

Department of Scientific and Industrial Research

**DIVISION OF MARINE
AND FRESHWATER RESEARCH
ANNUAL REPORT**

1982-83



D.E. Hurley
Director

DIVISION OF
MARINE AND FRESHWATER SCIENCE

ANNUAL REPORT

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Division of Marine and Freshwater Science

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INTRODUCTION

This year has been for all of us the Year of the Amalgamation. The Chief Director's Review of the Institute issued in September, 1982, recommended that Freshwater Section of Ecology Division at Taupo be transferred administratively from Ecology Division and merged with the New Zealand Oceanographic Institute at Greta Point to form a new Division of Marine and Freshwater Science. MFS, as the new division is now known in the initialised administrative shorthand, was to have a new structure with the Director of the Institute as its Director and Dr R.A. Heath of NZOI and Dr E. White (Officer-in-Charge at Taupo) as Deputy Directors, the triumvirate together forming a policy directorate for the new division.

Freshwater Section was renamed "Taupo Research Laboratory" while the larger unit at Greta Point in Wellington retained the long-established name of the New Zealand Oceanographic Institute. This was done for practical as well as historic and nostalgic reasons concerned with its existing reputation in the international marine science community. NZOI is an internationally accepted acronym and has an international identity in the world of oceanography which we did not wish to lose.

A major reason for amalgamation was to provide a thrust in research into biological productivity, using the accumulated skills and expertise of the scientists at Taupo, in analysis of water properties and biological processes, to enhance studies of the marine biological realm already commenced at the Institute. This is proving to be a sound basis for amalgamation.

Along with amalgamation went the definition of objectives for the new division, involving us in a thorough, protracted, and somewhat soul-searching examination of what the new division should be doing in the next ten years. This was followed by a re-examination of all projects in the light of the objectives and a decision to concentrate on those that, in the light of the national interest, were considered most important. This has meant the deferral or termination of others. This project priority assessment has continued beyond the formal financial year; in hindsight we might have done it differently, but now that it is behind us it provides a firm direction for work over the next five years. The feeling that we have had a surfeit of paper work is not entirely unjustified, nor is it confined to the scientists. We have therefore decided to make 1984, as far as possible, a "Year of Science".

This does not mean that science has been neglected, and a reading of the sections that follow will show major scientific achievements. From the year's activities I will single out only two or three of the more unusual. One was participation in the planning and execution of the so-called "Tripartite Cruises" which cemented our association with the Ministry of Foreign Affairs as well as with the administrators and scientists of Australia and the United States (especially the U.S. Geological Survey - the scientists of Hawaii Institute of Geophysics are old friends). There are actually more than the three ANZUS nations involved - the island nations of the CCOP/SOPAC group were also active participants in these initial exploratory cruises.

Nearer home, there was the first involvement by Taupo scientists in sea-going although they had already been involved in assisting NZOI with techniques and analyses, Max Gibbs being the first of those from Taupo to be involved in transferring skills from fresh to salt waters.

This was the year that computer-input of data developed from a cottage industry to a large-scale activity and it is a major landmark to have 25 years of station data now on-line; the year that laying, servicing, reading, and interpreting current meters for the outside world of consultants and local authorities became an important activity; and the year that the charging

policy became reality. We have traditionally regarded our role as one of making information and services freely available to the taxpayer as part of our scientific brief. (Hence there have been no problems associated with introduction of the Freedom of Information Act.) However, it must be admitted that there is some satisfaction in being able to charge for scientific services which reinforces the feeling that the work being done is of value to the community.

In the administrative field, Greta Point has become the guinea-pig in the training of assistant advisory officers and management trainees for administrative services within divisions. This has meant a sequence of changing faces in the office. I hope the apprehensions which must arise in those selected for training at the Institute are compensated for by both the experience and the experiences of life at the Point.

Looming over all has been the indefinite future of our research vessel, Tangaroa: it is clear that, as in 1972 when we first acquired Tangaroa, a major point in our history is being reached with the necessity for a major overhaul or replacement coming even closer. An Oceanographic Institute without a ship is like a yacht without a sail, conceivable but of no great practical utility to the crew trying to reach a determined point in space. To that end, a considerable effort has gone into a lengthy examination of our future ship needs, the possible alternatives to having our own research vessel - there are none that are practical - including the possibility of joint operation with others. It is our belief that efficient oceanographic research demands a replacement deep-sea vessel of comparable size to Tangaroa, dedicated to oceanographic work in the New Zealand region and the South Pacific. With a growing deep-sea fishing industry, a burgeoning offshore oil and gas industry, an increasing demand for marine baseline and engineering data of all kinds, and the need for ocean-climate understanding, there is no substitute for a deep-sea vessel. The amount and increasing sophistication of work needing to be done demands more than shared usage of a multi-user vessel.

Once again, I have to thank the officers and crew of Tangaroa - the vessel may change but we hope to retain your services on her replacement - and the staff of the division, permanent, temporary, and vacation workers, with a special word for the staff at Taupo. To all staff, amalgamation has meant change and disruption but we hope that the end result will be both satisfying and productive.

D.E. Hurley

OBJECTIVES OF THE DIVISION OF MARINE AND FRESHWATER SCIENCE

In early 1983, after extensive discussion among the Directorate, section leaders, and senior staff (based on input from all staff members), the Division established a set of nine scientific objectives. Cited below in bold is a short title which is unlikely to be changed for the next 5-10 years, except in response to departmental or governmental policy changes. The remainder of each objective seeks to describe the locations in which it will be done, now and in the immediate future. Modifications to the latter part of each objective will be made as research is completed and new priorities identified.

Associated with the establishment of objectives has been the introduction of a more formal review of projects for the past year, and assessment by each scientist and technician of their research priorities for the next year. The review and assessment of research priorities will continue on an annual basis. It is envisaged that, in the future, many of the individual projects contributing to different aspects of the same area of research will be grouped into programmes.

1. **To study the sedimentary regime of the New Zealand continental shelf and slope in areas considered to have potential for development**

It is intended that such investigations, in combination with the Division's ongoing sediment-mapping programme, will provide background information essential for the future siting of man-made structures such as submarine pipelines and cables, and for advising on anchorages for oil-drilling rigs, aspects of coastal stability, the dispersal of wastes dumped from harbour dredging, and sedimentary regimes in the fishing/shellfish grounds.

2. **To define the mineral resources within the New Zealand Exclusive Economic Zone**

Deposits to be prospected for and investigated include heavy mineral concentrations, submarine phosphorite, glauconite, and manganese nodules.

Emphasis is now being placed on completing studies of the phosphorite deposits on Chatham Rise.

3. **To evaluate the structure and stratigraphy of the New Zealand continental margin**

These studies will establish the basic geology of the New Zealand continental shelf and adjacent areas in relation to crustal plate movements. This will permit identification of resource potential, geological hazards, and rock types of importance to possible offshore engineering projects.

4. **To study interaction between plants and those nutrients of importance in the control of eutrophication**

Excessive amounts of nitrogen and phosphorus added to fresh waters cause accelerated eutrophication, so the way in which these nutrients

are used by bacteria, algae, and higher plants needs to be understood if this form of water pollution is to be controlled. Reduction of the nutrient load to lakes is the most practical way of controlling eutrophication at present; so research is also directed at establishing relationships between nutrient load and lake condition, the effectiveness of riparian strips in removing nutrients from streams, and processes which can strip nutrients from sewage effluents.

5. To study nutrient supply and transfer through the marine food web to animals and plants of economic importance

An understanding of the biological, chemical, and physical processes which operate within productive marine systems will provide information of use to fisheries management. Attention is being given to the significance of upwelling processes off the west coast of South Island in relation to the deep-water, pelagic, and squid fisheries of the area. The capacity of the Marlborough Sounds to support existing and projected mussel farming is also being studied.

6. To study the distribution, abundance, and identity of benthic species in the New Zealand Exclusive Economic Zone in relation to their environment and their role as an energy source in the marine food web

Benthic organisms are an important food source for bottom-feeding marine fish. Several benthic organisms are known to contain substances with antibacterial and antiviral activity while others are a potential or actual economic resource.

Initial emphasis is being placed on publishing distributional charts of dominant species within the New Zealand Exclusive Economic Zone, and analysing how benthic communities correlate with environmental factors.

7. To study the variability of water properties and movements on New Zealand's continental shelf and slope

The understanding of many aspects of the marine environment depends on knowledge of the physics of the oceans. This knowledge is essential to understanding the dispersion of fish larvae and plankton, the movement and deposition of sediment, and the impact of the oceans on climate.

Present physical oceanographic studies are aimed at understanding the variability with time of the physical environment. These include coastal climate studies using temperature and salinity observations, measurements of shelf and slope currents, and studies of near-surface ocean variability using satellite remote-sensing techniques.

8. To assess the impact of development in marine and freshwater environments

Estuarine studies will initially concentrate on sedimentation and benthic biological/sediment relationships in Rangaunu Harbour associated with proposed development. Freshwater studies will initially concentrate on the effects of geothermal waste discharges and on sedimentation in hydro lakes. As a baseline for pollution studies, geochemical cycling of elements in sediments from New Zealand lakes and harbours will be investigated.

Offshore studies will concentrate on the benthos and sedimentary regime of the Chatham Rise, associated with the potential development of the phosphorite resource in an important fishing area.

9. To engage, where deemed appropriate, in research related to international and bilateral co-operative programmes, New Zealand's aid programmes, and the New Zealand Antarctic Research Programme

This includes projects where there is a responsibility to participate in international programmes; where New Zealand science may benefit from access to new techniques, new data, and new instrumentation; where New Zealand aid obligations are involved (e.g., CCOP/SOPAC); and where two-ship or multi-ship operations are necessary.

It covers research in the Antarctic which has been a traditional, but minor, aspect of the Division's programme.

The discovery and evaluation of metalliferous sediments from back-arc basins in the Southwest Pacific is one focus of attention.

RESEARCH PROGRAMMES

N.Z. OCEANOGRAPHIC INSTITUTE

The Institute's interests are naturally centred within New Zealand's Exclusive Economic Zone, but range from the Equator to the Antarctic, and from the East Australian coast into the central South Pacific, far to the east of New Zealand. Studies extend over a comprehensive variety of marine and lacustrine environments that include lakes of fluviatile, glacial, volcanic and man-made origin, coastal inlets, fiords, harbours and estuaries, and the seafloor down to abyssal depths, and environments ranging from tropical atolls and lagoons to the seafloor beneath the Ross Ice Shelf in Antarctica.

BIOLOGICAL OCEANOGRAPHY

The Biology Section of the Institute comprises nine scientists (1 a visitor) and five technicians. The Section aims to contribute to the classification of marine ecosystems according to their living and non-living aspects and their probable modes of functioning. This work breaks up naturally into a study of the kinds and distribution of organisms and research into the principal processes governing the functioning of selected ecosystems. The work of the Section is designed to assist in decision-making concerning the use of marine ecosystems in order to ensure their beneficial use as well as conservation of living marine resources. The Section's work is aimed at objectives 5, 6, 8, and sometimes 9.

PLANKTON

Work on plankton ecology during the year continues to be focused on the West Coast Programme. Papers on the winter cruise of 1979 and summer cruise of 1982 were either completed or are in various stages of completion. In March of 1983 work on this area was extended into western Cook Strait as a joint effort by the Taupo and Greta Point laboratories.

Studies on the organism causing the Tasman Bay "slime" neared completion and studies on the Lake Grassmere microalgae were completed and the manuscript is in preparation as a contribution to the investigation of the potential for commercial harvest of brine shrimp in the lakes.

BENTHOS

Great progress was made this year in the reorganisation of the biological collections so they are now available for study. Concentrated effort went into a summary of information concerning the Chatham Rise benthos and an assessment of the possible effects of phosphorite mining. Collation of data on sedimentary environments of the Westland shelf and upper slope is almost completed for comparison with information on benthic biomass and faunal associations. Papers are in preparation on the quantitative description of subtidal rock-wall biological associations in northern New Zealand and analysis of samples from Rangaunu Harbour, Rangaunu Bay, and Doubtless Bay are nearing completion and correlation with depth and sediment parameters, already analysed, will begin soon.

TAXONOMY AND DISTRIBUTION

Papers were published by Biology Section staff during 1982-83 on copepods, isopods, and bryozoa. Biological material collected by the Institute

was treated in publications by non-Institute specialists on copepods, gastropods (Pleurotomariidae), and Tantulocarida (new class of Crustacea).

Specific projects are listed in the section entitled PROJECT STATEMENTS (beginning on p. 49).

J.M. Bradford

MARINE GEOSCIENCE

The Marine Geoscience Section of the Division of Marine and Freshwater Science is the national research body with prime responsibility for investigating and advising upon all aspects of the morphology, sedimentology, structure, geochemistry, and economic potential of the seafloor around New Zealand, and of the country's lakes. It also has the responsibility of storing and curating the official collection of marine geological samples and records. The Section also plays an active role in integrating marine geoscientific research in other divisions of DSIR, other government departments, universities, and other scientific institutions.

In April 1982, the strength of the Geoscience Section increased by one, with the creation and filling of a vacancy for an additional science technician. The Section now comprises 8 scientists, 1 senior technical officer, and 2 technicians. One scientist was absent on study leave at the Pacific Geoscience Centre, British Columbia, throughout the entire period. A second scientist departed in March 1982 for a 6-month study leave, mainly at the Galveston Marine Geophysics Laboratory.

OFFSHORE MINERAL INVESTIGATIONS

Manganese Nodules : Analysis and evaluation of the nodule deposits near the Antipodes Islands, southeast of New Zealand, are complete, and the results are being prepared for publication.

Metalliferous Sediments : Data collected in 1981-82 on two cruises, surveying for sulphide and oxide ores along back-arc spreading axes in the Havre Trough and Lau Basin, are being assessed and preliminary results are already published. Collaboration with Imperial College (London) scientists continues.

Phosphorites : The investigation of the unique, very recent phosphorites off the East Australian coast has progressed a stage further with the completion of a Ph.D. thesis by G.W. O'Brien, using material collected during a joint N.Z. Oceanographic Institute/Flinders University survey of these deposits.

A second cruise in the South Pacific Seamount Phosphorite programme, in mid-1982, concentrated on the northern margin of the Fiji Plateau. Two guyots were located which yielded phosphatic samples more closely akin to Nauru and Ocean Island material than to the normal phosphorites encountered on South Pacific seamounts. A further cruise to investigate these occurrences, and the detailed morphology and infrastructure of the guyots and adjacent shallow banks is scheduled for late 1983, again in collaboration with the Department of Oceanography, Florida State University.

For a summary of the status of Chatham Rise phosphorite research, see p. 16.

Glauconite : Further field work is awaiting laboratory appraisal and economic evaluation by the Industrial Processing Division of DSIR.

CCOP/SOPAC and the Tripartite Agreement : Through its involvement with the Co-ordinating Committee for Offshore Prospecting in the South Pacific (CCOP/

SOPAC), a United Nations agency based in Suva, the Geoscience Section has collaborated in a number of enterprises in the Exclusive Economic Zones of various South Pacific Island territories, e.g., surveys of precious and black coral distributions, and assessments of the constructional suitability of volcanic and coral sands and gravels from Tonga, Samoa, and the Cook Islands.

The Geoscience Section has also co-ordinated and participated in New Zealand's contribution for seafloor economic minerals in the EEZ's of South Pacific Island territories under the Tripartite Agreement among the United States, Australia, and New Zealand.

ENVIRONMENTAL STUDIES

A considerable part of the Section's research effort is concentrated on detailed surveys - often in association with local authorities - of harbours, estuaries, and fiords, with a view to understanding the sedimentary regimes in these environments. This in turn enables the Section to advise on correcting natural depositional/erosional problems, and on possible detrimental effects of disturbing the environment.

The Geoscience Section has continued in its monitoring and advisory capacity to the Wellington City Council on matters pertaining to the mobility of sediment on Wellington's beaches. At the instigation of the Wellington Regional Council, a survey has commenced for possible evidence of metal pollution of Wellington Harbour sediments. Bathymetric and sedimentological studies are also in progress in Rangaunu Harbour, Northland, to help determine the suitability of this site as a barge terminal for timber export.

The Section also has a long-standing commitment to advise the Marine Division of the Ministry of Transport on geological matters bearing on the control of offshore dumping and the issuing of dumping permits. Most of these are for the disposal of dredging spoil by local harbour boards, outside harbour limits. The advice is based largely on data from hydrographic charts, on information provided by the local harbour boards, and on data collected by the Section.

LAKE, DAM, AND RESERVOIR STUDIES

Studies of sedimentation in South Island glacial lakes have included surveys, now complete, of Lake Wakatipu in the Clutha catchment, and Lake Tekapo in the Waitaki catchment. Studies of these natural lakes have provided information on possible siltation problems that may affect existing and planned hydro-electric storage lakes within these catchments. Lake Benmore, an existing hydro-electric storage lake, is now under investigation.

Work continues on shoreline evolutionary studies in Lakes Moawhango and Otomangakau, two recently-formed lakes associated with the Tongariro Power Scheme in central North Island.

For bathymetric work, see p. 24.

SEDIMENTARY STUDIES

Along with the more applied projects enumerated above, the Marine Geoscience Section is pursuing a series of purely scientific research topics, many of which have, in fact, proliferated from the mineral exploration and other applied programmes. Examples of this are the fission-track dating (in association with the Institute of Nuclear Sciences, DSIR) of volcanic glass shards in superficial sediments of Chatham Rise, and an investigation of the sedimentological effects of the Western Boundary Undercurrent.

The investigation of the submarine canyon and fan off eastern Otago is now complete, and the results prepared for publication. This project has been succeeded by a comprehensive study of the post-Pleistocene sedimentary evolution of Cook Strait, collating the results of earlier research and concentrating on the sediment dynamics (erosion, transportation, and deposition) of the region. This new project is intended to provide a definitive documentation of the modern sedimentary regimes in Cook Strait, the locus of the nation's critically important inter-island pipelines and cables.

Although Geoscience Section's resident micropalaeontologist has been temporarily seconded to another Government Department, research into the taxonomy, distribution, and stratigraphy of Tertiary diatoms is being pursued within the Section, until late 1983 at least by visiting Deutscher Akademischer Austauschdienst (DADD) fellow, Dr Juliane Fenner. Dr Fenner's research is aimed at the interpretation of palaeoceanography in Early to Middle Tertiary times, the period of final disruption of the Southern Hemisphere super-continent (Gondwanaland), and establishment of the circumpolar current system in the Southern Ocean.

OFFSHORE MORPHOLOGY AND STRUCTURE

The study of sedimentary and volcanogenic effects of oblique subduction at the Hikurangi Margin (the Indian-Pacific plate boundary east of North Island) is now complete, and the structural-stratigraphic analysis of Tertiary rock formations exposed along the crest of Chatham Rise is approaching completion. Both projects have possible implications for future offshore petroleum exploration east of New Zealand.

The effects of transform movements on continental shelf deposits off the Canteibury and Marlborough coasts have been evaluated in joint projects with New Zealand and overseas university personnel and the results prepared for publication, as are the tectonism and economic potential of the Northland Plateau off northern New Zealand.

SAMPLE AND RECORDS STORAGE/RETRIEVAL

Upgrading of the cataloguing and storage facilities for sediment, core, and rock samples continues. The transfer to computer storage of the entire existing data collection in the Institute's cruise registers was effected during the year, and a start made on implementing computer storage of "under-way" track (echo-sounding, profiling, side-scan sonar) records/data.

D.J. Cullen

PHYSICAL OCEANOGRAPHY

RECENT DEVELOPMENTS

As noted in last year's Annual Report, after much discussion over several years, 1981 saw the first concentrated NZOI physical oceanographic planned programme of temporal observations on the west coast of South Island. This continuing physical oceanographic programme, although self-contained, forms a component of the broader West Coast Project which has the ambitious aim of developing an ecological model for the area (see under Biological Oceanography). Within the overall physical oceanographic programme each scientist has his own specific oceanographic interest; Norm Ridgway is carrying out hydrological studies; Alex Gilmour has an interest in the time-series analysis of the current-meter and tide-gauge records; Ron Heath is acquiring

the current-meter and tide-gauge information to allow determination of the time scales involved and exchange across the continental slope. All these studies will act as input to the modelling effort.

Current meter observations (covering about 300 days in all) from the continental slope exhibit flows along and across the slope with periods of 1, 2, and 4 weeks superimposed on the internal tidal flow and a weak mean flow - these flows may drive the flow on the adjacent continental shelf and, because their time scale is long compared to primary production time scales, may be of importance to the west coast ecosystem. There are considerable differences in salt and heat content on the shelf between the three sets of temperature-salinity-depth data collected in January, March, and May 1982 which indicate a larger onshore-offshore exchange than previously supposed.

This unified physical oceanographic programme is supported by Bruce Shakespeare (equipment, current meters, drogues) and Malcolm Greig and Anthony Cole (data analysis).

The watching brief on satellite remote sensing started in 1981-82 by Ted Barnes has expanded rapidly to provide a very useful scientific product. The available imagery has revealed for the first time the complexity of the oceanic circulation off the east coast of New Zealand and in western Cook Strait and, in conjunction with Norm Ridgway's coastal climate studies and current observations (both current meters and planned satellite buoy observations), should reveal much information on temporal variability.

With several developments on the New Zealand coast requiring current observations (e.g., Cook Strait cable, Marsden Point wharf, Motunui) there has been a rapid expansion in the usage of the Division's current meter maintenance and decoding facility. Bruce Shakespeare has an expanding role in this area and his experience in the field is increasingly in demand.

Model studies of the normal modes of oscillation in shallow bodies of water such as harbours and lakes have been initiated by Norm Ridgway and Alex Gilmour using programmes from the University of Hawaii. These studies will provide partial information on the frequency response of harbours subjected to tsunami excitation and help to indicate which shoreline areas are most at risk.

These recent developments unify and complement the overall physical oceanographic research programme which includes :

- | | |
|----------------------------|---|
| ocean climate | - daily temperatures and weekly salinities are being measured at 16 coastal sites to provide information on seasonal and longer-term variability; |
| estuaries | - studies in Pelorus Sound and Rangaunu Harbour; |
| deep ocean | - study of the southern Tasman Sea and eddies in the Antarctic Circumpolar Current in the Southwest Pacific; |
| tides | - tides of Cook Strait, west coast South Island, Chatham Rise; |
| long waves | - waves on the continental shelf and slope; |
| microstructures | - mixing of water masses, mixed layer implications; |
| tsunamis | - development of educational programme for Civil Defence organisers and the general public, particularly in tsunami warning system; |
| inter-disciplinary studies | - physical/biological productivity modelling, sediment-water interaction |

Specific projects are listed in the section entitled PROJECT STATEMENTS (beginning on p. 84).

R.A. Heath

TAUPO RESEARCH LABORATORY

At the Taupo Research Laboratory studies of eutrophication continued in a variety of directions. Progress was made on modelling physical, chemical, and biological features which influence algal dominance and succession in lakes. Studies of limnological processes occurring in the extreme temperature and light conditions of the Antarctic were brought to fruition. Further evidence was collected of those nutrient features which separate Northern Hemisphere and New Zealand lakes of similar trophic status. An explanation was found for the high concentrations of phosphate which occur in many cold-water springs in the central volcanic plateau, and the influence of riparian strips on the stream transport of nutrients to lakes continued to receive attention.

Substantial effort went into studies of the effects of geothermal waters and waste waters on the aquatic environment. Specifically, the effect of geothermal waters on the distribution and abundance of invertebrate animals was studied. The possible consequences for the algal flora of increasing the boron concentration of the Waikato River were examined. The accumulation of mercury in fish, and its distribution in the Kaituna Catchment were studied. Consideration was given to the consequences of possible geothermal waste-water spills at the proposed Ngawha Power Station, and a detailed field investigation of the ecological effects of the supposed geothermal input to Lake Rotoiti was carried out.

E. White

RESEARCH SPECIAL REPORTS

CHATHAM RISE PHOSPHORITE

An investigation of the phosphorite deposits on Chatham Rise was started in 1974 because of growing awareness of the rapid depletion of New Zealand's existing sources of phosphate on Nauru, Ocean Island, and Christmas Island, and by uncertainty over future supplies, exemplified by the abrupt closure in mid-1978 of the Queensland phosphate mines, until then generally regarded as New Zealand's most likely alternative source of phosphate.

Samples and data collected during four oceanographic cruises aboard R.V. Tangaroa and two joint New Zealand / West German surveys using German research vessels, have provided information on the distribution, thickness, geochemistry, and geological history of the phosphorite. The phosphorite is now known to occur as a series of patches along some 400 km of the crest of Chatham Rise between longitudes 177° E and 177° W. The most extensive patches, between 179° E and 180°, have been estimated to contain around 100 million tonnes of phosphorite. Mining losses would of course reduce this figure. New Zealand's imports of rock phosphate at present average about 1 million tonnes, at a cost of around \$107 million annually.

