbours depth, length and energy dissipation. *N.Z. Institution of Engineers. Transactions (1) 3* : 177-187.

Discusses the relationship of tidal prism and area by means of a simple analytical model of a rectangular harbour. Effects of changing depth, length and amount of friction on tidal characteristics are analysed for particular harbours.

- 183 HEATH, R.A. 1975 : Stability of some New Zealand coastal inlets. *N.Z. Journal of Marine and Freshwater Research 9* : 449-457.

The relationship between tidal compartment and estuary cross sectional area ratio for 20 New Zealand estuaries (including the Manukau Harbour) is examined.

- 184 HEATH, R.A. 1976 : Broad classification of New Zealand coastal inlets with emphasis on residence times. *N.Z. Journal of Marine and Freshwater Research 10* : 429-444.

Includes data on physical dimensions, tidal compartments, freshwater inflows and residence times for the Manukau Harbour.

- 185 HEATH, R.A. 1976 : Estimates of the components of sea surface elevation contributing to the long term variation of mean sea level around New Zealand. *Journal of the Royal Society of New Zealand 6* : 95-105.

Estimates the relative contributions to the mean sea level from tides, atmospheric pressure, and oceanographic influences. Includes mathematical analysis and past records. Contains tables, maps and graphical data.

- 186 HEATH, R.A.; GREIG, M.J.N.; SHAKESPEARE, B.S. 1977 : Circulation and hydrology of Manukau Harbour. *N.Z. Journal of Marine and Freshwater Research 11 (3)* : 589-607.

Discusses temperature, salinity, circulation, entrance channel flow and stability, and residence time of water of the Manukau Harbour.

- 187 HENRIQUES, P.R. 1976 : Manukau Harbour ecology : preliminary investigations. Report to the Works Division, Auckland Regional Authority, Auckland. 112 p.

Deals with hydrology, geology, chemistry, sedimentology, water classification and biology of the harbour. Contains maps and references.

188 HENRIQUES, P.R. 1977 : Selected ecological aspects of the Manukau Harbour. Unpublished Ph.D. thesis, University of Auckland, New Zealand.

Investigates several ecological aspects of the Manukau Harbour related to its benthic flora and fauna, water chemistry, sedimentology and bacteriology.

189 HICKS, S.R. 1973 : An inshore seismic survey. Unpublished M.Sc. thesis, University of Auckland, New Zealand.

Presents results of a high-resolution marine seismic survey carried out in the Waitemata Harbour.

190 HICKS, S.R. 1975 : Seismic reflection profiling in the Rangitoto channel and the Tamaki Estuary. Geophysics Division Report 109. N.Z. Department of Scientific and Industrial Research. 11 p.

Results of shallow seismic reflection profiling surveys conducted in the Rangitoto Channel and Tamaki Inlet entrance of the Hauraki Gulf, to assist Auckland Harbour Board in planning dredging operations.

191 HICKS, S.R.; KIBBLEWHITE, A.C. 1976 : Seismic reflection profiling in very shallow waters in the Upper Waitemata Harbour, New Zealand. *N.Z. Journal of Geology and Geophysics* 19 (2) : 213-231.

This study demonstrates that seismic reflection profiling techniques can be effective for marine engineering in shallow water.

192 HOUNSELL, W.K. 1935 : Hydrographic observations in Auckland Harbour. *Transactions and Proceedings of the Royal Society of New Zealand* 64 : 257-274.

Defines the boundaries, dimensions and areas of the Auckland Harbour. Also gives information on tides, rainfall, temperature, barometric pressure, wind velocity, sewage disposal and pollution, and the chemical composition of the harbour water. Includes temperature data for other estuaries including Kaipara and Tamaki and the north-east open coast.

193 HUME, T.M. 1979 : Aspects of the hydrology of the Mangere Inlet - Waipara Channel area, northeast Manukau Harbour. Unpublished internal report, Water and Soil Division, Ministry of Works and Development, Auckland. December 1979. 62 p.

Description and results of field investigations including bathymetry, dye dispersal, tidal velocity and discharge, water temperature and salinity, and water tidal calculation.

194 HUME, T.M. 1979 : Auckland Combined Cycle Power Station Investigations - Model tests for siting marine cooling water intake and outlet structures in Onehunga Bay. Unpublished internal report, Water and Soil Division, Ministry of Works and Development, Auckland.

July 1979. 18 p.

A physical model of Onehunga Bay was used to assist in locating power station cooling water intake and outlet structures in Onehunga Bay.

- 195 HUME, T.M. 1979 : Tidal observations in Pahurehure Inlet, Manukau Harbour. Unpublished internal report, Water and Soil Division, Ministry of Works and Development, Auckland. June 1979. 16 p.

Reports on drogue current measurements and a tidal gauging carried out at the entrance to the inlet at Weymouth.

- 196 HUME, T.M. 1979 : Tidal observations in Tamaki Inlet, Waitemata Harbour. Unpublished internal report, Water and Soil Division, Ministry of Works and Development, Auckland. June 1979. 21 p.

Presents tide level, current velocity and discharge information and calculates tidal volumes for spring and neap tide situations at Old Panmure Bridge on the Tamaki Inlet.

- 197 HUME, T.M. 1980 : Index to published and unpublished hydrological data for selected areas of the Waitemata and Manukau Harbours, Auckland. Unpublished internal report, Water and Soil Division, Ministry of Works and Development, Auckland. September 1980. 13 p.

A bibliography listing data on bathymetry, tides, currents and water quality.

- 198 HUME, T.M. 1980 : Wave measurements in the southern Manukau Harbour. Unpublished internal report, Water and Soil Division, Ministry of Works and Development, Auckland. January 1980. 10 p.

Wave parameters were measured over the period June 1978 - March 1979 to establish the maximum wave.

- 199 HUME, T.M. 1983 : Sediments of the Upper Waitemata Harbour. Upper Waitemata Harbour Catchment Study Specialist Report, Auckland Regional Authority, Auckland. 95 p.

Describes surficial sediments, depositional history and sedimentary processes for the Upper Waitemata Harbour with emphasis on Lucas Creek. This information is compared with present day and historical data from other estuaries to predict sedimentological changes likely to result from catchment and estuary use change. These include changes in sediment character and rates of deposition, nutrient distribution, estuarine stability and the effects of engineering works.

- 200 HUME, T.M.; FRY, R.G. 1983 : Upper Waitemata Harbour Sediments : Baseline Studies. Unpublished internal report 83/023, Hamilton Science Centre, Ministry of Works and Development, Hamilton. 117 p.

Documents data collected during sedimentological studies undertaken in Lucas and Hellyers Creek estuaries as part of the Upper Waitemata Harbour Catchment Study. Estuarine morphology, bathymetry, surficial sediment texture, nutrients and clay mineralogy are discussed.

- 201 HUME, T.M.; HARRIS, T.F.W. 1981 : Bibliography of oceanography and sedimentology for the Northland-Auckland coast. *Water and Soil Miscellaneous Publication No. 28*. Ministry of Works and Development, Wellington. 63 p.

An annotated bibliography.

- 202 HUTCHINSON, E.G. 1978 : Manukau Harbour Surveys - Dispersion of effluent in the Manukau Harbour. Unpublished internal report, Works Division, Auckland Regional Authority, Auckland.

Traces effluent discharge across the north-western and north-eastern sections of the Manukau Harbour. Parameters measured include faecal coliforms, total coliforms, turbidity, DO, wind, air temperature, pH and chloride.

- 203 HUTCHINSON, E.G. 1978 : Manukau Harbour Surveys. Internal report, Works Division, Auckland Regional Authority, Auckland. 10 February 1978.

Assesses water quality effect of effluent discharge from the Mangere Sewage Treatment Works. Looks at aspects of faecal coliforms, turbidity, chloride, BOD and DO relative to tides. Areas of study include northern to north-eastern Manukau Harbour from Ihumatao to Puponga Point.

- 204 HUTCHINSON, P.S.; MOUNTJOY, C.U. 1978 : Model tests on a pile breakwater and marina entrance. *N.Z. Engineering 33* : 87-89.

Discusses model wave tank tests undertaken to simulate a reduction of wave energy within the marina (scale 1:40). Breakwater structures were tested for wind generated waves into (north-westerly) and across (westerly) the marina model respectively.

- 205 HUTTON, F.W. 1970 : Geology of the North Head of Manukau Harbour. *Transactions and Proceedings of the New Zealand Institute 2* : 161.

Discusses the volcanic nature of many of the rocks found at or near to Paratutai. Looks at the lava flows, dykes, agglomerates and sediments in the area.

- 206 HYDROGRAPHIC BRANCH, R.N.Z.N. 1935 : Chart 2535, Manukau Harbour to Cape Egmont 1:288,000, Waikato River and Aotea Harbour 1:36,500, Mokau River 1:24,300.

- 207 HYDROGRAPHIC BRANCH, R.N.Z.N. 1961 : New Zealand-North Island. Manukau Harbour 1:48,000. Surveyed by Commander W.J. Droole.

Chart of southern Manukau Harbour (Waiuku Channel to Weymouth Point) and west coast Cochran's Gap to Bethell's Beach.

- 208 HYDROGRAPHIC BRANCH, R.N.Z.N. 1963 : Chart NZ4315. Approaches to Onehunga 1:18,000, Onehunga Wharf 1:2,000.
- 209 HYDROGRAPHIC BRANCH, R.N.Z.N. 1969 : Chart NZ43. Maungonui Bluff to Manukau Harbour 1:280,000.
- 210 HYDROGRAPHIC BRANCH, R.N.Z.N. 1969 : Chart NZ4314. Manukau Harbour 1:48,000.
- 211 HYDROGRAPHIC BRANCH, R.N.Z.N. 1969 : Chart NZ4315. Approaches to Onehunga 1:18,000.
- 212 HYDROGRAPHIC BRANCH, R.N.Z.N. 1975 : Chart NZ5322. Auckland Harbour 1:18,000, Calliope Dock and Basin 1:4,500, Commercial Harbour 1:7500.
- 213 HYDROGRAPHIC BRANCH, R.N.Z.N. 1976 : Chart NZ43. Hokianga Harbour to Manukau Harbour 1:290,000.
- 214 HYDROGRAPHIC BRANCH, R.N.Z.N. 1977 : Chart NZ532. Approaches to Auckland 1:100,000.
- 215 HYDROGRAPHIC BRANCH, R.N.Z.N. 1977 : Chart NZ5324. Tamaki Strait and approaches including Waiheke Island 1:40,000.
- 216 HYDROGRAPHIC BRANCH, R.N.Z.N. 1980 : Chart NZ43. Manukau Harbour to Cape Egmont 1:300,000.
- 217 JOHNSTON, R.M.S. (compiler) 1980 : Interim physical data report on the Upper Waitemata Harbour estuary. Unpublished internal report 80/6, Hamilton Science Centre, Ministry of Works and Development, Hamilton. February 1980. 191 p.