The phosphorite occurs mainly as gravel-sized (10-14 mm diameter) nodules with an average phosphate content of 21.5 percent, accumulated to a maximum thickness of 0.7 m at or just below the sediment surface. Water depths in the region range from 370-420 m, and it is considered that the deposit would be suitable for mining by either of the modern underwater techniques (suction and air-lift dredging) being developed overseas.

Collaborative research on the agronomic potential of Chatham Rise phosphorite, using materials supplied by Oceanographic Institute, is in progress at the Soil Science Department, Massey University. More extensive larger-scale agricultural testing is being undertaken by Ruakura Agricultural Research Station, Ministry of Agriculture and Fisheries. The suitability of the phosphorite as a direct-application, slow-release source of phosphate is being studied especially for use on hill country, which consumes about half of our imported phosphate. Results of this research so far are promising. Weight for weight, crushed Chatham Rise phosphorite, performs agronomically at least as well as - and in some respects better than - superphosphate, and indications are that it maintains its potency in the soil for up to four times as long.

Following the Geoscience Section's investigation and promotion of the phosphorite deposits between 1976-81, the prime role in further economic evaluation of this resource has been assumed by the prospecting-licence holders Fletcher-Challenge Ltd, in association with the major West German industrial organisations Preussag and Salzgitter. The Geoscience Section is completing residual, structural, geochemical, and petrographic studies of the Chatham Rise phosphorites, and is also undertaking more detailed analyses of the associated superficial sediments with a view to predicting possible environmental effects of eventual large-scale mining of this resource.

D.J. Cullen

BIOLOGICAL PRODUCTIVITY IN THE OCEAN

Biological production is enhanced in areas within New Zealand's EEZ where the nutrients required for the growth of phytoplankton upwell from deep waters to the surface. These upwelling zones support many commercially important fish species. Upwelling systems are present at various locations around the New Zealand coast, and initial attention is being given to the west coast of South

Island and the western approaches to Cook Strait, work being co-ordinated between the DMFS (in full), Fisheries Research Division of the Ministry of Agriculture and Fisheries, Universities, and the Cawthron Institute.

Preliminary results show that the upwelling along the west coast enhances local production of plankton and seems to sustain the larvae of deep-water fish which spawn along the coast. This coastal upwelling depends on large-scale ocean currents and prevailing winds, which are being further studied.

Recent work off the north-west coast of South Island has shown that promontories such as Cape Foulwind, Kahurangi Point, and Cape Farewell are the foci of strengthened upwelling under some conditions. Patches of cold, nutrient-rich water, approximately 20 km in diameter, form periodically from the region off Kahurangi Point and drift into western Cook Strait. These patches have a lifetime of about two weeks, and primary production is enhanced up to seven times in this water. In summer the squid-fishing fleet in this region apparently congregates along the southern boundary of these biologically rich patches of water.

J.M. Bradford

REMOTE SENSING PROGRAMME

Two types of data products from satellites are being used to help our understanding of ocean processes. The first is high-resolution sea-surface temperature data. With a temperature resolution of 0.1°C and a spatial resolution of approximately 1 km, images of the seas surrounding New Zealand are good enough to enable current flows to be clearly seen. The possibility of covering the whole of the EEZ several times a day clearly provides information that is not obtainable by surface vessels. Despite the limitation of cloud obstruction enough data are being obtained to extend our knowledge considerably of how the various ocean-current systems around New Zealand vary with time, when backed up by sub-surface station measurements from surface ships.

The second source of data is the Coastal Zone Colour Scanner. This views the ocean through a number of different colour filters. The relative brightnesses enable an assessment of chlorophyll in the water to be made. A recent cruise in March 1983 obtained ground truth which should help validate the technique for the New Zealand region.

It is clear that remotely sensed data from satellites are becoming an important source of information for New Zealand oceanographers. We hope to establish facilities to allow routine reception and production of these data.

E.J. Barnes

ESTUARINE RESEARCH

GEOLOGY

Estuarine geology has been studied within a framework of seeking to understand contemporary processes, rates, and forms of sedimentation in New Zealand estuaries. Case studies of estuaries with "typical" circulations and morphologies have been undertaken and, where possible, they have been chosen to coincide with estuaries facing development proposals (e.g., Pauatahanui, Rangaunu). Much of this research was initiated solely from within NZOI and the results have been published in the scientific literature. Many of the smaller projects were begun in response to requests from outside NZOI, by local bodies such as Harbour Boards or Councils. Most of these "one-off" jobs were under-

taken to solve specific problems, such as at Port Taranaki, Evans Bay, Lyall Bay, and Oriental Bay.

Within New Zealand marine geology has traditionally been applied to two areas, viz., beyond the 10-m isobath, studied by ships, and land-based coastal and estuarine studies above low-water mark. By virtue of the data-collection techniques, much of the coastal research has been labour-intensive and capital-poor. Despite this, considerable knowledge has been amassed, particularly by the universities on the recent sedimentology of the coast and estuaries.

Very little is known about the sedimentology of the immediate nearshore zone (from low water out to the 10-m isobath), despite this being the zone where most of the sediment transport takes place. Coastal and estuarine sediment budgets have been documented but little is known about contemporary exchanges of sediment between the coast and inner shelf. To understand these relationships, the dynamics of the nearshore should be studied. Many of New Zealand's coastal problems originate in this zone. For instance, the problem of keeping New Zealand's ports and harbours navigable has been one of trying to contain sediment transport in the nearshore zone (especially in estuarine entrances); similarly, most of the problems of pipeline construction and maintenance, and cable laying, etc., have been associated with sediment transport and seabed stability in the nearshore zone. Coastal erosion owes its origin to changes in nearshore bathymetry (e.g., at New Plymouth, Camaru, Timaru) and would be much better understood if exchanges in sediment between the coast and inner shelf were documented. To help solve some of these applied problems and link the well-documented coastal studies to those of the shelf, two aims should be pursued.

1. Determine the role of the nearshore zone in the sediment budget of the shelf and coast. Is sediment being worked onshore, offshore, or along shore? What are the rates of sediment transport? What is the role of estuarine entrances as sources and sinks of sediment to/from the shelf?
2. Assess the stability of the sea floor in the nearshore zone. Are there long-term or cyclical changes in bathymetry (particularly around estuarine entrances), and what effect do these changes have on the coast? Can these changes be predicted from controlling processes?

BIOLOGY

Little estuarine biology was undertaken at NZOI prior to the mid-1970s, although there were isolated studies of fouling species, bacteriological surveys of Waitemata and Manukau Harbours, and studies on the benthic ecology of the southern fiords. As industrial development proceeded around New Zealand's major cities and concern for the environment grew, several long-term biological studies were initiated in order to determine these fluctuations in populations caused by natural variability and those caused by environmental perturbation.

The largest study of this type was in Manukau Harbour where selected intertidal sites were monitored over two years to follow changes caused by larval recruitment, adult mobility, and the trophic level of the fauna, correlated with the grain size of the surface sediment. At the same time, a detailed subtidal survey was completed to describe the major benthic communities throughout the harbour. Research in Manukau continued during the Auckland Combined-Cycle Power Station site-selection investigations. A NZOI biologist was part of the working group which co-ordinated the research into water quality, primary productivity, suspended sediments, temperature, salinity, plankton, benthos, fish, and bird populations at all sites. The data from the benthic sampling were analysed and the results published at NZOI.

A multidisciplinary study of Pauatahanui Inlet was supported by three projects involving biology staff at NZOI - the subtidal benthic populations, the intertidal communities and animal/sediment interactions, and the biology of the cockle Chione stutchburyi. NZOI has completed an extensive survey of Rangaunu Harbour, Northland, to identify the biological communities intertidally and subtidally) and to correlate these with sediment grain size, stability, depth, and other physical parameters. The results will be used for a management plan of the harbour and to assess the potential impact of proposed barge facilities and wharf development.

The southern fiords have been the focus of a detailed research programme into the evolutionary significance of brachiopods and this has also led to the discovery of a unique biological habitat and rich invertebrate communities on the subtidal rock walls. Research is continuing with growth rates, standing crop, and conservation strategies for a potential black coral resource.

Brachiopod research and benthic community analyses have also been undertaken in several estuaries of Stewart Island, including Paterson Inlet, Port Pegasus, and Port Adventure.

The potential impact of mussel farming and forestry development on the water quality, productivity and food source for benthic communities within the Marlborough Sounds has begun.

Future research efforts in estuarine biology will be concentrated in the Marlborough Sounds Project and on the black coral resource of Fiordland.

PHYSICAL STUDIES

New Zealand's coastal inlets and embayments have been classified into groups of similar types according to their broad physical parameters. The intention is to study one or two inlets in each group so as not only to gain valuable background information but, more importantly, to allow principles to be established as to how the inlets function.

To date, studies have been made in Tasman and Hawke Bays, Pelorus Sound, the southern fiords, and Manukau and Rangaunu Harbours. Physical aspects of these studies have concentrated on evaluating the residence times, resonant periods, heat budgets, tidal asymmetry, tidal energy dissipation, and storm events. These studies are complemented by a programme of monitoring of daily temperatures and weekly salinities at 15 sites around the New Zealand coast.

R.A. Pickrill
K.R. Grange
R.A. Heath

GEOTHERMAL STUDIES

Studies on the distribution of mercury in the Kaituna River catchment, conducted at the request of the Commission for the Environment, were completed in April 1982. A report was produced describing the existing situation in the river and in the Maketu and Little Waihi estuaries, and also the likely consequences of discharging sewage effluent and Tikitere geothermal fluid into the Kaituna River.

A project undertaken to assess the effects on the biology of Lake Rotoiti of a suspected geothermal influence in the bottom of the lake reached the stage of data interpretation. Detailed modelling of the thermal hydraulic characteristics of the lake are continuing. Some preliminary conclusions from this work were presented to the Bay of Plenty Catchment Commission for its deliberations on water rights associated with exploration of the Ruahine Springs Geothermal field.

The consequences for the local environment of geothermal water spills during power production at Ngawha were assessed and a report produced. Other work at Ngawha included analysis of mercury in geothermal fluids, stream sediments, tree foliage and soils, and in sediments and shellfish from the Waitangi estuary.

Studies on the effects of boron on algae are continuing. Batch culture experiments have been used to test the response of blue-green algae and diatoms isolated from the Waikato River to boron concentrations up to $30 \mu\text{g.B.l}^{-1}$. In particular, the dominant taxa in the Waikato River, Melosira spp. have now been successfully isolated and tested. Present experiments involve mixed cultures of algal species and in situ experiments in large enclosures are being considered.

Field work has been completed on assessing the impact of geothermal waters on stream invertebrate fauna. A publication of this work is expected in 1983.

E. White

NUTRIENT REMOVAL BY STREAM-BANK VEGETATION

Nutrients entering lakes can be of two types, those dissolved in the water, and those associated with solids. The vegetation bordering streams or in stream headwaters is able to modify the concentrations of both these types of nutrients. This is done directly (by absorption or sedimentation) or indirectly (by providing a habitat in which organisms such as bacteria can operate).

The Taupo Research Laboratory of the DMFS is engaged in research on the extent to which stream-bank plants and their associated microflora are able to remove or transform nutrients, particularly compounds of nitrogen and phosphorus, from streams originating in fertilised pastures. The study has special relevance in the Taupo area where the Waikato Valley Authority is at present implementing the Lake Taupo Catchment Control Scheme. This involves the 'retirement' of buffer strips along the streams entering Lake Taupo. Stream-bank vegetation is allowed to develop in such protected areas and research is aimed at assessing the impact of such protection on nutrient levels in the streams.

Evidence indicates that nitrate, in particular, is effectively removed on a seasonal basis by both stream-bank vegetation and by denitrifying bacteria associated with wetland areas. Studies on the long-term effectiveness of this process are continuing.

C. Howard-Williams

RESEARCH ADJUNCTS

CHARTING THE SEA

In the late 1950s the N.Z. Oceanographic Institute began a bathymetric survey programme in order to chart and contour water depths in the ocean and in coastal waters (and lakes). Charts depicting various biological, geological and geophysical, and hydrological data were also planned. To date, the Oceanographic Institute has produced 144 marine charts at various scales that include :

- Coastal Series Charts - consist of two subseries each of 37 chart areas. One subseries illustrates the bathymetry, the other the sediments on the continental shelf and most of the continental slope around New Zealand.
- Oceanic Series Charts - two subseries, each of 72 chart areas. One subseries illustrates the bathymetry, the other the sediments on the floor of the Tasman Sea and Southwest Pacific Ocean.
- Island Series Charts - cover the near-shore bathymetry around islands in the South Pacific Ocean and in the New Zealand region.
- Miscellaneous Series - These illustrate :
Charts
 1. the bathymetry of sediments of areas outside the scope of the other series;
 2. details of physical, chemical, and biological parameters;
 3. geological structure of the ocean floor;
 4. analyses and distribution of minerals in ocean-floor sediment.

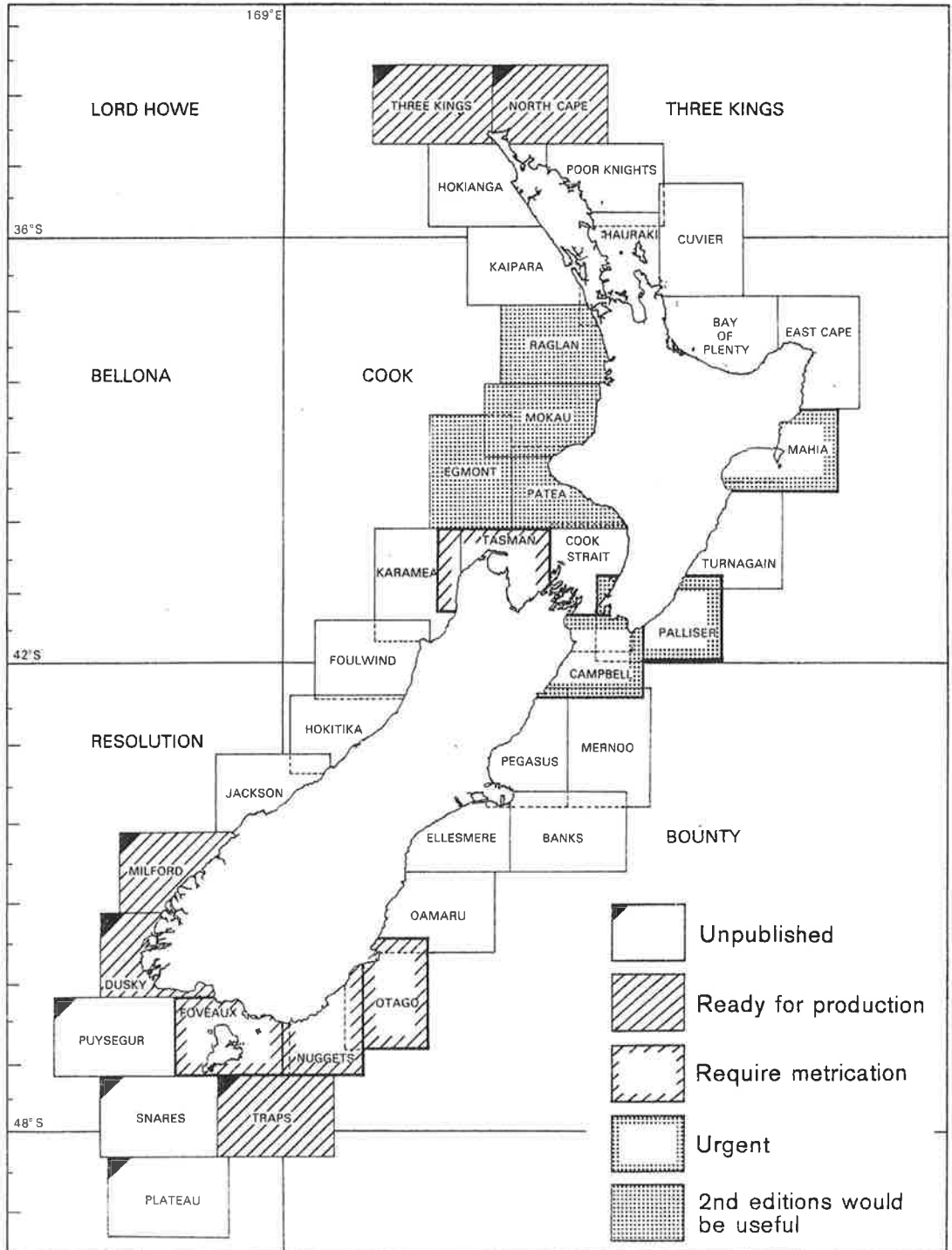
In late 1982 and early 1983, eight marine charts were published. The Bounty sediment chart (scale 1:1,000,000) saw completion of a trilogy of charts summarising sediment characteristics of the continental shelf and slope, and adjacent deep seafloor around mainland New Zealand. The chart also encompasses parts of the Chatham Rise with its potentially economic sedimentary deposits of phosphorite and glauconite. Thus the publication provides a valuable regional perspective of these deposits. Three charts dealing with the bathymetry of the South Pacific Islands of Penrhyn, Manihiki, and Pukapuka were published as part of New Zealand's commitment to the "Committee for Co-Ordination of Joint Prospecting for Mineral Resources in the South Pacific Offshore Areas" (CCOP/SOPAC). Scientific input to these publications was made jointly by staff from NZOI and regional offices of CCOP/SOPAC.

Scientific studies of shelf sedimentation off Northern Canterbury provided sufficient new information to warrant a 2nd edition of Pegasus bathymetry (1:200,000). Publication was timely in view of current interest in the New Zealand plate boundary, part of which is covered by the Pegasus area.

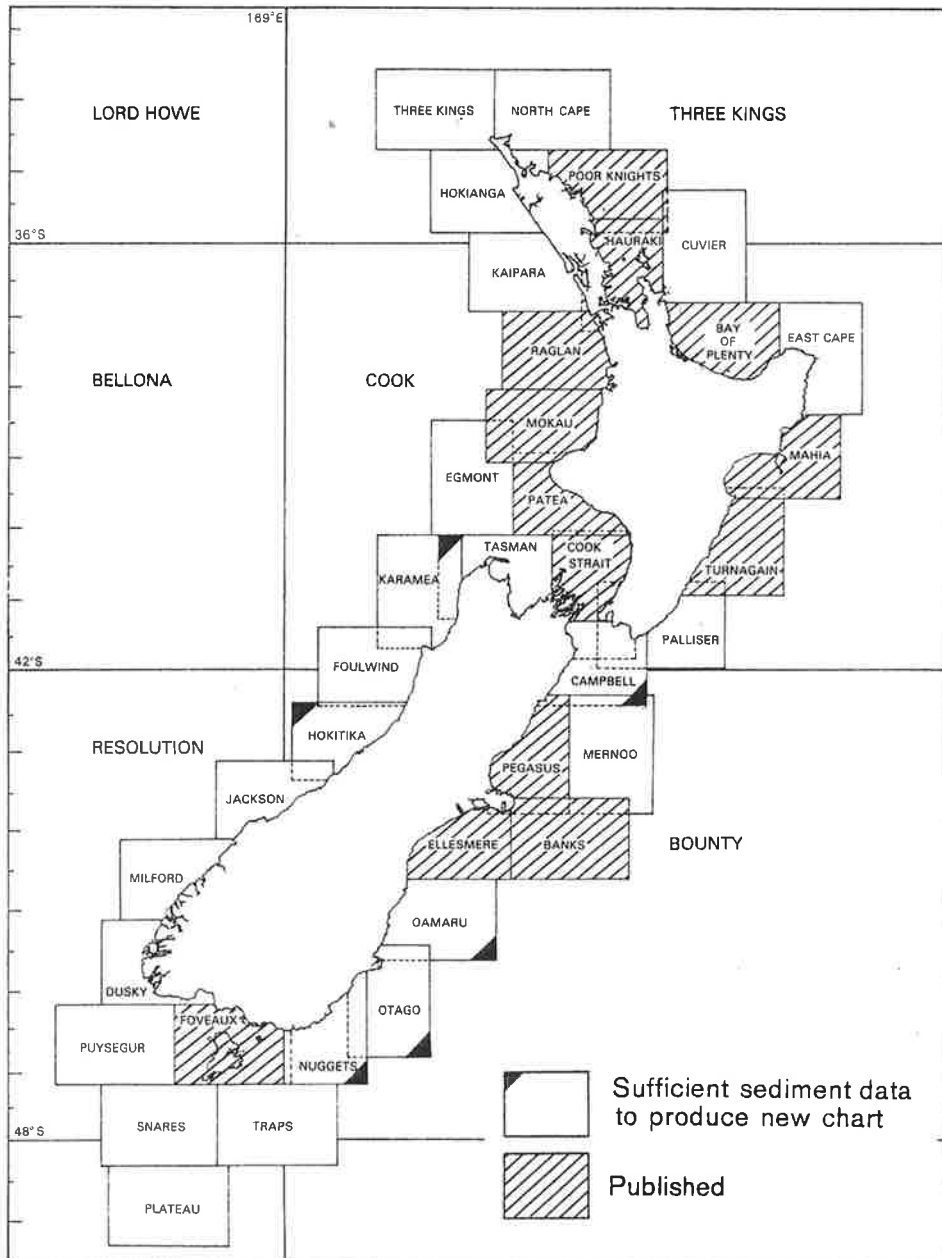
The completion of bathymetric charts of George Sound and Preservation Inlet meant that the fiord charting programme was well underway with seven fiords now charted and published, and another three in preparation.

L. Carter

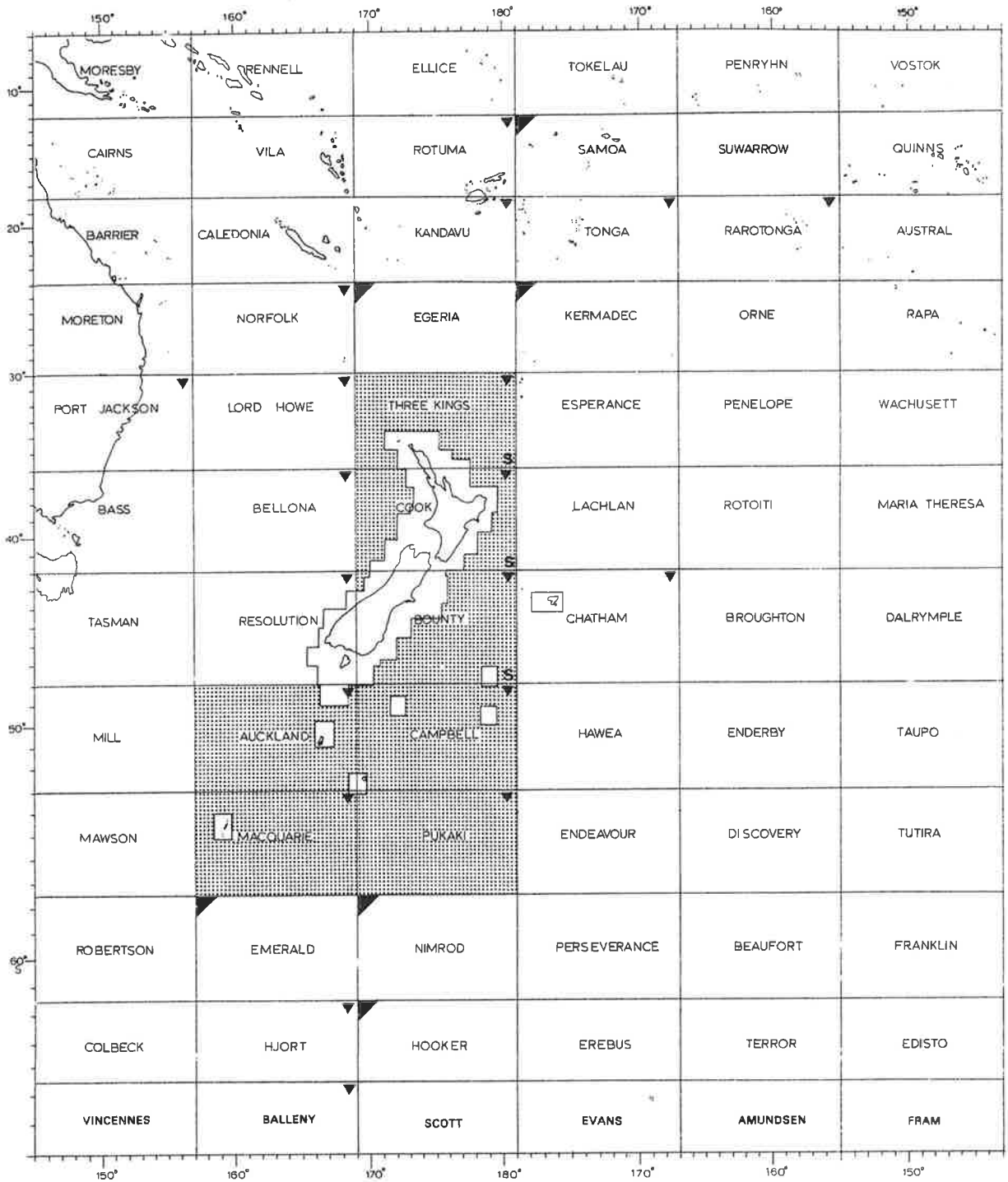
COASTAL BATHYMETRY



COASTAL SEDIMENTS



OCEANIC BATHYMETRY



Unpublished, but ready for production



2nd editions should be contemplated



Published

LAKE SURVEYS AND LAKE CHARTS

Sedimentation studies in South Island glacial lakes continue with seasonal surveys of Lake Benmore to establish patterns of sediment inflow, dispersion, and deposition in the man-made lake. This work provides new and comparative data with similar studies in the natural upper-catchment Lakes Tekapo and Wakatipu, studied since 1979, the results of which are now mostly published.