Contains data on channel cross sections, tidal ranges and periods and flushing times, dispersion coefficients, bathymetry, tidal compartments, rainfall and current velocities. Some text with graphs, maps, diagrams and tables. Part of Upper Waitemata Harbour Catchment Study.

- 218 JONES, B.G. 1969 : Sedimentology of the Waitemata Group in the Stanley Point - Devonport area, Auckland, New Zealand. *N.Z. Journal of Geology and Geophysics* 12 : 215-247.

As for Jones and Martin (1965).

- 219 JONES, B.G.; MARTIN, K.R. 1965 : The geology of the Cornwallis area, Manukau Harbour, Auckland. *Tane* 11 : 69-76.

Contains petrological data pertinent to provenance studies.

- 220 KINGSTON REYNOLDS THOM AND ALLARDICE LTD 1973 : Bledisloe and Kings

Wharves redevelopment scheme : Environmental impact report. Report prepared for Auckland Harbour Board. August 1973. 120 p.

The water quality section (pp. 40-48) briefly summarises the effect of harbour dredging, impoundment, reclamation, stormwater discharge, shipping and spills, on harbour currents, sedimentation, water quality and waves.

- 221 KINGSTON REYNOLDS THOM AND ALLARDICE LTD, 1974 : Auckland Harbour Board - Hobson Bay Marina Park : Environmental impact report. Report prepared for Auckland Harbour Board. February 1974. Volume I (101 p.) and II (222 p.).

Volume II contains a report on the geology of, and sedimentation in, the bay area, and a report describing existing hydraulic conditions in the Hobson Bay, Whakatakataka Bay, Orakei Basin and Purewa Valley areas followed by a comparative outline of the new conditions which would result from the proposals.

- 222 KINGSTON REYNOLDS THOM AND ALLARDICE LTD, 1975 : Auckland Harbour Board. Fergusson Wharf stage III : Environmental impact report ; parts I (17 p.) and II (67 p.). Report prepared for Auckland Harbour Board. May 1975.

Contains a section describing tidal flow patterns in the vicinity and predicts the effect the proposed structure will have on tidal currents, notes on the effect of dredging fill material from the borrow area in the Tamaki Inlet, and an assessment of the effects of construction works on sediment concentrations and deposition in the vicinity.

- 223 KINGSTON REYNOLDS THOM AND ALLARDICE LTD; BECA CARTER HOLLINGS AND FERNER LTD, 1976 : Auckland Harbour Board. Fergusson Wharf Stage III. Supplementary information to environmental impact report. Report prepared for Auckland Harbour Board. February 1976. 190 p. + appendices.

Contains additional information on the hydraulics of the Fergusson Wharf area and a report discussing the way in which the Tamaki estuary sediment transport patterns would be changed if an enlarged channel was dredged at the northern entrance (as a source of sand borrow material for the wharf extensions).

- 224 LAM, C.W.Y. 1979 : The assessment of eutrophication in estuaries, a review of N.Z. and overseas studies. Working report No. 2, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

Contains data on water quality, sediment chemistry and discusses physical characteristics of the Upper Waitemata Harbour catchment.

- 225 LE MARQUAND, D. 1979 : The dynamics of some Waitemata Harbour beaches.

Unpublished M.A. thesis, University of Auckland. 119 p.

Discusses changes in beach plan and profile and sediment transport factors.

- 226 MALE, A.G.R. 1977 : Mapping suspended sediment in coastal waters from satellite imagery. Unpublished M.A. thesis, University of Auckland. 91 p.

Presents analytical techniques utilising satellite imagery for determining the directions of coastal currents by mapping suspended sediment dispersal patterns. Some examples from the Auckland region are discussed.

- 227 MANNING, P.A. 1983 : Engineering geology of a section along the northern coast of the Manukau Harbour, Auckland. Unpublished M.Sc. thesis, Geology Department, University of Auckland. August 1983.

Outlines the history, structure, type and strength of the rock formations around the northern Manukau Harbour.

- 228 McLACHLAN, M.J. 1984 : Tidal gaugings at two cross sections in Lucas Creek, Upper Waitemata Harbour. Unpublished internal report 84/04, Water Quality Centre, Ministry of Works and Development, Hamilton.

Displays data on discharge, area, mean velocity, volume, dye discharge and mass, from gaugings undertaken at 2 sites on the Lucas Creek. Graphs of dye concentration vs time, mean velocity vs time and discharge and tide levels vs time. Also cross sections of the sites.

- 229 McLACHLAN, M.J. 1984 : Tidal gauging at Hobsonville Jetty, Upper Waitemata Harbour. Unpublished internal report 84/03, Water Quality Centre, Ministry of Works and Development, Hamilton.

Displays tidal discharge, area, mean velocity, volume and time data. Includes graphs of mean velocity vs time, discharge vs time, tide levels vs time and cross section area vs time.