Resulting from these earlier investigations of Lake Wakatipu, which has a predominant headwater inflow, further studies of diurnal inflow patterns are being made. These patterns result from relatively high diurnal water-temperature changes caused by the inflowing water passing over extensive braided channels of the headwater rivers. Diurnal changes in sediment inflow contributes to these inflow patterns.

Fourteen bathymetric charts in the Institute's Lake Chart Series were published during 1982. Fourteen inland Canterbury lakes were surveyed and five bathymetric charts covering these are ready for publication.

J. Irwin

DIVING ACTIVITIES

The 1982-83 year saw a slight reduction in the number of cruises requiring the use of divers. A staff member attended the Public Service Diving Course in December 1982, increasing the size of the NZOI diving team from three regular members to four.

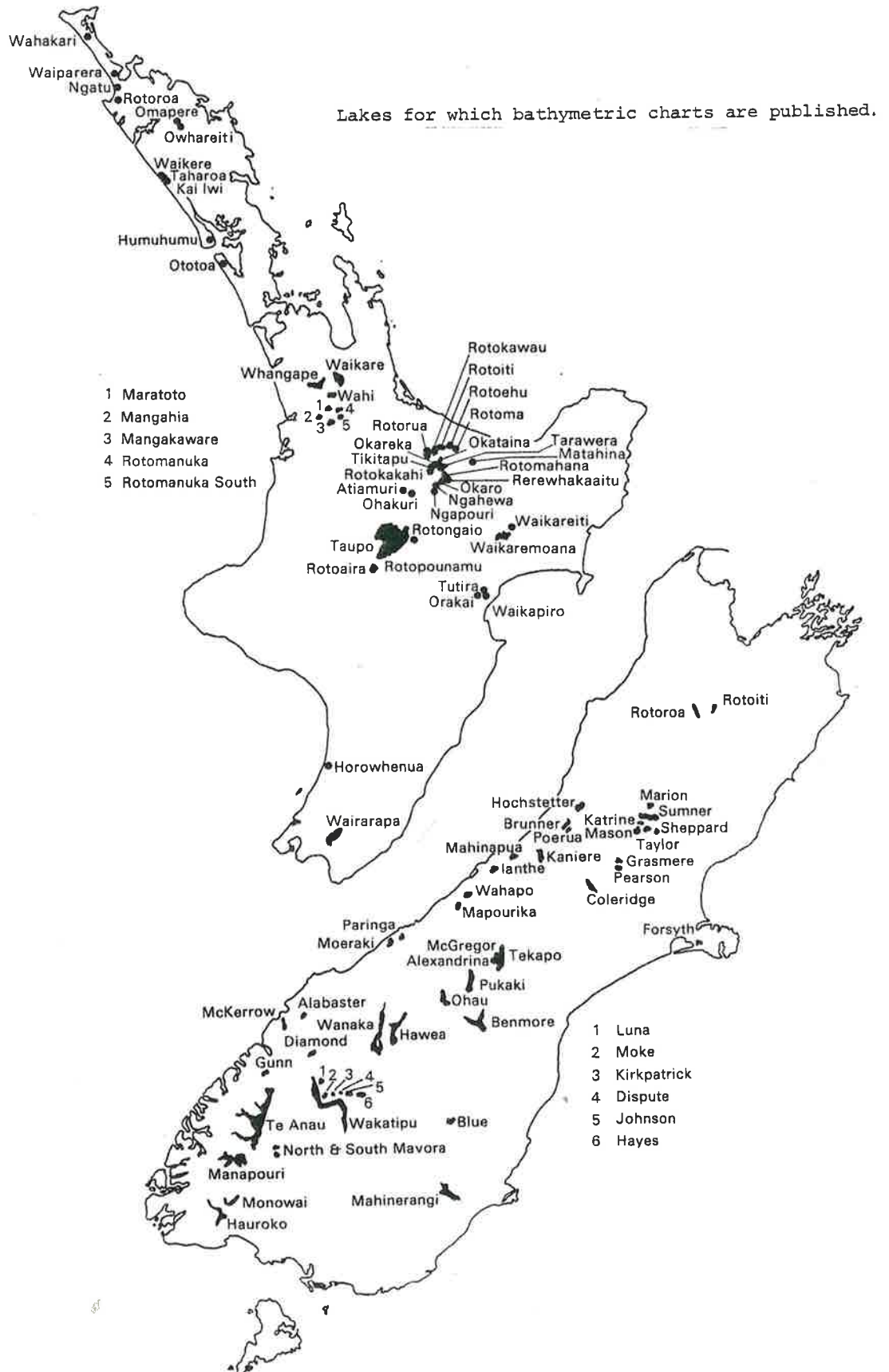
During April and May 1982, Institute divers were called on to help the Institute of Nuclear Sciences to find a gas leak in Cook Strait Power Cable No. 3. A series of dives was carried out up to 2.2 km offshore from Oteranga Bay, in depths of up to 40 m. Detectors were placed on the cable which recorded pulses of radioactive gas passing through it. In addition the cable was inspected over most of its length to 2.2 km offshore, and photographed at various locations. Diving at times on the outer part of the cable was most uncomfortable because of strong currents.

During the year a number of dives were carried out off the Greta Point reclamation in Evans Bay. A series of metal stakes was driven into the bottom off the south-east corner of the reclamation where it was suspected that erosion was taking place. Subsequent measurement of the stakes indicated the amount of erosion. An iron test platform placed 15 m deep and 100 m off the reclamation by R.V. Tangaroa was located. Underwater instruments for testing were attached to it and recovered.

A further cruise to investigate the fauna of Fiordland's underwater rock walls took place in July 1982. The majority of samples were taken by divers in spite of the weather conditions. Rain, wind, snow, and 4°C freshwater surface-layer temperatures were frequently encountered.

A cruise in February 1983 to the Marlborough Sounds resulted in some dives being carried out to investigate benthic communities in Pelorus and Queen Charlotte Sounds. At the end of the cruise, a tide gauge was recovered by divers.

R.J. Singleton



COMPUTING FACILITIES

DFMS owns three Digital Equipment Corp. PDP-11 minicomputer systems, one at Greta Point (NZOI), another at the Taupo Laboratory, and the third aboard R.V. Tangaroa. There are also four dedicated lines to the DSIR's National Computer Network from NZOI, and it is expected that the Taupo Laboratory will have two similar lines installed in the near future, with direct connection to the Palmerston North node of the Network.

The shipboard system is being used extensively for recording ship's tracks, navigational, and bathymetric data and planning is taking place for an upgraded system capable of handling all these operations automatically. These further enhancements are intended over the next few years as funds become available.

The shore-based system at NZOI is used for recovery and processing of data from digitally recording oceanographic instruments and for further processing of shipboard data; also for small-scale statistical and numerical computation. A considerable proportion of its usage is now recovering and processing digitally recorded instrument data for outside organisations as a revenue-earning operation with clients from other Government Departments, universities, local bodies, and private industry. In order to cope with this demand, the computer system is to be upgraded considerably in 1983 with a new processor and multi-user operating system with considerably greater power; this should relieve pressure on the system considerably.

The Taupo system is used primarily for processing of instrument data (particularly from an auto-analyser system), with some small-scale numerical computation. Enhancements to this are planned in 1983, with a new processor, increased memory, and hard-disc system.

Usage of the DSIR's centralised VAX computers is now consistently high, with large-scale scientific processing and software-package use taking place along with increased use by administration and the library.

With the help of vacation workers over the summer, NZOI has now set up a search-and-retrieval system for the Division's entire oceanographic station index, with cataloguing of the biological sample collection and further geological data to take place when vacation workers are available again for data entry at the end of 1983.

A.G. Cole

R.V. TANGAROA

During the 1982-83 financial year Tangaroa was fully employed throughout the period and spent 235 days at sea. Activities in physical oceanography, geophysics, mineral exploration, and marine biology required the vessel to operate in areas as diverse as the Southwest Pacific, Tasman Sea, Fiordland, and the Bounty Trough in support of both national and international research programmes. Other activities included the delivery of freight and urgent mail to Raoul Island.

Representatives of NZOI, Fisheries Research and Management Divisions of MAF, the Hydrographer RNZN, and Defence Scientific Establishment met in December to formulate joint research vessel programmes for submission to the Cabinet Committee on Science and Technology.

Days at sea according to principal user -

DMFS	191
Geophysics Division, DSIR	15
Victoria University	14
Canterbury University	15
	235

R.E. Williams

ACTIVITIES

During the period, approximately 30,000 miles were covered in the areas from north of the Fijian group to Stewart Island and from east of the Chathams to Australia. Valuable bathymetric data were collated aboard Tangaroa from many areas previously uncovered. Details of the cruises are given in the Table on the following pages.

During the annual survey in Auckland, extensive distortion in the strengthening of No.1 Double Bottoms in the foreward part of the hull was detected. Photographs and measurements were obtained for later comparisons. In February-March, further examination of the hull for structural damage indicated that repairs were needed and the annual survey was brought forward to May-June. At the same time a restriction was imposed on Tangaroa to limit her field of activities to north of Stewart Island. In May-June substantial repairs were carried out in No.1 Hold to strengthen the fore-part of the ship. Restrictions remained in force to date and, as yet, there have been no indications of any deteriorations. The area in the way of No.1 Double Bottoms is being constantly monitored and various measurements taken to assess any changes occurring in the area.

In 1982, Ian Park, one of the First Mates, left the vessel to resume shore duties. Consequently Doug. Teasdale was promoted to Mate and Peter Allison to Second Mate. Stephen Banks, ex Maritime Carriers took over the Third Mate's position. George Guthrie, who had been Second Engineer since 1973 retired early due to ill health and was replaced by another Scotsman, Jimmy McLean. John Parsloe completed another tour of duty on Benjamin Bowring and was on the vessel when she returned to London with the Trans-Globe Expedition.

Peter Scarrott

TABLE : Details of cruises of R.V. Tangaroa in its 10th year of operation,
1 April 1982 to 31 March 1983.

Cruise No.	Name of Cruise	Activity	Days at Sea*
1133	Southern Havre Trough NZOI : Imperial College London	Complete systematic survey of the nature and geochemistry of marine sediments in Havre Trough - Lau Basin with a view to finding metal-liferous sediments at the "back-arc spreading centre"; sediment sampling around White Island.	19
1134	West Coast III NZOI	Physical oceanography of West Coast, South Island; study of temporal variability of flow on West Coast; included current meter retrieval and deployment, tracking of radio buoy current drogues, retrieval and deployment of tide gauge at Jackson Bay, standard stations near current moorings and over Challenger Plateau.	15
1135	Fiji Phosphate NZOI : Florida State University	Distribution, geochemistry and geochronology of phosphatic sediments and phosphorite deposits on isolated seamounts, submarine ridges, shoals, and banks of the Tropical South Pacific; dating of phosphates and relating their distribution to past/present bathymetry, oceanography and geochemical conditions.	43
1136	Fiord Faunas '82 NZOI	Continuation of work on physical factors affecting black coral distribution and growth rates, influence of pruning, viability of transplants; estimation of biomass on fiord rock walls and sediment bottoms; feeding mechanisms, reproduction, distribution, and electrophoresis studies on brachiopods.	23
1137	Tasman Basin NZOI : Australian National Museum	Sampling deep-water benthic faunas and some environmental factors in the Tasman Sea between Wellington and Sydney; benthic faunas off Sydney on continental slope and abyssal plain in conjunction with Australian Museum; obtained brachiopod samples from off Sydney and from Stephens Hole.	31

* Includes departure date and arrival date

Cruise No.	Name of Cruise	Activity	Days at Sea*
1138	Bounty II Geophysics Division, DSIR	Geophysical survey of eastern Bounty Trough and southern flank of Chatham Rise to provide base for a study of the development of the Trough and data for mapping; seismic sonobuoy measurements over eastern Hikurangi Trough and northern flank of Chatham Rise to investigate nature of shallow 'oceanic' crust in region; detailed gravity and seismic measurements off Chatham Islands.	17
1139	Cook Strait Sedimentation NZOI	Evaluate sedimentary transport regime within Cook Strait; study Cook Strait canyons as sedimentary conduits; evolution of Cook Strait over past 20 ky; locate and evaluate effects of faults of N.Z. transform margin; current measurements in Cook Strait.	14
1140	Kaikoura Benthic '82 University of Canterbury Zoology and Geology Departments	Benthic fauna along transect from shallow to deep water; distribution and population biology of epibenthic hermit crabs; biologically active compounds from benthic invertebrates; taxonomy and distribution of benthic ostracodes; distribution and dynamics of sediments off Kaikoura; bottom-dwelling fish off Kaikoura for identification and for studies of muscle physiology.	16
1141	Seafloor Magneto- tellurics Victoria University of Wellington Physics Department: Scripps Institution of Oceanography	Detailed seismic and bathymetric survey of Cook Strait; laying of six ocean-bottom units containing magnetotelluric and ocean-bottom current sensors in Bay of Plenty to determine electrical conductivity of earth's crust and upper mantle; to relate this to temperature and structure of crust and upper mantle; to interpret this in terms of tectonic structure.	21

* Includes departure date and arrival date

Cruise No.	Name of Cruise	Activity	Days at Sea*
1142	West Coast IV NZOI	Detailed information on role of benthos in the West Coast upwelling system; in particular the part played by benthic organisms in the transfer of carbon from primary producers in the water column to the food resource available to bottom-feeding fish; to obtain supporting data on hydrology and surface production.	21
1143	Marlborough Sounds NZOI : Taupo Research Laboratory	Set up and test nutrient analyser and fluorometer for continuous nutrient and chlorophyll analysis; measurements of same in Sounds; study regional variability in composition and abundance of benthos in areas of significance to mussel production.	10

* Includes departure date and arrival date

FACILITIES AND SERVICES

LIBRARY

This year is notable for the merger with Freshwater Section, Ecology Division, and the additional responsibility this has meant, and a complete change of library staff.

New journal display shelving has been erected ensuring that research staff can more easily keep up to date with the most recent literature.

On-line bibliographic retrieval services have increased over the year and the introduction of INMAGIC - a Data Base Management System - and the anticipated arrival of a VT131 terminal will further streamline cataloguing and user services.

Considerable binding of journals was undertaken, though the cost of this continues to be restrictive. Interaction with other libraries remains high with 1125 interloan requests satisfied and 567 requests made by NZOI library.

Exchange records are being computerised for easier access.

Despite obvious advances in library services the lack of space is of real concern and weighs against the improved user services.

M.G. Hardy

EDITORIAL AND PUBLICATIONS

The Division of Marine and Freshwater Science annually produces a number of publications. From the Oceanographic Institute come various series of charts (see p. 21) as well as NZOI Records, Memoirs, Field Reports, Summaries, Miscellaneous Publications and Hydrology Station Data. File Reports are produced by the Taupo Laboratory.

During the calendar year 1982, 57 publications were produced by the Division (p. 119), not including 23 charts and 6 File Reports. Since its inception in 1954, the Oceanographic Institute alone has produced, to the end of 1982, directly or indirectly (including non-Institute staff working on Institute material) 1037 published papers and reports and 212 charts. All publications are available to the public, most being obtainable at cost. Charts, especially lake and coastal bathymetry charts, sell well and netted over \$4,700 during the 1982-83 year.

Memoirs, Charts, and NZOI Records are sent to 518 institutions. From most of these we receive, in exchange, valuable publications in the field of marine sciences which assist in maintaining our library's standing as a centre of excellence in this field. Some of the above publications are sent on a gift basis to smaller institutions, especially in the Third World, while a list of publications is sent on an information basis to 845 addresses (in 86 countries and dependencies). These include individuals as well as institutions.

D.P. Gordon

BIOLOGICAL COLLECTIONS

Since the establishment of the Oceanographic Institute in 1954, a significant quantity of marine biological material, mainly benthic, has been collected. The Institute has extensive collections of benthic animals from the Antarctic (especially from the Ross Sea and off the Balleny Islands), the New Zealand sector of the Subantarctic (the Campbell Plateau, the Macquarie Ridge and associated southern islands), from comprehensive benthic surveys of the New Zealand shelf and slope, and from the Southwest Pacific (including Tahiti, the Cook Islands, Tonga, and Fiji). There is also some planktonic and intertidal material. To date, over 5,000 biological stations have been sampled by the Institute.

In addition to the above samples, there is housed at the Institute a collection of 4,000 classical type slides of diatoms, prepared by workers from last century including van Heurk, Tempère, and Peragalo. The acquisition of this collection was a major addition to the New Zealand data-base for diatom research.

As a consequence, the Institute is becoming an increasingly important repository for types and figured specimens. A total of 597 taxa are represented by primary types (holotypes or paratypes). These may be borrowed but only in accordance with certain conditions. These are outlined in N.Z. Oceanographic Memoir 76 (1979) and are sent to people when they request a loan.

Previously, owing to the move to the new building, the collections were inaccessible. However, all collections, including types, are now available.

D.G. McKnight
E.W. Dawson

CURRENT-METER SERVICE-AND-REPAIR

The Oceanographic Institute currently has a service, repair, and calibration facility for all instrumentation used in oceanographic current-meter mooring deployments. This service is charged for in accordance with DSIR policy, and is being widely used by other government departments and private companies.

NZOI has found that deployment of instrumentation for long periods of up to two years in the ocean requires special expertise in mooring design and deployment, using reliable instruments. Considerable time and effort has been spent developing such expertise in this field, making full use of experience gained by other oceanographic organisations in the U.S., England, and Norway.

This has developed into a data-processing service where NZOI processes data tapes from instruments owned and deployed by other organisations who lack the facilities or expertise to do this efficiently. Over the past four years, NZOI has developed many computer programmes used in the analysis of current-meter data output, and is now recognised as having expertise in this field in being engaged to design and deploy instrument moorings on behalf of organisations which have suffered loss or damage to instruments or the loss of valuable data.

This facility will be enhanced in the near future when a high-pressure test vessel will be installed which will enable the testing of all instruments under simulated water-depth pressure before deployment. This will prevent loss or damage of instruments caused by flooding with seawater during deployment from ship.

B.S. Shakespeare

PUBLIC RELATIONS

The Division's public relations activities cover a number of avenues.

1. Handling requests for information

Enquiries come from many sources and several hundred are received by mail, telephone, or personal visits in the course of a year. These come from the media, school teachers, school leavers, parents, book publishers, sports and commercial fishermen, and representatives of clubs and societies.

The receptionist handles enquiries directly or routes requests for information to individual staff members or to the publications section. The latter mails out informative brochures, leaflets, and lists of publications and charts. A new list of all publications was produced in December 1982. The last such list was compiled in 1977.

2. Newspaper and magazine articles

These originate from press releases or from journalists seeking interesting copy. Gilbert Peterson (Head Office) also writes articles each year which feature the Division's research. Numerous articles appeared early in 1983, for example, featuring Hoe Chang's investigations of the "Nelson Slime" and the plankton blooms off Bream Bay. Other newspaper articles featured giant lithodid crabs, Cook Strait cable work, Marlborough Sounds surveys, the establishment of the new Division, and Norm Ridgway's address to the Ministry of Civil Defence concerning the Regional Tsunami Contingency Plan. Activities of Taupo staff were reported on by the Taupo Times.

Other articles appeared in Energy Conservation (the use of old crates and tins on tropical island biological research cruises) and Island Business News (seafloor research in the North Fiji Basin).

3. Radio and Television

Radio interviews occur from time to time when some divisional activity becomes newsworthy, or staff may be available to field questions on talk-back shows.

Television One's "Science Express", maintained correspondence during 1982 in preparation for 1983 programmes featuring SWISH, R.V. Tangaroa, and Chatham Rise phosphorite.

4. Lectures and talks

Staff members often give talks to schools, clubs and learned societies, and other groups. Groups addressed during 1982-83 included the Rotary Club of Courtenay Place, Nelson Branch of the Royal Society of New Zealand, New Zealand Marine Sciences Society, Pacific Science Congress, Ministry of Civil Defence, Naenae College, guests and staff of T.H.C.'s Milford Sound Hotel, and Plimmerton Rotary Club.

5. Tours

Although public open days are intended approximately every three years, visits by the public or organised groups occur fairly often. During 1982-83, over 240 such people visited the Oceanographic Institute building at Greta Point. Groups included pupils from Rongotai College, Samuel Marsden Collegiate School, Roseneath School, and Queen Margaret College; participants in the Junior Officers Common Training Course, RNZN; members of Rotoclub Paraparaumu; the Technology Section, Wellington Branch, Royal Society of New Zealand; and staff of Soil Bureau, DSIR.

Overseas visitors included the Chinese Science and Technology Delegation comprising Mr Huang Kunyi, Deputy Director of the Foreign Affairs Bureau of the State Scientific and Technological Commission of the Peoples Republic of China, and officials. A group from the Environmental Unit, Ministry of Energy, Philippines, included Mr P.E. Legaspi, Miss E.R. Collantes, and Mr A.R. Villamarzo.

A number of delegates to the XV Pacific Science Congress in Dunedin also visited the Institute.

6. Exhibits and Films

Photographic displays are periodically prepared by divisional staff. Most are first shown in the foyer of the Institute building and then may circulate to other parts of the Wellington area (e.g., Head Office, DSIR; Office of the Minister of Science and Technology; suburban libraries; banks), to Taupo, or elsewhere in New Zealand.

A colour display from the September 1981 cruise to the Cook Islands was sent in August 1982 to the Rarotonga Museum. Scanning electron micrographs and examples of bryozoans (lace-corals) were sent in November 1982 for exhibition in the Lands and Survey Department's Visitor Centre at Punakaiki, Westland.

Most displays are available on request for public display areas or exhibitions.

D.P. Gordon

WORKSHOPS

MARLBOROUGH SOUNDS OCEANOGRAPHY WORKSHOP

A one-day informal workshop on the Marlborough Sounds was held on 26 April 1982 at NZOI. The purpose was to review existing information and ideas about the hydrology and marine biology of the Sounds in order to determine what further information need be collected and the co-ordination of further data collection. Thirteen speakers gave information on the following topics :

- Physical oceanography of the Marlborough Sounds;
- Marine geology of the Sounds;
- Biological oceanography of the Sounds;
- General ecological studies in the Sounds;
- A simple model for studying estuarine eutrophication;
- Shellfish sanitation;
- Wind and spatfall predictions for farmed mussels;
- Mussel farming and productivity;
- Fisheries research and Sounds oceanography;
- Oceanography and forestry development;
- Maritime planning and the need for oceanographic data;
- Use of oceanographic data by the Commission for the Environment.

Following the above presentations there was a discussion of a number of points raised.

IN-HOUSE SEMINARS

During the year, in-house seminars are held at both NZOI and Taupo. These are contributed by staff or visitors and focus on work in progress or recently completed.

NZOI

1982	2 April	The undersea world of Palmerston Atoll K.R. Grange, NZOI
	16 April	Brachiopod pedicle morphology and behaviour J.R. Richardson, NZOI
	30 April	Remote sensing at NZOI E.J. Barnes, NZOI
	14 May	Sedimentation on the Marlborough continental shelf - a conflict between tectonism and flow L. Carter, NZOI
	28 May	Re-examination of block survey hydrologic data around New Zealand R.A. Heath, NZOI
	4 June	The seafloor around the Kermadec Islands R.J. Singleton, NZOI
	17 June	Results of a recent geological/geophysical cruise to the North Fiji Basin J.V. Eade, NZOI
	2 July	Ecological regions and districts of New Zealand, with emphasis on coastal ecology P. Simpson, Biological Resources Centre, DSIR
	30 July	Survey of the Cook Strait power cable K.R. Grange, NZOI
	13 August	Coastal erosion in California R.M. Norris, University of California, Santa Barbara
	27 August	Distribution of hard-shelled plankton around New Zealand D.A. Burns, NZOI
	3 September	Life in a Russian academic institute I. Beu, NZOI
	10 September	Biological bulldozers and the evolution of marine benthos C. Thayer, University of Pennsylvania
	14 September	A beginners guide to statistics and computers A.E. Aldridge, Applied Mathematics Division, DSIR
	24 September	Oceanographic contribution to the climate programme N.M. Ridgway, NZOI
	29 October	Computers and taxonomic identification R. Pankhurst, British Museum (Natural History), London
	5 November	Benthic fauna and sediments of the Tasman Sea K.R. Grange, NZOI

1983 4 March Field studies on Gough Island and Tristan da Cunha
C.H. Hay, NZOI

18 March Research facilities at U.S. geological institutions
K.B. Lewis, NZOI

TAUPO

1982 2 July Nitrogen cycling in forests with particular reference to
N-fixation and the role of mycorrhizae
Prof. W.B. Silvester, University of Waikato

30 July Planning in Taupo County with special emphasis on the Lake
Taupo Reserves Scheme
P. Crawford, Taupo County Council

17 September Water quality problems in Hong Kong
C. Lam, Environmental Protection Agency, Hong Kong

8 October Reservoirs : Hydraulic influence on physical, chemical and
biological processes
J. Priscu, Taupo

5 November The dynamics of growth, recruitment, and mortality in adult
Taupo trout
T. Stephens, University of Waikato

26 November Drying-out and recovery of Lake Chilwa, a large African
lake
C. Howard-Williams, Taupo

1983 28 January Hydraulics and water-layer movements in an Auckland
reservoir
R. Spiegel, Taupo

24 February Zooplankton grazing
R. Pridmore, MWD Hamilton Science Centre

OVERSEAS TRAVEL

G.W. Coulter	February 1982 - January 1984	Deputy Director, South Pacific Forum Fishing Agency, Honiara, Solomon Islands
D.J. Cullen	6-21 October 1982	Visited Florida State University, Tallahassee, the USGS in San Fran- cisco, and the East-West Center in Hawaii under the auspices of the US-NZ Co-operative Science Pro- gramme.
J.V. Eade	1-14 August 1982	Hawaii Institute of Geophysics, Hawaii, studying cores from the North Fiji Basin collected on the <u>Kana Keoki</u> during the joint Aust/ NZ/USA Tripartite Programme for CCOP/SOPAC.
D.J. Forsyth	July 1982	Attended the 8th International Symposium on Chironomidae, Jackson- ville, Florida, U.S.A.
G.P. Glasby	July-October 1982	Ten-week study leave to visit research institutions in West Ger- many and Britain.
R.A. Heath	17-18 February 1983	SCOR Working Group (74) meeting on the Southern Ocean at Lamont Doherty Observatory, Columbia Uni- versity, New York, U.S.A.
D.E. Hurley	August 1982 - October 1982	Attended Joint Oceanographic Assem- bly, Halifax, Nova Scotia British Museum (Natural History), London, England.
K.B. Lewis	March-November 1982	Study leave at the University of Texas Institute for Geophysics Marine Laboratory, Galveston, Texas incorporating visits to Scripps, USGS at Menlo Park, Halifax, AAPG in Park City, Utah, IGS at Leeds, England, and University of Tokyo, Japan.
	March-April 1983	CCOP/SOPAC Workshop on Concrete from Coral, Rarotonga, Cook Islands
R.A. Pickrill	1981 - October 1982	Study leave at the Pacific Geo- science centre, Vancouver Island, Canada, incorporating visits to the U.S.A.
J.R. Richardson	January-July 1983	Smithsonian Institution in Washing- ton, D.C., U.S.A. on a Fulbright Educational Award.
R.M.C. Thompson	14-28 February 1983	Suva, Fiji, for final compilation and preliminary editing of a co- authored bibliography "Geology and

		Geophysics of the Southwestern Pacific" with Dr C. Jouannic of the Technical Secretariat, CCOP/SOPAC.
W.F. Vincent	February 1982 - August 1983	Director of NSF-funded research programme at Lake Titicaca (Peru-Bolivia) through the University of California at Davis.
A.B. Viner	November 1982	SIL/UNEP Limnology and Water Resources in S.E. Asia and the Pacific : Sustainable Clean Water. Kuala Lumpur, Malaysia.

HONOURS AND AWARDS

Geoff Glasby	Fellowship from the Alexander von Humbolt Foundation to work in West Germany.
John Mitchell	Recipient of Kingma Award for 1982 (Geology Technician of the Year) from the Geological Society of New Zealand.
Dick Pickrill	Visiting Fellowship from N.S.E.R.C. Canada to visit the Institute of Ocean Sciences at Sidney, British Columbia, Canada.
Joyce Richardson	Fullbright Educational Award for study at the Smithsonian Institution, Washington, D.C.

VISITING WORKERS

NZOI

Dr Juliane Fenner	Visiting Deutscher Akademischer Austauschdienst (DAAD) Fellow, to study diatom taxonomy for the interpretation of Early and Middle Tertiary palaeoceanography, March 1983 to December 1983.
Dr Jurgen Sieg	Universität Osnabruck, Vechta, Federal Republic of Germany to study tanaid crustaceans, 20 July - 22 August 1982.
Dr P.K. Probert	NRAC Fellow, to work on marine benthic productivity for three years, 26 November 1981 - November 1984.
Prof. R.M. Norris	University of California, Santa Barbara, to work on Cook Strait shorelines, April - November 1982.

TAUPO

Dr John C. Priscu	University of California, Davis, for 18 months working on phytoplankton ecology.
Dr Kalevi Salonen	Lammi Biological Station, University of Helsinki, Finland, for six months to study seasonal and spatial changes in carbon content of zooplankton, to April 1983.
Dr Robert H. Spigel	Department of Civil Engineering, University of Canterbury, for one year working on lake hydrology.

OTHER VISITORS

Many day or short-term visitors from overseas toured the Institute during 1982-1983. These included delegations, visitors from research vessels (R.V. Admiral Vladimirsky, Glomar Challenger), and technologists and scientists visiting New Zealand institutions and/or attending conferences, (e.g., Pacific Science Congress).

Australia

Dr R.M. Carter	James Cook University, Townsville
Mr D.G. Keeley	
Mr David McEwan	Department of Science and Technology, Canberra
Dr W.J. McTaggart	

China

Tong Dalin (leader)	
Huang Kunyi	
Ma Guan	State Scientific and Technological Commission of the
Shi Guangchang	Peoples Republic of China
Zhang Dengyi	

Fiji

Dr Rob Burne	
Dr Ralf Carter	
Dr Gary Gauss	Committee for Co-ordination of Joint Prospecting for
Mr Cruz Matos	Mineral Resources in South Pacific Offshore Areas,
Dr Don Tiffin	Suva

France

Dr Yves Flessis	Muséum National d'Histoire Naturelle, Paris
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Japan

Mr Kazuma Hirai	Department of Civil Life and Environment, Shiga
Mr Hiroya Kotani	Prefectural Government Office
Dr Eiichi Honza	Geological Survey of Japan
Prof. Shoji Horie	
Dr Matsuo Koyama	Kyoto University
Dr Hiroshi Hotta	Japan Marine Science and Technology Center
Dr Motoji Ikeya	Yamaguchi University
Dr Fumio Ito	Tokyo Electric Power Company, Engineering R & D
	Center
Dr Kunio Omoto	Tohoku University

Philippines

Miss E.R. Collantes	
Mr P.E. Legaspi	Environmental Unit, Ministry of Energy
Mr A.R. Villamarzo	

Thailand

Dr Larry Machesky	ESCAP, Bangkok
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United Kingdom

Dr Ronald Hedley
Mr Richard Pankhurst

British Museum (Natural History), London

United States

Mr David Huey

Operations Manager, Deep Sea Drilling Project

Dr Gary Greene

U.S. Geological Survey, Menlo Park

Dr Richard Grigg

University of Hawaii

Dr Jim Kennett

University of Rhode Island

Dr Loren Kroenke

Hawaii Institute of Geophysics

Dr Brian Taylor

Dr David Lerner

University of California, Santa Cruz

Dr Ian MacGregor

Office of Scientific Ocean Drilling, National Science Foundation

Dr H.W. Menard

Scripps Institution of Oceanography

Dr M.J. Terman

U.S. Geological Survey, Reston

U.S.S.R.

Mr N. Akimushkin

Dr G. Michailovsky

Dr L. Ponamareva

Institute of Oceanology, Moscow

Dr Ianin

Soviet Embassy

Dr Igozhik

Dr Orlovsky

Institute of Geological Sciences of Ukrainian Academy of Sciences

Capt. L. Rud

R.V. Admiral Vladimirsky

OFFICES HELD

List of staff holding office in International Bodies, Scientific Societies, Committees, etc. 1982-83.

INTERNATIONAL BODIES

- L. Carter *International Union of Geological Sciences (IUGS)*
National representative, Commission for Marine Geology
- D.J. Cullen *International Geological Correlation Programme (IGCP)*
Project 156 (Phosphorites)
National representative/correspondent Working Group on
"Young Phosphogenic Systems" (UNESCO-IUGS)
- Society of Economic Paleontologists and Mineralogists*
Trace Fossil Research Group" with special interest in
animal/sediment relationships
- Editorial Board of*
Palaeogeography, Palaeoclimatology, Palaeoecology
- E.W. Dawson *Pacific Science Association (PSA) Scientific Committee on*
Coral Reefs
Chairman of Special Working Group on South Pacific Reefs
- 1983 Pacific Science Congress*
Convener of Coral Reef Section
- IABO Coral Reef Committee*
Member
- J.V. Eade *Committee for the Co-ordination of Joint Prospecting for*
Mineral Resources in South Pacific Offshore Areas (CCOP/
SOPAC)
Alternative New Zealand representative
- G.P. Glasby *Editorial Board of*
Marine Geology
- D.P. Gordon *International Association of Biological Oceanography*
(IABO-IUBS)
National Correspondent
- R.A. Heath *International Union of Geodesy and Geophysics (IUGS)*
1. Tsunami Committee
2. National Correspondent for International Association
for Physical Sciences of the Ocean (IAPSO)

- R.A. Heath *Intergovernmental Oceanographic Commission (IOC)*
1. WESTPAC - Technical Correspondent for Physical Oceanography
 2. WESTPAC - Chairman of Task Team on Coastal Continental Shelf Oceanography
 3. Member - Scientific Committee on Oceanic Research Working Group "General Circulation of the Southern Ocean"
 4. Member - Climate Changes in the Ocean Working Group on "Critical aspects of the T and S distribution"
- C. Howard-Williams *Editorial Board of*
Revue d'Hydrobiologie Tropicale
- D.E. Hurley *Intergovernmental Oceanographic Commission (IOC)*
Joint National Contact
- IOC/WMO - IGOSS Bathy/Tesac Operational Programme*
National Co-ordinator
- Scientific Committee on Oceanic Research (SCOR)*
New Zealand nominated member
- Advisory Editor*
Crustaceana
- K.B. Lewis *Intergovernmental Oceanographic Commission (IOC)*
New Zealand Correspondent on Geoscience for WESTPAC
- Japan - Australia - New Zealand Joint Indian - Pacific Plate Boundary Project*
New Zealand Scientific Co-ordinator
- Inter-Union Commission for the Lithosphere (ICL)*
Convener of National Committee for the Lithosphere
- J.R. Richardson *National Museum of Victoria*
Honorary Research Associate in Geology
- N.M. Ridgway *International Co-ordination Group for Tsunami Warning System in the Pacific (ICG-ITSU) (IOC)*
New Zealand National Contact
- Intergovernmental Oceanographic Commission (IOC)*
WESTPAC - Member of Programme Group
- A.B. Viner *Editorial Board of*
Revue d'Hydrobiologie Tropicale

NEW ZEALAND BODIES

J.M. Bradford	<i>N.Z. Marine Sciences Society</i> Secretary/Treasurer
	<i>Federation of N.Z. Biological Societies Steering Committee</i> Member
L. Carter	<i>National Committee for Geological Sciences</i> Convener
	<i>Scientific Ocean-Drilling Subcommittee of National Committee for Geological Sciences (IUGS)</i> Member
F.H. Chang	<i>Shellfish Sanitation Committee</i> Member
E.W. Dawson	<i>National Museum of New Zealand</i> Honorary Research Associate
J.V. Eade	<i>Royal Society of New Zealand</i> Expeditions Committee
	<i>National Committee for Geological Sciences</i> Member
D.J. Forsyth	<i>N.Z. Limnological Society</i> Secretary/Treasurer
K.R. Grange	<i>Wellington Shell Club Committee</i> Member
R.A. Heath	<i>National Committee for Geodesy and Geophysics</i> Member
	<i>N.Z. Marine Sciences Society</i> President
D.E. Hurley	<i>National Committee on Oceanic Research</i> Chairman
	<i>Royal Society of New Zealand</i> Honorary Librarian Chairman of Library Committee

D.E. Hurley	<i>Ross Dependency Research Committee</i> Appointed Member Convener, Biology Working Group
K.B. Lewis	<i>Scientific Ocean-Drilling Subcommittee of National Committee for Geological Sciences (IUGS)</i> Committee
P.A. Luckens	<i>N.Z. Ecological Society</i> Council <i>N.Z. Committee for Water Pollution Research</i> Member

INTERDEPARTMENTAL COMMITTEES

L. Carter	<i>Hydrographic Policy Working Party</i> Member
E.W. Dawson	<i>Outlying Islands Reserves Committee</i> Member
D.E. Hurley	<i>Hydrographic Policy Working Party</i> Member <i>N.Z. Journal of Marine and Freshwater Research</i> Chairman of Advisory Board
E. White	<i>Freshwater Fisheries Advisory Council</i> Member <i>Water Resources Council</i> Member <i>NWASCO - Research and Survey Committee</i> Member

PROJECT STATEMENTS

On the following pages 175 research projects are described. Listed below are those projects which were completed or otherwise terminated during 1982-83.

BIOLOGICAL OCEANOGRAPHY

- 75-2 Ross Sea - Balleny Islands Echinoderm Faunas
- 75-3 Manukau Harbour Littoral Monitoring
- 77-20 Brachiopod Biology
- 78-22 The Causes of Productivity Enhancement off East Cape
- 78-34 Ross Ice Shelf Under-ice Copepods
- 79-31 Fiordland Project
- 80-10 Effects of Light, Salinity, Temperature, and Nutrients on Growth and
 Photo-assimilation Rates of Four Phytoplankton Species
- 80-12 Mollusca of Bellona Reefs
- 80-15 Diatoms in Brachiopod Guts
- 81-10 Reactive Silicate in New Zealand Waters
- 81-14 Fine-structure of Mucilage-producing Phaeocystis pouchetii Cultured
 from the 1981 "Tasman Bay Slime"
- 81-16 Fauna of Bass Strait Carbonate Sediments
- 81-18 Chordariaceae (Phaeophyta) of New Zealand - a Revision
- 82-1 Marine Algae of the Kermadec Islands

MARINE GEOSCIENCE

- 76-4 Evolution of New Zealand's Submarine Topography
- 78-14 Distribution, Movement in Currents, and Use of Different Sediment
 Particles for Test Building in Tintinnids
- 78-19 Wellington South Coast Substrates
- 79-9 Sedimentation in the Bounty Trough
- 80-6 Diatom - Sediment Relationships in Rangaunu Harbour
- 80-7 Dump Sites on the New Zealand Continental Shelf

PHYSICAL OCEANOGRAPHY

- 75-1 Pelorus Sound
- 76-1 Internal Tides
- 78-2 Rangaunu Harbour - Physical Oceanography

- 78-8 General Tidal Studies
- 79-1 Tidal Energy Dissipation in Coastal Embayments
- 79-3 Catalogue of Tide Gauges in the Pacific Basin
- 80-3 Conductivity Temperature Depth (CTD) Instrumentation
- 81-11 Information Required for Environmental Assessment in Coastal Inlets
- 81-21 Eddies in New Zealand Waters
- 82-9 Bay of Plenty Currents

FRESHWATER RESEARCH

- 74-12T The Relationship Between Nutrient Load and Trophic Status of Lakes
- 74-15T Limnology of Lake Rotongaio
- 75-19T Population Dynamics of the Chironomid Polypedilum pavidus in Lake Rotongaio
- 76-11T Limnology of Opal Lake
- 77-14T Groundwater Phosphorus
- 77-21T Fractionation of Sediment Phosphate of Lakes
- 79-26T Water-quality Problems in Kinloch Marina
- 80-23T Septic Tank Studies
- 81-29T Invertebrate Faunas Subject to Geothermal Waters

BIOLOGICAL OCEANOGRAPHY

ECOLOGICAL FUNCTIONING

This comprises projects which include aspects of the structure of biological communities and their relationships to and interactions with their environment, whether physico-chemical (e.g., responses of phytoplankton to physical or nutrient properties of seawater), edaphic (e.g., animal/sediment relationships), or biotic (e.g., feeding of trophic interactions). These necessitate looking at planktonic, benthic, and intertidal systems as well as whole-organism biology.

PLANKTONIC RESEARCH

1. Studies focusing on the effects of the physical environment on the kinds and quantities of plankton organisms and the flow of material (e.g., carbon) through the system. These studies have potential fisheries applications.

78-22 The Causes of Productivity Enhancement off East Cape

This study was begun to explain a phytoplankton anomaly off East Cape which appears to be associated with a valuable winter fishery for southern bluefin tuna. The primary productivity study has now been completed and further work will look at warm-core eddy zooplankton (see 82-4).

J.M. Bradford
R.A. Heath
F.H. Chang
C.H. Hay

Duration of project : 1978-82

Progress 1982-83 : Completed. Using physical, chemical, and primary production data, the importance of warm-core eddies to productivity in New Zealand seas has been addressed.

Publications 1982-83 : Bradford, J.M.; Heath, R.A.; Chang, F.H.; Hay, C.H. 1982: The effect of warm-core eddies on oceanic productivity off north-eastern New Zealand. Deep-Sea Res. 29(12A) : 1501-16.

79-19 West Coast Project - Plankton

The west coast of South Island is the location of several developing fisheries. Although the offshore waters of the Tasman Sea are oligotrophic, coastal waters on which these fisheries depend are apparently much more productive. Initially, this project aims to describe the standing stocks of living organisms in various compartments of the ecosystem and the factors governing primary productivity, particularly the role of physical processes.

The project is a co-operative one, involving biologists, physicists, the Taupo Laboratory, Cawthron Institute, and MAF, and is being tackled from different aspects, e.g.

- | | |
|--------------------------|--------------------------------------|
| (a) the summer situation | |
| (b) the winter situation | (d) effect of submarine physiography |
| (c) upwelling processes | (e) modelling of the ecosystem |

J.M. Bradford
 F.H. Chang
 V.H. Wilkinson
 R.P. Baldwin
 B.E. Chapman

In association with : L. MacKenzie
 P. Gillespie
 Cawthron Institute, Nelson
 Physical Oceanography Section
 NZOI

Duration of project : 1979-1985

Progress 1982-83 : The winter phytoplankton studies have been completed and papers on phytoplankton standing stocks and primary productivity are in preparation.

With respect to upwelling processes, many of the C, N, and particulate C, N, and P samples from Tangaroa cruise 1144 are awaiting analysis at Taupo - much of this is dependent on the commissioning of new equipment.

Publications 1982-83 : Bradford, J.M. 1983: Physical and chemical oceanographic observations off Westland, New Zealand. N.Z. Jl mar. Freshwat. Res. 17(1) : 71-81.

Chang, F.H. 1983: Winter phytoplankton and microzooplankton populations off Westland, New Zealand, 1979. N.Z. Jl mar. Freshwat. 17(3) : 279-304.

79-34 Hard-shelled Plankton Survey Around New Zealand and the Southwestern Pacific

An analysis is being made of the changes in hard-shelled plankton from coastal/estuarine areas to deep-water areas, and the physical factors which cause these changes. At the same time the sediments beneath these areas are being analysed to see how the water-induced changes are mirrored in the sediments. Wherever possible the planktonic data are being related to the distribution of other organisms in the ecosystem.

D.A. Burns

Duration of project : 1979-87

Progress 1982-83 : In abeyance during secondment to The Treasury, though some progress has been made in writing-up.

80-9 Cook Strait Productivity

[In last year's Annual Report as "Relationships of Processes Bringing about Surface Nutrient Renewal to Phytoplankton Standing Crop and Primary Productivity in Cook Strait."] Cook Strait is an area of several kinds of fishing activity and appears to be a nursery area for the larvae of many species.

J.M. Bradford
 F.H. Chang
 V.H. Wilkinson

In association with : Dr Malcolm Bowman
 Dr Patricia Lapennas
 State University of New York
 Stony Brook, N.Y.

Duration of project : 1980-83

Progress 1982-83 : The relationships of processes bringing about surface nutrient renewal (including tidally induced mixing) to phytoplankton standing crop and primary productivity have been investigated and manuscripts drafted.

80-19 Antarctic Studies on Phytoplankton

The populations and dynamic changes in phytoplankton of the Ross Sea and particularly McMurdo Sound are being investigated to assess the survival of phytoplankton during formation and melt of the seasonal ice.

D.A. Burns

Duration of project : 1980-8?

Progress 1982-83 : In abeyance during secondment to The Treasury.

81-3 Wellington Harbour Seasonal Plankton

This study is planned to evaluate the effects of winds on the harbour zooplankton and phytoplankton and will be specifically oriented to understand the causes of the blooms of red micro-organisms regularly observed there.

F.H. Chang
 J.M. Bradford

Duration of project : 1981-84

Progress 1982-83 : This project has been delayed because of higher-priority work.

82-4 Warm-core Eddy Zooplankton

This work stems from project 78-22 ("The Causes of Productivity Enhancement off East Cape").

J.M. Bradford
 B.E. Chapman

Duration of project : 1982-85 (unless accorded higher priority)

Progress 1982-83 : All major taxonomic groups have been separated. Copepods, from a small number of stations, and salps have been identified and counted.

83-1 Prymnesium from the 1983 Northland Phytoplankton Blooms

Extensive fish mortalities related to Prymnesium parvum have been widely reported from northern Europe to the Middle East, particularly Israel. A very similar golden-brown phytoflagellate has been recorded for the first time in a recent phytoplankton bloom off Northland. Although there is no direct evidence to suggest an association of the reported fish kills with the appearance of Prymnesium with the recent events, this project aims to study the possible link between fish mortality and the toxic mechanism of this organism.

F.H. Chang
R.P. Baldwin

Duration of project : 1983-84

Progress 1982-83 : This project began in February 1983, in response to requests made by Fisheries Management Division of MAF in Auckland and Whangarei, to investigate the cause of fish mortalities during a heavy phytoplankton bloom in Bream Bay and the Coromandel area. A golden-brown phytoflagellate was found in the original samples received by NZOI. SEM and TEM studies undertaken at PEL have revealed that this is an undescribed species of Prymnesium. A single-species culture has been established.

2. Studies on the physiological ecology and structure of planktonic organisms which will give a more detailed understanding of how they interact with the natural environment.

81-10 Reactive Silicate in New Zealand Waters

In subantarctic waters and coastal waters around New Zealand, silica, necessary for diatom growth, is often not in good supply, but rivers may introduce silica into the sea. The source of reactive silica and its significance for phytoplankton production and population composition are worth investigating.

J.M. Bradford

Duration of project : 1981-82

Progress 1982-83 : A survey of existing data revealed that little information is available. This project has now been abandoned in favour of higher-priority work.

81-13 Interacting Effects of Light, Temperature, and Salinity on Growth of two Hypersaline Dunaliella Species from Lake Grassmere

The two phytoflagellate species Dunaliella salina and D. euchlora (Order Volvocales) have outstanding tolerance and adaptability to a very wide range of salinities. They are the principal food of the brine shrimp Artemia. This study has a commercial potential relating to the exploitation of Artemia growing in the lake. (Incorporating project 80-10.)

F.H. Chang

In association with : Dr Bob Wear
Zoology Department
Victoria University of Wellington

Duration of project : 1980-83

Progress 1982-83 : Laboratory work completed and a paper being drafted. Another phase of this study (80-10), studying the effects of light, temperature, salinity, and nutrients on growth of four other phytoplankton species has been discontinued because of higher-priority work.

81-14 Fine-structure of Mucilage-producing Phaeocystis pouchetii, Cultured from the 1981 "Tasman Bay Slime"

Massive occurrences of a mucilage-producing organism severely affected fish catches and the livelihood of fishermen in Tasman Bay. Overseas reports of slime outbreaks have repeatedly implicated the non-motile form of Phaeocystis pouchetii. The 1981 Tasman Bay slime outbreak has also involved this colonial form of the organism. This project aims to study the fine-structure of the colonial non-motile form in order to understand the mucilage-producing mechanism.

F.H. Chang

Duration of project : 1981-82

Progress 1982-83 : Completed. A paper on the ultrastructure of the non-motile colonial form of P. pouchetii is in preparation.

Publications 1982-83 : Chang, F.H. 1983: The mucilage-producing Phaeocystis pouchetii (Prymnesiophyceae), cultured from 1981 "Tasman Bay Slime". N.Z. Jl mar. Freshwat. Res. 17(2) : 165-68.

3. Studies on planktonic organisms in trophic relationships.

80-15 Diatoms in Brachiopod Guts

An investigation of the feeding habits of brachiopods to assess which phytoplankton organisms are being ingested from seawater.

D.A. Burns
J.R. Richardson

Duration of project : 1980-82

Progress 1982-83 : This project has been terminated upon the retirement of JRR.