- 230 McLACHLAN, M.J.; HUME, T.M. 1981 : Data file - Lucas Creek tidal survey, 11 March 1981, Upper Waitemata Harbour Catchment Study. Unpublished Hamilton Science Centre Report 81/13, Ministry of Works and Development. 92 p. + appendices.

A detailed report documenting data collected during an intensive survey of Lucas Creek estuary as a part of the Upper Waitemata Harbour Catchment Study. Data includes bathymetry, wind, rainfall, freshwater inflow, tide levels, tidal currents, seawater temperatures and salinities and Rhodamine dye concentrations.

- 231 McLAY, C.L. 1976 : An inventory of the status and origin of New Zealand estuarine systems. *Proceedings of the N.Z. Ecological*

Society 23 : 8-26.

Describes where surveys have been made, and gives qualitative remarks on water quality condition and degree of eutrophication.

- 232 McLAY, C.L.; ROSE, F.; HAY, C.; DAVIS, S. 1975 : An inventory of the status and origin of New Zealand estuarine systems. Distributed at the Joint Conference - Marine Scientists and Ecological Societies Conference, Nelson, August 1975. Department of Zoology, University of Canterbury. 41 p.

Considers the Manukau and Waitemata giving population, area, classification, stratification, condition and whether they have been surveyed. Lists reports or work in progress. See also McLay, C.L. 1976.

- 233 McLEAN, R.F. 1968 : Statistical summary of the sea state observations in New Zealand 1977. Unpublished report of the Department of Geography, University of Canterbury.

Based on daily visual observations made at N.Z. Meteorological Service stations, including Manukau Heads.

- 234 McLEAN, R.F. 1976 : Coastal progradation in N.Z. in the past 100 years : summary statement. In "Case studies of coastal progradation in New Zealand during the past century" (edited by R.F. McLean). Contribution prepared for the International Geographical Union's Working Group on the Dynamics of Shoreline Erosion. May 1976. pp. 77-98.

Collates results of 12 studies of coastal progradation on the New Zealand coast including work at Whatipu (see Williams, P.W. 1977).

- 235 MERCER, S.F.M. 1979 : The hydrology of the north-east coast of the North Island 1973-4. *Fisheries Research Division Occasional Publication No. 17*. N.Z. Ministry of Agriculture and Fisheries. 28 p.

Surface and bottom temperatures and salinities recorded on contour maps.

- 236 MINISTRY OF ENERGY, 1980 : Auckland Combined Cycle Power Station investigations - Hydrology of the Waitemata and Manukau Harbours. Report of the Hydrology Working Group for the Electricity Division, Ministry of Energy, Wellington. September 1980. 170 p.

Collates information on hydrology in areas of the Manukau and Waitemata Harbours. Assesses effects of cooling water system, outfall and intakes on hydrology. Parameters considered are tides, currents, bathymetry, sediments, water temperatures, salinities and waves. Maps and tables. Recommendations on power station cooling system options.

- 237 MINISTRY OF TRANSPORT, MARINE DIVISION, (published annually) : New Zealand Nautical Almanac and Tide Tables. Marine Division, Ministry of Transport, Wellington.
- Contains various navigational and meteorological data, information on tidal flows and streams, and tide tables for current year.
- 238 MINISTRY OF WORKS AND DEVELOPMENT, 1961 : Manukau Harbour mudflats reclamation contour survey. Drawing ADO 29817 of February 1961. Scale 1 inch = 400 feet.
- 239 MINISTRY OF WORKS AND DEVELOPMENT, 1973 : Results of water temperature surveys in Otara Creek and Otara Power Station cooling pond - February to April 1973. Data held by Ministry of Works and Development, Auckland.
- 240 MINISTRY OF WORKS AND DEVELOPMENT, 1973 : Tidal current velocity measurements made at Pahurehure motorway culvert (N47:437353) on 27 March 1973. Data held by Water and Soil Division, Ministry of Works and Development, Auckland.
- 241 MINISTRY OF WORKS AND DEVELOPMENT, 1974-1975 : Tide gauge records from Otara Estuary at boat ramp - January 1974 to February 1975. Data held by Ministry of Works and Development, Auckland.
- 242 MINISTRY OF WORKS AND DEVELOPMENT, 1975 : Mt Roskill to Wiri Motorway, Onehunga Bay section ; Environmental impact report. Report prepared by Civil Division, Ministry of Works and Development, Auckland. May 1975. 18 p. + figures + appendices.
- Includes an assessment of potential hydrographic and hydrological effects that construction of the motorway would have on Onehunga Bay, the adjacent coastline, and the Port of Onehunga.
- 243 MINISTRY OF WORKS AND DEVELOPMENT, 1976 : Auckland Thermal No. 1 Report on hydrological investigations, Manukau Harbour. Internal Report, Ministry of Works and Development, Auckland.
- Report on tidal current, drogue studies, and water temperature surveys of 1975 - 1976, with drawings 1/202/3/2116, sheets 1-4, scale 1:20000.
- 244 MINISTRY OF WORKS AND DEVELOPMENT, 1977-1978 : Water temperature and salinity data from Weymouth (N47:374362) and Pahurehure motorway culvert (N47:437353) 1977-1978. Data held by Water and Soil Division, Ministry of Works and Development, Auckland.
- 245 MINISTRY OF WORKS AND DEVELOPMENT, 1978 : Bathymetry of Clarks Creek West, Waiiau Pa. Drawing 1/202/3/2104/6 of March 1978. Scale 1:10000. Chart held by Ministry of Works and Development, Auckland.
- 246 MINISTRY OF WORKS AND DEVELOPMENT, 1980 : Devonport Naval Base proposed new wharf : Environmental impact report. Prepared for

the Ministry of Defence, Wellington. April 1980. 68 p. + appendices.

Report includes brief consideration of the effect of wharf extensions on local sedimentation patterns and hydraulic regime. It compares results of 1963 Wallingford model to tidal current measurements made in February 1980.

- 247 NELSON, C.S. 1977 : Grain-size parameters of insoluble residues in mixed terrigenous - skeletal carbonate sediments and sedimentary rocks : some New Zealand examples. *Sedimentology* 24 31-52.

Contains textural and compositional data on Takapuna and Mission Bay beaches, Auckland.

- 248 N.Z. ELECTRICITY DEPARTMENT, 1967 : Tidal volumetric gaugings at Otara Creek and Tamaki River - spring ebb and flood flows. 28-29 March 1967. Drawings HDO 10782 (File 6/1). Data held by Electricity Division, Ministry of Energy (formerly NZED), Auckland.

- 249 N.Z. ELECTRICITY DEPARTMENT : Water temperature and salinity records from Otara Creek - 1969 to present. Data held by Electricity Division, Ministry of Energy, Auckland.

- 250 N.Z. ELECTRICITY DEPARTMENT, 1974 : Preliminary environmental impact report on Auckland Thermal No. 1 Power Station. Prepared by the Development Division, N.Z. Electricity Department, Wellington. August 1974. 73 p. + appendices.

Considers 6 possible coastal locations for a 1400 MW natural gas fired thermal power station including Whatipu and Wattle Bay (Manukau Heads) and south Manukau Harbour. Brief comments on aspects of the hydrology and sediments of these areas as they relate to cooling water supply and cooling pond reclamation.

- 251 N.Z. ELECTRICITY DEPARTMENT, 1976 : Environmental impact report for the Auckland Thermal No. 1 Power Station at Waiau Pa. Report prepared by the Development Division, N.Z. Electricity Department, Wellington. October 1976. 125 p. + supplement.

Makes brief reference to the effects of proposed power station construction and operation on Manukau Harbour sediments and hydrology.

- 252 NICHOLSON, D.S.; FYFE, H.E. 1958 : Borehole survey of North Island ironsands from New Plymouth to Kaipara Harbour. *N.Z. Journal of Geology and Geophysics* 1 : 617-634.

Includes estimates of the (above sea level) quantities of total sand and recoverable ironsand (approx 58% Fe) at Waikato Heads, Manukau Harbour North Head, Piha and south Muriwai.

- 253 NICHOLSON, D.S.; CORNES, J.J.S.; MARTIN, W.R.B. 1958 : Ilmenite deposits in N.Z. *N.Z. Journal of Geology and Geophysics* 1 : 611-

A quantitative description of the ilmenite resources of the New Zealand coast. Includes data for Muriwai and Piha beaches and the Manukau and Waikato Heads.

- 254 O'SULLIVAN, M.J. 1982 : A mathematical model of the Upper Waitemata Harbour estuary. Department of Theoretical and Applied Mechanics, School of Engineering, University of Auckland. 160 p.

Outlines and discusses modelling of tidal creeks, dispersion in a tidal creek and estuaries. Discusses a finite element model and its application to Lucas Creek. A brief mention of modelling of the Upper Waitemata Harbour estuary. Data include cross sections, dye concentration, pollutant concentrations, water levels, discharge and salinity.

- 255 PARNELL, K.E. 1981 : Estuarine water dispersion and exchange in Lucas Creek, Upper Waitemata Harbour. Unpublished M.A. thesis, Department of Geography, University of Auckland.

Discusses results of experiments to examine the dispersion of water entering Lucas Creek using fluorometric tracer techniques. Implications of results, discussion and recommendations are also discussed. Graphs, photos, cross sections and tables included.

- 256 PARNELL, K. 1982 : Guidelines for contaminant release in the Upper Waitemata Harbour, Auckland, New Zealand. Working Report No. 37, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority. 49 p.

Examines estuaries of the Upper Waitemata Harbour and devises a discharge strategy for estuarine outfalls in the area based on both field data and theoretical considerations.

- 257 PICKRILL, R.A. 1979 : Wind waves in New Zealand - An annotated bibliography. *Miscellaneous Publication N.Z. Oceanographic Institute 88*. 27 p.

- 258 POWELL, A.W.B. 1937 : Animal communities of the sea bottom in Auckland and Manukau Harbours. *Transactions of the Royal Society of New Zealand 66* : 354-401.

Attempts to define and classify the benthic animal communities of the Auckland and Manukau Harbours and correlate them with the bottom materials. The report describes the origin of the harbours, the substratum and the succession of the animal communities.

- 259 RAUDKIVI, A.G. 1979 : Proposed marina at Herald Island. Report prepared for Sinclair-Johns Consultants. June 1979. 5 p. + appendices.

Discusses hydrology and sedimentation in vicinity of Herald Island.