83-2 Isolation of Dinophysis fortii from Marlborough Sounds

Toxicity tests of mussels, conducted overseas, have shown that Dinophysis fortii is the causative organism for diarrhetic shellfish poisoning. This is a new type of shellfish poison and a new term "diarrhetic shellfish toxin" (D.S.T.) has been adopted. This project is initially aimed at establishing a unialgal culture of Dinophysis fortii for obtaining a toxin standard against which the bioassay is measured.

F.H. Chang

Duration of project : 1983-84

Progress 1982-83 : This project started in March 1983 in response to a request made by the Shellfish Sanitation Committee to develop a single-species Dinophysis fortii culture. An arrangement has since been made with the National Health Institute to air-freight samples from the Marlborough Sounds to NZOI at fortnightly intervals. This project will continue until the desirable organism, D. fortii, is isolated for unialgal culture.

SEAWEED RESEARCH**81-18 Chordariaceae (Phaeophyta) of New Zealand - A Revision**

A systematic revision of the New Zealand members of the brown algal family Chordariaceae has been undertaken because of problems apparent in their treatment in Lindauer et al. (1961).

W.A. Nelson

In association with : Miss N.M. Adams
National Museum
Wellington

Duration of project : 1981-82

Progress 1982-83 : Completed. Paper published.

Publications 1982-83 : Nelson, W.A.; Adams, N.M. 1983: A taxonomic revision of the families Chordariaceae and Chordariopsidaceae (Phaeophyta) in New Zealand. N.Z. J Bot. 21(1) : 77-92.

82-1 Marine Algae of the Kermadec Islands

The algal flora of the Kermadec Islands was poorly known. The purpose of this project was to make systematic collections around these islands, especially subtidally, so that an updated account of the flora could be prepared. The composition of the algal flora of the Kermadecs is of great interest because of the mixture of tropical and northern New Zealand elements found there.

W.A. Nelson

In association with : Miss N.M. Adams
National Museum
Wellington

Duration of project : 1982-83

Progress 1982-83 : Completed. A paper is in press.

Publications 1982-83 : Nelson, W.A.; Adams, N.M. (in press): Marine algae of the Kermadec Islands. N.Z. J Bot. 21.

82-2 Littoral and Infralittoral Ecology of New Zealand's Southern Islands

There is a dearth of information on the identity, ecology, and biogeography of the marine fauna and flora of New Zealand's subantarctic islands, which makes it difficult to assess any environmental impact in this area. Many samples have been taken by NZOI from this region, which need only to be worked up, however work will be concentrated on the algal flora.

C.H. Hay

In association with : Miss N.M. Adams
National Museum
Wellington

Duration of project : 1982-84

Progress 1982-83 : Approximately 3,000 specimens of marine algae have been examined at the National Museum and at the herbarium of Botany Division, DSIR, Lincoln. From these, data have been compiled

on the distribution and seasonality of the various species. A checklist will soon be compiled for each of the subantarctic islands.

82-3 Marine Ecology of South Atlantic and South Indian Ocean Subantarctic Islands

Most papers concerning the marine biogeography of the so-called Southern Ocean are fairly superficial, and a number contain factual errors. This is mainly because most marine biologists are unable to make personal observations and studies on a wide variety of the oceanic islands that are dotted around the Southern Hemisphere between the convergence zones. The inaccessibility of these islands and the southern coast of Chile effectively prevents biogeographers from making detailed comparative studies based on their own observations.

It is hardly surprising therefore, that some circumpolar species are recognised as different species, or even genera, in different sectors of the Southern Ocean. It is also the reason why there are very few comparative ecological papers on the near-shore marine life of the region.

Biological collections from many of these islands are also difficult to study, since many are scattered in Europe and North America.

NZOI is the only research institute in the world with a comprehensive collection of the marine flora of islands like Marion and Gough, which now allows a comparison of this flora from subantarctic islands, from both sides of the Southern Hemisphere, that straddle the convergence zones.

C.H. Hay

Duration of project : 1982-84

Progress 1982-83 : Two papers have been submitted for publication, one concerning the beds of Macrocystis at Marion Island, and the other concerning the distribution of Durvillaea at Marion, Gough, and the New Zealand Chatham Islands. A much larger paper on the marine flora and fauna of Gough Island is in the early stages of preparation.

BENTHIC RESEARCH

Studies focusing on the structure and diversity of benthic communities and their relationships with the underlying substratum and the overlying water column, and nutrient pathways between the levels. These studies, from the points of view of methodology and access, are divided naturally into inshore, shelf and slope, and deep sea.

1. INSHORE

69-3 Coral Reef Ecosystems in the Southwest Pacific

Comparative zoogeographical analyses are being made of hermatypic coral genera and associated faunas across biological and physical gradients from Tonga and the Cook Islands to the southern limits of reef-building corals at the Kermadec Islands. Practical applications of such studies will be towards documenting islands in the Cook Group which have been designated reserves as "Islands for Science" under the auspices of the International Council for the Preservation of Nature,

as well as allowing comparisons of non-exploited with heavily pressured islands and generally adding to the knowledge of the basis of biological productivity of these particularly rich ecosystems so important in the economy of Man in the Pacific.

E.W. Dawson

In association with : Dr D.R. Stoddart
Department of Geography
University of Cambridge, U.K.

Duration of project : 1969-1987

Progress 1982-83 : Some working-up of material from the northern Cook Islands was undertaken - generally deferred while other work is completed.

75-3 Manukau Harbour Littoral Monitoring

The purpose of this project is to investigate seasonal, short-term and long-term variation in littoral macrobenthic communities and their relationships with sediments, and to develop a method to separate natural fluctuations from man-induced changes.

K.R. Grange

Duration of project : 1975-83

Progress 1982-83 : Completed. A final publication, incorporating a large volume of data and graphs remains to be published. Two bibliographic and three research papers stemming from this study have already been published.

Publications 1982-83 : Grange, K.R. 1982: Macrobenthic communities at possible combined-cycle power station sites in Manukau and Waitemata Harbours, Auckland. NZOI oceanogr. Summ. 19 : 20 p.

79-29 Rangaunu Harbour Faunal Survey

The purpose of this project is to assess the impact of proposed development on the estuarine ecosystem, and to provide a quantitative appraisal of the existing ecology for use in the Northland Harbour Board's planning policy of the harbour.

K.R. Grange
P.W. Anderson
R.J. Singleton

Duration of project : 1979-84

Progress 1982-83 : The initial sorting of species has been completed by PWA, with final sorting and identification to be completed. Data analysis (RJS) and subsequent interpretation remain.

79-31 Fiordland Project

This work aimed to compare the biotic communities of the vertical rock faces of fiords. The 17 areas that have been examined have been compared also to fiords in other parts of the world and variations in composition of communities are able to be correlated with aspects of the physical environment. Monitoring of growth rates of protected

black coral and other rock-wall fauna is in progress. The black coral work will continue as a separate project.

J.R. Richardson
K.R. Grange^s
R.J. Singleton
P.J. Hill
W.deL. Main
P.W. Anderson

Duration of project : 1979-82

Progress 1982-83 : Completed. Data are now being compiled for the final publications, including an assessment of the impact of development on Milford Sound.

80-14 Hawke Bay Invertebrate Communities

The purpose of this project is to identify the major invertebrate communities in Hawke Bay from data collected on past cruises. Parts of Hawke Bay have dense faunas and are popular fishing grounds.

K.R. Grange
D.E. Hurley
P.W. Anderson

Duration of project : 1980-84

Progress 1982-83 : No progress - this work is not high-priority. Taxonomic changes have to be incorporated.

81-6 Shallow Rock-wall Communities

A repeatable method is being developed to study, quickly and reliably, quantitative aspects of community structure with depth in relation to physical factors, using scuba and photography of underwater quadrats.

K.R. Grange
R.J. Singleton

Duration of project : 1981-83

Progress 1982-83 : Initial analysis of quadrats is almost completed. A paper was presented at the Offshore Islands of Northern New Zealand Symposium in Auckland.

Publications 1982-83 : Grange, K.R. (in press): Species diversity of shallow rock-wall marine communities in northern New Zealand. In "The Offshore Islands of northern New Zealand. Proceedings of a symposium convened by the Offshore Islands Research Group in Auckland, 10-13 May 1983". Lands & Survey Department, Wellington.

82-5 Regional and Seasonal Variation in Water Quality and Benthos of the Marlborough Sounds

This project will study regional variability and standing crop in the Marlborough Sounds benthos as a contribution to the base-line data accumulating on the sounds ecosystems.

C.H. Hay

Duration of project : 1982-85

Progress 1982-83 : One cruise has yielded summer data. Another summer cruise and one in the winter of 1984 will give comparative data.

2. SHELF AND SLOPE

69-4 Distribution of New Zealand Benthic Bivalves

This study involves surveying and documenting the benthic bivalves, their distribution, and abundance. The shells which persist after the death of the animal preserve a record of age, size, and sometimes the cause of death. The size-frequency distribution of live animals and/or dead shells is related to the biology, including the rate of turnover. [This was listed in previous Annual Reports as project 68-1, but it was actually begun in 1969.]

P.A. Luckens

Duration of project : 1969-85

Progress 1982-83 : Detailed analysis of Tawera from Macquarie Island is nearing completion.

74-1 Chatham Rise Benthos

The role of the benthos in this resource-significant area is being studied, initially through descriptions of distributions, then by considering benthic processes.

E.W. Dawson

Duration of project : 1974-86

Progress 1982-83 : A report on the likely impacts of phosphorite mining was completed. Faunal data already collected from the Rise are being analysed in current laboratory work.

Publications 1982-83 : Dawson, E.W. (in press): The benthic fauna of the Chatham Rise : an assessment of possible effects of phosphorite mining. Geol. Jb. D52.

75-5 Cold-Water Coral Banks in the New Zealand Region - Their Occurrence and Significance

Coral structures, well-known in the North Atlantic in relation to fishing activities, form "oases" of high productivity in surrounding oligotrophic uniform deep-sea bottoms. Many species of invertebrates are peculiar to this habitat which has fossil analogues, in the New Zealand Tertiary, in the Wairarapa coral thickets. Their form and extent are being examined by side-scan sonar and photography. [This project is now part of 74-1 (above).]

E.W. Dawson

Duration of project : 1975-83

Progress 1982-83 : Coral patches on the Chatham Rise were analysed from videotapes made during the Sonne phosphorite cruise. Sounding records from off the Auckland Islands have been studied for a re-examination of the original coral bank of D.F. Squires.

77-19 Canyon Faunas

Submarine canyons are peculiar deep-sea environments. Investigations of their sediments and fauna suggest that their spatial and temporal variability is much greater than the typical ocean floor beside them. Instability of the sedimentary environment appears to prevent the success of assemblages normally found on continental shelves and slopes yet they seem to be the centre of aggregations of fish of commercial interest due perhaps to the concentrations of organic debris or to their topographic heterogeneity. Preliminary examinations have been made of the topography and benthic associations in the Cook Strait and Hokitika Canyons as well as some attempts towards photography and zonation studies in conjunction with studies on coral banks also found on canyon edges.

E.W. Dawson

Duration of project : 1977-8?

Progress 1982-83 : No progress. Deferred while other work is completed.

78-23 Bathyal Fauna of the Exclusive Economic Zone (EEZ)

Faunal composition, zonation, diversity, and trophic relationships of the bathyal fauna of the EEZ.

This project seeks to determine the role played by the larger bottom-living marine invertebrates in the ecosystems of which the fisheries and other exploitable resources of the EEZ form a major part and in the productivity and predictability of marine biological resources generally.

E.W. Dawson

Duration of project : 1978-8?

Progress 1982-83 : Analysis of shelf distributional patterns of macro-invertebrates, notably crabs, molluscs, and echinoderms, has been proceeding. No work was done on food-value estimations (as caloric values and pyrolysis mass spectrograms) except for familiarisation with the literature and discussions with those experienced in the techniques. Some distributional records are being prepared for publication.

81-16 Fauna of Bass Strait Carbonate Sediments

The restricted physical conditions in which these sediments are deposited, and the presence of faunas of low diversity, provide a basis for -

- (i) documenting Recent analogues of the Tertiary limestones of New Zealand and Australia;
- (ii) differentiating factors governing the distribution of marine animals by comparative studies of specialised faunas from other restricted environments.

Study of faunas from carbonate and terrigenous sediments may provide a tool for predicting benthic faunas in relation to their environment.

J.R. Richardson
P.W. Anderson

Duration of project : 1981-83

Progress 1982-83 : Completed. One paper is in press and two others are being prepared, i.e., Indicator faunas of carbonate sediments; Revision of the brachiopod family Magadinidae.

Publications 1982-83 : Richardson, J.R.; Anderson, P.W. (in press): Substrates of Recent brachiopods from Australia and New Zealand. N.Z. Jl Zool. 10.

81-17 West Coast Project - Benthos

A preliminary assessment is being made of the role of the benthos in the coastal upwelling system off the west coast of South Island, particularly the part played by benthic organisms in the transfer of energy from pelagic production to bottom-feeding fish.

P.K. Probert
J.M. Bradford
P.W. Anderson
R.P. Baldwin
B.E. Chapman
R.J. Singleton

Duration of project : 1981-85

Progress 1982-83 : Benthic macrofauna from the 1982 summer cruise is now mostly identified (about 300 taxa to date) and a start will soon be made on an analysis of the structure of the shelf and upper-slope communities. During the 1983 summer cruise, replicate box-core samples will be taken to obtain estimates of macrofaunal and meiofaunal biomass, sediment ATP, and for sediment analysis. During the same cruise an Agassiz trawl and remote underwater camera will be used to survey the larger epifauna of the shelf and upper slope, and a quantitative analysis of this material is proceeding. Sediment data from the 1982 and 1983 cruises will be incorporated into a manuscript describing the sedimentary environment of the area (in association with K.M. Swanson, Department of Geology, University of Canterbury).

3. DEEP-SEA

81-4 Abyssal Fauna and Environment

This project aims to assess the fauna, its patterns of distribution, and correlated environmental parameters for the deep sea. The idea is being pursued that hydrological data may indicate differences in environments and, hence, pin-point particular locations for sampling. NZOI has about 20 stations at abyssal depths - most of the New Zealand region and Southwest Pacific is virtually unexplored.

D.G. McKnight
W.deL. Main
R.J. Singleton

Duration of project : 1981-85

Progress 1982-83 : One cruise was conducted in 1982. This project has been discontinued. Shallow-water studies are considered to be more useful.

WHOLE-ORGANISM BIOLOGY

Studies on the morphology, anatomy, physiology, and ecology of marine organisms in relation to the environment in which they live.

77-20 Brachiopod Biology

Basic studies have been conducted on the taxonomy, comparative anatomy, ecology, and biochemistry of brachiopods, partly in relation to their environment. A variety of projects have involved different people.

J.R. Richardson
W.deL. Main

In association with : R. Mineur
I. Stewart
Monash University, Melbourne

A.E. Aldridge
Applied Mathematics Division, DSIR, Auckland

G. Lyon
Institute of Nuclear Sciences, DSIR, Lower Hutt

W.A. Hoverd
Victoria University of Wellington

P.J. Smith
Fisheries Research Division, MAF, Wellington

D. Crump
Chemistry Division, DSIR, Lower Hutt

Duration of project : 1977-83

Progress 1982-83 : Completed. Several papers have been published or are in press or in preparation.

Publications 1982-83 : Richardson, J.R. 1982: Survivors of a glorious past. B.P. Recorder 173 : 8-12.

Lyon, G.L.; Richardson, J.R. 1983: Non-terrestrial food source for Fiordland brachiopods : carbon isotope evidence. Inst. Nuclear Sci. (N.Z.) Rep. INS-R 317 : 15 p.

Richardson, J.R. 1983: Brachiopoda. In Brownsey, P.J.; Baker, A.N. (eds) "The New Zealand Biota - what do we know after 200 years?". Nat. Mus. N.Z. Misc. Ser. 7 : 72-73.

Richardson, J.R. (in press): Free and mobile brachiopods from New Zealand Oligocene deposits and Australian waters. Alcheringa.

COMPOSITION OFTHE NEW ZEALAND MARINE FAUNA AND FLORA

Research projects under this heading identify the components of marine communities, whether in open water or on rocky walls or on shores or the seafloor. Lacking the long historical background of identification of marine faunas and flora of the Northern Hemisphere, and possessing a considerable length of coastline and a large area of continental shelf, New Zealand has had to make do with less systematic effort for a substantially larger task, especially with the establishment of a 200-mile resource zone.

From its inception, NZOI recognised the need to survey and document the marine fauna of the New Zealand region. Knowledge of the composition of the fauna and the distribution and abundance of key species is of interest to such matters as the geological history and biogeographical relationships of the fauna of the Pacific, but this information also provides the essential background for studies in other fields and the controlled exploitation of species with commercial potential.

The general survey of New Zealand, including the offshore region from about 20-1500 m, has been completed by NZOI. Only the area deeper than about 1500 m remains to be surveyed on a general basis but a start has already been made.

The many thousands of biological samples now held at NZOI form the raw data of such faunal studies, and represent an outstanding collection of national importance unrivalled elsewhere in its supporting environmental information. The practical objective of the survey is to have this information readily available and disseminated in the form of the NZOI Memoirs of the "Marine Fauna of New Zealand" series as well as in smaller scientific papers where appropriate.

Notable is the widespread co-operative effort, involving many distinguished workers from overseas or other New Zealand institutions, who, collectively, have done the larger proportion of systematic and biogeographical analysis. Where NZOI staff have expertise, they also provide systematic input.

69-2 Deep-sea Brachiopods

The deep-water Brachiopoda of the New Zealand region are of very great interest biogeographically, especially in relation to the increasing amount of information steadily becoming available from deep-sea expeditions of the USSR and United States. The extensive collections made by NZOI are furnishing important material for descriptions of new species, extensions of records made as long ago as HMS Challenger's pioneer dredgings of 1874, and biogeographical relationships to other parts of the world.

E.W. Dawson

Duration of project : 1969-85

Progress 1982-83 : Draft descriptions have been made of new species of Dallina, Terebratulina, and deep-water fossil Liothyrella from southern New Zealand. Deferred while awaiting more material and completing other projects.

70-1 Lithodid Crabs of New Zealand and the Pacific

The family Lithodidae, typified by the king crabs of Alaska, is widespread in deep waters of the Pacific and southern oceans. A study of the systematics, ecology, and fisheries potential of the four New Zealand species is providing much of importance to the world-wide interest in the commercial exploitation of this group.

E.W. Dawson

In association with : Dr J.C. Yaldwyn
National Museum, Wellington

Duration of project : 1970-84

Progress 1982-83 : Two papers, one completed, the other requiring a small amount of additional work, describe new or incompletely known species. A manuscript on the lithodid fauna of New Zealand is nearing completion. A key to Lithodes world-wide is ready for publication.

Publications 1982-83 : Dawson, E.W.; Yaldwyn, J.C. (in press): Lithodes nintokuuae Sakai; a deep-water stone crab (Crustacea, Anomura, Lithodidae) newly recorded from Hawaii. Pacif. Sci.

75-2 Ross Sea - Balleny Islands Echinoderm Faunas

D.G. McKnight

Duration of project : 1975-82

Progress 1982-83 : No progress while collections were inaccessible. This project has now been discontinued in favour of other work.

76-6 New Zealand Echinoderms

From an originally taxonomic study, sufficient samples are available for analysis of distributional patterns within the various groups, and possible correlation of these with major features of the environment.

D.G. McKnight

Duration of project : 1976-85

Progress 1982-83 : Some delay due to inaccessibility of collections. Taxonomy nearing completion.

76-9 Natant Shrimps of the New Zealand EEZ

This project aims to identify and determine the distribution of benthic natant shrimps from the Exclusive Economic Zone.

W.deL. Main

In association with : Dr J.C. Yaldwyn
National Museum
Wellington

Duration of project : 1976-85

Progress 1982-83 : One paper is about to be submitted. Identification and distribution of NZOI specimens is almost completed.

Publications 1982-83 : Main, W.deL.; Yaldwyn, J.C. (in prep.) A new stylodactylid crab from New Zealand and Kermadec Island waters, with notes on characters of the genus Stylodactylus (Decapoda, Natantia, Caridea).

78-24 Bathycrinoids of Indian and Pacific Oceans

Samples from the Galathea expedition and the U.S. National Museum have been examined. This project relates to 81-4 (q.v.) in that bathy-

crinoids may be useful if rather rare indicators of environmental types. Measurements suggest some useful taxonomic characters within the group.

D.G. McKnight

Duration of project : 1978-84

Progress 1982-83 : A draft manuscript has been completed.

78-25 Coral Reef Fish Distributions in North Tasman and Coral Seas

The North Tasman Sea has several fish in common with Australia, New Zealand, and the Kermadecs, but there are also many endemic species. Zoogeography of the area may indicate recruitment areas for the New Zealand fish fauna, especially newer arrivals. Collation of data and photographs from several cruises should result in a coloured textbook capable of being sold. This has not been done before for this area.

K.R. Grange
R.J. Singleton

Duration of project : 1978-84

Progress 1982-83 : Distributions have been tabulated, species identified, and photographs prepared. The duration of this project depends on a vehicle for publishing.

78-26 Hermatypic Corals of the North Tasman Sea

This area includes the southern limit of reef-building or hermatypic corals and the systematics and ecology of the genera appear to differ from those found within the tropics. Each isolated atoll has a collection of endemic forms. This project aims to identify the major coral genera and their distribution in the Tasman Sea.

K.R. Grange
R.J. Singleton

Duration of project : 1978-8?

Progress 1982-83 : One publication prepared and published. Further work pending.

Publications 1982-83 : Grange, K.R.; Singleton, R.J. 1983: Australia's lonely atolls. Aust. Nat. Hist. 21(2) : 76-79.

78-29 Scaphopoda of New Zealand - A Review

The tusk shells of New Zealand were monographed by Dell (1957) based on limited collections. Deep-water work by NZOI has extended ranges both geographically and bathymetrically. The fauna has been regarded as totally endemic but close relationships demonstrated for other deeper-water molluscs suggest likely affinities with the more recently monographed Japanese fauna. Closely linked to the sediment, these animals will contribute to understanding the role of the benthos in certain areas of seafloor.

E.W. Dawson

Duration of project : 1978-84

Progress 1982-83 : No progress while other work was attended to, except for keeping up with the literature affecting the taxonomy of these organisms.

78-34 Ross Ice Shelf Under-ice Copepods

A unique collection of scavenging copepods was made available for study. They came from beneath the Ross Ice Shelf about 500 km from the open sea. These proved to be rare or undescribed species. ϕ

J.M. Bradford

In association with : Prof. J.B.J. Wells
Zoology Department
Victoria University of Wellington

Duration of project : 1978-82

Progress 1982-83 : Completed. A paper has been accepted for publication.

Publications 1982-83 : Bradford, J.M.; Wells, J.B.J. 1983: New calanoid and harpacticoid copepods from beneath the Ross Ice Shelf, Antarctica. Polar Biol. 2 : 1-15.

79-22 Shallow-water Echinoderm Fauna of the Southwest Pacific

The attenuation of the tropical coral reef faunas eastwards through Polynesia and southwards to New Zealand, although evident in the literature, is poorly documented. Some samples from project 76-6 are of value in studying this process. Further sampling is required but will be done only as the opportunity arises.

D.G. McKnight

Duration of project : 1978-82

Progress 1982-83 : Three manuscripts are in preparation. This project will then be discontinued in favour of higher-priority work.

79-24 New Zealand and Southwest Pacific Dinoflagellates

The marine dinoflagellates of the New Zealand region are being investigated to determine what species are present and what part they play in the coastal to oceanic planktonic communities.

This is the only study of marine dinoflagellates to be carried out in this region since 1890. [This project was listed in the last Annual Report as completed, but some final analyses remain.]

J.S. Mitchell
D.A. Burns

Duration of project : 1979-84

Progress 1982-83 : Additional papers have been completed, making four published to date. Two more are in preparation.

Publications 1982-83 : Burns, D.A.; Mitchell, J.S. 1982: Further examples of the dinoflagellate genus Ceratium from New Zealand coastal waters. N.Z. Jl mar. Freshwat. Res. 16(1) : 57-67.

Burns, D.A.; Mitchell, J.S. 1982: Some coastal marine dinoflagellates from around New Zealand. N.Z. Jl mar. Freshwat. Res. 16(1) : 69-79.

Burns, D.A.; Mitchell, J.S. 1983: Dinoflagellates of the genus Dinophysis Ehrenberg from New Zealand coastal waters. N.Z. J. mar. Freshwat. Res. 16(4) : 289-98.

79-26 Deep-sea Asellota (Crustacea : Isopoda) from New Zealand

Deep-sea isopods (and other deep-sea animals) have been collected along transects out from the New Zealand coast using the epibenthic sledge which produces extremely good faunal samples. The material has provided the basis for monographs on the New Zealand asellote isopods.

R.J. Lincoln
(Visiting worker,
British Museum, (Nat. Hist.))

Duration of project : 1979-8?