260 RICKETTS, B.D. 1977 : The coastal geology of the Ihumatao area, Auckland. *Tane* 23 : 119-124.

261 SCHOFIELD, J.C. 1970 : Coastal sands of Northland and Auckland. *N.Z. Journal of Geology and Geophysics* 13 : 767-824.

A comprehensive account of the mineralogy, texture and origin of beach, dune and river sands including those from the Manukau Harbour and Hauraki Gulf areas. Includes textural and mineralogical data.

262 SCHOFIELD, J.C.; WOOLHOUSE, L. 1970 : Industrial sands of Northland and Auckland. *Industrial Minerals and Rocks. N.Z. Department of Scientific and Industrial Research Information Series 79* : 29-102.

Includes textural and compositional analyses for sands from the Waitemata and Manukau Harbours and categorises them with respect to their potential industrial uses.

263 SCRIVEN, J. 1981 : History of the Upper Waitemata Harbour and Catchment. Working Report No. 19, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

Describes land use changes caused by Polynesian and European settlement of the catchment.

264 SEAGER, L. 1962 : Manukau Harbour survey - Wattle Bay. *Poirieria* 1(2) : 27-28.

Relates sediment type from areas around Wattle Bay to invertebrate species.

265 SEARLE, E.J. 1958 : Pleistocene and recent studies of Waitemata Harbour : Part I - The Main Channel. *N.Z. Journal of Geology and Geophysics* 1 : 501-508.

Analyses features of sedimentology from Kauri Point to North Head. Discusses the small Waitemata islands, the harbour bed and profile, rates of deposition, shore platforms, and bedrock benches inferring sea level changes.

266 SEARLE, E.J. 1959 : Pleistocene and recent studies of Waitemata Harbour : Part II - North Shore and Shoal Bay. *N.Z. Journal of Geology and Geophysics* 2 : 95-107.

Discusses sediments of the Whau formation which are typical of low lying areas at the head of the harbour, about the Tamaki estuary and in districts south of the Manukau Harbour. Erosion of the surface of the Whau formation by stream courses is discussed.

267 SEARLE, E.J. 1959 : Pleistocene and recent studies of Waitemata

Harbour : Part 3 - Tamaki Head to Mechanics Bay. *N.Z. Journal of Geology and Geophysics* 2 : 479-488.

Describes sediments from bore log drillings in low terraces and their possible modes of deposition (i.e. river drainage, volcanic ash showers, lava flows, etc) for Tamaki Heads to Mechanics Bay.

- 268 SIMISTER, M.R. 1974 : Planning and conservation of Auckland's coastal environmental resources. Unpublished Master of Town Planning thesis, University of Auckland.

Outlines and discusses possible present and future legalities and role of planning in examining coastal problems, ecology in relation to planning and administration policies.

- 269 SIMPSON, J.D. 1978 : Analysis of copper and lead in the Waitemata and Manukau Harbours. Unpublished M.Sc thesis, University of Auckland.

Discusses the theory, techniques of measurement and analysis of copper and lead pollutants as well as their concentration in both the Waitemata and Manukau Harbour waters.

- 270 SKERMAN, T.M. 1958 : Seasonal variations in sea-water surface temperatures within New Zealand harbours. *N.Z. Journal of Geology and Geophysics* 1 : 197-218.

Details seawater surface temperatures in Auckland Harbour for 1954-1955.

- 271 SLINN, D.J. 1968 : Some hydrological observations in Auckland and Otago Harbours. *Transactions of the Royal Society of New Zealand. General* 2 : 79-97.

Monthly means of temperature, salinity, oxygen and nutrients.

- 272 SMITH, S.P. 1879 : Notes of a traditional change in the coast line at Manukau Heads. *Transactions New Zealand Institute* 11 : 514-516.

Discussion of former coastline positions between the Manukau Harbour and the Waikato Heads based on Maori folklore.

- 273 SMITH, A.W.; NICHOLLS, J.S.; AGNEW, R.; WATT, W.J. 1978 : Whither the Manukau? *N.Z. Engineering* 33 : 79-81, and 162, 192.

Discussion of the past and present Manukau Harbour environment, with ideas for possible redevelopment.

- 274 SPENCER, E.M. 1964 : A bibliography of New Zealand coastal geomorphology and submarine morphology 1950-1964. N.Z. Library School, Wellington. 30 p.

The bibliography covers the area between 30°50' S and 165° E175° W. Geomorphological features of the coast including

- Journal of
 Processes
 drainage,
 leads to
 Coastal
 Planning
 Future
 Coastal
 Erosion
 Sea and
 Quality of
 Analysis
 Erosion
 Surface
 Quality of
 Harbour
 Land and
 Use of New
 Directions
 Line at
 14-516.
 Manukau
 Further
 Harbour
 Coastal
 Library
 and 165°
 including
- raised beaches, sand dune, harbours and sea floor morphology are described. A section on hydrology includes circulation in harbours, ocean currents and sea surface temperatures.
- 275 STANISICH, M.T. 1981 : Phytogeography and site ecology of inter-tidal habitats : Awhitu Peninsula. Unpublished M.Sc. thesis, University of Auckland.
- Discusses distribution of coastal vegetation along the eastern side of Awhitu Peninsula. Outlines methods and techniques and describes and evaluates the site areas. Some comparisons of Waitemata and Manukau Harbours. Sediment type and texture also discussed. Aerial photos.
- 276 STANTON, B.R. 1973 : Some oceanographic observations in the vicinity of proposed thermal power stations. I. Te Atatu. In "Proceedings of the Pollution Research Conference, Wairakei, New Zealand, 20-32 June 1973" (edited by D. Zwartz). N.Z. Department of Scientific and Industrial Research Bulletin 97. pp. 495-503.
- Contains preliminary results of sea temperatures at five points in the shallows near Te Atatu, monitored over a year.
- 277 STEWART, J.C. 1970 : The planning implications of a residential marina : A case study of the Ngataringa Bay scheme. Unpublished Diploma of Town Planning dissertation, University of Auckland.
- Discusses the Ngataringa Bay scheme, compares surveys of other marinas and coastal development. Disadvantages, advantages and cost of development are covered through local opinion, policies and acts, site investigation, and social and economic implications.
- 278 TANNER, D.A. 1949 : Study of current velocities and distribution adjacent to proposed upper harbour reclamations by means of a tidal model. Unpublished B.E. (Hons) Thesis, Auckland University College.
- Outlines and discusses the methods, aims, results and limitations of assessing current velocities and distribution of Waitemata Harbour using a tidal model. Brief consideration of bed-movement with some model results. Photos, maps and tidal curves from model.
- 279 TAYLOR, A.E. 1978 : Manukau Harbour sediments - A chemical characterisation. Report from Auckland Regional Authority Research Advisory Subcommittee, Auckland. pp. 127-137.
- Assesses the effects of effluent on sediments near the Manukau Sewage Treatment Works. Contains results and discussion of 49 sample sites undertaken in proximity to ponds 1 and 4. Results represented in table listings.
- 280 TAYLOR, A.E. 1982 : Manukau Harbour Sediments - chemical characteristics. Report from Auckland Regional Authority Research Advisory Subcommittee, Auckland. pp. 66-77.

A survey of chemical characteristics of sediments at 83 sites in the Manukau Harbour, mainly near the sewage purification works oxidation ponds. Results of COD, phosphorus, nitrogen and organic sediment index (OSI) are listed and discussed. NB : amendment survey to earlier report on a 'chemical characterisation' by A.E. Taylor 1978.

- 281 THOMPSON, R.M.C. 1981 : A bibliography of the major ports and harbours of New Zealand. (marine geology, physical oceanography and related topics). *Miscellaneous Publication N.Z. Oceanographic Institute 93* 60 p.

An annotated bibliography including descriptions of the main characteristics of New Zealand major ports and harbours.

- 282 THOMPSON, S.A. 1975 : Waitemata Harbour, selected sedimentary topics. Unpublished M.Sc thesis, University of Auckland. 113 p.

Results and interpretation of Waitemata Harbour sedimentology based on analysis of 100 recent sediment samples. A brief description of rock units adjacent to and underlying the harbour is given.

- 283 THOMPSON, S.A.; GREGORY, M.R. 1973 : Recent sediments of Waitemata Harbour. Preliminary survey report, Waitemata Harbour Study. Auckland Harbour Board, Auckland Regional Authority, Auckland. October 1973. 33 p.

Describes sampling methods, granulometric analysis, sedimentary petrology/mineralogy, sources of recent sediments and sedimentary processes within the harbour.

- 284 TONKIN & TAYLOR, 1975 : Report on preliminary survey of water resources. Prepared for Auckland Regional Water Board, Auckland. 134 p.

Some data on hydrology in the Manukau and Waitemata Harbour areas.

- 285 TONKIN AND TAYLOR, 1977 : Glenbrook Water Rights Application 1977. Prepared for New Zealand Steel Ltd.

Contains a little on the future discharge standards of the Glenbrook Steel Mill. Also review controls on discharge and discussions on water processing.

- 286 TONKIN AND TAYLOR, 1983 : Woolf Fisher Works. Application for Water Rights Renewal. Prepared for New Zealand Steel Ltd with the assistance of Bioresearches Ltd.

Discusses biological and water quality effects of wastewater discharges and monitoring of metal concentrations of Waiuku River sediments and biota. Data and discussion on DO, suspended and dissolved solids, pH, discharge, temperature, nutrients and dispersal of waste water.

- 287 TORTELL, P. 1981 : New Zealand Atlas of Coastal Resources. Commission for the Environment, Wellington. 28 p. + maps.
- 288 VAN DER LINDEN, W.J.M. 1968 : Raglan Bathymetry. *N.Z. Oceanographic Institute Chart, Coastal Series 1:200,000.*

- 289 VAN ROON, M.R. 1980 : Report on the water quality of Hobsonville Inlet, Upper Waitemata Harbour Catchment, in comparison with other New Zealand and overseas estuaries. Working Report No. 1, Upper Waitemata Harbour Catchment Study, Auckland Regional Authority, Auckland.

Describes the state of Hobsonville estuary and compares it to other New Zealand estuaries. Water quality parameters discussed, and shown graphically. Includes data on BOD, DO, temperature, land use, suspended solids, turbidity, chlorophyll, nitrate, ammonia, phosphorus and faecal coliforms.

- 290 VAN ROON, M.R. 1983 : Water quality in the Upper Waitemata Harbour and catchment. Upper Waitemata Harbour Catchment Study Specialist Report, Auckland Regional Authority, Auckland. 430 p.