Progress 1982-83 : Work on one family, the Haploniscidae, has been completed and will shortly be submitted as a memoir in the Marine Fauna of New Zealand series. Two papers (below) on other crustacean material have stemmed from the asellote work.

Publications 1982-83 : Boxshall, G.A.; Lincoln, R.J. 1983: Tantulocarida, a new class of Crustacea ectoparasitic on other crustaceans. J. crustacean Biol. 3(1) : 1-16.

Lincoln, R.J.; Boxshall, G.A. (in press): A new species of Deoterthron (Crustacea : Tantulocarida) ectoparasitic on a deep-sea asellote from New Zealand. J. nat. Hist.

79-28 Non-Reef-Building Scleractinian Corals of New Zealand - Distribution, Biogeography, and Taxonomy

A review of the New Zealand coral fauna following the initial monograph of shelf forms by Squires & Keyes (1967) is based on extensive deep-water collections now available which are being studied in relation to subsequent world-wide revisions. Distributional analysis in terms of physical limits and benthic significance is also being considered.

E.W. Dawson

In association with : Dr S. Cairns
U.S. National Museum, Washington, D.C.

Dr. H. Zibrowius
Station Marine d'Endoume, Marseilles

Duration of project : 1979-85

Progress 1982-83 : Deferred while other work was being completed. Draft manuscripts on two genera (Stephanocyathus, Letepsammia) exist.

79-32 Ecology and Distribution of New Zealand Coastal Diatoms

A detailed analysis of the diatom populations of New Zealand coastal and estuarine waters and an assessment of the relative abundance and importance of diatoms relative to other organisms in the coastal planktonic environment.

D.A. Burns

In association with : Dr U.V. Cassie
 Botany Division, DSIR, Auckland

Duration of project : 1979-85

Progress 1982-83 : Continuing. DAB on temporary secondment elsewhere. This project now includes 79-35.

80-11 Pennatulacea (Sea-pens) of New Zealand

NZOI collections document the presence of these animals in New Zealand waters. The number of species is limited, but they could be found to be ideal environmental indicators when the fauna is known.

D.G. McKnight

Duration of project : 1980-85

Progress 1982-83 : No progress while collections remained inaccessible. Taxonomic and distributional studies are about to begin.

80-12 Mollusca of Bellona Reefs

Several cruises have sampled the shallow-water molluscan fauna of the isolated reefs to the north of New Zealand. Identification of new species and distributional data on the common species should complement equivalent data on echinoderms being studied by D.G. McKnight.

K.R. Grange

In association with : Dr W.O. Cernohorsky
 Auckland Institute and Museum

Duration of project : 1980-83

Progress 1982-83 : Completed. Two papers published incorporating Bellona and other material.

Publications 1982-83 : Bouchet, P.; Metivier, B. 1982: Living Pleurotomariidae (Mollusca : Gastropoda) from the South Pacific. N.Z. J. Zool. 9(3) : 309-18.

80-13 Free-living Axinellid Sponge from Chatham Rise - Morphology and Ichnology

D.J. Cullen

In association with : Dr P.R. Bergquist
 Zoology Department
 University of Auckland

Duration of project : 1980-84

Progress 1982-83 : Delayed while other work proceeded with.

80-22 Bryozoa of Western South Island

This project is an assessment of the identity and diversity of the Bryozoa from an area of New Zealand never before studied in this regard, partly in connection with the West Coast Project.

D.P. Gordon

Duration of project : 1980-84

Progress 1982-83 : Drawings and SEM photography for over 300 species are virtually completed. The text of the first of two memoirs from this project is almost completed also. It deals with 13 species of ctenostomes and 122 species of anascan cheilostomes from the deep sea to the intertidal.

81-5 Antipatharian and Gorgonian Coelenterates of New Zealand

Museum specimens will be examined, and further specimens are to be collected. The major part of the research will be to compare the common Fiordland species with those from other shallow areas in Northland and Marlborough Sounds.

K.R. Grange

Duration of project : 1981-85

Progress 1982-83 : Skeletons of several species have been examined by SEM. Identities are being determined.

MARINE GEOSCIENCE

OFFSHORE MINERALS

Regional sediment mapping by NZOI has defined deposits of sand, gravel, ironsand, phosphorite, glauconite, manganese nodules, metalliferous sediments, and heavy minerals.

76-2 Gravels in Northern Hawke Bay

Gravel deposits, which could be of value for constructional purposes in east coast areas short of aggregate, were partly mapped by side-scan sonar in 1976. Detailed sampling is required for full evaluation of east coast offshore gravel potential. Available data warrant a Field Report.

K.B. Lewis

Duration of project : 1976-87

Progress 1982-83 : Deferred in favour of higher-priority work.

77-8 Lau Ridge Phosphate and Associated Mineral Deposits

Little is known of the shape and sediments of the Lau Ridge. However, indications are that the environment may be or have been suitable for the formation of phosphate deposits - either phosphorite or phosphatic limestone. Original field work was carried out by NZOI during the Fiji-Tonga Royal Society Expedition in 1977 by CCOP/SOPAC.

J.V. Eade
D.J. Cullen

In association with : P. Rodda
Mineral Resources Department
Suva, Fiji

Duration of project : 1977-84

Progress 1982-83 : Preliminary data are included in the following publication.

Publications 1982-83 : Cullen, D.J. (in press): Submarine sediments of the Southwestern Pacific. In Cronan, D.S. (ed.) "Marine Geology and Mineral Resources of the Southwest Pacific". Academic Press, New York.

78-11 Phosphorite Deposits from Chatham Rise - Distribution and Composition

79-8

Comprehensive investigations are being carried out into distribution, geochemistry, age, size-frequency, etc., with a view to determining the economic potential of the deposit and the mode of formation of the nodules. This project also includes fission-track mapping of uranium in the nodules.

D.J. Cullen

In association with : Dr H. Kudrass
Bundesanstalt für Geowissenschaften und
Rohstoffe

Mr T. Wall
Australian Atomic Energy Commission

Duration of project : 1978-84

Progress 1982-83 : The main project is completed, but residual studies remain. Further publications are in press and in preparation.

Publications 1982-83 : Kudrass, H.-R.; Cullen, D.J. 1982: Submarine phosphorite nodules from the central Chatham Rise off New Zealand - composition, distribution, and reserves - (VALDIVIA - Cruise 1978). Geol. Jb. D51 : 3-41 + 2 figs (fold).

Cullen, D.J. (in press): Submarine sediments of the Southwest Pacific. In Cronan, D.S. (ed.) "Marine Geology and Mineral Resources of the Southwest Pacific". Academic Press, New York.

Cullen, D.J. (in press): Chatham Rise phosphorites of New Zealand. In Notholt, A.; Sheldon, R. (eds) "World Phosphate Resources" Cambridge University Press, Cambridge.

Mitchell, J.S.; Cullen, D.J. (in press): Central Chatham Rise bathymetry, 1:50,000. (2 sheets). N.Z. oceanogr. Inst. Chart, Misc. Ser. 60.

79-5 East Australian Phosphorite

This is an investigation of the distribution, field-relations, petrology, and age of an occurrence of apparently very recently formed (i.e., within the last few thousand years) phosphorite off the New South Wales coast. Comparable recent phosphorites are rare, and known only off the Namibian and Peruvian coasts.

D.J. Cullen

In association with : Dr C.C. von der Borch
Dr H.H. Veeh
G.W. O'Brien
Flinders University, Adelaide

Duration of project : 1979-84

Progress 1982-83 : Deferred pending completion of thesis by G.W. O'Brien.

79-6 Chatham Rise Glauconite

78-12
80-4

Deposits of glauconite (a complex potassium-iron silicate) on Chatham Rise are being investigated to determine their distribution, geological nature, and their economic potential. The glauconite contains 8% K_2O , and could conceivably have value as a potash fertiliser. [Projects 78-12 and 80-4 are now incorporated in 79-6.]

D.J. Cullen

In association with : Dr R. Richards
Industrial Processing Division, DSIR,
Lower Hutt

Duration of project : 1978-86

Progress 1982-83 : Deferred pending a report from IPD on the usefulness and processing amenability of the glauconite.

80-5 Southwest Pacific Seamount Phosphorites

Listed in last year's Annual Report as "Samoa/Tokelau/Cook Islands Phosphorite", this project aims to determine the distribution, geological nature, and genesis of phosphatic sediments on seamounts and guyots in the Southwestern Pacific. These represent possible locations of economic deposits.

D.J. Cullen

In association with : Dr W.C. Burnett
Florida State University
Dr D.Z. Piper
U.S. Geological Survey

Duration of project : 1980-85

Progress 1982-83 : Two distinct types of deposits have been recognised, one typical of isolated seamounts, the other more akin to the economically important insular deposits of Nauru and Ocean Island. Some of this work has been incorporated in the publication listed under 77-8.

81-2 Metalliferous Sediments in the Tonga-Kermadec Ridge - Lau Basin - Fiji Plateau

Geochemical prospecting for metalliferous sediments in back-arc basins is being carried out.

G.P. Glasby

In association with : Dr D.J. Cronan
Imperial College, London

Duration of project : 1981-85

Progress 1982-83 : Results from the first two cruises (1981-82) continue to be worked up.

Publications 1982-83 : Cronan, D.S.; Glasby, G.P.; Moorby, S.A.; Thomson, J.; Knedler, K.E.; McDougall, J.C. 1982: A submarine hydrothermal manganese deposit from the south-west Pacific island arc. Nature, Lond. 298(5873) : 456-58.

Moorby, S.A.; Cronan, D.S.; Glasby, G.P. (in press): Geochemistry of hydrothermal manganese oxide deposits from the south-west Pacific island arc. Geochim. cosmochim. Acta.

Cronan, D.S.; Moorby, S.A.; Knedler, K.; Thomson, J.; Hodgkinson, R. (in press): Hydrothermal and volcanoclastic sedimentation on the Tonga-Kermadec Ridge and in its adjacent marginal basins. In "Proceedings of the Symposium on Back-arc Basins". University of Keele.

SEDIMENTARY STUDIES

These are projects which study processes, rates, and forms of sedimentation in the sea and in lakes and estuaries. Many of these projects have application to mineral studies and biological processes, and many of an applied nature have been of value to

harbour boards, city councils and other local authorities, and to industry.

69-1 Distribution of Planktonic Foraminifera in the Southwestern Pacific

Fossil planktonic foraminifera in Tertiary sediments are useful palaeoclimate indicators. This study aims to provide an understanding of the various parameters that control their distribution in surface waters and the processes in the region that modify this pattern when their shells fall to the seafloor and become part of the sedimentary column.

J.V. Eade

In association with : Dr J.V. Gardiner
U.S. Geological Survey, Menlo Park

Duration of project : 1969-87

Progress 1982-83 : None. This project has been relegated low priority due to a change in direction of research.

73-1 Distribution of Felsic and Mafic Sands in Wanganui Bight

Side-scan sonar and sampling surveys were carried out to show the distribution and evolution of black-sand shoals off Wanganui. They proved to be controlled by storm-generated currents. Additional detailed data, collected in 1977 in a search for lost aircraft, merit an additional report.

K.B. Lewis

Duration of project : 1973-85

Progress 1982-83 : Deferred while other work was being completed.

73-2 Sedimentation and Quaternary Evolution of Cook Strait

Cook Strait represents an unusual geological setting. Present sedimentary processes, sedimentary history, and shallow seismic structure are being studied to provide baseline and site-specific information for power cables and possible pipelines. Seismic profiles and side-scan sonographs indicate a complex Quaternary history associated with the waxing and waning of tidal currents as the Farewell-Egmont land corridor was drowned and exposed.

K.B. Lewis
L. Carter

Duration of project : 1973-85

Progress 1982-83 : Two cruises completed and a Field Report written. SWISH to be deployed.

Publications 1982-83 : Carter, L. 1983: Sediments, shallow seismic stratigraphy, and structure in the vicinity of the submarine power cables, Cook Strait, New Zealand. NZOI oceanogr. Fld Rep. 19 : 14 p.

76-3 Recent Sedimentary History of Pauatahanui Harbour

Changes in sedimentation are being studied using sub-bottom reflection profiling and coring techniques.

J.V. Eade

Duration of project : 1976-8?

Progress 1982-83 : Deferred in favour of higher-priority work.

76-8 Water Motion - Sediment Transport Interaction

This project involves the interaction of physical oceanographers and sedimentologists utilising SWISH. Modifications have been made to the design. Reliable monitoring equipment for the benthic boundary layer is being developed.

L. Carter
E.J. Barnes
B.J. Hunt

Duration of project : 1976-8?

Progress 1982-83 : Recent deployments of monitoring equipment off Canterbury and Cook Strait have been successful, leading to completion of a paper (below). Replacement of electromagnetic current meters is underway. The associated camera system is to be upgraded.

Publications 1982-83 : Carter, L. (in press): Current modification of a mass failure deposit, Canterbury continental shelf. Mar. Geol.

77-9 Fission-Track Dating of Volcanic Glass Shards in Chatham Rise Sediments

This is a study of the relationship of volcanic glass shards to known and dated ash showers on land in New Zealand.

D.J. Cullen

In association with : Dr D. Seward
Dr N. Whitehead
Institute of Nuclear Sciences, DSIR

Duration of project : 1977-84

Progress 1982-83 : Deferred while other work was undertaken.

77-11 Sedimentation on the Eastern South Island Continental Margin

77-12

This study is examining late Quaternary and modern sedimentary processes affecting the shelf and slope, thereby providing a comprehensive view of how this section of the shelf/slope operates. It is of both local and international interest, the latter because of the position of the continental margin to a transform margin. CRA are utilising the results with respect to their exploration for gold.

L. Carter

In association with : Prof. G. Griggs
University of California, Santa Cruz
Dr C. Landis
Otago University, Dunedin
Dr R.M. Carter
James Cook University, Townsville

Duration of project : 1977-83

Progress 1982-83 : A number of papers were published or completed for publication. The final publications are being drafted.

Publications 1982-83 : Carter, L.; Carter, R.M.; Griggs, G.B. 1982: Sedimentation in the Conway Trough, a deep near-shore marine basin at the junction of the Alpine Transform and Hikurangi Subduction plate boundary, New Zealand. Sedimentology 29 : 475-97.

Carter, R.M.; Carter, L. 1982: The Motunau Fault and other structures of the southern edge of the Australian-Pacific plate boundary, offshore Marlborough, New Zealand. Tectonophysics 83 : 133-59.

Griggs, G.B.; Carter, L.; Kennett, J.P.; Carter, R.M. (in press): Late Quaternary marine stratigraphy southeast of New Zealand. Bull. Geol. Soc. Am.

Carter, R.M.; Carter, L.; Williams, J.J.; Landis, C.A. (in press): Modern and relict sedimentation on the Otago continental shelf, New Zealand. Mem. N.Z. oceanogr. Inst.

77-16 Wellington Beaches

Seasonal changes in beach levels at Balaena Bay are being studied in order to aid future artificial sanding of this and other beaches by the Wellington City Corporation.

L. Carter
J.S. Mitchell

Duration of project : 1977-83

Progress 1982-83 : Field work and laboratory analyses were completed. Analysis of met. records by JSM is also completed.

77-17 Auckland Harbour Sedimentation

In 1937 A.W.B. Powell published an account of a 1926-27 survey of sediments of the Waitemata Harbour. He used sediment grade as an important index but used non-standard sieves and methods; thus his sediment correlations are not directly comparable with those of subsequent workers. This study will analyse samples from his localities and compare present-day sediments with those over half a century ago.

J.C. McDougall

Duration of project : 1977-83

Progress 1982-83 : Analyses completed. Writing-up to commence.

78-14 Distribution, Movement in Currents, and Use of Different Sediment Particles for Test Building in Tintinnids

The tests of tintinnids (hard-shelled planktonic protozoa) are constructed from particles scavenged from the water or the sediment; they are therefore diagnostic of the water in which they were built. Tintinnid tests are therefore being analysed distributionally and anomalous test particles related to water movement and currents. This is the first work on tintinnids in the New Zealand region.

D.A. Burns

Duration of project : 1978-82

Progress 1982-83 : Completed. Paper in press.

Publications 1982-83 : Burns, D.A. (in press): The distribution and morphology of tintinnids from the coastal waters around New Zealand. N.Z. J. mar. Freshwat. Res. 17.

78-15 Sediments Associated with Chatham Rise Phosphorite

Investigation of Chatham Rise phosphorite is now near completion but some subsidiary studies remain to be dealt with. This project includes a detailed grain-size survey and compilation of sediment thickness.

D.J. Cullen
J.S. Mitchell
J.C. McDougall

Duration of project : 1978-85

Progress 1982-83 : Some of this work has been written up in the book chapters cited under 78-11. Further work is nearing completion, and analysis of fine-grade silt and clay sediments is proceeding. A report on Chatham Rise sedimentary structure is near writing up.

78-17 Sedimentary Environment of Foveaux Strait Oyster Beds

Foveaux Strait has a complex sediment distribution and bedform pattern which is partly related to the tidal stream. Detailed understanding of sedimentary processes is important to the regulations of oyster fisheries. Side-scan sonar surveys of eastern Foveaux Strait have been made in conjunction with Fisheries Research Division, MAF, to determine the environmental preferences of the oysters. Diver verification of sonograph structures and some sediment sampling are still required.

K.B. Lewis

In association with : Dr H.J. Cranfield
Fisheries Research Division, MAF
Wellington

Duration of project : 1978-85

Progress 1982-83 : None, while awaiting further input from MAF.

78-19 Wellington South Coast Substrates

Data relevant to engineering projects in Wellington Harbour Entrance and along the coast south of Wellington already exist. Some additional data are required to synthesise the total pattern of sediment movement and rocky outcrops on a storm-dominated coast.

K.B. Lewis
E.S. Arron

In association with : G. Campbell
Wellington City Council
Ministry of Works & Development Staff
Wellington

Duration of project : 1978-82

Progress 1982-83 : Completed. Paper in press.

Publications 1982-83 : Lewis, K.B.; Mildenhall, D.C.; Clowes, C.H. (in press): The late Quaternary seismic, sedimentary, and palynological stratigraphy beneath Evans Bay, Wellington Harbour. N.Z. Jl Geol. Geophys. 26.

79-9 Sedimentation in the Bounty Trough

The climatic history of the Bounty Trough is being reconstructed from a study of the coccolith and diatom microfossils in cores from the shelf to deep-water areas.

D.A. Burns

Duration of project : 1979-8?

Progress 1982-83 : This project has been discontinued in favour of higher-priority work. (DAB at present on secondment to The Treasury.)

79-10 Rangaunu Harbour Sedimentology

This is part of an ongoing project to study the sedimentology of 'typical' New Zealand estuaries in order to identify the role of estuaries in the sedimentary regime of the coast and shelf. Harbour sediments have been mapped and relationships between sediment texture and energy conditions have been used to map depositional environments within the harbour.

R.A. Pickrill

Duration of project : 1979-84

Progress 1982-83 : A manuscript has been prepared which now only awaits analysis of data for project 81-8. A sediment chart is being prepared for the Miscellaneous Series.

80-6 Diatom-Sediment Relationships in Rangaunu Harbour

Samples from the harbour have been collected and now await analysis.

D.A. Burns

Duration of project : 1980-82

Progress 1982-83 : DAB on secondment to The Treasury. The project will be terminated in favour of higher priority work.

80-7 Dump Sites on the New Zealand Continental Shelf

In 1980 NZOI began to carry out comprehensive surveys of various dredging and dumping sites in harbours around New Zealand. At present NZOI assumes an advisory role to the Ministry of Transport which controls dredging and dumping under the Marine Pollution Act, 1974.

L. Carter

R.A. Pickrill

Duration of project : 1980-8? This project will not henceforth be listed as such, but individual projects encompassed by the heading will be listed separately.

Progress 1982-83 : Taranaki, Timaru, Otago, and Bay of Plenty sites have been surveyed and preliminary results conveyed to appropriate harbour boards. Work on North Island sites continues.

Publications 1982-83 : Carter, L. 1982: Side-scan sonar survey of the shipping channel, Otago Harbour. NZOI oceanogr. Fld Rep. 18 : 14 p.

80-18 Sedimentation and Mineral Formation Beneath the Deep-flowing Antarctic Bottom Water, off the Campbell Plateau

The processes controlling sedimentation are to be studied using current measurements, time-lapse photography, and sediment samples at 4000 m depth in the fast-flowing Western Boundary Current. This flow is believed to favour growth of ferro-manganese crusts and nodules and this aspect will also be examined.

L. Carter
R.A. Heath

In association with : Dr C.T. Shafer
Bedford Institute of Oceanography
Nova Scotia

Duration of project : 1980-84

Progress 1982-83 : Data from an additional cruise are being compiled.

80-24 Southern Fiords - Sediment Studies

This is part of an ongoing project to study the sedimentology of 'typical' New Zealand estuaries in order to identify the role of estuaries in the sedimentary regime of the coast and shelf. [It was listed in last year's Annual Report as project 77-14 but it did not begin until 1980.]

R.A. Pickrill

Duration of project : 1980-84

Progress 1982-83 : Owing to 12 months study leave in 1982, little progress was made. While in Canada, however, sedimentology in Canadian fiords was studied, which will lead to comparative studies between the two countries. This will be carried out with Dr B. Bornhold, Canadian Geological Survey.

81-8 Rangaunu Harbour Entrance Dynamics

Proposed port development in the entrance to Rangaunu Harbour has generated a joint project with the Northland Harbour Board. The stability of the seafloor in the harbour entrance and directions and rates of sediment transport are being studied in detail.

R.A. Pickrill

In association with : Northland Harbour Board
Whangarei

Duration of project : 1981-84

Progress 1982-83 : Owing to 12-months study leave in 1982, little progress was made, however a manuscript has been completed.

83-3 Wellington Harbour Metal Pollution

This will be a baseline study of metal pollution in Wellington Harbour as determined by the geochemistry of the sediments.

G.P. Glasby

Duration of project : 1983-84

Progress 1982-83 : Samples were collected for analysis.

OFFSHORE MORPHOLOGY AND STRUCTURE

This comprises projects which are primarily of scientific interest but which have implications for future mineral discoveries, petroleum exploration, or, in inshore areas, foundations for submarine structures.

76-4 Evolution of New Zealand's Submarine Topography

The structural evolution of the New Zealand plateau and adjacent ocean basins is being studied.

K.B. Lewis

In association with : Dr J.W. Cole
Victoria University of Wellington

Duration of project : 1976-81

Progress 1982-83 : The initial phase was completed with the publication of a summary by Cole and Lewis on the structure of north-eastern New Zealand. This project is to be redefined as a new programme whose major emphasis is producing a series of geological maps of the New Zealand continental margin.

76-5 Geology of the Northland Plateau

The geology of the Northland continental margin is not understood. Interpretation of the geological history from on-land geology has not solved the problem. The answer to many problems in the region, and therefore assessment of regional resources, lies in understanding the offshore geology.

J.V. Eade

In association with : Dr G.H. Packham
University of Sydney
Dr D. Falvey
Bureau of Mineral Resources, Canberra

Duration of project : 1976-8? (comprising a continuing set of small projects).

Progress 1982-83 : Project was restarted - it had been in abeyance during an extended period of leave. One paper was published.

Publications 1982-83 : Kroenke, L.W.; Eade, J.V. 1982: Three Kings Ridge : a west-facing arc. Geo-Mar. Lett. 2 : 5-10.

78-16 Structural and Sedimentological Effects of Oblique Subduction at the Hikurangi Margin

The Hikurangi Margin has several major changes of structural and sedimentological character associated with changes in the mode of interaction between the Indian and Pacific crustal plates. Definition of structural and sedimentological processes along the margin is important for the understanding of geological processes and resource potential both onshore and offshore along the east coast and for the understanding of active margin processes in general.

K.B. Lewis

In association with : J.R. Pettinga
University of Canterbury, Christchurch
M.A. Hampton
U.S. Geological Survey, Menlo Park
D. Bennett
N.Z. Oil and Gas, Wellington

Duration of project : 1978-87

Progress 1982-83 : Reprocessed data were re-examined while on study leave at the University of Texas. Data collected in 1981 were synthesised with other data and prepared for publication.

79-12 The Structure and Sediment of the Bay of Plenty

The Bay of Plenty is a structurally unusual and scientifically interesting area where intra-oceanic back-arc spreading interacts with an ensalitic marginal basin. The understanding of the tectonic and sedimentological evolution of this area is of prime importance in the interpretation of the geological history of northern New Zealand and of "fossil" marginal basins in several parts of the world.

K.B. Lewis

In association with : Dr H.M. Pantin
Institute of Geological Sciences,
Leeds, U.K.

Dr T. Healy
Department of Earth Sciences
University of Waikato, Hamilton

Duration of project : 1979-86

Progress 1982-83 : Interpretation of existing data was completed and a manuscript completed while on study leave.

Publications 1982-83 : Lewis, K.B.; Pantin, H.M. (in press): Intersection of a marginal basin with a continent : structure and sediments in the Bay of Plenty, New Zealand. Geol. Soc. Lond. Spec. Publ.

82-6 The North Fiji Basin - A Study of Active Seafloor Spreading

The South Pandora Ridge provides an excellent example of a rapid-spreading ridge in a back-arc basin. The geology and geophysics are being studied with the emphasis on establishing information on the occurrence and formation of polymetallic sulphide deposits.

J.V. Eade

In association with : Hawaii Institute of Geophysics
University of Auckland
University of New South Wales

Duration of project : 1982-85

Progress 1982-83 : A cruise on the Kana Keoki was undertaken in 1982. Reports on the sediments and seismicity of the North Fiji Basin are in preparation.

LAKE, DAM, AND RESERVOIR STUDIES

These comprise projects which focus on various aspects including morphology and bathymetry, sedimentation, shoreline evolution, and the physical characteristics of the water.

77-18 Shoreline Development on Fetch-limited Shores

A model for shoreline evolution of fetch-limited shores has been developed to predict shoreline response to changing water levels and shoreline development on newly formed lakes. The model is being tested on recently formed Lakes Moawhango and Otomangakau.

R.A. Pickrill
J.S. Mitchell

Duration of project : 1977-86

Progress 1982-83 : During study leave in Canada (1982), the model was extended to incorporate longer fetch-lengths.

Publications 1982-83 : Pickrill, R.A.; Currie, R.G. 1983: Computer programs to estimate wave generated orbital velocities and threshold erosion velocities. Current Res., Pt A. Geol. Surv. Can. Pap. 83-1A : 253-61.

Pickrill, R.A. 1983: Wave-built shelves on some low-energy coasts. Mar. Geol. 51 : 193-216.

79-17 Sedimentation in South Island Glacial Lakes

Studies of the mechanics of sedimentation and the resulting sedimentary structures in natural lakes provide an insight into possible siltation problems in hydro-electric storage lakes.

J. Irwin
R.A. Pickrill

Duration of project : 1979-84

Progress 1982-83 : 1. Completed studies in Lakes Wakatipu and Tekapo have provided new and comparative data for studies in Lake Benmore.

2. Diurnal inflow patterns being studied in Lake Wakatipu are being investigated in man-made and inflow-controlled Lake Benmore.

3. Seasonal inflow studies in Lakes Tekapo and Wakatipu are completed. Sedimentary structure studies are completed for Lake Tekapo. Structural data for Lake Wakatipu are being written up.

Publications 1982-83 : Irwin, J.; Pickrill, R.A. 1982: Water temperature and turbidity in glacially fed Lake Tekapo. N.Z. Jl mar. Freshwat. Res. 16(2) : 189-200.

Irwin, J.; Pickrill, R.A. (in press): Sedimentation in glacial-fed natural lakes : implications for hydroelectric storage lakes. Trans. Inst. Prof. Engrs N.Z.

Pickrill, R.A.; Irwin, J. 1982: Sedimentation in a deep glacier-fed lake, Lake Tekapo, South Island, New Zealand. Sedimentology 30 : 63-75.

Pickrill, R.A.; Irwin, J. 1982: Predominant headwater inflow and its control of lake-river interactions in Lake Wakatipu. N.Z. Jl mar. Freshwat. Res. 16(2) : 201-13.

Irwin, J.; Pickrill, R.A.; Main, W.deL. 1983: An outrigger for sampling from small boats. J. sedim. Petrol. (Res. Meth. Pap.) 53(2) : 675-76.

79-18 Seismic Survey of North Island Lakes

Delineation of subsurface morphology and recent sedimentary history allows the calculation of sediment budgets for selected North Island lakes.

R.A. Pickrill
J. Irwin

Duration of project : 1979-85

Progress 1982-83 : Seismic data collected in 1980 have been mapped. Continuation of the project awaits further fieldwork and collection of long cores.

81-23 Lake Sediment Geochemistry

This project seeks to measure variations in sediment chemistry of lakes from different parts of New Zealand.

G.P. Glasby

In association with : Dr P. Stoffers
Institute für Sedimentforschung
Universität Heidelberg
Federal Republic of Germany

Progress 1982-83 : A paper based on a reconnaissance survey was drafted and submitted for publication.

Publications 1982-83 : Stoffers, P.; Glasby, G.P.; Plüger, W.L.; Walter, P. (in press): Reconnaissance survey of the mineralogy and geochemistry of some New Zealand lake and nearshore sediments. N.Z. Jl mar. Freshwat. Res.

CHARTING

These are projects which directly, or in the course of other studies, seek to describe the surface morphology of the seafloor around New Zealand or oceanic islands, or the bathymetry of lakes, estuaries, and fiords, in New Zealand. Charts featuring geological and physical features are also produced.

79-37 Coastal Bathymetry Charts of Northern North Island

To complete the coastal series for North Island, the area from Kaipara to North Cape needs working up.

J.V. Eade
J. Irwin

Duration of project : 1979-84

Progress 1982-83 : The coastal areas for Kaipara and Hokianga were completed and are now in press. Three Kings and North Cape will be done in 1984.

81-20 Bathymetry of Lakes, Estuaries, and Fiords

The programme of bathymetric surveys has been mainly in response to requests from outside agencies, and to give broad coverage of New Zealand lakes and estuaries. These basic bathymetric data are required for research in these areas.

J. Irwin
W.deL. Main

Duration of project : 1981-8?

Progress 1982-83 :

1. During this period, charts were published for Lakes Alabaster, Blue, Diamond, Dispute, Hochstetter, Ianthe, Johnson, Kaniere, Kirkpatrick, Luna, McKerrow, Mahinapua, Mangakaware, Maratoto, Matahina, Moke, Ngatu, Omapere, Poerua, Rotoiti (2nd edn), Rotoroa, Sheppard, Taylor, and Waikareiti; also Preservation Inlet and George Sound.
2. Also, 14 inland Canterbury lakes were surveyed at the end of 1982, resulting in 5 charts in press.
3. A revised chart of Milford Sound is in press and a chart of Bligh Sound is being prepared for the Miscellaneous Series.
4. A joint project is underway with the Waikato Valley Authority to produce bathymetric charts of the Waikato hydro lakes. A chart of Lake Arapuni is near completion.
5. A bathymetric chart of Palmerston Atoll is in press.

82-7 Charting of Coastal Sediments

Some sediment charts of coastal areas have already been produced. The goal is to provide a complete set of such charts for the New Zealand coastal region.

E.S. Arron
J.S. Mitchell
L. Carter

Duration of project : 1982-8?

Progress 1982-83 : Sediment charts for areas Raglan and Mokau were completed and published. Charts for Tasman, Oamaru, and Pegasus (2nd edn) are in preparation.

82-8 Sediments of the New Zealand Region

In the New Zealand region there is a vast amount of sedimentary information which should be published on a scale of 1:6,000,000. At the moment no more 1:1,000,000 charts are envisaged but a new chart will be a compilation of all existing data.

J.C. McDougall

Duration of project : 1982-84

Progress 1982-83 : Preliminary drafting underway.

PHYSICAL OCEANOGRAPHY

SHELF AND SLOPE

These projects consider aspects of the physical oceanography of the inshore continental shelf and coastal zone.

78-3 Coastal Climate Survey

As part of the study of temporal variability, daily temperature and weekly water samples for salinity determination have been collected by several harbour boards around the New Zealand coast for NZOI.

N.M. Ridgway
B.S. Shakespeare
M.J.N. Greig

Duration of project : 1978-85

Progress 1982-83 : Sea-temperature data have been entered on computer. Air-temperature data remain to be entered. Preliminary assessment of results is being carried out.

78-32 Influence of the Physical Environment on Primary Productivity

This project seeks to investigate, via simple models, the influence of the depth of the mixed layer in controlling primary production around New Zealand.

R.A. Heath
J.M. Bradford

Duration of project : 1978-84

Progress 1982-83 : A draft manuscript is being finalised.

80-1 West Coast Project - Physical Oceanography

This is a study of temporal variability of the physical oceanography of the west coast of South Island, as a component of a larger multi-disciplinary approach involving productivity studies.

R.A. Heath
A.E. Gilmour
N.M. Ridgway

Duration of project : 1980-85

Progress 1982-83 : Tides have been analysed and a paper submitted for publication. Further current-meter data and tidal elevations have been obtained and these and the 1982 hydrological data are at present being analysed. Three papers are in draft form. Hydrological data have been obtained from an early 1983 cruise near Farewell Spit (1144).

Publications 1982-83 : Heath, R.A. 1982: What drives the circulation on the New Zealand west coast continental shelf? N.Z. J1 mar. Freshwat. Res. 16(2) : 215-26.

Heath, R.A. (in press): The depth of the mixed layer as an indicator of circulation around New Zealand. N.Z. J1 mar. Freshwat. Res.

80-25 Remote Sensing

This technique is an important new data source for physical and biological oceanography.

E.J. Barnes

Duration of project : 1980-8?

Progress 1982-83 : An archiving programme got underway. AVHRR data are being used for sea-surface temperature imagery. This information is being used to study eddies, upwelling, etc. around central New Zealand.

CZCS imagery coincident with cruise 1144 is being processed.

81-12 Continental Shelf and Slope Currents

This is an analysis of current observations from New Zealand's continental shelf and slope. The main observational programme at present is in Cook Strait (on behalf of N.Z. Electricity) and on the west coast (see 80-1).

R.A. Heath
B.S. Shakespeare
M.J.N. Greig

Duration of project : 1981-8?

Progress 1982-83 : Current-meter records have been obtained from three sites in Cook Strait. A paper has been prepared on Chatham Rise observations.

Publications 1982-83 : Heath, R.A. (in press): Observations on Chatham Rise currents. N.Z. Jl mar. Frshwat. Res.

82-9 Bay of Plenty Currents

This is an investigation into the inflow region of the East Cape Current.

N.M. Ridgway
M.J.N. Greig

Duration of project : 1982-83

Progress 1982-83 : Completed. A paper is being drafted.

HARBOURS, ESTUARIES, COASTAL EMBAYMENTS

The majority of New Zealand's coastal embayments and estuaries have been classified into groups of similar circulation types based on their physical properties. The overall aim is to study at least one from each group and to allow the knowledge from the study to be used in guiding future problem-oriented research in others of the group. To date, detailed studies within this project have been made of Pauatahanui Inlet, Manukau Harbour, Pelorus Sound, Tasman Bay, Aotea Harbour, Raglan Harbour, and Rangaunu Harbour.

75-1 Pelorus Sound

A joint physical oceanographic/sedimentological study of Pelorus Sound, begun in 1975, led to a reasonably detailed understanding of

the processes in the Sound. An overview based on these and one subsequent cruise has been made.

R.A. Heath
L. Carter

Duration of project : 1975-82

Progress 1982-83 : Project completed in this form.

Publications 1982-83 : Heath, R.A. 1982: Temporal variability of the waters of Pelorus Sound, South Island, New Zealand. N.Z. Jl mar. Freshwat. Res. 16(1) : 111-17.

78-2 Rangaunu Harbour - Physical Oceanography

Physical oceanographic observations collected as part of a sedimentological study have been analysed.

R.A. Heath
B.S. Shakespeare
M.J.N. Greig

Duration of project : 1978-82

Progress 1982-83 : Completed.

Publications 1982-83 : Heath, R.A.; Shakespeare, B.S. (in press): Physical oceanography of Rangaunu Harbour, Northland, New Zealand. N.Z. Jl mar. Freshwat. Res.

79-1 Tidal Energy Dissipation in Coastal Embayments

In order to extend the classification scheme mentioned above, a recent study has been made of methods to estimate the tidal dissipation in coastal inlets as this dissipation in combination with the freshwater inflow has a strong influence on the distribution of physical properties within inlets.

R.A. Heath

Duration of project : 1979-82

Progress 1982-83 : Completed. This approach was used in Rangaunu Harbour (see 78-2) to complete the project in this form.

81-11 Information Required for Environmental Assessment in Coastal Inlets

This project seeks to evaluate ways of possibly short-circuiting environmental assessment by investigating how estuarine systems work.

R.A. Heath
K.R. Grange

Duration of project : 1981-83

Progress 1982-83 : Completed.

Publications 1982-83 : Heath, R.A.; Grange, K.R. (in press): Use of physical parameters in biological assessment of New Zealand coastal inlets. N.Z. Jl mar. Freshwat. Res.

82-10 Tsunami Risk to the Hauraki Gulf

In response to a query from the Auckland Regional Authority, an assessment is to be made of which shore areas of the Hauraki Gulf are most at risk from tsunamis. The normal modes of oscillations of the Gulf will be studied and, if possible, the run-up of waves will also be studied.

A.E. Gilmour
N.M. Ridgway
M.J.N. Greig

Duration of project : 1982-84

Progress 1982-83 : A programme for normal-mode analysis has been obtained.

TIDAL STUDIES

76-1 Internal Tides

Preliminary observations of the internal tide over the continental shelf at a selected site north-west of Cape Egmont showed that it could be large (amplitude around 20 m) in the New Zealand region. This work has been followed by investigations at two other sites and although data analysis is not complete, small internal tides were found at these locations, west of Cape Foulwind, and east of Cape Turnagain.

B.R. Stanton

Duration of project : 1976-82

Progress 1982-83 : Completed in this form.

78-8 General Tidal Studies

These are aimed at understanding various aspects of the New Zealand tidal regime.

R.A. Heath

Duration of project : 1978-83

Progress 1982-83 : Discontinued in this form. Future studies will be listed as individual projects.

Publications 1982-83 : Heath, R.A. 1983: Generation of the M_4 tide in Cook Strait, New Zealand. Dt. hydrogr. Z. 35 : 261-70.

Heath, R.A. 1983: Tidal currents in the south-western Pacific Basin and Campbell Plateau, southeast of New Zealand. Deep-sea Res. 30(4A) : 393-409.

79-3 Catalogue of Tide Gauges in the Pacific Basin

Continuing on from a project commenced during an 18-month period as Associate Director of the International Tsunami Information Center in Honolulu, a catalogue of tide gauges is being prepared at the request of UNESCO.

N.M. Ridgway

Duration of project : 1979-83

Progress 1982-83 : Completed. To be published by UNESCO in their Technical Series.

OPEN-OCEAN STUDIES

Subsequent to completion of the broad-scale block survey of the circulation and distribution of temperature and salinity around New Zealand, the emphasis offshore has been towards areas of special interest evident from the broad surveys.

78-6 Dynamics of the Flow Southeast of New Zealand

This investigation is looking at the role of eddies in the transfer of momentum heat and salt away from the circumpolar current.

R.A. Heath

In association with : Dr H. Bryden
Woods Hole Oceanographic Institute, USA

Duration of project : 1978-84

Progress 1982-83 : One paper has been published. Analysis is now being made of the long-term dynamics (initially by H. Bryden).

Publications 1982-83 : Heath, R.A. 1983: Tidal currents in the South-western Pacific Basin and Campbell Plateau southeast of New Zealand. Deep-Sea Res. 30(4A) : 393-409.

Bryden, H.L.; Heath, R.A. (in press): Energetic eddies at the northern edge of the Antarctic Circumpolar Current in the Southwest Pacific. Progr. Oceanogr.

80-18 Deep-flowing Western Boundary Currents

This project investigates the physical oceanography and sedimentary influences (past and present) of one of the world's major oceanographic features. In this we recognise an international obligation. There is an applied interest as these currents induce the formation of manganese nodules.

L. Carter
R.A. Heath

Duration of project : 1980-84

Progress 1982-83 : A second cruise has been completed. Sufficient data are at hand, from Tangaroa, Eltanin, and Knorr observations, to begin compilation.

81-21 Eddies in New Zealand Waters

An analysis of the characteristics of oceanic eddies in New Zealand waters and a comparison of South Pacific Western Boundary eddies is being carried out.

R.A. Heath

Duration of project : 1981-83

Progress 1982-83 : Completed in its present form and a paper written. It will be expanded as another project to include remote sensing possibilities (with E.J. Barnes).

Publications 1982-83 : Heath, R.A. (in press): Outline of oceanic eddies around New Zealand. Aust. J. mar. Freshwat. Res.

INSTRUMENT DEVELOPMENT

As part of the physical oceanography programme, especially that involving the measurement of ocean microstructure, there has been an ongoing need for instrument development and calibration.

77-5 S T E V E (Salinity-Temperature-Velocity-Equipment)

STEVE was designed to measure fine-scale variations in microstructure of the sea. Such variations are associated with mixing which is a vital process in oceanic circulation. This nearly neutrally buoyant device for detailed hydrographic measurements in the upper 500 m of the ocean has been used in waters to the north-west of New Zealand.

A.E. Gilmour

A.G. Cole

In association with : Dr T.G.L. Shirtcliffe
Victoria University of Wellington

Duration of project : 1977-8?

Progress 1982-83 : Some previously collected data were analysed at VUW.

78-10 Quartz Temperature and Pressure Recorder

Development of a recording hydrographic instrument using quartz oscillator temperature and pressure sensors has continued. A further aim is to provide a stable salinity-measuring sensor.

A.E. Gilmour

E.J. Barnes

Duration of project : 1978-84

Progress 1982-83 : This project has not been actively pursued recently because of higher-priority work.

78-35 Electronic Meter Block

The system is a replacement and enhancement for the original prototype (now seven years old).

W.E. Whitley

Duration of project : 1978-84

Progress 1982-83 : The project is 80% complete. The software and hardware development is complete. All that remains is to physically build the housings, then install/commission.

80-3 Conductivity-Temperature-Depth (CTD) Instrumentation

Frequency-modulated oscillators for CTD sensing have been developed. This type of sensor can still prove effective in comparison with direct analogue to digital transducers in some applications.

A.E. Gilmour

Duration of project : 1980-83

Progress 1982-83 : Terminated.

81-22 P I R T S - Programme to Integrate Real-Time System

NZOI currently uses a number of instruments, e.g., transmissiometer, fluorometer, quantum meter, which display readings in real time from an underwater package via a non-load-bearing electrical cable. PIRTS aims to integrate these instruments with a depth/temperature package and NZOI's existing array of load-bearing armoured cables, slip-rings and winches.

P.J. Hill

Duration of project : 1981-84

Progress 1982-83 : Modes 1, 2, and 3, i.e., stand-alone BT, BT-transmissiometer, and BT-quantum meter were readied for field trials by June 1983.

OTHER PROJECTS

COMPUTER RETRIEVAL

79-36 NZOI Station and Underway Data Storage and Retrieval

To correlate more easily the position of geophysical records it has been decided to store, in computer format, data from NZOI stations and ship's tracks during geophysical and geological cruises.

A.G. Cole
K.B. Lewis

Duration of project : 1979-84

Progress 1982-83 : Continuing. With the help of vacation workers over the summer, the complete index of over 19,000 marine stations has been entered into the computer; these include biological station data which are essential to Project 80-20.

It is intended that the Geophysics Division manual data-logging system will be used until an automatic data-logging system can be acquired; as a first step, the obsolete shipboard computer will be replaced with a more modern and powerful microprocessor-based system.

80-20 Information Retrieval of Biological Collection Data

With the large amount of biological information now filed, and continuing to be obtained from biological cruises as well as subsequent identifications, analyses, and statistical calculations, etc. it is vital that these data be stored by computer, thus allowing speedier and far less tedious retrieval and correlations.

A.G. Cole
E.W. Dawson
D.G. McKnight

Duration of project : 1980-84

Progress 1982-83 : Vacation workers were used over the summer to input all NZOI station statistics as a necessary prerequisite to entry of biological data. This data input will continue at the end of the year with the input of biological data by vacation students.

81-9 Catalogue and Retrieval System for Underwater Photographs

The Institute has well in excess of 3,000 underwater photographs taken with remote cameras. A system has been developed that will enable the information contained in the photos to be sorted, catalogued, and retrieved.

R.J. Singleton
A.G. Cole

Duration of project : 1981-8?

Progress 1982-83 : Remote photos from all recent cruises have been entered. The backlog of remote photos from 1968

to the present time have been printed, where prints did not already exist (by student workers). These have been interpreted and coded and are now being entered in the computer. The entire backlog of remote photos should be entered by the end of 1983.

INSTRUMENT DEVELOPMENT

80-16 Modification of Camera System

The underwater TV is to be used as a viewfinder for the remote camera. A spare pair of conductors in the TV cable is to be used to trigger the camera from the surface. This system was to be developed for J.R. Richardson's Fiordland project to photograph the fiord walls beyond diving depth.

R.J. Singleton

Duration of project : 1980-8?

Progress 1982-83 : Delayed. The system was not needed for Dr Richardson's last cruise to the fiords (July 1982).

81-7 Microprocessor Controller for Remote Camera

This system will allow the remote underwater camera to be positioned just above the sea bottom, and photos will be taken automatically at a pre-determined rate whenever the bottom is in focus.

R.J. Singleton

Duration of project : 1981-84

Progress 1982-83 : Using an Intel 8085 microprocessor for this project, as previously proposed, would involve a considerable amount of time building and testing hardware, as well as programming. With the present advances in computer technology, I feel sure that very shortly a hand-held computer or something similar, with input and output ports, will come on the market that will be ideal for this job. This will eliminate most of the hardware development and enable the programming to be done in a high-level language.

81-24 Diver's Data Recorder

A recorder has been developed to make diving operations more effective by automatically recording the dive profile, together with manually entered event marks. Dive depth, time, and surface intervals are continuously displayed, thus allowing the diver's compression status to be determined.

P.J. Hill

Duration of project : 1981-83

Progress 1982-83 : Completed. Two prototypes have been completed and are in use in the field. Commercialisation of the instrument is proceeding with Harding Signals Ltd who are building a batch of 8 units for market evaluation purposes.

ENVIRONMENTAL ASSESSMENT AND ANALYSISENVIRONMENTAL IMPACT REPORTS / MANAGEMENT PLANS

Documents forwarded from other scientific organisations/institutions or government departments, require information and comments on proposed reclamations, etc.

P.A. Luckens

Those dealt with during 1982-83 include :

- Reports on Martha Hill Mine
- Integrating conservation with development
- Various district scheme and management plans
- Proposals for parks and reserves

FRESHWATER RESEARCH

Research includes study of the causes, effects, and methods of control of eutrophication in New Zealand's lakes and rivers. In broad terms, the research covers the mechanisms of transfer of materials, particularly plant nutrients, from land to water; the interactions of plants and their nutrients within fresh waters; the interactions of a physical, chemical, and biological nature which occur between sediments and the water in contact with them; the factors which dictate what trophic status water will have; and methodology appropriate to such pursuits. In 1975 examination of the ecological consequences of adding geothermal wastes to fresh water was added to the section's responsibilities.

71-6T Macrobenthos of Lake Ngapouri

The seasonal changes over 12 months in the chemical content of chironomid larvae and sediments are being studied.

D.J. Forsyth

Duration of project : 1971-84

Progress 1982-83 : Results were computerised. Additional analysis of some data and writing-up remain.

74-11T Groundwater Quality along the Foreshore of Lake Taupo

This study is tracing decline in nutrient concentrations associated with reticulation of sewage through the town.

M.M. Gibbs

Duration of project : 1974-84

Progress 1982-83 : A further monitoring sampling was made of groundwater along the foreshore.

74-12T The Relationship Between Nutrient Load and Trophic Status of Lakes

Information is being accumulated about nutrient loads and the condition of New Zealand lakes in order to allow an appraisal of the applicability of modelling techniques being developed overseas. The purpose is to provide an objective assessment of the usefulness of nutrient loading control in the management of eutrophication.

E. White

Duration of project : 1974-83

Progress 1982-83 : Completed. Two lectures were given and a paper published. A final manuscript from this work has been submitted.

Publications 1982-83 : White, E. 1982: Eutrophication in New Zealand lakes. In "Water in New Zealand's Future". Proc. 4th Natn. Wat. Conf., August 24-26, 1982, Auckland, New Zealand.

74-15T Limnology of Lake Rotongaio

Seasonal, chemical, floral, and faunal changes in Lake Rotongaio are being followed.

D.J. Forsyth
 M.T. Downes
 M.M. Gibbs
 L.J. Kemp
 G.W. Payne
 I.D. McCallum
 B. Don

Duration of project : 1974-83

Progress 1982-83 : Completed. Results have been written up.

Publications 1982-83 : Forsyth, D.J.; Downes, M.T.; Gibbs, M.M.; Kemp, L.; McCallum, I.; McKenzie, L.; Payne, G. (in press): Aspects of the limnology of Lake Rotongaio. N.Z. J. mar. Freshwat. Res.

75-17T The Effect of Changed Hydraulic and Nutrient Loads on Lake Rotoaira

This is a study of the limnology and nutrient loading in order to assess the effect of the changed hydrological regime introduced with the Tongariro Power Development. Comparison is to be made with data collected by MAF in 1968-70. The purpose is to assess the effect of changed water-residence time on the trophic status.

E. White
 M.T. Downes
 G.W. Payne
 D.J. Forsyth

Duration of project : 1975-84

Progress 1982-83 : No progress was made.