Contains mass transport data for sediment and nutrients from Upper Waitemata Harbour catchment streams.

- 291 WAITEMATA CITY COUNCIL, 1977 : Proposed reclamation - Henderson Creek. Prepared for the City of Waitemata, Auckland. 11 p.

Some aspects of effects on physical systems of the creek. Reclamation effects on water movement, sedimentation, water quality and visual amenities are discussed briefly.

- 292 WALLINGFORD HYDRAULICS RESEARCH STATION, 1959. : The effect of reclamations in Waitemata Harbour. Internal Report, Wallingford Hydraulics Research Station. December 1959. 9 p. + figures.

Field evidence and theoretical considerations are used to predict the effect of reclamations on the hydraulic and sedimentation regime in the harbour.

- 293 WELLS-GREEN, P.S. 1974 : Currents, waves and sediment transport, Upper Waitemata Harbour. Unpublished B.E. (Hons) thesis, University of Auckland. 125 p.

Contains field investigation of soil samples from harbour bed, speed and direction measurements of tidal currents and collection of wind-wave data. Also laboratory experiments analysing soils and hydraulic models simulating current and wave action on the bed. Main results are tidal current flow patterns and sediment transport rates.

- 294 WELLS-GREEN, P.S. 1975 : Current, waves and sediment transport, Upper Waitemata Harbour. *N.Z. Engineering 30* : 291-293.

Discusses field investigations of speeds and directions of tidal currents, wind waves and bed shear stress of the harbour. Laboratory experiments on tidal currents and waves are more extensively discussed. Includes graphs.

- 295 WELLS-GREEN, P.S. 1979 : Port of Onehunga - tidal model. Unpublished internal report, Auckland Harbour Board. July 1979. 58 p. + appendices.

A detailed hydraulic study of the Manukau Harbour in the vicinity of Onehunga Wharf. Field surveys of tidal levels and streams, water surface slopes, discharges and calculations of harbour bed roughness are incorporated into a physical model. The main results of the study are model testing of various harbour constructions proposed to reduce the rate of sediment deposition around Onehunga Wharf.

- 296 WELLS-GREEN, P.S. 1980 : Westhaven Boatharbour. Wave model of breakwater western gap. Report prepared for Auckland Harbour Board. November 1980. 32 p. + appendices.

A detailed report describing the design, construction and testing of a small scale physical model of the entrance to the Westhaven Boatharbour. The study evaluates the effectiveness of various wave screen proposed structures in reducing wave action at the breakwater gap.

- 297 WEST HARBOUR MARINAS LTD., 1981 : Proposed Marina - Herald Island. Planning and environmental impact report. Collated reports from Sinclair Johns Consultants, Bioresearches Ltd, Beca Carter Hollings and Ferner Ltd, Sinton and Cato, Dean and Jefferson and Professors V.J. Chapman and A.J. Raudkivi. 42 p. + appendices.

Covers aspects of suspended material and tidal circulation in the vicinity of the proposed marina site. Water quality in terms of pollutants, tidal flushing, salinity and temperature are reviewed. Effects of dredging are mentioned for biological and water quality impact. The possible use of culverts beneath Herald Island are proposed to improve tidal circulation within the marina.

- 298 WILLIAMS, B.L. 1980 : Upper Waitemata Catchment Study - A simulation method for water quality modelling for an estuarine creek - Part A. Working Report No. 8, Upper Waitemata Catchment Study, Auckland Regional Authority, Auckland.

Outlines the application of the mixed segment approach to model water quality in the Lucas Creek sector of the Upper Waitemata Harbour. Contains discussions on the graphical and mathematical analysis of results.

- 299 WILLIAMS, B.L.; HARRAY, K.G.; JOHNSTON, R.M.S. 1981 : Velocity and salinity profiles at Lucas Creek mouth, Upper Waitemata Harbour. Unpublished internal report 81/1, Hamilton Science Centre, Ministry of Works and Development, Hamilton. 49 p.

Reports on data collected during a tidal gauging near the Lucas Creek mouth. Contains profiles, graphs and tables of velocity and salinity variations over a tidal cycle.

- 300 WILLIAMS, B.L.; RUTHERFORD, J.C. 1983 : The flushing of pollutants and nutrients from the Upper Waitemata Harbour. Upper Waitemata Harbour Catchment Study Specialist Report, Auckland Regional Authority, Auckland. 88 p. + appendices.

Discusses the hydrology including freshwater inflows, salinity distributions, velocity profiles and dye experiments. Nutrient and volume exchange models are used to evaluate flushing of pollutants.

- 301 WILLIAMS, P.W. 1976 : Progradation of Whatipu Beach 1844-1974, Auckland, New Zealand. In "Case studies of coastal progradation in New Zealand during the past century" (edited by R.F. McLean). Contribution to International Geographic Union's Working Group on the Dynamics of Shoreline Erosion. May 1976. pp. 1-7.

Documents shoreline change at Whatipu Beach since 1844 on the basis of data from hydrographic charts, ground survey data and aerial photographs.

- 302 WILLIAMS, P.W. 1977 : Progradation of Whatipu Beach 1844-1976, Auckland, New Zealand. *N.Z. Geographer* 33 : 84-89.

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