75-19T Population Dynamics of the Chironomid Polypedilum pavidus in Lake Rotongaio

Polypedilum pavidus is a littoral chironomid in Lake Rotongaio. Measurements have been made of population density, dry weight, caloric values of larvae, chlorophyll, and total pigment in the water column each week for one year. The relationships to a blue-green algal bloom are also being studied.

D.J. Forsyth
 I.D. McCallum

Duration of project : 1975-83

Progress 1982-83 : Completed. A paper has been submitted.

75-20T Macrobenthos and Zooplankton of Lake Rotoaira

Population changes over 12 months are being traced and compared with information obtained before the start of the Tongariro Power Development Scheme.

D.J. Forsyth
 I.D. McCallum

Duration of project : 1975-84

Progress 1982-83 : Data have been tabulated.

76-11T Limnology of Opal Lake

Physical and chemical measurements of the water column and algal and zooplankton species and numbers of macrobenthos in spring and summer have been made.

D.J. Forsyth
A.L. MacKenzie

Duration of project : 1976-82

Progress 1982-83 : Completed and a paper published.

76-12T Westland Forest Lakes

Nutrient limitation is being studied in Westland lakes.

G.W. Payne

Duration of project : 1976-83

Progress 1982-83 : Writing-up has begun.

76-13T Chemical Characteristics of Short Sediment Cores from Lakes

The depth of interaction of the nutrient-producing sediment with the water above is being assessed. This is important in building a model of nutrient recycling, especially for lake restoration plans.

A.B. Viner

Duration of project : 1976-83

Progress 1982-83 : Practical work for six lakes has been completed.

76-14T Automated Kjeldahl-N and Total Phosphorus Analytical System

A system is being developed to measure automatically Kjeldahl-N and total P in the lake water using a Technicon digester.

S.E. Pickmere

Duration of project : 1976-83

Progress 1982-83 : Preliminary write-up is completed.

77-13T Groundwater Quality of the Upper Waikato River Catchment

The quality of groundwater entering the Waikato River from selected catchments of various land uses is being investigated.

M.M. Gibbs

Duration of project : 1977-84

Progress 1982-83 : One complete sampling and gauging of all surface inputs within the catchment was completed. These data have yet to be processed.

77-14T Groundwater Phosphorus

The quantity and origin of phosphorus in cold spring waters is being determined.

M. Timperley

Duration of project : 1977-83

Progress 1982-83 : Completed. A paper has been published.

Publications 1982-83 : Timperley, M.H. 1983: Phosphorus in spring waters of the Taupo Volcanic Zone, North Island, New Zealand. Chem. Geol. 38: 287-306.

77-17T Variations in C, N, P Ratios in Phytoplankton

This is a monthly survey of particulate C, N, and P in several lakes on the central plateau. Changes in C, N, and P ratios in particulate material during bioassays are being studied.

S.E. Pickmere

G.W. Payne

Duration of project : 1977-83

Progress 1982-83 : No further work was carried out in 1983. A nutrient limitation study (82-10) incorporates particulate testing. Lake Taupo profiles await evaluation.

77-18T Transfer of $^{32}\text{PO}_4$ Between Solution and Particulate Material in Lakewater

Transfer rates of radioactive phosphate, when related to the concentration of normal phosphate in solution and phosphorus in particulate material, may be used to indicate 'intensity of biological activity' in lakewater. The purpose is to identify periods of intense biological activity and to see if this approach can be used as a bioassay procedure to identify limiting nutrients.

E. White

S.E. Pickmere

G.W. Payne

Duration of project : 1977-84

Progress 1982-83 : Occasional experiments and data manipulation have been carried out, and several manuscripts are partly completed. One paper has been published and one submitted.

Publications 1982-83 : White, E.; Payne, G.; Pickmere, S.; Pick, F.R. 1982: Factors influencing orthophosphate turnover times : a comparison of Canadian and New Zealand lakes. Can. J. Fish. aquatic Sci. 39(3) : 469-74.

Lean, D.R.S.; White, E. 1983: Chemical and radiotracer measurements of phosphorus uptake by lake plankton. Can. J. Fish. aquatic Sci. 40(2) : 147-55.

77-19T Fractionation of Soluble Phosphorus Compounds

Techniques are being developed by which the various phosphorus compounds which occur in natural water may be separated and their chemical and biological properties studied.

E. White

G.W. Payne

S.E. Pickmere

Duration of project : 1977-84

Progress 1982-83 : No experimental work was carried out. Several manuscripts are in preparation.

77-20T Sorption of Phosphate by Lake Sediments

The potential significance of sorption in the sequestering of this nutrient, and under what environmental circumstances, is being assessed in relation to the amount of man-made nutrient-input permissible. [This links with project 77-21T.]

A.B. Viner

Duration of project : 1977-83

Progress 1982-83 : Two lake sediments have been experimented with which are worth reporting on. Work by M. Timperley is largely superseding this project.

77-21T Fractionation of Sediment Phosphate of Lakes

This project is investigating the biological availability of phosphate for plant nutrition by algal bioassay, which is thought to be of more value than chemical analyses (see 77-20T).

A.B. Viner

Duration of project : 1977-83

Progress 1982-83 : Completed. A methodology was devised and a report written. Its application to various lake sediments has not been pursued.

77-22T Drift Fauna of the Mangawhero Stream

Seasonal sampling of fauna is being carried out.

D.J. Forsyth
I.D. McCallum

Duration of project : 1977-83

Progress 1982-83 : I.D. McCallum is analysing the results and writing up for publication.

77-23T Ecological Consequences of Proposed Geothermal Energy Developments in the Natural Freshwaters Near Sites of Development (Lake Rotoiti)

The purpose of this project is to estimate the sublacustrine geothermal influence on lake hydrodynamics, nutrient loading, and trophic status, and to deduce the consequences for Lake Rotoiti of any change in the geothermal input.

G.W. Coulter
R.H. Spigel
M.M. Gibbs
R.J. Vigor-Brown
M.H. Timperley
J. Davies

Duration of project : 1977-84

Progress 1982-83 : Field work and a preliminary analysis of temperature-profile data are complete. A model has been developed to predict the evolution of

stratification; the model's predictions appear to be on target.

Publications 1982-83 : Spigel, R.H.; Timperley, M.H. 1983: Geothermal influences on the limnology of Lake Rotoiti. Preliminary conclusions from the 1982 field data. Taupo Res. Lab. File Rep. 27/T/58.

78-14T Surface-water Chemistry in a Small Catchment

The importance of vegetation in the weathering of geological material and the quantification of the major ion discharge from a pumice/greywacke catchment are being investigated.

M.H. Timperley

Duration of project : 1978-83

Progress 1982-83 : There was no progress during 1982-83. Data are on computer file awaiting further analysis.

78-15T Particle Sizes of River Suspended Load and Nutrient Phosphate

Quantification of the amount of nutrients transported by rivers' suspended loads has been analysed. A pattern of phosphate-particle association has been established.

A.B. Viner

Duration of project : 1978-86

Progress 1982-83 : A report has been written.

78-16T Lake Taupo Major Ion Balance

The mechanisms controlling the major ion composition of Lake Taupo water, the magnitude of geothermal inflow (and hence likely ammonia contribution) to the lake are being studied.

M.H. Timperley
R.J. Vigor-Brown

Duration of project : 1978-83

Progress 1982-83 : A theoretical model to explain Lake Taupo water chemistry was developed and presented at the 1982 Limsoc meeting (and if possible to the Water-Rock Interaction Symposium in Japan 1983). Current work is on manuscript preparation and analysing sediment cores from Lake Taupo.

78-17T Phytoplankton Dynamics of Lakes Taupo and Waikaremoana

Seasonal succession of algal species is being studied in relation to productivity and changes in chemical and physical conditions in these two deep oligotrophic lakes.

W.F. Vincent
J. Davies
C. Howard-Williams

Duration of project : 1978-84

Progress 1982-83 : In abeyance while on leave. Data await writing up.

78-20T Mechanisms of Rapid Photosynthetic Adaptation in Natural Plankton Populations and Associated Changes in in vivo Fluorescence

This project is investigating the biophysical mechanisms by which phytoplankton adjusts photosynthetically to large-scale variations in light intensity as they are swept through the euphotic zone of a mixed water column. A primary aim of this project is to develop bioassay techniques based on in vivo fluorescence of chlorophyll.

W.F. Vincent
G.W. Payne

Duration of project : 1978-84

Progress 1982-83 : In abeyance while on leave. Data await writing up.

Publications 1982-83 : Vincent, W.F. 1983: Fluorescence properties of the freshwater phytoplankton : three classes compared. Brit. phycol. J. 18 : 5-21.

78-22T C, N, P Metabolism of Anabaena

This project relates to project 79-27. The characteristics of this economically important alga, as interpreted from field data, were to be refined under controlled laboratory conditions.

A.B. Viner
L.J. Kemp

Duration of project : 1978-83

Progress 1982-83 : Much time was spent in setting up continuous cultures. Some experiments were performed at different dilution rates and there are probably sufficient data to report upon. Since the departure of L.J. Kemp the project has ceased.

78-23T Natural ¹⁵N Abundance in Sediments

The natural abundance of ¹⁵N relative to ¹⁴N is considered to be a reflection of microbial denitrification. A comparison of lakes should show their various degrees of potentiality for denitrification.

A.B. Viner

Duration of project : 1978-83

Progress 1982-83 : Difficulties in working with the Waikato University mass-spectrometer led to termination of sampling. Existing data for four lakes are due to be reported upon.

78-25T Mercury in Aquatic Systems

The distribution of mercury through freshwater food chains in systems with different mercury exposures and different food-chain lengths is being determined.

M.H. Timperley
R.J. Vigor-Brown

Duration of project : 1978-83

Progress 1982-83 : Sampling was concentrated on the lower ends of food chains (e.g., plankton). Laboratory studies were conducted on mechanisms of mercury

binding in sediments. Experience gained is being applied to ecological problems, e.g., at Kaituna, Ngawha.

Publications 1982-83 : Timperley, M.H.; Vigor-Brown, R.J. 1982: Mercury as a possible contaminant from the nutrient pipeline of the Upper Kaituna Catchment Control Scheme. Ecol. Div. File Rep. 27/T/51.

79-24T The Role of Stream-bank Vegetation in the Long-term Removal of Nutrients from Stream Water

This work examines the uptake of nitrogen and phosphorus compounds from stream waters by aquatic vegetation and vegetated habits. The study includes aspects of stream hydrology, growth, nutrient uptake, and decomposition of vegetation, and nutrient loads in streams.

C. Howard-Williams
J. Davies
S.E. Pickmere
R.J. Vigor-Brown
M.T. Downes

Duration of project : 1979-84

Progress 1982-83 : One paper has been published and one is due to appear shortly. Work continued in monitoring the two study streams. No further major field research effort is foreseen until more data have been written up, although a possible extension of our work into a catchment currently under study by MWD is being considered.

Publications 1982-83 : Howard-Williams, C.; Davies, J.; Pickmere, S. 1982: The dynamics of growth, the effects of changing area and nitrate uptake by watercress Nasturtium officinale R.Br. in a New Zealand stream. J. appl. Ecol. 19 : 589-601.

Howard-Williams, C.; Pickmere, S.; Davies, J. 1983: Decay rates and nitrogen dynamics of decomposing watercress (Nasturtium officinale R.Br.). Hydrobiologia 99 : 207-14.

79-25T The Growth of Lagarosiphon major in Lake Taupo

This project will examine in situ growth and decomposition rates and the distribution of the plant in Lake Taupo, and will attempt to identify factors controlling distribution, possible future spread, and growth in the lake.

C. Howard-Williams
J. Davies

Duration of project : 1979-84

Progress 1982-83 : Work has progressed on data analysis and, in particular, on analysis of wave patterns and wave energies on littoral areas around Lake Taupo using a computer-assisted simulation model. Wave energies are being compared with plant distribution and biomass.

79-26T Water-quality Problems in Kinloch Marina

This project involves monitoring the water, algae, and macrophytes in the marina. Advice on water quality and removal of aquatic weeds and nuisance algae is given as needs arise.

C. Howard-Williams
J. Davies
S.E. Pickmere

Duration of project : 1979-82

Progress 1982-83 : Completed.

Publications 1982-83 : Howard-Williams, C.; Davies, J.; Pickmere, S.
1982: Water quality problems in Kinloch
Marina, Lake Taupo. Ecol. Div. File Rep.
27/T/54.

79-27T Nutrient Dynamics of Lake Rotongaio

This is a multi-technique, intensive investigation of a lake to relate many different processes into a single model, with the aim of using it as a type study against which to compare less complete lake studies. Blue-green algal and diatom growth conditions are also being compared.

A.B. Viner
L.J. Kemp

Duration of project : 1979-83

Progress 1982-83 : There is a considerable amount of data requiring evaluation. This project has expanded largely to exclude most other projects for time allocation. Two reports have been written directly from the data, and one other indirectly from the data. About four more could be written, two of which are partially done.

79-29T The Limnology of Antarctic Lakes

This project involves studies of the inland waters of the New Zealand sector of Antarctica.

W.F. Vincent

Duration of project : 1982-85

Progress 1982-83 : In abeyance while on leave. Data await writing up.

Publications 1982-83 : Vincent, W.F. 1982: Life in Antarctic lakes and rivers. Alpha 18 : 6 p.

Vincent, W.F.; Vincent, C.L. 1982: Factors controlling phytoplankton production in Lake Vanda (77° S). Can. J. Fish. aquatic Sci.
39(12) : 1602-09.

79-30T Algal Succession in Lake Okaro

Using a high-intensity sampling programme, the time scale of floristic and physiological changes of algae are being examined in a eutrophic lake.

W.F. Vincent
K.D. Law

Duration of project : 1979-84

Progress 1982-83 : In abeyance while on leave. Data await writing up.

79-32T Denitrification in Sediments and Lake Waters

The significance of denitrification as a nitrogen sink in the lakes of the central plateau is being assessed.

M.T. Downes
J.C. Priscu
J. Davies

Duration of project : 1979-84

Progress 1982-83 : (i) The denitrification potential of Lake Rotorua sediments was assessed. A wider survey is required plus an investigation of $\text{NO}_3 \rightarrow \text{NH}_4$ using ^{15}N technology.

(ii) Comparative assays of nitrogen cycling parameters in Lakes Taupo and Rotongaio were carried out.

(iii) A successful assay of water column denitrification was made.

79-33T Zooplankton of Lake Okaro

The roles of calanoid and cladoceran crustacea in the grazing of phyto- and bacterioplankton are being investigated. The population dynamics and production of the zooplankton are under study.

D.J. Forsyth
M.R. James

Duration of project : 1979-84

Progress 1982-83 : Data were analysed to obtain population dynamics and production values for the dominant crustacean, Calamoecia lucasi. Development time for cladocerans was measured and the role of grazing of crustacea on lake bacterioplankton was defined.

79-35T Investigation of Nitrification Rates in Sediments and Lake Waters

The significance of bacterial ammonia oxidation in the nitrogen cycle of central plateau lakes is being assessed.

M.J. Downes
W.F. Vincent
J. Davies

Duration of project : 1979-83

Progress 1982-83 : Field work on Lake Okaro is finished and is currently being written up.

80-17T Factors Influencing the Distribution of Aquatic Macrophytes in Lake Waikaremoana

This is a study of the distributional pattern of macrophytes and factors influencing their growth. Particular attention is being paid to

the effects of varying lake levels and optical properties on the extent of the important littoral zone in this lake.

C. Howard-Williams
J. Davies

Duration of project : 1980-84

Progress 1982-83 : Data analysis on plant phytosociology has continued with the help of Applied Maths Division. A further two field trips (March, December) were carried out; data from one have been written up.

Publications 1982-83 : Howard-Williams, C.; Downes, M.T.; Davies, J.; Law, K.D. 1982: Plant ecology of Lake Waikaremoana IV : Comparative analysis of results from a late summer expedition (22-25 March, 1982). Ecol. Div. File Rep. 27/T/52.

80-20T Total Phosphorus Analysis

A more convenient and reliable technique is being developed which is amenable to partial automation for the determination of total phosphorus in natural waters.

S.E. Pickmere
M.T. Downes

Duration of project : 1980-82

Progress 1982-83 : A semi-automated persulphate digestion method has been developed and tested over various water types, both filtered and unfiltered. Some further work is required to define the oxidising capacity when analysing more eutrophic waters.

80-21T Nutrient Analysis in Seawater

Automated chemical methods for plant micro-nutrients in seawater are being developed.

M.T. Downes
K.D. Law

Duration of project : 1980-83

Progress 1982-83 : Recent field testing of automated techniques suggests that nitrate and ammonia analyses are adequate. Phosphorus and silica analyses require further development.

80-23T Septic Tank Studies

The effectiveness of evapotranspiration beds for treating domestic septic tank effluent is being investigated.

M.H. Timperley
S.E. Pickmere

Duration of project : 1980-82

Progress 1982-83 : Completed.

80-25T Selective Withdrawal in Lakes

This is an experimental determination of withdrawal layer thickness and development of a theoretical explanation (and experimental verification) of pycnocline formation by selective withdrawal. §

R.H. Spiegel

Duration of project : 1980-84

Progress 1982-83 : A draft manuscript has been written.

80-26T Modelling of Stratification in Upper Huia Reservoir

A general reservoir model, DYRESM, is being applied to a New Zealand reservoir, to predict the evolution of thermal stratification.

R.H. Spiegel

Duration of project : 1980-83

Progress 1982-83 : Field monitoring is almost complete; the model is operational and has been updated to include recent work on selected withdrawal, topographic shading and wind mixing. Work is needed on input to the data file.

81-25T Particulate Matter in Lake Waters

This project seeks to understand the role of abiotic particulate matter in the cycle of phosphorus in lake waters.

M.H. Timperley

R.J. Vigor-Brown

Duration of project : 1981-83

Progress 1982-83 : A centrifugal procedure has been developed for separating biota from abiotic colloids. A colloid (10% Fe, 90% organic matter) has been isolated from Lake Rerewhakaaitu water.

81-26T Factors Controlling Algal Production in Lakes of the Central Volcanic Plateau

The relative influence of light, temperature, nutrient supply, and grazing on patterns of phytoplankton production is being investigated in lakes of central North Island.

W.F. Vincent

K.D. Law

R.J. Vigor-Brown

M.M. Gibbs

Duration of product : 1981-84

Progress 1982-83 : Data continued to be compiled by K.L. and R.V.-B. during the absence of W.F.V.

81-28T Boron Sensitivity of Waikato River Phytoplankton

The potential of boron to cause species alterations within the natural phytoplankton populations of the Waikato River is being investigated.

V.H. Wilkinson
K.D. Law
W.F. Vincent

Duration of project : 1981-83

Progress 1982-83 : Unialgal culture studies on the effect of boron on the growth of five diatom species have been completed. Other lab. studies have investigated a potential mechanism of boron toxicity and the synergistic growth interactions between a mixed blue-green algal and diatom population. The data require analysis and writing up.

Publications 1982-83 : Law, K.D.; Vincent, W.F. 1982: Effects of boron on blue-green algal growth. Ecol. Div. File Rep. 27/T/49.

81-29T Invertebrate Faunas Subject to Geothermal Waters

The effect on stream faunas of geothermal inputs at Ngawha, Mokai, and selected localities is being studied.

D.J. Forsyth
L.J. Kemp

Duration of project : 1981-83

Progress 1982-83 : Completed.

Publications 1982-83 : Forsyth, D.J. 1983: The effect of geothermal waters on stream invertebrates. Taupo Res. Lab. File Rep. 27/T/57.

81-30T Chemical Methods Manual

A detailed description of routine chemical analytical methods currently in use by the section is being compiled in a form suitable for use as a bench manual.

M.T. Downes
M.H. Timperley
S.E. Pickmere
R.J. Vigor-Brown
M.M. Gibbs

Duration of project : 1981-83

Progress 1982-83 : Most automated techniques have been written up. A chapter on AutoAnalyzer principles and methodology is still in preparation.

81-31T Computer Facilities Development

It is intended to install, maintain, and develop computer facilities at the Taupo Research Laboratory for general computing and data-logging from laboratory instruments.

M.H. Timperley
G.W. Payne

Duration of project : 1981-83

Progress 1982-83 : There has been continued improvement and expansion of the software base. The first steps have been taken for a link to the DSIR network.

81-32T Nitrogen Balance for an Exotic Forest Catchment

This project seeks to quantify and identify the origin of nitrogenous compounds entering Lake Taupo from a pumice catchment under exotic forestry.

S.E. Pickmere
M.H. Timperley
R.J. Vigor-Brown

Duration of project : 1981-83

Progress 1982-83 : Field work on nitrogen mass balance has been completed. The data are now being analysed. Laboratory work has started on the chemistry of the atmospheric nitrogen input.

81-33T Optical Properties of New Zealand Lake Waters

The aim is to understand factors affecting the quality and quantity of both available radiation (as it affects biological processes under-water) and perceived colour from above.

C. Howard-Williams
W.F. Vincent
J. Davies
J.C. Priscu

Duration of project : 1981-84

Progress 1982-83 : Following an initial survey of some 40 lakes, two manuscripts have been written up. An analysis of factors affecting extinction coefficients was undertaken in conjunction with E. White's project, 82-10.

Publications 1982-83 : Howard-Williams, C.; Spigel, R. 1983: Limnological characteristics of the Tiniroro and Putere lakes. Taupo Res. Lab. File Rep. 27/T/59.

82-9T Ecology and Life History of the Freshwater Mussel Hyridella menziesi in Tapuaeharuru Bay, Lake Taupo

This project seeks to determine :

- (a) Factors affecting the distribution and standing crop of Hyridella in Tapuaeharuru Bay;
- (b) The potential for the stripping of particulate nitrogen and phosphorus in the littoral zone;
- (c) The life history of Hyridella in Tapuaeharuru Bay.

M.R. James
M.T. Downes

Duration of project : 1982-84

Progress 1982-83 : Three of the six sites have been surveyed with estimates of density and standing crop having been made. Initial estimates of age structure, growth rates, and length/weight relationships have been made for one site.

82-10T Nutrient Limitation in Central Volcanic Plateau Lakes

The nutrients limiting phytoplankton growth at four limnologically critical times of year in 12 central volcanic plateau lakes, are being determined using short-term bioassays.

E. White
S.E. Pickmere
G.W. Payne
K.D. Law
J.C. Priscu
V.H. Wilkinson

Duration of project : 1982-84

Progress 1982-83 : Field work is completed. Data manipulation is reasonably advanced.

82-11T An Evaluation of Chlorophyll a Estimation Methodologies

The original objective was to review and appraise the methodology of chlorophyll a determination used at the Taupo Research Laboratory. This objective was subsequently expanded to include an experimental assessment of certain critical steps in the method.

V.H. Wilkinson

Duration of project : 1982-83

Progress 1982-83 : The experimental work is complete and a report will be produced this year.

82-13T Topographic Shading of Solar Radiation

A methodology is being developed for calculating correction factors to be applied to daily totals for solar radiation measured at a site without obstructions on the horizon, when these measurements are to be used for a site with shading effects.

R.H. Spigel

In association with : J. Mason
Department of Civil Engineering
University of Canterbury, Christchurch

Duration of project : 1982-84

Progress 1982-83 : A project report by postgraduate student John Mason has been completed.

ANTARCTIC PROJECTS

75-2 Ross Sea - Balleny Islands Echinoderm Faunas

D.G. McKnight

Duration of project : 1975-82

Progress 1982-83 : No progress while collections were inaccessible.
This project has now been terminated in favour
of other work.

78-34 Ross Ice Shelf Under-ice Copepods

A unique collection of scavenging copepods was made available for study. They came from beneath the Ross Ice Shelf about 500 km from the open sea. These proved to be rare or undescribed species.

J.M. Bradford

In association with : Prof. J.B.J. Wells
Zoology Department
Victoria University of Wellington

Duration of project : 1978-82

Progress 1982-83 : Completed.

Publications 1982-83 : Bradford, J.M.; Wells, J.B.J. 1983: New calanoid and harpacticoid copepods from beneath the Ross Ice Shelf, Antarctica. Polar Biol. 2 : 1-15.

79-29T The Limnology of Antarctic Lakes

This project involves studies of the inland waters of the New Zealand sector of Antarctica.

W.F. Vincent

Duration of project : 1982-85

Progress 1982-83 : In abeyance while on leave. Data await writing up.

Publications 1982-83 : Vincent, W.F. 1982: Life in Antarctic lakes and rivers. Alpha 18 : 6 p.

Vincent, W.F.; Vincent, C.L. 1982: Factors controlling phytoplankton production in Lake Vanda (77° S). Can. J. Fish. aquatic Sci. 39(12) : 1602-09.

80-19 Antarctic Studies on Phytoplankton

The populations and dynamic changes in phytoplankton of the Ross Sea and particularly McMurdo Sound are being investigated to assess the survival of phytoplankton during formation and melt of the seasonal ice.

D.A. Burns

Duration of project : 1980-8?

Progress 1982-83 : In abeyance during secondment to The Treasury.

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